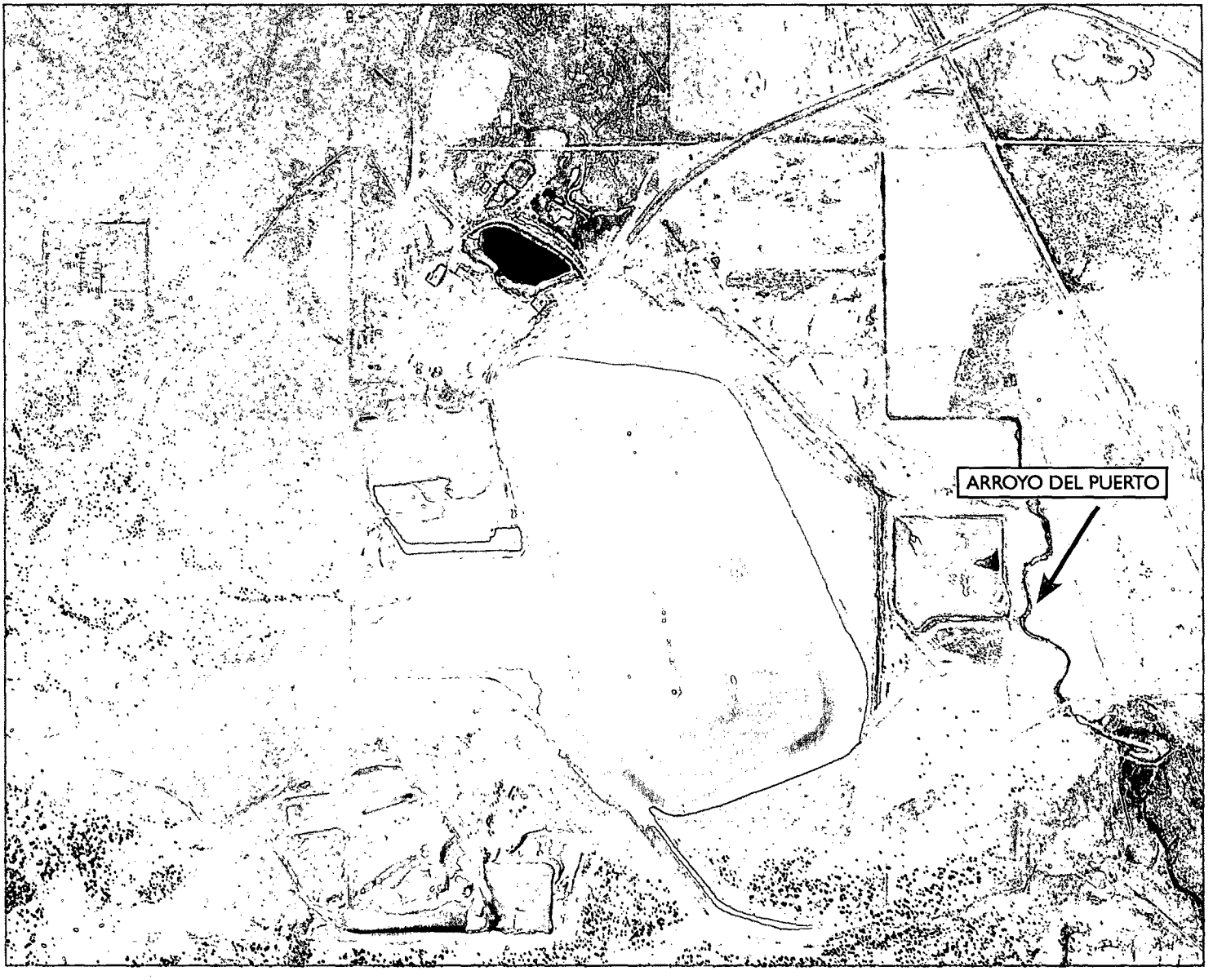
SITE EROSION PROTECTION MEASURES
FROM SURFACE WATER FLOW IN THE ARROYO DEL PUERTO
AMBROSIA LAKE MILL
AMBROSIA LAKE, NEW MEXICO



Prepared for:
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March 2008
Amendment 1 to Revision 1
Prepared By:

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March 21, 2008

Mr. Tom McLaughlin, Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop T-7-E18
Washington, DC 20555

Subject: **Rio Algom Mining, LLC; Docket 40-8905**
Erosion Protection Design for Surface Water
Flow in the Arroyo Del Puerto, Amendment 1 to Revision 1,

Dear Mr. McLaughlin,

On behalf of Rio Algom Mining LLC, please find attached three copies of the submittal *Site Erosion Protection Measures From Surface Water Flow in the Arroyo Del Puerto, Amendment 1 to Revision 1,* for Rio Algom Mining LLC's Ambrosia Lake Mill Facility, Ambrosia Lake, New Mexico.

This amendment identifies changes to the Revision 1 submittal dated January 25, 2008 for erosion protection design and reflects discussions with Nuclear Regulatory Commission (NRC) staff. The primary change in the design is to shift the alignment of the northern portion of the diversion embankment/channel to avoid an archaeological find. This amendment includes the design revision and an assessment of this change as it relates to the Revision 1 submittal, especially concerning rock sizing, scour depth, and embankment height.

If you have any questions or concerns, please do not hesitate to contact Mr. Terry Fletcher (Rio Algom Mining) at 505-287-8851, extension11 or me at the address/phone numbers listed.

Sincerely,

TETRA TECH, INC.

John M. McBee

John M. McBee, P.E.

Cc: Project file
Terry Fletcher, Rio Algom Mining LLC
Russ Jones, TRONOX

Attachments

SITE EROSION PROTECTION MEASURES FROM SURFACE WATER FLOW IN THE ARROYO DEL PUERTO

AMBROSIA LAKE MILL
AMBROSIA LAKE, NEW MEXICO

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MARCH 2008
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1.0 INTRODUCTION

Following the initial submittal of the site erosion protection measures for the Arroyo del Puerto in October 2007, numerous comments regarding the design were provided in written and verbal form from the U.S. Nuclear Regulatory Commission (NRC). Appendix A contains a summary of the primary comments and initial and additional responses to the comments. Continuing revision to the document and resolution to the concerns expressed in the review comments resulted in Revision 1 of the document dated January 2008. At the writing of this Amendment 1, Revision 1 of the document has met with tentative verbal approval from the NRC.

The purpose of Amendment 1 to Revision 1 is to respond to a field condition that came to light during the later stages of the review process. An archaeology site was discovered in the approximate area of Station 65+00 within the Diversion Channel excavation. The site was deemed significant enough to prompt a re-alignment of the Diversion Channel north of the location in order to prevent its disturbance. Therefore, the previous alignment from Station 84+56 to Station 35+00 was shifted north to a straighter alignment from the corner of Tailings Pond 4 to the site entrance road. The same channel slope was maintained but the resulting alignment shortened the stationing which now ends at Station 83+81 at the site entrance road. Due to the alignment shift to the north, additional cut is now required for the Diversion Channel excavation.

The following items are contained in this Amendment 1 to Revision 1 document:

1) Additional discussion in response to comment 10 of Appendix A regarding overland and gully flows into the side banks of the Interior Channel.
2) Revised HEC-RAS hydrologic modeling and corresponding amended Calculation D.1.
3) Additional excavation definitions to better define bedrock when it is encountered.
4) Revised design drawing set.
5) Enlarged Map Insets of Drawing Sheets 2 and 4.

2.0 INTERIOR SITE DRAINAGE AND EROSION PROTECTION

During the NRC review of interior site drainage Calculation C.2, Design Flowrates and Erosion Protection, Comment 10 of Appendix A had a concern whether the design had adequately considered the impact of gully flows entering the Interior Channel laterally and discharging directly down the side slope of the channel. Under this occurrence, concentrated flow rates impacting the erosion protection may be several times larger than the uniform overland flow rates discharging from the drainage areas. The previous calculations had developed conservative flowrates for the 20% channel side slopes by using a 20% slope for the entire drainage to determine the times of concentration. While attempting to be conservative, this approach is not representative of the flow regime. Alternatively, the uniform overland flow rates were multiplied to determine the maximum magnitude flows that could be withstood by the design rock size being used of D_{50} = 7.8 inches. It was determined that this rock size could withstand 3 times the overland flow rates from Catchment 1, 4 times from Catchment 4, and 6 times from Catchment 7. These magnitude ratios were deemed sufficient to withstand the forces from lateral gully inflows into the side slopes of the Interior Channel

3.0 EXTERIOR SITE DRAINAGE AND EROSION PROTECTION

The HEC-RAS hydrologic modeling was revised to reflect the topographic changes at the previous hydrologic sections 21 thru 8. The results of this modeling and the corresponding calculations for rock sizes and scour depth are shown in the amended Calculation D.1 that is contained in Appendix B of this Amended Report.

The geometric data for the embankment and channel were maintained as before in Revision 1. The primary changes were in the far left overbank elevation data and the location of the stationing at the site entrance road reducing to Station 83+81. The final results are very similar to that performed for Revision 1. The amended evaluation of the HEC-RAS analysis indicates that the flow regime still transitions from subcritical flow to supercritical flow at approximate Station 27+50. The results indicate a D_{50} = 7.8-inch rock size for the 3H:1V side slopes and D_{50} = 12.0-inch rock size for the aprons and 4H:1V slopes. Scour depth is less than 4.0 feet along the site entrance road extension,

less than 7.0 feet for the subcritical flow region between Stations 83+81 and 27+50, less than 10.0 feet for the supercritical flow region between Stations 27+50 and 1+50, and less than 4.0 feet between Stations 1+50 and (-)2+00. Freeboard along the Diversion Embankment still remains primarily between 3.0 to 4.0 feet.

4.0 EROSION PROTECTION SPECIFICATIONS

An additional specification has been included to reflect a definition for the classification of bedrock when it is encountered during the channel excavation. This definition may be utilized when shallow bedrock is encountered during construction of the buried slope between Station 27+50 and 1+50 as shown by the alternate Detail G on Drawing Sheet 7. This additional specification is contained in the following subsection 4.1.

4.1 Excavation Classification

Excavation will be classified as common (soil) excavation or rock excavation in accordance with the following definitions. The primary excavation during construction of the embankment and diversion channel will be in soil. The soils are either alluvial or windblown by their genesis and the contact with the underlying bedrock is typically an erosional surface. The bedrock underlying the area of construction is the Mancos Shale with interbeds of sandstone or siltstone.

Common excavation shall be defined as the excavation of all materials that can be excavated, transported, and unloaded by the use of tracked dozers or wheel tractor-scrapers with pusher tractors or that can be excavated and dumped into place or loaded onto hauling equipment by means of excavators having a rated capacity of one cubic yard and equipped with attachments (such as shovel, bucket, or backhoe) appropriate to the character of the materials and the site conditions.

Rock excavation shall be defined as the excavation of all hard, compacted or cemented materials the accomplishment of which requires ripping prior to removal or the use of excavators larger than defined for common excavation.

The excavation and removal of isolated rock fragments larger than one cubic yard in volume encountered in materials otherwise conforming to the definition of common excavation shall be classified as rock excavation.

Excavation will be classified according to the above definitions by the Engineer, based on his judgment of the character of the materials and the site conditions.

The presence of isolated boulders or rock fragments larger than one cubic yard in size will not in itself be sufficient cause to change the classification of the surrounding material.

For the purpose of this classification, the following definitions shall apply:

Heavy ripping equipment shall be defined as a rear-mounted, heavy duty, single-tooth, ripping attachment mounted on a tractor having a power rating of 200-300 net horsepower (at the flywheel).

Wheel tractor-scraper shall be defined as a self-loading (not elevating) and unloading scraper having a struck bowl capacity of l2-20 yards.

Pusher tractor shall be defined as a track type tractor having a power rating of 200-300 net horsepower (at the flywheel) equipped with appropriate attachments.

5.0 DESIGN SUMMARY

The final results are very similar to that performed for Revision 1 and no additional design changes are deemed necessary for the re-alignment of Amendment 1. In conclusion, the amended design for the diversion of the Arroyo del Puerto still addresses the concerns brought forth by the NRC reviews with respect to the design contained in Revision 1. The Diversion Embankment is protected adequately from the effects of a PMF and has adequate freeboard to prevent overtopping. The Diversion

Channel and overbank area is adequate in size to contain the PMF flood flows without creating velocities too large for the available erosion protection rock sizes. Additionally, the system is not subject to sedimentation problems that would increase the risk of overtopping the Diversion Embankment.

6.0 DESIGN DRAWINGS

The changes of the re-alignment have also been added to the design drawings. A complete set of the amended design drawings is contained in Appendix C. In addition, Drawing Sheet 2 and 4 have been enlarged and included in Appendix D. The following Table 6.1 is a list of the design drawings contained in Appendix C of this Amendment 1 by sheet #, title, and applicable scale on the drawing

Table 6.1
Arroyo Del Puerto Erosion Protection Measures – Design Drawings
Rio Algom Mining LLC

Drawing Sheet #	Title	Scale
1 of 24	SITE PLAN	1' = 800'
2 of 24	INTERIOR SITE DRAINAGE PLAN	1' = 800'
3 of 24	EXTENT OF PROBABLE MAXIMUM FLOOD	1' = 800'
4 of 24	EROSON PROTECTION MEASURES	1' = 800'
5 of 24	INTERIOR SITE DRAINAGE CHANNEL SECTION DETAILS	Varies
6 of 24	DIVERSION EMBANKMENT/CHANNEL SECTION DETAILS	Varies
7 of 24	DIVERSION EMBANKMENT/CHANNEL SECTION DETAILS	Varies
8 of 24	PLAN DETAILS (1 OF 5)	Varies
9 of 24	PLAN DETAILS (2 OF 5)	Varies
10 of 24	PLAN DETAILS (3 OF 5)	Varies
11 of 24	PLAN DETAILS (4 OF 5)	Varies
12 of 24	PLAN DETAILS (5 OF 5)	Varies
13 of 24	INTERIOR CHANNEL PLAN AND PROFILE (1 OF 4)	1" = 100' Hor, 1" = 10 Ver
14 of 24	INTERIOR CHANNEL PLAN AND PROFILE (2 OF 4)	1" = 100' Hor, 1" = 10 Ver
15 of 24	INTERIOR CHANNEL PLAN AND PROFILE (3 OF 4)	1" = 100' Hor, 1" = 10 Ver
16 of 24	INTERIOR CHANNEL PLAN AND PROFILE (4 OF 4)	1" = 100' Hor, 1" = 10 Ver
17 of 24	DIVERSION EMBANKMENT/CHANNEL PLAN AND PROFILE (1 OF 8)	1" = 150' Hor, 1" = 15 Ver
18 of 24	DIVERSION EMBANKMENT/CHANNEL PLAN AND PROFILE (2 OF 8)	1" = 150' Hor, 1" = 15 Ver
19 of 24	DIVERSION EMBANKMENT/CHANNEL PLAN AND PROFILE (3 OF 8)	1" = 150' Hor, 1" = 15 Ver
20 of 24	DIVERSION EMBANKMENT/CHANNEL PLAN AND PROFILE (4 OF 8)	1" = 150' Hor, 1" = 15 Ver
21 of 24	DIVERSION EMBANKMENT/CHANNEL PLAN AND PROFILE (5 OF 8)	1" = 150' Hor, 1" = 15 Ver
22 of 24	DIVERSION EMBANKMENT/CHANNEL PLAN AND PROFILE (6 OF 8)	1" = 150' Hor, 1" = 15 Ver
23 of 24	DIVERSION EMBANKMENT/CHANNEL PLAN AND PROFILE (7 OF 8)	1" = 150' Hor, 1" = 15 Ver
24 of 24	DIVERSION EMBANKMENT/CHANNEL PLAN AND PROFILE (8 OF 8)	1" = 150' Hor, 1" = 15 Ver

Appendix A ..... Response to NRC Draft Comments and Points of Discussion

Arroyo Del Puerto Channel Re-Design

Surface Water Hydrology and Erosion Protection

Ambrosia Lake Mill, Rio Algom Mining LLC

RESPONSES TO NRC DRAFT COMMENTS AND POINTS OF DISCUSSION

ARROYO DEL PUERTO CHANNEL RE-DESIGN

SURFACE WATER HYDROLOGY AND EROSION PROTECTION

AMBROSIA LAKE MILL, RIO ALGOM MINING LLC

The following NRC comments are based on review of the Rio Algom Mining LLC (RAMC) submittal "Site Erosion Protection Measures From Surface Water Flow in The Arroyo Del Puerto," dated October, 2007. The comments are considered to be draft comments and are intended to be used for discussion purposes in conference calls between NRC staff and Rio Algom Mining LLC.

The corresponding responses to the NRC comments formed the basis for the design changes that resulted in Revision 1 to the submittal, dated January, 2008.

1. Big Question for Pond 9 - Is this area completely cleaned up?? If any contaminated material remains, erosion protection will likely be needed in this area.

Response: Pond 9 is presently being cleaned up and will be completely cleaned up over the next few weeks. The excavated materials are being deposited into the Tailings Cell 2 expansion.

2. Interior Channel, Inlet Area, Sheet 7. The rock size at the upper end (inlet area) of the interior drainage channel should be designed for concentrated flows entering the channel upstream of the inlet. The use of 3.2-inch rock for the upper 10 feet of the channel does not seem reasonable.

Response: Comment acknowledged. The 3.2-inch rock was the result of using a shallower slope adjacent to the steep slope transition into the interior drainage channel. However, it does not appear practical to change rock size in such a short distance. This rock size will be changed to be 7.8-inch rock to match the rock size for the steep slope inlet apron.

Additional Response: Revised to 7.8-inch entrance rock to match the rock on the steep slope transition into the Interior channel. The entrance flow also checked with the steeper 20% side slope of the channel and 7.8-inch rock size is still adequate.

3. Picky Comment, Section 4.4 of Specs. Proper language should be used in the specs to require a specific activity. For example, a sentence may indicate that " the test section should be examined....", but the spec should state that the test section will be examined.

Response: Comment acknowledged. Text to be revised to state that the test section shall be examined.

4. Side Slope Correction Factor. The rock size for the side slopes of the interior and exterior channels needs to be corrected for the side slope (use USACE, EM 1110-2-1601). Because the rock size was based on the use of the Abt-Johnson and shear stress methods, a correction for the side slope is needed if the side slope is steeper than about 1V on 4H. For the 1V on 3H slopes, the correction factor will increase the rock size by about 10%, or so.

Response: The slope correction factor does not impact the design for the interior channel. The interior channel has sideslopes of 1V on 5V which has a slope correction factor of 1.00. The rock sizes for the 1V on 3H sideslopes of the exterior channel will be rechecked using the sideslope correction factor.

Additional Response:

- *The sideslope correction factor of 0.88 was used for the 3H:1V sideslopes.*
- *The sideslope correction factor of 1.00 was used for a 4H:1V sideslope that is now proposed from Station 30+00 to 1+50.*

5. Rock Size for Aprons and Toes of Slopes. The rock size for the aprons on the right bank of the exterior diversion channel (and the interior diversion channel downstream of Pond 6) needs to be corrected for the side slope angle that will exist when the rock falls into the assumed scoured area. As recommended in NUREG-1623, the scoured slope should be assumed to be about 1V on 2H. This may result in an increase in the rock size of about 40%. If the required rock size is excessive, RAMC could pre-form a slope (excavate and extend a specific slope to the required scour depth) and provide the required rock size on that slope (USACE EM 1110-2-1601 has some guidance for design and construction of these types of rock toes and aprons). Further, it should be noted that existing gullies downstream of the proposed channel appear to have side slopes that are steeper than 1V on 2H. If these channels serve as a rough guide for the correct side slope to be assumed in the scoured area, even the use of a 1V on 2H assumed slope may not be valid for these types of soils, and therefore the pre-formed slope option is likely to be better.

Response: Comment acknowledged. The exterior channel has a much larger scour depth, therefore, if the rock apron is to be used as shown a slope correction factor based on a scour depth sideslope angle of 1V to 2H will have to be applied. Mitigating design changes would be to carry the sideslope protection to scour depth, flatten the sideslope, or redesign the rock apron using a more specific flood depth.

Additional Response:

- *The interior channel at the location of the right bank apron has a scour depth that is less than 3.0 feet. The apron is designed to be 3.0 feet*

deep which means that the apron is an added conservative feature since the sideslope rock is constructed to scour depth at a 5H:1V slope giving it a slope correction factor of 1.0.

- *For the exterior channel the sideslope correction factor of 0.72 was used for an assumed 2H:1V sideslope for an apron and scour situation.*
- *The sideslope correction factor of 1.00 was used for a 4H:1V sideslope that is built and buried to scour depth. now proposed from Station 30+00 to 1+50.*

6. Provide more Info. Calculation C.3 should be provided, as promised on p.11.

Response: This was a previous calculation submitted as part of an earlier design package. This design had indicated that for overland surface flow the Pond 3 sideslope protection required D_{50} = 2.43 inches and that the apron required D_{50} = 8.5 inches. This calculation was inadvertently omitted as part of this package and will be provided.

Additional Response: This calculation has been provided.

7. Water Surface Profiles, Exterior Diversion Channel Calc D-1. Based on review of the information provided, it appears that the water surface profiles may need to be recalculated. It appears that supercritical flow will occur in the exterior diversion channel and that the Manning's n value need to be re-examined.

a. Slope of Energy Grade Line and Supercritical Flow. For those cross-sections downstream of approximately RS 8 or RS 9, the slope of the energy grade line (EGL) was computed by the HEC-RAS program to be the critical slope (indicating that critical depth equals the computed depth) of about 0.005. However, the proposed slope of much of the exterior channel is approximately 0.01, indicating that supercritical flow will likely exist in the channel. Therefore, the actual slope of the EGL to be used in rock sizing is likely to be approximately the same as the channel slope of 0.01. For any sections where the slope of the channel is greater than the critical slope, RAMC should re-run the HEC-RAS calculations in a downstream direction, determine those locations where supercritical flow exists, re-calculate the slope of the EGL at various sections (particularly because the Abt-Johnson and shear stress methods are used), and re-design the rock sizes accordingly.

Response: Comment acknowledged. The HEC-RAS model is being re-run using a flow regime of both supercritical as well as mixed and then compared with the subcritical results. The results of the mixed run match the results from the subcritical run from Section 21 to 7 and match the results from the supercritical run from 7 to (-)4. Section 7 is the point at which the flow regime transitioned from subcritical flow to supercritical flow. Therefore, the sections from Section 7 and downstream will have to be rechecked accordingly.
Additional Response: HEC-RAS has been remodeled using a mixed flow regime. Supercritical flow occurs at Section 6 (Station 25+00). Additional detail has also

been utilized for Manning's 'n' distribution across the channel as well as the specific flow regime at the right bank which is critical for rock sizing and apron or slope design.

b. Manning's 'n' values. The Manning's 'n' values used for the overbank areas of the exterior diversion channel were computed to be less than the n values for the channel. Using the USACE equations for 'n' values, this does not seem appropriate, since: (1) the depth of flow in the channel is greater than the depth of flow in the overbank; and (2) the composition of the majority of the channel (the part that is not lined with rock) is similar to the overbank area. RAMC should double-check the calculation of 'n' values and re-run HEC-RAS, as necessary.

Response: Comment Acknowledged. Manning's 'n' values range from 0.030 for excavated earth channels that are weedy to 0.050 for floodplains that have light brush. Likewise, Manning's 'n' values can be calculated for rock protected areas that range from 0.0317 for 3.2-inch size rock to 0.0395 for 12-inche size rock. The HEC-RAS will be re-run using the following 'n' values:

- *Left Overbank 0.035 to reflect a higher value than the channel but less than the floodplain value of 0.050 to reflect the higher flow depths.*
- *Channel 0.030 to reflect a weedy excavated earth channel*
- *Right Channel Bank & Overbank Use calculated Manning's 'n' based on size of rock protection.*

Additional Response: The Mannings 'n' values indicated above were utilized. Additional detail has also been utilized for Manning's 'n' distribution across the channel as well as the specific flow regime at the right bank which is critical for rock sizing and apron or slope design.

8. Design of Confluence of Exterior and Interior Channels, Sheet 10, Detail 4. The design of the channels in the area of their confluence should be re-considered, as follows.

a. The diversion berm for the exterior channel may be exposed to erosive velocities on the left bank of the interior channel. It appears that riprap should be "wrapped" around the berm and that the left bank of interior channel and the berm area should be protected with rock for some distance upstream of the confluence.

Response: Comment Acknowledged. Details will be revised to wrap riprap around the end of the diversion berm at the confluence area. Additional protection will also be added on the left bank of the interior channel at the confluence area.

Additional Response: Markups of additional details provided for additional

aprons and berm protection at the confluence area..

b. Gully migration from upstream head-cutting could advance up the channels and cause some problems in this area. Protection may be needed across the width of the channels (somewhere near Section RS 0) , and/or the rock aprons may need to be extended to greater depths. In addition to the scour depth produced by the PMF, RAMC should consider the size and depth of naturally occurring gullies downstream of this area and consider those gully depths in the design of riprap in the confluence area.

Response: Comment Acknowledged. Additional rock protection will be placed across both channels in the area of the confluence to minimize head cutting. Additional Response: Markups of additional details provided for additional aprons and berm protection at the confluence area..

9.. Confluence of Interior Drainage Channel and Existing Discharge Channels. The existing discharge channel appears to have a steeper slope than the proposed interior drainage channel. If so, the rock sizes in the interior channel need to be checked to assure that it will withstand the entrance velocities in the discharge channel. RAMC should provide the results of previous calculations of velocities and required rock sizes and should demonstrate that the riprap design for the interior channel is adequate.

Response: Comment Acknowledged. The results of the previous calculations from the north diversion channel and the discharge channel will be provided. The rock sizes in the interior channel will be checked according to NUREG-1623, Appendix D, Section 3.2.2 to ensure that they can withstand the entrance velocities from the side channels.

Additional Response: These calculations have been provided.

10. Design of Channels for Overland and Gully Flows. In several areas, surface runoff will be entering the interior channel and exterior channel in a direction perpendicular to the actual channel direction. One particular area, namely the area contributing flow to the interior channel from Catchment Area 4, may have slopes steep enough to cause gullies to form and for flows from those gullies to be discharged directly down the side slope of the drainage channel. The rock sizes on the side slope should be checked for this occurrence.

Response: The sideslope protection rock will be extended out from the channel 10 feet along the adjacent surface at those locations meeting existing unprotected grades.

Additional Response: These areas have been rechecked for the top and sideslopes for the incoming overland flows. These new calculations have been included in the interior channel design spreadsheet.

Appendix B .....Amended Exterior Site Drainage Calculation D.1

Design Flowrates and Erosion Protection

Calculation D.1
Rio Algom Mining LLC
Ambrosia Lake, New Mexico
Arroyo Del Puerto
Exterior Site Drainage Calculations
Design Flowrates and Erosion Protection
Amendment 1 to Revision 1

1. Amendment 1 to Revision 1

Revision 1 to this calculation was the result of responding to NRC comments.
Following the tentative approval of Revision 1 the Diversion Embankment / Channel was impacted by an archaeology site located in the channel in the approximate vicinity of Station 65+00.
As a result, the alignment between the site entrance road and the corner at Tailings Pond 4 was revised by pushing it north . The HEC-RAS model was revised and the calculations contained in Calculation D.1 were redone.

2. Diversion Embankment/Channel Design Layout

The geometric data for the embankment and channel was maintained as before. The primary changes were in the far left overbank elevation data and the location of the station at the incoming site entrance.

The geometric data along with additional topography data was utilized as input into the HEC-RAS Model (USACE, 2003) A summary of this input data is contained on Worksheet Tab "HEC-RAS Input Data", (calc. Sheets 30 thru 35 of 43)

3. HEC-RAS Results

The final results are very similar to that performed for Revision 1. No additional design changes are deemed necessary. The amended evaluation of the HEC-RAS analysis still indicates that the flow regime transitions from subcritical flow to supercritical flow at approximate Statiion 27+50. This has resulted in higher velocities in the supercritical area which promted the change to a buried 4H:1V rock protected slope within this area.

The summary results of the HEC-RAS analysis, rock size calculations, and depth scour calculations for the Diversion Embankment/Channel are contained on Worksheet Tab "Rock-Scour Depth Summary", (calc. Sheet 2 thru 3 of 43). The detailed results of the HEC-RAS analysis and subsequent calculations are summarized on the table of Worksheet Tab "HEC-RAS Results", (calc. Sheets 4 thru 19 of 43). Erosion protection sizes have been estimated on this table by the Abt and Johnson Method and then oversizing by 4% to determine the D_{50} size rock before applying slope correction factors. The size of rock after applying the slope factors determines whether an apron will be used or a buried rock slope taken down past the scour depth. The scour depths along the diversion channel have also been estimated on this table.

The extent of the PMF is illustrated on "Drawing Sheet 3".
The extent of the PMF is also illustrated by the graphic cross-sections of the flood flow taken from the HEC-RAS Model and shown on Worksheet Tab "PMF X-Sections", (calc. Sheets 20 thru 28 of 43).
Also, a profile of the flow regime is shown on Worksheet Tab "PMF Profile", (calc. Sheet 29 of 43).

The raw data taken directly from the HEC-RAS model is contained on the following worksheets:

Worksheet Tab "HEC-RAS Profile Output"	Calc. Sheet 36 of 43
Worksheet Tab "HEC-RAS Flow Dist Output"	Calc. Sheets 37 thru 40 of 43
Worksheet Tab "HEC-RAS Cross-Sect Output"	Calc. Sheets 41 thru 43 of 43

4. Scour Depth Calculations

The USACE Equilibrium scour depth method was deemed most appropriate and was used for final design.

5. Conclusion:

The resulting rock sizes indicate D_{50}=7.8-inch rock size for the 3H:1V side slopes, D_{50}=12.0-inch rock size for the aprons and 4H:1V slopes. Scour depth is less than 4.0 feet along the entrance road extension, less than 7.0 feet for the subcritical flow region for Station 83+81 to 27+50, less than 10.0 feet for the supercritical flow region fro Station 27+50 to 1+50, and less than 4.0 feet from Station 1+50 to -2+00.
Freeboard along the Diversion Embankment is primarily between 3.0 to 4.0 feet.

		Embankment Slope / Apron D_{50} (inches)					
1	2	3	4	5	6	7	8
			D_{50} ROCK SIZE CALCULATION w/ SLOPE CORRECTION FACTORS (inches)				
River Section	Station	Channel X-Section Position	Abt and Johnson Method (inches)	Add Riprap Oversize 4%	2H:1V Apron Slope: Abt and Johnson D_{50} / Slope Factor (0.72)	3H:1V Slope: Abt and Johnson D_{50} / Slope Factor (0.88)	4H:1V Slope: Abt and Johnson D_{50} / Slope Factor (1.00)
21	9500						
20	9000						
19	8500	R. Chan. Apron	2.25	2.34	3.24	2.65	2.34
18	8381	R. Chan. C3	2.11	2.20	3.05	2.50	2.20
		R. Chan. C1 (Apron)	1.88	1.95	2.71	2.22	1.95
17	8000	R. Chan. C3	2.48	2.58	3.58	2.93	2.58
		R. Chan. C1 (Apron)	2.21	2.29	3.19	2.61	2.29
16	7500	R. Chan. C3	4.05	4.21	5.85	4.79	4.21
		R. Chan. C1 (Apron)	3.86	4.01	5.57	4.56	4.01
15	7000	R. Chan. C3	3.69	3.83	5.32	4.36	3.83
		R. Chan. C1 (Apron)	3.28	3.41	4.74	3.88	3.41
14	6500	R. Chan. C3	5.72	5.95	8.26	6.76	5.95
		R. Chan. C1 (Apron)	5.52	5.75	7.98	6.53	5.75
13	6000	R. Chan. C3	5.42	5.64	7.83	6.41	5.64
		R. Chan. C1 (Apron)	5.27	5.48	7.61	6.23	5.48
12	5500	R. Chan. C3	7.49	7.79	10.82	8.85	7.79
		R. Chan. C1 (Apron)	6.64	6.90	9.59	7.84	6.90
11	5000	R. Chan. C3	3.26	3.39	4.71	3.85	3.39
		R. Chan. C1 (Apron)	2.88	3.00	4.17	3.41	3.00
10	4500	R. Chan. C3	2.50	2.60	3.62	2.96	2.60
		R. Chan. C1 (Apron)	2.22	2.31	3.20	2.62	2.31
9	4000	R. Chan. C3	7.31	7.61	10.56	8.64	7.61
		R. Chan. C1 (Apron)	6.61	6.88	9.55	7.82	6.88
8	3500	R. Chan. C3	5.97	6.21	8.62	7.05	6.21
		R. Chan. C1 (Apron)	5.26	5.47	7.60	6.22	5.47
7	3000	R. Chan. C3	6.61	6.87	9.55	7.81	6.87
		R. Chan. C1 (Apron)	5.83	6.07	8.43	6.90	6.07
6	2500	R. Chan. C7	10.42	10.84	15.05	12.32	10.84
		R. Chan. C1 (Slope)	8.75	9.10	12.64	10.34	9.10
5	2000	R. Chan. C7	11.38	11.83	16.43	13.44	11.83
		R. Chan. C1 (Slope)	10.21	10.62	14.75	12.07	10.62
4	1500	R. Chan. C7	12.15	12.63	17.54	14.35	12.63
		R. Chan. C1 (Slope)	11.19	11.64	16.17	13.23	11.64
3	1000	R. Chan. C7	12.30	12.79	17.77	14.54	12.79
		R. Chan. C1 (Slope)	11.31	11.76	16.34	13.37	11.76
2	500	R. Chan. C7	12.34	12.83	17.83	14.58	12.83
		R. Chan. C1 (Slope)	11.34	11.79	16.38	13.40	11.79
1	0	R. Chan. C2	6.67	6.94	9.63	7.88	6.94
		R. Chan. C1 (Slope)	5.03	5.23	7.26	5.94	5.23
0	-100	R. Chan. C2	6.32	6.57	9.13	7.47	6.57
		R. Chan. C1 (Slope)	4.89	5.09	7.07	5.78	5.09
-1	-500						
-2	-1000						
-3	-1500						
-4	-2000						

D_{50} = 3.2 inch rock nominal (3.24 inch actual)

D_{50} = 7.8 inch rock nominal (7.95 inch actual)

D_{50} = 9.2 inch rock nominal (9.33 inch actual)

D_{50} = 12 inch rock nominal (12.97 inch actual)

D_{50} > 12.97 inch rock

		Embankment Slope / Apron D_{50} (inches)								
1	2	9	10	11	12	13	14	15	16	17
		D50 ROCK SIZE FOR BERM ABOVE GRADE SLOPES		D50 ROCK SIZE FOR BERM APRONS or BURIED SLOPES		DEPTH SCOUR (FT)				
River Section	Station	Minimum Required D_{50} to Use	Proposed D_{50} to Use for Slope	Minimum Required D_{50} to Use	Proposed D_{50} to Use for Apron/ Buried Slope	USDOT HEC-14 Scour Depth	USACE Equilibrium Scour Depth	CSU Equation for Piers	USDOT HEC-18 Froelich Equation for Live Bed Scour	Average Scour Depth
21	9500									
20	9000									
19	8500	3.24	3.24	3.24	3.24	#REF!	3.5	#REF!	#REF!	#REF!
18	8381			3.20	12.97	#REF!	4.7	#REF!	#REF!	#REF!
		3.20	7.95							
17	8000			7.80	12.97	#REF!	5.5	#REF!	#REF!	#REF!
		3.20	7.95							
16	7500			7.80	12.97	#REF!	6.9	#REF!	#REF!	#REF!
		7.80	7.95							
15	7000			7.80	12.97	#REF!	7.0	#REF!	#REF!	#REF!
		7.80	7.95							
14	6500			12.00	12.97	#REF!	6.9	#REF!	#REF!	#REF!
		7.80	7.95							
13	6000			9.20	12.97	#REF!	7.0	#REF!	#REF!	#REF!
		7.80	7.95							
12	5500			12.00	12.97	#REF!	7.0	#REF!	#REF!	#REF!
		7.84	7.95							
11	5000			7.80	12.97	#REF!	4.9	#REF!	#REF!	#REF!
		7.80	7.95							
10	4500			7.80	12.97	#REF!	4.3	#REF!	#REF!	#REF!
		3.20	7.95							
9	4000			12.00	12.97	#REF!	6.9	#REF!	#REF!	#REF!
		7.82	7.95							
8	3500			9.20	12.97	#REF!	6.0	#REF!	#REF!	#REF!
		7.80	7.95							
7	3000			12.00	12.97	#REF!	6.8	#REF!	#REF!	#REF!
		7.80	7.95							
6	2500			12.00	12.97	#REF!	9.5	#REF!	#REF!	#REF!
		9.20	12.97							
5	2000			12.67	12.97	#REF!	9.2	#REF!	#REF!	#REF!
		12.00	12.97							
4	1500			12.63	12.97	#REF!	8.9	#REF!	#REF!	#REF!
		12.00	12.97							
3	1000			12.79	12.97	#REF!	9.1	#REF!	#REF!	#REF!
		12.00	12.97							
2	500			12.83	12.97	#REF!	9.4	#REF!	#REF!	#REF!
		12.00	12.97							
1	0			7.80	12.97	#REF!	1.3	#REF!	#REF!	#REF!
		7.80	12.97							
0	-100			7.80	12.97	#REF!	1.7	#REF!	#REF!	#REF!
		7.80	12.97							
-1	-500									
-2	-1000									
-3	-1500									
-4	-2000									

D_{50} = 3.2 inch rock nominal (3.24 inch actual)

D_{50} = 7.8 inch rock nominal (7.95 inch actual)

D_{50} = 9.2 inch rock nominal (9.33 inch actual)

D_{50} = 12 inch rock nominal (12.97 inch actual)

D_{50} > 12.97 inch rock

INPUT DATA VALUES TO HEC-RAS

River Section	Station	Flow (cfs)	Proposed Top of Berm Elevation	Estimated Freeboard on Diversion Berm	Elevation at Base of Right Berm	Depth of Flow at Base of Right Berm	Channel Slope (ft/ft)	Right Bank & Apron Rock Sizes	Right Bank & Buried Slope Rock Sizes	Channel X-Section Position	Manning's n Value
1	2	3	4	5	6	7	8	9	10	11	12
21	9500	78000	No Berm	N/A	N/A	N/A	0.0032			LOB	0.0350
										L. Channel	0.0300
										Main Channel	0.0300
										R. Channel	0.0300
										ROB	0.0350
20	9000	78000	No Berm	N/A	N/A	N/A	0.0032			LOB	0.0350
										L. Channel	0.0300
										Main Channel	0.0300
										R. Channel	0.0300
										ROB	0.0350
19	8500	78000	No Berm	N/A	N/A	N/A	0.0032			LOB	0.0300
										L. Channel	0.0300
										Main Channel	0.0300
								3.2		R. Chan. Apron	0.0317
								3.2		R. Bank Slope	0.0317
18	8381	78000	6965.00	2.21	6948.48	14.31	0.0032			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368
17	8000	78000	6962.27	-0.30	6947.27	15.30	0.0032			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368
16	7500	78000	6961.22	-0.09	6946.22	15.09	0.001			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368
15	7000	78000	6960.47	-0.59	6945.72	15.34	0.001			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368

INPUT DATA VALUES TO HEC-RAS

River Section	Station	Flow (cfs)	Proposed Top of Berm Elevation	Estimated Freeboard on Diversion Berm	Elevation at Base of Right Berm	Depth of Flow at Base of Right Berm	Channel Slope (ft/ft)	Right Bank & Apron Rock Sizes	Right Bank & Buried Slope Rock Sizes	Channel X-Section Position	Manning's n Value
1	2	3	4	5	6	7	8	9	10	11	12
14	6500	78000	6959.72	1.32	6945.22	13.18	0.001			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368
13	6000	78000	6958.97	1.23	6944.72	13.02	0.001			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368
12	5500	78000	6958.22	3.71	6944.22	10.29	0.001			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368
11	5000	78000	6957.47	2.54	6943.72	11.21	0.001			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368
10	4500	78000	6956.72	2.04	6943.22	11.46	0.005			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368
9	4000	78000	6953.72	3.00	6940.72	10.00	0.005			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368
8	3500	78000	6951.22	3.80	6938.22	9.20	0.005			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368

INPUT DATA VALUES TO HEC-RAS

River Section	Station	Flow (cfs)	Proposed Top of Berm Elevation	Estimated Freeboard on Diversion Berm	Elevation at Base of Right Berm	Depth of Flow at Base of Right Berm	Channel Slope (ft/ft)	Right Bank & Apron Rock Sizes	Right Bank & Buried Slope Rock Sizes	Channel X-Section Position	Manning's n Value
1	2	3	4	5	6	7	8	9	10	11	12
7	3000	78000	6948.72	3.23	6935.72	9.77	0.010			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
								12		R. Chan. C2 (Apron)	0.0395
								12		R. Chan. C1 (Apron)	0.0395
								7.8		R. Bank Slope	0.0368
6	2500	78000	6943.72	3.11	6930.72	9.89	0.010			R. Chan. C7	0.0300
									12	R. Chan. C6 (Slope)	0.0395
									12	R. Chan. C5 (Slope)	0.0395
									12	R. Chan. C4 (Slope)	0.0395
									12	R. Chan. C3 (Slope)	0.0395
									12	R. Chan. C2 (Slope)	0.0395
									12	R. Chan. C1 (Slope)	0.0395
									12	R. Bank Slope	0.0395
5	2000	78000	6938.72	3.33	6925.72	9.67	0.010			R. Chan. C7	0.0300
									12	R. Chan. C6 (Slope)	0.0395
									12	R. Chan. C5 (Slope)	0.0395
									12	R. Chan. C4 (Slope)	0.0395
									12	R. Chan. C3 (Slope)	0.0395
									12	R. Chan. C2 (Slope)	0.0395
									12	R. Chan. C1 (Slope)	0.0395
									12	R. Bank Slope	0.0395
4	1500	78000	6933.22	3.34	6920.72	9.16	0.010			R. Chan. C7	0.0300
									12	R. Chan. C6 (Slope)	0.0395
									12	R. Chan. C5 (Slope)	0.0395
									12	R. Chan. C4 (Slope)	0.0395
									12	R. Chan. C3 (Slope)	0.0395
									12	R. Chan. C2 (Slope)	0.0395
									12	R. Chan. C1 (Slope)	0.0395
									12	R. Bank Slope	0.0395
3	1000	78000	6928.22	3.19	6915.72	9.31	0.010			R. Chan. C7	0.0300
									12	R. Chan. C6 (Slope)	0.0395
									12	R. Chan. C5 (Slope)	0.0395
									12	R. Chan. C4 (Slope)	0.0395
									12	R. Chan. C3 (Slope)	0.0395
									12	R. Chan. C2 (Slope)	0.0395
									12	R. Chan. C1 (Slope)	0.0395
									12	R. Bank Slope	0.0395

INPUT DATA VALUES TO HEC-RAS

River Section	Station	Flow (cfs)	Proposed Top of Berm Elevation	Estimated Freeboard on Diversion Berm	Elevation at Base of Right Berm	Depth of Flow at Base of Right Berm	Channel Slope (ft/ft)	Right Bank & Apron Rock Sizes	Right Bank & Buried Slope Rock Sizes	Channel X-Section Position	Manning's n Value
1	2	3	4	5	6	7	8	9	10	11	12
2	500	78000	6923.22	2.83	6910.72	9.67	0.010			R. Chan. C7	0.0300
									12	R. Chan. C6 (Slope)	0.0395
									12	R. Chan. C5 (Slope)	0.0395
									12	R. Chan. C4 (Slope)	0.0395
									12	R. Chan. C3 (Slope)	0.0395
									12	R. Chan. C2 (Slope)	0.0395
									12	R. Chan. C1 (Slope)	0.0395
									12	R. Bank Slope	0.0395
1	0	78000	No Berm	N/A	N/A	N/A	0.009			R. Chan. C2	0.0300
									12	R. Chan. C1 (Slope)	0.0395
									12	R. Bank Slope	0.0395
0	-100	78000	No Berm	N/A	N/A	N/A	0.009			R. Chan. C2	0.0300
									12	R. Chan. C1 (Slope)	0.0395
									12	R. Bank Slope	0.0395
-1	-500	78000	No Berm	N/A	N/A	N/A	0.009			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
										R. Chan. C2	0.0300
										R. Chan. C1	0.0300
										R. Bank Slope	0.0350
-2	-1000	78000	No Berm	N/A	N/A	N/A	0.009			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
										R. Chan. C2	0.0300
										R. Chan. C1	0.0300
										R. Bank Slope	0.0350
-3	-1500	78000	No Berm	N/A	N/A	N/A	0.009			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
										R. Chan. C2	0.0300
										R. Chan. C1	0.0300
										R. Bank Slope	0.0350
-4	-2000	78000	No Berm	N/A	N/A	N/A	0.009			R. Chan. C5	0.0300
										R. Chan. C4	0.0300
										R. Chan. C3	0.0300
										R. Chan. C2	0.0300
										R. Chan. C1	0.0300
										R. Bank Slope	0.0350

	HEC-RAS DATA RESULTS										
River Section	Water Surface Elevation (ft)	E.G. Slope (ft/ft)	Position	Left Station (ft)	Right Station (ft)	Split Section Flow (cfs)	Flow Area (sq ft)	Wetted Perimeter (ft)	Percentage of Conveyance	Hydraulic Depth (ft)	Velocity (ft/s)
1	13	14	15	16	17	18	19	20	21	22	23
21	6964.48	0.000916	LOB	1606	3350	23542.59	6799.6	1537.32	30.18	4.42	3.46
		0.000916	Chan	3350	3416.67	5995.26	779.32	66.79	7.69	11.69	7.69
		0.000916	Chan	3416.67	3483.33	7378.6	882.09	66.67	9.46	13.23	8.36
		0.000916	Chan	3483.33	3550	5749.78	759.88	66.76	7.37	11.4	7.57
		0.000916	ROB	3550	5225	35333.77	8847.54	1614.76	45.3	5.48	3.99
20	6962.91	0.002531	LOB	1457	3350	25842.54	5204.79	1468.68	33.13	3.54	4.97
		0.002531	Chan	3350	3416.67	9110	739.59	66.93	11.68	11.09	12.32
		0.002531	Chan	3416.67	3483.33	11778.86	861.53	66.67	15.1	12.92	13.67
		0.002531	Chan	3483.33	3550	8718.42	720.14	66.88	11.18	10.8	12.11
		0.002531	ROB	3550	4975	22550.18	4643.01	1354.25	28.91	3.43	4.86
19	6962.56	0.000729	LOB	605	2720	974.44	704.66	493.06	1.25	1.43	1.38
		0.000729	Chan	2720	3180	16384.05	3428.77	460.02	21.01	7.45	4.78
		0.000729	Chan	3180	3640	34330.39	5151.02	460.02	41.39	11.2	6.27
		0.000729	Chan	3640	4100	26099.22	4744.63	460.25	36.08	10.31	5.93
		0.000729	ROB	4100	4875	211.88	137.3	81.5	0.27	1.69	1.54
18	6962.79	0.000408	Chan	3468.45	3474.76	566.34	93.89	6.31	0.73	14.88	6.03
		0.000408	Chan	3474.76	3481.07	558.36	93.09	6.31	0.72	14.75	6
		0.000408	Chan	3481.07	3487.38	500.66	92.29	6.31	0.64	14.63	5.42
		0.000408	Chan	3487.38	3493.69	412.04	91.5	6.31	0.53	14.5	4.5
		0.000408	Chan	3493.69	3500	406.08	90.7	6.31	0.52	14.38	4.48
		0.000408	ROB	3500	4825	902.86	308.74	45.46	1.16	7.16	2.92
17	6962.56	0.000469	Chan	3468.45	3474.76	675.73	100.04	6.31	0.87	15.86	6.75
		0.000469	Chan	3474.76	3481.07	666.78	99.24	6.31	0.85	15.73	6.72
		0.000469	Chan	3481.07	3487.38	598.4	98.44	6.31	0.77	15.6	6.08
		0.000469	Chan	3487.38	3493.69	492.94	97.65	6.31	0.63	15.48	5.05
		0.000469	Chan	3493.69	3500	486.26	96.86	6.31	0.62	15.35	5.02
		0.000469	ROB	3500	3560	985.28	354.76	62.72	1.26	5.91	2.78
16	6961.30	0.001049	Chan	3468.45	3474.76	988.19	98.73	6.31	1.27	15.65	10.01
		0.001049	Chan	3474.76	3481.07	974.95	97.93	6.31	1.25	15.52	9.96
		0.001049	Chan	3481.07	3487.38	775.45	97.13	6.31	1.12	15.4	9.01
		0.001049	Chan	3487.38	3493.69	720.51	96.34	6.31	0.92	15.27	7.48
		0.001049	Chan	3493.69	3500	710.61	95.54	6.31	0.91	15.14	7.44
		0.001049	ROB	3500	3560	1390.76	342.28	62.51	1.78	5.7	4.06
15	6961.05	0.000818	Chan	3468.45	3474.76	895.4	100.29	6.31	1.15	15.89	8.93
		0.000818	Chan	3474.76	3481.07	883.59	99.49	6.31	1.13	15.77	8.88
		0.000818	Chan	3481.07	3487.38	793.02	98.69	6.31	1.02	15.64	8.04
		0.000818	Chan	3487.38	3493.69	653.27	97.9	6.31	0.84	15.52	6.67
		0.000818	Chan	3493.69	3500	644.44	97.1	6.31	0.83	15.39	6.64
		0.000818	ROB	3500	3559.3	1344.42	360.88	62.27	1.72	6.09	3.73

	HEC-RAS DATA RESULTS										
River Section	Water Surface Elevation (ft)	E.G. Slope (ft/ft)	Position	Left Station (ft)	Right Station (ft)	Split Section Flow (cfs)	Flow Area (sq ft)	Wetted Perimeter (ft)	Percentage of Conveyance	Hydraulic Depth (ft)	Velocity (ft/s)
1	13	14	15	16	17	18	19	20	21	22	23
14	6958.39	0.002297	Chan	3468.45	3474.76	1175.8	86.67	6.31	1.51	13.74	13.57
		0.002297	Chan	3474.76	3481.07	1157.88	85.87	6.31	1.48	13.61	13.48
		0.002297	Chan	3481.07	3487.38	785.67	85.07	6.31	1.33	13.48	12.19
		0.002297	Chan	3487.38	3493.69	752.38	84.28	6.31	1.09	13.36	10.11
		0.002297	Chan	3493.69	3500	739.15	83.48	6.31	1.08	13.23	10.05
		0.002297	ROB	3500	3558.5	1707.05	260.09	41.64	2.19	6.58	6.56
13	6957.73	0.002018	Chan	3468.45	3474.76	1080.33	85.64	6.31	1.39	13.57	12.61
		0.002018	Chan	3474.76	3481.07	1063.66	84.84	6.31	1.36	13.45	12.54
		0.002018	Chan	3481.07	3487.38	789.48	84.04	6.31	1.22	13.32	11.33
		0.002018	Chan	3487.38	3493.69	762.72	83.25	6.31	1	13.19	9.4
		0.002018	Chan	3493.69	3500	750.28	82.45	6.31	0.99	13.07	9.34
		0.002018	ROB	3500	3557.8	1549.71	253.99	41.17	1.99	6.5	6.1
12	6954.5	0.004287	Chan	3468.45	3474.76	1082.4	68.45	6.31	1.39	10.85	15.81
		0.004287	Chan	3474.76	3481.07	1061.52	67.66	6.31	1.36	10.72	15.69
		0.004287	Chan	3481.07	3487.38	787.88	66.86	6.31	1.21	10.6	14.16
		0.004287	Chan	3487.38	3493.69	699.83	66.07	6.31	0.99	10.47	11.73
		0.004287	Chan	3493.69	3500	635.33	65.27	6.31	0.97	10.34	11.63
		0.004287	ROB	3500	3557	1205.54	158.56	32.51	1.55	5.14	7.6
11	6954.92	0.00103	Chan	3468.45	3474.76	607.31	74.22	6.31	0.78	11.76	8.18
		0.00103	Chan	3474.76	3481.07	596.51	73.42	6.31	0.76	11.64	8.12
		0.00103	Chan	3481.07	3487.38	532.89	72.62	6.31	0.68	11.51	7.34
		0.00103	Chan	3487.38	3493.69	436.78	71.83	6.31	0.56	11.38	6.08
		0.00103	Chan	3493.69	3500	428.74	71.03	6.31	0.55	11.26	6.04
		0.00103	ROB	3500	3556.3	742.28	188.21	35.44	0.95	5.6	3.94
10	6954.67	0.000691	Chan	3468.45	3474.76	515.44	75.81	6.31	0.66	12.01	6.8
		0.000691	Chan	3474.76	3481.07	506.46	75.01	6.31	0.65	11.89	6.75
		0.000691	Chan	3481.07	3487.38	452.61	74.21	6.31	0.58	11.76	6.1
		0.000691	Chan	3487.38	3493.69	371.13	73.42	6.31	0.48	11.64	5.05
		0.000691	Chan	3493.69	3500	364.45	72.62	6.31	0.47	11.51	5.02
		0.000691	ROB	3500	3555.5	644.37	196.54	36.2	0.83	5.72	3.28
9	6950.71	0.004141	Chan	3468.45	3474.76	1016.1	66.61	6.31	1.3	10.56	15.25
		0.004141	Chan	3474.76	3481.07	995.96	65.81	6.31	1.28	10.43	15.13
		0.004141	Chan	3481.07	3487.38	775.92	65.01	6.31	1.14	10.3	13.66
		0.004141	Chan	3487.38	3493.69	712.16	64.22	6.31	0.93	10.18	11.31
		0.004141	Chan	3493.69	3500	648.22	63.42	6.31	0.91	10.05	11.21
		0.004141	ROB	3500	3552.54	1096.96	149.66	31.59	1.41	4.99	7.33
8	6947.41	0.003111	Chan	3468.45	3474.76	771.74	61.56	6.31	0.99	9.76	12.54
		0.003111	Chan	3474.76	3481.07	755.19	60.76	6.31	0.97	9.63	12.43
		0.003111	Chan	3481.07	3487.38	672.17	59.96	6.31	0.86	9.5	11.21
		0.003111	Chan	3487.38	3493.69	548.72	59.17	6.31	0.7	9.38	9.27
		0.003111	Chan	3493.69	3500	536.47	58.37	6.31	0.69	9.25	9.19
		0.003111	ROB	3500	3554	760.96	126.63	29.05	0.98	4.59	6.01

	HEC-RAS DATA RESULTS										
River Section	Water Surface Elevation (ft)	E.G. Slope (ft/ft)	Position	Left Station (ft)	Right Station (ft)	Split Section Flow (cfs)	Flow Area (sq ft)	Wetted Perimeter (ft)	Percentage of Conveyance	Hydraulic Depth (ft)	Velocity (ft/s)
1	13	14	15	16	17	18	19	20	21	22	23
7	6945.48	0.003357	Chan	3468.45	3474.76	871.59	65.15	6.31	1.12	10.33	13.38
		0.003357	Chan	3474.76	3481.07	853.93	64.36	6.31	1.09	10.2	13.27
		0.003357	Chan	3481.07	3487.38	760.96	63.56	6.31	0.98	10.07	11.97
		0.003357	Chan	3487.38	3493.69	622.02	62.77	6.31	0.8	9.95	9.91
		0.003357	Chan	3493.69	3500	608.92	61.97	6.31	0.78	9.82	9.83
		0.003357	ROB	3500	3554	928.19	142.84	30.86	1.19	4.88	6.5
6	6940.6	0.005904	Chan	3455.83	3462.14	1112.36	67.52	6.31	1.43	10.7	16.48
		0.005904	Chan	3462.14	3468.45	901.43	66.72	6.31	1.16	10.57	13.51
		0.005904	Chan	3468.45	3474.76	883.57	65.92	6.31	1.13	10.45	13.4
		0.005904	Chan	3474.76	3481.07	865.85	65.13	6.31	1.11	10.32	13.3
		0.005904	Chan	3481.07	3487.38	848.24	64.33	6.31	1.09	10.2	13.19
		0.005904	Chan	3487.38	3493.69	830.85	63.53	6.31	1.07	10.07	13.08
		0.005904	Chan	3493.69	3500	813.56	62.74	6.31	1.04	9.94	12.97
		0.005904	ROB	3500	3554	1185.17	146.42	31.24	1.52	4.94	8.09
5	6935.38	0.007563	Chan	3455.83	3462.14	1075.42	66.14	6.31	1.56	10.48	18.39
		0.007563	Chan	3462.14	3468.45	985.16	65.34	6.31	1.26	10.36	15.07
		0.007563	Chan	3468.45	3474.76	965.07	64.55	6.31	1.24	10.23	14.95
		0.007563	Chan	3474.76	3481.07	945.31	63.75	6.31	1.21	10.1	14.83
		0.007563	Chan	3481.07	3487.38	925.67	62.95	6.31	1.19	9.98	14.7
		0.007563	Chan	3487.38	3493.69	906.27	62.16	6.31	1.16	9.85	14.58
		0.007563	Chan	3493.69	3500	887	61.36	6.31	1.14	9.72	14.46
		0.007563	ROB	3500	3554	1263.87	140.02	30.55	1.62	4.83	9.03
4	6929.87	0.00925	Chan	3455.83	3462.14	1035.63	62.9	6.31	1.58	9.97	19.64
		0.00925	Chan	3462.14	3468.45	999.82	62.11	6.31	1.28	9.84	16.1
		0.00925	Chan	3468.45	3474.76	978.54	61.31	6.31	1.25	9.72	15.96
		0.00925	Chan	3474.76	3481.07	957.45	60.51	6.31	1.23	9.59	15.82
		0.00925	Chan	3481.07	3487.38	936.51	59.72	6.31	1.2	9.46	15.68
		0.00925	Chan	3487.38	3493.69	915.82	58.92	6.31	1.17	9.34	15.54
		0.00925	Chan	3493.69	3500	895.28	58.12	6.31	1.15	9.21	15.4
		0.00925	ROB	3500	3552.5	1208.6	125.55	28.93	1.55	4.57	9.63
3	6925.02	0.009182	Chan	3455.83	3462.14	1065.17	63.87	6.31	1.62	10.12	19.78
		0.009182	Chan	3462.14	3468.45	1022.45	63.07	6.31	1.31	10	16.21
		0.009182	Chan	3468.45	3474.76	1001.02	62.28	6.31	1.28	9.87	16.07
		0.009182	Chan	3474.76	3481.07	979.78	61.48	6.31	1.26	9.74	15.94
		0.009182	Chan	3481.07	3487.38	958.68	60.68	6.31	1.23	9.62	15.8
		0.009182	Chan	3487.38	3493.69	937.84	59.89	6.31	1.2	9.49	15.66
		0.009182	Chan	3493.69	3500	917.15	59.09	6.31	1.18	9.37	15.52
		0.009182	ROB	3500	3552.5	1258.66	129.8	29.42	1.61	4.65	9.7

	HEC-RAS DATA RESULTS										
River Section	Water Surface Elevation (ft)	E.G. Slope (ft/ft)	Position	Left Station (ft)	Right Station (ft)	Split Section Flow (cfs)	Flow Area (sq ft)	Wetted Perimeter (ft)	Percentage of Conveyance	Hydraulic Depth (ft)	Velocity (ft/s)
1	13	14	15	16	17	18	19	20	21	22	23
2	6920.38	0.008766	Chan	3455.83	3462.14	1110.34	66.11	6.31	1.68	10.48	19.79
		0.008766	Chan	3462.14	3468.45	1059.79	65.32	6.31	1.36	10.35	16.23
		0.008766	Chan	3468.45	3474.76	1038.34	64.52	6.31	1.33	10.23	16.09
		0.008766	Chan	3474.76	3481.07	1017.07	63.72	6.31	1.3	10.1	15.96
		0.008766	Chan	3481.07	3487.38	995.93	62.93	6.31	1.28	9.97	15.83
		0.008766	Chan	3487.38	3493.69	975.05	62.13	6.31	1.25	9.85	15.69
		0.008766	Chan	3493.69	3500	954.31	61.34	6.31	1.22	9.72	15.56
		0.008766	ROB	3500	3552.5	1359.23	139.91	30.54	1.74	4.83	9.72
1	6907.16	0.039376	Chan	3475	3487.5	231.2	19.51	12.5	0.3	1.56	11.85
		0.039376	Chan	3487.5	3500	139.66	16.38	12.5	0.18	1.31	8.52
		0.039376	ROB	3500	4502.11	980.59	108.81	93.75	1.26	1.16	9.01
0	6906.81	0.023508	Chan	3473.1	3486.55	336.14	28.82	13.46	0.43	2.14	11.66
		0.023508	Chan	3486.55	3500	212.96	25.2	13.46	0.27	1.87	8.45
		0.023508	ROB	3500	4475	23.02	4.54	5.5	0.03	0.87	5.07
-1	6902.31	0.015873	Chan	3655.95	3679.76	391.42	44.47	23.81	0.5	1.87	8.8
		0.015873	Chan	3679.76	3703.57	315.53	39.07	23.81	0.4	1.64	8.08
		0.015873	Chan	3703.57	3727.38	246.32	33.68	23.81	0.32	1.41	7.31
		0.015873	Chan	3727.38	3751.19	184.14	28.28	23.81	0.24	1.19	6.51
		0.015873	Chan	3751.19	3775	128.82	22.83	23.81	0.17	0.96	5.64
		0.015873	ROB	3775	5025	3.1	1.07	2.67	0	0.42	2.9
-2	6898.51	0.007777	Chan	3832.14	3860.71	516.64	69.48	28.57	0.66	2.43	7.44
		0.007777	Chan	3860.71	3889.29	448.86	63.86	28.57	0.58	2.24	7.03
		0.007777	Chan	3889.29	3917.86	384.87	58.23	28.57	0.49	2.04	6.61
		0.007777	Chan	3917.86	3946.43	324.87	52.6	28.57	0.42	1.84	6.18
		0.007777	Chan	3946.43	3975	268.5	46.92	28.57	0.34	1.64	5.72
		0.007777	ROB	3975	5375	10.84	3.57	4.88	0.01	0.77	3.04
-3	6893.62	0.010203	Chan	3832.14	3860.71	436.46	58.25	28.57	0.56	2.04	7.49
		0.010203	Chan	3860.71	3889.29	368.53	52.63	28.57	0.47	1.84	7.00
		0.010203	Chan	3889.29	3917.86	305.21	47	28.57	0.39	1.65	6.49
		0.010203	Chan	3917.86	3946.43	246.74	41.37	28.57	0.32	1.45	5.96
		0.010203	Chan	3946.43	3975	192.87	35.69	28.57	0.25	1.25	5.4
		0.010203	ROB	3975	5125	5.67	1.98	3.63	0.01	0.57	2.86
-4	6889.52	0.007742	Chan	3832.14	3860.71	517.97	69.68	28.57	0.66	2.44	7.43
		0.007742	Chan	3860.71	3889.29	450.2	64.06	28.57	0.58	2.24	7.03
		0.007742	Chan	3889.29	3917.86	386.21	58.43	28.57	0.5	2.04	6.61
		0.007742	Chan	3917.86	3946.43	326.19	52.8	28.57	0.42	1.85	6.18
		0.007742	Chan	3946.43	3975	269.8	47.11	28.57	0.35	1.65	5.73
		0.007742	ROB	3975	5025	10.95	3.6	4.9	0.01	0.77	0

		D_{50} ROCK SIZE CALCULATION w/ SLOPE CORRECTION FACTORS (inches)					D50 ROCK SIZE FOR BERM ABOVE GRADE SLOPES		D50 ROCK SIZE FOR BERM APRONS or BURIED SLOPES	
River Section	Channel X-Section Position	Abt and Johnson Method (inches)	Add Riprap Oversize 4%	2H:1V Apron Slope: Abt and Johnson D_{50} / Slope Factor (0.72)	3H:1V Slope: Abt and Johnson D_{50} / Slope Factor (0.88)	4H:1V Slope: Abt and Johnson D_{50} / Slope Factor (1.00)	Minimum Required D_{50} to Use	Proposed D_{50} to Use for Slope	Minimum Required D_{50} to Use	Proposed D_{50} to Use for Apron/ Buried Slope
1	25	26	27	28	29	30	31	32	33	34
21	LOB									
	L. Channel									
	Main Channel									
	R. Channel									
	ROB	1.45	1.51	2.10	1.72	1.51				
20	LOB									
	L. Channel									
	Main Channel									
	R. Channel									
	ROB	1.93	2.01	2.79	2.28	2.01				
19	LOB									
	L. Channel									
	Main Channel									
	R. Chan. Apron	2.25	2.34	3.24	2.65	2.34	3.2	3.24	3.24	3.24
	R. Bank Slope	0.40	0.42	0.58	0.47	0.42				
18	R. Chan. C5	2.26	2.35	3.27	2.68	2.35				
	R. Chan. C4	2.25	2.34	3.24	2.65	2.34				
	R. Chan. C3	2.11	2.20	3.05	2.50	2.20			3.20	12.97
	R. Chan. C2 (Apron)	1.89	1.97	2.74	2.24	1.97				
	R. Chan. C1 (Apron)	1.88	1.95	2.71	2.22	1.95	3.2	7.95		
	R. Bank Slope	0.97	1.01	1.40	1.15	1.01				
17	R. Chan. C5	2.65	2.76	3.83	3.14	2.76				
	R. Chan. C4	2.63	2.74	3.80	3.11	2.74				
	R. Chan. C3	2.48	2.58	3.58	2.93	2.58			7.80	12.97
	R. Chan. C2 (Apron)	2.22	2.31	3.21	2.63	2.31				
	R. Chan. C1 (Apron)	2.21	2.29	3.19	2.61	2.29	3.2	7.95		
	R. Bank Slope	0.91	0.94	1.31	1.07	0.94				
16	R. Chan. C5	4.64	4.83	6.70	5.48	4.83				
	R. Chan. C4	4.61	4.79	6.65	5.44	4.79				
	R. Chan. C3	4.05	4.21	5.85	4.79	4.21			7.80	12.97
	R. Chan. C2 (Apron)	3.89	4.04	5.62	4.59	4.04				
	R. Chan. C1 (Apron)	3.86	4.01	5.57	4.56	4.01	7.8	7.95		
	R. Bank Slope	1.56	1.62	2.25	1.84	1.62				
15	R. Chan. C5	3.95	4.10	5.70	4.66	4.10				
	R. Chan. C4	3.92	4.07	5.66	4.63	4.07				
	R. Chan. C3	3.69	3.83	5.32	4.36	3.83			7.80	12.97
	R. Chan. C2 (Apron)	3.31	3.44	4.78	3.91	3.44				
	R. Chan. C1 (Apron)	3.28	3.41	4.74	3.88	3.41	7.8	7.95		
	R. Bank Slope	1.37	1.43	1.99	1.62	1.43				

		D_{50} ROCK SIZE CALCULATION w/ SLOPE CORRECTION FACTORS (inches)					D50 ROCK SIZE FOR BERM ABOVE GRADE SLOPES		D50 ROCK SIZE FOR BERM APRONS or BURIED SLOPES	
River Section	Channel X-Section Position	Abt and Johnson Method (inches)	Add Riprap Oversize 4%	2H:1V Apron Slope: Abt and Johnson D_{50} / Slope Factor (0.72)	3H:1V Slope: Abt and Johnson D_{50} / Slope Factor (0.88)	4H:1V Slope: Abt and Johnson D_{50} / Slope Factor (1.00)	Minimum Required D_{50} to Use	Proposed D_{50} to Use for Slope	Minimum Required D_{50} to Use	Proposed D_{50} to Use for Apron/ Buried Slope
1	25	26	27	28	29	30	31	32	33	34
14	R. Chan. C5	7.16	7.45	10.35	8.47	7.45				
	R. Chan. C4	7.10	7.39	10.26	8.39	7.39				
	R. Chan. C3	5.72	5.95	8.26	6.76	5.95			12.00	12.97
	R. Chan. C2 (Apron)	5.58	5.80	8.06	6.59	5.80				
	R. Chan. C1 (Apron)	5.52	5.75	7.98	6.53	5.75	7.8	7.95		
	R. Bank Slope	3.07	3.19	4.43	3.63	3.19				
13	R. Chan. C5	6.46	6.72	9.33	7.64	6.72				
	R. Chan. C4	6.41	6.66	9.25	7.57	6.66				
	R. Chan. C3	5.42	5.64	7.83	6.41	5.64			9.20	12.97
	R. Chan. C2 (Apron)	5.32	5.53	7.68	6.28	5.53				
	R. Chan. C1 (Apron)	5.27	5.48	7.61	6.23	5.48	7.8	7.95		
	R. Bank Slope	2.77	2.88	4.00	3.27	2.88				
12	R. Chan. C5	8.94	9.30	12.92	10.57	9.30				
	R. Chan. C4	8.85	9.20	12.78	10.46	9.20				
	R. Chan. C3	7.49	7.79	10.82	8.85	7.79			12.00	12.97
	R. Chan. C2 (Apron)	7.01	7.29	10.12	8.28	7.29				
	R. Chan. C1 (Apron)	6.64	6.90	9.59	7.84	6.90	7.84	7.95		
	R. Bank Slope	3.79	3.95	5.48	4.48	3.95				
11	R. Chan. C5	3.51	3.65	5.06	4.14	3.65				
	R. Chan. C4	3.47	3.61	5.01	4.10	3.61				
	R. Chan. C3	3.26	3.39	4.71	3.85	3.39			7.80	12.97
	R. Chan. C2 (Apron)	2.91	3.03	4.21	3.44	3.03				
	R. Chan. C1 (Apron)	2.88	3.00	4.17	3.41	3.00	7.8	7.95		
	R. Bank Slope	1.49	1.55	2.16	1.76	1.55				
10	R. Chan. C5	2.69	2.80	3.89	3.18	2.80				
	R. Chan. C4	2.67	2.77	3.85	3.15	2.77				
	R. Chan. C3	2.50	2.60	3.62	2.96	2.60			7.80	12.97
	R. Chan. C2 (Apron)	2.24	2.33	3.24	2.65	2.33				
	R. Chan. C1 (Apron)	2.22	2.31	3.20	2.62	2.31	3.2	7.95		
	R. Bank Slope	1.15	1.19	1.66	1.36	1.19				
9	R. Chan. C5	8.51	8.85	12.29	10.05	8.85				
	R. Chan. C4	8.41	8.75	12.15	9.94	8.75				
	R. Chan. C3	7.31	7.61	10.56	8.64	7.61			12.00	12.97
	R. Chan. C2 (Apron)	6.97	7.25	10.07	8.24	7.25				
	R. Chan. C1 (Apron)	6.61	6.88	9.55	7.82	6.88	7.82	7.95		
	R. Bank Slope	3.60	3.75	5.20	4.26	3.75				
8	R. Chan. C5	6.45	6.71	9.31	7.62	6.71				
	R. Chan. C4	6.37	6.62	9.20	7.53	6.62				
	R. Chan. C3	5.97	6.21	8.62	7.05	6.21			9.20	12.97
	R. Chan. C2 (Apron)	5.33	5.54	7.69	6.30	5.54				
	R. Chan. C1 (Apron)	5.26	5.47	7.60	6.22	5.47	7.8	7.95		
	R. Bank Slope	2.72	2.83	3.93	3.22	2.83				

		D_{50} ROCK SIZE CALCULATION w/ SLOPE CORRECTION FACTORS (inches)					D50 ROCK SIZE FOR BERM ABOVE GRADE SLOPES		D50 ROCK SIZE FOR BERM APRONS or BURIED SLOPES	
River Section	Channel X-Section Position	Abt and Johnson Method (inches)	Add Riprap Oversize 4%	2H:1V Apron Slope: Abt and Johnson D_{50} / Slope Factor (0.72)	3H:1V Slope: Abt and Johnson D_{50} / Slope Factor (0.88)	4H:1V Slope: Abt and Johnson D_{50} / Slope Factor (1.00)	Minimum Required D_{50} to Use	Proposed D_{50} to Use for Slope	Minimum Required D_{50} to Use	Proposed D_{50} to Use for Apron/ Buried Slope
1	25	26	27	28	29	30	31	32	33	34
7	R. Chan. C5	7.13	7.42	10.30	8.43	7.42				
	R. Chan. C4	7.05	7.33	10.18	8.33	7.33				
	R. Chan. C3	6.61	6.87	9.55	7.81	6.87			12.00	12.97
	R. Chan. C2 (Apron)	5.90	6.14	8.53	6.98	6.14				
	R. Chan. C1 (Apron)	5.83	6.07	8.43	6.90	6.07	7.8	7.95		
	R. Bank Slope	3.04	3.16	4.39	3.59	3.16				
6	R. Chan. C7	10.42	10.84	15.05	12.32	10.84			12.00	12.97
	R. Chan. C6 (Slope)	9.26	9.64	13.38	10.95	9.64				
	R. Chan. C5 (Slope)	9.16	9.53	13.23	10.83	9.53				
	R. Chan. C4 (Slope)	9.06	9.42	13.08	10.71	9.42				
	R. Chan. C3 (Slope)	8.95	9.31	12.93	10.58	9.31				
	R. Chan. C2 (Slope)	8.85	9.21	12.79	10.46	9.21				
	R. Chan. C1 (Slope)	8.75	9.10	12.64	10.34	9.10	9.2	12.97		
	R. Bank Slope	4.41	4.59	6.37	5.21	4.59				
5	R. Chan. C7	11.38	11.83	16.43	13.44	11.83			12.67	12.97
	R. Chan. C6 (Slope)	10.83	11.26	15.65	12.80	11.26				
	R. Chan. C5 (Slope)	10.71	11.14	15.47	12.65	11.14				
	R. Chan. C4 (Slope)	10.58	11.01	15.29	12.51	11.01				
	R. Chan. C3 (Slope)	10.46	10.88	15.11	12.36	10.88				
	R. Chan. C2 (Slope)	10.34	10.75	14.93	12.22	10.75				
	R. Chan. C1 (Slope)	10.21	10.62	14.75	12.07	10.62	12.0	12.97		
	R. Bank Slope	5.15	5.35	7.44	6.08	5.35				
4	R. Chan. C7	12.15	12.63	17.54	14.35	12.63			12.63	12.97
	R. Chan. C6 (Slope)	11.91	12.39	17.20	14.07	12.39				
	R. Chan. C5 (Slope)	11.77	12.24	17.00	13.91	12.24				
	R. Chan. C4 (Slope)	11.62	12.09	16.79	13.74	12.09				
	R. Chan. C3 (Slope)	11.48	11.94	16.58	13.57	11.94				
	R. Chan. C2 (Slope)	11.34	11.79	16.38	13.40	11.79				
	R. Chan. C1 (Slope)	11.19	11.64	16.17	13.23	11.64	12.0	12.97		
	R. Bank Slope	5.65	5.87	8.15	6.67	5.87				
3	R. Chan. C7	12.30	12.79	17.77	14.54	12.79			12.79	12.97
	R. Chan. C6 (Slope)	12.02	12.50	17.36	14.21	12.50				
	R. Chan. C5 (Slope)	11.88	12.35	17.16	14.04	12.35				
	R. Chan. C4 (Slope)	11.74	12.21	16.95	13.87	12.21				
	R. Chan. C3 (Slope)	11.60	12.06	16.75	13.70	12.06				
	R. Chan. C2 (Slope)	11.45	11.91	16.54	13.54	11.91				
	R. Chan. C1 (Slope)	11.31	11.76	16.34	13.37	11.76	12.0	12.97		
	R. Bank Slope	5.70	5.93	8.24	6.74	5.93				

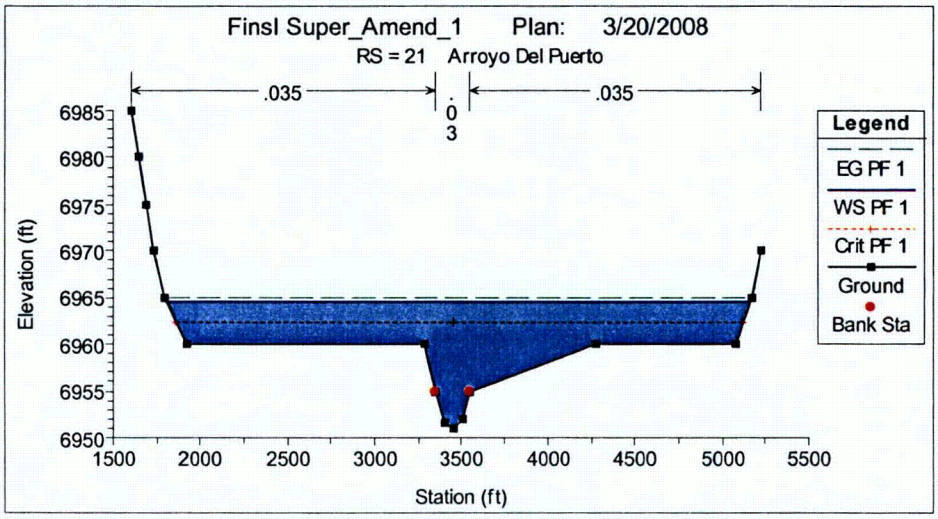
		D_{50} ROCK SIZE CALCULATION w/ SLOPE CORRECTION FACTORS (inches)					D50 ROCK SIZE FOR BERM ABOVE GRADE SLOPES		D50 ROCK SIZE FOR BERM APRONS or BURIED SLOPES	
River Section	Channel X-Section Position	Abt and Johnson Method (inches)	Add Riprap Oversize 4%	2H:1V Apron Slope: Abt and Johnson D_{50} / Slope Factor (0.72)	3H:1V Slope: Abt and Johnson D_{50} / Slope Factor (0.88)	4H:1V Slope: Abt and Johnson D_{50} / Slope Factor (1.00)	Minimum Required D_{50} to Use	Proposed D_{50} to Use for Slope	Minimum Required D_{50} to Use	Proposed D_{50} to Use for Apron/ Buried Slope
1	25	26	27	28	29	30	31	32	33	34
2'	R. Chan. C7	12.34	12.83	17.83	14.58	12.83			12.83	12.97
	R. Chan. C6 (Slope)	12.02	12.50	17.37	14.21	12.50				
	R. Chan. C5 (Slope)	11.89	12.36	17.17	14.05	12.36				
	R. Chan. C4 (Slope)	11.75	12.22	16.97	13.89	12.22				
	R. Chan. C3 (Slope)	11.61	12.08	16.77	13.72	12.08				
	R. Chan. C2 (Slope)	11.47	11.93	16.57	13.56	11.93				
	R. Chan. C1 (Slope)	11.34	11.79	16.38	13.40	11.79	12.0	12.97		
	R. Bank Slope	5.72	5.94	8.26	6.75	5.94				
1	R. Chan. C2	6.67	6.94	9.63	7.88	6.94			7.80	12.97
	R. Chan. C1 (Slope)	5.03	5.23	7.26	5.94	5.23	7.8	12.97		
	R. Bank Slope	4.85	5.04	7.00	5.73	5.04				
0	R. Chan. C2	6.32	6.57	9.13	7.47	6.57			7.80	12.97
	R. Chan. C1 (Slope)	4.89	5.09	7.07	5.78	5.09	7.8	12.97		
	R. Bank Slope	2.32	2.42	3.36	2.75	2.42				
-1	R. Chan. C5									
	R. Chan. C4									
	R. Chan. C3									
	R. Chan. C2									
	R. Chan. C1									
	R. Bank Slope									
-2	R. Chan. C5									
	R. Chan. C4									
	R. Chan. C3									
	R. Chan. C2									
	R. Chan. C1									
	R. Bank Slope									
-3	R. Chan. C5									
	R. Chan. C4									
	R. Chan. C3									
	R. Chan. C2									
	R. Chan. C1									
	R. Bank Slope									
-4	R. Chan. C5									
	R. Chan. C4									
	R. Chan. C3									
	R. Chan. C2									
	R. Chan. C1									
	R. Bank Slope									

	USACE EQUILBRIUM SCOUR DEPTH								
River Section	he = Equilibrium Scour Depth (ft)	qe = equilibrium discharge (cfs/ft)	g (ft/sec^2)	Ss = Sediment Specific Gravity	de = median grain-size diameter (mm)	$0.234*qe^{6/9}$	g(Ss-1)	$[g(Ss-1)]^{4/9}$	$de^{1/3}$
1	49	50	51	52	53	54	55	56	57
21									
20									
19									
	3.45	56.7	32.2	2.65	0.074	8.472	53.130	5.845	0.420
18									
	4.65	79.3	32.2	2.65	0.074	11.420	53.130	5.845	0.420
17									
	5.45	94.8	32.2	2.65	0.074	13.382	53.130	5.845	0.420
16									
	6.87	122.9	32.2	2.65	0.074	16.849	53.130	5.845	0.420
15									
	7.00	125.7	32.2	2.65	0.074	17.188	53.130	5.845	0.420

	USACE EQUILBRIUM SCOUR DEPTH								
River Section	he = Equilibrium Scour Depth (ft)	qe = equilibrium discharge (cfs/ft)	g (ft/sec^2)	Ss = Sediment Specific Gravity	de = median grain-size diameter (mm)	$0.234*qe^{8/9}$	g(Ss-1)	$[g(Ss-1)]^{4/9}$	$de^{1/3}$
1	49	50	51	52	53	54	55	56	57
14									
	6.95	124.5	32.2	2.65	0.074	17.046	53.130	5.845	0.420
13									
	6.98	125.1	32.2	2.65	0.074	17.120	53.130	5.845	0.420
12									
	6.96	124.9	32.2	2.65	0.074	17.089	53.130	5.845	0.420
11									
	4.92	84.5	32.2	2.65	0.074	12.071	53.130	5.845	0.420
10									
	4.25	71.7	32.2	2.65	0.074	10.441	53.130	5.845	0.420
9									
	6.87	123.0	32.2	2.65	0.074	16.858	53.130	5.845	0.420
8									
	6.05	106.5	32.2	2.65	0.074	14.839	53.130	5.845	0.420

	USACE EQUILBRIUM SCOUR DEPTH								
River Section	he = Equilibrium Scour Depth (ft)	qe = equilibrium discharge (cfs/ft)	g (ft/sec^2)	Ss = Sediment Specific Gravity	de = median grain-size diameter (mm)	$0.234*qe^{6/9}$	g(Ss-1)	$[g(Ss-1)]^{4/9}$	$de^{1/3}$
1	49	50	51	52	53	54	55	56	57
	6.75	120.6	32.2	2.65	0.074	16.569	53.130	5.845	0.420
6	9.46	176.3	32.2	2.65	0.074	23.219	53.130	5.845	0.420
5	9.18	170.4	32.2	2.65	0.074	22.533	53.130	5.845	0.420
4	8.88	164.1	32.2	2.65	0.074	21.790	53.130	5.845	0.420
3	9.10	168.8	32.2	2.65	0.074	22.342	53.130	5.845	0.420

	USACE EQUILBRIUM SCOUR DEPTH								
River Section	he = Equilibrium Scour Depth (ft)	qe = equilibrium discharge (cfs/ft)	g (ft/sec^2)	Ss = Sediment Specific Gravity	de = median grain-size diameter (mm)	$0.234*qe^{6/9}$	g(Ss-1)	$[g(Ss-1)]^{4/9}$	$de^{1/3}$
1	49	50	51	52	53	54	55	56	57
2	9.45	176.0	32.2	2.65	0.074	23.182	53.130	5.845	0.420
1	1.28	18.5	32.2	2.65	0.074	3.130	53.130	5.845	0.420
0	1.67	25.0	32.2	2.65	0.074	4.087	53.130	5.845	0.420
-1									
-2									
-3									
-4									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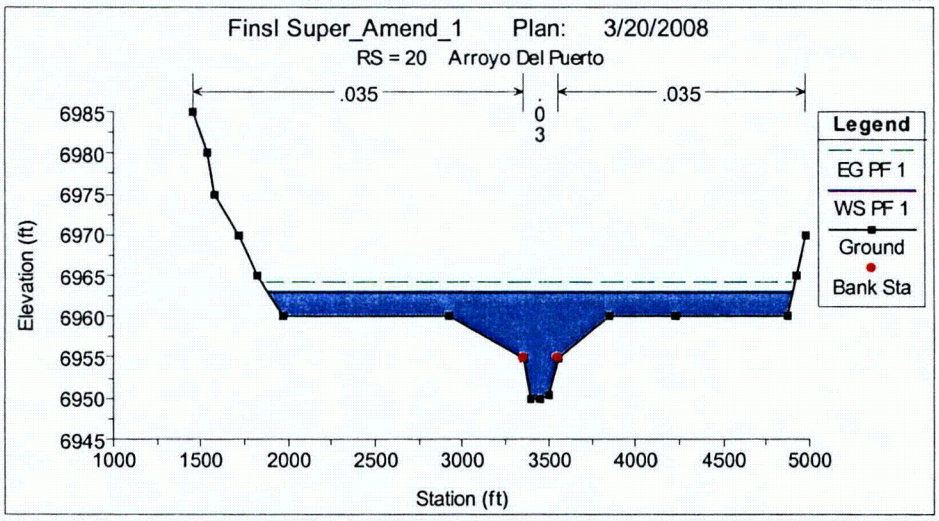
Station (ft)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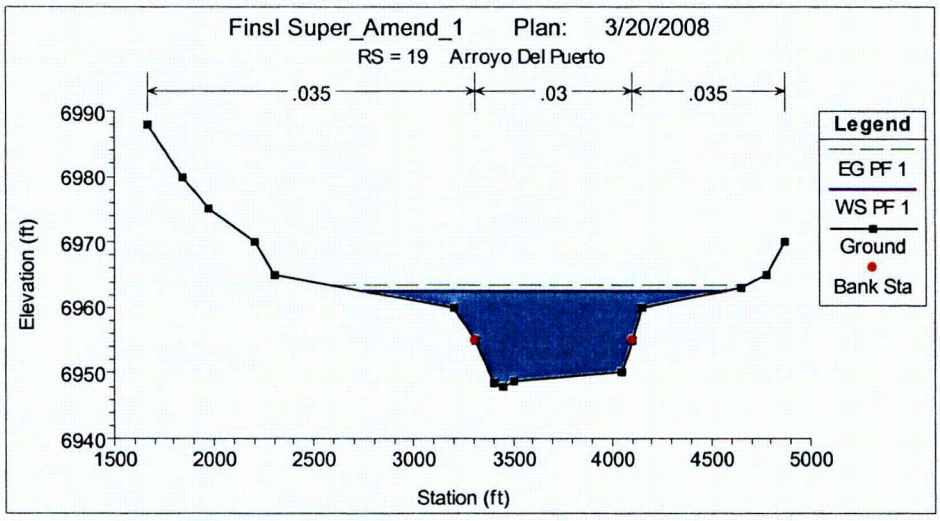
Station (ft)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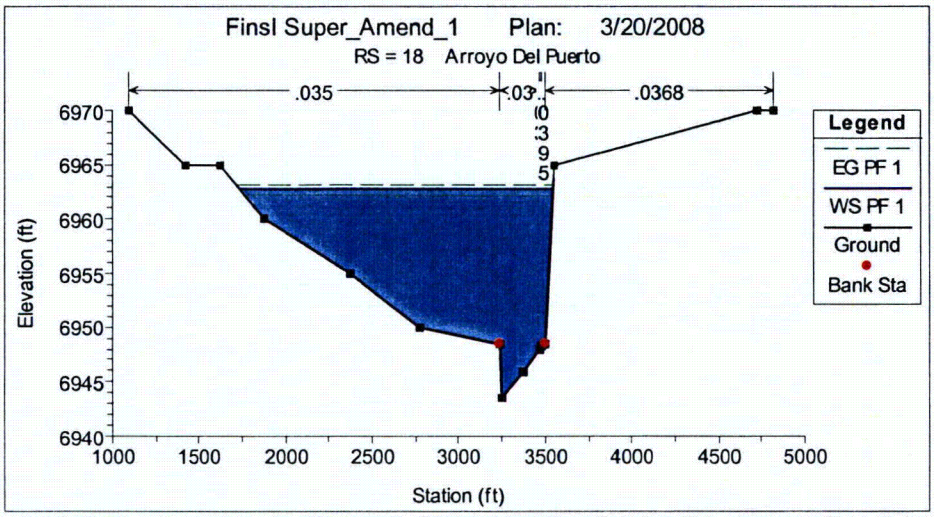
Station (ft)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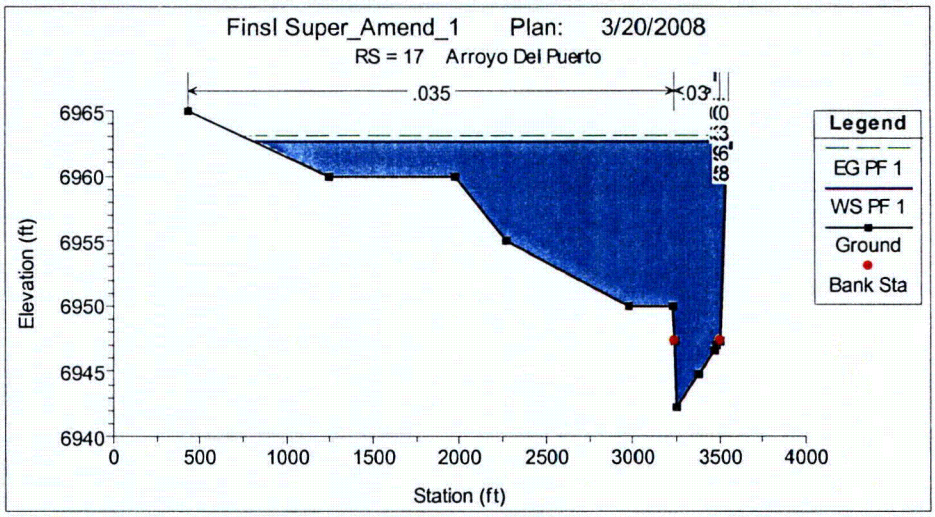
Station (ft)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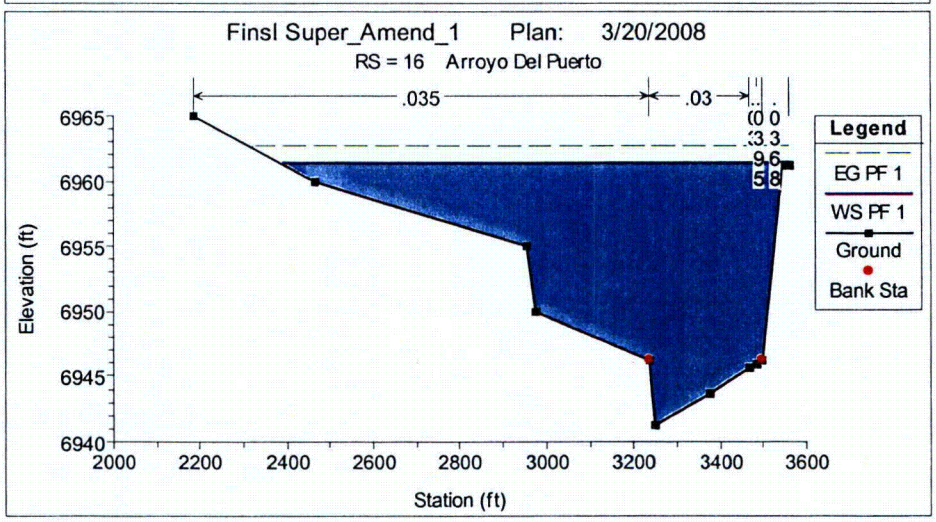
Bank Sta
Elevation (ft)
Station (ft)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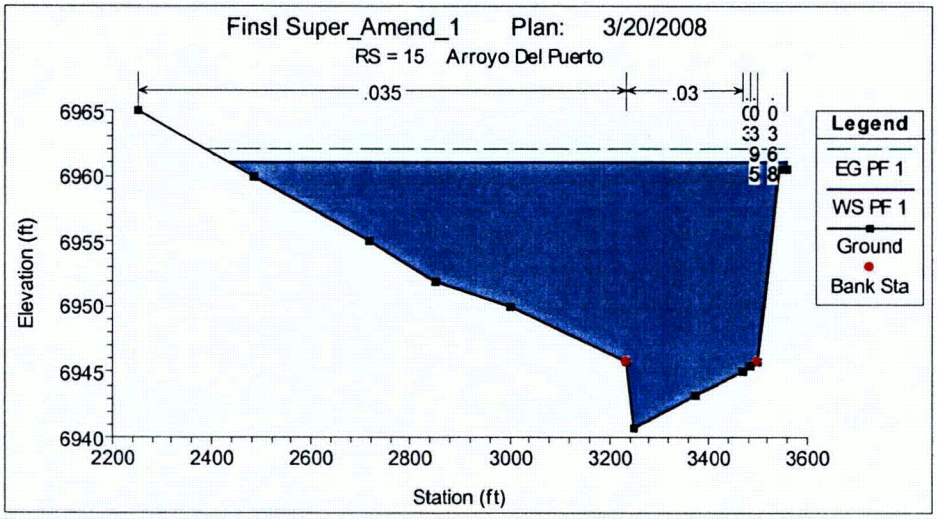
Bank Sta
Elevation (ft)
Station (ft)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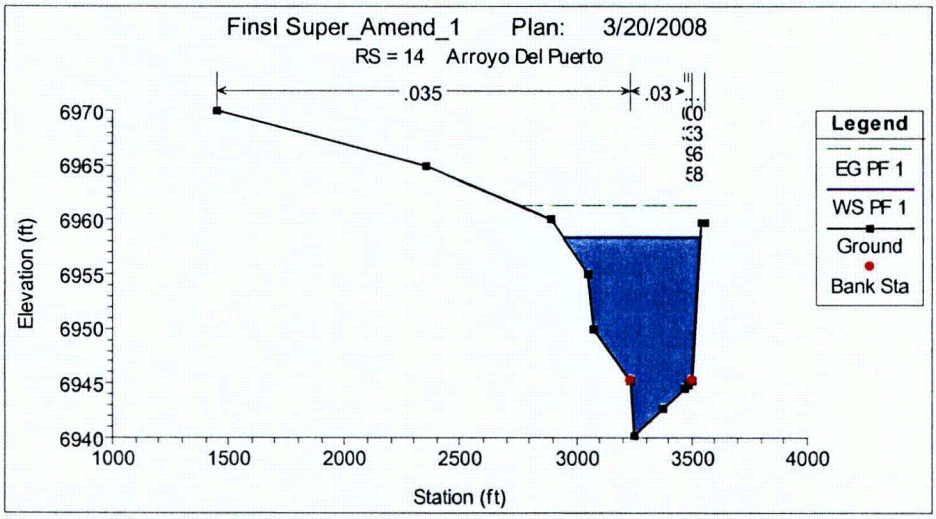
Station (ft)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Bank Sta
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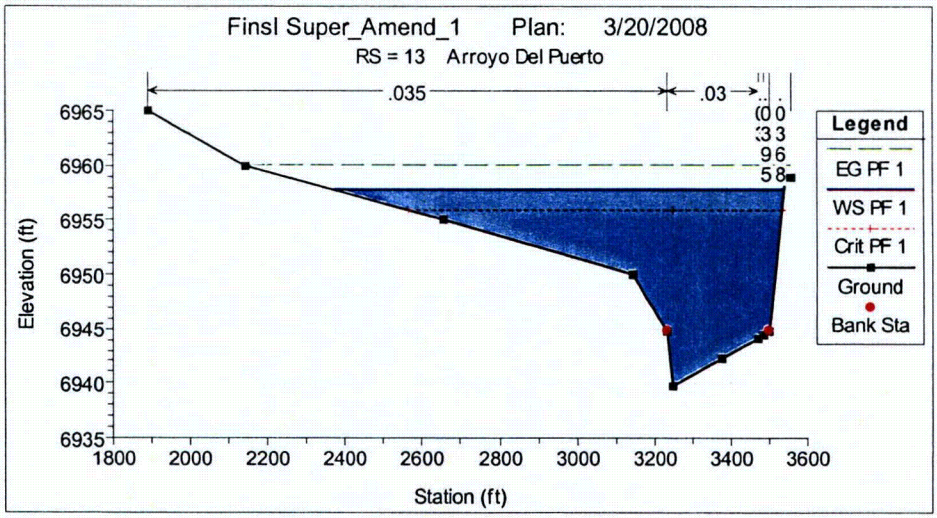
4000
Station (ft)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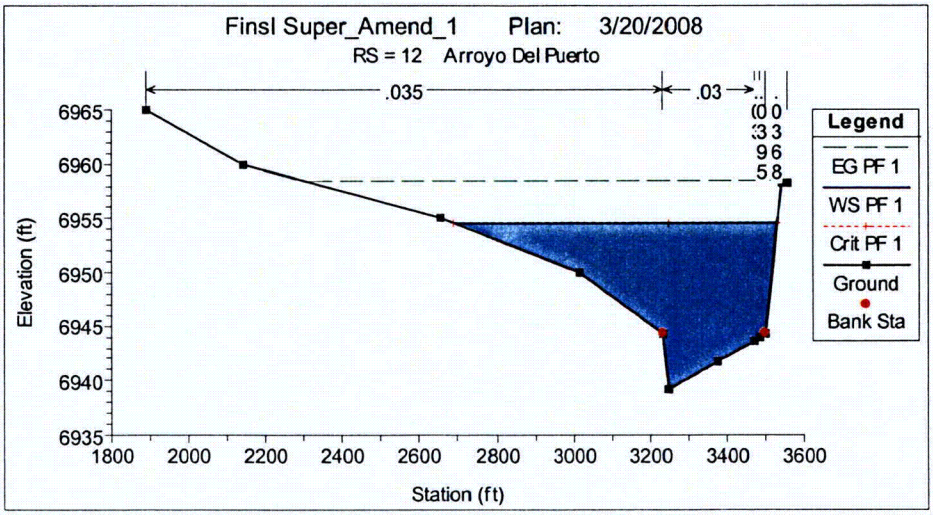
Station (ft)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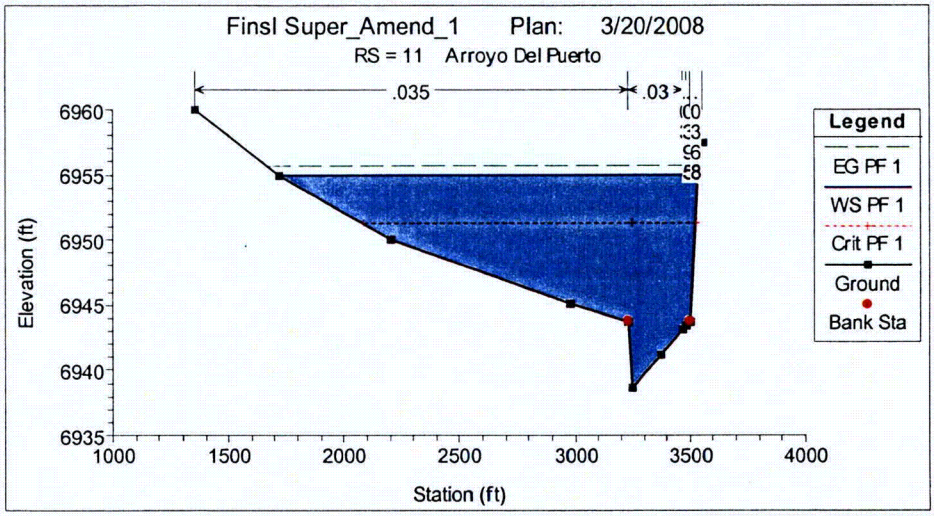
Station (ft)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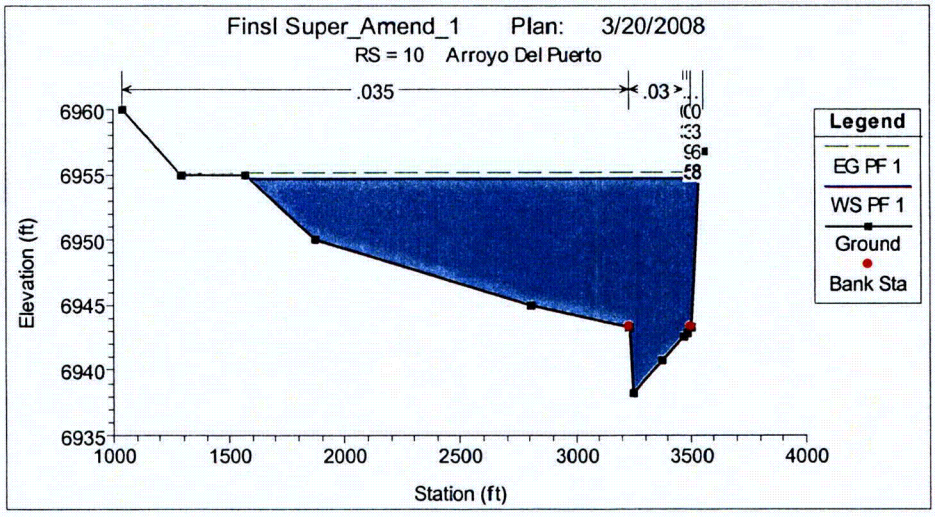
Station (ft)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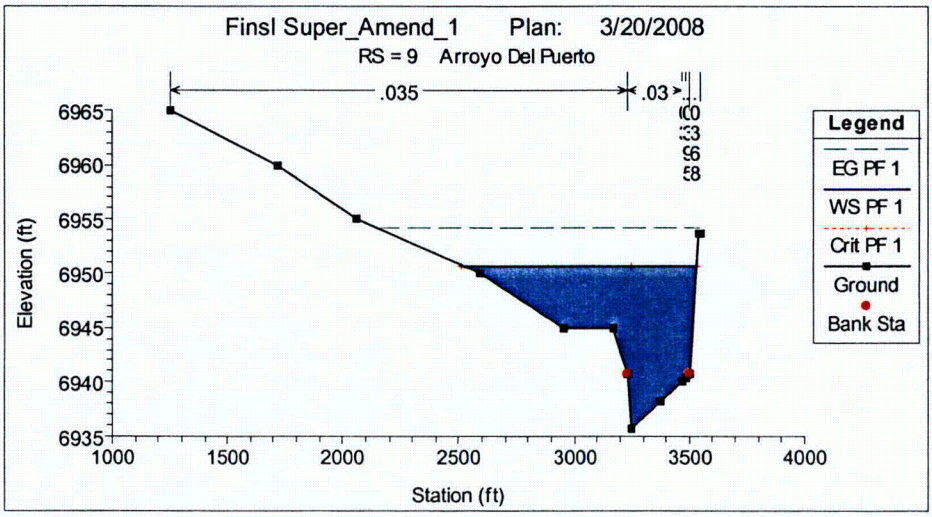
Station (ft)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Crit PF 1
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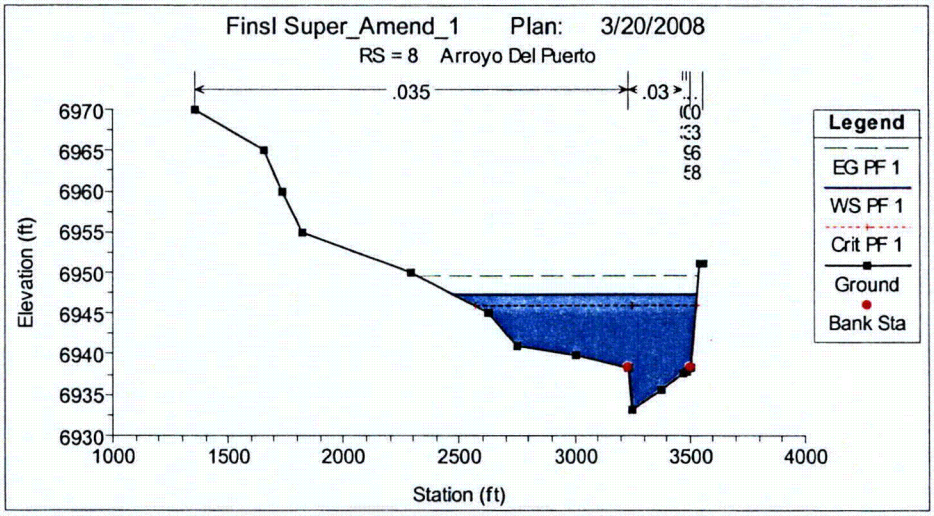
Bank Sta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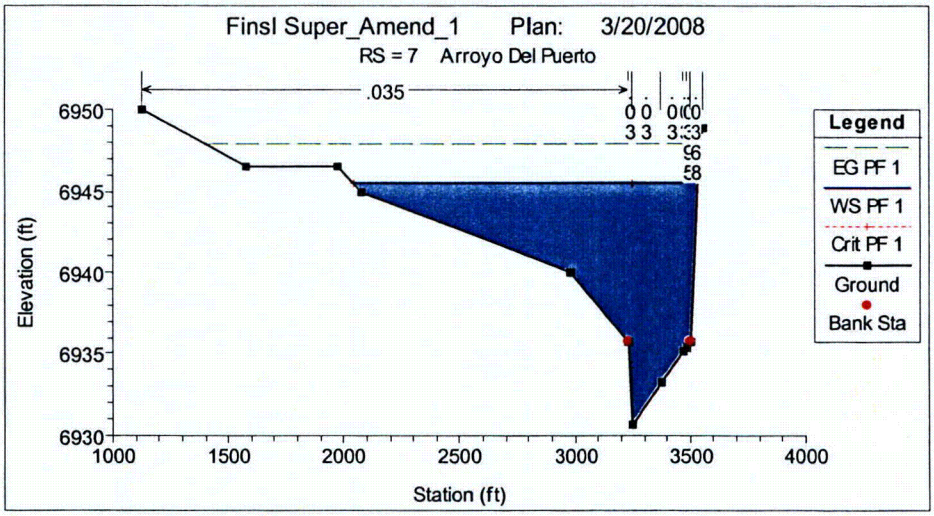
3500
4000
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta


Finsl Super_Amend_1 Plan: 3/20/2008
RS = 7 Arroyo Del Puerto
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Elevation (ft)
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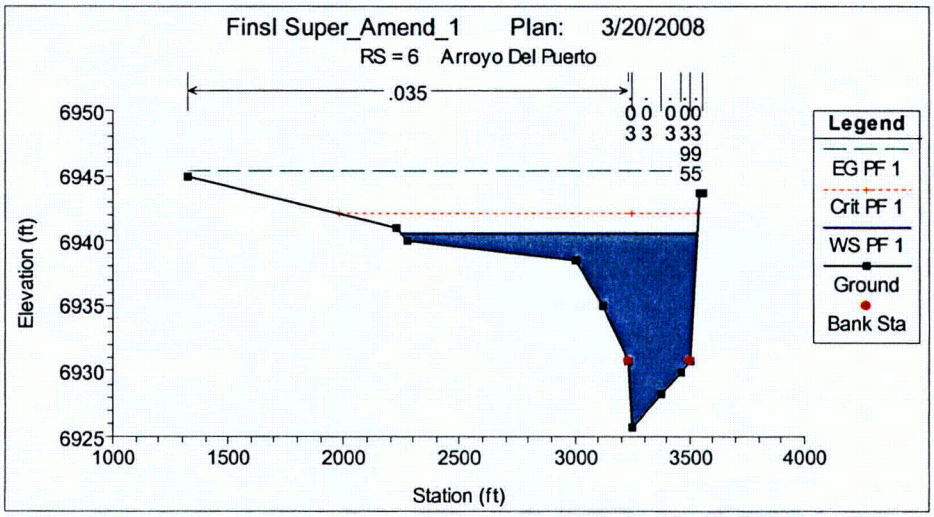
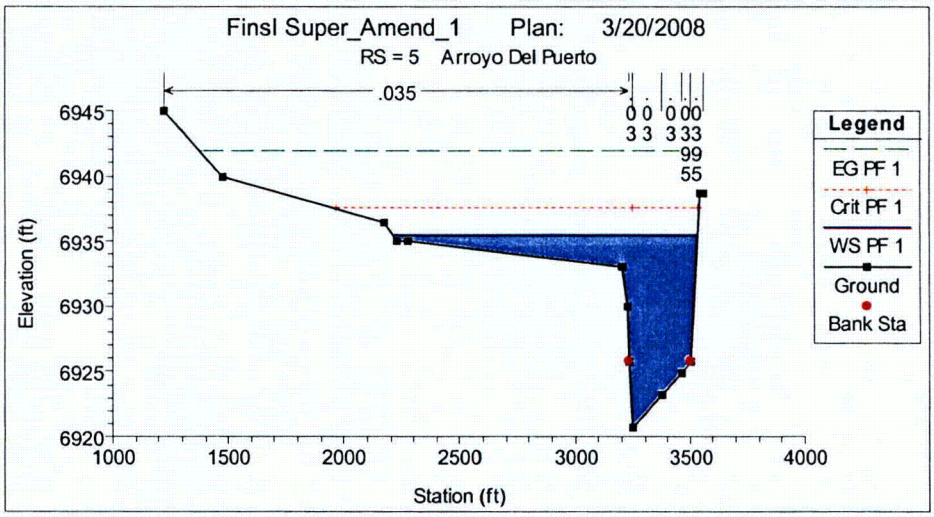
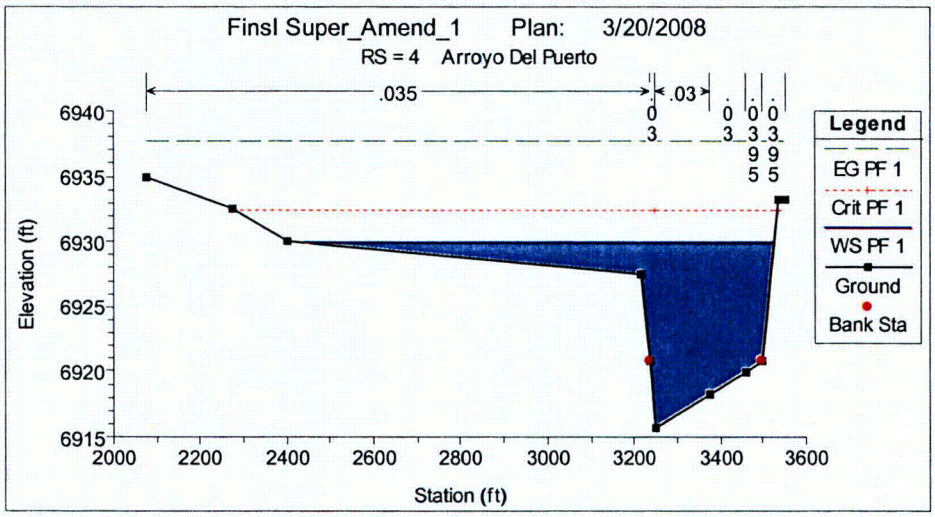
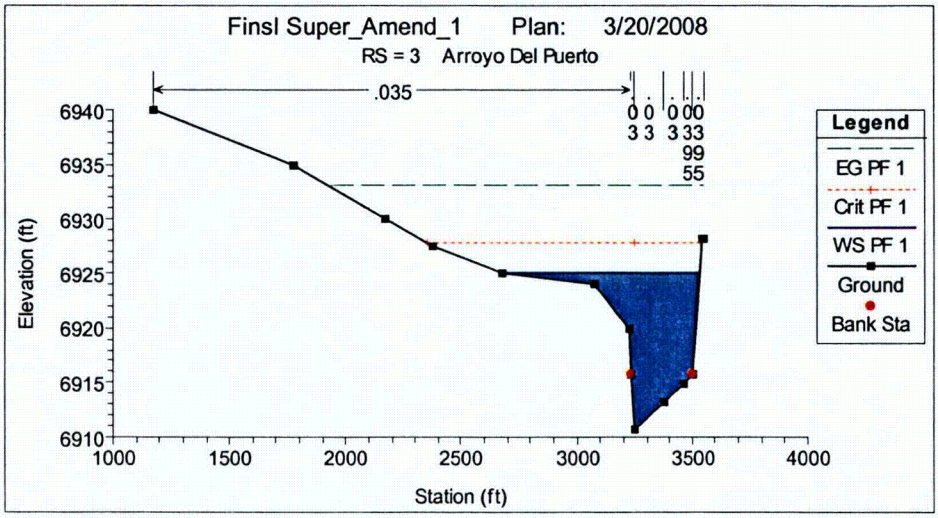
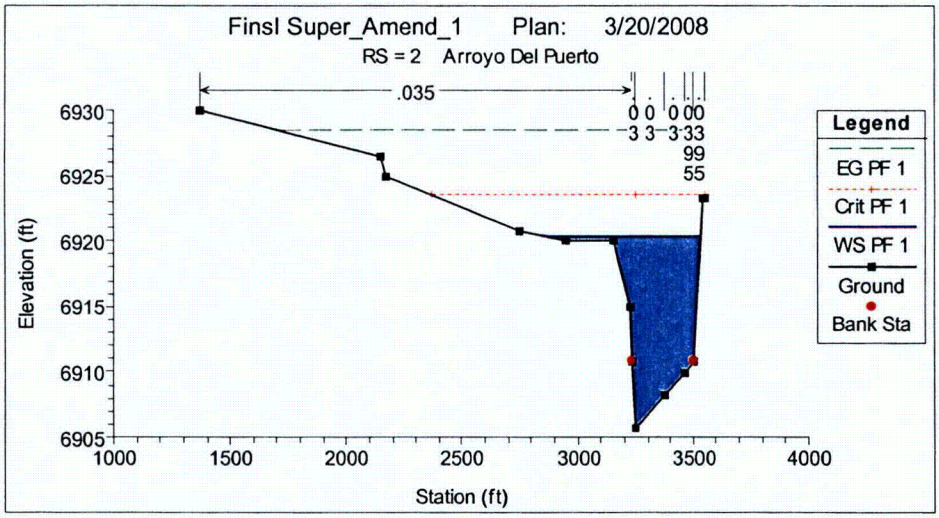
6940
6935
6930
1000
1500
2000
2500
3000
3500
4000
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta

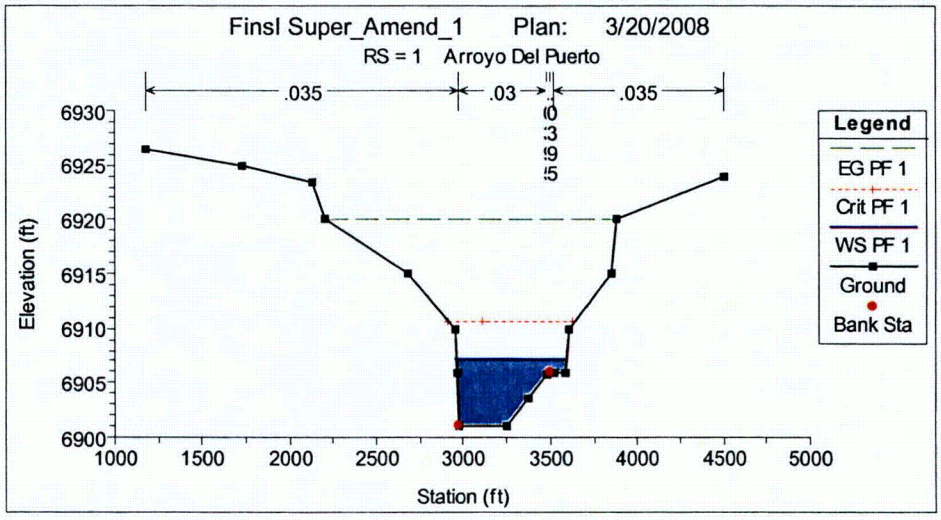

Finsl Super_Amend_1 Plan: 3/20/2008
RS = 6 Arroyo Del Puerto
.035
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

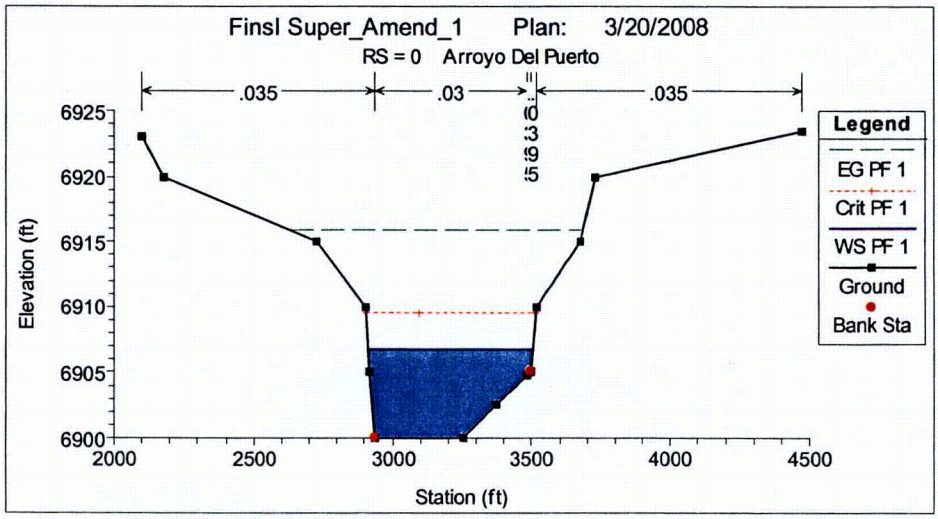

Finsl Super_Amend_1 Plan: 3/20/2008
RS = 5 Arroyo Del Puerto
.035
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

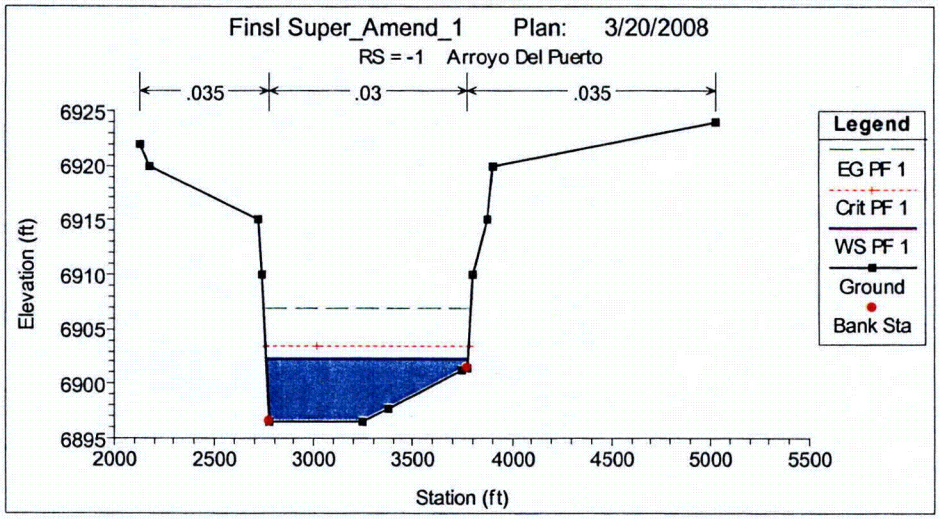

Finsl Super_Amend_1 Plan: 3/20/2008
RS = 4 Arroyo Del Puerto
.035
.03
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

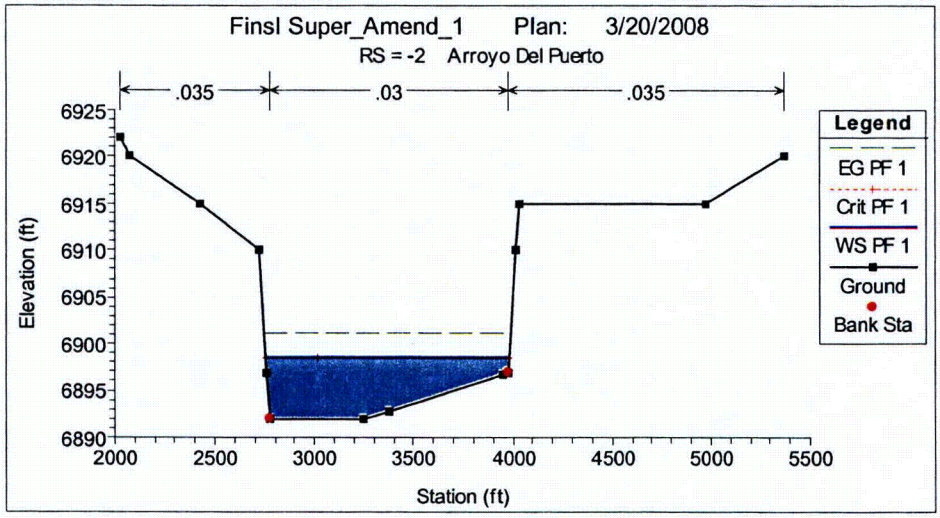

Finsl Super_Amend_1 Plan: 3/20/2008
RS = 3 Arroyo Del Puerto
.035
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

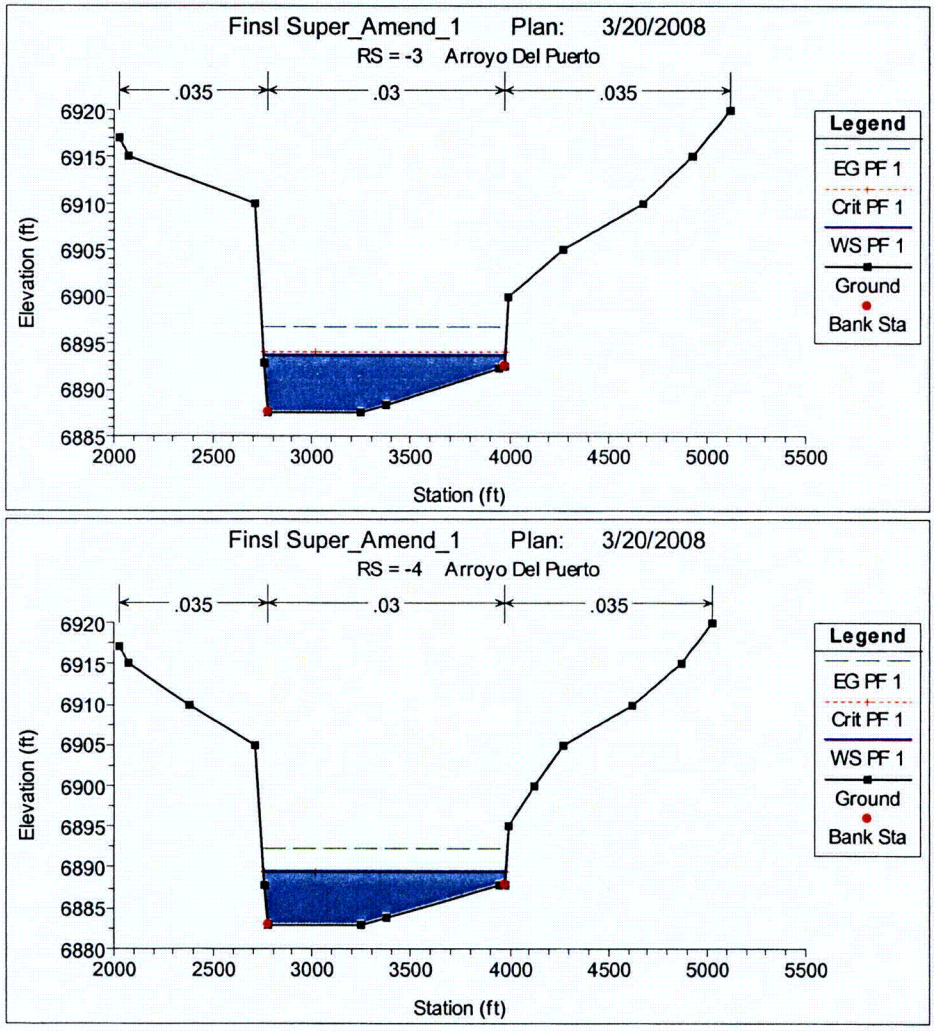

Finsl Super_Amend_1 Plan: 3/20/2008
RS = 2 Arroyo Del Puerto
.035
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

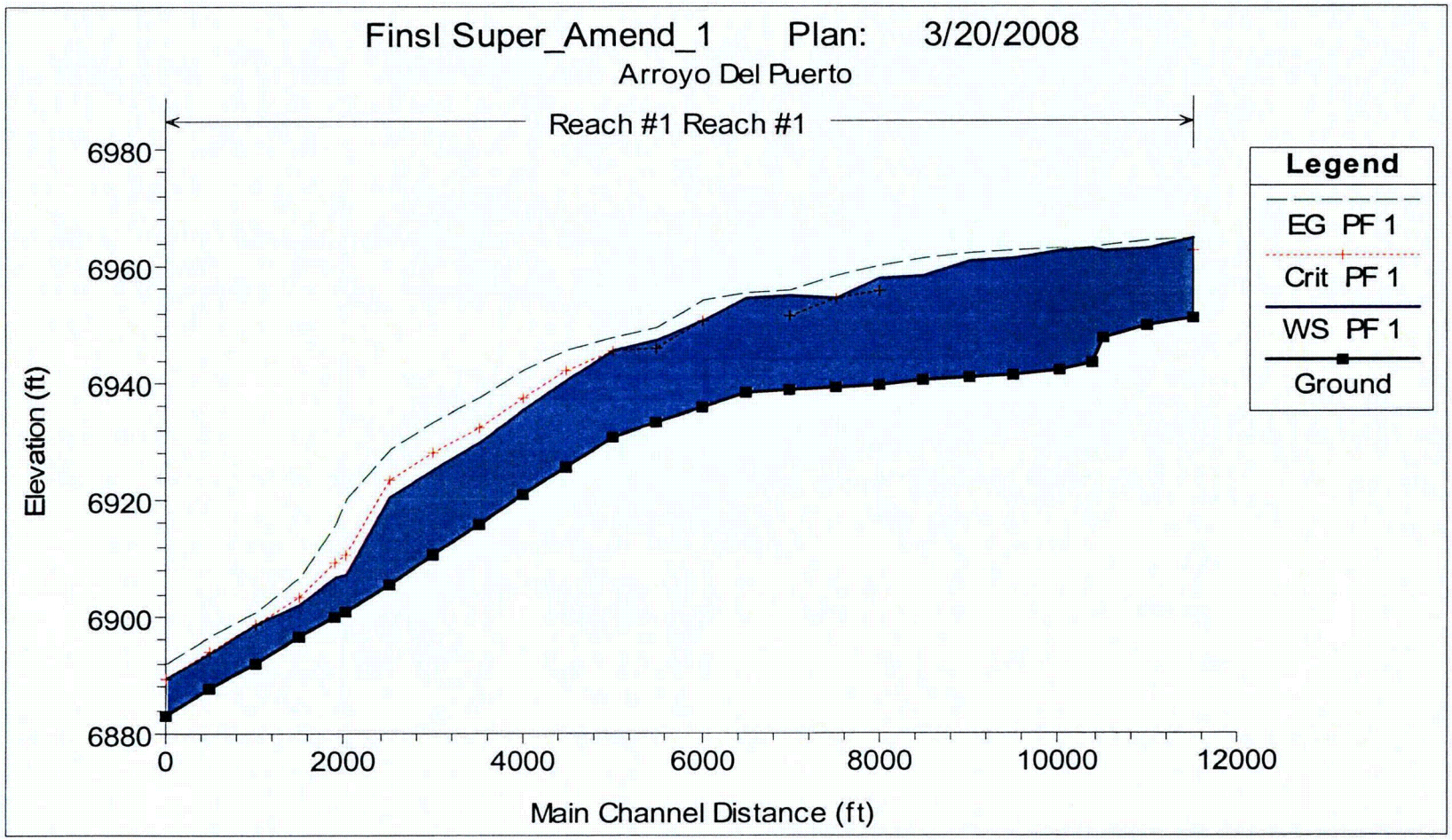

Finsl Super_Amend_1 Plan: 3/20/2008
RS = 1 Arroyo Del Puerto
.035
.03
.035
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Finsl Super_Amend_1 Plan: 3/20/2008
RS = 0 Arroyo Del Puerto
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


Finsl Super_Amend_1 Plan: 3/20/2008
RS = -1 Arroyo Del Puerto
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


Finsl Super_Amend_1 Plan: 3/20/2008
RS = -2 Arroyo Del Puerto
.035
.03
.035
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


Finsl Super_Amend_1 Plan: 3/20/2008
RS = -3 Arroyo Del Puerto
.035
.03
.035
Elevation (ft)
6920
6915
6910
6905
6900
6895
6890
6885
2000
2500
3000
3500
4000
4500
5000
5500
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
Finsl Super_Amend_1 Plan: 3/20/2008
RS = -4 Arroyo Del Puerto
.035
.03
.035
Elevation (ft)
6920
6915
6910
6905
6900
6895
6890
6885
6880
2000
2500
3000
3500
4000
4500
5000
5500
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta


Finsl Super_Amend_1 Plan: 3/20/2008
Arroyo Del Puerto
Reach #1 Reach #1
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Elevation (ft)
6980
6960
6940
6920
6900
6880
0
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)

	Downstream Reach Lengths				Other Embankment / Channel Data											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Section #	Left Channel	Main Channel	Main Channel Intermediate Reaches	Right Channel	Approximate Existing Base Elevation at Base of Berm (Right Channel Bottom)	Height Difference (Existing Elev - Proposed Elev)	Proposed Slope from previous Starting Station	Starting Station	End Station for Given Slope	Proposed Elevation at Base of Berm (Right Channel Bottom) at Beginning Station	Proposed Elevation at Center of Channel	Proposed Sloped Channel Bottom Width	Proposed Base of Berm (Right Channel Bottom) Elevation	Proposed Top of Berm Elevation	Relative Berm Height from Base of Right Channel Bottom	Proposed Berm Fill Height
		119														
21	540	500	250	460	6951.0	-1.0	0.0032	9500	9250	6952.000	6951.00	100	6952.00			
			250				0.0032	9250	9000	6951.20	6950.20	100				
20	540	500	250	460	6950.0	-0.4	0.0032	9000	8750	6950.40	6949.40	100	6950.40			
			250				0.0032	8750	8500	6949.60	6948.60	100				
19	134	119	59.5	104	6949.1	0.3	0.0032	8500	8441	6948.80	6947.80	100	6948.80			
			59.5				0.0032	8441	8381	6948.61	6947.61	100				
18	381	381	190.5	381	6948.5	0.0	0.0032	8381	8191	6948.48	6945.98	250	6948.48	6965.00	16.52	16.50
			190.5				0.0032	8191	8000	6947.87	6945.37	250				
17	500	500	250	500	6947.80	0.5	0.0032	8000	7750	6947.27	6944.77	250	6947.27	6962.27	15.00	14.46
			250				0.0032	7750	7500	6946.47	6943.97	250				
16	500	500	250	500	6947.0	0.8	0.0010	7500	7250	6946.22	6943.72	250	6946.22	6961.22	15.00	14.21
			250				0.0010	7250	7000	6945.97	6943.47	250				
15	500	500	250	500	6947.5	1.8	0.0010	7000	6750	6945.72	6943.22	250	6945.72	6960.47	14.75	12.96
			250				0.0010	6750	6500	6945.47	6942.97	250				
14	500	500	250	500	6949.0	3.8	0.0010	6500	6250	6945.22	6942.72	250	6945.22	6959.72	14.50	10.71
			250				0.0010	6250	6000	6944.97	6942.47	250				
13	513	500	250	487	6946.5	1.8	0.0010	6000	5750	6944.72	6942.22	250	6944.72	6958.97	14.25	12.46
			250				0.0010	5750	5500	6944.47	6941.97	250				
12	500	500	250	500	6946.5	2.3	0.0010	5500	5250	6944.22	6941.72	250	6944.22	6958.22	14.00	11.71
			250				0.0010	5250	5000	6943.97	6941.47	250				
11	500	500	250	500	6945.0	1.3	0.0010	5000	4750	6943.72	6941.22	250	6943.72	6957.47	13.75	12.46
			250				0.0010	4750	4500	6943.47	6940.97	250				
10	500	500	250	500	6944.0	0.8	0.0010	4500	4250	6943.22	6940.72	250	6943.22	6956.72	13.50	12.71
			250				0.0050	4250	4000	6941.97	6939.47	250				
9	525	500	250	475	6942.5	1.8	0.0050	4000	3750	6940.72	6938.22	250	6940.72	6953.72	13.00	11.21

	Downstream Reach Lengths				Other Embankment / Channel Data											
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Section #	Left Channel	Main Channel	Main Channel Intermediate Reaches	Right Channel	Approximate Existing Base Elevation at Base of Berm (Right Channel Bottom)	Height Difference (Existing Elev - Proposed Elev)	Proposed Slope from previous Starting Station	Starting Station	End Station for Given Slope	Proposed Elevation at Base of Berm (Right Channel Bottom) at Beginning Station	Proposed Elevation at Center of Channel	Proposed Sloped Channel Bottom Width	Proposed Base of Berm (Right Channel Bottom) Elevation	Proposed Top of Berm Elevation	Relative Berm Height from Base of Right Channel Bottom	Proposed Berm Fill Height
			250				0.0050	3750	3500	6939.47	6936.97	250				
8	525	500	250	475	6938.0	-0.2	0.0050	3500	3250	6938.22	6935.72	250	6938.22	6951.22	13.00	13.21
			250				0.0050	3250	3000	6936.97	6934.47	250				
7	500	500	250	500	6933.3	-2.4	0.0050	3000	2750	6935.72	6933.22	250	6935.72	6948.72	13.00	15.41
			250				0.0100	2750	2500	6933.22	6930.72	250				
6	500	500	250	500	6930.0	-0.7	0.0100	2500	2250	6930.72	6928.22	250	6930.72	6943.72	13.00	13.71
			250				0.0100	2250	2000	6928.22	6925.72	250				
5	500	500	250	500	6927.0	1.3	0.0100	2000	1750	6925.72	6923.22	250	6925.72	6938.72	13.00	11.71
			250				0.0100	1750	1500	6923.22	6920.72	250				
4	500	500	250	500	6923.0	2.3	0.0100	1500	1250	6920.72	6918.22	250	6920.72	6933.22	12.50	10.21
			250				0.0100	1250	1000	6918.22	6915.72	250				
3	500	500	250	500	6921.0	5.3	0.0100	1000	750	6915.72	6913.22	250	6915.72	6928.22	12.50	7.21
			250				0.0100	750	500	6913.22	6910.72	250				
2	500	500	250	500	6915.0	4.3	0.0100	500	250	6910.72	6908.22	250	6910.72	6923.22	12.50	8.21
			250				0.0100	250	0	6908.22	6905.72	250	6908.22	6918.22	10.00	
1	100	100	50	100	6905.0	-1.0	0.0090	0	-50	6905.97	6903.47	615	6905.97	6905.97	0.00	0.96
			50				0.0090	-50	-100	6905.52	6903.02	545				
0	400	400	200	400	6903.0	-2.1	0.0090	-100	-300	6905.07	6902.57	565	6905.07			
			200				0.0090	-300	-500	6903.27	6900.77	783				
-1	500	500	250	500	6900.0	-1.5	0.0090	-500	-750	6901.47	6898.97	1000	6901.47			
			250				0.0090	-750	-1000	6899.22	6896.72	1100				
-2	500	500	250	500	6897.5	0.5	0.0090	-1000	-1250	6896.97	6894.47	1200	6896.97			
			250				0.0090	-1250	-1500	6894.72	6892.22	1200				
-3	500	500	250	500	6895.0	2.5	0.0090	-1500	-1750	6892.47	6889.97	1200	6892.47			
			250				0.0090	-1750	-2000	6890.22	6887.72	1200				
-4	500	500	250	500	6892.5	4.5	0.0090	-2000	-2250	6887.97	6885.47	1200	6887.97			
	Total Length	11500	11250					11500								

	HEC-RAS CHANNEL CROSS-SECTION INPUT DATA																	
1	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Section #	left overbank-6		left overbank-5		left overbank-4		left overbank-3		left overbank-2		left overbank-1		left overbank-1		left bank		left bottom	
	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
21	1606.00	6985.00	1,649	6,980	1,691	6,975	1,734	6,970	1,800	6,965	1,925	6,960	3,285	6,960	3350	6955.00	3400	6951.50
20	1457.00	6985.00	1543.00	6980.00	1585.00	6975.00	1713.00	6970.00	1,819	6965.00	1,968	6,960	2,925	6,960	3350	6955.00	3400	6949.90
19			1670.00	6988.00	1840	6980.00	1968	6975.00	2202	6970.00	2308	6965.00	3202	6,960	3308	6955.00	3400	6948.30
18			1,100	6970.00	1,425	6965.00	1,625	6965.00	1,875	6960.00	2,375	6,955	2,775	6,950	3235	6948.48	3250	6943.48
17			430	6965.00	1245	6960.00	1973	6960.00	2271	6955.00	2975	6950	3225	6950	3235	6947.27	3250	6942.27
16							2186	6965.00	2463	6960.00	2952	6955	2975	6950	3235	6946.22	3250	6941.22
15					2250.00	6965.00	2484.00	6960.00	2718.00	6955.00	2850	6952	3000	6950	3235	6945.715	3250	6940.72
14					1425.00	6970.00	2356.00	6965.00	2888.00	6960.00	3050	6955	3075	6950	3235	6945.22	3250	6940.22
13							1888	6965.00	2144	6960.00	2654	6955	3144	6950	3235	6944.72	3250	6939.72
12							1888	6965.00	2144	6960.00	2654	6955	3016	6950	3235	6944.22	3250	6939.22
11							1356.00	6960.00	1718	6955.00	2207	6950	2975	6945.12	3235	6943.72	3250	6938.72
10					1037.00	6960.00	1293.00	6955.00	1569.00	6955.00	1867	6950	2803	6945	3235	6943.22	3250	6938.22
9			1250.00	6965.00	1718.00	6960.00	2059.00	6955.00	2590.00	6950.00	2952	6945	3165	6945	3235	6940.72	3250	6935.72

	HEC-RAS CHANNEL CROSS-SECTION INPUT DATA																	
1	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Section #	left overbank-6		left overbank-5		left overbank-4		left overbank-3		left overbank-2		left overbank-1		left overbank-1		left bank		left bottom	
8	1356.00	6970.00	1654.00	6965.00	1739.00	6960.00	1824	6955.00	2293	6950.00	2910	6945	3165	6940	3235	6938.22	3250	6933.22
7					1125	6950.00	1575	6946.50	1975	6946.50	2075	6945	2975	6940	3235	6935.72	3250	6930.72
6					1325	6945.00	2225	6941.00	2275	6940.00	2975	6935	3125	6935	3235	6930.72	3250	6925.72
5	1225	6945.00	1475	6940.00	2175	6936.50	2225	6935.00	2275	6935.00	3200	6933	3222.1	6930	3235	6925.72	3250	6920.72
4							2075	6935.00	2275	6932.50	2400	6930	3150	6925	3235	6920.72	3250	6915.72
3	1175	6940.00	1775	6935.00	2175	6930.00	2375	6927.60	2675	6925.00	3075	6922	3222.1	6920	3235	6915.72	3250	6910.72
2	1375	6930.00	2150	6926.50	2175	6925.00	2750	6920.70	2950	6920.00	3075	6920	3222.1	6915	3235	6910.72	3250	6905.72
1	1175	6926.50	1725	6925.00	2125	6923.50	2200	6920.00	2675	6915	2947.89	6910	2960.0	6905.97	2975.0	6900.97	3250	6900.97
0			2100	6923.00	2175	6920.00	2725	6915.00			2905.20	6910	2920.0	6905.07	2935.0	6900.07	3250	6900.07
-1							2125	6922.00	2175	6920	2719.39	6915	2734.4	6910.00	2775.0	6896.47	3250	6896.47
-2					2025	6922.00	2075	6920.00	2425	6915	2720.89	6910	2760.0	6896.97	2775.0	6891.97	3250	6891.97
-3							2025	6917.00	2075	6915	2707.39	6910	2758.7	6892.90	2775.0	6887.47	3250	6887.47
-4					2025	6917.00	2075	6915.00	2375	6910	2708.89	6905	2760.0	6887.97	2775.0	6882.97	3250	6882.97

	HEC-RAS CHANNEL CROSS-SECTION INPUT DATA															
1	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
Section #	Center Channel		right bottom		right bank		right berm		right overbank-1		right overbank-2		right overbank-3		right overbank-4	
	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
21	3450	6951.00	3500	6952.00	3550	6955.00	4275	6960.00	5075	6960.00	5175	6965.00	5225	6970.00		
20	3450	6949.40	3500	6950.40	3550	6955.00	3850	6960.00	4225	6960.00	4875	6960.00	4925	6965.00	4975	6970.00
19	3450	6947.80	3500	6948.80	4050	6950.00	4100	6955.00	4150	6960.00	4650	6963.00	4775	6965.00	4875.00	6970.00
18	3375	6945.98	3500	6948.48	3549.5	6965.00	4725	6970.00	4,825	6,970						
17	3375	6944.77	3500	6947.27	3545.0	6962.27	3560.0	6962.27								
16	3375	6943.72	3500	6946.22	3545.0	6961.22	3560.0	6961.22								
15	3375	6943.22	3500	6945.72	3544.3	6960.47	3559.3	6960.47								
14	3375	6942.72	3500	6945.22	3543.6	6959.72	3558.5	6959.72								
13	3375	6942.22	3500	6944.72	3542.8	6958.97	3557.8	6958.97								
12	3375	6941.72	3500	6944.22	3542.0	6958.22	3557.0	6958.22								
11	3375	6941.22	3500	6943.72	3541.3	6957.47	3556.3	6957.47								
10	3375	6940.72	3500	6943.22	3540.5	6956.72	3555.5	6956.72								
9	3375	6938.22	3500	6940.72	3539.0	6953.72	3554.0	6953.72								

HEC-RAS CHANNEL CROSS-SECTION INPUT DATA

1	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
Section #	Center Channel		right bottom		right bank		right berm		right overbank-1		right overbank-2		right overbank-3		right overbank-4	
8	3375	6935.72	3500	6938.22	3539.0	6951.215	3554.0	6951.22								
			3470	6935.12												
7	3375	6933.22	3500	6935.72	3539.0	6948.72	3554.0	6948.72								
			3470	6930.12												
6	3375	6928.22	3500	6930.72	3539.0	6943.72	3554.0	6943.72								
			3470	6925.12												
5	3375	6923.22	3500	6925.72	3539.0	6938.72	3554.0	6938.72								
			3470	6920.12												
4	3375	6918.22	3500	6920.72	3537.5	6933.22	3552.5	6933.22								
			3470	6915.12												
3	3375	6913.22	3500	6915.72	3537.5	6928.22	3552.5	6928.22								
			3470	6910.12												
2	3375	6908.22	3500	6910.72	3537.5	6923.22	3552.5	6923.22								
1	3375	6903.47	3590	6905.97	3602.1	6910.00	3852.11	6915.00	3877.11	6920	4502.11	6924				
			3470	6904.47												
0	3375	6902.57	3500	6905.07	3514.8	6910.00	3675	6915.00	3725	6920	4475	6923.5				
			3470	6900.87												
-1	3375	6898.97	3775	6901.47	3800.6	6910.00	3875	6915.00	3900	6920	5025	6924				
-2	3375	6894.47	3975	6896.97	4014.1	6910.00	4029.1	6915.00	4975	6915	5375	6920				
-3	3375	6889.97	3975	6892.47	3997.6	6900.00	4275	6905.00	4675	6910	4925	6915	5125	6920		
-4	3375	6885.47	3975	6887.97	3996.1	6895.00	4125	6900.00	4275	6905	4625	6910	4875	6915	5025	6920

	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	Reach #1	21	PF 1	78000	6951.00	6964.48	6962.45	6964.89	0.000916	7.9	18068.43	3351.67	0.4
2	Reach #1	20	PF 1	78000	6949.90	6962.91		6964.1	0.002531	12.75	12169.06	3022.67	0.66
3	Reach #1	19	PF 1	78000	6947.80	6962.56		6963.36	0.000729	7.34	12099.43	1831.4	0.36
4	Reach #1	18	PF 1	78000	6943.48	6962.79		6963.16	0.000408	6.49	17955.52	1807.74	0.28
5	Reach #1	17	PF 1	78000	6942.27	6962.56		6962.99	0.000469	7.23	19329.91	2731.89	0.3
6	Reach #1	16	PF 1	78000	6941.22	6961.30		6962.57	0.001049	10.72	10537.5	1169.01	0.45
7	Reach #1	15	PF 1	78000	6940.72	6961.05		6962.02	0.000818	9.55	11542.16	1124.27	0.4
8	Reach #1	14	PF 1	78000	6940.22	6958.39		6961.19	0.002297	14.7	6469.78	599.28	0.65
9	Reach #1	13	PF 1	78000	6939.72	6957.73	6955.86	6959.94	0.002018	13.68	8245.04	1163.02	0.61
10	Reach #1	12	PF 1	78000	6939.22	6954.50	6954.5	6958.35	0.004287	17.56	5897.83	840.75	0.87
11	Reach #1	11	PF 1	78000	6938.72	6954.92	6951.29	6955.64	0.00103	9	13375.95	1807.32	0.43
12	Reach #1	10	PF 1	78000	6938.22	6954.67		6955.15	0.000691	7.46	15810.4	1945.49	0.35
13	Reach #1	9	PF 1	78000	6935.72	6950.71	6950.71	6954.15	0.004141	16.99	6412.98	1015.26	0.85
14	Reach #1	8	PF 1	78000	6933.22	6947.41	6945.9	6949.53	0.003111	14.1	7644.63	1062.47	0.73
15	Reach #1	7	PF 1	78000	6930.72	6945.48	6945.48	6947.86	0.003357	14.94	8060.38	1486.18	0.75
16	Reach #1	6	PF 1	78000	6925.72	6940.60	6942.07	6945.43	0.005904	19.34	5747.59	1284.65	0.97
17	Reach #1	5	PF 1	78000	6920.72	6935.38	6937.54	6941.93	0.007563	21.64	4845.41	1316.71	1.09
18	Reach #1	4	PF 1	78000	6915.72	6929.87	6932.48	6937.64	0.00925	23.25	4244.19	1084.8	1.2
19	Reach #1	3	PF 1	78000	6910.72	6925.02	6927.87	6933.01	0.009182	23.37	4003.42	855.5	1.2
20	Reach #1	2	PF 1	78000	6905.72	6920.38	6923.55	6928.51	0.008766	23.29	3762.18	686.92	1.18
21	Reach #1	1	PF 1	78000	6900.97	6907.16	6910.6	6919.95	0.039376	28.99	2788.64	637.12	2.29
22	Reach #1	0	PF 1	78000	6900.07	6906.81	6909.53	6915.83	0.023508	24.2	3255.05	590.44	1.8
23	Reach #1	-1	PF 1	78000	6896.47	6902.31	6903.47	6906.83	0.015873	17.09	4584.55	1020.07	1.41
24	Reach #1	-2	PF 1	78000	6891.97	6898.51	6898.54	6901.06	0.007777	12.83	6107.49	1224.26	1.01
25	Reach #1	-3	PF 1	78000	6887.47	6893.62	6894.02	6896.62	0.010203	13.92	5626.78	1221.91	1.14
26	Reach #1	-4	PF 1	78000	6882.97	6889.52	6889.53	6892.06	0.007742	12.81	6115.86	1224.3	1.01

Plan:	Reach #1	Reach #1 RS: 21	Profile: PF 1						
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
1	LOB	1606	3350	23542.59	6799.6	1537.32	30.18	4.42	3.46
2	Chan	3350	3416.67	5995.26	779.32	66.79	7.69	11.69	7.69
3	Chan	3416.67	3483.33	7378.6	882.09	66.67	9.46	13.23	8.36
4	Chan	3483.33	3550	5749.78	759.88	66.76	7.37	11.4	7.57
5	ROB	3550	5225	35333.77	8847.54	1614.76	45.3	5.48	3.99
Plan:	Reach #1	Reach #1 RS: 20	Profile: PF 1						
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
1	LOB	1457	3350	25842.54	5204.79	1468.68	33.13	3.54	4.97
2	Chan	3350	3416.67	9110	739.59	66.93	11.68	11.09	12.32
3	Chan	3416.67	3483.33	11778.86	861.53	66.67	15.1	12.92	13.67
4	Chan	3483.33	3550	8718.42	720.14	66.88	11.18	10.8	12.11
5	ROB	3550	4975	22550.18	4643.01	1354.25	28.91	3.43	4.86
Plan:	Reach #1	Reach #1 RS: 19	Profile: PF 1						
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
1	LOB	605	2720	974.44	704.66	493.06	1.25	1.43	1.38
2	Chan	2720	3180	16384.05	3428.77	460.02	21.01	7.45	4.78
3	Chan	3180	3640	34330.39	5151.02	460.02	41.39	11.2	6.27
4	Chan	3640	4100	26099.22	4744.63	460.25	36.08	10.31	5.93
5	ROB	4100	4875	211.88	137.3	81.5	0.27	1.69	1.54
Plan:	Reach #1	Reach #1 RS: 18	Profile: PF 1						
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	566.34	93.89	6.31	0.73	14.88	6.03
40	Chan	3474.76	3481.07	558.36	93.09	6.31	0.72	14.75	6
41	Chan	3481.07	3487.38	500.66	92.29	6.31	0.64	14.63	5.42
42	Chan	3487.38	3493.69	412.04	91.5	6.31	0.53	14.5	4.5
43	Chan	3493.69	3500	406.08	90.7	6.31	0.52	14.38	4.48
44	ROB	3500	4825	902.86	308.74	45.46	1.16	7.16	2.92
Plan:	Reach #1	Reach #1 RS: 17	Profile: PF 1						
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	675.73	100.04	6.31	0.87	15.86	6.75
40	Chan	3474.76	3481.07	666.78	99.24	6.31	0.85	15.73	6.72
41	Chan	3481.07	3487.38	598.4	98.44	6.31	0.77	15.6	6.08
42	Chan	3487.38	3493.69	492.94	97.65	6.31	0.63	15.48	5.05
43	Chan	3493.69	3500	486.26	96.86	6.31	0.62	15.35	5.02
44	ROB	3500	3560	985.28	354.76	62.72	1.26	5.91	2.78
Plan:	Reach #1	Reach #1 RS: 16	Profile: PF 1						
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	988.19	98.73	6.31	1.27	15.65	10.01
40	Chan	3474.76	3481.07	974.95	97.93	6.31	1.25	15.52	9.96
41	Chan	3481.07	3487.38	775.45	97.13	6.31	1.12	15.4	9.01
42	Chan	3487.38	3493.69	720.51	96.34	6.31	0.92	15.27	7.48
43	Chan	3493.69	3500	710.61	95.54	6.31	0.91	15.14	7.44
44	ROB	3500	3560	1390.76	342.28	62.51	1.78	5.7	4.06
Plan:	Reach #1	Reach #1 RS: 15	Profile: PF 1						
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	895.4	100.29	6.31	1.15	15.89	8.93
40	Chan	3474.76	3481.07	883.59	99.49	6.31	1.13	15.77	8.88
41	Chan	3481.07	3487.38	793.02	98.69	6.31	1.02	15.64	8.04
42	Chan	3487.38	3493.69	653.27	97.9	6.31	0.84	15.52	6.67
43	Chan	3493.69	3500	644.44	97.1	6.31	0.83	15.39	6.64
44	ROB	3500	3559.3	1344.42	360.88	62.27	1.72	6.09	3.73

Plan: Reach #1	Reach #1 RS: 14	Profile: PF 1							
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	1175.8	86.67	6.31	1.51	13.74	13.57
40	Chan	3474.76	3481.07	1157.88	85.87	6.31	1.48	13.61	13.48
41	Chan	3481.07	3487.38	785.67	85.07	6.31	1.33	13.48	12.19
42	Chan	3487.38	3493.69	752.38	84.28	6.31	1.09	13.36	10.11
43	Chan	3493.69	3500	739.15	83.48	6.31	1.08	13.23	10.05
44	ROB	3500	3558.5	1707.05	260.09	41.64	2.19	6.58	6.56
Plan: Reach #1	Reach #1 RS: 13	Profile: PF 1							
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	1080.33	85.64	6.31	1.39	13.57	12.61
40	Chan	3474.76	3481.07	1063.66	84.84	6.31	1.36	13.45	12.54
41	Chan	3481.07	3487.38	789.48	84.04	6.31	1.22	13.32	11.33
42	Chan	3487.38	3493.69	762.72	83.25	6.31	1	13.19	9.4
43	Chan	3493.69	3500	750.28	82.45	6.31	0.99	13.07	9.34
44	ROB	3500	3557.8	1549.71	253.99	41.17	1.99	6.5	6.1
Plan: Reach #1	Reach #1 RS: 12	Profile: PF 1							
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	1082.4	68.45	6.31	1.39	10.85	15.81
40	Chan	3474.76	3481.07	1061.52	67.66	6.31	1.36	10.72	15.69
41	Chan	3481.07	3487.38	787.88	66.86	6.31	1.21	10.6	14.16
42	Chan	3487.38	3493.69	699.83	66.07	6.31	0.99	10.47	11.73
43	Chan	3493.69	3500	635.33	65.27	6.31	0.97	10.34	11.63
44	ROB	3500	3557	1205.54	158.56	32.51	1.55	5.14	7.6
Plan: Reach #1	Reach #1 RS: 11	Profile: PF 1							
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	607.31	74.22	6.31	0.78	11.76	8.18
40	Chan	3474.76	3481.07	596.51	73.42	6.31	0.76	11.64	8.12
41	Chan	3481.07	3487.38	532.89	72.62	6.31	0.68	11.51	7.34
42	Chan	3487.38	3493.69	436.78	71.83	6.31	0.56	11.38	6.08
43	Chan	3493.69	3500	428.74	71.03	6.31	0.55	11.26	6.04
44	ROB	3500	3556.3	742.28	188.21	35.44	0.95	5.6	3.94
Plan: Reach #1	Reach #1 RS: 10	Profile: PF 1							
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	515.44	75.81	6.31	0.66	12.01	6.8
40	Chan	3474.76	3481.07	506.46	75.01	6.31	0.65	11.89	6.75
41	Chan	3481.07	3487.38	452.61	74.21	6.31	0.58	11.76	6.1
42	Chan	3487.38	3493.69	371.13	73.42	6.31	0.48	11.64	5.05
43	Chan	3493.69	3500	364.45	72.62	6.31	0.47	11.51	5.02
44	ROB	3500	3555.5	644.37	196.54	36.2	0.83	5.72	3.28
Plan: Reach #1	Reach #1 RS: 9	Profile: PF 1							0
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	1016.1	66.61	6.31	1.3	10.56	15.25
40	Chan	3474.76	3481.07	995.96	65.81	6.31	1.28	10.43	15.13
41	Chan	3481.07	3487.38	775.92	65.01	6.31	1.14	10.3	13.66
42	Chan	3487.38	3493.69	712.16	64.22	6.31	0.93	10.18	11.31
43	Chan	3493.69	3500	648.22	63.42	6.31	0.91	10.05	11.21
44	ROB	3500	3552.54	1096.96	149.66	31.59	1.41	4.99	7.33
Plan: Reach #1	Reach #1 RS: 8	Profile: PF 1							
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	771.74	61.56	6.31	0.99	9.76	12.54
40	Chan	3474.76	3481.07	755.19	60.76	6.31	0.97	9.63	12.43
41	Chan	3481.07	3487.38	672.17	59.96	6.31	0.86	9.5	11.21
42	Chan	3487.38	3493.69	548.72	59.17	6.31	0.7	9.38	9.27
43	Chan	3493.69	3500	536.47	58.37	6.31	0.69	9.25	9.19
44	ROB	3500	3554	760.96	126.63	29.05	0.98	4.59	6.01

Plan:	Reach #1	Reach #1 RS: 7	Profile: PF 1							
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
39	Chan	3468.45	3474.76	871.59	65.15	6.31	1.12	10.33	13.38
40	Chan	3474.76	3481.07	853.93	64.36	6.31	1.09	10.2	13.27
41	Chan	3481.07	3487.38	760.96	63.56	6.31	0.98	10.07	11.97
42	Chan	3487.38	3493.69	622.02	62.77	6.31	0.8	9.95	9.91
43	Chan	3493.69	3500	608.92	61.97	6.31	0.78	9.82	9.83
44	ROB	3500	3554	928.19	142.84	30.86	1.19	4.88	6.5
Plan:	Reach #1	Reach #1 RS: 6	Profile: PF 1						
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	Velocity
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	(ft/s)
37	Chan	3455.83	3462.14	1112.36	67.52	6.31	1.43	10.7	18.07
38	Chan	3462.14	3468.45	901.43	66.72	6.31	1.16	10.57	16.48
39	Chan	3468.45	3474.76	883.57	65.92	6.31	1.13	10.45	13.51
40	Chan	3474.76	3481.07	865.85	65.13	6.31	1.11	10.32	13.4
41	Chan	3481.07	3487.38	848.24	64.33	6.31	1.09	10.2	13.3
42	Chan	3487.38	3493.69	830.85	63.53	6.31	1.07	10.07	13.19
43	Chan	3493.69	3500	813.56	62.74	6.31	1.04	9.94	13.08
44	ROB	3500	3554	1185.17	146.42	31.24	1.52	4.94	12.97
Plan:	Reach #1	Reach #1 RS: 5	Profile: PF 1						8.09
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	Velocity
37	Chan	3455.83	3462.14	1075.42	66.14	6.31	1.56	10.48	20.17
38	Chan	3462.14	3468.45	985.16	65.34	6.31	1.26	10.36	18.39
39	Chan	3468.45	3474.76	965.07	64.55	6.31	1.24	10.23	15.07
40	Chan	3474.76	3481.07	945.31	63.75	6.31	1.21	10.1	14.95
41	Chan	3481.07	3487.38	925.67	62.95	6.31	1.19	9.98	14.83
42	Chan	3487.38	3493.69	906.27	62.16	6.31	1.16	9.85	14.7
43	Chan	3493.69	3500	887	61.36	6.31	1.14	9.72	14.58
44	ROB	3500	3554	1263.87	140.02	30.55	1.62	4.83	14.46
Plan:	Reach #1	Reach #1 RS: 4	Profile: PF 1						9.03
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	Velocity
37	Chan	3455.83	3462.14	1035.63	62.9	6.31	1.58	9.97	21.56
38	Chan	3462.14	3468.45	999.82	62.11	6.31	1.28	9.84	19.64
39	Chan	3468.45	3474.76	978.54	61.31	6.31	1.25	9.72	16.1
40	Chan	3474.76	3481.07	957.45	60.51	6.31	1.23	9.59	15.96
41	Chan	3481.07	3487.38	936.51	59.72	6.31	1.2	9.46	15.82
42	Chan	3487.38	3493.69	915.82	58.92	6.31	1.17	9.34	15.68
43	Chan	3493.69	3500	895.28	58.12	6.31	1.15	9.21	15.54
44	ROB	3500	3552.5	1208.6	125.55	28.93	1.55	4.57	15.4
Plan:	Reach #1	Reach #1 RS: 3	Profile: PF 1						9.63
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	Velocity
37	Chan	3455.83	3462.14	1065.17	63.87	6.31	1.62	10.12	21.7
38	Chan	3462.14	3468.45	1022.45	63.07	6.31	1.31	10	19.78
39	Chan	3468.45	3474.76	1001.02	62.28	6.31	1.28	9.87	16.21
40	Chan	3474.76	3481.07	979.78	61.48	6.31	1.26	9.74	16.07
41	Chan	3481.07	3487.38	958.68	60.68	6.31	1.23	9.62	15.94
42	Chan	3487.38	3493.69	937.84	59.89	6.31	1.2	9.49	15.8
43	Chan	3493.69	3500	917.15	59.09	6.31	1.18	9.37	15.66
44	ROB	3500	3552.5	1258.66	129.8	29.42	1.61	4.65	15.52
Plan:	Reach #1	Reach #1 RS: 2	Profile: PF 1						9.7
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	Velocity
37	Chan	3455.83	3462.14	1110.34	66.11	6.31	1.68	10.48	21.71
38	Chan	3462.14	3468.45	1059.79	65.32	6.31	1.36	10.35	19.79
39	Chan	3468.45	3474.76	1038.34	64.52	6.31	1.33	10.23	16.23
40	Chan	3474.76	3481.07	1017.07	63.72	6.31	1.3	10.1	16.09
41	Chan	3481.07	3487.38	995.93	62.93	6.31	1.28	9.97	15.96
42	Chan	3487.38	3493.69	975.05	62.13	6.31	1.25	9.85	15.83
43	Chan	3493.69	3500	954.31	61.34	6.31	1.22	9.72	15.69
44	ROB	3500	3552.5	1359.23	139.91	30.54	1.74	4.83	15.56

Plan:	Reach #1	Reach #1 RS: 1	Profile: PF 1						9.72
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	Velocity
38	Chan	3425	3437.5	561.33	32.01	12.5	0.72	2.56	18.66
39	Chan	3437.5	3450	473	28.88	12.5	0.61	2.31	17.54
40	Chan	3450	3462.5	390.89	25.76	12.5	0.5	2.06	16.38
41	Chan	3462.5	3475	315.17	22.64	12.5	0.4	1.81	15.17
42	Chan	3475	3487.5	231.2	19.51	12.5	0.3	1.56	13.92
43	Chan	3487.5	3500	139.66	16.38	12.5	0.18	1.31	11.85
44	ROB	3500	4502.11	980.59	108.81	93.75	1.26	1.16	8.52
Plan:	Reach #1	Reach #1 RS: 0	Profile: PF 1						9.01
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	Velocity
38	Chan	3419.29	3432.74	691.07	43.3	13.46	0.89	3.22	16.84
39	Chan	3432.74	3446.19	597.5	39.68	13.46	0.77	2.95	15.96
40	Chan	3446.19	3459.64	509.45	36.06	13.46	0.65	2.68	15.06
41	Chan	3459.64	3473.1	427.11	32.44	13.46	0.55	2.41	14.13
42	Chan	3473.1	3486.55	336.14	28.82	13.46	0.43	2.14	13.17
43	Chan	3486.55	3500	212.96	25.2	13.46	0.27	1.87	11.66
44	ROB	3500	4475	23.02	4.54	5.5	0.03	0.87	8.45
Plan:	Reach #1	Reach #1 RS: -1	Profile: PF 1						5.07
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	Velocity
39	Chan	3655.95	3679.76	391.42	44.47	23.81	0.5	1.87	(ft/s)
40	Chan	3679.76	3703.57	315.53	39.07	23.81	0.4	1.64	8.8
41	Chan	3703.57	3727.38	246.32	33.68	23.81	0.32	1.41	8.08
42	Chan	3727.38	3751.19	184.14	28.28	23.81	0.24	1.19	7.31
43	Chan	3751.19	3775	128.82	22.83	23.81	0.17	0.96	6.51
44	ROB	3775	5025	3.1	1.07	2.67	0	0.42	5.64
Plan:	Reach #1	Reach #1 RS: -2	Profile: PF 1						2.9
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	Velocity
39	Chan	3832.14	3860.71	516.64	69.48	28.57	0.66	2.43	(ft/s)
40	Chan	3860.71	3889.29	448.86	63.86	28.57	0.58	2.24	7.44
41	Chan	3889.29	3917.86	384.87	58.23	28.57	0.49	2.04	7.03
42	Chan	3917.86	3946.43	324.87	52.6	28.57	0.42	1.84	6.61
43	Chan	3946.43	3975	268.5	46.92	28.57	0.34	1.64	6.18
44	ROB	3975	5375	10.84	3.57	4.88	0.01	0.77	5.72
Plan:	Reach #1	Reach #1 RS: -3	Profile: PF 1						3.04
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	Velocity
39	Chan	3832.14	3860.71	436.46	58.25	28.57	0.56	2.04	(ft/s)
40	Chan	3860.71	3889.29	368.53	52.63	28.57	0.47	1.84	7.49
41	Chan	3889.29	3917.86	305.21	47	28.57	0.39	1.65	7.00
42	Chan	3917.86	3946.43	246.74	41.37	28.57	0.32	1.45	6.49
43	Chan	3946.43	3975	192.87	35.69	28.57	0.25	1.25	5.96
44	ROB	3975	5125	5.67	1.98	3.63	0.01	0.57	5.4
Plan:	Reach #1	Reach #1 RS: -4	Profile: PF 1						2.86
	Pos	Left Sta	Right Sta	Flow	Area	W.P.	Percent	Hydr	
		(ft)	(ft)	(cfs)	(sq ft)	(ft)	Conv	Depth(ft)	Velocity
39	Chan	3832.14	3860.71	517.97	69.68	28.57	0.66	2.44	(ft/s)
40	Chan	3860.71	3889.29	450.2	64.06	28.57	0.58	2.24	7.43
41	Chan	3889.29	3917.86	386.21	58.43	28.57	0.5	2.04	7.03
42	Chan	3917.86	3946.43	326.19	52.8	28.57	0.42	1.85	6.61
43	Chan	3946.43	3975	269.8	47.11	28.57	0.35	1.65	6.18
44	ROB	3975	5025	10.95	3.6	4.9	0.01	0.77	5.73

Plan: Reach #1	Reach #1 RS: 21	Profile: PF 1			
E.G. Elev (ft)	6964.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.035	0.03	0.035
W.S. Elev (ft)	6964.48	Reach Len. (ft)	540	500	460
Crit W.S. (ft)	6962.45	Flow Area (sq ft)	6799.6	2421.29	8847.54
E.G. Slope (ft/ft)	0.000916	Area (sq ft)	6799.6	2421.29	8847.54
Q Total (cfs)	78000	Flow (cfs)	23542.59	19123.63	35333.77
Top Width (ft)	3351.67	Top Width (ft)	1537.04	200	1614.63
Vel Total (ft/s)	4.32	Avg. Vel. (ft/s)	3.46	7.9	3.99
Max Chl Dpth (ft)	13.48	Hydr. Depth (ft)	4.42	12.11	5.48
Conv. Total (cfs)	2577097	Conv. (cfs)	777840.3	631839.1	1167418
Length Wtd. (ft)	497.82	Wetted Per. (ft)	1537.32	200.22	1614.76
Min Ch El (ft)	6951	Shear (lb/sq ft)	0.25	0.69	0.31
Alpha	1.4	Stream Power (lb/ft s)	0.88	5.46	1.25
Frctn Loss (ft)	0.71	Cum Volume (acre-ft)	1032.53	1056.48	139.71
C & E Loss (ft)	0.08	Cum SA (acres)	216	110.52	33.57

Plan: Reach #1	Reach #1 RS: 20	Profile: PF 1			
E.G. Elev (ft)	6964.1	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.19	Wt. n-Val.	0.035	0.03	0.035
W.S. Elev (ft)	6962.91	Reach Len. (ft)	540	500	460
Crit W.S. (ft)		Flow Area (sq ft)	5204.79	2321.27	4643.01
E.G. Slope (ft/ft)	0.002531	Area (sq ft)	5204.79	2321.27	4643.01
Q Total (cfs)	78000	Flow (cfs)	25842.51	29607.33	22550.15
Top Width (ft)	3022.67	Top Width (ft)	1468.61	200	1354.06
Vel Total (ft/s)	6.41	Avg. Vel. (ft/s)	4.97	12.75	4.86
Max Chl Dpth (ft)	13.01	Hydr. Depth (ft)	3.54	11.61	3.43
Conv. Total (cfs)	1550266	Conv. (cfs)	513625.3	588451.9	448189
Length Wtd. (ft)	501.03	Wetted Per. (ft)	1468.68	200.47	1354.25
Min Ch El (ft)	6949.9	Shear (lb/sq ft)	0.56	1.83	0.54
Alpha	1.87	Stream Power (lb/ft s)	2.78	23.34	2.63
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)	958.12	1029.26	68.48
C & E Loss (ft)	0.12	Cum SA (acres)	197.37	108.23	17.9

Plan: Reach #1	Reach #1 RS: 19	Profile: PF 1			
E.G. Elev (ft)	6963.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.8	Wt. n-Val.	0.035	0.03	0.035
W.S. Elev (ft)	6962.56	Reach Len. (ft)	134	119	104
Crit W.S. (ft)		Flow Area (sq ft)	1120.63	10181.03	797.77
E.G. Slope (ft/ft)	0.000729	Area (sq ft)	1120.63	10181.03	797.77
Q Total (cfs)	78000	Flow (cfs)	2031.7	74678.91	1289.39
Top Width (ft)	1831.4	Top Width (ft)	563.21	792	476.19
Vel Total (ft/s)	6.45	Avg. Vel. (ft/s)	1.81	7.34	1.62
Max Chl Dpth (ft)	14.76	Hydr. Depth (ft)	1.99	12.85	1.68
Conv. Total (cfs)	2889047	Conv. (cfs)	75252.3	2766037	47757.7
Length Wtd. (ft)	123.62	Wetted Per. (ft)	563.34	792.51	476.45
Min Ch El (ft)	6947.8	Shear (lb/sq ft)	0.09	0.58	0.08
Alpha	1.24	Stream Power (lb/ft s)	0.16	4.29	0.12
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	918.91	957.51	39.76
C & E Loss (ft)	0.13	Cum SA (acres)	184.78	102.53	8.23

Plan: Reach #1	Reach #1 RS: 12	Profile: PF 1			
E.G. Elev (ft)	6958.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.85	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6954.5	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6954.5	Flow Area (sq ft)	2352.23	3387.04	158.56
E.G. Slope (ft/ft)	0.004287	Area (sq ft)	2352.23	3387.04	158.56
Q Total (cfs)	78000	Flow (cfs)	17333.42	59461.03	1205.54
Top Width (ft)	840.75	Top Width (ft)	544.91	265	30.84
Vel Total (ft/s)	13.23	Avg. Vel. (ft/s)	7.37	17.56	7.6
Max Chl Dpth (ft)	15.28	Hydr. Depth (ft)	4.32	12.78	5.14
Conv. Total (cfs)	1191243	Conv. (cfs)	264722	908109.1	18411.5
Length Wtd. (ft)	500	Wetted Per. (ft)	545.01	265.86	32.51
Min Ch El (ft)	6939.22	Shear (lb/sq ft)	1.16	3.41	1.31
Alpha	1.42	Stream Power (lb/ft s)	8.51	59.86	9.92
Frctn Loss (ft)	0.93	Cum Volume (acre-ft)	474.71	648.41	18.68
C & E Loss (ft)	0.94	Cum SA (acres)	115.26	83.56	4.38

Plan: Reach #1	Reach #1 RS: 11	Profile: PF 1			
E.G. Elev (ft)	6955.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6954.92	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6951.29	Flow Area (sq ft)	9558.6	3629.14	188.21
E.G. Slope (ft/ft)	0.00103	Area (sq ft)	9558.6	3629.14	188.21
Q Total (cfs)	78000	Flow (cfs)	44583.11	32674.61	742.28
Top Width (ft)	1807.32	Top Width (ft)	1508.69	265	33.63
Vel Total (ft/s)	5.83	Avg. Vel. (ft/s)	4.66	9	3.94
Max Chl Dpth (ft)	16.19	Hydr. Depth (ft)	6.34	13.69	5.6
Conv. Total (cfs)	2430897	Conv. (cfs)	1389448	1018316	23133.5
Length Wtd. (ft)	500	Wetted Per. (ft)	1508.74	265.86	35.44
Min Ch El (ft)	6938.72	Shear (lb/sq ft)	0.41	0.88	0.34
Alpha	1.37	Stream Power (lb/ft s)	1.9	7.9	1.35
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)	406.35	608.14	16.69
C & E Loss (ft)	0.07	Cum SA (acres)	103.47	80.52	4.01

Plan: Reach #1	Reach #1 RS: 10	Profile: PF 1			
E.G. Elev (ft)	6955.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6954.67	Reach Len. (ft)	500	500	500
Crit W.S. (ft)		Flow Area (sq ft)	11917.95	3695.91	196.54
E.G. Slope (ft/ft)	0.000691	Area (sq ft)	11917.95	3695.91	196.54
Q Total (cfs)	78000	Flow (cfs)	49768.63	27587	644.37
Top Width (ft)	1945.49	Top Width (ft)	1646.15	265	34.34
Vel Total (ft/s)	4.93	Avg. Vel. (ft/s)	4.18	7.46	3.28
Max Chl Dpth (ft)	16.45	Hydr. Depth (ft)	7.24	13.95	5.72
Conv. Total (cfs)	2967644	Conv. (cfs)	1893533	1049595	24516.3
Length Wtd. (ft)	500	Wetted Per. (ft)	1646.21	265.86	36.2
Min Ch El (ft)	6938.22	Shear (lb/sq ft)	0.31	0.6	0.23
Alpha	1.27	Stream Power (lb/ft s)	1.3	4.48	0.77
Frctn Loss (ft)	0.7	Cum Volume (acre-ft)	283.09	566.1	14.48
C & E Loss (ft)	0.3	Cum SA (acres)	85.37	77.48	3.62

Plan: Reach #1	Reach #1 RS: 3	Profile: PF 1			
E.G. Elev (ft)	6933.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	7.98	Wt. n-Val.	0.035	0.032	0.039
W.S. Elev (ft)	6925.02	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6927.87	Flow Area (sq ft)	746.01	3127.61	129.8
E.G. Slope (ft/ft)	0.009182	Area (sq ft)	746.01	3127.61	129.8
Q Total (cfs)	78000	Flow (cfs)	3659.72	73081.61	1258.66
Top Width (ft)	855.5	Top Width (ft)	562.59	265	27.91
Vel Total (ft/s)	19.48	Avg. Vel. (ft/s)	4.91	23.37	9.7
Max Chl Dpth (ft)	14.3	Hydr. Depth (ft)	1.33	11.8	4.65
Conv. Total (cfs)	814022.3	Conv. (cfs)	38193.5	762693.1	13135.6
Length Wtd. (ft)	500	Wetted Per. (ft)	563.34	265.86	29.42
Min Ch El (ft)	6910.72	Shear (lb/sq ft)	0.76	6.74	2.53
Alpha	1.35	Stream Power (lb/ft s)	3.72	157.57	24.53
Frctn Loss (ft)	4.61	Cum Volume (acre-ft)	11.95	306.03	3.22
C & E Loss (ft)	0.02	Cum SA (acres)	8.71	56.19	1.31

Plan: Reach #1	Reach #1 RS: 2	Profile: PF 1			
E.G. Elev (ft)	6928.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	8.13	Wt. n-Val.	0.035	0.032	0.039
W.S. Elev (ft)	6920.38	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6923.55	Flow Area (sq ft)	400.46	3221.81	139.91
E.G. Slope (ft/ft)	0.008786	Area (sq ft)	400.46	3221.81	139.91
Q Total (cfs)	78000	Flow (cfs)	1609.71	75031.05	1359.23
Top Width (ft)	686.92	Top Width (ft)	392.95	265	28.97
Vel Total (ft/s)	20.73	Avg. Vel. (ft/s)	4.02	23.29	9.72
Max Chl Dpth (ft)	14.66	Hydr. Depth (ft)	1.02	12.16	4.83
Conv. Total (cfs)	833071.1	Conv. (cfs)	17192.4	801361.5	14517.2
Length Wtd. (ft)	500	Wetted Per. (ft)	393.81	265.86	30.54
Min Ch El (ft)	6905.72	Shear (lb/sq ft)	0.56	6.63	2.51
Alpha	1.22	Stream Power (lb/ft s)	2.24	154.46	24.36
Frctn Loss (ft)	4.49	Cum Volume (acre-ft)	5.37	269.59	1.67
C & E Loss (ft)	0.01	Cum SA (acres)	3.23	53.15	0.99

Plan: Reach #1	Reach #1 RS: 1	Profile: PF 1			
E.G. Elev (ft)	6919.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	12.8	Wt. n-Val.	0.035	0.03	0.036
W.S. Elev (ft)	6907.16	Reach Len. (ft)	100	100	100
Crit W.S. (ft)	6910.6	Flow Area (sq ft)	57.4	2622.43	108.81
E.G. Slope (ft/ft)	0.039376	Area (sq ft)	57.4	2622.43	108.81
Q Total (cfs)	78000	Flow (cfs)	990.82	76028.59	980.58
Top Width (ft)	637.12	Top Width (ft)	18.56	525	93.56
Vel Total (ft/s)	27.97	Avg. Vel. (ft/s)	17.26	28.99	9.01
Max Chl Dpth (ft)	6.19	Hydr. Depth (ft)	3.09	5	1.16
Conv. Total (cfs)	393078.8	Conv. (cfs)	4993.2	383144	4941.6
Length Wtd. (ft)	100	Wetted Per. (ft)	19.57	525.05	93.75
Min Ch El (ft)	6900.97	Shear (lb/sq ft)	7.21	12.28	2.85
Alpha	1.05	Stream Power (lb/ft s)	124.48	355.96	25.71
Frctn Loss (ft)	8.09	Cum Volume (acre-ft)	2.74	236.04	0.25
C & E Loss (ft)	0.47	Cum SA (acres)	0.87	48.61	0.28

Plan: Reach #1	Reach #1 RS: 18	Profile: PF 1			
E.G. Elev (ft)	6963.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6962.79	Reach Len. (ft)	381	381	381
Crit W.S. (ft)		Flow Area (sq ft)	13191.59	4455.19	308.74
E.G. Slope (ft/ft)	0.000408	Area (sq ft)	13191.59	4455.19	308.74
Q Total (cfs)	78000	Flow (cfs)	48191.63	28905.51	902.86
Top Width (ft)	1807.74	Top Width (ft)	1499.6	265	43.14
Vel Total (ft/s)	4.34	Avg. Vel. (ft/s)	3.65	6.49	2.92
Max Chl Dpth (ft)	19.31	Hydr. Depth (ft)	8.8	16.81	7.16
Conv. Total (cfs)	3862591	Conv. (cfs)	2386468	1431412	44710.2
Length Wtd. (ft)	381	Wetted Per. (ft)	1499.69	265.86	45.46
Min Ch El (ft)	6943.48	Shear (lb/sq ft)	0.22	0.43	0.17
Alpha	1.27	Stream Power (lb/ft s)	0.82	2.77	0.51
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	896.9	937.52	38.43
C & E Loss (ft)	0.01	Cum SA (acres)	181.61	101.09	7.61

Plan: Reach #1	Reach #1 RS: 17	Profile: PF 1			
E.G. Elev (ft)	6962.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6962.56	Reach Len. (ft)	500	500	500
Crit W.S. (ft)		Flow Area (sq ft)	14261.43	4713.72	354.76
E.G. Slope (ft/ft)	0.000469	Area (sq ft)	14261.43	4713.72	354.76
Q Total (cfs)	78000	Flow (cfs)	42952.18	34062.54	985.28
Top Width (ft)	2731.89	Top Width (ft)	2406.89	265	60
Vel Total (ft/s)	4.04	Avg. Vel. (ft/s)	3.01	7.23	2.78
Max Chl Dpth (ft)	20.29	Hydr. Depth (ft)	5.93	17.79	5.91
Conv. Total (cfs)	3599857	Conv. (cfs)	1982330	1572055	45472.7
Length Wtd. (ft)	500	Wetted Per. (ft)	2407.33	265.86	62.72
Min Ch El (ft)	6942.27	Shear (lb/sq ft)	0.17	0.52	0.17
Alpha	1.71	Stream Power (lb/ft s)	0.52	3.76	0.46
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)	776.84	897.42	35.53
C & E Loss (ft)	0.08	Cum SA (acres)	164.52	98.77	7.16

Plan: Reach #1	Reach #1 RS: 16	Profile: PF 1			
E.G. Elev (ft)	6962.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.27	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6961.3	Reach Len. (ft)	500	500	500
Crit W.S. (ft)		Flow Area (sq ft)	5536.62	4658.6	342.28
E.G. Slope (ft/ft)	0.001049	Area (sq ft)	5536.62	4658.6	342.28
Q Total (cfs)	78000	Flow (cfs)	26670.11	49939.13	1390.76
Top Width (ft)	1169.01	Top Width (ft)	844.01	265	60
Vel Total (ft/s)	7.4	Avg. Vel. (ft/s)	4.82	10.72	4.06
Max Chl Dpth (ft)	20.08	Hydr. Depth (ft)	6.56	17.58	5.7
Conv. Total (cfs)	2407873	Conv. (cfs)	823310.6	1541629	42932.9
Length Wtd. (ft)	500	Wetted Per. (ft)	844.61	265.86	62.51
Min Ch El (ft)	6941.22	Shear (lb/sq ft)	0.43	1.15	0.36
Alpha	1.49	Stream Power (lb/ft s)	2.07	12.31	1.46
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)	663.22	843.63	31.53
C & E Loss (ft)	0.09	Cum SA (acres)	145.86	95.73	6.47

Plan: Reach #1	Reach #1 RS: 9	Profile: PF 1			
E.G. Elev (ft)	6954.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.45	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6950.71	Reach Len. (ft)	525	500	475
Crit W.S. (ft)	6950.71	Flow Area (sq ft)	2953.78	3309.53	149.66
E.G. Slope (ft/ft)	0.004141	Area (sq ft)	2953.78	3309.53	149.66
Q Total (cfs)	78000	Flow (cfs)	20670.12	56232.92	1096.96
Top Width (ft)	1015.26	Top Width (ft)	720.29	265	29.97
Vel Total (ft/s)	12.16	Avg. Vel. (ft/s)	7	16.99	7.33
Max Chl Dpth (ft)	14.99	Hydr. Depth (ft)	4.1	12.49	4.99
Conv. Total (cfs)	1212181	Conv. (cfs)	321229.9	873903.8	17047.7
Length Wtd. (ft)	508.39	Wetted Per. (ft)	720.46	265.86	31.59
Min Ch El (ft)	6935.72	Shear (lb/sq ft)	1.06	3.22	1.22
Alpha	1.5	Stream Power (lb/ft s)	7.42	54.67	8.98
Frctn Loss (ft)	1.82	Cum Volume (acre-ft)	197.74	525.89	12.49
C & E Loss (ft)	0.4	Cum SA (acres)	71.78	74.44	3.25

Plan: Reach #1	Reach #1 RS: 8	Profile: PF 1			
E.G. Elev (ft)	6949.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.12	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6947.41	Reach Len. (ft)	525	500	475
Crit W.S. (ft)	6945.9	Flow Area (sq ft)	4420.67	3097.33	126.63
E.G. Slope (ft/ft)	0.003111	Area (sq ft)	4420.67	3097.33	126.63
Q Total (cfs)	78000	Flow (cfs)	33565.2	43673.84	760.96
Top Width (ft)	1062.47	Top Width (ft)	769.9	265	27.56
Vel Total (ft/s)	10.2	Avg. Vel. (ft/s)	7.59	14.1	6.01
Max Chl Dpth (ft)	14.19	Hydr. Depth (ft)	5.74	11.69	4.59
Conv. Total (cfs)	1398365	Conv. (cfs)	601748.6	782973.8	13642.3
Length Wtd. (ft)	509.68	Wetted Per. (ft)	770	265.86	29.05
Min Ch El (ft)	6933.22	Shear (lb/sq ft)	1.12	2.26	0.85
Alpha	1.31	Stream Power (lb/ft s)	8.47	31.91	5.09
Frctn Loss (ft)	1.65	Cum Volume (acre-ft)	153.3	489.12	10.98
C & E Loss (ft)	0.03	Cum SA (acres)	62.8	71.4	2.94

Plan: Reach #1	Reach #1 RS: 7	Profile: PF 1			
E.G. Elev (ft)	6947.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.38	Wt. n-Val.	0.035	0.031	0.037
W.S. Elev (ft)	6945.48	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6945.48	Flow Area (sq ft)	4669.08	3248.46	142.84
E.G. Slope (ft/ft)	0.003357	Area (sq ft)	4669.08	3248.46	142.84
Q Total (cfs)	78000	Flow (cfs)	28541.71	48530.1	928.19
Top Width (ft)	1486.18	Top Width (ft)	1191.9	265	29.27
Vel Total (ft/s)	9.68	Avg. Vel. (ft/s)	6.11	14.94	6.5
Max Chl Dpth (ft)	14.76	Hydr. Depth (ft)	3.92	12.26	4.88
Conv. Total (cfs)	1346134	Conv. (cfs)	492576.3	837538.4	16018.8
Length Wtd. (ft)	500	Wetted Per. (ft)	1191.95	265.86	30.86
Min Ch El (ft)	6930.72	Shear (lb/sq ft)	0.82	2.56	0.97
Alpha	1.63	Stream Power (lb/ft s)	5.02	38.26	6.3
Frctn Loss (ft)	1.64	Cum Volume (acre-ft)	98.52	452.7	9.52
C & E Loss (ft)	0.04	Cum SA (acres)	50.98	68.35	2.63

Plan: Reach #1	Reach #1 RS: 0	Profile: PF 1			
E.G. Elev (ft)	6915.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	9.02	Wt. n-Val.	0.035	0.03	0.04
W.S. Elev (ft)	6906.81	Reach Len. (ft)	400	400	400
Crit W.S. (ft)	6909.53	Flow Area (sq ft)	68.12	3182.39	4.54
E.G. Slope (ft/ft)	0.023508	Area (sq ft)	68.12	3182.39	4.54
Q Total (cfs)	78000	Flow (cfs)	962.11	77014.88	23.02
Top Width (ft)	590.44	Top Width (ft)	20.22	565	5.22
Vel Total (ft/s)	23.96	Avg. Vel. (ft/s)	14.12	24.2	5.07
Max Chl Dpth (ft)	6.74	Hydr. Depth (ft)	3.37	5.63	0.87
Conv. Total (cfs)	508727.9	Conv. (cfs)	6275	502302.8	150.1
Length Wtd. (ft)	400	Wetted Per. (ft)	21.31	565.05	5.5
Min Ch El (ft)	6900.07	Shear (lb/sq ft)	4.69	8.27	1.21
Alpha	1.01	Stream Power (lb/ft s)	66.25	200.03	6.14
Frctn Loss (ft)	2.99	Cum Volume (acre-ft)	2.6	229.38	0.12
C & E Loss (ft)	1.13	Cum SA (acres)	0.82	47.36	0.17

Plan: Reach #1	Reach #1 RS: -1	Profile: PF 1			
E.G. Elev (ft)	6906.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.52	Wt. n-Val.	0.035	0.03	0.035
W.S. Elev (ft)	6902.31	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6903.47	Flow Area (sq ft)	51.24	4532.25	1.07
E.G. Slope (ft/ft)	0.015873	Area (sq ft)	51.24	4532.25	1.07
Q Total (cfs)	78000	Flow (cfs)	540.81	77456.09	3.1
Top Width (ft)	1020.07	Top Width (ft)	17.54	1000	2.53
Vel Total (ft/s)	17.01	Avg. Vel. (ft/s)	10.55	17.09	2.9
Max Chl Dpth (ft)	5.84	Hydr. Depth (ft)	2.92	4.53	0.42
Conv. Total (cfs)	619101.7	Conv. (cfs)	4292.5	614784.6	24.6
Length Wtd. (ft)	500	Wetted Per. (ft)	18.48	1000.02	2.67
Min Ch El (ft)	6896.47	Shear (lb/sq ft)	2.75	4.49	0.4
Alpha	1	Stream Power (lb/ft s)	28.99	76.75	1.15
Frctn Loss (ft)	7.65	Cum Volume (acre-ft)	2.05	193.96	0.09
C & E Loss (ft)	1.35	Cum SA (acres)	0.65	40.17	0.13

Plan: Reach #1	Reach #1 RS: -2	Profile: PF 1			
E.G. Elev (ft)	6901.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.54	Wt. n-Val.	0.035	0.03	0.035
W.S. Elev (ft)	6898.51	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6898.54	Flow Area (sq ft)	64.2	6039.72	3.57
E.G. Slope (ft/ft)	0.007777	Area (sq ft)	64.2	6039.72	3.57
Q Total (cfs)	78000	Flow (cfs)	511.32	77477.84	10.84
Top Width (ft)	1224.26	Top Width (ft)	19.63	1200	4.63
Vel Total (ft/s)	12.77	Avg. Vel. (ft/s)	7.98	12.83	3.04
Max Chl Dpth (ft)	6.54	Hydr. Depth (ft)	3.27	5.03	0.77
Conv. Total (cfs)	884493.1	Conv. (cfs)	5798.2	878571.9	123
Length Wtd. (ft)	500	Wetted Per. (ft)	20.69	1200.02	4.88
Min Ch El (ft)	6891.97	Shear (lb/sq ft)	1.51	2.44	0.36
Alpha	1	Stream Power (lb/ft s)	12	31.35	1.08
Frctn Loss (ft)	3.88	Cum Volume (acre-ft)	1.39	133.29	0.06
C & E Loss (ft)	0	Cum SA (acres)	0.44	27.55	0.09

Plan: Reach #1	Reach #1 RS: 15	Profile: PF 1			
E.G. Elev (ft)	6962.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.97	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6961.05	Reach Len. (ft)	500	500	500
Crit W.S. (ft)		Flow Area (sq ft)	6457.33	4723.95	360.88
E.G. Slope (ft/ft)	0.000818	Area (sq ft)	6457.33	4723.95	360.88
Q Total (cfs)	78000	Flow (cfs)	31540.48	45115.11	1344.42
Top Width (ft)	1124.27	Top Width (ft)	799.97	265	59.3
Vel Total (ft/s)	6.76	Avg. Vel. (ft/s)	4.88	9.55	3.73
Max Chl Dpth (ft)	20.33	Hydr. Depth (ft)	8.07	17.83	6.09
Conv. Total (cfs)	2727750	Conv. (cfs)	1103007	1577727	47016
Length Wtd. (ft)	500	Wetted Per. (ft)	800.12	265.86	62.27
Min Ch El (ft)	6940.72	Shear (lb/sq ft)	0.41	0.91	0.3
Alpha	1.37	Stream Power (lb/ft s)	2.01	8.66	1.1
Frctn Loss (ft)	0.64	Cum Volume (acre-ft)	594.38	789.78	27.5
C & E Loss (ft)	0.18	Cum SA (acres)	136.43	92.69	5.79

Plan: Reach #1	Reach #1 RS: 14	Profile: PF 1			
E.G. Elev (ft)	6961.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.81	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6958.39	Reach Len. (ft)	500	500	500
Crit W.S. (ft)		Flow Area (sq ft)	2057.67	4152.02	260.09
E.G. Slope (ft/ft)	0.002297	Area (sq ft)	2057.67	4152.02	260.09
Q Total (cfs)	78000	Flow (cfs)	15270.31	61022.64	1707.05
Top Width (ft)	599.28	Top Width (ft)	294.78	265	39.5
Vel Total (ft/s)	12.06	Avg. Vel. (ft/s)	7.42	14.7	6.56
Max Chl Dpth (ft)	18.17	Hydr. Depth (ft)	6.98	15.67	6.58
Conv. Total (cfs)	1627535	Conv. (cfs)	318627.6	1273288	35619.1
Length Wtd. (ft)	500	Wetted Per. (ft)	295.4	265.86	41.64
Min Ch El (ft)	6940.22	Shear (lb/sq ft)	1	2.24	0.9
Alpha	1.24	Stream Power (lb/ft s)	7.41	32.91	5.88
Frctn Loss (ft)	1.08	Cum Volume (acre-ft)	545.51	738.84	23.93
C & E Loss (ft)	0.18	Cum SA (acres)	130.15	89.65	5.22

Plan: Reach #1	Reach #1 RS: 13	Profile: PF 1			
E.G. Elev (ft)	6959.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.22	Wt. n-Val.	0.035	0.03	0.037
W.S. Elev (ft)	6957.73	Reach Len. (ft)	513	500	487
Crit W.S. (ft)	6955.86	Flow Area (sq ft)	3882.25	4108.8	253.99
E.G. Slope (ft/ft)	0.002018	Area (sq ft)	3882.25	4108.8	253.99
Q Total (cfs)	78000	Flow (cfs)	20236.94	56213.35	1549.71
Top Width (ft)	1163.02	Top Width (ft)	858.96	265	39.06
Vel Total (ft/s)	9.46	Avg. Vel. (ft/s)	5.21	13.68	6.1
Max Chl Dpth (ft)	18	Hydr. Depth (ft)	4.52	15.5	6.5
Conv. Total (cfs)	1736342	Conv. (cfs)	450490.4	1251354	34497.8
Length Wtd. (ft)	502.9	Wetted Per. (ft)	859.15	265.86	41.17
Min Ch El (ft)	6939.72	Shear (lb/sq ft)	0.57	1.95	0.78
Alpha	1.59	Stream Power (lb/ft s)	2.97	26.64	4.74
Frctn Loss (ft)	1.43	Cum Volume (acre-ft)	511.42	691.43	20.98
C & E Loss (ft)	0.16	Cum SA (acres)	123.52	86.6	4.77

Plan: Reach #1	Reach #1 RS: 6	Profile: PF 1			
E.G. Elev (ft)	6945.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.83	Wt. n-Val.	0.035	0.032	0.039
W.S. Elev (ft)	6940.6	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6942.07	Flow Area (sq ft)	2320.49	3280.69	146.42
E.G. Slope (ft/ft)	0.005904	Area (sq ft)	2320.49	3280.69	146.42
Q Total (cfs)	78000	Flow (cfs)	13355.29	63459.53	1185.18
Top Width (ft)	1284.65	Top Width (ft)	990	265	29.64
Vel Total (ft/s)	13.57	Avg. Vel. (ft/s)	5.76	19.34	8.09
Max Chl Dpth (ft)	14.88	Hydr. Depth (ft)	2.34	12.38	4.94
Conv. Total (cfs)	1015158	Conv. (cfs)	173817.1	825916.3	15424.9
Length Wtd. (ft)	500	Wetted Per. (ft)	990.14	265.86	31.24
Min Ch El (ft)	6925.72	Shear (lb/sq ft)	0.86	4.55	1.73
Alpha	1.69	Stream Power (lb/ft s)	4.97	87.97	13.98
Frctn Loss (ft)	2.18	Cum Volume (acre-ft)	58.41	415.23	7.86
C & E Loss (ft)	0.25	Cum SA (acres)	38.46	65.31	2.29

Plan: Reach #1	Reach #1 RS: 5	Profile: PF 1			
E.G. Elev (ft)	6941.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	6.55	Wt. n-Val.	0.035	0.032	0.039
W.S. Elev (ft)	6935.38	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6937.54	Flow Area (sq ft)	1482.54	3222.85	140.02
E.G. Slope (ft/ft)	0.007563	Area (sq ft)	1482.54	3222.85	140.02
Q Total (cfs)	78000	Flow (cfs)	7006.94	69729.19	1263.87
Top Width (ft)	1316.71	Top Width (ft)	1022.73	265	28.98
Vel Total (ft/s)	16.1	Avg. Vel. (ft/s)	4.73	21.64	9.03
Max Chl Dpth (ft)	14.66	Hydr. Depth (ft)	1.45	12.16	4.83
Conv. Total (cfs)	896893.8	Conv. (cfs)	80570.3	801790.7	14532.8
Length Wtd. (ft)	500	Wetted Per. (ft)	1023.63	265.86	30.55
Min Ch El (ft)	6920.72	Shear (lb/sq ft)	0.68	5.72	2.16
Alpha	1.63	Stream Power (lb/ft s)	3.23	123.84	19.53
Frctn Loss (ft)	3.33	Cum Volume (acre-ft)	36.58	377.91	6.21
C & E Loss (ft)	0.17	Cum SA (acres)	26.91	62.27	1.95

Plan: Reach #1	Reach #1 RS: 4	Profile: PF 1			
E.G. Elev (ft)	6937.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	7.77	Wt. n-Val.	0.035	0.032	0.039
W.S. Elev (ft)	6929.87	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6932.48	Flow Area (sq ft)	1031.65	3086.98	125.55
E.G. Slope (ft/ft)	0.00925	Area (sq ft)	1031.65	3086.98	125.55
Q Total (cfs)	78000	Flow (cfs)	5018.11	71773.3	1208.6
Top Width (ft)	1084.8	Top Width (ft)	792.36	265	27.45
Vel Total (ft/s)	18.38	Avg. Vel. (ft/s)	4.86	23.25	9.63
Max Chl Dpth (ft)	14.15	Hydr. Depth (ft)	1.3	11.65	4.57
Conv. Total (cfs)	810992.6	Conv. (cfs)	52175	746251.4	12566.2
Length Wtd. (ft)	500	Wetted Per. (ft)	793.46	265.86	28.93
Min Ch El (ft)	6915.72	Shear (lb/sq ft)	0.75	6.71	2.51
Alpha	1.48	Stream Power (lb/ft s)	3.65	155.9	24.12
Frctn Loss (ft)	4.17	Cum Volume (acre-ft)	22.15	341.69	4.69
C & E Loss (ft)	0.12	Cum SA (acres)	16.49	59.23	1.63

Plan: Reach #1	Reach #1 RS: -3	Profile: PF 1			
E.G. Elev (ft)	6896.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	3	Wt. n-Val.	0.035	0.03	0.035
W.S. Elev (ft)	6893.62	Reach Len. (ft)	500	500	500
Crit W.S. (ft)	6894.02	Flow Area (sq ft)	56.75	5568.04	1.98
E.G. Slope (ft/ft)	0.010203	Area (sq ft)	56.75	5568.04	1.98
Q Total (cfs)	78000	Flow (cfs)	496.86	77497.47	5.67
Top Width (ft)	1221.91	Top Width (ft)	18.46	1200	3.45
Vel Total (ft/s)	13.86	Avg. Vel. (ft/s)	8.75	13.92	2.86
Max Chl Dpth (ft)	8.15	Hydr. Depth (ft)	3.07	4.64	0.57
Conv. Total (cfs)	772195.1	Conv. (cfs)	4918.9	767220.1	56.1
Length Wtd. (ft)	500	Wetted Per. (ft)	19.46	1200.02	3.63
Min Ch El (ft)	6887.47	Shear (lb/sq ft)	1.86	2.96	0.35
Alpha	1	Stream Power (lb/ft s)	16.27	41.14	0.99
Frctn Loss (ft)	4.39	Cum Volume (acre-ft)	0.69	66.67	0.03
C & E Loss (ft)	0.05	Cum SA (acres)	0.22	13.77	0.05

Plan: Reach #1	Reach #1 RS: -4	Profile: PF 1			
E.G. Elev (ft)	6892.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.54	Wt. n-Val.	0.035	0.03	0.035
W.S. Elev (ft)	6889.52	Reach Len. (ft)			
Crit W.S. (ft)	6889.53	Flow Area (sq ft)	64.33	6047.93	3.6
E.G. Slope (ft/ft)	0.007742	Area (sq ft)	64.33	6047.93	3.6
Q Total (cfs)	78000	Flow (cfs)	511.59	77477.46	10.95
Top Width (ft)	1224.3	Top Width (ft)	19.65	1200	4.65
Vel Total (ft/s)	12.75	Avg. Vel. (ft/s)	7.95	12.81	3.04
Max Chl Dpth (ft)	6.55	Hydr. Depth (ft)	3.27	5.04	0.77
Conv. Total (cfs)	886500.4	Conv. (cfs)	5814.4	880561.6	124.5
Length Wtd. (ft)		Wetted Per. (ft)	20.71	1200.02	4.9
Min Ch El (ft)	6882.97	Shear (lb/sq ft)	1.5	2.44	0.36
Alpha	1	Stream Power (lb/ft s)	11.94	31.2	1.08
Frctn Loss (ft)	4.42	Cum Volume (acre-ft)			
C & E Loss (ft)	0.14	Cum SA (acres)			