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May 10, 2012

FEMA LOMC Clearinghouse
7390 Coca Cola Drive, Suite 204
Hanover MD 21076

BELL BEND NUCLEAR POWER PLANT
DATA TO SUPPORT THE
WALKER RUN CLOMR REQUEST
BNP-2012-070 Docket No. 52-039

Reference: 1) Case No.: 12-03-0820R
Walker Run
Community: Township of Salem, PA
Community No.: 420625

We have received the request for additional data (February 27, 2012) required to support the Conditional Letter of Map Revision (CLOMR) review for the above-referenced case. This CLOMR request is in support of the proposed Bell Bend Nuclear Power Plant in Salem Township, Luzerne County, PA. Listed below are the comments received, followed by our responses to those comments.

1. The submitted plans, entitled "Drawing No. B1-S1," and "Drawing No. B1-S2," prepared by Pennoni Associates, Inc., dated April 19, 2011, appear to be a design plan for proposed Bridge No. 1. It is stated in the submission response letter (for previous CLOMR request 11-03-1940R) dated January 20, 2012, that this bridge is not in the flood study. Please clarify why plans were submitted again. Since this bridge is not in the submitted hydraulic models, we are not intending to review the plans.

The drawings for Bridge #1 were inadvertently included with the previous submittal. These have been removed from this submittal. The Bridge Drawings have been added to the Flood Study Report as Appendix K.

2. Our review of the submitted design plans for the proposed bridges over Walker Run and Unnamed Tributary to Walker Run revealed that they are not printed to the appropriate scale. Please submit all drawings to scale.

The bridge drawings were inadvertently copied at the wrong scale. Full size plan sheets have been included with this submittal.

3. Our review of the existing and proposed conditions hydraulic models for Walker Run and Unnamed Tributary to Walker Run revealed the following issues. Please revise the models

as necessary, and submit digital copies of the input and output files.

a. The flow at Cross-Section 5250, in the existing and proposed conditions hydraulic models, and the flow at Cross-Sections 875 and 10, in the proposed conditions hydraulic model, overtops the roadway for Walker Run. In addition, the same scenario occurs at Cross-Section 4528, in the existing and proposed conditions hydraulic model for Unnamed Tributary to Walker Run. In high flow situations, the pressure or weir flow method should be selected as the bridge modeling approach. Please select pressure or weir flow method to model these structures that overtop the roadway. Also, there should be no ineffective flow at cross sections immediately downstream of bridges that overtop, as water is no longer constrained to flow through the bridges. Please revise the ineffective flow for all those cross-sections that are immediately downstream of structures subject to overtopping.

The modeling approach has been changed to "Pressure and/or Weir" for the structures at station 5250 and 3914 on Walker Run and at station 4528 on the tributary. This modeling approach was already applied to the structures at stations 875 and -10 on Walker Run. In addition, the ineffective flow areas downstream of these structures have been eliminated.

b. The 1-percent-annual-chance (base) Flood Elevations (BFEs) are higher than the end points of Cross-Sections 2669 and 2570 in the submitted existing conditions HEC-RAS hydraulic computer models along Walker Creek. The use of vertically extended cross-sections might both overestimate the BFEs and underestimate the width of the base floodplain. Please revise the cross-section geometry coordinates so that the end points of all cross-sections are equal to or extend higher than the corresponding BFEs.

Existing conditions Cross Sections 2669 and 2570 have been extended so that BFEs are not higher than the end points of the cross sections.

c. The typical contraction and expansion loss coefficients are equal to 0.3 and 0.5, respectively, at Bridge and Culvert Sections 2, 3, and 4 (as referenced in the HEC-RAS Hydraulic Reference Manual) and are equal to 0.1 and 0.3, respectively, at all other sections. Please revise the submitted hydraulic model so that the contraction and expansion loss coefficients are equal to 0.3 and 0.5, respectively, at Cross-Sections 147 and 4043 in the existing and proposed conditions model for Walker Run and Cross-Sections 3162 and 4750 for the proposed conditions model for Unnamed Tributary to Walker Run.

The contraction and expansion loss coefficients for cross sections 147 and 4043 on Walker Run have been set to 0.3 and 0.5, respectively, as suggested. The contraction and expansion loss coefficients for station 3162 on the tributary were not changed, as the downstream bridge spans the entire floodplain. Also the contraction and expansion loss coefficients for station 4750 on the tributary were not changed, as this cross section is across a backwater pond condition, as is the next downstream section immediately upstream of the structure. The increased coefficients are not appropriate in either of these cases.

4. Our review of the submitted work map, entitled "Floodplain Map Flood Study – Walker Run," prepared by Land Studies and last revised date December 15, 2011, revealed the following issues. Please submit a revised topographic work map, certified by a registered Professional Engineer, that shows all applicable items listed in Section C of Application/Certification Form 2, entitled "Riverine Hydrology and Hydraulics Form," including the following information:

a. FEMA effective study cross-sections are crossing with other added cross-sections at

several locations within the base floodplain for Walker Run. Please re-orient the cross-sections such that the cross-sections do not cross each other within the base floodplain boundary.

Based on subsequent discussions with the reviewer, all but four of the cross sections from the current effective model have been removed from the existing and proposed conditions models. The four sections that remain (BHJ, BHN, BHT, and BIA), have been realigned, if necessary, and the geometry has been adjusted based on the existing topography.

b. Some of the proposed structures and roadways in the revision area are not overtopped by the base flood elevations; therefore, the proposed floodplain boundary limits should be shown as being contained within the structures at these locations rather than flowing over them. These structures should be shown outside the proposed floodplain limits. Please trim the floodplain and floodway delineations, just upstream and downstream of these structures, such that the delineations will appear to be contained within the structures.

The floodplain lines have been revised so that they do not extend over bridges that are not overtopped by the base flood.

c. Please ensure that top width of the base floodplain computed in the revised model is delineated correctly in the revised work map.

The top width of the base floodplain had been checked and is now delineated correctly on the work map.

5. To aid in accuracy, please continue to provide digital Computer-Aided Design (CAD) or Geographic Information System (GIS) data along with the hardcopy topographic work map submittal. Please ensure the digital data are spatially referenced, and cite what projection (coordinate system, example: UTM/State Plane) was used.

Updated CAD files are provided on the enclosed DVD. The drawing is referenced to the UTM/ State Plane coordinate system.

6. Our review of the submitted annotated copies of the effective Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) revealed that they are not printed to the correct scale. Also, the downstream limit floodplain boundary tie-in is not shown properly as there is an obvious disconnect. Please submit revised FIRM and FBFM panels to show the revised delineations and how they tie-in to the effective delineations at the downstream end of the revised reach, as well as ensure the correct scale is shown on the maps. All boundary lines and the stream centerline must be well defined and labeled and must match those shown on the submitted work map. The annotated FIRM and FBFM must also show the title block of the effective FIRM and FBFM as well as the scale of the submitted annotated FIRM and FBFM.

The FIRM and FBFM were inadvertently copied at the wrong scale. Maps have been printed to the correct size for this submittal.

In addition, there was an alignment error on the previously submitted annotated FIRM and FBFM which resulted in the noted disconnect at the tie-ins. This has been corrected and the downstream tie-ins are now shown properly.

Please do not hesitate to contact Brad Wise of my staff [610-774-6508 or bawise@pplweb.com] directly should you have any questions regarding this submittal.

Respectfully,

Michael J. Caverly

MJC/kw

Enclosures: 1) Walker Run Flood Study, Rev.4
2) Data DVD (FEMA Only)

cc: (w/ Enclosures on Disc)

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Enclosure 1

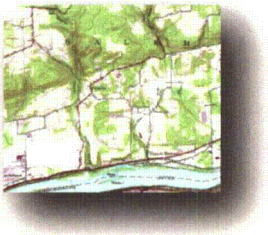
Walker Run Flood Study, Rev.4

Enclosure 2

Data DVD (FEMA Only)

Bell Bend Nuclear Power Plant
Flood Study Report
Walker Run

Salem Township, Luzerne County, PA
LSI Doc. No. FS-WR-001

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Rev 4, April 27, 2012

Walker Run Flood Study Report

PPL Bell Bend Nuclear Power Plant
Salem Township, Luzerne County, PA
Rev 4, April 27, 2012

Table of Contents

A RECORD OF REVISIONS

Revision	Date	Pages/Sections Changed	Brief Description
0	January 2011	All	Initial release
1	August 2011	All	Text edits - No change to flood models
2	September 2011	All	Addressed comments received from FEMA dated July 1, 2011
2	September 2011	Appendix I	Peak discharges used have been calculated using Win TR-20.
2	September 2011	Appendix B Sheet 2	Enlargements of the existing structures with field surveyed spot elevations and descriptions have been provided.
2	September 2011	Appendix H	Bridge geometry data for all proposed bridges has been updated to be consistent with the bridge drawings.
2	September 2011	Appendix E, Appendix F	Two Duplicate Effective Models are now provided. Duplicate Effective Model A was run in HEC-2 to recreate the original model in the original software. Duplicate Effective Model B was run in HEC-RAS using input that was identical, to the greatest extent possible, to the effective model.
2	September 2011	Appendix H	The bridge modeling method has now been set to use the highest energy answer between the energy and momentum methods.
2	September 2011	Appendix G, Appendix H	The Existing Conditions (Corrected Effective) Model and the Proposed Conditions Model have been run using a subcritical flow regime.
2	September 2011	Appendix G, Appendix H	The encroachment analysis has been revised to eliminate surcharges greater than 1.0 ft. All negative surcharges at modeled cross sections have also been eliminated.
2	September 2011	Appendix F, Appendix G, Appendix H	The downstream boundary condition known water surface elevations have now been adjusted to the NAVD 88 vertical datum (NGVD 29, -0.75ft.) for all HEC-RAS models.
2	September 2011	Appendix G, Appendix H	The Existing and Proposed Condition Models now include an evaluation of the 10-year, 50-year, and 500-year floods.
2	September 2011	Appendix G, Appendix H	The junction at the confluence of the Unnamed Tributary with Walker Run has been removed. Normal depth has been used as the downstream boundary condition for the tributary. The backwater of Walker Run has been reflected in the delineation on the Floodplain Map.
2	September 2011	Appendix G, Appendix H	All Levees have been removed from the Existing and Proposed Models.
2	September 2011	Appendix G, Appendix H	Interpolated cross sections have been removed. Four additional cross sections have been added to better define the geometry of the Unnamed Tributary.
2	September 2011	Appendix B	The floodway and 0.2-percent-annual-chance flood delineations have been added to the Floodplain Map in Appendix B.
2	September 2011	Appendix B	Base Flood, Floodway and 0.2-percent- annual-chance flood delineations from the currently effective Flood Insurance Rate Maps have been overlaid on the Floodplain Map in Appendix B.

2	September 2011	Appendix B	Tie-ins from the effective flood hazard boundaries to the proposed delineations have been provided at the upstream and downstream ends of the study reach.
3	December 2011	Section 2, Appendix I	Remove Walker Run from TR-20 analysis (Only model Tributary)
3	December 2011	Appendix B	Additional details added to existing structure enlargements on Sheet 2 of the plan set
3	December 2011	Sections 2.2, 2.3, Appendix E, F	Add 10-yr, 50-yr, and 500-yr profiles to Duplicate Effective Models
3	December 2011	Appendix G, H	Adjust bridge modeling approach
3	December 2011	Appendix G, H	Revise floodway encroachment stations
3	December 2011	Section 3, Appendix D, F, G, H	Correct Datum Conversion to -0.71 ft.
3	December 2011	Appendix G, H	Adjust Expansion and Contraction Coefficients
3	December 2011	Appendix G, H	Set entrance loss coefficient to 0.5 for culvert at station 4528 of Tributary #1
3	December 2011	Appendix G, H	Revise top of ineffective flow areas at existing bridges
3	December 2011	Appendix B	Update Floodplain map per other changes and add existing contour labels
3	December 2011	Appendix C	Provide more detailed annotated FIRM and FBFM
3	December 2011	Appendix G, H	Provide additional cross sections in vicinity of bridges
4	April 2012	Appendix K	Add Bridge Plans to Report
4	April 2012	Appendix G, H	Adjust Bridge Modeling Approach
4	April 2012	Appendix G, H	Adjust Expansion and Contraction Coefficients
4	April 2012	Sections 3.4, 3.5, 4 Appendix G, H	Remove Current Effective cross sections and realign selected cross sections
4	April 2012	Appendix B	Revise Floodplain and Floodway Lines

1 Introduction

PPL is proposing a new facility, the Bell Bend Nuclear Power Plant (BBNPP), on a site near Berwick, PA. The site is located in Salem Township, Luzerne County, northeast of Berwick and north of US Route 11. An existing nuclear power plant, Susquehanna Steam Electric Station (SSES), lies to the east of the proposed facility. The proposed site is primarily forested, with areas of field, meadow, and wetlands. Walker Run, which flows into the Susquehanna River at Beach Haven, PA, runs along the western edge of the proposed site and will be restored as part of the stream and wetland mitigation plan for the proposed nuclear facility. The Federal Emergency Management Agency (FEMA) conducted a flood study on Walker Run that was used as a basis for this hydraulic analysis. An unnamed tributary (Tributary #1) flows into Walker Run from the northeast and will also be impacted by several new bridges associated with the proposed facility.

The objectives of this study are to update the Current Effective Flood Insurance Study (FIS) prepared by FEMA in 1977 based on more detailed topographic information and to determine the hydraulic effects of the proposed project on Walker Run and Tributary #1. This report presents the Existing Conditions Model (Corrected Effective Model) and Proposed Conditions Model and compares those results to the Current Effective and Duplicate Effective Models.

1.1 Model Inputs

The following inputs were used in this study:

- Bell Bend Nuclear Power Plant Stream and Wetland Mitigation Design Report, Walker Run Site, 2010, LandStudies, Inc.
- Conceptual Bridge Type Studies for Bell Bend Nuclear Power Plant, Salem Township, Luzerne County, PA, April 19, 2011, Pennoni Associates, Inc.
- Flood Insurance Study, Township of Salem, Pennsylvania, Luzerne County, 1979, FEMA Federal Insurance Administration
- FEMA FIS HEC-2 input data was acquired from the FEMA Engineering Library in the form of scans of output files.
- HEC-RAS River Analysis System Hydraulic Reference Manual, Version 4.0, March 2008, US Army Corps of Engineers Hydraulic Engineering Center

- Precipitation Frequency Data Server, National Oceanic and Atmospheric Administration (NOAA) National Weather Service Hydrometeorological Designs Studies Center, Website http://hdsc.nws.noaa.gov/hdsc/pfds/
- Probable Maximum Flood (PMF) Event Study, 2008, Paul C. Rizzo Associates, Inc.
- Soil Map 2, Penn State University College of Agricultural Sciences Cooperative Extension Geospatial Technology Program, Website www.soilmap.psu.edu
- Detailed existing cross sections and structures on Walker Run and Tributary #1 were based on data collected by LandStudies, Inc between 6/2/2009 and 3/11/2010.
- One (1) foot topographic mapping produced by Peters Consultants, Inc. in November 2007, January 2008, and April 2010.
- Proposed contours, walls and bridges, as provided by Pennoni and as included in the Joint Permit Drawings for BBNPP dated June 15, 2011.
- Vertical Datum conversion from NGVD29 to NAVD88 provided by National Geodetic Survey VERTCON process based on Latitude/ Longitude of site.

2 Hydrology

The Walker Run watershed was evaluated in a Probable Maximum Flood (PMF) Event Study in 2008 by Paul C. Rizzo Associates, Inc. (Rizzo) for the Bell Bend Nuclear Power Plant project. Rizzo divided the watershed into three Sub Basins, based on watershed delineations on the United States Geological Survey (USGS) Berwick Quadrangle base map (Appendix A). The drainage area for Sub Basin A2 is the most upstream drainage area of Walker Run and measures 2.43 square miles. Tributary #1's drainage area is Sub Basin A3, measuring 0.68 square miles. The downstream drainage area to Walker Run, Sub basin A1, measures 0.98 square miles. Land use in the watershed is primarily woods, with meadow and some urban. LandStudies identified the land cover types and acreages for each sub basin.

Soils information and geology of the site were determined from the Rizzo report, then verified using Penn State University's online soil map tool (www.soilmap.psu.edu). Several soils exist in the Walker Run watershed, including Chenango, Oquaga & Lordstown, and Wyoming, producing a mixture primarily of hydrologic soil groups "A" and "C". A soils map is included in Appendix A. Four distinct geologic formations exist within the Walker Run watershed, including the Hamilton Group, Trimmers Rock Formation, Irish Valley Member, and Sherman Creek Member. The underlying geology of the headwaters upstream of the project site consists of east to west trending bands of the upper Devonian-age Sherman Creek and Irish Valley Members. The Sherman Creek Member is composed of alternating grayish-red siltstone and claystone as well as minor intervals of gray sandstone. The Irish Valley Member consists of nonmarine, gray and grayish red sandstone and grayish-red claystone interbedded with minor, thin light-olive-gray marine siltstone. The underlying geology of the upstream portion of the project site consists of an east to west trending band of the upper Devonian-age Trimmers Rock Formation, which is composed of olive-gray siltstone and shale.

The underlying geology of the downstream portion of the project site consists of an east to west trending band of the lower and middle Devonian-age Hamilton Group. The Hamilton Group is made up of two formations: the Mahantango Formation and the Marcellus Formation. The Mahantango Formation is composed of gray, brown and olive shale and siltstone while the Marcellus Formation is composed of black, carbonaceous shale (Appendix A).

Hydrologic analyses of the contributing drainage areas to Walker Run and Tributary #1 were performed to confirm existing peak discharges for the combined drainage area and Walker Run's drainage area, which were provided in the FEMA FIS, and to determine the existing peak discharge for Tributary #1 (not provided in the FEMA FIS). The 100-year peak discharge used in the FEMA FIS for the total watershed (combined drainage area) is 1860 cfs and for Subbasin A2 (Walker Run watershed) is 1640 cfs.

Win TR-20 software was used to model the Tributary #1 watershed area, as delineated by Rizzo. Land cover and soils information, as discussed above, were used to select appropriate Curve Numbers. Time of concentration paths were delineated on the USGS watershed maps and Tc values were calculated based on TR-55 procedures. Twenty-four hour rainfall depths of 2.89 in., 4.20 in., 6.08 in., 7.16 in., and 10.51in. (for the 2, 10, 50, 100, and 500-year storm events, respectively, per National Oceanic and Atmospheric Administration (NOAA) Precipitation Frequency Data Server) were used. With these inputs, the Win TR-20 model returned 100-year peak discharge rate of 300 cfs for the tributary. Input data and Win TR-20 output is provided in Appendix I.

3 Hydraulics

3.1 General Description

The US Army Corps of Engineers Hydrologic Engineering Centers River Analysis System (HEC-RAS) Version 4.1.0 software was used for the hydraulic analysis. HEC-RAS is intended for calculating water-surface profiles for steady or unsteady flow in natural or man-made channels. The computational procedure is based on the solution of the one-dimensional energy equation with energy loss due to friction computed using Manning's equation. The computational procedure is generally known as the Standard Step Method and can be used for subcritical as well as supercritical flow conditions.

For this project, the water-surface profile for steady, subcritical flow was calculated. The effects of various structures in the floodplain, notably the four existing bridges, existing culvert crossing and proposed bridge on Walker Run, as well as the two existing culvert crossings and four proposed bridges on Tributary #1 were also considered in the computations.

The Current Effective Model was prepared in the NGVD 29 vertical datum. Because all of the updated topographic data is in the NAVD 88 vertical datum, all HEC-RAS geometry data is also in NAVD 88. All geometry data copied from the current effective model was converted to

NAVD 88 with a correction factor of -0.71 ft, based on the National Geodetic Survey VERTCON process and the latitude and longitude of the site. All mapping is also in the NAVD 88 datum. Datum conversion documentation is provided in Appendix D.

3.2 Duplicate Effective Model A (HEC-2)

The original FEMA FIS HEC-2 input data was acquired from the FEMA Engineering Library in the form of scans of output files. A new HEC-2input file was created by copying the printout to the greatest extent possible, although some of the data was not legible due to the quality of the scan. The duplicate effective model includes from cross section BHJ to the upstream limit of the Current Effective Model. The HEC-2 input file was then run in HEC-2, as required by FEMA to create a "Duplicate Effective Model." The intent of this model was to recreate the original study, with the original software, on our equipment. Because Cross Section BHJ was the downstream limit of Duplicate Effective Model A, downstream boundary conditions at this section sere set to match the modeled water surface elevations from the original FIS at this cross section for each profile. The HEC-2 input data and output text files for Duplicate Effective Model A are located in Appendix E.

3.3 Duplicate Effective Model B (HEC-RAS)

The Current Effective input data was entered into HEC-RAS to develop a "control" model for comparison with the more detailed existing and proposed models to be discussed later. The model includes HEC-2 cross-sections extending from Station 51+98 (FEMA FIS XS "BIA"; HEC-2 cross section 65.0) to Station -2+55 (FEMA FIS XS "BHJ"; HEC-2 cross section 44.0). The FEMA FIS model includes the bridge data original to the HEC-2 model. All elevation data was adjusted to the NAVD 88 vertical datum for entry into HEC-RAS. The 100-year peak flows used in the FEMA FIS were applied to the model. The 100-year water surface elevation of 652.58 ft, as listed in the FIS at cross section "BHJ" and adjusted to NAVD 88, was used as the downstream boundary condition. A mixed flow regime was selected, though the flow remained in subcritical flow for the majority of the model, in keeping with the original HEC-2 model. HEC-RAS data for Duplicate Effective Model B is provided in Appendix F.

3.4 Existing Conditions Model (Corrected Effective Model)

Detailed existing cross sections of Walker Run and Tributary #1 were surveyed by LandStudies, Inc. and supplemented with one (1) foot existing contours produced by Peters Consultants, Inc. Cross sections were inserted into the Duplicate Effective HEC-RAS model to create an Existing Conditions Model (also the Corrected effective Model). Existing cross sections extend from Station 58+62 (upstream of FEMA FIS XS "BIA") to the downstream

limit of the "control" model, Station -2+55 (FEMA FIS XS "BHJ"). Due to conflicts in both horizontal alignment and cross section geometry, all but four of the cross sections from the current effective model were removed from the study. The original cross sections that remain (BIA, BHT, BHN, and BHJ) were realigned horizontally and cross section geometry was modified as appropriate based on the existing topography.

Cross sections for Tributary #1 begin at the confluence of Walker Run and extend to Tributary Station 44+00, just south of Beach Grove Road. Manning's 'n' values for the surveyed existing cross sections were kept consistent with FEMA FIS Manning's 'n' values, when possible. Manning's 'n' values for tributary #1 were chosen from the HEC-RAS Hydraulic Reference Manual based on existing conditions. Photographs illustrating selected 'n' values are provided in the Appendix J.

Four bridges and one farm road culvert cross Walker Run within the studied section, while two culverts cross Tributary #1. All crossings are characterized within the existing conditions model.

The 100-year peak flows from FEMA FIS of 1860 cfs for the total watershed and 1640 cfs for the Walker Run watershed were used in the HEC-RAS existing model, as well as the calculated flow of 300 cfs for the Tributary #1 watershed. For the Walker Run downstream boundary condition, the 100-year water surface elevation of 652.58 ft was used, as in Duplicate Effective Model B. Tributary #1 was not joined to Walker run with a junction because the peak discharges are not coincident. Instead, the downstream boundary condition was set to normal depth based on a slope of 0.0015 ft/ ft. A subcritical flow regime was considered in the HEC-RAS analysis.

An encroachment analysis was also included in the Existing Conditions Model to establish the Floodway based on the more accurate geometry data used in this study. The floodway was determined by first using the automated encroachment analysis within HEC-RAS to raise the level of water surface elevation one (1) foot (Method 4). After an initial run using the automated method, encroachment stations were fine-tuned manually to achieve a consistent increase in the water surface elevation of as close to one (1) foot as possible. The Existing Conditions data is located in Appendix G).

3.5 Proposed Conditions Model

The proposed condition involves lowering the floodplain and bankfull elevations of Walker Run, as well as constructing a stable plan and profile to reduce erosive shear stresses on the banks during high flows. Wetlands will border the channel throughout the floodplain and native, wet-tolerant herbaceous and woody vegetation will be installed throughout the project site. The proposed grading, primarily from the mitigation plan by LandStudies, Inc. and supplemented with proposed contours, walls and bridges, as provided by Pennoni and as

included in the Joint Permit Drawings for BBNPP dated October 28, 2011, was used to generate cross-sections and profiles for the proposed condition geometry data. Tributary #1 has very minor grading changes affecting the floodplain.

Of the four bridges crossing Walker Run in existing conditions, three will remain and one will be replaced with a larger structure to span the 100-year floodplain. The Beach Grove Road Bridge at the upstream end of the project will remain, Market Street Bridge which divides the restoration project will remain, and the lower Market Street Bridge at the downstream limit of the study will remain. The small farm road crossing bridge through the lower restoration will be replaced with a larger bridge to span the 100-year floodplain. The culvert crossing downstream of the Tributary #1 confluence with Walker Run will remain. Manning's 'n' values were increased slightly from existing condition values through the restored reach to reflect the proposed vegetation of heavy brush and understory in a forested wetland environment.

Tributary #1 will have four (4) proposed bridges spanning its 100-year floodplain. The existing culvert crossing at Station 12+81 will be removed and replaced with a bridge to span the floodplain. The other culvert crossing upstream at Station 45+28 will remain. The three additional proposed bridges include a pipe bridge near Trib cross section 16+58, a road and pipe bridge near Trib cross section 28+34 and a railroad bridge near Trib cross section 33+56.

The same flow information and boundary conditions used in the existing conditions model were used in proposed conditions (Q_{100} = 1640 cfs for Walker Run, Q_{100} = 300 cfs for the Tributary #1 watershed, and Q_{100} = 1860 cfs for total watershed with downstream $WSEL_{100}$ = 652.58 ft). A subcritical flow regime was considered in the HEC-RAS analysis.

An encroachment analysis was used to establish a revised floodway through the project reach in the proposed conditions model due to the extent of change in the channel plan-form. The floodway was determined by first using the automated encroachment analysis within HEC-RAS to raise the level of water surface elevation one (1) foot (Method 4). After an initial run using the automated method, encroachment stations were fine-tuned manually to achieve a consistent increase in the water surface elevation of as close to one (1) foot as possible.

Proposed HEC-RAS data can be found in Appendix H.

4 Results and Conclusions

A summary of 100-year flood elevations and velocities for all of the above models is provided in Appendix D. Duplicate Effective Model A successfully duplicates the flood elevations reported in the current FIS to a reasonable degree of accuracy. Minor deviations of up to 0.30 ft are likely the result of incorrect translation of illegible data on the original HEC-2 printouts. Duplicate Effective Model B also returns values generally similar to Duplicate

effective Model A although there are a few significant discrepancies of up to 1.21 ft that are likely a result of slightly different modeling routines in HEC-2 and HEC-RAS.

The Corrected Effective Model has substantial deviation from the Duplicate Effective Model B, differing by more than one foot at Cross Section BHN. This is expected, due to the significant differences in the geometry files. The existing conditions model contains more detail of the studied site due to the additional existing cross-sections. Also, geometric variation can be attributed to the amount of degradation that has occurred in Walker Run since 1977 when the FEMA FIS HEC-2 data was developed. Finally, the effective model does not include all of the structures on Walker Run. These structures, which are included in the Existing Conditions Model, are the cause for the greatest discrepancies between the two models.

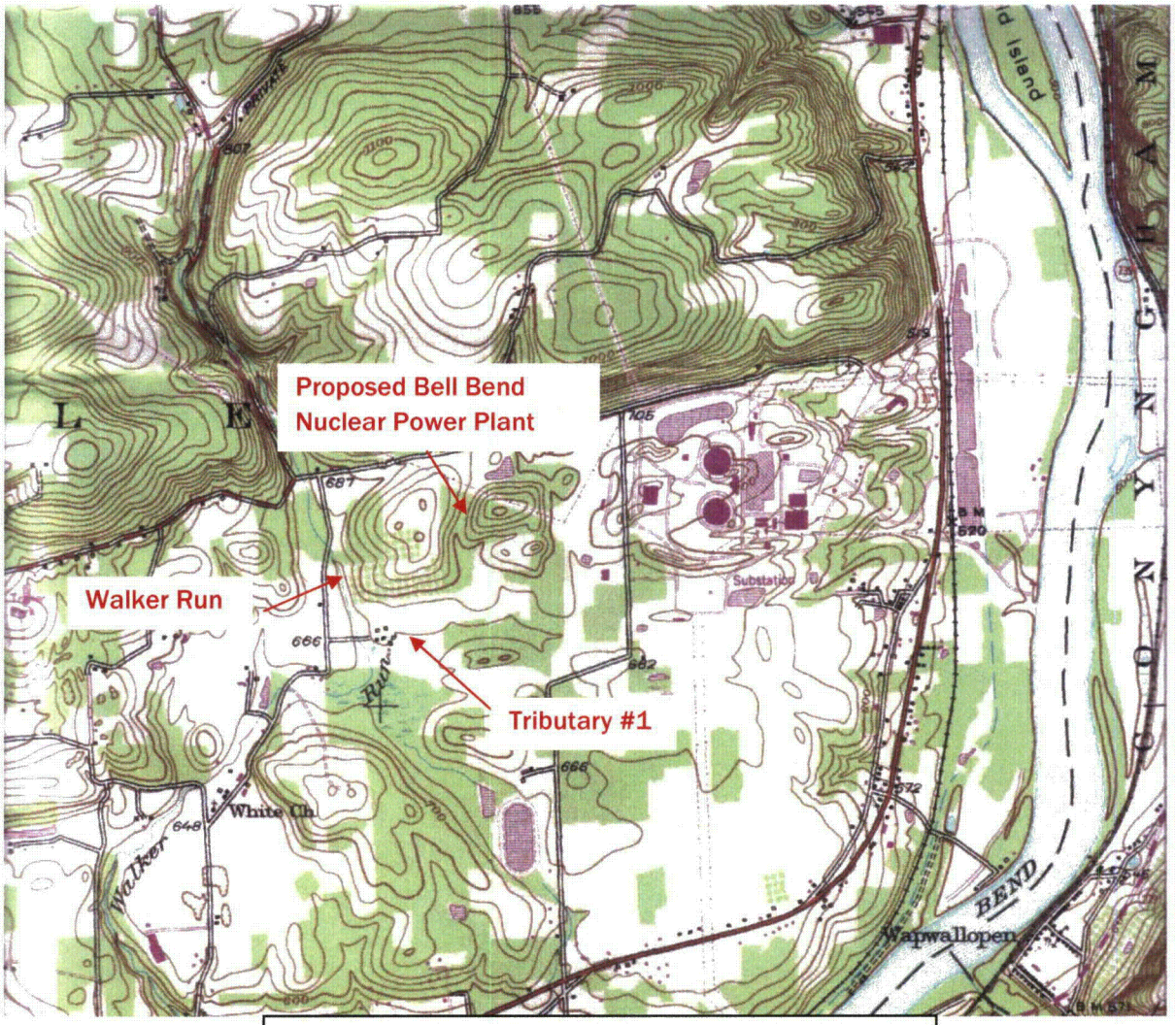
The existing conditions model was then compared to the proposed conditions model. In the restored channel and floodplain section of Walker Run, the proposed conditions water surface elevations are lower than the existing conditions water surface elevations by as much as 2.35 ft. The additional storage provided in the proposed cross-section lowers the water surface elevations for the 100-year storm event substantially. In areas downstream of the Walker Run restoration, the water surface elevations for proposed and existing conditions are equal. Since the proposed water surface elevations are equal to or lower than the existing water surface elevations along Walker Run, it can be concluded that the proposed BBNPP and associated mitigation for Walker Run have no negative hydraulic effect on Walker Run or its floodplain.

Along Tributary #1, proposed conditions water surface elevations are equal to existing conditions water surface elevations at most cross-sections. The removal of the existing culvert and installation of the four bridges between cross sections 12+81 and 33+56 changes the hydraulics of this reach such that water surface elevations fluctuate above and below the existing conditions. The proposed bridges span the 100-year floodplain, but there are piers that affect the floodplain hydraulics. The maximum increase in water surface in the proposed condition is 0.62 ft at Station 13+28, while the maximum reduction in water surface elevation is 0.23 ft at Station 33+56. All water surface elevation discrepancies between the existing and proposed conditions models on the unstudied Tributary #1 are less than one (1) foot and all increases are contained within the PPL property.

A new floodway was delineated due to the relocation of Walker Run in the proposed restoration plans. The floodway was assessed using the encroachment analysis in HEC-RAS with a target water surface elevation increase of one (1.0) foot and plotted with the existing and proposed 100-year storm event floodplain. The plot of the proposed floodway can be found on the Proposed 100 Year Floodplain Map in Appendix B.

Appendix A:
Maps

- Location Map
- Soils Map
- Geology Map
- Walker Run Watershed Map



Source: Berwick, PA USGS 7.5-minute topographic quadrangle

Location	Scale
	1" = 2000'

Project Location Map

BBNPP Proposed Site near Walker Run and Tributary #1

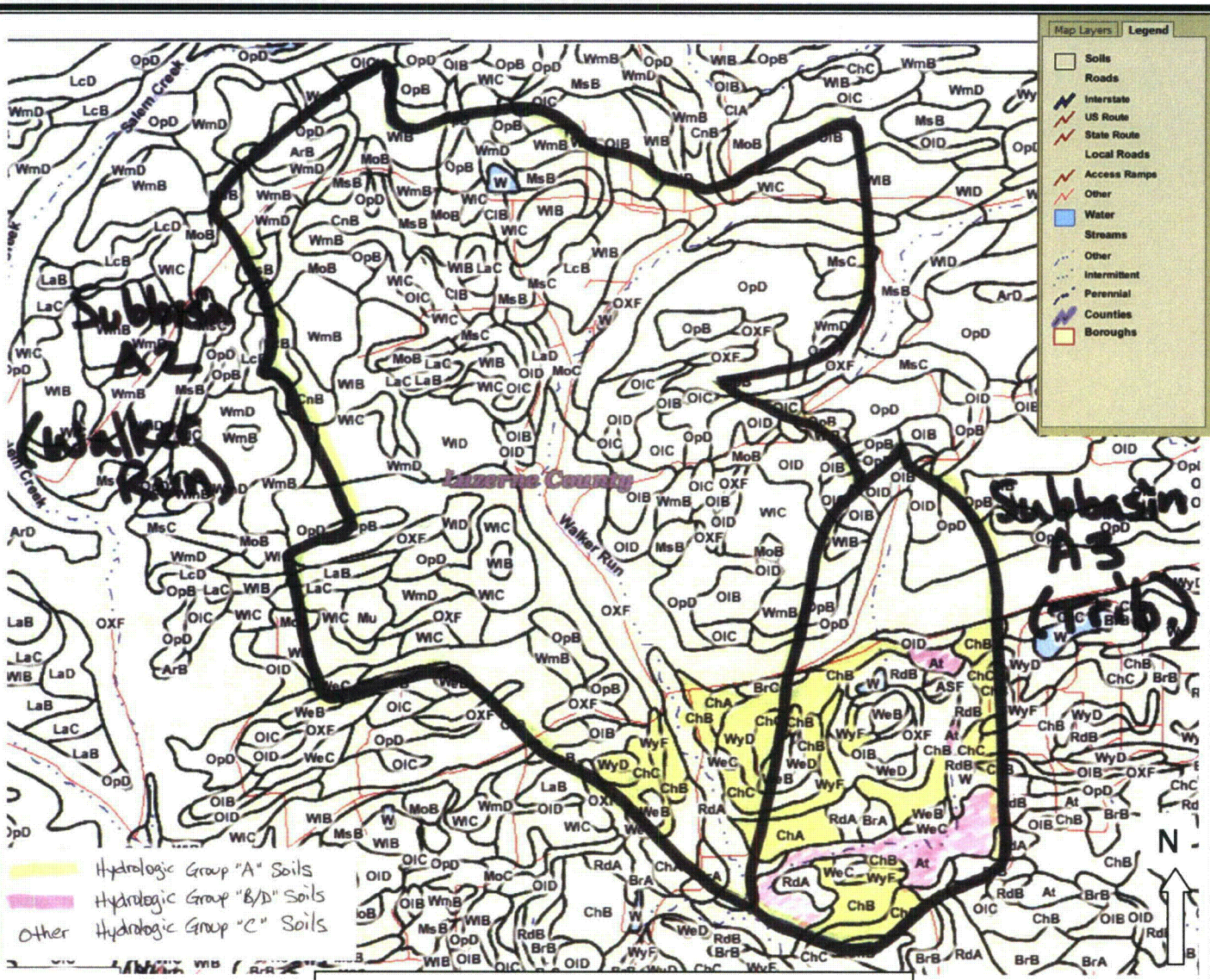
Land studies

Walker Run Flood Study Report

Bell Bend Nuclear Power Plant

Salem Township, Luzerne County, PA

December 2010



Source: http://soilmap.psu.edu

Location	Scale
41°05'14" N, 76°10'04" W	1" = 2000'

Soils Location Map

Walker Run and Tributary #1 Drainage Areas

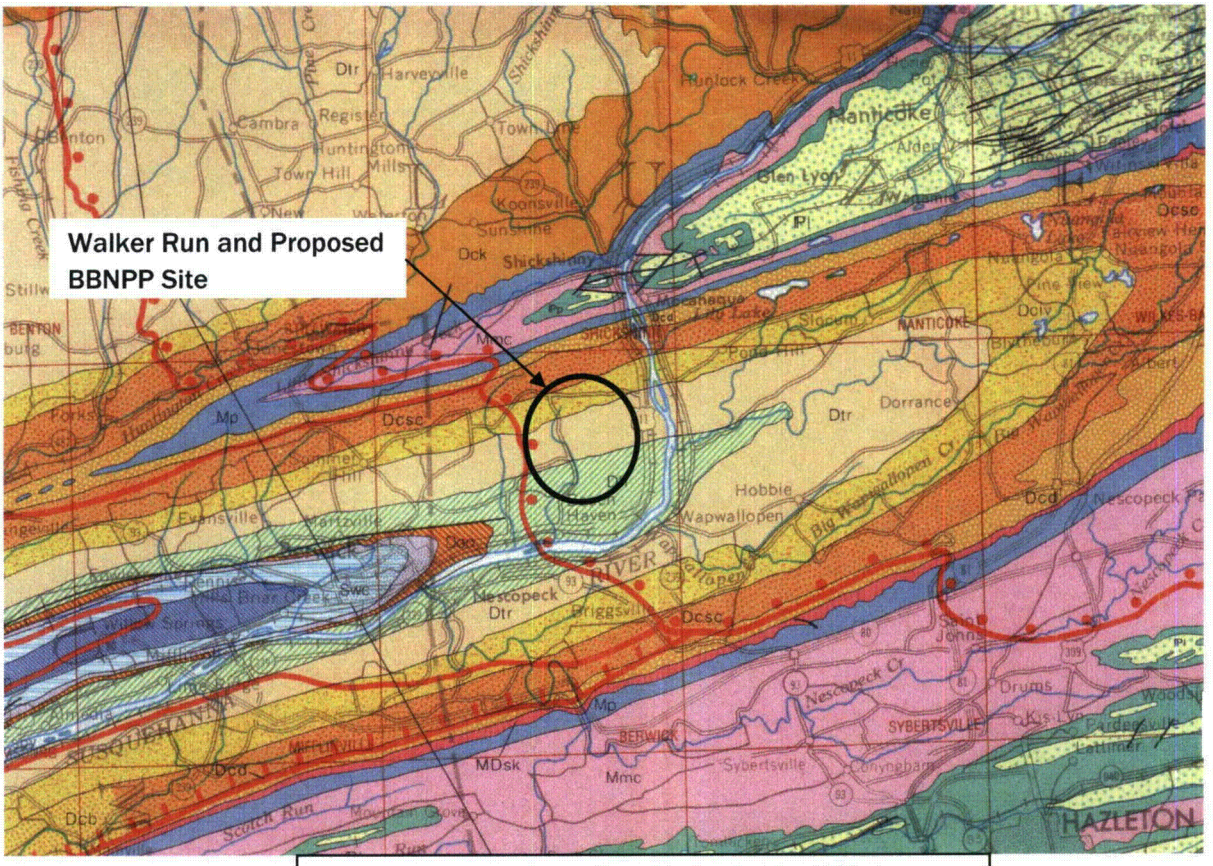
Land studies

Walker Run Flood Study Report

Bell Bend Nuclear Power Plant

Salem Township, Luzerne County, PA

December 2010



Source: Geologic Map of Pennsylvania. 1980.

Geologic Formation
Dh = Hamilton Group

Location
41˚05'14" N, 76˚10'04" W
Scale
1:250,000

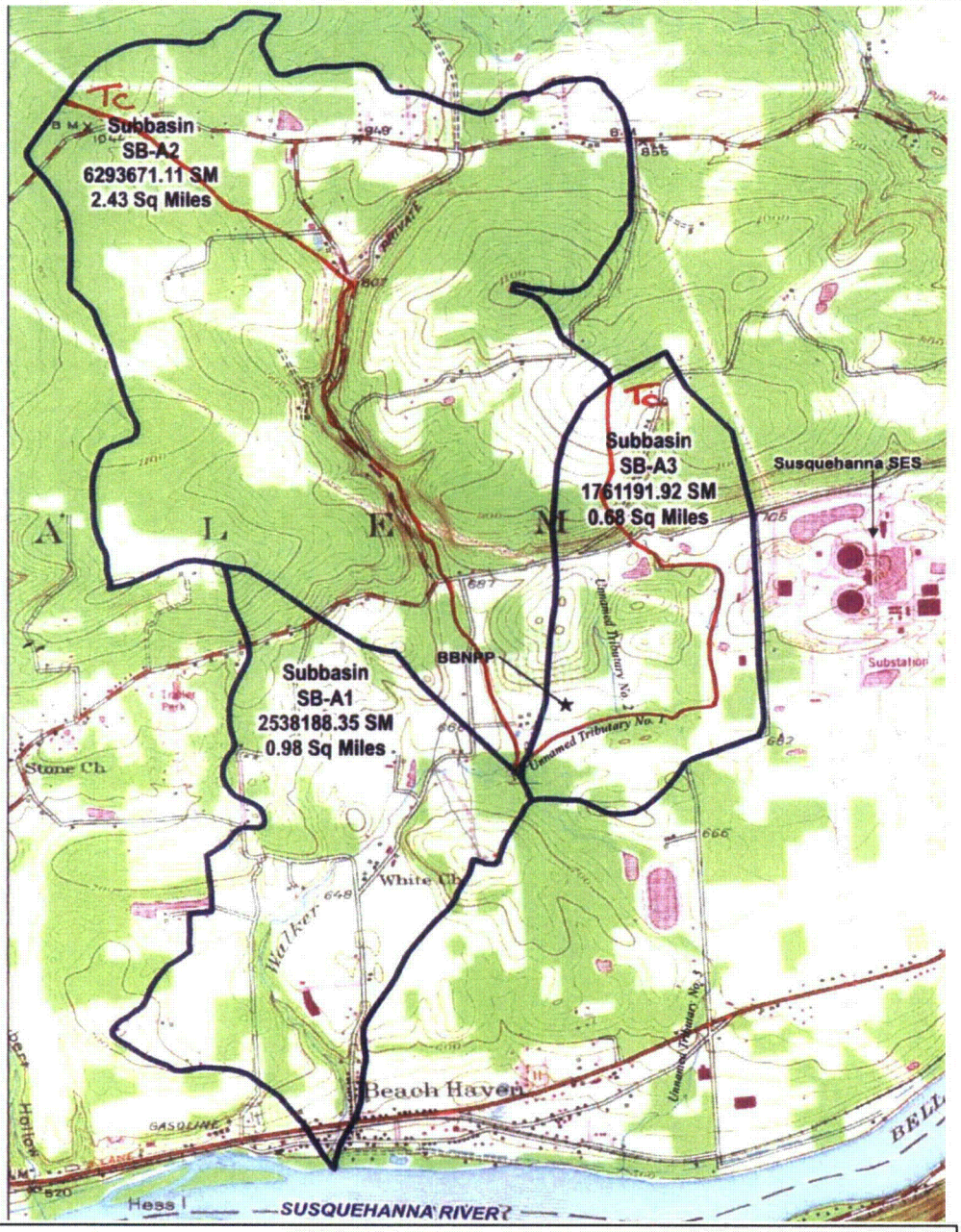
Geology Map

BBNPP Proposed Site near Walker Run and Tributary #1

Land studies

Walker Run Flood Study Report

Bell Bend Nuclear Power Plant
Salem Township, Luzerne County, PA
December 2010



Source: Figure 2.4-3 from COLA; Berwick, PA USGS 7.5 minute topographic quadrangle

Location	Scale
41°05'17" N, 76°07'54" W	1" = 3,000'

Walker Run Watershed Map

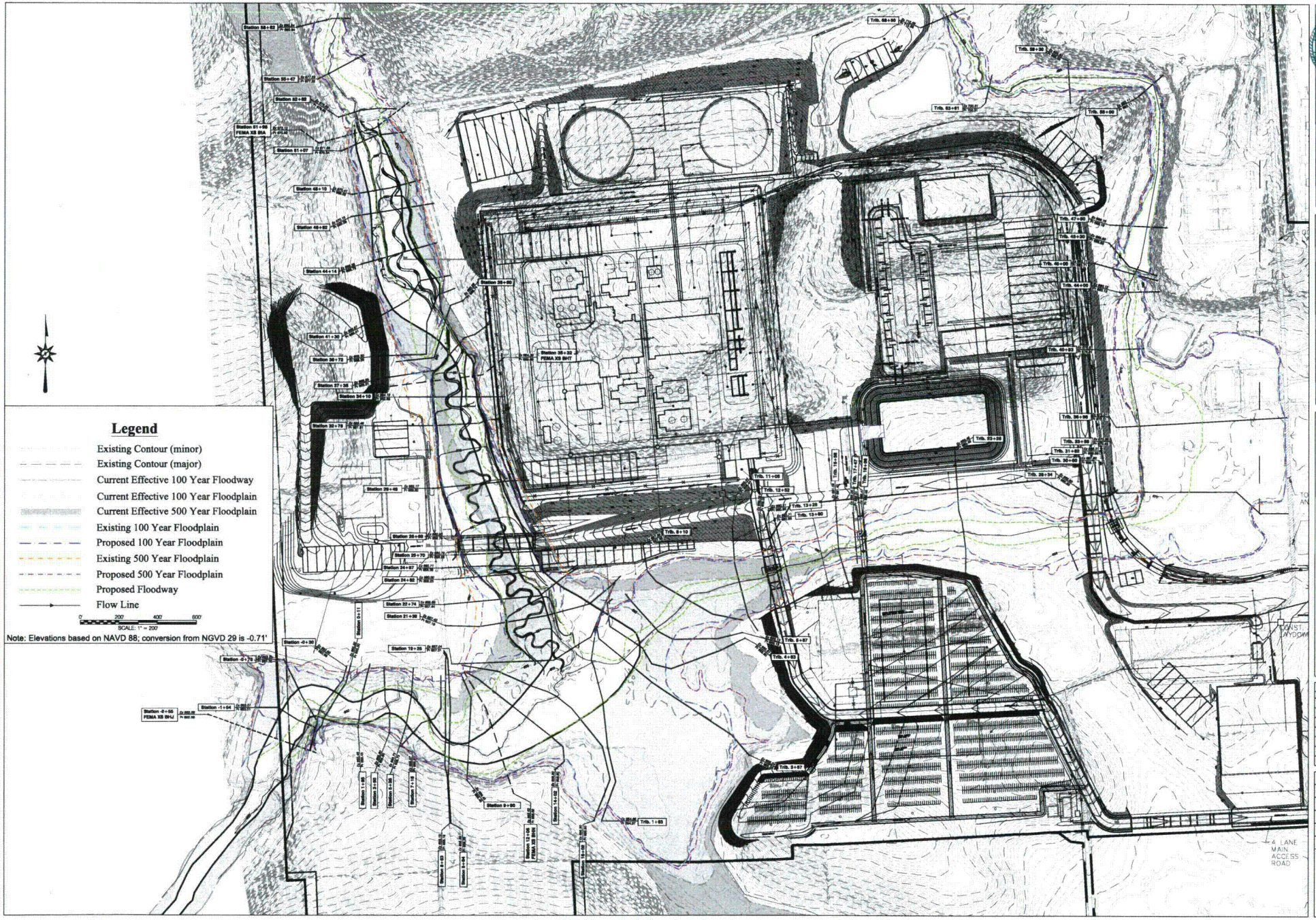
Drainage area of Walker Run and Tributary #1 showing time of concentration paths for each subdrainage area

Land Studies

Walker Run Flood Study Report

Bell Bend Nuclear Power Plant
Salem Township, Luzerne County, PA
December 2010

Appendix B:
Floodplain Map



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Land Studies

PROJECT:
BELL BEND NUCLEAR POWER PLANT
PPL BELL BEND, LLC.
38 BOWDOY LANE, SUITE 2
BERWICK, PENNSYLVANIA 18603

SHEET TITLE:
FLOODPLAIN MAP
FLOOD STUDY - WALKER RUN
SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA

Revisions			
No.	Date	Description (per WQM)	
1	11/19/10	Initial Submission	
2	8/2/11	FEMA comments	
3	12/15/11	FEMA comments	
4	4/27/12	FEMA comments	

Project Number	E-728-L8
Drawn By	EPJ
Checked By	BE
Date	September 2, 2011
Scale	1" = 200'
Drawing Number	FS-WR-P1
Sheet Number	1 OF 2

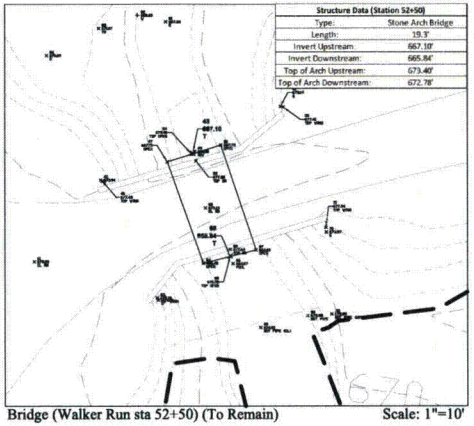
Legend

Existing Contour (minor)
Existing Contour (major)
Edge of Pavement (Paved)
Edge of Pavement (Unpaved)

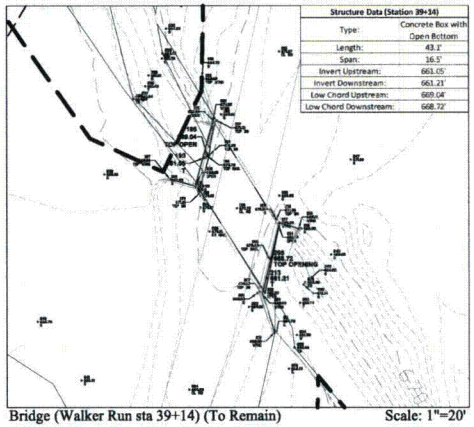
Note: Elevations based on NAVD 88; conversion from NGVD 29 is -0.71'

Abbreviations

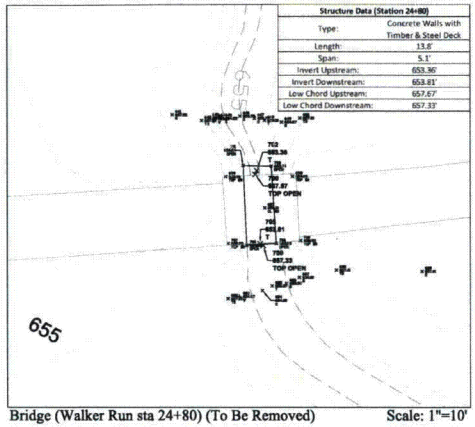
CL RD	Centerline of Road
G	Ground
INV	Invert
OPEN	Width of Span
RCP	Reinforced Concrete Pipe
SLCPP	Smooth Lined Corrugated Plastic Pipe
T	Thalweg
Top Br	Top of Bridge
Top Open	Low Chord of Bridge
Top Wing	Top of Wing Wall
W	Water Surface at Edge of Water (At Time of Survey)
Wing	Wing Wall



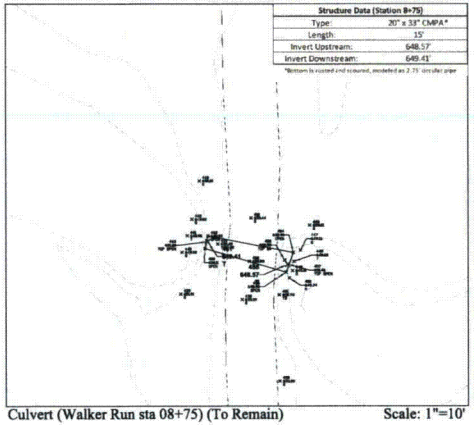
Bridge (Walker Run sta 52+50) (To Remain) Scale: 1"=10'



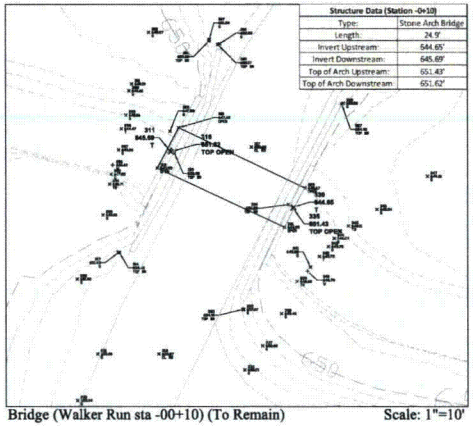
Bridge (Walker Run sta 39+14) (To Remain) Scale: 1"=20'



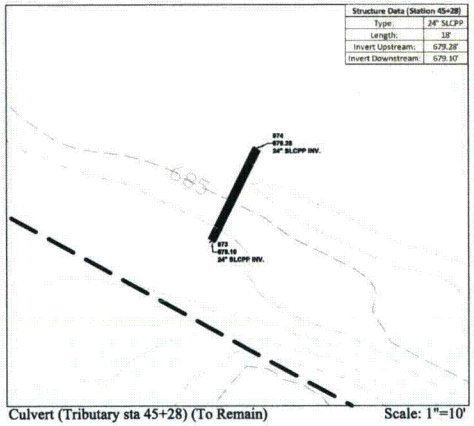
Bridge (Walker Run sta 24+80) (To Be Removed) Scale: 1"=10'



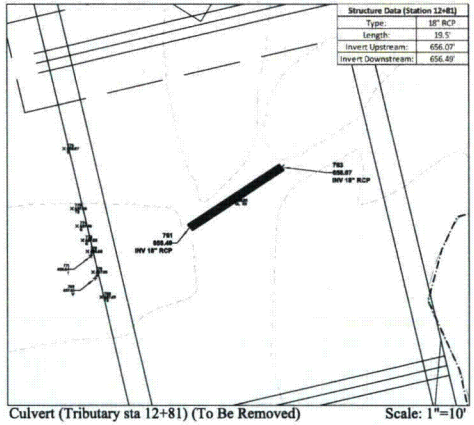
Culvert (Walker Run sta 08+75) (To Remain) Scale: 1"=10'



Bridge (Walker Run sta -00+10) (To Remain) Scale: 1"=10'



Culvert (Tributary sta 45+28) (To Remain) Scale: 1"=10'



Culvert (Tributary sta 12+81) (To Be Removed) Scale: 1"=10'

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PROJECT:
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PPL BELL BEND, LLC.
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BERWICK, PENNSYLVANIA 18603

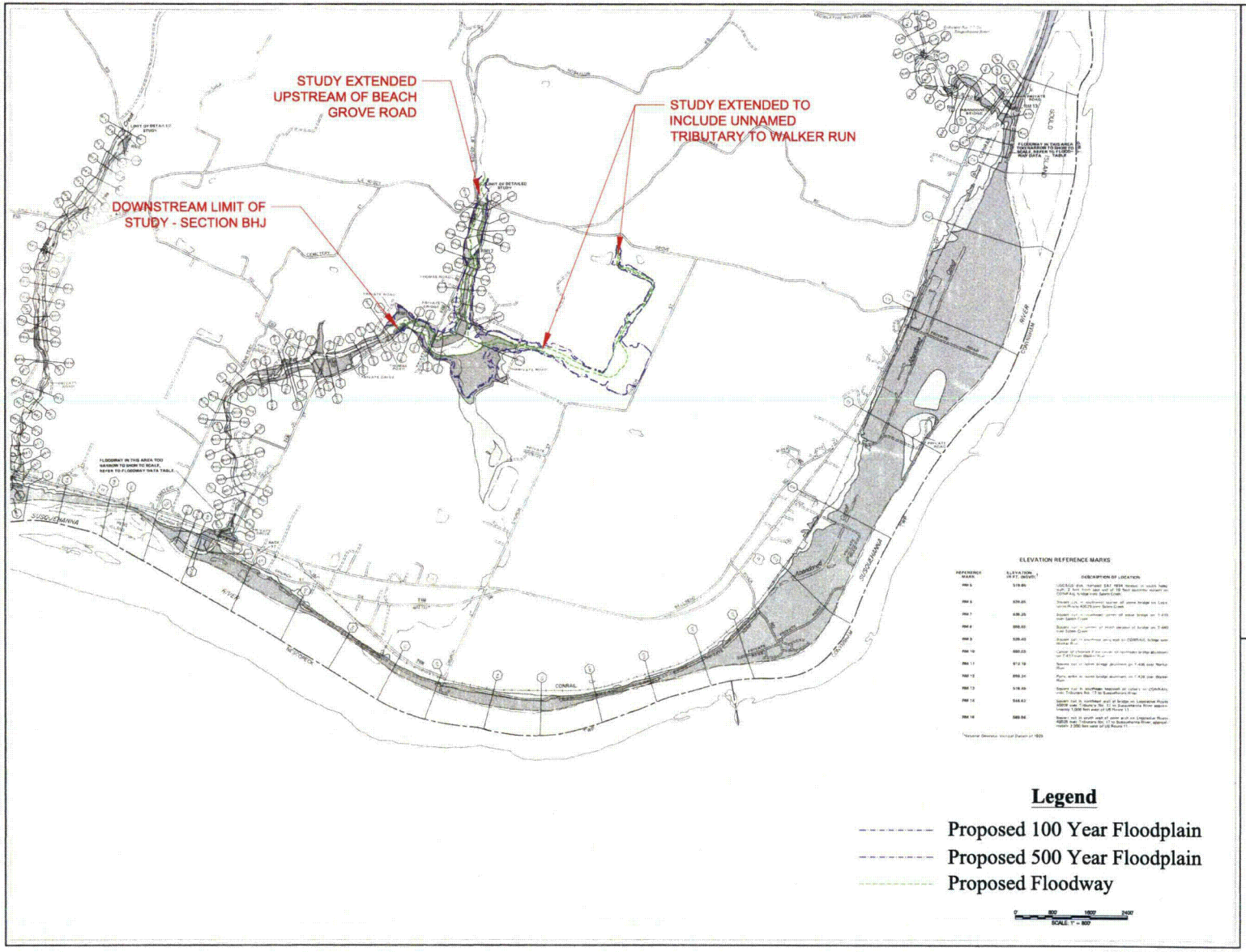
SHEET TITLE:
EXISTING STRUCTURES PLAN
FLOOD STUDY - WALKER RUN
SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA

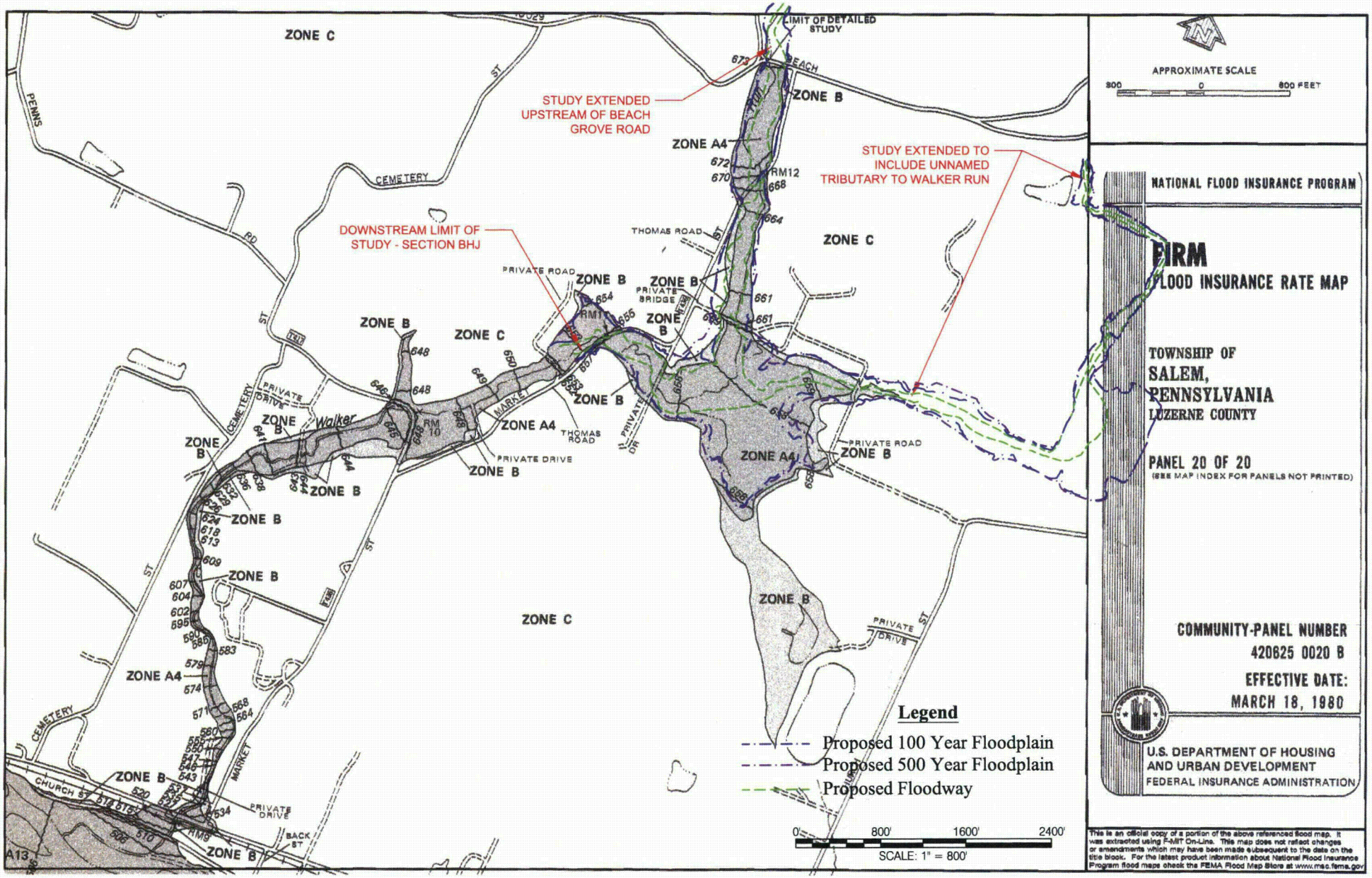
Revisions		
No.	Date	Description
1	12/15/11	Add Structure Data

Project Number	E-720-L8
Drawn By	APK
Checked By	BE
Date	SEPTEMBER 2, 2011
Scale	AS NOTED
Drawing Number	FS-WR-P2
Sheet Number	2 OF 2

Appendix C:
Annotated FEMA Maps

- Floodway Map
- FIRM


STUDY EXTENDED UPSTREAM OF BEACH GROVE ROAD
STUDY EXTENDED TO INCLUDE UNNAMED TRIBUTARY TO WALKER RUN
DOWNSTREAM LIMIT OF STUDY - SECTION BHJ
ELEVATION REFERENCE MARKS
Legend
Proposed 100 Year Floodplain
Proposed 500 Year Floodplain
Proposed Floodway
SCALE 1" = 800'
KEY TO MAP
NATIONAL FLOOD INSURANCE PROGRAM
FLOODWAY
FLOOD BOUNDARY AND FLOODWAY MAP
TOWNSHIP OF
SALEM,
PENNSYLVANIA
LUZERNE COUNTY
PANEL 20 OF 20
COMMUNITY-PANEL NUMBER
420625 0020 B
EFFECTIVE DATE:
MARCH 19, 1980
U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION


ZONE C
LIMIT OF DETAILED STUDY
STUDY EXTENDED UPSTREAM OF BEACH GROVE ROAD
STUDY EXTENDED TO INCLUDE UNNAMED TRIBUTARY TO WALKER RUN
DOWNSTREAM LIMIT OF STUDY - SECTION BHJ
ZONE A4
ZONE B
ZONE C
PENNS CEMETERY RD
THOMAS ROAD
PRIVATE ROAD
PRIVATE BRIDGE
PRIVATE DRIVE
MARKET ST
CHURCH ST
BACK ST
Walker Run
RM12
RM11
RM10
RM9
Legend
Proposed 100 Year Floodplain
Proposed 500 Year Floodplain
Proposed Floodway
0
800'
1600'
2400'
SCALE: 1" = 800'
APPROXIMATE SCALE
800 0 800 FEET
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
TOWNSHIP OF
SALEM,
PENNSYLVANIA
LUZERNE COUNTY
PANEL 20 OF 20
(SEE MAP INDEX FOR PANELS NOT PRINTED)
COMMUNITY-PANEL NUMBER
420825 0020 B
EFFECTIVE DATE:
MARCH 18, 1980
U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix D:
Flood Model Summary Table

100-Yr Flood Model Summary Table

(all elevations are NAVD 1988; FIS and Duplicate Effective A elevations have been converted from NGVD 1929 with a conversion factor of -0.71 ft.)

River Station/ Cross Section	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Δ WSE (ft)	Vel Chnl (ft/s)	Δ V (ft/s)
Walker Run							
5862	Existing Conditions	1640	675.53	680.84		10.73	
	Proposed Conditions	1640	675.53	680.84	0.00	10.73	0.00
5547	Existing Conditions	1640	669.38	677.23		4.34	
	Proposed Conditions	1640	669.38	677.22	-0.01	4.35	0.01
5282	Existing Conditions	1640	667.03	676.63		5.09	
	Proposed Conditions	1640	667.03	676.62	-0.01	5.11	0.02
5250	Existing Bridge						
5198	FEMA (FIS)	1640		672.35		4.56	
HEC-2 XS 65.0, BIA	Duplicate Effective A (HEC-2)	1640		672.38	0.03	4.52	-0.04
	Duplicate Effective B (HEC-RAS)	1640		672.24	-0.14	4.57	0.05
	Corrected Effective/ Existing Conditions	1640	665.75	672.12	-0.12	5.32	0.75
	Proposed Conditions	1640	665.75	670.92	-1.20	6.40	1.08
5107	Existing Conditions	1640	664.59	671.65		6.50	
	Proposed Conditions	1640	664.59	670.34	-1.31	7.69	1.19
4995	FEMA (FIS)	1640		672.04		4.47	
HEC-2 XS 64.0, BHZ	Duplicate Effective A (HEC-2)	1640	666.24	672.08	0.04	4.41	-0.06
	Duplicate Effective B (HEC-RAS)			671.89	-0.19	4.49	0.08
4810	Existing Conditions	1640	663.49	670.41		5.39	
	Proposed Conditions	1640	662.87	669.52	-0.89	4.31	-1.08
4735	FEMA (FIS)	1640		671.51		3.90	
HEC-2 XS 63.0, BHY	Duplicate Effective A (HEC-2)	1640		671.59	0.08	3.80	-0.10
	Duplicate Effective B (HEC-RAS)			671.20	-0.39	3.93	0.13
4692	Existing Conditions	1640	662.02	670.15		3.64	
	Proposed Conditions	1640	663.77	669.29	-0.86	4.05	0.41
4495	FEMA (FIS)	1640		671.28		3.14	
HEC-2 XS 62.0, BHX	Duplicate Effective A (HEC-2)	1640		671.37	0.09	3.07	-0.07
	Duplicate Effective B (HEC-RAS)	1640		670.88	-0.49	3.17	0.10
4414	Existing Conditions	1640	662.46	669.35		5.99	
	Proposed Conditions	1640	662.97	668.79	-0.56	3.97	-2.02
4295	FEMA (FIS)	1640		671.16		2.86	
HEC-2 XS 61.0, BHW	Duplicate Effective A (HEC-2)	1640		671.27	0.11	2.68	-0.18
	Duplicate Effective B (HEC-RAS)	1640		671.73	0.46	2.78	0.10
4130	Existing Conditions	1640	661.54	668.57		4.48	
	Proposed Conditions	1640	662.26	668.41	-0.16	3.53	-0.95
4043	FEMA (FIS)	1640		671.01		2.71	
HEC-2 XS 60.0, BHV	Duplicate Effective A (HEC-2)	1640		671.14	0.13	2.48	-0.23
	Duplicate Effective B (HEC-RAS)	1640		670.52	-0.62	2.59	0.11
3972	Existing Conditions	1640	661.21	668.3		3.92	
	Proposed Conditions	1640	661.21	668.29	-0.01	2.45	-1.47

River Station/ Cross Section	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Δ WSE (ft)	Vel Chnl (ft/s)	Δ V (ft/s)
3914	Existing Bridge						
3860	Existing Conditions	1640	660.73	666.98		5.84	
	Proposed Conditions	1640	660.73	666.74	-0.24	7.14	1.30
3785	FEMA (FIS)	1640		667.26		8.50	
HEC-2 XS 58.0, BHU	Duplicate Effective A (HEC-2)	1640		667.29	0.03	8.36	-0.14
	Duplicate Effective B (HEC-RAS)	1640		667.23	-0.06	10.95	2.59
3735	Existing Conditions	1640	660.36	666.35		4.71	
	Proposed Conditions	1640	660.36	665.01	-1.34	6.97	2.26
3532	FEMA (FIS)	1640		663.32		8.48	
HEC-2 XS 57.0, BHT	Duplicate Effective A (HEC-2)	1640		663.02	-0.30	8.02	-0.46
	Duplicate Effective B (HEC-RAS)	1640		663.59	0.57	7.58	-0.44
	Corrected Effective/ Existing Conditions	1640	658.75	664.39	0.80	7.88	0.30
	Proposed Conditions	1640	658.87	663.69	-0.70	5.03	-2.85
3410	Existing Conditions	1640	657.83	664.12		3.93	
	Proposed Conditions	1640	658.92	662.63	-1.49	6.85	2.92
3375	FEMA (FIS)	1640		662.39		4.24	
HEC-2 XS 56.0, BHS	Duplicate Effective A (HEC-2)	1640		662.13	-0.26	4.00	-0.24
	Duplicate Effective B (HEC-RAS)	1640		662.51	0.38	5.23	1.23
3278	Existing Conditions	1640	657.01	663.46		6.29	
	Proposed Conditions	1640	657.99	661.81	-1.65	4.55	-1.74
3065	FEMA (FIS)	1640		661.06		5.92	
HEC-2 XS 55.0, BHR	Duplicate Effective A (HEC-2)	1640		660.97	-0.09	5.46	-0.46
	Duplicate Effective B (HEC-RAS)	1640		661.53	0.56	5.55	0.09
2949	Existing Conditions	1640	655.77	662.17		4.14	
	Proposed Conditions	1640	656.74	659.52	-2.65	5.79	1.65
2730	FEMA (FIS)	1640		659.93		4.18	
HEC-2 XS 54.0, BHQ	Duplicate Effective A (HEC-2)	1640		659.93	0.00	4.15	-0.03
	Duplicate Effective B (HEC-RAS)	1640		661.14	1.21	4.75	0.60
2669	Existing Conditions	1640	655.65	660.95		5.47	
	Proposed Conditions	1640	654.10	658.79	-2.16	2.58	-2.89
2570	Existing Conditions	1640	655.15	660.79		3.19	
	Proposed Conditions	1640	654.50	658.58	-2.21	2.75	-0.44
2497	Existing Conditions	1640	653.51	660.71		2.78	
	Proposed Conditions	1640	654.75	658.35	-2.36	4.23	1.45
2480	Existing Bridge						
2462	Existing Conditions	1640	653.86	660		4.02	
	Proposed Conditions	1640	654.61	658.23	-1.77	3.73	-0.29
2339	FEMA (FIS)	1640		657.79		2.55	
HEC-2 XS 52.0, BHP	Duplicate Effective A (HEC-2)	1640		657.78	-0.01	2.81	0.26
	Duplicate Effective B (HEC-RAS)	1640		657.98	0.20	2.59	-0.22
2274	Existing Conditions	1640	651.42	658.66		8.37	
	Proposed Conditions	1640	653.90	657.44	-1.22	5.12	-3.25
2139	Existing Conditions	1640	650.72	657.42		4.04	
	Proposed Conditions	1640	653.31	657.19	-0.23	2.47	-1.57
2010	FEMA (FIS)	1640		657.47		1.85	
HEC-2 XS 51.0, BHO	Duplicate Effective A (HEC-2)	1640		657.42	-0.05	1.88	0.03

River Station/ Cross Section	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Δ WSE (ft)	Vel Chnl (ft/s)	Δ V (ft/s)
	Duplicate Effective B (HEC-RAS)	1640		657.76	0.34	1.50	-0.38
1925	Existing Conditions	1640	651.09	657.04		2.88	
	Proposed Conditions	1640	652.07	657.01	-0.03	2.08	-0.80
1602	Existing Conditions	1640	650.67	656.9		1.33	
	Proposed Conditions	1640	650.67	656.9	0.00	1.33	0.00
1402	Existing Conditions	1640	649.80	656.8		1.72	
	Proposed Conditions	1640	649.80	656.8	0.00	1.72	0.00
1208	FEMA (FIS)	1860		657.07		2.01	
HEC-2 XS 50.0, BHN	Duplicate Effective A (HEC-2)	1860		656.99	-0.08	2.06	0.05
	Duplicate Effective B (HEC-RAS)	1860		657.43	0.44	1.75	-0.31
	Corrected Effective/ Existing Conditions	1860	650.78	656.62	-0.81	2.27	0.52
	Proposed Conditions	1860	650.78	656.62	0.00	2.27	0.00
990	Existing Conditions	1860	649.47	656.45		2.48	
	Proposed Conditions	1860	649.47	656.45	0.00	2.48	0.00
933	FEMA (FIS)	1860		656.72		4.84	
HEC-2 XS 49.0, BHM	Duplicate Effective A (HEC-2)	1860		656.61	-0.11	5.01	0.17
	Duplicate Effective B (HEC-RAS)	1860		657.19	0.58	4.17	-0.84
884	Existing Conditions	1860	648.62	656.29		3.37	
	Proposed Conditions	1860	648.62	656.29	0.00	3.37	0.00
875	Existing Bridge						
863	Existing Conditions	1860	648.96	656.19		3.29	
	Proposed Conditions	1860	648.96	656.19	0.00	3.29	0.00
715	Existing Conditions	1860	647.90	655.97		3.96	
	Proposed Conditions	1860	647.90	655.97	0.00	3.96	0.00
536	Existing Conditions	1860	646.97	655.73		3.79	
	Proposed Conditions	1860	646.97	655.73	0.00	3.79	0.00
428	FEMA (FIS)	1860		656.31		2.49	
HEC-2 XS 47.0, BHL	Duplicate Effective A (HEC-2)	1860		656.31	0.00	2.89	0.40
	Duplicate Effective B (HEC-RAS)	1860		656.76	0.45	2.64	-0.25
350	Existing Conditions	1860	647.08	655.6		3.07	
	Proposed Conditions	1860	647.08	655.6	0.00	3.07	0.00
185	Existing Conditions	1860	646.40	655.45		3.45	
	Proposed Conditions	1860	646.40	655.45	0.00	3.45	0.00
147	FEMA (FIS)	1860		655.93		4.63	
HEC-2 XS 46.0, BHK	Duplicate Effective A (HEC-2)	1860		655.92	-0.01	4.52	-0.11
	Duplicate Effective B (HEC-RAS)	1860		656.49	0.57	3.95	-0.57
11	Existing Conditions	1860	645.71	655.3		3.44	
	Proposed Conditions	1860	645.71	655.3	0.00	3.44	0.00
-10	Existing Bridge						
-30	Existing Conditions	1860	644.46	652.99		9.92	
	Proposed Conditions	1860	644.46	652.99	0.00	9.92	0.00
-78	Existing Conditions	1860	645.43	653.25		4.51	
	Proposed Conditions	1860	645.43	653.25	0.00	4.51	0.00
-154	Existing Conditions	1860	644.90	653.01		5.61	
	Proposed Conditions	1860	644.90	653.01	0.00	5.61	0.00

River Station/ Cross Section	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Δ WSE (ft)	Vel Chnl (ft/s)	Δ V (ft/s)
-255 HEC-2 XS 44.0, BHJ	FEMA (FIS)	1860		652.58		4.72	
	Duplicate Effective A (HEC-2)	1860		652.58	0.00	4.79	0.07
	Duplicate Effective B (HEC-RAS)	1860		652.58	0.00	4.78	-0.01
	Corrected Effective/ Existing Conditions	1860	645.78	652.58	0.00	6.02	1.24
	Proposed Conditions	1860	645.78	652.58	0.00	6.02	0.00
Unnamed Tributary to Walker Run							
6850	Existing Conditions	300	709.19	712.58		4.08	
	Proposed Conditions	300	709.19	712.58	0.00	4.08	0.00
6361	Existing Conditions	300	695.20	700.31		7.23	
	Proposed Conditions	300	695.20	700.31	0.00	7.23	0.00
5930	Existing Conditions	300	692.00	695.53		1.99	
	Proposed Conditions	300	692.00	695.53	0.00	1.99	0.00
5500	Existing Conditions	300	691.00	692.11		5.18	
	Proposed Conditions	300	691.00	692.11	0.00	5.18	0.00
4750	Existing Conditions	300	684.00	686.16		1.62	
	Proposed Conditions	300	684.00	686.16	0.00	1.62	0.00
4530	Existing Conditions	300	684.00	685.83		0.81	
	Proposed Conditions	300	684.00	685.83	0.00	0.81	0.00
4528	Existing Culvert						
4500	Existing Conditions	300	683.30	683.71		1.86	
	Proposed Conditions	300	683.30	683.71	0.00	1.86	0.00
4400	Existing Conditions	300	675.78	680.12		2.34	
	Proposed Conditions	300	675.78	680.12	0.00	2.34	0.00
4093	Existing Conditions	300	673.10	676.81		8.12	
	Proposed Conditions	300	673.10	676.81	0.00	8.12	0.00
3696	Existing Conditions	300	669.50	672.01		0.62	
	Proposed Conditions	300	669.50	672.01	0.00	0.62	0.00
3356	Existing Conditions	300	667.67	670.66		3.62	
	Proposed Conditions	300	667.67	670.43	-0.23	6.28	2.66
3162	Existing Conditions	300	666.50	668.31		3.62	
	Proposed Conditions	300	666.50	668.88	0.57	1.95	-1.67
3060	Existing Conditions	300	666.00	667.8		2.06	
	Proposed Conditions	300	666.00	668.15	0.35	1.62	-0.44
2834	Existing Conditions	300	664.89	665.69		7.37	
	Proposed Conditions	300	664.89	665.69	0.00	7.37	0.00
2326	Existing Conditions	300	659.90	663.48		2.03	
	Proposed Conditions	300	659.90	663.48	0.00	2.03	0.00
1806	Existing Conditions	300	659.10	662.47		3.44	
	Proposed Conditions	300	659.10	662.46	-0.01	3.47	0.03
1747	Existing Conditions	300	658.90	662.05		4.79	
	Proposed Conditions	300	658.90	662.01	-0.04	4.91	0.12
1658	Existing Conditions	300	657.96	661.59		4.31	
	Proposed Conditions	300	657.96	661.42	-0.17	4.81	0.50
1360	Existing Conditions	300	657.83	660.71		2.50	

River Station/ Cross Section	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Δ WSE (ft)	Vel Chnl (ft/s)	Δ V (ft/s)
	Proposed Conditions	300	657.83	660.96	0.25	1.73	-0.77
1328	Existing Conditions	300	657.50	660.21		5.17	
	Proposed Conditions	300	657.50	660.86	0.65	2.87	-2.30
1281	Existing Culvert						
1252	Existing Conditions	300	656.64	659.09		1.74	
	Proposed Conditions	300	656.64	659.05	-0.04	1.63	-0.11
1105	Existing Conditions	300	655.65	658.44		2.01	
	Proposed Conditions	300	655.65	658.44	0.00	2.01	0.00
810	Existing Conditions	300	653.84	657.36		1.67	
	Proposed Conditions	300	653.84	657.36	0.00	1.67	0.00
587	Existing Conditions	300	653.78	656.13		2.82	
	Proposed Conditions	300	653.78	656.13	0.00	2.82	0.00
463	Existing Conditions	300	653.23	655.61		1.09	
	Proposed Conditions	300	653.23	655.6	-0.01	1.09	0.00
357	Existing Conditions	300	652.40	655.34		1.73	
	Proposed Conditions	300	652.40	655.33	-0.01	1.75	0.02
183	Existing Conditions	300	652.14	654.98		1.06	
	Proposed Conditions	300	652.14	654.97	-0.01	1.06	0.00

Questions concerning the VERTCON process may be mailed to NGS

Latitude: 041 05 21.19

Longitude: 076 09 57.34

NGVD 29 height:

Datum shift(NAVD 88 minus NGVD 29): -0.216 meter =-0.708 ft.

Appendix E:
Duplicate Effective Model A

- HEC-2 Input Data
- HEC-2 Output Data

WALKER RUN - INPUT

```
T1       SUSQUEHANNA RIVER BASIN COMMISSION
T2       BLOOMSBURG-BERWICK-SHICKSHINNY REACH
T3       WALKER RUN - 100 YR. FLOOD
J1     0       4       0       0       0       0       0       0  653.29       0
J2  +1.0       0    -1.0       0       0       0       0       0       0       0
J3    38      43       1       9      50       3      61      36      21      22
J3    27      28       4       0      38      39      43       1       3      11
J3    12      10      26      20      50      51       4       0     200       0
QT     5     550    1320    1860    1860    3100
NC  0.09    0.09    0.05     0.3     0.7
ET                                  15.4
X1    44.     22.  1405.  1412.     225.     200.     260.       0       0       0
GR 685.1  1000.  680.3  1092.  675.1  1128.  670.1  1170.  665.3  1230.
GR 660.8  1310.  658.3  1330.  655.4  1350.  650.5  1372.   648.  1405.
GR 646.5  1408.  648.7  1412.  650.4  1450.   650.  1490.  650.1  1525.
GR 649.8  1570.  650.6  1610.  655.1  1670.  660.1  1712.  665.6  1740.
GR 670.1  1750.  675.6  1790.       0       0       0       0       0       0
NC  0.09    0.09    0.05     0.3     0.7       0       0       0       0       0
ET     0       0       0       0     9.1       0       0       0  1656.  1815.
X1 46.01     40.  1655.5  1664.5     100.     850.     230.
X3    10.                                                 653.    653.
GR 699.6  1000.   695.  1040.  691.7  1100.  689.7  1170.  684.7  1210.
GR 682.8  1260.  685.1  1340.  681.8  1400.  679.8  1440.  677.1  1490.
GR  675.  1530.  669.8  1555.  664.5  1580.  659.5  1610.  654.4  1635.
GR 652.9  1640.  652.9  1650.  648.1  1655.5  647.7  1656.  646.8  1657.
GR 646.7  1658.  646.7  1659.  646.7  1660.  646.7  1661.  646.7  1662.
GR 646.7  1663.   647.  1664.  647.4  1664.5  649.5  1670.  649.8  1680.
GR 649.8  1690.  651.9  1750.  654.4  1815.   655.  1830.   656.  1870.
GR 654.8  1900.  659.5  1925.  661.7  2100.  666.1  2240.  666.9  2450.
SB          1.5     2.5              9.              42.         646.7  646.7
ET                                  9.1                         1656.  1815.
X1 46.02                           30.     30.     30.
X2                    1.   652.5  654.4
X3    10.                                                 654.4   654.4
BT    30.  1530.   675.   675.  1555.   669.8   669.8  1580.  664.5  664.5
BT 1610.  659.5  659.5  1635.  654.4  654.4  1640.  654.4  652.9  1650.
BT   656.  652.9 1655.5  657.5  648.1  1656.  657.6  650.3  1657.  657.7
BT 651.4  1658.  657.8  652.1  1659.  657.9  652.4  1660.   658.  652.5
BT 1661.  657.8  652.4  1662.  657.8  652.1  1663.  657.7  651.3  1664.
BT 657.6   650. 1664.5  657.5  647.4  1670.   657.  649.5  1680.   656.
BT 649.8  1690.  654.4  649.8  1750.  654.4  651.9  1815.  654.4  654.4
BT 1830.   655.   655.  1870.   656.   656.  1900.  654.9  654.9  1925.
BT 659.5  659.5  2100.  661.7  661.7  2240.  665.1  665.1  2450.  666.9
BT 666.9
NC  0.09    0.09    0.05     0.3     0.7
ET                                  6.4
X1    46.     36.  1650.  1670.     175.      50.     145.
GR 700.2  1000.  695.6  1040.  692.3  1100.  690.3  1170.  688.3  1210.
GR 683.4  1260.  685.7  1340.  682.4  1400.  680.4  1440.  677.7  1490.
GR 675.6  1530.  670.4  1555.  665.1  1580.   660.  1610.  655.8  1640.
GR 650.2  1650.  647.5  1660.  650.1  1670.  652.5  1750.  655.8  1830.
GR 656.8  1870.  655.5  1900.  660.1  1925.  662.3  2100.  665.7  2240.
GR 667.5  2450.  670.4  2623.  675.4  2720.  680.1  2760.  655.3  2800.
GR 690.3  2838.  695.1  2848.  700.2  2900.  705.2  2940.  710.2  3010.
GR 715.2  3100.
ET                                  9.1                         1390.  1510.
X1    47.     28.  1410.  1440.     220.     240.     400.
GR 687.3  1000.  685.6  1050.  680.6  1090.  675.2  1110.  670.4  1130.
GR 665.3  1150.  660.1  1210.  656.3  1250.  652.5  1350.  650.1  1410.
GR   648.  1430.  650.4  1440.  655.1  1550.  657.4  1605.  660.2  1630.
GR 662.5  1750.  665.2  1860.  667.3  2000.  668.1  2100.  668.6  2180.
GR 670.1  2365.  672.1  2450.  675.3  2540.  685.1  2640.  690.3  2700.
GR 700.1  2750.  705.4  2800.  710.2  2920.
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WALKER RUN - INPUT

```
NC  0.09     0.09     0.05     0.3      0.7
ET                                      9.1                                  1645.    1735.
X1 49.01       28.    1709.    1712.     350.     275.     450.
X3   10.                                                        653.7    653.7
GR  725.     1000.     720.     1035.    715.2    1088.    709.9    1120.   704.8    1152.
GR 700.3     1200.    695.3     1238.    690.3    1270.    685.1    1290.   680.4    1340.
GR 675.4     1402.    669.8     1445.    664.9    1480.    660.2    1530.   664.9    1590.
GR 654.4     1609.    651.7     1709.    650.4   1709.5    650.2   1710.5   650.4   1711.5
GR 651.7     1712.    654.4     1890.     655.    1930.    660.3    2080.   663.9    2200.
GR 664.1     2300.    663.9     2400.    665.4    2500.
SB             1.5      2.5                3.                 7.1             650.2    650.2
ET                                      9.1                                  1645.    1709.
X1 49.02                                 20.      20.      20.
X2                       1.     653.2    654.4
X3   10.                                                        654.4    654.4
BT   16.     1480.    664.9     664.9    1530.    660.2    660.2    1590.   654.9    654.9
BT 1609.     654.4    654.4     1709.    654.4    651.7   1709.5    654.4    653.   1710.5
BT 654.4     653.2   1711.5     654.4     653.    1712.    654.4    651.7   1890.    654.4
BT 654.4     1930.     655.      655.    2080.    660.3    660.3    2200.   663.9    663.9
BT 2300.     664.1    664.1     2400.    663.9    663.9    2500.    665.4   665.4
ET                                      15.4
X1   49.       26.    1700.     1720.     30.      30.      30.
GR 725.3     1000.    720.3     1035.    715.5    1088.    710.8    1120.   705.1    1152.
GR 700.5     1200.    695.6     1238.    690.6    1270.    685.4    1290.   680.7    1340.
GR 675.7     1402.    670.1     1445.    665.2    1480.    660.5    1530.   655.2    1590.
GR 651.7     1700.    650.5     1710.    651.4    1720.    655.3    1750.   657.8    1900.
GR 660.6     2080.    664.2     2200.    664.4    2300.    664.2    2400.   665.7    2500.
GR 665.1     2590.
NC  0.08     0.08     0.05      0.1      0.3
ET                                      15.4
X1   50.       22.    1740.     1765.     300.     175.     275.
GR 725.3     1000.    720.1     1035.    715.4    1060.    710.1    1080.   705.8    1130.
GR 700.3     1165.    695.6     1190.    690.3    1225.    685.7    1265.   680.3    1345.
GR 675.3     1380.    670.4     1470.    665.9    1528.    660.2    1570.   655.5    1610.
GR 652.5     1680.    652.1     1740.    651.5    1752.    652.1    1765.    655.    1960.
GR  660.     2205.     665.     2330.
QT    5.      480.    1160.     1640.    1640.    3600.
NC  0.06     0.06     0.05      0.1      0.3
ET                                      9.1                                  2350.    2800.
X1   51.       23.    2715.     2750.    1200.     200.     740.
GR 690.1     1000.    687.3     1100.    685.1    1230.    680.2    1275.   675.6    1340.
GR 670.8     1450.    665.2     1635.    660.5    1798.    657.3    2030.   656.4    2295.
GR 655.1     2298.    656.7     2300.    656.7    2460.    655.1    2470.   656.7    2475.
GR 655.5     2600.    655.1     2715.     653.    2740.    655.3    2750.   658.1    2960.
GR 660.4     3230.    665.4     3345.    665.2    3360.
NC  0.06     0.06     0.05      0.1      0.3
ET                                      10.4
X1   52.       34.    2145.     2268.     600.     350.     330.
GR 725.1     1000.    720.1     1030.    715.4    1080.    710.9    1108.   705.3    1130.
GR 700.2     1150.    695.3     1170.    690.3    1195.    685.4    1225.    680.    1240.
GR 675.3     1295.    670.7     1400.    667.5    1500.    665.3    1590.   664.1    1630.
GR 665.1     1700.    665.7     1735.    665.2    1772.     660.    1825.   660.4    1888.
GR 658.1     2100.    656.1     2145.     654.    2250.    655.2    2268.   657.2    2350.
GR 660.6     2440.    662.1     2600.    665.3    2735.    667.3    2755.   668.1    2900.
GR 668.3     3100.     670.     3250.    672.1    3350.    675.4    3465.
NC  0.06     0.06     0.05      0.3      0.7
ET                                      9.1                                  2100.    2260.
X1  52.1       20.    2247.     2253.     175.      80.     133.
X3   10.                                                         657.     657.
GR 666.2     1735.    665.7     1772.    660.5    1825.     660.    1888.   659.2    2045.
GR 658.6     2100.    655.6     2145.    654.6    2246.    654.6    2247.   654.6    2250.
GR 654.6     2253.    655.7     2268.    657.7    2350.    659.2    2390.   661.1    2440.
GR 662.6     2600.    665.8     2735.    667.8    2755.    668.6    2900.   668.8    3100.
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SB          1.5     2.5          6.          23.4          654.6   654.6
ET                                9.1                      2100.   2268.
X1  52.2                         12.     12.     12.
X2                    1.   658.5  659.2
X3   10.                                                659.2   659.2
BT   20.   1735.   666.2   666.2  1772.   665.7   665.7  1825.   660.5   660.5
BT 1888.   660.9   660.9  2045.   659.2   659.2  2100.   659.2   658.6  2145.
BT 659.2   655.6  2246.   659.2   654.6  2247.   659.2   658.5  2250.   659.2
BT 658.5  2253.   659.2   654.6  2268.   659.2   655.7  2350.   659.2   657.7
BT 2390.   659.2   659.2  2440.   661.1   661.1  2600.   662.6   662.6  2735.
BT 665.8   665.8  2755.   667.8   667.8  2900.   668.6   668.6  3100.   668.8
BT 668.8
NC  0.06   0.06    0.05    0.3     0.7
ET                                10.4
X1   54.     35.   1818.   1837.   300.    250.    245.
GR 725.2   1000.   720.7  1120.   715.2  1198.   710.1  1242.   705.1  1262.
GR 700.6   1268.   695.3  1300.   690.3  1312.   685.3  1328.   680.1  1350.
GR 675.1   1368.   672.2  1470.   670.3  1588.   669.8  1595.   665.1  1669.
GR 657.5   1760.    657.  1818.   655.5  1830.    657.  1837.   657.5  1880.
GR  663.   2000.   665.1  2180.   668.1  2220.   667.   2300.   670.4  2465.
GR 672.4   2680.   675.5  2718.   680.3  2760.   685.3  2805.    690.  2840.
GR 695.7   2855.   700.7  2875.   705.1  2900.    710.  2980.   715.1  3015.
NC  0.06    0.06    0.05    0.1     0.3
X1   55.     29.   1510.   1530.   340.    320.    330.
GR  725.   1000.   720.6  1095.   715.5  1110.   710.1  1210.   705.1  1260.
GR 700.3   1290.   695.8  1300.   690.6  1315.   685.2  1330.   680.2  1355.
GR 675.7   1385.   670.5  1405.   665.3  1425.   657.5  1510.   656.7  1520.
GR 656.9   1530.   662.2  1670.   665.1  1805.   667.3  1828.   670.4  1978.
GR 672.1   2070.   675.4  2178.   680.1  2210.   688.3  2248.   690.7  2285.
GR 695.6   2310.   700.1  2355.   705.1  2420.   710.1  2525.
NC  0.09    0.05    0.05    0.1     0.3
ET                                6.4
X1   56.     29.   1443.   1460.   300.    325.    310.
GR 725.1   1000.   720.1  1095.   715.2  1140.   710.6  1170.   705.2  1220.
GR 700.4   1275.   695.2  1285.   690.3  1305.   685.1  1320.   680.7  1338.
GR 675.4   1360.   665.3  1420.    660.  1443.    658.  1448.   659.1  1460.
GR 659.7   1550.   665.6  1680.    665.  1705.   667.5  1800.   670.2  1978.
GR 675.4   2042.   680.5  2080.   685.8  2100.   690.1  2125.   695.7  2140.
GR 700.2   2162.   705.6  2180.   710.6  2225.   715.1  2260.
NC  0.09    0.06    0.06    0.4     0.8
ET                                4.4
X1   57.     32.   1507.   1520.   160.    170.    160.
GR  725.   1000.   720.1  1055.   715.9  1095.   710.2  1155.   705.6  1190.
GR 700.2   1240.   695.6  1280.   690.3  1330.   685.7  1368.   680.5  1390.
GR 675.1   1428.   665.1  1502.    661.  1507.    659.  1510.   660.6  1520.
GR 662.2   1600.   665.8  1730.   667.1  1750.   666.5  1770.   667.1  1850.
GR 670.1   1975.   675.5  2000.   680.1  2125.   685.1  2180.   690.9  2200.
GR 695.1   2222.   700.7  2252.   705.6  2262.   710.6  2285.   715.2  2325.
GR 720.7   2372.   725.1  2415.
NC   0.1    0.09   0.055    0.4     0.8
X1   58.     31.   1412.   1440.   250.    175.    250.
GR 725.1   1000.    720.   1022.   715.6  1052.   710.2  1085.   705.2  1110.
GR 700.1   1140.   690.3  1172.   685.4  1260.   680.5  1290.   675.6  1318.
GR 670.1   1360.   665.7  1412.    661.  1430.   665.7  1440.   666.6  1500.
GR  668.   1550.   667.5  1580.   666.9  1650.   670.2  1760.   675.1  1800.
GR 677.3   1900.   680.3  1980.   685.4  2035.   690.2  2055.   695.3  2080.
GR 700.2   2095.   708.4  2108.   710.4  2118.   715.2  2130.   720.1  2140.
GR 725.1   2150.
NC   0.1    0.09    0.05    0.4     0.8
ET                                9.1                      1616.   1740.
X1 60.01     17.   1616.   1634.   250.     25.    105.
X3   10.                                                670.5   668.4
GR 679.5   1242.   676.7  1335.   672.7  1372.   671.7  1390.   668.9  1490.
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GR  668.   1520.   662.6   1615.   662.6   1616.   661.6   1625.   662.8   1634.
GR 662.8   1636.   667.8   1740.   668.7   1820.   669.7   1910.   674.8   1960.
GR 679.7   2040.   684.6   2125.
SB           1.5     2.5             18.             143.
ET                                   9.1                             1616.   1740.
X1 60.02                             41.     41.     41.
X2                   1.    670.1   608.7
X3   10.                                                   671.3   668.7
BT   17.   1242.   679.5   679.5   1335.   674.7   674.7   1372.   672.7   672.7
BT 1390.   672.6   671.7   1490.   672.2   668.9   1520.    672.    668.   1615.
BT 671.3   662.6   1616.   672.1   670.1   1625.   672.1   670.1   1634.   672.1
BT 670.1   1636.   671.3   662.8   1740.   670.4   667.8   1820.   668.7   668.7
BT 1910.   669.7   669.7   1960.   674.8   674.8   2040.   679.7   679.7   2125.
BT 684.6   684.6
NC   0.1     0.1    0.05     0.3     0.7
ET                                   4.4
X1   60.     29.   1620.   1630.     90.     125.    109.
GR  725.   1000.    720.   1030.   715.2   1048.   710.2   1062.   705.7   1080.
GR 700.4   1102.   695.1   1128.   690.4   1150.   685.3   1205.   680.1   1242.
GR 675.3   1330.   672.3   1390.   668.6   1520.   665.1   1620.    663.   1625.
GR 665.6   1630.    668.   1740.   670.3   1910.   675.4   1960.   680.3   2040.
GR 685.2   2125.   690.1   2162.   695.5   2188.   700.1   2210.   705.3   2220.
GR 710.2   2245.   715.6   2258.   720.5   2270.   725.1   2295.
NC   0.1     0.1    0.05     0.1     0.3
ET                                   6.4
X1   61.     29.   1730.   1745.    225.     225.    260.
GR 725.6   1000.   720.5   1032.    715.   1052.   710.3   1075.   705.3   1100.
GR 700.1   1130.    695.   1158.   690.7   1180.   685.4   1210.   680.3   1262.
GR  675.   1370.   670.1   1408.   670.2   1470.   668.3   1600.    666.   1730.
GR  664.   1735.   666.2   1745.   667.2   1800.    675.   1820.   680.4   1875.
GR 685.4   1955.   690.5   1985.    695.   2015.    700.   2045.   705.3   2060.
GR 710.1   2075.    715.   2105.   720.3   2152.   725.1   2215.
NC   0.1     0.1    0.05     0.1     0.3
ET                                   6.4
X1   62.     33.   2220.   2240.    125.     225.    200.
GR 725.4   1000.    720.   1020.    715.   1038.   710.2   1050.   705.2   1058.
GR 704.5   1060.    700.   1100.   695.6   1148.   690.3   1208.   689.5   1315.
GR 685.5   1500.   684.5   1670.   680.5   1820.   674.5   1905.    675.   1910.
GR 672.5   1950.   670.1   1990.   668.5   2100.   665.5   2220.   664.5   2230.
GR 665.3   2240.   670.3   2280.    675.   2300.   680.4   2320.    685.   2360.
GR 690.2   2420.    695.   2450.    700.   2480.   705.2   2510.   710.1   2560.
GR  715.   2645.   720.2   2740.   725.2   2790.
NC   0.1     0.1    0.05     0.1     0.3
X1   63.     31.   1860.   1880.    200.     225.    240.
GR 725.4   1000.   720.4   1015.   715.3   1030.   710.6   1058.   705.3   1068.
GR 702.5   1080.   700.2   1110.   695.4   1140.   690.1   1186.   687.5   1280.
GR 685.1   1390.   684.5   1430.   685.2   1478.   680.3   1620.   675.6   1660.
GR 670.3   1690.   668.6   1860.    665.   1870.   667.3   1880.   670.2   2000.
GR 675.4   2020.   680.6   2042.   685.2   2075.   690.2   2120.   695.5   2175.
GR 700.1   2225.   705.1   2240.   710.4   2280.   715.2   2330.    720.   2355.
GR 725.4   2410.
NC   0.1     0.1    0.05     0.1     0.3
X1   64.     33.   1430.   1450.    275.     225.    255.
GR 725.1   1000.   720.3   1010.   715.3   1022.   710.4   1055.   705.2   1075.
GR 700.2   1100.   695.6   1120.   692.5   1140.   692.5   1150.   690.1   1180.
GR 685.5   1270.   677.5   1300.   675.6   1315.   670.1   1390.   668.4   1430.
GR  667.   1440.   669.4   1450.   670.4   1465.   670.3   1485.   668.5   1540.
GR 670.2   1610.   675.3   1635.   680.2   1662.   690.8   1685.   687.5   1725.
GR 690.2   1750.   695.2   1770.   700.1   1780.   705.1   1810.   710.6   1835.
GR 715.1   1850.   720.1   1870.   725.2   1895.
NC   0.1     0.1    0.05     0.3     0.5
ET                                   4.4
X1   65.     29.   1420.   1448.    125.     90.     105.
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WALKER RUN - INPUT

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GR 725.4   1000.   710.3   1050.   705.3   1070.   700.4   1120.   695.6   1130.
GR 690.4   1160.   685.4   1185.   680.2   1220.   678.3   1265.   678.3   1275.
GR 675.6   1285.   670.3   1305.   669.1   1350.   668.5   1420.   667.5   1430.
GR 670.2   1448.   672.5   1500.   675.2   1540.   677.5   1570.   680.2   1590.
GR  685.   1605.   690.1   1640.   695.3   1662.   700.1   1680.   705.4   1695.
GR 710.2   1720.   715.2   1740.   720.3   1755.    725.   1765.
EJ
ER
```

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1*****************************************
 *  HEC-2 WATER SURFACE PROFILES         *
 *                                       *
 *  Version   4.6.2;  May 1991           *
 *                                       *
 *  RUN DATE    11AUG11    TIME   12:33:43  *
 *****************************************
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*****************************************
*  U.S. ARMY CORPS OF ENGINEERS         *
*  HYDROLOGIC ENGINEERING CENTER        *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616-4687         *
*          (916) 756-1104               *
*****************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                   X
X     X  X        X     X             X
X     X  XXXXXXX   XXXXX              XXXXXXX
```

1

THIS RUN EXECUTED 11AUG11 12:33:43

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*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************
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```
T1      SUSQUEHANNA RIVER BASIN COMMISSION
T2      BLOOMSBURG-BERWICK-SHICKSHINNY REACH
T3      WALKER RUN - 100 YR. FLOOD

J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
        0       4         0         0         0         0         0         0      653.29       0

J2  NPROF      IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
    +1.0        0       -1.0        0         0         0         0         0         0         0

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

      38        43         1         9        50         3        61        36        21        22
      27        28         4         0        38        39        43         1         3        11
      12        10        26        20        50        51         4         0       200         0

QT        5       550      1320      1860      1860      3100
```

```
NC     0.09      0.09      0.05      0.3       0.7
ET                                           15.4
X1       44.       22.     1405.     1412.     225.      200.      260.         0         0         0
GR    685.1     1000.     680.3     1092.    675.1     1128.     670.1     1170.     665.3     1230.
GR    660.8     1310.     658.3     1330.    655.4     1350.     650.5     1372.      648.     1405.
GR    646.5     1408.     648.7     1412.    650.4     1450.      650.     1490.     650.1     1525.
GR    649.8     1570.     650.6     1610.    655.1     1670.     660.1     1712.     665.6     1740.
GR    670.1     1750.     675.6     1790.        0         0         0         0         0         0

NC     0.09      0.09      0.05      0.3       0.7         0         0         0         0         0
ET        0         0         0        0       9.1         0         0         0     1656.     1815.
X1    46.01       40.    1655.5    1664.5     100.      850.      230.
X3       10.                                                              653.      653.
GR    699.6     1000.      695.     1040.    691.7     1100.     689.7     1170.     684.7     1210.
GR    682.8     1260.     685.1     1340.    681.8     1400.     679.8     1440.     677.1     1490.
GR     675.     1530.     669.8     1555.    664.5     1580.     659.5     1610.     654.4     1635.
GR    652.9     1640.     652.9     1650.    648.1    1655.5     647.7     1656.     646.8     1657.
GR    646.7     1658.     646.7     1659.    646.7     1660.     646.7     1661.     646.7     1662.
GR    646.7     1663.      647.     1664.    647.4    1664.5     649.5     1670.     649.8     1680.
GR    649.8     1690.     651.9     1750.    654.4     1815.      655.     1830.      656.     1870.
GR    654.8     1900.     659.5     1925.    661.7     2100.     666.1     2240.     666.9     2450.
1
    11AUG11      12:33:43                                                                    PAGE     2


SB                1.5       2.5                 9.                  42.                 646.7     646.7
ET                                              9.1                                     1656.     1815.
X1    46.02                                     30.       30.       30.
X2                            1.      652.5     654.4
X3       10.                                                              654.4     654.4
BT       30.     1530.      675.      675.    1555.     669.8     669.8     1580.     664.5     664.5
BT     1610.     659.5     659.5     1635.    654.4     654.4     1640.     654.4     652.9     1650.
BT      656.     652.9    1655.5     657.5    648.1     1656.     657.6     650.3     1657.     657.7
BT     651.4     1658.     657.8     652.1    1659.     657.9     652.4     1660.      658.     652.5
BT     1661.     657.8     652.4     1662.    657.8     652.1     1663.     657.7     651.3     1664.
BT     657.6      650.    1664.5     657.5    647.4     1670.      657.     649.5     1680.      656.
BT     649.8     1690.     654.4     649.8    1750.     654.4     651.9     1815.     654.4     654.4
BT     1830.      655.      655.     1870.     656.      656.     1900.     654.9     654.9     1925.
BT     659.5     659.5     2100.     661.7    661.7     2240.     665.1     665.1     2450.     666.9
BT     666.9

NC     0.09      0.09      0.05      0.3       0.7
ET                                            6.4
X1       46.       36.     1650.     1670.     175.       50.      145.
GR    700.2     1000.     695.6     1040.    692.3     1100.     690.3     1170.     688.3     1210.
GR    683.4     1260.     685.7     1340.    682.4     1400.     680.4     1440.     677.7     1490.
GR    675.6     1530.     670.4     1555.    665.1     1580.      660.     1610.     655.8     1640.
GR    650.2     1650.     647.5     1660.    650.1     1670.     652.5     1750.     655.8     1830.
GR    656.8     1870.     655.5     1900.    660.1     1925.     662.3     2100.     665.7     2240.
GR    667.5     2450.     670.4     2623.    675.4     2720.     680.1     2760.     655.3     2800.
GR    690.3     2838.     695.1     2848.    700.2     2900.     705.2     2940.     710.2     3010.
GR    715.2     3100.

ET                                              9.1                                     1390.     1510.
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X1      47.      28.    1410.    1440.     220.     240.     400.
GR     687.3   1000.     685.6   1050.    680.6   1090.    675.2   1110.    670.4   1130.
GR     665.3   1150.     660.1   1210.    656.3   1250.    652.5   1350.    650.1   1410.
GR      648.   1430.     650.4   1440.    655.1   1550.    657.4   1605.    660.2   1630.
GR     662.5   1750.     665.2   1860.    667.3   2000.    668.1   2100.    668.6   2180.
GR     670.1   2365.     672.1   2450.    675.3   2540.    685.1   2640.    690.3   2700.
GR     700.1   2750.     705.4   2800.    710.2   2920.

NC      0.09    0.09      0.05     0.3      0.7
ET                                          9.1                                1645.    1735.
X1     49.01      28.    1709.    1712.     350.     275.     450.
X3       10.                                                        653.7    653.7
GR      725.   1000.      720.   1035.    715.2   1088.    709.9   1120.    704.8   1152.
GR     700.3   1200.     695.3   1238.    690.3   1270.    685.1   1290.    680.4   1340.
GR     675.4   1402.     669.8   1445.    664.9   1480.    660.2   1530.    664.9   1590.
GR     654.4   1609.     651.7   1709.    650.4  1709.5    650.2  1710.5    650.4  1711.5
GR     651.7   1712.     654.4   1890.     655.   1930.    660.3   2080.    663.9   2200.
GR     664.1   2300.     663.9   2400.    665.4   2500.
1
    11AUG11      12:33:43                                                                PAGE     3


SB              1.5       2.5                3.                 7.1                650.2    650.2
ET                                          9.1                                1645.    1709.
X1     49.02                                20.      20.       20.
X2                         1.     653.2     654.4
X3       10.                                                        654.4    654.4
BT       16.   1480.     664.9    664.9    1530.    660.2    660.2   1590.    654.9    654.9
BT     1609.    654.4     654.4   1709.    654.4   651.7   1709.5    654.4     653.  1710.5
BT     654.4    653.2    1711.5    654.4     653.   1712.    654.4   651.7   1890.    654.4
BT     654.4   1930.      655.     655.    2080.   660.3    660.3   2200.    663.9    663.9
BT     2300.    664.1     664.1   2400.    663.9   663.9   2500.    665.4    665.4

ET                                         15.4
X1       49.      26.    1700.    1720.      30.      30.      30.
GR     725.3   1000.     720.3   1035.    715.5   1088.    710.8   1120.    705.1   1152.
GR     700.5   1200.     695.6   1238.    690.6   1270.    685.4   1290.    680.7   1340.
GR     675.7   1402.     670.1   1445.    665.2   1480.    660.5   1530.    655.2   1590.
GR     651.7   1700.     650.5   1710.    651.4   1720.    655.3   1750.    657.8   1900.
GR     660.6   2080.     664.2   2200.    664.4   2300.    664.2   2400.    665.7   2500.
GR     665.1   2590.

NC      0.08    0.08      0.05     0.1      0.3
ET                                         15.4
X1       50.      22.    1740.    1765.     300.     175.     275.
GR     725.3   1000.     720.1   1035.    715.4   1060.    710.1   1080.    705.8   1130.
GR     700.3   1165.     695.6   1190.    690.3   1225.    685.7   1265.    680.3   1345.
GR     675.3   1380.     670.4   1470.    665.9   1528.    660.2   1570.    655.5   1610.
GR     652.5   1680.     652.1   1740.    651.5   1752.    652.1   1765.     655.   1960.
GR      660.   2205.      665.   2330.

QT       5.    480.     1160.    1640.    1640.    3600.
NC      0.06    0.06      0.05     0.1      0.3
ET                                          9.1                                2350.    2800.
```

X1	51.	23.	2715.	2750.	1200.	200.	740.			
GR	690.1	1000.	687.3	1100.	685.1	1230.	680.2	1275.	675.6	1340.
GR	670.8	1450.	665.2	1635.	660.5	1798.	657.3	2030.	656.4	2295.
GR	655.1	2298.	656.7	2300.	656.7	2460.	655.1	2470.	656.7	2475.
GR	655.5	2600.	655.1	2715.	653.	2740.	655.3	2750.	658.1	2960.
GR	660.4	3230.	665.4	3345.	665.2	3360.				
NC	0.06	0.06	0.05	0.1	0.3					
ET					10.4					
X1	52.	34.	2145.	2268.	600.	350.	330.			
GR	725.1	1000.	720.1	1030.	715.4	1080.	710.9	1108.	705.3	1130.
GR	700.2	1150.	695.3	1170.	690.3	1195.	685.4	1225.	680.	1240.
GR	675.3	1295.	670.7	1400.	667.5	1500.	665.3	1590.	664.1	1630.
GR	665.1	1700.	665.7	1735.	665.2	1772.	660.	1825.	660.4	1888.
GR	658.1	2100.	656.1	2145.	654.	2250.	655.2	2268.	657.2	2350.
GR	660.6	2440.	662.1	2600.	665.3	2735.	667.3	2755.	668.1	2900.
GR	668.3	3100.	670.	3250.	672.1	3350.	675.4	3465.		

1

NC	0.06	0.06	0.05	0.3	0.7					
ET					9.1				2100.	2260.
X1	52.1	20.	2247.	2253.	175.	80.	133.			
X3	10.							657.	657.	
GR	666.2	1735.	665.7	1772.	660.5	1825.	660.	1888.	659.2	2045.
GR	658.6	2100.	655.6	2145.	654.6	2246.	654.6	2247.	654.6	2250.
GR	654.6	2253.	655.7	2268.	657.7	2350.	659.2	2390.	661.1	2440.
GR	662.6	2600.	665.8	2735.	667.8	2755.	668.6	2900.	668.8	3100.
SB		1.5	2.5		6.		23.4		654.6	654.6
ET					9.1				2100.	2268.
X1	52.2				12.	12.	12.			
X2			1.	658.5	659.2					
X3	10.							659.2	659.2	
BT	20.	1735.	666.2	666.2	1772.	665.7	665.7	1825.	660.5	660.5
BT	1888.	660.9	660.9	2045.	659.2	659.2	2100.	659.2	658.6	2145.
BT	659.2	655.6	2246.	659.2	654.6	2247.	659.2	658.5	2250.	659.2
BT	658.5	2253.	659.2	654.6	2268.	659.2	655.7	2350.	659.2	657.7
BT	2390.	659.2	659.2	2440.	661.1	661.1	2600.	662.6	662.6	2735.
BT	665.8	665.8	2755.	667.8	667.8	2900.	668.6	668.6	3100.	668.8
BT	668.8									
NC	0.06	0.06	0.05	0.3	0.7					
ET					10.4					
X1	54.	35.	1818.	1837.	300.	250.	245.			
GR	725.2	1000.	720.7	1120.	715.2	1198.	710.1	1242.	705.1	1262.
GR	700.6	1268.	695.3	1300.	690.3	1312.	685.3	1328.	680.1	1350.
GR	675.1	1368.	672.2	1470.	670.3	1588.	669.8	1595.	665.1	1669.
GR	657.5	1760.	657.	1818.	655.5	1830.	657.	1837.	657.5	1880.
GR	663.	2000.	665.1	2180.	668.1	2220.	667.	2300.	670.4	2465.
GR	672.4	2680.	675.5	2718.	680.3	2760.	685.3	2805.	690.	2840.
GR	695.7	2855.	700.7	2875.	705.1	2900.	710.	2980.	715.1	3015.

```
NC      0.06        0.06        0.05        0.1         0.3
X1        55.         29.       1510.       1530.       340.        320.        330.
GR       725.       1000.       720.6       1095.       715.5       1110.       710.1       1210.       705.1       1260.
GR       700.3      1290.       695.8       1300.       690.6       1315.       685.2       1330.       680.2       1355.
GR       675.7      1385.       670.5       1405.       665.3       1425.       657.5       1510.       656.7       1520.
GR       656.9      1530.       662.2       1670.       665.1       1805.       667.3       1828.       670.4       1978.
GR       672.1      2070.       675.4       2178.       680.1       2210.       688.3       2248.       690.7       2285.
GR       695.6      2310.       700.1       2355.       705.1       2420.       710.1       2525.

NC      0.09        0.05        0.05        0.1         0.3
ET                                                      6.4
X1        56.         29.       1443.       1460.       300.        325.        310.
GR       725.1      1000.       720.1       1095.       715.2       1140.       710.6       1170.       705.2       1220.
GR       700.4      1275.       695.2       1285.       690.3       1305.       685.1       1320.       680.7       1338.
GR       675.4      1360.       665.3       1420.       660.        1443.       658.        1448.       659.1       1460.
GR       659.7      1550.       665.6       1680.       665.        1705.       667.5       1800.       670.2       1978.
GR       675.4      2042.       680.5       2080.       685.8       2100.       690.1       2125.       695.7       2140.
GR       700.2      2162.       705.6       2180.       710.6       2225.       715.1       2260.
1
    11AUG11      12:33:43                                                                                          PAGE     5

NC      0.09        0.06        0.06        0.4         0.8
ET                                                      4.4
X1        57.         32.       1507.       1520.       160.        170.        160.
GR       725.       1000.       720.1       1055.       715.9       1095.       710.2       1155.       705.6       1190.
GR       700.2      1240.       695.6       1280.       690.3       1330.       685.7       1368.       680.5       1390.
GR       675.1      1428.       665.1       1502.       661.        1507.       659.        1510.       660.6       1520.
GR       662.2      1600.       665.8       1730.       667.1       1750.       666.5       1770.       667.1       1850.
GR       670.1      1975.       675.5       2000.       680.1       2125.       685.1       2180.       690.9       2200.
GR       695.1      2222.       700.7       2252.       705.6       2262.       710.6       2285.       715.2       2325.
GR       720.7      2372.       725.1       2415.

NC       0.1        0.09        0.055       0.4         0.8
X1        58.         31.       1412.       1440.       250.        175.        250.
GR       725.1      1000.        720.       1022.       715.6       1052.       710.2       1085.       705.2       1110.
GR       700.1      1140.       690.3       1172.       685.4       1260.       680.5       1290.       675.6       1318.
GR       670.1      1360.       665.7       1412.       661.        1430.       665.7       1440.       666.6       1500.
GR        668.      1550.       667.5       1580.       666.9       1650.       670.2       1760.       675.1       1800.
GR       677.3      1900.       680.3       1980.       685.4       2035.       690.2       2055.       695.3       2080.
GR       700.2      2095.       708.4       2108.       710.4       2118.       715.2       2130.       720.1       2140.
GR       725.1      2150.

NC       0.1        0.09        0.05        0.4         0.8
ET                                                      9.1                                             1616.       1740.
X1      60.01         17.       1616.       1634.       250.         25.        105.
X3        10.                                                                   670.5       668.4
GR       679.5      1242.       676.7       1335.       672.7       1372.       671.7       1390.       668.9       1490.
GR        668.      1520.       662.6       1615.       662.6       1616.       661.6       1625.       662.8       1634.
GR       662.8      1636.       667.8       1740.       668.7       1820.       669.7       1910.       674.8       1960.
GR       679.7      2040.       684.6       2125.

SB                    1.5         2.5                     18.                     143.
ET                                                      9.1                                             1616.       1740.
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X1    60.02                                    41.      41.      41.
X2                        1.     670.1    608.7
X3      10.                                                    671.3    668.7
BT      17.    1242.    679.5    679.5    1335.    674.7    674.7    1372.    672.7    672.7
BT    1390.    672.6    671.7    1490.    672.2    668.9    1520.     672.     668.    1615.
BT    671.3    662.6    1616.    672.1    670.1    1625.    672.1    670.1    1634.    672.1
BT    670.1    1636.    671.3    662.8    1740.    670.4    667.8    1820.    668.7    668.7
BT    1910.    669.7    669.7    1960.    674.8    674.8    2040.    679.7    679.7    2125.
BT    684.6    684.6

NC      0.1      0.1     0.05      0.3      0.7
ET                                         4.4
X1       60.      29.    1620.    1630.     90.     125.     109.
GR      725.    1000.     720.    1030.    715.2    1048.    710.2    1062.    705.7    1080.
GR    700.4    1102.    695.1    1128.    690.4    1150.    685.3    1205.    680.1    1242.
GR    675.3    1330.    672.3    1390.    668.6    1520.    665.1    1620.     663.    1625.
GR    665.6    1630.     668.    1740.    670.3    1910.    675.4    1960.    680.3    2040.
GR    685.2    2125.    690.1    2162.    695.5    2188.    700.1    2210.    705.3    2220.
GR    710.2    2245.    715.6    2258.    720.5    2270.    725.1    2295.
1
    11AUG11      12:33:43                                                                PAGE     6


NC      0.1      0.1     0.05      0.1      0.3
ET                                         6.4
X1       61.      29.    1730.    1745.    225.     225.     260.
GR    725.6    1000.     720.5    1032.    715.     1052.    710.3    1075.    705.3    1100.
GR    700.1    1130.     695.    1158.    690.7    1180.    685.4    1210.    680.3    1262.
GR     675.    1370.    670.1    1408.    670.2    1470.    668.3    1600.     666.    1730.
GR     664.    1735.    666.2    1745.    667.2    1800.     675.    1820.    680.4    1875.
GR    685.4    1955.    690.5    1985.     695.    2015.     700.    2045.    705.3    2060.
GR    710.1    2075.     715.    2105.    720.3    2152.    725.1    2215.

NC      0.1      0.1     0.05      0.1      0.3
ET                                         6.4
X1       62.      33.    2220.    2240.    125.     225.     200.
GR    725.4    1000.     720.    1020.    715.     1038.    710.2    1050.    705.2    1058.
GR    704.5    1060.     700.    1100.    695.6    1148.    690.3    1208.    689.5    1315.
GR    685.5    1500.    684.5    1670.    680.5    1820.    674.5    1905.     675.    1910.
GR    672.5    1950.    670.1    1990.    668.5    2100.    665.5    2220.    664.5    2230.
GR    665.3    2240.    670.3    2280.     675.    2300.    680.4    2320.     685.    2360.
GR    690.2    2420.     695.    2450.     700.    2480.    705.2    2510.    710.1    2560.
GR     715.    2645.    720.2    2740.    725.2    2790.

NC      0.1      0.1     0.05      0.1      0.3
X1       63.      31.    1860.    1880.    200.     225.     240.
GR    725.4    1000.    720.4    1015.    715.3    1030.    710.6    1058.    705.3    1068.
GR    702.5    1080.    700.2    1110.    695.4    1140.    690.1    1186.    687.5    1280.
GR    685.1    1390.    684.5    1430.    685.2    1478.    680.3    1620.    675.6    1660.
GR    670.3    1690.    668.6    1860.     665.    1870.    667.3    1880.    670.2    2000.
GR    675.4    2020.    680.6    2042.    685.2    2075.    690.2    2120.    695.5    2175.
GR    700.1    2225.    705.1    2240.    710.4    2280.    715.2    2330.     720.    2355.
GR    725.4    2410.
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NC      0.1       0.1       0.05       0.1       0.3
X1       64.       33.      1430.      1450.     275.      225.      255.
GR     725.1     1000.     720.3      1010.     715.3     1022.     710.4     1055.     705.2     1075.
GR     700.2     1100.     695.6      1120.     692.5     1140.     692.5     1150.     690.1     1180.
GR     685.5     1270.     677.5      1300.     675.6     1315.     670.1     1390.     668.4     1430.
GR      667.     1440.     669.4      1450.     670.4     1465.     670.3     1485.     668.5     1540.
GR     670.2     1610.     675.3      1635.     680.2     1662.     690.8     1685.     687.5     1725.
GR     690.2     1750.     695.2      1770.     700.1     1780.     705.1     1810.     710.6     1835.
GR     715.1     1850.     720.1      1870.     725.2     1895.

NC      0.1       0.1       0.05       0.3       0.5
ET                                             4.4
X1       65.       29.      1420.      1448.     125.      90.       105.
GR     725.4     1000.     710.3      1050.     705.3     1070.     700.4     1120.     695.6     1130.
GR     690.4     1160.     685.4      1185.     680.2     1220.     678.3     1265.     678.3     1275.
GR     675.6     1285.     670.3      1305.     669.1     1350.     668.5     1420.     667.5     1430.
GR     670.2     1448.     672.5      1500.     675.2     1540.     677.5     1570.     680.2     1590.
GR      685.     1605.     690.1      1640.     695.3     1662.     700.1     1680.     705.4     1695.
GR     710.2     1720.     715.2      1740.     720.3     1755.      725.     1765.
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    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
    Q         QLOB      QCH       QROB      ALOB      ACH       AROB      VOL       TWA       R-BANK ELEV
    TIME      VLOB      VCH       VROB      XNL       XNCH      XNR       WTN       ELMIN     SSTA
    SLOPE     XLOBL     XLCH      XLOBR     ITRIAL    IDC       ICONT     CORAR     TOPWID    ENDST


 *PROF 1
0

 CCHV=     .300 CEHV=     .700
 *SECNO 44.000
    44.000      6.79    653.29       .00    653.29    653.38       .09       .00       .00    648.00
    1860.0     319.8     195.8    1344.4     150.8      40.9     701.3        .0        .0    648.70
       .00      2.12      4.79      1.92      .090      .050      .090      .000    646.50   1359.47
   .002910       225.      260.      200.         0         0         0       .00    286.39   1645.87


 CCHV=     .300 CEHV=     .700
 *SECNO 46.010

 3265 DIVIDED FLOW

    46.010      8.51    655.21       .00       .00    655.44       .23      1.96       .10    648.10
    1860.0     102.2     485.5    1272.3      58.2      74.9     551.7      12.8       4.2    647.40
       .05      1.76      6.48      2.31      .090      .050      .090      .000    646.70   1631.08
   .003105       100.      230.      850.         2         0         0       .00    219.07   1902.13


 SPECIAL BRIDGE

 SB  XK        XKOR      COFQ      RDLEN     BWC       BWP       BAREA     SS        ELCHU     ELCHD
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.00	1.50	2.50	.00	9.00	.00	42.00	.00	646.70	646.70

*SECNO 46.020

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.61

PRESSURE AND WEIR FLOW, Weir Submergence Based on TRAPEZOIDAL Shape

EGPRS	EGLWC	H3	QWEIR	QPR	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
700.89	655.44	.00	1537.	328.	42.	52.	652.50	654.40	264.

46.020	9.83	656.53	.00	.00	656.63	.09	1.19	.00	648.10
1860.0	123.7	385.4	1351.0	95.1	86.9	852.7	13.4	4.4	647.40
.06	1.30	4.43	1.58	.090	.050	.090	.000	646.70	1624.54
.001192	30.	30.	30.	2	0	8	.00	284.69	1909.23

1

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .300 CEHV= .700
*SECNO 46.000

3265 DIVIDED FLOW

46.000	9.13	656.63	.00	.00	656.78	.15	.11	.04	650.20
1860.0	52.1	706.1	1101.8	38.8	156.2	659.8	14.9	4.8	650.10
.07	1.34	4.52	1.67	.090	.050	.090	.000	647.50	1634.05
.001564	175.	145.	50.	2	0	0	.00	265.14	2801.45

*SECNO 47.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.60

47.000	9.02	657.02	.00	.00	657.08	.06	.27	.03	650.10
1860.0	651.5	686.6	521.9	609.2	237.8	514.9	21.6	6.6	650.40
.11	1.07	2.89	1.01	.090	.050	.090	.000	648.00	1242.34
.000607	220.	400.	240.	0	0	0	.00	353.75	1596.09

CCHV= .300 CEHV= .700
*SECNO 49.010

49.010	7.12	657.32	.00	.00	657.35	.03	.26	.01	651.70
1860.0	600.0	50.5	1209.5	434.7	20.3	940.9	31.7	9.2	651.70

.18	1.38	2.49	1.29	.090	.050	.090	.000	650.20	1603.72
.001030	350.	450.	275.	2	0	0	.00	391.93	1995.65

SPECIAL BRIDGE

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	.00	1.50	2.50	.00	3.00	.00	7.10	.00	650.20	650.20

*SECNO 49.020
6870 D.S. ENERGY OF 657.35 IS HIGHER THAN COMPUTED ENERGY OF 657.34
PRESSURE AND WEIR FLOW, Weir Submergence Based on TRAPEZOIDAL Shape

EGPRS	EGLWC	H3	QWEIR	QPR	BAREA	TRAPEZOID AREA	ELLC	ELTRD	WEIRLN
2255.83	657.35	.00	1860.	6.	7.	9.	653.20	654.40	434.

1

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
49.020	7.12	657.32	.00	.00	657.35	.03	.00	.00	651.70
1860.0	599.8	50.4	1209.8	435.7	20.3	943.6	32.3	9.4	651.70
.19	1.38	2.48	1.28	.090	.050	.090	.000	650.20	1603.70
.001021	20.	20.	20.	1	0	12	.00	392.22	1995.92

*SECNO 49.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .64

49.000	6.82	657.32	.00	.00	657.49	.17	.05	.10	651.70
1860.0	883.0	631.7	345.3	451.6	126.0	242.1	33.1	9.6	651.40
.19	1.96	5.01	1.43	.090	.050	.090	.000	650.50	1565.96
.002465	30.	30.	30.	2	0	0	.00	305.45	1871.41

CCHV= .100 CEHV= .300
*SECNO 50.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.34

50.000	6.20	657.70	.00	.00	657.73	.02	.22	.01	652.10
1860.0	646.1	303.6	910.4	604.1	147.6	988.9	40.1	11.7	652.10
.25	1.07	2.06	.92	.080	.050	.080	.000	651.50	1591.25
.000450	300.	275.	175.	2	0	0	.00	501.21	2092.46

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CCHV=      .100 CEHV=      .300
*SECNO 51.000
    51.000       5.13    658.13       .00       .00    658.15       .02       .42       .00    655.10
    1640.0    1137.7     266.2     236.0    1216.6     141.8     300.2      70.6      25.8    655.30
       .46       .94      1.88       .79      .060      .050      .060      .000    653.00   1969.88
   .000626     1200.      740.      200.         3         0         0       .00    993.55   2963.43


CCHV=      .100 CEHV=      .300
*SECNO 52.000

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =    .61

    52.000       4.49    658.49       .00       .00    658.59       .10       .42       .02    656.10
    1640.0       81.4    1210.9     347.6      69.7     431.4     209.9      83.7      33.4    655.20
       .51       1.17      2.81      1.66      .060      .050      .060      .000    654.00   2063.94
   .001675      600.      330.      350.         2         0         0       .00    320.24   2384.18


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    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

CCHV=      .300 CEHV=      .700
*SECNO 52.100
    52.100       4.15    658.75       .00       .00    658.84       .09       .25       .00    654.60
    1640.0    1100.2      85.8     454.0     448.9      24.9     237.4      85.8      34.3    654.60
       .53       2.45      3.44      1.91      .060      .050      .060      .000    654.60   2085.80
   .002010      175.      133.       80.         2         0         0       .00    292.34   2378.13


SPECIAL BRIDGE

SB  XK         XKOR       COFQ       RDLEN      BWC        BWP        BAREA      SS         ELCHU      ELCHD
       .00       1.50       2.50        .00       6.00        .00      23.40        .00    654.60     654.60

*SECNO 52.200

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  2.39

PRESSURE AND WEIR FLOW,  Weir Submergence Based on TRAPEZOIDAL Shape

 EGPRS       EGLWC       H3         QWEIR      QPR        BAREA    TRAPEZOID AREA      ELLC       ELTRD      WEIRLN
    773.16     725.95        .00      1442.       201.         23.         23.       658.50     659.20       497.
```

52.200	5.86	660.46	.00	.00	660.48	.02	1.64	.00	654.60
1640.0	1050.3	63.8	525.9	932.2	35.2	489.1	86.1	34.4	654.60
.53	1.13	1.81	1.08	.060	.050	.060	.000	654.60	1830.17
.000353	12.	12.	12.	2	0	10	.00	592.96	2423.13

CCHV= .300 CEHV= .700
*SECNO 54.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .36

54.000	5.14	660.64	.00	.00	660.77	.14	.21	.08	657.00
1640.0	679.2	345.5	615.3	255.2	83.3	252.8	92.7	37.1	657.00
.55	2.66	4.15	2.43	.060	.050	.060	.000	655.50	1722.46
.002760	300.	245.	250.	2	0	0	.00	225.95	1948.41

CCHV= .100 CEHV= .300
1
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 55.000

55.000	4.98	661.68	.00	.00	661.91	.23	1.11	.03	657.50
1640.0	251.1	516.7	872.2	95.3	94.6	301.9	96.7	38.6	656.90
.58	2.64	5.46	2.89	.060	.050	.060	.000	656.70	1464.44
.004260	340.	330.	320.	2	0	0	.00	191.86	1656.29

CCHV= .100 CEHV= .300
*SECNO 56.000

56.000	4.84	662.84	.00	.00	663.01	.17	1.09	.01	660.00
1640.0	18.9	282.4	1338.6	17.5	70.6	417.7	100.4	40.0	659.10
.61	1.08	4.00	3.20	.090	.050	.050	.000	658.00	1430.69
.002803	300.	310.	325.	2	0	0	.00	188.43	1619.12

CCHV= .400 CEHV= .800
*SECNO 57.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .39

57.000	4.73	663.73	.00	.00	664.31	.58	.97	.32	661.00
1640.0	10.6	405.2	1224.2	4.6	50.5	229.2	101.9	40.7	660.60
.61	2.33	8.02	5.34	.090	.060	.060	.000	659.00	1503.67
.018442	160.	160.	170.	2	0	0	.00	151.72	1655.38

CCHV= .400 CEHV= .800
*SECNO 58.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

58.000	7.00	668.00	668.00	.00	668.74	.74	3.28	.13	665.70
1640.0	58.6	1088.1	493.3	31.2	130.1	229.1	103.5	41.7	665.70
.62	1.88	8.36	2.15	.100	.055	.090	.000	661.00	1384.85
.013329	250.	250.	175.	4	11	0	.00	301.51	1686.59

CCHV= .400 CEHV= .800
*SECNO 60.010
1
11AUG11 12:33:43 PAGE 12

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 2.17

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 670.50 ELREA= 668.40

60.010	7.47	669.07	.00	.00	669.32	.25	.39	.20	662.60
1640.0	.0	713.1	926.9	.0	124.7	477.7	104.1	41.9	662.80
.63	.00	5.72	1.94	.000	.050	.090	.000	661.60	1616.00
.002834	250.	105.	25.	2	0	0	.00	237.84	1853.84

SPECIAL BRIDGE

5070, VARIABLE ELCHU OR ELCHD ON SB CARD NOT SPECIFIED

SB	XK	XKOR	COFQ	RDLEN	BWC	BWP	BAREA	SS	ELCHU	ELCHD
	.00	1.50	2.50	.00	18.00	.00	143.00	.00	661.60	661.60

*SECNO 60.020

6070,LOW FLOW BY NORMAL BRIDGE

EGPRS= .000 EGLWC= 669.325 ELLC= 670.100 PCWSE= 669.071 ELTRD= 608.700

4575 CRITICAL DEPTH ASSUMED BELOW ELLC OF 670.100 EGLC= 671.339 EGC= 671.342 WSEL= 670.247

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE, NRD= 17 MIN ELTRD= 608.70 MAX ELLC= 670.10

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 671.30 ELREA= 668.70

60.020	8.50	670.10	670.10	.00	671.34	1.24	.23	.79	662.60
1640.0	.0	1385.9	254.1	.0	143.1	135.2	104.5	42.2	662.80
.63	.00	9.68	1.88	.000	.050	.090	.000	661.60	1616.00
.016948	41.	41.	41.	2	14	0	-608.38	297.92	1913.92

CCHV= .300 CEHV= .700

1

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 60.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 5.68

60.000	8.85	671.85	.00	.00	671.87	.02	.17	.37	665.10
1640.0	585.6	190.3	864.1	686.1	76.8	1027.0	107.1	43.3	665.60
.66	.85	2.48	.84	.100	.050	.100	.000	663.00	1405.72
.000525	90.	109.	125.	2	0	0	.00	519.50	1925.22

CCHV= .100 CEHV= .300
*SECNO 61.000

61.000	7.98	671.98	.00	.00	672.01	.03	.13	.00	666.00
1640.0	1010.0	277.7	352.4	1106.7	103.6	319.0	115.8	45.7	666.20
.71	.91	2.68	1.10	.100	.050	.100	.000	664.00	1393.49
.000654	225.	260.	225.	2	0	0	.00	418.74	1812.23

CCHV= .100 CEHV= .300
*SECNO 62.000

62.000	7.58	672.08	.00	.00	672.13	.05	.11	.01	665.50
1640.0	1013.2	437.7	189.1	948.8	142.7	178.1	120.6	46.9	665.30
.74	1.07	3.07	1.06	.100	.050	.100	.000	664.50	1956.95
.000780	125.	200.	225.	1	0	0	.00	330.63	2287.59

CCHV= .100 CEHV= .300

*SECNO 63.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .69

63.000	7.30	672.30	.00	.00	672.38	.08	.24	.01	668.60
1640.0	594.2	442.5	603.3	495.1	116.4	434.0	126.2	48.5	667.30
.77	1.20	3.80	1.39	.100	.050	.100	.000	665.00	1678.70
.001655	200.	240.	225.	2	0	0	.00	329.36	2008.06

CCHV= .100 CEHV= .300
*SECNO 64.000

64.000	5.79	672.79	.00	.00	672.90	.11	.52	.01	668.40
1640.0	303.5	427.0	909.5	191.1	96.8	536.3	131.5	50.2	669.40
.80	1.59	4.41	1.70	.100	.050	.100	.000	667.00	1353.28
.002754	275.	255.	225.	2	0	0	.00	269.42	1622.71

1

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= .300 CEHV= .500
*SECNO 65.000

65.000	5.59	673.09	.00	.00	673.24	.15	.32	.02	668.50
1640.0	956.3	574.6	109.2	467.3	127.2	93.0	133.3	50.8	670.20
.81	2.05	4.52	1.17	.100	.050	.100	.000	667.50	1294.48
.003109	125.	105.	90.	2	0	0	.00	214.24	1508.72

1

THIS RUN EXECUTED 11AUG11 12:33:43

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

WALKER RUN - 100 YR. FLO

SUMMARY PRINTOUT

SECNO	Q	CWSEL	WSELK	DIFWSP	EG	DIFEG	PERENC	STCHL	STCHR	STENCL	STENCR	TOPWID
44.000	1860.00	653.29	653.29	.00	653.38	.00	.00	1405.00	1412.00	.00	.00	286.39
46.010	1860.00	655.21	.00	.00	655.44	.00	.00	1655.50	1664.50	.00	.00	219.07
*46.020	1860.00	656.53	.00	.00	656.63	.00	.00	1655.50	1664.50	.00	.00	284.69
46.000	1860.00	656.63	.00	.00	656.78	.00	.00	1650.00	1670.00	.00	.00	265.14
*47.000	1860.00	657.02	.00	.00	657.08	.00	.00	1410.00	1440.00	.00	.00	353.75
49.010	1860.00	657.32	.00	.00	657.35	.00	.00	1709.00	1712.00	.00	.00	391.93
49.020	1860.00	657.32	.00	.00	657.35	.00	.00	1709.00	1712.00	.00	.00	392.22
*49.000	1860.00	657.32	.00	.00	657.49	.00	.00	1700.00	1720.00	.00	.00	305.45
*50.000	1860.00	657.70	.00	.00	657.73	.00	.00	1740.00	1765.00	.00	.00	501.21
51.000	1640.00	658.13	.00	.00	658.15	.00	.00	2715.00	2750.00	.00	.00	993.55
*52.000	1640.00	658.49	.00	.00	658.59	.00	.00	2145.00	2268.00	.00	.00	320.24
52.100	1640.00	658.75	.00	.00	658.84	.00	.00	2247.00	2253.00	.00	.00	292.34
*52.200	1640.00	660.46	.00	.00	660.48	.00	.00	2247.00	2253.00	.00	.00	592.96
*54.000	1640.00	660.64	.00	.00	660.77	.00	.00	1818.00	1837.00	.00	.00	225.95
55.000	1640.00	661.68	.00	.00	661.91	.00	.00	1510.00	1530.00	.00	.00	191.86
56.000	1640.00	662.84	.00	.00	663.01	.00	.00	1443.00	1460.00	.00	.00	188.43
*57.000	1640.00	663.73	.00	.00	664.31	.00	.00	1507.00	1520.00	.00	.00	151.72

1

SECNO	Q	CWSEL	WSELK	DIFWSP	EG	DIFEG	PERENC	STCHL	STCHR	STENCL	STENCR	TOPWID
*58.000	1640.00	668.00	.00	.00	668.74	.00	.00	1412.00	1440.00	.00	.00	301.51
*60.010	1640.00	669.07	.00	.00	669.32	.00	.00	1616.00	1634.00	.00	.00	237.84
*60.020	1640.00	670.10	.00	.00	671.34	.00	.00	1616.00	1634.00	.00	.00	297.92
*60.000	1640.00	671.85	.00	.00	671.87	.00	.00	1620.00	1630.00	.00	.00	519.50

61.000	1640.00	671.98	.00	.00	672.01	.00	.00	1730.00	1745.00	.00	.00	418.74
62.000	1640.00	672.08	.00	.00	672.13	.00	.00	2220.00	2240.00	.00	.00	330.63
*63.000	1640.00	672.30	.00	.00	672.38	.00	.00	1860.00	1880.00	.00	.00	329.36
64.000	1640.00	672.79	.00	.00	672.90	.00	.00	1430.00	1450.00	.00	.00	269.42
65.000	1640.00	673.09	.00	.00	673.24	.00	.00	1420.00	1448.00	.00	.00	214.24

1
11AUG11 12:33:43

WALKER RUN - 100 YR. FLO

SUMMARY PRINTOUT

SECNO	XLCH	Q	CWSEL	EG	HL	OLOSS	HV	VCH	CASE	DIFWSP	DIFWSX	TOPWID
44.000	.00	1860.00	653.29	653.38	.00	.00	.09	4.79	.00	.00	.00	286.39
46.010	230.00	1860.00	655.21	655.44	1.96	.10	.23	6.48	.00	.00	1.92	219.07
*46.020	30.00	1860.00	656.53	656.63	1.19	.00	.09	4.43	16384.00	.00	1.33	284.69
46.000	145.00	1860.00	656.63	656.78	.11	.04	.15	4.52	.00	.00	.10	265.14
*47.000	400.00	1860.00	657.02	657.08	.27	.03	.06	2.89	16384.00	.00	.39	353.75
49.010	450.00	1860.00	657.32	657.35	.26	.01	.03	2.49	.00	.00	.30	391.93
49.020	20.00	1860.00	657.32	657.35	.00	.00	.03	2.48	.00	.00	.00	392.22
*49.000	30.00	1860.00	657.32	657.49	.05	.10	.17	5.01	16384.00	.00	.00	305.45
*50.000	275.00	1860.00	657.70	657.73	.22	.01	.02	2.06	16384.00	.00	.38	501.21
51.000	740.00	1640.00	658.13	658.15	.42	.00	.02	1.88	.00	.00	.43	993.55
*52.000	330.00	1640.00	658.49	658.59	.42	.02	.10	2.81	16384.00	.00	.36	320.24
52.100	133.00	1640.00	658.75	658.84	.25	.00	.09	3.44	.00	.00	.26	292.34
*52.200	12.00	1640.00	660.46	660.48	1.64	.00	.02	1.81	16384.00	.00	1.70	592.96
*54.000	245.00	1640.00	660.64	660.77	.21	.08	.14	4.15	16384.00	.00	.18	225.95
55.000	330.00	1640.00	661.68	661.91	1.11	.03	.23	5.46	.00	.00	1.05	191.86
56.000	310.00	1640.00	662.84	663.01	1.09	.01	.17	4.00	.00	.00	1.16	188.43
*57.000	160.00	1640.00	663.73	664.31	.97	.32	.58	8.02	16384.00	.00	.89	151.72

*58.000	250.00	1640.00	668.00	668.74	3.28	.13	.74	8.36	4097.00	.00	4.27	301.51
*60.010	105.00	1640.00	669.07	669.32	.39	.20	.25	5.72	16384.00	.00	1.07	237.84
*60.020	41.00	1640.00	670.10	671.34	.23	.79	1.24	9.68	4097.00	.00	1.03	297.92
*60.000	109.00	1640.00	671.85	671.87	.17	.37	.02	2.48	16384.00	.00	1.75	519.50
61.000	260.00	1640.00	671.98	672.01	.13	.00	.03	2.68	.00	.00	.13	418.74
62.000	200.00	1640.00	672.08	672.13	.11	.01	.05	3.07	.00	.00	.10	330.63
*63.000	240.00	1640.00	672.30	672.38	.24	.01	.08	3.80	16384.00	.00	.22	329.36

SECNO	XLCH	Q	CWSEL	EG	HL	OLOSS	HV	VCH	CASE	DIFWSP	DIFWSX	TOPWID
64.000	255.00	1640.00	672.79	672.90	.52	.01	.11	4.41	.00	.00	.50	269.42
65.000	105.00	1640.00	673.09	673.24	.32	.02	.15	4.52	.00	.00	.30	214.24

SUMMARY OF ERRORS AND SPECIAL NOTES

WARNING SECNO= 46.020 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 47.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 49.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 50.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 52.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 52.200 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 54.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO= 57.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

CAUTION SECNO= 58.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 58.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

WARNING SECNO= 60.010 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

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CAUTION SECNO=      60.020  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      60.020  PROFILE=  1  MINIMUM SPECIFIC ENERGY

WARNING SECNO=      60.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE

WARNING SECNO=      63.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
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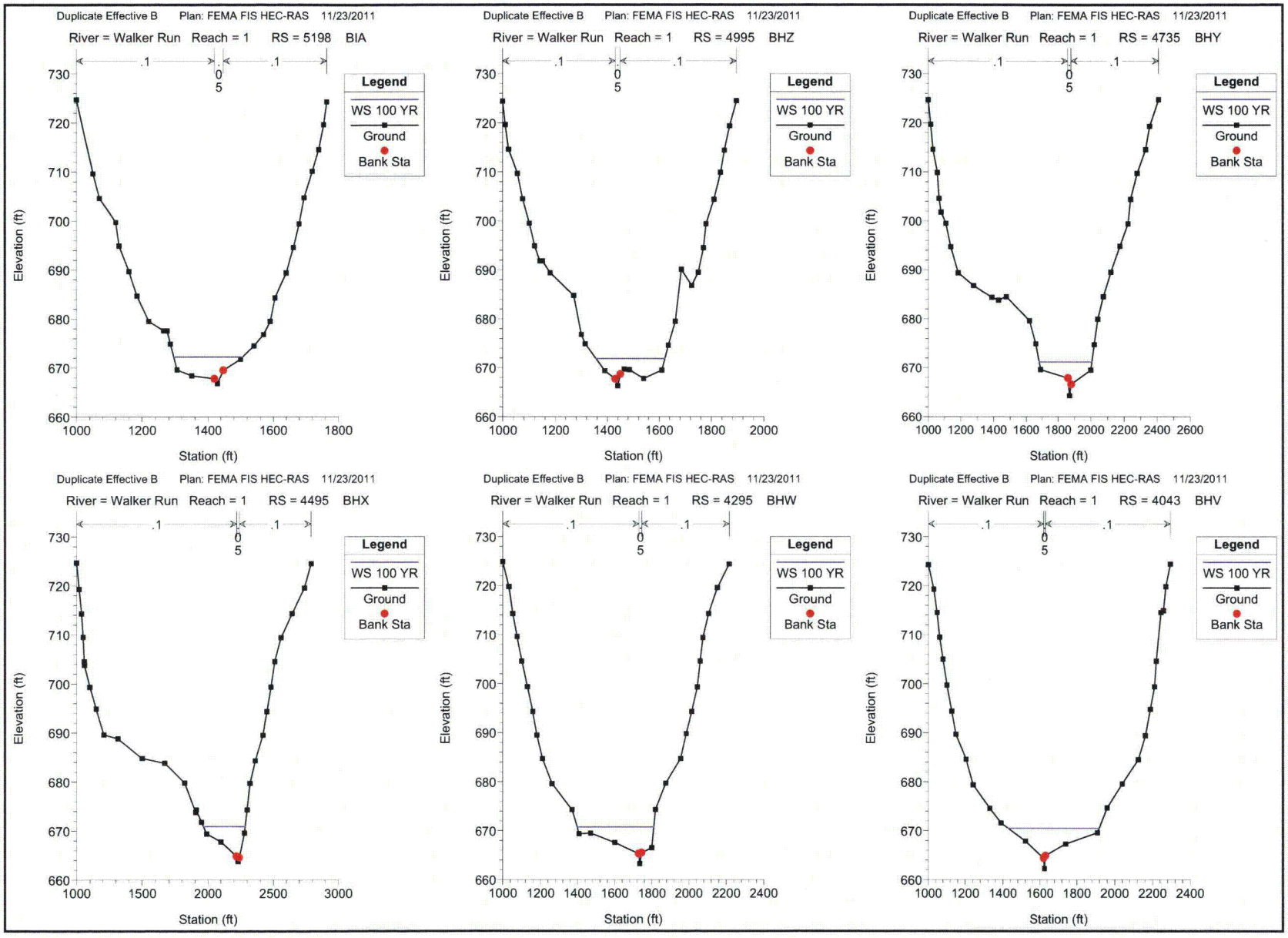
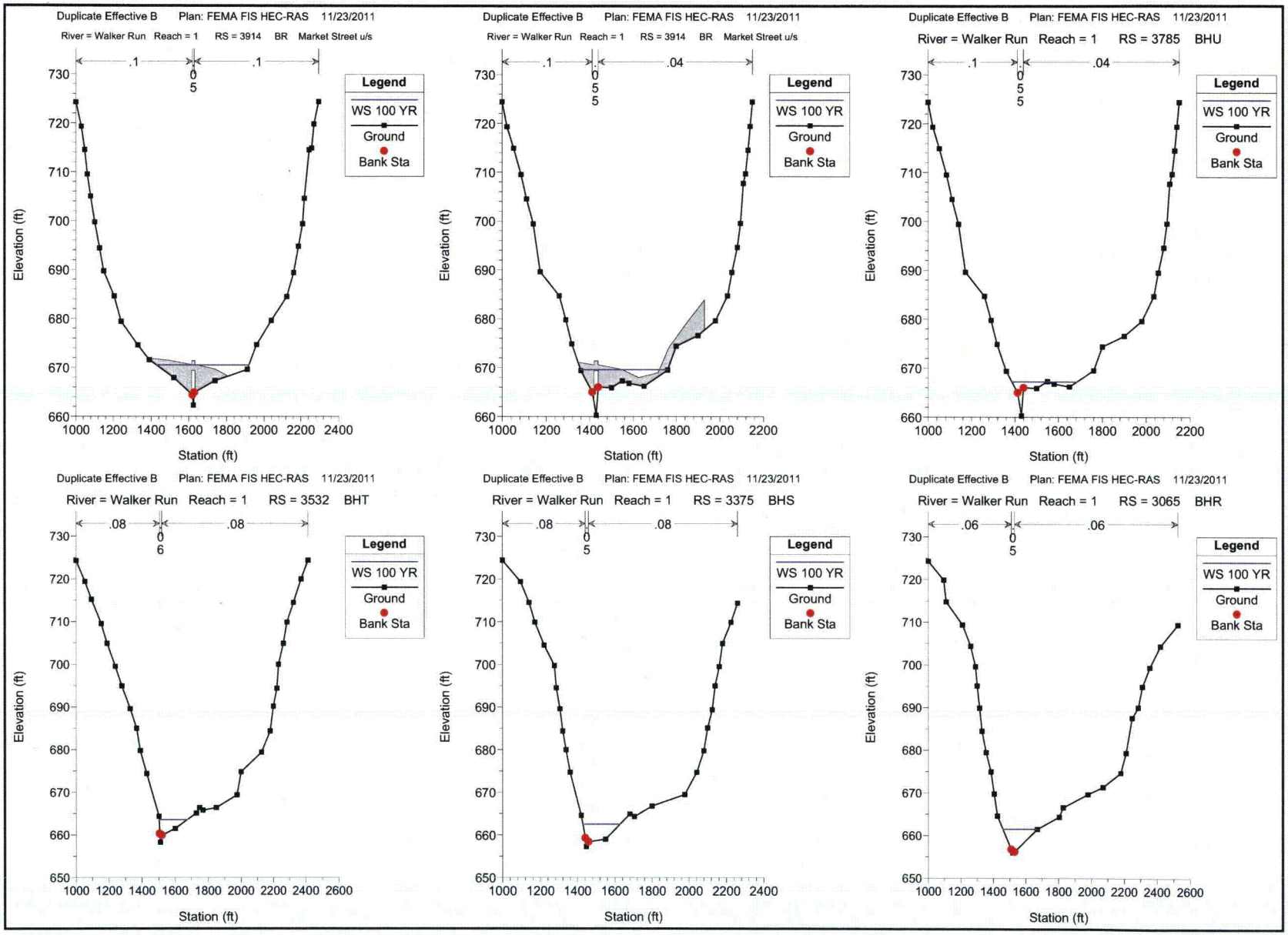
Appendix F:
Duplicate Effective Model B

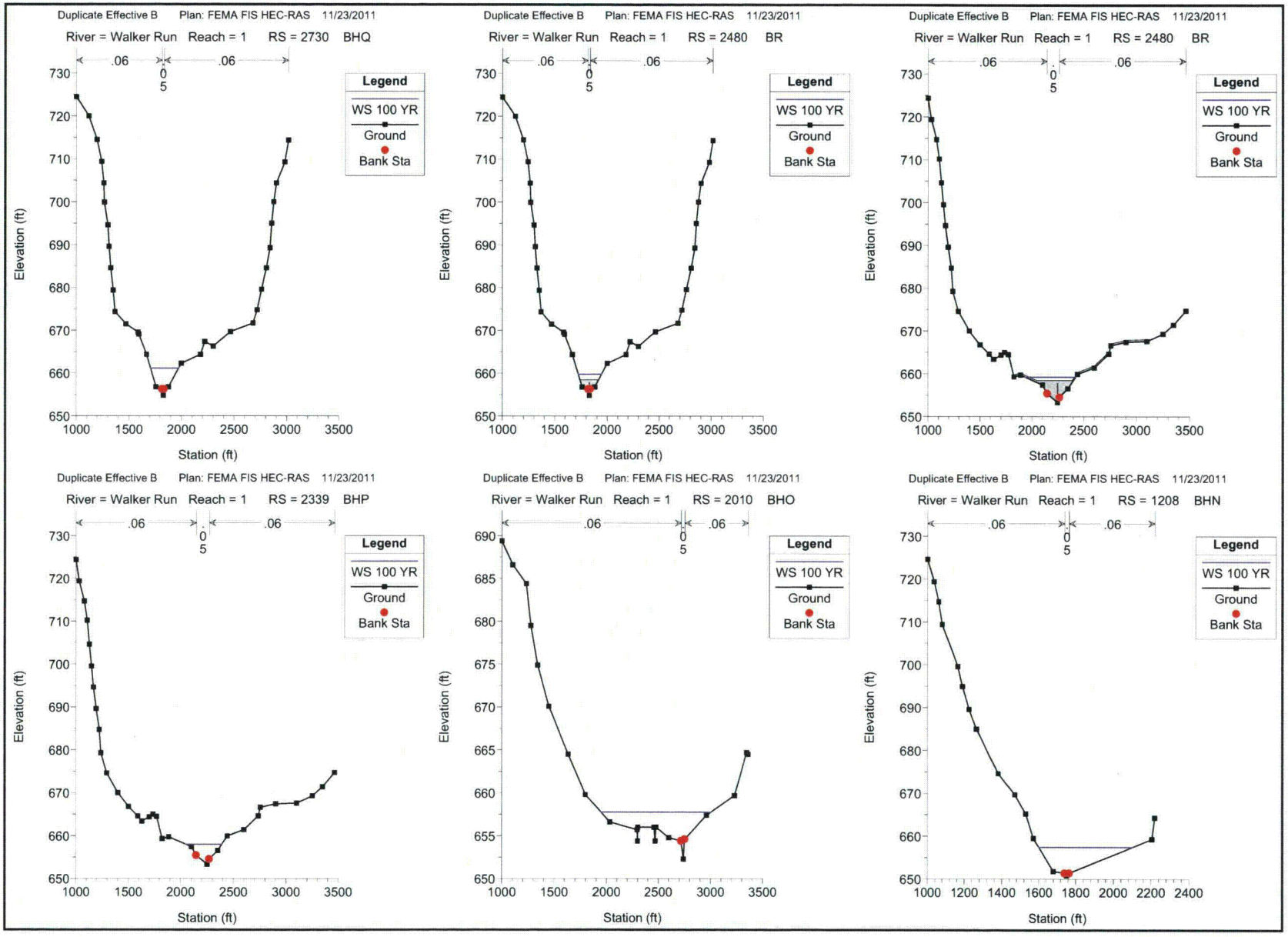
- HEC-RAS Reports
- HEC-RAS Cross-Sections
- HEC-RAS Profiles

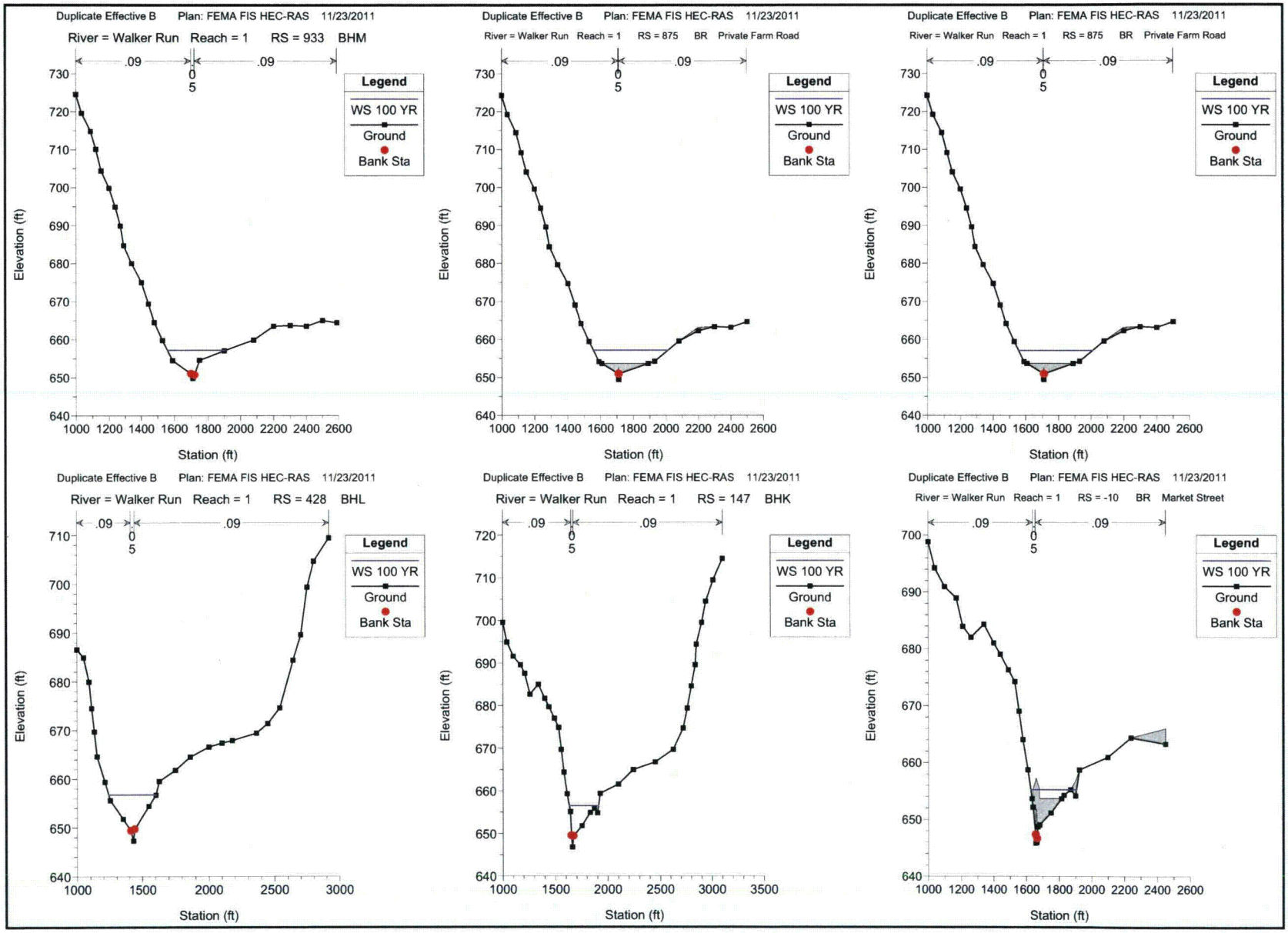
HEC-RAS Plan: FEMA HECRAS River: Walker Run Reach: 1 Profile: 100 YR

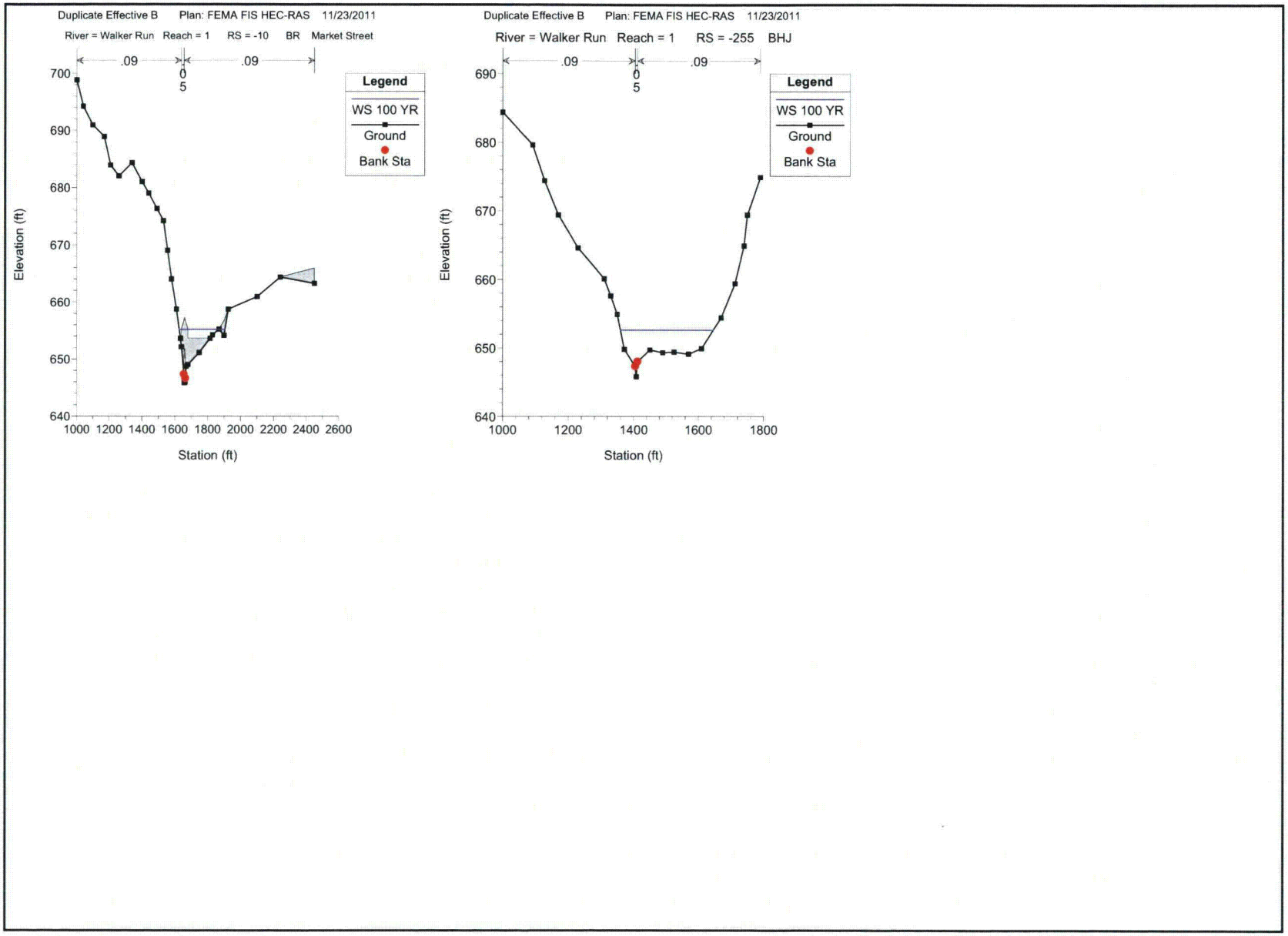
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5198	100 YR	1640.00	666.79	672.24	670.27	672.40	0.003528	4.71	657.66	211.64	0.40
1	4995	100 YR	1640.00	666.29	671.89		672.02	0.003353	4.73	770.75	265.76	0.39
1	4735	100 YR	1640.00	664.29	671.20		671.31	0.002426	4.40	918.59	325.66	0.33
1	4495	100 YR	1640.00	663.79	670.88		670.95	0.001133	3.52	1109.32	320.33	0.24
1	4295	100 YR	1640.00	663.29	670.73		670.77	0.001021	3.17	1306.11	413.23	0.22
1	4043	100 YR	1640.00	662.29	670.52	667.81	670.55	0.000895	3.06	1473.28	491.33	0.20
1	3914		Bridge									
1	3785	100 YR	1640.00	660.29	667.23	667.23	667.79	0.011435	7.39	336.54	292.81	0.62
1	3532	100 YR	1640.00	658.29	663.59	662.89	663.98	0.013532	7.51	374.45	172.54	0.63
1	3375	100 YR	1640.00	657.29	662.51		662.68	0.003982	5.05	579.00	198.45	0.42
1	3065	100 YR	1640.00	656.00	661.53		661.68	0.002499	4.50	603.28	213.05	0.35
1	2730	100 YR	1640.00	654.79	661.14	658.28	661.19	0.000893	2.77	889.55	266.85	0.21
1	2480		Bridge									
1	2339	100 YR	1640.00	653.29	657.98		658.07	0.001332	2.60	777.32	344.00	0.24
1	2010	100 YR	1640.00	652.29	657.76		657.78	0.000361	1.51	2007.43	1058.59	0.13
1	1208	100 YR	1860.00	650.79	657.43		657.45	0.000296	1.75	1753.29	502.09	0.12
1	933	100 YR	1860.00	649.79	657.19	654.70	657.30	0.001528	4.18	1006.98	347.15	0.28
1	875		Bridge									
1	428	100 YR	1860.00	647.29	656.76		656.80	0.000457	2.59	1519.17	367.76	0.16
1	147	100 YR	1860.00	646.79	656.49	652.98	656.59	0.001039	3.86	1026.92	279.25	0.24
1	-10		Bridge									
1	-255	100 YR	1860.00	645.79	652.58	650.78	652.67	0.002920	4.79	891.65	285.90	0.35

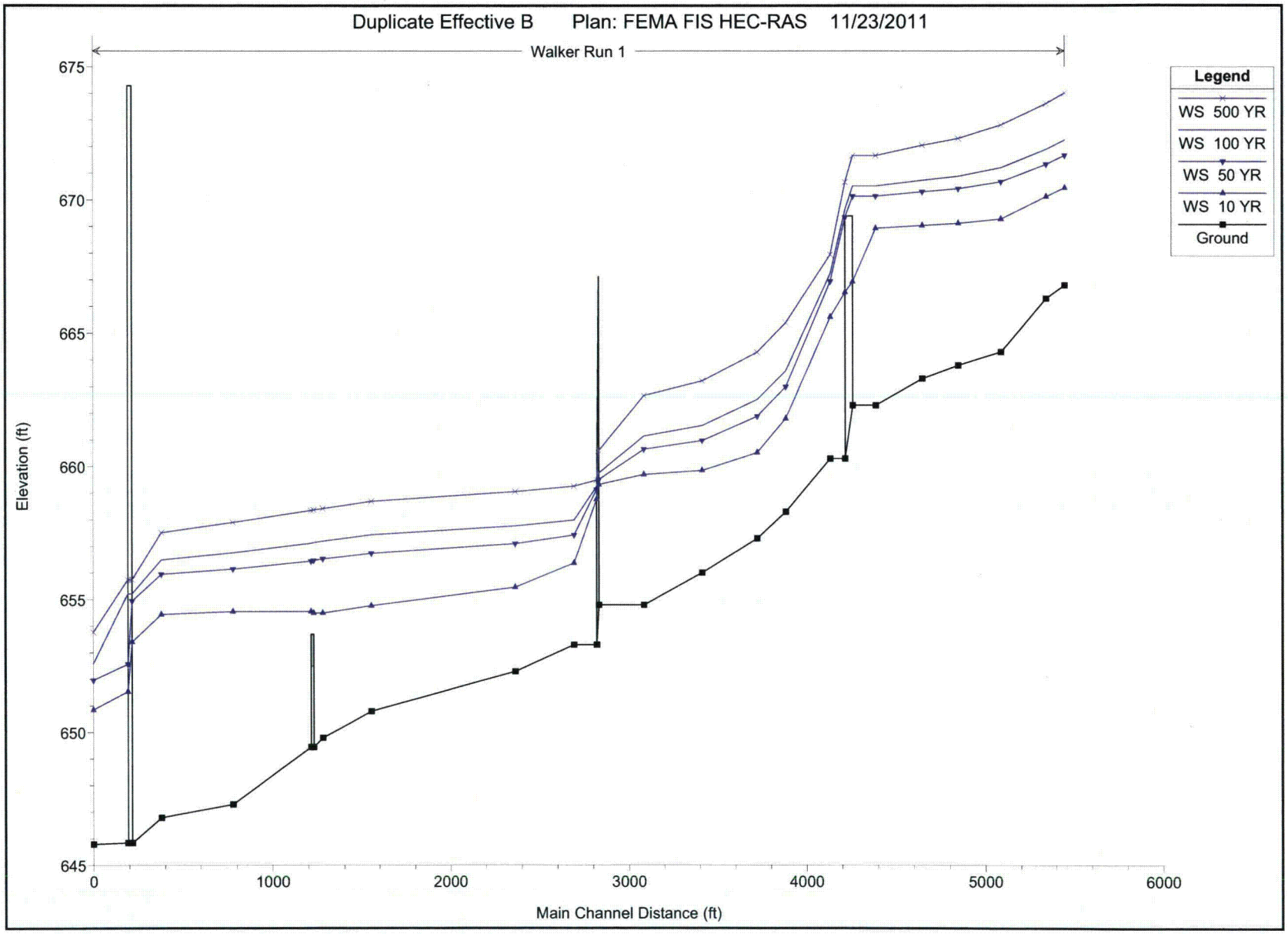

Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 5198 BIA
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 4995 BHZ
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 4735 BHY
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 4495 BHX
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 4295 BHW
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 4043 BHV
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 3914 BR Market Street u/s
.1
.1
0
5
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 3914 BR Market Street u/s
.1
.04
0
5
5
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 3785 BHU
.1
.04
0
5
5
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 3532 BHT
.08
.08
0
6
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 3375 BHS
.08
.08
0
5
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 3065 BHR
.06
.06
0
5
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 2730 BHQ
.06 .05 .06
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 2480 BR
.06 .05 .06
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 2480 BR
.06 .05 .06
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 2339 BHP
.06 .05 .06
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 2010 BHO
.06 .05 .06
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 1208 BHN
.06 .05 .06
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = 933 BHM
River = Walker Run Reach = 1 RS = 875 BR Private Farm Road
River = Walker Run Reach = 1 RS = 875 BR Private Farm Road
River = Walker Run Reach = 1 RS = 428 BHL
River = Walker Run Reach = 1 RS = 147 BHK
River = Walker Run Reach = 1 RS = -10 BR Market Street
.09
.09
0
5
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = -10 BR Market Street
.09
.09
0
5
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
700
690
680
670
660
650
640
1000 1200 1400 1600 1800 2000 2200 2400 2600
Station (ft)
Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
River = Walker Run Reach = 1 RS = -255 BHJ
.09
.09
0
5
Legend
WS 100 YR
Ground
Bank Sta
Elevation (ft)
690
680
670
660
650
640
1000 1200 1400 1600 1800
Station (ft)


Duplicate Effective B Plan: FEMA FIS HEC-RAS 11/23/2011
Walker Run 1
Legend
WS 500 YR
WS 100 YR
WS 50 YR
WS 10 YR
Ground
Elevation (ft)
675
670
665
660
655
650
645
0
1000
2000
3000
4000
5000
6000
Main Channel Distance (ft)

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Duplicate Effective B
Project File : DupEffectiveB.prj
Run Date and Time: 11/23/2011 9:23:28 AM

Project in English units

PLAN DATA

Plan Title: FEMA FIS HEC-RAS
Plan File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions Nov 2011\WR REV 3 HEC-RAS Final\DupEffectiveB.p07

Geometry Title: FEMA FIS HEC-RAS
Geometry File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions Nov 2011\WR REV 3 HEC-RAS Final\DupEffectiveB.g05

Flow Title : FEMA Flow Data
Flow File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions Nov 2011\WR REV 3 HEC-RAS Final\DupEffectiveB.f04

Plan Summary Information:

Number of:	Cross Sections =	18	Multiple Openings =	0	
	Culverts =	0	Inline Structures =	0	
	Bridges =	4	Lateral Structures =	0	

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: Between every coordinate point (HEC2 Style)
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: FEMA Flow Data
Flow File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions Nov 2011\WR REV 3 HEC-RAS Final\DupEffectiveB.f04

Flow Data (cfs)

River	Reach	RS	100 YR	10 YR	50 YR	500 YR
Walker Run	1	5198	1640	480	1180	3600
Walker Run	1	1208	1860	550	1320	3100

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Walker Run	1	100 YR	Known WS = 673.06	Known WS = 652.58
Walker Run	1	10 YR	Known WS = 673.06	Known WS = 650.85
Walker Run	1	50 YR	Known WS = 673.06	Known WS = 651.96
Walker Run	1	500 YR	Known WS = 673.06	Known WS = 653.77

GEOMETRY DATA

Geometry Title: FEMA FIS HEC-RAS
Geometry File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions Nov 2011\WR REV 3 HEC-RAS Final\DupEffectiveB.g05

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 5198

INPUT
Description: BIA
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.7	1050	709.59	1070	704.59	1120	699.7	1130	694.89
1160	689.7	1185	684.7	1220	679.5	1265	677.59	1275	677.59
1285	674.89	1305	669.59	1350	668.39	1420	667.79	1430	666.79
1448	669.5	1500	671.79	1540	674.5	1570	676.79	1590	679.5
1605	684.29	1640	689.39	1662	694.59	1680	699.39	1695	704.7
1720	710.09	1740	714.5	1755	719.59	1765	724.29		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

1000	.1	1420	.05	1448	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1420	1448	125	105	90	.3	.5

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4995

INPUT
Description: BHZ

Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.39	1010	719.59	1022	714.59	1055	709.7	1075	704.5
1100	699.5	1120	694.89	1140	691.79	1150	691.79	1180	689.39
1270	684.79	1300	676.79	1315	674.89	1390	669.39	1430	667.7
1440	666.29	1450	668.7	1465	669.7	1485	669.59	1540	667.79
1610	669.5	1635	674.59	1662	679.5	1685	690.09	1725	686.79
1750	689.5	1770	694.5	1780	699.39	1810	704.39	1835	709.89
1850	714.39	1870	719.39	1895	724.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	1430	.05	1450	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1430	1450	275	255	225	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4735

INPUT
Description: BHY

Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.7	1015	719.7	1030	714.59	1058	709.89	1068	704.59
1080	701.79	1110	699.5	1140	694.7	1186	689.39	1280	686.79
1390	684.39	1430	683.79	1478	684.5	1620	679.59	1660	674.89
1690	669.59	1860	667.89	1870	664.29	1880	666.59	2000	669.5
2020	674.7	2042	679.89	2075	684.5	2120	689.5	2175	694.79
2225	699.39	2240	704.39	2280	709.7	2330	714.5	2355	719.29
2410	724.7								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	1860	.05	1880	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1860	1880	200	240	225	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4495

INPUT
Description: BHX

Station Elevation Data num= 33

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.7	1020	719.29	1038	714.29	1050	709.5	1058	704.5
1060	703.79	1100	699.29	1148	694.89	1208	689.59	1315	688.79
1500	684.79	1670	683.79	1820	679.79	1905	673.79	1910	674.29
1950	671.79	1990	669.39	2100	667.79	2220	664.79	2230	663.79
2240	664.59	2280	669.59	2300	674.29	2320	679.7	2360	684.29
2420	689.5	2450	694.29	2480	699.29	2510	704.5	2560	709.39
2645	714.29	2740	719.5	2790	724.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	2220	.05	2240	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2220	2240	125	200	225	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4295

INPUT
Description: BHW
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.89	1032	719.79	1052	714.29	1075	709.59	1100	704.59
1130	699.39	1158	694.29	1180	689.5	1210	684.7	1262	679.59
1370	674.29	1408	669.39	1470	669.5	1600	667.59	1730	665.29
1735	663.29	1745	665.5	1800	666.5	1820	674.29	1875	679.7
1955	684.7	1985	689.79	2015	694.29	2045	699.29	2060	704.59
2075	709.39	2105	714.29	2152	719.59	2215	724.39		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	1730	.05	1745	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1730	1745	225	260	225	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4043

INPUT
Description: BHV
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.29	1030	719.29	1048	714.5	1062	709.5	1080	705
1102	699.7	1128	694.39	1150	689.7	1205	684.59	1242	679.39
1330	674.59	1390	671.59	1520	667.89	1620	664.39	1625	662.29
1630	664.89	1740	667.29	1910	669.59	1960	674.7	2040	679.59
2125	684.5	2162	689.39	2188	694.79	2210	699.39	2220	704.59
2245	714.5	2258	714.89	2270	719.79	2295	724.39		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	1620	.05	1630	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.

1620	1630	381	255	191	.3	.7

BRIDGE

RIVER: Walker Run
REACH: 1 RS: 3914

INPUT
Description: Market Street u/s
Distance from Upstream XS = 128.4
Deck/Roadway Width = 43.1
Weir Coefficient = 2.5
Upstream Deck/Roadway Coordinates
num= 17

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1242	678.79	678.79	1335	673.99	673.99	1372	671.99	671.99
1390	671.89	670.99	1490	671.49	668.19	1520	671.29	667.29
1616	670.59	661.89	1616	671.39	669.39	1625	671.39	669.39
1634	671.39	669.39	1634	670.59	662.09	1740	669.69	667.09
1820	667.99	667.99	1910	668.99	668.99	1960	674.09	674.09
2040	678.99	678.99	2125	683.89	683.89			

Upstream Bridge Cross Section Data
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.29	1030	719.29	1048	714.5	1062	709.5	1080	705
1102	699.7	1128	694.39	1150	689.7	1205	684.59	1242	679.39
1330	674.59	1390	671.59	1520	667.89	1620	664.39	1625	662.29
1630	664.89	1740	667.29	1910	669.59	1960	674.7	2040	679.59
2125	684.5	2162	689.39	2188	694.79	2210	699.39	2220	704.59
2245	714.5	2258	714.89	2270	719.79	2295	724.39		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	1620	.05	1630	.1

Bank Sta: Left	Right	Coeff Contr.	Expan.
1620	1630	.3	.7

Downstream Deck/Roadway Coordinates
num= 17

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1047	678.79	678.79	1140	673.99	673.99	1177	671.99	671.99
1195	671.89	670.99	1295	671.49	668.19	1325	671.29	667.29
1421	670.59	661.89	1421	671.39	669.39	1430	671.39	669.39
1439	671.39	669.39	1439	670.59	662.09	1545	669.69	
1625	667.99		1715	668.99		1765	674.09	
1845	678.99		1930	683.89				

Downstream Bridge Cross Section Data
Station Elevation Data num= 31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.39	1022	719.29	1052	714.89	1085	709.5	1110	704.5
1140	699.39	1172	689.59	1260	684.7	1290	679.79	1318	674.89
1360	669.39	1412	665	1430	660.29	1440	666	1500	665.89
1550	667.29	1580	666.79	1650	666.2	1760	669.5	1800	674.39
1900	676.59	1980	679.59	2035	684.7	2055	689.5	2080	694.59
2095	699.5	2108	707.7	2118	709.7	2130	714.5	2140	719.39
2150	724.39								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
    1000      .1    1412    .055    1440     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          1412    1440            .4       .8

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =   668.7
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 3785

INPUT
Description: BHU
Station Elevation Data    num=      31
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    1000  724.39    1022  719.29    1052  714.89    1085   709.5    1110   704.5
    1140  699.39    1172  689.59    1260   684.7    1290  679.79    1318  674.89
    1360  669.39    1412     665    1430  660.29    1440     666    1500  665.89
    1550  667.29    1580  666.79    1650   666.2    1760   669.5    1800  674.39
    1900  676.59    1980  679.59    2035   684.7    2055   689.5    2080  694.59
    2095   699.5    2108   707.7    2118   709.7    2130   714.5    2140  719.39
    2150  724.39

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    1000      .1    1412    .055    1440     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1412    1440             250     250     175             .4       .8

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 3532
```

INPUT
Description: BHT
Station Elevation Data num= 32

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.29	1055	719.39	1095	715.2	1155	709.5	1190	704.89
1240	699.5	1280	694.89	1330	689.59	1368	685	1390	679.79
1428	674.39	1502	664.39	1507	660.29	1510	658.29	1520	659.89
1600	661.5	1730	665.09	1750	666.39	1770	665.79	1850	666.39
1975	669.39	2000	674.79	2125	679.39	2180	684.39	2200	690.2
2222	694.39	2232	700	2262	704.89	2285	709.89	2325	714.5
2372	720	2415	724.39						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.08	1507	.06	1520	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1507	1520	160	160	170	.4 .8

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 3375

INPUT
Description: BHS
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.39	1095	719.39	1140	714.5	1170	709.89	1220	704.5
1275	699.7	1285	694.5	1305	689.59	1320	684.39	1338	680
1360	674.7	1420	664.59	1443	659.29	1448	657.29	1460	658.39
1550	659	1680	664.89	1705	664.29	1800	666.79	1978	669.5
2042	674.7	2080	679.79	2100	685.09	2125	689.39	2140	695
2162	699.5	2180	704.89	2225	709.89	2260	714.39		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.08	1443	.05	1460	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1443	1460	300	310	325	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 3065

INPUT
Description: BHR
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.29	1095	719.89	1110	714.79	1210	709.39	1260	704.39
1290	699.59	1300	695.09	1315	689.89	1330	684.5	1355	679.5
1385	675	1405	669.79	1425	664.59	1510	656.79	1520	656
1530	656.2	1670	661.5	1805	664.39	1828	666.59	1978	669.7
2070	671.39	2178	674.7	2210	679.39	2248	687.59	2285	690
2310	694.89	2355	699.39	2420	704.39	2525	709.39		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.06	1510	.05	1530	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1510	1530	340	330	320	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2730

INPUT
Description: BHQ
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.5	1120	720	1198	714.5	1242	709.39	1262	704.39
1268	699.89	1300	694.59	1312	689.59	1328	684.59	1350	679.39
1368	674.39	1470	671.5	1588	669.59	1595	669.09	1669	664.39
1760	656.79	1818	656.29	1830	654.79	1837	656.29	1880	656.79
2000	662.29	2180	664.39	2220	667.39	2300	666.29	2465	669.7
2680	671.7	2718	674.79	2760	679.59	2805	684.59	2840	689.29
2855	695	2875	700	2900	704.39	2980	709.29	3015	714.39

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.06	1818	.05	1837	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1818	1837	487	390	342	.3	.7

BRIDGE

RIVER: Walker Run
REACH: 1 RS: 2480

INPUT
Description:
Distance from Upstream XS = 251
Deck/Roadway Width = 12.5
Weir Coefficient = 2.5
Upstream Deck/Roadway Coordinates
num= 20

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1315	665.49	665.49	1352	664.99	664.99	1405	659.79	659.79
1468	660.19	660.19	1625	658.49	658.49	1680	658.49	657.89
1725	658.49	654.89	1827	658.49	653.89	1827	658.49	657.79
1833	658.49	657.79	1833	658.49	653.89	1848	658.49	654.99
1930	658.49	656.99	1970	658.49	658.49	2020	660.39	660.39
2180	661.89	661.89	2315	665.09	665.09	2335	667.09	667.09
2480	667.89	667.89	2680	668.09	668.09			

Upstream Bridge Cross Section Data
Station Elevation Data num= 35

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.5	1120	720	1198	714.5	1242	709.39	1262	704.39
1268	699.89	1300	694.59	1312	689.59	1328	684.59	1350	679.39
1368	674.39	1470	671.5	1588	669.59	1595	669.09	1669	664.39
1760	656.79	1818	656.29	1830	654.79	1837	656.29	1880	656.79
2000	662.29	2180	664.39	2220	667.39	2300	666.29	2465	669.7
2680	671.7	2718	674.79	2760	679.59	2805	684.59	2840	689.29
2855	695	2875	700	2900	704.39	2980	709.29	3015	714.39

Manning's n Values num= 3

```
     Sta   n Val     Sta   n Val     Sta   n Val
    1000     .06    1818     .05    1837     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
          1818    1837             .3       .7

Downstream  Deck/Roadway Coordinates
    num=      20
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    1735  665.49            1772  664.99            1825  659.79
    1888  660.19            2045  658.49            2100  658.49
    2145  658.49            2247  658.49            2247  658.49  657.79
    2253  658.49  657.79    2253  658.49            2268  658.49
    2350  658.49            2390  658.49            2440  660.39
    2600  661.89            2735  665.09            2755  667.09
    2900  667.89            3100  668.09

Downstream Bridge Cross Section Data
Station Elevation Data    num=      34
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    1000  724.39    1030  719.39    1080   714.7    1108   710.2    1130  704.59
    1150   699.5    1170  694.59    1195  689.59    1225   684.7    1240  679.29
    1295  674.59    1400     670    1500  666.79    1590  664.59    1630  663.39
    1700  664.39    1735     665    1772   664.5    1825  659.29    1888   659.7
    2100  657.39    2145  655.39    2250  653.29    2268   654.5    2350   656.5
    2440  659.89    2600  661.39    2735  664.59    2755  666.59    2900  667.39
    3100  667.59    3250  669.29    3350  671.39    3465   674.7

Manning's n Values        num=      3
     Sta   n Val     Sta   n Val     Sta   n Val
    1000     .06    2145     .05    2268     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
          2145    2268             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =   659.2
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
      Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
      Pressure and Weir flow
          Submerged Inlet Cd          =
          Submerged Inlet + Outlet Cd =      .8
          Max Low Cord                =

Additional Bridge Parameters
      Add Friction component to Momentum
      Do not add Weight component to Momentum
      Class B flow critical depth computations use critical depth
          inside the bridge at the upstream end
      Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION
```

RIVER: Walker Run
REACH: 1 RS: 2339

INPUT
Description: BHP
Station Elevation Data num= 34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.39	1030	719.39	1080	714.7	1108	710.2	1130	704.59
1150	699.5	1170	694.59	1195	689.59	1225	684.7	1240	679.29
1295	674.59	1400	670	1500	666.79	1590	664.59	1630	663.39
1700	664.39	1735	665	1772	664.5	1825	659.29	1888	659.7
2100	657.39	2145	655.39	2250	653.29	2268	654.5	2350	656.5
2440	659.89	2600	661.39	2735	664.59	2755	666.59	2900	667.39
3100	667.59	3250	669.29	3350	671.39	3465	674.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.06	2145	.05	2268	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2145	2268	600	330	350	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2010

INPUT
Description: BHO
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	689.39	1100	686.59	1230	684.39	1275	679.5	1340	674.89
1450	670.09	1635	664.5	1798	659.79	2030	656.59	2295	655.7
2298	654.39	2300	656	2460	656	2470	654.39	2475	656
2600	654.79	2715	654.39	2740	652.29	2750	654.59	2960	657.39
3230	659.7	3345	664.7	3360	664.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.06	2715	.05	2750	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
2715	2750	1200	809	740 .1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 1208

INPUT
Description: BHN
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.59	1035	719.39	1060	714.7	1080	709.39	1165	699.59
1190	694.89	1225	689.59	1265	685	1380	674.59	1470	669.7
1528	665.2	1570	659.5	1680	651.79	1740	651.39	1752	650.79
1765	651.39	2205	659.29	2220	664.29				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.06	1740	.05	1765	.06

Bank Sta: Left 1740 Right 1765 Lengths: Left Channel 300 Right 275 Right 175 Coeff Contr. .1 Expan. .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 933

INPUT
Description: BHM
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.59	1035	719.59	1088	714.79	1120	710.09	1152	704.39
1200	699.79	1238	694.89	1270	689.89	1290	684.7	1340	680
1402	675	1445	669.39	1480	664.5	1530	659.79	1590	654.5
1700	651	1710	649.79	1720	650.7	1750	654.59	1900	657.09
2080	659.89	2200	663.5	2300	663.7	2400	663.5	2500	665
2590	664.39								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	1700	.05	1720	.09

Bank Sta: Left 1700 Right 1720 Lengths: Left Channel 400 Right 500 Right 325 Coeff Contr. .3 Expan. .7

BRIDGE

RIVER: Walker Run
REACH: 1 RS: 875

INPUT
Description: Private Farm Road
Distance from Upstream XS = 50
Deck/Roadway Width = 14.9
Weir Coefficient = 2.5
Upstream Deck/Roadway Coordinates
num= 16

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1400	664.19		1530	659.49		1590	654.19	
1609	653.69		1709	653.69	650.99	1709.5	653.69	652.29
1710.5	653.69	652.49	1711.5	653.69	652.29	1712	653.69	650.99
1890	653.69		1930	654.29		2080	659.59	
2200	663.19		2300	663.39		2400	663.19	
2500	664.69							

Upstream Bridge Cross Section Data
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.245	1035	719.245	1088	714.445	1120	709.145	1152	704.045
1200	699.545	1238	694.545	1270	689.545	1290	684.345	1340	679.645
1402	674.645	1445	669.045	1480	664.145	1530	659.445	1590	654.145
1608	653.645	1709	650.945	1709.5	649.645	1710.5	649.445	1711.5	650.645
1712	650.945	1890	653.645	1930	654.245	2080	659.545	2200	662.245
2300	663.345	2400	663.145	2500	664.645				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
    1000     .09    1709     .05    1712     .09

Bank Sta: Left   Right    Coeff Contr.   Expan.
          1709    1712            .3       .7

Downstream  Deck/Roadway Coordinates
    num=      16
     Sta Hi Cord Lo Cord    Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    1400  664.19           1530  659.49           1590  654.19
    1609  653.69           1709  653.69  650.99  1709.5  653.69  652.29
  1710.5  653.69  652.49  1711.5  653.69  652.29    1712  653.69  650.99
    1890  653.69           1930  654.29           2080  659.59
    2200  663.19           2300  663.39           2400  663.19
    2500  664.69

Downstream Bridge Cross Section Data
Station Elevation Data    num=      28
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    1000 724.245    1035 719.245    1088 714.445    1120 709.145    1152 704.045
    1200 699.545    1238 694.545    1270 689.545    1290 684.345    1340 679.645
    1402 674.645    1445 669.045    1480 664.145    1530 659.445    1590 654.145
    1608 653.645    1709 650.945  1709.5 649.645  1710.5 649.445  1711.5 650.645
    1712 650.945    1890 653.645    1930 654.245    2080 659.545    2200 662.245
    2300 663.345    2400 663.145    2500 664.645

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    1000     .09    1709     .05    1712     .09

Bank Sta: Left   Right    Coeff Contr.   Expan.
          1709    1712            .3       .7

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =   654.4
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Walker Run
```

REACH: 1 RS: 428

INPUT
Description: BHL
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	686.59	1050	684.89	1090	679.89	1110	674.5	1130	669.7
1150	664.59	1210	659.39	1250	655.59	1350	651.79	1410	649.39
1430	647.29	1440	649.7	1550	654.39	1605	656.7	1630	659.5
1750	661.79	1860	664.5	2000	666.59	2100	667.39	2180	667.89
2365	669.39	2450	671.39	2540	674.59	2640	684.39	2700	689.59
2750	699.39	2800	704.7	2920	709.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	1410	.05	1440	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1410	1440	220	400	240	.3	.7

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 147

INPUT
Description: BHK
Station Elevation Data num= 36

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	699.5	1040	694.89	1100	691.59	1170	689.59	1210	687.59
1260	682.7	1340	685	1400	681.7	1440	679.7	1490	677
1530	674.89	1555	669.7	1580	664.39	1610	659.29	1640	655.09
1650	649.5	1660	646.79	1670	649.39	1750	651.79	1830	654.89
1870	655.89	1900	654.79	1925	659.39	2100	661.59	2240	665
2450	666.79	2623	669.7	2720	674.7	2760	679.39	2800	684.59
2838	689.59	2848	694.39	2900	699.5	2940	704.5	3010	709.5
3100	714.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	1650	.05	1670	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
1650	1670	305	380	405	.3	.7

BRIDGE

RIVER: Walker Run
REACH: 1 RS: -10

INPUT
Description: Market Street
Distance from Upstream XS = 163
Deck/Roadway Width = 23.7
Weir Coefficient = 2.5
Upstream Deck/Roadway Coordinates
num= 30

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1530	674.29	674.29	1555	669.09	669.09	1560	663.79	663.79
1610	658.79	658.79	1635	653.69	653.69	1640	653.69	651.69
1640	655.29	652.19	1655.5	656.79	647.39	1656	656.79	649.59

1657	656.99	650.69	1658	657.09	651.39	1659	657.19	651.69
1660	657.29	651.79	1661	657.09	651.69	1662	657.09	651.39
1663	656.99	650.59	1664	656.89	649.29	1664.5	656.79	646.69
1670	656.29	648.79	1680	655.29	649.09	1680	653.69	649.09
1750	653.69	651.19	1845	653.69		1860	654.29	
1870	655.29		1900	656.79		1925	658.79	
2100	660.99		2240	664.39		2480	666.19	

Upstream Bridge Cross Section Data
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	698.845	1040	694.245	1100	690.945	1170	688.945	1210	683.945
1260	682.045	1340	684.345	1400	681.045	1440	679.045	1490	676.345
1530	674.245	1555	669.045	1580	664.045	1610	658.745	1635	653.645
1640	652.145	1641	652.145	1655.5	647.345	1656	646.945	1657	645.845
1658	645.945	1659	645.945	1660	645.945	1661	645.945	1662	645.945
1663	645.945	1664	646.245	1664.5	646.645	1670	648.745	1680	649.045
1750	651.145	1815	653.645	1830	654.245	1870	655.245	1900	654.145
1925	658.745	2100	660.945	2240	664.345	2450	663.245		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	1640	.05	1655.5	.09

Bank Sta: Left	Right	Coeff Contr.	Expan.
1655.5	1664.5	.3	.7

Downstream Deck/Roadway Coordinates
num= 30

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
1530	674.29	674.29	1555	669.09	669.09	1560	663.79	663.79
1610	658.79	658.79	1635	653.69	653.69	1640	653.69	651.69
1640	655.29	652.19	1655.5	656.79	647.39	1656	656.79	649.59
1657	656.99	650.69	1658	657.09	651.39	1659	657.19	651.69
1660	657.29	651.79	1661	657.09	651.69	1662	657.09	651.39
1663	656.99	650.59	1664	656.89	649.29	1664.5	656.79	646.69
1670	656.29	648.79	1680	655.29	649.09	1680	653.69	649.09
1750	653.69	651.19	1845	653.69		1860	654.29	
1870	655.29		1900	656.79		1925	658.79	
2100	660.99		2240	664.39		2480	666.19	

Downstream Bridge Cross Section Data
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	698.845	1040	694.245	1100	690.945	1170	688.945	1210	683.945
1260	682.045	1340	684.345	1400	681.045	1440	679.045	1490	676.345
1530	674.245	1555	669.045	1580	664.045	1610	658.745	1635	653.645
1640	652.145	1641	652.145	1655.5	647.345	1656	646.945	1657	645.845
1658	645.945	1659	645.945	1660	645.945	1661	645.945	1662	645.945
1663	645.945	1664	646.245	1664.5	646.645	1670	648.745	1680	649.045
1750	651.145	1815	653.645	1830	654.245	1870	655.245	1900	654.145
1925	658.745	2100	660.945	2240	664.345	2450	663.245		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	1640	.05	1655.5	.09

Bank Sta: Left	Right	Coeff Contr.	Expan.
1655.5	1664.5	.3	.7

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98

```
Elevation at which weir flow begins          =   654.4
Energy head used in spillway design          =
Spillway height used in design               =
Weir crest shape                             = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Walker Run
REACH: 1                RS: -255

INPUT
Description: BHJ
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    1000  684.39    1092  679.59    1128  674.39    1170  669.39    1230  664.59
    1310  660.09    1330  657.59    1350  654.89    1372  649.79    1405  647.29
    1408  645.79    1412     648    1450   649.7    1490  649.29    1525  649.39
    1570  649.09    1610  649.89    1670  654.39    1712  659.39    1740  664.89
    1750  669.39    1790  674.89

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    1000     .09    1405     .05    1412     .09

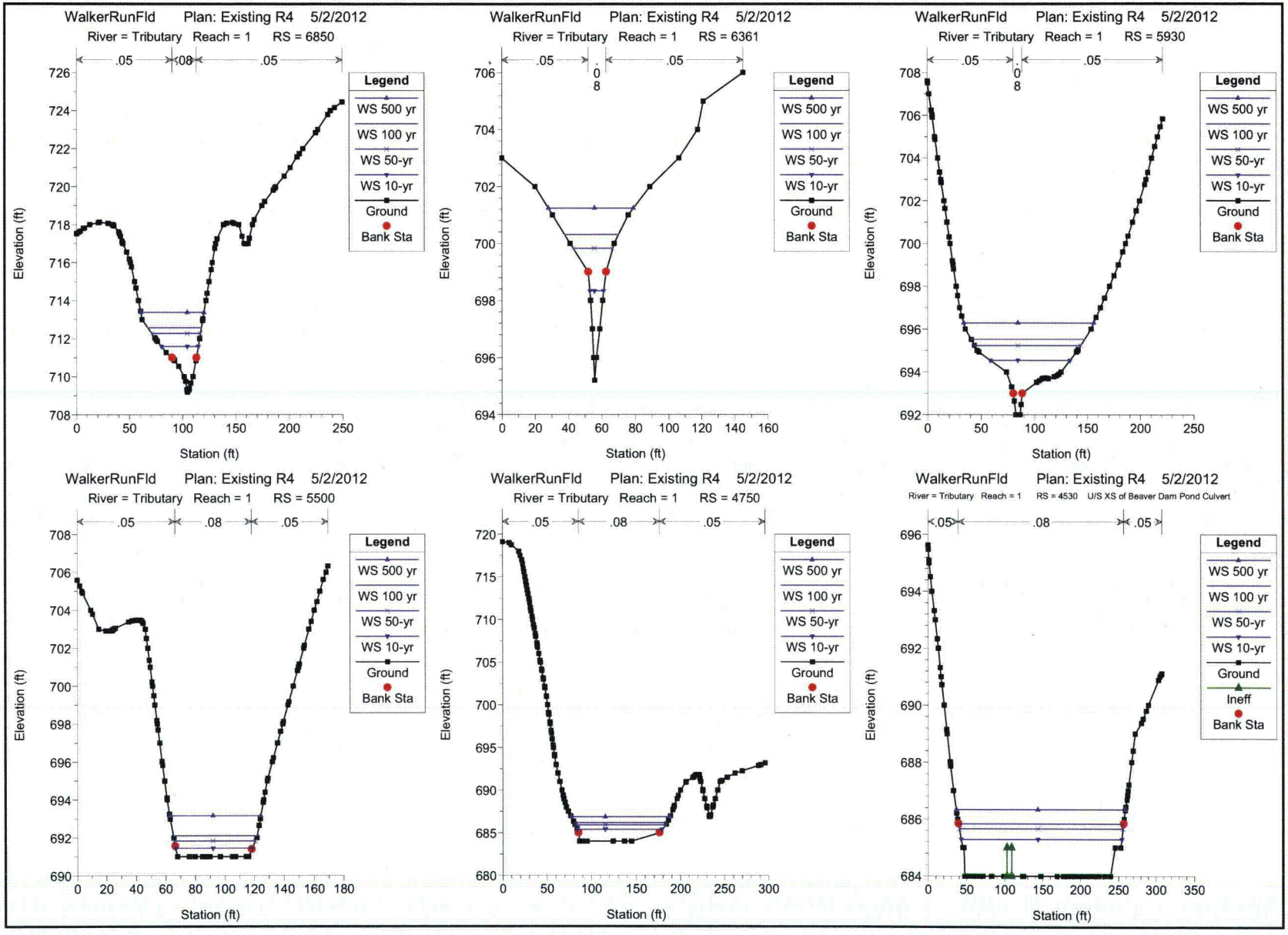
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          1405    1412              225     260     200             .3      .7
```

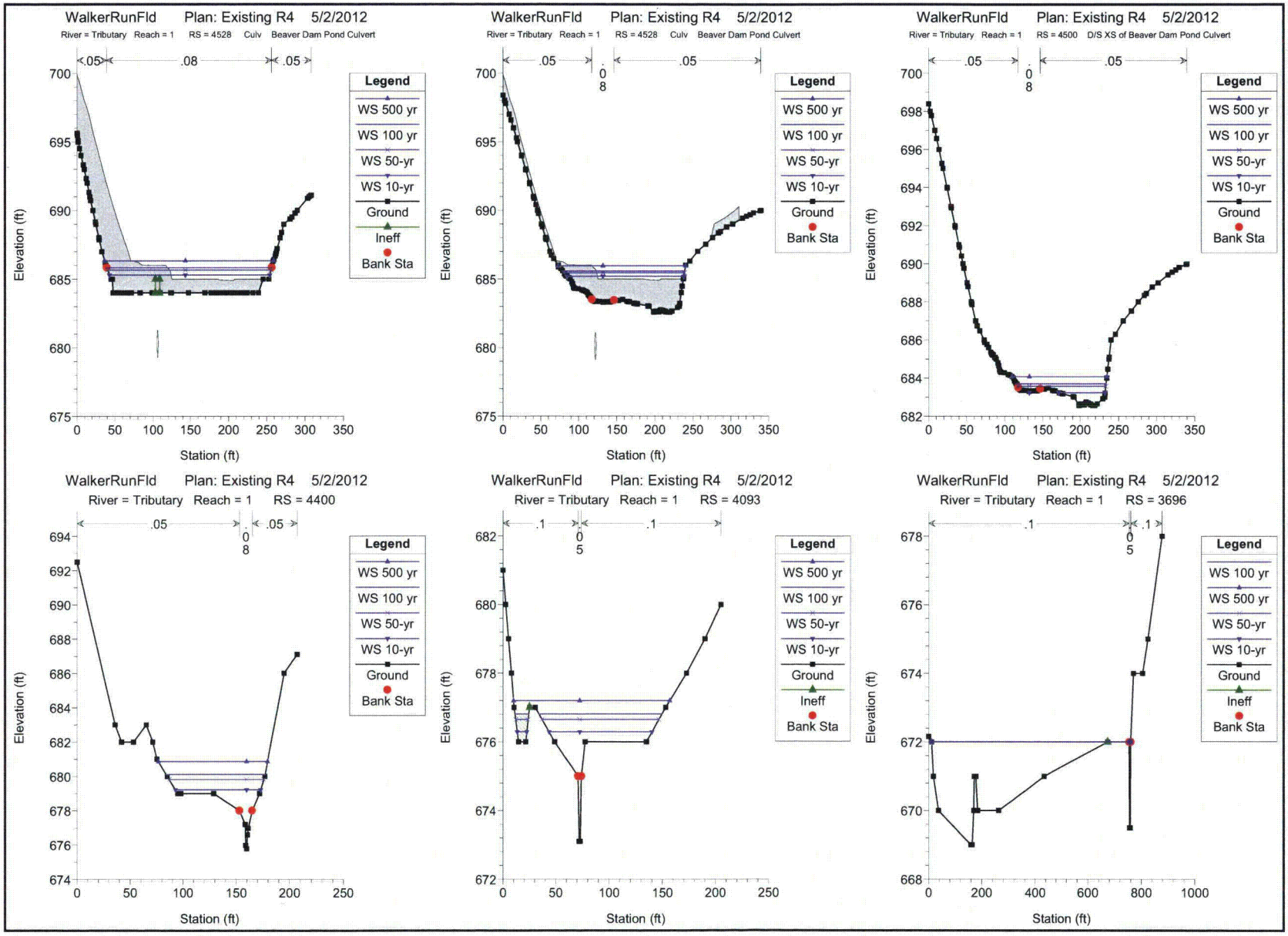
Appendix G:
Corrected Effective/ Existing Conditions Model

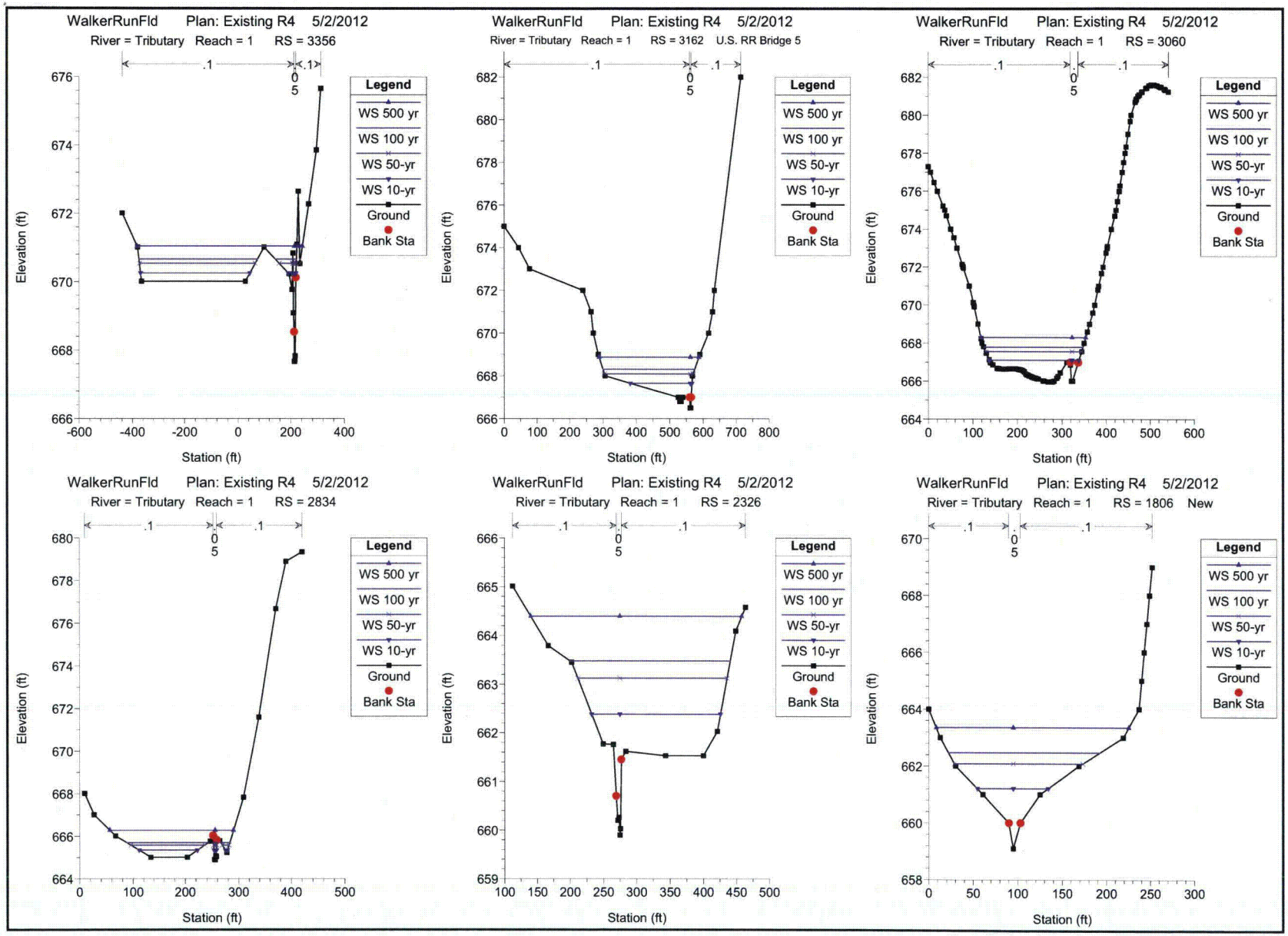
- HEC-RAS Reports
- HEC-RAS Cross-Sections
- HEC-RAS Profiles

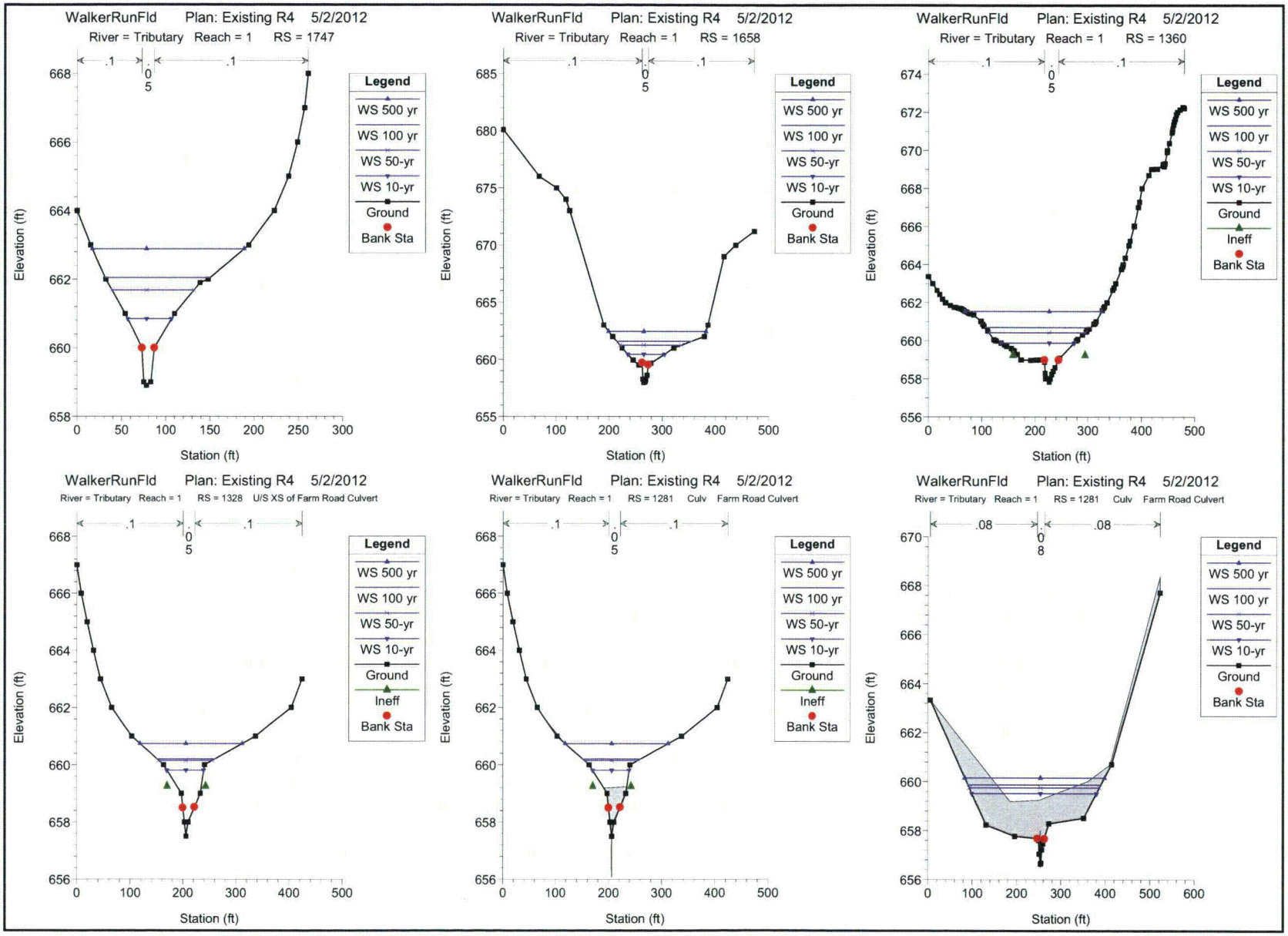
HEC-RAS Plan: EX COPY River: Walker Run Reach: 1 Profile: 100 yr

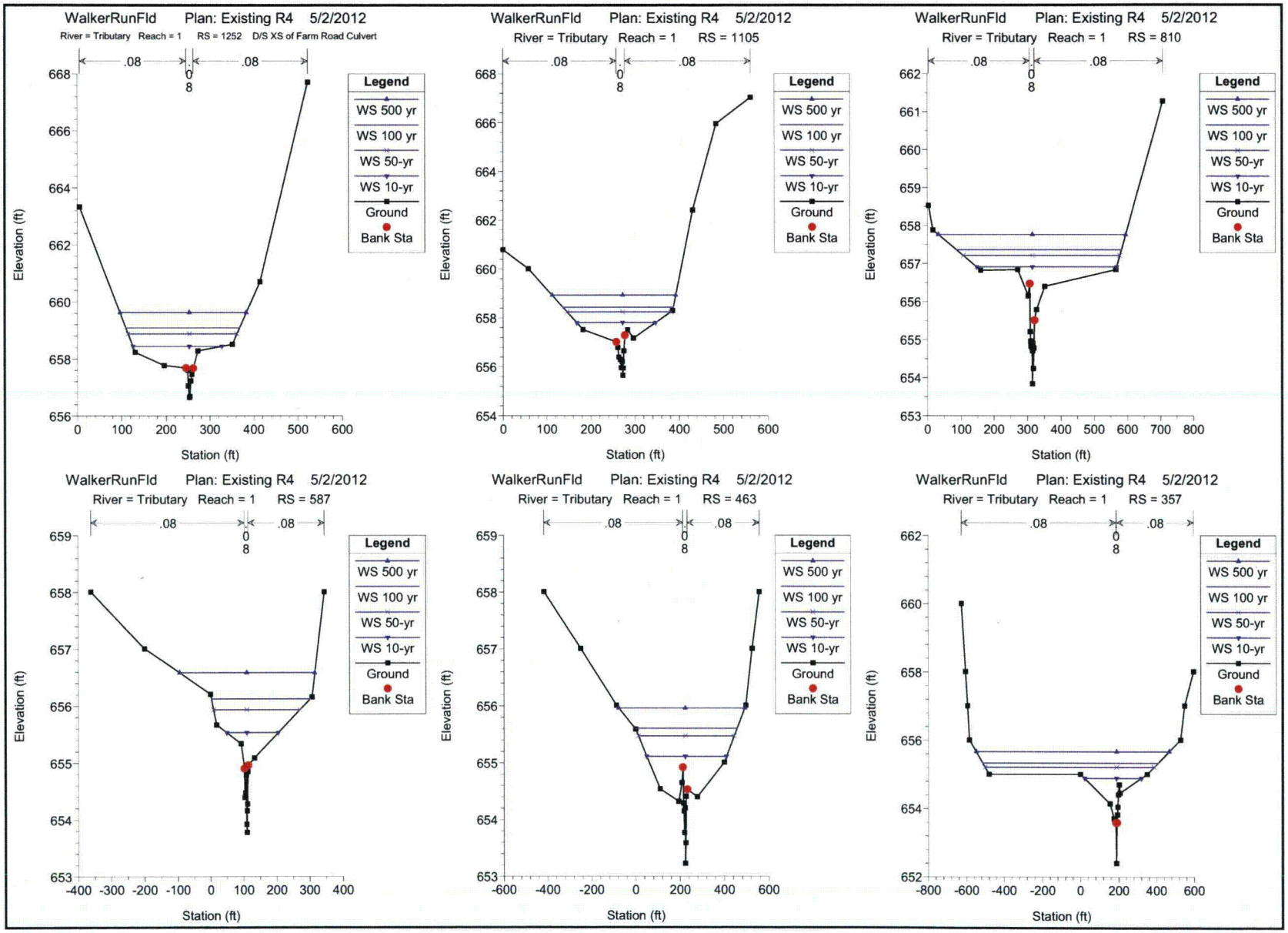
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5862	100 yr	1640.00	675.53	680.84	680.84	681.74	0.021365	10.73	341.13	163.77	0.90
1	5547	100 yr	1640.00	669.38	677.23		677.32	0.001714	4.34	917.01	218.69	0.29
1	5282	100 yr	1640.00	667.03	676.63	673.35	676.84	0.001973	5.09	789.71	236.11	0.31
1	5250		Bridge									
1	5198	100 yr	1640.00	665.45	672.12		672.44	0.006179	5.32	503.87	219.50	0.50
1	5107	100 yr	1640.00	664.59	671.65		672.02	0.006138	6.50	579.57	274.35	0.51
1	4810	100 yr	1640.00	663.49	670.41		670.60	0.003908	5.39	763.87	311.10	0.39
1	4692	100 yr	1640.00	662.02	670.15		670.28	0.001798	3.64	873.60	314.95	0.28
1	4414	100 yr	1640.00	662.46	669.35		669.60	0.004913	5.99	691.29	303.63	0.44
1	4130	100 yr	1640.00	661.54	668.57	667.33	668.68	0.002845	4.48	929.89	363.42	0.34
1	3972	100 yr	1640.00	661.21	668.30	666.95	668.39	0.001776	3.92	1179.40	475.43	0.27
1	3914		Bridge									
1	3860	100 yr	1640.00	660.73	666.98		667.28	0.005366	5.84	467.92	361.49	0.44
1	3735	100 yr	1640.00	660.36	666.35		666.57	0.004670	4.71	466.42	287.28	0.38
1	3532	100 yr	1640.00	658.50	664.39	664.39	664.99	0.022119	7.88	360.18	282.09	0.77
1	3410	100 yr	1640.00	657.83	664.12		664.21	0.002443	3.93	797.51	323.07	0.32
1	3278	100 yr	1640.00	657.01	663.46		663.71	0.006571	6.29	558.17	384.39	0.50
1	2949	100 yr	1640.00	655.77	662.17		662.28	0.003062	4.14	723.75	376.29	0.33
1	2669	100 yr	1640.00	655.65	660.95		661.16	0.005310	5.47	571.95	399.02	0.47
1	2570	100 yr	1640.00	655.15	660.79	659.23	660.85	0.001649	3.19	945.73	477.37	0.27
1	2497	100 yr	1640.00	653.51	660.71	659.31	660.76	0.000926	2.78	1164.10	507.90	0.20
1	2480		Bridge									
1	2462	100 yr	1640.00	653.86	660.00		660.10	0.002353	4.02	855.09	499.77	0.31
1	2274	100 yr	1640.00	651.42	658.66	658.66	659.23	0.010241	8.37	446.51	390.50	0.62
1	2139	100 yr	1640.00	650.72	657.42		657.50	0.002811	4.04	844.68	523.24	0.32
1	1925	100 yr	1640.00	651.09	657.04		657.08	0.001492	2.88	1242.86	842.21	0.24
1	1602	100 yr	1860.00	650.67	656.90		656.91	0.000370	1.33	2825.89	1169.40	0.10
1	1402	100 yr	1860.00	649.80	656.80		656.82	0.000604	1.72	1969.63	683.79	0.12
1	1208	100 yr	1860.00	649.57	656.62		656.65	0.000989	2.27	1547.22	555.60	0.17
1	990	100 yr	1860.00	649.47	656.45		656.48	0.001163	2.48	1407.10	509.75	0.18
1	884	100 yr	1860.00	648.62	656.29	654.44	656.34	0.001605	3.37	1288.97	442.26	0.24
1	875		Culvert									
1	863	100 yr	1860.00	648.96	656.19		656.24	0.001269	3.29	1336.89	432.74	0.24
1	715	100 yr	1860.00	647.90	655.97		656.05	0.001480	3.96	1181.57	370.74	0.26
1	536	100 yr	1860.00	646.97	655.73		655.81	0.001257	3.79	1162.07	313.36	0.24
1	350	100 yr	1860.00	647.08	655.60		655.65	0.000800	3.07	1329.98	308.49	0.20
1	185	100 yr	1860.00	646.40	655.45		655.51	0.000911	3.45	1207.77	272.48	0.21
1	011	100 yr	1860.00	645.71	655.30	652.71	655.37	0.000842	3.44	1406.13	431.12	0.20
1	-10		Bridge									
1	-30	100 yr	1860.00	644.46	652.99	652.00	654.05	0.009523	9.92	416.93	225.47	0.66
1	-78	100 yr	1860.00	645.43	653.25		653.43	0.001924	4.51	889.89	311.25	0.31
1	-154	100 yr	1860.00	644.90	653.01		653.24	0.002923	5.61	821.95	318.12	0.38
1	-255	100 yr	1860.00	645.50	652.58	650.51	652.83	0.003695	6.02	621.91	160.12	0.41

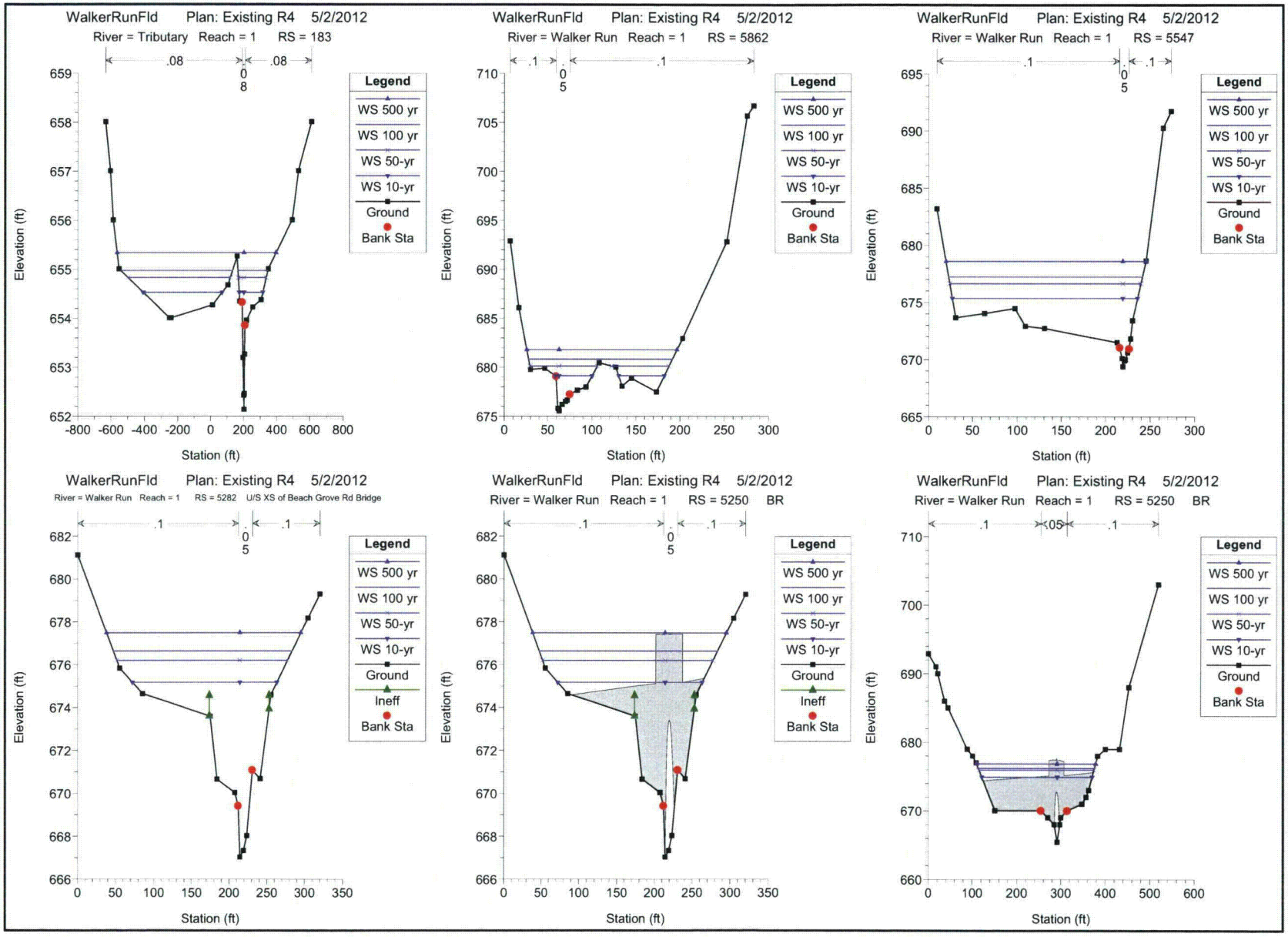

WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 6850
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 6361
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 5930
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 5500
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 4750
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 4530 U/S XS of Beaver Dam Pond Culvert
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

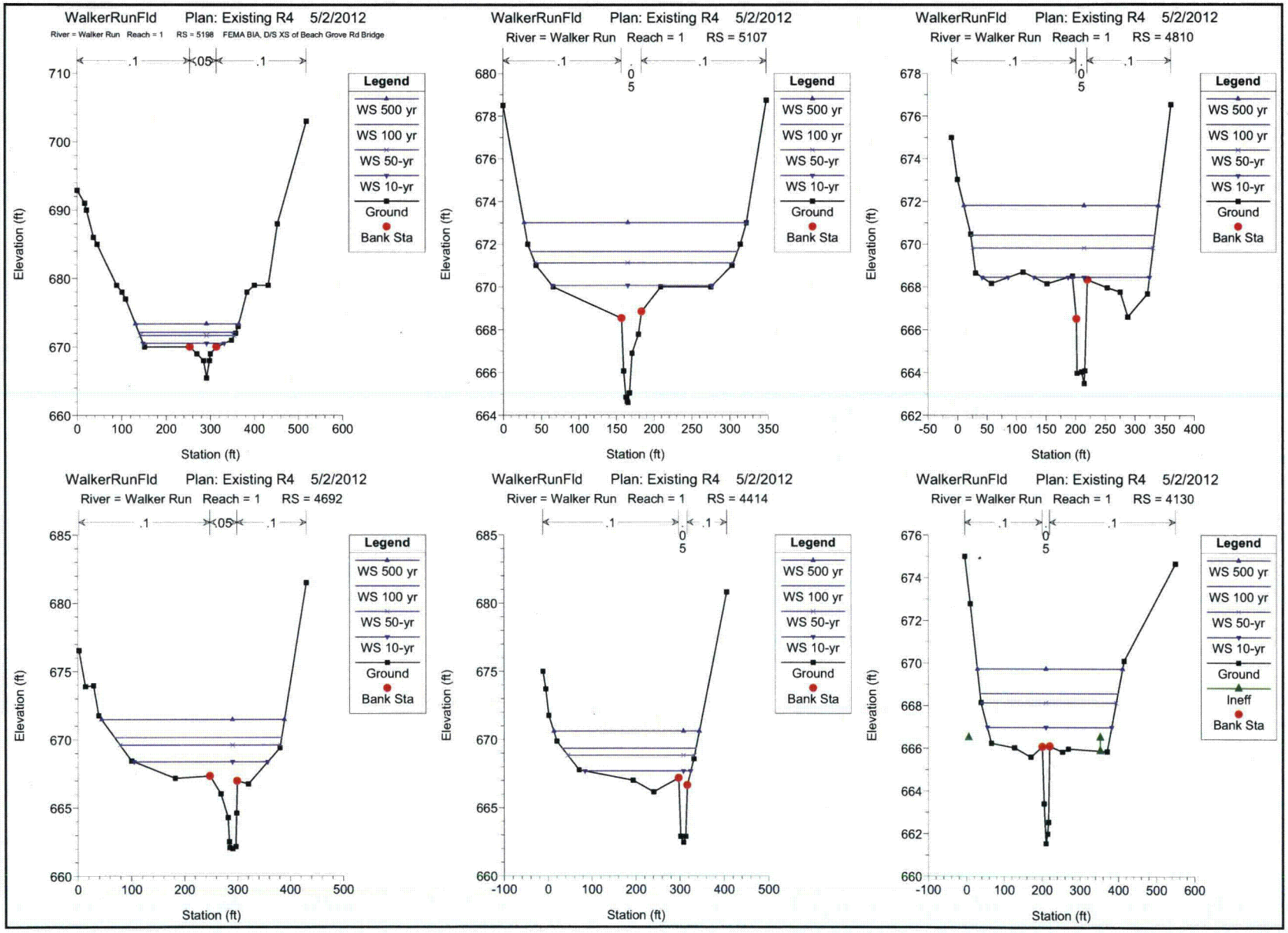

WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 4528 Culv Beaver Dam Pond Culvert
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 4528 Culv Beaver Dam Pond Culvert
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 4500 D/S XS of Beaver Dam Pond Culvert
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 4400
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 4093
.1 .05 .1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 3696
.1 .05 .1
Legend
WS 100 yr
WS 500 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

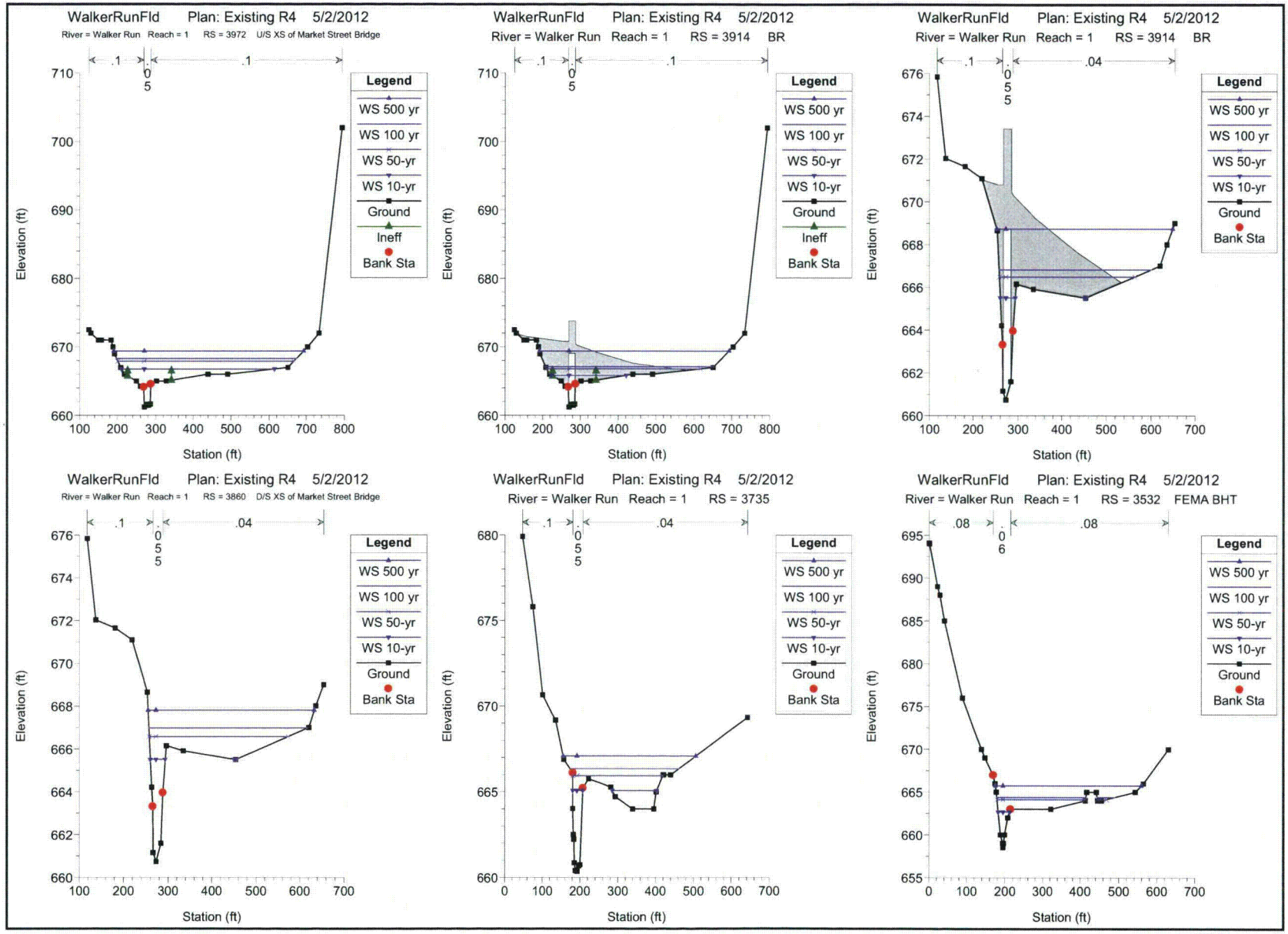

WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 3356
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 3162 U.S. RR Bridge 5
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 3060
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 2834
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 2326
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 1806 New
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta

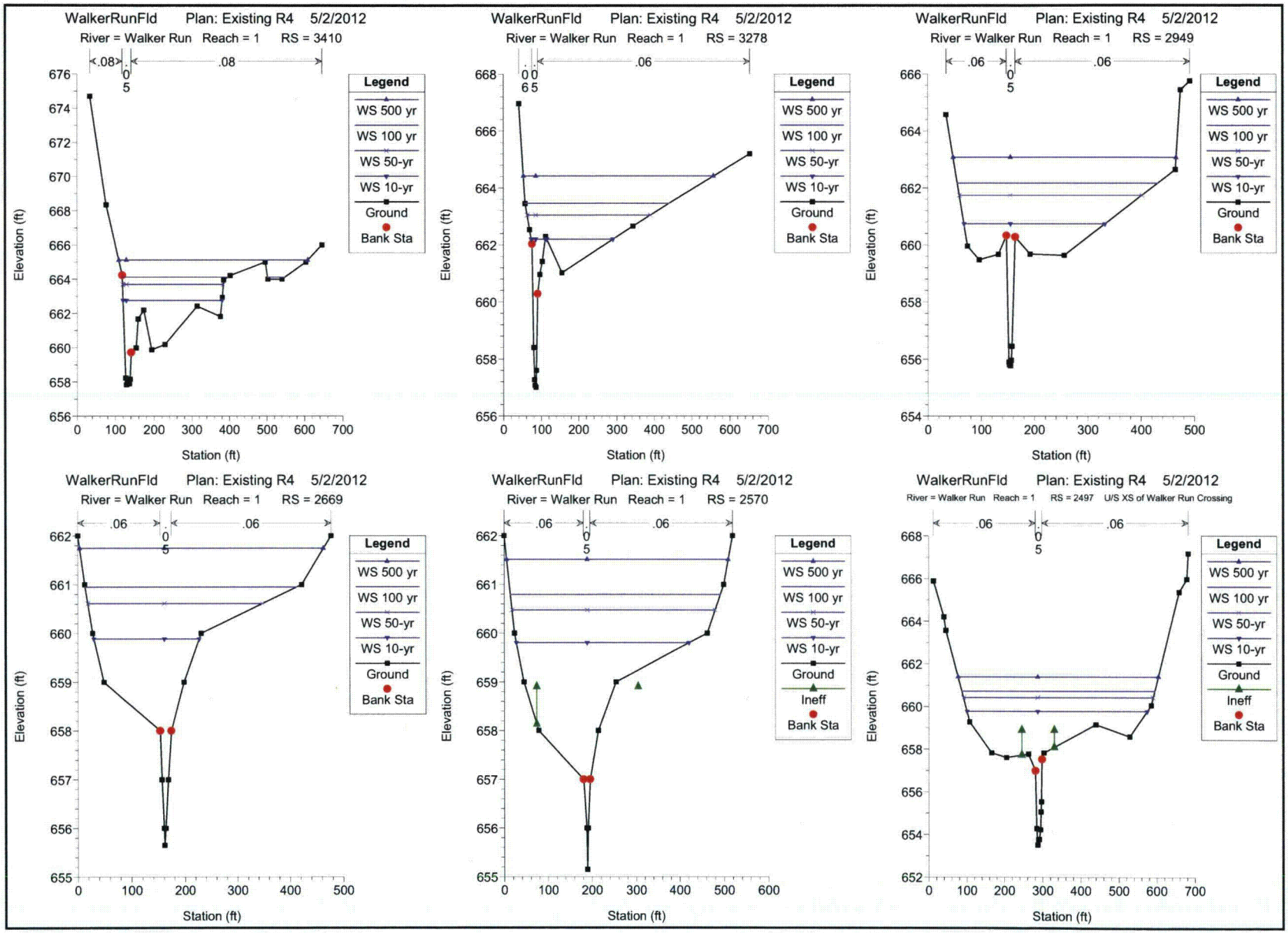

WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 1747
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 1658
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 1360
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 1328 U/S XS of Farm Road Culvert
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 1281 Culv Farm Road Culvert
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 1281 Culv Farm Road Culvert
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

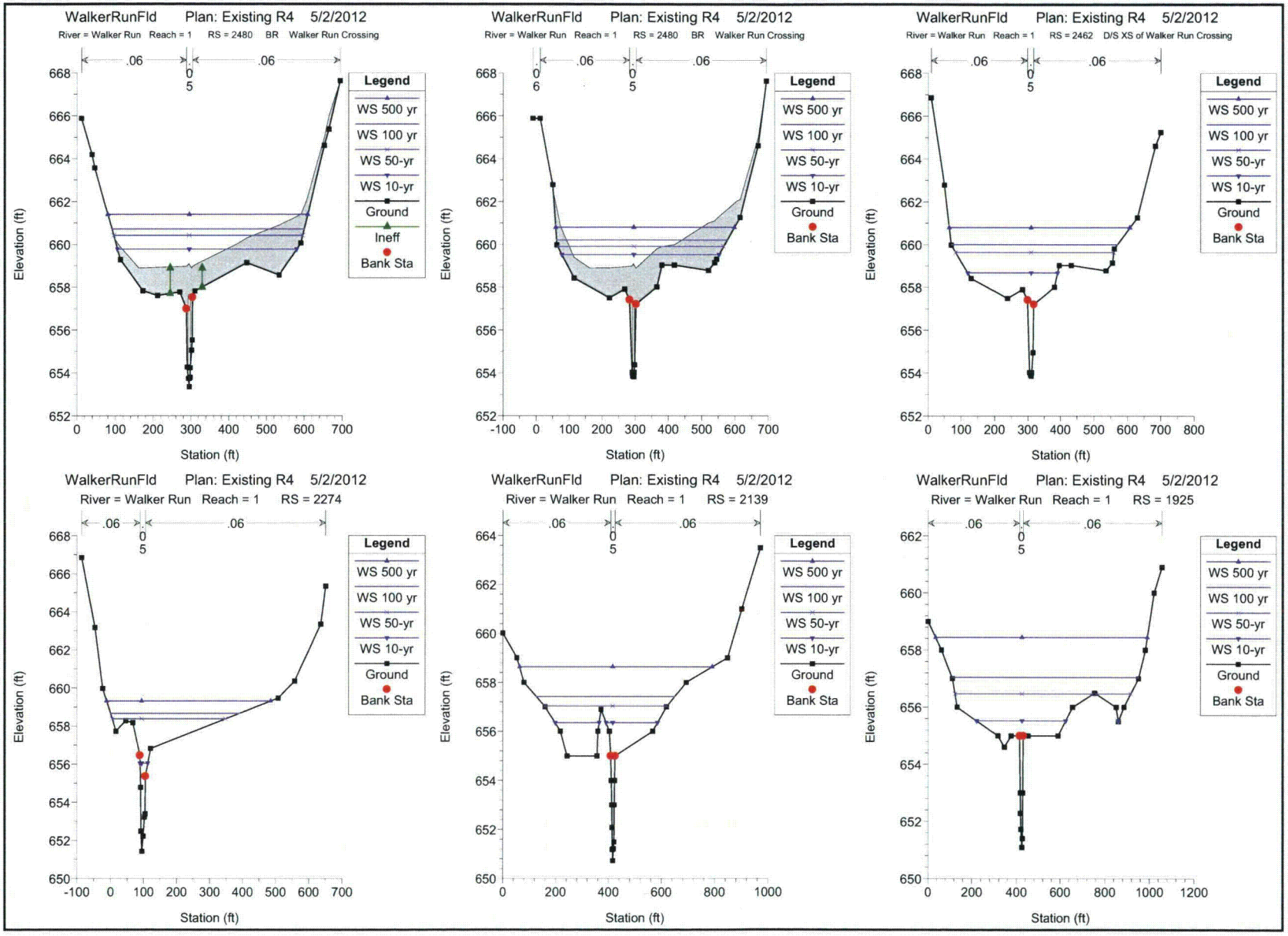

WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 1252 D/S XS of Farm Road Culvert
.08 .08
0
8
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 1105
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 810
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 587
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 463
WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 357

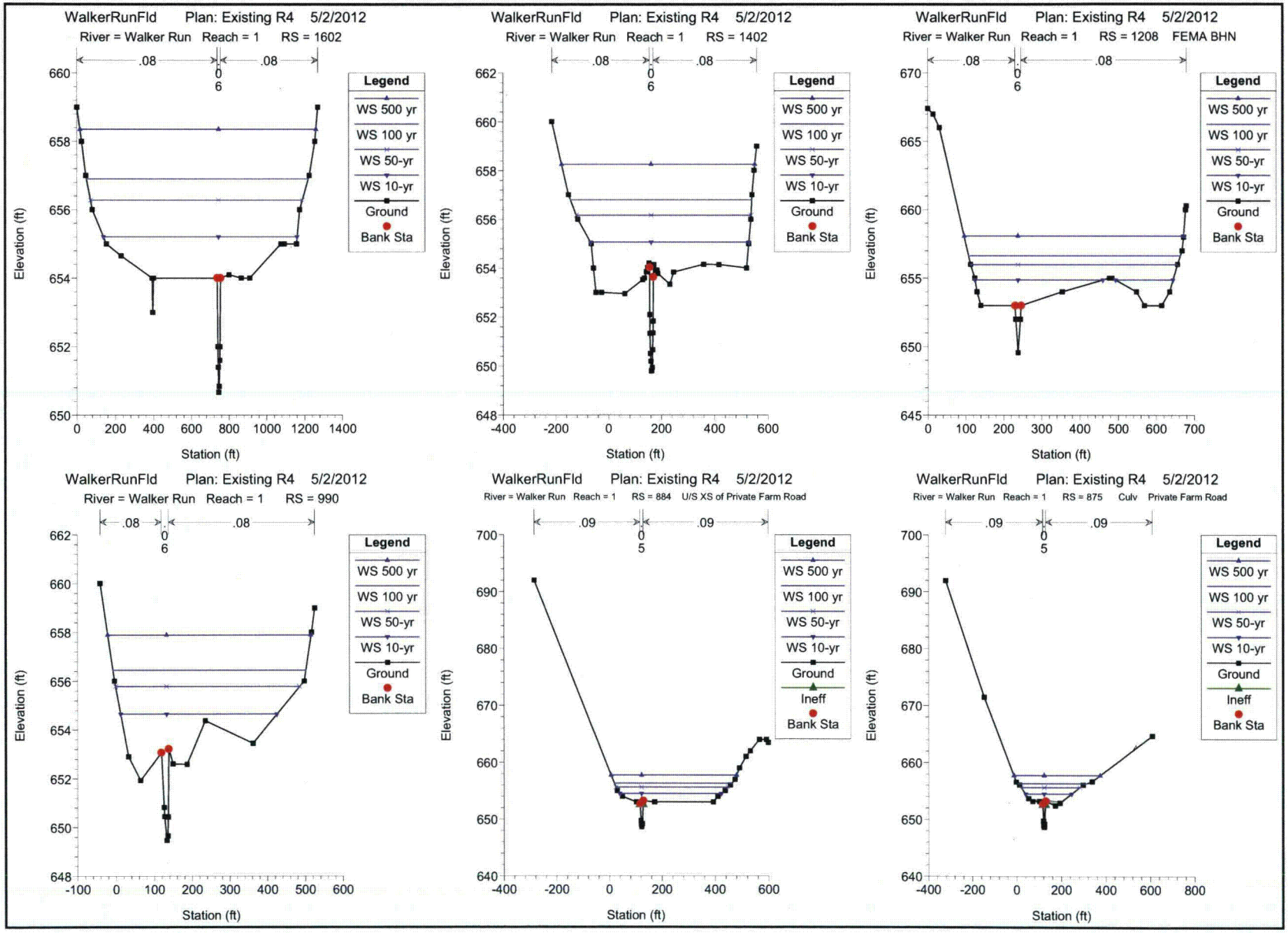

WalkerRunFld Plan: Existing R4 5/2/2012
River = Tributary Reach = 1 RS = 183
.08
.08
0
8
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 5862
.1
.1
.1
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 5547
.1
.1
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 5282 U/S XS of Beach Grove Rd Bridge
.1
.1
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 5250 BR
.1
.1
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 5250 BR
.1
.05
.1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

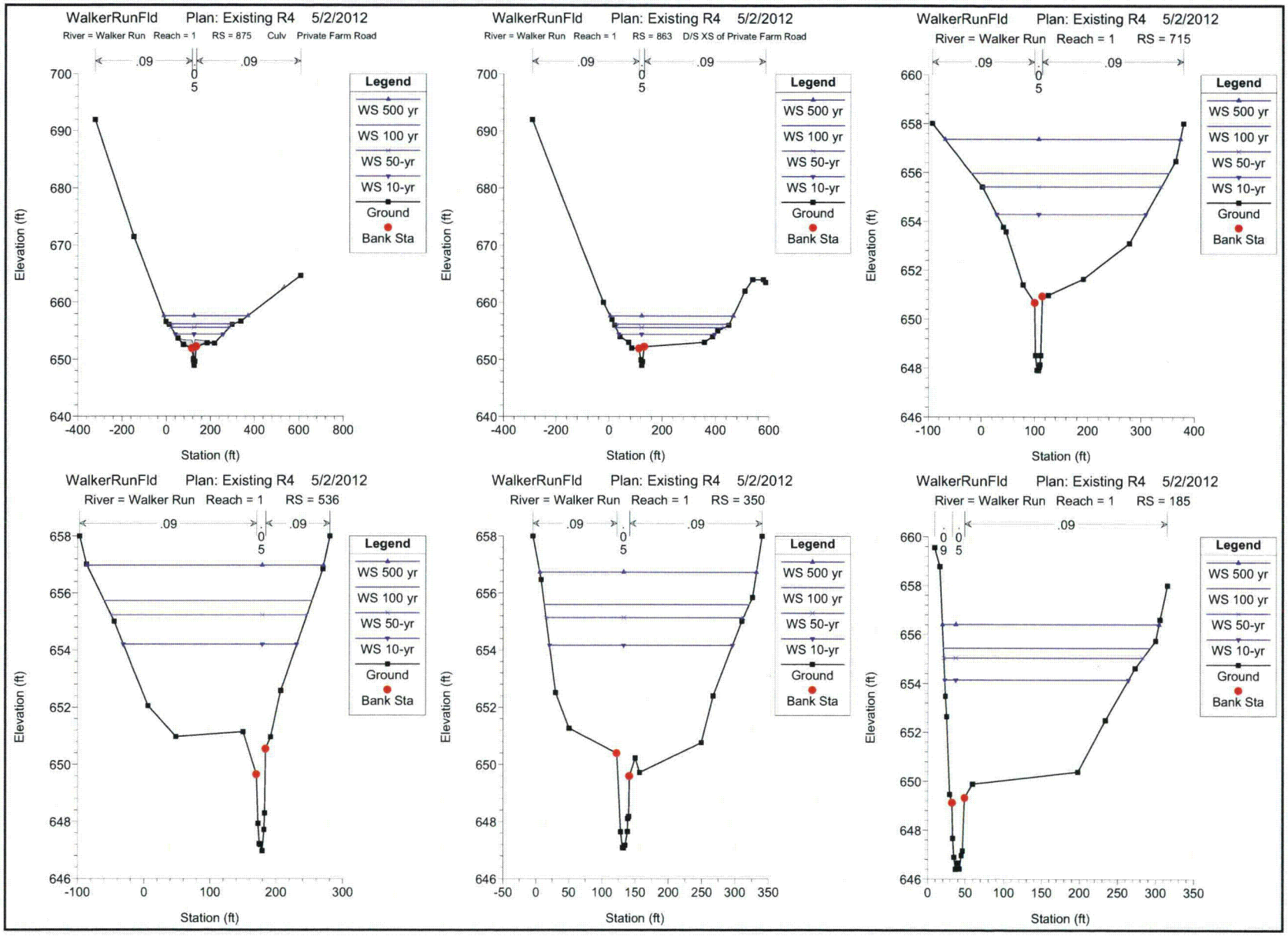

WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 5198 FEMA BIA, D/S XS of Beach Grove Rd Bridge
.1 .05 .1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 5107
.1 .05 .1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 4810
.1 .05 .1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 4692
.1 .05 .1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 4414
.1 .05 .1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 4130
.1 .05 .1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

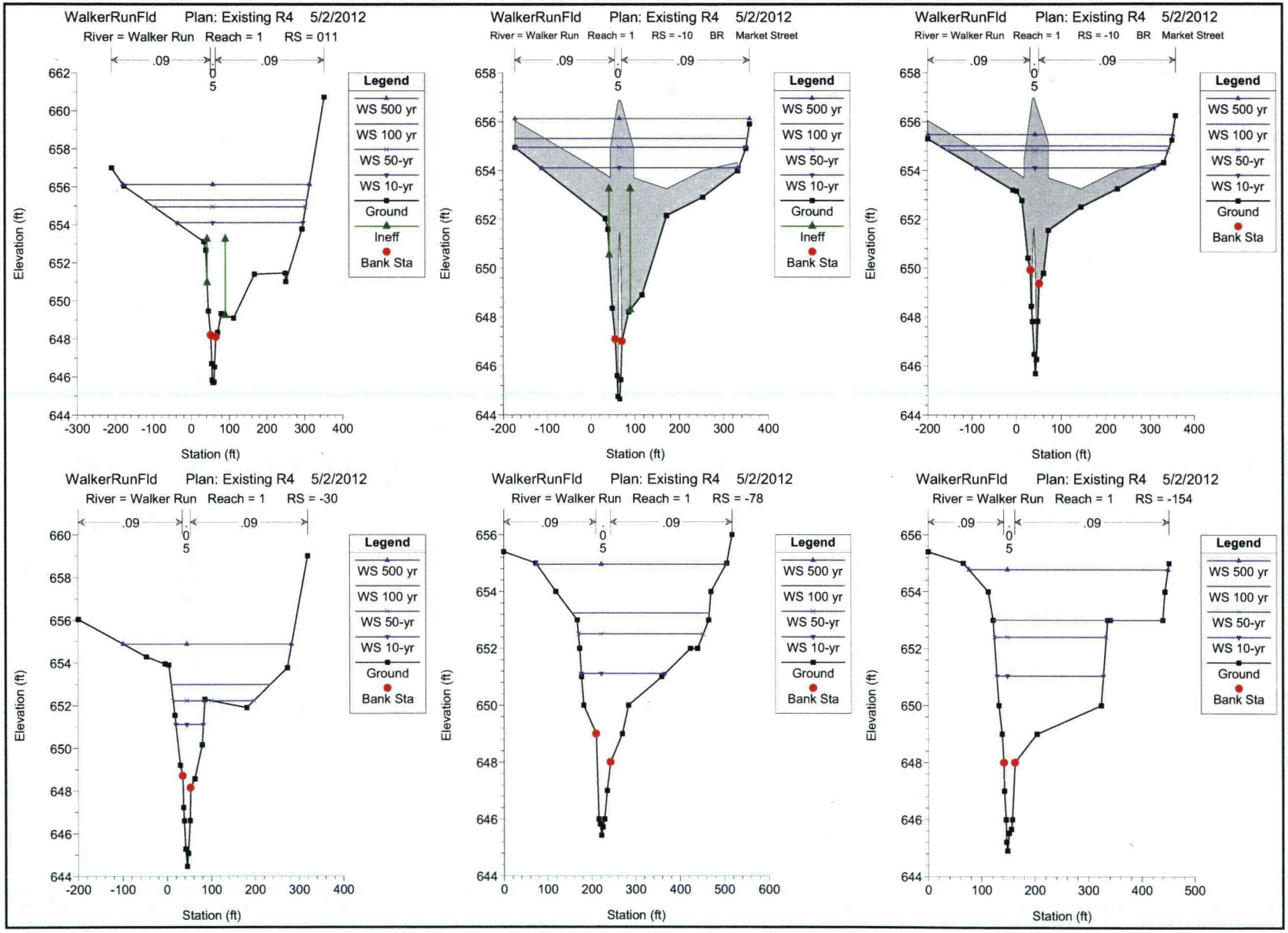

WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 3972 U/S XS of Market Street Bridge
.1 .05 .1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 3914 BR
.1 .05 .1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 3914 BR
.1 .055 .04
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 3860 D/S XS of Market Street Bridge
.1 .055 .04
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 3735
.1 .055 .04
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 3532 FEMA BHT
.08 .06 .08
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

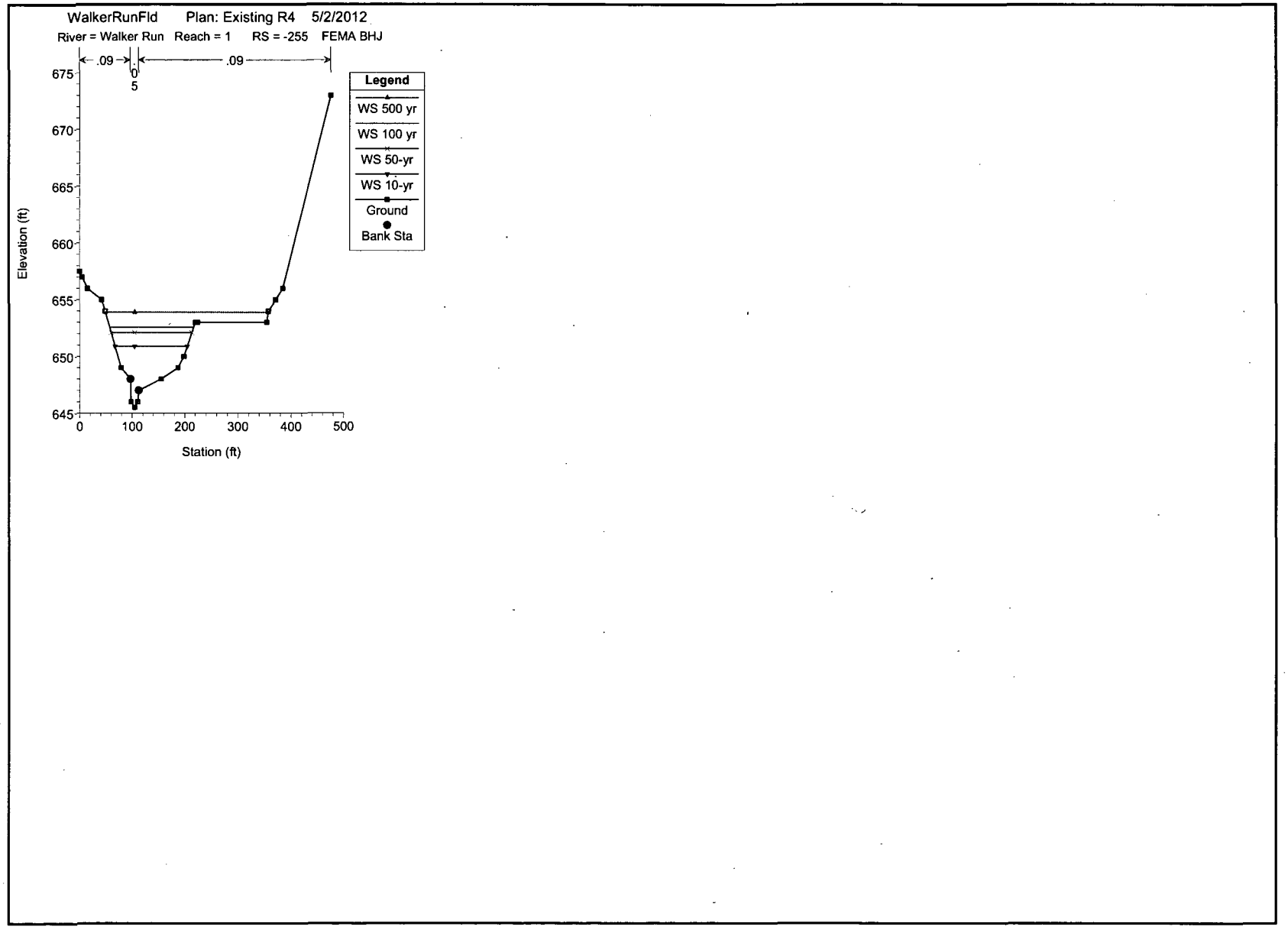

WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 3410
.08
.08
0.5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 3278
.06
.06
0.5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 2949
.06
.06
0.5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 2669
.06
.06
0.5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 2570
.06
.06
0.5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 2497 U/S XS of Walker Run Crossing
.06
.06
0.5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

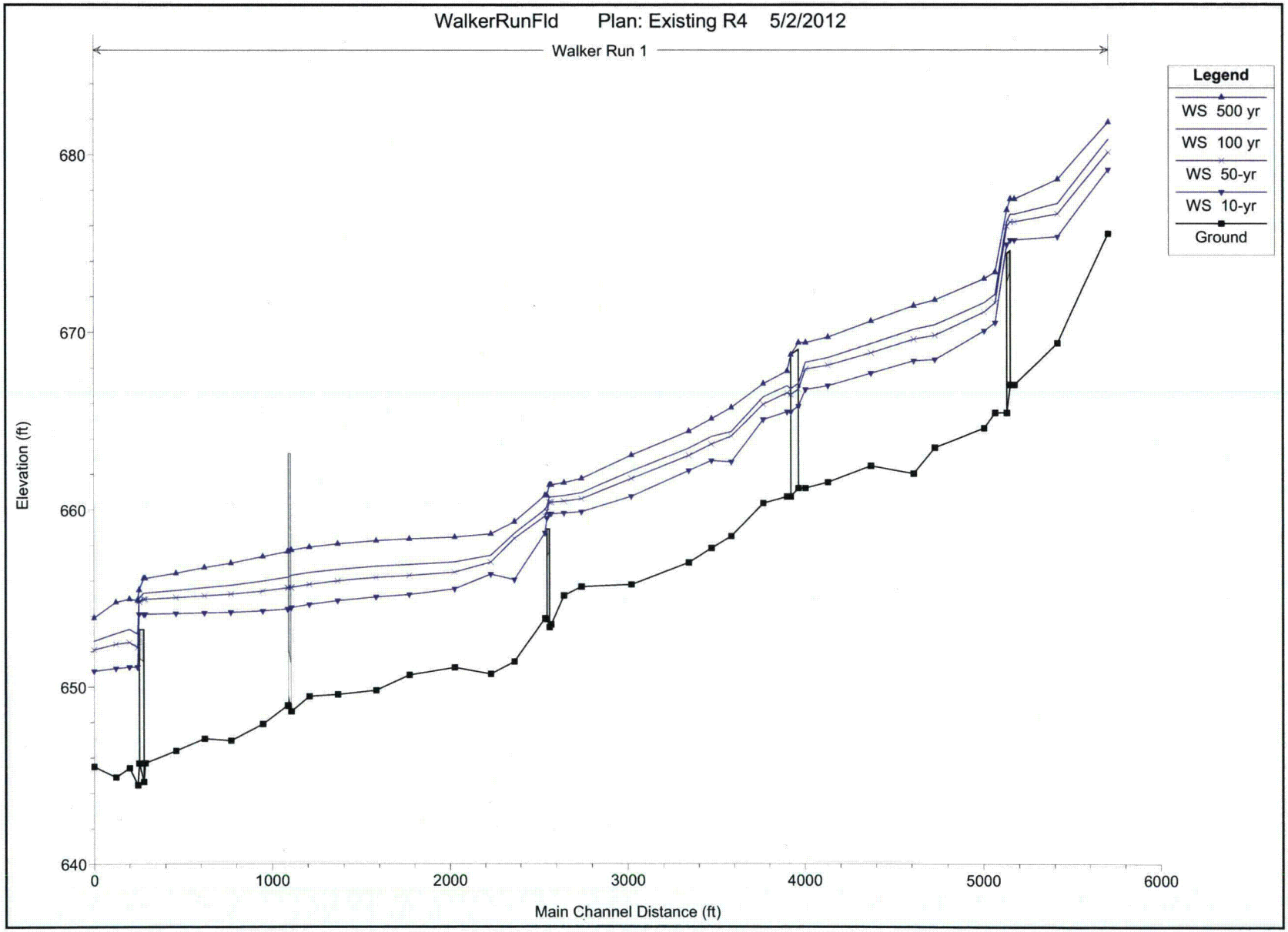

WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 2480 BR Walker Run Crossing
.06
.06
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 2480 BR Walker Run Crossing
.06
.06
0
6
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 2462 D/S XS of Walker Run Crossing
.06
.06
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 2274
.06
.06
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 2139
.06
.06
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 1925
.06
.06
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

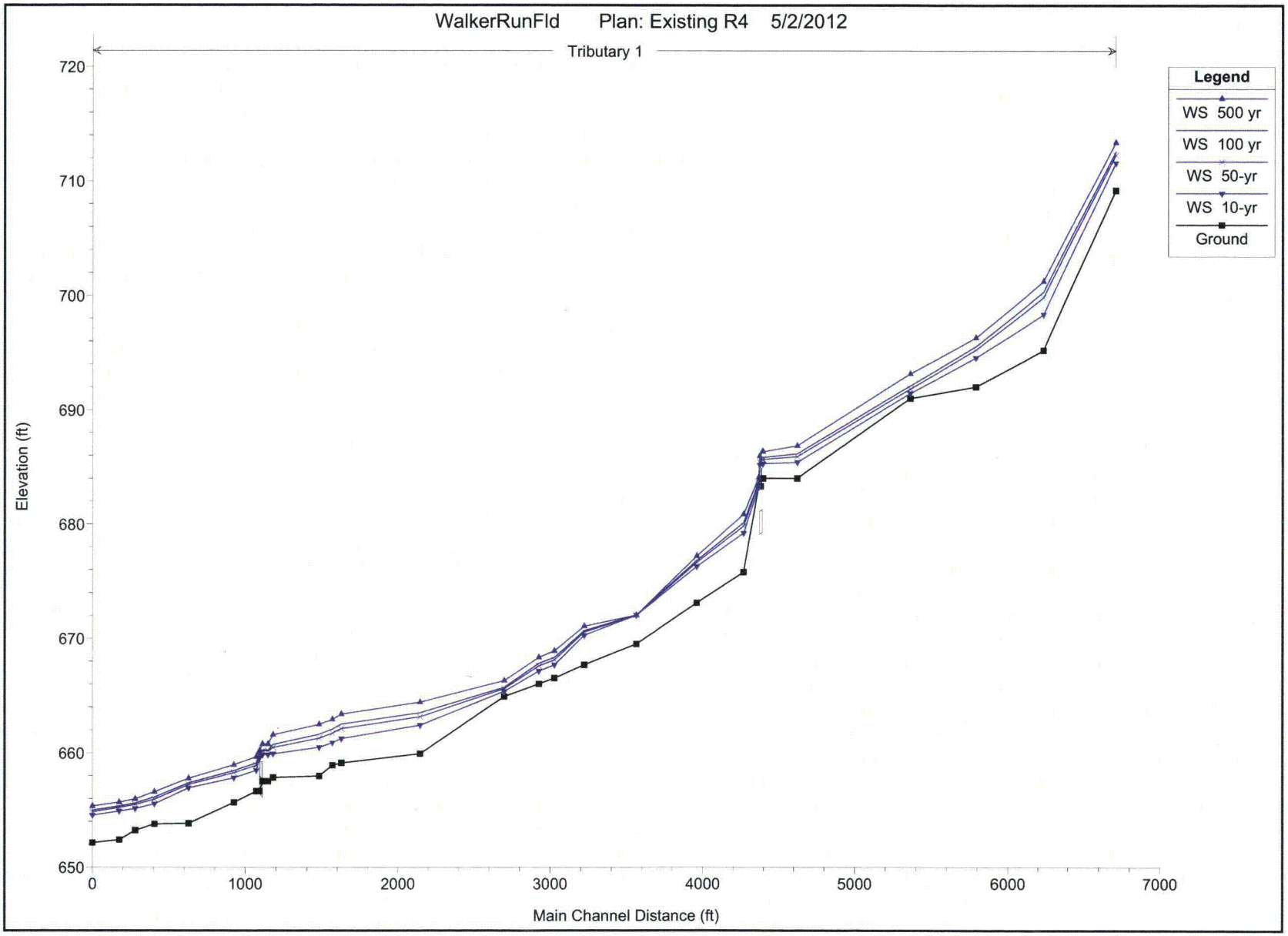

WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 1602
.08
.08
0
6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 1402
.08
.08
0
6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 1208 FEMA BHN
.08
.08
0
6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 990
.08
.08
0
6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 884 U/S XS of Private Farm Road
.09
.09
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 875 Culv Private Farm Road
.09
.09
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 875 Culv Private Farm Road
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 863 D/S XS of Private Farm Road
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 715
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 536
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 350
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 185
.09
.09
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = 011
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = -10 BR Market Street
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = -10 BR Market Street
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = -30
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = -78
WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = -154
.09
.05
.09
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


WalkerRunFld Plan: Existing R4 5/2/2012
River = Walker Run Reach = 1 RS = -255 FEMA BHJ
.09
.09
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
675
670
665
660
655
650
645
0
100
200
300
400
500
Station (ft)


WalkerRunFld Plan: Existing R4 5/2/2012
Walker Run 1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Elevation (ft)
680
670
660
650
640
0
1000
2000
3000
4000
5000
6000
Main Channel Distance (ft)


WalkerRunFld Plan: Existing R4 5/2/2012
Tributary 1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Elevation (ft)
720
710
700
690
680
670
660
650
0
1000
2000
3000
4000
5000
6000
7000
Main Channel Distance (ft)

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: WalkerRunFld
Project File : WalkerRunFld.prj
Run Date and Time: 5/2/2012 2:56:18 PM

Project in English units

PLAN DATA

Plan Title: Existing R4
Plan File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions March 2012\REV 4 HECRAS - Final - Clean\WalkerRunFld.p01

Geometry Title: Existing Conditions R4
Geometry File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions March 2012\REV 4 HECRAS - Final - Clean\WalkerRunFld.g01

Flow Title : Existing Conditions
Flow File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions March 2012\REV 4 HECRAS - Final - Clean\WalkerRunFld.f03

Plan Summary Information:
Number of: Cross Sections = 65 Multiple Openings = 0
Culverts = 3 Inline Structures = 0
Bridges = 4 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = Walker Run Reach = 1

RS	Profile	Method	Value1	Value2
5862	100 yr encroachment	1	50	108.12
5547	100 yr encroachment	1	160	226.17
5282	100 yr encroachment	1	75	265
5198	100 yr encroachment	1	151	348
5107	100 yr encroachment	1	60	275
4810	100 yr encroachment	1	70.73	245.06
4692	100 yr encroachment	1	100.41	364.89
4414	100 yr encroachment	1	193.46	331.76
4130	100 yr encroachment	1	65.97	269.33
3972	100 yr encroachment	1	210	600
3860	100 yr encroachment	1	262.64	295.78
3735	100 yr encroachment	1	181.15	320
3532	100 yr encroachment	1	169	413
3410	100 yr encroachment	1	118.62	250
3278	100 yr encroachment	1	68.65	180
2949	100 yr encroachment	1	74.16	255.96
2669	100 yr encroachment	1	75	210
2570	100 yr encroachment	1	125	250
2497	100 yr encroachment	1	272.27	501.55
2462	100 yr encroachment	1	275	425
2274	100 yr encroachment	1	89.33	300
2139	100 yr encroachment	1	404	567
1925	100 yr encroachment	1	375	657
1602	100 yr encroachment	1	584	1053
1402	100 yr encroachment	1	10.08	391.43
1208	100 yr encroachment	1	140	340
990	100 yr encroachment	1	15	410
884	100 yr encroachment	1	70	220

863	100 yr encroachment	1	65	215
715	100 yr encroachment	1	70	237.94
536	100 yr encroachment	1	36.84	184.3
350	100 yr encroachment	1	74.21	237.94
185	100 yr encroachment	1	32.38	176.38
011	100 yr encroachment	1	42	249.3
-30	100 yr encroachment	1	15.72	63.98
-78	100 yr encroachment	1	167	284
-154	100 yr encroachment	1	133	206.89
-255	100 yr encroachment	1	79	187

River = Tributary Reach = 1

RS	Profile	Method	Value1	Value2
6850	100 yr encroachment	1	90.32	113.19
6361	100 yr encroachment	1	52	70.17
5930	100 yr encroachment	1	75	112
5500	100 yr encroachment	1	66.48	118.28
4750	100 yr encroachment	1	85.56	176.24
4530	100 yr encroachment	1	46.66	245.5
4500	100 yr encroachment	1	117.21	152.28
4400	100 yr encroachment	1	129	172
4093	100 yr encroachment	1	68.09	94.92
3696	100 yr encroachment	1	434.5	760
3356	100 yr encroachment	1	-25	219.51
3162	100 yr encroachment	1	513.93	564
3060	100 yr encroachment	1	270	337.11
2834	100 yr encroachment	1	175	258.87
2326	100 yr encroachment	1	249.41	330
1806	100 yr encroachment	1	61	125
1747	100 yr encroachment	1	54	110
1658	100 yr encroachment	1	256.45	295
1360	100 yr encroachment	1	217.64	244.74
1328	100 yr encroachment	1	197	233
1252	100 yr encroachment	1	223.26	315
1105	100 yr encroachment	1	220	300
810	100 yr encroachment	1	285	379.19
587	100 yr encroachment	1	95	140.89
463	100 yr encroachment	1	169.65	267.48
357	100 yr encroachment	1	114.71	195
183	100 yr encroachment	1	-6	255.38

FLOW DATA

Flow Title: Existing Conditions
Flow File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions March 2012\REV 4 HECRAS - Final - Clean\WalkerRunFld.f03

Flow Data (cfs)

River	Reach	RS	100 yr	100 yr encroachment	500 yr	10-yr	50-yr
Tributary	1	6850	300	300	606	84	213
Tributary	1	4400	300	300	606	84	213
Tributary	1	1252	300	300	606	84	213
Walker Run	1	5862	1640	1640	3100	480	1180
Walker Run	1	5198	1640	1640	3100	480	1180
Walker Run	1	1602	1860	1860	3600	550	1320

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Tributary	1	100 yr	Critical	Normal S = 0.0015
Tributary	1	100 yr encroachment	Critical	Known WS = 655.97
Tributary	1	500 yr	Critical	Normal S = 0.0015
Tributary	1	10-yr	Critical	Normal S = 0.0015
Tributary	1	50-yr	Critical	Normal S = 0.0015
Walker Run	1	100 yr	Critical	Known WS = 652.58
Walker Run	1	100 yr encroachment	Critical	Known WS = 653.58
Walker Run	1	500 yr	Critical	Known WS = 653.89
Walker Run	1	10-yr	Critical	Known WS = 650.89
Walker Run	1	50-yr	Critical	Known WS = 652.09

GEOMETRY DATA

Geometry Title: Existing Conditions R4
Geometry File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions March 2012\REV 4 HECRAS - Final - Clean\WalkerRunFld.g01

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 6850

INPUT
Description:
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	717.52	.35	717.54	2.18	717.61	3.78	717.66	6.3	717.8
7.85	717.82	12.81	718	20.71	718.1	21.89	718.12	30.23	718.06
30.44	718.06	34.3	718	34.95	717.97	35.49	717.93	40.01	717.62
40.91	717.52	41.61	717.38	43.04	717.13	43.18	717.1	43.68	717.04
43.98	717	47.48	716.55	50.04	716.18	50.95	716	52.04	715.78
54.81	715	56.01	714.66	58.49	714	60.5	713.45	61.8	713
73.57	712.06	74.45	712	75.39	711.91	76.44	711.85	84.53	711.28
90.32	711	91.39	710.93	91.8	710.91	92.02	710.89	92.48	710.85
96.49	710.55	101.47	710	102.88	709.75	104.15	709.32	104.25	709.26
104.43	709.22	104.66	709.19	104.87	709.2	105.86	709.3	106.32	709.38
107.84	709.67	109.84	710	112.63	710.84	113.19	711	113.34	711.06
116.12	712	118.92	712.94	119.09	713	119.23	713.05	122.01	714
123.04	714.38	124.97	715	126.95	715.63	128.05	716	130.39	716.75
131.16	717	132.68	717.25	138.64	718	141.42	718.08	146.9	718.11
148.71	718.06	153.13	718	156.17	717.38	157.97	717	159.64	716.99
159.72	716.99	161.24	717	161.76	717	162.96	717.28	166.09	718
167.49	718.26	174.81	719	177.43	719.22	185.26	719.81	186.71	719.92
187.13	719.95	187.68	720	195.49	720.55	201.16	721	207.47	721.56
209.54	721.73	212.78	722	224.62	722.84	226.57	723	236.08	723.8
238.51	724	242.33	724.16	249.45	724.46				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	90.32	.08	113.19	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
90.32	113.19	460	476	490	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 6361

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	703	20	702	30.5	701	41	700	52	699
53.4	698	54.4	697	55.1	696	55.7	695.2	56.8	696
58.9	697	60.6	698	62.7	699	67.6	700	75.9	701
88.7	702	106.3	703	117.8	704	121.2	705	145	706

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	52	.08	62.7	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
52	62.7	438	444	454	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 5930

INPUT
Description:
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	707.61	.21	707.52	1.49	707	3.75	706.23	4.35	706.04
4.46	706	4.67	705.91	6.78	705	7.13	704.87	9.64	704
11.48	703.34	12.46	703	12.85	702.86	15.32	702	16.31	701.64
18.18	701	20.11	700.31	21	700	23.24	699.19	23.8	699
24.33	698.81	26.66	698	27.99	697.57	29.87	697	31.89	696.61
35.21	696	40.81	695.52	43.76	695.24	46.22	695	47.88	694.93
73.56	694	78.44	693.3	80.01	693	80.83	692.64	82.4	692
83.33	692	84.28	692	84.3	692	84.31	692	86.28	692
87.21	692.48	88.27	693	101.79	693.51	104.21	693.59	106.79	693.68
108.18	693.72	110.29	693.73	112.58	693.7	112.72	693.69	118.36	693.78
120.92	693.83	122.97	693.9	125.05	694	139.58	694.93	140.72	695
141.28	695.05	153.31	696	158.07	696.55	162.09	697	166	697.45
170.75	698	174.95	698.5	179.08	699	183.24	699.61	185.81	700
188.27	700.35	192.66	701	196.14	701.53	199.34	702	204.09	702.76
205.4	703	207.13	703.33	210.72	704	213.77	704.54	216.32	705
218.9	705.47	221.12	705.84						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	80.01	.08	88.27	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
80.01	88.27	448.37	429.25	409.23	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 5500

INPUT
Description:
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.59	1.65	705.28	3.11	705	3.68	704.9	9.3	704

10.58	703.79	14.78	703	14.79	703	19.67	702.91	20.62	702.9
22.18	702.9	22.97	702.9	23.58	702.92	24.01	702.94	24.36	702.98
24.87	703	25.93	703.05	26.08	703.05	35.07	703.38	37.21	703.44
39.27	703.47	41.12	703.49	42.58	703.48	43.53	703.46	44.12	703.41
44.76	703.31	46.18	703	46.94	702.52	47.85	702	48.86	701.36
49.48	701	50.69	700.22	51.08	700	51.86	699.5	52.59	699
53.94	698.19	54.24	698	54.73	697.69	55.88	697	57.44	696.04
57.51	696	57.79	695.83	59.23	695	60.7	694.11	60.9	694
62.37	693.25	62.91	693	62.98	692.98	65.37	692	65.4	691.99
66.48	691.55	67.85	691	67.95	691	75.95	691	79.78	691
84.86	691	87.6	691	89.79	691	96.84	691	105.06	691
105.18	691	106.9	691	107.22	691	114.51	691	116.13	691
118.28	691.39	121.68	692	123.18	692.64	124.03	693	126.02	693.87
126.33	694	127.25	694.4	128.76	695	129.16	695.13	132.13	696
132.9	696.22	135.68	697	137.76	697.61	139.16	698	139.62	698.13
142.67	699	143.27	699.17	146.17	700	149.04	700.82	149.66	701
150.18	701.16	153.12	702	153.66	702.15	156.6	703	158.09	703.4
160.27	704	162.03	704.45	164.06	705	166.44	705.61	168.26	706
169.59	706.33								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	66.48	.08	118.28	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
66.48	118.28	758.93	739.98 740.88	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4750

INPUT
Description:
Station Elevation Data num= 130

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	719.11	7.68	719	10.17	718.76	18.45	718	20.03	717.49
21.92	717	22.84	716.49	23.71	716	24.48	715.58	25.43	715
26.3	714.49	27.18	714	28.1	713.46	28.92	713	29.88	712.44
30.65	712	31.64	711.37	32.27	711	33.35	710.38	33.99	710
35.06	709.39	35.7	709	36.83	708.35	37.43	708	38.7	707.26
39.13	707	39.54	706.76	40.87	706	42.26	705.19	42.58	705
43.96	704.19	44.31	704	45.75	703.16	46.03	703	47.5	702.13
47.72	702	49.25	701.01	49.26	701	49.27	700.99	50.71	700
51.78	699.09	51.92	699	52.06	698.89	53.27	698	53.57	697.79
54.58	697	55.07	696.68	55.87	696	56.82	695.31	57.23	695
58.25	694.16	58.5	694	60.18	693.01	60.19	693	60.23	692.98
62.33	692	64.4	691	64.41	691	66.77	690	68.03	689.39
68.88	689	70.28	688.56	71.66	688	73.93	687.54	76.53	687
79.74	686.35	81.27	686	83.57	685.49	85.56	685	86.56	684
89.9	684	94.99	684	124.36	684	137.07	684	144.81	684
176.24	685	176.89	685.09	183.88	686	186.34	686.5	188.39	687
191.16	687.7	192.31	688	193.07	688.2	196.16	689	197.57	689.37
200.05	690	206.17	690.93	206.7	691	214.37	691.48	215.87	691.59
217.4	691.74	217.65	691.76	218.07	691.79	218.54	691.81	219.08	691.82
219.68	691.82	220.29	691.82	221.04	691.82	221.15	691.82	221.32	691.79
221.59	691.74	222.48	691.36	223.33	691	225.37	690.05	225.47	690
225.68	689.91	227.73	689	229.96	688.11	230.23	688	230.4	687.93
232.65	687	233.17	686.93	233.41	686.89	233.91	686.96	234.15	687
234.42	687.11	236.86	688	237.5	688.24	239.62	689	242.37	690
245.17	691	245.95	691.05	247.15	691.13	252.96	691.51	261.76	692
269.9	692.26	288.24	692.9	290.57	692.98	291.12	693	296.01	693.22

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	85.56	.08	176.24	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
85.56	176.24	238.3	226.5 190.7	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4530

INPUT
Description: U/S XS of Beaver Dam Pond Culvert
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	695.63	.38	695.48	1.28	695.09	1.48	695	3.09	694.51
5.01	694	8.08	693.32	9.54	693	12.07	692.33	13.44	692
15.74	691.32	16.91	691	18	690.72	20.83	690	24.22	689.15
24.81	689	28.69	688.02	28.78	688	28.95	687.96	29.27	687.87
32.8	687	37.18	686.21	38.3	686	39.25	685.85	44.98	685
46.66	685	47.66	684	49.21	684	50.78	684	51.95	684
53.56	684	58.64	684	62.64	684	65.43	684	71.47	684
82.7	684	83.09	684	98.62	684	101.48	684	107.38	684
109.3	684	123.54	684	124.7	684	147.47	684	168.98	684
177.3	684	180.32	684	182.51	684	188.98	684	190.4	684
193.03	684	193.27	684	193.44	684	194.9	684	194.96	684
195.01	684	195.13	684	196.34	684	196.91	684	203.33	684
207.17	684	210.36	684	211.96	684	215.52	684	218.11	684
220.77	684	224.16	684	231.87	684	239.24	684	245.5	685

253.07	685	256.85	685.84	257.54	686	258.89	686.31	259.73	686.43
261.48	686.68	262.26	686.84	263.03	687	264	687.21	267.77	688
269.77	688.4	272.58	689	280.78	689.37	283.12	689.52	287.24	689.8
289.93	690	303.56	690.88	305.27	691	307.07	691.07	307.94	691.11

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.25	.08	256.85	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
39.25	256.85	26.8	29.2	29.5 .3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	103	685	F
109	307.94	685	F

CULVERT

RIVER: Tributary
REACH: 1 RS: 4528

INPUT
Description: Beaver Dam Pond Culvert
Distance from Upstream XS = 10.5
Deck/Roadway Width = 4
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 126

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	699.94		.08	699.93		.17	699.9	
.37	699.82		1.81	699.59		4.29	699.12	
4.86	699		5.91	698.73		7.54	698.44	
9.65	698		12.65	697.57		15.79	697	
17.04	696.74		19.94	696		20.51	695.88	
24.52	695		25.05	694.9		29.34	694	
29.78	693.91		34.3	693		38.09	692.22	
39.2	692		43.19	691.18		43.98	691	
44.34	690.93		44.67	690.88		49.26	690	
51.11	689.68		55.23	689		60.28	688.18	
61.36	688		65.16	687.39		67.46	687	
68.34	686.86		70.96	686.33		80.51	686.24	
80.67	686.24		84.94	686.05		86.72	686.04	
89.52	686.04		93.66	686.03		94.45	686.03	
95.14	686.02		96.47	686.02		97.36	686.02	
101.68	686.02		102.68	686.02		104.7	686.03	
105.44	686.03		109.35	686.02		114.19	686.01	
117.38	686		119.45	685.81		120.95	685.78	
123.15	685.61		123.97	685.38		125.3	685	
127.21	685		132.46	685		134.61	685	
139.57	685		141.83	685		144.59	685	
147.06	685		149.69	685		153.25	685	
155	685		158.41	685		163.68	685	
164.26	685		164.58	685		172.54	685	
173.23	685		174.29	685		182.66	685	
183.32	685		185.42	685		189.93	684.94	
190.82	684.95		198.27	684.93		198.45	684.93	
205.79	684.9		205.98	684.91		206.25	684.92	
207.99	685		214.82	685		215.17	685	
216.22	685		218.29	685		218.85	685	
220.55	685		221.47	685		221.8	685	
222.26	685		222.79	685		223.34	685	
225.66	685		229.27	685		229.91	685	
232.18	685		233.95	685		235.25	685	
238.49	685		239.5	685		240.33	685	
240.63	685		242.95	685		245.9	685	
246.88	685		249.8	685		250.83	685	
252.46	685		260.7	685		262.47	685.37	
265.16	686		268.07	686.63		269.63	687	
272.57	687.71		273.81	688		274.81	688.23	
278.02	689		278.88	689.03		292.31	689.45	
305.41	690		309.17	690.2		310.77	690.28	

Upstream Bridge Cross Section Data
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	695.63	.38	695.48	1.28	695.09	1.48	695	3.09	694.51
5.01	694	8.08	693.32	9.54	693	12.07	692.33	13.44	692
15.74	691.32	16.91	691	18	690.72	20.83	690	24.22	689.15
24.81	689	28.69	688.02	28.78	688	28.95	687.96	29.27	687.87
32.8	687	37.18	686.21	38.3	686	39.25	685.85	44.98	685
46.66	685	47.66	684	49.21	684	50.78	684	51.95	684
53.56	684	58.64	684	62.64	684	65.43	684	71.47	684
82.7	684	83.09	684	98.62	684	101.48	684	107.38	684
109.3	684	123.54	684	124.7	684	147.47	684	168.98	684
177.3	684	180.32	684	182.51	684	188.98	684	190.4	684
193.03	684	193.27	684	193.44	684	194.9	684	194.96	684
195.01	684	195.13	684	196.34	684	196.91	684	203.33	684
207.17	684	210.36	684	211.96	684	215.52	684	218.11	684
220.77	684	224.16	684	231.87	684	239.24	684	245.5	685
253.07	685	256.85	685.84	257.54	686	258.89	686.31	259.73	686.43
261.48	686.68	262.26	686.84	263.03	687	264	687.21	267.77	688
269.77	688.4	272.58	689	280.78	689.37	283.12	689.52	287.24	689.8
289.93	690	303.56	690.88	305.27	691	307.07	691.07	307.94	691.11

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.25	.08	256.85	.05

Bank Sta: Left Right Coeff Contr. Expan.
39.25 256.85 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	103	685	F
109	307.94	685	F

Downstream Deck/Roadway Coordinates
num= 126

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	699.94		.08	699.93		.17	699.9	
.37	699.82		1.81	699.59		4.29	699.12	
4.86	699		5.91	698.73		7.54	698.44	
9.65	698		12.65	697.57		15.79	697	
17.04	696.74		19.94	696		20.51	695.88	
24.52	695		25.05	694.9		29.34	694	
29.78	693.91		34.3	693		38.09	692.22	
39.2	692		43.19	691.18		43.98	691	
44.34	690.93		44.67	690.88		49.26	690	
51.11	689.68		55.23	689		60.28	688.18	
61.36	688		65.16	687.39		67.46	687	
68.34	686.86		70.96	686.33		80.51	686.24	
80.67	686.24		84.94	686.05		86.72	686.04	
89.52	686.04		93.66	686.03		94.45	686.03	
95.14	686.02		96.47	686.02		97.36	686.02	
101.68	686.02		102.68	686.02		104.7	686.03	
105.44	686.03		109.35	686.02		114.19	686.01	
117.38	686		119.45	685.81		120.95	685.78	
123.15	685.61		123.97	685.38		125.3	685	
127.21	685		132.46	685		134.61	685	
139.57	685		141.83	685		144.59	685	
147.06	685		149.69	685		153.25	685	
155	685		158.41	685		163.68	685	
164.26	685		164.58	685		172.54	685	
173.23	685		174.29	685		182.66	685	
183.32	685		185.42	685		189.93	684.94	
190.82	684.95		198.27	684.93		198.45	684.93	
205.79	684.9		205.98	684.91		206.25	684.92	
207.99	685		214.82	685		215.17	685	
216.22	685		218.29	685		218.85	685	
220.55	685		221.47	685		221.8	685	
222.26	685		222.79	685		223.34	685	
225.66	685		229.27	685		229.91	685	
232.18	685		233.95	685		235.25	685	
238.49	685		239.5	685		240.33	685	
240.63	685		242.95	685		245.9	685	
246.88	685		249.8	685		250.83	685	
252.46	685		260.7	685		262.47	685.37	
265.16	686		268.07	686.63		269.63	687	
272.57	687.71		273.81	688		274.81	688.23	
278.02	689		278.88	689.03		292.31	689.45	
305.41	690		309.17	690.2		310.77	690.28	

Downstream Bridge Cross Section Data
Station Elevation Data num= 122

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	698.39	2.25	698	3.51	697.78	8.04	697	10.4	696.58
13.75	696	17.58	695.27	19.01	695	24.3	694.01	24.35	694
24.36	694	24.39	693.99	24.56	693.96	29.6	693	29.96	692.93
34.84	692	35.26	691.92	40.08	691	40.93	690.86	43.54	690.41
45.59	690	46.73	689.76	50.78	689	51.85	688.8	56.28	688
56.66	687.94	56.88	687.91	57.21	687.86	62.06	687	64.06	686.74
67.41	686.48	73.1	686	73.58	685.87	76.63	685.77	78.89	685.6
81.72	685.36	82.81	685.28	83.36	685.25	84.22	685.21	84.7	685.21
87.07	685.08	87.43	685.08	88.66	685	90.82	684.79	91.94	684.65
92.9	684.44	93.35	684.38	94.01	684.33	94.9	684.3	99.29	684.28
104.43	684.19	106.71	684.15	109.3	684.08	111.09	684	111.21	683.99
112.38	683.85	113.67	683.78	114.6	683.71	115.76	683.68	117.21	683.5
118.12	683.44	119.46	683.39	121.24	683.35	122.15	683.37	127.52	683.35
131.92	683.3	134.65	683.33	135.14	683.32	139.51	683.33	140.67	683.32
141.87	683.33	142.84	683.34	143.7	683.37	146.54	683.44	152.28	683.42
157.84	683.49	163.36	683.36	165.79	683.33	166.88	683.33	172.36	683.22
173.32	683.21	176.18	683.19	177.33	683.17	190.83	683.03	191.87	683
198.11	682.59	198.65	682.57	200.68	682.65	201.32	682.65	205.33	682.59
206.51	682.67	207.73	682.75	210.04	682.71	210.84	682.68	212.81	682.65
213.82	682.63	213.87	682.6	216.59	682.57	219.18	682.57	222.09	682.65
229.54	682.91	231.92	683	232.46	683.21	234.58	684	235.86	684.47
237.43	685	237.7	685.1	240.19	686	245.86	686.3	256.09	687
266.97	687.52	275.91	688	283.94	688.34	286.47	688.44	294.52	688.78
302.29	689	315.27	689.42	320.65	689.56	325.31	689.67	329.74	689.81
338.75	689.97	339.92	689.99						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	117.21	.08	146.54	.05

Bank Sta: Left Right Coeff Contr. Expan.
117.21 146.54 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical

Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	2	

FHWA Chart # 55- Circular Culvert
FHWA Scale # 1 - Smooth tapered inlet throat
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	4.3	18	.013	.013	0	.5	1

Upstream Elevation = 679.28
Centerline Station = 106
Downstream Elevation = 679.1
Centerline Station = 122

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4500

INPUT
Description: D/S XS of Beaver Dam Pond Culvert
Station Elevation Data num= 122

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	698.39	2.25	698	3.51	697.78	8.04	697	10.4	696.58
13.75	696	17.58	695.27	19.01	695	24.3	694.01	24.35	694
24.36	694	24.39	693.99	24.56	693.96	29.6	693	29.96	692.93
34.84	692	35.26	691.92	40.08	691	40.93	690.86	43.54	690.41
45.59	690	46.73	689.76	50.78	689	51.85	688.8	56.28	688
56.66	687.94	56.88	687.91	57.21	687.86	62.06	687	64.06	686.74
67.41	686.48	73.1	686	73.58	685.87	76.63	685.77	78.89	685.6
81.72	685.36	82.81	685.28	83.36	685.25	84.22	685.21	84.7	685.21
87.07	685.08	87.43	685.08	88.66	685	90.82	684.79	91.94	684.65
92.9	684.44	93.35	684.38	94.01	684.33	94.9	684.3	99.29	684.28
104.43	684.19	106.71	684.15	109.3	684.08	111.09	684	111.21	683.99
112.38	683.85	113.67	683.78	114.6	683.71	115.76	683.68	117.21	683.5
118.12	683.44	119.46	683.39	121.24	683.35	122.15	683.37	127.52	683.35
131.92	683.3	134.65	683.33	135.14	683.32	139.51	683.33	140.67	683.32
141.87	683.33	142.84	683.34	143.7	683.37	146.54	683.44	152.28	683.42
157.84	683.49	163.36	683.36	165.79	683.33	166.88	683.33	172.36	683.22
173.32	683.21	176.18	683.19	177.33	683.17	190.83	683.03	191.87	683
198.11	682.59	198.65	682.57	200.68	682.65	201.32	682.65	205.33	682.59
206.51	682.67	207.73	682.75	210.04	682.71	210.84	682.68	212.81	682.65
213.82	682.63	213.87	682.6	216.59	682.57	219.18	682.57	222.09	682.65
229.54	682.91	231.92	683	232.46	683.21	234.58	684	235.86	684.47
237.43	685	237.7	685.1	240.19	686	245.86	686.3	256.09	687
266.97	687.52	275.91	688	283.94	688.34	286.47	688.44	294.52	688.78
302.29	689	315.27	689.42	320.65	689.56	325.31	689.67	329.74	689.81
338.75	689.97	339.92	689.99						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	117.21	.08	146.54	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
117.21	146.54	87.5	99.4	102.5	.3	.5

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4400

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	692.5	36	683	42	682	53	682	65	683		
71	682	75	681	85	680	95	679	98	679		
129	679	153	678	158.35	677.2	158.8	675.98	159.72	675.78		
160.48	676.59	161.3	676.98	165	678	172	679	177	680		
195	686	207	687.1								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	153	.08	165	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
153	165	307	307	307	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4093

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	681	2.6	680	5.25	679	8	678	10.5	677
14.7	676	21.5	676	25	677	30.5	677	49	676
71	675	72	673.1	73	673.1	74	675	77.5	676
135	676	153	677	172.5	678	190	679	205	680

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	71	.05	74	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
71	74	397	397	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	25	677	F

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 3696

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	672.16	11	672	18	671	37	670	160	669
165	669	170	670	172.25	671	178	671	185	670
263	670	434.5	671	674	672	754	672	756	669.5
758	669.5	760	672	770	674	805	674	825	675
878	678								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	754	.05	760	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
754	760	340	340	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	674	672	F

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 3356

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-438.69	672.01	-380.28	671.01	-365.82	670.01	28	670.01	100	671.01
194.18	670.23	205.77	669.77	208.9	670.84	210.78	669.09	213.43	668.53
214.16	667.67	215.07	667.67	215.68	667.68	216.52	667.72	217	667.83
219.51	670.12	224.24	671.09	229.11	672.65	234.42	670.53	267.47	672.28
295.86	673.86	312.17	675.66						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-438.69	.1	213.43	.05	219.51	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
213.43	219.51	366	194	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 3162

INPUT
Description: U.S. RR Bridge 5
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	675	44	674	77.6	673	239.6	672	263.8	671
270.3	670	285.6	669	305.8	668	525.6	667	530	666.8
534	666.8	539	667	559.7	667	561	666.5	563	666.5
564	667	568	668	590	669	617	670	628.5	671
634.4	672	714.8	682						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	559.7	.05	564	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
559.7	564	110	102	100	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 3060

INPUT

Description:
Station Elevation Data num= 134

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	677.29	4.96	677	13.14	676.458	20.5	676	33.24	675.219
37.14	675	40.85	674.703	50.32	674	57.58	673.547	64.18	673
75.95	672.148	77.44	672.043	78.01	672	78.74	671.948	91.82	671
100.82	670.131	102.13	670	102.99	669.907	111.76	669	118.45	668.231
120.59	668	124.12	667.815	130.23	667.473	136.79	667.132	138.85	667
140.16	666.969	145.2	666.863	154.44	666.68	155.26	666.666	156.3	666.66
158.55	666.654	168.04	666.64	173.87	666.635	180.69	666.647	185.3	666.653
190.3	666.653	194.79	666.65	196.46	666.646	201.96	666.623	205.02	666.614
206.76	666.606	209.03	666.59	211.59	666.565	213.97	666.531	215.69	666.49
218.49	666.39	220.78	666.337	223.52	666.327	226.26	666.277	229.89	666.254
232.73	666.212	234.22	666.204	237.2	666.171	240.44	666.159	242.97	666.138
246.63	666.115	247.3	666.111	257.44	666.02	257.53	666.019	259.69	666
269.27	665.969	273.25	665.96	275.98	665.958	277.93	665.962	279.6	665.973
282.51	666	288.25	666.162	290.98	666.257	296.08	666.443	311.06	667
315.34	667	318.74	667	319.25	666.857	321.78	666	322.5	666
323.1	666	323.83	666	324.35	666	336.57	666.947	337.11	666.988
337.27	667	344.9	667.568	350.35	668	357.48	668.597	362.17	669
369.51	669.588	373.99	670	381.08	670.809	383.04	671	389.62	671.675
393.01	672	399.88	672.75	402.18	673	402.92	673.096	411.81	674
419.61	674.697	422.64	675	425.8	675.465	429.64	676	431.45	676.282
436.25	677	439.62	677.517	442.85	678	445.29	678.334	449.9	679
454.89	679.674	456.91	680	466.37	680.694	467.68	680.787	467.98	680.804
469.08	680.847	469.4	680.864	472.54	681	475.1	681.07	475.6	681.085
480.77	681.211	482.1	681.238	489.99	681.417	492.27	681.436	497.6	681.559
500.74	681.561	502.8	681.594	504.57	681.607	506.26	681.606	507.99	681.597
509.84	681.581	515.93	681.561	520.86	681.502	523.99	681.484	525.21	681.47
532.36	681.376	533.63	681.355	534.84	681.329	541.81	681.241		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	318.74	.05	337.11	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
318.74	337.11	188	226	141	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 2834

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9.3	668.01	26.89	667.01	67.11	666.01	134	665.01	204	665.01
246.49	665.76	252.14	666.03	254.24	664.9	255.77	664.89	256.85	665.07
257.71	665.03	258.87	665.82	263.61	665.79	277.29	665.23	309.05	667.83
338.85	671.59	371.24	676.68	390.72	678.9	420.6	679.35		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9.3	.1	252.14	.05	258.87	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
252.14	258.87	555.44	553.2	557.68	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 2326

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
112.13	665.01	166.8	663.79	202.29	663.45	249.41	661.77	264.83	661.76
269.31	660.7	271.41	660.2	273.33	660.26	274.88	659.9	275.72	660.03
277.04	661.45	283.76	661.62	343.16	661.53	399.81	661.53	420.98	662.03
448.82	664.09	463.58	664.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
112.13	.1	269.31	.05	277.04	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
269.31	277.04	520	520	520	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1806

INPUT
Description: New
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	664	13	663	30	662	61	661	90	660
95	659.1	103	660	125	661	169	662	219	663
237	664	240	665	243	666	246	667	249	668

252 669

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	90	.05	103	.1

Bank Sta: Left	Right	Lengths: Left Channel	Channel	Right	Coeff Contr.	Expan.
90	103	59	59	59	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1747

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	664	15	663	32	662	54	661	73	660
75	659	78	658.9	83	659	87	660	110	661
139	661.9	148	662	194	663	223	664	239	665
249	666	257	667	261	668				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	73	.05	87	.1

Bank Sta: Left	Right	Lengths: Left Channel	Channel	Right	Coeff Contr.	Expan.
73	87	89	89	89	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1658

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	680.1	68	676	101	675	119	674	126	673
190	663	207	662	225	661	245.91	659.93	256.45	659.51
262.44	659.72	264.16	658.26	265.67	657.96	267.08	657.99	268.29	658.05
269.24	658.2	271.93	658.6	274.07	659.54	279.61	659.65	322	661
379	662	386	663	416	669	438	670	473	671.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	262.44	.05	274.07	.1

Bank Sta: Left	Right	Lengths: Left Channel	Channel	Right	Coeff Contr.	Expan.
262.44	274.07	290.04	297.96	301.02	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1360

INPUT
Description:
Station Elevation Data num= 133

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	663.365	8.11	663	15.93	662.641	21.14	662.423	26.61	662.185
31.61	662	32.7	661.981	41.37	661.85	48.82	661.755	52.16	661.744
55.89	661.708	58.08	661.707	59.26	661.703	60.41	661.694	61.58	661.68
62.81	661.661	65.38	661.618	66.49	661.595	68.85	661.538	72.65	661.501
75.75	661.436	79.04	661.405	85.46	661.35	98.24	661.027	98.37	661.025
99.34	661	102.23	660.857	104.38	660.771	111.18	660.526	123.04	660.053
126.01	660	127.18	659.98	136.22	659.885	136.56	659.877	142.99	659.783
146.79	659.703	155.28	659.601	159.01	659.499	161.23	659.46	166.49	659.282
173.2	659	174.09	658.999	174.21	658.999	191.49	658.982	191.85	658.982
196.28	658.984	198.06	658.985	201.95	658.992	202.85	658.992	204.56	658.995
206.92	659	210.16	659.002	211.98	659.003	212.84	659.002	214.84	659.001
216.87	659.001	217.64	659	217.94	658.88	219.24	658.295	219.7	658.07
219.84	658	220.21	658	226.9	657.83	229.38	658	231.64	658.227
231.99	658.242	234.8	658.391	238.12	658.584	244.74	659	247.18	659.09
278.53	660	280.97	660.065	281.4	660.078	290.08	660.31	296.63	660.471
298.54	660.529	302.43	660.616	311.2	660.867	313.3	660.914	315.27	661
326.87	661.587	329.7	661.73	331.06	661.792	335.65	662	346.63	662.658
348.5	662.778	351.83	663	362.64	663.75	364.72	663.894	365.98	664
369.59	664.346	376.67	665	378.66	665.236	386.46	666	386.77	666.037
394.3	667	396.29	667.279	400.99	668	413.48	668.692	418.73	669
419.36	669.003	420.17	669.006	420.4	669.006	426.91	669.016	427.87	669.017
428.87	669.016	429.6	669.015	429.99	669.014	440.45	669.262	440.86	669.198
442.35	669.153	442.92	669.198	442.99	669.211	443.05	669.248	443.3	669.29
444.34	669.314	448.02	669.897	448.28	669.923	448.73	670	452.25	670.375
457.45	670.92	458.12	671	458.89	671.131	460.41	671.347	461.87	671.508
463.6	671.644	465.55	671.859	465.76	671.885	467.9	672	472.53	672.128
478.07	672.263	479.32	672.227	480.67	672.21				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	217.64	.05	244.74	.1

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       217.64  244.74              34      32      30             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0   158.9  659.25       F
   294.7  480.67  659.25       F

CROSS SECTION


RIVER: Tributary
REACH: 1                  RS: 1328

INPUT
Description: U/S XS of Farm Road Culvert
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     667       8     666      19     665      31     664      44     663
      65     662     103     661     163     660     197     659     200   658.5
     203     658     206   657.5     210     658     222 658.522     233     659
     241     660     337     661     404     662     424     663

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1     200     .05     222      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         200     222              76      76      76             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     170  659.25       F
     243     424  659.25       F

CULVERT


RIVER: Tributary
REACH: 1                  RS: 1281

INPUT
Description: Farm Road Culvert
Distance from Upstream XS =      36
Deck/Roadway Width        =    19.5
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       5  663.33             185  659.19             250  659.25
     360  660.01             410  660.68             530  668.88

Upstream Bridge Cross Section Data
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     667       8     666      19     665      31     664      44     663
      65     662     103     661     163     660     197     659     200   658.5
     203     658     206   657.5     210     658     222 658.522     233     659
     241     660     337     661     404     662     424     663

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1     200     .05     222      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         200     222             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     170  659.25       F
     243     424  659.25       F

Downstream  Deck/Roadway Coordinates
    num=       6
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       5  663.33             185  659.19             250  659.25
     360  660.01             410  660.68             530  668.88

Downstream Bridge Cross Section Data
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    4.92  663.33  130.71  658.23  195.23  657.77  245.69  657.68  249.14  657.6
  250.31  657.05  253.09  656.64  254.08  656.68  256.22  657.22  258.88  657.46
  262.11  657.67  272.66  658.28  351.77  658.51  414.17   660.7  522.68  667.71

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    4.92     .08  245.69     .08  262.11     .08

Bank Sta: Left   Right    Coeff Contr.   Expan.
       245.69  262.11             .3       .5

Upstream Embankment side slope             =     0 horiz. to 1.0 vertical
Downstream Embankment side slope           =     0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =    .98
Elevation at which weir flow begins        =
Energy head used in spillway design        =
```

Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	1.5	

FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 3 - Groove end entrance; pipe projecting from fill
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	36	19.5	.017	.017	0	.5	1

Upstream Elevation = 656.07
Centerline Station = 206
Downstream Elevation = 656.49
Centerline Station = 253

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1252

INPUT
Description: D/S XS of Farm Road Culvert
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4.92	663.33	130.71	658.23	195.23	657.77	245.69	657.68	249.14	657.6
250.31	657.05	253.09	656.64	254.08	656.68	256.22	657.22	258.88	657.46
262.11	657.67	272.66	658.28	351.77	658.51	414.17	660.7	522.68	667.71

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4.92	.08	245.69	.08	262.11	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
245.69	262.11	144	147	148	.3	.5

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1105

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	660.79	58	660.01	182.03	657.52	258.26	657.01	261.27	656.79
263.66	656.39	267.27	656.3	269.06	655.96	270.58	656.29	271.28	656.21
272.59	655.65	273.38	655.95	275.14	656.65	277.45	657.28	283.91	657.51
296.89	657.17	385.44	658.29	430.88	662.41	483.44	665.95	561.11	667.03

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	258.26	.08	277.45	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
258.26	277.45	287	295	303	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 810

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
3.67	658.53	16.9	657.88	160	656.82	271.95	656.84	302.8	656.15
307.34	656.47	308.53	655.21	309.94	654.96	311.1	654.83	313.17	654.83
314.06	654.79	314.94	653.84	315.53	654.71	316.36	654.9	317.37	654.24
318.8	654.78	320.94	655.51	327.28	655.79	351.67	656.4	565.4	656.84
707	661.28								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
3.67	.08	307.34	.08	320.94	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
307.34	320.94	228	224	222	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 587

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-362	658.01	-200	657.01	0	656.21	18.41	655.67	92.6	655.34
102.91	654.9	103.88	654.39	105.93	654.47	108.13	654.79	109.33	653.92

110.17	653.78	110.56	654.16	111.32	654.28	112.69	654.85	114.18	654.96
132.53	655.09	307.17	656.16	344.29	658.01				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-362	.08	102.91	.08	114.18	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
102.91	114.18	122	126	127	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 463

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-416	658.01	-250	657.01	-87	656.01	0	655.59	109.8	654.54
194.42	654.32	208.54	654.65	213.7	654.92	215.61	654.29	217.64	654.15
219.79	653.77	223.31	654.2	224.25	653.23	226.46	653.59	227.82	654.41
233.37	654.53	278.57	654.4	400	655.01	496.5	656.01	525.1	657.01
557	658.01								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-416	.08	213.7	.08	233.37	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
213.7	233.37	105	105	104	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 357

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-626.5	660.01	-604.5	658.01	-594.5	657.01	-584.5	656.01	-479.5	655.01
0	655.01	153.93	654.15	175.05	653.71	185.31	653.59	188.41	652.4
191.14	653.59	193.32	653.82	195.38	654.05	198.28	654.41	202.04	654.7
206.36	654.46	350	655.01	528.59	656.01	549.3	657.01	596.9	658.01

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-626.5	.08	185.31	.08	191.14	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
185.31	191.14	179	175	168	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 183

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-631.8	658.01	-603	657.01	-586	656.01	-551	655.01	-252	654.01
-242	654.01	11.07	654.27	105.3	654.68	160.67	655.27	176.42	654.35
191.7	654.33	196.59	653.2	201.52	652.43	202.85	652.14	204.43	652.46
205.71	653.27	208.19	653.86	217.88	653.96	255.38	654.23	305.72	654.38
349	655.01	494	656.01	531.9	657.01	611	658.01		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-631.8	.08	191.7	.08	208.19	.08

Bank Sta: Left	Right	Coeff Contr.	Expan.
191.7	208.19	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 5862

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6.57	692.9	16.52	686.09	30.12	679.79	46.8	679.9	59.74	679.08
61.77	675.79	63.16	675.53	66.68	676.21	70.59	676.51	72.5	676.66
75.29	677.24	83.9	677.66	93.4	677.98	108.12	680.46	126.96	680.02
134.28	678.08	144.98	678.89	173.49	677.49	203.06	682.96	252.93	692.83
275.94	705.68	283.35	706.71						

Manning's n Values num= 3

```
     Sta   n Val     Sta   n Val     Sta   n Val
    6.57      .1   59.74     .05   75.29      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         59.74   75.29             286.1   288.2   294.6            .1       .3

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 5547

INPUT
Description:
Station Elevation Data    num=      19
     Sta   Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    9.27   683.2   30.72  673.65   63.49  674.03   97.47  674.46  108.85  672.92
  130.75  672.73  212.69  671.49  215.49  671.05  218.29   670.1  219.35  669.38
  220.92   669.9   222.1  669.99  224.66   670.6  226.17  670.93  227.99  671.82
  230.09   673.4   245.5  678.64  264.68  690.27  273.75  691.73

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    9.27      .1  215.49     .05  226.17      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        215.49  226.17             241.9   240.7     241            .3       .5

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 5282

INPUT
Description: U/S XS of Beach Grove Rd Bridge
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  681.12   55.69  675.84   85.36  674.65  174.96  673.59  184.04  670.66
  207.55  670.04  212.26  669.41  214.34  667.03  219.14  667.34  223.57  668.03
  230.88  671.08  241.05  670.68  255.44   674.6  304.55  678.17     320  679.29

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  212.26     .05  230.88      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        212.26  230.88             106.4   106.4   105.8            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     174  674.56          F
     253     320  674.56          F

BRIDGE


RIVER: Walker Run
REACH: 1                  RS: 5250

INPUT
Description:
Distance from Upstream XS =    22.3
Deck/Roadway Width        =    19.3
Weir Coefficient          =     2.5
Upstream  Deck/Roadway Coordinates
    num=      18
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
      50  674.39          171.95     675          201.95  675.12
  201.96  677.41       0  202.64  677.41       0   214.6  677.42  667.71
  216.27  677.42   671.5  217.27  677.42   672.7  218.96  677.42   673.3
  219.96  677.43   673.4  220.96  677.43   673.3  222.65  677.43   672.7
  224.11  677.43   671.5  226.87  677.43  668.95   226.9  677.43       0
  237.26  677.43       0  237.27  675.18          269.27  675.39

Upstream Bridge Cross Section Data
Station Elevation Data    num=      15
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  681.12   55.69  675.84   85.36  674.65  174.96  673.59  184.04  670.66
  207.55  670.04  212.26  669.41  214.34  667.03  219.14  667.34  223.57  668.03
  230.88  671.08  241.05  670.68  255.44   674.6  304.55  678.17     320  679.29

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  212.26     .05  230.88      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
        212.26  230.88            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     174  674.56          F
     253     320  674.56          F

Downstream  Deck/Roadway Coordinates
    num=      19
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
```

```
   113.7  674.36           242.5     675          272.49  675.12
   272.5  677.34       0  273.18   677.4       0  285.14  677.49       0
  285.74  677.48  667.76  286.81  677.42  670.88  287.81  677.42  672.08
   289.5  677.42  672.68   290.5  677.64  672.78   291.5  677.43  672.68
  293.19  677.43  672.08  294.65  677.43  670.88   296.8  677.43  668.66
  307.99  677.19       0     308  675.18              340  675.39
   378.7  675.68

Downstream Bridge Cross Section Data
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   692.9      17     691      21     690      37     686      45     685
      89     679     101     678     109     677     151     670     254     670
     270     669     285     668   291.5  665.45     298     668     300     669
     314     670     348     671     357     672     363     673     383     678
     400     679     432     679     453     688     519     703

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1     254     .05     314      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
          254     314            .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =   674.6
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
      Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
      Pressure and Weir flow
          Submerged Inlet Cd          =
          Submerged Inlet + Outlet Cd =       .8
          Max Low Cord                =

Additional Bridge Parameters
      Add Friction component to Momentum
      Do not add Weight component to Momentum
      Class B flow critical depth computations use critical depth
          inside the bridge at the upstream end
      Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 5198

INPUT
Description: FEMA BIA, D/S XS of Beach Grove Rd Bridge
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   692.9      17     691      21     690      37     686      45     685
      89     679     101     678     109     677     151     670     254     670
     270     669     285     668   291.5  665.45     298     668     300     669
     314     670     348     671     357     672     363     673     383     678
     400     679     432     679     453     688     519     703

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1     254     .05     314      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          254     314               69    63.3    68.4             .3       .5

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 5107

INPUT
Description:
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   678.5      32     672      43     671      66     670     157  668.53
  159.47  666.07  162.36  664.84  164.03  664.65   165.2  664.59  166.57  665.03
  167.21  665.04  170.72   666.9  179.24  667.79  183.47  668.84     209     670
     275     670     303     671     314     672     322     673     348  678.75

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1     157     .05  183.47      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          157  183.47            278.8   275.8   274.5             .3       .5
```

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4810

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-10	675	0	673.03	22.15	670.47	30.66	668.65	57.63	668.16
111.49	668.7	152.11	668.15	195.12	668.51	201.6	666.51	202.75	663.97
210.2	664.04	214.86	663.49	215.85	664.09	220.3	668.33	253.63	667.96
275.4	667.76	288.1	666.6	321.23	667.68	361.14	676.54		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-10	.1	201.6	.05	220.3	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
201.6	220.3	116.3	116.4	116.7	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4692

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
2.2	676.54	14.2	673.9	29.44	673.96	39.22	671.77	100.41	668.46
182.33	667.17	248.38	667.34	268.47	666.03	281.75	664.29	284.12	662.53
284.81	662.09	290.66	662.02	296.54	662.16	298.07	664.62	299.42	666.98
320.4	666.76	380.91	669.4	431.24	681.51				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
2.2	.1	248.38	.05	299.42	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
248.38	299.42	239.8	240.2	242 .1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4414

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-12	675	-5.7	673.7	1.31	671.76	19.96	669.88	70.87	667.77
193.46	667.01	240.89	666.16	297.49	667.18	302.08	662.9	308.32	662.46
313.21	662.89	316.82	666.65	331.76	668.59	406.27	680.82		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-12	.1	297.49	.05	316.82	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
297.49	316.82	234.7	242.5	250.6 .1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4130

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-5	675	9.79	672.78	38.19	668.15	65.97	666.24	127.28	666.03
170.88	665.59	200.6	666.07	205.29	663.4	210.07	661.54	214.21	661.99
216.84	662.54	219.86	666.1	253.95	665.83	269.33	665.98	370.38	665.85
415.17	670.09	549.86	674.65						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-5	.1	200.6	.05	219.86	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
200.6	219.86	121	125.4	126.4 .3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-5	5.49	666.5	F
352.29	549.86	666.5	F

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 3972

INPUT
Description: U/S XS of Market Street Bridge
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
124.69	672.5	129.69	672	149.69	671	157.69	671	183.69	671
188.69	670	192.69	669	208.69	667	218.69	666	249.69	665
259.88	664.22	268.46	664.16	270.18	661.21	277.41	661.6	281.39	661.43
285.52	661.64	287.08	664.59	301.69	665	327.69	665	439.69	666
491.69	666	650.69	667	703.69	670	733.69	672	793.69	702

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
124.69	.1	268.46	.05	287.08	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
268.46 287.08 103.8 104.6 107 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
124.69	226.89	666.5	F
341.4	793.69	666.5	F

BRIDGE

RIVER: Walker Run
REACH: 1 RS: 3914

INPUT
Description:
Distance from Upstream XS = 40.1
Deck/Roadway Width = 43.1
Weir Coefficient = 2.5
Upstream Deck/Roadway Coordinates
num= 16

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
3	673.611	0	74.3	672.778		154.64	671.546	
219.18	671.069		257.71	670.8		269.91	670.8	
269.92	673.78	669.04	275.2	673.78	669.04	286.42	673.78	669.04
286.43	673.78		288	673.78		288.1	670.45	
290.02	670.3		342.19	669.234		438.84	667.629	
583.41	666.57							

Upstream Bridge Cross Section Data
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
124.69	672.5	129.69	672	149.69	671	157.69	671	183.69	671
188.69	670	192.69	669	208.69	667	218.69	666	249.69	665
259.88	664.22	268.46	664.16	270.18	661.21	277.41	661.6	281.39	661.43
285.52	661.64	287.08	664.59	301.69	665	327.69	665	439.69	666
491.69	666	650.69	667	703.69	670	733.69	672	793.69	702

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
124.69	.1	268.46	.05	287.08	.1

Bank Sta: Left Right Coeff Contr. Expan.
268.46 287.08 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
124.69	226.89	666.5	F
341.4	793.69	666.5	F

Downstream Deck/Roadway Coordinates
num= 16

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	673.611		71.3	672.778		151.64	671.546	
216.18	671.069		254.71	670.8		266.91	670.8	
266.92	673.42	668.72	272.2	673.42	668.72	283.42	673.42	668.72
283.43	673.42		285	673.42		285.1	670.45	
289.14	670.3		339.19	669.234		435.84	667.629	
550	666							

Downstream Bridge Cross Section Data
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
117.66	675.84	137.05	672.03	181.62	671.65	219.23	671.09	253.06	668.65
262.64	664.21	265.16	663.32	266.08	661.15	272.52	660.73	283.67	661.59
288.12	663.96	295.78	666.15	334.66	665.91	453.82	665.5	620.6	667
636.24	668	654.4	669						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
117.66	.1	265.16	.055	288.12	.04

Bank Sta: Left Right Coeff Contr. Expan.
265.16 288.12 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 667.3
Energy head used in spillway design =

Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Pressure and Weir flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd = .8
Max Low Cord =

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 3860

INPUT
Description: D/S XS of Market Street Bridge
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
117.66	675.84	137.05	672.03	181.62	671.65	219.23	671.09	253.06	668.65
262.64	664.21	265.16	663.32	266.08	661.15	272.52	660.73	283.67	661.59
288.12	663.96	295.78	666.15	334.66	665.91	453.82	665.5	620.6	667
636.24	668	654.4	669						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
117.66	.1	265.16	.055	288.12	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
265.16	288.12	145.3	134.5	132.2	.3	.5

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 3735

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
46.72	679.91	74.63	675.8	101.02	670.65	135.38	669.18	157.56	666.89
181.15	666.12	181.25	664.03	182.71	662.51	184.32	662.24	185.67	660.86
187.89	660.4	192.29	660.36	196.75	660.67	199.82	660.74	207.26	665.22
222.51	665.76	281.32	665.28	293.21	664.71	340	664	396	664
402	665	420	666	422	666	440	666	642.15	669.34

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
46.72	.1	181.15	.055	207.26	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
181.15	207.26	191.4	181.9	171.6	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 3532

INPUT
Description: FEMA BHT
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	694.1	1	694	22	689	29	688	41	685
89	676	139	670	148	669	169	667	174	666
177	665	188	660	194	659	195	658.5	196	659
199	660	207	662	214	663	322	663	413	664
417	665	442	665	445	664	455	664	543	665
564	666	630	670						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	169	.06	214	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
169	214	112.8	111.5	111.9	.1	.3

CROSS SECTION

RIVER: Walker Run

REACH: 1 RS: 3410

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
33.79	674.7	76.45	668.35	118.62	664.23	127.12	658.22	129.14	657.83
131.86	658.02	136.11	657.9	138.1	658.16	141.34	659.72	154.15	659.99
159.04	661.67	173.29	662.2	193.85	659.88	228.32	660.18	314.35	662.42
376	661.82	381.4	662.93	385.18	663.96	402.12	664.21	496	665
503	664	541	664	604	665	646	666		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
33.79	.08	118.62	.05	141.34	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
118.62	141.34	124.5	128.5	131.4	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 3278

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
40.42	666.96	56.89	663.45	68.65	662.53	75.07	662.03	79.29	658.4
81.65	657.27	82.94	657.07	85.53	657.01	86.77	657.6	90.32	660.28
96.28	660.96	102.77	661.42	111.91	662.29	155.88	661.02	343	662.66
653	665.2								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
40.42	.06	75.07	.05	90.32	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
75.07	90.32	325.2	323.2	320.7	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2949

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
34.18	664.58	74.16	659.96	96.72	659.48	132.97	659.67	148.16	660.33
152.24	655.9	153.74	655.8	155.46	655.77	156.94	655.96	158.15	656.45
164.41	660.28	192.14	659.68	255.96	659.64	464.54	662.65	474.11	665.45
491.53	665.76								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
34.18	.06	148.16	.05	164.41	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
148.16	164.41	279	279	276.7	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2669

INPUT
Description:
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	662	13	661	28	660	49	659	153	658
156	657	160	656	161	655.65	163	656	168	657
174	658	198	659	231	660	422	661	477	662

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	153	.05	174	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
153	174	97.8	97.2	99.2	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2570

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	662	23	660	44	659	78	658	181	657

188	656	189.5	655.15	191	656	196	657	214	658
254	659	462	660	499	661	519	662		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	181	.05	196	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
181	196	72.3	71.9	71.4	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	73.5	658.9	F
304.5	519	658.9	F

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2497

INPUT
Description: U/S XS of Walker Run Crossing
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
12.53	665.89	39.47	664.2	44.97	663.57	107.45	659.28	166.22	657.83
205.6	657.61	262.97	657.78	280.78	656.99	283.96	654.28	286.94	653.51
288.71	653.76	291.25	653.78	294.33	654.23	295.69	655.07	296.61	655.54
297.97	657.53	303.08	657.83	439.74	659.15	528.78	658.58	585.34	660.05
658.58	665.36	678.36	665.96	682.31	667.16				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
12.53	.06	280.78	.05	297.97	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
280.78	297.97	33.1	35	35.9	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
12.53	245	658.9	F
330	682.31	658.9	F

BRIDGE

RIVER: Walker Run
REACH: 1 RS: 2480

INPUT
Description: Walker Run Crossing
Distance from Upstream XS = 9.5
Deck/Roadway Width = 13.8
Weir Coefficient = 2.5
Upstream Deck/Roadway Coordinates
num= 29

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
11.87	665.82		47.14	662.724		74.04	660.848	
113.05	659.88		162.23	658.903		172.76	658.91	
211.42	658.93		287.93	658.98		289.31	658.99	
290	659.02		292.63	659.05		292.63	659.05	657.67
294.77	659.103	657.67	297.73	659	657.67	297.74	659	
297.95	659		301.58	658.9		301.83	658.9	
303.52	658.95		304.43	658.97		310.59	659.05	
422.97	660.036		447.67	660.3		533.91	660.9	
591.63	661.4		605.41	662.027		653	665	
665.09	666		694.26	667.627				

Upstream Bridge Cross Section Data
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
11.87	665.882	39.22	664.19	46.11	663.57	113.05	659.28	172.76	657.83
211.42	657.61	270.23	657.78	287.93	657	290	654.27	293.2	653.74
295.57	653.36	295.74	653.75	297.74	653.79	297.95	654.24	301.83	655.06
303.52	655.54	304.43	657.53	310.59	657.82	447.67	659.14	533.91	658.57
591.63	660.06	653	664.61	665.09	665.37	694.25	667.63		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
11.87	.06	287.93	.05	304.43	.06

Bank Sta: Left	Right	Coeff Contr.	Expan.
287.93	304.43	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
11.87	245	658.9	F
330	694.25	658.9	F

Downstream Deck/Roadway Coordinates
num= 31

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
11.87	665.82		47.14	662.724		62.28	661.7	
74.04	660.848		114.78	659.4		162.23	658.903	
222.04	658.91		268.28	658.96		282.83	658.98	
289.31	658.99		290.86	659.01		292.33	659.02	
292.63	659.05		292.63	659.05	657.33	294.77	659.103	657.33
297.73	659	657.33	297.74	659		298.39	659	

```
  301.58   658.9          302.27   658.9          365.85   659.8
  380.66   659.9           418.1  659.99          422.97 660.036
  520.51     661          538.81   661.1           544.9   661.2
  605.41 662.027          615.07   662.1          669.45     665
  694.26 667.627

Downstream Bridge Cross Section Data
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     -10 665.882   11.87 665.882   50.11  662.78   62.28  659.98  114.78  658.43
  222.04   657.5  268.28  657.91  282.83  657.41  290.86  654.02  292.33  653.93
  293.18  653.85  295.81  653.81  296.52  654.02  298.39  654.38  302.27  657.21
  365.85  658.01  380.66  659.03   418.1  659.03  520.51  658.78  538.81  659.14
   544.9  659.31  615.07  661.25  669.45  664.61  694.25  667.63

Manning's n Values        num=       4
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
     -10     .06   11.87     .06  282.83     .05  302.27     .06

Bank Sta: Left   Right   Coeff Contr.   Expan.
        282.83  302.27             .3       .5

Upstream Embankment side slope                =       0 horiz. to 1.0 vertical
Downstream Embankment side slope              =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins           =   659.2
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =       .8
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 2462

INPUT
Description: D/S XS of Walker Run Crossing
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
     9.2  666.86   49.93  662.78   70.39  659.98   130.3  658.42  237.98  657.49
  283.65   657.9  298.45  657.41  305.06  654.03  307.41  653.92  309.95  653.86
  311.78  654.02  315.94  654.96  317.95  657.21  381.94  658.01  396.57  659.03
  433.04  659.03  535.44  658.78  555.06  659.14  560.39   659.8  629.95  661.26
  684.19   664.6  700.62  665.24

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     9.2     .06  298.45     .05  317.95     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        298.45  317.95             167.2   172.3   167.7             .3       .5

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 2274

INPUT
Description:
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   -85.7  666.85   -46.1  663.17     -23  659.97   16.47  657.72   45.83  658.28
   67.54  658.17   89.33  656.46   91.41  654.78   92.23  652.48   95.09  651.42
   99.01  652.22   102.9  653.21  104.42  653.39  105.71  655.36  121.29  656.82
  507.83  659.46  557.25  660.35     636  663.34   650.4  665.34

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
   -85.7     .06   89.33     .05  105.71     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         89.33  105.71             134.3     133   122.5             .1       .3

CROSS SECTION
```

RIVER: Walker Run
REACH: 1 RS: 2139

INPUT
Description:
Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	660.01	53	659	80	658	160	657	218	656
243	655	357	655	360	656	372	656.9	404	656
409	655	411	.654	413	653	414	652.08	415.27	651.18
416.54	650.72	418.55	651.21	420.93	651.49	422	653	423	654
425	655	567	656	619	657	693	658	848	659
901	661	970	663.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	409	.05	425	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
409	425	203.6	205.7	208.3	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 1925

INPUT
Description:
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	659	62	658	112	657	134	656	316	655
345	654.6	375	655	413	655	417	653	417.29	652.28
419.5	651.72	423.69	651.09	426.64	651.4	428	653	430	655
452	655	591	655	657	656	754	656.5	850	656
860	655.5	885	656	951	657	982	658	1021	660
1056	660.9								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	413	.05	430	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
413	430	266.6	255	247.3	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 1602

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	659	25	658	47	657	80	656	153	655
230	654.65	392	654	395	653	396	653	400	654
738	654	741	652	741.82	651.4	745.51	650.67	747.9	650.84
750.86	651.6	752	652	755	654	800	654.1	866	654
911	654	1076	655	1093	655	1158	655	1174	656
1225	657	1255	658	1270	659				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	738	.06	755	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
738	755	189.2	189	189.3	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 1402

INPUT
Description:
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-214.73	660.01	-151.73	657.01	-116.53	656.01	-65.33	655.01	-57.33	654.01
-47.9	653.01	-26.6	653.01	61.72	652.96	129.69	653.53	136.69	653.6
143.69	653.86	148.69	654.03	153.69	654.21	156.09	654.04	156.39	652.1
156.89	651.34	158.69	650.52	160.49	650.2	161.99	649.8	163.69	649.82
165.69	649.95	166.99	650.67	168.49	651.36	169.29	651.84	169.89	653.64
172.09	654.15	177.99	653.93	183.69	653.92	187.1	653.79	232.35	653.34
246.57	653.84	359.8	654.16	416.89	654.15	519.9	654.01	527.8	655.01
536.5	656.01	540.2	657.01	548.5	658.01	558	659		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-214.73	.08	156.09	.06	169.89	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.

156.09 169.89 221.7 215.6 213.1 .1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 1208

INPUT
Description: FEMA BHN
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	667.4	14	667	31	666	113	656	124	655
130	654	140	653	230	653	232	652	238	649.57
244	652	246	653	354	654	477	655	484	655
548	654	569	653	614	653	635	654	656	656
668	657	672	658	677	660	679	660.3		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	230	.06	246	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
230	246	161.3	157.6	155.9	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 990

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-41.4	660.01	-4.3	656.01	32.63	652.9	63.74	651.93	118.97	653.07
125.76	650.82	126.92	650.45	132.87	649.47	135.28	649.66	136.76	650.43
138.23	653.22	149.36	652.61	186.43	652.59	234.63	654.38	362.19	653.45
497.17	656.01	516.5	658.01	525	659				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-41.4	.08	118.97	.06	138.23	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
118.97	138.23	100.9	101.5	101.9	.3	.5

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 884

INPUT
Description: U/S XS of Private Farm Road
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-284.98	692	30.02	655	49.02	654	103.02	653	117.08	652.72
120.1	649.74	121.4	649.01	123.02	648.62	125.03	649.16	129.44	653.21
172.02	653	393.02	653	410.02	654	437.02	655	456.02	656
474.02	657	491.02	659	515.02	661	531.02	662	565.02	664
591.02	664	598.02	663.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-284.98	.09	117.08	.05	129.44	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
117.08	129.44	25.5	20.8	21	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-284.98	115.5	652.53	F
130.5	598.02	652.53	F

CULVERT

RIVER: Walker Run
REACH: 1 RS: 875

INPUT
Description: Private Farm Road
Distance from Upstream XS = 1.6
Deck/Roadway Width = 15
Weir Coefficient = 2.5
Upstream Deck/Roadway Coordinates
num= 17

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
12.14	656.071	656.071	52.52	653.686	653.686	71.38	653.5	653.18
115.86	653.386	649.74	122.61	652.528	648.62	122.83	652.53	648.66
124.23	652.54	648.9	130.22	653.444	653.21	173.58	653.2	652.41
194.42	653.1	652.9	217.91	652.805	652.805	378.6	653.084	653.084
465.08	656.47	656.47	522.51	662.265	662.265	535.78	663.101	663.101
535.81	663.177	663.177	535.99	663.037	663.037			

Upstream Bridge Cross Section Data
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-322.11	691.97	-147.11	671.47	-2.11	656.57	12.14	656.071	52.52	653.686
71.38	653.18	101.3	653.2	116.89	652.72	120.15	649.74	120.82	648.93
121.18	649.01	122.65	648.62	124.23	648.9	124.43	649.16	129.48	653.21
173.58	652.41	194.42	652.9	297.89	656.07	337.89	656.67	607.89	664.67

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-322.11	.09	116.89	.05	129.48	.09

Bank Sta: Left Right Coeff Contr. Expan.
116.89 129.48 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-322.11	115.5	652.53	F
130.5	607.89	652.53	F

Downstream Deck/Roadway Coordinates
num= 24

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
12.14	656.071	656.071	52.52	653.686	653.686	77.11	653.4	652.55
115.86	653.386	651.91	122.61	652.528	649.92	122.73	652.53	650.54
122.85	652.53	651.24	123.07	652.53	651.64	123.32	652.53	651.8
123.57	652.53	651.64	123.79	652.53	651.24	123.91	652.53	650.54
124.03	652.53	650.11	126.1	652.53	648.93	130.22	653.444	649.62
136.9	653.4	652.21	185.27	653.2	652.86	217.91	652.805	652.8
378.6	653.084	653.084	465.08	656.47	656.47	522.51	662.265	662.265
535.78	663.101	663.101	535.81	663.177	663.177	535.99	663.037	663.037

Downstream Bridge Cross Section Data
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-322.11	691.97	-147.11	671.47	-2.11	656.57	12.14	656.071	52.52	653.686
77.11	652.55	116.71	651.91	123.34	649.92	124.03	650.11	125.51	649.41
126.1	648.93	130.12	649.62	136.9	652.21	185.27	652.86	218.62	652.8
297.89	656.07	337.89	656.67	607.89	664.667				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-322.11	.09	116.71	.05	136.9	.09

Bank Sta: Left Right Coeff Contr. Expan.
116.71 136.9 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 654.4
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name Shape Rise Span
Culvert #1 Circular 2.75
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG

Culvert Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
2.2	15	.023	.023	.1	.9	1

Upstream Elevation = 648.57
Centerline Station = 123.3
Downstream Elevation = 649.41
Centerline Station = 123.2

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 863

INPUT
Description: D/S XS of Private Farm Road
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-291.09	692	-22.09	660	10.91	657	20.91	656	40.91	654
73.91	653	84.91	652	113.12	651.91	120.43	649.92	123.41	648.96
126.4	649.62	133.22	652.21	357.91	653	388.91	654	407.91	655
449.91	656	509.91	662	538.91	664	578.91	664	586.91	663.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-291.09	.09	113.12	.05	133.22	.09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
113.12 133.22 148.6 139.8 131.4 .3 .5

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 715

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-92.4	658.01	2.21	655.41	40.88	653.76	46.14	653.57	77.95	651.4
100.08	650.67	101.47	648.52	104.64	647.91	107.47	647.9	108.96	648.04
110.34	648.14	111.67	648.52	114.47	650.93	126.37	650.97	191.93	651.64
278.3	653.09	365.34	656.46	380	658				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-92.4	.09	100.08	.05	114.47	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
100.08	114.47	166.1	176	183.6	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 536

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-97	658	-86.6	657.01	-45.02	655.01	5.76	652.05	48.16	650.97
149.99	651.14	170.47	649.65	172.89	647.93	174.84	647.22	176.44	647.18
179.25	646.97	182.05	647.71	182.91	648.29	184.3	650.54	191.59	650.96
206.95	652.58	269.71	656.85	280	658				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-97	.09	170.47	.05	184.3	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
170.47	184.3	144.7	149.2	152.8	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 350

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-5	658	7.67	656.47	30.04	652.51	50.26	651.27	122.31	650.39
128.41	647.64	131.05	647.09	132.71	647.08	135.14	647.17	138.64	647.65
139.08	648.11	140.48	648.18	141.29	649.59	150.13	650.23	156.97	649.72
249.39	650.76	267.01	652.4	309.86	655.02	325.84	655.85	340	658

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-5	.09	122.31	.05	141.29	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
122.31	141.29	167	162.4	160.2	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 185

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8.8	659.55	15.53	658.78	23.2	653.48	25.13	652.64	29.31	649.46
32.38	649.12	33.4	647.67	34.97	646.89	37.17	646.4	40.26	646.66
42.19	646.41	44.77	646.96	46.4	647.15	49.26	649.32	59.74	649.89
197.88	650.38	234.08	652.49	273.02	654.62	299.87	655.74	305.41	656.59
315	658								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8.8	.09	32.38	.05	49.26	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
32.38	49.26	175.6	171.8	167.7	.3	.5

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 011

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-210	657	-177.52	656.04	33.24	653.12	38.49	652.67	45.07	649.46

```
   51.29   648.2   53.81   646.7    54.7  645.84   57.12  645.71   59.41  645.74
   61.18  646.53   64.38  648.11   69.53  648.34   79.21  649.32  111.92  649.09
   167.8   651.4   249.3  651.46  251.06  651.01   293.8  653.77  352.41  660.72

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -210     .09   51.29     .05   64.38     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         51.29   64.38             39.3    41.1    44.6             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -210      42  653.25       F
      90  352.41  653.25       F

BRIDGE


RIVER: Walker Run
REACH: 1                  RS: -10

INPUT
Description: Market Street
Distance from Upstream XS =     8.5
Deck/Roadway Width        =    24.9
Weir Coefficient          =     2.5
Upstream  Deck/Roadway Coordinates
    num=      20
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
-172.52  656.04           32.59  653.86           44.69   653.7
  44.69  654.91           62.11  656.78  644.95   62.5    656.8  647.67
  62.61  656.82  648.73   63.5   656.84   650.4   65.5    656.88   651.4
   65.9  656.88  651.43   66.3   656.88   651.4   68.3    656.84   650.4
   69.6  656.82  648.73     70    656.8  647.67  70.35    656.78  645.67
  98.44   654.9           98.45   653.7          172.12   653.25
 253.49     654           332.2  654.33

Upstream Bridge Cross Section Data
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
-172.52  654.94   32.43  652.03   38.83  651.58   48.62  648.36   55.15   647.1
   59.2   645.6   61.39  644.75   65.45  644.65   67.71  645.44   70.85  647.01
  86.15  648.21   116.5   648.9  172.12  652.15  253.49   652.9   332.2  653.98
  350.6   654.9  358.85   655.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
-172.52     .09   55.15     .05   70.85     .09

Bank Sta: Left   Right    Coeff Contr.   Expan.
         55.15   70.85             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
-172.52      42  653.25       F
      90  358.85  653.25       F

Downstream  Deck/Roadway Coordinates
    num=      20
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
-199.02  656.04            6.09  653.86           18.19   653.7
  18.19  654.42           35.61  656.78  645.95      36   656.83  648.67
  36.11  656.85  649.52      37  656.92  650.59      39   656.98  651.59
   39.4  656.98  651.62    39.8  656.98  651.59    41.8   656.92  650.59
   43.1  656.85  649.52    43.5  656.83  648.75   43.85   656.78  647.42
  71.94  655.17           71.95   653.7          145.62   653.25
 226.99     654           332.2  654.33

Downstream Bridge Cross Section Data
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
-199.02  655.29   -6.99  653.19   1.13   653.15   13.19  652.77   26.39  650.42
   31.8  649.93   33.72  648.44  36.22   647.82   39.63  646.48    42.3  645.69
  44.81  646.28    48.1  647.83     51   649.37   61.17  649.79   72.07  651.55
 145.62   652.5  226.99  653.25  332.2   654.33   350.6  655.25  358.85  656.25

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
-199.02     .09    31.8     .05      51     .09

Bank Sta: Left   Right    Coeff Contr.   Expan.
          31.8      51             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =   654.4
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer
```

High Flow Method
Pressure and Weir flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd = .8
Max Low Cord =

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: -30

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-199.02	656.04	-46.68	654.28	-4.4	653.95	4.43	653.9	17.96	651.54
30.08	649.2	35.6	648.71	37.35	647.22	38.98	646.6	41.82	645.27
45.52	644.46	48.05	645.07	52.27	646.61	53.56	648.15	63.11	648.57
79.88	650.16	85.95	652.29	181.4	651.9	273.84	653.77	319.73	659.02

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-199.02	.09	35.6	.05	53.56	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
35.6	53.56	35.6	46.2	55.1	.3 .5

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: -78

INPUT
Description:
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	655.4	73	655	119	654	167	653	173	652
177	651	182	650	210	649	216	646	219	645.82
222	645.43	225	645.72	229	646	235	647	243	648
270	649	284	650	359	651	424	652	440	652
465	653	470	654	506	655	518	656		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.09	210	.05	243	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
210	243	64	75.7	79.9	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: -154

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	655.4	66	655	113	654	122	653	133	650
139	649	142	648	143	647	146	646	147	645.21
149	644.9	152	645.52	156	645.66	158	646	163	648
204	649	324	650	336	653	341	653	440	653
444	654	452	655						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.09	142	.05	163	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
142	163	125.1	125.7	125.2	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: -255

INPUT
Description: FEMA BHJ
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	657.5	5	657	15	656	42	655	48	654
79	649	97	648	98	646	105	645.5	111	646
113	647	155	648	187	649	198	650	220	653

```
     224      653      354      653      357      654      372      655      385      656
     476      673

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
       0     .09       97     .05      113     .09

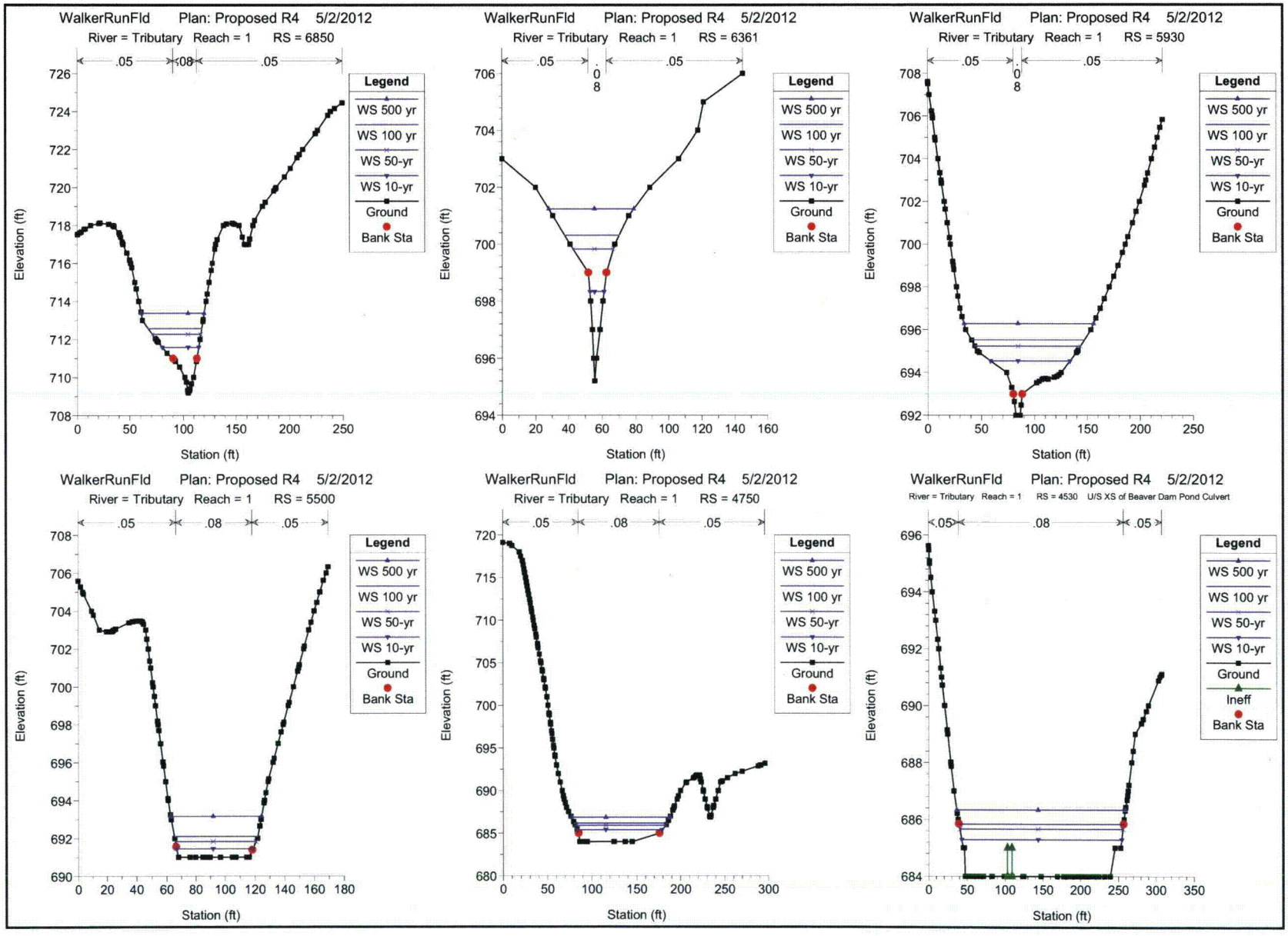
Bank Sta: Left   Right    Coeff Contr.   Expan.
           97     113             .1        .3
```

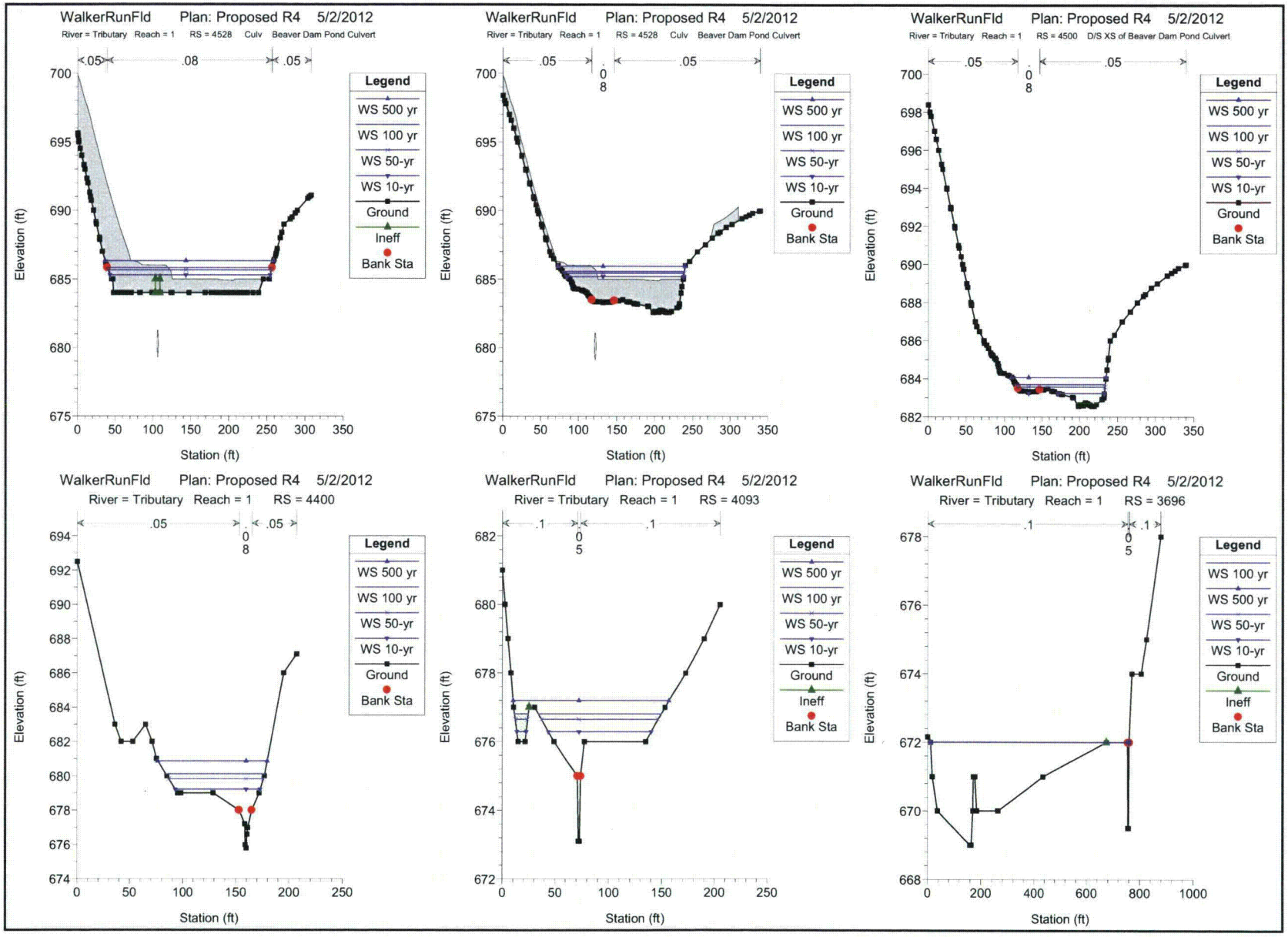
Appendix H:
Proposed Conditions Model

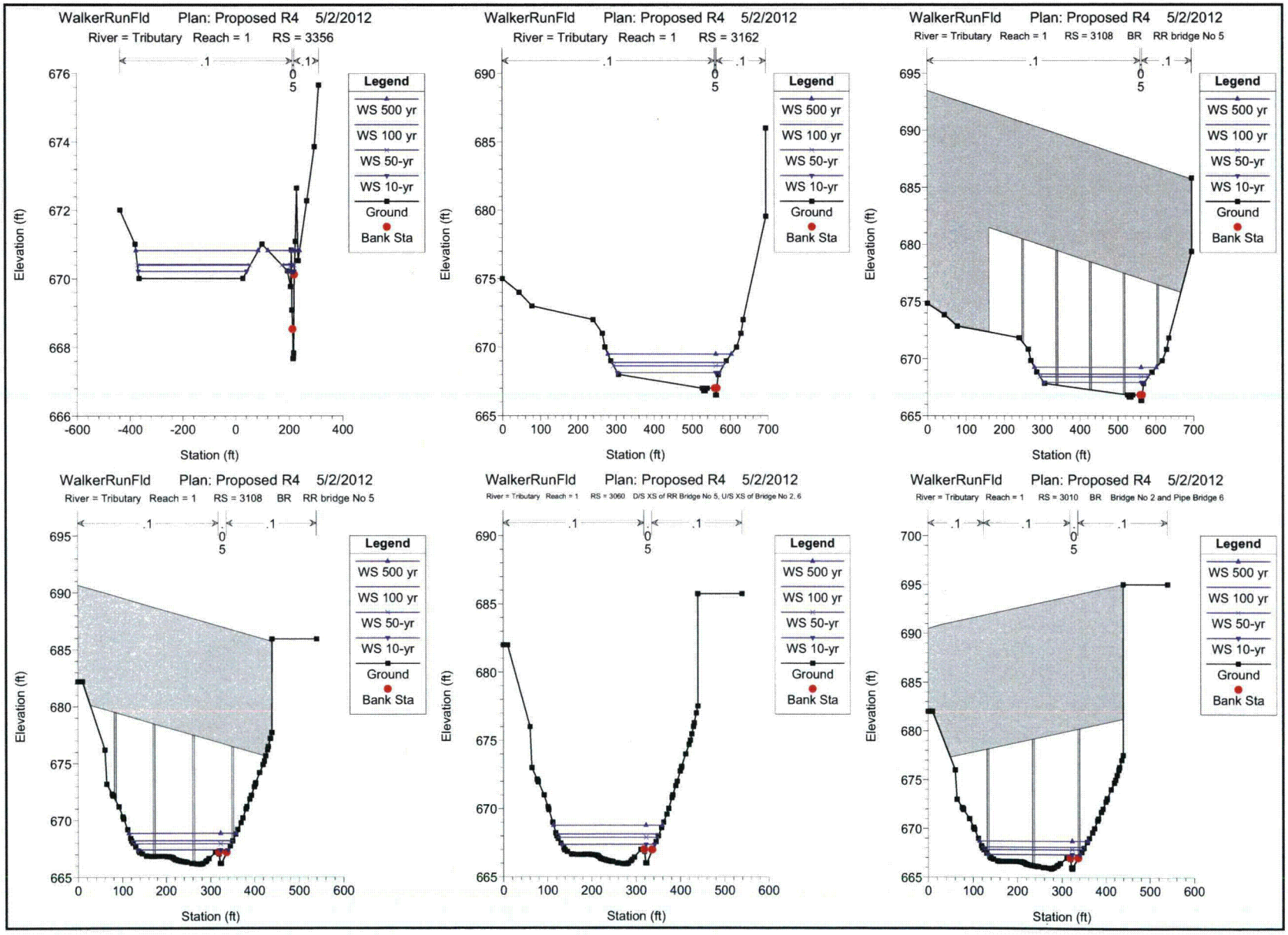
- HEC-RAS Reports
- HEC-RAS Cross-Sections
- HEC-RAS Profiles

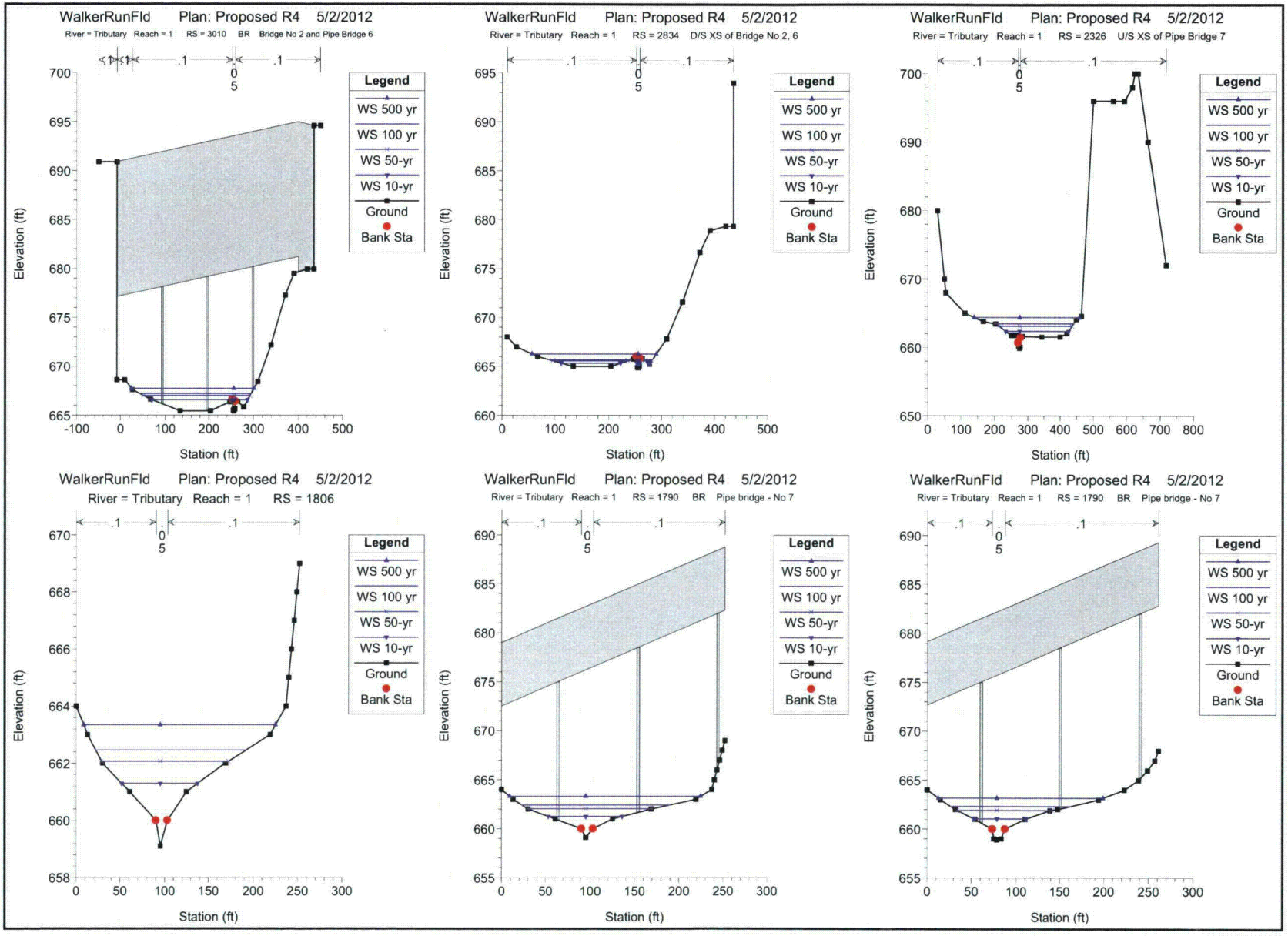
HEC-RAS Plan: PRO COPY River: Walker Run Reach: 1 Profile: 100 yr

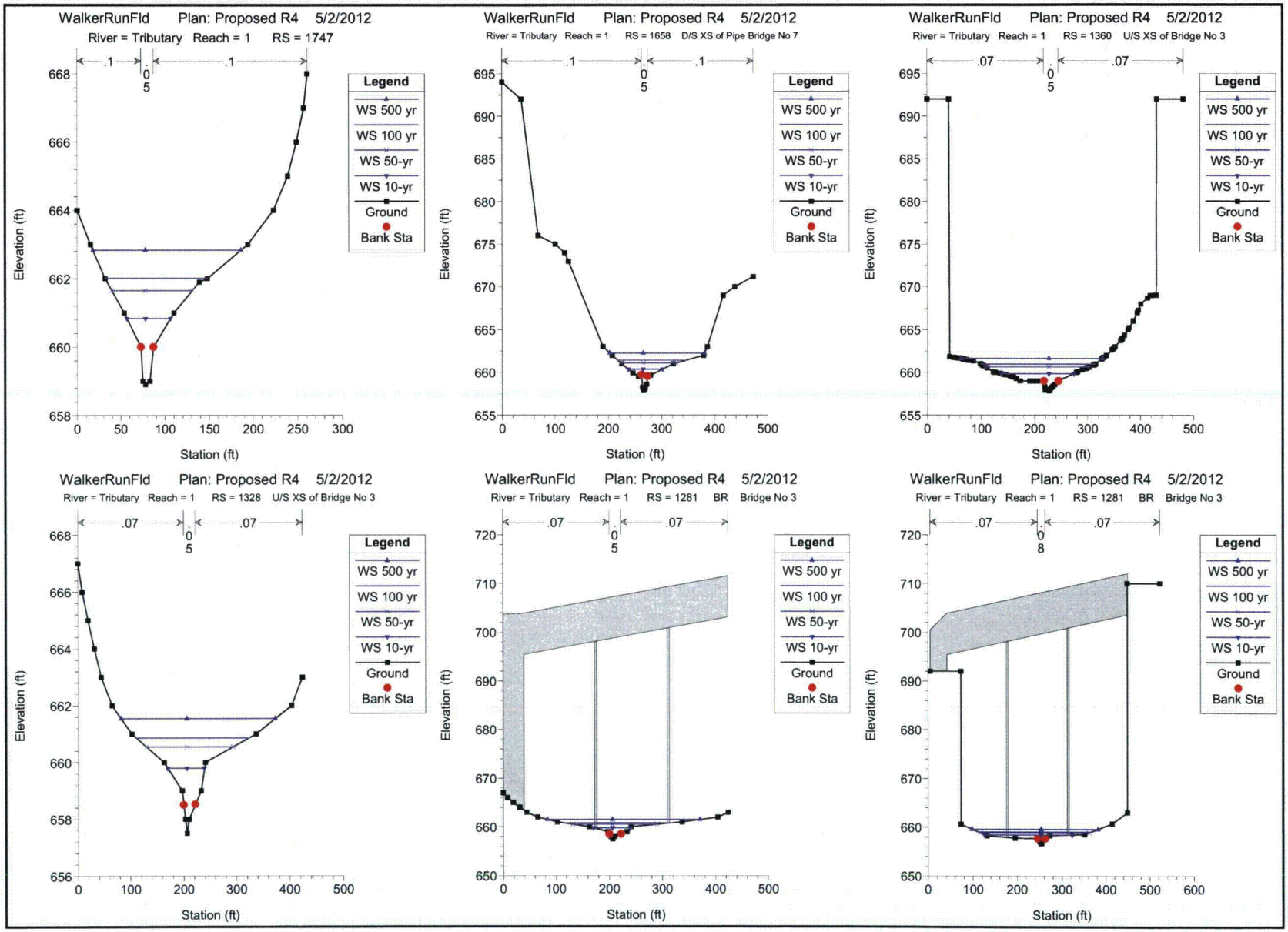
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	5862	100 yr	1640.00	675.53	680.84	680.84	681.74	0.021365	10.73	341.13	163.77	0.90
1	5547	100 yr	1640.00	669.38	677.22		677.31	0.001725	4.35	915.07	218.64	0.29
1	5282	100 yr	1640.00	667.03	676.62	673.35	676.83	0.001994	5.11	786.23	235.75	0.31
1	5250		Bridge									
1	5198	100 yr	1640.00	665.45	670.92		671.47	0.008345	6.40	380.85	199.94	0.59
1	5107	100 yr	1640.00	664.59	670.34		670.87	0.009889	7.69	424.64	226.21	0.65
1	4810	100 yr	1640.00	662.87	669.52		669.60	0.002247	4.31	965.82	302.89	0.32
1	4692	100 yr	1640.00	663.77	669.29		669.35	0.001964	4.05	998.85	294.05	0.31
1	4414	100 yr	1640.00	662.97	668.79		668.88	0.001975	3.97	963.64	286.78	0.31
1	4130	100 yr	1640.00	662.26	668.41	665.69	668.47	0.001368	3.53	1168.54	360.81	0.26
1	3972	100 yr	1640.00	661.21	668.29	664.72	668.36	0.000626	2.45	1320.01	475.21	0.18
1	3914		Bridge									
1	3860	100 yr	1640.00	660.73	666.74	666.74	667.22	0.008521	7.14	384.31	334.25	0.55
1	3735	100 yr	1640.00	660.36	665.01		665.30	0.009681	6.97	500.74	239.08	0.59
1	3532	100 yr	1640.00	659.50	663.69		663.83	0.006635	5.03	637.48	231.91	0.45
1	3410	100 yr	1640.00	658.92	662.63		662.86	0.011455	6.85	547.81	252.95	0.67
1	3278	100 yr	1640.00	657.99	661.81		661.93	0.004792	4.55	656.62	264.19	0.44
1	2949	100 yr	1640.00	656.74	659.52		659.72	0.010330	5.79	551.60	332.64	0.63
1	2669	100 yr	1640.00	654.10	658.79	657.05	658.84	0.001405	2.58	941.87	373.67	0.23
1	2620		Bridge									
1	2570	100 yr	1640.00	654.50	658.58		658.63	0.001749	2.75	877.11	366.19	0.26
1	2497	100 yr	1640.00	654.75	658.35		658.44	0.004718	4.23	753.77	366.68	0.42
1	2462	100 yr	1640.00	654.61	658.23		658.30	0.003064	3.73	814.63	374.04	0.36
1	2274	100 yr	1640.00	653.90	657.44		657.58	0.006464	5.12	610.11	281.89	0.50
1	2139	100 yr	1640.00	653.31	657.19		657.22	0.001306	2.47	1194.93	520.29	0.23
1	1925	100 yr	1640.00	652.07	657.01		657.03	0.000676	2.08	1604.95	840.17	0.17
1	1602	100 yr	1860.00	650.67	656.90		656.91	0.000370	1.33	2825.89	1169.40	0.10
1	1402	100 yr	1860.00	649.80	656.80		656.82	0.000604	1.72	1969.63	683.79	0.12
1	1208	100 yr	1860.00	649.57	656.62		656.65	0.000989	2.27	1547.22	555.60	0.17
1	990	100 yr	1860.00	649.47	656.45		656.48	0.001163	2.48	1407.10	509.75	0.18
1	884	100 yr	1860.00	648.62	656.29	654.44	656.34	0.001605	3.37	1288.97	442.26	0.24
1	875		Culvert									
1	863	100 yr	1860.00	648.96	656.19		656.24	0.001269	3.29	1336.89	432.74	0.24
1	715	100 yr	1860.00	647.90	655.97		656.05	0.001480	3.96	1181.57	370.74	0.26
1	536	100 yr	1860.00	646.97	655.73		655.81	0.001257	3.79	1162.07	313.36	0.24
1	350	100 yr	1860.00	647.08	655.60		655.65	0.000800	3.07	1329.98	308.49	0.20
1	185	100 yr	1860.00	646.40	655.45		655.51	0.000911	3.45	1207.77	272.48	0.21
1	011	100 yr	1860.00	645.71	655.30	652.71	655.37	0.000842	3.44	1406.13	431.12	0.20
1	-10		Bridge									
1	-30	100 yr	1860.00	644.46	652.99	652.00	654.05	0.009523	9.92	416.93	225.47	0.66
1	-78	100 yr	1860.00	645.43	653.25		653.43	0.001924	4.51	889.89	311.25	0.31
1	-154	100 yr	1860.00	644.90	653.01		653.24	0.002923	5.61	821.95	318.12	0.38
1	-255	100 yr	1860.00	645.50	652.58	650.51	652.83	0.003695	6.02	621.91	160.12	0.41

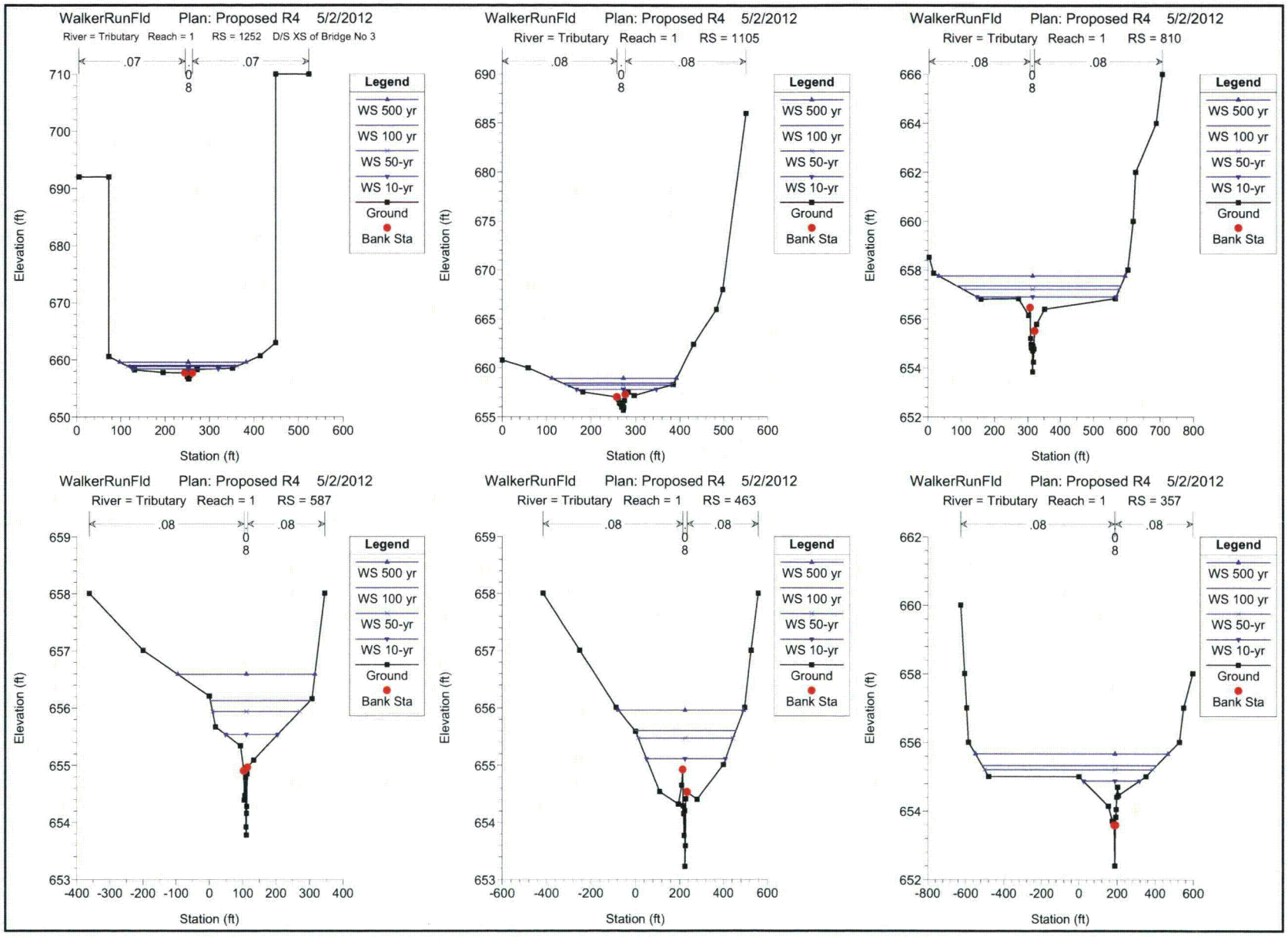

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 6850
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 6361
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 5930
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 5500
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 4750
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 4530 U/S XS of Beaver Dam Pond Culvert
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

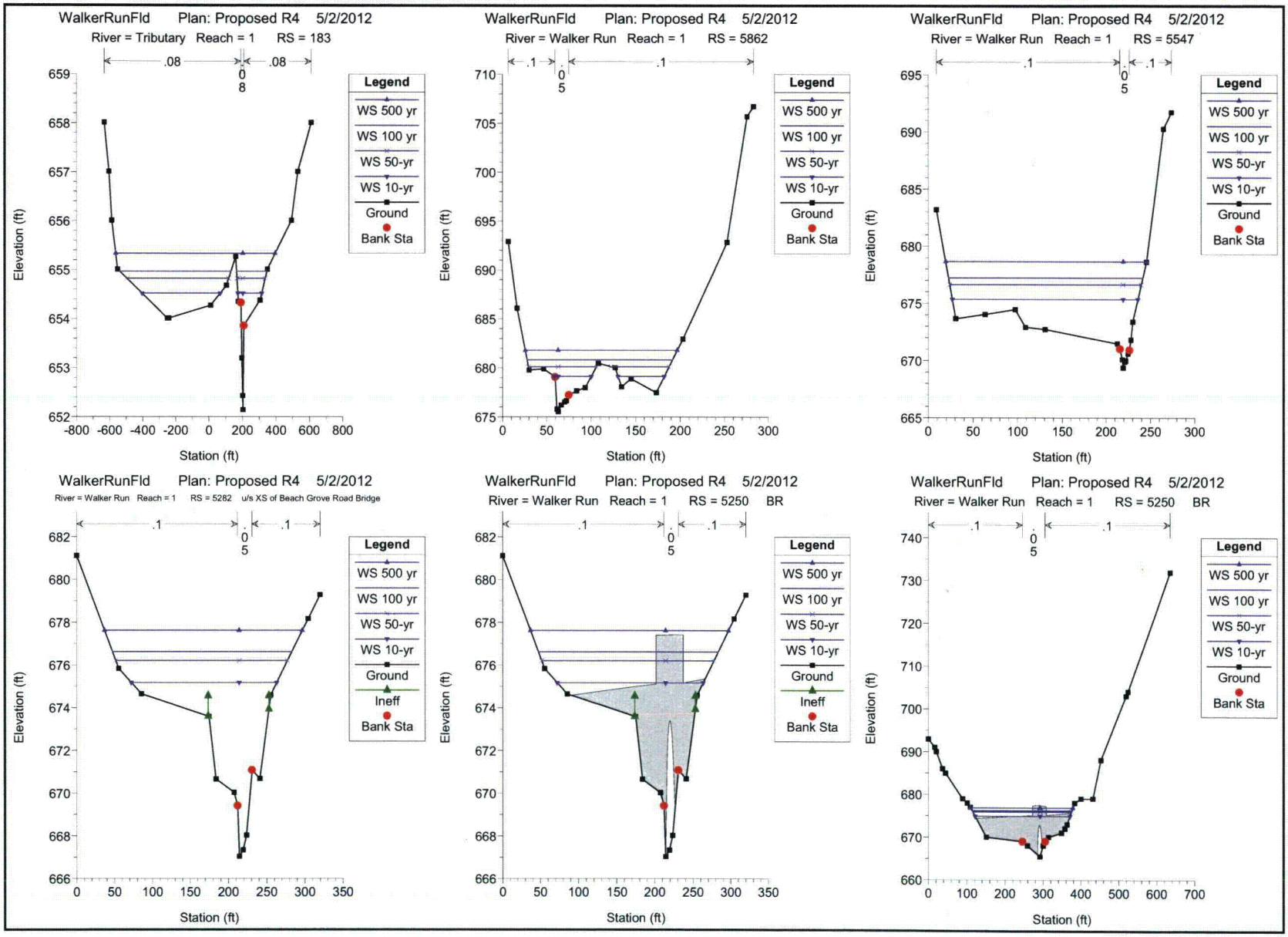

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 4528 Culv Beaver Dam Pond Culvert
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 4528 Culv Beaver Dam Pond Culvert
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 4500 D/S XS of Beaver Dam Pond Culvert
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 4400
.05 .08 .05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 4093
.1 .05 .1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 3696
.1 .05 .1
Legend
WS 100 yr
WS 500 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

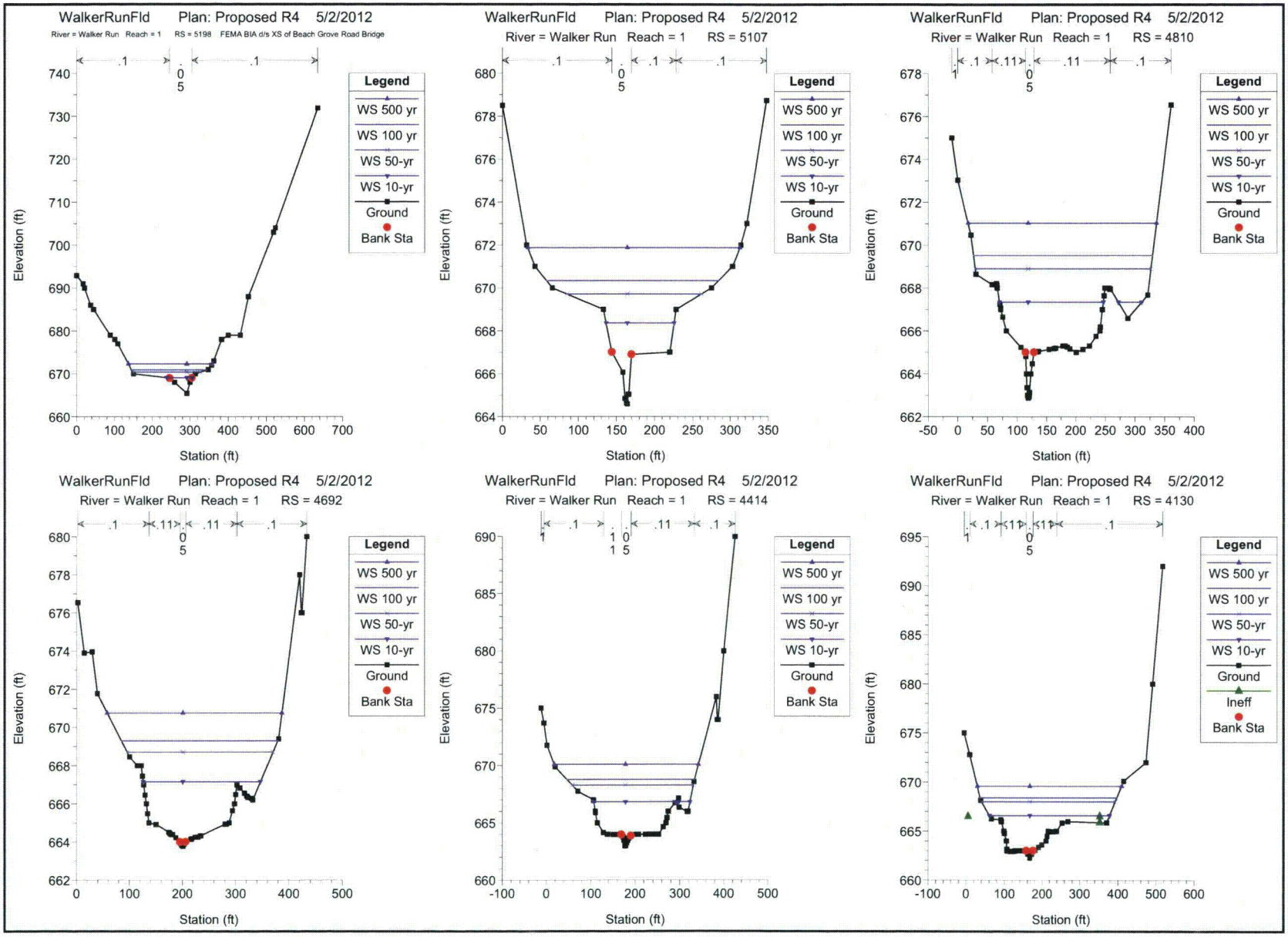

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 3356
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 3162
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 3108 BR RR bridge No 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 3108 BR RR bridge No 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 3060 D/S XS of RR Bridge No 5, U/S XS of Bridge No 2, 6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 3010 BR Bridge No 2 and Pipe Bridge 6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

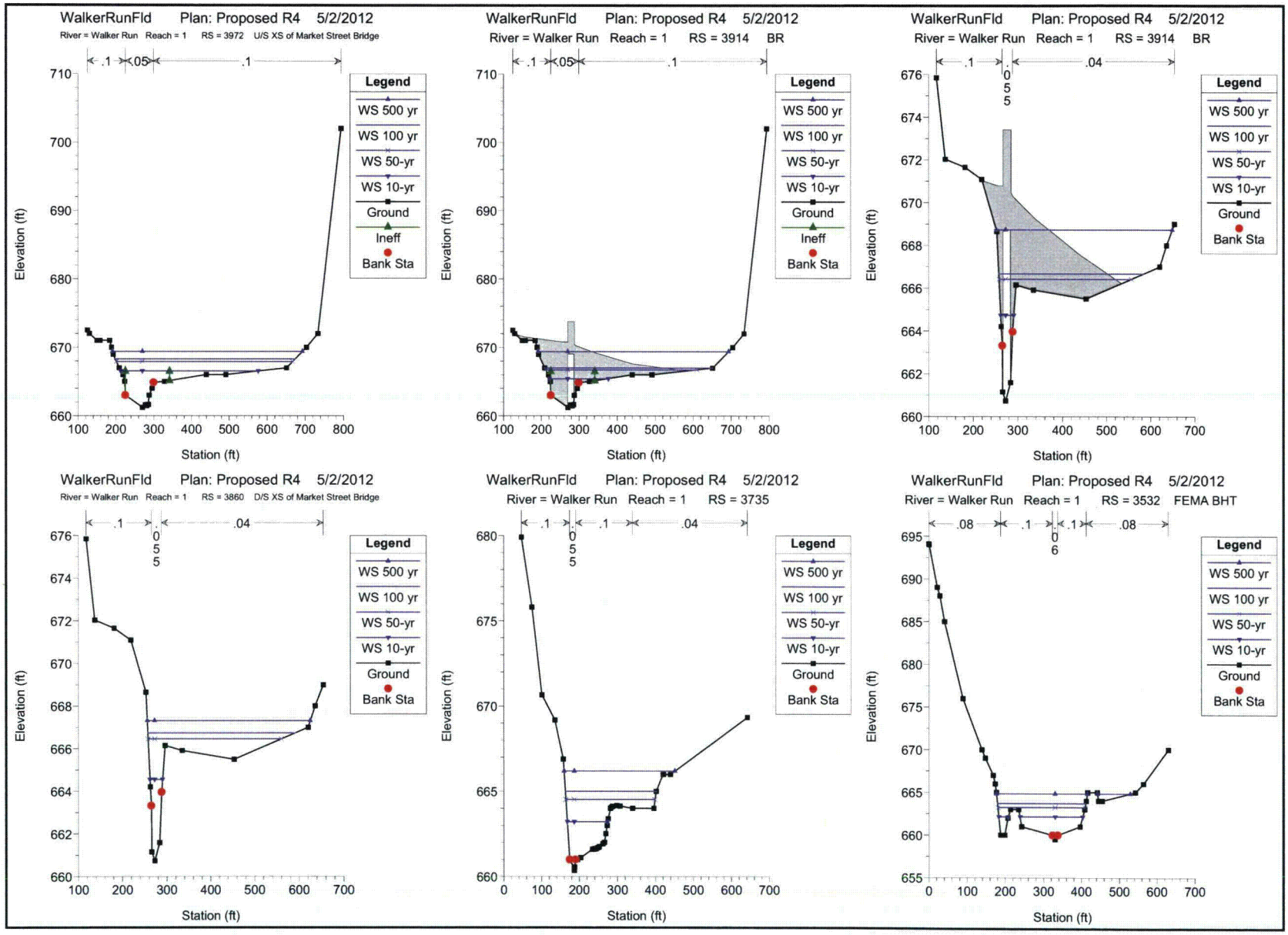

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 3010 BR Bridge No 2 and Pipe Bridge 6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 2834 D/S XS of Bridge No 2, 6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 2326 U/S XS of Pipe Bridge 7
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1806
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1790 BR Pipe bridge - No 7
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1790 BR Pipe bridge - No 7
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

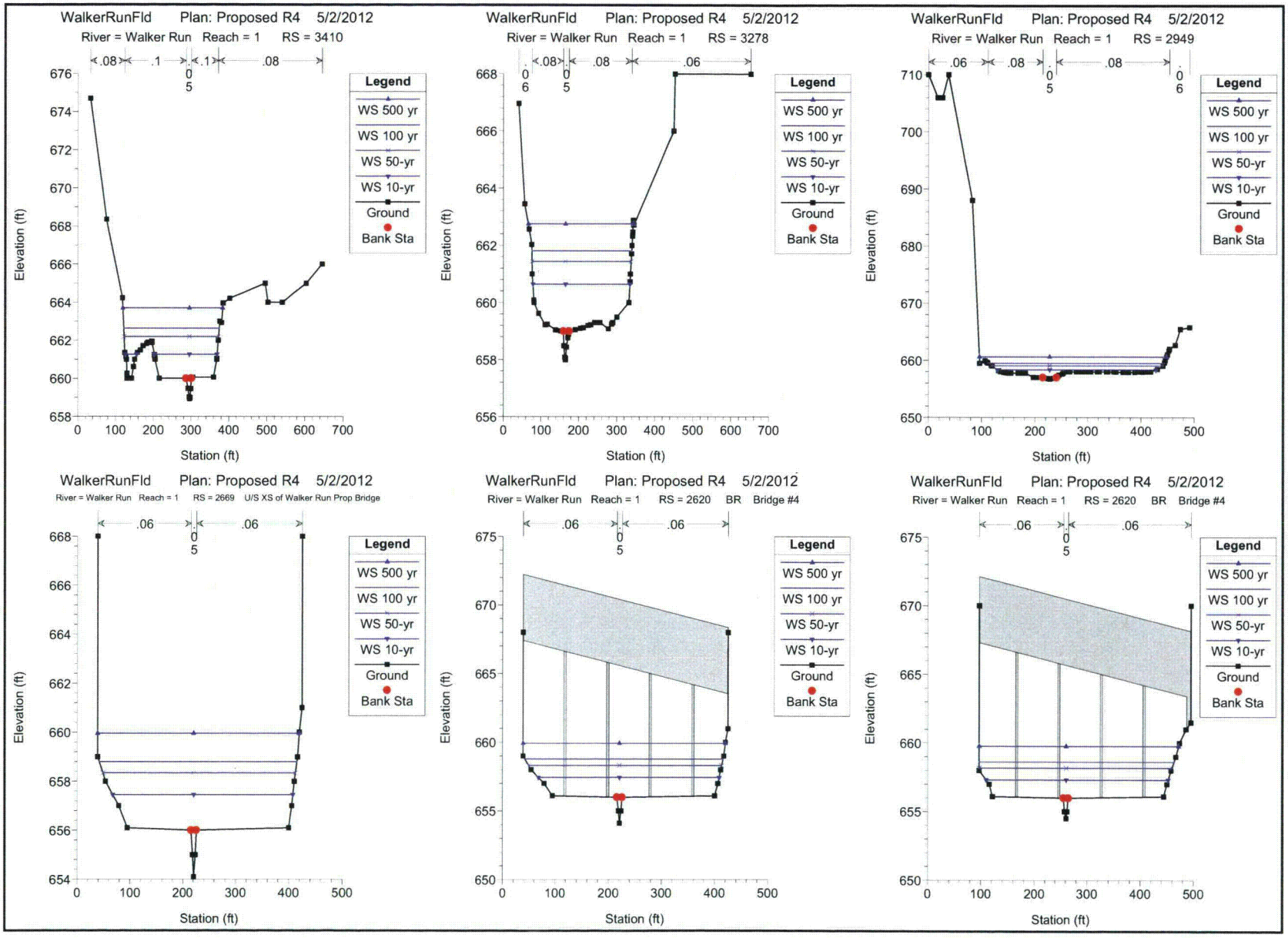

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1747
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1658 D/S XS of Pipe Bridge No 7
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1360 U/S XS of Bridge No 3
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1328 U/S XS of Bridge No 3
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1281 BR Bridge No 3
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1281 BR Bridge No 3
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

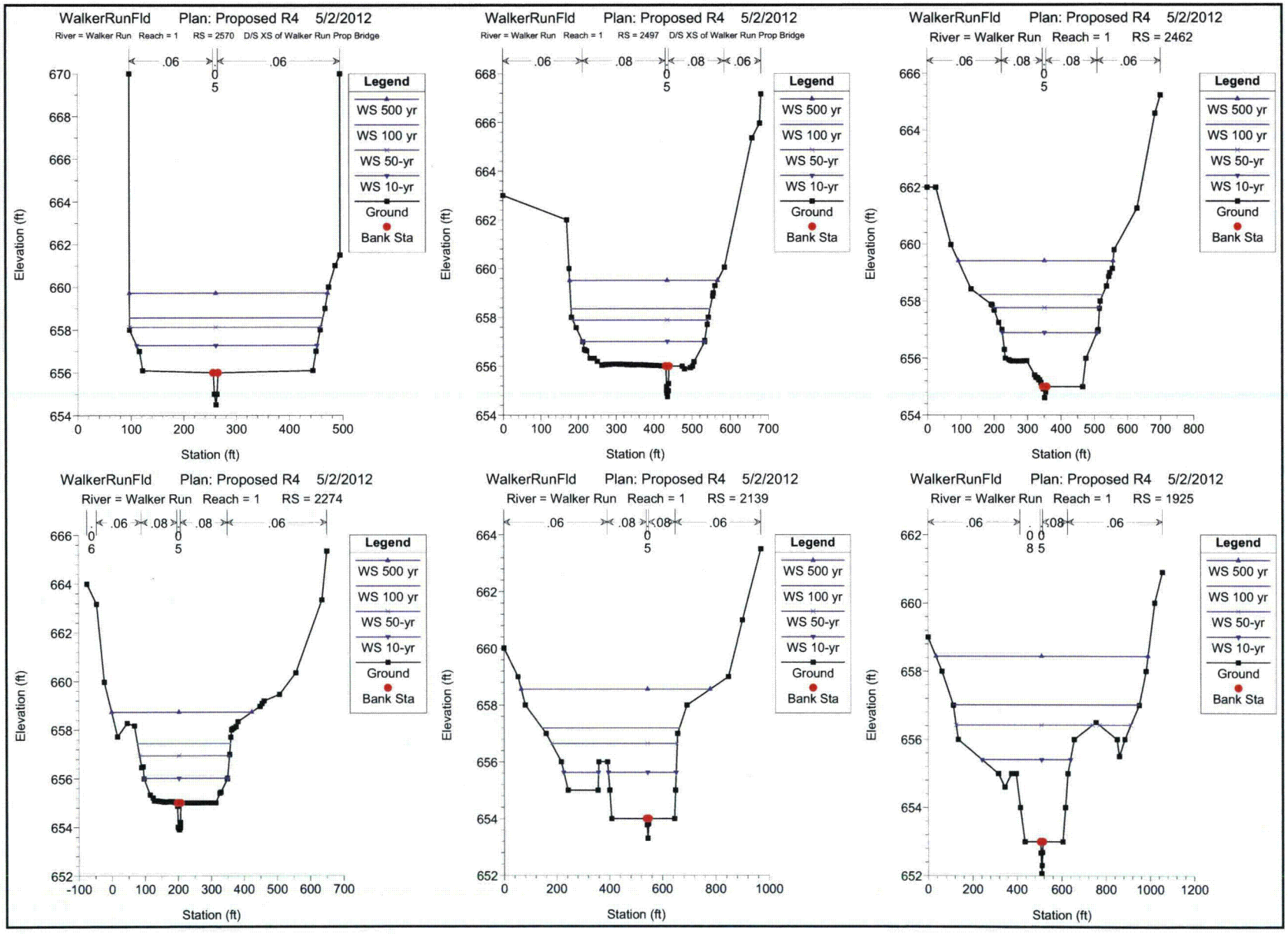

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1252 D/S XS of Bridge No 3
.07
.07
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 1105
.08
.08
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 810
.08
.08
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 587
.08
.08
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 463
.08
.08
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 357
.08
.08
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

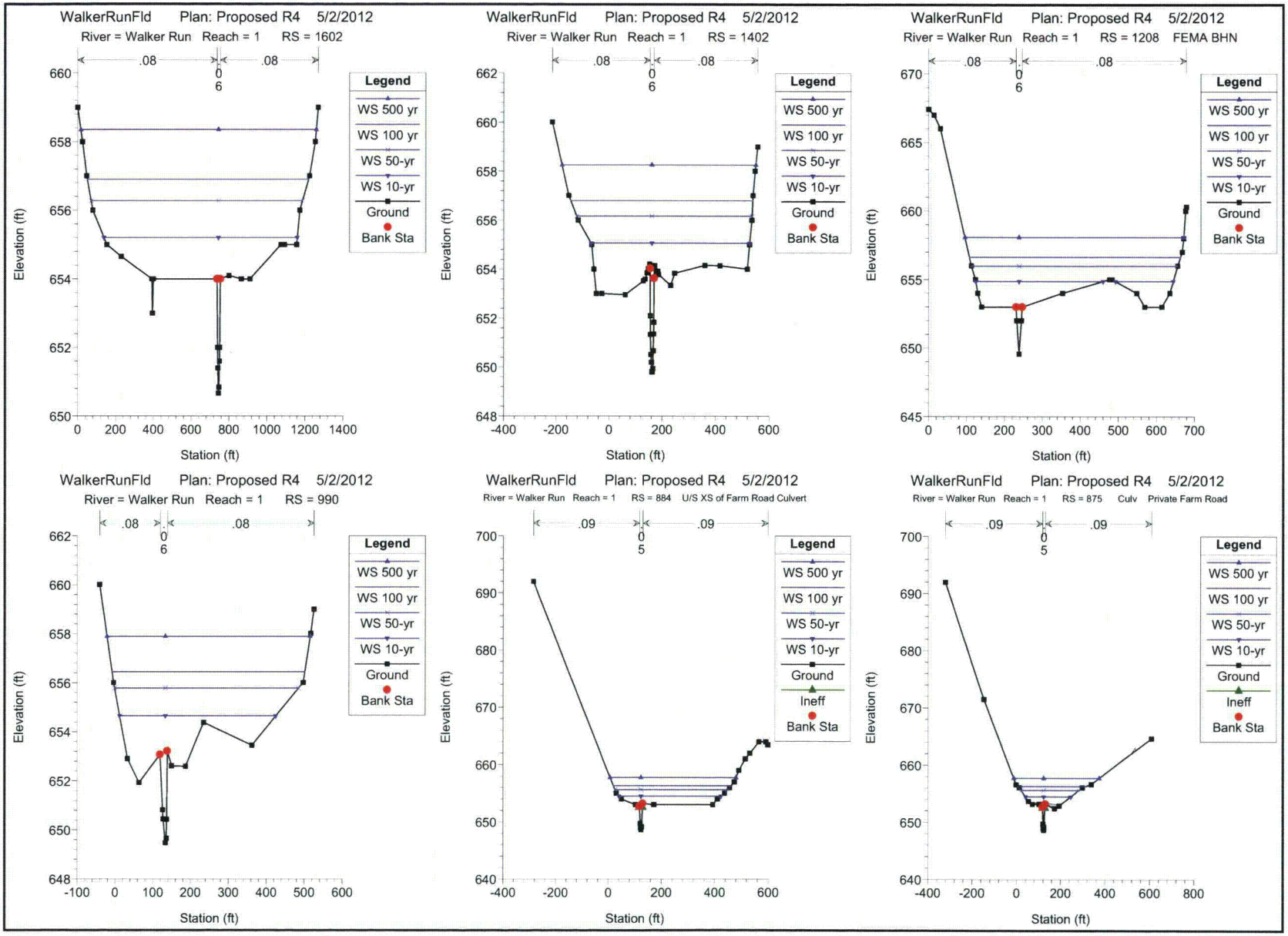

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Tributary Reach = 1 RS = 183
.08
.08
0.08
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 5862
.1
.1
0.05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 5547
.1
.1
0.05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 5282 u/s XS of Beach Grove Road Bridge
.1
.1
0.05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 5250 BR
.1
.1
0.05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 5250 BR
.1
.1
0.05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

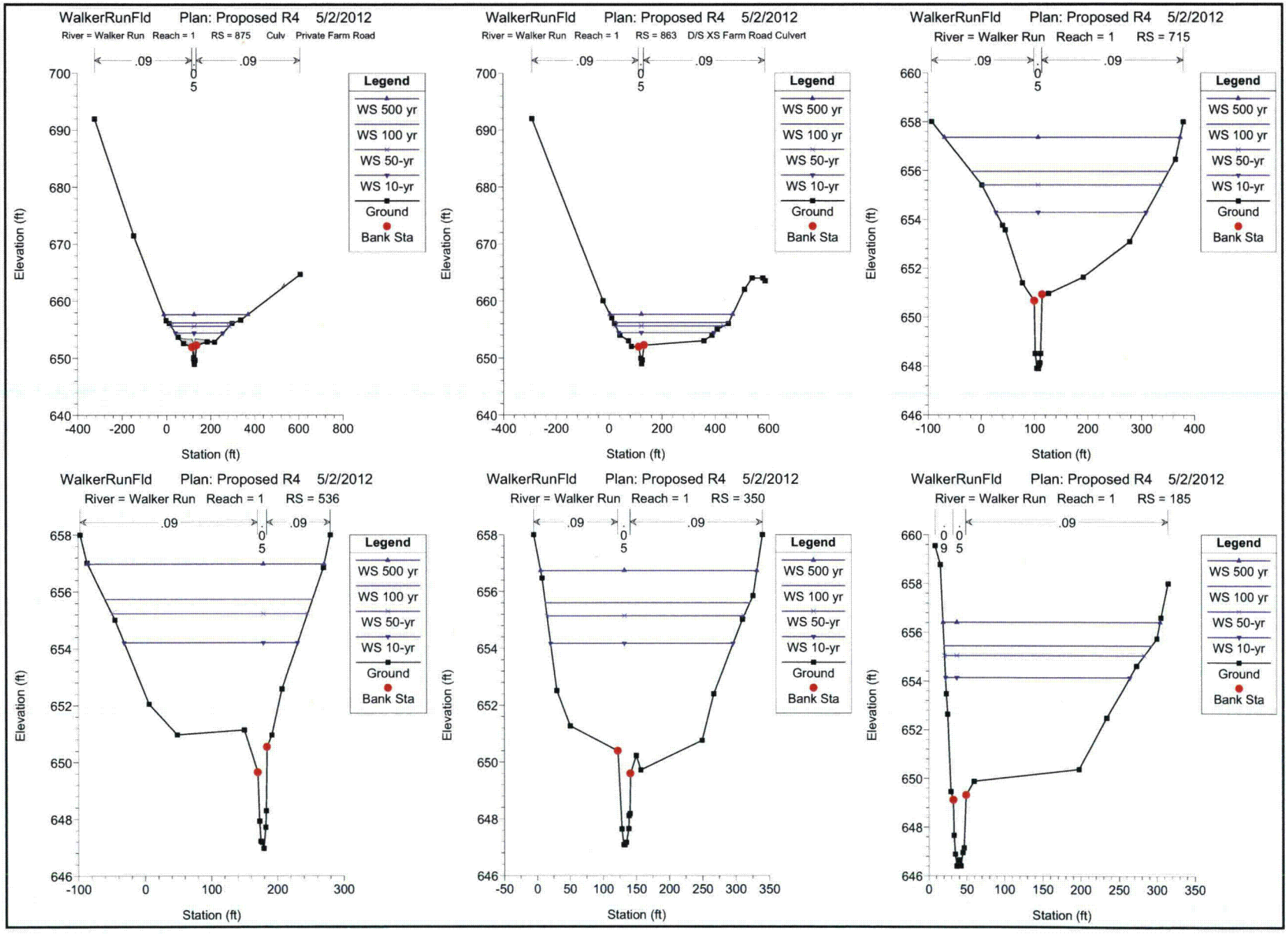

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 5198 FEMA BIA d/s XS of Beach Grove Road Bridge
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 5107
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 4810
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 4692
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 4414
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 4130
Elevation (ft)
Station (ft)
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta

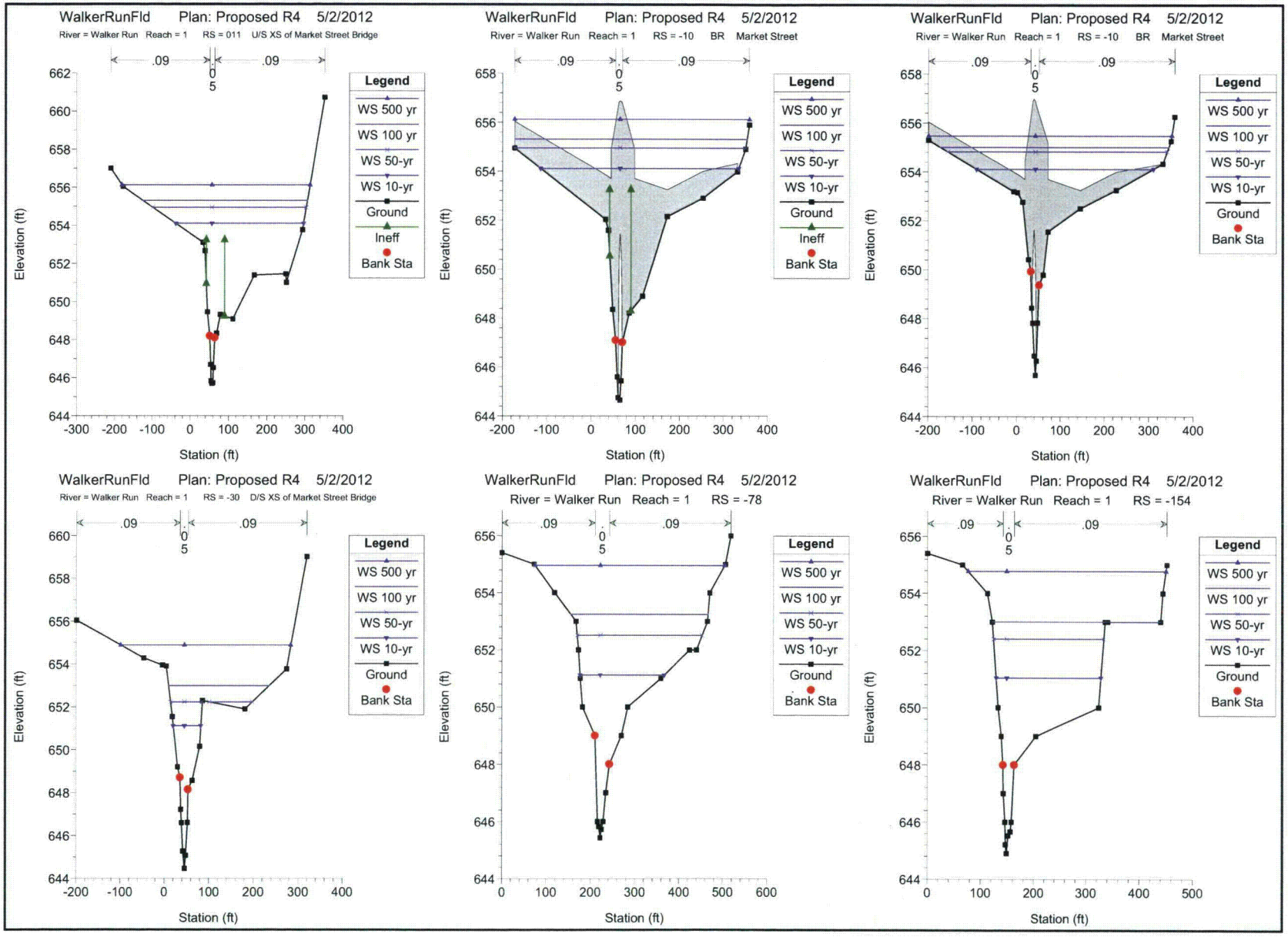

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 3972 U/S XS of Market Street Bridge
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 3914 BR
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 3914 BR
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 3860 D/S XS of Market Street Bridge
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 3735
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 3532 FEMA BHT
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

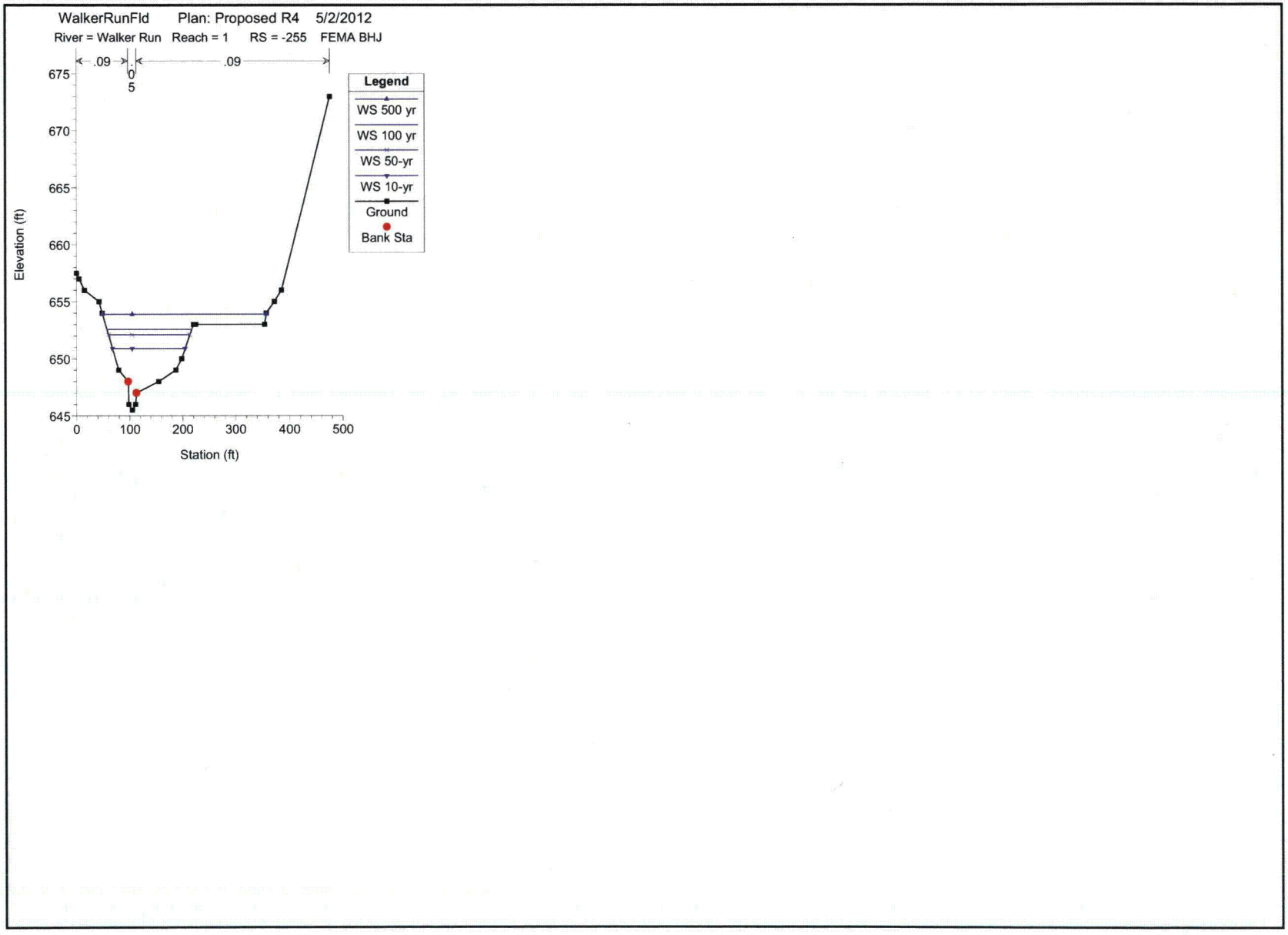

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 3410
.08 .1 .1 .08
0 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 3278
.08 .08 .06
0 6 0 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 2949
.06 .08 .08
0 5 0 6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 2669 U/S XS of Walker Run Prop Bridge
.06 .06
0 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 2620 BR Bridge #4
.06 .06
0 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 2620 BR Bridge #4
.06 .06
0 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

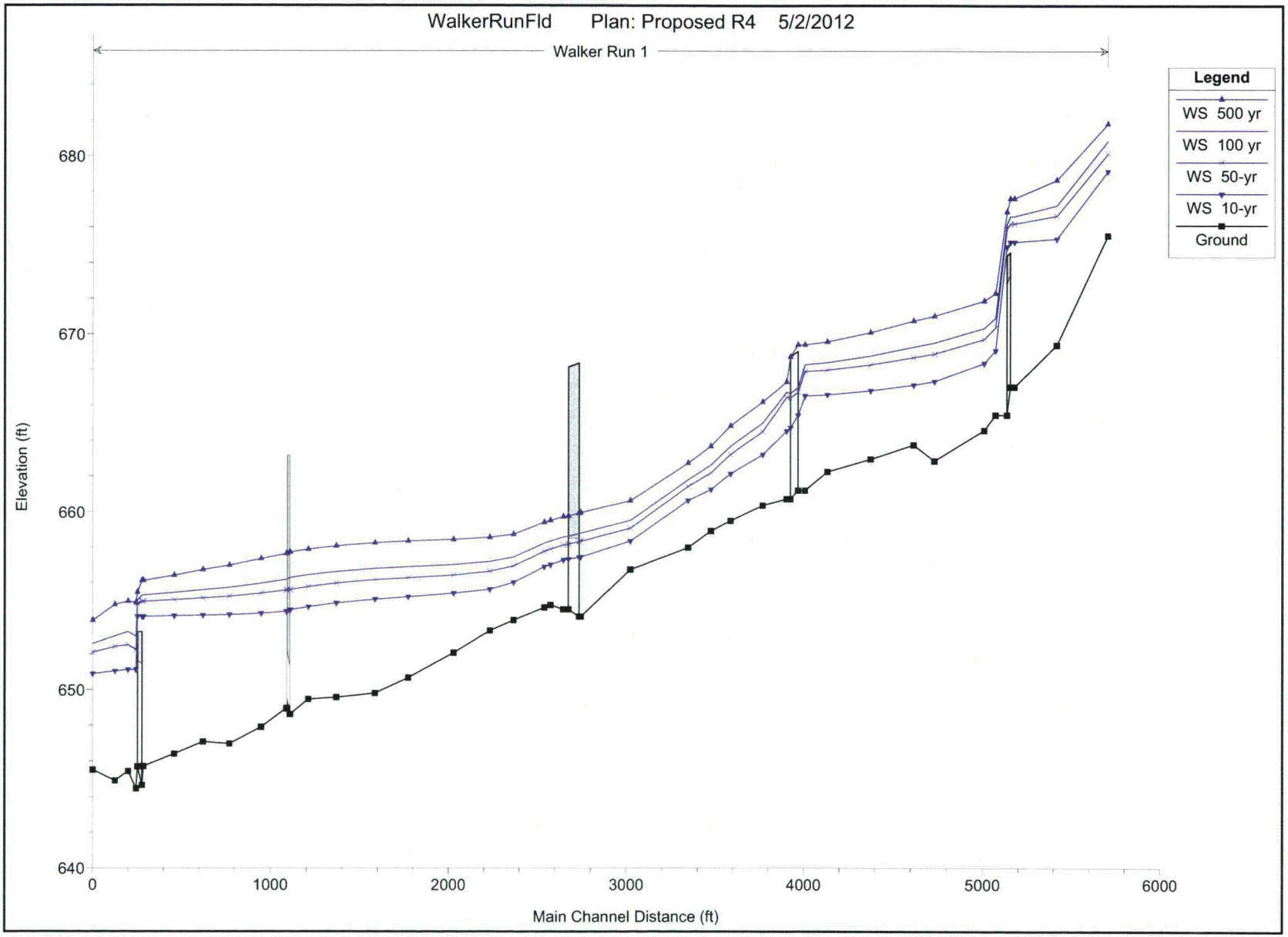

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 2570 D/S XS of Walker Run Prop Bridge
.06 .06
0 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 2497 D/S XS of Walker Run Prop Bridge
.06 .08 .08 .06
0 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 2462
.06 .08 .08 .06
0 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 2274
.06 .08 .08 .06
0 0 0 5 6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 2139
.06 .08 .08 .06
0 5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 1925
.06 .08 .08 .06
0 0 0 5 8
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)

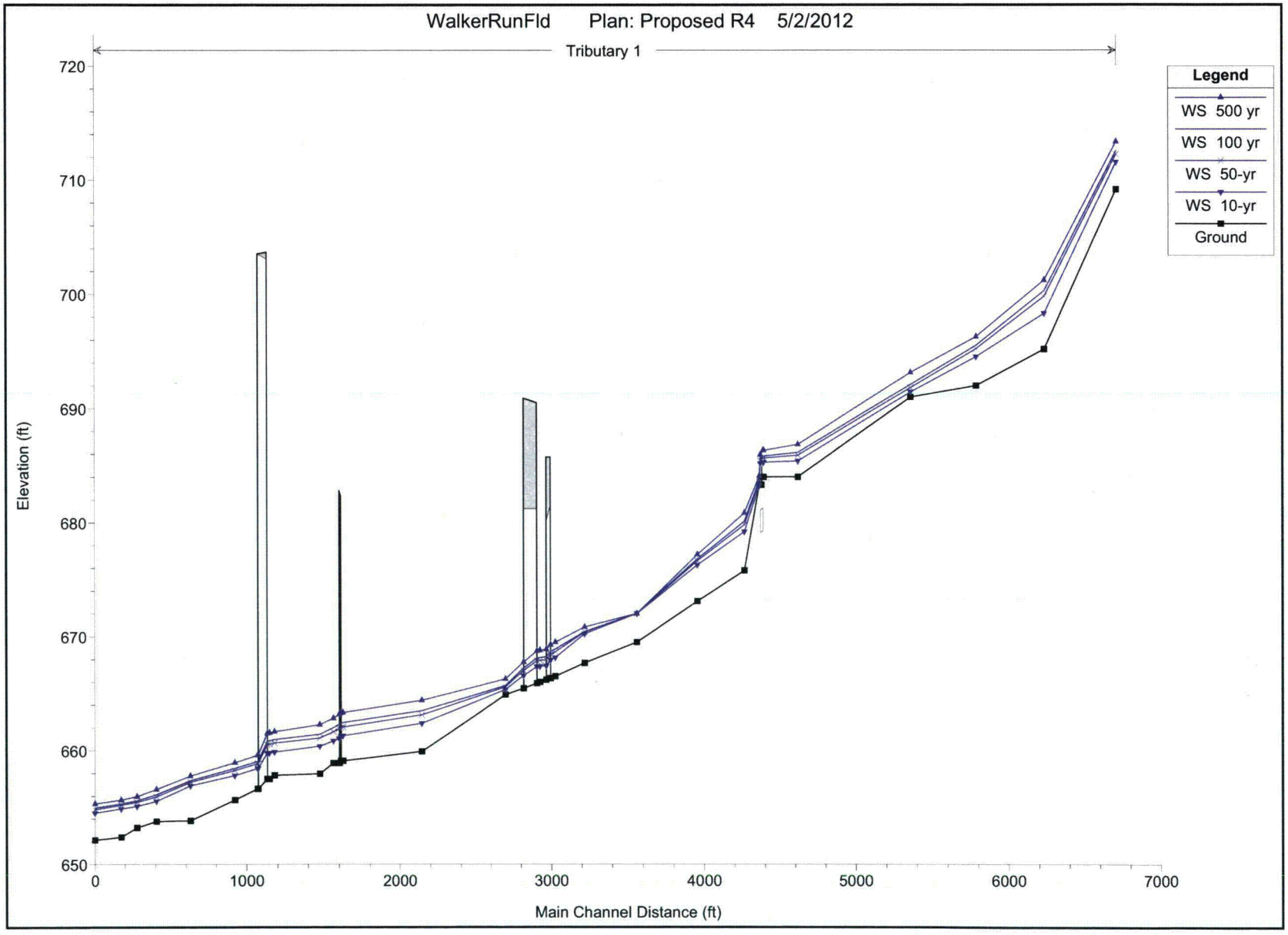

WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 1602
.08
.08
0
6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 1402
.08
.08
0
6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 1208 FEMA BHN
.08
.08
0
6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 990
.08
.08
0
6
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 884 U/S XS of Farm Road Culvert
.09
.09
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 875 Culv Private Farm Road
.09
.09
0
5
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 875 Culv Private Farm Road
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 863 D/S XS Farm Road Culvert
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 715
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 536
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 350
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 185
.09
.05
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
Station (ft)


WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = 011 U/S XS of Market Street Bridge
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = -10 BR Market Street
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = -10 BR Market Street
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = -30 D/S XS of Market Street Bridge
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = -78
WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = -154
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
.09
.09
0
5


WalkerRunFld Plan: Proposed R4 5/2/2012
River = Walker Run Reach = 1 RS = -255 FEMA BHJ
.09
.05
.09
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Bank Sta
Elevation (ft)
675
670
665
660
655
650
645
0
100
200
300
400
500
Station (ft)


WalkerRunFld Plan: Proposed R4 5/2/2012
Walker Run 1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Elevation (ft)
680
670
660
650
640
0
1000
2000
3000
4000
5000
6000
Main Channel Distance (ft)


WalkerRunFld Plan: Proposed R4 5/2/2012
Tributary 1
Legend
WS 500 yr
WS 100 yr
WS 50-yr
WS 10-yr
Ground
Elevation (ft)
720
710
700
690
680
670
660
650
0
1000
2000
3000
4000
5000
6000
7000
Main Channel Distance (ft)

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X     X    X  X
XXXXXXX  XXXX     X      XXX   XXXX      XXXXXX    XXXX
X     X  X        X            X  X      X    X        X
X     X  X        X    X       X   X     X    X        X
X     X  XXXXXX    XXXX        X    X    X    X   XXXXX
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PROJECT DATA
Project Title: WalkerRunFld
Project File : WalkerRunFld.prj
Run Date and Time: 5/2/2012 3:02:38 PM

Project in English units

PLAN DATA

Plan Title: Proposed R4
Plan File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions March 2012\REV 4 HECRAS - Final - Clean\WalkerRunFld.p04

Geometry Title: Proposed Conditions R4
Geometry File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions March 2012\REV 4 HECRAS - Final - Clean\WalkerRunFld.g04

Flow Title : Existing Conditions
Flow File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions March 2012\REV 4 HECRAS - Final - Clean\WalkerRunFld.f03

Plan Summary Information:
Number of: Cross Sections = 65 Multiple Openings = 0
Culverts = 2 Inline Structures = 0
Bridges = 8 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

Encroachment Data
Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = Walker Run Reach = 1

RS	Profile	Method	Value1	Value2
5862	100 yr encroachment	1	50	108.12
5547	100 yr encroachment	1	160	226.17
5282	100 yr encroachment	1	75	265
5198	100 yr encroachment	1	151	344.46
5107	100 yr encroachment	1	139	225
4810	100 yr encroachment	1	70.73	245.06
4692	100 yr encroachment	1	122.3	302.51
4414	100 yr encroachment	1	105.71	274.29
4130	100 yr encroachment	1	65.97	269.33
3972	100 yr encroachment	1	200	582
3860	100 yr encroachment	1	262	350
3735	100 yr encroachment	1	174.59	261.64
3532	100 yr encroachment	1	243	397
3410	100 yr encroachment	1	195.89	372.42
3278	100 yr encroachment	1	117.52	231.3
2949	100 yr encroachment	1	155	299.61
2669	100 yr encroachment	1	135	300
2570	100 yr encroachment	1	185	340
2497	100 yr encroachment	1	350	505.3
2462	100 yr encroachment	1	275	475
2274	100 yr encroachment	1	96.48	348.92
2139	100 yr encroachment	1	393	658
1925	100 yr encroachment	1	396	754
1602	100 yr encroachment	1	584	1053
1402	100 yr encroachment	1	10.08	391.43
1208	100 yr encroachment	1	140	340
990	100 yr encroachment	1	15	410
884	100 yr encroachment	1	52.79	230

863	100 yr encroachment	1	55	220
715	100 yr encroachment	1	70	237.94
536	100 yr encroachment	1	36.84	184.3
350	100 yr encroachment	1	74.21	237.94
185	100 yr encroachment	1	32.38	176.38
011	100 yr encroachment	1	42	249
-30	100 yr encroachment	1	15.72	63.98
-78	100 yr encroachment	1	167	284
-154	100 yr encroachment	1	133	206.89
-255	100 yr encroachment	1	79	187

River = Tributary Reach = 1

RS	Profile	Method	Value1	Value2
6850	100 yr encroachment	1	90.32	113.19
6361	100 yr encroachment	1	52	70.17
5930	100 yr encroachment	1	75	112
5500	100 yr encroachment	1	66.48	118.28
4750	100 yr encroachment	1	85.56	176.24
4530	100 yr encroachment	1	46.66	245.5
4500	100 yr encroachment	1	117.21	152.28
4400	100 yr encroachment	1	129	172
4093	100 yr encroachment	1	68.09	94.92
3696	100 yr encroachment	1	434.5	760
3356	100 yr encroachment	1	-25	219.51
3162	100 yr encroachment	1	513.93	564
3060	100 yr encroachment	1	280	337.11
2834	100 yr encroachment	1	175	258.87
2326	100 yr encroachment	1	249.41	330
1806	100 yr encroachment	1	61	125
1747	100 yr encroachment	1	54	110
1658	100 yr encroachment	1	245.91	295
1360	100 yr encroachment	1	217.64	244.74
1328	100 yr encroachment	1	200	222
1252	100 yr encroachment	1	245.69	270
1105	100 yr encroachment	1	220	300
810	100 yr encroachment	1	285	379.19
587	100 yr encroachment	1	95	140.89
463	100 yr encroachment	1	169.65	267.48
357	100 yr encroachment	1	114.71	195
183	100 yr encroachment	1	-6	255.38

FLOW DATA

Flow Title: Existing Conditions
Flow File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions March 2012\REV 4 HECRAS - Final - Clean\WalkerRunFld.f03

Flow Data (cfs)

River	Reach	RS	100 yr	100 yr encroachment	500 yr	10-yr	50-yr
Tributary	1	6850	300	300	606	84	213
Tributary	1	4400	300	300	606	84	213
Tributary	1	1252	300	300	606	84	213
Walker Run	1	5862	1640	1640	3100	480	1180
Walker Run	1	5198	1640	1640	3100	480	1180
Walker Run	1	1602	1860	1860	3600	550	1320

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Tributary	1	100 yr	Critical	Normal S = 0.0015
Tributary	1	100 yr encroachment	Critical	Known WS = 655.97
Tributary	1	500 yr	Critical	Normal S = 0.0015
Tributary	1	10-yr	Critical	Normal S = 0.0015
Tributary	1	50-yr	Critical	Normal S = 0.0015
Walker Run	1	100 yr	Critical	Known WS = 652.58
Walker Run	1	100 yr encroachment	Critical	Known WS = 653.58
Walker Run	1	500 yr	Critical	Known WS = 653.89
Walker Run	1	10-yr	Critical	Known WS = 650.89
Walker Run	1	50-yr	Critical	Known WS = 652.09

GEOMETRY DATA

Geometry Title: Proposed Conditions R4
Geometry File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversite E-726-L8\TASKS\Task 10 - Floodplain\Study and Revsions Walker Run\Revisions March 2012\REV 4 HECRAS - Final - Clean\WalkerRunFld.g04

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 6850

INPUT
Description:
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	717.52	.35	717.54	2.18	717.61	3.78	717.66	6.3	717.8
7.85	717.82	12.81	718	20.71	718.1	21.89	718.12	30.23	718.06
30.44	718.06	34.3	718	34.95	717.97	35.49	717.93	40.01	717.62
40.91	717.52	41.61	717.38	43.04	717.13	43.18	717.1	43.68	717.04
43.98	717	47.48	716.55	50.04	716.18	50.95	716	52.04	715.78
54.81	715	56.01	714.66	58.49	714	60.5	713.45	61.8	713
73.57	712.06	74.45	712	75.39	711.91	76.44	711.85	84.53	711.28
90.32	711	91.39	710.93	91.8	710.91	92.02	710.89	92.48	710.85
96.49	710.55	101.47	710	102.88	709.75	104.15	709.32	104.25	709.26
104.43	709.22	104.66	709.19	104.87	709.2	105.86	709.3	106.32	709.38
107.84	709.67	109.84	710	112.63	710.84	113.19	711	113.34	711.06
116.12	712	118.92	712.94	119.09	713	119.23	713.05	122.01	714
123.04	714.38	124.97	715	126.95	715.63	128.05	716	130.39	716.75
131.16	717	132.68	717.25	138.64	718	141.42	718.08	146.9	718.11
148.71	718.06	153.13	718	156.17	717.38	157.97	717	159.64	716.99
159.72	716.99	161.24	717	161.76	717	162.96	717.28	166.09	718
167.49	718.26	174.81	719	177.43	719.22	185.26	719.81	186.71	719.92
187.13	719.95	187.68	720	195.49	720.55	201.16	721	207.47	721.56
209.54	721.73	212.78	722	224.62	722.84	226.57	723	236.08	723.8
238.51	724	242.33	724.16	249.45	724.46				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	90.32	.08	113.19	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
90.32	113.19	460	476	490	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 6361

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	703	20	702	30.5	701	41	700	52	699
53.4	698	54.4	697	55.1	696	55.7	695.2	56.8	696
58.9	697	60.6	698	62.7	699	67.6	700	75.9	701
88.7	702	106.3	703	117.8	704	121.2	705	145	706

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	52	.08	62.7	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
52	62.7	438	444	454	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 5930

INPUT
Description:
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	707.61	.21	707.52	1.49	707	3.75	706.23	4.35	706.04
4.46	706	4.67	705.91	6.78	705	7.13	704.87	9.64	704
11.48	703.34	12.46	703	12.85	702.86	15.32	702	16.31	701.64
18.18	701	20.11	700.31	21	700	23.24	699.19	23.8	699
24.33	698.81	26.66	698	27.99	697.57	29.87	697	31.89	696.61
35.21	696	40.81	695.52	43.76	695.24	46.22	695	47.88	694.93
73.56	694	78.44	693.3	80.01	693	80.83	692.64	82.4	692
83.33	692	84.28	692	84.3	692	84.31	692	86.28	692
87.21	692.48	88.27	693	101.79	693.51	104.21	693.59	106.79	693.68
108.18	693.72	110.29	693.73	112.58	693.7	112.72	693.69	118.36	693.78
120.92	693.83	122.97	693.9	125.05	694	139.58	694.93	140.72	695
141.28	695.05	153.31	696	158.07	696.55	162.09	697	166	697.45
170.75	698	174.95	698.5	179.08	699	183.24	699.61	185.81	700
188.27	700.35	192.66	701	196.14	701.53	199.34	702	204.09	702.76
205.4	703	207.13	703.33	210.72	704	213.77	704.54	216.32	705
218.9	705.47	221.12	705.84						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	80.01	.08	88.27	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
80.01	88.27	448.37	429.25	409.23	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 5500

INPUT
Description:
Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.59	1.65	705.28	3.11	705	3.68	704.9	9.3	704

10.58	703.79	14.78	703	14.79	703	19.67	702.91	20.62	702.9
22.18	702.9	22.97	702.9	23.58	702.92	24.01	702.94	24.36	702.98
24.87	703	25.93	703.05	26.08	703.05	35.07	703.38	37.21	703.44
39.27	703.47	41.12	703.49	42.58	703.48	43.53	703.46	44.12	703.41
44.76	703.31	46.18	703	46.94	702.52	47.85	702	48.86	701.36
49.48	701	50.69	700.22	51.08	700	51.86	699.5	52.59	699
53.94	698.19	54.24	698	54.73	697.69	55.88	697	57.44	696.04
57.51	696	57.79	695.83	59.23	695	60.7	694.11	60.9	694
62.37	693.25	62.91	693	62.98	692.98	65.37	692	65.4	691.99
66.48	691.55	67.85	691	67.95	691	75.95	691	79.78	691
84.86	691	87.6	691	89.79	691	96.84	691	105.06	691
105.18	691	106.9	691	107.22	691	114.51	691	116.13	691
118.28	691.39	121.68	692	123.18	692.64	124.03	693	126.02	693.87
126.33	694	127.25	694.4	128.76	695	129.16	695.13	132.13	696
132.9	696.22	135.68	697	137.76	697.61	139.16	698	139.62	698.13
142.67	699	143.27	699.17	146.17	700	149.04	700.82	149.66	701
150.18	701.16	153.12	702	153.66	702.15	156.6	703	158.09	703.4
160.27	704	162.03	704.45	164.06	705	166.44	705.61	168.26	706
169.59	706.33								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	66.48	.08	118.28	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
66.48	118.28	758.93	739.98	740.88	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4750

INPUT
Description:
Station Elevation Data num= 130

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	719.11	7.68	719	10.17	718.76	18.45	718	20.03	717.49
21.92	717	22.84	716.49	23.71	716	24.48	715.58	25.43	715
26.3	714.49	27.18	714	28.1	713.46	28.92	713	29.88	712.44
30.65	712	31.64	711.37	32.27	711	33.35	710.38	33.99	710
35.06	709.39	35.7	709	36.83	708.35	37.43	708	38.7	707.26
39.13	707	39.54	706.76	40.87	706	42.26	705.19	42.58	705
43.96	704.19	44.31	704	45.75	703.16	46.03	703	47.5	702.13
47.72	702	49.25	701.01	49.26	701	49.27	700.99	50.71	700
51.78	699.09	51.92	699	52.06	698.89	53.27	698	53.57	697.79
54.58	697	55.07	696.68	55.87	696	56.82	695.31	57.23	695
58.25	694.16	58.5	694	60.18	693.01	60.19	693	60.23	692.98
62.33	692	64.4	691	64.41	691	66.77	690	68.03	689.39
68.88	689	70.28	688.56	71.66	688	73.93	687.54	76.53	687
79.74	686.35	81.27	686	83.57	685.49	85.56	685	86.56	684
89.9	684	94.99	684	124.36	684	137.07	684	144.81	684
176.24	685	176.89	685.09	183.88	686	186.34	686.5	188.39	687
191.16	687.7	192.31	688	193.07	688.2	196.16	689	197.57	689.37
200.05	690	206.17	690.93	206.7	691	214.37	691.48	215.87	691.59
217.4	691.74	217.65	691.76	218.07	691.79	218.54	691.81	219.08	691.82
219.68	691.82	220.29	691.82	221.04	691.82	221.15	691.82	221.32	691.79
221.59	691.74	222.48	691.36	223.33	691	225.37	690.05	225.47	690
225.68	689.91	227.73	689	229.96	688.11	230.23	688	230.4	687.93
232.65	687	233.17	686.93	233.41	686.89	233.91	686.96	234.15	687
234.42	687.11	236.86	688	237.5	688.24	239.62	689	242.37	690
245.17	691	245.95	691.05	247.15	691.13	252.96	691.51	261.76	692
269.9	692.26	288.24	692.9	290.57	692.98	291.12	693	296.01	693.22

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	85.56	.08	176.24	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
85.56	176.24	238.3	226.5	190.7	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4530

INPUT
Description: U/S XS of Beaver Dam Pond Culvert
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	695.63	.38	695.48	1.28	695.09	1.48	695	3.09	694.51
5.01	694	8.08	693.32	9.54	693	12.07	692.33	13.44	692
15.74	691.32	16.91	691	18	690.72	20.83	690	24.22	689.15
24.81	689	28.69	688.02	28.78	688	28.95	687.96	29.27	687.87
32.8	687	37.18	686.21	38.3	686	39.25	685.85	44.98	685
46.66	685	47.66	684	49.21	684	50.78	684	51.95	684
53.56	684	58.64	684	62.64	684	65.43	684	71.47	684
82.7	684	83.09	684	98.62	684	101.48	684	107.38	684
109.3	684	123.54	684	124.7	684	147.47	684	168.98	684
177.3	684	180.32	684	182.51	684	188.98	684	190.4	684
193.03	684	193.27	684	193.44	684	194.9	684	194.96	684
195.01	684	195.13	684	196.34	684	196.91	684	203.33	684
207.17	684	210.36	684	211.96	684	215.52	684	218.11	684
220.77	684	224.16	684	231.87	684	239.24	684	245.5	685

253.07	685	256.85	685.84	257.54	686	258.89	686.31	259.73	686.43
261.48	686.68	262.26	686.84	263.03	687	264	687.21	267.77	688
269.77	688.4	272.58	689	280.78	689.37	283.12	689.52	287.24	689.8
289.93	690	303.56	690.88	305.27	691	307.07	691.07	307.94	691.11

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.25	.08	256.85	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
39.25	256.85	26.8	29.2	29.5	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	103	685	F
109	307.94	685	F

CULVERT

RIVER: Tributary
REACH: 1 RS: 4528

INPUT
Description: Beaver Dam Pond Culvert
Distance from Upstream XS = 10.5
Deck/Roadway Width = 4
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 126

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	699.94		.08	699.93		.17	699.9	
.37	699.82		1.81	699.59		4.29	699.12	
4.86	699		5.91	698.73		7.54	698.44	
9.65	698		12.65	697.57		15.79	697	
17.04	696.74		19.94	696		20.51	695.88	
24.52	695		25.05	694.9		29.34	694	
29.78	693.91		34.3	693		38.09	692.22	
39.2	692		43.19	691.18		43.98	691	
44.34	690.93		44.67	690.88		49.26	690	
51.11	689.68		55.23	689		60.28	688.18	
61.36	688		65.16	687.39		67.46	687	
68.34	686.86		70.96	686.33		80.51	686.24	
80.67	686.24		84.94	686.05		86.72	686.04	
89.52	686.04		93.66	686.03		94.45	686.03	
95.14	686.02		96.47	686.02		97.36	686.02	
101.68	686.02		102.68	686.02		104.7	686.03	
105.44	686.03		109.35	686.02		114.19	686.01	
117.38	686		119.45	685.81		120.95	685.78	
123.15	685.61		123.97	685.38		125.3	685	
127.21	685		132.46	685		134.61	685	
139.57	685		141.83	685		144.59	685	
147.06	685		149.69	685		153.25	685	
155	685		158.41	685		163.68	685	
164.26	685		164.58	685		172.54	685	
173.23	685		174.29	685		182.66	685	
183.32	685		185.42	685		189.93	684.94	
190.82	684.95		198.27	684.93		198.45	684.93	
205.79	684.9		205.98	684.91		206.25	684.92	
207.99	685		214.82	685		215.17	685	
216.22	685		218.29	685		218.85	685	
220.55	685		221.47	685		221.8	685	
222.26	685		222.79	685		223.34	685	
225.66	685		229.27	685		229.91	685	
232.18	685		233.95	685		235.25	685	
238.49	685		239.5	685		240.33	685	
240.63	685		242.95	685		245.9	685	
246.88	685		249.8	685		250.83	685	
252.46	685		260.7	685		262.47	685.37	
265.16	686		268.07	686.63		269.63	687	
272.57	687.71		273.81	688		274.81	688.23	
278.02	689		278.88	689.03		292.31	689.45	
305.41	690		309.17	690.2		310.77	690.28	

Upstream Bridge Cross Section Data
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	695.63	.38	695.48	1.28	695.09	1.48	695	3.09	694.51
5.01	694	8.08	693.32	9.54	693	12.07	692.33	13.44	692
15.74	691.32	16.91	691	18	690.72	20.83	690	24.22	689.15
24.81	689	28.69	688.02	28.78	688	28.95	687.96	29.27	687.87
32.8	687	37.18	686.21	38.3	686	39.25	685.85	44.98	685
46.66	685	47.66	684	49.21	684	50.78	684	51.95	684
53.56	684	58.64	684	62.64	684	65.43	684	71.47	684
82.7	684	83.09	684	98.62	684	101.48	684	107.38	684
109.3	684	123.54	684	124.7	684	147.47	684	168.98	684
177.3	684	180.32	684	182.51	684	188.98	684	190.4	684
193.03	684	193.27	684	193.44	684	194.9	684	194.96	684
195.01	684	195.13	684	196.34	684	196.91	684	203.33	684
207.17	684	210.36	684	211.96	684	215.52	684	218.11	684
220.77	684	224.16	684	231.87	684	239.24	684	245.5	685
253.07	685	256.85	685.84	257.54	686	258.89	686.31	259.73	686.43
261.48	686.68	262.26	686.84	263.03	687	264	687.21	267.77	688
269.77	688.4	272.58	689	280.78	689.37	283.12	689.52	287.24	689.8
289.93	690	303.56	690.88	305.27	691	307.07	691.07	307.94	691.11

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.25	.08	256.85	.05

Bank Sta: Left Right Coeff Contr. Expan.

39.25	256.85	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	103	685	F
109	307.94	685	F

Downstream Deck/Roadway Coordinates

num= 126

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	699.94		.08	699.93		.17	699.9	
.37	699.82		1.81	699.59		4.29	699.12	
4.86	699		5.91	698.73		7.54	698.44	
9.65	698		12.65	697.57		15.79	697	
17.04	696.74		19.94	696		20.51	695.88	
24.52	695		25.05	694.9		29.34	694	
29.78	693.91		34.3	693		38.09	692.22	
39.2	692		43.19	691.18		43.98	691	
44.34	690.93		44.67	690.88		49.26	690	
51.11	689.68		55.23	689		60.28	688.18	
61.36	688		65.16	687.39		67.46	687	
68.34	686.86		70.96	686.33		80.51	686.24	
80.67	686.24		84.94	686.05		86.72	686.04	
89.52	686.04		93.66	686.03		94.45	686.03	
95.14	686.02		96.47	686.02		97.36	686.02	
101.68	686.02		102.68	686.02		104.7	686.03	
105.44	686.03		109.35	686.02		114.19	686.01	
117.38	686		119.45	685.81		120.95	685.78	
123.15	685.61		123.97	685.38		125.3	685	
127.21	685		132.46	685		134.61	685	
139.57	685		141.83	685		144.59	685	
147.06	685		149.69	685		153.25	685	
155	685		158.41	685		163.68	685	
164.26	685		164.58	685		172.54	685	
173.23	685		174.29	685		182.66	685	
183.32	685		185.42	685		189.93	684.94	
190.82	684.95		198.27	684.93		198.45	684.93	
205.79	684.9		205.98	684.91		206.25	684.92	
207.99	685		214.82	685		215.17	685	
216.22	685		218.29	685		218.85	685	
220.55	685		221.47	685		221.8	685	
222.26	685		222.79	685		223.34	685	
225.66	685		229.27	685		229.91	685	
232.18	685		233.95	685		235.25	685	
238.49	685		239.5	685		240.33	685	
240.63	685		242.95	685		245.9	685	
246.88	685		249.8	685		250.83	685	
252.46	685		260.7	685		262.47	685.37	
265.16	686		268.07	686.63		269.63	687	
272.57	687.71		273.81	688		274.81	688.23	
278.02	689		278.88	689.03		292.31	689.45	
305.41	690		309.17	690.2		310.77	690.28	

Downstream Bridge Cross Section Data

Station Elevation Data num= 122

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	698.39	2.25	698	3.51	697.78	8.04	697	10.4	696.58
13.75	696	17.58	695.27	19.01	695	24.3	694.01	24.35	694
24.36	694	24.39	693.99	24.56	693.96	29.6	693	29.96	692.93
34.84	692	35.26	691.92	40.08	691	40.93	690.86	43.54	690.41
45.59	690	46.73	689.76	50.78	689	51.85	688.8	56.28	688
56.66	687.94	56.88	687.91	57.21	687.86	62.06	687	64.06	686.74
67.41	686.48	73.1	686	73.58	685.87	76.63	685.77	78.89	685.6
81.72	685.36	82.81	685.28	83.36	685.25	84.22	685.21	84.7	685.21
87.07	685.08	87.43	685.08	88.66	685	90.82	684.79	91.94	684.65
92.9	684.44	93.35	684.38	94.01	684.33	94.9	684.3	99.29	684.28
104.43	684.19	106.71	684.15	109.3	684.08	111.09	684	111.21	683.99
112.38	683.85	113.67	683.78	114.6	683.71	115.76	683.68	117.21	683.5
118.12	683.44	119.46	683.39	121.24	683.35	122.15	683.37	127.52	683.35
131.92	683.3	134.65	683.33	135.14	683.32	139.51	683.33	140.67	683.32
141.87	683.33	142.84	683.34	143.7	683.37	146.54	683.44	152.28	683.42
157.84	683.49	163.36	683.36	165.79	683.33	166.88	683.33	172.36	683.22
173.32	683.21	176.18	683.19	177.33	683.17	190.83	683.03	191.87	683
198.11	682.59	198.65	682.57	200.68	682.65	201.32	682.65	205.33	682.59
206.51	682.67	207.73	682.75	210.04	682.71	210.84	682.68	212.81	682.65
213.82	682.63	213.87	682.6	216.59	682.57	219.18	682.57	222.09	682.65
229.54	682.91	231.92	683	232.46	683.21	234.58	684	235.86	684.47
237.43	685	237.7	685.1	240.19	686	245.86	686.3	256.09	687
266.97	687.52	275.91	688	283.94	688.34	286.47	688.44	294.52	688.78
302.29	689	315.27	689.42	320.65	689.56	325.31	689.67	329.74	689.81
338.75	689.97	339.92	689.99						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	117.21	.08	146.54	.05

Bank Sta: Left Right Coeff Contr. Expan.

117.21	146.54	.3	.5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical

Downstream Embankment side slope = 0 horiz. to 1.0 vertical

Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name Shape Rise Span
Culvert #1 Circular 2
FHWA Chart # 55- Circular Culvert
FHWA Scale # 1 - Smooth tapered inlet throat
Solution Criteria = Highest U.S. EG

Culvert Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
4.3	18	.013	.013	0	.5	1

Upstream Elevation = 679.28
Centerline Station = 106
Downstream Elevation = 679.1
Centerline Station = 122

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4500

INPUT
Description: D/S XS of Beaver Dam Pond Culvert
Station Elevation Data num= 122

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	698.39	2.25	698	3.51	697.78	8.04	697	10.4	696.58
13.75	696	17.58	695.27	19.01	695	24.3	694.01	24.35	694
24.36	694	24.39	693.99	24.56	693.96	29.6	693	29.96	692.93
34.84	692	35.26	691.92	40.08	691	40.93	690.86	43.54	690.41
45.59	690	46.73	689.76	50.78	689	51.85	688.8	56.28	688
56.66	687.94	56.88	687.91	57.21	687.86	62.06	687	64.06	686.74
67.41	686.48	73.1	686	73.58	685.87	76.63	685.77	78.89	685.6
81.72	685.36	82.81	685.28	83.36	685.25	84.22	685.21	84.7	685.21
87.07	685.08	87.43	685.08	88.66	685	90.82	684.79	91.94	684.65
92.9	684.44	93.35	684.38	94.01	684.33	94.9	684.3	99.29	684.28
104.43	684.19	106.71	684.15	109.3	684.08	111.09	684	111.21	683.99
112.38	683.85	113.67	683.78	114.6	683.71	115.76	683.68	117.21	683.5
118.12	683.44	119.46	683.39	121.24	683.35	122.15	683.37	127.52	683.35
131.92	683.3	134.65	683.33	135.14	683.32	139.51	683.33	140.67	683.32
141.87	683.33	142.84	683.34	143.7	683.37	146.54	683.44	152.28	683.42
157.84	683.49	163.36	683.36	165.79	683.33	166.88	683.33	172.36	683.22
173.32	683.21	176.18	683.19	177.33	683.17	190.83	683.03	191.87	683
198.11	682.59	198.65	682.57	200.68	682.65	201.32	682.65	205.33	682.59
206.51	682.67	207.73	682.75	210.04	682.71	210.84	682.68	212.81	682.65
213.82	682.63	213.87	682.6	216.59	682.57	219.18	682.57	222.09	682.65
229.54	682.91	231.92	683	232.46	683.21	234.58	684	235.86	684.47
237.43	685	237.7	685.1	240.19	686	245.86	686.3	256.09	687
266.97	687.52	275.91	688	283.94	688.34	286.47	688.44	294.52	688.78
302.29	689	315.27	689.42	320.65	689.56	325.31	689.67	329.74	689.81
338.75	689.97	339.92	689.99						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	117.21	.08	146.54	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
117.21	146.54	87.5	99.4	102.5	.3	.5

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4400

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	692.5	36	683	42	682	53	682	65	683
71	682	75	681	85	680	95	679	98	679
129	679	153	678	158.35	677.2	158.8	675.98	159.72	675.78
160.48	676.59	161.3	676.98	165	678	172	679	177	680
195	686	207	687.1						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	153	.08	165	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
153	165	307	307	307	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4093

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	681	2.6	680	5.25	679	8	678	10.5	677
14.7	676	21.5	676	25	677	30.5	677	49	676
71	675	72	673.1	73	673.1	74	675	77.5	676
135	676	153	677	172.5	678	190	679	205	680

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	71	.05	74	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
71	74	397	397	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	25	677	F

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 3696

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	672.16	11	672	18	671	37	670	160	669
165	669	170	670	172.25	671	178	671	185	670
263	670	434.5	671	674	672	754	672	756	669.5
758	669.5	760	672	770	674	805	674	825	675
878	678								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	754	.05	760	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
754	760	340	340	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	674	672	F

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 3356

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-438.69	672.01	-380.28	671.01	-365.82	670.01	28	670.01	100	671.01
194.18	670.23	205.77	669.77	208.9	670.84	210.78	669.09	213.43	668.53
214.16	667.67	215.07	667.67	215.68	667.68	216.52	667.72	217	667.83
219.51	670.12	224.24	671.09	229.11	672.65	234.42	670.53	267.47	672.28
295.86	673.86	312.17	675.66						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-438.69	.1	213.43	.05	219.51	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
213.43	219.51	366	194	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 3162

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	675	44	674	77.6	673	239.6	672	263.8	671
270.3	670	285.6	669	305.8	668	525.6	667	530	666.8
534	666.8	539	667	559.7	667	561	666.5	563	666.5
564	667	568	668	590	669	617	670	628.5	671
634.4	672	695	679.55	695.1	686				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	559.7	.05	564	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
559.7	564	110	102	100	.1	.3

BRIDGE

RIVER: Tributary
REACH: 1 RS: 3108

INPUT

Description: RR bridge No 5
Distance from Upstream XS = 32
Deck/Roadway Width = 28
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 11

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-134.4	695	0	160.28	691.73	0	160.29	691.73	681.48
249.4	690.73	680.48	338.52	689.73	679.48	427.63	688.73	678.48
516.75	687.74	677.49	605.86	686.74	676.49	695	685.74	675.49
695	685.74	0	904.29	691.8	0			

Upstream Bridge Cross Section Data
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	674.84	44	673.84	77.6	672.84	239.6	671.84	263.8	670.84
270.3	669.84	285.6	668.84	305.8	667.84	525.6	666.84	530	666.64
534	666.64	539	666.84	559.7	666.84	561	666.34	563	666.34
564	666.84	568	667.84	590	668.84	617	669.84	628.5	670.84
634.4	671.84	695	679.39	695.1	685.84				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	559.7	.05	564	.1

Bank Sta: Left Right Coeff Contr. Expan.
559.7 564 .1 .3

Downstream Deck/Roadway Coordinates
num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-94.72	691.73	0	-94.71	691.73	681.48	-5.6	690.73	680.48
83.52	689.73	679.48	172.63	688.73	678.48	261.75	687.74	677.49
350.86	686.74	676.49	440	685.74	675.49			

Downstream Bridge Cross Section Data
Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	682.2	10	682.2	60	676.2	64.18	673.2	75.95	672.348
77.44	672.243	78.01	672.2	78.74	672.148	91.82	671.2	100.82	670.331
102.13	670.2	102.99	670.107	111.76	669.2	118.45	668.431	120.59	668.2
124.12	668.015	130.23	667.673	136.79	667.332	138.85	667.2	140.16	667.169
145.2	667.063	154.44	666.88	155.26	666.866	156.3	666.86	158.55	666.854
168.04	666.84	173.87	666.835	180.69	666.847	185.3	666.853	190.3	666.853
194.79	666.85	196.46	666.846	201.96	666.823	205.02	666.814	206.76	666.806
209.03	666.79	211.59	666.765	213.97	666.731	215.69	666.69	218.49	666.59
220.78	666.537	223.52	666.527	226.26	666.477	229.89	666.454	232.73	666.412
234.22	666.404	237.2	666.371	240.44	666.359	242.97	666.338	246.63	666.315
247.3	666.311	257.44	666.22	257.53	666.219	259.69	666.2	269.27	666.169
273.25	666.16	275.98	666.158	277.93	666.162	279.6	666.173	282.51	666.2
288.25	666.362	290.98	666.457	296.08	666.643	311.06	667.2	315.34	667.2
318.74	667.2	319.25	667.057	321.78	666.2	322.5	666.2	323.1	666.2
323.83	666.2	324.35	666.2	336.57	667.147	337.11	667.188	337.27	667.2
344.9	667.768	350.35	668.2	357.48	668.797	362.17	669.2	369.51	669.788
373.99	670.2	381.08	671.009	383.04	671.2	389.62	671.875	393.01	672.2
399.88	672.95	402.18	673.2	402.92	673.296	411.81	674.2	419.61	674.897
422.64	675.2	425.8	675.665	429.64	676.2	431.45	676.482	436.25	677.2
439.62	677.717	440	685.94	540	685.94				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	318.74	.05	337.11	.1

Bank Sta: Left Right Coeff Contr. Expan.
318.74 337.11 .1 .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 5

Pier Data
Pier Station Upstream= 249.39 Downstream= -5.6
Upstream num= 2

Width	Elev	Width	Elev
5	0	5	680.48

Downstream num= 2

Width	Elev	Width	Elev
5	0	5	680.48

Pier Data
Pier Station Upstream= 338.52 Downstream= 83.52
Upstream num= 2

Width	Elev	Width	Elev
5	0	5	679.48

Downstream num= 2

Width	Elev	Width	Elev
5	0	5	679.48

Pier Data

```
Pier Station     Upstream=  427.63    Downstream=  172.63
Upstream     num=       2
    Width   Elev    Width   Elev
       5       0       5  678.48
Downstream     num=       2
    Width   Elev    Width   Elev
       5       0       5  678.48

Pier Data
Pier Station     Upstream=  516.75    Downstream=  261.75
Upstream     num=       2
    Width   Elev    Width   Elev
       5       0       5  677.49
Downstream     num=       2
    Width   Elev    Width   Elev
       5       0       5  677.49

Pier Data
Pier Station     Upstream=  605.86    Downstream=  350.86
Upstream     num=       2
    Width   Elev    Width   Elev
       5       0       5  676.49
Downstream     num=       2
    Width   Elev    Width   Elev
       5       0       5  676.49

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =       2
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Tributary
REACH: 1                  RS: 3060

INPUT
Description: D/S XS of RR Bridge No 5, U/S XS of Bridge No 2, 6
Station Elevation Data    num=      98
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     682      10     682      60     676   64.18     673   75.95 672.148
   77.44 672.043   78.01     672   78.74 671.948   91.82     671  100.82 670.131
  102.13     670  102.99 669.907  111.76     669  118.45 668.231  120.59     668
  124.12 667.815  130.23 667.473  136.79 667.132  138.85     667  140.16 666.969
   145.2 666.863  154.44  666.68  155.26 666.666   156.3  666.66  158.55 666.654
  168.04  666.64  173.87 666.635  180.69 666.647   185.3 666.653   190.3 666.653
  194.79  666.65  196.46 666.646  201.96 666.623  205.02 666.614  206.76 666.606
  209.03  666.59  211.59 666.565  213.97 666.531  215.69  666.49  218.49  666.39
  220.78 666.337  223.52 666.327  226.26 666.277  229.89 666.254  232.73 666.212
  234.22 666.204   237.2 666.171  240.44 666.159  242.97 666.138  246.63 666.115
   247.3 666.111  257.44  666.02  257.53 666.019  259.69     666  269.27 665.969
  273.25  665.96  275.98 665.958  277.93 665.962   279.6 665.973  282.51     666
  288.25 666.162  290.98 666.257  296.08 666.443  311.06     667  315.34     667
  318.74     667  319.25 666.857  321.78     666   322.5     666   323.1     666
  323.83     666  324.35     666  336.57 666.947  337.11 666.988  337.27     667
   344.9 667.568  350.35     668  357.48 668.597  362.17     669  369.51 669.588
  373.99     670  381.08 670.809  383.04     671  389.62 671.675  393.01     672
  399.88  672.75  402.18     673  402.92 673.096  411.81     674  419.61 674.697
  422.64     675   425.8 675.465  429.64     676  431.45 676.282  436.25     677
  439.62 677.517     440  685.74     540  685.74

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1  318.74     .05  337.11      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        318.74  337.11              188     226     141             .1       .3

BRIDGE


RIVER: Tributary
REACH: 1                  RS: 3010

INPUT
Description: Bridge No 2 and Pipe Bridge 6
Distance from Upstream XS =       20
Deck/Roadway Width        =       87
Weir Coefficient          =      2.6
Upstream  Deck/Roadway Coordinates
    num=       7
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
```

```
      0   690.5       0   31.83  690.94       0   31.84  690.94  677.14
 133.42  691.95  678.15  235.92  692.97  679.17  338.42     694   680.2
    440  695.01  681.21

Upstream Bridge Cross Section Data
Station Elevation Data    num=      98
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0      682       10      682       60      676    64.18      673    75.95  672.148
   77.44  672.043    78.01      672    78.74  671.948    91.82      671   100.82  670.131
  102.13      670   102.99  669.907   111.76      669   118.45  668.231   120.59      668
  124.12  667.815   130.23  667.473   136.79  667.132   138.85      667   140.16  666.969
   145.2  666.863   154.44   666.68   155.26  666.666    156.3   666.66   158.55  666.654
  168.04   666.64   173.87  666.635   180.69  666.647    185.3  666.653    190.3  666.653
  194.79   666.65   196.46  666.646   201.96  666.623   205.02  666.614   206.76  666.606
  209.03   666.59   211.59  666.565   213.97  666.531   215.69   666.49   218.49   666.39
  220.78  666.337   223.52  666.327   226.26  666.277   229.89  666.254   232.73  666.212
  234.22  666.204    237.2  666.171   240.44  666.159   242.97  666.138   246.63  666.115
   247.3  666.111   257.44   666.02   257.53  666.019   259.69      666   269.27  665.969
  273.25   665.96   275.98   665.87   277.93  665.962    279.6  665.973   282.51      666
  288.25  666.162   290.98  666.257   296.08  666.443   311.06      667   315.34      667
  318.74      667   319.25  666.857   321.78      666    322.5   665.89    323.1   665.89
  323.83   665.89   324.35      666   336.57  666.947   337.11  666.988   337.27      667
   344.9  667.568   350.35      668   357.48  668.597   362.17      669   369.51  669.588
  373.99      670   381.08  670.809   383.04      671   389.62  671.675   393.01      672
  399.88   672.75   402.18      673   402.92  673.096   411.81      674   419.61  674.697
  422.64      675    425.8  675.465   429.64      676   431.45  676.282   436.25      677
  439.62  677.517      440      695      540      695

Manning's n Values        num=       4
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
       0      .1   124.12      .1   318.74      .05   337.11      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
       318.74  337.11             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       7
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
   -8.16  690.94  677.14    93.42  691.95  678.15   195.92  692.97  679.17
  298.42      694   680.2      400  695.01  681.21   400.01  695.01       0
    435  694.61       0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      25
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
     -50     690.9    -8.16     690.9    -8.16   668.62      9.3   668.62     26.89   667.62
   67.11   666.62      134   665.44      204   665.44   246.49   666.37   252.14   666.64
  254.24   665.51   255.77   665.44   256.85   665.68   257.71   665.64   258.87   666.43
  263.61    666.4   277.29   665.84   309.05   668.44   338.85    672.2   371.24   677.29
  390.72   679.51    420.6   679.96      435   679.96      435   694.61      450   694.61

Manning's n Values        num=       5
     Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
     -50      .1    -8.16      .1    26.89      .1   252.14      .05   258.87      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
       252.14  258.87             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  3

Pier Data
Pier Station     Upstream=  133.42    Downstream=   93.42
Upstream     num=       2
    Width   Elev    Width   Elev
      4.5      0      4.5  678.15
Downstream     num=       2
    Width   Elev    Width   Elev
      4.5      0      4.5  678.15

Pier Data
Pier Station     Upstream=  235.92    Downstream=  195.92
Upstream     num=       2
    Width   Elev    Width   Elev
      4.5      0      4.5  679.17
Downstream     num=       2
    Width   Elev    Width   Elev
      4.5      0      4.5  679.17

Pier Data
Pier Station     Upstream=  338.42    Downstream=  298.42
Upstream     num=       2
    Width   Elev    Width   Elev
      4.5      0      4.5   680.2
Downstream     num=       2
    Width   Elev    Width   Elev
      4.5      0      4.5   680.2
```

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
Momentum Cd = 2
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 2834

INPUT
Description: D/S XS of Bridge No 2, 6
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9.3	668.01	26.89	667.01	67.11	666.01	134	665.01	204	665.01
246.49	665.76	252.14	666.03	254.24	664.9	255.77	664.89	256.85	665.07
257.71	665.03	258.87	665.82	263.61	665.79	277.29	665.23	309.05	667.83
338.85	671.59	371.24	676.68	390.72	678.9	420.6	679.35	435	679.35
435.1	694								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9.3	.1	252.14	.05	258.87	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
252.14	258.87	555.48	553.2	557.76	.1 .3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 2326

INPUT
Description: U/S XS of Pipe Bridge 7
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
29	680	50	670	54	668	112.13	665.01	166.8	663.79
202.29	663.45	249.41	661.77	264.83	661.76	269.31	660.7	271.41	660.2
273.33	660.26	274.88	659.9	275.72	660.03	277.04	661.45	283.76	661.62
343.16	661.53	399.81	661.53	420.98	662.03	448.82	664.09	463.58	664.58
500	696	560	696	593	696	617	698	624	700
634	700	663	690	718	672				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
29	.1	269.31	.05	277.04	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
269.31	277.04	520	520	520	.1 .3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1806

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	664	13	663	30	662	61	661	90	660
95	659.1	103	660	125	661	169	662	219	663
237	664	240	665	243	666	246	667	249	668
252	669								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	90	.05	103	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
90	103	59	59	59	.1 .3

BRIDGE

RIVER: Tributary
REACH: 1 RS: 1790

INPUT
Description: Pipe bridge - No 7
Distance from Upstream XS = 12

```
Deck/Roadway Width        =      10
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=        9
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    -159  677.93       0  -26.01      678       0     -26     678   671.5
      64   681.5     675     154      685   678.5     244   688.5     682
     334     692   685.5  334.01      692       0     341   692.5       0

Upstream Bridge Cross Section Data
Station Elevation Data    num=      16
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0     664       13     663       30     662       61     661       90     660
      95   659.1      103     660      125     661      169     662      219     663
     237     664      240     665      243     666      246     667      249     668
     252     669

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1      90     .05     103      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
           90     103             .1       .3

Downstream  Deck/Roadway Coordinates
    num=        9
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -154.78  677.93       0  -30.01      678       0     -30     678   671.5
      60   681.5     675     150      685   678.5     240   688.5     682
     330     692   685.5  330.01      692       0  345.22   692.5       0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      18
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0     664       15     663       32     662       54     661       73     660
      75     659       78   658.9       83     659       87     660      110     661
     139   661.9      148     662      194     663      223     664      239     665
     249     666      257     667      261     668

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1      73     .05      87      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
           73      87             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  3

Pier Data
Pier Station     Upstream=      64    Downstream=      61
Upstream     num=       2
    Width   Elev    Width   Elev
        3       0       3     675
Downstream     num=       2
    Width   Elev    Width   Elev
        3       0       3     675

Pier Data
Pier Station     Upstream=     154    Downstream=     151
Upstream     num=       2
    Width   Elev    Width   Elev
        3       0       3   678.5
Downstream     num=       2
    Width   Elev    Width   Elev
        3       0       3   678.5

Pier Data
Pier Station     Upstream=     244    Downstream=     241
Upstream     num=       2
    Width   Elev    Width   Elev
        3       0       3     682
Downstream     num=       2
    Width   Elev    Width   Elev
        3       0       3     682

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =     1.2
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
```

Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1747

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	664	15	663	32	662	54	661	73	660
75	659	78	658.9	83	659	87	660	110	661
139	661.9	148	662	194	663	223	664	239	665
249	666	257	667	261	668				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	73	.05	87	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
73	87	89	89	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1658

INPUT
Description: D/S XS of Pipe Bridge No 7
Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	694	36	692	68	676	101	675	119	674
126	673	190	663	207	662	225	661	245.91	659.93
256.45	659.51	262.44	659.72	264.16	658.26	265.67	657.96	267.08	657.99
268.29	658.05	269.24	658.2	271.93	658.6	274.07	659.54	279.61	659.65
322	661	379	662	386	663	416	669	438	670
473	671.2								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	262.44	.05	274.07	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
262.44	274.07	290.04	297.96	301.02	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1360

INPUT
Description: U/S XS of Bridge No 3
Station Elevation Data num= 105

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	692	40	692	41.37	661.85	48.82	661.755	52.16	661.744
55.89	661.708	58.08	661.707	59.26	661.703	60.41	661.694	61.58	661.68
62.81	661.661	65.38	661.618	66.49	661.595	68.85	661.538	72.65	661.501
75.75	661.436	79.04	661.405	85.46	661.35	98.24	661.027	98.37	661.025
99.34	661	102.23	660.857	104.38	660.771	111.18	660.526	123.04	660.053
126.01	660	127.18	659.98	136.22	659.885	136.56	659.877	142.99	659.783
146.79	659.703	155.28	659.601	159.01	659.499	161.23	659.46	166.49	659.282
173.2	659	174.09	658.999	174.21	658.999	191.49	658.982	191.85	658.982
196.28	658.984	198.06	658.985	201.95	658.992	202.85	658.992	204.56	658.995
206.92	659	210.16	659.002	211.98	659.003	212.84	659.002	214.84	659.001
216.87	659.001	217.64	659	217.94	658.88	219.24	658.295	219.7	658.07
219.84	658	220.21	658	226.9	657.83	229.38	658	231.64	658.227
231.99	658.242	234.8	658.391	238.12	658.584	244.74	659	247.18	659.09
278.53	660	280.97	660.065	281.4	660.078	290.08	660.31	296.63	660.471
298.54	660.529	302.43	660.616	311.2	660.867	313.3	660.914	315.27	661
326.87	661.587	329.7	661.73	331.06	661.792	335.65	662	346.63	662.658
348.5	662.778	351.83	663	362.64	663.75	364.72	663.894	365.98	664
369.59	664.346	376.67	665	378.66	665.236	386.46	666	386.77	666.037
394.3	667	396.29	667.279	400.99	668	413.48	668.692	418.73	669
419.36	669.003	420.17	669.006	420.4	669.006	426.91	669.016	427.87	669.017
428.87	669.016	429.6	669.015	429.99	669.014	431	692	481	692

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.07	217.64	.05	244.74	.07

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
217.64	244.74	34	32	30	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 1328

```
INPUT
Description: U/S XS of Bridge No 3
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     667       8     666      19     665      31     664      44     663
      65     662     103     661     163     660     197     659     200   658.5
     203     658     206   657.5     210     658     222 658.522     233     659
     241     660     337     661     404     662     424     663

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .07     200     .05     222     .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          200     222               76      76      76             .1      .3

BRIDGE


RIVER: Tributary
REACH: 1                  RS: 1281

INPUT
Description: Bridge No 3
Distance from Upstream XS =      14
Deck/Roadway Width        =      60
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=       8
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   703.7       0      39  703.91       0      39   703.9   695.4
  174.75  706.62  698.12  311.42  709.35  700.85  447.16  712.06  703.56
  447.16  712.06       0  533.08  712.06

Upstream Bridge Cross Section Data
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0     667       8     666      19     665      31     664      44     663
      65     662     103     661     163     660     197     659     200   658.5
     203     658     206   657.5     210     658     222 658.522     233     659
     241     660     337     661     404     662     424     663

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .07     200     .05     222     .07

Bank Sta: Left   Right    Coeff Contr.   Expan.
          200     222             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       7
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0     700       0   41.84   703.9       0   41.84   703.9   695.4
  177.59  706.62  698.12  314.26  709.35  700.85     450  712.06  703.56
     450  712.06       0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      19
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    4.92     692      73     692      73  660.58  130.71  658.23  195.23  657.77
  245.69  657.68  249.14   657.6  250.31  657.05  253.09  656.64  254.08  656.68
  256.22  657.22  258.88  657.46  262.11  657.67  272.66  658.28  351.77  658.51
  414.17   660.7     449     663     449     710  522.68     710

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    4.92     .07  245.69     .08  262.11     .07

Bank Sta: Left   Right    Coeff Contr.   Expan.
        245.69  262.11             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Piers =  2

Pier Data
Pier Station     Upstream=  174.75    Downstream=  177.59
Upstream     num=       2
    Width   Elev    Width   Elev
      4.5      0      4.5  698.12
Downstream   num=       2
    Width   Elev    Width   Elev
      4.5      0      4.5  698.12

Pier Data
Pier Station     Upstream=  311.42    Downstream=  314.26
Upstream     num=       2
    Width   Elev    Width   Elev
```

```
     4.5       0     4.5  700.85
Downstream     num=       2
    Width   Elev    Width   Elev
     4.5       0     4.5  700.85

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =       2
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Tributary
REACH: 1                    RS: 1252

INPUT
Description: D/S XS of Bridge No 3
Station Elevation Data     num=      19
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    4.92      692       73      692       73   660.58   130.71   658.23   195.23   657.77
  245.69   657.68   249.14   657.6   250.31   657.05   253.09   656.64   254.08   656.68
  256.22   657.22   258.88   657.46  262.11   657.67   272.66   658.28   351.77   658.51
  414.17    660.7      449      663      449      710   522.68      710

Manning's n Values         num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
    4.92      .07   245.69      .08   262.11      .07

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        245.69  262.11              144     147  148.02             .1       .3

CROSS SECTION


RIVER: Tributary
REACH: 1                    RS: 1105

INPUT
Description:
Station Elevation Data     num=      21
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
       0   660.79       58   660.01   182.03   657.52   258.26   657.01   261.27   656.79
  263.66   656.39   267.27    656.3   269.06   655.96   270.58   656.29   271.28   656.21
  272.59   655.65   273.38   655.95   275.14   656.65   277.45   657.28   283.91   657.51
  296.89   657.17   385.44   658.29   430.88   662.41   483.44   665.95      498      668
     551      686

Manning's n Values         num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
       0      .08   258.26      .08   277.45      .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        258.26  277.45              287     295     303             .1       .3

CROSS SECTION


RIVER: Tributary
REACH: 1                    RS: 810

INPUT
Description:
Station Elevation Data     num=      25
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
    3.67   658.53     16.9   657.88      160   656.82   271.95   656.84   302.8   656.15
  307.34   656.47   308.53   655.21   309.94   654.96    311.1   654.83   313.17   654.83
  314.06   654.79   314.94   653.84   315.53   654.71   316.36    654.9   317.37   654.24
   318.8   654.78   320.94   655.51   327.28   655.79   351.67    656.4    565.4   656.84
  602.78   658.01      619      660      626      662      688      664      707      666

Manning's n Values         num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
    3.67      .08   307.34      .08   320.94      .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        307.34  320.94              228     224     222             .1       .3

CROSS SECTION


RIVER: Tributary
REACH: 1                    RS: 587
```

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-362	658.01	-200	657.01	0	656.21	18.41	655.67	92.6	655.34
102.91	654.9	103.88	654.39	105.93	654.47	108.13	654.79	109.33	653.92
110.17	653.78	110.56	654.16	111.32	654.28	112.69	654.85	114.18	654.96
132.53	655.09	307.17	656.16	344.29	658.01				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-362	.08	102.91	.08	114.18	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
102.91	114.18	122	126	127	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 463

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-416	658.01	-250	657.01	-87	656.01	0	655.59	109.8	654.54
194.42	654.32	208.54	654.65	213.7	654.92	215.61	654.29	217.64	654.15
219.79	653.77	223.31	654.2	224.25	653.23	226.46	653.59	227.82	654.41
233.37	654.53	278.57	654.4	400	655.01	496.5	656.01	525.1	657.01
557	658.01								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-416	.08	213.7	.08	233.37	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
213.7	233.37	105	105	104	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 357

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-626.5	660.01	-604.5	658.01	-594.5	657.01	-584.5	656.01	-479.5	655.01
0	655.01	153.93	654.15	175.05	653.71	185.31	653.59	188.41	652.4
191.14	653.59	193.32	653.82	195.38	654.05	198.28	654.41	202.04	654.7
206.36	654.46	350	655.01	528.59	656.01	549.3	657.01	596.9	658.01

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-626.5	.08	185.31	.08	191.14	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
185.31	191.14	179	175	168	.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 183

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-631.8	658.01	-603	657.01	-586	656.01	-551	655.01	-252	654.01
-242	654.01	11.07	654.27	105.3	654.68	160.67	655.27	176.42	654.35
191.7	654.33	196.59	653.2	201.52	652.43	202.85	652.14	208.19	653.86
305.72	654.38	349	655.01	494	656.01	531.9	657.01	611	658.01

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-631.8	.08	191.7	.08	208.19	.08

Bank Sta: Left	Right	Coeff Contr.	Expan.
191.7	208.19	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 5862

INPUT
Description:
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6.57	692.9	16.52	686.09	30.12	679.79	46.8	679.9	59.74	679.08

61.77	675.79	63.16	675.53	66.68	676.21	70.59	676.51	72.5	676.66
75.29	677.24	83.9	677.66	93.4	677.98	108.12	680.46	126.96	680.02
134.28	678.08	144.98	678.89	173.49	677.49	203.06	682.96	252.93	692.83
275.94	705.68	283.35	706.71						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
6.57	.1	59.74	.05	75.29	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
59.74	75.29	286.1	288.2	294.6	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 5547

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9.27	683.2	30.72	673.65	63.49	674.03	97.47	674.46	108.85	672.92
130.75	672.73	212.69	671.49	215.49	671.05	218.29	670.1	219.35	669.38
220.92	669.9	222.1	669.99	224.66	670.6	226.17	670.93	227.99	671.82
230.09	673.4	245.5	678.64	264.68	690.27	273.75	691.73		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9.27	.1	215.49	.05	226.17	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
215.49	226.17	241.9	240.7	241 .3	.5

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 5282

INPUT
Description: u/s XS of Beach Grove Road Bridge
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	681.12	55.69	675.84	85.36	674.65	174.96	673.59	184.04	670.66
207.55	670.04	212.26	669.41	214.34	667.03	219.14	667.34	223.57	668.03
230.88	671.08	241.05	670.68	255.44	674.6	304.55	678.17	320	679.29

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	212.26	.05	230.88	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
212.26	230.88	106.4	106.4	105.8 .3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	174	674.56	F
253	320	674.56	F

BRIDGE

RIVER: Walker Run
REACH: 1 RS: 5250

INPUT
Description:
Distance from Upstream XS = 22.3
Deck/Roadway Width = 19.3
Weir Coefficient = 2.5
Upstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
50	674.39		171.95	675		201.95	675.12	
201.96	677.41	0	202.64	677.41	0	214.6	677.42	667.71
216.27	677.42	671.5	217.27	677.42	672.7	218.96	677.42	673.3
219.96	677.43	673.4	220.96	677.43	673.3	222.65	677.43	672.7
224.11	677.43	671.5	226.87	677.43	668.95	226.9	677.43	0
237.26	677.43	0	237.27	675.18		269.27	675.39	

Upstream Bridge Cross Section Data
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	681.12	55.69	675.84	85.36	674.65	174.96	673.59	184.04	670.66
207.55	670.04	212.26	669.41	214.34	667.03	219.14	667.34	223.57	668.03
230.88	671.08	241.05	670.68	255.44	674.6	304.55	678.17	320	679.29

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	212.26	.05	230.88	.1

Bank Sta: Left	Right	Coeff Contr.	Expan.
212.26	230.88	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent

```
      0     174  674.56       F
    253     320  674.56       F

Downstream  Deck/Roadway Coordinates
    num=      19
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
   113.7  674.36           242.5     675          272.49  675.12
   272.5  677.34       0  273.18   677.4       0  285.14  677.49       0
  285.74  677.48  667.76  286.81  677.42  670.88  287.81  677.42  672.08
   289.5  677.42  672.68   290.5  677.64  672.78   291.5  677.43  672.68
  293.19  677.43  672.08  294.65  677.43  670.88   296.8  677.43  668.66
  307.99  677.19       0     308  675.18             340  675.39
   378.7  675.68

Downstream Bridge Cross Section Data
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   692.9      17     691      21     690      37     686      45     685
      89     679     101     678     109     677     151     670     246     669
     259     668   291.5  665.45     300     668     305     669     314     670
     348     671     357     672     363     673     383     678     400     679
     432     679     453     688     519     703     524     704     635   731.9

Manning's n Values        num=      3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1     246     .05     305      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
          246     305             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =   674.6
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
      Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
      Pressure and Weir flow
          Submerged Inlet Cd          =
          Submerged Inlet + Outlet Cd =      .8
          Max Low Cord                =

Additional Bridge Parameters
      Add Friction component to Momentum
      Do not add Weight component to Momentum
      Class B flow critical depth computations use critical depth
          inside the bridge at the upstream end
      Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 5198

INPUT
Description: FEMA BIA d/s XS of Beach Grove Road Bridge
Station Elevation Data    num=      25
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   692.9      17     691      21     690      37     686      45     685
      89     679     101     678     109     677     151     670     246     669
     259     668   291.5  665.45     300     668     305     669     314     670
     348     671     357     672     363     673     383     678     400     679
     432     679     453     688     519     703     524     704     635   731.9

Manning's n Values        num=      3
     Sta   n Val     Sta   n Val     Sta   n Val
       0      .1     246     .05     305      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          246     305               69    63.3    68.4             .3       .5

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 5107

INPUT
Description:
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   678.5      32     672      43     671      66     670     133     669
     144     667  158.69  666.07  161.58  664.84  163.25  664.65  164.42  664.59
  165.79  665.03  166.43  665.04  169.94   666.9     220     667     228     669
     275     670     303     671     314     672     322     673     348  678.75
```

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	144	.05	169.94	.1	228	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
144	169.94	278.8	275.8	274.5	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4810

INPUT
Description:
Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-10	675	0	673.03	22.15	670.47	30.66	668.65	57.63	668.16
64.81	668.208	65.68	668.122	66.08	668	70.73	667.243	71.83	667.059
72.15	667	75.4	666.647	81.53	666	105.92	665.242	113.64	665
113.91	664.818	115.25	664	116.22	663.356	116.96	663	118.18	662.871
119.73	662.932	120.24	663	120.56	663.14	122.83	664	125.34	664.475
128.1	665	133.43	665.032	135.86	665.045	154.3	665.142	162.99	665.18
165.61	665.201	178.31	665.3	180.17	665.3	180.7	665.3	181.83	665.3
185.8	665.25	190.21	665.165	200.97	665	211.96	665.141	223.37	665.3
234.5	665.753	241.06	666	241.82	666.19	245.06	667	247.93	667.645
249.2	668	249.5	668	250	668.001	252.44	668.004	252.46	668.004
252.53	668.004	255.19	668.001	255.55	668.001	256.08	668	257.45	667.938
257.73	667.957	257.9	667.966	258.59	667.961	288.1	666.6	321.23	667.68
361.14	676.54								

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-10	.1	0	.1	57.63	.11	113.64	.05	128.1	.11
258.59	.1								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
113.64	128.1	116.3	116.4	116.7	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4692

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
2.2	676.54	14.2	673.9	29.44	673.96	39.22	671.77	100.41	668.46
115.19	668	117.8	668	120.39	668	122.3	668	124.73	667.454
126.96	667	129.52	666.456	131.99	666	134.43	665.482	136.94	665
150.39	664.915	174.31	664.51	176.11	664.456	178.71	664.392	181.33	664.388
187.44	664.226	195.53	664	197.09	663.916	198.85	663.834	200.84	663.787
201.06	663.773	203.64	663.897	206.14	664	216.1	664.145	218.05	664.16
224.56	664.251	229.54	664.259	234.53	664.327	280.45	664.929	282.17	664.936
287.78	665	294.26	665.639	297.98	666	300.25	666.484	302.51	667
307.96	666.83	316.64	666.554	320.98	666.408	322.95	666.329	329.57	666.282
329.66	666.29	331.96	666.203	380.91	669.4	419.8	678	423	676
424	676	433	680						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
2.2	.1	136.94	.11	195.53	.05	206.14	.11	302.51	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
195.53	206.14	239.8	240.2	242	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 4414

INPUT
Description:
Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-12	675	-5.7	673.7	1.31	671.76	19.96	669.88	70.87	667.77
105.71	667	105.98	666.94	109.83	666	110.36	665.876	114.28	665
128.45	664.158	137.09	664.014	137.29	664.006	138.95	664	151.88	663.973
152.23	663.974	164.32	663.974	164.86	663.977	169.07	663.978	172.77	663.817
173.49	663.764	174.35	663.649	175.33	663.466	177.51	663.013	177.55	663.014
178.12	663	178.49	662.971	178.66	663	179.14	663.063	181.06	663.262
181.27	663.281	183.82	663.485	186.11	663.666	187.66	663.778	188.15	663.78
188.44	663.796	189.28	663.798	189.93	663.833	190.54	663.877	202.44	664
207.78	664	207.97	664	208.27	664	223.32	664	224.04	664
226.1	664	236.4	664	239.7	664	246.89	664	252.71	664
263.16	664.644	269.13	665	271.32	665.454	274.29	666	289.21	666.75
296.88	667.165	298.28	666.355	316.64	665.969	317.16	665.968	317.2	666
317.52	666	318.14	666	318.59	666	331.76	668.59	383	676
385	674	387	674	400	680	425	690		

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val

```
    -12      .1    -5.7      .1  128.45     .11  169.07     .05  190.54     .11
 331.76      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        169.07  190.54             234.7   242.5   250.6             .1      .3

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 4130

INPUT
Description:
Station Elevation Data    num=      52
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      -5     675    9.79  672.78   38.19  668.15   65.97  666.24   90.55 666.158
   91.61 666.009   91.72     666   92.08 665.946   98.82     665  100.19 664.775
  105.05     664  106.39 663.159  106.76     663  107.96 662.985  116.25 662.936
  120.19 662.935  124.72 662.947   127.3 662.968  130.71     663  136.98     663
  145.11     663  151.76     663   154.8     663  156.55     663  160.84 662.674
  166.49 662.262  171.27 662.654   174.9     663  179.99 663.043  180.66  663.04
     190 663.361  198.82 663.597  210.12     664  213.33 664.489  215.93     665
   218.2 664.985  218.74 664.983  220.89 664.961  221.71 664.955  226.08 664.933
  227.28 664.933  229.38 664.933  237.05 664.971  238.12 664.969  239.02     665
  253.95  665.83  269.33  665.98  370.38  665.85  415.17  670.09     473     672
     491     680     517     692

Manning's n Values        num=       6
     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
      -5      .1    9.79      .1   90.55     .11  156.55     .05   174.9     .11
 239.02      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        156.55  174.9              121   125.4   126.4             .3      .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
      -5    5.49   666.5        F
  352.29     517   666.5        F

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 3972

INPUT
Description: U/S XS of Market Street Bridge
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  124.69   672.5  129.69     672  149.69     671  157.69     671  183.69     671
  188.69     670  192.69     669  208.69     667  218.69     666  223.52     665
   225.4     663  270.18  661.21  277.41   661.6  281.39  661.43  285.52  661.64
   287.4     663   295.4     664  298.04  664.77  299.32  664.86  327.69     665
  439.69     666  491.69     666  650.69     667  703.69     670  733.69     672
  793.69     702

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  124.69      .1   225.4     .05  299.32      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         225.4  299.32             103.8   104.6     107             .3      .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  124.69   225.4   666.5        F
   341.4  793.69   666.5        F

BRIDGE


RIVER: Walker Run
REACH: 1                  RS: 3914

INPUT
Description:
Distance from Upstream XS =    40.1
Deck/Roadway Width        =    43.1
Weir Coefficient          =     2.5
Upstream  Deck/Roadway Coordinates
    num=      16
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       3 673.611       0    74.3 672.778          154.64 671.546
  219.18 671.069          257.71   670.8          269.91   670.8
  269.92  673.78  669.04   275.2  673.78  669.04  286.42  673.78  669.04
  286.43  673.78             288  673.78           288.1  670.45
  290.02   670.3          342.19 669.234          438.84 667.629
  583.41  666.57

Upstream Bridge Cross Section Data
Station Elevation Data    num=      26
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  124.69   672.5  129.69     672  149.69     671  157.69     671  183.69     671
  188.69     670  192.69     669  208.69     667  218.69     666  223.52     665
   225.4     663  270.18  661.21  277.41   661.6  281.39  661.43  285.52  661.64
```

```
  287.4     663   295.4     664  298.04  664.77  299.32  664.86  327.69     665
 439.69     666  491.69     666  650.69     667  703.69     670  733.69     672
 793.69     702

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  124.69      .1   225.4     .05  299.32      .1

Bank Sta: Left   Right    Coeff Contr.   Expan.
         225.4  299.32            .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
  124.69   225.4   666.5       F
   341.4  793.69   666.5       F

Downstream  Deck/Roadway Coordinates
    num=      16
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0 673.611           71.3 672.778          151.64 671.546
  216.18 671.069          254.71   670.8          266.91   670.8
  266.92  673.42  668.72   272.2  673.42  668.72  283.42  673.42  668.72
  283.43  673.42             285  673.42           285.1  670.45
  289.14   670.3          339.19 669.234          435.84 667.629
     550     666

Downstream Bridge Cross Section Data
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  117.66  675.84  137.05  672.03  181.62  671.65  219.23  671.09  253.06  668.65
  262.64  664.21  265.16  663.32  266.08  661.15  272.52  660.73  283.67  661.59
  288.12  663.96  295.78  666.15  334.66  665.91  453.82   665.5   620.6     667
  636.24     668   654.4     669

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  117.66      .1  265.16    .055  288.12     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
         265.16  288.12            .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =   667.3
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
      Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
      Pressure and Weir flow
          Submerged Inlet Cd          =
          Submerged Inlet + Outlet Cd =      .8
          Max Low Cord                =

Additional Bridge Parameters
      Add Friction component to Momentum
      Do not add Weight component to Momentum
      Class B flow critical depth computations use critical depth
          inside the bridge at the upstream end
      Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 3860

INPUT
Description: D/S XS of Market Street Bridge
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  117.66  675.84  137.05  672.03  181.62  671.65  219.23  671.09  253.06  668.65
  262.64  664.21  265.16  663.32  266.08  661.15  272.52  660.73  283.67  661.59
  288.12  663.96  295.78  666.15  334.66  665.91  453.82   665.5   620.6     667
  636.24     668   654.4     669

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
  117.66      .1  265.16    .055  288.12     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         265.16  288.12            145.3   134.5   132.2            .3       .5

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 3735
```

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
46.72	679.91	74.63	675.8	101.02	670.65	135.38	669.18	157.56	666.89
174.59	661	186.31	660.48	186.72	660.36	187.27	660.56	190.57	661
193.83	661	195.08	661	203.49	661.11	234.44	661.6	236.03	661.59
238.97	661.63	240.01	661.61	241.57	661.64	242.67	661.63	244.2	661.62
247.27	661.68	250.62	661.71	252.67	661.76	261.64	661.92	262.33	661.94
265.73	662	269.46	662.52	272.84	663	275.62	663.39	281.52	664
284.12	664.07	287.2	664.13	298.4	664.17	306.64	664.14	340	664
396	664	402	665	420	666	422	666	440	666
642.15	669.34								

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
46.72	.1	174.59	.055	190.57	.1	340	.04

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
174.59	190.57	191.4	181.9	171.6	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 3532

INPUT
Description: FEMA BHT
Station Elevation Data num= 30

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	694.1	1	694	22	689	29	688	41	685
89	676	139	670	148	669	169	667	174	666
177	665	188	660	199	660	207	662	214	663
235	663	243	661	323	660	330	659.5	337	660
397	661	409	663	413	664	417	665	442	665
445	664	455	664	543	665	564	666	630	670

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.08	188	.1	323	.06	337	.1	413	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
323	337	112.8	111.5	111.9	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 3410

INPUT
Description:
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
33.79	674.7	76.45	668.35	118.62	664.23	124.75	661.35	124.85	661.36
127.56	661.14	129.03	661	130.2	660.26	130.68	660	138.5	660
142.94	660	147.75	660.61	151	661	157.96	661.36	165.48	661.49
172.81	661.72	182.05	661.83	185.53	661.89	186.48	661.9	195.32	661.95
195.65	661.95	195.89	661.95	196.08	661.94	196.17	661.94	196.63	661.89
202.22	661.25	203.08	661.21	203.57	661.16	203.9	661.1	204.29	661
215	660	286.94	660	292.1	659.48	292.19	659.47	295.01	659.02
296.11	658.92	296.16	658.92	297.06	658.95	297.65	659	299.62	659.46
301.23	660	305.18	660.06	360	660.06	368.41	661	368.55	661.04
372.42	662	372.5	662.02	376.43	663	381.4	662.93	385.18	663.96
402.12	664.21	496	665	503	664	541	664	604	665
646	666								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
33.79	.08	124.75	.1	286.94	.05	301.23	.1	372.42	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
286.94	301.23	124.5	128.5	131.4	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 3278

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
40.42	666.96	56.89	663.45	68.42	662.57	75.07	662.03	76.37	661
81.04	660.09	81.46	660	94.29	659.62	111.19	659.22	111.85	659.22
111.94	659.22	112.62	659.22	117.52	659.24	139.22	659.04	153.04	659.01
156.74	659.01	160.34	659	161.5	658.49	163.91	658.08	164.9	658
166.03	657.99	166.14	658.05	168.81	658.44	172.27	658.76	173.42	658.88
173.99	658.91	175.26	659	190.83	659.05	204.68	659.1	212.3	659.12
225	659.2	231.3	659.22	242	659.3	255.25	659.3	277.78	659.08
286.69	659.25	289.27	659.3	300.2	659.49	332.26	660	335.19	660.73
336.28	661	339.14	661.71	340.3	662	341.7	662.33	342.25	662.47
343.67	662.84	343.81	662.88	344.38	662.72	345.42	662.71	450	666

```
     453     668     653     668

Manning's n Values          num=        5
      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
    40.42     .06    76.37     .08   160.34     .05   175.26     .08    340.3     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        160.34  175.26              325.2   323.2   320.7             .1      .3

CROSS SECTION


RIVER: Walker Run
REACH: 1                    RS: 2949

INPUT
Description:
Station Elevation Data      num=       74
      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
        0     710     17.6     706     26.4     706      38     710      83     688
    96.72  659.48   106.73  659.92   109.72  659.69   111.72  659.53   118.37  659.09
   118.87  659.08   119.65     659   131.83  658.19   134.85     658   141.52  657.88
   145.97  657.82    150.6  657.78   154.47  657.77   168.39  657.77   172.22  657.76
   174.36  657.76    181.6  657.76   196.62  657.02   201.25  657.01   202.88  657.01
   208.06     657   214.52     657   216.28  656.97   220.44  656.88   224.77  656.81
   225.97  656.79   227.96  656.74   235.14  656.86   239.37  656.95   239.92  656.87
   240.15  656.85   241.06     657   244.18  657.21   246.32  657.43   252.53  657.63
   254.33  657.76   263.53     658   266.22     658   266.62     658   279.29     658
   282.15     658    290.8     658   299.61     658   305.47     658   318.22     658
   321.61     658   335.13     658   335.56     658   337.59     658   349.25     658
   353.11  657.96   366.29  657.93   376.49  657.92   388.48  657.92   398.28     658
    403.1  657.96    412.2     658   418.32     658      431  658.44   441.57     659
      444   659.6    445.6     660   448.16  660.63   449.64     661   452.33  661.67
   453.68     662   464.54  662.65   474.11  665.45   491.53  665.76

Manning's n Values          num=        5
      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val
        0     .06   111.72     .08   214.52     .05   241.06     .08   453.68     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        214.52  241.06              279     279   276.7             .1      .3

CROSS SECTION


RIVER: Walker Run
REACH: 1                    RS: 2669

INPUT
Description: U/S XS of Walker Run Prop Bridge
Station Elevation Data      num=       17
      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
     38.9     668       39     659       54     658       79     657       95   656.1
      216     656      219     655      221   654.1      224     655      226     656
      400   656.1      406     657      411     658      417     659      420     660
      425     661    425.1     668

Manning's n Values          num=        3
      Sta   n Val      Sta   n Val      Sta   n Val
     38.9     .06      216     .05      226     .06

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
          216     226              97.8    97.2    99.2             .1      .3

BRIDGE


RIVER: Walker Run
REACH: 1                    RS: 2620

INPUT
Description: Bridge #4
Distance from Upstream XS =        9
Deck/Roadway Width        =       60
Weir Coefficient          =      2.5
Upstream  Deck/Roadway Coordinates
    num=       11
      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
     -266  673.19        0     -106  673.19        0    38.99  672.23        0
       39  672.23    667.4      119  671.43    666.6      199  670.63    665.8
      279  669.83      665      359  669.03    664.2      439  668.23    663.4
   439.01  668.23        0   488.54      668        0

Upstream Bridge Cross Section Data
Station Elevation Data      num=       17
      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
     38.9     668       39     659       54     658       79     657       95   656.1
      216     656      219     655      221   654.1      224     655      226     656
      400   656.1      406     657      411     658      417     659      420     660
      425     661    425.1     668

Manning's n Values          num=        3
      Sta   n Val      Sta   n Val      Sta   n Val
     38.9     .06      216     .05      226     .06
```

```
Bank Sta: Left   Right    Coeff Contr.   Expan.
          216     226            .1       .3

Downstream  Deck/Roadway Coordinates
    num=      11
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
     -88  673.19       0      42  673.19       0   86.99  672.23       0
      87  672.23   667.4     167  671.43   666.6     247  670.63   665.8
     327  669.83     665     407  669.03   664.2     487  668.23   663.4
  487.01  668.23       0  594.31  667.16       0

Downstream Bridge Cross Section Data
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    96.9     670      97     658     116     657     122   656.1     256     656
     258     655     261   654.5     263     655     265     656     444   656.1
     450     657     458     658     467     659     474     660     486     661
     495   661.5   495.1     670

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    96.9    .06     256     .05     265     .06

Bank Sta: Left   Right    Coeff Contr.   Expan.
          256     265            .1       .3

Upstream Embankment side slope               =       0 horiz. to 1.0 vertical
Downstream Embankment side slope             =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins          =   659.2
Energy head used in spillway design          =
Spillway height used in design               =
Weir crest shape                             = Broad Crested

Number of Piers =  4

Pier Data
Pier Station     Upstream=     119    Downstream=     167
Upstream     num=       2
    Width   Elev    Width   Elev
      4.5       0     4.5   666.6
Downstream     num=       2
    Width   Elev    Width   Elev
      4.5       0     4.5   666.6

Pier Data
Pier Station     Upstream=     199    Downstream=     247
Upstream     num=       2
    Width   Elev    Width   Elev
      4.5       0     4.5   665.8
Downstream     num=       2
    Width   Elev    Width   Elev
      4.5       0     4.5   665.8

Pier Data
Pier Station     Upstream=     279    Downstream=     327
Upstream     num=       2
    Width   Elev    Width   Elev
      4.5       0     4.5     665
Downstream     num=       2
    Width   Elev    Width   Elev
      4.5       0     4.5     665

Pier Data
Pier Station     Upstream=     359    Downstream=     407
Upstream     num=       2
    Width   Elev    Width   Elev
      4.5       0     4.5   664.2
Downstream     num=       2
    Width   Elev    Width   Elev
      4.5       0     4.5   664.2

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       Momentum               Cd   =       2
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Walker Run
REACH: 1                 RS: 2570
```

INPUT
Description: D/S XS of Walker Run Prop Bridge
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
96.9	670	97	658	116	657	122	656.1	256	656
258	655	261	654.5	263	655	265	656	444	656.1
450	657	458	658	467	659	474	660	486	661
495	661.5	495.1	670						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
96.9	.06	256	.05	265	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
256	265	72.3	71.9	71.4	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2497

INPUT
Description: D/S XS of Walker Run Prop Bridge
Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	663	169.7	662	176	660	182	658	194.31	657.58
211.95	657	216.39	656.69	219.45	656.65	222.52	656.63	231.11	656.33
241.63	656.33	250.53	656.2	262.61	656.04	264.91	656.05	272.27	656.06
275.1	656.07	279.86	656.07	285.09	656.08	293.79	656.09	295.78	656.09
306.04	656.09	308.92	656.08	310.65	656.09	312.14	656.09	319.96	656.08
322.32	656.08	328.92	656.06	333.01	656.06	337.43	656.07	341.59	656.05
347.14	656.05	350.97	656.06	354.99	656.06	355.25	656.06	355.57	656.06
356.3	656.06	365.12	656.06	371.78	656.05	378.51	656.05	383.44	656.04
386.2	656.04	390.9	656.04	397.79	656.03	406.48	656.03	418.61	656.01
431.55	656	433.09	655.17	433.4	655	433.64	654.95	433.9	654.9
435.69	654.75	436.92	654.97	437.79	655	438.31	655.29	439.78	656
442.48	656	474.44	656	480.93	655.89	496.46	655.94	501.55	656
505.3	656.18	532.81	657	533.28	657.05	540.1	657.71	542.97	658
554.45	658.87	555.99	659	560.72	659.3	585.34	660.05	658.58	665.36
678.36	665.96	682.31	667.16						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.06	211.95	.08	431.55	.05	439.78	.08	585.34	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
431.55	439.78	33.1	35	35.9	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2462

INPUT
Description:
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	662	26	662	70.39	659.98	130.3	658.42	191.55	657.89
194.47	657.86	200.62	657.68	214.06	657.25	223.61	657	230.7	656.3
233.59	656	244.38	655.94	249.84	655.91	254.12	655.9	258.8	655.9
262.67	655.9	264.18	655.9	270.27	655.9	276.39	655.9	283.92	655.9
289.65	655.91	298.05	655.91	321.59	655.41	325.07	655.33	330.35	655.31
333.33	655.24	335.99	655.23	339.76	655.14	344.9	655.03	345.18	655.02
345.99	655	347.04	654.92	350.97	654.61	354.06	654.81	357.06	655
358	655	465	655	475	656	510.01	656.95	510.72	656.94
512.02	657	515.93	657.74	517.81	658	537.09	658.53	543.64	658.86
546.52	659	555.06	659.14	560.39	659.8	629.95	661.26	684.19	664.6
700.62	665.24								

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.06	223.61	.08	345.99	.05	357.06	.08	510.01	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
345.99	357.06	167.2	172.3	167.7	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2274

INPUT
Description:
Station Elevation Data num= 100

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-75	664	-46.1	663.17	-23	659.97	16.47	657.72	45.83	658.28
67.54	658.17	89.33	656.46	93.94	656.49	96.48	656	115.41	655.33
123.78	655.21	127.83	655.09	128.92	655.09	136.61	655.09	138.38	655.08
145.96	655.07	151.42	655.06	157.67	655.04	158.35	655.04	167.72	655.05
171.56	655.05	174.69	655.06	177.39	655.06	177.46	655.06	177.55	655.06
178.01	655.06	178.84	655.06	180.13	655.06	181.79	655.06	183.41	655.05
185.32	655.05	187.03	655.05	188.39	655.04	190.37	655.03	197.78	655

198	654.86	199.56	654	201.75	653.95	203.12	653.9	205.3	653.98
206.05	654	206.47	654.2	208.38	655	216.7	655	220.33	655
222.84	655	226.47	655	228.67	655	231.37	655	234.06	655
236.43	655	238.01	655	239.75	655	241.29	655	243.55	655
249.93	655	253.81	655	256.01	655	257.29	655	258.3	655
259.56	655	260.69	655	262.07	655	263.95	655	267.98	655
274.42	655	279.63	655	285.91	655	289.82	655	292.73	655
297.33	655	299.5	655	301.91	655	303.86	655	306.15	655
308.81	655	310.99	655	314	655	326.12	655.4	329.29	655.44
348.92	655.98	349.06	655.98	349.18	655.99	349.26	655.99	349.69	656
349.83	656.02	356.2	657	360.13	657.7	362.04	658	364.41	658.04
369.84	658.08	376.37	658.13	382.25	658.34	448.6	658.96	455.12	659.08
460.9	659.19	507.83	659.46	557.25	660.35	636	663.34	650.4	665.34

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-75	.06	-46.1	.06	89.33	.08	197.78	.05	208.38	.08
349.83	.06								

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
197.78	208.38	134.3	133	122.5	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2139

INPUT
Description:
Station Elevation Data num= 23

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	660.01	53	659	80	658	160	657	218	656
243	655	357	655	360	656	393	656	401	655
408	654	541	654	542.37	653.78	545.04	653.31	547.91	653.81
549	654	646	654	650	655	658	657	693	658
848	659	901	661	970	663.5				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.06	393	.08	541	.05	549	.08	650	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
541	549	203.6	205.7	208.3	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 1925

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	659	62	658	112	657	134	656	316	655
345	654.6	375	655	396	655	415	654	435	653
505	653	506.79	652.67	510.05	652.07	511.46	652.3	513.89	652.69
516	653	605	653	617	654	628	655	657	656
754	656.5	850	656	860	655.5	885	656	951	657
982	658	1021	660	1056	660.9				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.06	415	.08	505	.05	516	.08	628	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
505	516	266.6	255	247.3	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 1602

INPUT
Description:
Station Elevation Data num= 28

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	659	25	658	47	657	80	656	153	655
230	654.65	392	654	395	653	396	653	400	654
738	654	741	652	741.82	651.4	745.51	650.67	747.9	650.84
750.86	651.6	752	652	755	654	800	654.1	866	654
911	654	1076	655	1093	655	1158	655	1174	656
1225	657	1255	658	1270	659				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	738	.06	755	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
738	755	189.2	189	189.3	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 1402

INPUT
Description:
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-214.73	660.01	-151.73	657.01	-116.53	656.01	-65.33	655.01	-57.33	654.01
-47.9	653.01	-26.6	653.01	61.72	652.96	129.69	653.53	136.69	653.6
143.69	653.86	148.69	654.03	153.69	654.21	156.09	654.04	156.39	652.1
156.89	651.34	158.69	650.52	160.49	650.2	161.99	649.8	163.69	649.82
165.69	649.95	166.99	650.67	168.49	651.36	169.29	651.84	169.89	653.64
172.09	654.15	177.99	653.93	183.69	653.92	187.1	653.79	232.35	653.34
246.57	653.84	359.8	654.16	416.89	654.15	519.9	654.01	527.8	655.01
536.5	656.01	540.2	657.01	548.5	658.01	558	659		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-214.73	.08	156.09	.06	169.89	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
156.09	169.89	221.7	215.6	213.1	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 1208

INPUT
Description: FEMA BHN
Station Elevation Data num= 24

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	667.4	14	667	31	666	113	656	124	655
130	654	140	653	230	653	232	652	238	649.57
244	652	246	653	354	654	477	655	484	655
548	654	569	653	614	653	635	654	656	656
668	657	672	658	677	660	679	660.3		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	230	.06	246	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
230	246	161.3	157.6	155.9	.1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 990

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-41.4	660.01	-4.3	656.01	32.63	652.9	63.74	651.93	118.97	653.07
125.76	650.82	126.92	650.45	132.87	649.47	135.28	649.66	136.76	650.43
138.23	653.22	149.36	652.61	186.43	652.59	234.63	654.38	362.19	653.45
497.17	656.01	516.5	658.01	525	659				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-41.4	.08	118.97	.06	138.23	.08

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
118.97	138.23	100.9	101.5	101.9	.3 .5

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 884

INPUT
Description: U/S XS of Farm Road Culvert
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-284.98	692	30.02	655	49.02	654	103.02	653	117.08	652.72
120.1	649.74	121.4	649.01	123.02	648.62	125.03	649.16	129.44	653.21
172.02	653	393.02	653	410.02	654	437.02	655	456.02	656
474.02	657	491.02	659	515.02	661	531.02	662	565.02	664
591.02	664	598.02	663.5						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-284.98	.09	117.08	.05	129.44	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
117.08	129.44	25.5	20.8	21	.3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-284.98	115.5	652.53	F
130.5	598.02	652.53	F

CULVERT

RIVER: Walker Run
REACH: 1 RS: 875

INPUT
Description: Private Farm Road
Distance from Upstream XS = 1.6
Deck/Roadway Width = 15
Weir Coefficient = 2.5
Upstream Deck/Roadway Coordinates
num= 17

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
12.14	656.071	656.071	52.52	653.686	653.686	71.38	653.5	653.18
115.86	653.386	649.74	122.61	652.528	648.62	122.83	652.53	648.66
124.23	652.54	648.9	130.22	653.444	653.21	173.58	653.2	652.41
194.42	653.1	652.9	217.91	652.805	652.805	378.6	653.084	653.084
465.08	656.47	656.47	522.51	662.265	662.265	535.78	663.101	663.101
535.81	663.177	663.177	535.99	663.037	663.037			

Upstream Bridge Cross Section Data
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-322.11	691.97	-147.11	671.47	-2.11	656.57	12.14	656.071	52.52	653.686
71.38	653.18	101.3	653.2	116.89	652.72	120.15	649.74	120.82	648.93
121.18	649.01	122.65	648.62	124.23	648.9	124.43	649.16	129.48	653.21
173.58	652.41	194.42	652.9	297.89	656.07	337.89	656.67	607.89	664.67

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-322.11	.09	116.89	.05	129.48	.09

Bank Sta: Left Right Coeff Contr. Expan.
116.89 129.48 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-322.11	115.5	652.53	F
130.5	607.89	652.53	F

Downstream Deck/Roadway Coordinates
num= 24

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
12.14	656.071	656.071	52.52	653.686	653.686	77.11	653.4	652.55
115.86	653.386	651.91	122.61	652.528	649.92	122.73	652.53	650.54
122.85	652.53	651.24	123.07	652.53	651.64	123.32	652.53	651.8
123.57	652.53	651.64	123.79	652.53	651.24	123.91	652.53	650.54
124.03	652.53	650.11	126.1	652.53	648.93	130.22	653.444	649.62
136.9	653.4	652.21	185.27	653.2	652.86	217.91	652.805	652.8
378.6	653.084	653.084	465.08	656.47	656.47	522.51	662.265	662.265
535.78	663.101	663.101	535.81	663.177	663.177	535.99	663.037	663.037

Downstream Bridge Cross Section Data
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-322.11	691.97	-147.11	671.47	-2.11	656.57	12.14	656.071	52.52	653.686
77.11	652.55	116.71	651.91	123.34	649.92	124.03	650.11	125.51	649.41
126.1	648.93	130.12	649.62	136.9	652.21	185.27	652.86	218.62	652.8
297.89	656.07	337.89	656.67	607.89	664.667				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-322.11	.09	116.71	.05	136.9	.09

Bank Sta: Left Right Coeff Contr. Expan.
116.71 136.9 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins = 654.4
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	2.75	

FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	2.2	15	.023	.023	.1	.9	1

Upstream Elevation = 648.57
Centerline Station = 123.3
Downstream Elevation = 649.41
Centerline Station = 123.2

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 863

INPUT
Description: D/S XS Farm Road Culvert
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-291.09	692	-22.09	660	10.91	657	20.91	656	40.91	654
73.91	653	84.91	652	113.12	651.91	120.43	649.92	123.41	648.96
126.4	649.62	133.22	652.21	357.91	653	388.91	654	407.91	655
449.91	656	509.91	662	538.91	664	578.91	664	586.91	663.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-291.09	.09	113.12	.05	133.22	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
113.12	133.22	148.6	139.8	131.4	.3	.5

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 715

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-92.4	658.01	2.21	655.41	40.88	653.76	46.14	653.57	77.95	651.4
100.08	650.67	101.47	648.52	104.64	647.91	107.47	647.9	108.96	648.04
110.34	648.14	111.67	648.52	114.47	650.93	126.37	650.97	191.93	651.64
278.3	653.09	365.34	656.46	380	658				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-92.4	.09	100.08	.05	114.47	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
100.08	114.47	166.1	176	183.6	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 536

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-97	658	-86.6	657.01	-45.02	655.01	5.76	652.05	48.16	650.97
149.99	651.14	170.47	649.65	172.89	647.93	174.84	647.22	176.44	647.18
179.25	646.97	182.05	647.71	182.91	648.29	184.3	650.54	191.59	650.96
206.95	652.58	269.71	656.85	280	658				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-97	.09	170.47	.05	184.3	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
170.47	184.3	144.7	149.2	152.8	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 350

INPUT
Description:
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-5	658	7.67	656.47	30.04	652.51	50.26	651.27	122.31	650.39
128.41	647.64	131.05	647.09	132.71	647.08	135.14	647.17	138.64	647.65
139.08	648.11	140.48	648.18	141.29	649.59	150.13	650.23	156.97	649.72
249.39	650.76	267.01	652.4	309.86	655.02	325.84	655.85	340	658

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-5	.09	122.31	.05	141.29	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
122.31	141.29	167	162.4	160.2	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 185

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8.8	659.55	15.53	658.78	23.2	653.48	25.13	652.64	29.31	649.46
32.38	649.12	33.4	647.67	34.97	646.89	37.17	646.4	40.26	646.66

```
   42.19  646.41   44.77  646.96    46.4  647.15   49.26  649.32   59.74  649.89
  197.88  650.38  234.08  652.49  273.02  654.62  299.87  655.74  305.41  656.59
     315     658

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
     8.8     .09   32.38     .05   49.26     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         32.38   49.26             175.6   171.8   167.7            .3      .5

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: 011

INPUT
Description: U/S XS of Market Street Bridge
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
    -210     657 -177.52  656.04   33.24  653.12   38.49  652.67   45.07  649.46
   51.29   648.2   53.81   646.7    54.7  645.84   57.12  645.71   59.41  645.74
   61.18  646.53   64.38  648.11   69.53  648.34   79.21  649.32  111.92  649.09
   167.8   651.4   249.3  651.46  251.06  651.01   293.8  653.77  352.41  660.72

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    -210     .09   51.29     .05   64.38     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         51.29   64.38              39.3    41.1    44.6            .3      .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
    -210      42  653.25       F
      90  352.41  653.25       F

BRIDGE


RIVER: Walker Run
REACH: 1                  RS: -10

INPUT
Description: Market Street
Distance from Upstream XS =     8.5
Deck/Roadway Width        =    24.9
Weir Coefficient          =     2.5
Upstream  Deck/Roadway Coordinates
    num=      20
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -172.52  656.04           32.59  653.86           44.69   653.7
   44.69  654.91           62.11  656.78  644.95    62.5   656.8  647.67
   62.61  656.82  648.73    63.5  656.84   650.4    65.5  656.88   651.4
    65.9  656.88  651.43    66.3  656.88   651.4    68.3  656.84   650.4
    69.6  656.82  648.73      70   656.8  647.67   70.35  656.78  645.67
   98.44   654.9           98.45   653.7          172.12  653.25
  253.49     654           332.2  654.33

Upstream Bridge Cross Section Data
Station Elevation Data    num=      17
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -172.52  654.94   32.43  652.03   38.83  651.58   48.62  648.36   55.15   647.1
    59.2   645.6   61.39  644.75   65.45  644.65   67.71  645.44   70.85  647.01
   86.15  648.21   116.5   648.9  172.12  652.15  253.49   652.9   332.2  653.98
   350.6   654.9  358.85   655.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -172.52     .09   55.15     .05   70.85     .09

Bank Sta: Left   Right    Coeff Contr.   Expan.
         55.15   70.85             .3      .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
 -172.52      42  653.25       F
      90  358.85  653.25       F

Downstream  Deck/Roadway Coordinates
    num=      20
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
 -199.02  656.04            6.09  653.86           18.19   653.7
   18.19  654.42           35.61  656.78  645.95      36  656.83  648.67
   36.11  656.85  649.52      37  656.92  650.59      39  656.98  651.59
    39.4  656.98  651.62    39.8  656.98  651.59    41.8  656.92  650.59
    43.1  656.85  649.52    43.5  656.83  648.75   43.85  656.78  647.42
   71.94  655.17           71.95   653.7          145.62  653.25
  226.99     654           332.2  654.33

Downstream Bridge Cross Section Data
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -199.02  655.29   -6.99  653.19    1.13  653.15   13.19  652.77   26.39  650.42
    31.8  649.93   33.72  648.44   36.22  647.82   39.63  646.48    42.3  645.69
   44.81  646.28    48.1  647.83      51  649.37   61.17  649.79   72.07  651.55
```

```
  145.62   652.5  226.99  653.25   332.2  654.33   350.6  655.25  358.85  656.25

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -199.02     .09    31.8     .05      51     .09

Bank Sta: Left   Right    Coeff Contr.   Expan.
          31.8      51             .3       .5

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .98
Elevation at which weir flow begins         =   654.4
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
      Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
      Pressure and Weir flow
          Submerged Inlet Cd          =
          Submerged Inlet + Outlet Cd =      .8
          Max Low Cord                =

Additional Bridge Parameters
      Add Friction component to Momentum
      Do not add Weight component to Momentum
      Class B flow critical depth computations use critical depth
          inside the bridge at the upstream end
      Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: -30

INPUT
Description: D/S XS of Market Street Bridge
Station Elevation Data    num=      20
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 -199.02  656.04  -46.68  654.28    -4.4  653.95    4.43   653.9   17.96  651.54
   30.08   649.2    35.6  648.71   37.35  647.22   38.98   646.6   41.82  645.27
   45.52  644.46   48.05  645.07   52.27  646.61   53.56  648.15   63.11  648.57
   79.88  650.16   85.95  652.29  181.4   651.9  273.84  653.77  319.73  659.02

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 -199.02     .09    35.6     .05   53.56     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          35.6   53.56             35.6    46.2    55.1             .3       .5

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: -78

INPUT
Description:
Station Elevation Data    num=      24
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   655.4      73     655     119     654     167     653     173     652
     177     651     182     650     210     649     216     646     219  645.82
     222  645.43     225  645.72     229     646     235     647     243     648
     270     649     284     650     359     651     424     652     440     652
     465     653     470     654     506     655     518     656

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .09     210     .05     243     .09

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          210     243              64    75.7    79.9             .1       .3

CROSS SECTION


RIVER: Walker Run
REACH: 1                  RS: -154

INPUT
Description:
Station Elevation Data    num=      22
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   655.4      66     655     113     654     122     653     133     650
     139     649     142     648     143     647     146     646     147  645.21
     149   644.9     152  645.52     156  645.66     158     646     163     648
     204     649     324     650     336     653     341     653     440     653
```

444	654	452	655

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.09	142	.05	163	.09

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
142	163	125.1	125.7	125.2	.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: -255

INPUT
Description: FEMA BHJ
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	657.5	5	657	15	656	42	655	48	654
79	649	97	648	98	646	105	645.5	111	646
113	647	155	648	187	649	198	650	220	653
224	653	354	653	357	654	372	655	385	656
476	673								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.09	97	.05	113	.09

Bank Sta: Left	Right	Coeff Contr.	Expan.
97	113	.1	.3

Appendix I:
Hydrology Data

Tc and Land Use Computations

Time of concentration

Tributary
Tc = 166.4 min

Sheet Flow	Shallow Concentrated Flow	Channel
L = 300 feet	L = 4,100 feet	L = 6,600 feet
S = 2.5 %	S = 7.3 %	S = 0.7 %
n = 0.24	unpaved	n = 0.08
		A = 70 ft^2
		P = 150 ft

Walker Run
Tc = 128.6 min

Sheet Flow	Shallow Concentrated Flow	Channel
L = 300 feet	L = 7,000 feet	L = 10,000 feet
S = 0.8 %	S = 4.5 %	S = 1.4 %
n = 0.24	unpaved	n = 0.05
		A = 100 ft^2
		P = 80 ft

Land Use

	Tributary		Walker Run	
DA	438.4 ac		1557.1 ac	
Woods	50% (219.2 ac)		60 % (934.3 ac)	
Meadow	50% (219.2 ac)		40% (622.8 ac)	
A Soils	20%		10%	
B/D Soils	10%		–	
C Soils	70%		90%	
Woods		CN*A		CN*A
A Soils (CN=30)	43.84 ac	1315.2	93.43 ac	2803
B Soils (CN=55)	21.92 ac	1205.6	–	
C Soils (CN= 70)	153.44 ac	10740.8	840.87 ac	58861
Meadow				
A Soils (CN=30)	43.84 ac	1315.2	62.28 ac	1868
B Soils (CN= 58)	21.92 ac	1271.36	–	
C Soils (CN= 71)	153.44 ac	10894.24	560.52 ac	39797
Total		26742		103329
Weighted CN		61		66

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

BERWICK, PENNSYLVANIA (36-0611) 41.0667 N 76.25 W 587 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Fri May 22 2009

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Docs | Return to State Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.34	0.52	0.64	0.84	1.03	1.21	1.32	1.66	2.04	2.41	2.84	3.18	3.75	4.33	5.90	7.34	9.28	11.17
2	0.40	0.62	0.76	1.01	1.25	1.46	1.58	1.98	2.44	2.89	3.40	3.80	4.47	5.14	6.96	8.62	10.83	12.98
5	0.47	0.72	0.89	1.22	1.53	1.80	1.96	2.43	3.01	3.58	4.21	4.65	5.43	6.19	8.14	9.92	12.26	14.58
10	0.52	0.80	0.98	1.36	1.74	2.08	2.27	2.82	3.50	4.20	4.92	5.41	6.28	7.09	9.15	11.02	13.46	15.93
25	0.58	0.89	1.10	1.55	2.01	2.50	2.74	3.40	4.25	5.18	6.07	6.61	7.61	8.48	10.68	12.66	15.23	17.91
50	0.63	0.96	1.19	1.70	2.23	2.85	3.15	3.91	4.92	6.08	7.12	7.72	8.82	9.74	12.02	14.08	16.73	19.59
100	0.69	1.03	1.28	1.85	2.47	3.26	3.63	4.50	5.69	7.16	8.37	9.03	10.24	11.19	13.54	15.64	18.36	21.39
200	0.74	1.10	1.37	2.00	2.72	3.72	4.17	5.17	6.59	8.43	9.87	10.58	11.91	12.86	15.25	17.38	20.13	23.34
500	0.82	1.21	1.50	2.23	3.08	4.42	5.02	6.24	8.01	10.51	12.29	13.08	14.57	15.48	17.86	19.98	22.72	26.17
1000	0.88	1.28	1.61	2.41	3.38	5.05	5.77	7.19	9.29	12.45	14.55	15.39	17.01	17.84	20.14	22.21	24.90	28.53

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

*** Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.37	0.58	0.71	0.94	1.15	1.35	1.48	1.87	2.31	2.69	3.23	3.59	4.23	4.83	6.45	7.99	10.04	11.99
2	0.44	0.69	0.84	1.13	1.38	1.63	1.78	2.24	2.76	3.23	3.88	4.28	5.05	5.74	7.60	9.36	11.71	13.94
5	0.52	0.81	0.99	1.35	1.70	2.01	2.20	2.74	3.40	4.00	4.79	5.24	6.12	6.90	8.87	10.77	13.25	15.65
10	0.57	0.89	1.09	1.51	1.93	2.33	2.54	3.17	3.94	4.67	5.59	6.08	7.06	7.89	9.96	11.96	14.55	17.10
25	0.65	0.99	1.22	1.72	2.23	2.79	3.07	3.82	4.77	5.73	6.86	7.38	8.52	9.41	11.60	13.71	16.45	19.21
50	0.70	1.07	1.32	1.89	2.48	3.19	3.54	4.39	5.52	6.70	8.02	8.59	9.85	10.77	13.02	15.22	18.07	20.97
100	0.76	1.15	1.42	2.06	2.75	3.65	4.07	5.05	6.39	7.85	9.40	10.01	11.41	12.34	14.63	16.89	19.81	22.88
200	0.82	1.23	1.53	2.23	3.03	4.17	4.69	5.83	7.41	9.21	11.03	11.69	13.22	14.14	16.46	18.76	21.70	24.98
500	0.92	1.35	1.68	2.49	3.45	4.98	5.67	7.06	9.05	11.42	13.69	14.39	16.11	17.00	19.23	21.55	24.45	28.03
1000	0.99	1.44	1.80	2.71	3.80	5.72	6.56	8.17	10.56	13.44	16.16	16.88	18.77	19.56	21.68	23.94	26.79	30.57

* The **upper** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **greater** than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

*** Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.30	0.47	0.57	0.76	0.93	1.09	1.19	1.48	1.83	2.18	2.54	2.87	3.38	3.94	5.44	6.82	8.67	10.50
2	0.36	0.56	0.68	0.91	1.12	1.31	1.43	1.78	2.19	2.61	3.04	3.43	4.04	4.68	6.41	7.99	10.11	12.21
5	0.42	0.65	0.80	1.09	1.37	1.61	1.76	2.17	2.70	3.23	3.75	4.19	4.89	5.62	7.48	9.18	11.43	13.70
10	0.47	0.72	0.88	1.23	1.56	1.86	2.03	2.51	3.12	3.77	4.38	4.87	5.63	6.41	8.39	10.18	12.54	14.95
25	0.52	0.80	0.98	1.39	1.80	2.22	2.43	3.00	3.76	4.61	5.36	5.90	6.79	7.63	9.76	11.67	14.16	16.78
50	0.56	0.85	1.06	1.51	1.99	2.52	2.78	3.43	4.32	5.37	6.24	6.85	7.82	8.72	10.95	12.95	15.52	18.31
100	0.61	0.91	1.13	1.64	2.19	2.86	3.17	3.91	4.95	6.27	7.27	7.96	9.02	9.96	12.26	14.32	16.99	19.94
200	0.65	0.97	1.21	1.77	2.40	3.23	3.61	4.46	5.66	7.32	8.49	9.22	10.41	11.36	13.75	15.84	18.57	21.70
500	0.71	1.05	1.31	1.94	2.69	3.80	4.27	5.29	6.76	8.98	10.43	11.26	12.56	13.53	15.97	18.09	20.86	24.23
1000	0.76	1.11	1.39	2.08	2.92	4.28	4.84	6.01	7.73	10.48	12.18	13.10	14.51	15.46	17.89	19.98	22.75	26.30

* The **lower** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **less** than.

WinTR-20 Printed Page File Beginning of Input Data List
C:\Program Files (x86)\USDA\WinTR-20 version 1.11.11\Walker Run Trib.inp

```
WinTR-20: Version 1.11                  0         0         1.        0
Walker Run

SUB-AREA:
          Trib      Outlet    Berwick   .68       61.       2.77


STORM ANALYSIS:
          2-yr      Berwick   0.        2.89      Type II   2         2.89
          10-yr     Berwick   0.        4.2       Type II   2         2.89
          50-yr     Berwick   0.        6.08      Type II   2         2.89
          100-yr    Berwick   0.        7.16      Type II   2         2.89
          500-yr    Berwick   0.        10.51     Type II   2         2.89




GLOBAL OUTPUT:
                    10.       .08       YYNNN     NNNNNN


VERIFICATION:
          PROCESSING          Y     Y
```

WinTR-20 Printed Page File End of Input Data List

Walker Run

Name of printed page file:
C:\Program Files (x86)\USDA\WinTR-20 version 1.11.11\Walker Run Trib.out

STORM 2-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Trib	0.680	Berwick	0.322		14.08	23.6	34.72

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)						
12.880	10.1	11.7	13.2	14.6	16.0	17.2	18.4
13.440	19.4	20.4	21.2	21.9	22.5	22.9	23.2
14.000	23.4	23.6	23.6	23.6	23.4	23.2	22.9
14.560	22.4	22.0	21.5	21.0	20.5	20.0	19.6
15.120	19.1	18.7	18.3	17.9	17.5	17.2	16.8
15.680	16.5	16.2	15.8	15.5	15.2	14.9	14.6
16.240	14.3	14.1	13.8	13.6	13.3	13.1	12.8
16.800	12.6	12.4	12.2	12.0	11.8	11.6	11.4
17.360	11.2	11.1	10.9	10.7	10.6	10.4	10.3
17.920	10.1	10.0					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.680		0.322		14.08	23.6	34.72

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)						
12.880	10.1	11.7	13.2	14.6	16.0	17.2	18.4
13.440	19.4	20.4	21.2	21.9	22.5	22.9	23.2
14.000	23.4	23.6	23.6	23.6	23.4	23.2	22.9
14.560	22.4	22.0	21.5	21.0	20.5	20.0	19.6
15.120	19.1	18.7	18.3	17.9	17.5	17.2	16.8
15.680	16.5	16.2	15.8	15.5	15.2	14.9	14.6

16.240	14.3	14.1	13.8	13.6	13.3	13.1	12.8
16.800	12.6	12.4	12.2	12.0	11.8	11.6	11.4
17.360	11.2	11.1	10.9	10.7	10.6	10.4	10.3
17.920	10.1	10.0					

STORM 10-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Trib	0.680	Berwick	0.914		13.86	84.2	123.88

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
12.320	11.6	15.1	18.7	23.4	28.0	33.8	39.5
12.880	45.4	51.2	56.6	61.7	66.3	70.3	73.9
13.440	76.7	79.3	81.1	82.9	83.5	84.1	84.0
14.000	83.7	83.0	82.0	80.8	79.1	77.3	74.8
14.560	72.3	69.7	67.2	64.8	62.6	60.5	58.5
15.120	56.6	54.8	53.1	51.5	50.0	48.6	47.2
15.680	45.8	44.5	43.2	42.0	40.9	39.8	38.7
16.240	37.8	36.8	35.9	35.0	34.2	33.4	32.6
16.800	31.9	31.2	30.5	29.8	29.2	28.5	28.0
17.360	27.4	26.9	26.4	25.9	25.4	25.0	24.5
17.920	24.1	23.7	23.3	23.0	22.6	22.3	22.0
18.480	21.7	21.4	21.1	20.8	20.5	20.3	20.0
19.040	19.8	19.5	19.3	19.1	18.9	18.6	18.4
19.600	18.2	18.0	17.8	17.6	17.4	17.2	17.0
20.160	16.7	16.5	16.3	16.1	15.9	15.7	15.6
20.720	15.4	15.2	15.0	14.9	14.7	14.6	14.4
21.280	14.3	14.1	14.0	13.8	13.7	13.6	13.5
21.840	13.4	13.3	13.2	13.1	13.0	12.9	12.8
22.400	12.7	12.7	12.6	12.5	12.4	12.4	12.3
22.960	12.3	12.2	12.2	12.1	12.1	12.0	12.0
23.520	11.9	11.9	11.8	11.8	11.7	11.7	11.7
24.080	11.6	11.6	11.5	11.4	11.3	11.2	11.1
24.640	10.9	10.8	10.6	10.4	10.1		

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	0.680		0.914		13.86	84.2	123.88

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
12.320	11.6	15.1	18.7	23.4	28.0	33.8	39.5
12.880	45.4	51.2	56.6	61.7	66.3	70.3	73.9
13.440	76.7	79.3	81.1	82.9	83.5	84.1	84.0
14.000	83.7	83.0	82.0	80.8	79.1	77.3	74.8
14.560	72.3	69.7	67.2	64.8	62.6	60.5	58.5
15.120	56.6	54.8	53.1	51.5	50.0	48.6	47.2
15.680	45.8	44.5	43.2	42.0	40.9	39.8	38.7
16.240	37.8	36.8	35.9	35.0	34.2	33.4	32.6
16.800	31.9	31.2	30.5	29.8	29.2	28.5	28.0
17.360	27.4	26.9	26.4	25.9	25.4	25.0	24.5
17.920	24.1	23.7	23.3	23.0	22.6	22.3	22.0
18.480	21.7	21.4	21.1	20.8	20.5	20.3	20.0
19.040	19.8	19.5	19.3	19.1	18.9	18.6	18.4
19.600	18.2	18.0	17.8	17.6	17.4	17.2	17.0
20.160	16.7	16.5	16.3	16.1	15.9	15.7	15.6
20.720	15.4	15.2	15.0	14.9	14.7	14.6	14.4
21.280	14.3	14.1	14.0	13.8	13.7	13.6	13.5
21.840	13.4	13.3	13.2	13.1	13.0	12.9	12.8

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
22.400	12.7	12.7	12.6	12.5	12.4	12.4	12.3
22.960	12.3	12.2	12.2	12.1	12.1	12.0	12.0
23.520	11.9	11.9	11.8	11.8	11.7	11.7	11.7
24.080	11.6	11.6	11.5	11.4	11.3	11.2	11.1
24.640	10.9	10.8	10.6	10.4	10.1		

STORM 50-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Trib	0.680	Berwick	2.057		13.76	213.3	313.61

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
12.000	11.5	17.2	23.4	31.0	39.4	49.1	60.4
12.560	72.3	86.4	100.5	115.8	131.0	144.7	158.2
13.120	169.7	180.2	189.0	196.2	202.5	206.5	210.3
13.680	211.7	213.2	211.8	210.3	207.6	204.5	200.5
14.240	195.8	190.3	183.8	177.1	169.6	162.1	155.5
14.800	148.9	143.1	137.6	132.4	127.4	122.7	118.3
15.360	114.1	110.3	106.6	103.1	99.6	96.3	93.1
15.920	90.1	87.2	84.6	82.1	79.6	77.4	75.1
16.480	73.0	71.0	69.1	67.2	65.5	63.8	62.2
17.040	60.6	59.1	57.8	56.4	55.2	53.9	52.8
17.600	51.7	50.6	49.6	48.7	47.7	46.9	46.0
18.160	45.2	44.4	43.7	43.0	42.3	41.6	41.0
18.720	40.4	39.8	39.3	38.7	38.2	37.7	37.2
19.280	36.7	36.3	35.8	35.3	34.9	34.4	34.0
19.840	33.6	33.1	32.7	32.2	31.8	31.4	31.0
20.400	30.5	30.1	29.7	29.4	29.0	28.7	28.3
20.960	28.0	27.7	27.4	27.1	26.8	26.5	26.3
21.520	26.0	25.8	25.5	25.3	25.1	24.9	24.7
22.080	24.5	24.3	24.1	24.0	23.8	23.7	23.5
22.640	23.4	23.3	23.1	23.0	22.9	22.8	22.7
23.200	22.6	22.5	22.4	22.3	22.2	22.1	22.0
23.760	21.9	21.8	21.8	21.7	21.6	21.5	21.3
24.320	21.2	21.0	20.8	20.6	20.3	20.0	19.6
24.880	19.2	18.7	18.2	17.6	17.0	16.3	15.6
25.440	14.9	14.2	13.5	12.8	12.1	11.4	10.7

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	0.680		2.057		13.76	213.3	313.61

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
12.000	11.5	17.2	23.4	31.0	39.4	49.1	60.4
12.560	72.3	86.4	100.5	115.8	131.0	144.7	158.2
13.120	169.7	180.2	189.0	196.2	202.5	206.5	210.3
13.680	211.7	213.2	211.8	210.3	207.6	204.5	200.5
14.240	195.8	190.3	183.8	177.1	169.6	162.1	155.5
14.800	148.9	143.1	137.6	132.4	127.4	122.7	118.3
15.360	114.1	110.3	106.6	103.1	99.6	96.3	93.1
15.920	90.1	87.2	84.6	82.1	79.6	77.4	75.1
16.480	73.0	71.0	69.1	67.2	65.5	63.8	62.2
17.040	60.6	59.1	57.8	56.4	55.2	53.9	52.8
17.600	51.7	50.6	49.6	48.7	47.7	46.9	46.0
18.160	45.2	44.4	43.7	43.0	42.3	41.6	41.0
18.720	40.4	39.8	39.3	38.7	38.2	37.7	37.2
19.280	36.7	36.3	35.8	35.3	34.9	34.4	34.0
19.840	33.6	33.1	32.7	32.2	31.8	31.4	31.0
20.400	30.5	30.1	29.7	29.4	29.0	28.7	28.3
20.960	28.0	27.7	27.4	27.1	26.8	26.5	26.3
21.520	26.0	25.8	25.5	25.3	25.1	24.9	24.7
22.080	24.5	24.3	24.1	24.0	23.8	23.7	23.5
22.640	23.4	23.3	23.1	23.0	22.9	22.8	22.7
23.200	22.6	22.5	22.4	22.3	22.2	22.1	22.0
23.760	21.9	21.8	21.8	21.7	21.6	21.5	21.3
24.320	21.2	21.0	20.8	20.6	20.3	20.0	19.6
24.880	19.2	18.7	18.2	17.6	17.0	16.3	15.6
25.440	14.9	14.2	13.5	12.8	12.1	11.4	10.7

STORM 100-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Trib	0.680	Berwick	2.816		13.79	300.3	441.55

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.840	10.7	15.9	22.1	30.0	39.7	50.4	63.2
12.400	76.6	93.3	110.0	130.1	150.3	171.1	192.1
12.960	211.3	229.3	245.6	259.1	271.7	280.4	289.1
13.520	293.6	298.2	299.4	300.0	298.2	295.1	291.0
14.080	285.7	279.8	272.2	264.4	254.5	244.6	234.0
14.640	223.3	213.7	204.4	195.9	188.0	180.5	173.5
15.200	166.7	160.7	154.6	149.3	144.0	139.0	134.2
15.760	129.5	125.0	120.8	116.9	113.1	109.6	106.2
16.320	103.0	99.9	97.0	94.2	91.6	89.0	86.6
16.880	84.3	82.0	79.9	77.8	76.0	74.1	72.4
17.440	70.7	69.1	67.6	66.2	64.8	63.5	62.3
18.000	61.1	60.0	58.8	57.8	56.8	55.8	54.9
18.560	54.0	53.2	52.4	51.6	50.8	50.1	49.4
19.120	48.7	48.1	47.5	46.8	46.2	45.6	45.0

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
19.680	44.4	43.8	43.2	42.6	42.1	41.5	40.9
20.240	40.3	39.8	39.2	38.7	38.2	37.7	37.2
20.800	36.8	36.4	35.9	35.5	35.1	34.8	34.4
21.360	34.0	33.7	33.3	33.0	32.7	32.4	32.1
21.920	31.9	31.6	31.3	31.1	30.9	30.7	30.5
22.480	30.3	30.1	29.9	29.7	29.6	29.4	29.3
23.040	29.1	29.0	28.9	28.7	28.6	28.5	28.3
23.600	28.2	28.1	28.0	27.9	27.8	27.7	27.5
24.160	27.4	27.2	27.0	26.8	26.6	26.2	25.9
24.720	25.5	25.0	24.4	23.8	23.2	22.4	21.6
25.280	20.8	19.9	19.0	18.1	17.2	16.3	15.4
25.840	14.5	13.6	12.7	11.9	11.1	10.3	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	0.680		2.816		13.79	300.3	441.55

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.840	10.7	15.9	22.1	30.0	39.7	50.4	63.2
12.400	76.6	93.3	110.0	130.1	150.3	171.1	192.1
12.960	211.3	229.3	245.6	259.1	271.7	280.4	289.1
13.520	293.6	298.2	299.4	300.0	298.2	295.1	291.0
14.080	285.7	279.8	272.2	264.4	254.5	244.6	234.0
14.640	223.3	213.7	204.4	195.9	188.0	180.5	173.5
15.200	166.7	160.7	154.6	149.3	144.0	139.0	134.2
15.760	129.5	125.0	120.8	116.9	113.1	109.6	106.2
16.320	103.0	99.9	97.0	94.2	91.6	89.0	86.6
16.880	84.3	82.0	79.9	77.8	76.0	74.1	72.4
17.440	70.7	69.1	67.6	66.2	64.8	63.5	62.3
18.000	61.1	60.0	58.8	57.8	56.8	55.8	54.9
18.560	54.0	53.2	52.4	51.6	50.8	50.1	49.4
19.120	48.7	48.1	47.5	46.8	46.2	45.6	45.0
19.680	44.4	43.8	43.2	42.6	42.1	41.5	40.9
20.240	40.3	39.8	39.2	38.7	38.2	37.7	37.2
20.800	36.8	36.4	35.9	35.5	35.1	34.8	34.4
21.360	34.0	33.7	33.3	33.0	32.7	32.4	32.1
21.920	31.9	31.6	31.3	31.1	30.9	30.7	30.5
22.480	30.3	30.1	29.9	29.7	29.6	29.4	29.3
23.040	29.1	29.0	28.9	28.7	28.6	28.5	28.3
23.600	28.2	28.1	28.0	27.9	27.8	27.7	27.5
24.160	27.4	27.2	27.0	26.8	26.6	26.2	25.9
24.720	25.5	25.0	24.4	23.8	23.2	22.4	21.6
25.280	20.8	19.9	19.0	18.1	17.2	16.3	15.4
25.840	14.5	13.6	12.7	11.9	11.1	10.3	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Trib	0.680	Berwick	5.452		13.67	606.0	891.16

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)						
10.720	10.4	11.5	12.6	13.9	15.3	16.9	18.5
11.280	20.3	22.3	24.5	27.1	30.2	34.3	39.2
11.840	48.4	57.5	73.4	89.5	110.4	132.7	158.9
12.400	187.8	219.7	255.9	293.2	334.3	375.3	413.9
12.960	452.4	484.4	515.2	539.6	560.8	577.4	589.1
13.520	598.5	602.4	605.6	601.2	596.9	587.4	577.5
14.080	564.6	550.6	534.2	515.6	495.9	473.8	451.8
14.640	430.6	409.4	391.5	373.8	357.9	342.5	328.3
15.200	314.9	302.2	290.6	279.3	269.0	258.7	249.2
15.760	239.7	231.0	222.5	214.8	207.4	200.4	193.8
16.320	187.4	181.5	175.7	170.4	165.1	160.3	155.5
16.880	151.1	146.7	142.7	138.8	135.1	131.7	128.3
17.440	125.2	122.1	119.3	116.6	114.1	111.6	109.3
18.000	107.0	104.8	102.8	100.8	99.0	97.1	95.5
18.560	93.8	92.3	90.8	89.3	87.9	86.5	85.3
19.120	84.0	82.9	81.7	80.6	79.4	78.3	77.2
19.680	76.1	75.1	74.0	72.9	71.9	70.9	69.8
20.240	68.8	67.8	66.8	65.8	65.0	64.1	63.3
20.800	62.6	61.8	61.1	60.3	59.7	59.0	58.3
21.360	57.7	57.1	56.5	56.0	55.4	54.9	54.4
21.920	53.9	53.5	53.1	52.7	52.3	51.9	51.5
22.480	51.2	50.9	50.6	50.3	50.0	49.7	49.4
23.040	49.2	48.9	48.7	48.5	48.2	48.0	47.8
23.600	47.6	47.4	47.2	47.0	46.8	46.6	46.4
24.160	46.2	45.9	45.6	45.2	44.7	44.2	43.6
24.720	42.9	42.1	41.2	40.1	39.0	37.7	36.4
25.280	35.0	33.5	32.0	30.5	29.0	27.4	25.9
25.840	24.4	22.8	21.4	20.0	18.7	17.3	16.1
26.400	14.9	13.8	12.8	11.8	10.9	10.1	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.680		5.452		13.67	606.0	891.16

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)						
10.720	10.4	11.5	12.6	13.9	15.3	16.9	18.5
11.280	20.3	22.3	24.5	27.1	30.2	34.3	39.2
11.840	48.4	57.5	73.4	89.5	110.4	132.7	158.9
12.400	187.8	219.7	255.9	293.2	334.3	375.3	413.9
12.960	452.4	484.4	515.2	539.6	560.8	577.4	589.1
13.520	598.5	602.4	605.6	601.2	596.9	587.4	577.5

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr (cfs)						
14.080	564.6	550.6	534.2	515.6	495.9	473.8	451.8
14.640	430.6	409.4	391.5	373.8	357.9	342.5	328.3
15.200	314.9	302.2	290.6	279.3	269.0	258.7	249.2
15.760	239.7	231.0	222.5	214.8	207.4	200.4	193.8
16.320	187.4	181.5	175.7	170.4	165.1	160.3	155.5
16.880	151.1	146.7	142.7	138.8	135.1	131.7	128.3
17.440	125.2	122.1	119.3	116.6	114.1	111.6	109.3
18.000	107.0	104.8	102.8	100.8	99.0	97.1	95.5
18.560	93.8	92.3	90.8	89.3	87.9	86.5	85.3
19.120	84.0	82.9	81.7	80.6	79.4	78.3	77.2
19.680	76.1	75.1	74.0	72.9	71.9	70.9	69.8
20.240	68.8	67.8	66.8	65.8	65.0	64.1	63.3
20.800	62.6	61.8	61.1	60.3	59.7	59.0	58.3
21.360	57.7	57.1	56.5	56.0	55.4	54.9	54.4
21.920	53.9	53.5	53.1	52.7	52.3	51.9	51.5
22.480	51.2	50.9	50.6	50.3	50.0	49.7	49.4
23.040	49.2	48.9	48.7	48.5	48.2	48.0	47.8
23.600	47.6	47.4	47.2	47.0	46.8	46.6	46.4
24.160	46.2	45.9	45.6	45.2	44.7	44.2	43.6
24.720	42.9	42.1	41.2	40.1	39.0	37.7	36.4
25.280	35.0	33.5	32.0	30.5	29.0	27.4	25.9
25.840	24.4	22.8	21.4	20.0	18.7	17.3	16.1
26.400	14.9	13.8	12.8	11.8	10.9	10.1	

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-yr (cfs)	10-yr (cfs)	50-yr (cfs)	100-yr (cfs)	500-yr (cfs)
Trib	0.680		23.6	84.2	213.3	300.3	606.0
OUTLET	0.680		23.6	84.2	213.3	300.3	606.0

Appendix J:
Manning's Roughness Coefficient Conditions

Walker Run Existing Conditions Manning's "n" Values

Bell Bend Nuclear Power Plant
Salem Township, Luzerne County, PA
December 2010

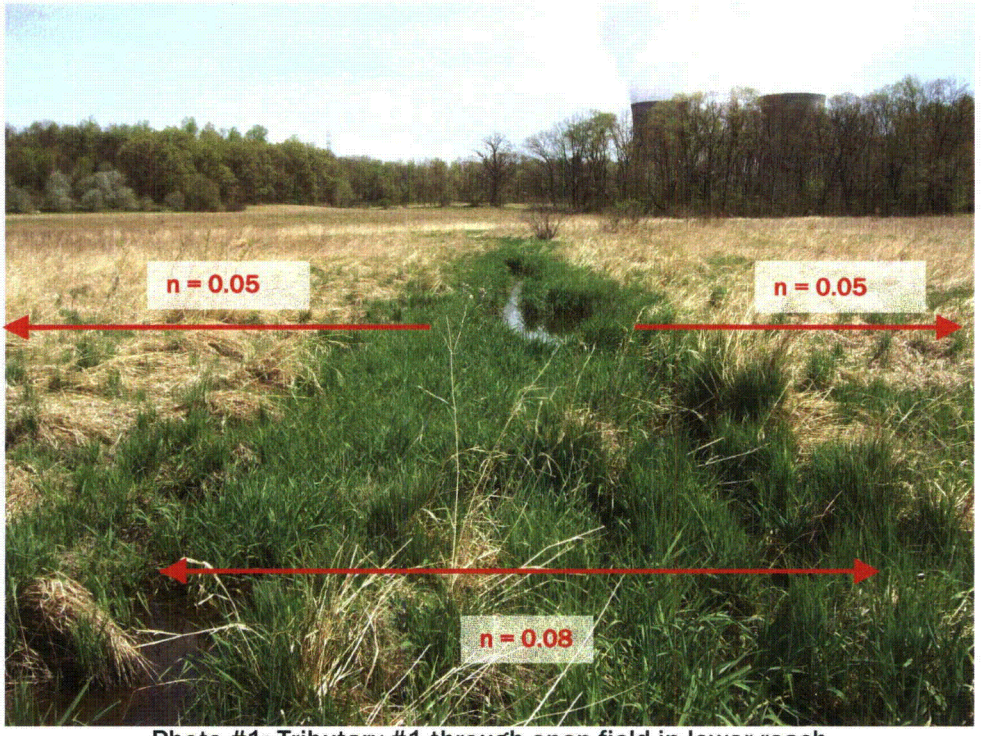


Photo #1: Tributary #1 through open field in lower reach

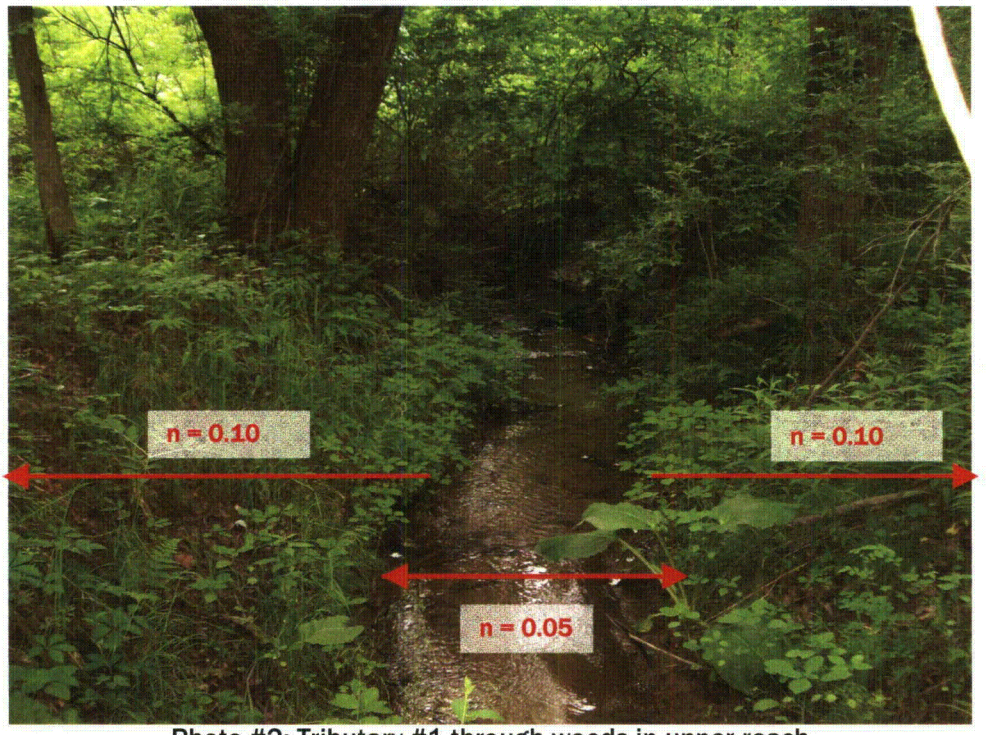
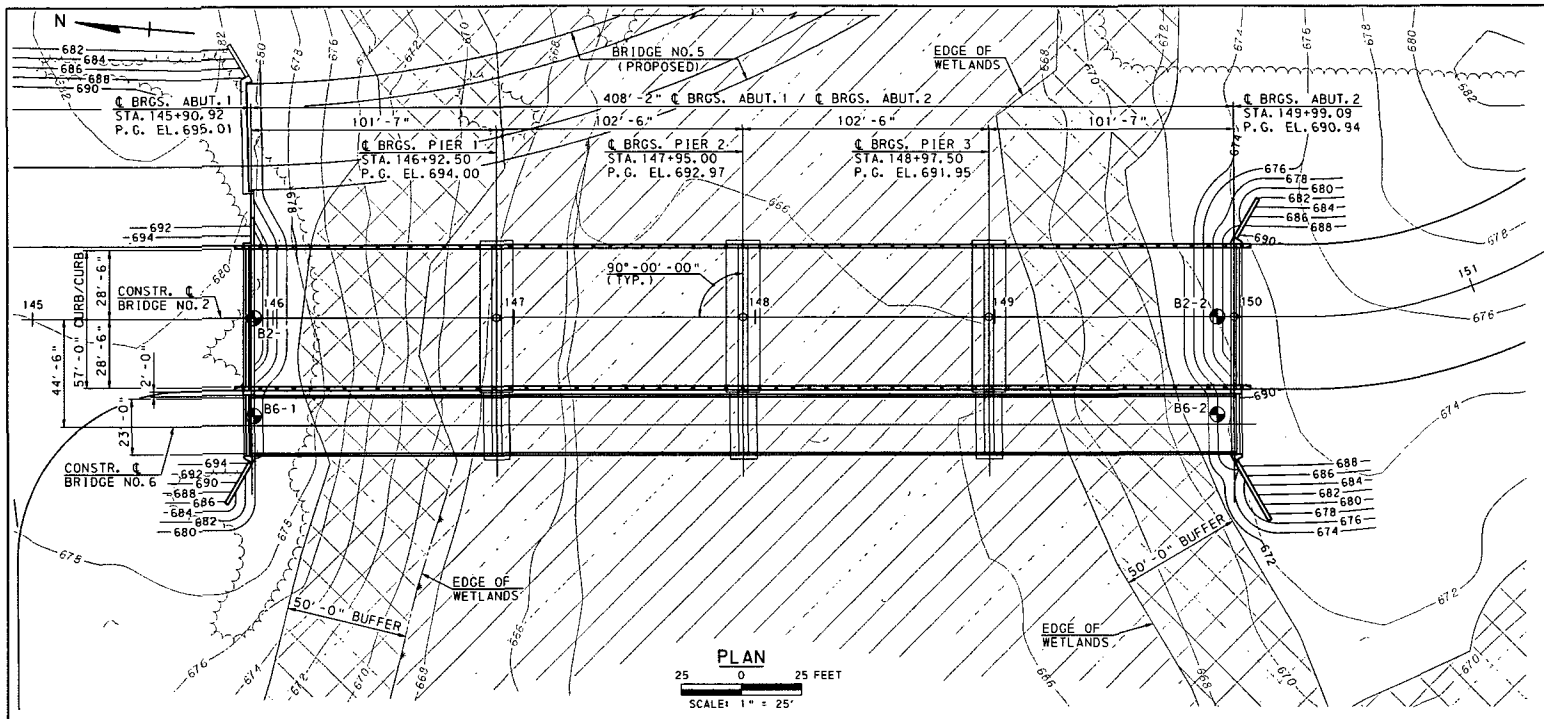


Photo #2: Tributary #1 through woods in upper reach

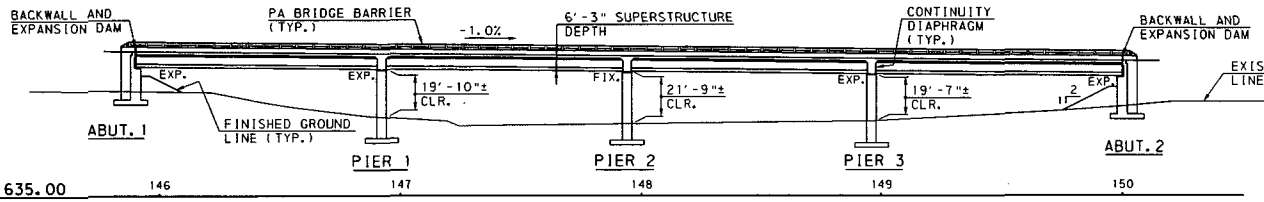
Appendix K:
Bridge Drawings



PLAN

25 0 25 FEET

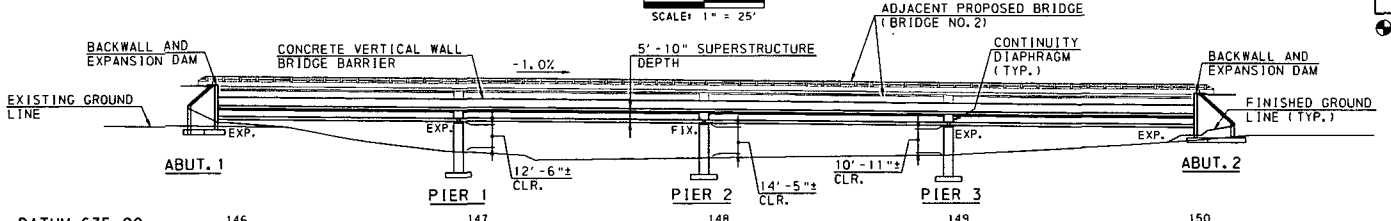
SCALE: 1" = 25'



SECTION ALONG ℄ BRIDGE 2

25 0 25 FEET

SCALE: 1" = 25'



ELEVATION - BRIDGE 6

25 0 25 FEET

SCALE: 1" = 25'

BORING LOCATION TABLE		
BORING NO.	NORTHING	EASTING
B2-1	339341.84	2407639.48
B2-2	338943.57	2407676.65
B6-1	339338.07	2407599.16
B6-2	338939.80	2407636.32

DENOTES BORING LOCATION.

DES: RPD | CKD: JJS | DWG: ASA | CKD: RPD

10/31/2011 2:31:44 PM
@FILES

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Engineers Surveyors Planners Landscape Architects

Pennoni

BY	DPG
REVISIONS	ISSUED FOR USE
NO.	1
DATE	4-19-11

DAVID F. GAUSMAN

CONCEPTUAL BRIDGE TYPE STUDIES
BELL BEND NUCLEAR PLANT, SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA
BRIDGE NO. 2 (MAIN ACCESS ROAD) & BRIDGE NO. 6 (UTILITY CROSSING) OVER WETLAND 12 & UNNAMED TRIB. TO WALKER RUN, STATION 147+95.00
FOUR-SPAN CONTINUOUS COMPOSITE PRESTRESSED CONCRETE PA BULB-TEE BEAM BRIDGE
GENERAL PLAN AND ELEVATION

JOB NO. PPLS 0902

SHEET 1 OF 2

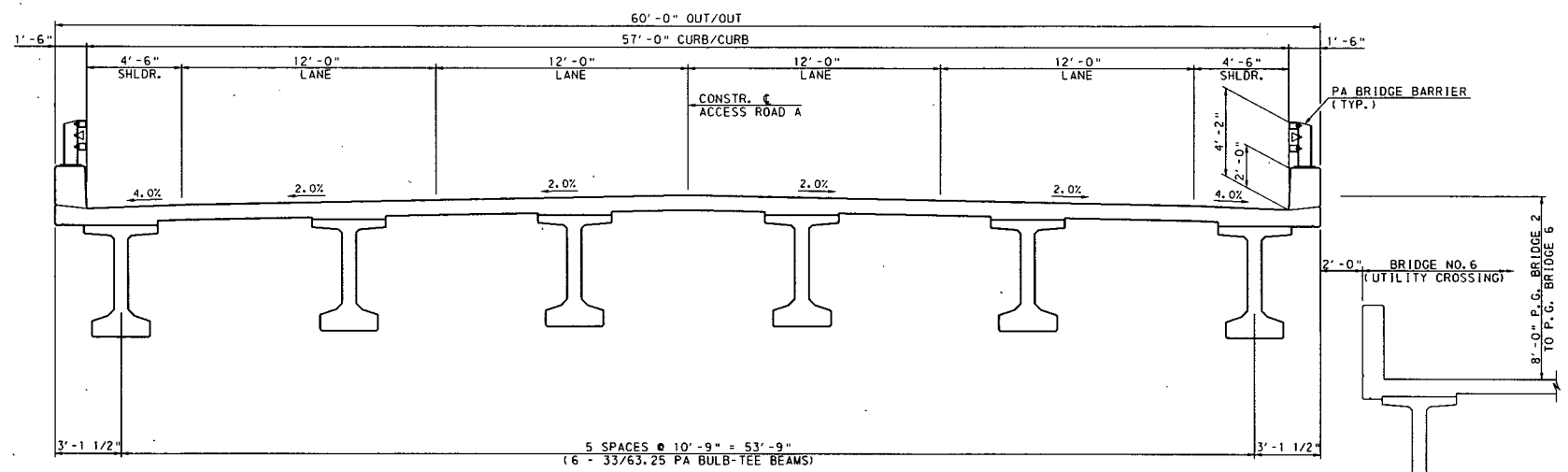
SCALE 1" = 25'

DRAWN BY ASA

DATE 1-28-11

APPROVED 4-19-11

DRAWING NO. B2-S1



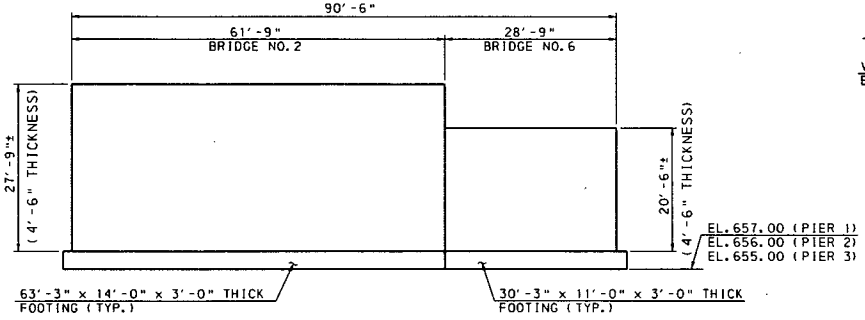
TYPICAL SECTION BRIDGE NO. 2

1 0 1 2 3 FEET

SCALE: 3/8" = 1'-0"

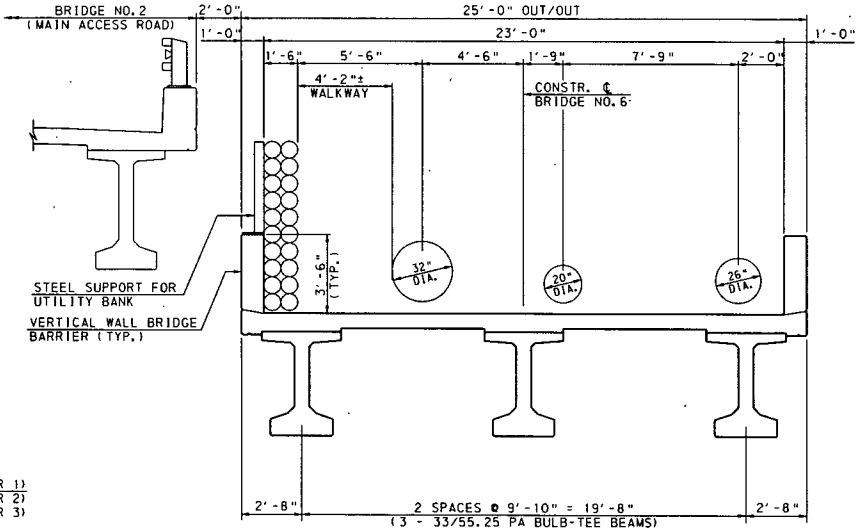
ANTICIPATED BRIDGE CONSTRUCTION ITEMS
CLASS AAA CEMENT CONCRETE
CLASS AA CEMENT CONCRETE
CLASS A CEMENT CONCRETE
PRESTRESSED CONCRETE I-BEAMS
NEOPRENE STRIP SEAL DAMS
METAL RAILING
REINFORCEMENT BARS
HP12 x 74 PILES
CLASS 3 EXCAVATION
SELECTED BORROW EXCAVATION, STRUCTURE BACKFILL

TABLE OF PROPOSED UTILITIES			
TYPE	MATERIAL	DIAMETER	QUANTITY
ELECTRICAL	GALV. RIGID STEEL	6"	20
CIRC. WATER	CARBON STEEL	32"	1
BLOW DOWN WATER	HDPE	26"	1
WATER	CARBON STEEL	20"	1



TYPICAL PIER AND FOOTING DIMENSIONS

NOT TO SCALE



TYPICAL SECTION BRIDGE NO. 6

1 0 1 2 3 FEET

SCALE: 3/8" = 1'-0"

DES: RPD | CKD: JJS | DWG: ASA | CKD: RPD

11/4/2011 2:20:32 PM
#FILES#

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Engineers Surveyors Planners Landscape Architects

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1	4-19-11	ISSUED FOR USE	DFG
2	10-28-11	REVISED PER THICKNESS	DFG

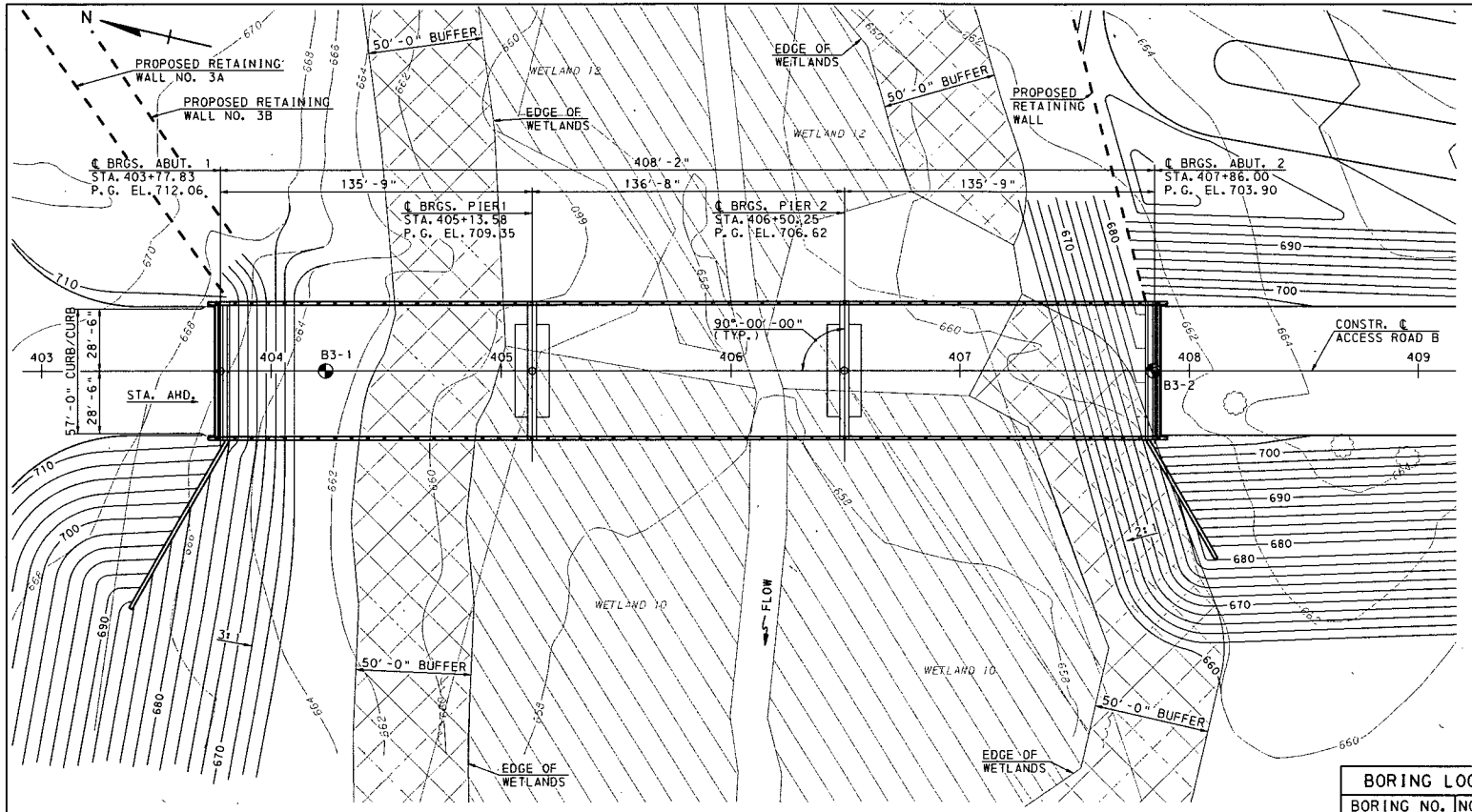
DAVID F. GAUGHAN PROFESSIONAL ENGINEER

CONCEPTUAL BRIDGE TYPE STUDIES
BELL BEND NUCLEAR PLANT, SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA
BRIDGE NO. 2 (MAIN ACCESS ROAD) & BRIDGE NO. 6
(UTILITY CROSSING) OVER WETLAND 12 & UNNAMED
TRIB. TO WALKER RUN, STATION 147+95.00
FOUR-SPAN CONTINUOUS COMPOSITE PRESTRESSED
CONCRETE PA BULB TEE-BEAM BRIDGE
TYPICAL SECTIONS

JOB NO. PPLS 0902

SHEET 2 OF 2

SCALE	DRAWING NO.
AS NOTED	B2-S2
DRAWN BY: ASA	
DATE: 1-28-11	
APPROVED: 4-19-11	



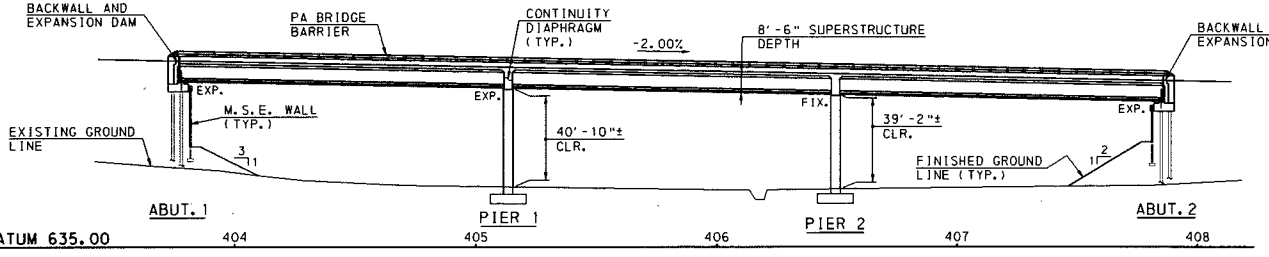
PLAN

25 0 25 FEET

SCALE: 1" = 25'

BORING LOCATION TABLE		
BORING NO.	NORTHING	EASTING
B3-1	339107.67	2405952.60
B3-2	338756.32	2406035.35

DENOTES BORING LOCATION.



SECTION ALONG CONSTR. ℄

25 0 25 FEET

SCALE: 1" = 25'

DES: JJS	CKD: SMP	DWG: ASA	CKD: DFG

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Pennoni Associates Inc. 100 N. WILKES-BARRE BLVD. WILKES-BARRE, PA 18702 Engineers Surveyors Planners Landscape Architects

Pennoni

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2	4-19-11	ISSUED FOR USE	DFG

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DAVID F. GAUSMAN PROFESSIONAL ENGINEER

CONCEPTUAL BRIDGE TYPE STUDIES

BELL BEND NUCLEAR PLANT, SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA

BRIDGE NO.3 ACCESS ROAD B OVER WETLAND 10 & 12
STATION 405+81.92
THREE-SPAN CONTINUOUS COMPOSITE PRESTRESSED CONCRETE I-BEAM BRIDGE

GENERAL PLAN AND ELEVATION

JOB NO. PPLS 0902

SHEET 1 OF 2

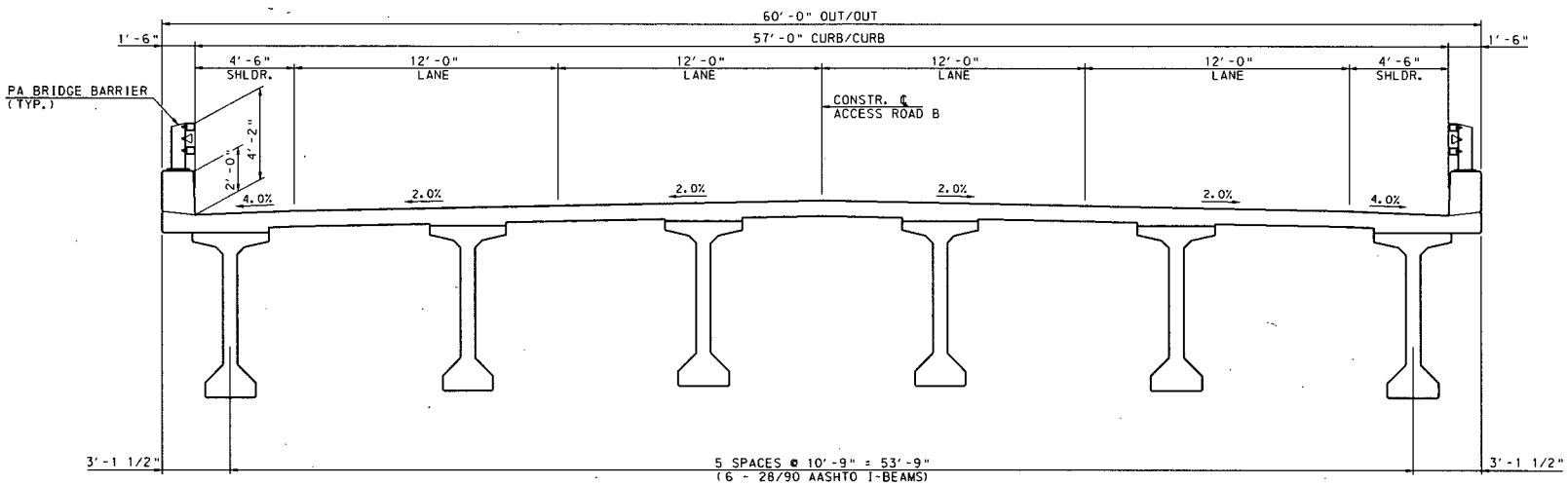
SCALE 1" = 25'

DRAWN BY ASA

DATE 1-28-11

APPROVED 4-19-11

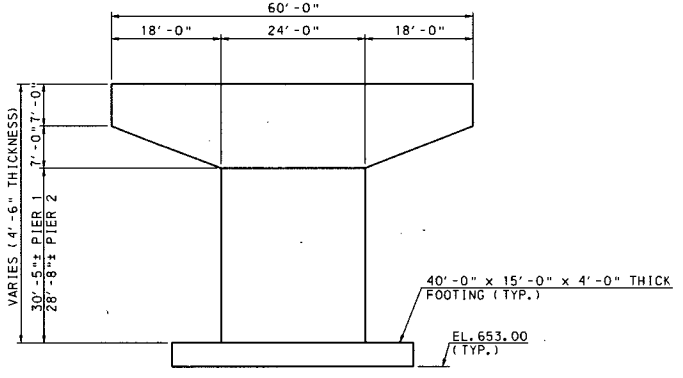
DRAWING NO. B3-S1



TYPICAL SECTION BRIDGE NO. 3

1 0 1 2 3 FEET

SCALE: 3/8" = 1'-0"



TYPICAL PIER AND FOOTING DIMENSIONS

NOT TO SCALE

ANTICIPATED BRIDGE CONSTRUCTION ITEMS
CLASS AAA CEMENT CONCRETE
CLASS AA CEMENT CONCRETE
CLASS A CEMENT CONCRETE
PRESTRESSED CONCRETE I-BEAMS
NEOPRENE STRIP SEAL DAMS
METAL RAILING
REINFORCEMENT BARS
HP12 x 74 PILES
MECHANICALLY STABILIZED EARTH ABUTMENTS
CLASS 3 EXCAVATION
SELECTED BORROW EXCAVATION, STRUCTURE BACKFILL
NO. 2 COARSE AGGREGATE

10/28/2011 11:10:57 AM
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DES: JJS	CKD: SMP	DWG: ASA	CKD: DFG

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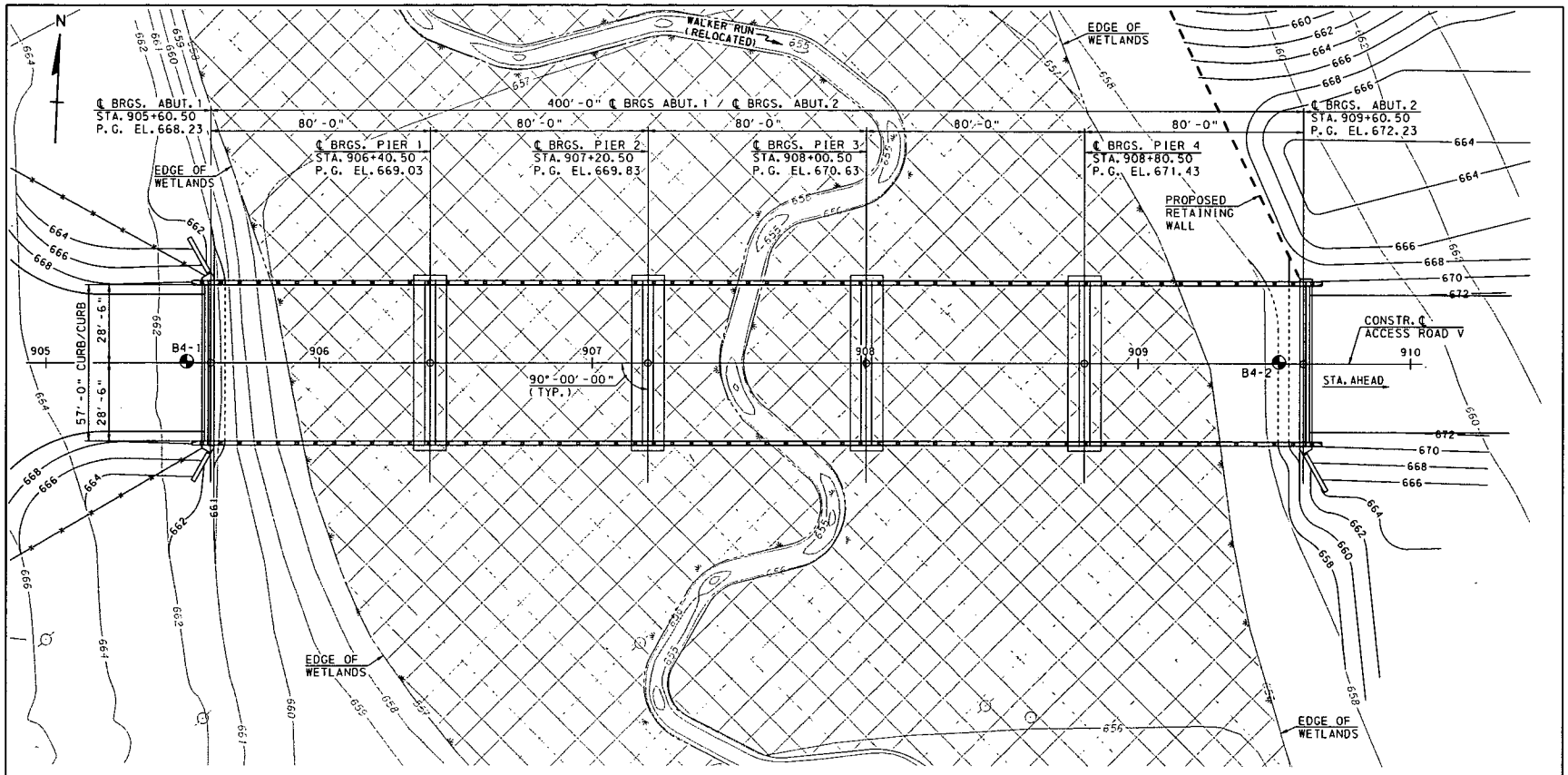
CONCEPTUAL BRIDGE TYPE STUDIES
BELL BEND NUCLEAR PLANT, SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA

BRIDGE NO. 3 ACCESS ROAD B OVER WETLAND 10
STATION 405+81.92
THREE-SPAN CONTINUOUS COMPOSITE PRESTRESSED
CONCRETE I-BEAM BRIDGE
TYPICAL SECTION

JOB NO. PPLS 0902

SHEET 2 OF 2

SCALE	DRAWING NO.
AS NOTED	B3-S2
DRAWN BY: ASA	
DATE: 01-28-11	
APPROVED: 4-19-11	



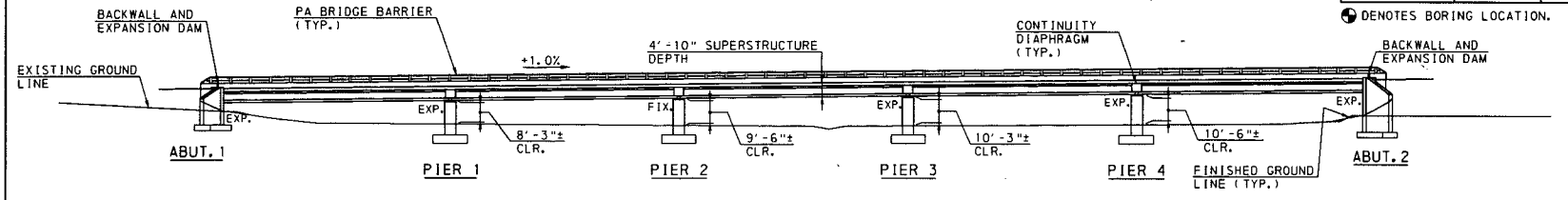
PLAN

20 0 20 FEET

SCALE: 1" = 20'

BORING LOCATION TABLE		
BORING NO.	NORTHING	EASTING
B4-1	339073.30	2404355.94
B4-2	339090.50	2404755.57

DENOTES BORING LOCATION.



ELEVATION

20 0 20 FEET

SCALE: 1" = 20'

DES: SMP	CKD: JJS	DWG: ASA	CKD: JJS

10/28/2011 11:10:13 AM
@FILE@

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DAVID F. CAUSMAN PROFESSIONAL ENGINEER

CONCEPTUAL BRIDGE TYPE STUDIES
BELL BEND NUCLEAR PLANT, SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA

BRIDGE NO. 4 ACCESS ROAD V OVER WALKER RUN
STATION 907+60.50
FIVE-SPAN CONTINUOUS COMPOSITE PRESTRESSED CONCRETE I-BEAM BRIDGE

GENERAL PLAN AND ELEVATION

JOB NO. PPLS 0902

SHEET 1 OF 2

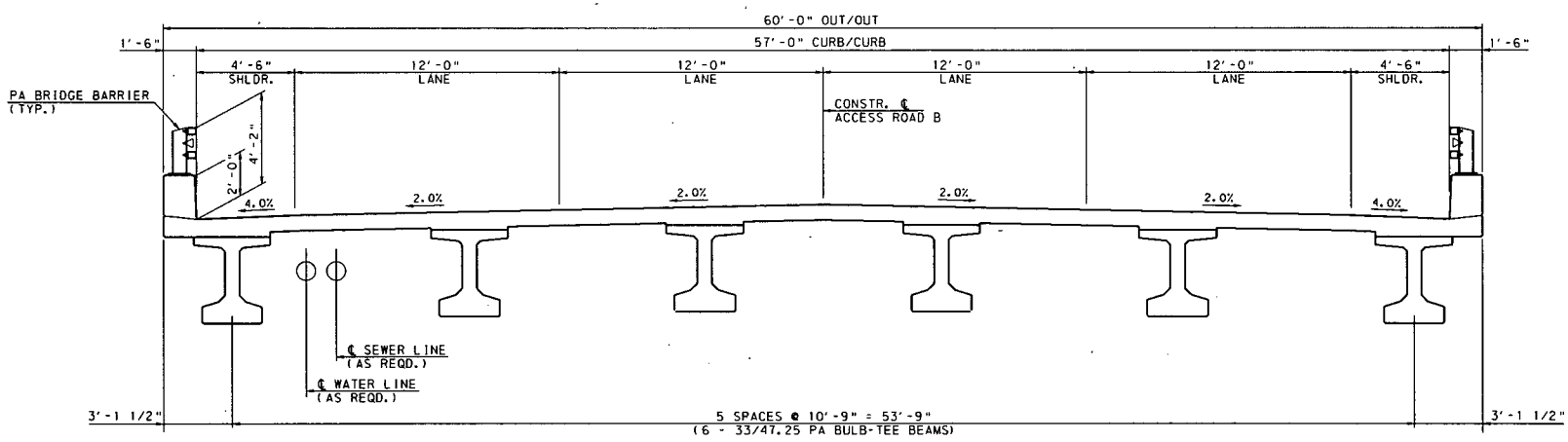
SCALE: 1" = 20'

DRAWN BY: ASA

DATE: 1-28-11

APPROVED: 4-19-11

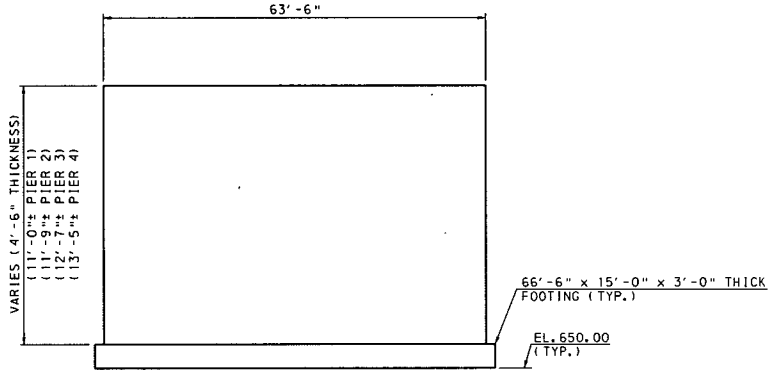
DRAWING NO. B4-S1



TYPICAL SECTION BRIDGE NO. 4

1 0 1 2 3 FEET

SCALE: 3/8" = 1'-0"



TYPICAL PIER AND FOOTING DIMENSIONS

NOT TO SCALE

ANTICIPATED BRIDGE CONSTRUCTION ITEMS
CLASS AAA CEMENT CONCRETE
CLASS AA CEMENT CONCRETE
CLASS A CEMENT CONCRETE
PRESTRESSED CONCRETE I-BEAMS
NEOPRENE STRIP SEAL DAMS
METAL RAILING
REINFORCEMENT BARS
CLASS 3 EXCAVATION
SELECTED BORROW EXCAVATION, STRUCTURE BACKFILL
NO. 2 COARSE AGGREGATE

10/28/2011 11:09:50 AM
@FILE@

DES: SMP	CKD: JJS	DWG: ASA	CKD: JJS

Pennoni Associates Inc. 100 N. WILKES-BARRE BLVD. WILKES-BARRE, PA 18702

Engineers Surveyors Planners Landscape Architects

Pennoni

DATE	NO.	REVISIONS	BY
4-19-11	1	ISSUED FOR USE	DFG

DAVID F. CAUSMAN — PROFESSIONAL ENGINEER

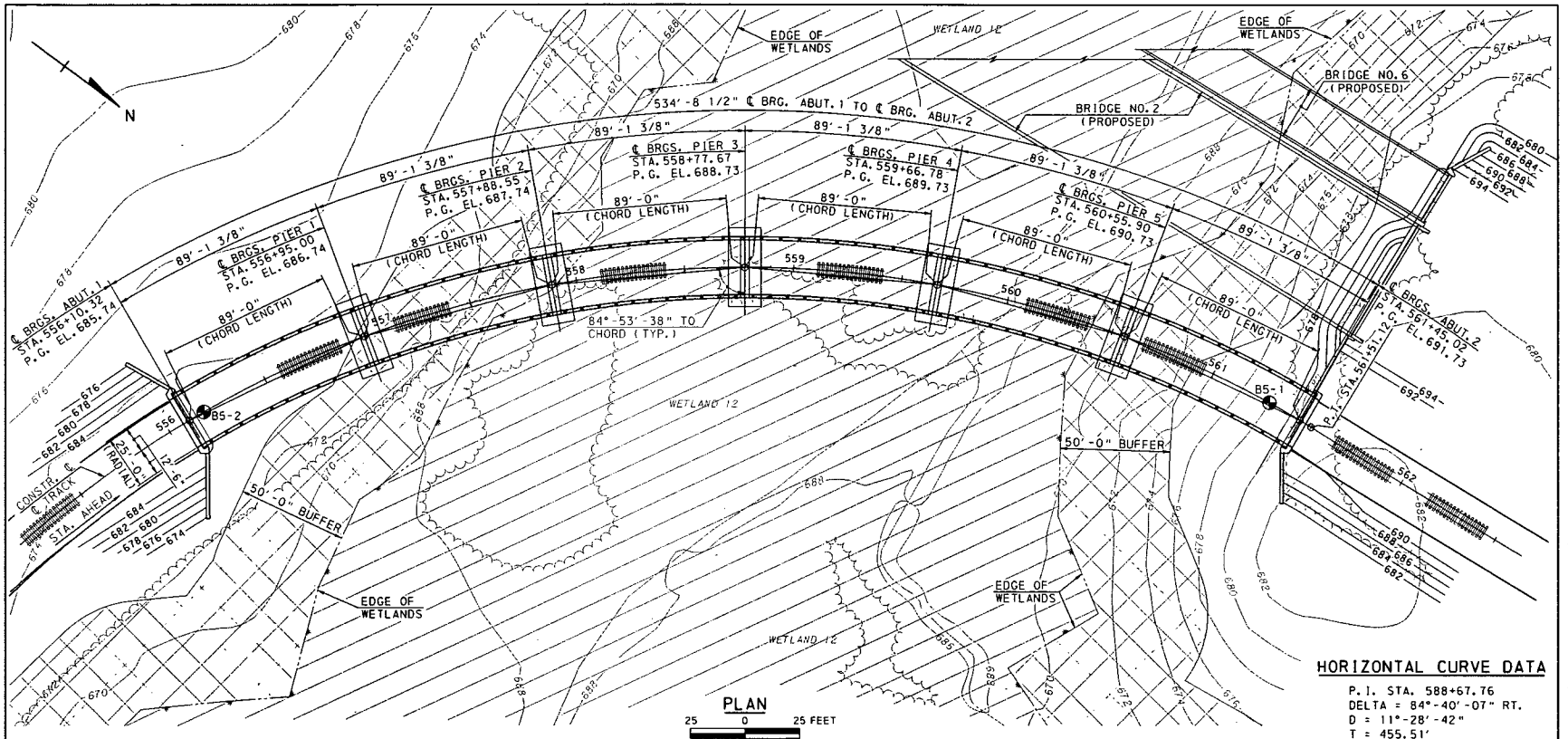
CONCEPTUAL BRIDGE TYPE STUDIES
BELL BEND NUCLEAR PLANT, SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA

BRIDGE NO. 4 ACCESS ROAD V OVER WALKER RUN
STATION 907+60.50
FIVE-SPAN CONTINUOUS COMPOSITE PRESTRESSED CONCRETE I-BEAM BRIDGE
TYPICAL SECTION

JOB NO. PPLS 0902

SHEET 2 OF 2

SCALE	DRAWING NO.
AS NOTED	B4-S2
DRAWN BY: ASA	
DATE: 01-28-11	
APPROVED: 4-19-11	



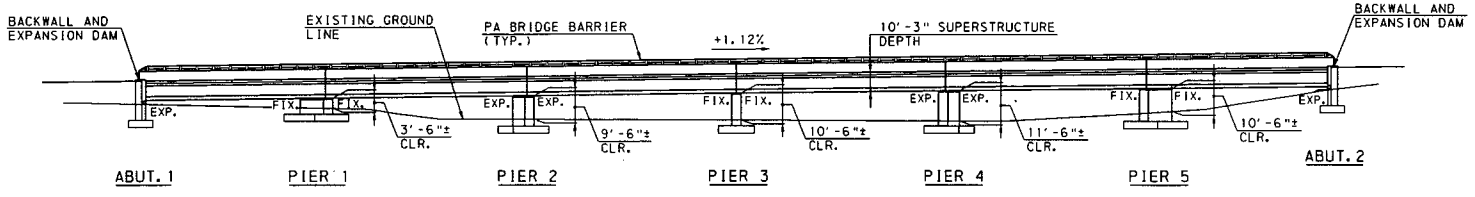
PLAN

25 0 25 FEET

SCALE: 1" = 25'

HORIZONTAL CURVE DATA

P. I. STA. 588+67.76
DELTA = 84°-40'-07" RT.
D = 11°-28'-42"
T = 455.51'
L = 738.87'
R = 500.00'
E = 130.39'



DATUM 620.00

ELEVATION

25 0 25 FEET

SCALE: 1" = 25'

BORING LOCATION TABLE		
BORING NO.	NORTHING	EASTING
B5-1	339334.45	2407715.99
B5-2	338944.70	2408011.37

DENOTES BORING LOCATION.

DES: JDF | CKD: SMP | DWG: ASA | CKD: DFG

10/28/2011 11:12:15 AM

Pennoni Associates Inc. 100 N. WILKES-BARRE BLVD. WILKES-BARRE, PA. 18702
Engineers Surveyors Planners Landscape Architects

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DAVID F. GAUSMANN PROFESSIONAL ENGINEER

CONCEPTUAL BRIDGE TYPE STUDIES

BELL BEND NUCLEAR PLANT, SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA

BRIDGE NO. 5 (RAILROAD) OVER WETLAND 12
STATION 558+77.67
SIX-SPAN COMPOSITE PRESTRESSED CONCRETE
AASHTO I-BEAM BRIDGE

GENERAL PLAN AND ELEVATION

JOB NO. PPLS 0902

SHEET 1 OF 2

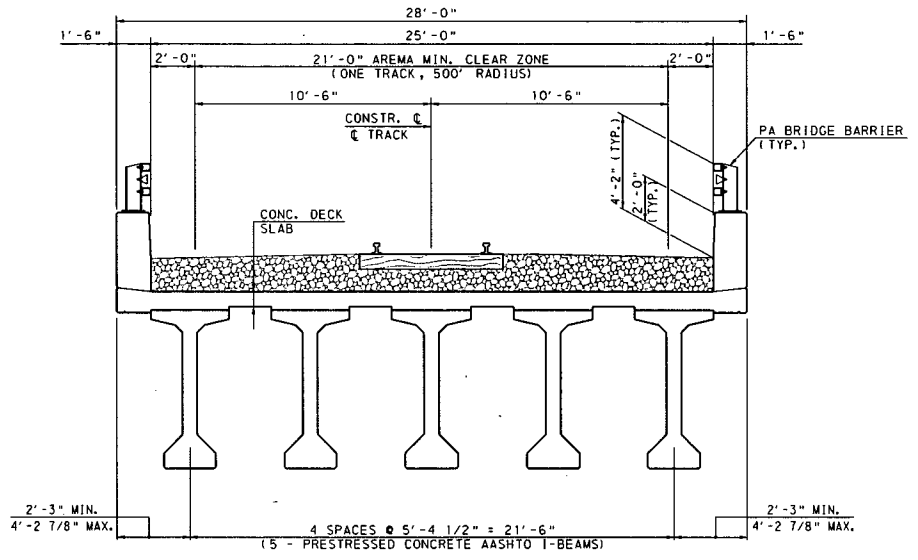
SCALE: 1" = 25'

DRAWN BY: ASA

DATE: 1-28-11

APPROVED: 4-19-11

DRAWING NO. B5-S1

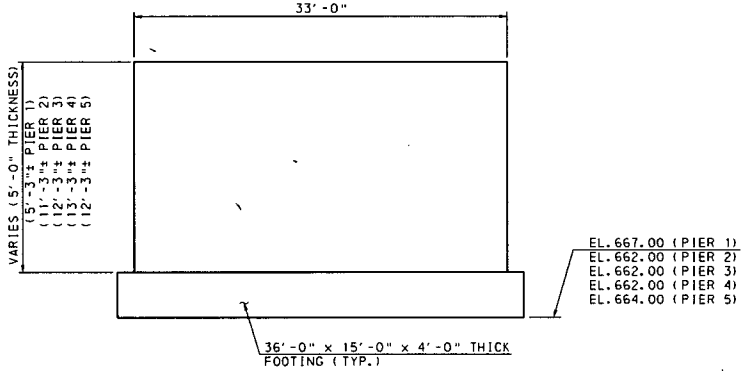


TYPICAL SECTION BRIDGE NO.5

1 0 1 2 3 FEET

SCALE: 3/8" = 1'-0"

ANTICIPATED BRIDGE CONSTRUCTION ITEMS
CLASS AAA CEMENT CONCRETE
CLASS AA CEMENT CONCRETE
CLASS A CEMENT CONCRETE
PRESTRESSED CONCRETE I-BEAMS
NEOPRENE STRIP SEAL DAMS
METAL RAILING
REINFORCEMENT BARS
HP12 x 74 PILES
CLASS 3 EXCAVATION
SELECTED BORROW EXCAVATION, STRUCTURE BACKFILL



TYPICAL PIER AND FOOTING DIMENSIONS

NOT TO SCALE

DES: JDF | CKD: SMP | DWG: ASA | CKD: DFG

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CONCEPTUAL BRIDGE TYPE STUDIES
BELL BEND NUCLEAR PLANT, SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA

BRIDGE NO.5 (RAILROAD) OVER WETLAND 12
STATION 558+77.67
SIX-SPAN COMPOSITE PRESTRESSED CONCRETE
AASHTO I-BEAM BRIDGE
TYPICAL SECTION

JOB NO. PPLS 0902

SHEET 2 OF 2

SCALE	DRAWING NO.
AS NOTED	B5-S2
DRAWN BY: ASA	
DATE: 1-28-11	
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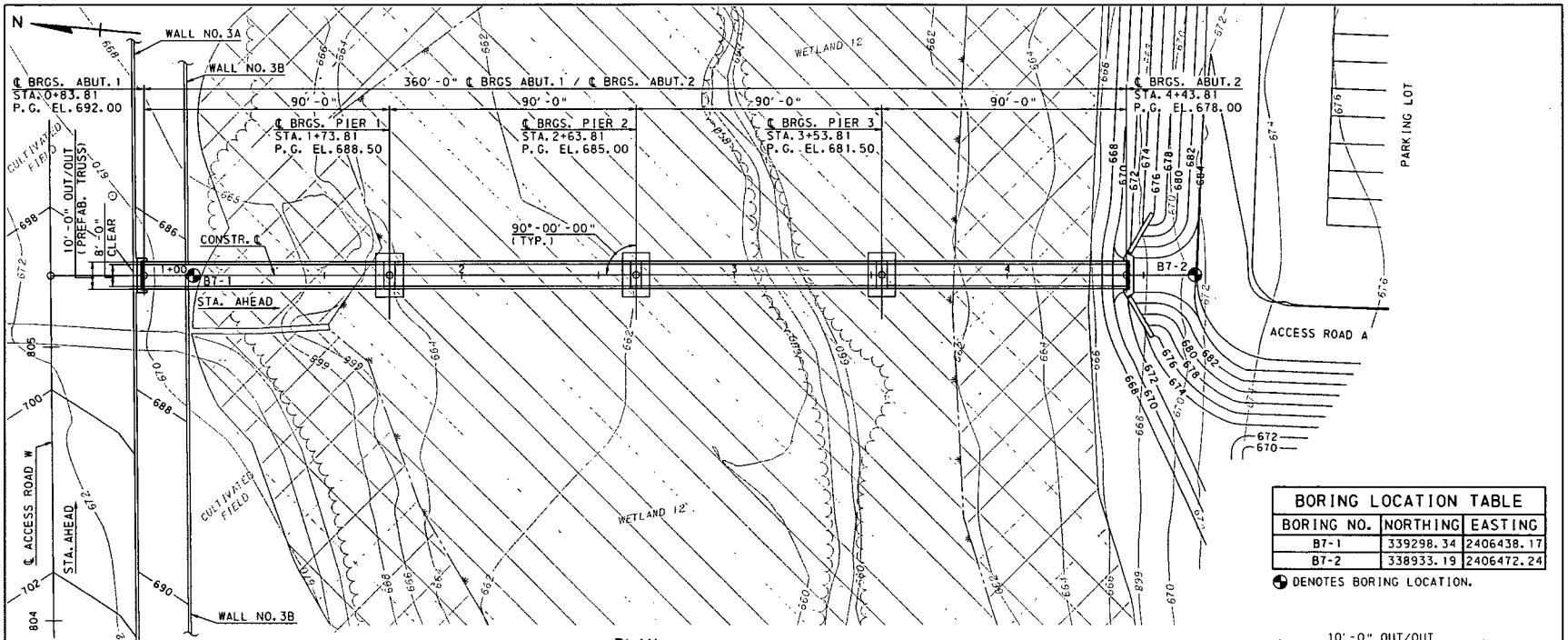


PLAN

20 0 20 FEET

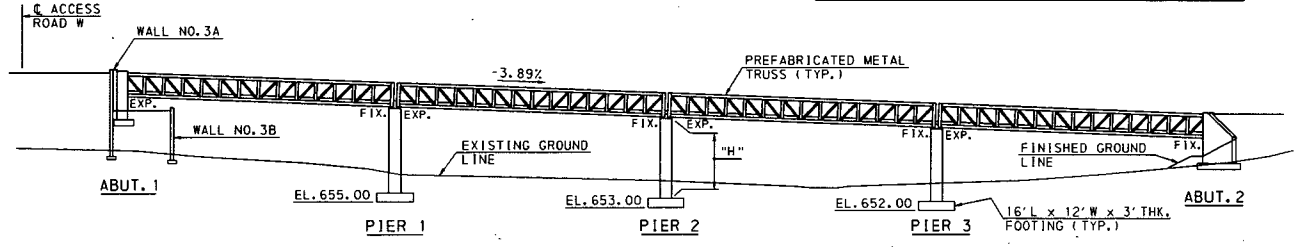
SCALE: 1" = 20'

BORING LOCATION TABLE		
BORING NO.	NORTHING	EASTING
B7-1	339298.34	2406438.17
B7-2	338933.19	2406472.24

DENOTES BORING LOCATION.

PIER STEM HEIGHTS, "H"	
PIER LOCATION	"H"
PIER 1	30'-6"±
PIER 2	29'-0"±
PIER 3	26'-6"±

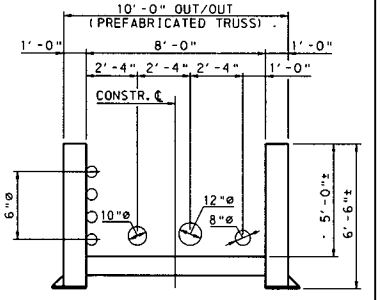
ANTICIPATED BRIDGE CONSTRUCTION ITEMS
PREFABRICATED TRUSS BRIDGE
CLASS A CEMENT CONCRETE
REINFORCEMENT BARS
CLASS 3 EXCAVATION
SELECTED BORROW EXCAVATION, STRUCTURE BACKFILL



ELEVATION

20 0 20 FEET

SCALE: 1" = 20'



TYPICAL SECTION

20 0 20 FEET

SCALE: 1" = 20'

TABLE OF PROPOSED UTILITIES			
TYPE	MATERIAL	DIAMETER	QUANTITY
WATER	D.I.P.	8"	1
SEWER	D.I.P.	10"	1
FIRE	CEMENT LINED D.I.P.	12"	1
ELECTRICAL	GALV. RIGID STEEL	6"	4

DES: SMP | CKD: JJS | DWG: ASA | CKD: DFG

10/28/2011 11:11:59 AM
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CONCEPTUAL BRIDGE TYPE STUDIES
BELL BEND NUCLEAR PLANT, SALEM TOWNSHIP
LUZERNE COUNTY, PENNSYLVANIA

BRIDGE NO. 7 OVER WETLAND 12
STATION 2+63.81
FOUR-SPAN PREFABRICATED METAL TRUSS UTILITY BRIDGE

GENERAL PLAN AND ELEVATION

JOB NO. PPLS 0902

SHEET 1 OF 1

SCALE	DRAWING NO.
1" = 25'	B7-S1
DRAWN BY: ASA	
DATE: 1-28-11	
APPROVED: 4-19-11	