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Preliminary Drainage Report

Eagle Rising

Project No. 61145

July 15, 2022

PCD File No.

Also see comment memo

Preliminary Drainage Report

Eagle Rising

Project No. 61145

July 15, 2022

prepared for

Casas Limited Partnership #4
5390 N. Academyt Boulevard, Suite 300
Colorado Springs, CO 80918

prepared by

MVE, Inc.
1903 Lelaray Street, Suite 200
Colorado Springs, CO 80909
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Statements and Acknowledgments

Engineer's Statement

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____

Charles C. Crum, P.E. Colorado No. 13348 Date
For and on Behalf of MVE, Inc.

Developer's Statement

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

_____ _____

Stephen J. Jacobs Date
Casas Limited Partnership #4
5390 N. Academyt Boulevard, Suite 300
Colorado Springs, CO 80918

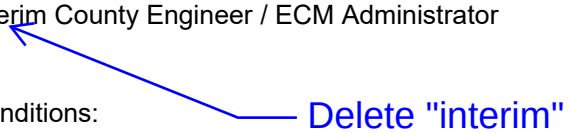
El Paso County

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____ _____

Joshua Palmer, P.E., Date
Interim County Engineer / ECM Administrator

Conditions:



Contents

Preliminary Drainage Report

The purpose of this Preliminary Drainage Report is to identify drainage patterns and quantities within and affecting the proposed Eagle Rising development and Eagle Rising subdivision. The development project is a residential subdivision with seventeen (17) 2.5± acre lots, and two (2) tracts. The report will identify specific solutions to problems on-site and off-site resulting from the proposed project. The report and included maps present results of hydrologic and drainage facilities analyses. The report will discuss the recommended drainage improvements to the site and identify drainage requirements relative to the proposed project. This report has been prepared and submitted in accordance with the requirements of the El Paso County development approval process. An Appendix is included with this report with pertinent calculations and graphs used in the drainage analyses and design.

1 General Location and Description

1.1 Location

The proposed Eagle Rising project and is located within the east one-half of Section 29, Township 12 South, Range 65 west of the 6th principal meridian in El Paso County, Colorado. The Eagle Rising project site consists of 70.8+/- acres and is situated east of Black Forest Road north of Highland Park subdivision filing No. 2. The site contains two existing single-family residences and several ancillary buildings. The El Paso County Assessor's Schedule Numbers for the site are 5229000034 and 5229000035. The proposed site has never been platted. A Vicinity Map is included in the Appendix.

The south edge of the site is adjacent to Highland Park Subdivision Filing No. 2 zoned RR-2.5 (Rural Residential (2.5 acres). Lots 9, 10 & 11 Eagle Wing Estates zoned RR-2.5 each containing a single family residence are located adjacent to the west side of the site. Also adjacent to the west side of the site is an unplatted parcel containing a single-family residence zoned RR-5. Lots 135, 136, 137, 141 & 142, Highland Park Filing No. 3, vacant lots zoned RR-2.5, are all adjacent to the east side of the site. Lot 1, Poco Subdivision, containing a single-family residence zoned RR-5, is also adjacent to the east side of the site. Also, adjacent to the east side of the site are lots 8 & 9 block 19 Park Forest Estates Filing No 2 zoned RR-5, containing a single-family residence. Lot 14 block 18, and lot 5 block 19, Park Forest Estates Filing No. 2, each containing a single-family residence and zoned RR-5, are adjacent to the north of the site. The site is located in El Paso County's Cottonwood Creek Drainage Basin.

1.2 Description of Property

The Eagle Rising site is 70.8+/- acres and is zoned RR-2.5 (Residential Rural (2.5 Acres). The property is the location of two (2) single-family residences, several ancillary buildings with an existing unpaved driveway. In addition, there are two on-line ponds along the main stem of Cottonwood Creek. These two man-made ponds along the said channel reach which were believed to be constructed around the 1950's. The purpose for their construction is unknown due to lack of history but is speculated to be for livestock use.

The site is covered with native grass and weeds in good condition, and coniferous trees. Cottonwood Creek flows to the east through the eastern portion of the site. The existing site topography slopes toward Cottonwood Creek with grades that range from 1% to 12%. Cottonwood Creek flows north to south to the east through the Eagle Rising site with all storm runoff flows from said Eagle Rising

flowing into Cottonwood Creek. The site is located in the Cottonwood Creek Drainage Basin. The flows from in Cottonwood Creek are tributary to Monument Creek.

According to the National Resource Conservation Service, there are two (2) soil types in the Eagle Rising site. Kettle gravelly loamy sand (map unit 40) makes up a portion of the soil in the northern end of the site. The soil is deep and somewhat excessively drained. Permeability is moderately rapid, surface runoff is slow, and the hazard of erosion is slight to moderate. Kettle gravelly loamy sand is classified as being part of Hydrologic Soil Group B.

The other soil type is Pring Coarse Sandy Loam (map unit 71) which makes up the rest of the site. The soil is deep and well drained. Permeability is moderately rapid, surface runoff is slow, and the hazard of erosion is slight to moderate. Pring Coarse Sandy Loam is classified as being part of Hydrologic Soil Group B.

A portion of the Soil Map and data tables from the National Cooperative Soil Survey and relevant Official Soil Series Descriptions (OSD) are included in the **Appendix**.[1] [2]

Cottonwood Creek, a major drainage way, runs through the eastern portion of the Eagle Rising site. The 100-year water surface elevation for the drainage-way was determined by hydraulic analysis utilizing HEC-RAS as prepared by M&S Civil which is included and accepted in this report. No build areas are shown on the Preliminary Plan for Eagle Rising that include the 100-year inundated area determine in the hydraulic analyses as well as Construction/Disturbance Limits from the Wetland Determination Mapping for the project. Two existing ponds, which are to remain, are present in the drainageway.

The current Flood Insurance Study of the region includes Flood Insurance Rate Maps (FIRM), effective on December 7, 2018.[3] The proposed subdivision is included in the Community Panels Numbered 08041C0527 G and 08041C0535 G of the Flood Insurance Rate Maps for the El Paso County. A small area in the southeastern corner of the Eagle Rising Site is shown to be included in a 100-year flood hazard area as determined by FEMA. A portion of the current FEMA Flood Insurance Rate Maps with the site delineated is included in the **Appendix**.

2 Drainage Basins and Sub-Basins

2.1 Major Basin Descriptions

The Eagle Rising site is located in the Cottonwood Creek Drainage Basin (FOMO2200) of the Fountain Creek Major Drainage Basin. The Cottonwood Creek Drainage Basin Covers an area of approximately 19 square miles and drains to Monument Creek. The *Cottonwood Creek Drainage Basin Planning Study* provides development recommendations and requirements for drainage development in the Cottonwood Creek Drainage Basin (DBPS).[4] The Cottonwood Creek Drainage Basin encompasses a part of the northeast portion of the City of Colorado Springs and extends to the north and east. The drainage basin and Cottonwood Creek drain southwest into Monument Creek. The Eagle Rising site is located north of Cottonwood Creek as it flows offsite towards Monument Creek . The site is located in sub-basin WR 050, upstream of Design Point 040 of the Drainage Basin Planning Study. No improvements are recommended on or near the Eagle Rising site. The proposed Eagle Rising project is in conformance with the DBPS.

2.2 Other Drainage Reports

The “Eagle Rising Preliminary Drainage Report” by M&S Civil Consultants, Inc. dated June 2013 and Revised July, 2013 was reviewed in preparation of this Preliminary Drainage Report.[5] Said report is not approved and therefore was only used for informational purposes. Calculations in said report

1 WSS
2 OSD
3 FIRM
4 DBPS
5 2015 PDR

were reviewed and found to be in compliance with the Drainage Design Criteria used to for the preparation of this report.

2.3 Sub-Basin Description

The existing drainage patterns of the Eagle Rising development project are described by various sub-basins making up 21 Existing Design Points and 22 Developed Design Points. All existing sub-basin delineations and data are depicted on the attached **Eagle Rising Hydrology Map Existing (on-site)**.

3 Drainage Design Criteria

3.1 Development Criteria Reference

This Preliminary Drainage Report for Eagle Rising has been prepared according to the report guidelines presented in the latest edition of *El Paso County Drainage Criteria Manual* (DCM)[6]. The County has also adopted portions of the City of Colorado Springs Drainage Criteria Manual Volumes 1 and 2, especially concerning the calculation of rainfall runoff flow rates.[7] [8] The hydrologic analysis is based on a collection of data from the DCM, the NRCS Web Soil Survey[9], and existing topographic data by Land Resource Associates.

3.2 Hydrologic Criteria

For this Preliminary Drainage Report, the Rational Method as described in the D*rainage Criteria Manual* has been used for all Storm Runoff calculations, as the development and all sub-basins are less than 130 acres in area. "Colorado Springs Rainfall Intensity Duration Frequency" curves, Figure 6-5 in the DCM, was used to obtain the design rainfall values; a copy is included in the **Appendix**. The "Overland (Initial) Flow Equation" (Eq. 6-8) in the DCM, and Manning's equation with estimated depths were used in time of concentration calculations. "Runoff Coefficients for Rational Method", Table 6-6 in the DCM, was utilized as a guide in estimating runoff coefficient and Percent Impervious values; a copy is included in the **Appendix**. Peak runoff discharges were calculated for each drainage sub-basin for both the 5-year storm event and the 100-year storm event with the Rational Method formula, (Eq. 6-5) in the DCM.[10]

4 Drainage Facility Design

4.1 General Concept

The intent of the drainage concept presented in this Preliminary Drainage Report is to allow for the development Eagle Rising which consists of seventeen (17) 2.5-acre lots, and two (2) tracts while maintaining the existing drainage patterns on the site. The site will be in compliance with the County's Stormwater Management regulations. Major and minor storm flows will continue to be safely conveyed through the site and downstream.

The proposed drainage facilities for the development of Eagle Rising are minimal. The proposed use of the land being 2.5 acre lots does not lead to the necessity of onsite drainage facilities, other than culverts to convey the existing flows under the proposed roadways and driveways. As mentioned above, the existing channel is currently witnessing close to the ultimate flows from the existing upstream developed property with minimum signs of deterioration.

The existing and proposed drainage hydrologic conditions are described in more detail below. Input data and results for all calculations are included in the **Appendix**. Drainage maps for the hydrology are also included in the **Appendix**.

6 DCM Section 4.3 and Section 4.4
7 CS DCM Vol 1
8 CS DCM Vol 2
9 WSS
10 DCM

Analysis is needed. Address Soils and Geology study comments also:

to no steeper than 2.5:1. Wet, soft soils should be expected at the toe of the dam and stabilization may be necessary. Well-defined spillways should be maintained for both dams. It

4.2 Existing Hydrologic Conditions

The Eagle Rising Development is approximately 70.8+/- acres in size. The site primarily consists of grass land with slopes ranging from 4% to 12% and greater adjacent to Cottonwood Creek. The Cottonwood Creek main stem and several tributary branches are located within the site boundary. In addition, there are two on-line ponds along the main stem. These two man-made ponds along the channel reach which were believed to be constructed around the 50's. The purpose for their construction is unknown due to lack of history but is speculated to be for livestock use. There are two existing single – family residences and several ancillary buildings present. Existing gravel roadways provide access. There is no evidence of severe erosion or degradation of existing channel. However, it has been mentioned by the previous owner that the existing ponds did overflow at the existing locations, into the downstream channel. Also, there is no evidence of large sediment transfer deposits in the channel way or in the existing ponds.

The slopes located on the downstream ends of the aforementioned ponds needed improvements to ensure safety. The downstream pond slopes have be regarded to a 2.5:1 slopes, maximum. The downstream slopes were cleaned of organics and have soft areas re-compacted. The fill was benched into the existing compacted slopes and the toes keyed into the existing ground. It is proposed that a maintenance access road be constructed along the embankment of the south pond. No other improvements to the pond embankments or overflow structures are proposed at this time.

The ponds along the main stem (described in the Existing Drainage Characteristics narrative) were treated as wide channels due to their limited capacity for storage. Utilizing this approach is conservative in nature because the model assumes no storage; therefore yielding a certain amount of velocity thru the pond reach, albeit minor. Upon field investigation, an outlet structure and pipe was discovered. This was not taken into consideration in the model since the size (12") is not large enough to convey a significant amount of flow and is thought to be used as an overflow structure during minor storm events only. A "mixed" flow regime approach was used in the model. This approach is typically used for reaches of channels when you have a "mixture" of subcritical and supercritical flow regimes as was evident from review of the model's output data.

The existing upstream land is currently 80% developed into 2.5 acre lots or larger, as planned in the Cottonwood Creek DBPS. Therefore, the planned developed flows per the DBPS are closely matched to the current flows routed through the site. A brief description of each existing drainage basin including runoff rates, and drainage patterns for each basin is provided in this section of the report. A summary of peak developed runoff for the basins and designated design points are depicted on the Hydrologic Map - On-site Existing in the **Appendix**. The off-site drainage area impacting Eagle Rising Development and more particularly on-site drainage areas have been divided into existing drainage basins described as follows:

Design Point E1 (DP El) flows (Q5=307cfs, Q100=547cfs) are generated from off-site basins A1, A2, A3, A4, A5, A8, A9 & A13. These basins were delineated in the 1994 Cottonwood Creek DBPS. These basins are located at the top of the Cottonwood Creek watershed and consist of large lot subdivisions, open space, fields and pastures. DP El is located on the main stem of Cottonwood Creek at the site northern boundary as creek flow enters the Eagle Rising development.

Design Point E2 (DP E2) flows (Q5=24cfs, Q100=57cfs) are generated from off-site basin OS-B1A. This basin is a sub-basin of DBPS basin B1 and has been created to determine the flow at the entry point into the site along a tributary branch of the main stem. This basin consists of large lot subdivisions, open space, fields and pastures.

Design Point E3 (DP E3) flows (Q5=42cfs, Q100=98cfs) are generated from off-site basin OS-B1B. This basin 1s a sub-basin of DBPS basin B1 and has been created to determine the flow at the entry point into the site along a tributary branch of the main stem. This basin consists of large lot subdivisions, open space, fields and pastures.

Design Point E4 (DP E4) flows (Q5=76cfs, Q100=136cfs) are generated from off-site basins A6, A7 and A10. These basins were delineated in the 1994 Cottonwood Creek DBPS. These basins consist of large lot subdivisions, open space, fields and pastures. DP E4 is located along a tributary reach off the main stem of Cottonwood Creek as flow enters the Eagle Rising development

Design Point E5 (DP E5) flows (Q5=408cfs, Q100=728cfs) are generated from DP El, DP E4 on-site basin EX-A and off-site basin A11. On-site basin EX-A consists of open space as well as a small portion of the creek itself. Off-site basin A11 consists of large lot subdivisions, open space, fields and pastures. These basins were delineated in the 1994 Cottonwood Creek DBPS. DPE5 is located on the main stem of Cottonwood Creek

Design Point E6 (DP E6) flows (Q5=484cfs, Q100=884cfs) are generated from DP E2, DP E3, DP E5, on-site basin EX-B and off-site basin A12. On-site basin EX-B consists of large lot (2.5ac +/-) existing development as well as a small portion of the creek itself. Off-site basin A12 consists of large lot subdivisions, open space, fields and pastures. This basin was delineated in the 1994 Cottonwood Creek.

Design Point E7 (DP E7) flows (Q5=l.7cfs, Q100=4.0cfs) are generated from off-site basin OS-B1C. Off-site basin OS-B1C consists of large lot subdivisions, open space, fields and pastures.

Design Point E8 (DP E8) flows (Q5=6cfs, Q100=14cfs) are generated from off-site basin OS-B1D. Off-site basin OS-B1D consists of large lot subdivisions, open space, fields and pastures.

Design Point E9 (DP E9) flows (Q5=485cfs, Q100=893cfs) are generated from DP E6, D, DP E8, and on-site basin EX-C, EX-D, and off-site basin OS-B4A. Off-site basin OS-B4A is a sub-basin of DBPS basin B4 and has been created to determine the flow at the entry point into the site as sheet flow into the main stem. Off-site basin OS-B4A consists of large lot subdivisions, open space, fields and pastures. On- site basins EX-C and EX-D consist of large lot (~2.5ac+/-) existing development. There are two existing ancillary structures present within the basins.

Design Point E10 (DP E10) flows (Q5=10cfs, Q100=24cfs) are generated from off-site basin OS-B1E. Off-site basin OS-B1E consists of large lot subdivisions, open space, fields and pastures.

Design Point E11 (DP E11) flows (Q5=9cfs, Q100=21cfs) are generated from off-site basin OS-B3A. Off-site basin OS-B3A consists of large lot subdivisions, open space, fields and pastures.

Design Point E12 (DP E12) flows (Q5=499cfs, Q100=926cfs) are generated from DP E9, DP El, DP E11, on¬ site basins EX-E, EX-F, and off-site basin OS-B4B. Off-site basin OS-B4B is a sub-basin of DBPS basin B4 and has been created to determine the flow at the entry point into the site as sheet flow into the main stem. Off and pastures. On-site basins EX-E and EX-F consist of pasture.

Design Point E13 (DP El3)-site basin OS-B4A consists of large lot subdivisions, open space, fields flows (Q5=2.1cfs, Q100=5.1cfs) are generated from off-site basin OS-B3B. Off¬ site basin OS-B3A consists of large lot subdivisions, open space, fields and pastures.

Design Point E14 (DP E14) flows (Q5=496cfs, Q100=925cfs) are generated from DP E12, DP E13, on-site basins EX-G and EX-H, and off-site basin OS-B4C. Off-site basin OS-B4C consists of large lot subdivisions, open space, fields and pastures. This basin is a sub-basin of DBPS basin B4 and has been created to determine the flow at the entry point into the site at the southern pond along the main stem as primarily sheet flow. DP14 is located on the main stem of Cottonwood Creek. On-site basins EX·G and EX-H consist of pasture.

Design Point E15 (DP E15) flows (Q5=6.5cfs, Q100=14.8cfs) are generated from off-site basin OS-B3C. This basin is a sub-basin of DBPS basin B3 and has been created to determine the flow at the entry point to the site. This calculated flow for information only since it does not mix with on-site flow. This basin consists of large lot subdivisions, open space, fields and pastures within the Eagle Wing subdivision.

Design Point El6 (DP E16) flows (Q5=4.9cfs, Q100=11.6cfs) are generated from off-site basin OS-B3C, and basin EX-H. DP E16 is a summation of the off-site basin and future onsite developed basin. DP El6 can be compared to DP16 in the next section for the total flows exiting the site.

Design Point E17 (DP E17) flows (Q5=64cfs, Q100=152cfs) are generated from off-site basins OS-B1A and OS-B1B (DP E2 & DP E3). The summations of these flows at DP E17 are combined in an existing small local depression area. The depression appears to be man-made, possibly for livestock watering. The current condition of the depression appears to hold some water at certain times of year but not continually. The downstream end of the depression area is a small bank to trap the

water in the existing natural swale. The depression area is proposed to be left intact, non disturbed, and is within a no build area.

Design Point E18 (DP E18) flows (Q5=4.2cfs, Q100=l0cfs) are generated from off-site basin OS-B1C (DP¬ E7) and basin EX-Cl. Basin EX-C1 was created by the construction of the existing Barn Building. The Barn construction has redirected the historic flows to the east and into the Cottonwood channel.

Design Point E19 (DP E19) flows (Q5=64cfs, Q100=151cfs) are generated from the summation of DP E18, basin EX-B, and DP E17. The summations of these historic flows enter the Cottonwood Creek channel and combine with flows from DP E5.

Design Point E20 (DP E20) flows (Q5=9.7cfs, Q100=23cfs) are generated from off-site basin OS-B1D (DP E8) and basin EX-D. Basin EX-D was created by the construction of the existing Barn Building and riding arena. This construction created a flat graded area and man-made pond. The pond overflow continues in the historic drainage swale to DP E20.

Design Point E21 (DP E21) flows (Q5=18cfs, Q100=43cfs) are generated from off-site basin OS-B1E (DP E10), OS-B3A (DP E11) and basin EX-F. Basin EX-F is an undisturbed historic drainage area. The summation of flows at DP E21 discharges into the existing south pond area and combine with flows from upstream DP E9.

The included Eagle Rising Hydrology Maps (Existing On-Site & Off-Site) depicts the existing topographic mapping, drainage basin delineations, drainage patterns, existing drives, drainage facilities, and runoff quantities with a data table including drainage areas and flow rates.

4.2.1 Developed Hydrologic Conditions

Provide complete channel analysis

Proposed drainage facilities for development of Eagle Rising are minimal. The proposed use of the land being 2.5 acre lots does not lead to the necessity of onsite drainage facilities, other than culverts to convey the existing flows under the proposed roadways and driveways. As mentioned above, the existing channel is currently witnessing close to the ultimate flows from the existing upstream developed property. The channel will be left in a natural condition for its aesthetic value, better water quality conditions, for both engineering and economic considerations. The 100 year storm water flow level has been established and used to provide the establishment of drainage no build easements above said 100 years levels in the Eagle Rising areas that are impacted.

The existing up-graded ponds may be used for detention of the increase in existing Eagle Rising site storm water flows compared to the Eagle Rising developed storm water flow. The existing 12" outlet culverts would need to be re-vamped with a riser, trash rack, and appropriate orifice outlet control to release Eagle Rising storm water flows at their existing historic rate. The Owner/Developer may qualify for 50% of the costs of these small on-site ponds as they would meet the criteria of **3.10.4a Reimbursement of Construction Costs for On-Site Ponds**, El Paso County Engineering Design Criteria Manual. Said section 3.10.4a also reads "It is important to note that reductions for meeting certain on site detention criteria and for development that consists of 2.5 or 5.0 acres lots (discussed above) cannot both be applied to the same development. Owner/Developer will elect the fee reduction mechanism at the Final Plating stage.

A brief description of each developed drainage basin including developed runoff rates, drainage patterns and proposed drainage facilities for each basin is provided in this section of the report. A summary of peak developed runoff for the basins and designated design points are depicted on the Proposed Hydrologic Map (on-site) in the **Appendix**. The site has been divided into twenty-two developed drainage basins described as follows:

Design Point 1 (DP1) flows (Q5=307cfs, Q100=547cfs) are generated from off-site basins A1, A2, A3, A4, A5, A8, A9 & A13. These basins were delineated in the 1994 Cottonwood Creek DBPS. These basins are located at the top of the Cottonwood Creek watershed and consist of large lot subdivisions, open space, fields and pastures. **DP1** is located on the main stem of Cottonwood Creek at the site northern boundary as creek flow enters the Eagle Rising development.

Clarify which ponds and provide an exhibit. Provide documentation from the water district that changes are acceptable

This is not applicable

Design Point 2 (DP2) flows (Q5=76cfs, Q100=136cfs) are generated from off-site basins A6, A7 and A10. These basins were delineated in the 1994 Cottonwood Creek DBPS. This basin consists of large lot subdivisions, open space, fields and pastures. **DP2** is located along a tributary reach off the main stem of Cottonwood Creek as flow enters the Eagle Rising development. This design point was set at this location for entry into the HECRAS model.

Design Point 3 (DP3) flows (Q5=408cfs, Q100=728cfs) are generated from **DP1**, **DP2**, on-site basin A and off-site basin A11. On-site basin A consists of large lot (~2.5ac +/-) proposed development as well as a small portion of the creek itself. Off-site basin A11 consists of large lot subdivisions, open space, fields and pastures. These basins were delineated in the 1994 Cottonwood Creek DBPS. **DP3** is located on the main stem of Cottonwood Creek. This design point was set at this location for entry into the HECRAS model.

Design Point 4 (DP4) flows (Q5=24cfs, Q100=57cfs) are generated from off-site basin OS-B1A. This basin is a sub-basin of DBPS basin B1 and has been created to determine the flow at the entry point into the site along a tributary branch of the main stem. This basin consists of large lot subdivisions, open space, fields and pastures. This flow is contained within a drainage-way (Drainageway 1) that runs through Lot 1, Filing No. 1. The slope of the drainage-way is approximately 3.6% and has velocities of 3.8fps and 4.7fps, depths of 0.8' and 1.1' during the 5yr and 100yr storms respectively, at the steepest and most defined a point along the reach. A threshold of 5 fps has been utilized for all natural drainage-ways within the project site due to the presence of well established vegetation in the bottom and along the side slopes. Refer to the hydraulic calculations in appendix 1 for additional information for all drainage-ways.

Design Point 5 (DP5) flows (Q5=42cfs, Q100=98cfs) are generated from off-site basin OS-B1B. This basin is a sub-basin of DBPS basin B1 and has been created to determine the flow at the entry point into the site along a tributary branch of the main stem. This basin consists of large lot subdivisions, open space, fields and pastures. This flow is contained within a drainage-way (drainage-way 2) that runs through Lots 1 & 2, Filing No. 1. The slope of the drainage-way is approximately 3.7% and has velocities of 3.8 fps and 4.7 fps, depths of 0.8' and 1.1' during the 5yr and 100yr storms respectively, at the steepest and most defined a point along the reach.

Design Point 6 (DP6) flows (Q5=68cfs, Q100=160cfs) are generated from **DP4** and **DP5** and on-site basins B and C. On-site basins B & C consist of large lot (~2.5ac +/-) proposed development. Drainagways 1 and 2 combine at this location. Immediately downstream of this outfall, there is an existing depression area which appears to be man-made.

Design Point 6A (DP 6A) flows (Q5=4.2cfs, Q100=10cfs) are generated from off-site basin OS-B1C (DP E7) and basin E1. Basin E1 was created by the construction of the existing Barn Building and the proposed development of large lots. On-site basins E1 consist of large lot (~2.5ac +/-) proposed development.

Design Point 6B (DP 6B) flows (Q5=65cfs, Q100=155cfs) are generated from the summation of **DP 6A**, and basin D. The summations of these flows will enter the Cottonwood Creek channel and combine with flows from DP 3.

Design Point 7 (DP7) flows (Q5=488cfs, Q100=892cfs) are generated from **DP3**, **DP6**, on-site basin D and off-site basin A12. On-site basin D consists of large lot (~2.5ac +/-) proposed development as well as a small portion of the creek itself. Off-site basin A12 consists of large lot subdivisions, open space, fields and pastures. This basin was delineated in the 1994 Cottonwood Creek DBPS. Flow is contained within a drainage-way (Drainage-way 3) that runs through numerous lots contained within the development (see map). A conservative 5 yr and 100 yr flow calculated along this reach is approximately 80 cfs and 197 cfs (DP6 and basin D direct runoff) respectively. The slope of the drainage-way is approximately 4.0% and has velocities of 6.1 fps and 7.7 fps, depths of 1.5' and 2.1' during the 5yr and 100yr storms respectively, at the steepest and most defined a point along the reach. These velocity values are above the threshold chosen for the project (5fps) and are therefore considered erosive in nature. However, this drainage-way is located along the rear lot lines of the lots noted and is not felt to be a threat to proposed structures. Therefore, no improvements are proposed at this time, thereby preserving the natural drainage-way characteristics. **DP7** is located

this is not acceptable

on the main stem of Cottonwood Creek. This design point was set at this location for entry into the HECRAS model.

Design Point 8 (DP8) flows (Q5=490cfs, Q100=898cfs) are generated from **DP7**, on-site basins E and off-site basin OS-B1C. Off-site basin OS-B1C is a sub-basin of DBPS basin B1 and has been created to determine the flow at the entry point into the site along a tributary branch of the main stem. This basin consists of large lot subdivisions, open space, fields and pastures. On-site basins E consists of large lot (~2.5ac +/-) proposed development. There is an existing residence and ancillary structures present within the basin. Flow is contained within a drainage-way (Drainage-way 4) that runs through lot 7 in Filing No. 1. A conservative 5 yr and 100 yr flow calculated along this reach is approximately 11 cfs and 26 cfs (DP6 and basin E2 direct runoff) respectively. The slope of the drainageway is approximately 4.0% and has velocities of 2.9 fps and 3.6 fps, depths of 0.5' and 0.7' during the 5yr and 100yr storms respectively, at the steepest and most defined a point along the reach. These velocity values are below the threshold chosen for the project (5 fps) and are therefore considered non-erosive in nature. Therefore, no improvements are proposed. **DP8** is located on the main stem of Cottonwood Creek. This design point was set at this location for entry into the HECRAS model.

Design Point 8A (DP 8A) flows (Q5=8.2cfs, Q100=20cfs) are generated from off-site basin OS-B1D (**DP E8**) and approximately half of basin F. The purpose of the computation of **DP 8A** is to understand the proposed flows in the roadside ditch and to size the driveway culverts to access Lots 3, 4, 5 & 6. At this time the exact location of the driveway culvert is unknown. However, a 36" CMP culvert or equivalent should be installed under the driveway to adequately convey the flows in a roadside ditch downstream.

Design Point 8B (DP 8B) flows (Q5=9.7cfs, Q100=23cfs) are generated from off-site basin OS-B1D (**DP E8**) and all of basin F. Flows from **DP 8B** are calculated to design Drainage-way 6 that runs along the shared property line of Lot 9 & 10. On each side of this property line, a 25' wide drainage easement (50' wide total) is proposed. A proposed swale in the drainage easement will convey the flows into the Cottonwood Creek Channel. The swale shall be constructed with temporary and permanent BMP's. At the base of the proposed swale, a permanent sediment basin shall be constructed to prevent sediment transfer into the channel. A conservative 100 yr flow calculated at this location is approximately 23 cfs (basin F and OS-B1D direct runoff – DP 8B). To convey this flow a 36" RCP with flared end sections at each end are proposed. The proposed slope of the culvert is 5.5%, with an outflow velocity of 18.5 fps. A riprap plunge pool will be located at the downstream end to dissipate energy. Downstream from the aforementioned culvert, flow is contained within a proposed drainage-way (Drainage-way 6) that runs between lots 9 and 10 in Filing No. 1. The slope of the drainage-way is approximately 6.4% and has velocities of 5.4 fps and 6.4 fps, depths of 0.9' and 1.2' during the 5yr and 100yr storms respectively, at the steepest and most defined a point along the reach. These velocity values are above the threshold chosen for the project (5fps) and are therefore considered erosive in nature. However, this drainage-way is located along the side lot lines of the lots noted and is not felt to be a threat to proposed structures. Therefore, no improvements are proposed. At the downstream end of the drainage-way, flows reach the main stem. Since the drainage-way outfall is immediately adjacent to the creek, short in nature, and within the prudent line setback, no proposed improvements are recommended. **DP9** is located on the main stem of Cottonwood Creek. This design point was set at this location for entry into the HECRAS model.

Design Point 9 (DP9) flows (Q5=490cfs, Q100=903cfs) are generated from **DP8**, on-site basin F and off-site basins OS-B1D and OS-B4A . Off-site basin OS-B1D is a sub-basin of DBPS basin B1 and has been created to determine the flow at the entry point into the site. Off-site basin OS-B4A is a sub-basin of DBPS basin B4 and has been created to determine the flow at the entry point into the site as sheet flow into the main stem. Off-site basins OS-B1D and OS-B4A consists of large lot subdivisions, open space, fields and pastures. On-site basins F consists of large lot (~2.5ac +/-) proposed development. There is an existing ancillary structure present within the basin.

Design Point 10 (DP10) flows (Q5=490cfs, Q100=904cfs) are generated from **DP9** and on-site basin G. On-site basin G consists of large lot (~2.5ac +/-) proposed development as well as a small

Prudent line is no longer in EPC criteria

Needs to be addressed

Provide comparison to existing condition flows

portion of the creek itself. Flow from basin G is contained within a broad swale that runs through lots 10 & 11 in Filing No. 1. At the downstream end of the swale, flow concentrates into a drainage-way prior to reaching the main stem. Since the drainage-way is immediately adjacent to the creek, short in nature, and within the prudent line setback, no proposed improvements are recommended. **DP10** is located on the main stem of Cottonwood Creek. This design point was set at this location for entry into the HECRAS model.

Design Point 11 (DP11) flows (Q5=24cfs, Q100=58cfs) are generated from on-site basins H and I and off-site basins OS-B1E and OS-B3A. Off-site basin OS-B1E is a sub-basin of DBPS basin B1 and has been created to determine the flow at the entry point into the site. Off-site basin OS-B3A is a sub-basin of DBPS basin B3 and has been created to determine the flow at the entry point into the site. Off-site basins OS-B1E and OS-B3A consist of large lot subdivisions, open space, fields and pastures. On-site basins H and I consist of large lot (~2.5ac +/-) proposed development. Flow from off-site basin OS-B1E and on-site basin H is contained within a drainage-way (Drainage-way 7) that runs through Lots 1 & 2 in Filing No. 1 adjacent to the proposed Eagle Wing Drive. The slope of the drainage-way is approximately 4.8% and has velocities of 2.6fps and 3.2fps, depths of 0.3' and 0.5' during the 5yr and 100yr storms respectively. Drainage-way 7 and flow from basin OS-B3A and basin I combine at the location of proposed Eagle Wing Drive. The proposed Eagle Wing Drive has been rough graded and 2-24" culverts with flared end sections at each end have been installed. A riprap plunge pool will be located at the downstream end to dissipate energy.

Design Point 11A (DP11A) flows (Q5=27cfs, Q100=64cfs) are generated from **DP 11**, and basin J. The combination of these flows are conveyed in Drainage-way 5, and into the existing pond area. Flow is contained within a drainage-way (Drainage-way 5) that runs through a tract in Lot 11, Filing No 1. A conservative 5 yr and 100 yr flow calculated along this reach is approximately 27 cfs and 64 cfs (DP11A). The slope of the drainage-way is approximately 5.1% and has velocities of 4.2 fps and 5.2fps, depths of 0.7' and 1.0' during the 5yr and 100yr storms respectively, at the steepest and most defined a point along the reach. These velocity values are right at the threshold chosen for the project (5 fps). However, this drainage-way is located along the open space tract and is not felt to be a threat to proposed structures. Therefore, no improvements are proposed at this time, other than the upstream sediment control basin at the end of the culvert, thereby preserving the natural drainage-way characteristics.

Design Point 12 (DP12) flows (Q5=501cfs, Q100=930cfs) are generated from DP10, DP11, DP 11A and on-site basin J. On-site basin J consists of large lot (~2.5ac +/-) proposed development as well as a small portion of the creek itself as well as an open space drainage tract designated to convey from upstream. **DP12** is located on the main stem of Cottonwood Creek. This design point was set at this location for entry into the HECRAS model.

Design Point 13 (DP13) flows (Q5=504cfs, Q100=937cfs) are generated from DP12, and off-site basin OS-B4B. Off-site basin OS-B4B consists of large lot subdivisions, open space, fields and pastures. This basin is a sub-basin of DBPS basin B4 and has been created to determine the flow at the entry point into the site at the southern pond along the main stem as sheet flow. **DP13** is located on the main stem of Cottonwood Creek. This design point was set at this location for entry into the HECRAS model.

Design Point 14 (DP14) flows (Q5=507cfs, Q100=943cfs) are generated from **DP13**, and off-site basin OS-B4C. Off-site basin OS-B4C consists of large lot subdivisions, open space, fields and pastures. This basin is a sub-basin of DBPS basin B4 and has been created to determine the flow at the entry point into the site at the southern pond along the main stem as primarily sheet flow. **DP14** is located on the main stem of Cottonwood Creek. This design point was set at this location for entry into the HECRAS model as well as for sizing the future crossing for Briargate Parkway which will be determined at the time of the those improvements with a separate study (DBPS recommends a 12'x9' CBC). This design point corresponds with design point E14. **Design point E14** has existing flow values of 496cfs and 925cfs for the 5yr and 100yr storms respectively. This is an increase in developed flows of 13cfs and 18cfs for the 5yr and 100yr storms respectively. These are negligible increases and are so close to the existing conditions due to the proposed development being large lot development and relatively small (70.8+/- acres) compared to the entire tributary watershed.

Design Point 15 (DP15) flows (Q5=2.1cfs, Q100=5.1cfs) are generated from off-site basin OS-B3B. This basin is a sub-basin of DBPS basin B3 and has been created to determine the flow at the entry point into the site. This basin consists of large lot subdivisions, open space, fields and pastures. This flow is contained within a broad swale that runs through Lot 12, Filing No. 1. The 100 yr flow calculated at this location is approximately 5.1 cfs. -To convey this flow an existing 24" RCP with flared end sections at each end is already installed under the existing driveway. The existing slope of the culvert is ~1.1%, with an outflow velocity of 8.0 fps. A riprap plunge pool will be located at the downstream end to dissipate energy.

Design Point 16 (DP16) flows (Q5=7cfs, Q100=16cfs) are generated from **DP15** and on-site basin L. On-site basin L consists of large lot (~2.5ac +/-) proposed development. Flow from **DP15**, downstream from the aforementioned culvert, is contained within a broad swale that runs through lots 12 & 13 in Filing No. 1. Due to the minimal amount of calculated flow within this swale, no calculations have been performed to determine erosiveness. Therefore, no improvements are proposed. **DP16** is located along the northern ROW of future Briargate Parkway. This design point was located to size the diversion drainage-way (Drainage-way 8). The drainage-way has been created to ensure site flow does not enter the Briargate Parkway ROW. A conservative 5 yr and 100 yr flow calculated along this reach is approximately 7cfs and 16cfs (DP15 and basin L direct runoff) respectively. The slope of the drainage-way is approximately 1.4% and has velocities of 2.6 fps and 3.2fps, depths of 1.0' and 1.3' during the 5yr and 100yr storms respectively. These velocity values are below the threshold chosen for the project (5fps) and are therefore considered non-erosive.

It is anticipated that with the future construction of the roadway, an area inlet be located within a roadside drainage-way, thus picking up the flows and routing them to the southern side of the roadway directly downstream of proposed main stem crossing structure. Until such time as this occurs, flow will be shallow unconcentrated sheet flow routing directly into the main stem below the southern pond.

Design Point 17 (DP17) flows (Q5=6.5cfs, Q100=14.8cfs) are generated from off-site basin OS-B3C. This basin is a sub-basin of DBPS basin B3 and has been created to determine the flow at the entry point adjacent to the site. This calculated flow for information only since it does not mix with on-site flow. This basin consists of large lot subdivisions, open space, fields and pastures within the Eagle Wing subdivision. Flows from the Eagle Wing development were calculated to be 17cfs and 36cfs for the 5yr and 100yr storms respectively. The flows are therefore almost double of that which was calculated in this report. Upon construction and analysis of the Briargate Parkway improvements and storm system sizing, this difference needs to be taken into consideration.

4.3 Proposed Residence and Ancillary Structure Protection

At this time, proposed home pads and ancillary structures (sheds, animal corals, etc.) locations are not known. It shall be the responsibility of the home builder and subsequently the homeowner to ensure flows from stormwater are appropriately routed around said structures to prevent flooding and damage to property. This can be accomplished by the use of broad swales as opposed to ditches which tend to concentrate flows and are therefore more susceptible to erosion. Swales shall be protected from erosion until such time that vegetation is established. A civil engineer may be necessary to aid in determination of swale placement and erosion control measures to be used.

5 Drainage and Bridge Fees

The site is located within the Cottonwood Creek Drainage Basin of Fountain Creek, El Paso Basin Number FOMO2200, which was last studied in 1994. Fees associated with this basin are Drainage Fees of $19,752 per impervious acre and Bridge Fees of $1,080 per impervious acre. The percent Imperiousness of the 2.5-acre Rural Residential site is 11% in accordance with El Paso County Engineering Criteria Manual Appendix L Table 3-1. Also, reduction in the per acre Drainage Fee are allowed pursuant to El Paso County Resolution 99-383 in the amount of 25% for lots 2.5 acres or larger will be utilized for this project.

Fees will be calculated in accordance with the future final plat.

Correct to 2022 Fee amounts and provide fee totals.

Address any structures to be removed and re-stabilization

6 Conclusion

This Preliminary Drainage Report presents existing and proposed drainage conditions for the proposed Eagle Rising project. The development contains 70.8+/- acres with seventeen (17) 2.5-acre single family residential lots, and associated roadways which will have negligible and inconsequential effects on the existing site drainage and drainage conditions downstream. The proposed project will not, with respect to stormwater runoff, negatively impact the adjacent properties and downstream properties.

References

NRCS Web Soil Survey. United States Department of Agriculture, Natural Resources Conservation Service ("http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx", accessed March, 2018).

NRCS Official Soil Series Descriptions. United States Department of Agriculture, Natural Resources Conservation Service ("http://soils.usda.gov/technical/classification/osd/index.html", accessed March, 2018).

Flood Insurance Rate Map. Federal Emergency Management Agency, National Flood Insurance Program (Washingon D.C.: FEMA, December 7, 2018).

Cottonwood Creek Drainage Basin Planning Study. Matrix Design Group (Colorado Springs: El Paso County, July, 2019).

Eagle Rising Preliminary Drainage Report. M&S Civil Consultants, Inc. (Colorado Springs, Colorado: , August, 2015).

NCSS Web Soil Survey. United States Department of Agriculture, Natural Resources Conservation Service ("http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx", accessed May, 2017).

Drainage Criteria Manual Volume 2, Stormwater Quality Policies, Procedures and Best Management Practices (BMPs). City of Colorado Spring Engineering Division (Colorado Springs: , May 2014).

City of Colorado Springs Drainage Criterial Manual, Volume 1. City of Colorado Springs Engineering Division Staff, Matrix Desgin Group/Wright Water Engineers (Colorado Springs: , May 2014).

City of Colorado Springs/El Paso County Drainage Criteria Manual. City of Colorado Springs, Department of Public Works, Engineering Division; HDR Infrastructure, Inc.; El Paso County, Department of Public Works, Engineering Division (Colorado Springs: City of Colorado Springs, Revised November 1991).

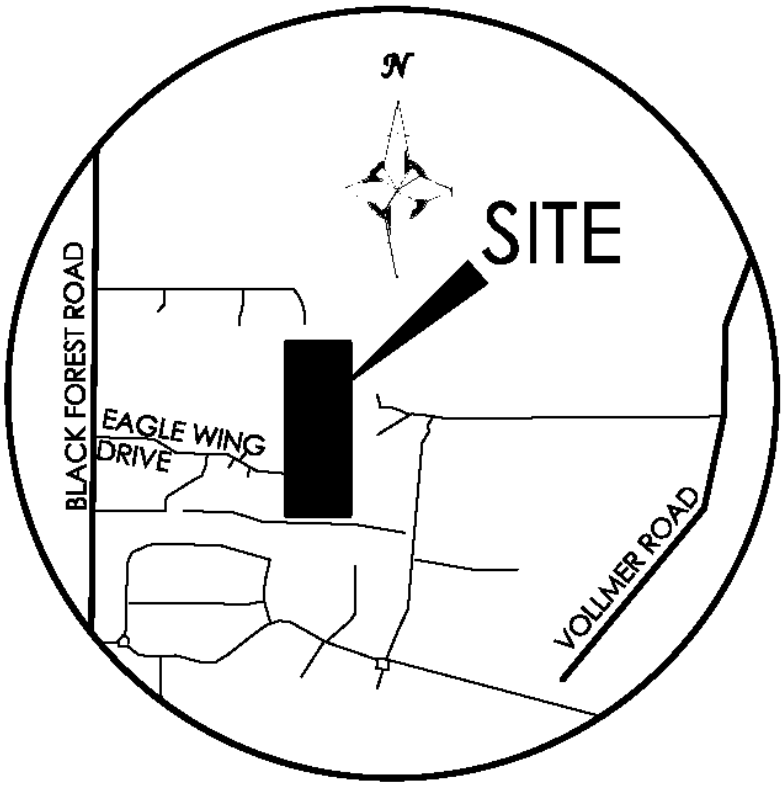
City of Colorado Springs Drainage Criteria Manual Volume 1. City of Colorado Springs Engineering Division with Matrix Design Group and Wright Water Engineers (Colorado Springs, Colorado: , May 2014).

Add El Paso County Engineering Criteria Manual

Appendices

7 General Maps and Supporting Data

Vicinity Map
Portions of Flood Insurance Rate Map
Portion of Drainage Area Identification Study Map
NRCS Soil Map and Tables
SCS Soil Type Descriptions
Hydrologic Soil Group Map and Tables



VICINITY MAP

NOT TO SCALE

National Flood Hazard Layer FIRMette

FEMA

104°41'41"W 38°58'59"N

104°41'3"W 38°58'31"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/15/2021 at 6:32 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

FEMA

104°41'41"W 38°58'36"N

104°41'3"W 38°58'8"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

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- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
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- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

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- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

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- Channel, Culvert, or Storm Sewer
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- 17.5 Water Surface Elevation
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- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

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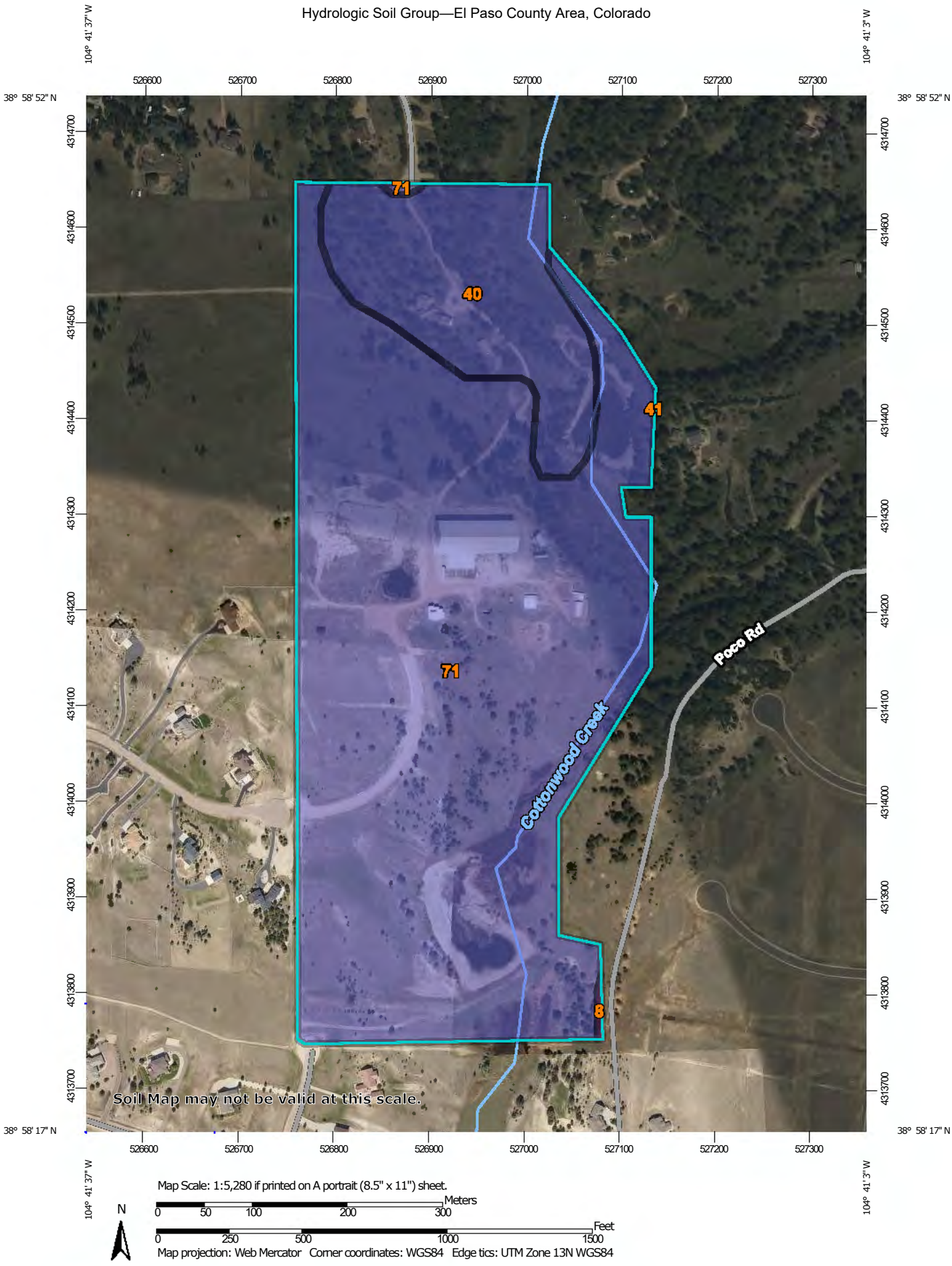
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



Map Scale: 1:5,280 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 19, 2018—May 26, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	0.1	0.1%
40	Kettle gravelly loamy sand, 3 to 8 percent slopes	B	12.3	16.9%
41	Kettle gravelly loamy sand, 8 to 40 percent slopes	B	0.0	0.0%
71	Pring coarse sandy loam, 3 to 8 percent slopes	B	60.5	83.0%
Totals for Area of Interest			**72.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for El Paso County Area, Colorado

March 1, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

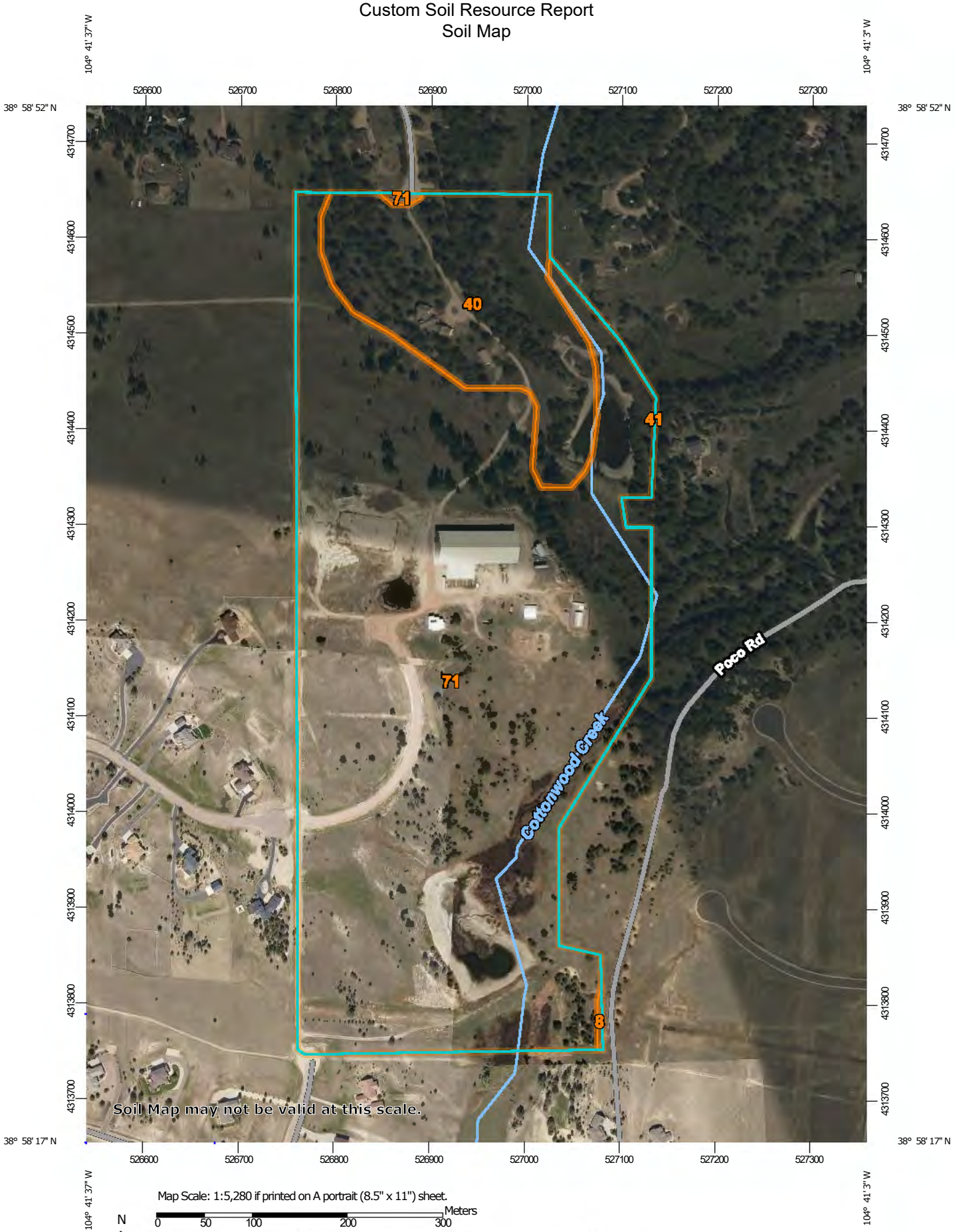
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.



Map Scale: 1:5,280 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 19, 2018—May 26, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	0.1	0.1%
40	Kettle gravelly loamy sand, 3 to 8 percent slopes	12.3	16.9%
41	Kettle gravelly loamy sand, 8 to 40 percent slopes	0.0	0.0%
71	Pring coarse sandy loam, 3 to 8 percent slopes	60.5	83.0%
Totals for Area of Interest		**72.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent

Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

40—Kettle gravelly loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 368g
Elevation: 7,000 to 7,700 feet
Farmland classification: Not prime farmland

Map Unit Composition

Kettle and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kettle

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

E - 0 to 16 inches: gravelly loamy sand
Bt - 16 to 40 inches: gravelly sandy loam
C - 40 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F048AY908CO - Mixed Conifer
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

41—Kettle gravelly loamy sand, 8 to 40 percent slopes

Map Unit Setting

National map unit symbol: 368h
Elevation: 7,000 to 7,700 feet
Farmland classification: Not prime farmland

Map Unit Composition

Kettle and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kettle

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

E - 0 to 16 inches: gravelly loamy sand
Bt - 16 to 40 inches: gravelly sandy loam
C - 40 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 8 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: B
Ecological site: F048AY908CO - Mixed Conifer
Hydric soil rating: No

Minor Components

Pleasant
Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Other soils
Percent of map unit:
Hydric soil rating: No

71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 369k
Elevation: 6,800 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition
Pring and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pring

Setting
Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile
A - 0 to 14 inches: coarse sandy loam
C - 14 to 60 inches: gravelly sandy loam

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Other soils

Percent of map unit:
Hydric soil rating: No

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8 Hydrologic Calculations

Runoff Coefficients and Percent Imperviousness Table 6-6
Colorado Springs Rainfall Intensity Duration Frequency Table 6-5
Hydrologic Calculations Summary Form SF-1 for Existing & Developed Conditions
Hydrologic Calculations Summary 5-yr Form SF-2 for Existing & Developed Conditions
Hydrologic Calculations Summary 100-yr Form SF-2 for Existing & Developed Conditions
Runoff Reduction Calculations
Runoff Reduction Map

EAGLE RISING
FINAL DRAINAGE REPORT

BASIN	TOTAL AREA *(Acres)*
A1	4.9
A2	1.6
B	3.1
C	1.2
D	10.7
E1	3.8
E2	7.5
F	8.8
G	2.6
H	4.1
I	1.6
J	2.7
K	2.8
L	5.3
EX-A1	4.9
EX-A2	1.6
EX-B	13.1
EX-C1	3.8
EX-C2	7.5
EX-D	9.0
EX-E	2.6
EX-F	7.5
EX-G	2.8
EX-H	5.3
OS-B1A	24.9
OS-B1B	41.0
OS-B1C	1.8
OS-B1D	6.0
OS-B1E	10.1
OS-B3A	9.1
OS-B3B	2.3
OS-B3C	5.7
OS-B4A	5.2
OS-B4B	8.1
OS-B4C	13.4

EAGLE RISING
FINAL DRAINAGE REPORT
(Area Drainage Summary)

				OVERLAND				STREET / CHANNEL FLOW				Time of Travel (T_c)	INTENSITY *		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
A1 (Onsite)	4.9	0.30	0.40	0.25	220	24	10.7	0	0.0%	0.0	0.0	10.7	4.0	7.1	*5.9*	*13.9*
A2 (Onsite)	1.6	0.30	0.40	0.25	220	24	10.7	0	0.0%	0.1	0.0	10.7	4.0	7.1	*1.9*	*4.5*
B	3.1	0.30	0.40	0.25	290	26	13.1	160	5.0%	7.8	0.3	13.5	3.6	6.5	*3.4*	*8.0*
C	1.2	0.30	0.40	0.25	160	13	10.1	70	1.2%	3.8	0.3	10.4	4.0	7.2	*1.5*	*3.5*
D	10.7	0.30	0.40	0.25	235	20	12.0	720	3.5%	6.5	1.8	13.9	3.6	6.4	*11.5*	*27.3*
E1	3.8	0.30	0.40	0.25	100	10	7.4	800	4.0%	7.0	1.9	9.3	4.2	7.5	*4.8*	*11.4*
E2	7.5	0.30	0.40	0.25	250	6	18.8	400	4.0%	7.0	1.0	19.8	3.0	5.4	*6.8*	*16.2*
F	8.8	0.30	0.40	0.25	300	11	17.9	600	3.7%	6.7	1.5	19.4	3.1	5.4	*8.1*	*19.2*
G	2.6	0.30	0.40	0.25	135	10	9.5	190	6.3%	8.8	0.4	9.9	4.1	7.3	*3.2*	*7.6*
H	4.1	0.30	0.40	0.25	300	22	14.3	160	3.8%	6.8	0.4	14.7	3.5	6.2	*4.3*	*10.2*
I	1.6	0.30	0.40	0.25	125	12	8.4	115	5.2%	8.0	0.2	8.7	4.3	7.7	*2.1*	*4.9*
J	2.7	0.30	0.40	0.25	210	16	11.8	185	6.5%	8.9	0.3	12.1	3.8	6.8	*3.1*	*7.3*

Add pavement to applicable basins unless a deviation is approved

				OVERLAND				STREET / CRANNEL FLOW				Time of Travel (T_c)	INTENSITY *		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_c (min)	TOTAL (min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
K	2.8	0.90	0.95	0.25	80	12	5.8	0	0.0%	0.0	0.0	5.8	4.9	8.7	*12.4*	*23.2*
L	5.3	0.30	0.40	0.25	300	14	16.6	500	2.4%	5.4	1.5	18.1	3.2	5.6	*5.1*	*12.0*
EX-A1	4.9	0.30	0.40	0.25	220	24	10.7	0	0.0%	0.1	0.0	10.7	4.0	7.1	*5.9*	*13.9*
EX-A2	1.6	0.30	0.40	0.25	220	24	10.7	0	0.0%	0.1	0.0	10.7	4.0	7.1	*1.9*	*4.6*
EX-B	13.1	0.30	0.40	0.25	235	20	12.0	720	3.5%	6.5	1.8	13.9	3.6	6.4	*14.1*	*33.5*
EX-C1	3.8	0.30	0.40	0.25	100	10	7.4	800	4.0%	7.0	1.9	9.3	4.2	7.5	*4.8*	*11.4*
EX-C2	7.5	0.30	0.40	0.25	250	6	18.8	400	4.0%	7.0	1.0	19.8	3.0	5.4	*6.8*	*16.2*
EX-D	9.0	0.30	0.40	0.25	300	9	19.2	745	5.4%	8.1	1.5	20.7	3.0	5.3	*8.0*	*19.0*
EX-E	2.6	0.30	0.40	0.25	135	10	9.5	190	6.3%	8.8	0.4	9.9	4.1	7.3	*3.2*	*7.6*
EX-F	7.5	0.30	0.40	0.25	300	14	16.6	185	6.5%	8.9	0.3	16.9	3.3	5.8	*7.4*	*17.5*
EX-G	2.8	0.90	0.95	0.25	80	12	5.8	0	0.0%	0.1	0.0	5.8	4.9	8.7	*12.4*	*23.2*
EX-H	5.3	0.30	0.40	0.25	300	14	16.6	500	2.4%	5.4	1.5	18.1	3.2	5.6	*5.0*	*12.0*
OS-B1A	24.9	0.30	0.40	0.25	300	18	15.2	940	4.8%	7.7	2.0	17.3	3.2	5.8	*24.2*	*57.4*
OS-B1B	41.0	0.30	0.40	0.25	300	32	12.6	1560	5.1%	7.9	3.3	15.9	3.4	6.0	*41.5*	*98.4*
OS-B1C	1.8	0.30	0.40	0.25	300	10	18.5	115	3.5%	6.5	0.3	18.8	3.1	5.5	*1.7*	*4.0*

				OVERLAND				STREET / CHANNEL FLOW				Time of Travel (T_c)	INTENSITY *		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_t (min)	TOTAL (min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
OS-B1D	6.0	0.30	0.40	0.25	300	20	14.7	575	3.5%	6.5	1.5	16.2	3.3	5.9	*6.0*	*14.3*
OS-B1E	10.1	0.30	0.40	0.25	300	22	14.3	810	3.6%	6.6	2.0	16.3	3.3	5.9	*10.1*	*24.0*
OS-B3A	9.1	0.30	0.40	0.25	300	15	16.2	400	4.7%	7.6	0.9	17.1	3.3	5.8	*8.9*	*21.1*
OS-B3B	2.3	0.30	0.40	0.25	300	10	18.5	180	2.9%	6.0	0.5	19.0	3.1	5.5	*2.1*	*5.1*
OS-B3C	5.7	0.35	0.45	0.25	300	14	16.6	310	4.7%	7.6	0.7	17.2	3.2	5.8	*6.5*	*14.8*
OS-B4A	5.2	0.30	0.40	0.25	300	38	11.9	160	13.5%	12.9	0.2	12.1	3.8	6.8	*5.9*	*14.1*
OS-B4B	8.1	0.30	0.40	0.25	300	42	11.5	220	15.0%	13.6	0.3	11.8	3.8	6.8	*9.3*	*22.2*
OS-B4C	13.4	0.30	0.40	0.25	300	14	16.6	1010	7.6%	9.6	1.7	18.3	3.2	5.6	*12.7*	*30.1*
A1 (Offsite)	120.6	0.20	0.20	Tc per DBPS								45.6	1.9	3.4	*45.5*	*81.0*
A2 (Offsite)	134.2	0.20	0.20	Tc per DBPS								39.2	2.1	3.7	*55.5*	*98.9*
A3	103.9	0.20	0.20	Tc per DBPS								40.3	2.0	3.6	*42.3*	*75.3*
A4	162.4	0.20	0.20	Tc per DBPS								35.0	2.2	3.9	*71.9*	*128.1*
A5	134.2	0.20	0.20	Tc per DBPS								38.2	2.1	3.7	*56.4*	*100.4*
A6	90.0	0.20	0.20	Tc per DBPS								37.3	2.1	3.8	*38.4*	*68.3*

				OVERLAND				STREET / CHANNEL FLOW				Time of Travel (T_c)	INTENSITY *		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C_5	C_{100}	C_5	Length (ft)	Height (ft)	T_C (min)	Length (ft)	Slope (%)	Velocity (fps)	T_c (min)	TOTAL (min)	I_5 (in/hr)	I_{100} (in/hr)	Q_5 (c.f.s.)	Q_{100} (c.f.s.)
A7	87.4	0.20	0.20	Tc per DBPS								39.3	2.1	3.7	*36.1*	*64.3*
A8	153.3	0.20	0.20	Tc per DBPS								42.6	2.0	3.5	*60.3*	*107.4*
A9	126.0	0.20	0.20	Tc per DBPS								36.2	2.2	3.9	*54.7*	*97.4*
A10	108.2	0.20	0.20	Tc per DBPS								40.4	2.0	3.6	*44.0*	*78.3*
A11	76.1	0.20	0.20	Tc per DBPS								31.7	2.3	4.2	*35.7*	*63.6*
A12	76.2	0.40	0.40	Tc per DBPS								31.7	2.3	4.2	*71.5*	*127.3*
A13	102.9	0.20	0.20	Tc per DBPS								39.2	2.1	3.7	*42.6*	*75.8*

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: VAS
Date: 2/7/2013

EAGLE RISING
FINAL DRAINAGE REPORT
(Surface Routing Summary - Existing)

Design Point(s)	Contributing Basins/Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow		Comments
					I_5	I_{100}	Q_5	Q_{100}	
E1	A1,A2,A3,A4,A5,A8,A9,A13 (Offsite)	207.50	207.50	66.4	1.5	2.6	307.4	547.1	Inflow Point to Site along main stem
E2	OS-B1A	7.47	9.96	17.3	3.2	5.8	24.2	57.4	
E3	OS-B1B	12.30	16.40	15.9	3.4	6.0	41.5	98.4	
E4	A6, A7, & A10	57.12	57.12	77.7	1.3	2.4	76.2	135.6	
E5	E1+E4+EX-A1+A11	281.31	281.80	68.5	1.5	2.6	408.2	727.9	
E6	E5+E2+E3+EX-B+A12+EX-A2+EX-C1	337.12	346.05	69.6	1.4	2.6	483.9	884.2	DBPS DP5=870, w/in accept. range
E7	OS-B1C	0.54	0.72	18.8	3.1	5.5	1.7	4.0	
E8	OS-B1D	1.80	2.40	16.2	3.3	5.9	6.0	14.3	
E9	E6+E7+E8+EX-C2+EX-D+OS-B4A	344.86	356.37	71.7	1.4	2.5	485.4	892.9	
E10	OS-B1E	3.03	4.04	16.3	3.3	5.9	10.1	24.0	
E11	OS-B3A	2.73	3.64	17.1	3.3	5.8	8.9	21.1	
E12	E9+EX-E+EX-F+E10+OS-B4B+E11	356.08	371.33	72.2	1.4	2.5	498.9	926.1	
E13	OS-B3B	0.69	0.92	19.0	3.1	5.5	2.1	5.1	
E14	E12+EX-G+E13+EX-H+OS-B4C	364.90	382.39	75.6	1.4	2.4	495.8	924.8	Future Briargate Pkwy Crossing
E15	OS-B3C	2.00	2.57	17.2	3.2	5.8	6.5	14.8	
E16	E13+EXH	2.23	3.01	37.1	2.1	3.8	4.9	11.6	
E17	E2+E3	19.77	26.36	17.3	3.2	5.8	64.0	152.0	
E18	E7+EXC1	1.68	2.24	28.1	2.5	4.5	4.2	10.0	
E19	E17+EX-B+E18	25.38	33.84	28.1	2.5	4.5	63.7	151.3	
E20	E8+EX-D	4.50	6.00	36.9	2.1	3.8	9.7	22.9	
E21	E10+E11+EX-F	8.01	10.68	34.0	2.3	4.0	18.1	42.9	

Calculated by: VAS
Date: 6/4/2013

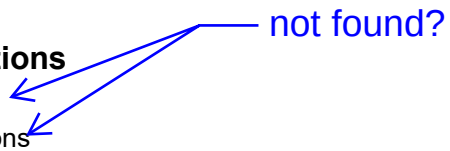
EAGLE RISING
FINAL DRAINAGE REPORT
(Surface Routing Summary - Proposed)

Design Point(s)	Contributing Basins/Design Points	Equivalent CA_5	Equivalent CA_{100}	Maximum T_C	Intensity		Flow		Comments
					I_5	I_{100}	Q_5	Q_{100}	
1	A1,A2,A3,A4,A5,A8,A9,A13 (Offsite)	207.50	207.50	66.4	1.5	2.6	307.4	547.1	Inflow Point to Site along main stem
2	A6, A7, A10 (Offsite)	57.12	57.12	77.7	1.3	2.4	76.2	135.6	
3	DP1,DP2,A1(Onsite),A11	281.31	281.80	68.5	1.5	2.6	408.2	727.9	
4	OS-B1A	7.47	9.96	17.3	3.2	5.8	24.2	57.4	
5	OS-B1B	12.30	16.40	15.9	3.4	6.0	41.5	98.4	
6	DP4,DP5,B,C	21.06	28.08	17.7	3.2	5.7	67.5	160.1	
6A	E7, E1	1.68	2.24	28.1	2.5	4.5	4.2	10.0	
6B	DP6, D, DP6A	25.95	34.60	28.1	2.5	4.5	65.2	154.7	
7	DP3,DP6B,A12,A2(Onsite)	338.22	347.52	69.1	1.4	2.6	487.9	892.4	DBPS DP5=870, w/in accept. range
8	DP7,E2	340.47	350.52	69.3	1.4	2.6	490.3	898.4	
8A	OS-B1D, 1/2 F	3.12	4.16	25.9	2.6	4.7	8.2	19.5	
8B	OS-B1D, F	4.44	5.92	35.6	2.2	3.9	9.7	23.1	50' Wide Drainage Swale
9	DP8,OS-B1D,F,OS-B4A	346.47	358.52	71.2	1.4	2.5	490.0	902.5	
10	DP9,G	347.25	359.56	71.4	1.4	2.5	490.2	903.5	
11	OS-B1E,H,OS-B3A,I	7.47	9.96	17.1	3.3	5.8	24.3	57.8	36" Culvert
11A	DP11, J	8.28	11.04	17.3	3.2	5.8	26.8	63.6	Outfall into Pond
12	DP10,DP11,J	355.53	370.60	71.5	1.4	2.5	501.4	930.3	
13	DP12,OS-B4B	357.96	373.84	71.7	1.4	2.5	503.9	936.7	
14	DP13,K,OS-B4C	362.48	379.07	72.5	1.4	2.5	506.5	942.8	Future Briargate Pkwy Crossing
15	OS-B3B	0.69	0.92	19.0	3.1	5.5	2.1	5.1	Ex. 24" Culvert
16	DP15,L	2.29	3.06	20.9	2.9	5.2	6.8	16.0	Diversion Swale
17	OS-B3C	2.00	2.57	17.2	3.2	5.8	6.5	14.8	Off-Site Flow

Calculated by: VAS

Date: 6/4/2013

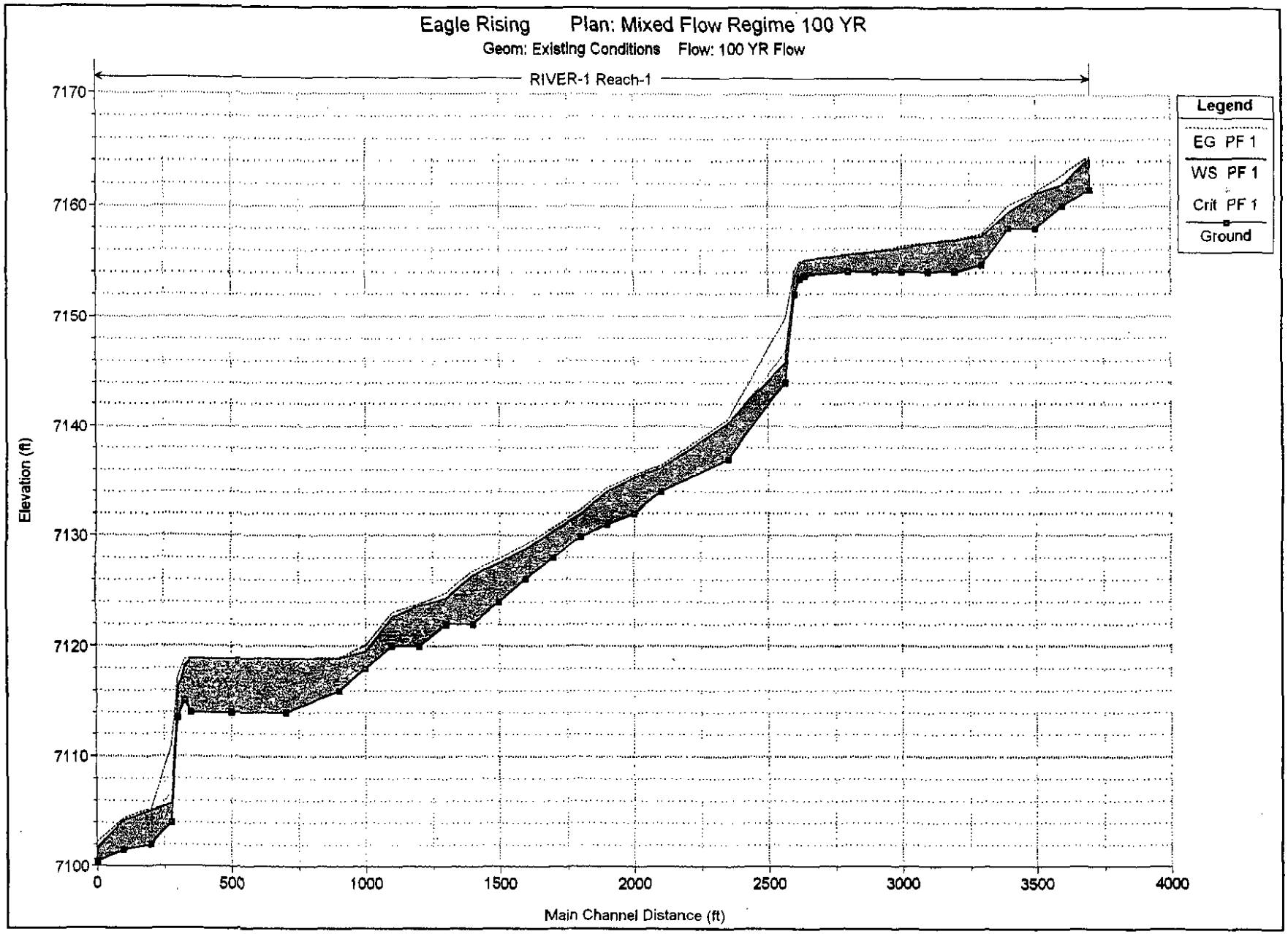
9 Hydraulic Calculations



Culvert Calculations
Ditch Flow Calculations
HEC-RAS Water Surface Elevations Calculations

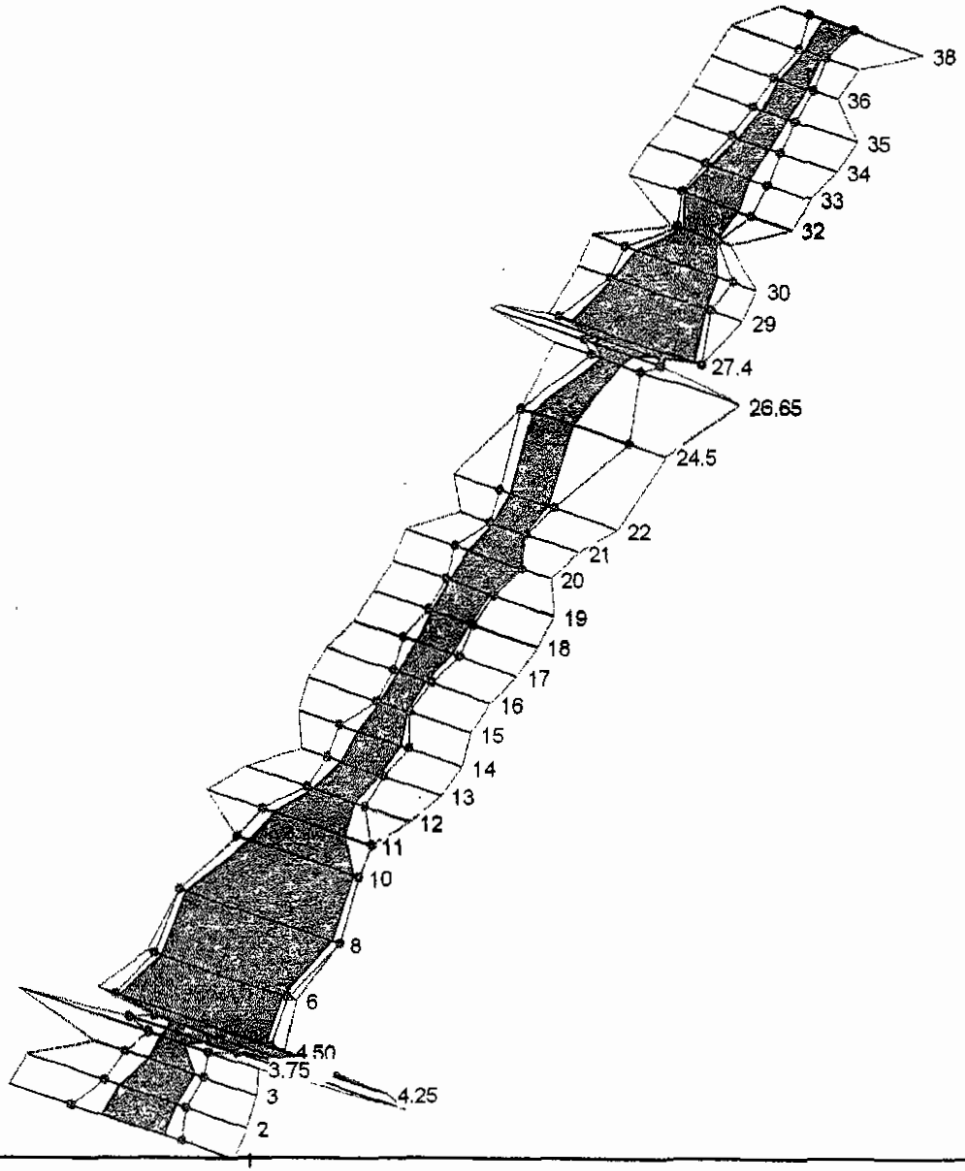
HECRAS MODEL DATA
SELECT OUTPUT RESULTS

Excerpt from Eagle Rising, Filing No. 1
Final Drainage Report
August 2015
Prepared by M&S Civil Consultants, Inc.


Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
RIVER-1 Reach-1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
7170
7160
7150
7140
7130
7120
7110
7100
0
500
1000
1500
2000
2500
3000
3500
4000
Main Channel Distance (ft)

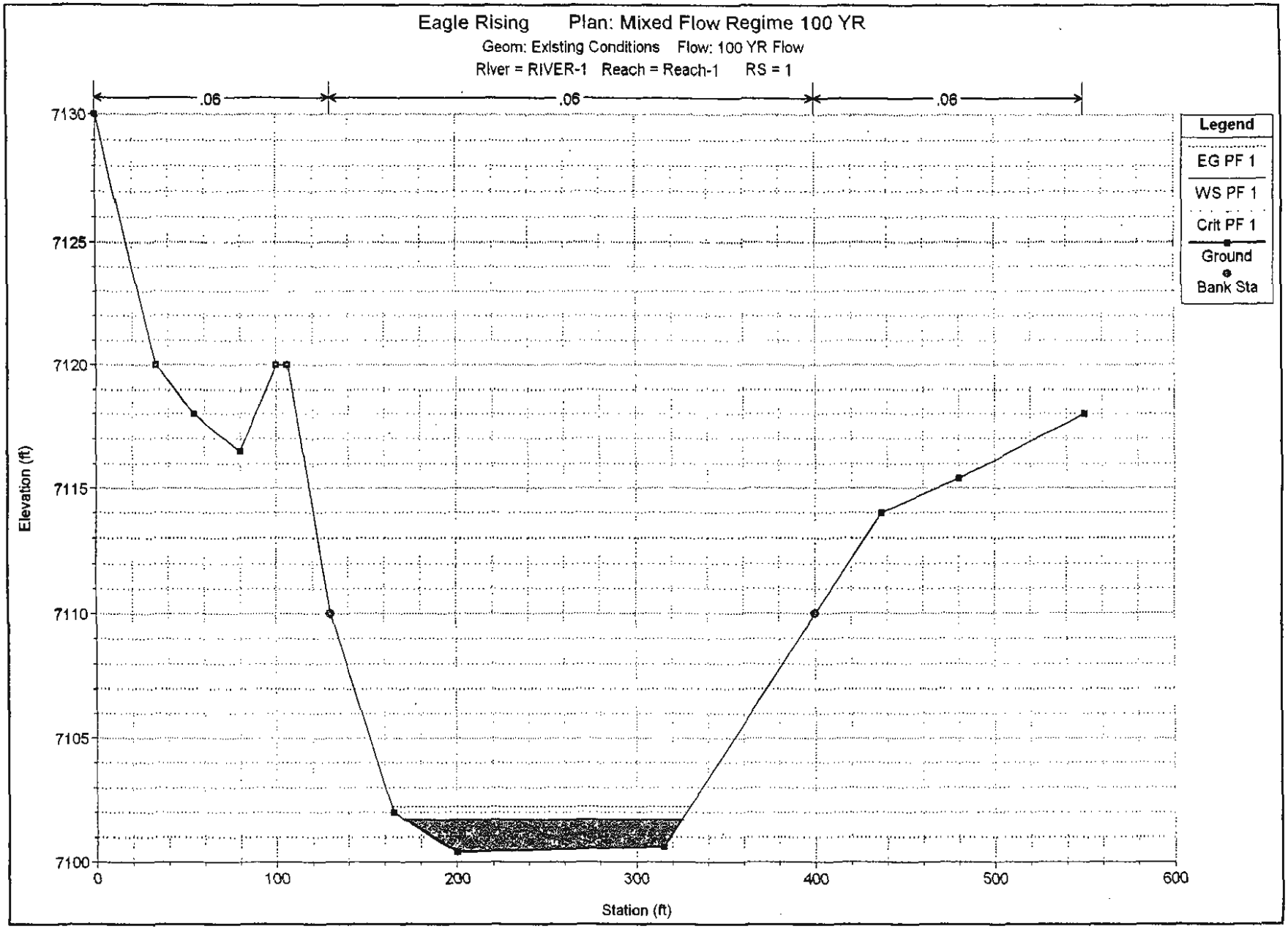
Eagle Rising Plan: Mixed Flow Regime 100 YR

Geom: Existing Conditions Flow: 100 YR Flow



HEC-RAS Plan: Mixed 100 yr River: RIVER-1 Reach: Reach-1 Profile: PF 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	38	PF 1	547.00	7161.45	7164.26	7163.23	7164.47	0.007955	3.64	150.11	70.21	0.44
Reach-1	37	PF 1	547.00	7160.05	7161.96	7161.96	7162.81	0.045691	7.39	73.97	44.09	1.01
Reach-1	36	PF 1	547.00	7158.00	7161.12	7159.57	7161.26	0.004299	3.03	180.68	69.95	0.33
Reach-1	35	PF 1	547.00	7158.01	7159.53	7159.53	7160.19	0.048662	6.52	83.91	64.11	1.00
Reach-1	34	PF 1	547.00	7154.67	7157.29	7156.51	7157.51	0.010323	3.80	144.14	77.43	0.49
Reach-1	33	PF 1	547.00	7154.05	7156.90		7156.98	0.002861	2.35	232.50	97.06	0.27
Reach-1	32	PF 1	547.00	7154.05	7156.89		7156.74	0.001867	1.83	299.03	132.88	0.21
Reach-1	31	PF 1	547.00	7154.00	7156.14		7156.36	0.010617	3.73	146.59	82.50	0.49
Reach-1	30	PF 1	547.00	7154.05	7155.83		7155.87	0.002308	1.67	328.16	197.49	0.23
Reach-1	29	PF 1	547.00	7154.05	7155.58		7155.63	0.002671	1.65	331.79	226.65	0.24
Reach-1	27.4	PF 1	547.00	7153.70	7155.06		7155.10	0.004133	1.68	325.86	300.84	0.28
Reach-1	27.2	PF 1	547.00	7153.40	7154.67		7154.91	0.026128	3.98	137.36	138.31	0.70
Reach-1	27	PF 1	724.00	7152.00	7153.52	7153.52	7154.13	0.050406	6.25	115.80	96.92	1.01
Reach-1	26.65	PF 1	724.00	7144.00	7145.86	7146.83	7149.81	0.459764	15.95	45.40	48.82	2.91
Reach-1	24.5	PF 1	724.00	7137.00	7140.27	7139.87	7140.62	0.021616	4.80	150.99	99.61	0.69
Reach-1	22	PF 1	724.00	7134.00	7136.17		7136.45	0.013146	4.23	171.05	93.40	0.55
Reach-1	21	PF 1	724.00	7132.00	7135.34		7135.55	0.006310	3.70	195.79	75.07	0.40
Reach-1	20	PF 1	881.00	7131.00	7134.09		7134.43	0.020840	4.67	188.53	125.66	0.67
Reach-1	19	PF 1	881.00	7129.85	7131.93		7132.34	0.020709	5.16	170.87	97.54	0.69
Reach-1	18	PF 1	881.00	7128.00	7130.43		7130.74	0.012422	4.50	195.89	93.74	0.55
Reach-1	17	PF 1	890.00	7126.10	7128.80		7129.23	0.018774	5.22	170.37	88.65	0.66
Reach-1	16	PF 1	890.00	7124.00	7127.58		7127.91	0.009378	4.67	190.76	69.49	0.50
Reach-1	15	PF 1	890.00	7122.00	7126.36	7125.44	7126.79	0.013585	5.22	170.51	68.97	0.58
Reach-1	14	PF 1	890.00	7122.00	7124.33		7124.82	0.030731	5.65	157.64	106.10	0.82
Reach-1	13	PF 1	890.00	7120.00	7123.64		7123.81	0.004330	3.25	273.59	96.32	0.34
Reach-1	12	PF 1	897.00	7120.00	7122.62	7122.06	7122.99	0.018550	4.93	181.83	102.56	0.65
Reach-1	11	PF 1	897.00	7118.00	7119.56	7119.56	7120.04	0.054076	5.56	161.33	170.02	1.01
Reach-1	10	PF 1	898.00	7116.00	7118.98	7117.49	7119.02	0.001823	1.72	523.01	252.51	0.21
Reach-1	8	PF 1	898.00	7114.00	7118.96		7118.96	0.000091	0.61	1475.14	356.98	0.05
Reach-1	6	PF 1	931.00	7114.00	7118.93		7118.94	0.000132	0.74	1254.86	297.10	0.06
Reach-1	4.50	PF 1	931.00	7114.00	7118.92		7118.92	0.000094	0.62	1498.20	360.35	0.05
Reach-1	4.25	PF 1	931.00	7115.00	7118.26	7118.26	7118.86	0.038349	6.27	154.60	135.00	0.91
Reach-1	4	PF 1	931.00	7113.50	7115.89	7116.30	7117.19	0.124906	9.15	101.74	95.03	1.56
Reach-1	3.75	PF 1	931.00	7104.00	7105.78	7106.86	7110.85	0.624543	18.08	51.50	57.86	3.38
Reach-1	3	PF 1	931.00	7102.00	7105.15	7104.02	7105.35	0.006978	3.58	259.97	113.60	0.42
Reach-1	2	PF 1	931.00	7101.50	7104.23	7103.50	7104.46	0.011767	3.82	243.75	143.54	0.52
Reach-1	1	PF 1	953.00	7100.40	7101.70	7101.70	7102.24	0.052150	5.87	162.36	153.47	1.01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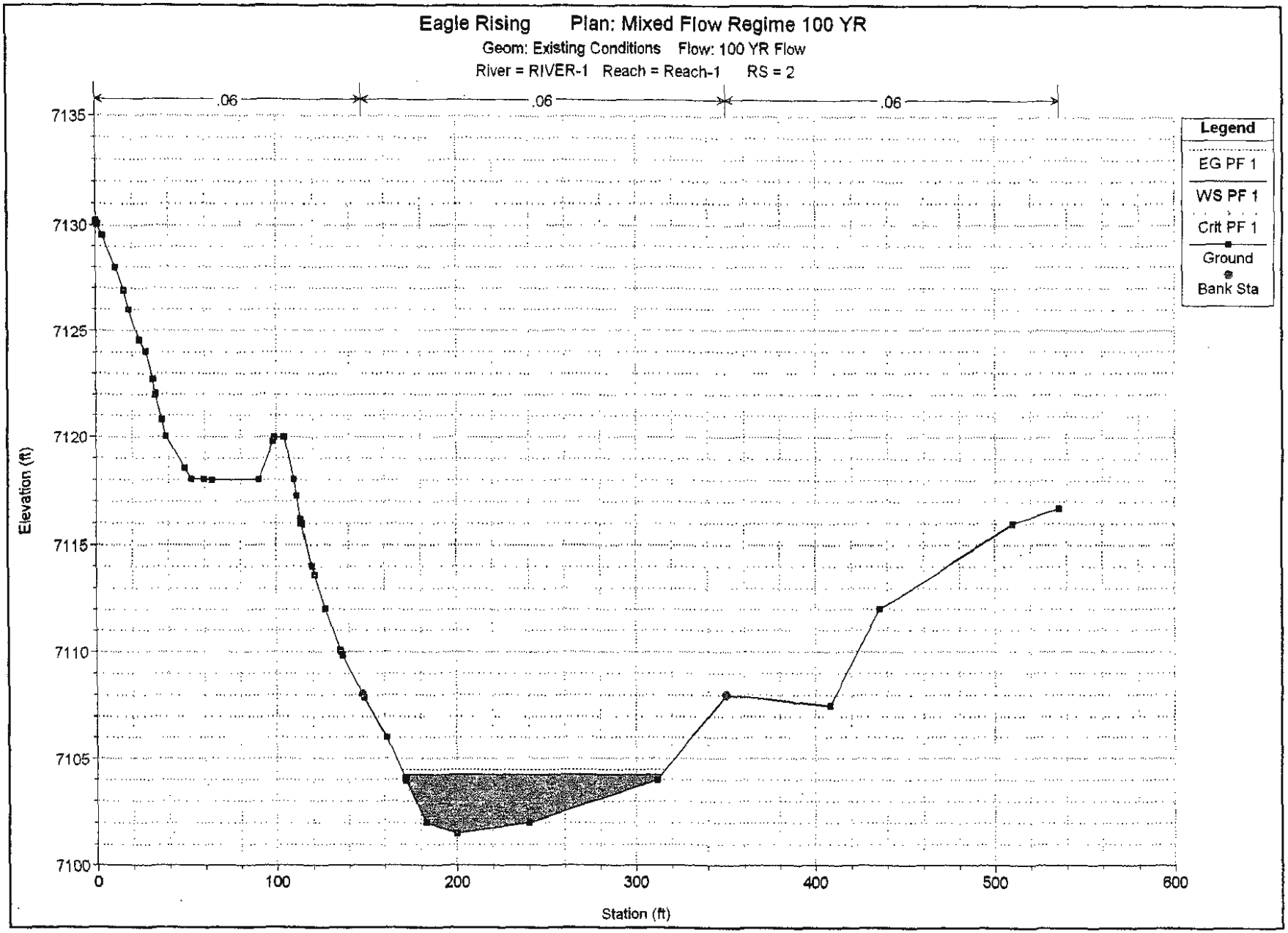
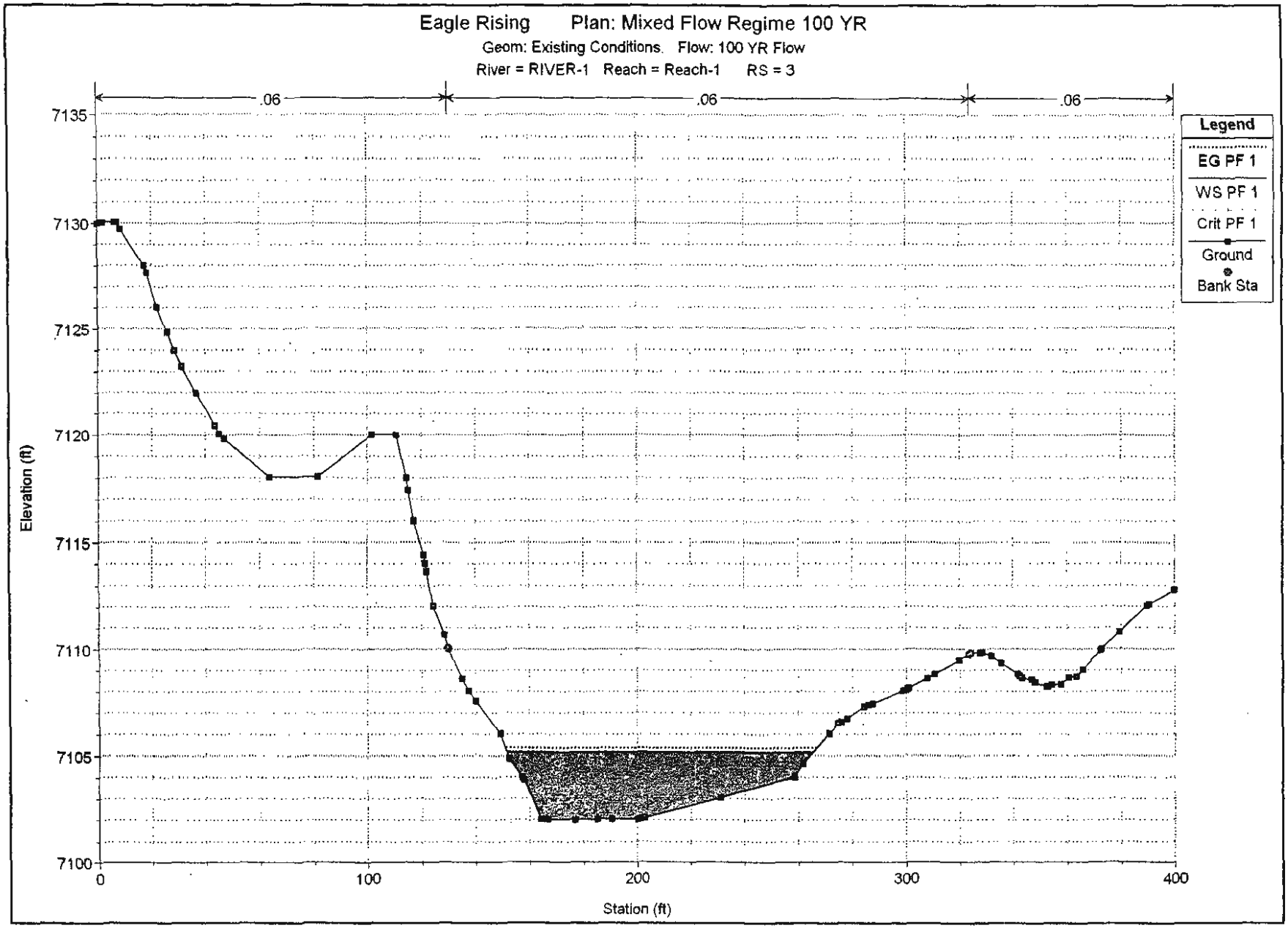
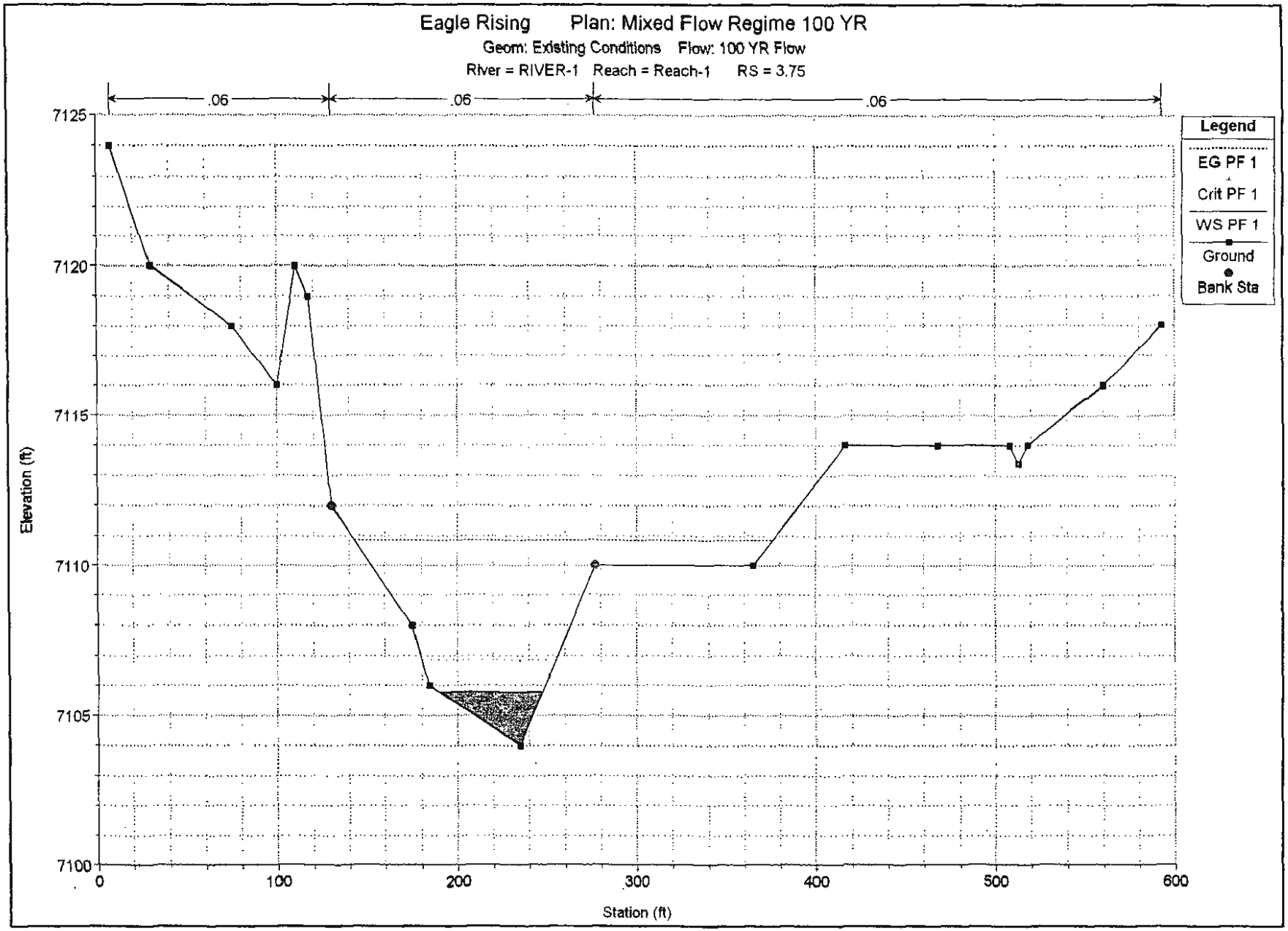
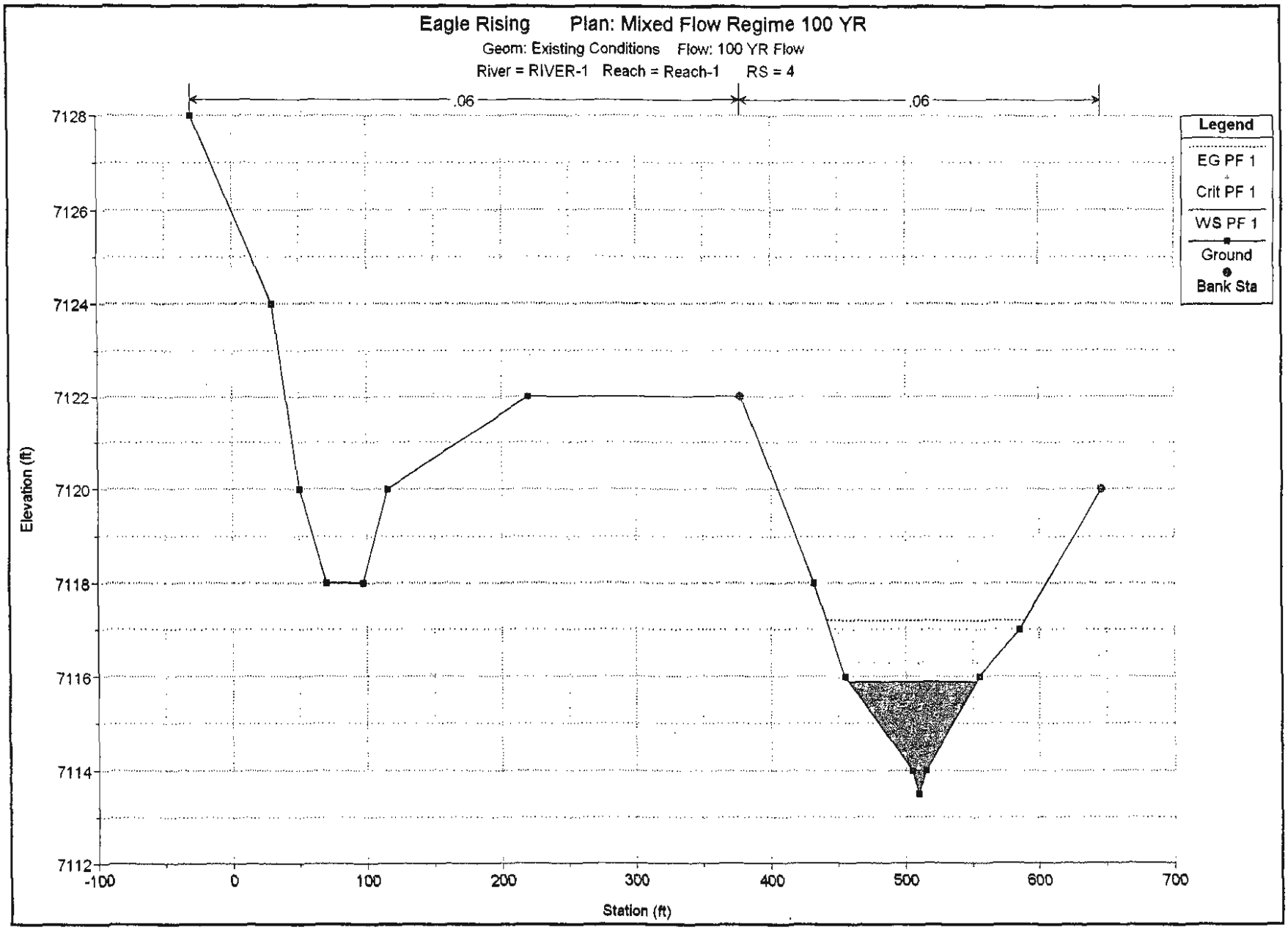
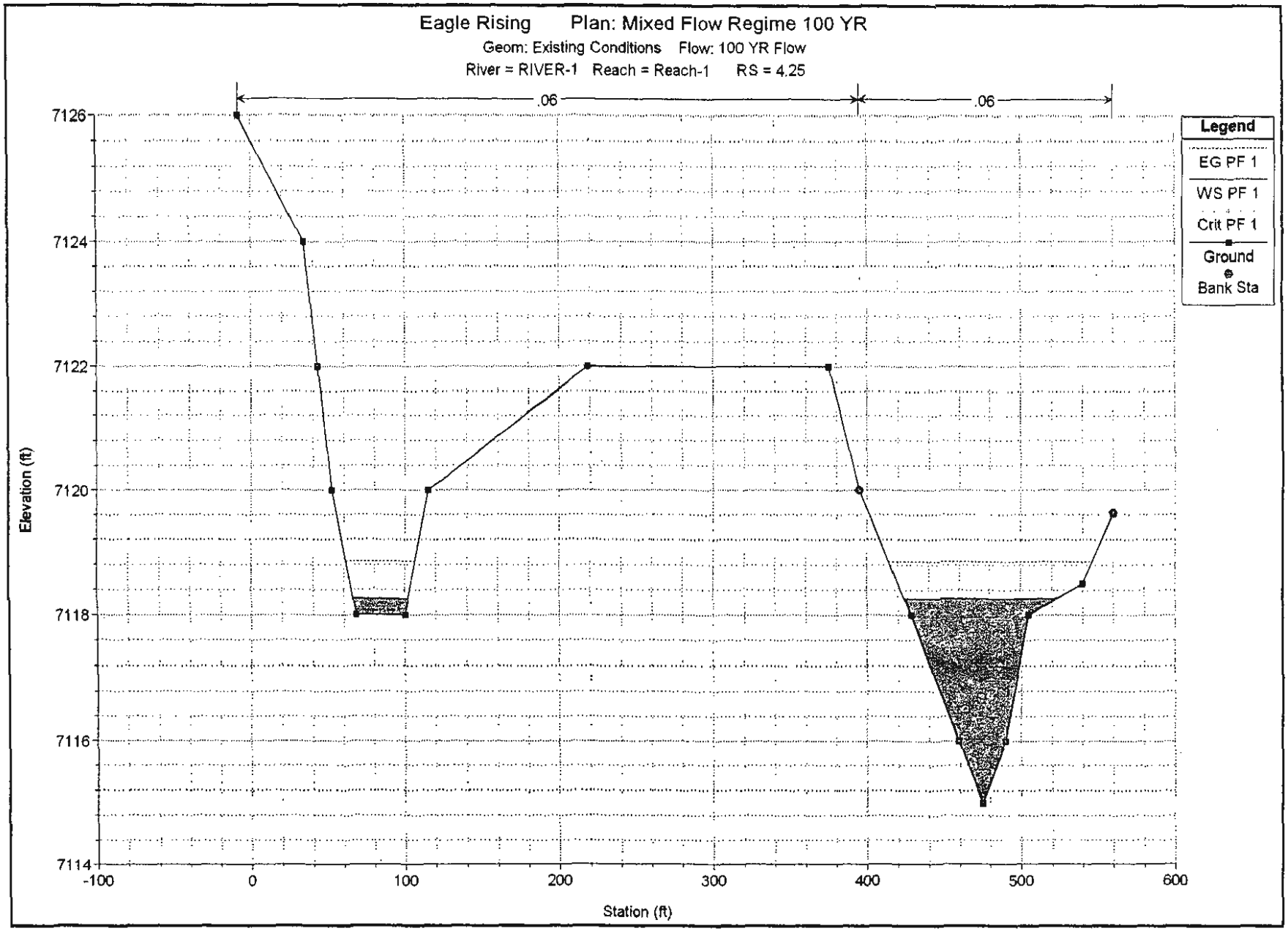
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 1
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7130
7125
7120
7115
7110
7105
7100
0
100
200
300
400
500
600
Station (ft)

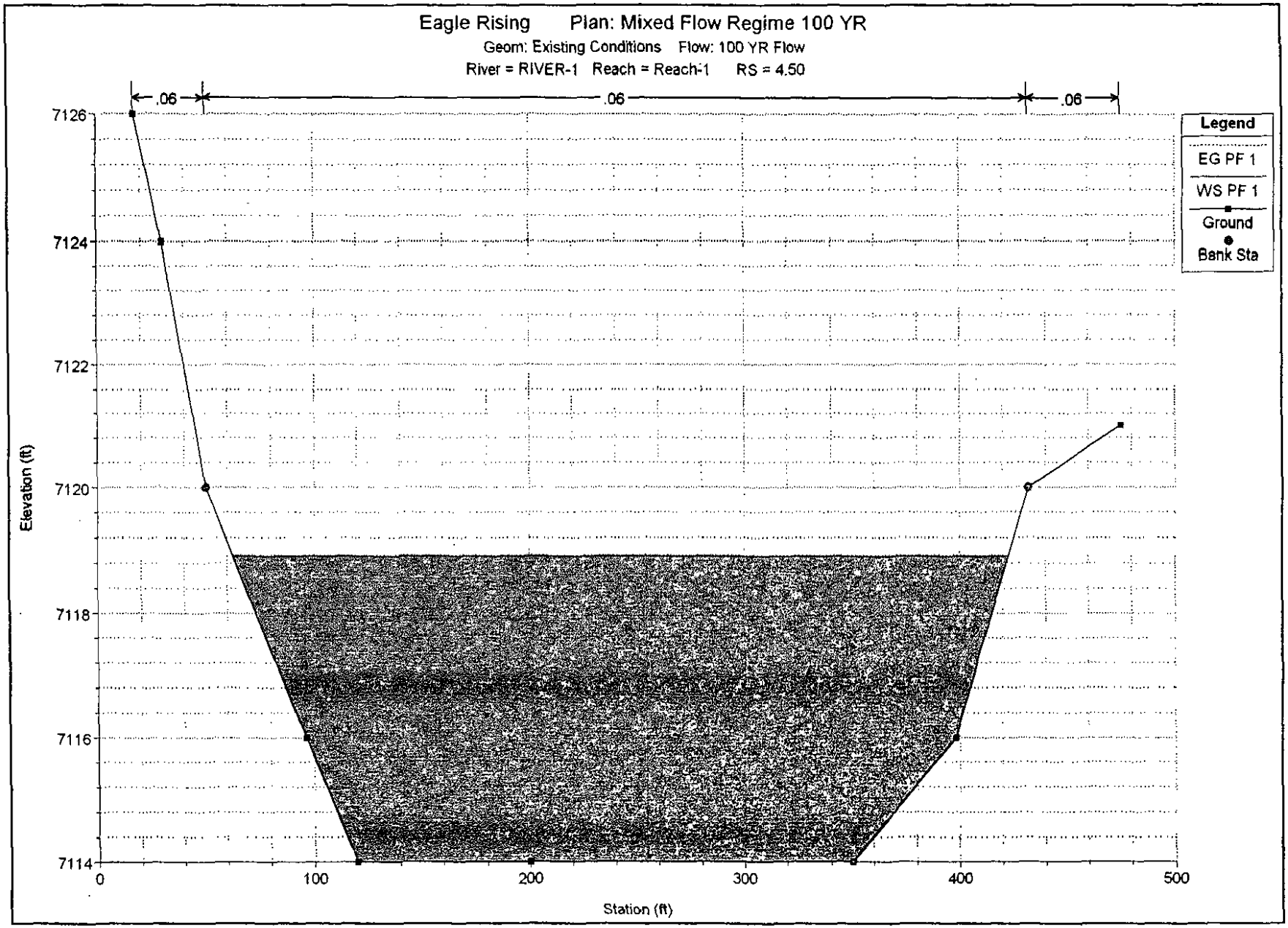

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 2
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7135
7130
7125
7120
7115
7110
7105
7100
0
100
200
300
400
500
600
Station (ft)

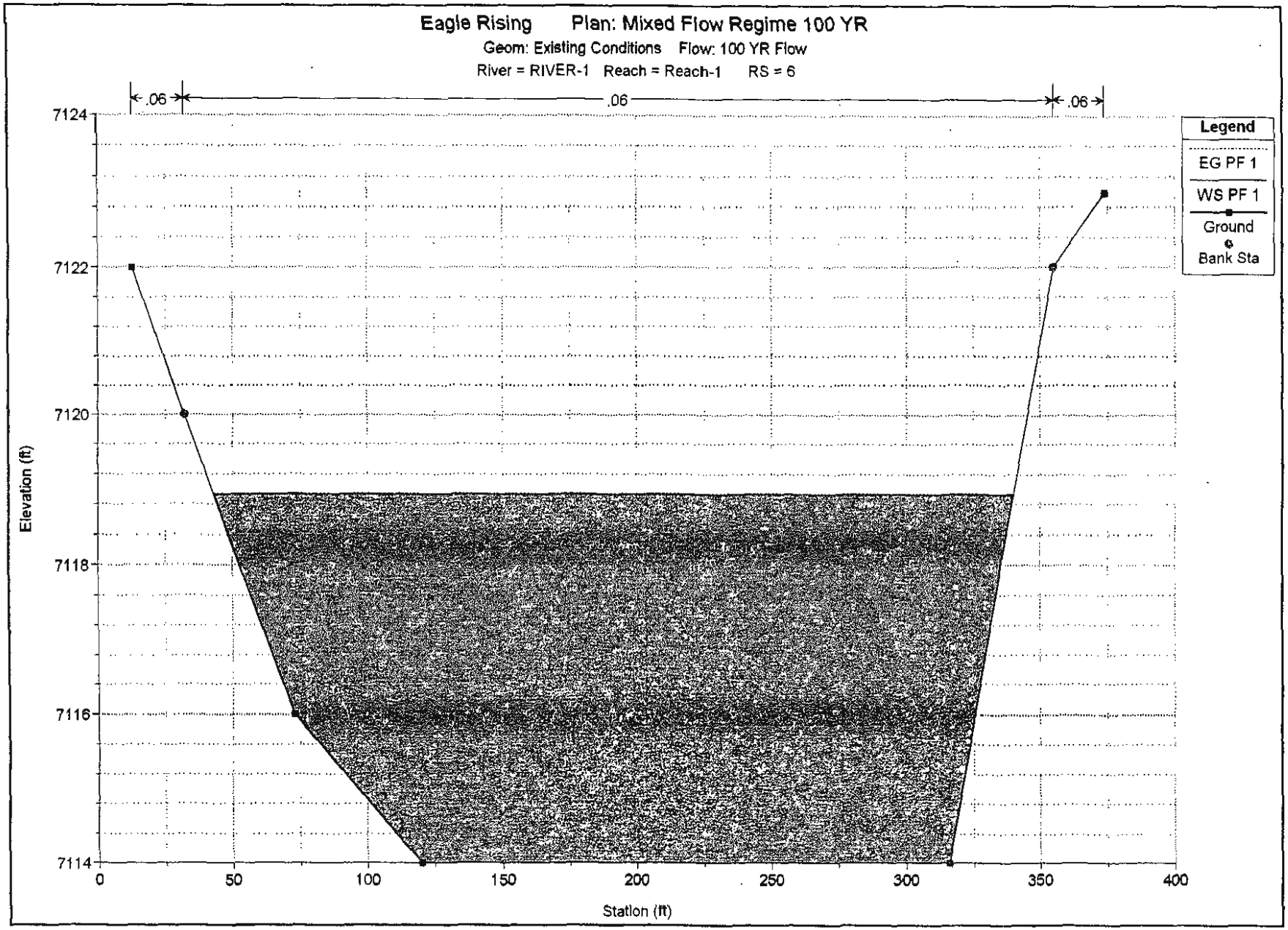

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions. Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 3
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7135
7130
7125
7120
7115
7110
7105
7100
0
100
200
300
400
Station (ft)

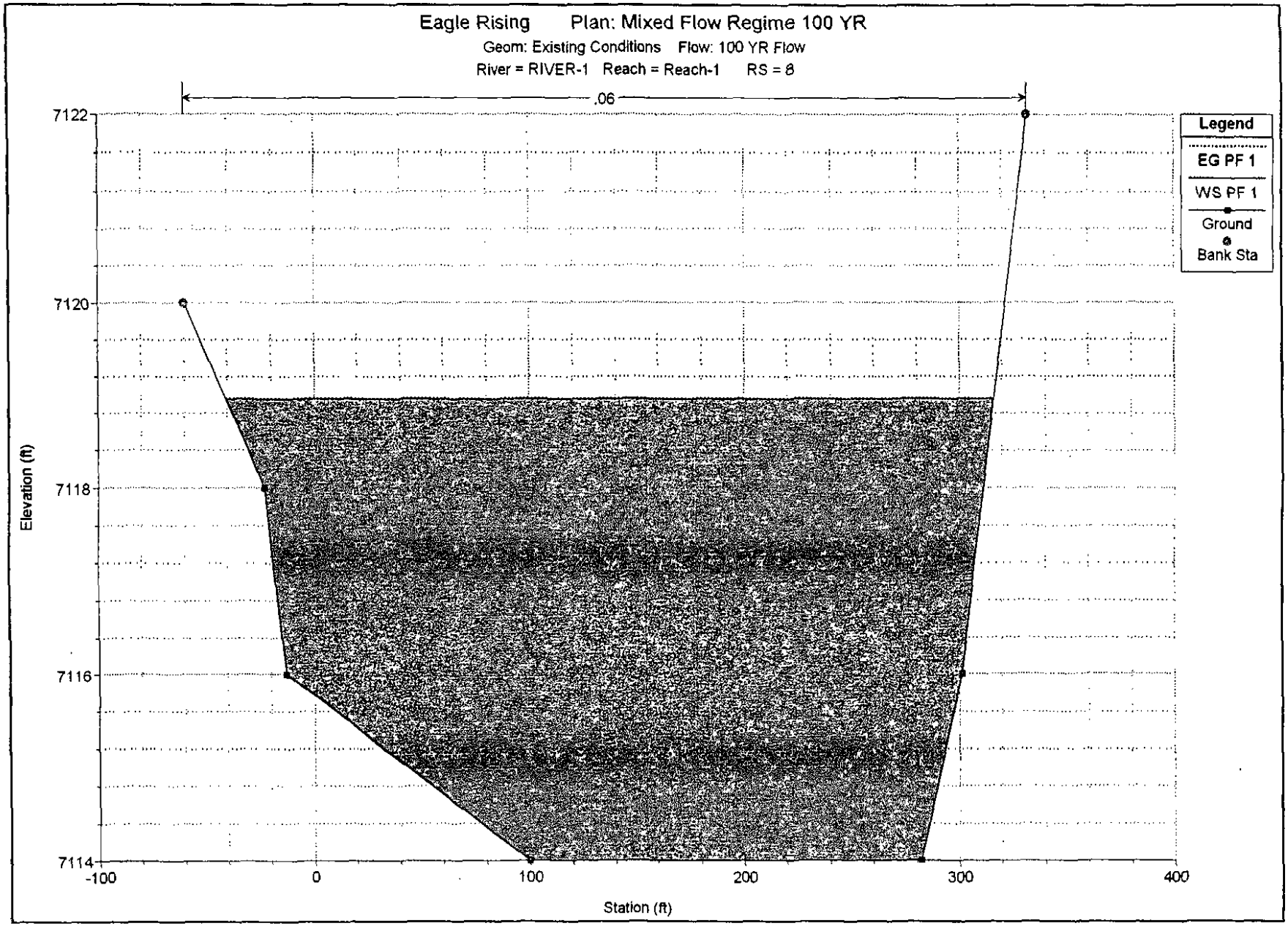

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 3.75
.06
.06
.06
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
7125
7120
7115
7110
7105
7100
0
100
200
300
400
500
600

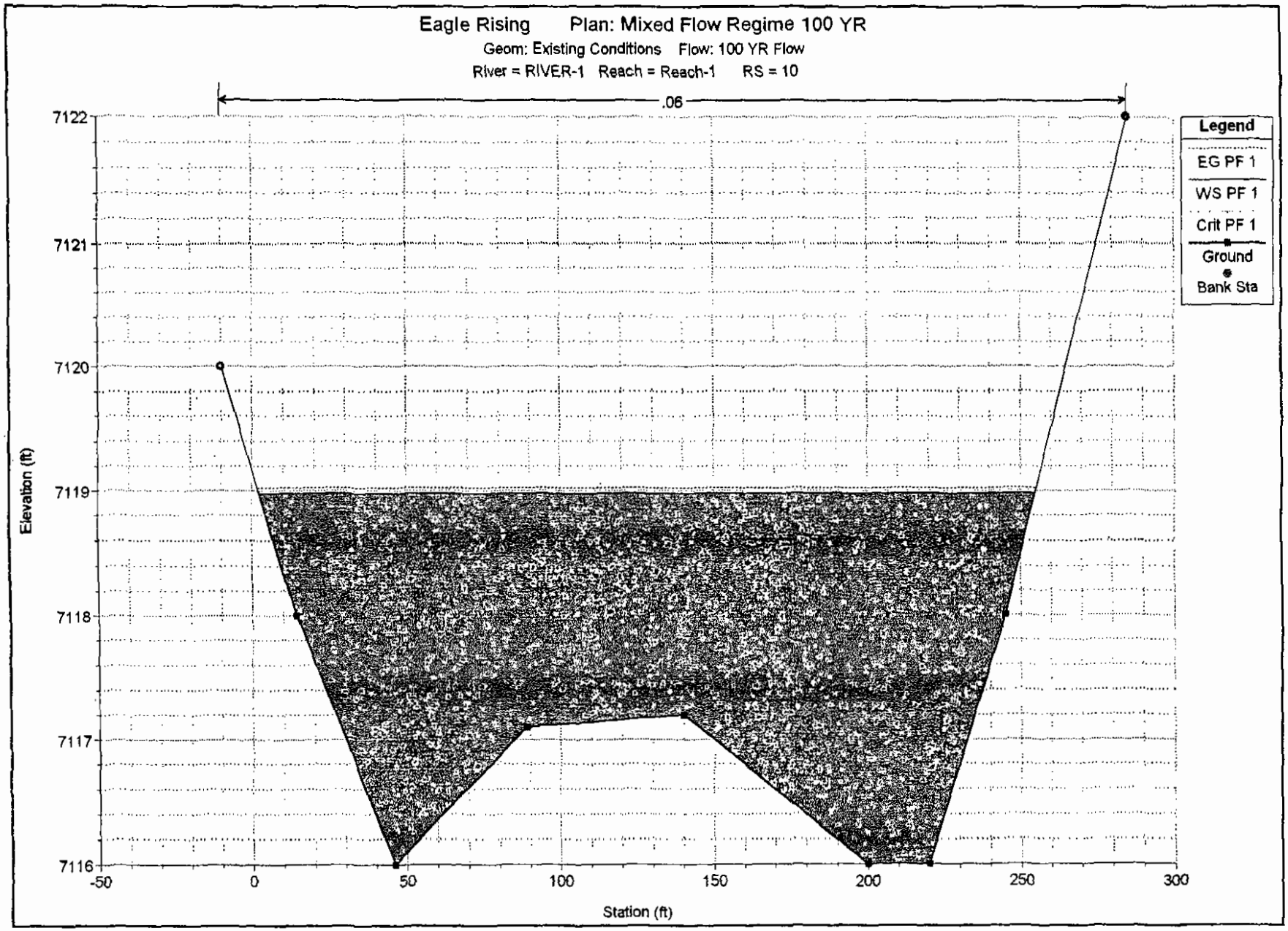

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 4
.06
.06
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7128
7126
7124
7122
7120
7118
7116
7114
7112
-100
0
100
200
300
400
500
600
700
Station (ft)

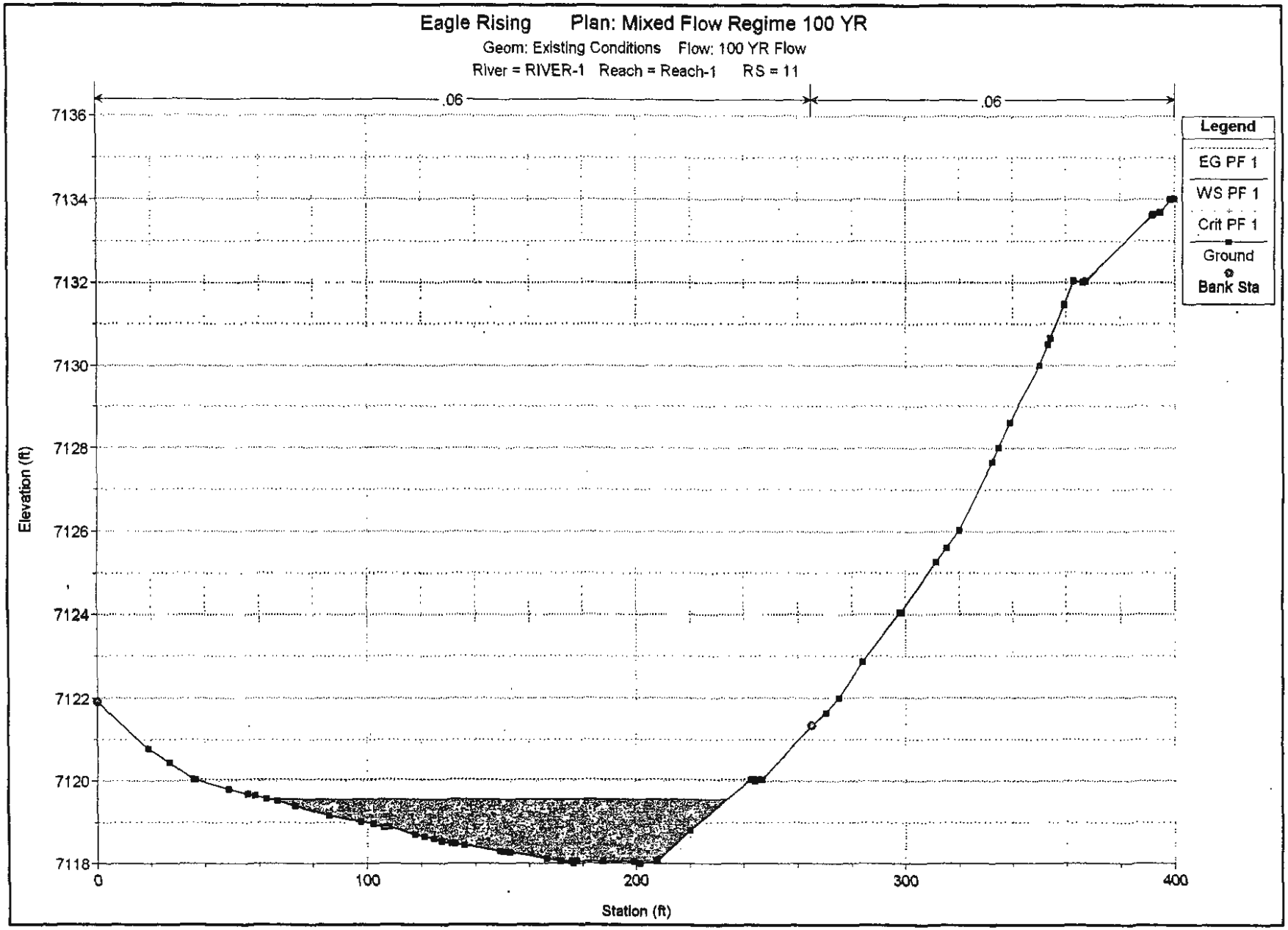

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 4.25
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7126
7124
7122
7120
7118
7116
7114
-100
0
100
200
300
400
500
600
Station (ft)

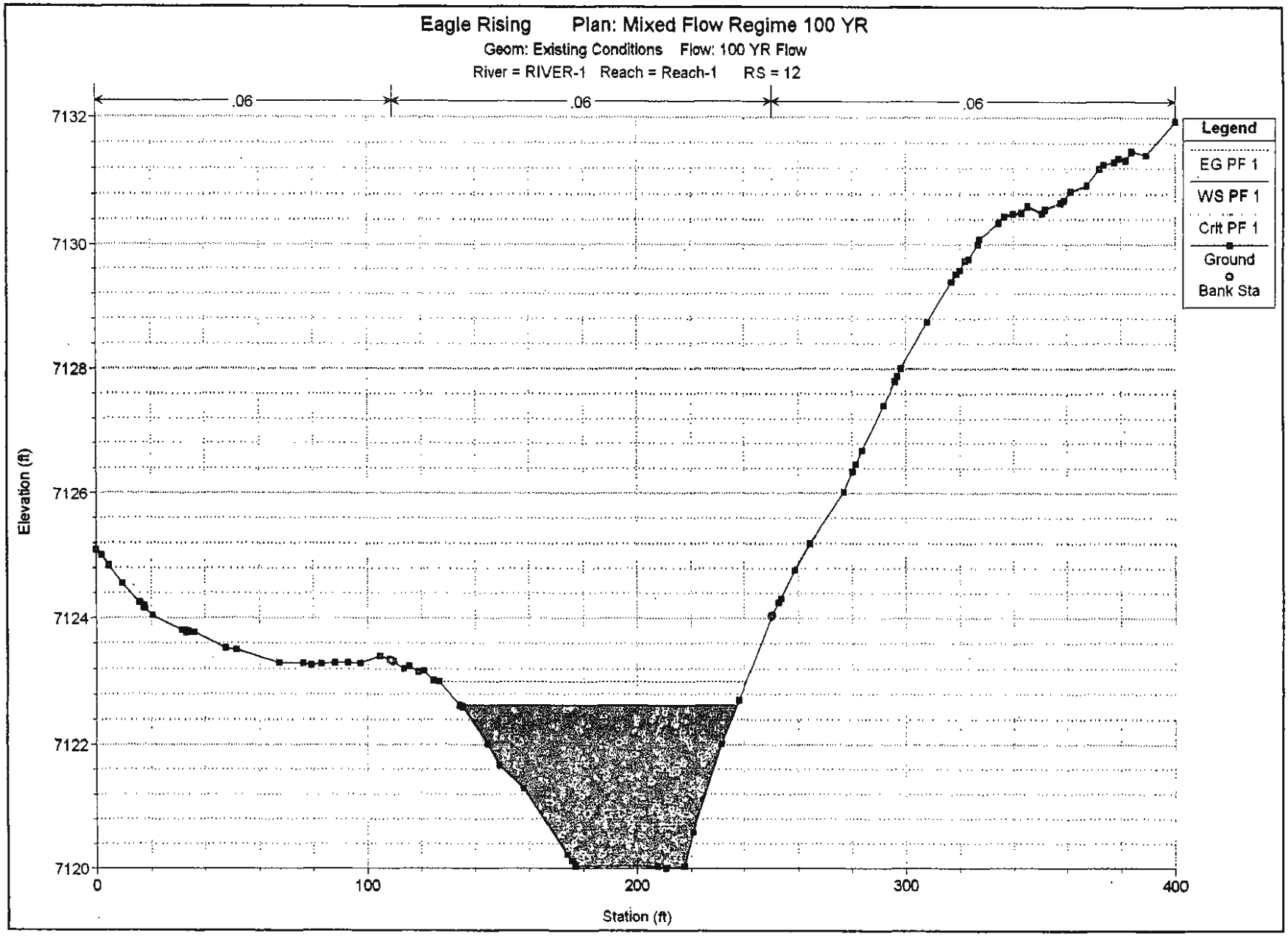

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 4.50
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7126
7124
7122
7120
7118
7116
7114
0
100
200
300
400
500
Station (ft)

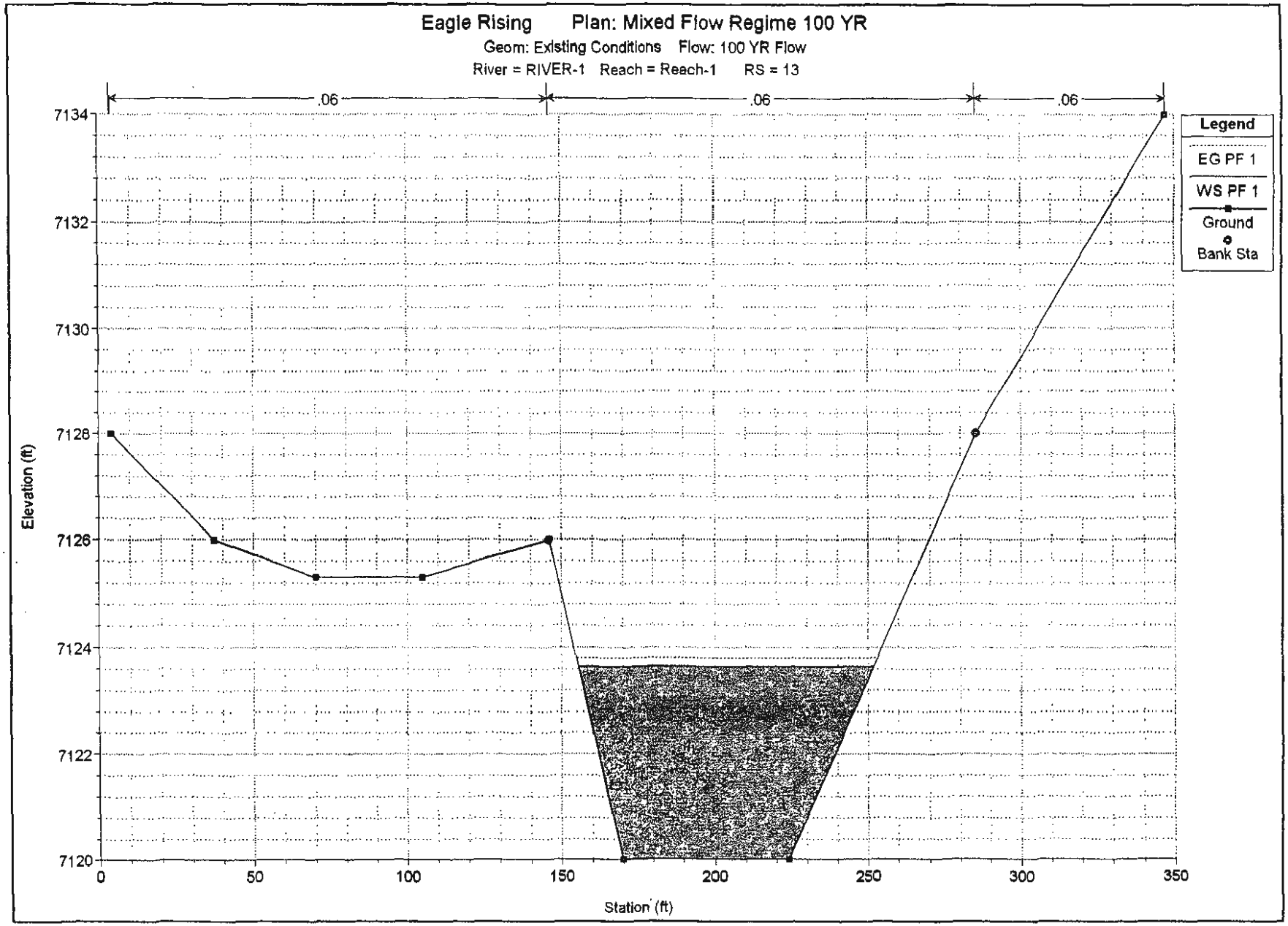

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 6
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7124
7122
7120
7118
7116
7114
0
50
100
150
200
250
300
350
400
Station (ft)

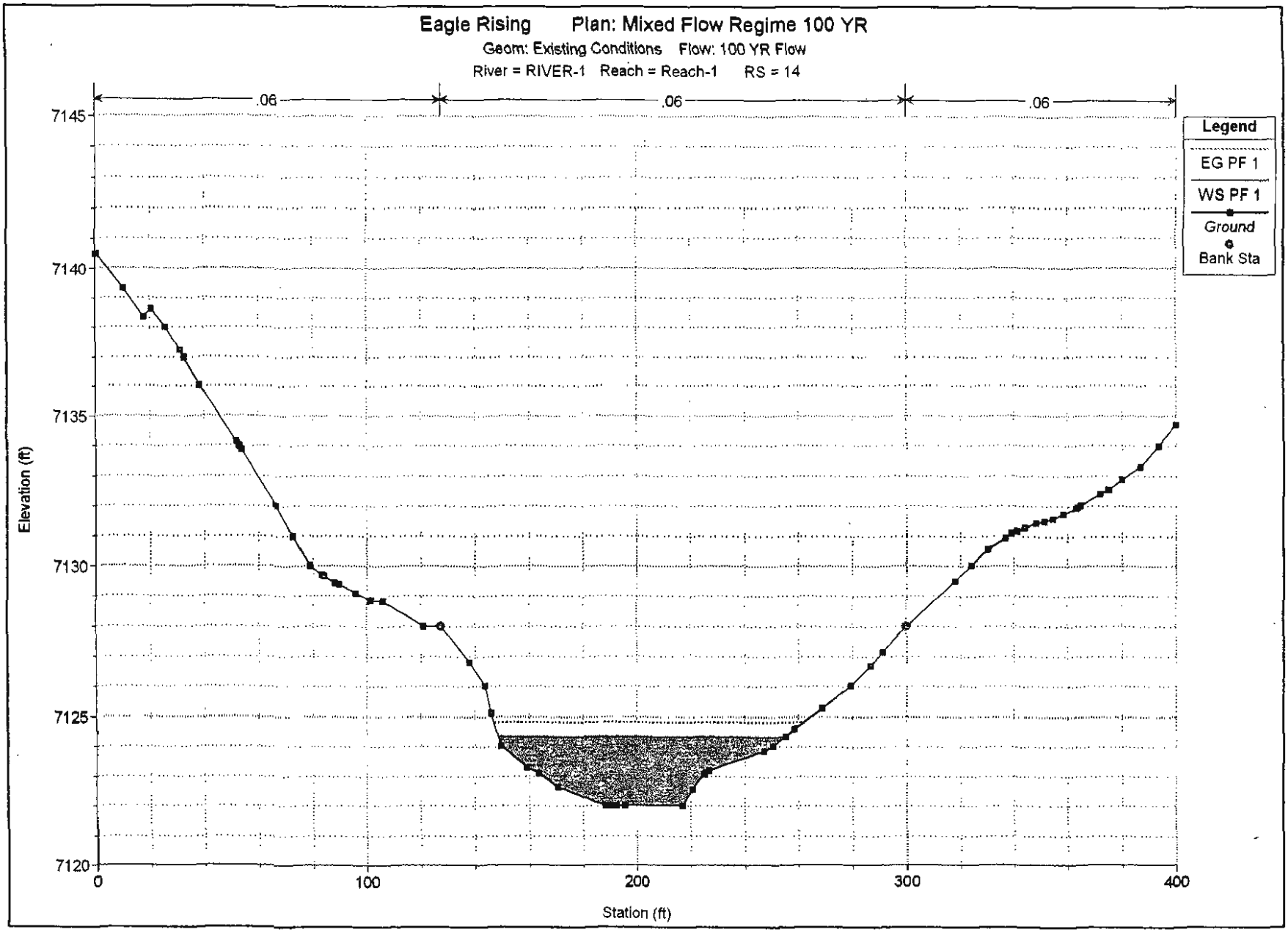

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 8
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7122
7120
7118
7116
7114
-100
0
100
200
300
400
Station (ft)

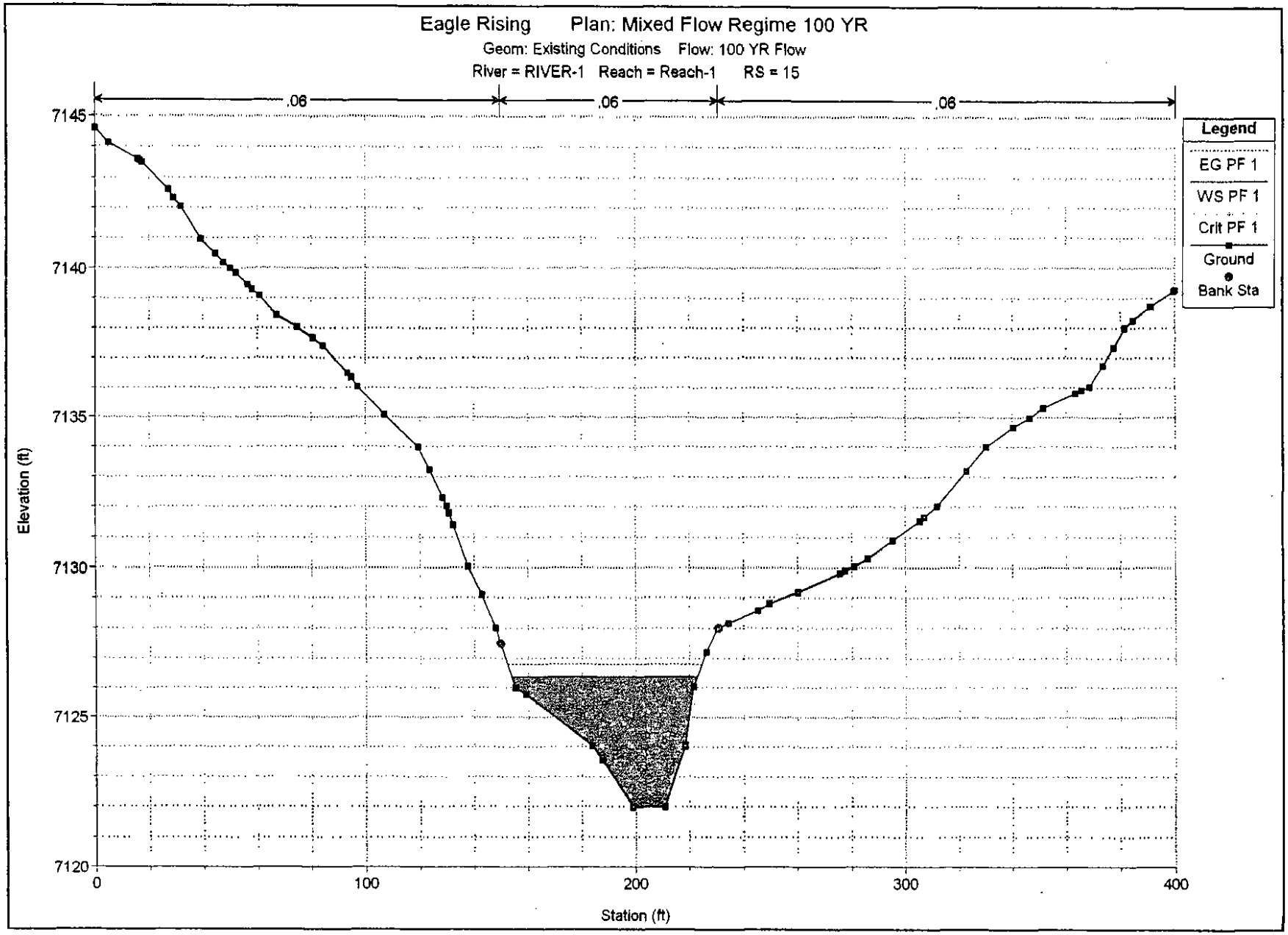

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 10
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7122
7121
7120
7119
7118
7117
7116
-50
0
50
100
150
200
250
300
Station (ft)

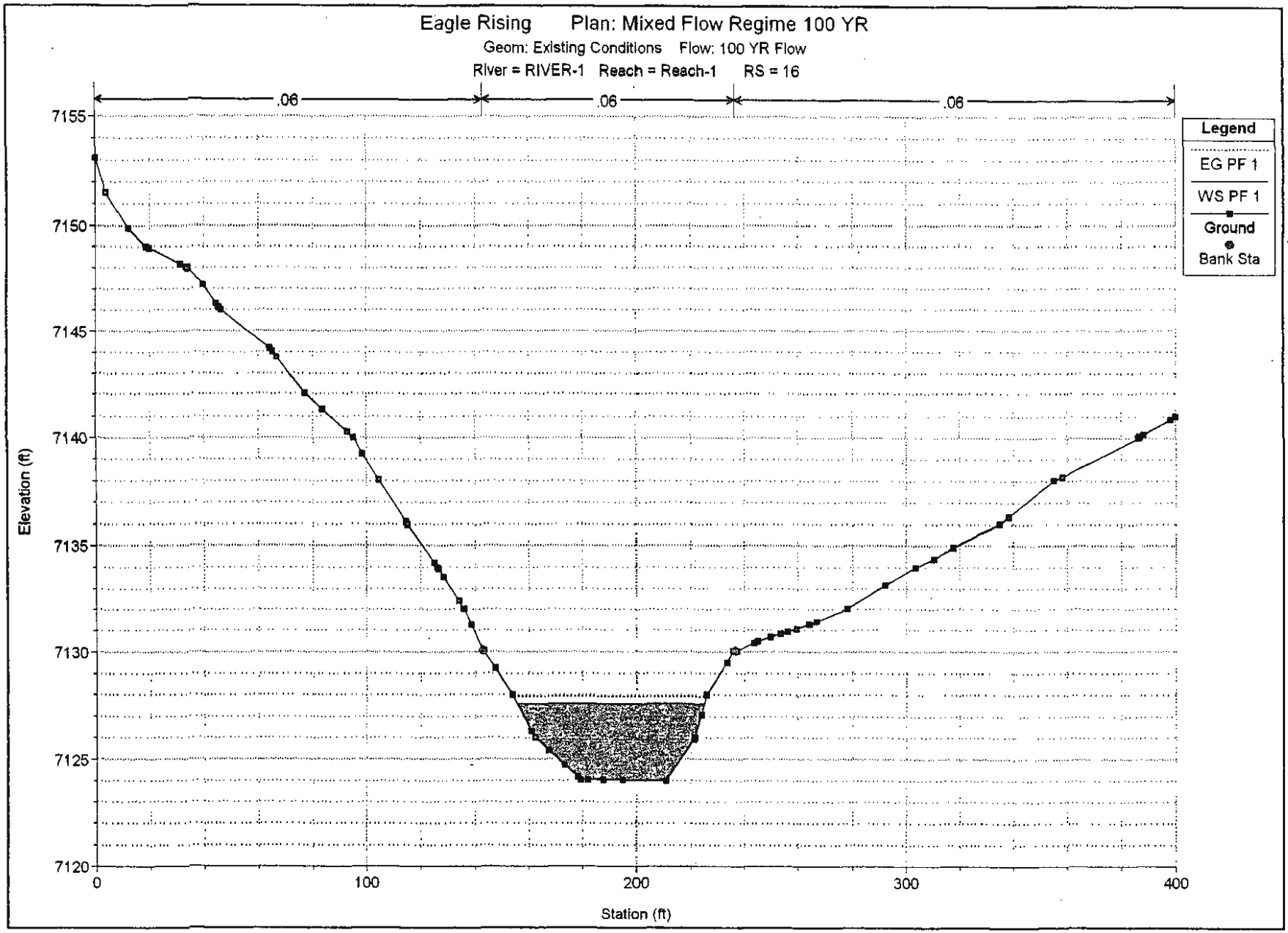

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 11
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7136
7134
7132
7130
7128
7126
7124
7122
7120
7118
0
100
200
300
400
Station (ft)

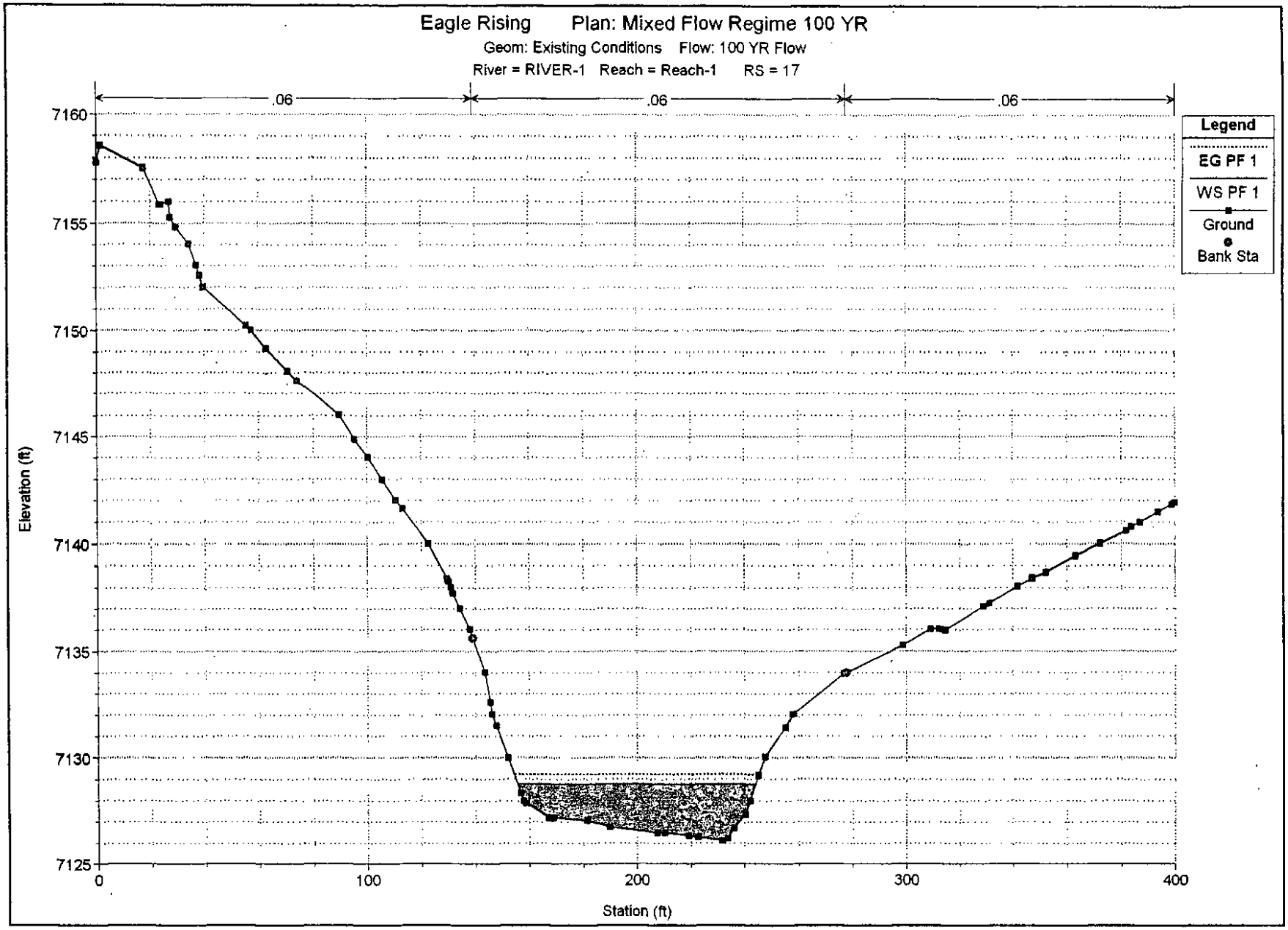

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 12
.06
.06
.06
7132
7130
7128
7126
7124
7122
7120
Elevation (ft)
0
100
200
300
400
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

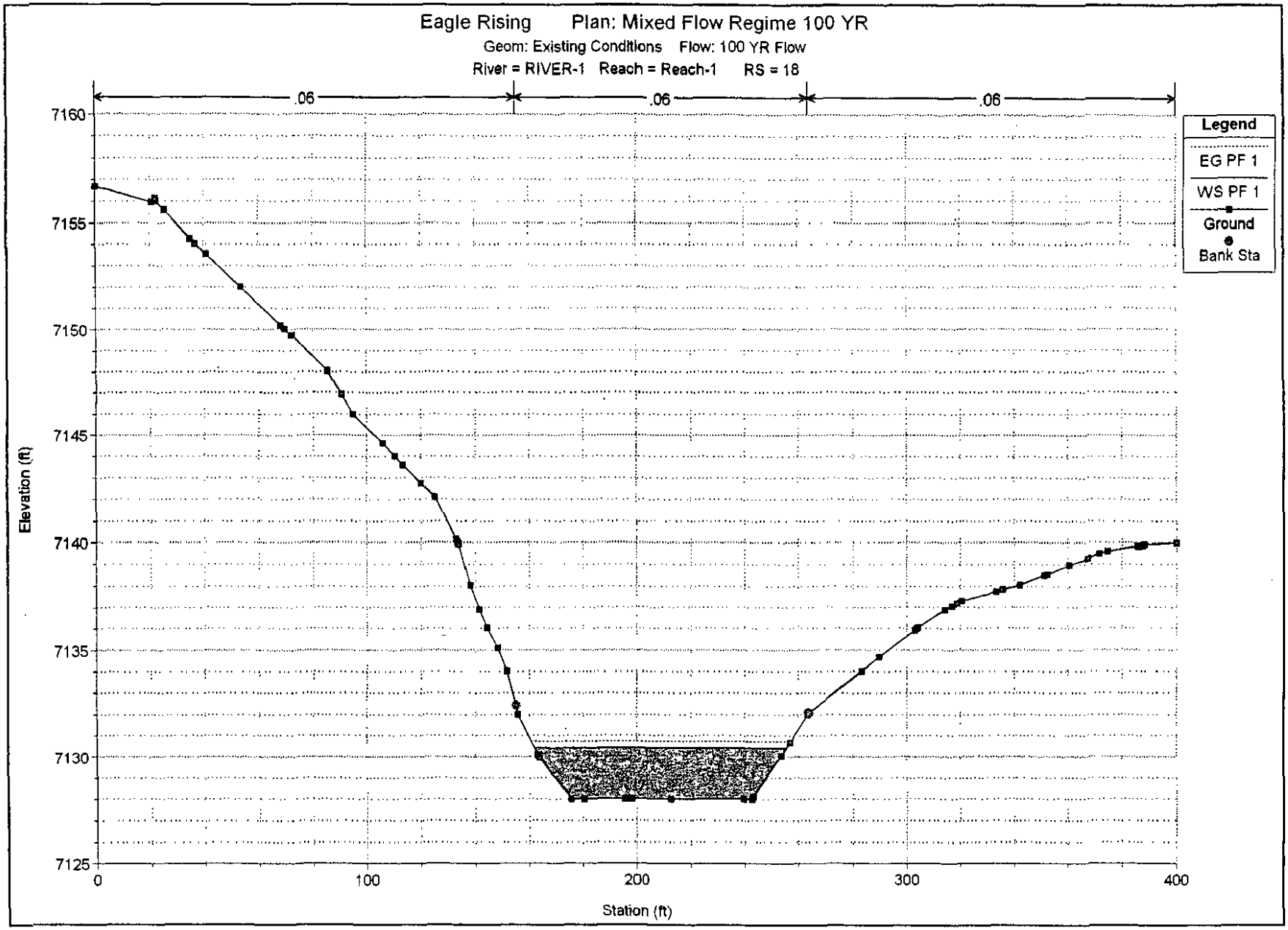

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 13
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7134
7132
7130
7128
7126
7124
7122
7120
0
50
100
150
200
250
300
350
Station (ft)

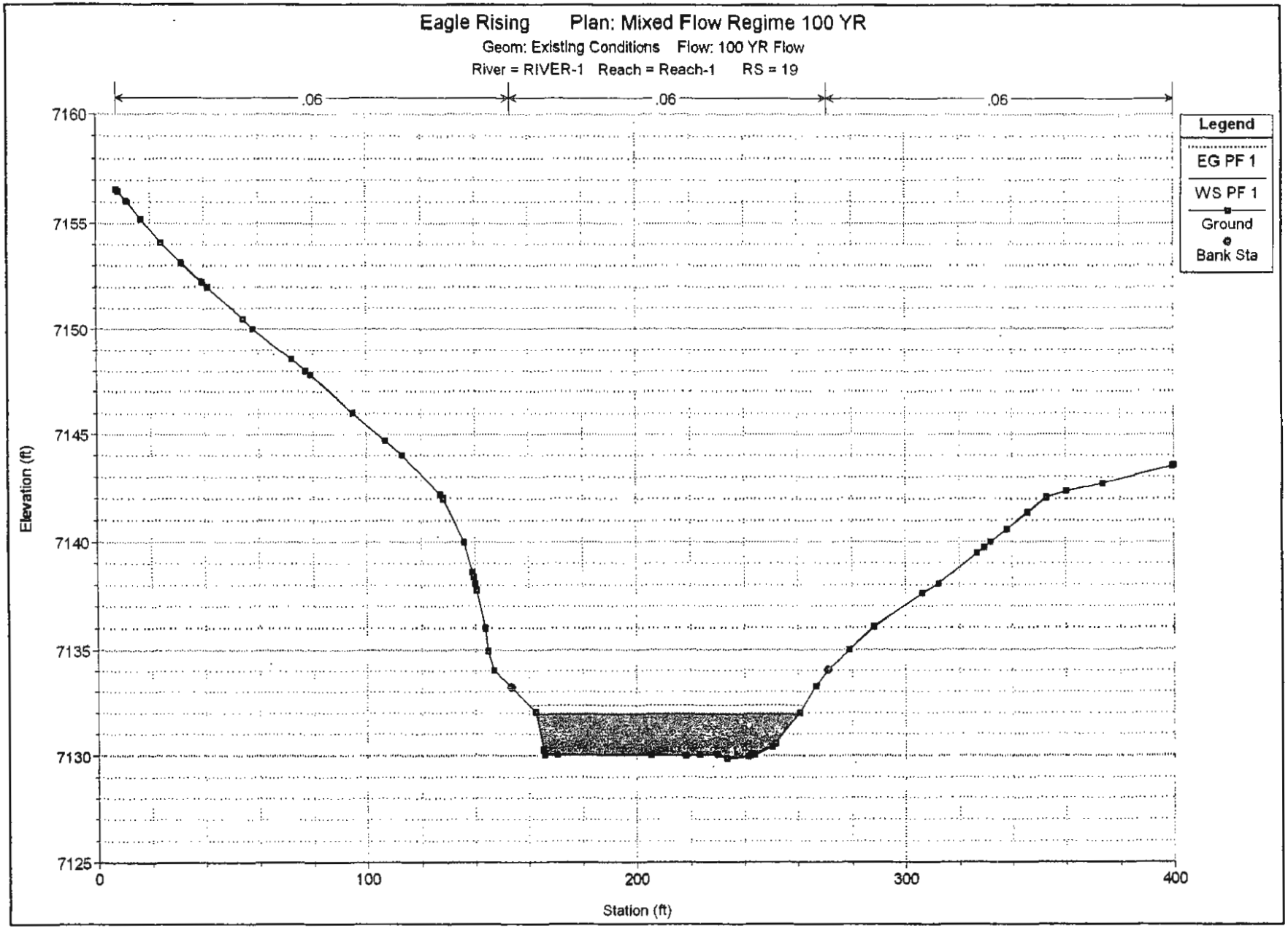

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 14
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
7145
7140
7135
7130
7125
7120
Elevation (ft)
0
100
200
300
400
Station (ft)

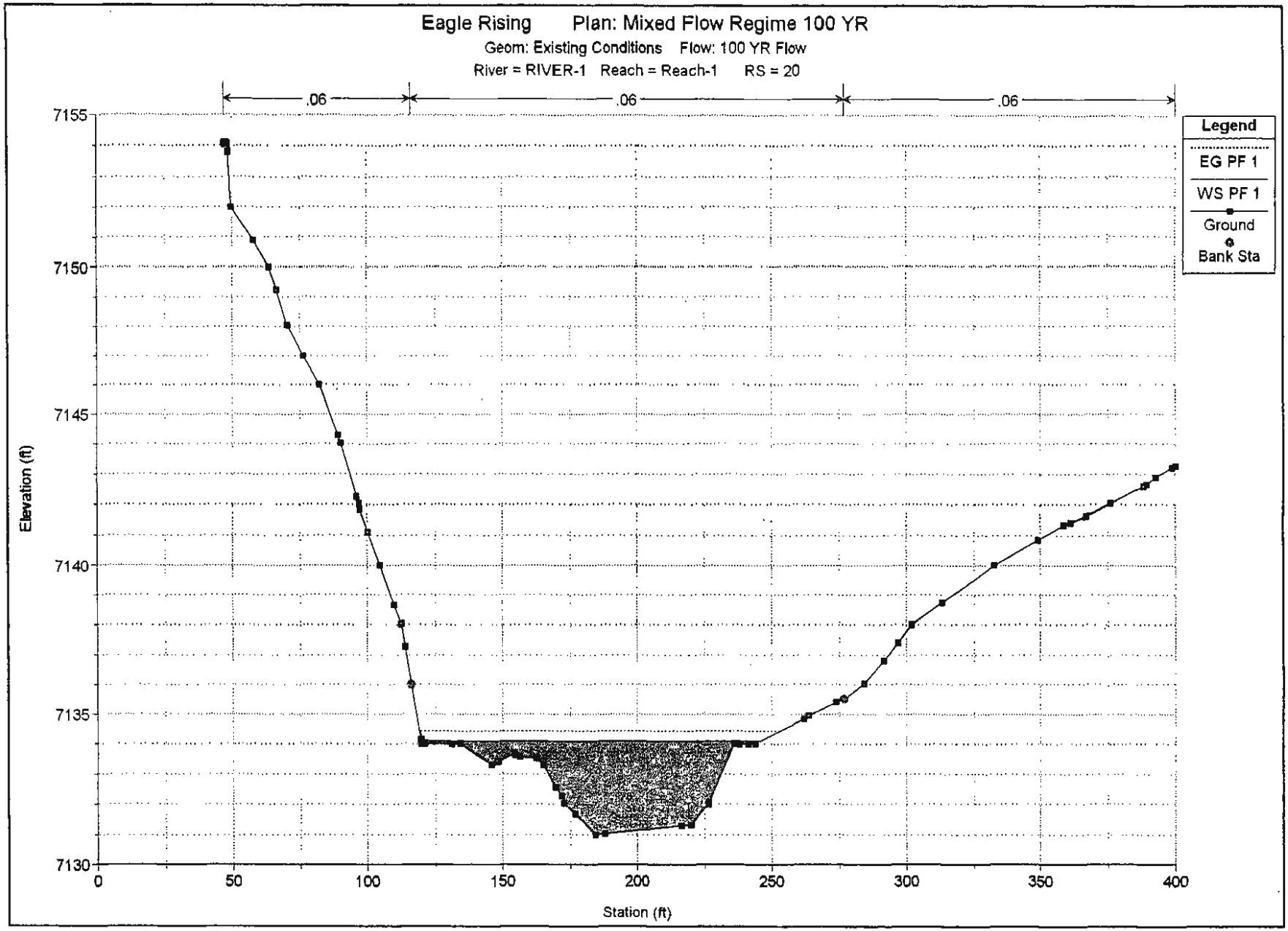

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 15
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
7145
7140
7135
7130
7125
7120
Elevation (ft)
0
100
200
300
400
Station (ft)

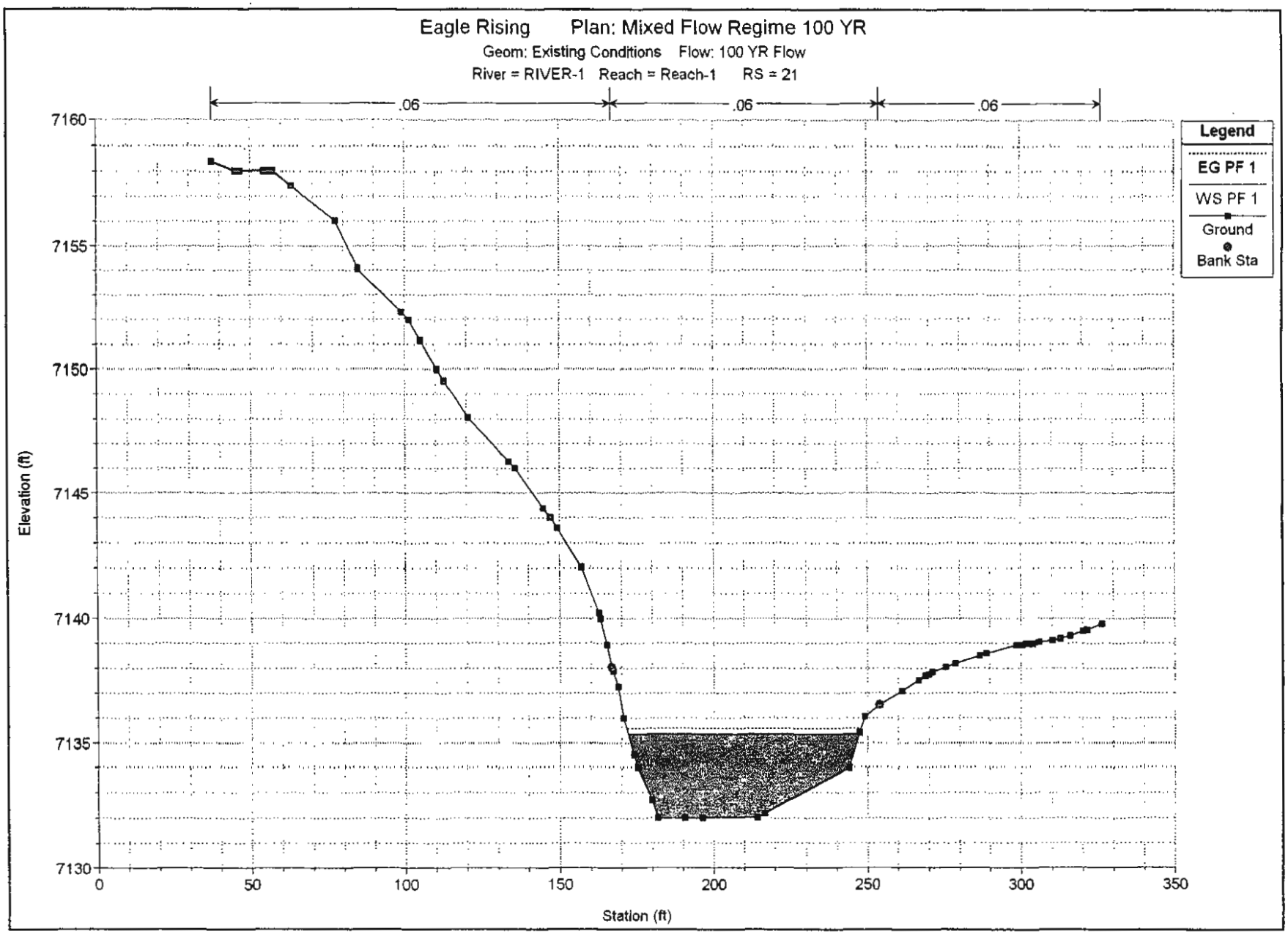

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 16
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7155
7150
7145
7140
7135
7130
7125
7120
0
100
200
300
400
Station (ft)

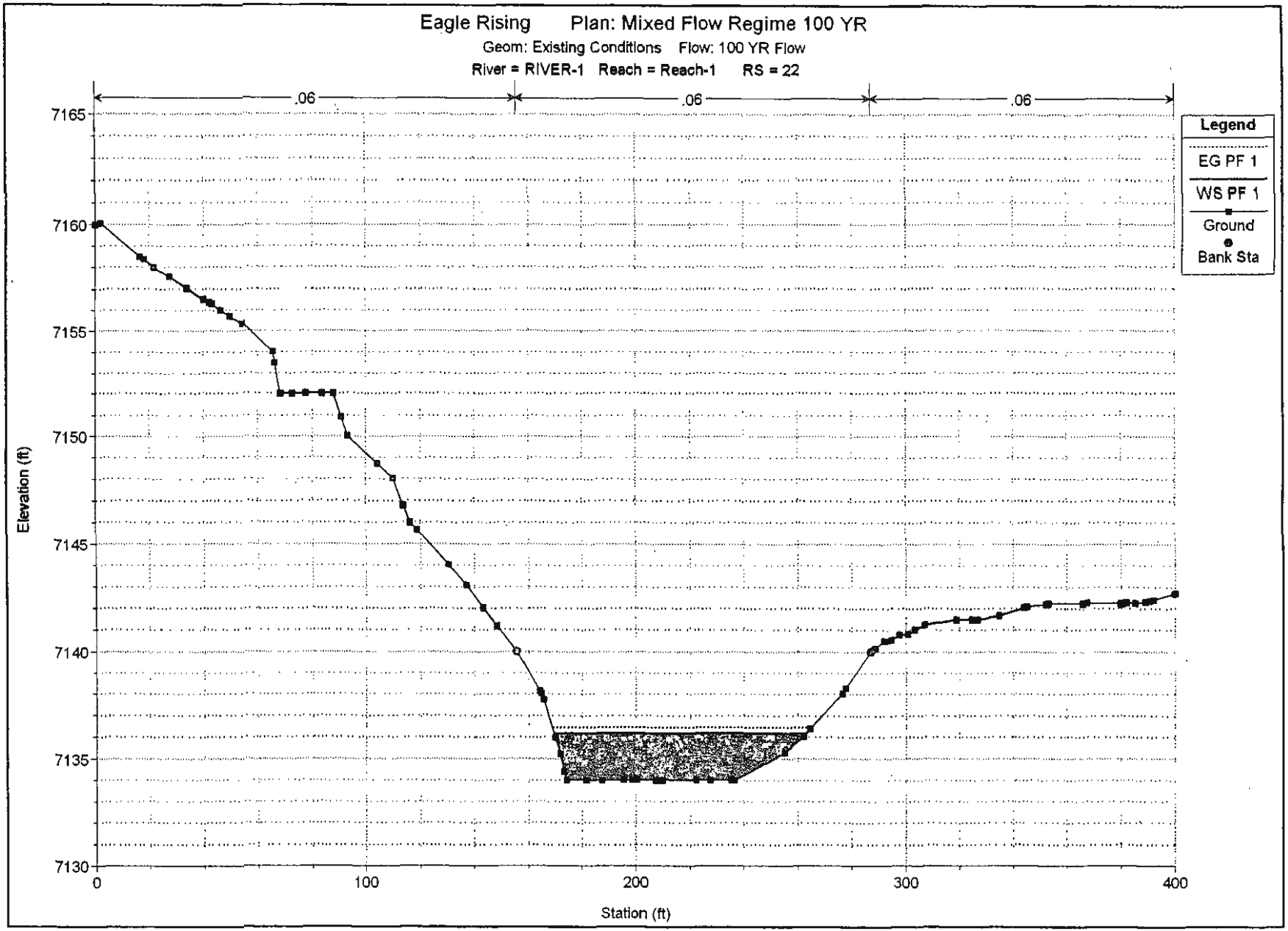

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 17
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7160
7155
7150
7145
7140
7135
7130
7125
0
100
200
300
400
Station (ft)

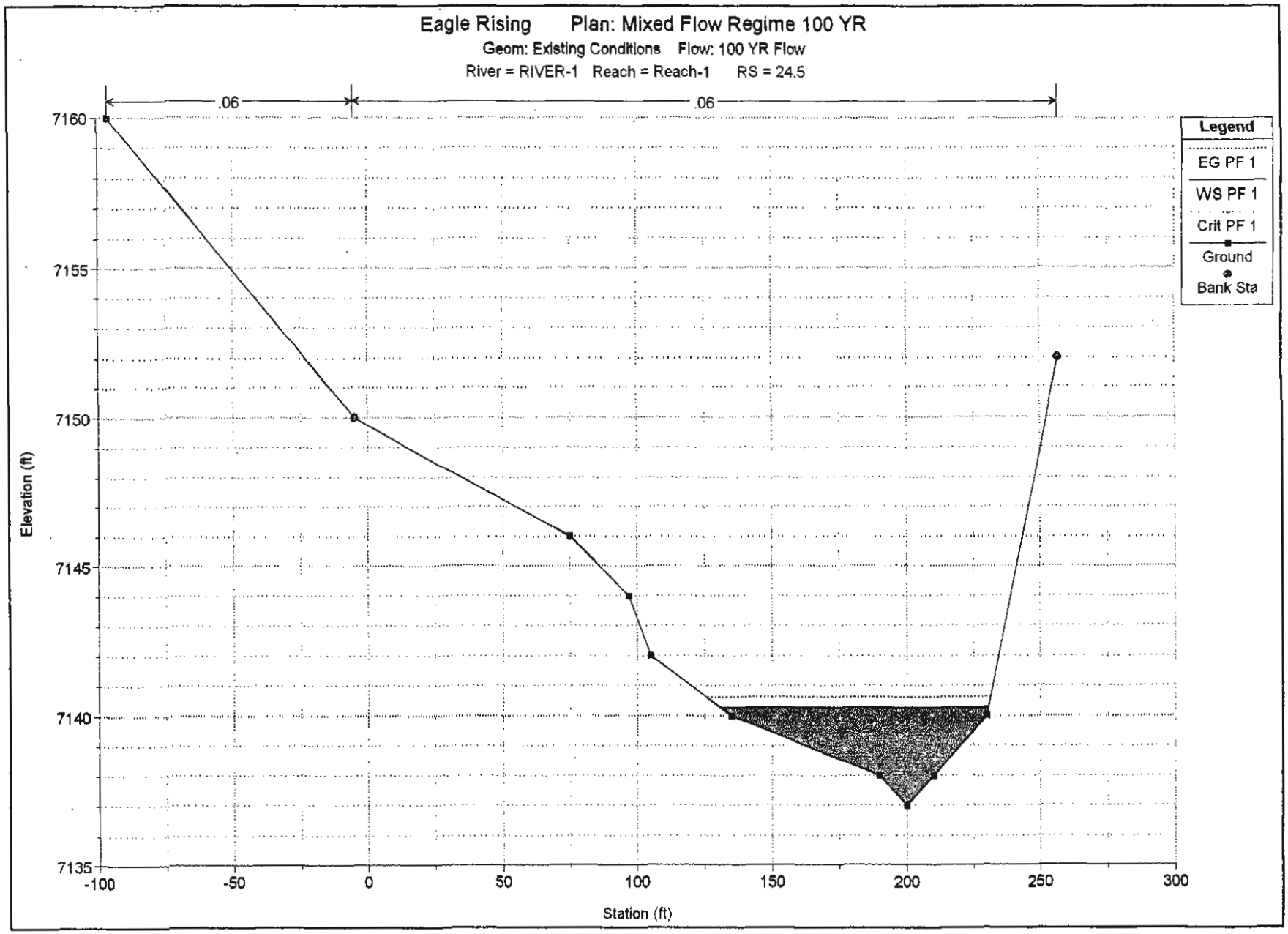

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 18
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7160
7155
7150
7145
7140
7135
7130
7125
0
100
200
300
400
Station (ft)

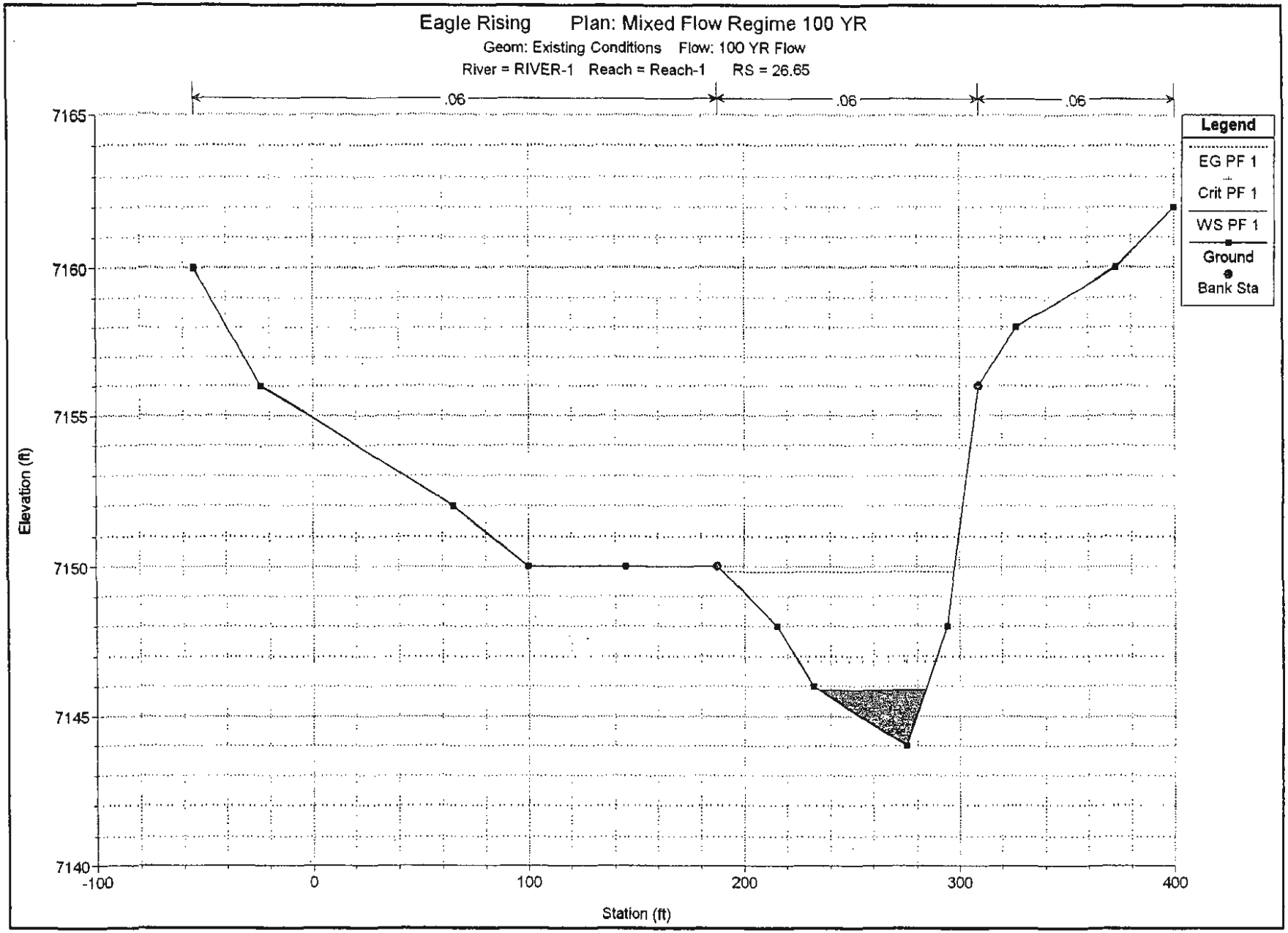

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 19
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7160
7155
7150
7145
7140
7135
7130
7125
0
100
200
300
400
Station (ft)

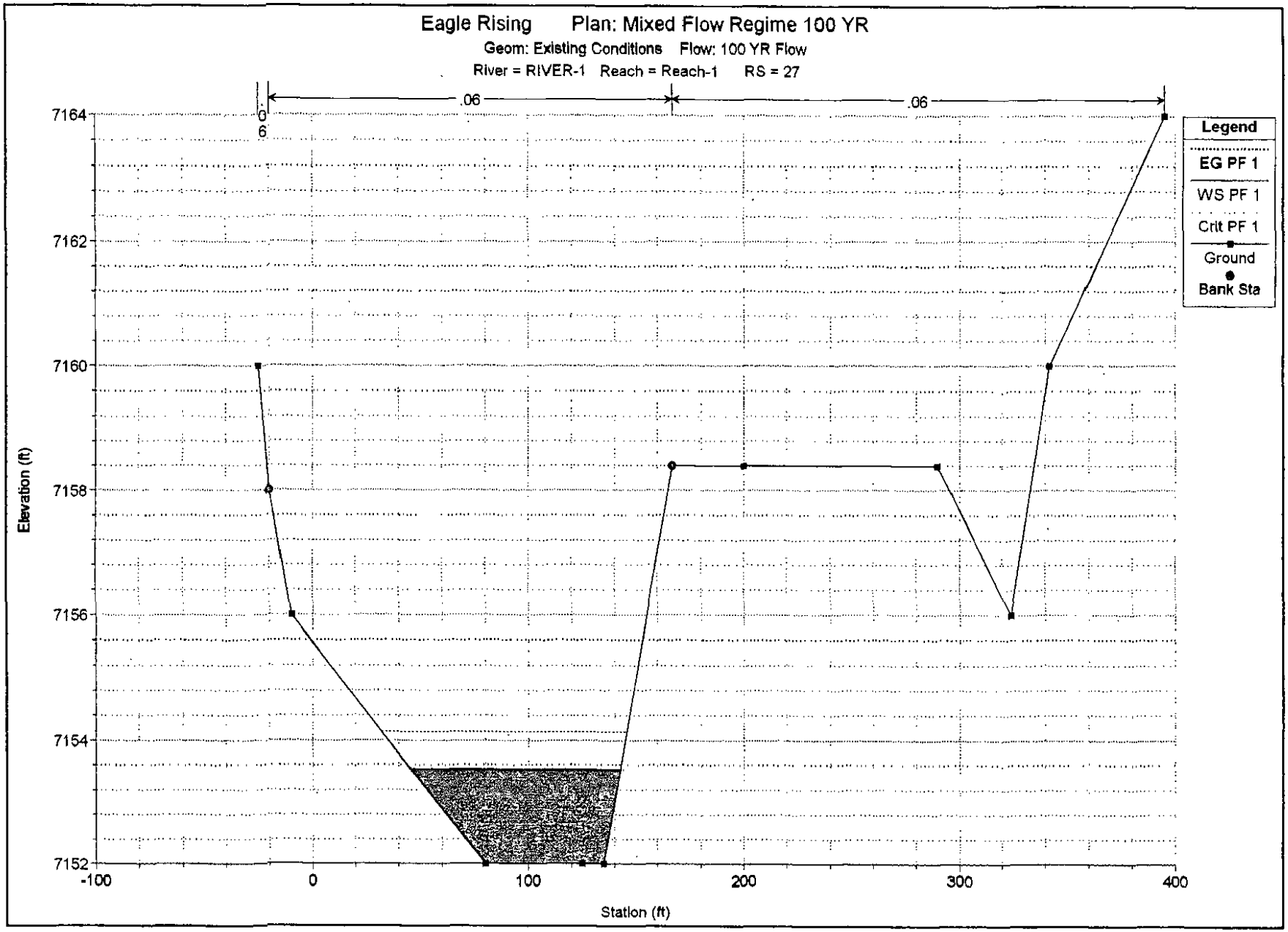

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 20
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7155
7150
7145
7140
7135
7130
0
50
100
150
200
250
300
350
400
Station (ft)

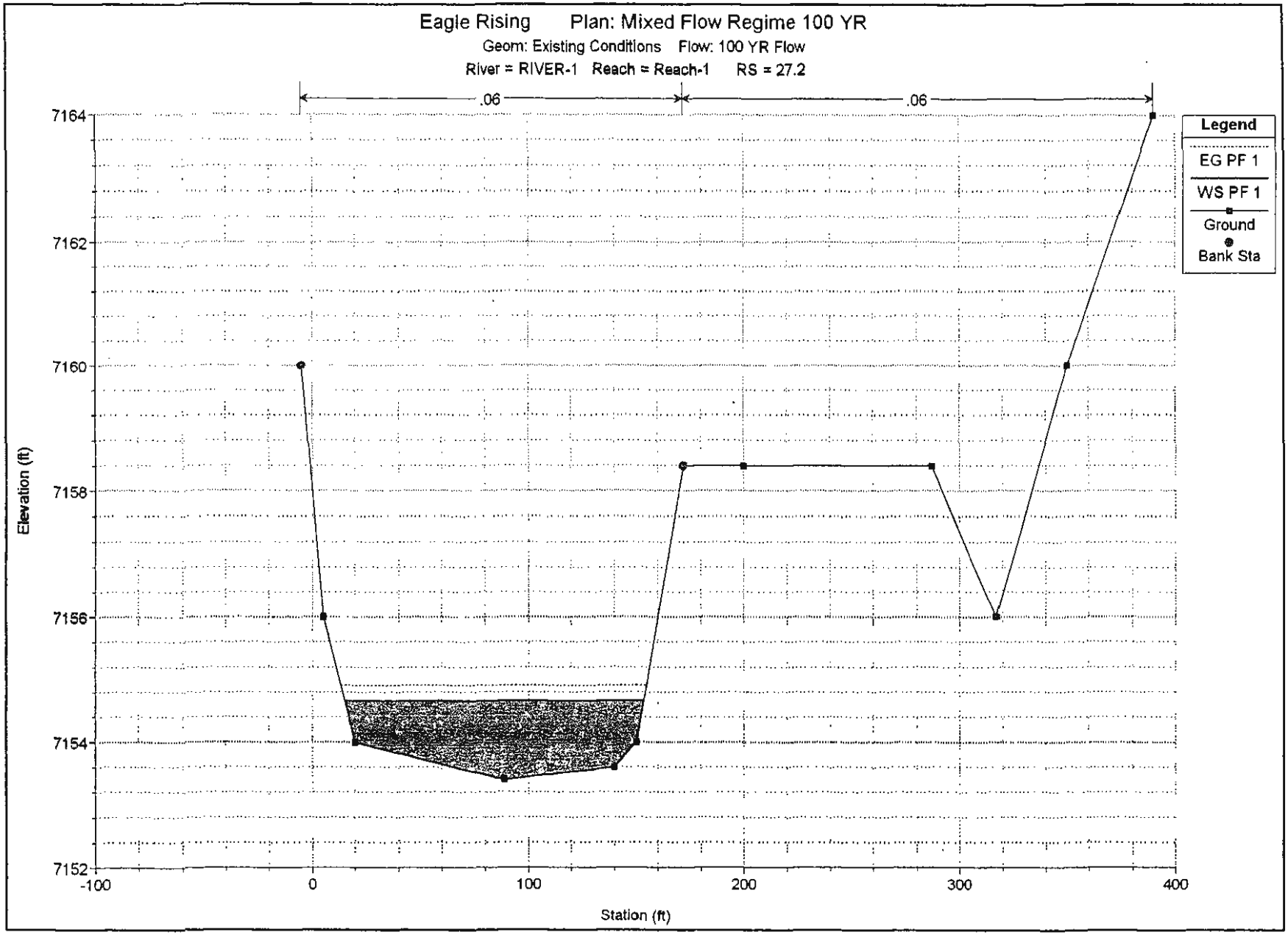

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 21
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7160
7155
7150
7145
7140
7135
7130
0
50
100
150
200
250
300
350
Station (ft)

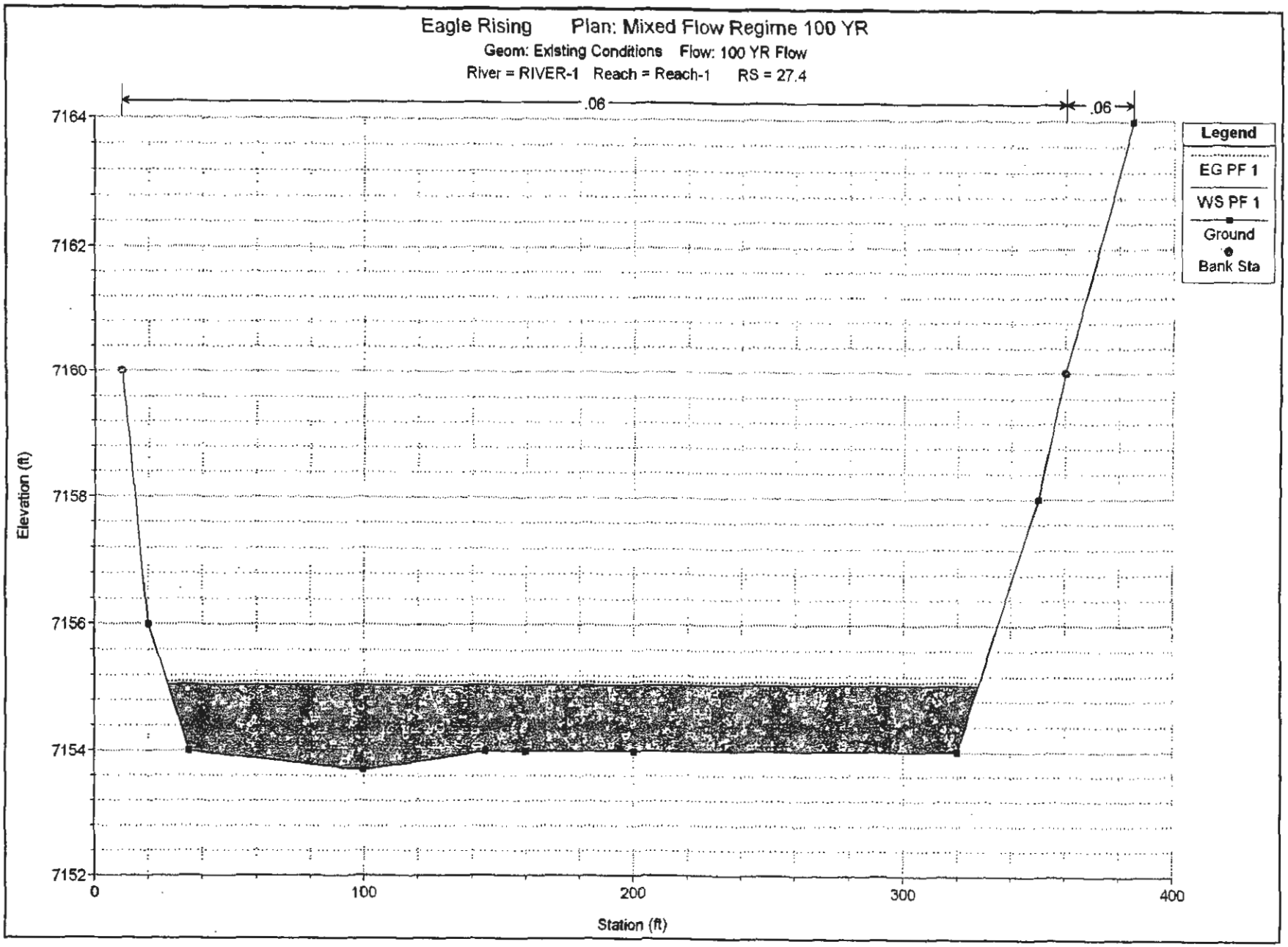

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 22
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7165
7160
7155
7150
7145
7140
7135
7130
0
100
200
300
400
Station (ft)

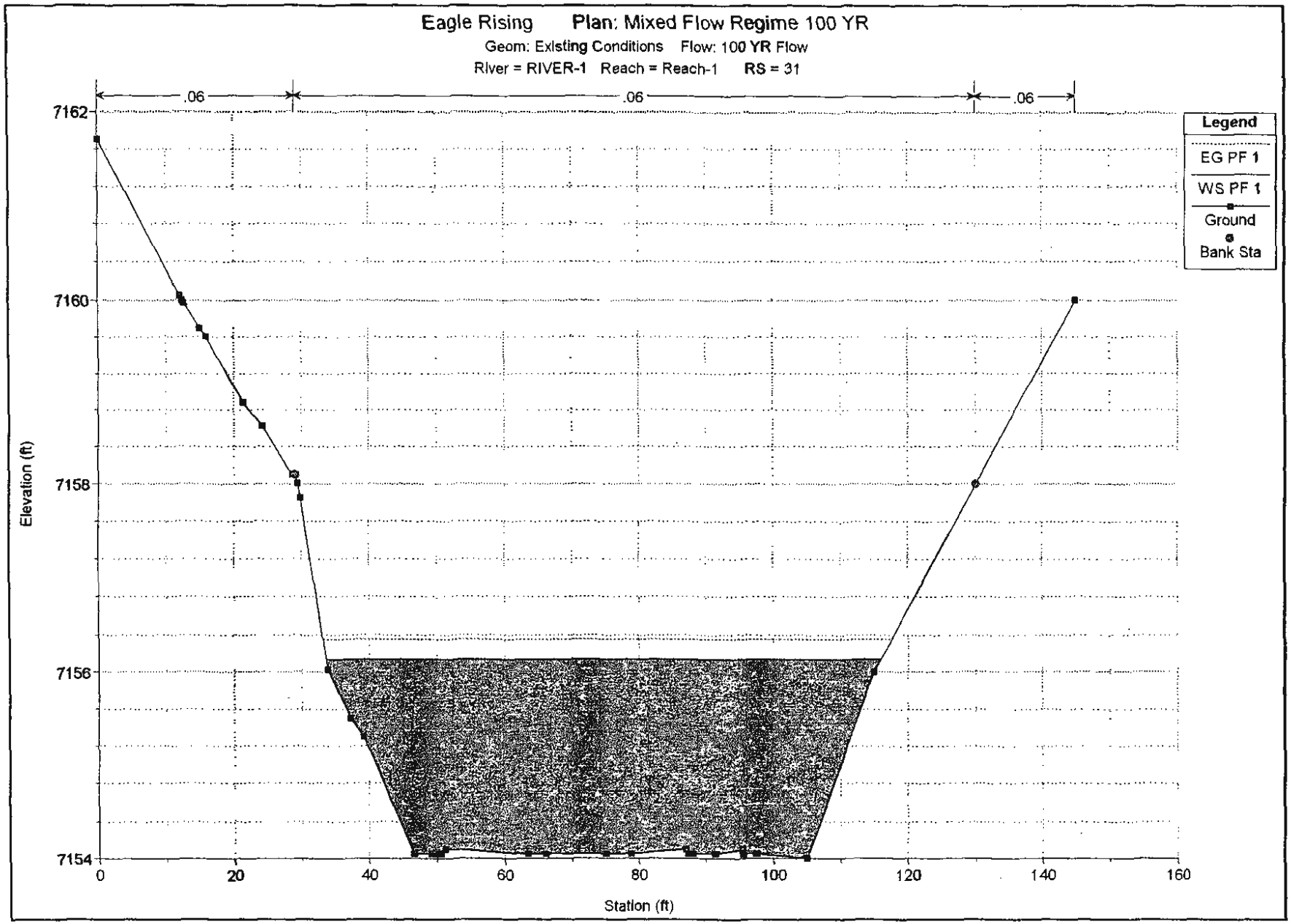

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 24.5
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7160
7155
7150
7145
7140
7135
-100
-50
0
50
100
150
200
250
300
Station (ft)

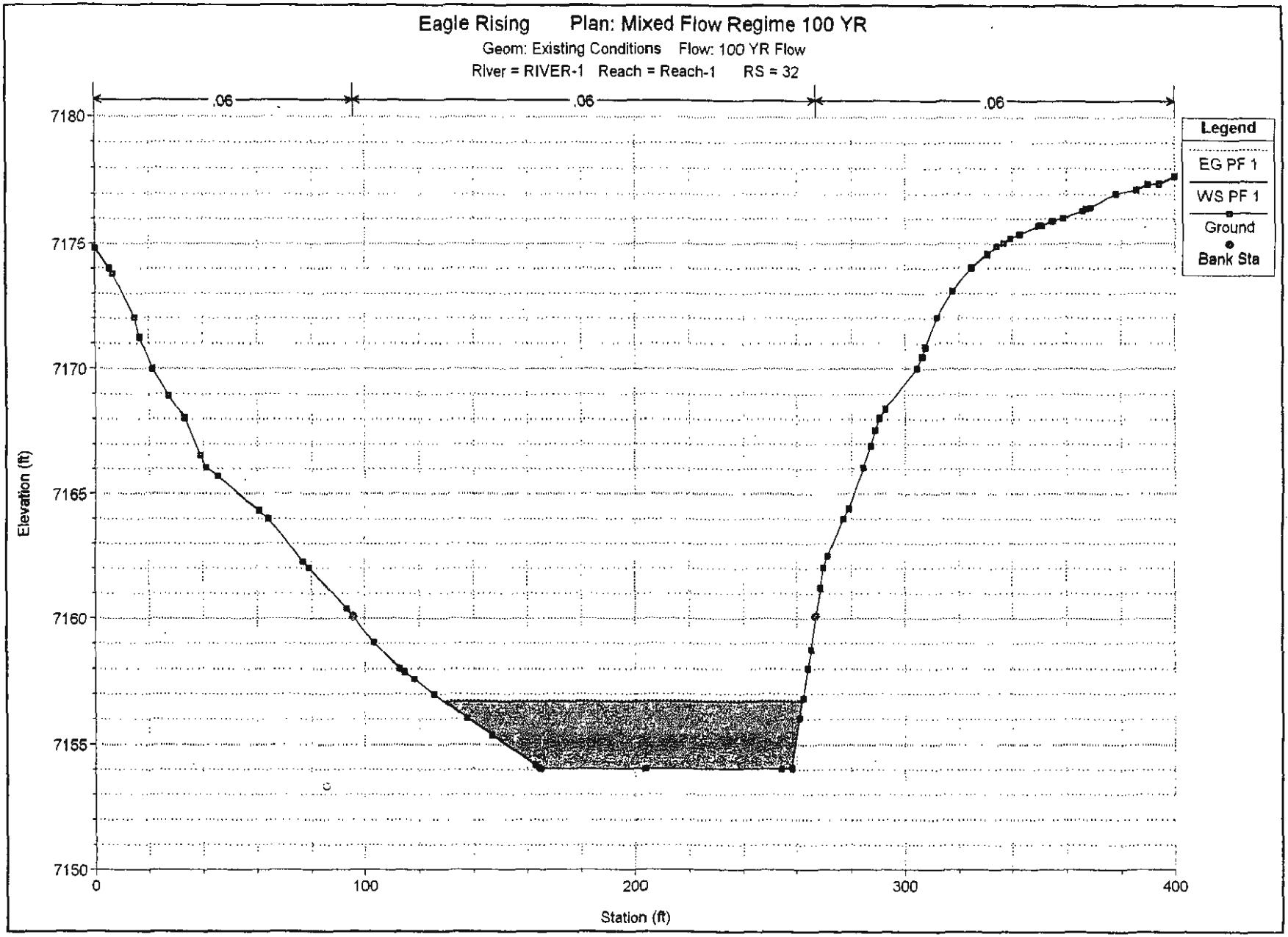

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 26.65
.06
.06
.06
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7165
7160
7155
7150
7145
7140
-100
0
100
200
300
400
Station (ft)

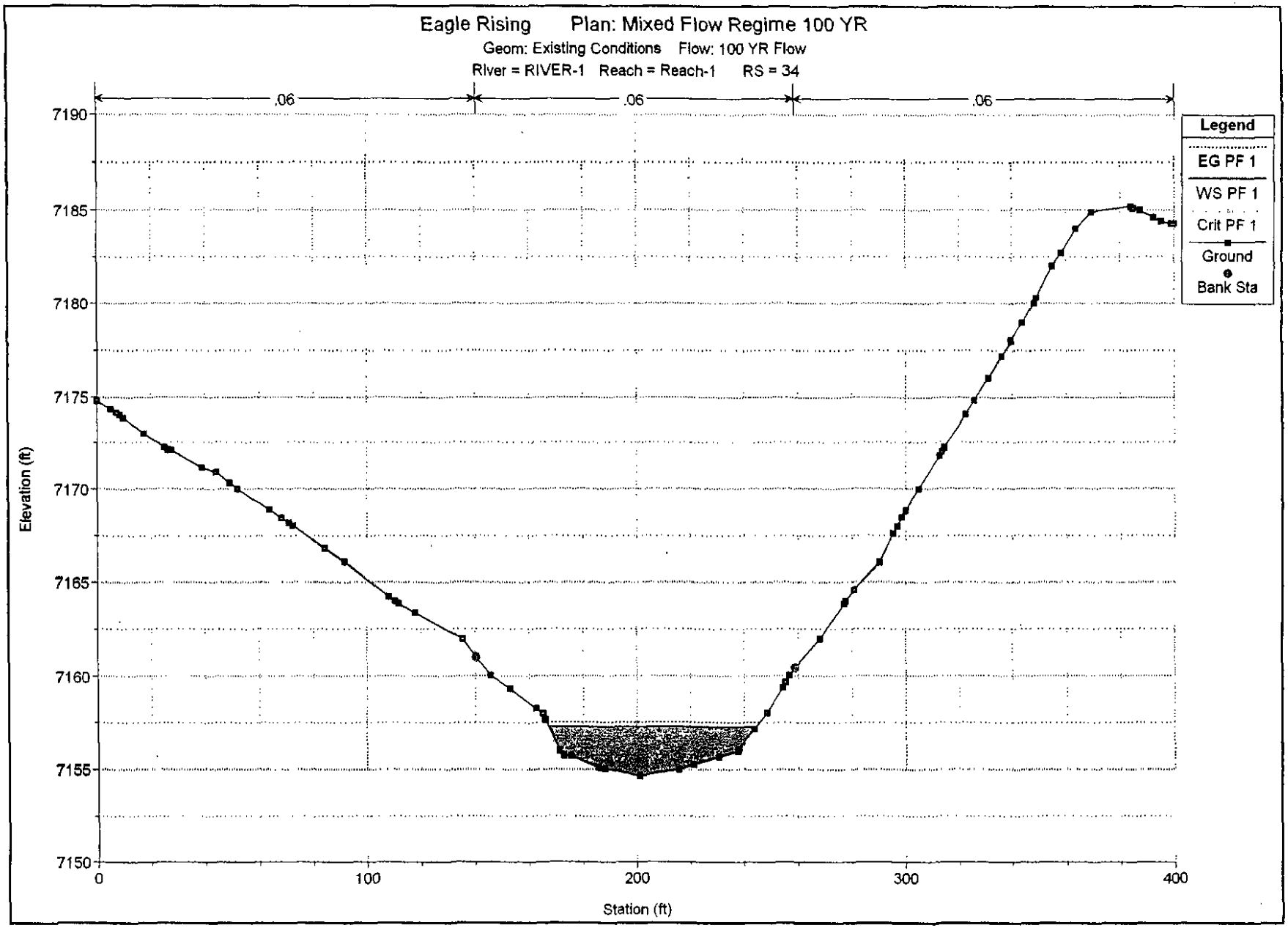

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 27
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7164
7162
7160
7158
7156
7154
7152
-100
0
100
200
300
400
Station (ft)

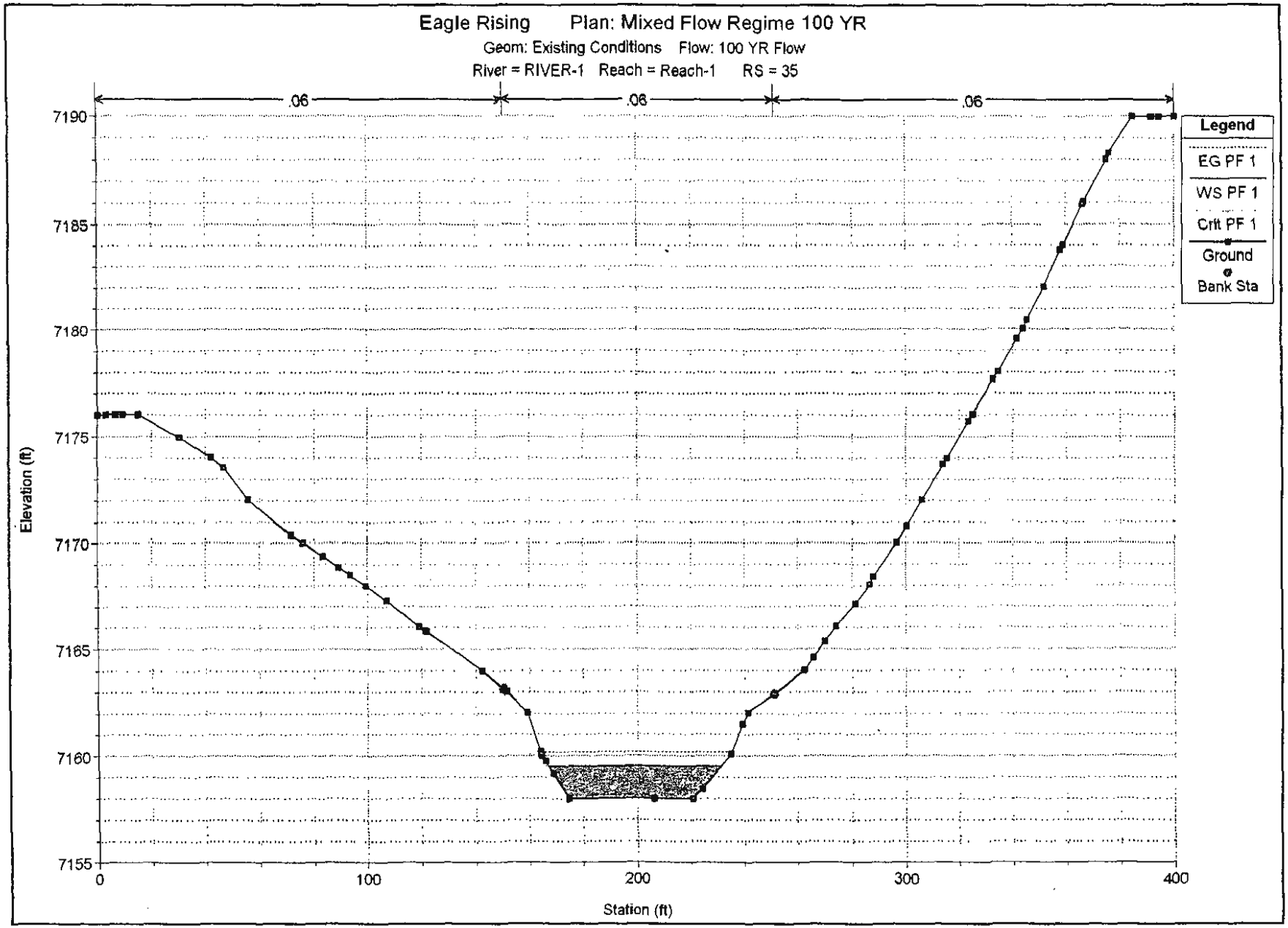

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 27.2
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7164
7162
7160
7158
7156
7154
7152
-100
0
100
200
300
400
Station (ft)

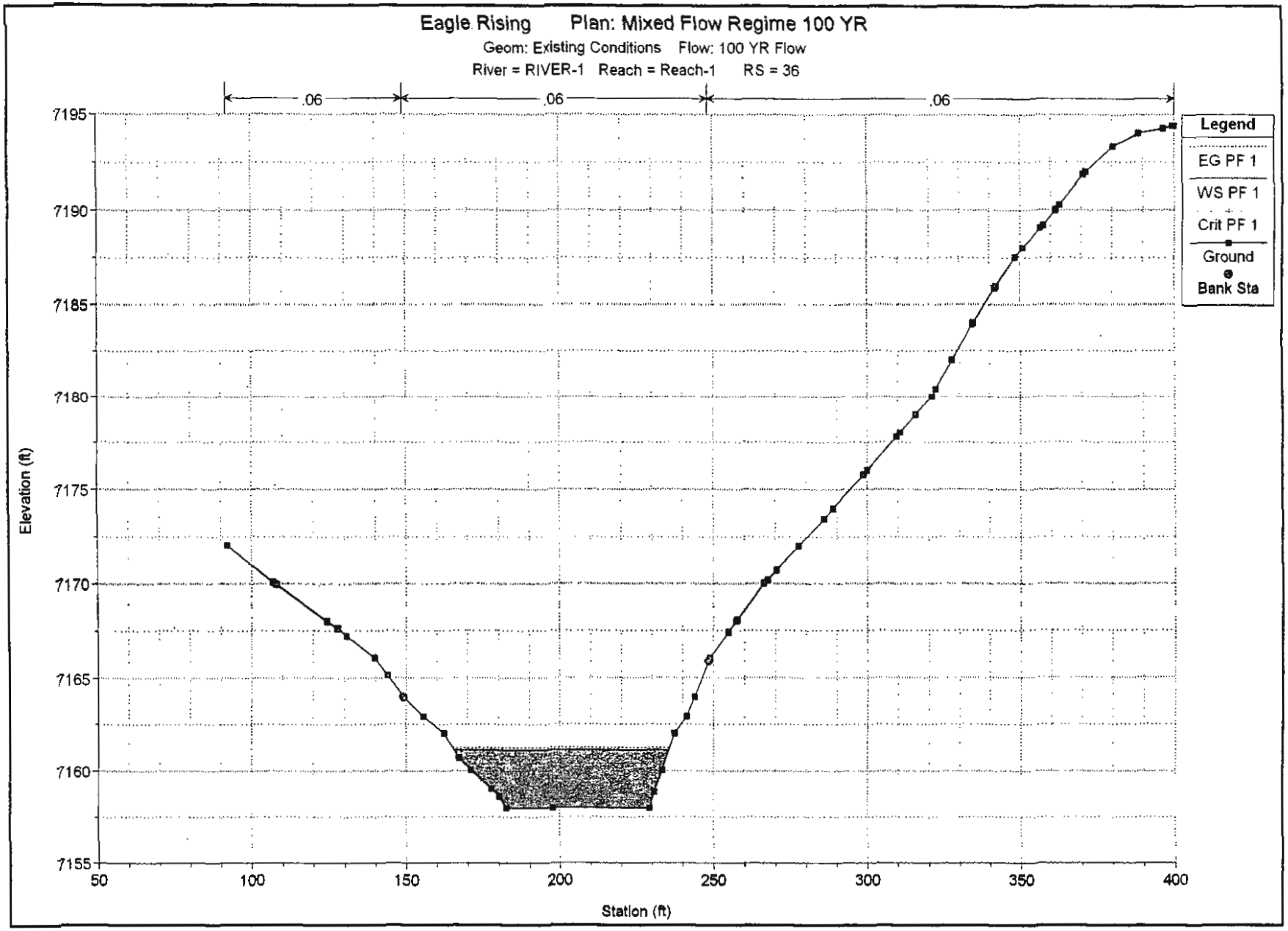

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 27.4
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7164
7162
7160
7158
7156
7154
7152
0
100
200
300
400
Station (ft)

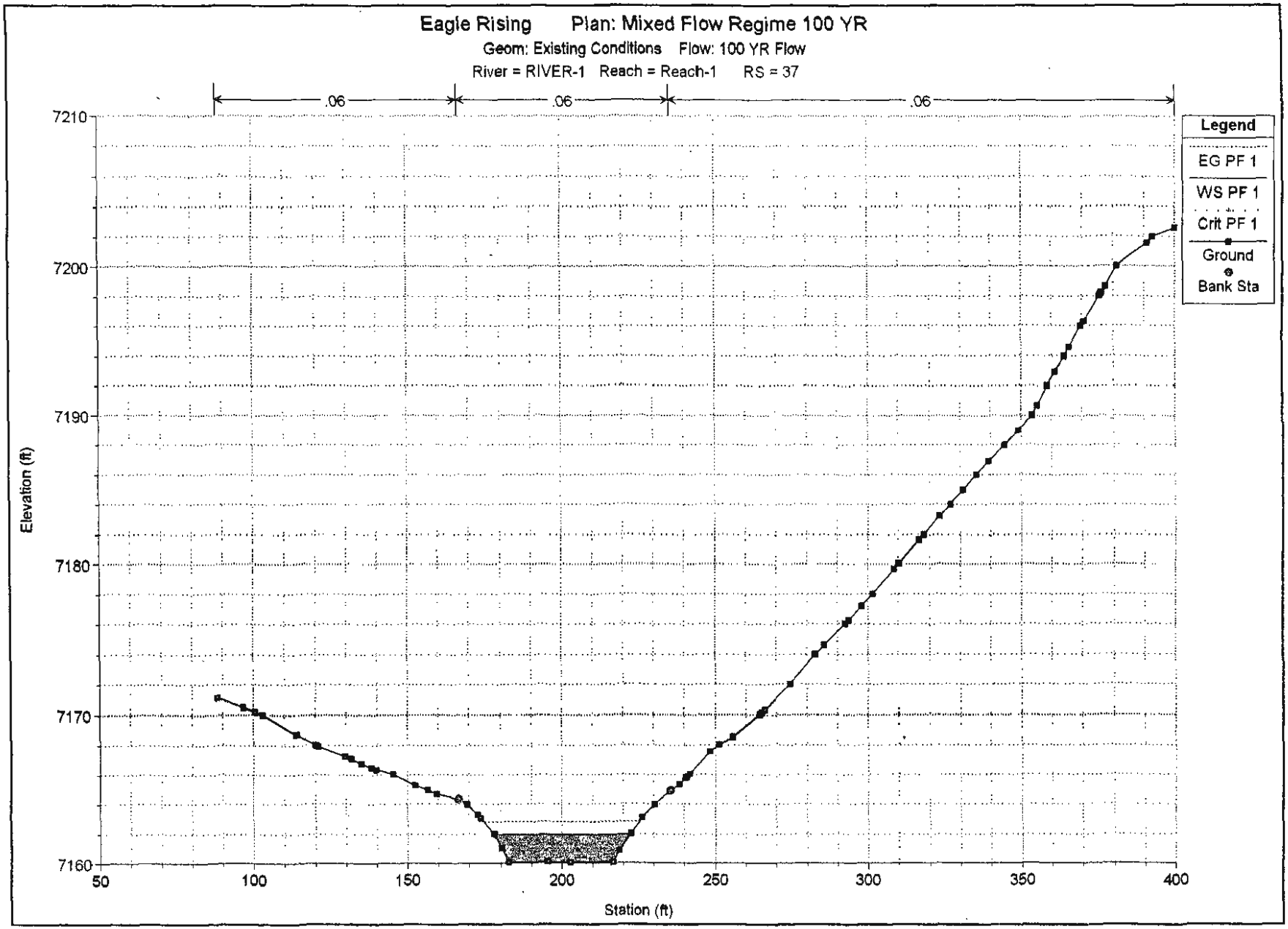

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 31
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7162
7160
7158
7156
7154
0
20
40
60
80
100
120
140
160
Station (ft)

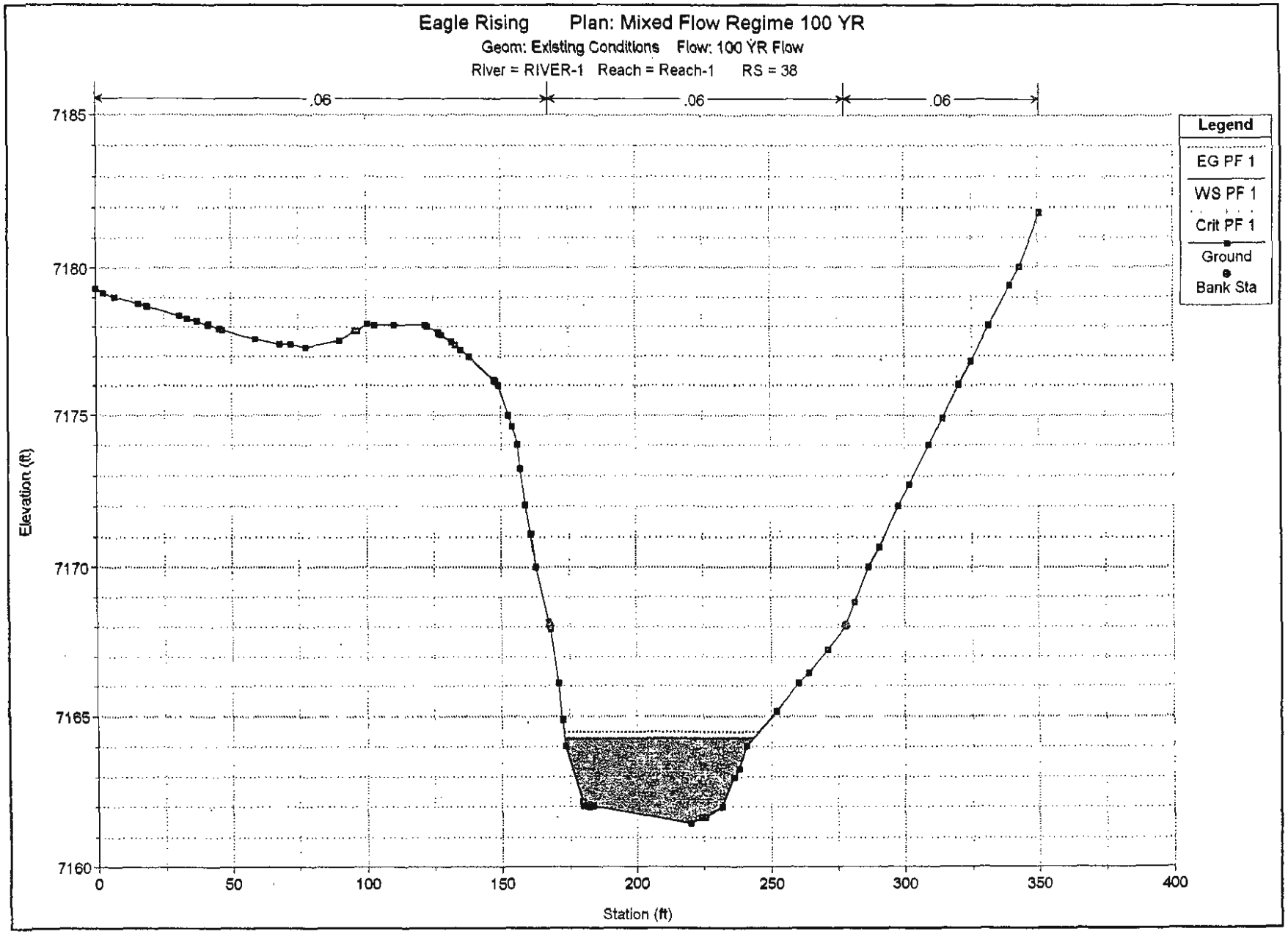

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 32
.06
.06
.06
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
7180
7175
7170
7165
7160
7155
7150
0
100
200
300
400
Station (ft)


Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 34
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7190
7185
7180
7175
7170
7165
7160
7155
7150
0
100
200
300
400
Station (ft)


Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 35
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7190
7185
7180
7175
7170
7165
7160
7155
0
100
200
300
400
Station (ft)


Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 36
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7195
7190
7185
7180
7175
7170
7165
7160
7155
50
100
150
200
250
300
350
400
Station (ft)


Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 37
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7210
7200
7190
7180
7170
7160
50
100
150
200
250
300
350
400
Station (ft)

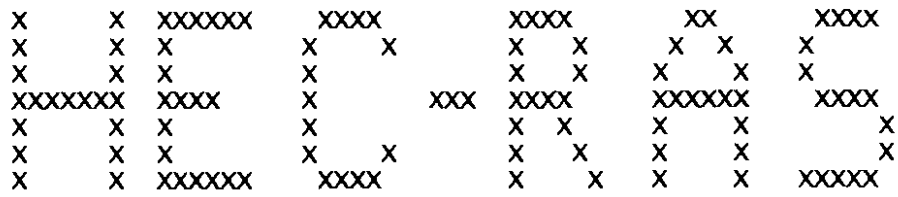

Eagle Rising Plan: Mixed Flow Regime 100 YR
Geom: Existing Conditions Flow: 100 YR Flow
River = RIVER-1 Reach = Reach-1 RS = 38
.06
.06
.06
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7185
7180
7175
7170
7165
7160
0
50
100
150
200
250
300
350
400
Station (ft)

HECRAS MODEL DATA
COMPLETE INPUT AND OUTPUT REPORT

Excerpt from Eagle Rising, Filing No. 1
Final Drainage Report
August 2015
Prepared by M&S Civil Consultants, Inc.

KurieRoad.rep

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



PROJECT DATA
Project Title: Eagle Rising
Project File : KurieRoad.prj
Run Date and Time: 6/10/2012 12:51:52 PM

Project in English units

PLAN DATA

Plan Title: Mixed Flow Regime 100 YR
Plan File : C:\Projects\Kurie Road\HECRAS\KurieRoad.p04

Geometry Title: Existing Conditions
Geometry File : C:\Projects\Kurie Road\HECRAS\KurieRoad.g01

Flow Title : 100 YR Flow
Flow File : C:\Projects\Kurie Road\HECRAS\KurieRoad.f02

Plan Summary Information:

Number of:	Cross Sections	= 37	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

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

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

FLOW DATA

Flow Title: 100 YR Flow

Flow File : C:\Projects\Kurie Road\HECRAS\KurieRoad.f02

Flow Data (cfs)

River	Reach	RS	PF 1
RIVER-1	Reach-1	38	547
RIVER-1	Reach-1	27	724
RIVER-1	Reach-1	20	881
RIVER-1	Reach-1	17	890
RIVER-1	Reach-1	12	897
RIVER-1	Reach-1	10	898
RIVER-1	Reach-1	6	931
RIVER-1	Reach-1	1	953

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF 1		Critical

GEOMETRY DATA

Geometry Title: Existing Conditions
Geometry File : C:\Projects\Kurie Road\HECRAS\KurieRoad.g01

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 38

INPUT
Description:
Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7179.3	2.8	7179.15	6.96	7179.01	15.52	7178.79	18.62	7178.71
18.83	7178.7	30.87	7178.39	33.64	7178.28	37.37	7178.19	41.56	7178.06
41.72	7178.1	45.64	7177.92	46.79	7177.9	58.79	7177.58	67.9	7177.41
72.02	7177.4	77.48	7177.3	89.79	7177.53	95.67	7177.87	96.76	7177.86
100.24	7178.1	103.14	7178.05	110.54	7178.05	121.99	7178.05	122.69	7178.01
126.85	7177.8	127.17	7177.74	127.92	7177.71	131.61	7177.47	133.11	7177.38
135.21	7177.2	138.27	7176.98	147.43	7176.18	147.94	7176.14	149.17	7176.02
152.89	7175	154.31	7174.64	156.04	7174.03	157.01	7173.23	158.94	7172.05
160.88	7171.1	162.55	7170.01	167.42	7168.16	167.78	7168.03	167.95	7167.93
170.8	7166.1	172.21	7164.89	173.28	7164.01	179.73	7162.17	180.1	7162.03
182.23	7162	183.75	7162.03	219.94	7161.45	224.01	7161.65	225.43	7161.65
231.9	7162	236.21	7162.97	237.96	7163.26	240.73	7164.01	252	7165.17
260.33	7166.1	264.11	7166.45	271.21	7167.23	277.96	7168.03	281.57	7168.82
286.59	7170	290.51	7170.67	297.83	7172.02	301.86	7172.71	308.96	7174.02
314.26	7174.9	320.09	7176.03	324.64	7176.82	331.52	7178.03	339.48	7179.39
343.15	7180	350.55	7181.82						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0	.06	167.78	.06	277.96	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
167.78	277.96	97	100	110	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 37

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88.31	7171.16	96.68	7170.48	100.62	7170.2	102.98	7170.01	113.83	7168.7
119.81	7168.03	120.33	7167.98	120.83	7167.94	129.43	7167.25	131.58	7167.1
135.02	7166.78	138.29	7166.5	139.83	7166.38	145.35	7166.05	152.53	7165.3
156.54	7164.99	159.48	7164.71	166.66	7164.34	169.43	7164.01	172.82	7163.3
173.69	7163.05	177.94	7162.03	180.25	7161.05	182.54	7160.05	195.24	7160.1
202.71	7160.05	216.58	7160.05	218.64	7160.84	222.4	7162.03	226.33	7163.1
230.31	7164.01	235.15	7164.85	235.61	7164.93	238.34	7165.36	240.33	7165.8
240.91	7165.87	241.7	7166.05	248.26	7167.57	251.08	7168.03	255.87	7168.5
264.65	7170.01	265.23	7170.13	266.26	7170.34	274.36	7172.02	282.69	7174
282.99	7174.02	285.71	7174.59	292.67	7176.03	293.66	7176.25	297.94	7177.2
301.53	7178.03	308.56	7179.67	310.08	7180.03	316.46	7181.63	318.11	7182
323.05	7183.22	326.6	7184.02	330.91	7184.97	335.4	7186.01	339.32	7186.9
344.48	7188.01	348.98	7188.98	353.68	7190	355.38	7190.62	358.68	7192
361.05	7192.94	364.1	7194.01	365.63	7194.6	369.71	7196.01	370.54	7196.3
375.5	7198.01	375.86	7198.13	376.13	7198.21	377.38	7198.65	381.05	7200
391.05	7201.59	392.75	7202	400	7202.59				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88.31	.06	166.66	.06	235.61	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
166.66	235.61	68	100	126	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 36

INPUT
Description:
Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
91.95	7172.05	106.9	7170.1	107.73	7170	108.14	7169.95	124.51	7168.03
127.78	7167.66	130.79	7167.26	139.77	7166.1	144.01	7165.16	149.14	7164.01
155.47	7162.94	162.21	7162.03	167.16	7160.7	171.12	7160.05	177.76	7159.04
180.32	7158.62	182.51	7158.01	197.76	7158	229.2	7158.01	230.75	7158.85
233.4	7160.05	237.39	7162.02	237.41	7162	237.45	7162.04	241.35	7162.94
243.96	7164.01	248.57	7165.92	248.91	7166.1	255.01	7167.42	257.6	7168.03
257.81	7168.08	266.24	7170.01	267.45	7170.2	270.38	7170.74	277.64	7172.02
285.96	7173.45	289	7174.02	298.71	7175.8	299.98	7176.03	309.66	7177.84
310.67	7178.03	315.83	7179.02	321.19	7180	322.34	7180.42	327.59	7182.03
334.38	7183.94	334.68	7184.02	341.62	7185.9	342.15	7186.01	348.58	7187.54
350.91	7188.01	356.68	7189.04	357.68	7189.2	361.49	7190	361.71	7190.05
362.93	7190.29	370.68	7191.88	371.46	7192	380.39	7193.34	388.45	7194.02
388.67	7194.03	388.69	7194.03	396.32	7194.3	399.39	7194.43	400	7194.42

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
91.95	.06	149.14	.06	248.57	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
149.14	248.57	97	100	102	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 35

INPUT
Description:
Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7176	3.08	7176.02	6.49	7176.02	9.02	7176.02	14.77	7176.02
14.94	7176	30.15	7174.97	42.02	7174.03	46.49	7173.54	55.7	7172.05
71.43	7170.4	75.88	7170.01	83.13	7169.39	89.17	7168.85	93.41	7168.49
99.43	7168	106.93	7167.28	119.29	7166.05	121.42	7165.88	122.1	7165.82
142.25	7164	150.45	7163.14	151.59	7163	159.07	7162.03	164	7160.19
164.08	7160.2	164.17	7160.12	164.33	7160.05	164.53	7160.01	165.92	7159.76
168.65	7159.2	174.48	7158.01	206.18	7158.01	220.53	7158.01	224.08	7158.43
234.9	7160.1	239.12	7161.48	241.31	7162.03	251.23	7162.89	262.23	7164.01
265.42	7164.6	269.98	7165.35	273.89	7166.05	281.15	7167.14	286.52	7168.03
288	7168.4	296.69	7170.01	300.48	7170.8	305.99	7172.02	314.13	7173.72
315.57	7174	323.51	7175.72	325	7176.03	332.62	7177.65	334.45	7178.03
341.73	7179.6	343.91	7180.03	345.46	7180.46	351.65	7182.03	358.05	7183.75
359.04	7184	366.3	7185.94	366.56	7186.01	366.78	7186.07	375.19	7188.01
376.19	7188.3	384.81	7190	391.59	7190	394.35	7190	400	7190

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	150.45	.06	251.23	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
150.45	251.23	90	100	110	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 34

INPUT
Description:
Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7174.8	5.1	7174.35	7.21	7174.15	8.33	7174.03	9.85	7173.85
17.12	7173	24.9	7172.26	26.16	7172.13	26.17	7172.13	26.55	7172.11
27.26	7172.1	38.72	7171.18	43.93	7170.91	49.04	7170.35	51.91	7170.01
63.47	7168.9	68.14	7168.45	70.89	7168.2	72.3	7168.03	84.09	7166.83
91.41	7166.1	107.94	7164.25	110.23	7164.01	111.72	7163.89	117.88	7163.41
135.46	7162	140.52	7161.01	145.65	7160.05	152.82	7159.36	162.58	7158.27
165.04	7158	165.96	7157.65	171.08	7156.03	172.68	7155.78	175.17	7155.75
185.62	7155.1	187.94	7155.04	201.04	7154.67	215.73	7155	221.06	7155.26
230.59	7155.7	237.52	7156.03	237.83	7156.1	243.86	7157.17	248.55	7158.01
254.29	7159.4	255.24	7159.69	256.58	7160.05	258.72	7160.45	268.27	7162.03
277.08	7163.9	277.62	7164.01	280.8	7164.59	290.29	7166.05	295.39	7167.63
296.89	7168	298.53	7168.51	299.85	7168.84	299.95	7168.86	304.87	7170.01
312.58	7171.8	313.58	7172.02	314.45	7172.22	322.38	7174.02	325.8	7174.83
331	7176	335.87	7177.18	339.53	7178.03	343.72	7178.99	348.01	7180.03

348.72	7180.3	354.64	7182.02	358.18	7182.7	363.6	7184	369.37	7184.94
383.9	7185.2	384.81	7185.12	387.48	7185	392.32	7184.62	395.03	7184.44
399	7184.3	400	7184.28						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	140.52	.06	258.72	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
140.52	258.72	103	100	103	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 33

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7175.2	1.7	7175.01	14.63	7173.8	16.38	7173.42	23.79	7172
25.2	7171.7	33.21	7170.01	42.78	7168.78	48.71	7168.03	56.46	7166.62
60.43	7166.1	84.2	7164.18	86.34	7164.01	86.93	7163.95	104.65	7162.03
105.9	7161.8	114.96	7160.05	116.55	7159.88	126.02	7158.89	133.61	7158.01
158.35	7156.1	158.65	7156.03	159.45	7155.84	167.43	7154.05	183.05	7154.05
240.65	7154.1	241.18	7154.51	242.72	7156.03	247.18	7157.65	247.88	7158.01
249.96	7158.7	253.97	7160.05	257.49	7161.33	259.27	7162.03	261.5	7162.52
263.23	7162.9	268.9	7164.01	273.75	7164.87	279.42	7166.05	283.83	7167.11
288	7168	290.7	7169.27	292.52	7170.01	296.21	7170.91	300.72	7172.02
305.85	7173.3	308.98	7174.02	314.11	7175.23	317.42	7176.03	323.16	7177.37
326.36	7178	335.18	7179.87	336.05	7180.03	343.86	7181.84	344.44	7182.02
353.03	7183.5	354.73	7183.78	356.11	7184	357.3	7184	364.34	7184
374.83	7182.8	382.5	7182.02	387.01	7180.92	389.02	7180.46	391.1	7180.03
398.23	7179.5	400	7179.4						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	105.9	.06	257.49	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
105.9	257.49	98	100	102	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 32

INPUT
Description:
Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7174.8	5.49	7174.03	6.7	7173.81	14.73	7172.05	16.62	7171.25
21.15	7170	27.29	7168.92	32.94	7168.03	38.86	7166.54	40.94	7166.05
45.23	7165.7	60.56	7164.32	64.15	7164.01	76.9	7162.27	79.04	7162.03
92.98	7160.4	95.51	7160.05	103.18	7159.04	112.55	7158.01	114.52	7157.88
118.13	7157.6	125.57	7156.99	137.48	7156.03	146.79	7155.36	162.89	7154.21
164.5	7154.1	165.13	7154.05	203.71	7154.05	254.2	7154.05	258.13	7154.05
258.27	7154.1	260.86	7156.03	262.41	7156.82	264.06	7158.01	265.45	7158.75
267.16	7160.1	268.87	7161.21	269.98	7162.03	271.54	7162.52	276.95	7164.01
278.96	7164.4	284.52	7166.05	287.22	7166.94	288.91	7167.57	290.48	7168.03
292.7	7168.4	304.45	7170.01	306.21	7170.47	307.4	7170.85	311.83	7172.05

317.42	7173.1	324.58	7174.03	324.7	7174.04	330.65	7174.58	334.22	7174.86
336.75	7175	339.25	7175.2	342.56	7175.36	349.38	7175.71	350.09	7175.73
350.69	7175.7	354.52	7175.9	354.98	7175.92	358.81	7176.02	365.96	7176.32
367.18	7176.4	368.98	7176.47	378.09	7177.04	385.81	7177.16	389.95	7177.38
394.22	7177.4	400	7177.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	95.51	.06	267.16	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
95.51	267.16	121	100	98	.1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 31

INPUT
Description:
Station Elevation Data num= 39

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7161.7	12.13	7160.05	12.45	7160	12.61	7159.98	12.76	7159.97
14.96	7159.7	15.94	7159.61	21.45	7158.88	24.15	7158.62	28.56	7158.11
29.02	7158.1	29.36	7158.01	29.77	7157.85	33.79	7156.03	37.18	7155.5
39.22	7155.3	46.66	7154.05	49.21	7154.05	50.03	7154.05	50.53	7154.05
51.18	7154.1	63.44	7154.05	66.07	7154.05	75.09	7154.05	78.75	7154.05
87	7154.1	87.22	7154.05	88.03	7154.05	91.34	7154.05	91.47	7154.05
95.35	7154.1	95.45	7154.05	95.54	7154.05	97.38	7154.05	97.54	7154.05
105	7154	115	7156	130	7158	145	7160		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	29.02	.06	130	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
29.02	130	166	100	76	.1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 30

INPUT
Description:
Station Elevation Data num= 54

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7163.1	11.88	7162.2	14.04	7162.03	14.38	7161.99	26.14	7160.62
30.61	7160.1	56.61	7158.42	61.3	7158.14	63.39	7158.01	76.21	7156.88
83.48	7156.4	86.25	7156.25	86.69	7156.26	90.65	7156.03	94.02	7155.83
96.29	7155.6	103.66	7155.19	106.08	7154.86	111.54	7154.05	114.23	7154.05
115.5	7154.1	123.7	7154.05	127.6	7154.05	128.58	7154.05	256.84	7154.05
277.64	7154.1	286.08	7154.05	286.39	7154.05	286.58	7154.05	291.05	7155.66
291.94	7156	296.24	7156.69	298.66	7157.03	304.99	7158.01	309.1	7158.67
310.99	7159	317.46	7160.05	333.82	7161.17	337.2	7161.48	344.41	7162.03
350.4	7163.6	351.93	7164.01	353.34	7164.19	367.01	7166.05	369.05	7166.44
370.17	7166.6	372.88	7167.07	377.49	7167.65	378.36	7167.77	378.6	7167.81
380.93	7168	388.47	7168.28	389.23	7168.29	400	7168.56		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0	.06	56.61	.06	317.46	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
56.61	317.46	158	100	50	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 29

INPUT
Description:
Station Elevation Data num= 51

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7170	.22	7170.01	1.34	7170.01	6.66	7169.64	22.95	7168.03
25.71	7167.4	33.13	7166.05	46.5	7164.59	51.88	7164.01	55.01	7163.41
58.41	7162.7	62.5	7162.03	64.85	7161.08	67.51	7160.05	68.99	7159.23
70.93	7158	73.87	7157.58	77.39	7157.1	84.5	7156.03	85.14	7156.03
92.72	7154.9	97.27	7154.05	97.47	7154.05	99.98	7154.05	100.01	7154.05
100.84	7154.1	101.29	7154.05	129.95	7154.05	139.86	7154.05	178.55	7154.05
255.12	7154.1	308.04	7154.05	312.4	7155.03	316.71	7156.03	322.33	7157.64
324.07	7158	326.54	7158.43	337.32	7160.05	345.12	7161.56	347.18	7162.03
347.22	7162	361.69	7163.92	362.35	7164.01	363.84	7164.2	377.86	7166.05
378.88	7166.2	383.05	7166.55	386.14	7166.81	396.33	7167.74	397.14	7167.8
400	7168								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	77.39	.06	322.33	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
77.39	322.33	162	160	116	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 27.4

INPUT
Description:
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10	7160	20	7156	35	7154	100	7153.7	145	7154
160	7154	200	7154	320	7154	350	7158	360	7160
385	7164								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
10	.06	10	.06	360	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10	360	20	20	20	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 27.2

INPUT
Description:

Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-5	7160	5	7156	20	7154	89	7153.4	140	7153.6
150	7154	172	7158.4	200	7158.4	287	7158.4	317	7156
350	7160	390	7164						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-5	.06	-5	.06	172	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-5	172	20	20	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 27

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-25	7160	-20	7158	-10	7156	80	7152	125	7152
135	7152	167	7158.4	200	7158.4	290	7158.4	324	7156
342	7160	395	7164						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-25	.06	-20	.06	167	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-20	167	35	35	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 26.65

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-55	7160	-24	7156	65	7152	100	7150	145	7150
188	7150	215	7148	232	7146	275	7144	294	7148
309	7156	327	7158	373	7160	400	7162		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-55	.06	188	.06	309	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
188	309	74	215	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 24.5

INPUT
Description:

Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-96	7160	-5	7150	75	7146	97	7144	105	7142
135	7140	190	7138	200	7137	210	7138	230	7140
257	7152								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-96	.06	-5	.06	257	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-5	257	163	250	267	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 22

INPUT
Description:
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7160	1.95	7160.05	16.55	7158.49	18.09	7158.39	21.62	7158.01
27.28	7157.6	33.74	7157.06	39.86	7156.54	42.02	7156.38	43.14	7156.3
46.29	7156	49.68	7155.74	54.28	7155.39	65.59	7154.05	66.42	7153.48
68.22	7152	72.44	7152.01	77.5	7152.01	83.48	7152.01	87.74	7152.01
90.62	7150.9	92.94	7150.03	104.27	7148.72	110.17	7148.05	113.86	7146.79
116.15	7146	118.81	7145.66	130.45	7144.03	137.13	7143.08	143.14	7142.05
148.48	7141.2	155.82	7140.01	163.99	7138.14	164.68	7138.03	165.61	7137.73
169.95	7136	171.88	7135.24	173.3	7134.4	174.13	7134.01	181.52	7134.01
187.39	7134	195.38	7134.01	198.47	7134.01	200.2	7134.01	207.03	7134.01
207.07	7134	207.24	7134.01	208.88	7134.01	209.07	7134.01	209.26	7134.01
209.47	7134	209.7	7134.01	222.26	7134.01	227.52	7134.01	235.34	7134.01
236.43	7134	255.05	7135.3	262.01	7136.04	264.49	7136.39	276.64	7138.03
277.78	7138.3	287.29	7140.01	288.76	7140.17	292.22	7140.51	294.63	7140.56
297.52	7140.8	300.83	7140.83	303.29	7141.02	307.13	7141.25	318.69	7141.49
324.57	7141.5	326.65	7141.49	334.99	7141.67	343.91	7142.05	344.99	7142.09
352.22	7142.2	353.02	7142.24	365.82	7142.24	367.25	7142.26	379.94	7142.23
380.11	7142.2	380.47	7142.24	380.84	7142.25	381.72	7142.28	385.1	7142.24
388.81	7142.3	390.56	7142.34	391.98	7142.4	399.61	7142.68	400	7142.7

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	155.82	.06	287.29	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
155.82	287.29	117	100	68	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 21

INPUT
Description:
Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
37.39	7158.4	44.96	7158.01	46.49	7158.01	54.39	7158.01	54.55	7158.01
55.13	7158	55.68	7158.01	57.27	7158.01	63.28	7157.42	77.32	7156.03
84.74	7154.1	84.82	7154.05	98.89	7152.32	101.37	7152.01	105.02	7151.17
110.39	7150	112.63	7149.57	120.54	7148.05	133.71	7146.29	135.85	7146.01

144.84	7144.4	147.06	7144.03	149.14	7143.6	157.03	7142.05	162.64	7140.23
163.18	7140	165.24	7138.95	166.78	7138.03	167.22	7137.89	168.94	7137.25
170.7	7136	174.06	7134.54	175.25	7134.01	179.76	7132.72	181.77	7132.03
190.62	7132	196.34	7132.03	214.31	7132.03	216.77	7132.19	244.07	7134.01
247.45	7135.4	249.03	7136.04	253.92	7136.53	261.3	7137.08	266.69	7137.52
268.78	7137.7	269.89	7137.76	271.14	7137.84	275.48	7138.03	278.67	7138.18
286.62	7138.5	288.9	7138.6	298.61	7138.93	298.83	7138.93	300.71	7138.94
301.78	7139	303.73	7138.98	305.73	7139.06	310.16	7139.11	312.85	7139.19
316.02	7139.3	320.08	7139.49	321.54	7139.55	326.28	7139.79		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
37.39	.06	166.78	.06	253.92	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
166.78	253.92	130	100	58	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 20

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
47.08	7154.1	47.27	7154.05	47.28	7154.05	47.37	7154.05	47.44	7154.05
47.72	7154.1	48.27	7154.05	48.44	7153.8	49.78	7152.01	57.89	7150.9
63.72	7150	66.5	7149.24	70.33	7148.05	76.08	7147	82.14	7146.01
88.91	7144.3	89.93	7144.03	96.01	7142.27	96.81	7142.05	97.17	7141.85
100.08	7141.1	104.64	7140.01	109.92	7138.67	112.57	7138.03	114.04	7137.26
116.23	7136	119.76	7134.15	119.9	7134.01	120.49	7134.01	120.98	7134.01
131.02	7134	134.13	7134.01	145.83	7133.31	147.97	7133.44	148.41	7133.41
154.17	7133.7	154.83	7133.64	156.56	7133.58	162.62	7133.53	162.65	7133.53
165.28	7133.3	169.61	7132.56	171.72	7132.28	172.68	7132.03	176.78	7131.69
184.25	7131	187.86	7131.02	216.55	7131.29	220.12	7131.33	226.42	7132.03
226.47	7132	226.53	7132.04	236.06	7134.01	237.16	7134.01	237.28	7134.01
237.85	7134	241.3	7134.01	243.78	7134.01	262.01	7134.84	263.87	7134.94
273.72	7135.4	276.95	7135.52	284.32	7136.04	291.65	7136.81	296.83	7137.39
301.97	7138	313.32	7138.74	332.8	7140.01	349.13	7140.85	358.76	7141.32
361.32	7141.4	367.02	7141.63	375.81	7142.05	388.15	7142.61	389.36	7142.67
392.68	7142.9	398.74	7143.21	400	7143.28				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
47.08	.06	116.23	.06	276.95	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
116.23	276.95	102	100	96	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 19

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7.63	7156.6	8.46	7156.52	11.15	7156.1	11.68	7156.03	16.87	7155.21
24.06	7154.1	31.53	7153.14	39.14	7152.23	41.15	7152.01	54.4	7150.51

58	7150	72.11	7148.58	77.2	7148.05	79.1	7147.85	94.77	7146.01
106.94	7144.7	113.17	7144.03	127.07	7142.2	128.24	7142.05	128.39	7142.01
135.94	7140	138.99	7138.59	139.6	7138.37	139.96	7138.03	140.55	7137.74
143.66	7136	144.76	7134.95	146.85	7134.01	153.46	7133.21	162.44	7132.03
165.39	7130.3	165.81	7130.04	170.26	7130.04	205.36	7130.04	205.52	7130.04
218.28	7130	223.31	7130.04	230.08	7130.04	233.45	7129.85	241.14	7129.97
242.17	7130	242.39	7130.04	243.61	7130.04	250.35	7130.42	251.49	7130.57
260.59	7132	266.66	7133.24	271	7134.01	279.12	7134.98	288.09	7136.04
306.39	7137.6	312.49	7138.03	326.72	7139.46	329.4	7139.73	331.9	7140.01
338.07	7140.6	345.72	7141.37	352.76	7142.05	360.25	7142.33	373.63	7142.72
399.49	7143.5	400	7143.54						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
7.63	.06	153.46	.06	271	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
153.46	271	104	100	92	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 18

INPUT
Description:
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7156.7	20.67	7155.97	22.02	7156.17	22.28	7156.04	22.31	7156.03
25.44	7155.6	35.02	7154.26	36.74	7154.05	40.54	7153.57	53.39	7152.01
68.34	7150.2	69.62	7150.03	72.11	7149.72	85.49	7148.05	90.54	7146.92
94.79	7146	105.96	7144.63	110.51	7144.03	113.49	7143.59	120.05	7142.75
125.39	7142.1	133.11	7140.17	133.63	7140.01	133.85	7139.92	138.13	7138.03
141.41	7136.9	144.27	7136.04	148.34	7135.09	151.54	7134.01	155.09	7132.41
155.78	7132	163.19	7130.11	163.42	7130.05	163.44	7130.04	163.83	7129.97
175.47	7128	180.28	7128.01	195.55	7128.01	198.02	7128.01	212.51	7128.01
239.47	7128	242.56	7128.01	243.16	7128.11	253.71	7130.04	257.04	7130.7
263.37	7132	263.81	7132.08	283.32	7134.01	289.69	7134.68	302.98	7135.91
303.72	7136	304.29	7136.04	314.24	7136.88	316.82	7137.07	318.83	7137.2
320.5	7137.3	333.39	7137.73	335.59	7137.82	335.81	7137.83	342.14	7138.03
351.15	7138.5	352.3	7138.54	360.48	7138.96	367.52	7139.28	371.61	7139.48
374.66	7139.6	385.86	7139.81	386.74	7139.85	387.72	7139.86	388.23	7139.9
400	7140								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	155.09	.06	263.81	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
155.09	263.81	109	100	92	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 17

INPUT
Description:
Station Elevation Data num= 79

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7157.8	1.41	7158.57	17.25	7157.53	23.49	7155.88	24.06	7155.87

27.02	7156	27.49	7155.28	29.58	7154.82	34.27	7154.05	37.08	7153.06
38.38	7152.6	39.55	7152.01	55.3	7150.24	57.2	7150.03	62.77	7149.18
70.67	7148.1	74.17	7147.65	89.58	7146.01	95.28	7144.9	100.35	7144.03
105.51	7143	110.53	7142.05	113.17	7141.62	122.73	7140.01	129.51	7138.41
130.02	7138.3	130.95	7138.03	131.65	7137.74	134.31	7137.05	137.99	7136.04
138.97	7135.6	143.55	7134.01	145.43	7132.61	146.11	7132.03	147.82	7131.5
152.16	7130	156.8	7128.38	157.85	7128.01	158.59	7127.89	159.01	7127.89
167.22	7127.2	167.5	7127.19	168.8	7127.21	181.26	7127.08	189.65	7126.77
207.37	7126.5	210.2	7126.51	219.14	7126.36	222.63	7126.31	231.55	7126.12
231.76	7126.1	233.78	7126.24	235.9	7126.71	240.4	7127.37	242.12	7128.01
245.31	7129.2	247.76	7130.04	255.16	7131.41	257.97	7132.03	276.84	7133.95
277.59	7134	298.76	7135.27	309.07	7136.04	312.26	7136.04	312.79	7136.04
314.57	7136	328.88	7137.13	331.29	7137.26	341.71	7138.03	347.09	7138.42
352.02	7138.7	362.98	7139.47	372.23	7140.01	381.77	7140.6	383.71	7140.76
387.07	7141	393.75	7141.48	398.75	7141.83	400	7141.91		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	138.97	.06	277.59	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
138.97	277.59	103	100	103	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 16

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7153.1	3.91	7151.53	12.15	7149.89	18.49	7149.01	19.8	7148.93
30.93	7148.2	31.18	7148.19	33.28	7148.05	33.71	7148	33.98	7147.96
39.55	7147.2	44.53	7146.3	45.35	7146.15	45.6	7146.1	46.14	7146.01
64.22	7144.2	65.28	7144.03	66.86	7143.75	76.94	7142.05	83.46	7141.32
92.73	7140.3	95.05	7140.01	98.34	7139.26	104.44	7138.03	114.66	7136.13
115.15	7136	125.17	7134.23	126.27	7134.01	126.73	7133.93	128.65	7133.54
134.29	7132.4	135.94	7132.03	138.58	7131.28	143.01	7130.04	147.35	7129.25
153.92	7128	160.86	7126.3	162.25	7126.03	167.39	7125.43	173.33	7124.73
178.23	7124.2	179.31	7124.04	181.81	7124.04	187.74	7124.04	194.83	7124.04
210.7	7124	221.19	7125.93	221.66	7126.03	224.06	7127.08	226.08	7128.01
233.51	7129.5	235.72	7130.04	236.61	7130.04	237.23	7130.04	243.72	7130.4
245.03	7130.5	249.81	7130.69	253.54	7130.84	256.08	7130.94	259.37	7131.08
263.91	7131.3	266.55	7131.42	278.08	7132.03	292.22	7133.14	303.51	7134.01
310.33	7134.4	317.5	7134.91	334.88	7136.04	338.14	7136.36	354.98	7138.03
358.24	7138.2	386.29	7140.01	386.92	7140.06	388.41	7140.16	398.02	7140.84
400	7141								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	143.01	.06	236.61	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
143.01	236.61	94	100	104	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 15

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7144.6	4.97	7144.15	15.72	7143.61	16.39	7143.56	17.37	7143.51
27.22	7142.6	28.96	7142.34	31.74	7142.05	39	7140.97	39.11	7140.95
44.38	7140.5	47.38	7140.19	49.88	7140.01	52.05	7139.85	56.36	7139.47
57.99	7139.3	60.75	7139.09	67.05	7138.45	74.71	7138.03	80.51	7137.68
84.15	7137.4	93.21	7136.5	94.73	7136.35	97	7136.04	106.99	7135.07
119.44	7134	123.56	7133.25	128.54	7132.32	129.96	7132.03	130.75	7131.8
132.32	7131.4	137.83	7130.04	142.8	7129.09	148	7128.01	149.8	7127.49
155.17	7126	155.37	7126.01	159.16	7125.76	183.65	7124.04	187.53	7123.56
198.83	7122	198.89	7122.01	198.9	7122.01	210.94	7122	218.35	7124.02
218.4	7124.04	218.44	7124.06	221.49	7126.03	226.17	7127.2	230.45	7128.01
230.74	7128.01	234.35	7128.17	245.19	7128.58	249.5	7128.8	260.13	7129.19
275.65	7129.82	277.53	7129.89	281	7130.04	286.04	7130.3	295.32	7130.9
305.45	7131.55	307.09	7131.67	311.98	7132.03	322.77	7133.2	330.24	7134.01
340.34	7134.66	346.23	7134.98	351.49	7135.3	363.39	7135.8	365.65	7135.91
368.71	7136.04	373.65	7136.75	377.58	7137.34	381.61	7138	384.7	7138.26
391.02	7138.72	399.41	7139.24	400	7139.28				

Manning's n values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	149.8	.06	230.74	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
149.8	230.74	105	100	115	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 14

INPUT
Description:
Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7140.5	10.2	7139.32	17.67	7138.34	20.51	7138.62	20.52	7138.62
25.82	7138	30.99	7137.23	32.45	7137	38.2	7136.04	51.73	7134.13
52.51	7134	52.82	7133.98	53.59	7133.87	66.28	7132.03	72.62	7131
78.69	7130	83.12	7129.71	84.02	7129.67	87.95	7129.43	89.52	7129.39
95.5	7129.1	101.31	7128.87	105.86	7128.86	121.22	7128.01	127.64	7128.01
137.93	7126.8	143.7	7126.03	145.91	7125.14	149.58	7124.04	158.92	7123.29
163.5	7123.1	170.55	7122.64	188.24	7122.01	190.08	7122.01	191.71	7122.01
192.13	7122	195.51	7122.01	217.1	7122.01	220.66	7122.56	224.95	7123.08
226.45	7123.2	247.02	7123.86	250.37	7124.04	255.12	7124.35	258.52	7124.59
268.88	7125.3	279.45	7126.03	286.77	7126.7	291.06	7127.14	300.05	7128.01
317.88	7129.5	324.11	7130.04	330.39	7130.57	330.49	7130.57	336.84	7130.94
339.1	7131.1	341.22	7131.18	344.05	7131.29	348.27	7131.46	351.26	7131.51
354.52	7131.6	358.34	7131.75	363.07	7131.94	363.58	7131.97	364.78	7132.03
372.07	7132.4	374.9	7132.55	379.91	7132.89	386.62	7133.31	393.42	7134.01
400	7134.7								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	127.64	.06	300.05	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
127.64	300.05	110	100	95	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 13

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4	7128	37	7126	70	7125.3	105	7125.3	146	7126
170	7120	224	7120	285	7128	347	7134		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
4	.06	146	.06	285	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
146	285	90	100	103	.1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 12

INPUT
Description:
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7125.1	1.85	7125.01	4.67	7124.84	9.65	7124.55	15.69	7124.25
17.27	7124.2	17.53	7124.15	20.53	7124.04	31.26	7123.81	32.85	7123.77
33.58	7123.8	34.09	7123.78	35.97	7123.78	47.44	7123.52	51.38	7123.5
67.14	7123.3	76.16	7123.29	79.2	7123.27	82.92	7123.28	87.94	7123.3
92.41	7123.3	97.15	7123.29	104.57	7123.4	108.08	7123.35	109.28	7123.32
113.41	7123.2	115.5	7123.24	118.78	7123.15	120.89	7123.17	124.55	7123.02
126.55	7123	134.23	7122.62	135.57	7122.6	144.52	7122.01	149.01	7121.67
158.02	7121.3	173.84	7120.23	175.61	7120.12	176.85	7120.03	207.65	7120.03
210.56	7120	217.37	7120.03	217.64	7120.03	220.76	7120.59	231.48	7122.01
237.85	7122.7	250.24	7124.04	252.58	7124.25	253.47	7124.32	258.81	7124.77
264.28	7125.2	276.85	7126.03	280.32	7126.35	281.48	7126.47	283.84	7126.69
291.77	7127.4	296.04	7127.79	296.93	7127.87	298.31	7128.01	307.94	7128.75
316.95	7129.4	318.74	7129.52	320.01	7129.58	321.99	7129.73	323.25	7129.76
326.58	7130	327.1	7130.08	334.32	7130.34	336.47	7130.44	339.84	7130.49
342.95	7130.5	345.16	7130.61	350.78	7130.5	351.82	7130.56	357.6	7130.66
358.87	7130.7	361.3	7130.84	367.5	7130.93	372.13	7131.19	373.78	7131.26
377.68	7131.3	379.17	7131.35	381.74	7131.32	383.94	7131.45	384.15	7131.47
389.47	7131.4	400	7131.95						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	109.28	.06	250.24	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
109.28	250.24	161	100	97	.1 .3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 11

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7121.9	18.7	7120.77	26.57	7120.43	35.56	7120.03	36.3	7120.03
48.58	7119.8	55.72	7119.69	58.52	7119.65	62.66	7119.57	66.67	7119.52
73.32	7119.4	85.87	7119.17	97.38	7119.02	102	7118.97	105.96	7118.89
108.04	7118.9	117.69	7118.71	121.08	7118.66	124.67	7118.61	127.41	7118.56
131.16	7118.5	132.31	7118.49	135.82	7118.45	149.19	7118.31	150.13	7118.3
151.25	7118.3	152.77	7118.27	166.5	7118.11	171.78	7118.04	175.84	7118.04
176.5	7118	176.99	7118.04	177.65	7118.04	187.57	7118.04	199.05	7118.04
201.56	7118	207.46	7118.04	207.83	7118.04	219.9	7118.82	242.63	7120.03
244.05	7120	244.42	7120.03	246.59	7120.03	265.11	7121.34	270.25	7121.64
275.07	7122	283.86	7122.87	297.71	7124.04	298.44	7124.04	311.43	7125.27
315.11	7125.6	319.79	7126.03	332.22	7127.67	334.64	7128.01	338.82	7128.63
350.01	7130	353.12	7130.51	354.1	7130.66	359.35	7131.45	362.67	7132.03
366.15	7132	367.19	7132.03	391.89	7133.61	392.26	7133.64	394.73	7133.69
398.48	7134	400	7134.01						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	0	.06	265.11	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
0	265.11	105	100	101	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 10

INPUT
Description:
Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-10	7120	14	7118	46	7116	89	7117.1	140	7117.2
200	7116	220	7116	245	7118	285	7122		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-10	.06	-10	.06	285	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-10	285	70	200	276	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 8

INPUT
Description:
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-60	7120	-23	7118	-13	7116	100	7114	282	7114
301	7116	332	7122						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-60	.06	-60	.06	332	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
-60	332	35	200	275	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 6

INPUT
Description:
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
13	7122	32	7120	73	7116	120	7114	316	7114
355	7122	374	7123						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
13	.06	32	.06	355	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
32	355	150	150	105	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.50

INPUT
Description:
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
17	7126	30	7124	50	7120	96	7116	120	7114
200	7114	350	7114	398	7116	432	7120	475	7121

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
17	.06	50	.06	432	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
50	432	25	25	25	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.25

INPUT
Description:
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-8	7126	34	7124	43	7122	52	7120	68	7118
100	7118	115	7120	219	7122	375	7122	395	7120
428	7118	459	7116	475	7115	490	7116	505	7118
540	7118.5	559.91	7119.63						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-8	.06	395	.06	559.91	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
395	559.91	25	25	25	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4

INPUT
Description:
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-30	7128	30	7124	50	7120	70	7118	97	7118
115	7120	220	7122	378	7122	432	7118	455	7116
505	7114	510	7113.5	515	7114	555	7116	585	7117
646	7120								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-30	.06	378	.06	646	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
378	646	25	25	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.75

INPUT
Description:
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8	7124	30	7120	75	7118	100	7116	110	7120
117	7119	130	7112	175	7108	184	7106	235	7104
277	7110	365	7110	416	7114	468	7114	508	7114
513	7113.4	518	7114	560	7116	593	7118		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8	.06	130	.06	277	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
130	277	95	75	20	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3

INPUT
Description:
Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7130	1.85	7130.04	6.43	7130.04	6.61	7130.04	7.26	7130.04
8.63	7129.7	17.18	7128.01	18.14	7127.65	21.97	7126.03	25.69	7124.83
28.36	7124	31.1	7123.25	36.36	7122.01	43.43	7120.42	44.91	7120.03
46.89	7119.8	63.61	7118.04	81.21	7118.04	101.68	7120	110.89	7120
114.28	7118	115.08	7117.43	117.14	7116.01	117.16	7116	120.96	7114.4
121.41	7114	122.02	7113.62	124.31	7112.04	128.41	7110.67	130.05	7110.01
135.04	7108.6	137.39	7108.02	140.19	7107.54	149.07	7106.04	152.53	7104.86
157.38	7104	158.06	7103.89	164.13	7102.02	164.16	7102.02	166.49	7102.02
176.59	7102	184.98	7102.02	190.33	7102.02	200.17	7102.02	201	7102.05
202.75	7102.1	230.91	7103.04	258.63	7104.01	261.76	7104.63	271.29	7106.04

274.77	7106.5	276.07	7106.56	278.16	7106.7	284.54	7107.27	286.26	7107.36
287.64	7107.4	298.88	7108.02	299.8	7108.06	300.39	7108.09	301	7108.14
307.73	7108.6	310.59	7108.8	319.82	7109.49	323.65	7109.76	323.95	7109.78
324.39	7109.8	327.84	7109.79	328.64	7109.84	332.06	7109.66	335.6	7109.32
341.74	7108.8	342.46	7108.72	343.34	7108.62	346.83	7108.54	348.04	7108.41
352.27	7108.2	352.68	7108.22	354.08	7108.29	357.69	7108.32	360.36	7108.64
363.35	7108.7	365.63	7109.02	372.6	7109.95	372.83	7109.98	373.09	7110.01
379.54	7110.8	389.55	7112.04	390.38	7112.1	400	7112.77		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	130.05	.06	323.95	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
130.05	323.95	115	100	50	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2

INPUT
Description:
Station Elevation Data num= 49

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7130.2	.66	7130.04	3.33	7129.54	10.86	7128.01	15.16	7126.9
18.22	7126	23.76	7124.57	27.27	7124.04	31.53	7122.74	32.68	7122.01
36.35	7120.8	38.49	7120.03	48.77	7118.56	52.44	7118.04	59.65	7118.04
64.19	7118	90.33	7118.04	98.21	7119.79	99.03	7119.97	104.19	7119.97
104.39	7120	104.39	7119.97	109.69	7118.04	111.21	7117.27	113.43	7116.19
113.8	7116	113.86	7115.99	119.38	7114.03	120.79	7113.62	126.75	7112.04
134.98	7110.1	135.38	7110.01	136.33	7109.84	147.54	7108.02	148.4	7107.9
161.13	7106	171.39	7104.09	171.62	7104.05	171.83	7104.01	172.05	7103.97
183.13	7102	200	7101.5	240	7102	312	7104	350	7108
408	7107.5	436	7112	510	7116	536	7116.7		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	147.54	.06	350	.06

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
147.54	350	95	100	90	.1	.3

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1

INPUT
Description:
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	7130	33	7120	54	7118	80	7116.5	100	7120
106	7120	130	7110	165	7102	200	7100.4	315	7100.6
400	7110	437	7114	480	7115.4	550	7118		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	130	.06	400	.06

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

130	400	0	0	0	.1	.3

SUMMARY OF MANNING'S N VALUES

River:RIVER-1

Reach	River Sta.	n1	n2	n3
Reach-1	38	.06	.06	.06
Reach-1	37	.06	.06	.06
Reach-1	36	.06	.06	.06
Reach-1	35	.06	.06	.06
Reach-1	34	.06	.06	.06
Reach-1	33	.06	.06	.06
Reach-1	32	.06	.06	.06
Reach-1	31	.06	.06	.06
Reach-1	30	.06	.06	.06
Reach-1	29	.06	.06	.06
Reach-1	27.4	.06	.06	.06
Reach-1	27.2	.06	.06	.06
Reach-1	27	.06	.06	.06
Reach-1	26.65	.06	.06	.06
Reach-1	24.5	.06	.06	.06
Reach-1	22	.06	.06	.06
Reach-1	21	.06	.06	.06
Reach-1	20	.06	.06	.06
Reach-1	19	.06	.06	.06
Reach-1	18	.06	.06	.06
Reach-1	17	.06	.06	.06
Reach-1	16	.06	.06	.06
Reach-1	15	.06	.06	.06
Reach-1	14	.06	.06	.06
Reach-1	13	.06	.06	.06
Reach-1	12	.06	.06	.06
Reach-1	11	.06	.06	.06
Reach-1	10	.06	.06	.06
Reach-1	8	.06	.06	.06
Reach-1	6	.06	.06	.06
Reach-1	4.50	.06	.06	.06
Reach-1	4.25	.06	.06	.06
Reach-1	4	.06	.06	.06
Reach-1	3.75	.06	.06	.06
Reach-1	3	.06	.06	.06
Reach-1	2	.06	.06	.06
Reach-1	1	.06	.06	.06

SUMMARY OF REACH LENGTHS

River: RIVER-1

Reach	River Sta.	Left	Channel	Right
Reach-1	38	97	100	110
Reach-1	37	68	100	126
Reach-1	36	97	100	102
Reach-1	35	90	100	110
Reach-1	34	103	100	103
Reach-1	33	98	100	102

Reach-1	32	121	100	98
Reach-1	31	166	100	76
Reach-1	30	158	100	50
Reach-1	29	162	160	116
Reach-1	27.4	20	20	20
Reach-1	27.2	20	20	20
Reach-1	27	35	35	35
Reach-1	26.65	74	215	273
Reach-1	24.5	163	250	267
Reach-1	22	117	100	68
Reach-1	21	130	100	58
Reach-1	20	102	100	96
Reach-1	19	104	100	92
Reach-1	18	109	100	92
Reach-1	17	103	100	103
Reach-1	16	94	100	104
Reach-1	15	105	100	115
Reach-1	14	110	100	95
Reach-1	13	90	100	103
Reach-1	12	161	100	97
Reach-1	11	105	100	101
Reach-1	10	70	200	276
Reach-1	8	35	200	275
Reach-1	6	150	150	105
Reach-1	4.50	25	25	25
Reach-1	4.25	25	25	25
Reach-1	4	25	25	25
Reach-1	3.75	95	75	20
Reach-1	3	115	100	50
Reach-1	2	95	100	90
Reach-1	1	0	0	0

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Mixed 100 yr

River: RIVER-1 Reach: Reach-1 RS: 38 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: RIVER-1 Reach: Reach-1 RS: 37 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program defaulted to critical depth.
River: RIVER-1 Reach: Reach-1 RS: 36 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
River: RIVER-1 Reach: Reach-1 RS: 35 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: RIVER-1 Reach: Reach-1 RS: 34 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: RIVER-1 Reach: Reach-1 RS: 32 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: RIVER-1 Reach: Reach-1 RS: 31 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: RIVER-1 Reach: Reach-1 RS: 27.4 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: RIVER-1 Reach: Reach-1 RS: 27 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: RIVER-1 Reach: Reach-1 RS: 26.65 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

River: RIVER-1 Reach: Reach-1 RS: 24.5 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

River: RIVER-1 Reach: Reach-1 RS: 22 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 21 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 20 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 19 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 18 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 17 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 16 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 15 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 14 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 13 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 12 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 11 Profile: PF 1

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.

River: RIVER-1 Reach: Reach-1 RS: 10 Profile: PF 1

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 4.50 Profile: PF 1

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 4.25 Profile: PF 1

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.

River: RIVER-1 Reach: Reach-1 RS: 4 Profile: PF 1

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

River: RIVER-1 Reach: Reach-1 RS: 3.75 Profile: PF 1

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

River: RIVER-1 Reach: Reach-1 RS: 3 Profile: PF 1

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

River: RIVER-1 Reach: Reach-1 RS: 2 Profile: PF 1

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

KurieRoad.rep

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

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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: Eagle Rising
Project File : KurieRoad.prj
Run Date and Time: 6/10/2012 12:51:52 PM

Project in English units

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7164.47	Element	Left OB	Channel
Vel Head (ft)	0.21	Wt. n-Val.		0.060
W.S. Elev (ft)	7164.26	Reach Len. (ft)	97.00	100.00
Crit W.S. (ft)	7163.23	Flow Area (sq ft)		150.11
E.G. Slope (ft/ft)	0.007955	Area (sq ft)		150.11
Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	70.21	Top Width (ft)		70.21
Vel Total (ft/s)	3.64	Avg. Vel. (ft/s)		3.64
Max Chl Dpth (ft)	2.81	Hydr. Depth (ft)		2.14
Conv. Total (cfs)	6132.9	Conv. (cfs)		6132.9
Length Wtd. (ft)	100.00	Wetted Per. (ft)		70.85
Min Ch El (ft)	7161.45	Shear (lb/sq ft)		1.05
Alpha	1.00	Stream Power (lb/ft s)	350.55	0.00
Frctn Loss (ft)	1.58	Cum Volume (acre-ft)	0.00	29.83

C & E Loss (ft)	0.06	Cum SA (acres)	0.02	12.16

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 37

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7162.81	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.85	Wt. n-Val.		0.060
W.S. Elev (ft)	7161.96	Reach Len. (ft)	68.00	100.00
126.00				
Crit W.S. (ft)	7161.96	Flow Area (sq ft)		73.97
E.G. Slope (ft/ft)	0.045691	Area (sq ft)		73.97
Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	44.09	Top Width (ft)		44.09
Vel Total (ft/s)	7.39	Avg. Vel. (ft/s)		7.39
Max Chl Dpth (ft)	1.91	Hydr. Depth (ft)		1.68
Conv. Total (cfs)	2559.0	Conv. (cfs)		2559.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)		44.81
Min Ch El (ft)	7160.05	Shear (lb/sq ft)		4.71
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)	0.00	29.57
C & E Loss (ft)	0.21	Cum SA (acres)	0.02	12.03

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 36

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7161.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.060	
W.S. Elev (ft)	7161.12	Reach Len. (ft)	97.00	100.00	102.00
Crit W.S. (ft)	7159.57	Flow Area (sq ft)		180.68	
E.G. Slope (ft/ft)	0.004299	Area (sq ft)		180.68	
Q Total (cfs)	547.00	Flow (cfs)		547.00	
Top Width (ft)	69.95	Top Width (ft)		69.95	
Vel Total (ft/s)	3.03	Avg. Vel. (ft/s)		3.03	
Max Chl Dpth (ft)	3.12	Hydr. Depth (ft)		2.58	
Conv. Total (cfs)	8342.4	Conv. (cfs)		8342.4	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		70.97	
Min Ch El (ft)	7158.00	Shear (lb/sq ft)		0.68	
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00	0.00
Frctn Loss (ft)	1.02	Cum Volume (acre-ft)	0.00	29.28	
C & E Loss (ft)	0.05	Cum SA (acres)	0.02	11.89	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 35

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7160.19	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.66	Wt. n-Val.		0.060
W.S. Elev (ft)	7159.53	Reach Len. (ft)	90.00	100.00
110.00				
Crit W.S. (ft)	7159.53	Flow Area (sq ft)		83.91
E.G. Slope (ft/ft)	0.048662	Area (sq ft)		83.91
Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	64.11	Top Width (ft)		64.11
Vel Total (ft/s)	6.52	Avg. Vel. (ft/s)		6.52
Max Chl Dpth (ft)	1.52	Hydr. Depth (ft)		1.31
Conv. Total (cfs)	2479.7	Conv. (cfs)		2479.7
Length Wtd. (ft)	100.00	Wetted Per. (ft)		64.37
Min Ch El (ft)	7158.01	Shear (lb/sq ft)		3.96
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	1.94	Cum Volume (acre-ft)	0.00	28.98
C & E Loss (ft)	0.13	Cum SA (acres)	0.02	11.74

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 34

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7157.51	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.22	Wt. n-Val.		0.060
W.S. Elev (ft)	7157.29	Reach Len. (ft)	103.00	100.00
103.00				
Crit W.S. (ft)	7156.51	Flow Area (sq ft)		144.14
E.G. Slope (ft/ft)	0.010323	Area (sq ft)		144.14
Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	77.43	Top Width (ft)		77.43
Vel Total (ft/s)	3.80	Avg. Vel. (ft/s)		3.80
Max Chl Dpth (ft)	2.62	Hydr. Depth (ft)		1.86
Conv. Total (cfs)	5383.8	Conv. (cfs)		5383.8
Length Wtd. (ft)	100.00	Wetted Per. (ft)		77.81
Min Ch El (ft)	7154.67	Shear (lb/sq ft)		1.19
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)	0.00	28.72
C & E Loss (ft)	0.04	Cum SA (acres)	0.02	11.58

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 33

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7156.98	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.09	Wt. n-Val.		0.060
W.S. Elev (ft)	7156.90	Reach Len. (ft)	98.00	100.00
102.00				
Crit W.S. (ft)		Flow Area (sq ft)		232.50
E.G. Slope (ft/ft)	0.002861	Area (sq ft)		232.50

Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	97.06	Top Width (ft)		97.06
Vel Total (ft/s)	2.35	Avg. Vel. (ft/s)		2.35
Max Chl Dpth (ft)	2.85	Hydr. Depth (ft)		2.40
Conv. Total (cfs)	10226.4	Conv. (cfs)		10226.4
Length Wtd. (ft)	100.00	Wetted Per. (ft)		98.23
Min Ch El (ft)	7154.05	Shear (lb/sq ft)		0.42
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	0.00	28.28
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	11.38

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 32

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7156.74	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.05	Wt. n-Val.		0.060
W.S. Elev (ft)	7156.69	Reach Len. (ft)	121.00	100.00
98.00				
Crit W.S. (ft)		Flow Area (sq ft)		299.03
E.G. Slope (ft/ft)	0.001867	Area (sq ft)		299.03
Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	132.88	Top Width (ft)		132.88
Vel Total (ft/s)	1.83	Avg. Vel. (ft/s)		1.83
Max Chl Dpth (ft)	2.64	Hydr. Depth (ft)		2.25
Conv. Total (cfs)	12660.3	Conv. (cfs)		12660.3
Length Wtd. (ft)	100.00	Wetted Per. (ft)		133.78
Min Ch El (ft)	7154.05	Shear (lb/sq ft)		0.26
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)	0.00	27.67
C & E Loss (ft)	0.02	Cum SA (acres)	0.02	11.11

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 31

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7156.36	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.22	Wt. n-Val.		0.060
W.S. Elev (ft)	7156.14	Reach Len. (ft)	166.00	100.00
76.00				
Crit W.S. (ft)		Flow Area (sq ft)		146.59
E.G. Slope (ft/ft)	0.010617	Area (sq ft)		146.59
Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	82.50	Top Width (ft)		82.50
Vel Total (ft/s)	3.73	Avg. Vel. (ft/s)		3.73
Max Chl Dpth (ft)	2.14	Hydr. Depth (ft)		1.78
Conv. Total (cfs)	5308.6	Conv. (cfs)		5308.6
Length Wtd. (ft)	100.00	Wetted Per. (ft)		82.90
Min Ch El (ft)	7154.00	Shear (lb/sq ft)		1.17
Alpha	1.00	Stream Power (lb/ft s)	145.00	0.00
0.00				
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	0.00	27.16
C & E Loss (ft)	0.05	Cum SA (acres)	0.02	10.87

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 30

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7155.87	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.04	Wt. n-Val.		0.060
W.S. Elev (ft)	7155.83	Reach Len. (ft)	158.00	100.00
50.00				
Crit W.S. (ft)		Flow Area (sq ft)		328.16
E.G. Slope (ft/ft)	0.002308	Area (sq ft)		328.16
Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	197.49	Top Width (ft)		197.49
Vel Total (ft/s)	1.67	Avg. Vel. (ft/s)		1.67
Max Chl Dpth (ft)	1.78	Hydr. Depth (ft)		1.66
Conv. Total (cfs)	11385.1	Conv. (cfs)		11385.1
Length Wtd. (ft)	100.00	Wetted Per. (ft)		197.91
Min Ch El (ft)	7154.05	Shear (lb/sq ft)		0.24
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	0.00	26.62
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	10.55

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 29

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7155.63	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.04	Wt. n-Val.		0.060
W.S. Elev (ft)	7155.58	Reach Len. (ft)	162.00	160.00
116.00				
Crit W.S. (ft)		Flow Area (sq ft)		331.79
E.G. Slope (ft/ft)	0.002671	Area (sq ft)		331.79
Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	226.65	Top Width (ft)		226.65
Vel Total (ft/s)	1.65	Avg. Vel. (ft/s)		1.65
Max Chl Dpth (ft)	1.53	Hydr. Depth (ft)		1.46
Conv. Total (cfs)	10584.1	Conv. (cfs)		10584.1

Length Wtd. (ft)	160.00	Wetted Per. (ft)		226.96
Min Ch El (ft)	7154.05	Shear (lb/sq ft)		0.24
Alpha 0.00	1.00	Stream Power (lb/ft s)	400.00	0.00
Frctn Loss (ft)	0.53	Cum Volume (acre-ft)	0.00	25.86
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	10.06

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 27.4

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7155.10	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.04	Wt. n-Val.		0.060
W.S. Elev (ft)	7155.06	Reach Len. (ft)	20.00	20.00
20.00				
Crit W.S. (ft)		Flow Area (sq ft)		325.86
E.G. Slope (ft/ft)	0.004133	Area (sq ft)		325.86
Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	300.84	Top Width (ft)		300.84
Vel Total (ft/s)	1.68	Avg. Vel. (ft/s)		1.68
Max Chl Dpth (ft)	1.36	Hydr. Depth (ft)		1.08
Conv. Total (cfs)	8508.7	Conv. (cfs)		8508.7
Length Wtd. (ft)	20.00	Wetted Per. (ft)		300.98
Min Ch El (ft)	7153.70	Shear (lb/sq ft)		0.28
Alpha 0.00	1.00	Stream Power (lb/ft s)	385.00	0.00
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	0.00	24.65
C & E Loss (ft)	0.02	Cum SA (acres)	0.02	9.09

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 27.2

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7154.91	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.25	Wt. n-Val.		0.060
W.S. Elev (ft)	7154.67	Reach Len. (ft)	20.00	20.00
20.00				
Crit W.S. (ft)		Flow Area (sq ft)		137.35
E.G. Slope (ft/ft)	0.026128	Area (sq ft)		137.35
Q Total (cfs)	547.00	Flow (cfs)		547.00
Top Width (ft)	138.31	Top Width (ft)		138.31
Vel Total (ft/s)	3.98	Avg. Vel. (ft/s)		3.98
Max Chl Dpth (ft)	1.26	Hydr. Depth (ft)		0.99
Conv. Total (cfs)	3384.0	Conv. (cfs)		3384.0
Length Wtd. (ft)	20.00	Wetted Per. (ft)		138.43
Min Ch El (ft)	7153.40	Shear (lb/sq ft)		1.62
Alpha	1.00	Stream Power (lb/ft s)	390.00	0.00
0.00				
Frctn Loss (ft)	0.74	Cum Volume (acre-ft)	0.00	24.54
C & E Loss (ft)	0.04	Cum SA (acres)	0.02	8.99

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 27

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7154.13	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.61	Wt. n-Val.		0.060
W.S. Elev (ft)	7153.52	Reach Len. (ft)	35.00	35.00
35.00				
Crit W.S. (ft)	7153.52	Flow Area (sq ft)		115.80
E.G. Slope (ft/ft)	0.050406	Area (sq ft)		115.80
Q Total (cfs)	724.00	Flow (cfs)		724.00

Top Width (ft)	96.92	Top Width (ft)		96.92
Vel Total (ft/s)	6.25	Avg. Vel. (ft/s)		6.25
Max Chl Dpth (ft)	1.52	Hydr. Depth (ft)		1.19
Conv. Total (cfs)	3224.8	Conv. (cfs)		3224.8
Length Wtd. (ft)	35.00	Wetted Per. (ft)		97.11
Min Ch El (ft)	7152.00	Shear (lb/sq ft)		3.75
Alpha	1.00	Stream Power (lb/ft s)	395.00	0.00
0.00				
Frctn Loss (ft)	1.69	Cum Volume (acre-ft)	0.00	24.49
C & E Loss (ft)	0.02	Cum SA (acres)	0.02	8.94

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 26.65

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7149.81	Element	Left OB	Channel
Right OB				
Vel Head (ft)	3.95	Wt. n-Val.		0.060
W.S. Elev (ft)	7145.86	Reach Len. (ft)	74.00	215.00
273.00				
Crit W.S. (ft)	7146.83	Flow Area (sq ft)		45.40
E.G. Slope (ft/ft)	0.459764	Area (sq ft)		45.40
Q Total (cfs)	724.00	Flow (cfs)		724.00
Top Width (ft)	48.82	Top Width (ft)		48.82
Vel Total (ft/s)	15.95	Avg. Vel. (ft/s)		15.95
Max Chl Dpth (ft)	1.86	Hydr. Depth (ft)		0.93
Conv. Total (cfs)	1067.8	Conv. (cfs)		1067.8

Length Wtd. (ft)	215.00	Wetted Per. (ft)		49.06
Min Ch El (ft)	7144.00	Shear (lb/sq ft)		26.56
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	3.99	Cum Volume (acre-ft)	0.00	24.42
C & E Loss (ft)	0.33	Cum SA (acres)	0.02	8.88

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 24.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7140.62	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.36	Wt. n-Val.		0.060
W.S. Elev (ft)	7140.27	Reach Len. (ft)	163.00	250.00
267.00				
Crit W.S. (ft)	7139.87	Flow Area (sq ft)		150.99
E.G. Slope (ft/ft)	0.021616	Area (sq ft)		150.99
Q Total (cfs)	724.00	Flow (cfs)		724.00
Top Width (ft)	99.61	Top Width (ft)		99.61
Vel Total (ft/s)	4.80	Avg. Vel. (ft/s)		4.80
Max Chl Dpth (ft)	3.27	Hydr. Depth (ft)		1.52
Conv. Total (cfs)	4924.4	Conv. (cfs)		4924.4
Length Wtd. (ft)	250.00	Wetted Per. (ft)		99.91
Min Ch El (ft)	7137.00	Shear (lb/sq ft)		2.04
Alpha	1.00	Stream Power (lb/ft s)	257.00	0.00
0.00				
Frctn Loss (ft)	4.15	Cum Volume (acre-ft)	0.00	23.94
C & E Loss (ft)	0.02	Cum SA (acres)	0.02	8.51

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 22

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7136.45	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.28	Wt. n-Val.		0.060
W.S. Elev (ft)	7136.17	Reach Len. (ft)	117.00	100.00
68.00				
Crit W.S. (ft)		Flow Area (sq ft)		171.05
E.G. Slope (ft/ft)	0.013146	Area (sq ft)		171.05
Q Total (cfs)	724.00	Flow (cfs)		724.00
Top Width (ft)	93.40	Top Width (ft)		93.40
Vel Total (ft/s)	4.23	Avg. Vel. (ft/s)		4.23
Max Chl Dpth (ft)	2.17	Hydr. Depth (ft)		1.83
Conv. Total (cfs)	6314.5	Conv. (cfs)		6314.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)		93.99
Min Ch El (ft)	7134.00	Shear (lb/sq ft)		1.49
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	0.00	23.01
C & E Loss (ft)	0.02	Cum SA (acres)	0.02	7.96

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 21

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7135.55	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.21	Wt. n-Val.		0.060
W.S. Elev (ft)	7135.34	Reach Len. (ft)	130.00	100.00
58.00				
Crit W.S. (ft)		Flow Area (sq ft)		195.79
E.G. Slope (ft/ft)	0.006310	Area (sq ft)		195.79
Q Total (cfs)	724.00	Flow (cfs)		724.00
Top Width (ft)	75.07	Top Width (ft)		75.07
Vel Total (ft/s)	3.70	Avg. Vel. (ft/s)		3.70
Max Chl Dpth (ft)	3.34	Hydr. Depth (ft)		2.61
Conv. Total (cfs)	9114.2	Conv. (cfs)		9114.2
Length Wtd. (ft)	100.00	Wetted Per. (ft)		75.97
Min Ch El (ft)	7132.00	Shear (lb/sq ft)		1.02
Alpha	1.00	Stream Power (lb/ft s)	326.28	0.00
0.00				
Frctn Loss (ft)	1.11	Cum Volume (acre-ft)	0.00	22.59
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	7.76

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 20

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7134.43	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.34	Wt. n-Val.		0.060
W.S. Elev (ft)	7134.09	Reach Len. (ft)	102.00	100.00
96.00				
Crit W.S. (ft)		Flow Area (sq ft)		188.53
E.G. Slope (ft/ft)	0.020840	Area (sq ft)		188.53

Q Total (cfs)	881.00	Flow (cfs)		881.00
Top Width (ft)	125.66	Top Width (ft)		125.66
Vel Total (ft/s)	4.67	Avg. Vel. (ft/s)		4.67
Max Chl Dpth (ft)	3.09	Hydr. Depth (ft)		1.50
Conv. Total (cfs)	6102.8	Conv. (cfs)		6102.8
Length Wtd. (ft)	100.00	Wetted Per. (ft)		126.17
Min Ch El (ft)	7131.00	Shear (lb/sq ft)		1.94
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	2.08	Cum volume (acre-ft)	0.00	22.15
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	7.53

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 19

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7132.34	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.41	Wt. n-Val.		0.060
W.S. Elev (ft)	7131.93	Reach Len. (ft)	104.00	100.00
92.00				
Crit W.S. (ft)		Flow Area (sq ft)		170.87
E.G. Slope (ft/ft)	0.020709	Area (sq ft)		170.87
Q Total (cfs)	881.00	Flow (cfs)		881.00
Top Width (ft)	97.54	Top Width (ft)		97.54
Vel Total (ft/s)	5.16	Avg. Vel. (ft/s)		5.16
Max Chl Dpth (ft)	2.08	Hydr. Depth (ft)		1.75
Conv. Total (cfs)	6122.0	Conv. (cfs)		6122.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)		98.20
Min Ch El (ft)	7129.85	Shear (lb/sq ft)		2.25
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				

Frctn Loss (ft)	1.58	Cum Volume (acre-ft)	0.00	21.74
C & E Loss (ft)	0.03	Cum SA (acres)	0.02	7.28

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 18

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7130.74	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.31	Wt. n-Val.		0.060
W.S. Elev (ft)	7130.43	Reach Len. (ft)	109.00	100.00
92.00				
Crit W.S. (ft)		Flow Area (sq ft)		195.89
E.G. Slope (ft/ft)	0.012422	Area (sq ft)		195.89
Q Total (cfs)	881.00	Flow (cfs)		881.00
Top Width (ft)	93.74	Top Width (ft)		93.74
Vel Total (ft/s)	4.50	Avg. Vel. (ft/s)		4.50
Max Chl Dpth (ft)	2.43	Hydr. Depth (ft)		2.09
Conv. Total (cfs)	7904.6	Conv. (cfs)		7904.6
Length Wtd. (ft)	100.00	Wetted Per. (ft)		94.18
Min Ch El (ft)	7128.00	Shear (lb/sq ft)		1.61
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	1.51	Cum Volume (acre-ft)	0.00	21.32
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	7.06

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 17

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7129.23	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.42	Wt. n-Val.		0.060
W.S. Elev (ft)	7128.80	Reach Len. (ft)	103.00	100.00
103.00				
Crit W.S. (ft)		Flow Area (sq ft)		170.37
E.G. Slope (ft/ft)	0.018774	Area (sq ft)		170.37
Q Total (cfs)	890.00	Flow (cfs)		890.00
Top Width (ft)	88.65	Top Width (ft)		88.65
Vel Total (ft/s)	5.22	Avg. Vel. (ft/s)		5.22
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)		1.92
Conv. Total (cfs)	6495.4	Conv. (cfs)		6495.4
Length Wtd. (ft)	100.00	Wetted Per. (ft)		89.20
Min Ch El (ft)	7126.10	Shear (lb/sq ft)		2.24
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	1.29	Cum Volume (acre-ft)	0.00	20.90
C & E Loss (ft)	0.03	Cum SA (acres)	0.02	6.85

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 16

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7127.91	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.34	Wt. n-Val.		0.060
W.S. Elev (ft)	7127.58	Reach Len. (ft)	94.00	100.00
104.00				
Crit W.S. (ft)		Flow Area (sq ft)		190.76
E.G. Slope (ft/ft)	0.009378	Area (sq ft)		190.76
Q Total (cfs)	890.00	Flow (cfs)		890.00

Top Width (ft)	69.49	Top Width (ft)		69.49
Vel Total (ft/s)	4.67	Avg. Vel. (ft/s)		4.67
Max Chl Dpth (ft)	3.58	Hydr. Depth (ft)		2.75
Conv. Total (cfs)	9190.5	Conv. (cfs)		9190.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)		70.30
Min Ch El (ft)	7124.00	Shear (lb/sq ft)		1.59
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	1.12	Cum Volume (acre-ft)	0.00	20.48
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	6.67

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 15

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7126.79	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.42	Wt. n-Val.		0.060
W.S. Elev (ft)	7126.36	Reach Len. (ft)	105.00	100.00
115.00				
Crit W.S. (ft)	7125.44	Flow Area (sq ft)		170.51
E.G. Slope (ft/ft)	0.013585	Area (sq ft)		170.51
Q Total (cfs)	890.00	Flow (cfs)		890.00
Top Width (ft)	68.97	Top Width (ft)		68.97
Vel Total (ft/s)	5.22	Avg. Vel. (ft/s)		5.22
Max Chl Dpth (ft)	4.36	Hydr. Depth (ft)		2.47
Conv. Total (cfs)	7635.9	Conv. (cfs)		7635.9
Length Wtd. (ft)	100.00	Wetted Per. (ft)		70.12
Min Ch El (ft)	7122.00	Shear (lb/sq ft)		2.06
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	1.96	Cum Volume (acre-ft)	0.00	20.07

C & E Loss (ft)	0.01	Cum SA (acres)	0.02	6.51

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 14

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7124.82	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.49	Wt. n-Val.		0.060
W.S. Elev (ft)	7124.33	Reach Len. (ft)	110.00	100.00
95.00				
Crit W.S. (ft)		Flow Area (sq ft)		157.64
E.G. Slope (ft/ft)	0.030731	Area (sq ft)		157.64
Q Total (cfs)	890.00	Flow (cfs)		890.00
Top Width (ft)	106.10	Top Width (ft)		106.10
Vel Total (ft/s)	5.65	Avg. Vel. (ft/s)		5.65
Max Chl Dpth (ft)	2.32	Hydr. Depth (ft)		1.49
Conv. Total (cfs)	5077.0	Conv. (cfs)		5077.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)		106.31
Min Ch El (ft)	7122.00	Shear (lb/sq ft)		2.85
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.92	Cum Volume (acre-ft)	0.00	19.69
C & E Loss (ft)	0.10	Cum SA (acres)	0.02	6.31

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 13

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7123.81	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.16	Wt. n-Val.		0.060
W.S. Elev (ft)	7123.64	Reach Len. (ft)	90.00	100.00
103.00				
Crit W.S. (ft)		Flow Area (sq ft)		273.59
E.G. Slope (ft/ft)	0.004330	Area (sq ft)		273.59
Q Total (cfs)	890.00	Flow (cfs)		890.00
Top Width (ft)	96.32	Top Width (ft)		96.32
Vel Total (ft/s)	3.25	Avg. Vel. (ft/s)		3.25
Max Chl Dpth (ft)	3.64	Hydr. Depth (ft)		2.84
Conv. Total (cfs)	13525.3	Conv. (cfs)		13525.3
Length Wtd. (ft)	100.00	Wetted Per. (ft)		97.00
Min Ch El (ft)	7120.00	Shear (lb/sq ft)		0.76
Alpha	1.00	Stream Power (lb/ft s)	347.00	0.00
0.00				
Frctn Loss (ft)	0.79	Cum Volume (acre-ft)	0.00	19.20
C & E Loss (ft)	0.02	Cum SA (acres)	0.02	6.07

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 12

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7122.99	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.38	Wt. n-Val.		0.060
W.S. Elev (ft)	7122.62	Reach Len. (ft)	161.00	100.00
97.00				

Crit W.S. (ft)	7122.06	Flow Area (sq ft)		181.83
E.G. Slope (ft/ft)	0.018550	Area (sq ft)		181.83
Q Total (cfs)	897.00	Flow (cfs)		897.00
Top Width (ft)	102.55	Top Width (ft)		102.55
Vel Total (ft/s)	4.93	Avg. Vel. (ft/s)		4.93
Max Chl Dpth (ft)	2.62	Hydr. Depth (ft)		1.77
Conv. Total (cfs)	6586.0	Conv. (cfs)		6586.0
Length Wtd. (ft)	100.00	Wetted Per. (ft)		102.81
Min Ch El (ft)	7120.00	Shear (lb/sq ft)		2.05
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	2.95	Cum Volume (acre-ft)	0.00	18.67
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	5.85

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 11

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7120.04	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.48	Wt. n-Val.		0.060
W.S. Elev (ft)	7119.56	Reach Len. (ft)	105.00	100.00
101.00				
Crit W.S. (ft)	7119.56	Flow Area (sq ft)		161.33
E.G. Slope (ft/ft)	0.054076	Area (sq ft)		161.33
Q Total (cfs)	897.00	Flow (cfs)		897.00
Top Width (ft)	170.02	Top Width (ft)		170.02
Vel Total (ft/s)	5.56	Avg. Vel. (ft/s)		5.56
Max Chl Dpth (ft)	1.56	Hydr. Depth (ft)		0.95
Conv. Total (cfs)	3857.3	Conv. (cfs)		3857.3

Length Wtd. (ft)	100.00	Wetted Per. (ft)		170.08
Min Ch El (ft)	7118.00	Shear (lb/sq ft)		3.20
Alpha 0.00	1.00	Stream Power (lb/ft s)	400.00	0.00
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	0.00	18.28
C & E Loss (ft)	0.13	Cum SA (acres)	0.02	5.53

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 10

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7119.02	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.05	Wt. n-Val.		0.060
W.S. Elev (ft)	7118.98	Reach Len. (ft)	70.00	200.00
276.00				
Crit W.S. (ft)	7117.49	Flow Area (sq ft)		523.01
E.G. Slope (ft/ft)	0.001823	Area (sq ft)		523.01
Q Total (cfs)	898.00	Flow (cfs)		898.00
Top Width (ft)	252.51	Top Width (ft)		252.51
Vel Total (ft/s)	1.72	Avg. Vel. (ft/s)		1.72
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)		2.07
Conv. Total (cfs)	21032.0	Conv. (cfs)		21032.0
Length Wtd. (ft)	200.00	Wetted Per. (ft)		252.76
Min Ch El (ft)	7116.00	Shear (lb/sq ft)		0.24

Alpha	1.00	Stream Power (lb/ft s)	285.00	0.00
0.00				
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.00	17.49
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	5.05

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 8

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7118.96	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.01	Wt. n-Val.		0.060
W.S. Elev (ft)	7118.96	Reach Len. (ft)	35.00	200.00
275.00				
Crit W.S. (ft)		Flow Area (sq ft)		1475.14
E.G. Slope (ft/ft)	0.000091	Area (sq ft)		1475.14
Q Total (cfs)	898.00	Flow (cfs)		898.00
Top Width (ft)	356.98	Top Width (ft)		356.98
Vel Total (ft/s)	0.61	Avg. Vel. (ft/s)		0.61
Max Chl Dpth (ft)	4.96	Hydr. Depth (ft)		4.13
Conv. Total (cfs)	93962.9	Conv. (cfs)		93962.9
Length Wtd. (ft)	200.00	Wetted Per. (ft)		357.61
Min Ch El (ft)	7114.00	Shear (lb/sq ft)		0.02
Alpha	1.00	Stream Power (lb/ft s)	332.00	0.00
0.00				
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.00	12.91
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	3.65

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 6

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7118.94	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.01	Wt. n-Val.		0.060
W.S. Elev (ft)	7118.93	Reach Len. (ft)	150.00	150.00
105.00				
Crit W.S. (ft)		Flow Area (sq ft)		1254.86
E.G. Slope (ft/ft)	0.000132	Area (sq ft)		1254.86
Q Total (cfs)	931.00	Flow (cfs)		931.00
Top Width (ft)	297.10	Top Width (ft)		297.10
Vel Total (ft/s)	0.74	Avg. Vel. (ft/s)		0.74
Max Chl Dpth (ft)	4.93	Hydr. Depth (ft)		4.22
Conv. Total (cfs)	81078.1	Conv. (cfs)		81078.1
Length Wtd. (ft)	150.00	Wetted Per. (ft)		297.78
Min Ch El (ft)	7114.00	Shear (lb/sq ft)		0.03
Alpha	1.00	Stream Power (lb/ft s)	374.00	0.00
0.00				
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.00	6.64
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	2.15

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.50

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7118.92	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.01	Wt. n-Val.		0.060
W.S. Elev (ft)	7118.92	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)		Flow Area (sq ft)		1498.20
E.G. Slope (ft/ft)	0.000094	Area (sq ft)		1498.20
Q Total (cfs)	931.00	Flow (cfs)		931.00
Top Width (ft)	360.35	Top Width (ft)		360.35
Vel Total (ft/s)	0.62	Avg. Vel. (ft/s)		0.62
Max Chl Dpth (ft)	4.92	Hydr. Depth (ft)		4.16

Conv. Total (cfs)	95859.8	Conv. (cfs)		95859.8
Length Wtd. (ft)	25.00	Wetted Per. (ft)		360.77
Min Ch El (ft)	7114.00	Shear (lb/sq ft)		0.02
Alpha	1.00	Stream Power (lb/ft s)	475.00	0.00
0.00				
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.00	1.90
C & E Loss (ft)	0.06	Cum SA (acres)	0.02	1.02

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4.25

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7118.86	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.60	Wt. n-Val.	0.060	0.060
W.S. Elev (ft)	7118.26	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	7118.26	Flow Area (sq ft)	8.66	145.94
E.G. Slope (ft/ft)	0.038349	Area (sq ft)	8.66	145.94
Q Total (cfs)	931.00	Flow (cfs)	16.25	914.75
Top Width (ft)	135.00	Top Width (ft)	35.95	99.05
Vel Total (ft/s)	6.02	Avg. Vel. (ft/s)	1.88	6.27
Max Chl Dpth (ft)	3.25	Hydr. Depth (ft)	0.24	1.47
Conv. Total (cfs)	4754.2	Conv. (cfs)	83.0	4671.2
Length Wtd. (ft)	25.00	Wetted Per. (ft)	35.98	99.32
Min Ch El (ft)	7115.00	Shear (lb/sq ft)	0.58	3.52
Alpha	1.07	Stream Power (lb/ft s)	559.91	0.00
0.00				
Frctn Loss (ft)	1.09	Cum Volume (acre-ft)	0.00	1.43
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.88

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program
defaulted to critical depth.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 4

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7117.19	Element	Left OB	Channel
Right OB				
Vel Head (ft)	1.30	Wt. n-Val.		0.060
W.S. Elev (ft)	7115.89	Reach Len. (ft)	25.00	25.00
25.00				
Crit W.S. (ft)	7116.30	Flow Area (sq ft)		101.74
E.G. Slope (ft/ft)	0.124906	Area (sq ft)		101.74
Q Total (cfs)	931.00	Flow (cfs)		931.00
Top Width (ft)	95.03	Top Width (ft)		95.03
Vel Total (ft/s)	9.15	Avg. Vel. (ft/s)		9.15
Max Chl Dpth (ft)	2.39	Hydr. Depth (ft)		1.07
Conv. Total (cfs)	2634.3	Conv. (cfs)		2634.3
Length Wtd. (ft)	25.00	Wetted Per. (ft)		95.17
Min Ch El (ft)	7113.50	Shear (lb/sq ft)		8.34
Alpha	1.00	Stream Power (lb/ft s)	646.00	0.00
0.00				
Frctn Loss (ft)	1.59	Cum Volume (acre-ft)		1.36
C & E Loss (ft)	0.07	Cum SA (acres)		0.83

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3.75

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7110.85	Element	Left OB	Channel
Right OB				
Vel Head (ft)	5.07	Wt. n-Val.		0.060
W.S. Elev (ft)	7105.78	Reach Len. (ft)	95.00	75.00
20.00				
Crit W.S. (ft)	7106.86	Flow Area (sq ft)		51.50
E.G. Slope (ft/ft)	0.624543	Area (sq ft)		51.50
Q Total (cfs)	931.00	Flow (cfs)		931.00
Top Width (ft)	57.86	Top Width (ft)		57.86
Vel Total (ft/s)	18.08	Avg. Vel. (ft/s)		18.08
Max Chl Dpth (ft)	1.78	Hydr. Depth (ft)		0.89
Conv. Total (cfs)	1178.1	Conv. (cfs)		1178.1
Length Wtd. (ft)	75.00	Wetted Per. (ft)		58.02
Min Ch El (ft)	7104.00	Shear (lb/sq ft)		34.61
Alpha	1.00	Stream Power (lb/ft s)	593.00	0.00
0.00				
Frctn Loss (ft)	5.96	Cum Volume (acre-ft)		1.31
C & E Loss (ft)	0.38	Cum SA (acres)		0.78

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7105.35	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.20	Wt. n-Val.		0.060
W.S. Elev (ft)	7105.15	Reach Len. (ft)	115.00	100.00
50.00				
Crit W.S. (ft)	7104.02	Flow Area (sq ft)		259.97
E.G. Slope (ft/ft)	0.006978	Area (sq ft)		259.97
Q Total (cfs)	931.00	Flow (cfs)		931.00
Top Width (ft)	113.60	Top Width (ft)		113.60
Vel Total (ft/s)	3.58	Avg. Vel. (ft/s)		3.58
Max Chl Dpth (ft)	3.15	Hydr. Depth (ft)		2.29
Conv. Total (cfs)	11144.9	Conv. (cfs)		11144.9
Length Wtd. (ft)	100.00	Wetted Per. (ft)		114.15
Min Ch El (ft)	7102.00	Shear (lb/sq ft)		0.99
Alpha	1.00	Stream Power (lb/ft s)	400.00	0.00
0.00				
Frctn Loss (ft)	0.89	Cum Volume (acre-ft)		1.04
C & E Loss (ft)	0.00	Cum SA (acres)		0.64

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 2

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7104.46	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.23	Wt. n-Val.		0.060
W.S. Elev (ft)	7104.23	Reach Len. (ft)	95.00	100.00
90.00				
Crit W.S. (ft)	7103.50	Flow Area (sq ft)		243.75
E.G. Slope (ft/ft)	0.011767	Area (sq ft)		243.75
Q Total (cfs)	931.00	Flow (cfs)		931.00
Top Width (ft)	143.54	Top Width (ft)		143.54

Vel Total (ft/s)	3.82	Avg. Vel. (ft/s)		3.82
Max Chl Dpth (ft)	2.73	Hydr. Depth (ft)		1.70
Conv. Total (cfs)	8582.5	Conv. (cfs)		8582.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)		143.79
Min Ch El (ft)	7101.50	Shear (lb/sq ft)		1.25
Alpha	1.00	Stream Power (lb/ft s)	536.00	0.00
0.00				
Frctn Loss (ft)	2.18	Cum Volume (acre-ft)		0.47
C & E Loss (ft)	0.03	Cum SA (acres)		0.34

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the
need for additional cross sections.

CROSS SECTION

RIVER: RIVER-1
REACH: Reach-1 RS: 1

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	7102.24	Element	Left OB	Channel
Right OB				
Vel Head (ft)	0.53	Wt. n-Val.		0.060
W.S. Elev (ft)	7101.70	Reach Len. (ft)		
Crit W.S. (ft)	7101.70	Flow Area (sq ft)		162.36
E.G. Slope (ft/ft)	0.052150	Area (sq ft)		162.36
Q Total (cfs)	953.00	Flow (cfs)		953.00
Top Width (ft)	153.47	Top Width (ft)		153.47
Vel Total (ft/s)	5.87	Avg. Vel. (ft/s)		5.87
Max Chl Dpth (ft)	1.30	Hydr. Depth (ft)		1.06
Conv. Total (cfs)	4173.2	Conv. (cfs)		4173.2
Length Wtd. (ft)		Wetted Per. (ft)		153.56
Min Ch El (ft)	7100.40	Shear (lb/sq ft)		3.44
Alpha	1.00	Stream Power (lb/ft s)	550.00	0.00
0.00				

10 Report Maps

Preliminary Plan Reinstated
Offsite Drainage Basin Map
Existing Condition Drainage Map
Proposed Condition Drainage Map

DEVELOPMENT NOTES:

1. TRACT A - USE OPEN SPACE - TO BE PLACED INTO A CONSERVATION EASEMENT AND OWNED AND MAINTAINED BY HOME OWNERS ASSOCIATION OR OTHER ENTITY ACCEPTABLE TO BOTH THE APPLICANT AND THE BOARD OF COUNTY COMMISSIONERS.
2. AREAS WITHIN PLATTED DRAINAGE EASEMENTS AND TRACT A SHALL BE A DRAINAGE & DRAINAGE MAINTENANCE ACCESS EASEMENT IN ITS ENTIRETY GRANTED TO EL PASO COUNTY. NO BUILDINGS, BUILDING PERMITS, WELLS OR SEPTIC SYSTEMS SHALL BE ALLOWED WITHIN THIS AREA.
3. NO NON-MOTORIZED TRAILS OR TRAIL EASEMENTS ARE INCLUDED WITHIN THIS APPLICATION.
4. THE EAGLE WING DRIVE EXTENSION SHALL BE OWNED AND MAINTAINED BY THE HOME OWNERS ASSOCIATION. THE KURIE ROAD EXTENSION SHALL BE OWNED AND MAINTAINED BY EL PASO COUNTY. BOTH ROADWAY EXTENSIONS SHALL BE GRAVEL SURFACED AND DESIGNED AND CONSTRUCTED TO EL PASO COUNTY STANDARDS.
5. WATER TO A CENTRAL DISTRIBUTION SYSTEM OWNED AND OPERATED BY THE PARK FOREST WATER DISTRICT. FIRE HYDRANTS TO BE PROVIDED WITH THE CENTRAL WATER DISTRIBUTION SYSTEM PER THE BLACK FOREST FIRE PROTECTION DISTRICT'S CODE AND SPECIFICATION REQUIREMENTS.
6. WASTE WATER TO BE INDIVIDUAL ON SITE SEPTIC SYSTEMS.
7. THIS PROPERTY IS LOCATED WITHIN AND SERVICED BY MOUNTAIN VIEW ELECTRIC ASSOCIATION SERVICE DISTRICT, THE BLACK FOREST FIRE DISTRICT, THE ACADEMY SCHOOL DISTRICT NO. 20 AND THE BLACK HILLS ENERGY CORPORATION SERVICE DISTRICT.
8. MAXIMUM BUILDING HEIGHT - 35'
9. BUILDING SETBACKS FOR FRONT, SIDE AND REAR YARDS - 25' UNLESS SHOWN OTHERWISE.
10. STANDARD DRAINAGE AND UTILITY EASEMENTS: FRONT - 15', SIDE - 10', REAR - 10' AND PERIMETER 30'.
11. PROPOSED METHOD OF GUARANTEEING FUNDS SHALL BE APPROVED BY AND ACCEPTABLE TO THE EL PASO COUNTY ATTORNEYS OFFICE.
12. ALL RECORDED EASEMENTS WHOSE LOCATION CAN BE DEFINED ARE SHOWN ON THE PLAN. A UTILITY MAINTENANCE EASEMENT WHICH AFFECTS THE ENTIRE PROPERTY IS RECORDED IN BK 3673 PG 917 OF THE EL PASO COUNTY PUBLIC RECORDS.
13. UTILITY LINES PROVIDING SERVICE TO EXISTING BUILDINGS AND FACILITIES MAY BE RELOCATED DEPENDING UPON FINAL UTILITY ENGINEERING PROVIDED BY INDIVIDUAL UTILITY COMPANIES.

STANDARD DSD PLAT NOTES

1. THE FOLLOWING REPORTS HAVE BEEN SUBMITTED IN ASSOCIATION WITH THE PRELIMINARY PLAN FOR THIS SUBDIVISION AND ARE ON FILE AT THE COUNTY DEVELOPMENT SERVICES DEPARTMENT: TRANSPORTATION IMPACT STUDY; DRAINAGE REPORT; WATER RESOURCES REPORT; WASTEWATER DISPOSAL REPORT; GEOLOGY AND SOILS REPORT; FIRE PROTECTION REPORT; NATURAL FEATURES REPORT.
2. ALL PROPERTY OWNERS ARE RESPONSIBLE FOR MAINTAINING PROPER STORM WATER DRAINAGE IN AND THROUGH THEIR PROPERTY. PUBLIC DRAINAGE EASEMENTS AS SPECIFICALLY NOTED ON THE PLAT SHALL BE MAINTAINED BY THE LOT OWNERS UNLESS OTHERWISE INDICATED. STRUCTURES, FENCES, MATERIALS OR LANDSCAPING THAT COULD IMPEDE THE FLOW OR RUNOFF SHALL NOT BE PLACED IN DRAINAGE EASEMENTS.
3. DEVELOPER SHALL COMPLY WITH FEDERAL AND STATE LAWS, REGULATIONS, ORDINANCES, REVIEW AND PERMIT REQUIREMENTS, AND OTHER AGENCY REQUIREMENTS, IF ANY, OF APPLICABLE AGENCIES INCLUDING, BUT NOT LIMITED TO, THE COLORADO DIVISION OF WILDLIFE, COLORADO DEPARTMENT OF TRANSPORTATION, U.S. ARMY CORPS OF ENGINEERS AND THE U.S. FISH AND WILDLIFE SERVICE REGARDING THE ENDANGERED SPECIES ACT, PARTICULARLY AS RELATED TO THE LISTED SPECIES IDENTIFIED IN THE PROJECT'S ENVIRONMENTAL ASSESSMENT.
4. NO DRIVEWAY SHALL BE ESTABLISHED UNLESS AN ACCESS PERMIT HAS BEEN GRANTED BY EL PASO COUNTY.
5. MAILBOXES SHALL BE INSTALLED IN ACCORDANCE WITH EL PASO COUNTY AND US POSTAL SERVICE REGULATIONS.
6. THE DEVELOPER SHALL BE RESPONSIBLE FOR THE FINAL DESIGN, CONSTRUCTION, AND MAINTENANCE OF PRIVATE DETENTION POND/WATER QUALITY BMP(s) AS DESCRIBED IN THE APPROVED PRELIMINARY/FINAL DRAINAGE REPORT FOR THIS SUBDIVISION. FINAL DESIGN, CONSTRUCTION DRAWINGS AND DRAINAGE REPORT UPDATES FOR THE DETENTION POND/WATER QUALITY BMP(S) SHALL BE PROVIDED WITH FINAL PLAT SUBMITTALS. THE DETENTION POND/WATER QUALITY BMP(S) SHALL BE CONSTRUCTED AND COMPLETED PRIOR TO THE ISSUANCE OF ANY BUILDING PERMITS.

GEOLOGIC HAZARDS NOTE;

AREAS OF THE FOLLOWING LOTS HAVE BEEN FOUND TO BE IMPACTED BY GEOLOGIC HAZARDS. MITIGATION MEASURES AND A MAP OF THE HAZARD AREA CAN BE FOUND IN THE SOILS, GEOLOGY, HAZARD AND WASTE WATER STUDY FOR THE EAGLE RISING SUBDIVISION BY ENTECH ENGINEERING DATED 5/30/2012 AND 9/14/2012, IN FILE SP-12-006 EAGLE RISING PRELIMINARY PLAN AVAILABLE AT THE EL PASO COUNTY DEVELOPMENT SERVICES DEPARTMENT.

AREAS OF PONDED WATER: LOTS 3, 6, 11 & 16 — LOTS 1, 7, 8, 9 & 10
AREAS OF POTENTIALLY SHALLOW GROUND WATER:
AREAS OF SEASONALLY WET SOILS: LOTS 4, 5, 6, 9, 10, 11, 14, 15, 16 & 17
AREAS WHERE SEPTIC SYSTEMS ARE NOT RECOMMENDED: LOTS 3, 6, 7, 8, 9, 10, 11, 14, 15, 16 & 17
AREAS WHERE SHALLOW BEDROCK MAY REQUIRE ENGINEERED SEPTIC SYSTEMS:
LOTS 3, 5, 8, 12 & 14
AREAS WHERE 30% + SLOPES EXIST: LOT 17

TYPICAL LINE SCHEDULE

1. FRONT BLDG SETBACK AT 200' MIN. LOT WIDTH
2. 25' BUILDING SETBACK
3. 15' FRONT UTILITY & DRAINAGE EASEMENT
4. 10' SIDE AND REAR UTILITY & DRAINAGE EASEMENT
5. 30' PERIMETER UTILITY & DRAINAGE EASEMENT
6. DRAINAGE EASEMENT WIDTH VARIES

PROPERTY OWNERS:

CASAS LIMITED PARTNERSHIP #4
PO BOX 2076
COLORADO SPRINGS, CO 80901-2076

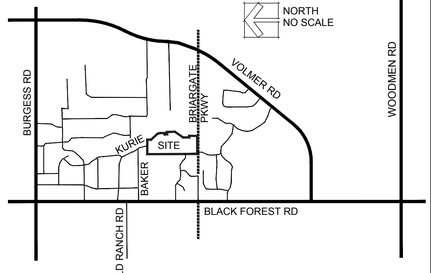
IQ INVESTORS LLC
PO BOX 2076
COLORADO SPRINGS, CO 80901-2976

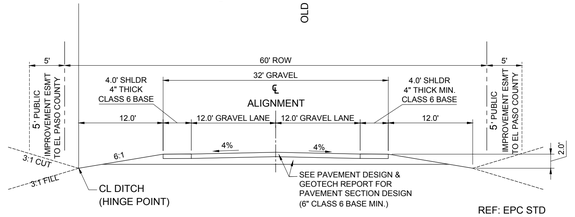
DEVELOPER
MYPAD, INC.

STEPHEN J. JACOBS, JR., PRESIDENT
PO BOX 2076
COLORADO SPRINGS, CO 80901-2976

VICINITY MAP

NORTH
NO SCALE





REF: EPC STD DTL SD_2-10

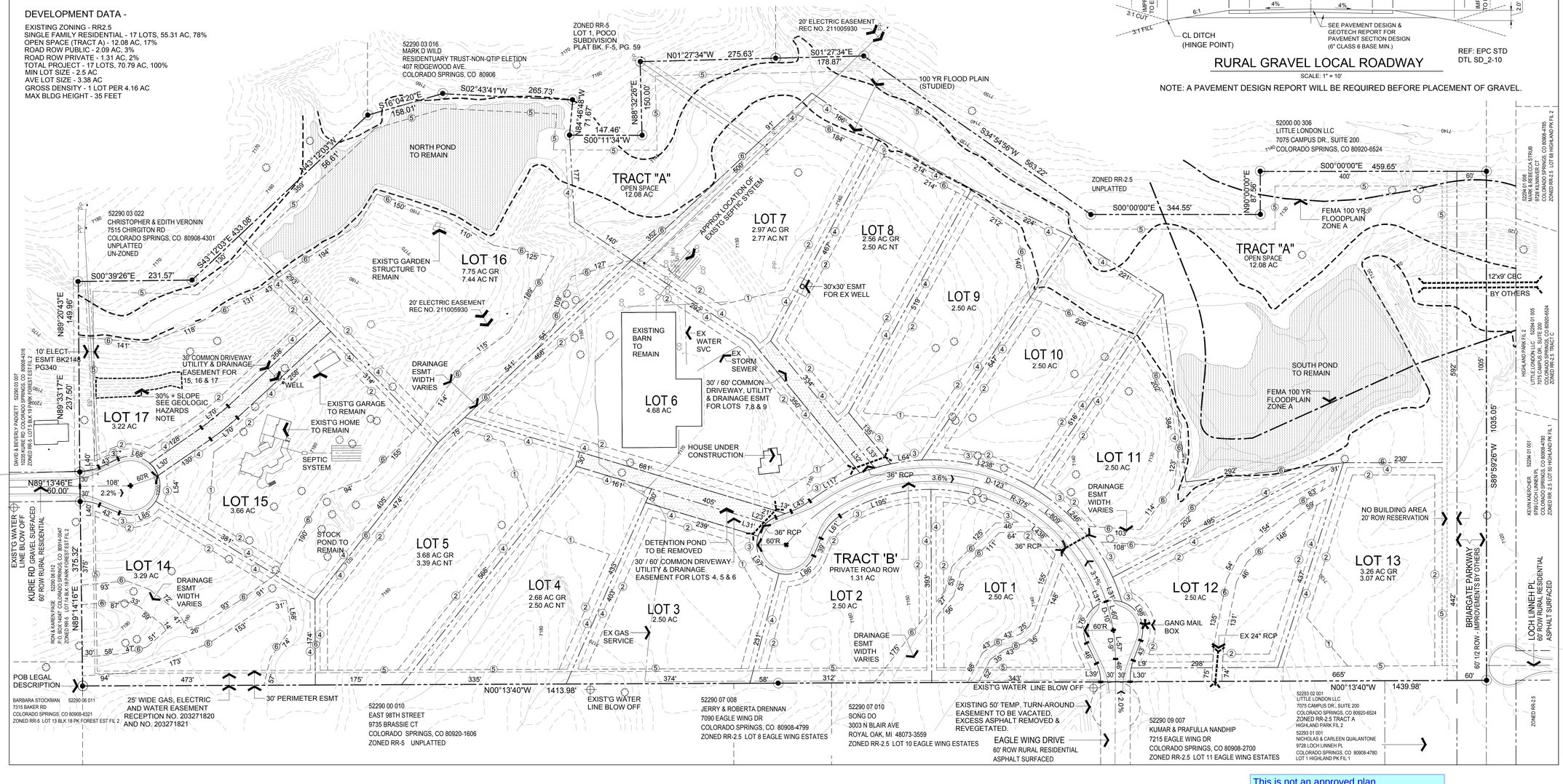
RURAL GRAVEL LOCAL ROADWAY

SCALE: 1" = 10'

NOTE: A PAVEMENT DESIGN REPORT WILL BE REQUIRED BEFORE PLACEMENT OF GRAVEL.

DEVELOPMENT DATA -

EXISTING ZONING - RR2.5
SINGLE FAMILY RESIDENTIAL - 17 LOTS, 55.31 AC, 78%
OPEN SPACE (TRACT A) - 12.08 AC, 17%
ROAD ROW PUBLIC - 2.09 AC, 3%
ROAD ROW PRIVATE - 1.31 AC, 2%
TOTAL PROJECT - 17 LOTS, 70.79 AC, 100%
MIN LOT SIZE - 2.5 AC
AVE LOT SIZE - 3.38 AC
GROSS DENSITY - 1 LOT PER 4.16 AC
MAX BLDG HEIGHT - 35 FEET



LRA
LAND RESOURCE ASSOCIATES
9738 MOUNTAIN RD.
CHIPITA PARK, CO 80809
719-684-2298

PARCEL NO.S 52290 00 018 & 52290 00 017
SCALE 1"=100'
CONT. INT. = 2'

PRELIMINARY PLAN - REINSTATED
EAGLE RISING

CASAS LIMITED PARTNERSHIP #4
P.O. BOX 2076, COLORADO SPRINGS, CO 80901-2076

ISSUED FOR:
COUNTY REINSTATEMENT
DATE - DEC 08. 2022

project number

computer file

issue date
APRIL 16, 2022

drawn by
DFJ

checked by

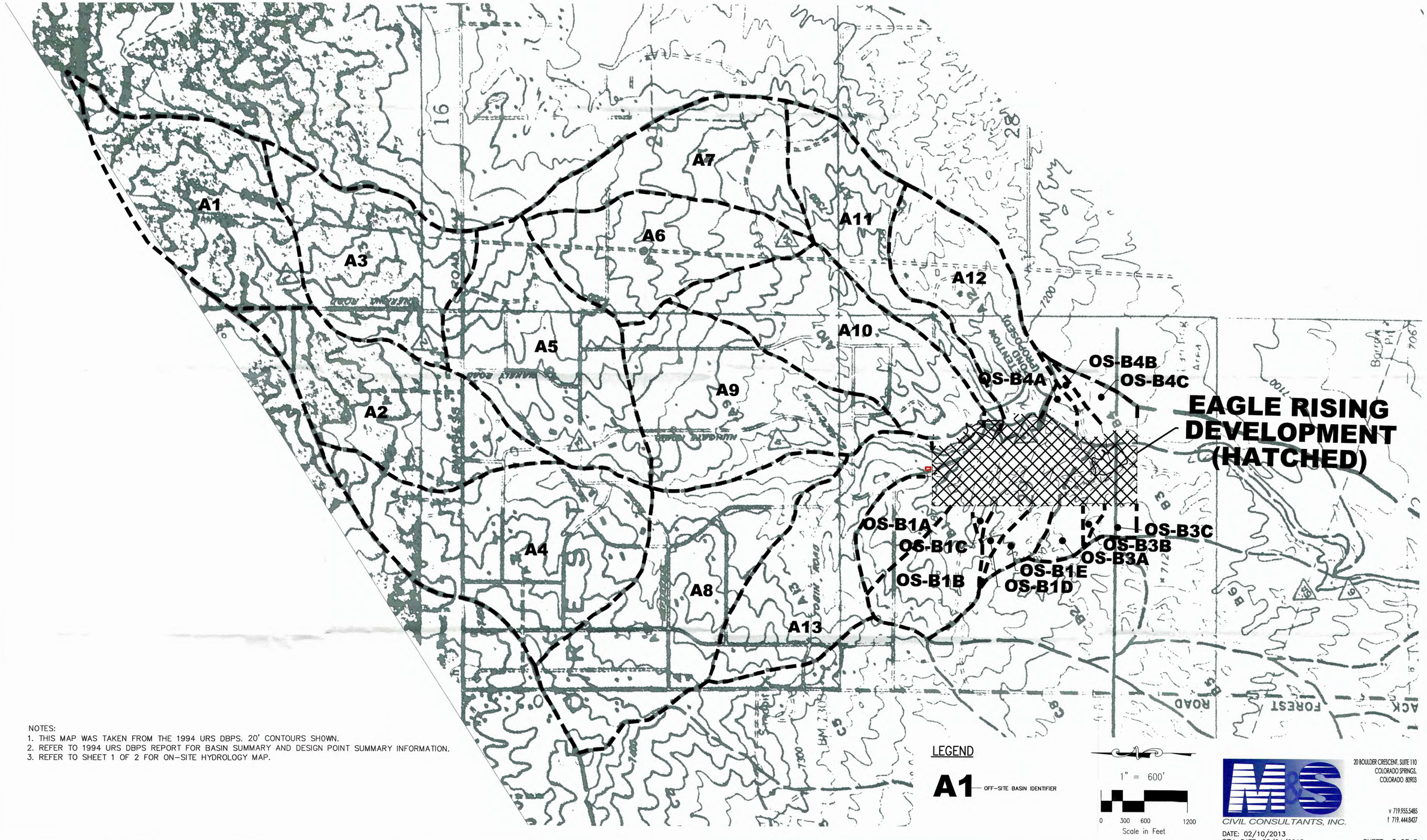
revisions

sheet number
1 OF TWO

PCD PROJECT NUMBER
SP205

This is not an approved plan

EAGLE RISING
HYDROLOGY MAP
(OFF-SITE)



NOTES:
1. THIS MAP WAS TAKEN FROM THE 1994 URS DBPS. 20' CONTOURS SHOWN.
2. REFER TO 1994 URS DBPS REPORT FOR BASIN SUMMARY AND DESIGN POINT SUMMARY INFORMATION.
3. REFER TO SHEET 1 OF 2 FOR ON-SITE HYDROLOGY MAP.

LEGEND

A1 — OFF-SITE BASIN IDENTIFIER

1" = 600'

0 300 600 1200

Scale in Feet

20 BOULDER CRESCENT, SUITE 110
COLORADO SPRINGS,
COLORADO 80903

v 719.955.5485
f 719.444.8427

CIVIL CONSULTANTS, INC.

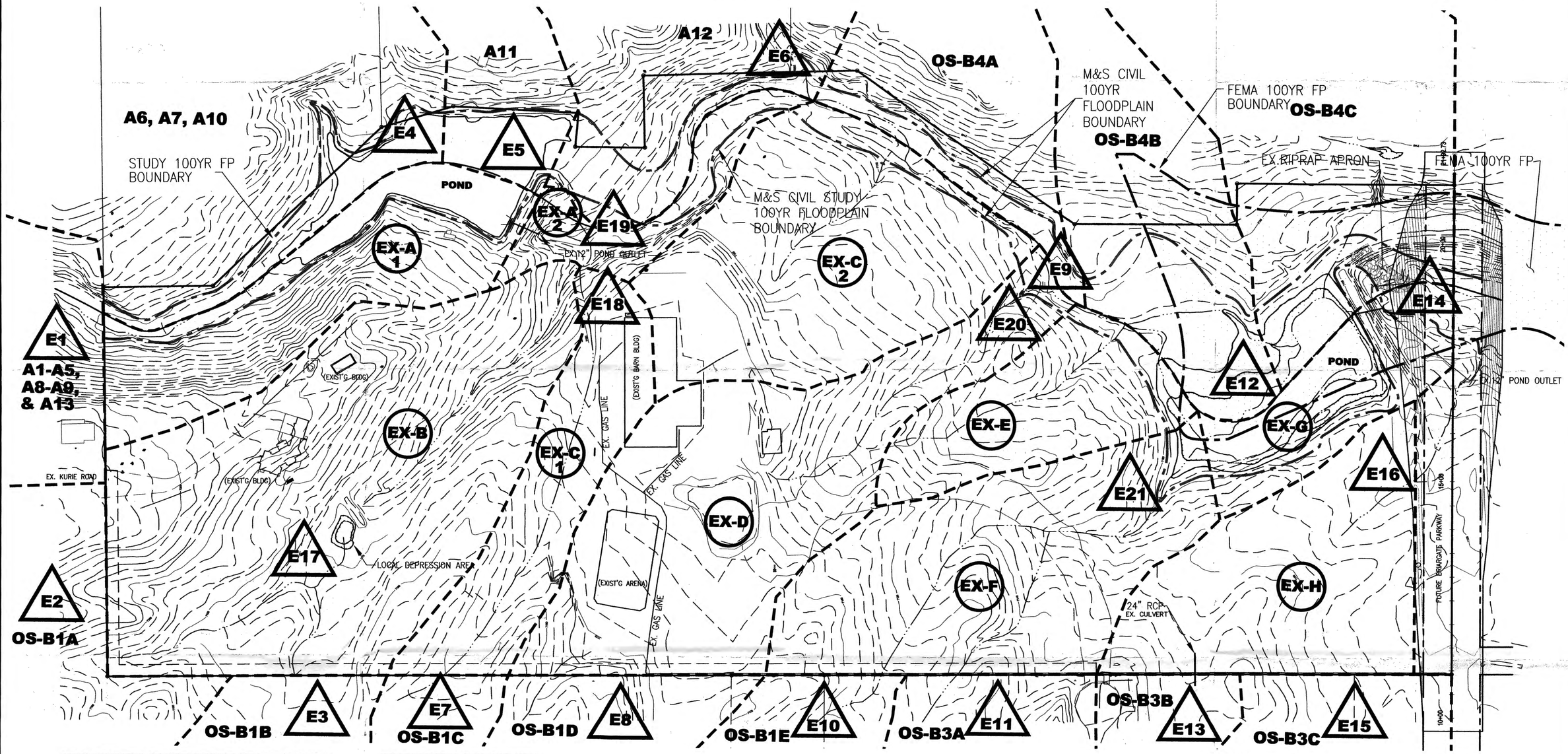
DATE: 02/10/2013
REV. DATE: 08/04/2015

EAGLE RISING
HYDROLOGY MAP
EXISTING
(ON-SITE)

1" = 100'

0 50 100 200

Scale in Feet



BASIN SUMMARY			
BASIN	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
EX-A1	4.9	5.9	13.9
EX-A2	1.6	1.9	4.6
EX-B	13.1	14.1	33.5
EX-C1	3.8	4.8	11.4
EX-C2	7.5	6.8	16.2
EX-D	9.0	8.0	19.0
EX-E	2.6	3.2	7.6
EX-F	7.5	7.4	17.5
EX-G	2.8	12.4	23.2
EX-H	5.3	5.0	12.0

BASIN SUMMARY			
BASIN	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
OS-B1A	24.9	24.2	57.4
OS-B1B	41.0	41.5	98.4
OS-B1C	1.8	1.7	4.0
OS-B1D	6.0	6.0	14.3
OS-B1E	10.1	10.1	24.0
OS-B3A	9.1	8.9	21.1
OS-B3B	2.3	2.1	5.1
OS-B3C	5.7	6.5	14.8
OS-B4A	5.2	5.9	14.1
OS-B4B	8.1	9.3	22.2
OS-B4C	13.4	12.7	30.1

BASIN SUMMARY			
BASIN	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
A1	120.6	45.5	81.0
A2	134.2	55.5	98.9
A3	103.9	42.3	75.3
A4	162.4	71.9	128.1
A5	134.2	56.4	100.4
A6	90.0	38.4	68.3
A7	87.4	36.1	64.3
A8	153.3	60.3	107.4
A9	126.0	54.7	97.4
A10	108.2	44.0	78.3
A11	76.1	35.7	63.6
A12	76.2	71.5	127.3
A13	102.9	42.6	75.8

DESIGN POINT SUMMARY		
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
E1	307.4	547.1
E2	24.2	57.4
E3	41.5	98.4
E4	76.2	135.6
E5	498.2	727.9
E6	483.9	884.2
E7	1.7	4.0
E8	6.0	14.3
E9	485.4	892.9
E10	10.1	24.0
E11	8.9	21.1
E12	498.9	926.1
E13	2.1	5.1

DESIGN POINT SUMMARY		
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
E14	495.8	924.8
E15	6.5	14.8
E16	4.9	11.6
E17	64.0	152.0
E18	4.2	10.0
E19	63.7	151.3
E20	9.7	22.9
E21	18.1	42.9

LEGEND

EX-A — ON-SITE BASIN IDENTIFIER

E1 — DESIGN POINT

FLOW ARROW

FEMA 100-YR FLOODPLAIN (ZONE A)

M&S CIVIL 100-YR FLOODPLAIN BOUNDARY

CIVIL CONSULTANTS, INC.

102 E PIKES PEAK AVENUE, SUITE 306
COLORADO SPRINGS,
COLORADO 80903

v 719.955.5485
f 719.444.8427

DATE: 2/7/2013
REV DATE: 7/12/2014

BASIN SUMMARY			
BASIN	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
A1	4.9	5.9	13.9
A2	1.6	1.9	4.5
B	3.1	3.4	8.0
C	1.2	1.5	3.5
D	10.7	11.5	27.3
E1	3.8	4.8	11.4
E2	7.5	6.8	16.2
F	8.8	8.1	19.2
G	2.6	3.2	7.6
H	4.1	4.3	10.2
I	1.6	2.1	4.9
J	2.7	3.1	7.3
K	2.8	12.4	23.2
L	5.3	5.1	12.0

BASIN SUMMARY			
BASIN	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
OS-B1A	24.9	24.2	57.4
OS-B1B	41.0	41.5	98.4
OS-B1C	1.8	1.7	4.0
OS-B1D	6.0	6.0	14.3
OS-B1E	10.1	10.1	24.0
OS-B3A	9.1	8.9	21.1
OS-B3B	2.3	2.1	5.1
OS-B3C	5.7	6.5	14.8
OS-B4A	5.2	5.9	14.1
OS-B4B	8.1	9.3	22.2
OS-B4C	13.4	12.7	30.1

BASIN SUMMARY			
BASIN	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
A1	120.6	45.5	81.0
A2	134.2	55.5	98.9
A3	103.9	42.3	75.3
A4	162.4	71.9	128.1
A5	134.2	56.4	100.4
A6	90.0	38.4	68.3
A7	87.4	36.1	64.3
A8	153.3	60.3	107.4
A9	126.0	54.7	97.4
A10	108.2	44.0	78.3
A11	76.1	35.7	63.6
A12	76.2	71.5	127.3
A13	102.9	42.6	75.8

DESIGN POINT SUMMARY		
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
E1	307.4	547.1
E2	24.2	57.4
E3	41.5	98.4
E4	76.2	135.6
E5	408.2	727.9
E6	483.9	884.2
E7	1.7	4.0
E8	6.0	14.3
E9	485.4	892.9
E10	10.1	24.0
E11	8.9	21.1
E12	498.9	926.1
E13	2.1	5.1

DESIGN POINT SUMMARY		
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
E14	495.8	924.8
E15	6.5	14.8
E16	4.9	11.6
E17	64.0	152.0
E18	4.2	10.0
E19	63.7	151.3
E20	9.7	22.9
E21	18.1	42.9

DESIGN POINT SUMMARY		
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
1	307.4	547.1
2	76.2	135.6
3	408.2	727.9
4	24.2	57.4
5	41.5	98.4
6	67.5	160.1
6A	4.2	10.0
6B	65.2	154.7
7	487.9	892.4
8	490.3	898.4
8A	8.2	19.5
8B	9.7	23.1
9	490.0	902.5
10	490.2	903.5

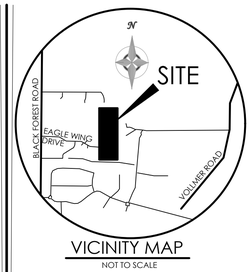
DESIGN POINT SUMMARY		
DESIGN POINT	Q5 (CFS)	Q100 (CFS)
11	24.3	57.8
11A	26.8	63.6
12	501.4	930.3
13	503.9	936.7
14	506.5	942.8
15	2.1	5.1
16	6.8	16.0
17	6.5	14.8

LEGEND

A — ON-SITE BASIN

1 — DESIGN POINT

FLOW ARROW



VICINITY MAP
NOT TO SCALE

BENCHMARK

Increase from 42.9 cfs to 57.8 cfs needs to be addressed - any stabilization required?

Show and label buildings to be removed

Show all jurisdictional and potentially jurisdictional wetlands

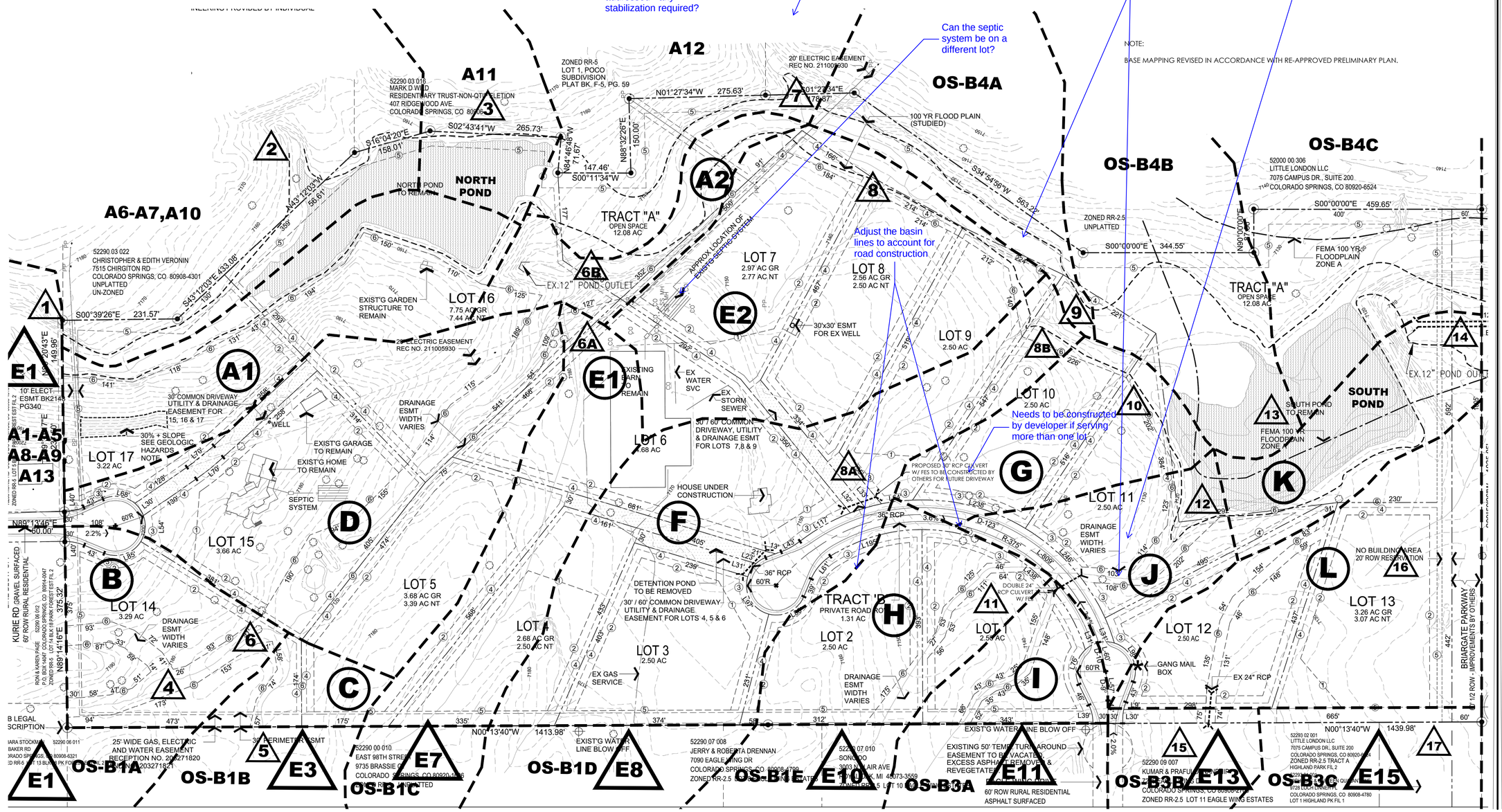
Show DP 11A

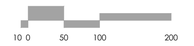
Can the septic system be on a different lot?

Adjust the basin lines to account for road construction

Needs to be constructed by developer if serving more than one lot

NOTE:
BASE MAPPING REVISED IN ACCORDANCE WITH RE-APPROVED PRELIMINARY PLAN.





MVE, INC.
ENGINEERS, SURVEYORS
1903 lelaray street, suite 200 colorado springs co 80909 719.635.5736

REVISIONS

DESIGNED BY
DRAWN BY
CHECKED BY
AS-BUILTS BY
CHECKED BY

EAGLE RISING
FILING NO.1

PRELIMINARY
DRAINAGE REPORT
ON-SITE HYDROLOGY

MVE PROJECT 61145

MVE DRAWING DRN-MAP-PP-Prelim

JUNE 29, 2022

SHEET 1 OF 1