

Impact Mitigation Analysis

Mitigation of Impacts to Adjacent Properties

Adverse impacts from vibration, noise, glare, blowing or flowing materials, or odors shall be mitigated to ensure minimal impacts to adjacent properties and travelers.”

- **Vibration Impacts:**

- There are two potential sources of vibration impacts, blasting and operational equipment, such as dozers, backhoes, and crushers.
 - ✓ No blasting will occur at the proposed operation.
 - ✓ The ground vibration from tracked equipment is minimal since the substrate will be sand. The sandy nature of the site will absorb vibration from such equipment.
 - ✓ The processing will not include any large crushing equipment. The crushing which may occur on-site, if needed, will use a typical sand and gravel crusher and screening system. Little vibration is transmitted from the equipment to the ground. Since the substrate is sandy it will absorb any such vibration.

- **Noise Impacts:**

- Mining operations create noise from a number of sources, to include haul trucks, excavation equipment, and processing equipment. Safety related sources of noise include backup alarms or horns, required by Federal safety regulations.
- Noise Mitigation Practices, includes but is not limited to:
 - ✓ Hours of operation: The proposed mining operation will only operate from 7 am to 7 pm, six days per week, as needed. (Only during daylight hours within that timeframe.)
 - ✓ Placement of topsoil stockpiles may be used to reduce noise and visual impacts.
 - ✓ Once the initial pit cut is achieved, operations may be moved below the surface elevation into the active pit. Relocation into the operational pit will help reduce operational noise.
 - ✓ The highway haul trucks point(s) of access will be away from residential areas and will help reduce the noise impact. (Please see the Mine Plan Map which shows the point of access mid-way along Sanborn Road, well away from the housing development on the west side of the proposed mining operation.

- **Glare Impacts:**

This is proposed to be a daytime mining operation. Therefore, there will be no operational lighting needed. If night operations should be

needed, we will return to the County to properly address operational lighting needs and impacts.

➤ **Blowing or Flowing Materials, or Odor Impacts:**

- ✓ We do not anticipate impacts from materials of items which might produce odors. This is a sand and gravel operation which will use water in its processing facility. In addition, we will secure portable toilets for use on-site. A commercial provider will service the portable toilets on a regular basis. In addition, the site will be gated to prevent illegal dumping.
- ✓ There should not be any “flowing materials”. It is true the fine sands and reject fine soil may flow somewhat. All such minor material movement will be contained within the active pit.
- ✓ Fugitive dust is the primary air pollutant. We will have in-place a fugitive dust control plan as part of our air quality permit. Fugitive dust control plans may include periodic watering to control fugitive dust from the roads and spray controls (as may be needed) for the crushing and screening operations, etc. It should be noted the pit roadways will be sand, or sand and gravel which should prevent significant generation of fugitive dust.

➤ **Impacts to Trails and Open Space:**

Please see section below (**Supplemental Information**) which discussed trails and open space.

Reclamation of Visual and Environmental Impacts

Reclamation of adverse visual and other environmental impacts shall take place within a reasonable and specified time frame.”

• **Adverse Visual Impact Reclamation:**

In a general sense, mining is not a long-term activity and varies in length from a few months (highway borrow site to longer term mining operations such as Climax Mine near Leadville, Colorado. In this case, the expected life of the mine is approximately between 53 and 80 years. During this time period, the site will be mined in a number of Phases. What they all have in common is as a mine or phase is completed, reclamation will begin. An operator has 5 years to complete reclamation for the phase or for the entire operation, if not mined in phases. A reclamation plan must specify a post mining land use which has the concurrence of the local county in which the mine is to be located. Once an operator notifies the DRMS that mining is complete at a mine site or phase of mining, the operator initiates site reclamation in order to meet the regulatory requirement to complete reclamation. Therefore, any visual impacts will be addressed shortly after mining in a phase is complete. In addition, once a pit (phase) is initially opened, the operations will be below grade and will have only limited visibility. Also, where possible, topsoil

stockpiles will be places to limit visibility to the operation from certain locations around the perimeter of a phase.

- Environmental Impact Mitigation:

There are a number of environmental impacts possible from a typical sand and gravel mining operation. Below are what we believe are the potential environmental issues and how we intend to mitigate impacts. Environment impacts are determined by Federal, State, and local (El Paso County) regulations. For example, typical county environmental impacts are noise, light, and visual impacts.

- Air Pollution:

- ✓ Section 6.3.1 of the El Paso County Land Development Code requires an operator comply with County, State and Federal air quality standards. We therefore request that the County review process and application approval occur pending approval of our air quality permit(s).

- ❖ By definition, this is not a construction activity, rather it is a mining operation.
- ❖ In a typical sand and gravel mining operation, such as the proposed operation, the expected air pollutant is fugitive dust.
- ❖ There will be some emissions from gas and diesel equipment (trucks and mining equipment). Engine emissions from equipment and fugitive dust are subject to regulation by the State Air Quality Control Division (AQCD). The AQCD will review the Operation's Air Pollution Emission Notice (APEN) and determine what operational controls will be required.
- ❖ Air quality impacts, therefore, will be mitigated by the requirements of the Air Quality Permit(s) issued by the AQCD. Prior to beginning any on-site mining operations, Ellicott Sand and Gravel will provide the documents as required by Section 6.3.1.(B)(2)(b) shortly after approval by the Colorado Air Quality Control Division.

- ✓ **We therefore suggest, since this is not a typical development, it may not be necessary for the County to apply the provision of Section 6.3.1.(B)(3) for the above reasons and waive this provision.**

- Section 6.3.1(C)(5)(a) and (b) Haul Trucks and Haulage Equipment:

- ✓ (a) Deposition of Dirt and Mud on Roads:
 - ❖ This is a sand and gravel operation. Therefore, dirt and mud should be minimal. The operational surface will be sand and or sand and gravel.
 - ❖ The access point(s) will be surfaced with pit run material (sand and/or gravel).

Cannot grant approval without approval of the air quality permit

Include a waiver request in LOI

- ✓ (b) Particulates Emission in Transit:
 - All loads will be covered.
- (6) Open Burning:
 - There will be no open burning.
- Impacts to Water Quality:
 - ✓ Ground Water Quality:
 - ❖ The operation is designed to not intercept the ground water and will stay at least 10 feet about the regional ground water elevation. "...drill logs for the 24 listed wells indicate the ground water table on the permit (area) is in excess of 80 feet below the surface except in State VI where a single well the depth is listed as 61feet." (Ellicott Sand and Gravel, DRMS approved Permit Application.)
 - ❖ No toxic or other hazardous material will be on site in reportable quantities.
 - All other solid and liquid waste will be disposed off-site at an approved facility.
 - We will contract with a commercial provider to handle and provide Port-a-potty's.
 - ❖ If diesel fuel is stored onsite, the storage facility will either be double walled with barriers to prevent vehicle strike, or a berm to contain the capacity of the fuel tank plus the appropriate design storm event. Other than the possibility of diesel fuel, the only other petroleum products which may impact ground water (and surface water) are antifreeze, hydraulic fluid and grease and oils. We will clean up spills of petroleum products which meet the reportable quantities limits and dispose off-site at an approved facility.
 - ✓ Surface Water:
 - ❖ This will be a non-discharging facility. Therefore, a Water Quality Control Division (WQCD) Discharge Permit should not be required. We will, however, comply with requirements of the WQCD in the event the WQCD determined a discharge permit is required.
 - ❖ We may need to obtain a Stormwater Discharge Permit. Regardless, we intend to have a Stormwater Management Plan (SWMP). We will implement the SWMP as a part of our Best Management Practices (BMP). The "Ellicott Sand and Gravel's Erosion and Sediment Quality Control Permit Application" will be provided as part of the Development Plan.
 - ❖ The ephemeral drainages will not be disturbed by mining.
 - ✓ With implementation of our SWMP, coupled with our commitment to stay at least 10 feet above the regional ground water table plus the

other commitments noted above, and that no ephemeral drainages will be disturbed by mining, we believe, will sufficiently mitigate any potential impacts to surface and ground water.

➤ Impacts from Hazardous Waste:

As discussed above, other than the possibility of diesel fuel, antifreeze, hydraulic fluid and grease and oils, no hazardous or toxic substances shall be on-site. The control of the above petroleum products will be as addressed above.

➤ Noxious Weed Mitigation:

The approval of the DRMS Permit Application contains a typical Noxious Weed Control Plan and was sent as a separate file.

➤ 6.3.2.(B) Drainage Report (Soil Erosion Control):

There are two types of soil erosion, rainfall runoff and wind erosion.

✓ Wind Erosion: Wind erosion is likely given the sandy nature of the proposed mine site. Wind erosion and also fugitive dust, will be controlled by the following means:

❖ Dust, primarily fugitive dust, will have the appearance of soil wind erosion. Fugitive dust will be controlled under the provision of the approved Air Quality Permit, likely through road watering and some type of controls on the crushing and screening operations and the drop/transfer points of the conveyor system. In addition, the processing operation will occasionally be moved to where mining is occurring to reduce travel distance from the in-bank resource and the processing facility. Doing so will reduce the potential for mining and haul equipment fugitive dust generation.

❖ Loss of soil and subsoil from bare, disturbed areas should be minimal due to the natural moisture in the soil and the active removal of in-bank raw sand and gravel product.

✓ Rainfall Runoff Erosion: This is a non-discharging facility and rainfall runoff does not report to any public or private sanitary or stormwater sewer system.

❖ Since this is a non-discharging facility, most soil erosion will be internal to the operation and should not affect off-site drainage ways.

❖ Significant topsoil, soil erosion should not occur on areas which have not been disturbed since such areas are covered by natural, perennial grasses and other vegetation. Once an area is ready for mining, the available topsoil will be salvaged and placed in topsoil stockpiles.

- ❖ Topsoil stockpiles will be seeded with the approved, seed mix, once the pile reaches its intended size. Seeding the topsoil stockpiles will ensure loss of soil due to erosion is mitigated.

- **Water Information:** *(The following water information is taken from the original Division of Reclamation and Mining, (DRMS) 112 Regular Permit Application and various documents on file with El Paso County. Some of the information from the DRMS Permit Application is paraphrased, other sections are direct quotes and so noted. The information taken from El Paso County available documents are so noted.)*

- The DRMS consulted with the DWR due to potential impacts to Black Squirrel and Big Spring Creeks. The Division of Water Resources response stated the proposed mining operation is within the Upper Black Squirrel Creek Designated Basin. The Colorado Ground Water Commission (GWC) will require storm water runoff captured by the various phased pits be released with 72 hours of a storm water event. They are also concerned the excavation would intercept ground water from the alluvial aquifer.
 - ✓ In response to the above concerns, Ellicott Sand and Gravel (ESG) will stay at least 10 feet above the regional alluvial ground water table. This will ensure no ground water is exposed.
 - ✓ In addition, in order to address the collection of tributary storm water, ESC has proposed the following. If the proposed mitigation does not result in ESC's ability to meet the 72-hour tributary storm water retention limit, ESC will secure a Gravel Pit Well Permit to account for instances where the 72 tributary storm water retention criteria is exceeded.
 - "As suggested by the Board of the Upper Black Squirrel Creek Designated Basin and the Colorado Ground water Commission, pumping would not be practical due to the high absorption (*infiltration rate*) of Black Squirrel Creek. "...it would be better to let the water be absorbed (*infiltrate*) into the ground and any (*tributary storm water*) left after the initial 72 hours would best be offset by not pumping one of the basin wells owned by the Schubert Ranch.)"
 - Note, the floor the mined-out pits will be consist of at least 10 feet of sandy material.
 Note: *This came from one of the upper Squirrel Creek Wager Basin Board members. The rational is that if you pump the basin well to make up for the evaporative losses you are just circulating the water. It is best if you just don't pump that well and leave the water in the ground, you then can claim replacement credit for the lack of use. Since the well in question is not an augmentation well, but rather a municipal well, it can be pumped and used for makeup water as needed.*
 - ✓ From the Ellicott Valley Comprehensive Plan, Map #2, Approximate Aquifer Limits: The proposed mining operation lies within the Denver Ground Water

Basin, and as stated above, so do the Black Squirrel Creek and Big Spring Creek regional alluvial aquifers. (Big Spring Creek joins Black Squirrel Creek just above Sanborn Road within the proposed mining operation.)

- ✓ “It is estimated that about 9,000-acre feet of water are annually recharged to alluvial aquifer which underlies the planning area... Presently, essentially all of this alluvial water is appropriated for agricultural uses or external sale.”
- ✓ “On average, there is also about 60-acre feet per acre of water in storage in the various bed rock aquifers under the planning area...Unlike alluvial supplies, this water is legally considered to be non-renewable.” (Page 72, Ellicott Valley Comprehensive Plan)

➤ Water Use:

- ✓ “We estimate the ...water uses at the mine ...will require 12.0 ac-ft per year.”
The source of water for use during mine operations will be from the Schubert Ranch. (Page 20, Exhibit G, 112 C Regular Operation Permit Application). Most of the water used for dust control will be used on haul roads.” (Page 8, Exhibit D, 112 C Regular Operation Permit Application).
- ✓ The Schubert Ranch has water rights permitted for industrial uses, please see the Mineral and Natural Resource Extraction Application. No water is anticipated for mine site reclamation.

➤ From the ESG Adequacy Response to the DRMS Adequacy Comments 01:

“Division of Water Resources (rec. 2/21/19)

Ellicott Sand & Gravel understands the DWR’s comments and agree with the three points they have raised. The application packet contains commitments to comply with each.

- 1 – The floor of the mine and mining will stay at least 10 feet above the groundwater table.
- 2 – Water used for industrial purposes will come for (*from*) a source approved for that use.
- 3 – Stormwater runoff intercepted by this operation will be released to the stream system within the time required by DWR or a Temporary Substitute Supply Plan will be obtained to cover the evaporation.”

➤ Stormwater:

- ✓ The Operation is proposed to be a dry mining operation. As stated above, the proposed floor of the various mine pits will be at least 10 feet above the average ground water elevation.
- ✓ Any storm water which falls on the site will be allowed to infiltrate in to the sandy floor of the pit. As stated above, this is in conformance with the recommendation

of the Board of the Upper Black Squirrel Creek Designated Basin and the Colorado Ground water Commission.

- ✓ In addition, "...all off site storm water runoff will be diverted around the permit area." (Page 20, Exhibit G, 112 C Regular Operation Permit Application)
- ✓ The Mineral and Natural Resource Extraction Application, Attachment I, contains a Stormwater Management Plan.

- **Impacts to Surrounding Ground Water Wells:**

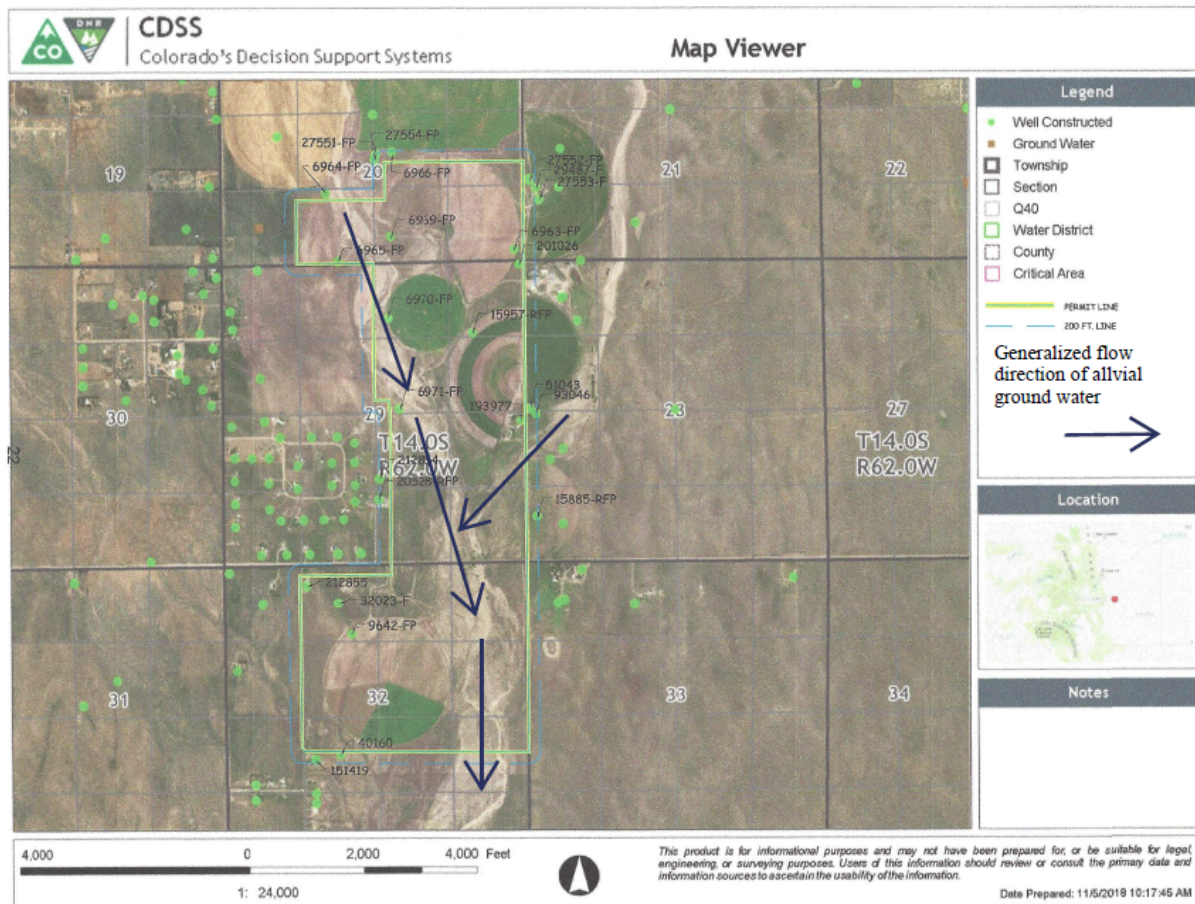
Given the commitments Ellicott Sand and Gravel has proposed, we believe there should be no significant impacts to surrounding ground water wells or to the users ground water quality. We offer the following to help demonstrate that no significant impacts to the surrounding ground water wells should occur:

- Ellicott Sand and Gravel will not mine closer than 10 feet to the average ground water elevation. The mining operation will be a dry mining operation.
- Ellicott Sand and Gravel will practice good housekeeping in dealing with any reportable spills of petroleum products such as fuels, oils and hydraulic fluids. A reportable spill is any spill of sufficient amount which requires a response based on a regulatory agency regulation.
- No other toxic or hazardous chemicals will be stored on-site.
- Any reportable spills, if they were left in-place and escaped the limits of the mining operation, would likely follow the alluvial ground water flow which is in a down gradient direction, generally away from the adjacent ground water wells. Please see following figure. (We intend to clean-up and report any regulated spill, in conformance with State and Federal regulatory requirements.)

Illustration of General Direction of Alluvial Ground Water Flow Direction

EXHIBIT G

WATER (CONT)



- Determine the degree to which any proposed land use may produce on- or off-site fugitive dust problems and design appropriate solutions for mitigation of any problem:

As part of the permits necessary to open a commercial sand and gravel mining operation, the operator must obtain and comply with a Colorado Department of Public Health and Environment, Air Quality Control

Division's Air Quality Permit. The permit is designed to address fugitive dust impacts and to mitigate those impacts.

- ✓ *Evaluate all land use proposals in the planning area in terms of both their individual and potential collective impacts on the alluvial aquifers which provide the area with its water supply:*
 - *To the degree possible under its land use authority the County should discourage any use of land or water which would adversely affect either the quantity or quality of groundwater in the planning area:*
 - As stated in the Extraction of Commercial Mineral Deposits application, and in the approved Division of Reclamation, Mining and Safety approved permit application, we are committed to staying at least ten (10) feet above the prevailing ground water elevation. In addition, any petroleum spills in reportable quantities associated with use of the mining equipment will be cleaned up and disposed off-site at an approved facility. No toxic or acidic materials in regulated quantities will be exposed or brought onto the site.
 - This will be a non-discharging facility and will include an erosion control plan and a Stormwater Management Plan, as required.
 - *Encourage all developers to coordinate with the Upper Black Squirrel Water District, the State Engineer, the United States Geological Survey, applicable special districts and the County Hydrologist to ensure that water supplies are available and protected:*

These concerns are addressed in the "Letter of Intent", Water Information section.
 - *Encourage the eventual use of local water resources by uses within the planning area:*

With the exception of the water retained in the product sold off-site, all ground water used for processing operations and fugitive dust control will be used on-site. Potable water will be brought onto the site for domestic use.
 - *Support development which integrates water conservation practices which include on-site handling of runoff.*

We estimate only 12-acre feet of ground water will be needed annually for mine operations and fugitive dust control. Most stormwater runoff will be internal to the operation and will infiltrate into the sandy floor of the active pit. Once a mine phase is finished, reclamation of that phase will begin. Once a phase is full reclaimed, we expect little runoff from that phase.
 - *Encourage individual developers to coordinate with adjacent property owners in the development and implementation of master drainage basin studies:*

Ellicott Sand and Gravel is not the property owner. We will discuss with the proposed mine site property owner if he/she wishes to partner with other property owners for such studies.

- *Visual and historical features:*
 - This issue is addressed in the Mineral and Natural Resource Extraction Application. In summary, there are no known historical features.
 - There should be minimal visual impact issues. Once the operation is underway, most of the activity will be below grade. Once mining is complete in a Phase, the Phase will be reclaimed. The entire mining operation is of limited duration.
- *Protect views to the Front Range, major ridge lines and the Upper Black Squirrel Valley:*

Since the operation is proposed to be below grade once operations are underway and that topsoil stockpiles will be placed to help mitigate any visual impact, we believe this concern is adequately addressed.
- *Preserve the open rural character of the Valley by clustering development, maintaining some open space and providing corridors:*
 - Out of the total 733.7 acres proposed as part of the total permit boundary, roughly, only 513.5 acres will be affected. The remaining 220.2 acres will be a buffer which could be considered open space and corridors.
 - It should be remembered the property is privately owned and its future use as open space and/or corridors is at the discretion of property owner.
- *Create new and diversified local visual environments by encouraging compatibility of design and landscaping:*
 - Since this is a State approved mining operation with an approved reclamation plan, and a reclamation bond sufficient to complete site reclamation, we believe this concern is addressed.
 - In addition, the approved reclamation plan is compatible with the approved post mining land use which will be rangeland and wildlife habitat.
- *Buffer unsightly uses such as junk yards and mineral extraction operations through careful location, berming and screening:*
 - The DRMS permit approval includes specifically located topsoil stockpiles to act as visual berms.
 - Also, since essentially all of the proposed mineral extraction and processing operations will be below grade (once operations begin), the operations will be significantly out of sight.
 - Therefore, visual impacts will be mitigated.

- *Locate public facilities such as water tanks and substations as unobtrusively as possible and further minimize their impact through the use of screening, berming and natural colors:*
 - No public facilities are planned.
 - At this point in time, there will be processing equipment, mining equipment and scale.
 - As stated above, once operations begin in a Phase, all activity will essentially be below grade and blocked from view. Each Phase is expected to be up to 60 feet deep.
- *The special use will be in harmony with the character of the neighborhood, and will generally be compatible with the existing and allowable land uses in the surrounding area:*
 - The proposed mining operation will take place in an area zoned as A-35 which includes mineral extraction.
 - The proposed operational permit boundary will be offset from adjacent property boundaries by at least 200 feet. There will be an additional offset from the proposed permit boundary to the affected land boundary.
 - Further, once the operation is underway, the mining and processing activities will be below grade in the active pit area.
 - The adjoining properties are zoned A-35 and RR-5. The RR-5 zoning is a small development to the west, south and north of the proposed mining operation. Please see the Mineral and Natural Resource Extraction Application Map, item 7.
- *The impact of the special use does not overburden or exceed the capacity of public facilities and services, or, in the alternative, the special use application demonstrates that it will provide adequate public facilities in a timely and efficient manner:*
 - The mining operation will not utilize any public facilities other than the road system. Proposed road use is addressed in the Traffic Study.
 - The only public services which could be impacted are emergency responders. Given we are subject to Mine Safety and Health Administration (MSHA) regulations, every effort will be made to ensure that the operation is safe and will not require fire, ambulance or law enforcement first responders. As stated above, the fire protection district is the Ellicott Fire District.
- *The special use will not create unmitigated traffic congestion or traffic hazards in the area, and has adequate, legal access:*
 - The Traffic Study which is part of the Application for the Extraction of Mineral Deposit.
- *The special use will comply with all applicable local, state, and federal laws and regulations regarding air, water, light, or noise pollution:*
 - The special use will comply with all applicable local, state, and federal laws and regulations regarding air, water, light, or noise pollution.

please indicate that based on the TIS, that the use will not create unmitigated congestion or hazards, or how the TIS identifies and gives mitigation techniques. Reference does not provide justification.

Ellicott Sand and Gravel will comply with all applicable local, state, and federal laws and regulations regarding air, water, light and noise pollution.

- *The special use will not otherwise be detrimental to the public health, safety and welfare of the present or future residents of El Paso County:*
- With the approval and issuance of the requested Special Use permit and our commitment to comply with all applicable local, state and federal laws and regulations, we believe this requirement will be met.
- *The special use conforms or will conform to all other applicable County rules, regulation or ordinances:*

With the approval and issuance of the requested Special Use permit and our commitment to comply with all applicable local, state and federal laws and regulations, we believe we requirement will be met.

Appendix 1
100 Year Flood Plain Evaluation

PIKES PEAK REGIONAL FLOODPLAIN MANAGEMENT OFFICE

Floodplain Development Permit Application

Date

This application is required for authorization of any construction or modification within a designated floodplain. If you need further information regarding this application and regulations, call 719-327-2898. Submit application and attachments to the Regional Floodplain Administration at Pikes Peak Regional Building Department.

OFFICE USE ONLY

F.P. Permit #

Building Permit #

Property Owner

George Schubert, Schubert Ranches, Inc.

Address 1555 S. Baggett Road

City Calhan

State CO

Zip Code 80808-7808

email Unknown

Phone 719-237-2870

Contact George Schubert

Phone 719-237-2870

email Unknown

Project Address/Location Schubert Ranches, Inc.

Community # see report

Zip Code 80808

Creek Black Squirrel

Parcel # see report

FIRM # 08041C0830G,
08041C0840G

Base Flood Elevation see report

Contractor Ellicott Sand & Gravel, Christine Wilson

Phone Number 719-568-3164

email EllicottSandGravel@gmail.com

Fax Number None

Project Type: (Check all that apply to your project.)

- ☐ New Construction
☐ Addition/Remodel Repair

- ☐ Single Family
☐ Multi-Family
☐ Manufactured Unit
☐ Non-Residential Use

- ☐ Water course modification
☐ Fill/Excavation
☐ Bridge
☐ Culvert
☒ Other Sand mine

Project Description: The mine permit area is 733.7 acres, with a maximum of 561.7 acres disturbed by the mining operation over the life of the mine.

Requirements of construction plans include:

- 1. Label mean sea level elevations of proposed lowest floor. Flood proofing level must be noted on plans for new structures.
- 2. All structural elements must be designed to withstand the effects of flooding by an engineer licensed by the state of Colorado.
- 3. A state of Colorado licensed engineer must certify that construction in a floodway will not increase of flood elevations.
- 4. Plans must be drawn to scale and include applicable items (listed in box).

- ☒ Drawn to Scale
☒ Dimensions
☒ Elevations
☒ Located correctly on site
☒ All structures on plan
☒ Fill areas indicated
☐ Drainage Plan

☒ Preliminary Elevation Certificate
☒ Finished Elevation Certificate

Created by

Environment, Inc.
EME Solutions, Inc.

Office Use Only: FEMA Submittals

☐ CLOMR ☐ Approved Date

☐ CLOMR-F ☐ Approved Date

☐ LOMR ☐ Approved Date

☐ LOMR-F ☐ Approved Date

Pikes Peak Regional Building Department

Permit # 20017

FLOOD PLAIN DEVELOPMENT PERMIT

Date 25-Feb-2020

Owner Information
Name: SCHUBERT RANCHES, INC. Phone:

Address: 1555 S. BAGGETT ROAD
CALHAN, CO 80808
Attention: GEORGE SCHUBERT

Project Location
Address: ELLICOTT SAND & GRAVEL

Location/Directions: Ellicott Sand & Gravel

Contractor/Engineer: Ellicott Sand & Gravel, Christine Wilson Phone: (719) 568-3164

Project Description

Single Family Residential:	<input type="checkbox"/>	Addition/Remodel (<50%):	<input type="checkbox"/>
Multi-Family Residential:	<input type="checkbox"/>	Rehabilitation	<input type="checkbox"/>
Manuf. (Mobile Home):	<input type="checkbox"/>	Subst. (>50 Appraisal) Imprv:	<input type="checkbox"/>
Non-Residential	<input checked="" type="checkbox"/>	Fill	<input type="checkbox"/>
New Construction	<input type="checkbox"/>	Bridge/Culvert	<input type="checkbox"/>
Watercourse Modification:	<input type="checkbox"/>	Levee:	<input type="checkbox"/>
Project Cost: \$0.00		Structure Market Value: \$0.00	

Creek: black squirrel
Description of work: sand mine The mine permit area is 733.7 acres, with a maximum of 561.7 acres disturbed by the mining operation over the life of the mine.
No-Rise attached

Flood Hazard Data

Location: Flood Fringe
Base (1%) Flood Elevation: varies
Lowest Floor Elevation:
Floodproofing Level:
Source Document: 08041C0830G, 08041C0840G

Permit Action

Permit Granted (Y/N): Yes Variance Granted (Y/N): No
Action Comments: contractor is permit owner : Ellicott Sand & Gravel,
No-Rise attached

Compliance Section

Elevation Certificate: N Date:
LOMA: N Date: CLOMR: N Date: LOMR: N Date:
Site Inspection:
Preliminary Required: N Date:
Final Required: N Date:
Compliance Comments: No-Rise attached

APPROVED
FEB 27 2020
KIC
RBD Floodplain

Regional Floodplain Division:

Date 25-Feb-2020

NOTE: This permit expires twelve (12) months from the date it is issued.

**Schubert Ranch Sand Resource
Floodplain Modeling
Technical Memorandum
For
Black Squirrel Creek

El Paso County, Colorado**

Prepared For:
Christine Wilson
Ellicott Sand and Gravel

Prepared By:
EME Solutions, Inc.
15248 W. Ellsworth Drive
Golden, CO 80401
John L. Jankousky, P.E.
Phone: 303-279-1707

February 25, 2020

ZERO RISE CERTIFICATION FOR SCHUBERT RANCH SAND RESOURCE PROJECT

I certify that I am a duly qualified registered Professional Engineer licensed in the state of Colorado.

I certify that the proposed project Schubert Ranch Sand Resource Project as detailed on the construction drawings in Appendix E of this report will result in zero rise in the FEMA designated 100-year flood heights, and no increase in the 100-year discharge at published and unpublished cross sections of the current FEMA floodplain of Black Squirrel Creek as shown on FEMA maps 08041C0830G and 08041C0840G.

This certification is intended as proof of meeting the requirements set forth in the Pikes Peak Regional Building Code RBC313.20.1.

Please note that no "encroachment" into the floodplain or floodway is planned. The project involves only excavation of pits for the commercial extraction of sand within the floodplain and/or floodway. The 100-year floodplain extent will be changed in some locations. The floodplain will extend to the pit wall. This change will occur only on property leased by the permittee. This change will not impact any neighboring property owners.

I offer the following documentation in accordance with standard Engineering practice to support my findings:

Schubert Ranch Sand Resource Floodplain Modeling Technical Memorandum for Black Squirrel Creek. El Paso County, Colorado. EME Solutions, Inc. February 25, 2020.



John L. Jankousky, P.E.
Registered Professional Engineer
State of Colorado No. 30941

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Appendix B.	Water Surface Profiles
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Appendix D.	Standard Table 1 and Standard Table 2 from the HEC-RAS Outputs
Appendix E.	Construction Plans and Stream Bank and Pit Armoring Details

1 OBJECTIVES

To support a floodplain permit application for Ellicott Sand and Gravel (the Client) at the Schubert Ranch Sand Resource (the Site), EME Solutions, Inc. (EME) performed floodplain modeling of Black Squirrel Creek in El Paso County, Colorado. The purpose of the floodplain modeling is to support a zero-rise certification for the floodway and floodplains. A US Army Corps of Engineers (USACE) Hydrologic Engineering Center River Analysis System (HEC-RAS) modeling analysis for the 100-year flood was performed for Black Squirrel Creek. This modeling analysis was based on the current model approved by Federal Emergency Management Agency (FEMA). The modeling effort required altering certain river cross sections to include the proposed sand quarry pits.

2 HEC-RAS MODEL SETUP

This section describes the HEC-RAS model setup, including the source of the model, the cross sections relating to the Site, the topographic mapping used, and roughness coefficients.

2.1 Source of HEC-RAS Model

EME used the HEC-RAS model, which included hydrology, provided by the FEMA Engineering Library (FEMA 2020). The provided model was created as part of the FEMA RiskMap project for El Paso County, Colorado. Anderson Consulting Engineers, Inc. (ACE), under contract with the Colorado Water Conservation Board (CWCBC), performed detailed (Zone AE) hydraulic analyses and floodplain mapping for portions of the following streams in El Paso County: Black Squirrel Creek, Book Ranch, Ellicott Consolidated, Ellicott Consolidated, and Telephone Exchange (Anderson Consulting Engineers, 2013). The results of this modeling were incorporated into the Flood Insurance Rate Maps (FIRMs) for the area including the Site (FIRM Map Numbers 08041C0830G, Revised December 7, 2018 and 08041C0840G, Revised December 7, 2018) (FEMA 2018a, FEMA 2018b). The results are also presented in the Flood Insurance Study for El Paso County (FEMA 2018c).

This modeling effort focused on the area that includes the Schubert Ranch Sand Resource Site: Black Squirrel Creek, Reach US to LBS, River Station 34955 to River Station 27503 (this includes three cross sections above the Site) and Black Squirrel Creek, Reach LBS to ROB Split, River Station 26962 to River Station 20250 (this includes three cross sections below the Site). The river station numbering indicates the river length from the extent of the detailed study, just downstream from the confluence of Black Squirrel Creek and Telephone Exchange. These cross section numbers are presented in Table A-1 in Appendix A.

2.2 Topographic Modeling

Anderson Engineering used the digital topographic mapping from Kucera International, Inc. that was previously used by the US Army Corps of Engineers (USACE) to model the streams in the study. Effective flood hazard information throughout El Paso County and its incorporated communities is based on the North American Vertical Datum (NAVD) of 1988. The detailed mapping at the Site matches this datum and the detailed mapping matched well with the model topographic contours.

2.3 Roughness Coefficients

The Manning's n values for all stream reaches were set at 0.03 for the main channels and 0.04 for the flood overbank areas.

3 DISCHARGE PROFILES

Hydrologic modeling of the Black Squirrel Creek Watershed was previously completed by the USACE using the USACE Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS). The results of this HEC-HMS modeling were used by Anderson Consulting Engineers in the HEC-RAS model for Black Squirrel Creek.

100-year discharge profiles (1% annual chance event) used in the hydraulic analyses are provided in Table 3.1.

Table 3.1 Summary of 100-Year Peak Discharges.

Location	Peak Discharge (cfs)
	1% Annual Chance Event
Black Squirrel Creek	
Book Ranch Confluence	46,640
Telephone Exchange Confluence	40,000
Ellicott Consolidated Confluence	37,400
Upstream of Ellicott Consolidated Confluence	29,850
Lower Big Springs Confluence	29,100
Upstream of Lower Big Springs Confluence	25,150

4 HYDRAULIC MODELING

Hydraulic modeling for the entire extent of the Anderson Engineering study was conducted using HEC-RAS Version 5.0.7 (USACE Hydrologic Engineering Center 2019). Hydraulic modeling included analysis of the 1% annual chance flood event. Discharges for each reach of Black Squirrel Creek were defined using the flow values provided in Table 3.1 above.

4.1 Boundary Conditions

Hydraulic analyses were conducted assuming subcritical, steady state flow conditions. Consequently, boundary conditions were required only at the downstream end of the mainstem reach of Black Squirrel Creek, the Ellicott Consolidated Highway Split Flow Path, and the Ellicott Consolidated East Tributary. For the Black Squirrel Creek main reach, normal depth was computed at the downstream end of the study reach utilizing a bed slope of 0.0048 ft/ft (Anderson Consulting Engineers, 2013).

4.2 Modeling of Project Topography

This modeling analysis required altering certain river cross sections to include the proposed sand quarry pits. The HEC-RAS model was run using both the existing topography used in the Anderson Consulting study and the proposed topography based on the final reclamation contours for the Schubert Ranch Sand Resource Site. Because of the depth of the pits, the pits were modeled as ineffective flow areas except for the top two feet. This is thought to be representative of the actual flow conditions in the pits. The pits are about 50 feet deep. The horizontal flow in these pits will be concentrated in the upper few feet.

4.3 HEC-RAS Model Results

The HEC-RAS model was run for the 100-year flows for both the existing topography and the proposed topography. The 100-year water surface elevations for the existing and developed conditions were evaluated in the modeled cross sections.

The model results show that no rise in water surface elevation is expected as a result of the construction of the Schubert Ranch Sand Resource project.

The results are presented in detail in the appendices. See Table A-1 in Appendix A for a comparison of water surface elevations for the existing and developed conditions. Appendix B presents water surface profile information. Appendix C presents detailed cross section information. Appendix D presents Standard Table 1 and Standard Table 2 from the HEC-RAS outputs. Within the HEC-RAS outputs, the existing topography without the pits is designated as

Plan 03 or “Plan-without-pits” (depending on the output file) and the developed conditions with the pits is designated as Plan 02. All of the data presented show the water surface elevations with the pits as equal or slightly lower than the existing condition water surface elevations without the pits.

The horizontal extents of the floodplains will change in some of the cross sections. In these cases, the floodplain will extend to the pit wall. This change will occur only on property leased by the permittee. This change will not impact any neighboring property owners. See Figure 1 for the existing conditions and Figure 2 for the post-project, developed conditions. Revised floodplain lines are shown in green on Figure 2.

4.4 Construction Plans and Bank and Pit Armoring

The construction of the mine will proceed in accordance with the Mine Plan submitted to and approved by the Division of Mining Reclamation and Safety (DRMS). In accordance with the Mine Plan and with discussions between EME and Keith Curtis, Floodplain Administrator, Pikes Peak Regional Building Department, the following requirements will be met: (1) no material stockpiles or fill of any kind that exceed the pre-mining elevations will be placed in the floodway. (2) Material stockpiles will be placed away from Black Squirrel Creek to the extent practicable. See Map Exhibit C-1, Mining Plan Map in Appendix E for some of the proposed stockpile locations. (3) Any temporary stockpiles within the floodplain will be placed with the longitudinal axis parallel to the creek, to encourage flow around the temporary stockpiles. (4) Bank and pit armoring will occur as mining progresses (see the discussion in the paragraph below).

The banks of Black Squirrel Creek and the adjacent pit edge of each sand pit are armored to a depth below the stream thalweg. This armoring is not required for the small pit in the northwest corner of the Site (Stage V), because this entire pit is outside of the limits of the 100-year floodplain. See the attached drawings in Appendix E for the locations and details of the bank and pit armoring. These armoring plans are in accordance with Urban Drainage and Flood Control District guidelines (Urban Drainage and Flood Control District 2013) and discussions with US Army Corps of Engineers personnel.

5 REFERENCES

Anderson Consulting Engineers, 2013. *Detailed Hydraulic Evaluation and Floodplain Mapping for Black Squirrel Creek and Tributaries, as part of the El Paso County FEMA RiskMap Study El Paso County, Colorado*. (ACE Project No. COCWCB12). Anderson Consulting Engineers, Inc., August 2013.

FEMA 2018a. Federal Emergency Management Agency. FIRM Map Number 08041C0830G, Revised December 7, 2018.

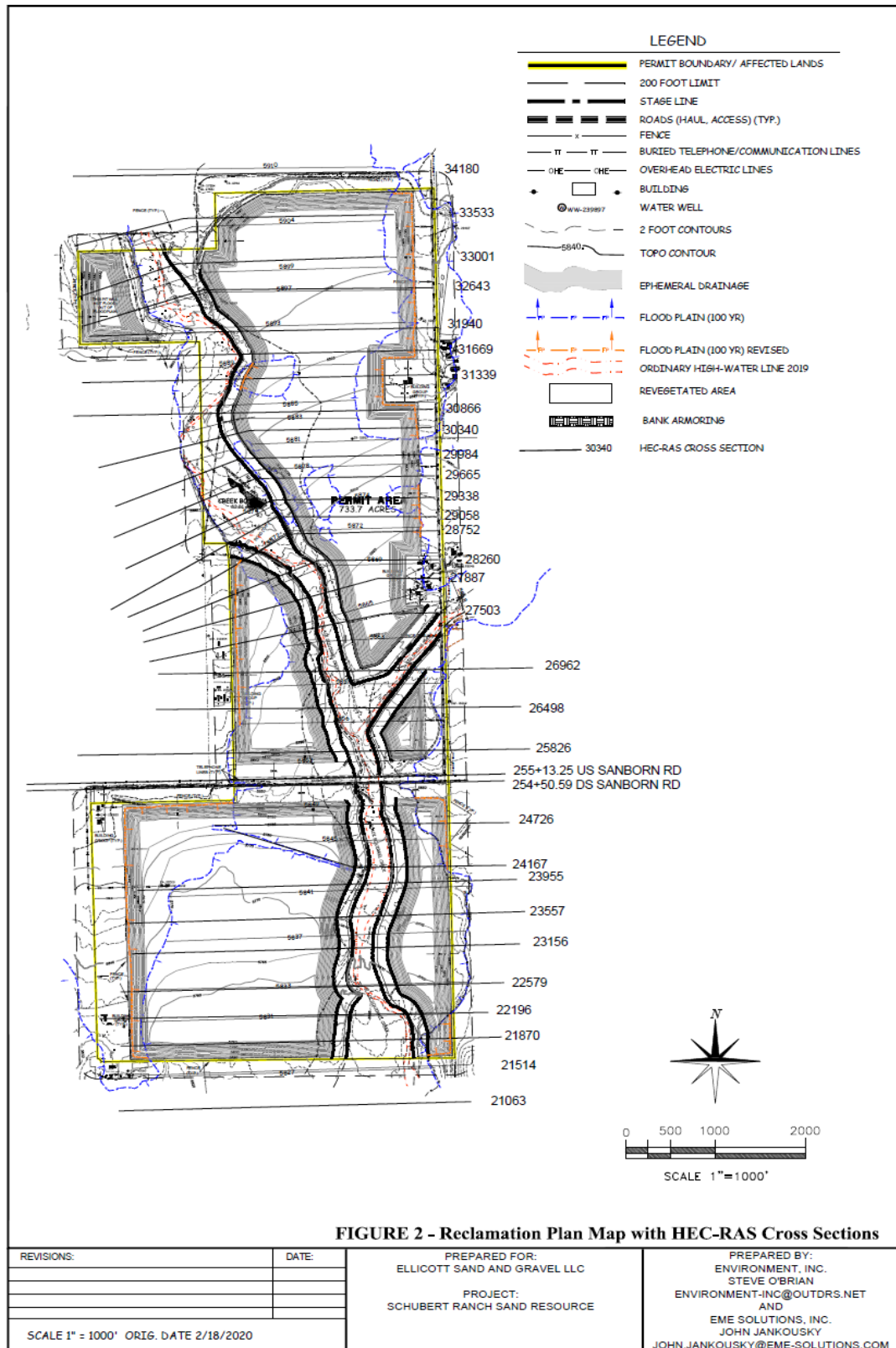
FEMA 2018b. Federal Emergency Management Agency. FIRM Map Number 08041C0840G, Revised December 7, 2018.

FEMA 2018c. *Flood Insurance Study, El Paso County, Colorado, and Incorporated Areas*. Flood Insurance Study Number 08041CV001A. Federal Emergency Management Agency. Revised December 7, 2018.

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Urban Drainage and Flood Control District 2013. *Technical Review Guidelines For Gravel Mining & Water Storage Activities Within or Adjacent to 100-Year Floodplains*. Prepared for Urban Drainage and Flood Control District by Wright Water Engineers, Inc. January 2013.

USACE Hydrologic Engineering Center 2019. HEC-RAS Version 5.0.7 Software. US Army Corps of Engineers, Hydrologic Engineering Center. March 2019.

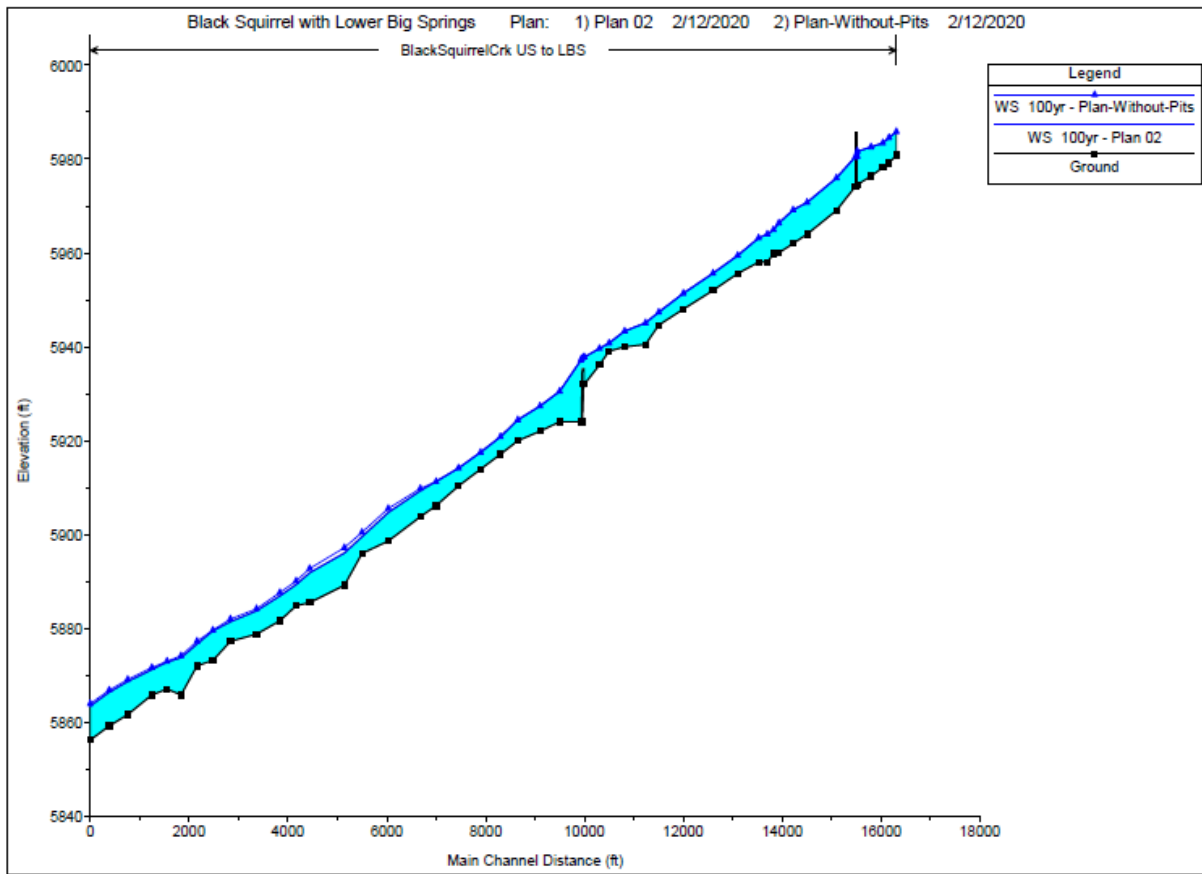


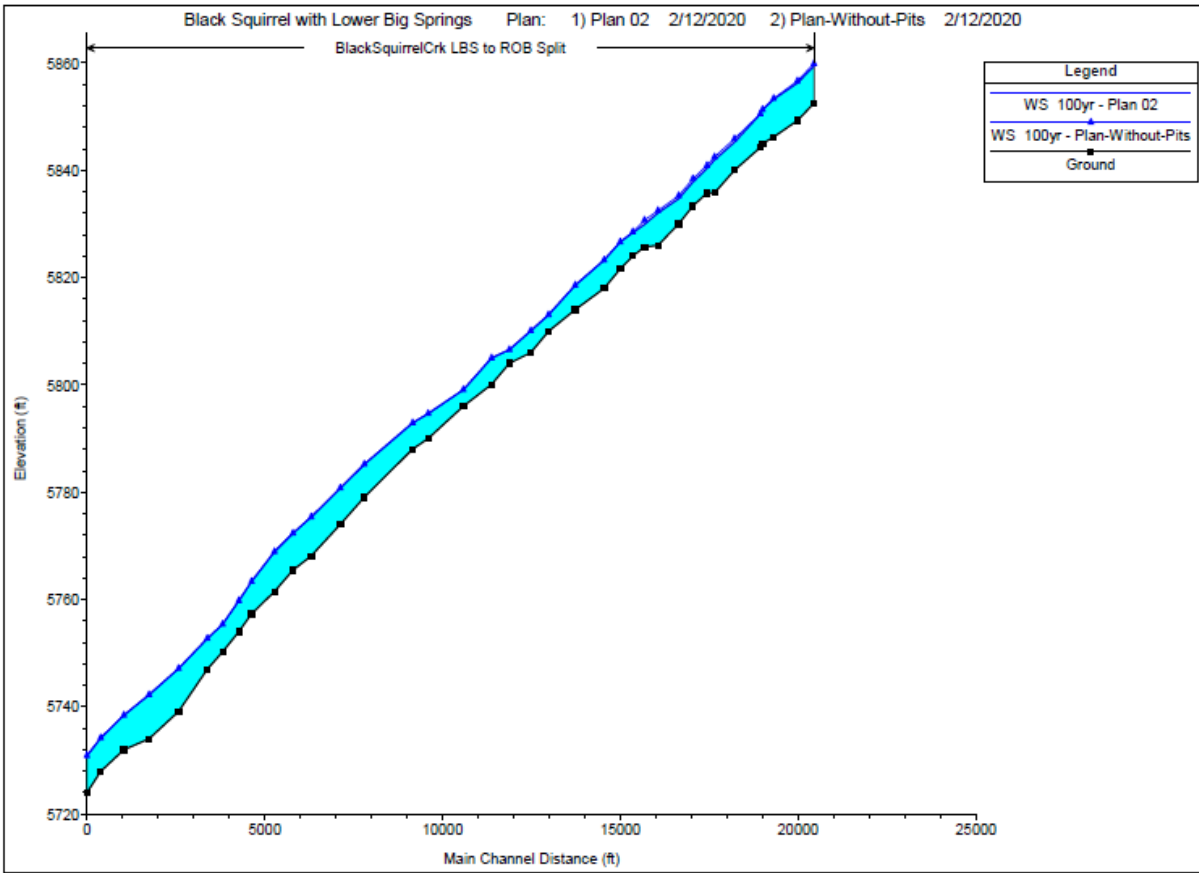
Appendix A. Table A-1. Comparison of Water Surface Elevations
Without Pits and With Pits

Table A-1. Comparison of Water Surface Elevations Without Pits and With Pits

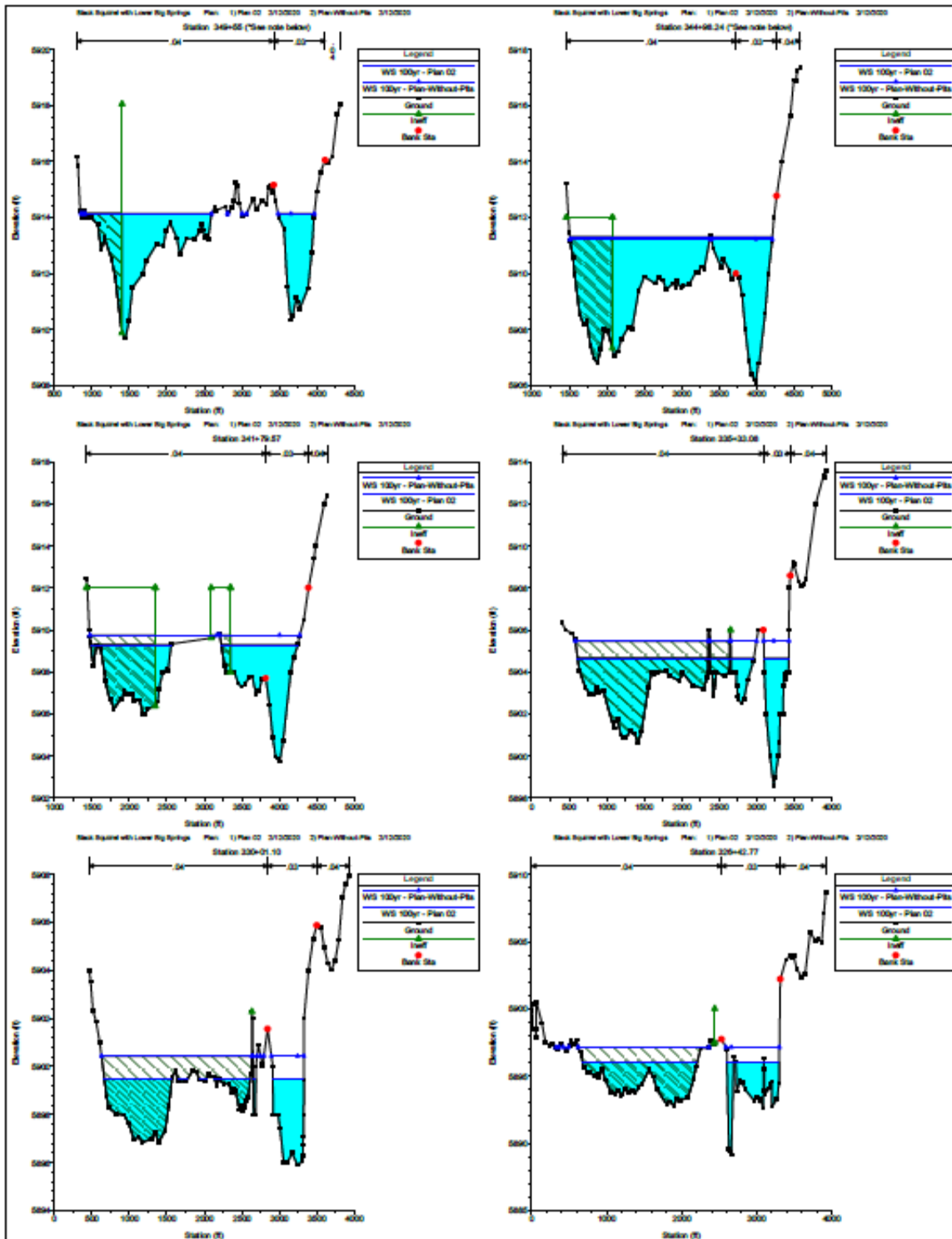
Reach	Cross Section	Regulatory Water Surface Elevation (100-year WSEL) (Feet NAVD)	Water Surface Elevation with Pits (100-year WSEL) (Feet NAVD)	Comment
US to LBS	34955	5914.13	5914.13	Upstream from pits
	34498	5911.23	5911.23	Upstream from pits
	34180	5909.75	5909.75	Upstream from pits
	33533	5905.48	5905.48	First cross section with pits
	33001	5900.43	5899.55	
	32643	5897.15	5896.00	
	31940	5892.70	5891.96	
	31669	5890.07	5889.29	
	31339	5887.59	5886.85	
	30866	5884.12	5883.69	
	30340	5881.94	5881.35	
	29984	5879.58	5879.45	
	29665	5877.18	5876.64	
	29338	5874.14	5873.52	
	29058	5872.96	5872.79	
	28752	5871.62	5871.19	
	28260	5869.06	5868.61	
	27887	5866.77	5866.36	
	27503	5863.88	5863.40	
LBS to ROB Split	26962	5859.86	5859.43	
	26498	5856.65	5856.28	
	26826	5853.37	5853.25	
	25513	5851.31	5851.31	Upstream side of Sanborn Road
	25451	5850.49	5850.47	Downstream side of Sanborn Road
	24726	5845.84	5845.23	
	24167	5842.46	5841.92	
	23955	5840.90	5840.35	
	23557	5838.39	5837.79	
	23156	5835.26	5834.70	
	22579	5832.48	5832.06	
	22196	5830.70	5829.91	
	21870	5828.53	5828.36	Last cross section with pits
	21514	5826.60	5826.60	Downstream of pits
	21063	5823.24	5823.24	Downstream of pits
	20250	5818.56	5818.56	Downstream of pits

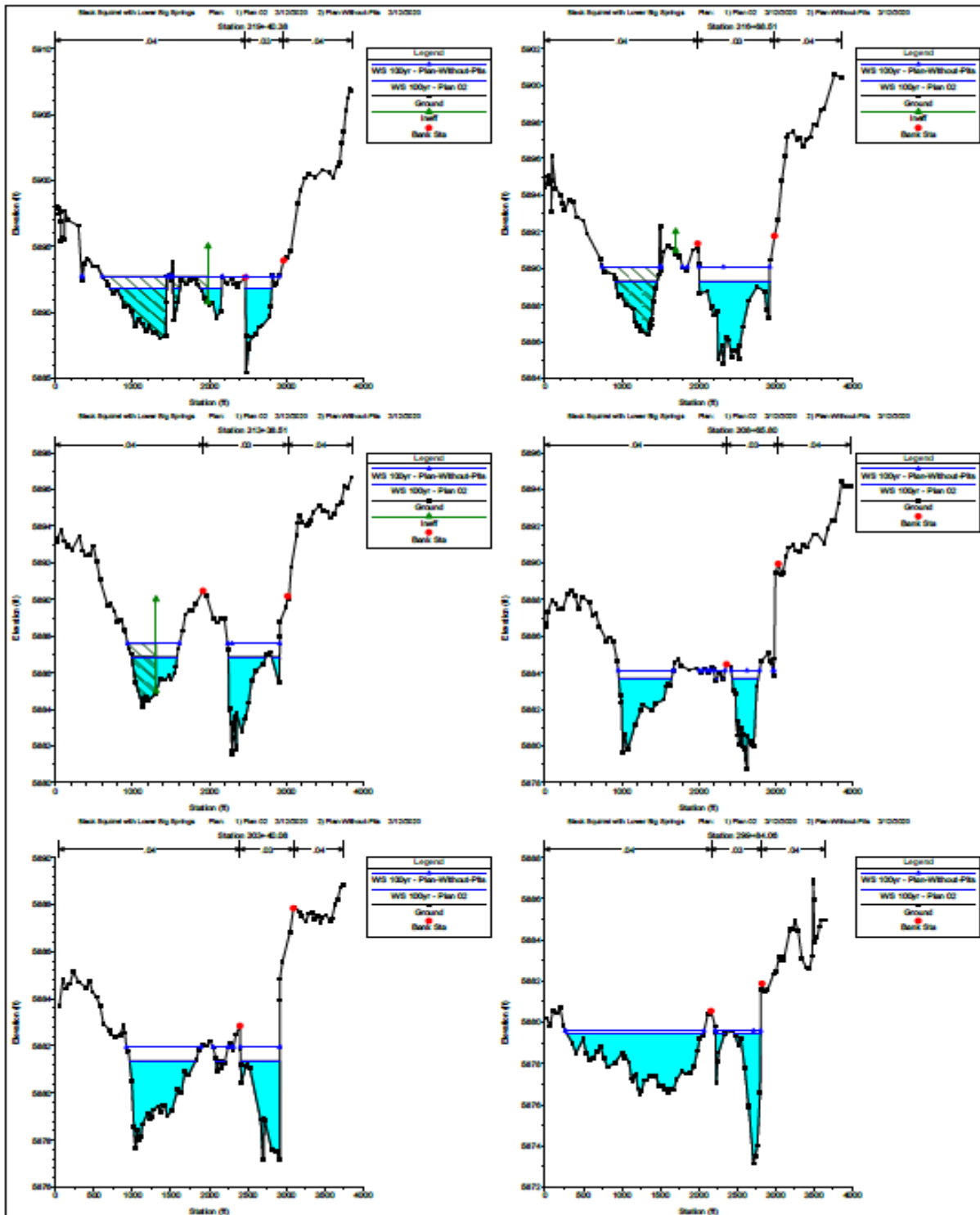
Appendix B. Water Surface Profiles

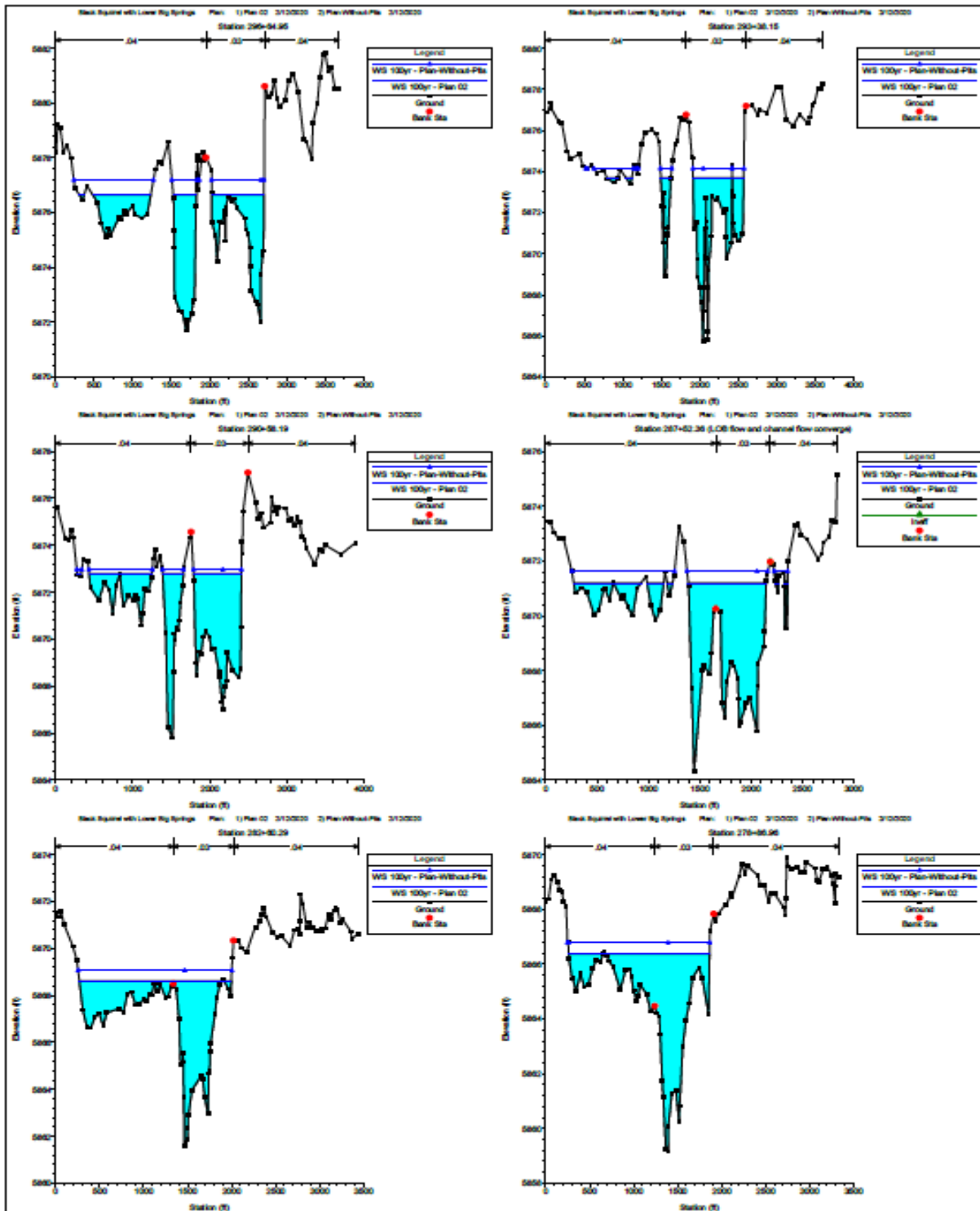


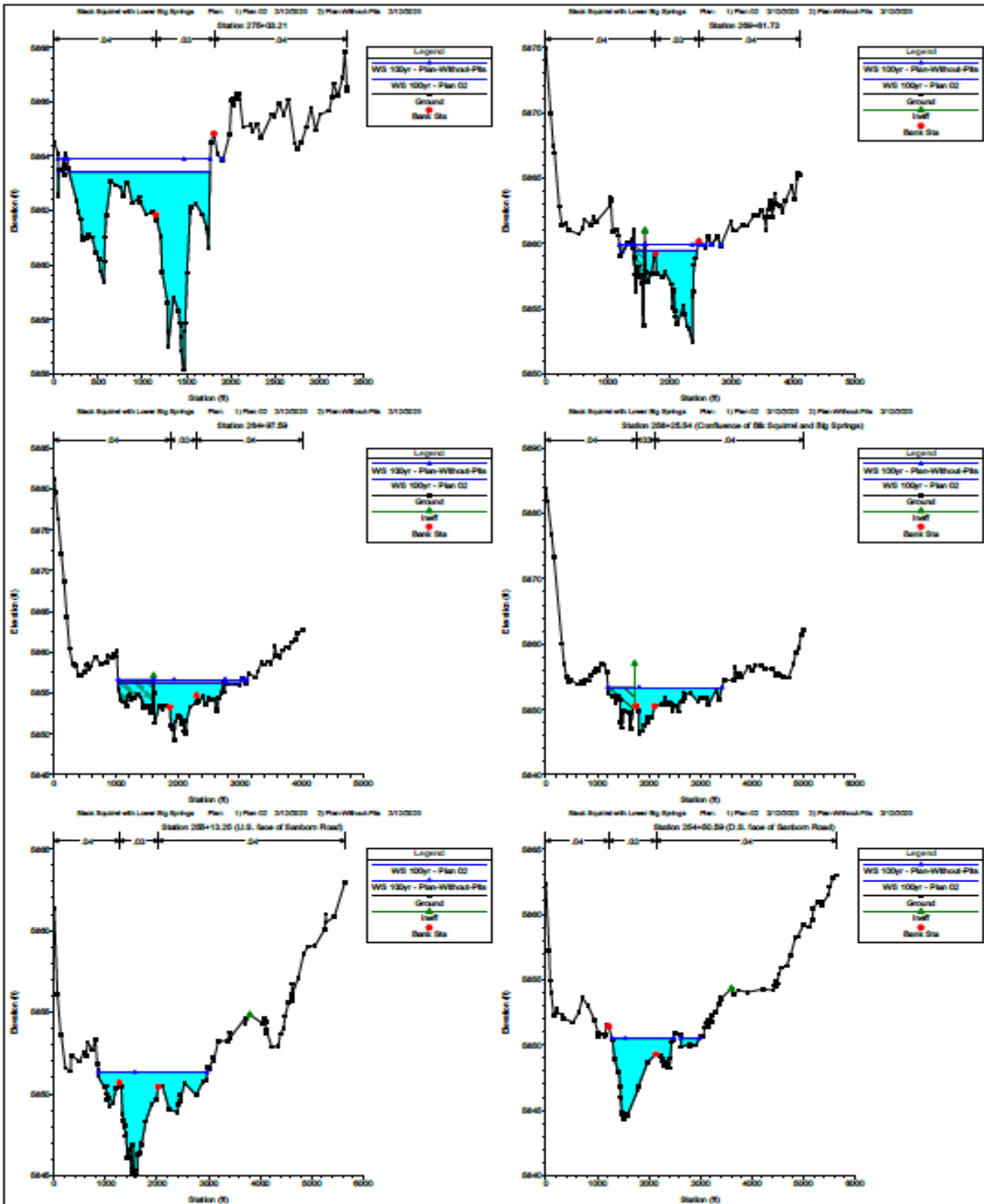


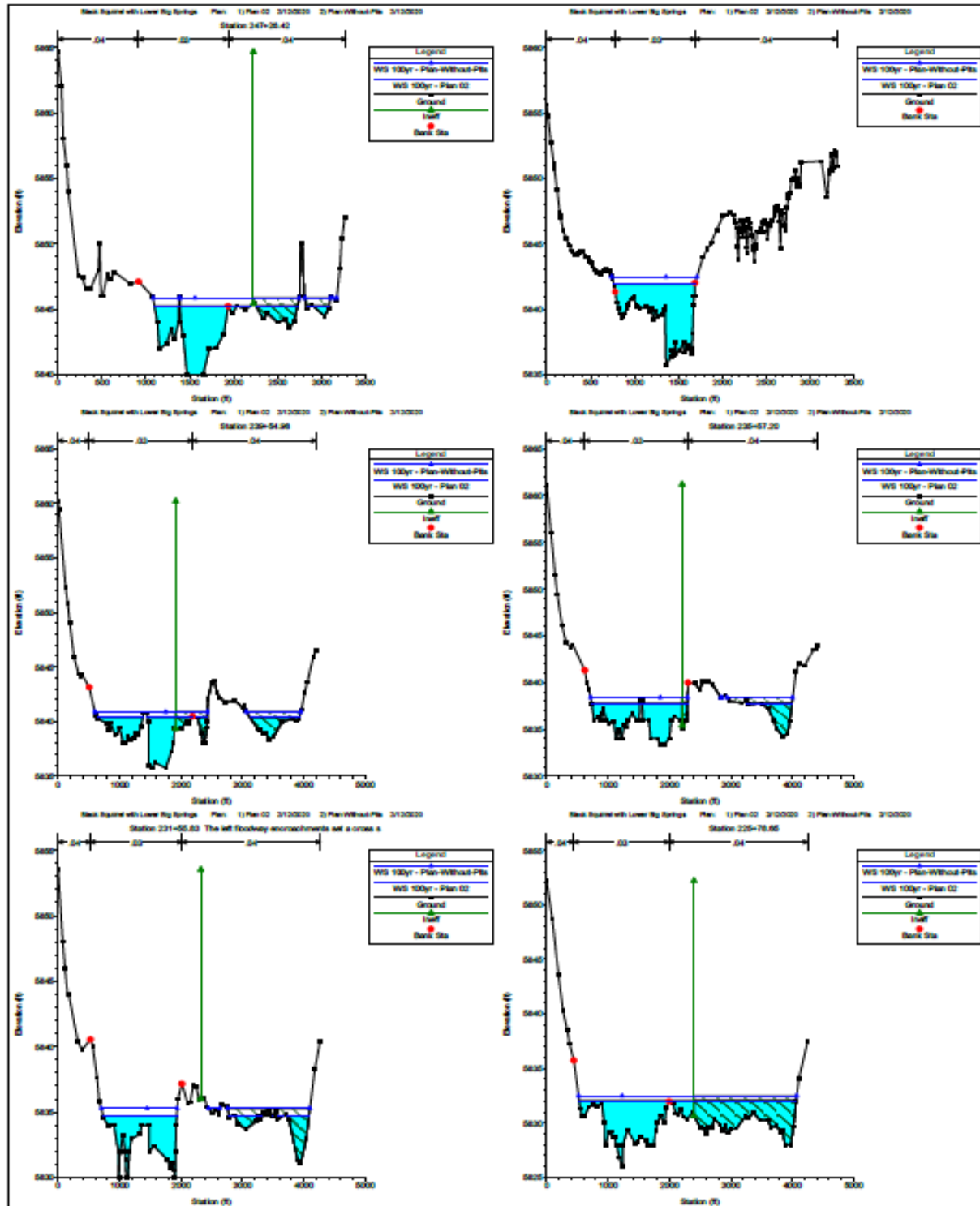
Appendix C. Detailed Cross Section Information

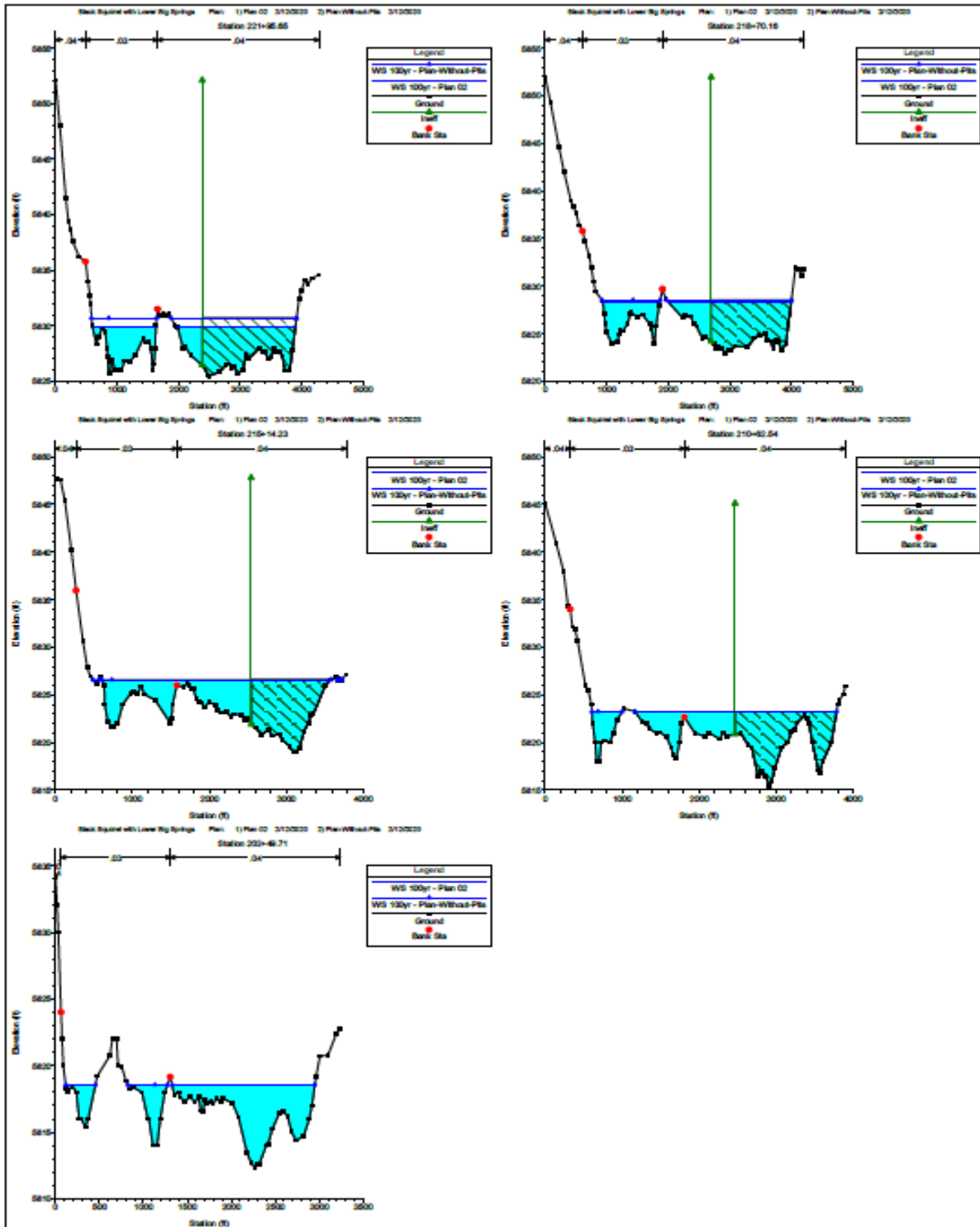












Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 34498 Profile: 100yr

E.G. Elev (ft)	5911.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5911.23	Reach Len. (ft)	299.30	318.67	327.60
Crit W.S. (ft)	5910.65	Flow Area (sq ft)	2789.33	1463.06	
E.G. Slope (ft/ft)	0.003041	Area (sq ft)	4502.06	1463.06	
Q Total (cfs)	16863.00	Flow (cfs)	8475.68	8387.32	
Top Width (ft)	2670.29	Top Width (ft)	2189.18	481.11	
Vel Total (ft/s)	3.97	Avg. Vel. (ft/s)	3.04	5.73	
Max Chl Dpth (ft)	5.13	Hydr. Depth (ft)	1.72	3.04	
Conv. Total (cfs)	305771.1	Conv. (cfs)	153686.6	152084.5	
Length Wtd. (ft)	310.62	Wetted Per. (ft)	1623.76	481.22	
Min Ch El (ft)	5906.10	Shear (lb/sq ft)	0.33	0.58	
Alpha	1.33	Stream Power (lb/ft s)	0.99	3.31	
Frctn Loss (ft)	1.13	Cum Volume (acre-ft)	419.92	311.08	0.54
C & E Loss (ft)	0.03	Cum SA (acres)	215.74	89.33	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 34180 Profile: 100yr

E.G. Elev (ft)	5910.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.64	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5909.75	Reach Len. (ft)	581.80	646.49	770.50
Crit W.S. (ft)	5909.28	Flow Area (sq ft)	1611.97	1521.97	
E.G. Slope (ft/ft)	0.004447	Area (sq ft)	4082.38	1521.97	
Q Total (cfs)	16863.00	Flow (cfs)	5546.55	11316.45	
Top Width (ft)	2763.61	Top Width (ft)	2313.14	450.47	
Vel Total (ft/s)	5.38	Avg. Vel. (ft/s)	3.44	7.44	
Max Chl Dpth (ft)	6.02	Hydr. Depth (ft)	1.32	3.38	
Conv. Total (cfs)	252876.5	Conv. (cfs)	83175.8	169700.7	
Length Wtd. (ft)	630.41	Wetted Per. (ft)	1218.07	450.61	
Min Ch El (ft)	5903.73	Shear (lb/sq ft)	0.37	0.94	
Alpha	1.42	Stream Power (lb/ft s)	1.26	6.97	
Frctn Loss (ft)	3.40	Cum Volume (acre-ft)	390.43	300.16	0.54
C & E Loss (ft)	0.08	Cum SA (acres)	200.27	85.92	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 33533 Profile: 100yr

E.G. Elev (ft)	5906.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.43	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5905.48	Reach Len. (ft)	518.83	531.98	578.90
Crit W.S. (ft)	5905.48	Flow Area (sq ft)	627.07	1360.51	
E.G. Slope (ft/ft)	0.006698	Area (sq ft)	5605.89	1360.51	
Q Total (cfs)	16863.00	Flow (cfs)	2834.31	14028.69	
Top Width (ft)	2727.09	Top Width (ft)	2392.58	334.51	
Vel Total (ft/s)	8.48	Avg. Vel. (ft/s)	4.52	10.31	
Max Chl Dpth (ft)	6.91	Hydr. Depth (ft)	1.81	4.07	
Conv. Total (cfs)	208038.7	Conv. (cfs)	34630.7	171408.1	
Length Wtd. (ft)	530.72	Wetted Per. (ft)	345.94	335.37	
Min Ch El (ft)	5898.57	Shear (lb/sq ft)	0.76	1.70	
Alpha	1.28	Stream Power (lb/ft s)	3.43	17.49	
Frctn Loss (ft)	3.94	Cum Volume (acre-ft)	325.73	278.77	0.54
C & E Loss (ft)	0.03	Cum SA (acres)	168.85	80.10	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 33001 Profile: 100yr

E.G. Elev (ft)	5902.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.70	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5900.43	Reach Len. (ft)	377.13	358.33	352.98
Crit W.S. (ft)	5900.43	Flow Area (sq ft)	93.57	1561.83	
E.G. Slope (ft/ft)	0.008258	Area (sq ft)	3883.59	1561.83	
Q Total (cfs)	16863.00	Flow (cfs)	386.45	16476.55	
Top Width (ft)	2539.15	Top Width (ft)	2104.95	434.20	
Vel Total (ft/s)	10.19	Avg. Vel. (ft/s)	4.13	10.55	
Max Chl Dpth (ft)	4.51	Hydr. Depth (ft)	0.94	3.60	
Conv. Total (cfs)	185564.7	Conv. (cfs)	4252.6	181312.1	
Length Wtd. (ft)	358.55	Wetted Per. (ft)	100.18	435.27	
Min Ch El (ft)	5895.91	Shear (lb/sq ft)	0.48	1.85	
Alpha	1.05	Stream Power (lb/ft s)	1.99	19.52	
Frothn Loss (ft)	1.88	Cum Volume (acre-ft)	269.22	260.92	0.54
C & E Loss (ft)	0.29	Cum SA (acres)	142.06	75.40	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 32643 Profile: 100yr

E.G. Elev (ft)	5897.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.		0.030	
W.S. Elev (ft)	5897.15	Reach Len. (ft)	577.75	702.39	421.88
Crit W.S. (ft)	5896.21	Flow Area (sq ft)		2477.00	
E.G. Slope (ft/ft)	0.003623	Area (sq ft)	4589.04	2477.00	
Q Total (cfs)	16863.00	Flow (cfs)		16863.00	
Top Width (ft)	2571.16	Top Width (ft)	1857.08	714.08	
Vel Total (ft/s)	6.81	Avg. Vel. (ft/s)		6.81	
Max Chl Dpth (ft)	8.01	Hydr. Depth (ft)		3.47	
Conv. Total (cfs)	280144.5	Conv. (cfs)		280144.5	
Length Wtd. (ft)	692.11	Wetted Per. (ft)		717.88	
Min Ch El (ft)	5889.14	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		5.31	
Frothn Loss (ft)	3.72	Cum Volume (acre-ft)	232.54	244.31	0.54
C & E Loss (ft)	0.07	Cum SA (acres)	124.91	70.68	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 31940 Profile: 100yr

E.G. Elev (ft)	5894.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.38	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5892.70	Reach Len. (ft)	259.81	271.87	261.48
Crit W.S. (ft)	5892.70	Flow Area (sq ft)	536.58	1401.40	
E.G. Slope (ft/ft)	0.008795	Area (sq ft)	3271.83	1401.40	
Q Total (cfs)	16863.00	Flow (cfs)	2782.60	14080.40	
Top Width (ft)	2239.38	Top Width (ft)	1802.04	437.34	
Vel Total (ft/s)	8.70	Avg. Vel. (ft/s)	5.19	10.05	
Max Chl Dpth (ft)	7.27	Hydr. Depth (ft)	1.10	3.20	
Conv. Total (cfs)	179812.8	Conv. (cfs)	29671.2	150141.6	
Length Wtd. (ft)	270.87	Wetted Per. (ft)	486.38	440.52	
Min Ch El (ft)	5885.43	Shear (lb/sq ft)	0.61	1.75	
Alpha	1.17	Stream Power (lb/ft s)	3.14	17.55	
Frothn Loss (ft)	1.75	Cum Volume (acre-ft)	180.41	213.04	0.54
C & E Loss (ft)	0.20	Cum SA (acres)	100.64	61.40	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 31669 Profile: 100yr

E.G. Elev (ft)	5890.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.71	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5890.07	Reach Len. (ft)	324.99	330.00	328.42
Crit W.S. (ft)	5889.51	Flow Area (sq ft)	7.24	2495.68	
E.G. Slope (ft/ft)	0.004923	Area (sq ft)	1415.70	2495.68	
Q Total (cfs)	16863.00	Flow (cfs)	4.41	16858.59	
Top Width (ft)	1736.87	Top Width (ft)	816.95	919.92	
Vel Total (ft/s)	6.74	Avg. Vel. (ft/s)	0.61	6.76	
Max Chl Dpth (ft)	5.29	Hydr. Depth (ft)	0.11	2.71	
Conv. Total (cfs)	240325.8	Conv. (cfs)	62.9	240263.0	
Length Wtd. (ft)	329.61	Wetted Per. (ft)	64.09	920.99	
Min Ch El (ft)	5884.78	Shear (lb/sq ft)	0.03	0.83	
Alpha	1.01	Stream Power (lb/ft s)	0.02	5.63	
Frctn Loss (ft)	2.14	Cum Volume (acre-ft)	166.43	200.88	0.54
C & E Loss (ft)	0.03	Cum SA (acres)	92.83	57.16	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 31339 Profile: 100yr

E.G. Elev (ft)	5888.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.01	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5887.59	Reach Len. (ft)	431.77	472.71	429.95
Crit W.S. (ft)	5887.54	Flow Area (sq ft)	525.28	1667.28	
E.G. Slope (ft/ft)	0.008981	Area (sq ft)	1388.99	1667.28	
Q Total (cfs)	16863.00	Flow (cfs)	2654.06	14208.94	
Top Width (ft)	1353.77	Top Width (ft)	675.12	678.65	
Vel Total (ft/s)	7.69	Avg. Vel. (ft/s)	5.05	8.52	
Max Chl Dpth (ft)	6.01	Hydr. Depth (ft)	1.72	2.46	
Conv. Total (cfs)	178142.6	Conv. (cfs)	28037.8	150104.9	
Length Wtd. (ft)	459.68	Wetted Per. (ft)	304.98	680.36	
Min Ch El (ft)	5881.58	Shear (lb/sq ft)	0.96	1.37	
Alpha	1.10	Stream Power (lb/ft s)	4.87	11.68	
Frctn Loss (ft)	3.67	Cum Volume (acre-ft)	155.97	185.11	0.54
C & E Loss (ft)	0.08	Cum SA (acres)	87.27	51.11	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 30866 Profile: 100yr

E.G. Elev (ft)	5884.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.74	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5884.12	Reach Len. (ft)	381.72	525.73	605.99
Crit W.S. (ft)	5883.96	Flow Area (sq ft)	1584.61	1067.59	
E.G. Slope (ft/ft)	0.007145	Area (sq ft)	1584.61	1067.59	
Q Total (cfs)	16863.00	Flow (cfs)	8076.26	8786.74	
Top Width (ft)	1329.44	Top Width (ft)	943.07	386.37	
Vel Total (ft/s)	6.36	Avg. Vel. (ft/s)	5.10	8.23	
Max Chl Dpth (ft)	5.38	Hydr. Depth (ft)	1.68	2.76	
Conv. Total (cfs)	199490.1	Conv. (cfs)	95542.6	103947.5	
Length Wtd. (ft)	456.17	Wetted Per. (ft)	943.53	387.35	
Min Ch El (ft)	5878.74	Shear (lb/sq ft)	0.75	1.23	
Alpha	1.18	Stream Power (lb/ft s)	3.82	10.12	
Frctn Loss (ft)	2.41	Cum Volume (acre-ft)	141.23	170.27	0.54
C & E Loss (ft)	0.10	Cum SA (acres)	79.25	45.33	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 30340 Profile: 100yr

E.G. Elev (ft)	5882.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5881.94	Reach Len. (ft)	335.79	356.02	418.52
Crit W.S. (ft)	5881.23	Flow Area (sq ft)	2165.00	1408.96	
E.G. Slope (ft/ft)	0.004080	Area (sq ft)	2165.00	1408.96	
Q Total (cfs)	16863.00	Flow (cfs)	8214.50	8648.50	
Top Width (ft)	1699.30	Top Width (ft)	1183.21	516.08	
Vel Total (ft/s)	4.72	Avg. Vel. (ft/s)	3.79	6.14	
Max Chl Dpth (ft)	4.76	Hydr. Depth (ft)	1.83	2.73	
Conv. Total (cfs)	264659.2	Conv. (cfs)	128923.8	135735.4	
Length Wtd. (ft)	344.26	Wetted Per. (ft)	1183.41	519.42	
Min Ch El (ft)	5877.18	Shear (lb/sq ft)	0.46	0.69	
Alpha	1.18	Stream Power (lb/ft s)	1.76	4.22	
Frctn Loss (ft)	2.19	Cum Volume (acre-ft)	124.81	155.33	0.54
C & E Loss (ft)	0.02	Cum SA (acres)	69.93	39.88	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 29984 Profile: 100yr

E.G. Elev (ft)	5880.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.56	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5879.58	Reach Len. (ft)	281.57	319.11	328.22
Crit W.S. (ft)	5879.56	Flow Area (sq ft)	3020.91	1127.15	
E.G. Slope (ft/ft)	0.009459	Area (sq ft)	3020.91	1127.15	
Q Total (cfs)	23714.00	Flow (cfs)	15372.89	8341.11	
Top Width (ft)	2398.16	Top Width (ft)	1807.11	591.04	
Vel Total (ft/s)	5.72	Avg. Vel. (ft/s)	5.09	7.40	
Max Chl Dpth (ft)	6.43	Hydr. Depth (ft)	1.67	1.91	
Conv. Total (cfs)	243824.6	Conv. (cfs)	158062.3	85762.3	
Length Wtd. (ft)	295.68	Wetted Per. (ft)	1807.19	592.00	
Min Ch El (ft)	5873.15	Shear (lb/sq ft)	0.99	1.12	
Alpha	1.10	Stream Power (lb/ft s)	5.02	8.32	
Frctn Loss (ft)	2.37	Cum Volume (acre-ft)	104.82	144.96	0.54
C & E Loss (ft)	0.00	Cum SA (acres)	58.41	35.36	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 29665 Profile: 100yr

E.G. Elev (ft)	5877.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5877.18	Reach Len. (ft)	284.00	326.80	348.43
Crit W.S. (ft)	5876.86	Flow Area (sq ft)	2462.89	1419.78	
E.G. Slope (ft/ft)	0.006858	Area (sq ft)	2462.89	1419.78	
Q Total (cfs)	23714.00	Flow (cfs)	14229.93	9484.07	
Top Width (ft)	2054.52	Top Width (ft)	1372.91	681.61	
Vel Total (ft/s)	6.11	Avg. Vel. (ft/s)	5.78	6.68	
Max Chl Dpth (ft)	5.49	Hydr. Depth (ft)	1.79	2.08	
Conv. Total (cfs)	286356.0	Conv. (cfs)	171832.1	114523.9	
Length Wtd. (ft)	311.63	Wetted Per. (ft)	1374.55	683.15	
Min Ch El (ft)	5872.00	Shear (lb/sq ft)	0.77	0.89	
Alpha	1.02	Stream Power (lb/ft s)	4.43	5.94	
Frctn Loss (ft)	2.25	Cum Volume (acre-ft)	87.09	135.64	0.54
C & E Loss (ft)	0.07	Cum SA (acres)	48.13	30.70	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 29338 Profile: 100yr

E.G. Elev (ft)	5875.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.31	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5874.14	Reach Len. (ft)	252.33	279.96	309.87
Crit W.S. (ft)	5874.14	Flow Area (sq ft)	568.25	2205.35	
E.G. Slope (ft/ft)	0.007607	Area (sq ft)	568.25	2205.35	
Q Total (cfs)	23714.00	Flow (cfs)	2582.44	21131.57	
Top Width (ft)	1372.35	Top Width (ft)	712.05	660.31	
Vel Total (ft/s)	8.55	Avg. Vel. (ft/s)	4.54	9.58	
Max Chl Dpth (ft)	8.38	Hydr. Depth (ft)	0.80	3.34	
Conv. Total (cfs)	271899.7	Conv. (cfs)	29609.7	242290.0	
Length Wtd. (ft)	274.54	Wetted Per. (ft)	713.90	667.57	
Min Ch El (ft)	5865.76	Shear (lb/sq ft)	0.38	1.57	
Alpha	1.15	Stream Power (lb/ft s)	1.72	15.03	
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)	77.21	122.04	0.54
C & E Loss (ft)	0.20	Cum SA (acres)	41.33	25.66	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 29058 Profile: 100yr

E.G. Elev (ft)	5873.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.64	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5872.96	Reach Len. (ft)	287.77	305.83	246.30
Crit W.S. (ft)	5872.16	Flow Area (sq ft)	1810.18	2356.28	
E.G. Slope (ft/ft)	0.003619	Area (sq ft)	1810.18	2356.28	
Q Total (cfs)	23714.00	Flow (cfs)	6722.50	16991.50	
Top Width (ft)	1788.76	Top Width (ft)	1164.23	624.53	
Vel Total (ft/s)	5.69	Avg. Vel. (ft/s)	3.71	7.21	
Max Chl Dpth (ft)	7.16	Hydr. Depth (ft)	1.55	3.77	
Conv. Total (cfs)	394194.1	Conv. (cfs)	111747.1	282447.0	
Length Wtd. (ft)	300.16	Wetted Per. (ft)	1165.28	625.85	
Min Ch El (ft)	5867.03	Shear (lb/sq ft)	0.35	0.85	
Alpha	1.27	Stream Power (lb/ft s)	1.30	6.13	
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	70.32	107.38	0.54
C & E Loss (ft)	0.01	Cum SA (acres)	35.90	21.54	1.00

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 28752 Profile: 100yr

E.G. Elev (ft)	5872.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5871.62	Reach Len. (ft)	417.55	492.07	349.60
Crit W.S. (ft)	5871.09	Flow Area (sq ft)	1921.91	1926.69	
E.G. Slope (ft/ft)	0.004470	Area (sq ft)	1921.91	1926.69	72.16
Q Total (cfs)	23714.00	Flow (cfs)	8157.19	15556.81	
Top Width (ft)	1920.88	Top Width (ft)	1282.51	504.92	133.46
Vel Total (ft/s)	6.16	Avg. Vel. (ft/s)	4.24	8.07	
Max Chl Dpth (ft)	7.28	Hydr. Depth (ft)	1.50	3.82	
Conv. Total (cfs)	354703.1	Conv. (cfs)	122011.5	232691.6	
Length Wtd. (ft)	470.46	Wetted Per. (ft)	1283.20	506.02	
Min Ch El (ft)	5865.79	Shear (lb/sq ft)	0.42	1.06	
Alpha	1.29	Stream Power (lb/ft s)	1.77	8.58	
Frctn Loss (ft)	2.43	Cum Volume (acre-ft)	58.00	92.34	0.34
C & E Loss (ft)	0.01	Cum SA (acres)	27.82	17.57	0.62

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 28260 Profile: 100yr

E.G. Elev (ft)	5869.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5869.06	Reach Len. (ft)	295.34	373.33	252.51
Crit W.S. (ft)	5868.99	Flow Area (sq ft)	1536.94	2156.63	
E.G. Slope (ft/ft)	0.006016	Area (sq ft)	1536.94	2156.63	
Q Total (cfs)	23714.00	Flow (cfs)	5595.58	18118.42	
Top Width (ft)	1747.90	Top Width (ft)	1082.06	665.84	
Vel Total (ft/s)	6.42	Avg. Vel. (ft/s)	3.64	8.40	
Max Chl Dpth (ft)	7.47	Hydr. Depth (ft)	1.42	3.24	
Conv. Total (cfs)	305729.2	Conv. (cfs)	72140.1	233589.0	
Length Wtd. (ft)	356.95	Wetted Per. (ft)	1082.12	666.92	
Min Ch El (ft)	5861.58	Shear (lb/sq ft)	0.53	1.21	
Alpha	1.38	Stream Power (lb/ft s)	1.94	10.20	
Frctn Loss (ft)	2.14	Cum Volume (acre-ft)	41.42	69.28	0.05
C & E Loss (ft)	0.01	Cum SA (acres)	16.48	10.96	0.09

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 27887 Profile: 100yr

E.G. Elev (ft)	5867.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5866.77	Reach Len. (ft)	397.19	383.75	354.51
Crit W.S. (ft)	5866.77	Flow Area (sq ft)	1281.25	2191.28	
E.G. Slope (ft/ft)	0.005047	Area (sq ft)	1281.25	2191.28	
Q Total (cfs)	23714.00	Flow (cfs)	4366.74	19347.26	
Top Width (ft)	1610.30	Top Width (ft)	987.43	622.87	
Vel Total (ft/s)	8.83	Avg. Vel. (ft/s)	3.41	8.83	
Max Chl Dpth (ft)	7.62	Hydr. Depth (ft)	1.30	3.52	
Conv. Total (cfs)	307499.2	Conv. (cfs)	56623.4	250875.8	
Length Wtd. (ft)	386.86	Wetted Per. (ft)	987.50	623.54	
Min Ch El (ft)	5859.15	Shear (lb/sq ft)	0.48	1.30	
Alpha	1.41	Stream Power (lb/ft s)	1.64	11.52	
Frctn Loss (ft)	1.77	Cum Volume (acre-ft)	31.86	50.65	0.05
C & E Loss (ft)	0.11	Cum SA (acres)	9.47	5.44	0.09

Plan: Plan-Without-Pits BlackSquirrelCrk US to LBS RS: 27503 Profile: 100yr

E.G. Elev (ft)	5864.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5863.88	Reach Len. (ft)	541.48	541.48	541.48
Crit W.S. (ft)	5863.37	Flow Area (sq ft)	1947.60	2344.84	0.73
E.G. Slope (ft/ft)	0.003617	Area (sq ft)	1947.60	2344.84	0.73
Q Total (cfs)	23714.00	Flow (cfs)	6613.01	17100.82	0.17
Top Width (ft)	1721.05	Top Width (ft)	1089.10	611.01	20.95
Vel Total (ft/s)	5.52	Avg. Vel. (ft/s)	3.40	7.29	0.24
Max Chl Dpth (ft)	7.74	Hydr. Depth (ft)	1.79	3.84	0.03
Conv. Total (cfs)	394317.2	Conv. (cfs)	109961.4	284352.9	2.9
Length Wtd. (ft)	541.48	Wetted Per. (ft)	1089.98	612.08	20.95
Min Ch El (ft)	5856.14	Shear (lb/sq ft)	0.40	0.87	0.01
Alpha	1.36	Stream Power (lb/ft s)	1.37	6.31	0.00
Frctn Loss (ft)	2.89	Cum Volume (acre-ft)	17.14	30.67	0.04
C & E Loss (ft)	0.10	Cum SA (acres)			

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 26962 Profile: 100yr

E.G. Elev (ft)	5861.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.67	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5859.86	Reach Len. (ft)	465.72	464.14	428.10
Crit W.S. (ft)	5859.86	Flow Area (sq ft)	324.63	2589.24	
E.G. Slope (ft/ft)	0.007872	Area (sq ft)	810.69	2589.24	6.16
Q Total (cfs)	29100.00	Flow (cfs)	1649.87	27450.13	
Top Width (ft)	1233.44	Top Width (ft)	472.79	689.48	71.17
Vel Total (ft/s)	9.99	Avg. Vel. (ft/s)	5.08	10.60	
Max Chl Dpth (ft)	7.35	Hydr. Depth (ft)	1.92	3.76	
Conv. Total (cfs)	327984.1	Conv. (cfs)	18595.5	309388.5	
Length Wtd. (ft)	461.36	Wetted Per. (ft)	169.54	691.01	
Min Ch El (ft)	5852.51	Shear (lb/sq ft)	0.94	1.84	
Alpha	1.08	Stream Power (lb/ft s)	4.78	19.52	
Frctn Loss (ft)	2.76	Cum Volume (acre-ft)	402.02	1164.81	895.23
C & E Loss (ft)	0.19	Cum SA (acres)	158.34	371.93	377.51

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 26498 Profile: 100yr

E.G. Elev (ft)	5857.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.03	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5856.65	Reach Len. (ft)	589.32	672.05	619.01
Crit W.S. (ft)	5856.25	Flow Area (sq ft)	951.01	1983.20	1195.20
E.G. Slope (ft/ft)	0.004695	Area (sq ft)	2435.47	1983.20	1195.20
Q Total (cfs)	29100.00	Flow (cfs)	5642.85	18642.84	4814.31
Top Width (ft)	2049.78	Top Width (ft)	840.81	429.40	779.58
Vel Total (ft/s)	7.05	Avg. Vel. (ft/s)	5.93	9.40	4.03
Max Chl Dpth (ft)	7.39	Hydr. Depth (ft)	3.57	4.62	1.53
Conv. Total (cfs)	424673.5	Conv. (cfs)	82349.5	272086.0	70258.1
Length Wtd. (ft)	649.53	Wetted Per. (ft)	267.22	430.25	779.95
Min Ch El (ft)	5849.26	Shear (lb/sq ft)	1.04	1.35	0.45
Alpha	1.33	Stream Power (lb/ft s)	6.19	12.70	1.81
Frctn Loss (ft)	3.16	Cum Volume (acre-ft)	384.67	1140.45	889.32
C & E Loss (ft)	0.01	Cum SA (acres)	151.32	365.97	373.33

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 25826 Profile: 100yr

E.G. Elev (ft)	5854.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.14	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5853.37	Reach Len. (ft)	304.11	312.29	311.37
Crit W.S. (ft)	5853.37	Flow Area (sq ft)	97.96	1770.16	2523.48
E.G. Slope (ft/ft)	0.005034	Area (sq ft)	1606.43	1770.16	2523.48
Q Total (cfs)	29100.00	Flow (cfs)	516.60	18297.65	10285.75
Top Width (ft)	2215.69	Top Width (ft)	553.73	350.07	1311.89
Vel Total (ft/s)	6.63	Avg. Vel. (ft/s)	5.27	10.34	4.08
Max Chl Dpth (ft)	7.16	Hydr. Depth (ft)	2.83	5.06	1.92
Conv. Total (cfs)	410139.9	Conv. (cfs)	7281.1	257890.0	144968.9
Length Wtd. (ft)	311.78	Wetted Per. (ft)	34.61	350.91	1312.18
Min Ch El (ft)	5846.21	Shear (lb/sq ft)	0.89	1.59	0.60
Alpha	1.68	Stream Power (lb/ft s)	4.69	16.39	2.46
Frctn Loss (ft)	1.69	Cum Volume (acre-ft)	357.33	1111.50	862.90
C & E Loss (ft)	0.04	Cum SA (acres)	141.89	359.95	358.47

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 25513 Profile: 100yr

E.G. Elev (ft)	5852.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.01	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5851.31	Reach Len. (ft)	62.66	62.66	62.66
Crit W.S. (ft)	5851.31	Flow Area (sq ft)	468.51	2663.68	1230.80
E.G. Slope (ft/ft)	0.005878	Area (sq ft)	468.51	2663.68	1230.80
Q Total (cfs)	29100.00	Flow (cfs)	1458.72	23465.79	4175.50
Top Width (ft)	2109.77	Top Width (ft)	409.84	753.22	946.71
Vel Total (ft/s)	6.67	Avg. Vel. (ft/s)	3.11	8.81	3.39
Max Chl Dpth (ft)	6.31	Hydr. Depth (ft)	1.14	3.54	1.30
Conv. Total (cfs)	379543.2	Conv. (cfs)	19025.7	306057.7	54459.9
Length Wtd. (ft)	62.66	Wetted Per. (ft)	409.92	753.89	946.81
Min Ch El (ft)	5845.00	Shear (lb/sq ft)	0.42	1.30	0.48
Alpha	1.45	Stream Power (lb/ft s)	1.31	11.42	1.62
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)	350.09	1095.61	849.48
C & E Loss (ft)	0.03	Cum SA (acres)	138.52	356.00	350.40

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 25451 Profile: 100yr

E.G. Elev (ft)	5851.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.26	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5850.49	Reach Len. (ft)	614.30	724.17	589.89
Crit W.S. (ft)	5850.47	Flow Area (sq ft)		2861.02	677.78
E.G. Slope (ft/ft)	0.007112	Area (sq ft)		2861.02	677.78
Q Total (cfs)	29100.00	Flow (cfs)		26721.46	2378.54
Top Width (ft)	1556.96	Top Width (ft)		855.48	701.48
Vel Total (ft/s)	8.22	Avg. Vel. (ft/s)		9.34	3.51
Max Chl Dpth (ft)	6.23	Hydr. Depth (ft)		3.34	0.97
Conv. Total (cfs)	345089.6	Conv. (cfs)		316864.8	28204.8
Length Wtd. (ft)	717.51	Wetted Per. (ft)		855.67	701.58
Min Ch El (ft)	5844.26	Shear (lb/sq ft)		1.48	0.43
Alpha	1.20	Stream Power (lb/ft s)		13.87	1.51
Frctn Loss (ft)	4.64	Cum Volume (acre-ft)	349.75	1091.63	848.11
C & E Loss (ft)	0.00	Cum SA (acres)	138.23	354.84	349.22

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 24726 Profile: 100yr

E.G. Elev (ft)	5847.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.27	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5845.84	Reach Len. (ft)	568.78	559.66	318.68
Crit W.S. (ft)	5845.57	Flow Area (sq ft)		3141.25	215.37
E.G. Slope (ft/ft)	0.005913	Area (sq ft)		3141.25	1196.47
Q Total (cfs)	29100.00	Flow (cfs)		28593.00	507.00
Top Width (ft)	1987.31	Top Width (ft)		849.41	1137.89
Vel Total (ft/s)	8.67	Avg. Vel. (ft/s)		9.10	2.35
Max Chl Dpth (ft)	5.84	Hydr. Depth (ft)		3.70	0.75
Conv. Total (cfs)	378426.4	Conv. (cfs)		371833.2	6593.2
Length Wtd. (ft)	557.55	Wetted Per. (ft)		850.25	287.89
Min Ch El (ft)	5840.00	Shear (lb/sq ft)		1.36	0.28
Alpha	1.08	Stream Power (lb/ft s)		12.41	0.65
Frctn Loss (ft)	3.38	Cum Volume (acre-ft)	349.75	1041.74	835.42
C & E Loss (ft)	0.00	Cum SA (acres)	138.23	340.67	336.76

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 24167 Profile: 100yr

E.G. Elev (ft)	5843.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.27	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5842.46	Reach Len. (ft)	195.53	211.79	527.93
Crit W.S. (ft)	5842.13	Flow Area (sq ft)	22.82	3212.28	4.90
E.G. Slope (ft/ft)	0.006205	Area (sq ft)	22.82	3212.28	4.90
Q Total (cfs)	29100.00	Flow (cfs)	43.67	29050.94	5.39
Top Width (ft)	972.78	Top Width (ft)	43.12	908.46	21.19
Vel Total (ft/s)	8.98	Avg. Vel. (ft/s)	1.91	9.04	1.10
Max Chl Dpth (ft)	6.69	Hydr. Depth (ft)	0.53	3.54	0.23
Conv. Total (cfs)	369424.0	Conv. (cfs)	554.5	368801.1	68.4
Length Wtd. (ft)	211.81	Wetted Per. (ft)	43.14	910.24	21.20
Min Ch El (ft)	5835.77	Shear (lb/sq ft)	0.20	1.37	0.09
Alpha	1.01	Stream Power (lb/ft s)	0.39	12.36	0.10
Frctn Loss (ft)	1.60	Cum Volume (acre-ft)	349.60	1000.92	831.02
C & E Loss (ft)	0.02	Cum SA (acres)	137.95	329.38	332.52

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 23955 Profile: 100yr

E.G. Elev (ft)	5842.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.22	Wt. n-Val.		0.030	
W.S. Elev (ft)	5840.90	Reach Len. (ft)	391.60	397.78	392.04
Crit W.S. (ft)	5840.90	Flow Area (sq ft)		3289.76	
E.G. Slope (ft/ft)	0.009435	Area (sq ft)		3608.77	1460.93
Q Total (cfs)	29100.00	Flow (cfs)		29100.00	
Top Width (ft)	2724.26	Top Width (ft)		1588.87	1135.39
Vel Total (ft/s)	8.85	Avg. Vel. (ft/s)		8.85	
Max Chl Dpth (ft)	5.16	Hydr. Depth (ft)		2.49	
Conv. Total (cfs)	299582.7	Conv. (cfs)		299582.7	
Length Wtd. (ft)	397.78	Wetted Per. (ft)		1319.62	
Min Ch El (ft)	5835.74	Shear (lb/sq ft)		1.47	
Alpha	1.00	Stream Power (lb/ft s)		12.99	
Frctn Loss (ft)	2.51	Cum Volume (acre-ft)	349.55	984.34	822.14
C & E Loss (ft)	0.15	Cum SA (acres)	137.85	323.31	325.51

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 23557 Profile: 100yr

E.G. Elev (ft)	5839.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.71	Wt. n-Val.		0.030	
W.S. Elev (ft)	5838.39	Reach Len. (ft)	393.92	401.37	367.59
Crit W.S. (ft)	5837.74	Flow Area (sq ft)		4311.04	
E.G. Slope (ft/ft)	0.004508	Area (sq ft)		4542.51	1560.86
Q Total (cfs)	29100.00	Flow (cfs)		29100.00	
Top Width (ft)	2666.95	Top Width (ft)		1580.23	1086.72
Vel Total (ft/s)	6.75	Avg. Vel. (ft/s)		6.75	
Max Chl Dpth (ft)	5.05	Hydr. Depth (ft)		2.89	
Conv. Total (cfs)	433417.3	Conv. (cfs)		433417.3	
Length Wtd. (ft)	401.37	Wetted Per. (ft)		1490.76	
Min Ch El (ft)	5833.34	Shear (lb/sq ft)		0.81	
Alpha	1.00	Stream Power (lb/ft s)		5.49	
Frctn Loss (ft)	2.52	Cum Volume (acre-ft)	349.55	947.12	808.54
C & E Loss (ft)	0.06	Cum SA (acres)	137.85	308.84	315.51

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 23156 Profile: 100yr

E.G. Elev (ft)	5836.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	5835.26	Reach Len. (ft)	530.91	577.18	509.09
Crit W.S. (ft)	5835.26	Flow Area (sq ft)		3222.45	
E.G. Slope (ft/ft)	0.009321	Area (sq ft)		3222.45	1695.45
Q Total (cfs)	29100.00	Flow (cfs)		29100.00	
Top Width (ft)	2765.14	Top Width (ft)		1240.18	1524.96
Vel Total (ft/s)	9.03	Avg. Vel. (ft/s)		9.03	
Max Chl Dpth (ft)	5.26	Hydr. Depth (ft)		2.60	
Conv. Total (cfs)	301412.0	Conv. (cfs)		301412.0	
Length Wtd. (ft)	575.02	Wetted Per. (ft)		1241.75	
Min Ch El (ft)	5830.00	Shear (lb/sq ft)		1.51	
Alpha	1.00	Stream Power (lb/ft s)		13.64	
Frctn Loss (ft)	3.22	Cum Volume (acre-ft)	349.55	911.35	794.80
C & E Loss (ft)	0.21	Cum SA (acres)	137.85	295.84	304.49

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 22579 Profile: 100yr

E.G. Elev (ft)	5833.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.58	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5832.48	Reach Len. (ft)	358.55	383.00	362.63
Crit W.S. (ft)	5831.76	Flow Area (sq ft)		4367.06	618.87
E.G. Slope (ft/ft)	0.003729	Area (sq ft)		4367.06	5135.75
Q Total (cfs)	29100.00	Flow (cfs)		27255.64	1844.36
Top Width (ft)	3554.89	Top Width (ft)		1472.37	2082.52
Vel Total (ft/s)	5.84	Avg. Vel. (ft/s)		6.24	2.98
Max Chl Dpth (ft)	6.48	Hydr. Depth (ft)		2.97	1.51
Conv. Total (cfs)	476550.2	Conv. (cfs)		446346.4	30203.8
Length Wtd. (ft)	380.20	Wetted Per. (ft)		1473.25	410.97
Min Ch El (ft)	5826.00	Shear (lb/sq ft)		0.69	0.35
Alpha	1.09	Stream Power (lb/ft s)		4.31	1.04
Frctn Loss (ft)	1.62	Cum Volume (acre-ft)	349.55	861.07	754.89
C & E Loss (ft)	0.01	Cum SA (acres)	137.85	277.87	283.41

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 22196 Profile: 100yr

E.G. Elev (ft)	5831.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5830.70	Reach Len. (ft)	314.79	325.49	318.98
Crit W.S. (ft)	5829.93	Flow Area (sq ft)		3172.91	1273.43
E.G. Slope (ft/ft)	0.004939	Area (sq ft)		3172.91	7258.15
Q Total (cfs)	29100.00	Flow (cfs)		22953.03	6146.97
Top Width (ft)	3099.76	Top Width (ft)		1058.39	2041.37
Vel Total (ft/s)	6.54	Avg. Vel. (ft/s)		7.23	4.83
Max Chl Dpth (ft)	5.21	Hydr. Depth (ft)		3.00	2.51
Conv. Total (cfs)	414077.9	Conv. (cfs)		326609.7	87468.2
Length Wtd. (ft)	323.83	Wetted Per. (ft)		1059.04	506.48
Min Ch El (ft)	5825.71	Shear (lb/sq ft)		0.92	0.78
Alpha	1.08	Stream Power (lb/ft s)		6.68	3.74
Frctn Loss (ft)	1.98	Cum Volume (acre-ft)	349.55	827.92	703.30
C & E Loss (ft)	0.02	Cum SA (acres)	137.85	266.75	266.25

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 21870 Profile: 100yr

E.G. Elev (ft)	5829.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5828.53	Reach Len. (ft)	350.43	355.93	352.22
Crit W.S. (ft)	5828.26	Flow Area (sq ft)		2466.51	1578.68
E.G. Slope (ft/ft)	0.007800	Area (sq ft)		2466.51	7399.65
Q Total (cfs)	29100.00	Flow (cfs)		20412.44	8687.56
Top Width (ft)	2979.38	Top Width (ft)		947.56	2031.82
Vel Total (ft/s)	7.19	Avg. Vel. (ft/s)		8.28	5.50
Max Chl Dpth (ft)	5.55	Hydr. Depth (ft)		2.60	2.17
Conv. Total (cfs)	329494.1	Conv. (cfs)		231126.4	98367.7
Length Wtd. (ft)	354.56	Wetted Per. (ft)		947.86	726.71
Min Ch El (ft)	5824.00	Shear (lb/sq ft)		1.27	1.08
Alpha	1.10	Stream Power (lb/ft s)		10.49	5.82
Frcn Loss (ft)	2.19	Cum Volume (acre-ft)	349.55	806.85	649.63
C & E Loss (ft)	0.11	Cum SA (acres)	137.85	259.25	251.33

Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 21514 Profile: 100yr

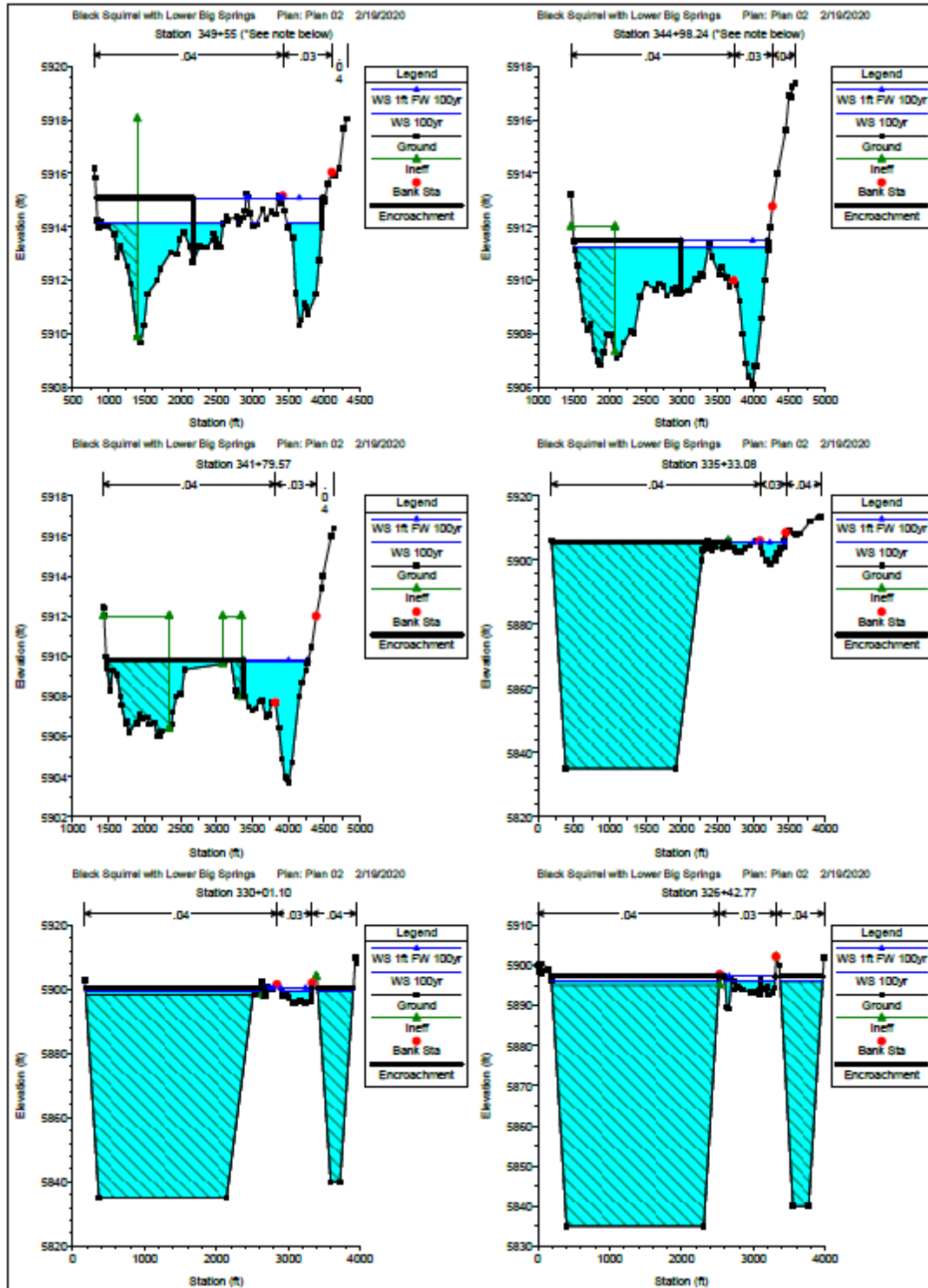
E.G. Elev (ft)	5827.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.52	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5826.60	Reach Len. (ft)	433.05	451.69	437.90
Crit W.S. (ft)	5825.81	Flow Area (sq ft)		2565.72	2544.67
E.G. Slope (ft/ft)	0.005023	Area (sq ft)		2565.72	7623.99
Q Total (cfs)	29100.00	Flow (cfs)		16327.36	12772.63
Top Width (ft)	3070.38	Top Width (ft)		1050.69	2019.69
Vel Total (ft/s)	5.69	Avg. Vel. (ft/s)		6.36	5.02
Max Chl Dpth (ft)	7.65	Hydr. Depth (ft)		2.44	2.63
Conv. Total (cfs)	410594.1	Conv. (cfs)		230375.3	180218.9
Length Wtd. (ft)	446.54	Wetted Per. (ft)		1051.19	966.68
Min Ch El (ft)	5821.60	Shear (lb/sq ft)		0.77	0.83
Alpha	1.04	Stream Power (lb/ft s)		4.87	4.14
Frcn Loss (ft)	2.94	Cum Volume (acre-ft)	349.55	786.29	588.89
C & E Loss (ft)	0.04	Cum SA (acres)	137.85	251.09	234.95

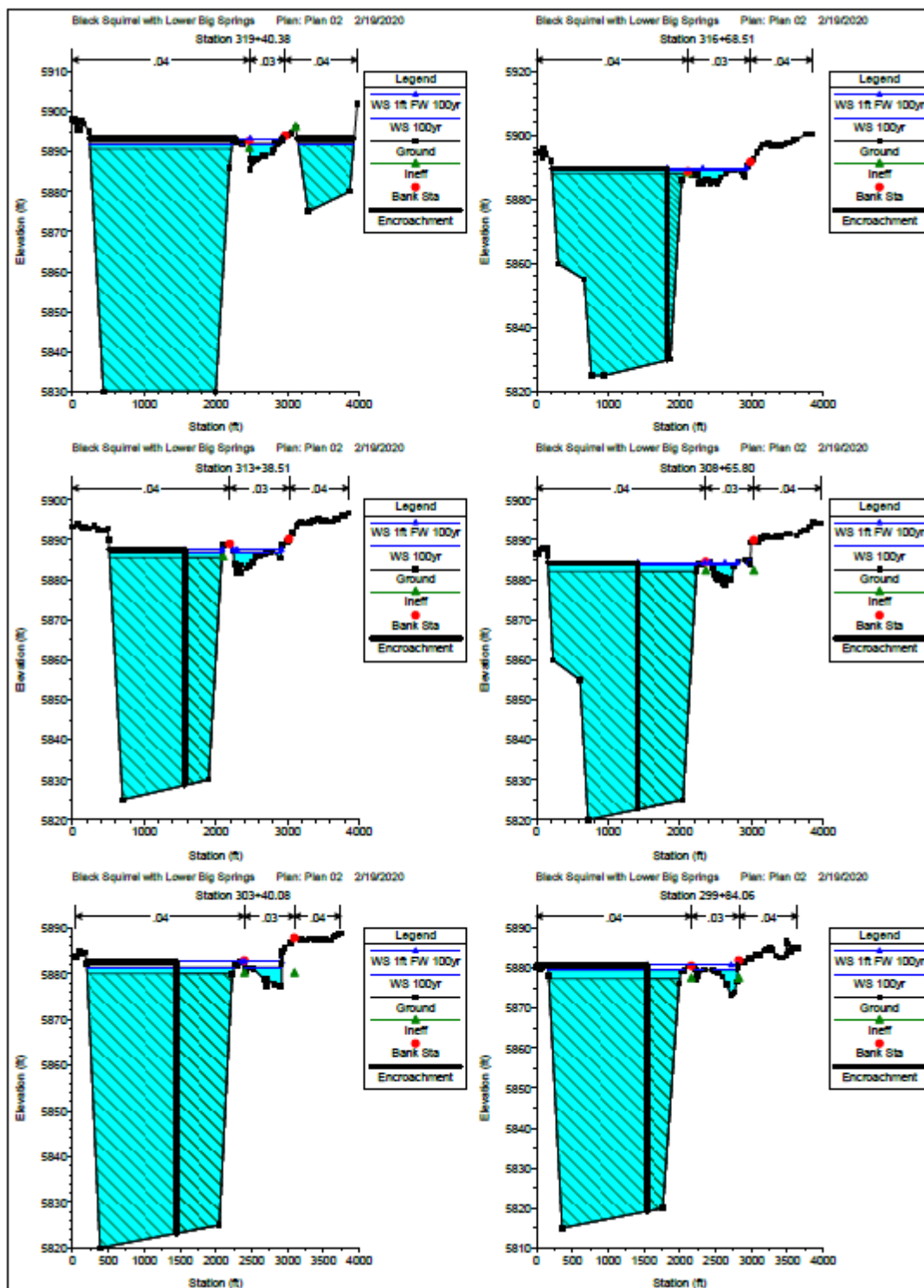
Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 21063 Profile: 100yr

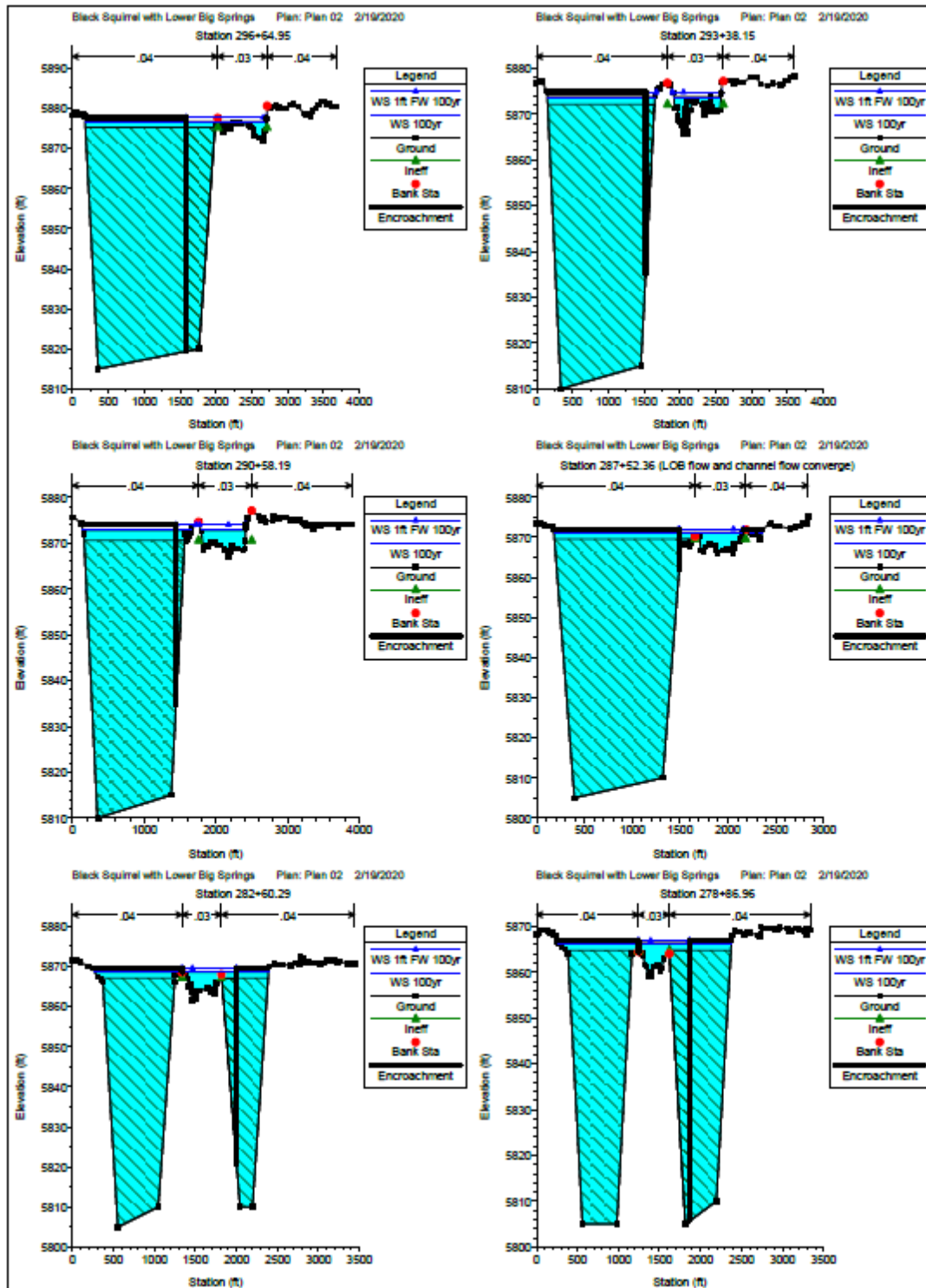
E.G. Elev (ft)	5824.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5823.24	Reach Len. (ft)	934.05	812.83	579.12
Crit W.S. (ft)	5823.12	Flow Area (sq ft)		2430.26	1484.24
E.G. Slope (ft/ft)	0.008973	Area (sq ft)		2430.26	6497.01
Q Total (cfs)	29100.00	Flow (cfs)		20135.41	8964.59
Top Width (ft)	3014.72	Top Width (ft)		1035.06	1979.66
Vel Total (ft/s)	7.43	Avg. Vel. (ft/s)		8.29	6.04
Max Chl Dpth (ft)	7.77	Hydr. Depth (ft)		2.35	2.25
Conv. Total (cfs)	307208.6	Conv. (cfs)		212569.4	94639.2
Length Wtd. (ft)	686.34	Wetted Per. (ft)		1035.60	660.02
Min Ch El (ft)	5818.00	Shear (lb/sq ft)		1.31	1.26
Alpha	1.06	Stream Power (lb/ft s)		10.89	7.61
Frcn Loss (ft)	5.01	Cum Volume (acre-ft)	349.55	760.39	517.91
C & E Loss (ft)	0.14	Cum SA (acres)	137.85	240.27	214.85

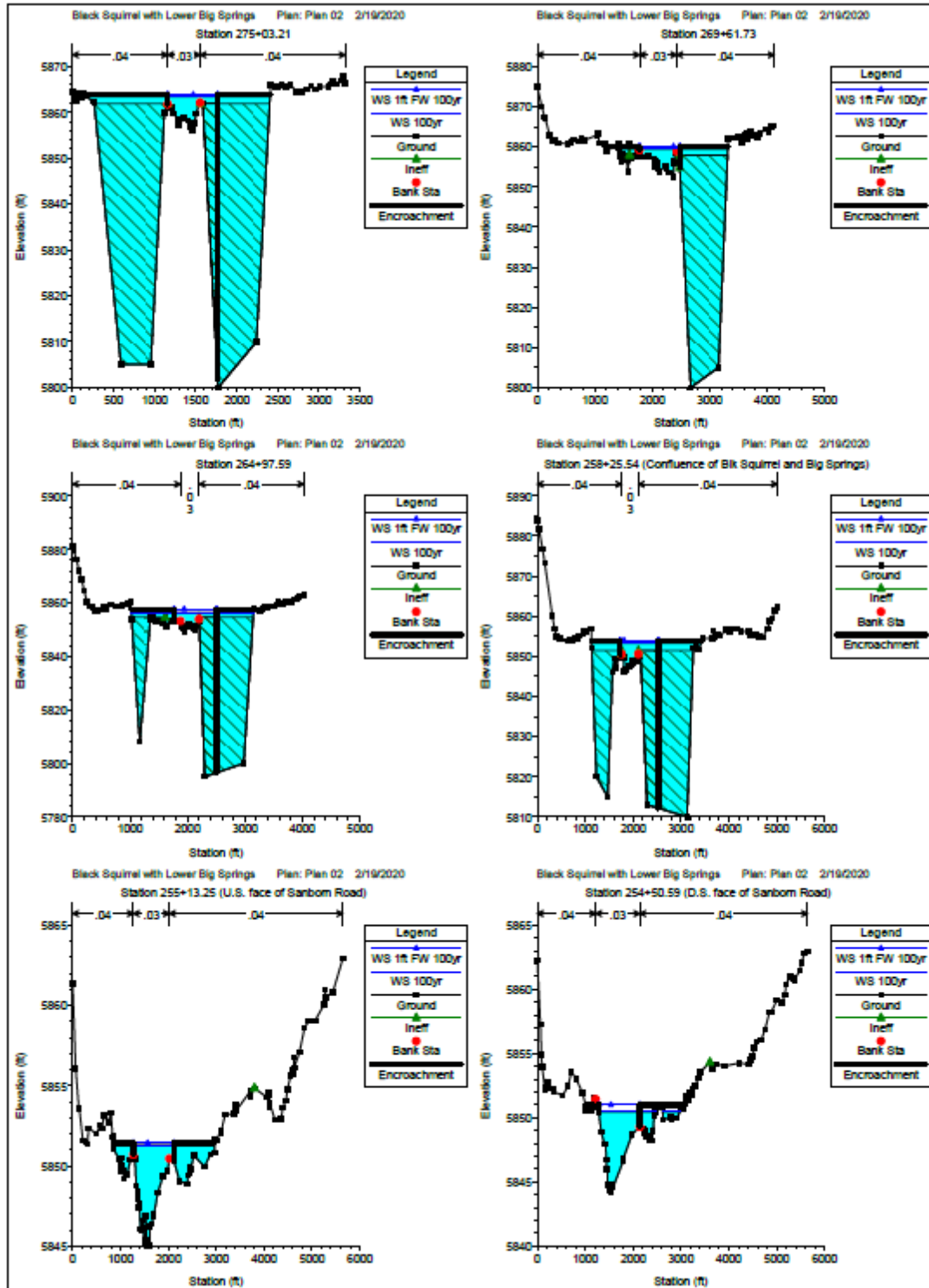
Plan: Plan-Without-Pits BlackSquirrelCrk LBS to ROB Split RS: 20250 Profile: 100yr

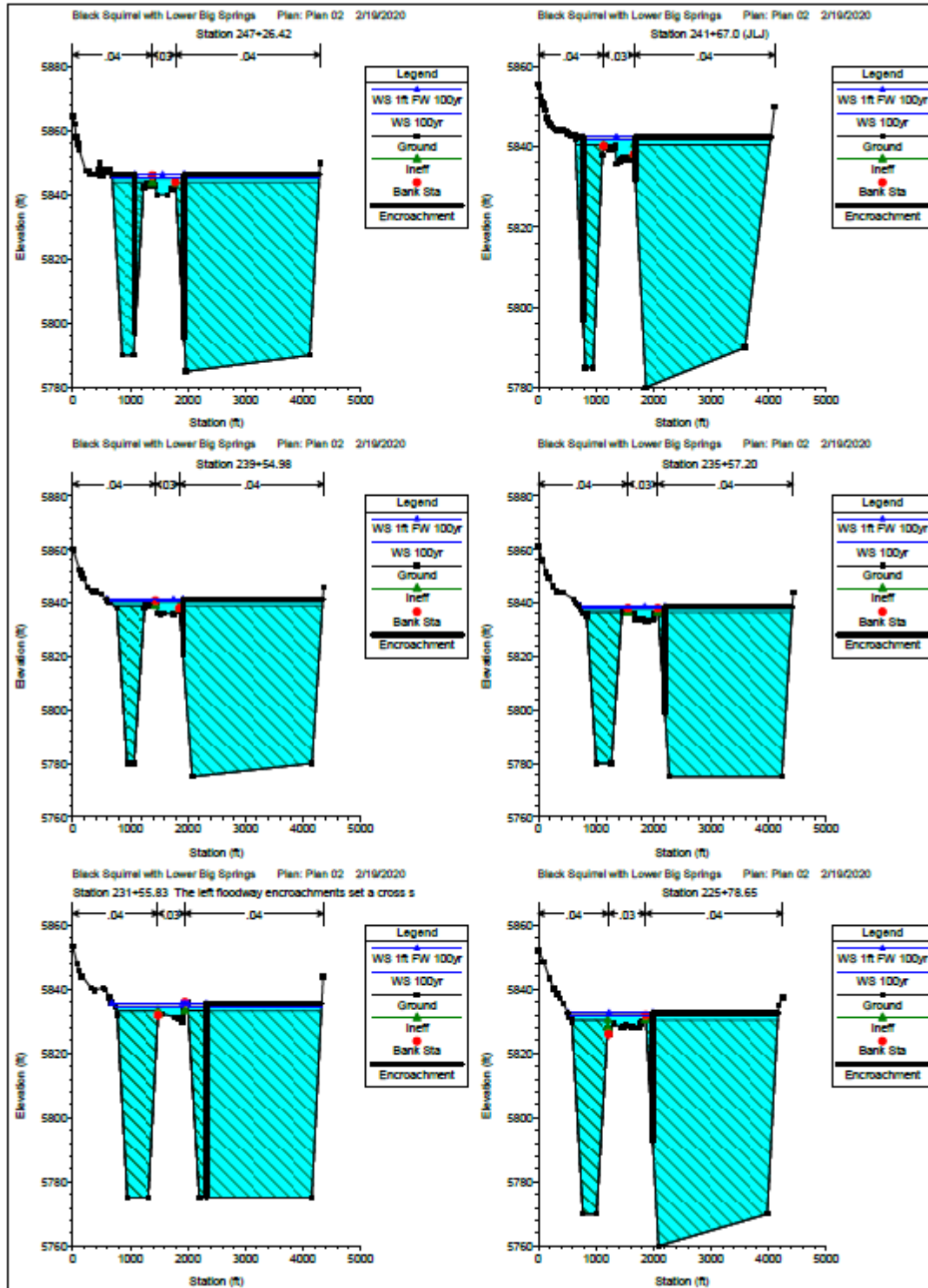
E.G. Elev (ft)	5819.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5818.56	Reach Len. (ft)	651.38	749.71	617.28
Crit W.S. (ft)	5817.68	Flow Area (sq ft)		1251.53	4161.67
E.G. Slope (ft/ft)	0.006059	Area (sq ft)		1251.53	4161.67
Q Total (cfs)	29100.00	Flow (cfs)		6565.18	22534.82
Top Width (ft)	2412.04	Top Width (ft)		788.27	1623.76
Vel Total (ft/s)	5.38	Avg. Vel. (ft/s)		5.25	5.41
Max Chl Dpth (ft)	6.24	Hydr. Depth (ft)		1.59	2.56
Conv. Total (cfs)	373848.2	Conv. (cfs)		84343.0	289505.2
Length Wtd. (ft)	643.85	Wetted Per. (ft)		788.57	1624.00
Min Ch El (ft)	5814.00	Shear (lb/sq ft)		0.60	0.97
Alpha	1.00	Stream Power (lb/ft s)		3.15	5.25
Frctn Loss (ft)	5.15	Cum Volume (acre-ft)	349.55	726.04	447.06
C & E Loss (ft)	0.03	Cum SA (acres)	137.85	223.26	190.90

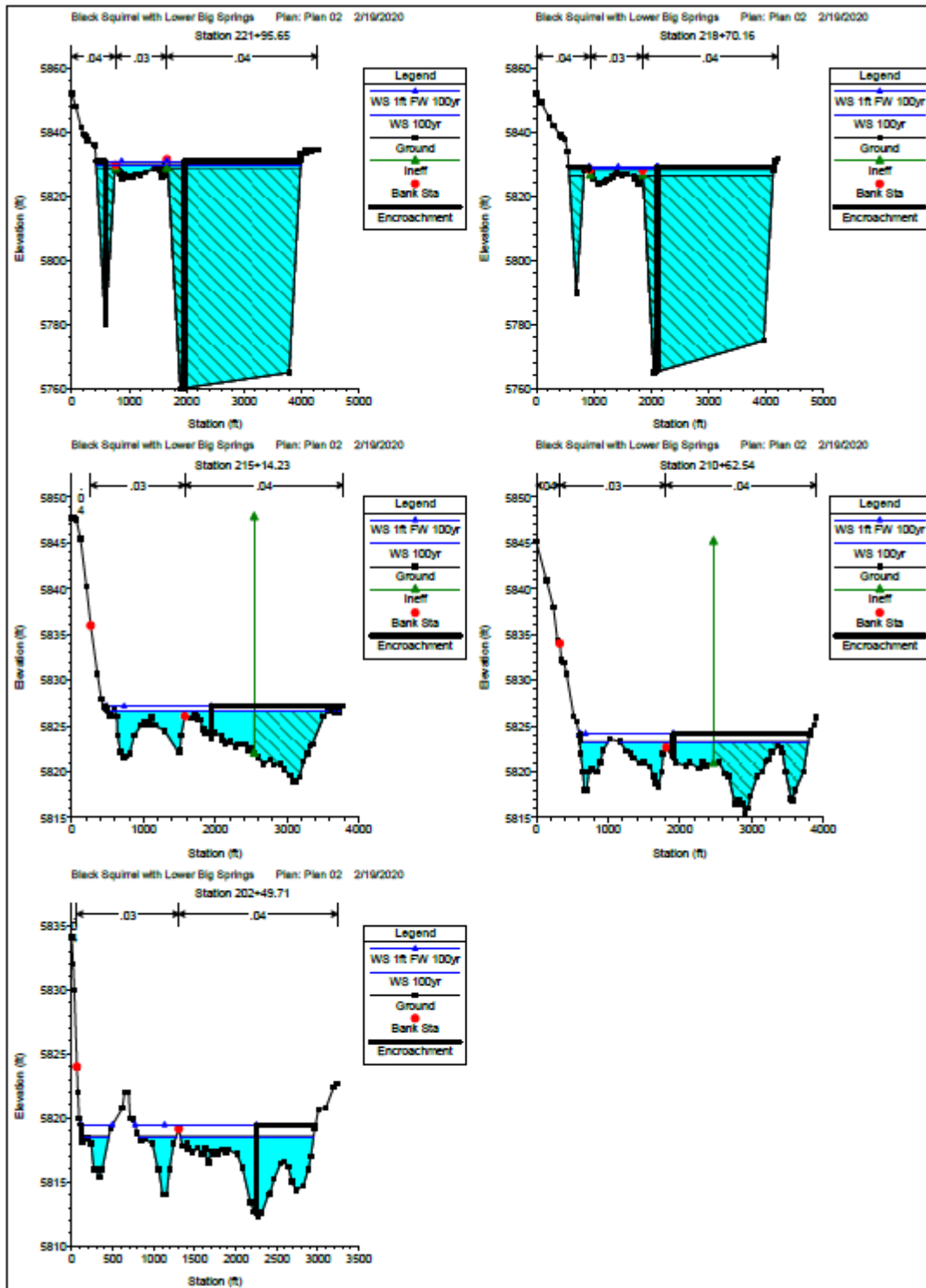












Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 34955 Profile: 100yr

E.G. Elev (ft)	5914.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.70	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5914.13	Reach Len. (ft)	455.61	456.76	458.45
Crit W.S. (ft)	5914.13	Flow Area (sq ft)	1750.86	1089.17	
E.G. Slope (ft/ft)	0.009128	Area (sq ft)	2370.87	1089.17	
Q Total (cfs)	16863.00	Flow (cfs)	7994.98	8868.02	
Top Width (ft)	2263.50	Top Width (ft)	1781.02	482.49	
Vel Total (ft/s)	5.94	Avg. Vel. (ft/s)	4.57	8.14	
Max Chl Dpth (ft)	4.45	Hydr. Depth (ft)	1.39	2.26	
Conv. Total (cfs)	176501.4	Conv. (cfs)	83681.7	92819.7	
Length Wtd. (ft)	456.20	Wetted Per. (ft)	1261.39	482.60	
Min Ch El (ft)	5910.34	Shear (lb/sq ft)	0.79	1.29	
Alpha	1.27	Stream Power (lb/ft s)	3.61	10.47	
Frcn Loss (ft)	2.23	Cum Volume (acre-ft)	12647.19	268.80	1482.44
C & E Loss (ft)	0.11	Cum SA (acres)	296.57	84.07	29.64

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 34498 Profile: 100yr

E.G. Elev (ft)	5911.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5911.23	Reach Len. (ft)	299.30	318.67	327.60
Crit W.S. (ft)	5910.65	Flow Area (sq ft)	2788.54	1462.83	
E.G. Slope (ft/ft)	0.003043	Area (sq ft)	4500.99	1462.83	
Q Total (cfs)	16863.00	Flow (cfs)	8474.89	8388.11	
Top Width (ft)	2670.19	Top Width (ft)	2189.09	481.09	
Vel Total (ft/s)	3.97	Avg. Vel. (ft/s)	3.04	5.73	
Max Chl Dpth (ft)	5.13	Hydr. Depth (ft)	1.72	3.04	
Conv. Total (cfs)	305667.1	Conv. (cfs)	153620.0	152047.1	
Length Wtd. (ft)	310.62	Wetted Per. (ft)	1623.69	481.20	
Min Ch El (ft)	5906.10	Shear (lb/sq ft)	0.33	0.58	
Alpha	1.33	Stream Power (lb/ft s)	0.99	3.31	
Frcn Loss (ft)	1.13	Cum Volume (acre-ft)	12611.25	255.42	1482.44
C & E Loss (ft)	0.03	Cum SA (acres)	275.80	79.02	29.64

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 34180 Profile: 100yr

E.G. Elev (ft)	5910.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.64	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5909.75	Reach Len. (ft)	581.80	646.49	770.50
Crit W.S. (ft)	5909.28	Flow Area (sq ft)	1612.56	1522.19	
E.G. Slope (ft/ft)	0.004444	Area (sq ft)	4083.50	1522.19	
Q Total (cfs)	16863.00	Flow (cfs)	5547.79	11315.21	
Top Width (ft)	2763.96	Top Width (ft)	2313.45	450.51	
Vel Total (ft/s)	5.38	Avg. Vel. (ft/s)	3.44	7.43	
Max Chl Dpth (ft)	6.02	Hydr. Depth (ft)	1.32	3.38	
Conv. Total (cfs)	252951.0	Conv. (cfs)	83218.8	169732.2	
Length Wtd. (ft)	630.41	Wetted Per. (ft)	1218.07	450.64	
Min Ch El (ft)	5903.73	Shear (lb/sq ft)	0.37	0.94	
Alpha	1.42	Stream Power (lb/ft s)	1.26	6.97	
Frcn Loss (ft)	3.40	Cum Volume (acre-ft)	12581.76	244.50	1482.44
C & E Loss (ft)	0.08	Cum SA (acres)	260.33	75.61	29.64

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 33533 Profile: 100yr

E.G. Elev (ft)	5906.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.43	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5905.48	Reach Len. (ft)	518.83	531.98	578.90
Crit W.S. (ft)	5905.48	Flow Area (sq ft)	627.07	1380.51	
E.G. Slope (ft/ft)	0.006698	Area (sq ft)	129660.70	1380.51	
Q Total (cfs)	16863.00	Flow (cfs)	2834.31	14028.69	
Top Width (ft)	3112.39	Top Width (ft)	2777.88	334.51	
Vel Total (ft/s)	8.48	Avg. Vel. (ft/s)	4.52	10.31	
Max Chl Dpth (ft)	70.48	Hydr. Depth (ft)	1.81	4.07	
Conv. Total (cfs)	206038.7	Conv. (cfs)	34630.7	171408.1	
Length Wtd. (ft)	527.91	Wetted Per. (ft)	345.94	335.37	
Min Ch El (ft)	5898.57	Shear (lb/sq ft)	0.76	1.70	
Alpha	1.28	Stream Power (lb/ft s)	3.43	17.49	
Frcn Loss (ft)	3.33	Cum Volume (acre-ft)	11688.59	223.11	1482.44
C & E Loss (ft)	0.26	Cum SA (acres)	226.33	69.78	29.64

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 33001 Profile: 100yr

E.G. Elev (ft)	5900.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.57	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5899.55	Reach Len. (ft)	377.13	358.33	352.96
Crit W.S. (ft)	5899.55	Flow Area (sq ft)	2577.26	1194.08	
E.G. Slope (ft/ft)	0.005959	Area (sq ft)	132866.00	1194.08	18477.52
Q Total (cfs)	16863.00	Flow (cfs)	7599.48	9263.52	
Top Width (ft)	3367.68	Top Width (ft)	2464.74	412.34	490.60
Vel Total (ft/s)	4.47	Avg. Vel. (ft/s)	2.95	7.76	
Max Chl Dpth (ft)	64.55	Hydr. Depth (ft)	1.05	2.90	
Conv. Total (cfs)	218447.9	Conv. (cfs)	98445.7	120002.2	
Length Wtd. (ft)	365.54	Wetted Per. (ft)	2481.66	413.15	
Min Ch El (ft)	5895.91	Shear (lb/sq ft)	0.39	1.08	
Alpha	1.85	Stream Power (lb/ft s)	1.14	8.34	
Frcn Loss (ft)	2.10	Cum Volume (acre-ft)	10125.15	207.51	1359.66
C & E Loss (ft)	0.01	Cum SA (acres)	195.11	65.22	26.38

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 32643 Profile: 100yr

E.G. Elev (ft)	5896.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5896.00	Reach Len. (ft)	577.75	702.39	421.88
Crit W.S. (ft)	5896.00	Flow Area (sq ft)	2085.77	1679.02	
E.G. Slope (ft/ft)	0.005564	Area (sq ft)	129310.90	1679.02	22583.17
Q Total (cfs)	16863.00	Flow (cfs)	5340.61	11522.39	
Top Width (ft)	3579.56	Top Width (ft)	2330.97	659.99	588.60
Vel Total (ft/s)	4.48	Avg. Vel. (ft/s)	2.56	6.86	
Max Chl Dpth (ft)	61.00	Hydr. Depth (ft)	0.89	2.54	
Conv. Total (cfs)	226060.4	Conv. (cfs)	71594.7	154465.7	
Length Wtd. (ft)	653.32	Wetted Per. (ft)	2348.26	663.29	
Min Ch El (ft)	5889.14	Shear (lb/sq ft)	0.31	0.88	
Alpha	1.71	Stream Power (lb/ft s)	0.79	6.03	
Frcn Loss (ft)	3.60	Cum Volume (acre-ft)	8990.23	195.69	1193.31
C & E Loss (ft)	0.01	Cum SA (acres)	174.35	60.81	22.00

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 31940 Profile: 100yr

E.G. Elev (ft)	5892.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5891.96	Reach Len. (ft)	259.81	271.87	261.48
Crit W.S. (ft)	5891.96	Flow Area (sq ft)	2496.25	1112.35	
E.G. Slope (ft/ft)	0.005467	Area (sq ft)	109426.60	1112.35	9883.27
Q Total (cfs)	16863.00	Flow (cfs)	7937.67	8925.33	
Top Width (ft)	3103.97	Top Width (ft)	1987.58	340.07	776.33
Vel Total (ft/s)	4.67	Avg. Vel. (ft/s)	3.18	8.02	
Max Chl Dpth (ft)	61.96	Hydr. Depth (ft)	1.26	3.27	
Conv. Total (cfs)	228062.2	Conv. (cfs)	107352.3	120709.9	
Length Wtd. (ft)	266.64	Wetted Per. (ft)	2006.04	343.00	
Min Ch El (ft)	5885.43	Shear (lb/sq ft)	0.42	1.11	
Alpha	1.78	Stream Power (lb/ft s)	1.35	8.88	
Frctn Loss (ft)	1.42	Cum Volume (acre-ft)	7407.00	173.19	1036.09
C & E Loss (ft)	0.07	Cum SA (acres)	145.71	52.75	15.40

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 31669 Profile: 100yr

E.G. Elev (ft)	5889.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5889.29	Reach Len. (ft)	324.99	330.00	328.42
Crit W.S. (ft)	5889.08	Flow Area (sq ft)	2243.83	1718.79	
E.G. Slope (ft/ft)	0.005225	Area (sq ft)	91184.27	1718.79	
Q Total (cfs)	16863.00	Flow (cfs)	6694.27	10168.73	
Top Width (ft)	2705.52	Top Width (ft)	1897.16	808.36	
Vel Total (ft/s)	4.26	Avg. Vel. (ft/s)	2.98	5.92	
Max Chl Dpth (ft)	64.29	Hydr. Depth (ft)	1.18	2.13	
Conv. Total (cfs)	233284.5	Conv. (cfs)	92609.2	140675.3	
Length Wtd. (ft)	327.82	Wetted Per. (ft)	1916.00	809.18	
Min Ch El (ft)	5884.78	Shear (lb/sq ft)	0.38	0.69	
Alpha	1.36	Stream Power (lb/ft s)	1.14	4.10	
Frctn Loss (ft)	2.22	Cum Volume (acre-ft)	6808.74	164.35	1006.42
C & E Loss (ft)	0.02	Cum SA (acres)	134.13	49.17	13.07

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 31339 Profile: 100yr

E.G. Elev (ft)	5887.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.58	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5886.85	Reach Len. (ft)	431.77	472.71	429.95
Crit W.S. (ft)	5886.85	Flow Area (sq ft)	1960.81	1181.34	
E.G. Slope (ft/ft)	0.009108	Area (sq ft)	82177.98	1181.34	
Q Total (cfs)	16863.00	Flow (cfs)	7981.91	8881.09	
Top Width (ft)	2162.48	Top Width (ft)	1575.08	587.39	
Vel Total (ft/s)	5.37	Avg. Vel. (ft/s)	4.07	7.52	
Max Chl Dpth (ft)	61.85	Hydr. Depth (ft)	1.24	2.01	
Conv. Total (cfs)	176715.8	Conv. (cfs)	83646.4	93069.4	
Length Wtd. (ft)	449.63	Wetted Per. (ft)	1593.39	588.90	
Min Ch El (ft)	5881.58	Shear (lb/sq ft)	0.70	1.14	
Alpha	1.31	Stream Power (lb/ft s)	2.85	8.57	
Frctn Loss (ft)	2.79	Cum Volume (acre-ft)	6162.03	153.37	1006.42
C & E Loss (ft)	0.08	Cum SA (acres)	121.18	43.88	13.07

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 30866 Profile: 100yr

E.G. Elev (ft)	5884.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5883.69	Reach Len. (ft)	381.72	525.73	605.99
Crit W.S. (ft)	5883.37	Flow Area (sq ft)	3288.46	912.94	
E.G. Slope (ft/ft)	0.004485	Area (sq ft)	102456.30	912.94	
Q Total (cfs)	16863.00	Flow (cfs)	11029.06	5833.94	
Top Width (ft)	2427.20	Top Width (ft)	2086.68	340.52	
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)	3.35	6.39	
Max Chl Dpth (ft)	63.69	Hydr. Depth (ft)	1.58	2.68	
Conv. Total (cfs)	251788.0	Conv. (cfs)	164679.2	87108.8	
Length Wtd. (ft)	437.24	Wetted Per. (ft)	2104.56	341.44	
Min Ch El (ft)	5878.74	Shear (lb/sq ft)	0.44	0.75	
Alpha	1.33	Stream Power (lb/ft s)	1.47	4.78	
Frctn Loss (ft)	2.28	Cum Volume (acre-ft)	5246.98	142.00	1006.42
C & E Loss (ft)	0.01	Cum SA (acres)	103.03	38.84	13.07

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 30340 Profile: 100yr

E.G. Elev (ft)	5881.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.39	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5881.35	Reach Len. (ft)	335.79	356.02	418.52
Crit W.S. (ft)	5881.23	Flow Area (sq ft)	2757.68	1108.12	
E.G. Slope (ft/ft)	0.006115	Area (sq ft)	108733.10	1108.12	
Q Total (cfs)	16863.00	Flow (cfs)	9693.80	7169.20	
Top Width (ft)	2563.65	Top Width (ft)	2053.27	510.37	
Vel Total (ft/s)	4.36	Avg. Vel. (ft/s)	3.52	6.47	
Max Chl Dpth (ft)	61.35	Hydr. Depth (ft)	1.34	2.17	
Conv. Total (cfs)	215635.9	Conv. (cfs)	123959.7	91676.2	
Length Wtd. (ft)	342.61	Wetted Per. (ft)	2071.77	513.33	
Min Ch El (ft)	5877.18	Shear (lb/sq ft)	0.51	0.82	
Alpha	1.31	Stream Power (lb/ft s)	1.79	5.33	
Frctn Loss (ft)	1.91	Cum Volume (acre-ft)	4321.65	129.81	1006.42
C & E Loss (ft)	0.00	Cum SA (acres)	84.89	33.71	13.07

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 29984 Profile: 100yr

E.G. Elev (ft)	5879.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5879.45	Reach Len. (ft)	281.57	319.11	328.22
Crit W.S. (ft)	5879.05	Flow Area (sq ft)	3953.53	1054.58	
E.G. Slope (ft/ft)	0.005223	Area (sq ft)	100270.80	1054.58	
Q Total (cfs)	23714.00	Flow (cfs)	17195.58	6518.43	
Top Width (ft)	2363.76	Top Width (ft)	1899.91	463.84	
Vel Total (ft/s)	4.74	Avg. Vel. (ft/s)	4.35	6.18	
Max Chl Dpth (ft)	64.45	Hydr. Depth (ft)	2.08	2.27	
Conv. Total (cfs)	328130.6	Conv. (cfs)	237935.2	90195.5	
Length Wtd. (ft)	293.53	Wetted Per. (ft)	1917.25	464.77	
Min Ch El (ft)	5873.15	Shear (lb/sq ft)	0.67	0.74	
Alpha	1.08	Stream Power (lb/ft s)	2.92	4.57	
Frctn Loss (ft)	2.43	Cum Volume (acre-ft)	3516.07	120.97	1006.42
C & E Loss (ft)	0.03	Cum SA (acres)	69.65	29.73	13.07

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 29665 Profile: 100yr

E.G. Elev (ft)	5877.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.71	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5876.64	Reach Len. (ft)	284.00	326.80	348.43
Crit W.S. (ft)	5876.64	Flow Area (sq ft)	2618.72	1052.63	
E.G. Slope (ft/ft)	0.015151	Area (sq ft)	95122.95	1052.63	
Q Total (cfs)	23714.00	Flow (cfs)	15120.40	8593.60	
Top Width (ft)	2506.68	Top Width (ft)	1828.74	677.94	
Vel Total (ft/s)	6.46	Avg. Vel. (ft/s)	5.77	8.16	
Max Chl Dpth (ft)	61.64	Hydr. Depth (ft)	1.43	1.55	
Conv. Total (cfs)	192654.8	Conv. (cfs)	122839.6	69815.2	
Length Wtd. (ft)	304.98	Wetted Per. (ft)	1845.52	679.31	
Min Ch El (ft)	5872.00	Shear (lb/sq ft)	1.34	1.47	
Alpha	1.09	Stream Power (lb/ft s)	7.75	11.97	
Frctn Loss (ft)	2.71	Cum Volume (acre-ft)	2884.56	113.25	1006.42
C & E Loss (ft)	0.02	Cum SA (acres)	57.60	25.55	13.07

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 29338 Profile: 100yr

E.G. Elev (ft)	5874.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5873.69	Reach Len. (ft)	252.33	279.96	309.87
Crit W.S. (ft)	5873.52	Flow Area (sq ft)	2370.88	1908.33	
E.G. Slope (ft/ft)	0.005841	Area (sq ft)	79903.99	1908.33	
Q Total (cfs)	23714.00	Flow (cfs)	9060.61	14653.39	
Top Width (ft)	2152.54	Top Width (ft)	1499.04	653.50	
Vel Total (ft/s)	5.54	Avg. Vel. (ft/s)	3.82	7.68	
Max Chl Dpth (ft)	63.69	Hydr. Depth (ft)	1.58	2.92	
Conv. Total (cfs)	310297.4	Conv. (cfs)	118557.9	191739.5	
Length Wtd. (ft)	269.03	Wetted Per. (ft)	1518.03	660.51	
Min Ch El (ft)	5865.76	Shear (lb/sq ft)	0.57	1.05	
Alpha	1.37	Stream Power (lb/ft s)	2.18	8.09	
Frctn Loss (ft)	1.06	Cum Volume (acre-ft)	2314.00	102.14	1006.42
C & E Loss (ft)	0.07	Cum SA (acres)	46.75	20.55	13.07

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 29058 Profile: 100yr

E.G. Elev (ft)	5873.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.42	Wt. n-Val.	0.040	0.030	
W.S. Elev (ft)	5872.79	Reach Len. (ft)	287.77	305.83	246.30
Crit W.S. (ft)	5872.14	Flow Area (sq ft)	3072.46	2250.44	
E.G. Slope (ft/ft)	0.002850	Area (sq ft)	73826.62	2250.44	
Q Total (cfs)	23714.00	Flow (cfs)	9697.36	14016.64	
Top Width (ft)	2132.85	Top Width (ft)	1511.67	621.18	
Vel Total (ft/s)	4.46	Avg. Vel. (ft/s)	3.16	6.23	
Max Chl Dpth (ft)	62.79	Hydr. Depth (ft)	2.03	3.62	
Conv. Total (cfs)	444230.0	Conv. (cfs)	181658.9	262571.1	
Length Wtd. (ft)	298.65	Wetted Per. (ft)	1530.15	622.46	
Min Ch El (ft)	5867.03	Shear (lb/sq ft)	0.36	0.64	
Alpha	1.36	Stream Power (lb/ft s)	1.13	4.01	
Frctn Loss (ft)	1.17	Cum Volume (acre-ft)	1868.74	88.78	1006.42
C & E Loss (ft)	0.04	Cum SA (acres)	38.03	16.46	13.07

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 28752 Profile: 100yr

E.G. Elev (ft)	5872.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.81	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5871.19	Reach Len. (ft)	417.55	492.07	349.60
Crit W.S. (ft)	5871.15	Flow Area (sq ft)	2325.80	1713.03	37.10
E.G. Slope (ft/ft)	0.005756	Area (sq ft)	72441.63	1713.03	37.85
Q Total (cfs)	23714.00	Flow (cfs)	8801.44	14808.21	104.35
Top Width (ft)	2018.32	Top Width (ft)	1476.06	489.86	52.40
Vel Total (ft/s)	5.82	Avg. Vel. (ft/s)	3.78	8.64	2.81
Max Chl Dpth (ft)	66.19	Hydr. Depth (ft)	1.58	3.50	0.71
Conv. Total (cfs)	312574.8	Conv. (cfs)	116012.0	195187.3	1375.5
Length Wtd. (ft)	461.15	Wetted Per. (ft)	1494.79	490.96	52.74
Min Ch El (ft)	5865.79	Shear (lb/sq ft)	0.56	1.25	0.25
Alpha	1.54	Stream Power (lb/ft s)	2.12	10.84	0.71
Frctn Loss (ft)	2.54	Cum Volume (acre-ft)	1385.60	74.86	1006.32
C & E Loss (ft)	0.00	Cum SA (acres)	28.16	12.56	12.92

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 28260 Profile: 100yr

E.G. Elev (ft)	5869.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.84	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5868.61	Reach Len. (ft)	295.34	373.33	252.51
Crit W.S. (ft)	5868.61	Flow Area (sq ft)	1486.06	1812.47	863.46
E.G. Slope (ft/ft)	0.005269	Area (sq ft)	42343.08	1812.47	21357.02
Q Total (cfs)	23714.00	Flow (cfs)	4940.00	15773.72	3000.28
Top Width (ft)	2122.34	Top Width (ft)	1067.76	480.20	574.38
Vel Total (ft/s)	5.70	Avg. Vel. (ft/s)	3.32	8.70	3.47
Max Chl Dpth (ft)	63.61	Hydr. Depth (ft)	1.39	3.77	1.50
Conv. Total (cfs)	326697.2	Conv. (cfs)	68056.1	217307.5	41333.6
Length Wtd. (ft)	339.82	Wetted Per. (ft)	1085.66	481.25	590.27
Min Ch El (ft)	5861.58	Shear (lb/sq ft)	0.45	1.24	0.48
Alpha	1.67	Stream Power (lb/ft s)	1.50	10.78	1.67
Frctn Loss (ft)	1.66	Cum Volume (acre-ft)	835.45	54.95	920.46
C & E Loss (ft)	0.00	Cum SA (acres)	15.97	7.08	10.40

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 27887 Profile: 100yr

E.G. Elev (ft)	5867.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5866.36	Reach Len. (ft)	397.19	383.75	354.51
Crit W.S. (ft)	5866.36	Flow Area (sq ft)	1468.07	1673.62	1178.24
E.G. Slope (ft/ft)	0.004533	Area (sq ft)	37398.05	1673.62	33607.47
Q Total (cfs)	23714.00	Flow (cfs)	4745.68	15068.21	3900.11
Top Width (ft)	2113.69	Top Width (ft)	980.20	376.85	756.64
Vel Total (ft/s)	5.49	Avg. Vel. (ft/s)	3.23	9.00	3.31
Max Chl Dpth (ft)	61.36	Hydr. Depth (ft)	1.50	4.44	1.56
Conv. Total (cfs)	352234.9	Conv. (cfs)	70489.7	223815.0	57930.1
Length Wtd. (ft)	381.42	Wetted Per. (ft)	999.03	377.24	773.81
Min Ch El (ft)	5859.15	Shear (lb/sq ft)	0.42	1.26	0.43
Alpha	1.84	Stream Power (lb/ft s)	1.34	11.30	1.43
Frctn Loss (ft)	1.71	Cum Volume (acre-ft)	565.13	40.01	761.15
C & E Loss (ft)	0.01	Cum SA (acres)	9.03	3.40	6.54

Plan: Plan 02 BlackSquirrelCrk US to LBS RS: 27503 Profile: 100yr

E.G. Elev (ft)	5864.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.84	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5863.40	Reach Len. (ft)	541.48	541.48	541.48
Crit W.S. (ft)	5863.40	Flow Area (sq ft)	1405.33	1733.70	1272.43
E.G. Slope (ft/ft)	0.004448	Area (sq ft)	36265.81	1733.70	37689.98
Q Total (cfs)	23714.00	Flow (cfs)	4342.88	15308.97	4062.14
Top Width (ft)	2247.47	Top Width (ft)	1000.05	395.86	851.56
Vel Total (ft/s)	5.38	Avg. Vel. (ft/s)	3.09	8.83	3.19
Max Chl Dpth (ft)	63.40	Hydr. Depth (ft)	1.41	4.38	1.49
Conv. Total (cfs)	355582.3	Conv. (cfs)	65119.9	229552.2	60910.3
Length Wtd. (ft)	541.48	Wetted Per. (ft)	1014.28	396.66	869.87
Min Ch EI (ft)	5856.14	Shear (lb/sq ft)	0.38	1.21	0.41
Alpha	1.86	Stream Power (lb/ft s)	1.19	10.72	1.30
Frctn Loss (ft)	3.03	Cum Volume (acre-ft)	229.29	25.00	471.03
C & E Loss (ft)	0.03	Cum SA (acres)			

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 26962 Profile: 100yr

E.G. Elev (ft)	5860.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.11	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5859.43	Reach Len. (ft)	465.72	464.14	428.10
Crit W.S. (ft)	5859.43	Flow Area (sq ft)	502.37	2289.31	1350.95
E.G. Slope (ft/ft)	0.006873	Area (sq ft)	624.75	2289.31	38094.59
Q Total (cfs)	29100.00	Flow (cfs)	1941.73	21723.14	5435.13
Top Width (ft)	1934.02	Top Width (ft)	395.88	650.21	887.93
Vel Total (ft/s)	7.02	Avg. Vel. (ft/s)	3.87	9.49	4.02
Max Chl Dpth (ft)	59.43	Hydr. Depth (ft)	1.27	3.52	1.52
Conv. Total (cfs)	351001.4	Conv. (cfs)	23421.0	262022.4	65558.0
Length Wtd. (ft)	457.52	Wetted Per. (ft)	397.67	651.73	904.82
Min Ch EI (ft)	5852.51	Shear (lb/sq ft)	0.54	1.51	0.64
Alpha	1.44	Stream Power (lb/ft s)	2.10	14.30	2.58
Frctn Loss (ft)	2.63	Cum Volume (acre-ft)	2129.68	1029.84	11793.79
C & E Loss (ft)	0.06	Cum SA (acres)	204.42	322.40	459.92

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 26498 Profile: 100yr

E.G. Elev (ft)	5857.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5856.28	Reach Len. (ft)	589.32	672.05	619.01
Crit W.S. (ft)	5856.22	Flow Area (sq ft)	1812.72	1546.48	1584.65
E.G. Slope (ft/ft)	0.004885	Area (sq ft)	9618.54	1546.48	47612.08
Q Total (cfs)	29100.00	Flow (cfs)	8246.97	15145.09	5707.94
Top Width (ft)	2115.05	Top Width (ft)	846.09	324.12	944.85
Vel Total (ft/s)	5.89	Avg. Vel. (ft/s)	4.55	9.79	3.60
Max Chl Dpth (ft)	61.28	Hydr. Depth (ft)	2.14	4.77	1.68
Conv. Total (cfs)	416331.8	Conv. (cfs)	117988.9	216679.8	81663.1
Length Wtd. (ft)	641.64	Wetted Per. (ft)	861.09	325.04	969.83
Min Ch EI (ft)	5849.26	Shear (lb/sq ft)	0.64	1.45	0.50
Alpha	1.68	Stream Power (lb/ft s)	2.92	14.21	1.80
Frctn Loss (ft)	3.02	Cum Volume (acre-ft)	2074.93	1009.40	11372.64
C & E Loss (ft)	0.00	Cum SA (acres)	197.78	317.21	450.91

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 25826 Profile: 100yr

E.G. Elev (ft)	5854.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.92	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5853.25	Reach Len. (ft)	304.11	312.29	311.37
Crit W.S. (ft)	5853.25	Flow Area (sq ft)	1154.09	1729.65	2261.09
E.G. Slope (ft/ft)	0.004533	Area (sq ft)	13100.01	1729.65	40890.34
Q Total (cfs)	29100.00	Flow (cfs)	4295.54	16708.52	8097.94
Top Width (ft)	2283.11	Top Width (ft)	625.11	350.07	1307.94
Vel Total (ft/s)	5.66	Avg. Vel. (ft/s)	3.72	9.66	3.58
Max Chl Dpth (ft)	43.25	Hydr. Depth (ft)	1.85	4.94	1.73
Conv. Total (cfs)	432199.1	Conv. (cfs)	63798.2	248128.6	120272.3
Length Wtd. (ft)	311.29	Wetted Per. (ft)	635.76	350.91	1319.62
Min Ch El (ft)	5846.21	Shear (lb/sq ft)	0.51	1.40	0.48
Alpha	1.85	Stream Power (lb/ft s)	1.91	13.47	1.74
Frcn Loss (ft)	1.60	Cum Volume (acre-ft)	1921.25	984.13	10743.80
C & E Loss (ft)	0.01	Cum SA (acres)	187.83	312.01	434.91

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 25513 Profile: 100yr

E.G. Elev (ft)	5852.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.01	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5851.31	Reach Len. (ft)	62.66	62.66	62.66
Crit W.S. (ft)	5851.31	Flow Area (sq ft)	468.51	2663.68	1230.80
E.G. Slope (ft/ft)	0.005878	Area (sq ft)	468.51	2663.68	1230.80
Q Total (cfs)	29100.00	Flow (cfs)	1458.72	23465.79	4175.50
Top Width (ft)	2109.77	Top Width (ft)	409.84	753.22	946.71
Vel Total (ft/s)	6.67	Avg. Vel. (ft/s)	3.11	8.81	3.39
Max Chl Dpth (ft)	6.31	Hydr. Depth (ft)	1.14	3.54	1.30
Conv. Total (cfs)	379543.2	Conv. (cfs)	19025.7	306057.7	54459.9
Length Wtd. (ft)	62.66	Wetted Per. (ft)	409.92	753.89	946.81
Min Ch El (ft)	5845.00	Shear (lb/sq ft)	0.42	1.30	0.48
Alpha	1.45	Stream Power (lb/ft s)	1.31	11.42	1.62
Frcn Loss (ft)	0.41	Cum Volume (acre-ft)	1873.88	968.38	10593.26
C & E Loss (ft)	0.03	Cum SA (acres)	184.22	308.06	426.85

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 25451 Profile: 100yr

E.G. Elev (ft)	5851.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.28	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5850.47	Reach Len. (ft)	614.30	724.17	589.89
Crit W.S. (ft)	5850.47	Flow Area (sq ft)		2839.33	660.04
E.G. Slope (ft/ft)	0.007260	Area (sq ft)		2839.33	660.04
Q Total (cfs)	29100.00	Flow (cfs)		26696.42	2403.58
Top Width (ft)	1547.47	Top Width (ft)		853.66	693.81
Vel Total (ft/s)	8.32	Avg. Vel. (ft/s)		9.40	3.64
Max Chl Dpth (ft)	6.21	Hydr. Depth (ft)		3.33	0.95
Conv. Total (cfs)	341522.5	Conv. (cfs)		313313.7	28208.8
Length Wtd. (ft)	685.77	Wetted Per. (ft)		853.85	693.91
Min Ch El (ft)	5844.26	Shear (lb/sq ft)		1.51	0.43
Alpha	1.19	Stream Power (lb/ft s)		14.17	1.57
Frcn Loss (ft)	4.02	Cum Volume (acre-ft)	1873.55	964.42	10591.90
C & E Loss (ft)	0.18	Cum SA (acres)	183.92	306.90	425.67

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 24726 Profile: 100yr

E.G. Elev (ft)	5845.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.68	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5845.23	Reach Len. (ft)	568.78	559.66	318.68
Crit W.S. (ft)	5845.23	Flow Area (sq ft)	977.19	1621.09	3579.53
E.G. Slope (ft/ft)	0.004826	Area (sq ft)	20873.83	1621.09	134418.50
Q Total (cfs)	29100.00	Flow (cfs)	3135.37	14289.23	11675.40
Top Width (ft)	3584.02	Top Width (ft)	688.26	394.98	2500.78
Vel Total (ft/s)	4.71	Avg. Vel. (ft/s)	3.21	8.81	3.26
Max Chl Dpth (ft)	60.23	Hydr. Depth (ft)	1.42	4.10	1.43
Conv. Total (cfs)	418907.3	Conv. (cfs)	45135.0	205699.7	168072.5
Length Wtd. (ft)	469.48	Wetted Per. (ft)	704.83	395.35	2518.97
Min Ch El (ft)	5840.00	Shear (lb/sq ft)	0.42	1.24	0.43
Alpha	1.96	Stream Power (lb/ft s)	1.34	10.89	1.40
Froth Loss (ft)	2.15	Cum Volume (acre-ft)	1726.36	927.35	9677.28
C & E Loss (ft)	0.01	Cum SA (acres)	179.07	296.52	404.04

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 24167 Profile: 100yr

E.G. Elev (ft)	5842.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.64	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5841.92	Reach Len. (ft)	195.53	211.79	527.93
Crit W.S. (ft)	5841.84	Flow Area (sq ft)	686.19	2073.18	3355.91
E.G. Slope (ft/ft)	0.004336	Area (sq ft)	17652.44	2073.18	116322.90
Q Total (cfs)	29100.00	Flow (cfs)	2060.28	16737.79	10301.93
Top Width (ft)	3393.76	Top Width (ft)	486.75	531.00	2376.01
Vel Total (ft/s)	4.76	Avg. Vel. (ft/s)	3.00	8.07	3.07
Max Chl Dpth (ft)	61.92	Hydr. Depth (ft)	1.41	3.90	1.41
Conv. Total (cfs)	441901.5	Conv. (cfs)	31286.7	254173.7	156441.2
Length Wtd. (ft)	331.81	Wetted Per. (ft)	504.63	532.36	2387.27
Min Ch El (ft)	5835.77	Shear (lb/sq ft)	0.37	1.05	0.38
Alpha	1.83	Stream Power (lb/ft s)	1.11	8.51	1.17
Froth Loss (ft)	1.54	Cum Volume (acre-ft)	1474.83	903.62	8760.09
C & E Loss (ft)	0.00	Cum SA (acres)	171.40	290.57	386.20

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 23955 Profile: 100yr

E.G. Elev (ft)	5841.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5840.35	Reach Len. (ft)	391.60	397.78	392.04
Crit W.S. (ft)	5840.35	Flow Area (sq ft)	970.82	1597.56	3614.45
E.G. Slope (ft/ft)	0.004951	Area (sq ft)	18866.67	1597.56	143852.20
Q Total (cfs)	29100.00	Flow (cfs)	2978.81	14069.18	12052.01
Top Width (ft)	3631.93	Top Width (ft)	744.66	396.81	2490.46
Vel Total (ft/s)	4.71	Avg. Vel. (ft/s)	3.07	8.81	3.33
Max Chl Dpth (ft)	65.35	Hydr. Depth (ft)	1.30	4.03	1.45
Conv. Total (cfs)	413577.9	Conv. (cfs)	42335.7	199955.4	171286.8
Length Wtd. (ft)	394.78	Wetted Per. (ft)	763.28	397.70	2508.56
Min Ch El (ft)	5835.74	Shear (lb/sq ft)	0.39	1.24	0.45
Alpha	1.94	Stream Power (lb/ft s)	1.21	10.93	1.48
Froth Loss (ft)	2.20	Cum Volume (acre-ft)	1392.87	894.69	7183.48
C & E Loss (ft)	0.00	Cum SA (acres)	168.63	288.32	356.71

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 23557 Profile: 100yr

E.G. Elev (ft)	5838.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5837.79	Reach Len. (ft)	393.92	401.37	367.59
Crit W.S. (ft)	5837.79	Flow Area (sq ft)	931.73	1661.20	3245.63
E.G. Slope (ft/ft)	0.006318	Area (sq ft)	25829.36	1661.20	134487.20
Q Total (cfs)	29100.00	Flow (cfs)	3040.89	14183.00	11876.12
Top Width (ft)	3635.45	Top Width (ft)	783.52	519.48	2332.44
Vel Total (ft/s)	4.98	Avg. Vel. (ft/s)	3.26	8.54	3.66
Max Chl Dpth (ft)	62.79	Hydr. Depth (ft)	1.19	3.20	1.39
Conv. Total (cfs)	366112.9	Conv. (cfs)	38258.0	178439.1	149415.8
Length Wtd. (ft)	385.99	Wetted Per. (ft)	801.91	520.16	2352.63
Min Ch El (ft)	5833.34	Shear (lb/sq ft)	0.46	1.26	0.54
Alpha	1.69	Stream Power (lb/ft s)	1.50	10.75	1.99
Frctn Loss (ft)	2.66	Cum Volume (acre-ft)	1191.97	879.81	5930.95
C & E Loss (ft)	0.00	Cum SA (acres)	161.77	284.13	335.00

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 23156 Profile: 100yr

E.G. Elev (ft)	5835.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5834.70	Reach Len. (ft)	530.91	577.18	509.09
Crit W.S. (ft)	5834.70	Flow Area (sq ft)	1032.28	1346.21	3255.02
E.G. Slope (ft/ft)	0.007520	Area (sq ft)	32314.00	1346.21	127671.30
Q Total (cfs)	29100.00	Flow (cfs)	4048.09	11995.84	13056.07
Top Width (ft)	3523.86	Top Width (ft)	750.12	449.86	2323.87
Vel Total (ft/s)	5.17	Avg. Vel. (ft/s)	3.92	8.91	4.01
Max Chl Dpth (ft)	59.70	Hydr. Depth (ft)	1.38	2.99	1.40
Conv. Total (cfs)	335578.1	Conv. (cfs)	46682.1	138334.8	150561.2
Length Wtd. (ft)	543.38	Wetted Per. (ft)	768.55	450.50	2342.71
Min Ch El (ft)	5830.00	Shear (lb/sq ft)	0.63	1.40	0.65
Alpha	1.58	Stream Power (lb/ft s)	2.47	12.50	2.62
Frctn Loss (ft)	2.79	Cum Volume (acre-ft)	929.07	865.96	4824.81
C & E Loss (ft)	0.06	Cum SA (acres)	154.83	279.67	315.36

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 22579 Profile: 100yr

E.G. Elev (ft)	5832.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5832.06	Reach Len. (ft)	358.55	383.00	362.63
Crit W.S. (ft)	5831.76	Flow Area (sq ft)	1093.26	2189.03	3578.84
E.G. Slope (ft/ft)	0.003734	Area (sq ft)	27340.91	2189.03	140521.00
Q Total (cfs)	29100.00	Flow (cfs)	3304.77	14953.81	10841.42
Top Width (ft)	3638.49	Top Width (ft)	693.46	644.94	2300.09
Vel Total (ft/s)	4.24	Avg. Vel. (ft/s)	3.02	6.83	3.03
Max Chl Dpth (ft)	72.08	Hydr. Depth (ft)	1.58	3.39	1.56
Conv. Total (cfs)	476229.3	Conv. (cfs)	54083.5	244723.1	177422.7
Length Wtd. (ft)	373.72	Wetted Per. (ft)	711.40	645.55	2321.37
Min Ch El (ft)	5826.00	Shear (lb/sq ft)	0.36	0.79	0.36
Alpha	1.58	Stream Power (lb/ft s)	1.08	5.40	1.09
Frctn Loss (ft)	1.90	Cum Volume (acre-ft)	565.53	842.54	3257.62
C & E Loss (ft)	0.02	Cum SA (acres)	146.03	272.41	288.34

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 22196 Profile: 100yr

E.G. Elev (ft)	5830.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5829.91	Reach Len. (ft)	314.79	325.49	318.98
Crit W.S. (ft)	5829.91	Flow Area (sq ft)	402.81	2225.13	2797.92
E.G. Slope (ft/ft)	0.007308	Area (sq ft)	8337.21	2225.13	141942.30
Q Total (cfs)	29100.00	Flow (cfs)	1400.38	17671.98	10027.64
Top Width (ft)	3515.24	Top Width (ft)	337.16	865.68	2312.40
Vel Total (ft/s)	5.36	Avg. Vel. (ft/s)	3.48	7.94	3.58
Max Chl Dpth (ft)	69.91	Hydr. Depth (ft)	1.19	2.57	1.21
Conv. Total (cfs)	340392.8	Conv. (cfs)	16380.8	206715.2	117296.7
Length Wtd. (ft)	322.22	Wetted Per. (ft)	351.68	866.24	2333.79
Min Ch El (ft)	5825.71	Shear (lb/sq ft)	0.52	1.17	0.55
Alpha	1.51	Stream Power (lb/ft s)	1.82	9.31	1.96
Frctn Loss (ft)	1.66	Cum Volume (acre-ft)	418.69	823.13	2081.88
C & E Loss (ft)	0.10	Cum SA (acres)	141.79	265.77	269.14

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 21870 Profile: 100yr

E.G. Elev (ft)	5828.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.	0.040	0.030	0.040
W.S. Elev (ft)	5828.36	Reach Len. (ft)	350.43	355.93	352.22
Crit W.S. (ft)	5827.79	Flow Area (sq ft)	499.54	2306.79	4230.15
E.G. Slope (ft/ft)	0.003826	Area (sq ft)	5109.82	2306.79	122329.60
Q Total (cfs)	29100.00	Flow (cfs)	1409.03	13085.39	14605.58
Top Width (ft)	3549.98	Top Width (ft)	356.48	915.34	2278.16
Vel Total (ft/s)	4.14	Avg. Vel. (ft/s)	2.82	5.67	3.45
Max Chl Dpth (ft)	63.36	Hydr. Depth (ft)	1.40	2.52	1.86
Conv. Total (cfs)	470453.2	Conv. (cfs)	22779.5	211548.5	236125.2
Length Wtd. (ft)	354.05	Wetted Per. (ft)	367.29	915.63	2296.57
Min Ch El (ft)	5824.00	Shear (lb/sq ft)	0.32	0.60	0.44
Alpha	1.22	Stream Power (lb/ft s)	0.92	3.41	1.52
Frctn Loss (ft)	1.54	Cum Volume (acre-ft)	370.10	806.20	1114.28
C & E Loss (ft)	0.02	Cum SA (acres)	139.29	259.12	252.33

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 21514 Profile: 100yr

E.G. Elev (ft)	5827.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.52	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5826.60	Reach Len. (ft)	433.05	451.69	437.90
Crit W.S. (ft)	5825.81	Flow Area (sq ft)		2565.72	2544.67
E.G. Slope (ft/ft)	0.005023	Area (sq ft)		2565.72	7623.99
Q Total (cfs)	29100.00	Flow (cfs)		16327.36	12772.63
Top Width (ft)	3070.38	Top Width (ft)		1050.69	2019.69
Vel Total (ft/s)	5.69	Avg. Vel. (ft/s)		6.36	5.02
Max Chl Dpth (ft)	7.65	Hydr. Depth (ft)		2.44	2.63
Conv. Total (cfs)	410594.1	Conv. (cfs)		230375.3	180218.9
Length Wtd. (ft)	446.54	Wetted Per. (ft)		1051.19	966.68
Min Ch El (ft)	5821.60	Shear (lb/sq ft)		0.77	0.83
Alpha	1.04	Stream Power (lb/ft s)		4.87	4.14
Frctn Loss (ft)	2.94	Cum Volume (acre-ft)	349.55	786.29	588.89
C & E Loss (ft)	0.04	Cum SA (acres)	137.85	251.09	234.95

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 21063 Profile: 100yr

E.G. Elev (ft)	5824.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5823.24	Reach Len. (ft)	934.05	812.83	579.12
Crit W.S. (ft)	5823.12	Flow Area (sq ft)		2430.26	1484.24
E.G. Slope (ft/ft)	0.006973	Area (sq ft)		2430.26	6497.01
Q Total (cfs)	29100.00	Flow (cfs)		20135.41	8964.59
Top Width (ft)	3014.72	Top Width (ft)		1035.06	1979.66
Vel Total (ft/s)	7.43	Avg. Vel. (ft/s)		8.29	6.04
Max Chl Dpth (ft)	7.77	Hydr. Depth (ft)		2.35	2.25
Conv. Total (cfs)	307208.6	Conv. (cfs)		212569.4	94639.2
Length Wtd. (ft)	686.34	Wetted Per. (ft)		1035.60	660.02
Min Ch El (ft)	5818.00	Shear (lb/sq ft)		1.31	1.26
Alpha	1.06	Stream Power (lb/ft s)		10.89	7.61
Frcn Loss (ft)	5.01	Cum Volume (acre-ft)	349.55	760.39	517.91
C & E Loss (ft)	0.14	Cum SA (acres)	137.85	240.27	214.85

Plan: Plan 02 BlackSquirrelCrk LBS to ROB Split RS: 20250 Profile: 100yr

E.G. Elev (ft)	5819.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.		0.030	0.040
W.S. Elev (ft)	5818.56	Reach Len. (ft)	651.38	749.71	617.28
Crit W.S. (ft)	5817.68	Flow Area (sq ft)		1251.53	4161.67
E.G. Slope (ft/ft)	0.006059	Area (sq ft)		1251.53	4161.67
Q Total (cfs)	29100.00	Flow (cfs)		6565.18	22534.82
Top Width (ft)	2412.04	Top Width (ft)		788.27	1623.76
Vel Total (ft/s)	5.38	Avg. Vel. (ft/s)		5.25	5.41
Max Chl Dpth (ft)	6.24	Hydr. Depth (ft)		1.59	2.56
Conv. Total (cfs)	373848.2	Conv. (cfs)		84343.0	289505.2
Length Wtd. (ft)	643.85	Wetted Per. (ft)		788.57	1624.00
Min Ch El (ft)	5814.00	Shear (lb/sq ft)		0.60	0.97
Alpha	1.00	Stream Power (lb/ft s)		3.15	5.25
Frcn Loss (ft)	5.15	Cum Volume (acre-ft)	349.55	726.04	447.06
C & E Loss (ft)	0.03	Cum SA (acres)	137.85	223.26	190.90

Appendix D. Standard Table 1 and Standard Table 2
from the HEC-RAS Outputs

HEC-RAS Profile: 100yr

Reach	River Sta	Profile	Plan	G Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Friction # Chl
US to LBS	43811	100yr	Plan 02	25150.00	5980.88	5985.83	5985.73	5986.34	0.007506	7.42	5194.96	3718.81	0.87
US to LBS	43811	100yr	Plan-Without-Pits	25150.00	5980.88	5985.83	5985.73	5986.34	0.007506	7.42	5194.96	3718.81	0.87
US to LBS	43800		Lat Struct										
US to LBS	43981	100yr	Plan 02	24250.00	5979.11	5984.56	5984.56	5985.18	0.006550	8.88	5218.49	3789.32	0.96
US to LBS	43981	100yr	Plan-Without-Pits	24250.00	5979.11	5984.56	5984.56	5985.18	0.006550	8.88	5218.49	3789.32	0.96
US to LBS	43935	100yr	Plan 02	23479.00	5978.18	5983.43	5983.43	5983.96	0.006231	8.51	5548.62	4002.15	0.78
US to LBS	43935	100yr	Plan-Without-Pits	23479.00	5978.18	5983.43	5983.43	5983.96	0.006231	8.51	5548.62	4002.15	0.78
US to LBS	43259	100yr	Plan 02	20580.00	5976.37	5982.57	5981.87	5982.91	0.001857	6.30	5927.46	3246.39	0.47
US to LBS	43259	100yr	Plan-Without-Pits	20580.00	5976.37	5982.57	5981.87	5982.91	0.001857	6.30	5927.46	3246.39	0.47
US to LBS	43022	100yr	Plan 02	18183.00	5974.53	5981.81	5981.81	5982.35	0.003571	9.84	3872.48	2954.64	0.70
US to LBS	43022	100yr	Plan-Without-Pits	18183.00	5974.53	5981.81	5981.81	5982.35	0.003571	9.84	3872.48	2954.64	0.70
US to LBS	43020		Bridge										
US to LBS	42986	100yr	Plan 02	18183.00	5974.22	5980.58	5980.58	5981.42	0.004905	10.73	3885.80	2954.58	0.80
US to LBS	42986	100yr	Plan-Without-Pits	18183.00	5974.22	5980.58	5980.58	5981.42	0.004905	10.73	3885.80	2954.58	0.80
US to LBS	42985		Lat Struct										
US to LBS	42900	100yr	Plan 02	18063.00	5969.06	5975.97	5975.97	5976.43	0.004188	7.78	4959.51	3183.78	0.70
US to LBS	42900	100yr	Plan-Without-Pits	18063.00	5969.06	5975.97	5975.97	5976.43	0.004188	7.78	4959.51	3183.78	0.70
US to LBS	42004	100yr	Plan 02	18063.00	5963.99	5970.75	5970.75	5971.71	0.005905	8.23	2746.00	1879.96	0.79
US to LBS	42004	100yr	Plan-Without-Pits	18063.00	5963.99	5970.75	5970.75	5971.71	0.005905	8.23	2746.00	1879.96	0.79
US to LBS	41722	100yr	Plan 02	18063.00	5962.00	5969.17	5969.17	5969.81	0.004785	7.29	3786.93	3105.26	0.73
US to LBS	41722	100yr	Plan-Without-Pits	18063.00	5962.00	5969.17	5969.17	5969.81	0.004785	7.29	3786.93	3105.26	0.73
US to LBS	41431	100yr	Plan 02	18063.00	5960.00	5966.35	5966.35	5966.98	0.005274	7.14	3954.80	3381.14	0.78
US to LBS	41431	100yr	Plan-Without-Pits	18063.00	5960.00	5966.35	5966.35	5966.98	0.005274	7.14	3954.80	3381.14	0.78
US to LBS	41325	100yr	Plan 02	18063.00	5959.81	5964.95	5964.95	5965.88	0.007637	8.50	2833.40	2436.38	0.90
US to LBS	41325	100yr	Plan-Without-Pits	18063.00	5959.81	5964.95	5964.95	5965.88	0.007637	8.50	2833.40	2436.38	0.90
US to LBS	41200	100yr	Plan 02	18063.00	5958.00	5964.00	5963.67	5964.48	0.003559	6.28	4240.01	2832.59	0.83
US to LBS	41200	100yr	Plan-Without-Pits	18063.00	5958.00	5964.00	5963.67	5964.48	0.003559	6.28	4240.01	2832.59	0.83
US to LBS	41023	100yr	Plan 02	18063.00	5958.00	5963.19	5963.77	5963.77	0.004457	7.48	4133.81	3218.29	0.71
US to LBS	41023	100yr	Plan-Without-Pits	18063.00	5958.00	5963.19	5963.77	5963.77	0.004457	7.48	4133.81	3218.29	0.71
US to LBS	40802	100yr	Plan 02	18063.00	5955.57	5959.44	5959.44	5960.02	0.006891	7.79	3960.55	2828.82	0.88
US to LBS	40802	100yr	Plan-Without-Pits	18063.00	5955.57	5959.44	5959.44	5960.02	0.006891	7.79	3960.55	2828.82	0.88
US to LBS	40100	100yr	Plan 02	18063.00	5952.00	5955.85	5955.48	5955.98	0.007742	6.11	4319.41	3814.48	0.84
US to LBS	40100	100yr	Plan-Without-Pits	18063.00	5952.00	5955.85	5955.48	5955.98	0.007742	6.11	4319.41	3814.48	0.84
US to LBS	39500	100yr	Plan 02	18063.00	5948.00	5951.37	5951.30	5951.88	0.006493	7.48	4182.46	3671.71	0.82
US to LBS	39500	100yr	Plan-Without-Pits	18063.00	5948.00	5951.37	5951.30	5951.88	0.006493	7.48	4182.46	3671.71	0.82
US to LBS	39000	100yr	Plan 02	18063.00	5944.58	5947.34	5947.34	5947.83	0.011459	7.14	3708.82	3556.58	1.01
US to LBS	39000	100yr	Plan-Without-Pits	18063.00	5944.58	5947.34	5947.34	5947.83	0.011459	7.14	3708.82	3556.58	1.01
US to LBS	38735	100yr	Plan 02	18063.00	5940.48	5945.05	5944.83	5945.23	0.004112	4.33	5594.43	4020.42	0.80
US to LBS	38735	100yr	Plan-Without-Pits	18063.00	5940.48	5945.05	5944.83	5945.23	0.004112	4.33	5594.43	4020.42	0.80
US to LBS	38312	100yr	Plan 02	18063.00	5939.97	5943.33	5943.17	5943.66	0.004985	5.94	4830.73	3812.26	0.70
US to LBS	38312	100yr	Plan-Without-Pits	18063.00	5939.97	5943.33	5943.17	5943.66	0.004985	5.94	4830.73	3812.26	0.70
US to LBS	38000	100yr	Plan 02	18063.00	5939.03	5940.78	5940.73	5941.17	0.014851	6.81	3715.40	3796.50	1.09
US to LBS	38000	100yr	Plan-Without-Pits	18063.00	5939.03	5940.78	5940.73	5941.17	0.014851	6.81	3715.40	3796.50	1.09
US to LBS	37905	100yr	Plan 02	18063.00	5936.12	5939.81	5939.75	5939.74	0.002598	3.87	6399.96	3673.38	0.50
US to LBS	37905	100yr	Plan-Without-Pits	18063.00	5936.12	5939.81	5939.75	5939.74	0.002598	3.87	6399.96	3673.38	0.50
US to LBS	37900		Lat Struct										
US to LBS	37500	100yr	Plan 02	16963.00	5932.00	5937.78	5937.07	5937.94	0.003563	3.78	5227.96	3537.02	0.56
US to LBS	37500	100yr	Plan-Without-Pits	16963.00	5932.00	5937.78	5937.07	5937.94	0.003563	3.78	5227.96	3537.02	0.56
US to LBS	37481		Culvert										
US to LBS	37431	100yr	Plan 02	16963.00	5924.00	5937.18	5937.16	5937.55	0.007553	6.89	3812.04	2846.51	0.88
US to LBS	37431	100yr	Plan-Without-Pits	16963.00	5924.00	5937.18	5937.16	5937.55	0.007553	6.89	3812.04	2846.51	0.88
US to LBS	37000	100yr	Plan 02	16963.00	5924.00	5930.49	5930.49	5931.39	0.005458	8.82	2890.44	1813.56	0.80
US to LBS	37000	100yr	Plan-Without-Pits	16963.00	5924.00	5930.49	5930.49	5931.39	0.005458	8.82	2890.44	1813.56	0.80
US to LBS	36800	100yr	Plan 02	16963.00	5922.00	5927.34	5927.02	5927.94	0.005902	7.98	3336.83	1937.43	0.80
US to LBS	36800	100yr	Plan-Without-Pits	16963.00	5922.00	5927.34	5927.02	5927.94	0.005902	7.98	3336.83	1937.43	0.80
US to LBS	36150	100yr	Plan 02	16963.00	5919.96	5924.41	5924.41	5925.30	0.006719	8.42	2980.30	1852.29	0.86
US to LBS	36150	100yr	Plan-Without-Pits	16963.00	5919.96	5924.41	5924.41	5925.30	0.006719	8.42	2980.30	1852.29	0.86

HEC-RAS Profile: 100yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Friction # Chl
US to LBS	35000	100yr	Plan 02	16963.00	5917.04	5920.81	5920.81	5921.23	0.012800	9.70	2103.51	1371.08	1.13
US to LBS	35000	100yr	Plan-Without-Pits	16963.00	5917.04	5920.81	5920.81	5921.23	0.012800	9.70	2103.51	1371.08	1.13
US to LBS	35400	100yr	Plan 02	16963.00	5913.86	5917.46	5917.34	5917.85	0.005155	6.07	3693.82	2163.61	0.72
US to LBS	35400	100yr	Plan-Without-Pits	16963.00	5913.86	5917.46	5917.34	5917.85	0.005155	6.07	3693.82	2163.61	0.72
US to LBS	34955	100yr	Plan 02	16963.00	5910.34	5914.13	5914.13	5914.83	0.009128	8.14	2640.03	2263.50	0.96
US to LBS	34955	100yr	Plan-Without-Pits	16963.00	5910.34	5914.13	5914.13	5914.83	0.009128	8.14	2640.03	2263.50	0.96
US to LBS	34495	100yr	Plan 02	16963.00	5906.10	5911.23	5910.85	5911.55	0.003043	5.73	4251.36	2670.19	0.56
US to LBS	34495	100yr	Plan-Without-Pits	16963.00	5906.10	5911.23	5910.85	5911.55	0.003041	5.73	4252.39	2670.29	0.56
US to LBS	34180	100yr	Plan 02	16963.00	5903.73	5909.75	5909.26	5910.39	0.004444	7.43	3134.75	2763.96	0.71
US to LBS	34180	100yr	Plan-Without-Pits	16963.00	5903.73	5909.75	5909.26	5910.39	0.004447	7.44	3133.93	2763.61	0.71
US to LBS	33533	100yr	Plan 02	16963.00	5906.57	5905.46	5905.46	5906.90	0.005596	10.31	1967.56	3112.36	0.90
US to LBS	33533	100yr	Plan-Without-Pits	16963.00	5906.57	5905.46	5905.46	5906.90	0.005596	10.31	1967.56	3112.36	0.90
US to LBS	33001	100yr	Plan 02	16963.00	5905.91	5909.55	5909.55	5900.12	0.005259	7.76	3771.33	3367.66	0.80
US to LBS	33001	100yr	Plan-Without-Pits	16963.00	5905.91	5909.55	5900.43	5902.12	0.005259	10.55	1695.40	2539.15	0.96
US to LBS	32543	100yr	Plan 02	16963.00	5909.14	5906.00	5906.00	5906.53	0.005564	6.86	3754.78	3579.56	0.78
US to LBS	32543	100yr	Plan-Without-Pits	16963.00	5909.14	5907.15	5909.21	5907.87	0.003923	6.81	2477.00	2571.16	0.84
US to LBS	31940	100yr	Plan 02	16963.00	5905.43	5901.96	5901.96	5902.57	0.005467	8.02	3608.80	3103.97	0.78
US to LBS	31940	100yr	Plan-Without-Pits	16963.00	5905.43	5902.70	5902.70	5904.06	0.006795	10.05	1937.96	2239.36	0.96
US to LBS	31669	100yr	Plan 02	16963.00	5904.78	5909.29	5909.08	5909.67	0.005225	5.92	3962.82	2705.52	0.72
US to LBS	31669	100yr	Plan-Without-Pits	16963.00	5904.78	5909.07	5909.51	5909.79	0.004923	6.78	2502.92	1736.87	0.72
US to LBS	31339	100yr	Plan 02	16963.00	5901.58	5906.84	5906.85	5907.43	0.009106	7.52	3142.15	2162.48	0.93
US to LBS	31339	100yr	Plan-Without-Pits	16963.00	5901.58	5907.59	5907.54	5908.61	0.009961	9.52	2192.96	1953.77	0.96
US to LBS	30996	100yr	Plan 02	16963.00	5978.74	5963.69	5963.37	5964.02	0.004468	6.39	4201.40	2427.20	0.69
US to LBS	30996	100yr	Plan-Without-Pits	16963.00	5978.74	5964.12	5963.96	5964.96	0.007146	9.23	2892.30	1329.44	0.87
US to LBS	30340	100yr	Plan 02	16963.00	5977.18	5961.38	5961.23	5961.74	0.006115	6.47	3985.90	2963.65	0.77
US to LBS	30340	100yr	Plan-Without-Pits	16963.00	5977.18	5961.94	5961.23	5962.35	0.004090	6.14	3573.97	1499.30	0.86
US to LBS	29964	100yr	Plan 02	23714.00	5973.15	5979.45	5979.05	5979.82	0.005223	6.18	5008.11	2363.76	0.72
US to LBS	29964	100yr	Plan-Without-Pits	23714.00	5973.15	5979.58	5979.56	5980.14	0.009459	7.40	4148.06	2398.16	0.94
US to LBS	29695	100yr	Plan 02	23714.00	5972.00	5976.64	5976.64	5977.35	0.015181	8.16	3671.35	2506.66	1.16
US to LBS	29695	100yr	Plan-Without-Pits	23714.00	5972.00	5977.18	5976.96	5977.77	0.009598	6.86	3992.67	2054.52	0.82
US to LBS	29336	100yr	Plan 02	23714.00	5969.76	5973.69	5973.52	5974.34	0.005941	7.66	4279.21	2152.54	0.79
US to LBS	29336	100yr	Plan-Without-Pits	23714.00	5969.76	5974.14	5974.14	5975.45	0.007907	9.56	2773.59	1372.35	0.92
US to LBS	29056	100yr	Plan 02	23714.00	5967.03	5972.79	5972.14	5973.21	0.002850	6.23	5322.91	2132.85	0.58
US to LBS	29056	100yr	Plan-Without-Pits	23714.00	5967.03	5972.96	5972.16	5973.60	0.003917	7.21	4196.46	1798.76	0.85
US to LBS	28752	100yr	Plan 02	23714.00	5965.79	5971.19	5971.15	5972.00	0.005796	6.64	4075.93	2016.32	0.81
US to LBS	28752	100yr	Plan-Without-Pits	23714.00	5965.79	5971.62	5971.09	5972.36	0.004470	8.07	3948.60	1920.66	0.73
US to LBS	28260	100yr	Plan 02	23714.00	5961.58	5966.61	5966.61	5969.46	0.005269	6.70	4161.96	2122.34	0.79
US to LBS	28260	100yr	Plan-Without-Pits	23714.00	5961.58	5969.06	5969.99	5969.94	0.006016	8.40	3593.56	1747.90	0.82
US to LBS	27867	100yr	Plan 02	23714.00	5959.15	5966.36	5966.36	5967.22	0.004533	9.00	4319.93	2113.69	0.75
US to LBS	27867	100yr	Plan-Without-Pits	23714.00	5959.15	5966.77	5966.77	5967.79	0.005947	8.83	3472.52	1610.30	0.83
US to LBS	27503	100yr	Plan 02	23714.00	5956.14	5963.40	5963.40	5964.24	0.004448	8.83	4411.46	2247.47	0.74
US to LBS	27503	100yr	Plan-Without-Pits	23714.00	5956.14	5963.98	5963.37	5964.53	0.003817	7.29	4293.17	1721.06	0.86
LBS to RCB Split	26962	100yr	Plan 02	29100.00	5952.51	5959.43	5959.43	5960.54	0.006573	9.49	4142.64	1934.02	0.59
LBS to RCB Split	26962	100yr	Plan-Without-Pits	29100.00	5952.51	5959.96	5959.86	5961.53	0.007872	10.60	2913.87	1233.44	0.96
LBS to RCB Split	26496	100yr	Plan 02	29100.00	5949.28	5956.28	5956.22	5957.19	0.004588	9.79	4943.85	2115.05	0.79
LBS to RCB Split	26496	100yr	Plan-Without-Pits	29100.00	5949.28	5956.85	5956.25	5957.60	0.004695	9.40	4129.41	2049.78	0.77
LBS to RCB Split	25626	100yr	Plan 02	29100.00	5946.21	5953.28	5953.28	5954.17	0.004533	9.86	5144.83	2283.11	0.77
LBS to RCB Split	25626	100yr	Plan-Without-Pits	29100.00	5946.21	5953.37	5953.37	5954.51	0.006034	10.34	4391.80	2215.69	0.81
LBS to RCB Split	25513	100yr	Plan 02	29100.00	5945.00	5951.31	5951.31	5952.31	0.005578	8.81	4962.96	2109.77	0.83
LBS to RCB Split	25513	100yr	Plan-Without-Pits	29100.00	5945.00	5951.31	5951.31	5952.31	0.006078	8.81	4962.96	2109.77	0.83
LBS to RCB Split	25451	100yr	Plan 02	29100.00	5944.26	5950.47	5950.47	5951.74	0.007260	9.40	3469.37	1547.47	0.91
LBS to RCB Split	25451	100yr	Plan-Without-Pits	29100.00	5944.26	5950.49	5950.47	5951.75	0.007112	9.34	3536.80	1556.96	0.90
LBS to RCB Split	24726	100yr	Plan 02	29100.00	5940.00	5945.23	5945.23	5945.91	0.004826	8.81	6177.81	3584.02	0.77
LBS to RCB Split	24726	100yr	Plan-Without-Pits	29100.00	5940.00	5945.64	5945.57	5947.11	0.005913	9.10	3396.62	1987.31	0.83
LBS to RCB Split	24167	100yr	Plan 02	29100.00	5935.77	5941.82	5941.84	5942.56	0.004336	8.07	6115.27	3363.76	0.72
LBS to RCB Split	24167	100yr	Plan-Without-Pits	29100.00	5935.77	5942.46	5942.13	5943.73	0.006205	9.04	3239.99	972.78	0.85
LBS to RCB Split	23955	100yr	Plan 02	29100.00	5935.74	5940.35	5940.35	5941.02	0.004951	8.81	6182.83	3631.93	0.77
LBS to RCB Split	23955	100yr	Plan-Without-Pits	29100.00	5935.74	5940.90	5940.90	5942.11	0.009435	8.85	3299.76	2724.26	0.96

HEC-RAS Profile 100yr (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Cut W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Friction # Ch
LBS to ROB Split	23657	100yr	Plan 02	29100.00	5633.34	5637.79	5637.79	5638.48	0.006318	8.54	5638.56	3638.48	0.84
LBS to ROB Split	23657	100yr	Plan-Without-Pits	29100.00	5633.34	5638.39	5637.74	5639.10	0.004808	8.75	4311.04	2696.98	0.70
LBS to ROB Split	23156	100yr	Plan 02	29100.00	5630.00	5634.70	5634.70	5635.36	0.007520	9.21	5633.51	3523.86	0.91
LBS to ROB Split	23156	100yr	Plan-Without-Pits	29100.00	5630.00	5635.26	5635.26	5636.53	0.006321	9.03	3222.45	2765.14	0.96
LBS to ROB Split	22579	100yr	Plan 02	29100.00	5626.00	5632.06	5631.76	5632.50	0.003734	6.83	6961.13	3636.49	0.85
LBS to ROB Split	22579	100yr	Plan-Without-Pits	29100.00	5626.00	5632.40	5631.76	5633.06	0.003729	6.24	4665.93	3954.89	0.84
LBS to ROB Split	22196	100yr	Plan 02	29100.00	5625.71	5629.91	5629.91	5630.59	0.007308	7.94	5425.85	3515.24	0.87
LBS to ROB Split	22196	100yr	Plan-Without-Pits	29100.00	5625.71	5630.70	5629.93	5631.42	0.004939	7.23	4446.34	3096.78	0.74
LBS to ROB Split	21570	100yr	Plan 02	29100.00	5624.00	5628.36	5627.79	5628.69	0.003828	5.67	7036.46	3549.96	0.83
LBS to ROB Split	21570	100yr	Plan-Without-Pits	29100.00	5624.00	5628.53	5628.26	5629.42	0.007000	6.28	4045.19	2979.38	0.90
LBS to ROB Split	21514	100yr	Plan 02	29100.00	5621.60	5626.60	5625.81	5627.12	0.006023	6.36	5110.39	3070.38	0.72
LBS to ROB Split	21514	100yr	Plan-Without-Pits	29100.00	5621.60	5626.60	5625.81	5627.12	0.006023	6.36	5110.39	3070.38	0.72
LBS to ROB Split	21063	100yr	Plan 02	29100.00	5618.00	5623.24	5623.12	5624.16	0.006973	8.29	3914.50	3014.72	0.95
LBS to ROB Split	21063	100yr	Plan-Without-Pits	29100.00	5618.00	5623.24	5623.12	5624.16	0.006973	8.29	3914.50	3014.72	0.95
LBS to ROB Split	20250	100yr	Plan 02	29100.00	5614.00	5618.96	5617.69	5619.01	0.006059	5.25	5413.20	2412.04	0.73
LBS to ROB Split	20250	100yr	Plan-Without-Pits	29100.00	5614.00	5618.96	5617.69	5619.01	0.006059	5.25	5413.20	2412.04	0.73
LBS to ROB Split	19500	100yr	Plan 02	29100.00	5610.00	5613.06	5612.84	5613.82	0.011029	6.18	4159.33	1969.30	0.96
LBS to ROB Split	19500	100yr	Plan-Without-Pits	29100.00	5610.00	5613.06	5612.84	5613.82	0.011029	6.18	4159.33	1969.30	0.96
LBS to ROB Split	19000	100yr	Plan 02	29100.00	5606.00	5610.09	5609.36	5610.57	0.008122	4.54	5313.64	2120.46	0.86
LBS to ROB Split	19000	100yr	Plan-Without-Pits	29100.00	5606.00	5610.09	5609.36	5610.57	0.008122	4.54	5313.64	2120.46	0.86
LBS to ROB Split	18400	100yr	Plan 02	29100.00	5604.00	5606.96	5606.27	5607.31	0.009108	5.33	4255.96	1914.56	0.86
LBS to ROB Split	18400	100yr	Plan-Without-Pits	29100.00	5604.00	5606.96	5606.27	5607.31	0.009108	5.33	4255.96	1914.56	0.86
LBS to ROB Split	17902	100yr	Plan 02	29100.00	5600.06	5605.02	5605.02	5605.27	0.002397	4.36	7261.28	2362.38	0.47
LBS to ROB Split	17902	100yr	Plan-Without-Pits	29100.00	5600.06	5605.02	5605.02	5605.27	0.002397	4.36	7261.28	2362.38	0.47
LBS to ROB Split	17102	100yr	Plan 02	29850.00	5796.00	5799.06	5798.47	5799.86	0.006553	5.63	5014.27	2072.72	0.77
LBS to ROB Split	17102	100yr	Plan-Without-Pits	29850.00	5796.00	5799.06	5798.47	5799.86	0.006553	5.63	5014.27	2072.72	0.77
LBS to ROB Split	16115	100yr	Plan 02	29850.00	5790.00	5794.83	5793.80	5795.07	0.004961	6.20	5674.81	2595.34	0.89
LBS to ROB Split	16115	100yr	Plan-Without-Pits	29850.00	5790.00	5794.83	5793.80	5795.07	0.004961	6.20	5674.81	2595.34	0.89
LBS to ROB Split	15673	100yr	Plan 02	29850.00	5786.00	5792.86	5791.98	5793.22	0.004113	5.37	6707.24	3106.22	0.84
LBS to ROB Split	15673	100yr	Plan-Without-Pits	29850.00	5786.00	5792.86	5791.98	5793.22	0.004113	5.37	6707.24	3106.22	0.84
LBS to ROB Split	14323	100yr	Plan 02	37400.00	5779.05	5785.20	5785.16	5786.20	0.007774	10.10	5413.66	2290.48	0.95
LBS to ROB Split	14323	100yr	Plan-Without-Pits	37400.00	5779.05	5785.20	5785.16	5786.20	0.007774	10.10	5413.66	2290.48	0.95
LBS to ROB Split	13646	100yr	Plan 02	37400.00	5774.00	5780.74	5780.74	5781.91	0.005511	10.32	5364.80	2000.40	0.84
LBS to ROB Split	13646	100yr	Plan-Without-Pits	37400.00	5774.00	5780.74	5780.74	5781.91	0.005511	10.32	5364.80	2000.40	0.84
LBS to ROB Split	12828	100yr	Plan 02	37400.00	5769.11	5775.30	5774.40	5776.28	0.003460	9.62	5505.41	1362.62	0.87
LBS to ROB Split	12828	100yr	Plan-Without-Pits	37400.00	5769.11	5775.30	5774.40	5776.28	0.003460	9.62	5505.41	1362.62	0.87
LBS to ROB Split	12316	100yr	Plan 02	37400.00	5765.44	5772.35	5771.83	5773.90	0.006459	10.92	3947.82	1182.25	1.00
LBS to ROB Split	12316	100yr	Plan-Without-Pits	37400.00	5765.44	5772.35	5771.83	5773.90	0.006459	10.92	3947.82	1182.25	1.00
LBS to ROB Split	11794	100yr	Plan 02	37400.00	5761.47	5768.89	5768.36	5769.39	0.006254	9.91	4626.67	1193.83	0.87
LBS to ROB Split	11794	100yr	Plan-Without-Pits	37400.00	5761.47	5768.89	5768.36	5769.39	0.006254	9.91	4626.67	1193.83	0.87
LBS to ROB Split	11152	100yr	Plan 02	37400.00	5757.31	5763.35	5763.32	5764.69	0.009728	10.78	4280.30	1593.46	1.05
LBS to ROB Split	11152	100yr	Plan-Without-Pits	37400.00	5757.31	5763.35	5763.32	5764.69	0.009728	10.78	4280.30	1593.46	1.05
LBS to ROB Split	10796	100yr	Plan 02	37400.00	5754.00	5759.77	5759.77	5761.15	0.010376	10.96	4413.52	1759.10	1.08
LBS to ROB Split	10796	100yr	Plan-Without-Pits	37400.00	5754.00	5759.77	5759.77	5761.15	0.010376	10.96	4413.52	1759.10	1.08
LBS to ROB Split	10341	100yr	Plan 02	37400.00	5750.24	5756.39	5756.04	5756.63	0.006342	9.47	4415.03	1342.86	0.87
LBS to ROB Split	10341	100yr	Plan-Without-Pits	37400.00	5750.24	5756.39	5756.04	5756.63	0.006342	9.47	4415.03	1342.86	0.87
LBS to ROB Split	9606	100yr	Plan 02	37400.00	5746.99	5752.71	5752.29	5753.95	0.005912	9.81	4456.29	1227.94	0.84
LBS to ROB Split	9606	100yr	Plan-Without-Pits	37400.00	5746.99	5752.71	5752.29	5753.95	0.005912	9.81	4456.29	1227.94	0.84
LBS to ROB Split	9096	100yr	Plan 02	37400.00	5739.13	5747.14	5747.14	5748.96	0.005944	11.45	3754.00	988.95	0.92
LBS to ROB Split	9096	100yr	Plan-Without-Pits	37400.00	5739.13	5747.14	5747.14	5748.96	0.005944	11.45	3754.00	988.95	0.92
LBS to ROB Split	8267	100yr	Plan 02	37400.00	5734.00	5742.22	5741.71	5743.50	0.005929	9.23	4270.01	1252.03	0.84
LBS to ROB Split	8267	100yr	Plan-Without-Pits	37400.00	5734.00	5742.22	5741.71	5743.50	0.005929	9.23	4270.01	1252.03	0.84
LBS to ROB Split	7560	100yr	Plan 02	37400.00	5732.00	5738.43	5737.89	5739.53	0.006221	8.44	4474.01	1371.11	0.78
LBS to ROB Split	7560	100yr	Plan-Without-Pits	37400.00	5732.00	5738.43	5737.89	5739.53	0.006221	8.44	4474.01	1371.11	0.78
LBS to ROB Split	6915	100yr	Plan 02	37400.00	5727.97	5734.19	5734.19	5735.53	0.007425	9.93	4543.64	2429.45	0.93
LBS to ROB Split	6915	100yr	Plan-Without-Pits	37400.00	5727.97	5734.19	5734.19	5735.53	0.007425	9.93	4543.64	2429.45	0.93
LBS to ROB Split	6525	100yr	Plan 02	37400.00	5724.00	5730.87	5730.87	5732.54	0.006149	10.83	4014.16	1965.57	0.98
LBS to ROB Split	6525	100yr	Plan-Without-Pits	37400.00	5724.00	5730.87	5730.87	5732.54	0.006149	10.83	4014.16	1965.57	0.98

HEC-RAS Profile 100yr

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frict Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
US to LBS	43811	100yr	Plan 02	5996.34	5996.83	0.51	1.17	0.01	12867.68	11572.00	710.32	3716.81
US to LBS	43811	100yr	Plan-Without-Pits	5996.34	5996.83	0.51	1.17	0.01	12867.68	11572.00	710.32	3716.81
US to LBS	43800		Let Struct									
US to LBS	43661	100yr	Plan 02	5996.16	5994.56	0.60	0.90	0.02	12528.04	9597.40	2024.56	3769.32
US to LBS	43661	100yr	Plan-Without-Pits	5996.16	5994.56	0.60	0.90	0.02	12528.04	9597.40	2024.56	3769.32
US to LBS	43636	100yr	Plan 02	5993.96	5993.43	0.52	0.81	0.09	11577.86	8795.19	3115.96	4002.19
US to LBS	43636	100yr	Plan-Without-Pits	5993.96	5993.43	0.52	0.81	0.09	11577.86	8795.19	3115.96	4002.19
US to LBS	43269	100yr	Plan 02	5992.91	5992.57	0.34	0.52	0.04	11185.17	9393.86	1.28	3246.39
US to LBS	43269	100yr	Plan-Without-Pits	5992.91	5992.57	0.34	0.52	0.04	11185.17	9393.86	1.28	3246.39
US to LBS	43022	100yr	Plan 02	5992.35	5991.61	0.74	0.01	0.13	10346.06	7936.94		2964.64
US to LBS	43022	100yr	Plan-Without-Pits	5992.35	5991.61	0.74	0.01	0.13	10346.06	7936.94		2964.64
US to LBS	43020		Bridge									
US to LBS	42996	100yr	Plan 02	5991.42	5990.58	0.64	1.01	0.19	10798.45	7424.95		2994.59
US to LBS	42996	100yr	Plan-Without-Pits	5991.42	5990.58	0.64	1.01	0.19	10798.45	7424.95		2994.59
US to LBS	42996		Let Struct									
US to LBS	42600	100yr	Plan 02	5976.43	5975.97	0.47	2.79	0.06	7427.39	7397.68	3227.93	3163.76
US to LBS	42600	100yr	Plan-Without-Pits	5976.43	5975.97	0.47	2.79	0.06	7427.39	7397.68	3227.93	3163.76
US to LBS	42004	100yr	Plan 02	5971.71	5970.76	0.96	1.42	0.09	1793.92	1629.08		1879.96
US to LBS	42004	100yr	Plan-Without-Pits	5971.71	5970.76	0.96	1.42	0.09	1793.92	1629.08		1879.96
US to LBS	41722	100yr	Plan 02	5969.81	5969.17	0.64	1.47	0.01	4034.78	13612.25	406.97	3106.26
US to LBS	41722	100yr	Plan-Without-Pits	5969.81	5969.17	0.64	1.47	0.01	4034.78	13612.25	406.97	3106.26
US to LBS	41431	100yr	Plan 02	5966.95	5966.35	0.60	0.71	0.03	4832.37	13067.29	163.34	3381.14
US to LBS	41431	100yr	Plan-Without-Pits	5966.95	5966.35	0.60	0.71	0.03	4832.37	13067.29	163.34	3381.14
US to LBS	41325	100yr	Plan 02	5966.88	5964.95	0.93	0.67	0.14	3632.59	14420.41		2436.38
US to LBS	41325	100yr	Plan-Without-Pits	5966.88	5964.95	0.93	0.67	0.14	3632.59	14420.41		2436.38
US to LBS	41200	100yr	Plan 02	5964.45	5964.00	0.45	0.68	0.01	5622.12	12430.89	0.00	2632.59
US to LBS	41200	100yr	Plan-Without-Pits	5964.45	5964.00	0.45	0.68	0.01	5622.12	12430.89	0.00	2632.59
US to LBS	41023	100yr	Plan 02	5963.77	5963.19	0.57	2.45	0.00	6906.83	11147.17		3216.29
US to LBS	41023	100yr	Plan-Without-Pits	5963.77	5963.19	0.57	2.45	0.00	6906.83	11147.17		3216.29
US to LBS	40602	100yr	Plan 02	5960.02	5959.44	0.59	3.76	0.06	8596.89	9456.11		2928.62
US to LBS	40602	100yr	Plan-Without-Pits	5960.02	5959.44	0.59	3.76	0.06	8596.89	9456.11		2928.62
US to LBS	40100	100yr	Plan 02	5956.96	5956.65	0.33	4.09	0.02	11615.62	6437.36		3814.49
US to LBS	40100	100yr	Plan-Without-Pits	5956.96	5956.65	0.33	4.09	0.02	11615.62	6437.36		3814.49
US to LBS	39600	100yr	Plan 02	5951.86	5951.37	0.51	4.04	0.01	8772.61	9280.39		3671.71
US to LBS	39600	100yr	Plan-Without-Pits	5951.86	5951.37	0.51	4.04	0.01	8772.61	9280.39		3671.71
US to LBS	39000	100yr	Plan 02	5947.83	5947.34	0.48	1.80	0.09	9698.44	8154.96		3996.98
US to LBS	39000	100yr	Plan-Without-Pits	5947.83	5947.34	0.48	1.80	0.09	9698.44	8154.96		3996.98
US to LBS	38736	100yr	Plan 02	5945.23	5945.08	0.18	1.66	0.02	12463.10	5969.90		4020.42
US to LBS	38736	100yr	Plan-Without-Pits	5945.23	5945.08	0.18	1.66	0.02	12463.10	5969.90		4020.42
US to LBS	38312	100yr	Plan 02	5943.66	5943.33	0.33	2.48	0.01	9079.30	8973.70		3812.26
US to LBS	38312	100yr	Plan-Without-Pits	5943.66	5943.33	0.33	2.48	0.01	9079.30	8973.70		3812.26
US to LBS	38000	100yr	Plan 02	5941.17	5940.76	0.41	1.29	0.14	12902.91	5150.09		3796.90
US to LBS	38000	100yr	Plan-Without-Pits	5941.17	5940.76	0.41	1.29	0.14	12902.91	5150.09		3796.90
US to LBS	37806	100yr	Plan 02	5939.74	5939.61	0.14	1.79	0.00	13796.27	4286.95	0.18	3873.36
US to LBS	37806	100yr	Plan-Without-Pits	5939.74	5939.61	0.14	1.79	0.00	13796.27	4286.95	0.18	3873.36
US to LBS	37800		Let Struct									
US to LBS	37500	100yr	Plan 02	5937.94	5937.78	0.16			14896.62	1831.37	134.81	3937.02
US to LBS	37500	100yr	Plan-Without-Pits	5937.94	5937.78	0.16			14896.62	1831.37	134.81	3937.02
US to LBS	37461		Culvert									
US to LBS	37431	100yr	Plan 02	5937.55	5937.16	0.39	2.79	0.15	11284.43	5578.55	0.02	2846.51
US to LBS	37431	100yr	Plan-Without-Pits	5937.55	5937.16	0.39	2.79	0.15	11284.43	5578.55	0.02	2846.51
US to LBS	37000	100yr	Plan 02	5931.39	5930.49	0.90	2.26	0.09	5096.95	11796.05		1613.96
US to LBS	37000	100yr	Plan-Without-Pits	5931.39	5930.49	0.90	2.26	0.09	5096.95	11796.05		1613.96
US to LBS	36600	100yr	Plan 02	5927.94	5927.34	0.59	2.61	0.03	8762.01	8100.99		1937.43
US to LBS	36600	100yr	Plan-Without-Pits	5927.94	5927.34	0.59	2.61	0.03	8762.01	8100.99		1937.43

HEC-RAS Profile 100yr (Continued)

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Froude Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
US to LBS	36150	100yr	Plan 02	5925.30	5924.41	0.89	3.18	0.02	3604.01	13068.99		1692.29
US to LBS	36150	100yr	Plan-Without-Pits	5925.30	5924.41	0.89	3.18	0.02	3604.01	13068.99		1692.29
US to LBS	35800	100yr	Plan 02	5921.93	5920.81	1.12	3.44	0.23	7139.65	9723.35		1371.08
US to LBS	35800	100yr	Plan-Without-Pits	5921.93	5920.81	1.12	3.44	0.23	7139.65	9723.35		1371.08
US to LBS	35400	100yr	Plan 02	5917.85	5917.49	0.36	2.99	0.03	11903.56	4959.44		2163.61
US to LBS	35400	100yr	Plan-Without-Pits	5917.85	5917.49	0.36	2.99	0.03	11903.56	4959.44		2163.61
US to LBS	34955	100yr	Plan 02	5914.83	5914.13	0.70	2.23	0.11	7594.98	8668.02		2263.50
US to LBS	34955	100yr	Plan-Without-Pits	5914.83	5914.13	0.70	2.23	0.11	7594.98	8668.02		2263.50
US to LBS	34495	100yr	Plan 02	5911.55	5911.23	0.33	1.13	0.03	8474.89	5366.11		2670.19
US to LBS	34495	100yr	Plan-Without-Pits	5911.55	5911.23	0.33	1.13	0.03	8474.89	5366.11		2670.19
US to LBS	34180	100yr	Plan 02	5910.39	5909.75	0.64	3.40	0.06	5547.79	11315.21		2763.95
US to LBS	34180	100yr	Plan-Without-Pits	5910.39	5909.75	0.64	3.40	0.06	5546.55	11316.45		2763.95
US to LBS	33833	100yr	Plan 02	5906.90	5906.48	1.43	3.33	0.26	2834.31	14038.69		3112.39
US to LBS	33833	100yr	Plan-Without-Pits	5906.90	5906.48	1.43	3.33	0.26	2834.31	14038.69		3112.39
US to LBS	33001	100yr	Plan 02	5900.12	5899.95	0.57	2.10	0.01	7599.49	5053.52		3367.69
US to LBS	33001	100yr	Plan-Without-Pits	5900.12	5899.95	0.57	2.10	0.01	7599.49	5053.52		3367.69
US to LBS	32543	100yr	Plan 02	5896.53	5896.00	0.53	3.60	0.01	5340.61	11522.39		3579.95
US to LBS	32543	100yr	Plan-Without-Pits	5897.87	5897.15	0.72	3.72	0.07		15663.00		2971.16
US to LBS	31940	100yr	Plan 02	5892.57	5891.06	0.60	1.42	0.07	7937.67	8625.33		3103.97
US to LBS	31940	100yr	Plan-Without-Pits	5894.05	5892.70	1.38	1.75	0.20	2752.60	14060.40		2239.36
US to LBS	31589	100yr	Plan 02	5889.67	5889.29	0.38	2.22	0.02	8894.27	10166.73		2705.50
US to LBS	31589	100yr	Plan-Without-Pits	5890.78	5890.07	0.71	2.14	0.03	4.41	15886.59		1736.87
US to LBS	31339	100yr	Plan 02	5887.43	5886.85	0.58	2.79	0.06	7981.91	8881.09		2162.48
US to LBS	31339	100yr	Plan-Without-Pits	5888.61	5887.99	1.01	3.67	0.06	2854.06	14006.94		1363.77
US to LBS	30698	100yr	Plan 02	5884.02	5883.69	0.33	2.28	0.01	11029.06	5633.94		2427.20
US to LBS	30698	100yr	Plan-Without-Pits	5884.86	5884.12	0.74	2.41	0.10	8076.26	5796.74		1329.44
US to LBS	30340	100yr	Plan 02	5881.74	5881.35	0.39	1.91	0.00	9693.80	7169.20		2963.89
US to LBS	30340	100yr	Plan-Without-Pits	5882.35	5881.94	0.41	2.19	0.02	8214.50	8648.50		1699.30
US to LBS	29994	100yr	Plan 02	5879.82	5879.45	0.38	2.43	0.03	17198.58	6518.43		2363.76
US to LBS	29994	100yr	Plan-Without-Pits	5880.14	5879.58	0.56	2.37	0.00	15372.89	6341.11		2366.16
US to LBS	29685	100yr	Plan 02	5877.35	5876.64	0.71	2.71	0.02	15120.40	8993.60		2906.89
US to LBS	29685	100yr	Plan-Without-Pits	5877.77	5877.19	0.59	2.26	0.07	14029.93	9484.07		2054.50
US to LBS	29336	100yr	Plan 02	5874.34	5873.69	0.65	1.06	0.07	3060.81	14853.39		2152.54
US to LBS	29336	100yr	Plan-Without-Pits	5875.45	5874.14	1.31	1.39	0.20	2662.44	21131.57		1372.35
US to LBS	29058	100yr	Plan 02	5873.21	5872.79	0.42	1.17	0.04	9697.36	14016.64		2132.85
US to LBS	29058	100yr	Plan-Without-Pits	5873.60	5872.95	0.64	1.20	0.01	6722.50	16991.50		1798.76
US to LBS	28752	100yr	Plan 02	5872.00	5871.19	0.81	2.54	0.00	8601.44	14806.21	104.35	2019.32
US to LBS	28752	100yr	Plan-Without-Pits	5872.38	5871.62	0.76	2.40	0.01	8157.19	15896.91		1920.88
US to LBS	25260	100yr	Plan 02	5869.46	5868.61	0.84	1.66	0.00	4940.00	15773.72	3000.28	2122.34
US to LBS	25260	100yr	Plan-Without-Pits	5869.94	5869.06	0.89	2.14	0.01	5695.58	18118.42		1747.90
US to LBS	27387	100yr	Plan 02	5867.22	5866.36	0.86	1.71	0.01	4745.68	15066.21	3900.11	2113.69
US to LBS	27387	100yr	Plan-Without-Pits	5867.79	5866.77	1.02	1.77	0.11	4396.74	19347.26		1610.30
US to LBS	27503	100yr	Plan 02	5864.24	5863.40	0.84	3.03	0.03	4342.88	15306.97	4062.14	2247.47
US to LBS	27503	100yr	Plan-Without-Pits	5864.53	5863.89	0.65	2.89	0.10	6613.01	17100.62	0.17	1721.05
LBS to RCB Split	25952	100yr	Plan 02	5860.54	5859.43	1.11	2.63	0.06	1941.73	21723.14	5435.13	1934.02
LBS to RCB Split	25952	100yr	Plan-Without-Pits	5861.53	5859.86	1.67	2.76	0.19	1649.67	27480.13		1233.44
LBS to RCB Split	25498	100yr	Plan 02	5857.19	5856.28	0.91	3.02	0.00	6246.97	15145.09	5707.94	2115.08
LBS to RCB Split	25498	100yr	Plan-Without-Pits	5857.68	5856.65	1.03	3.16	0.01	5642.85	18642.94	4814.31	2049.78
LBS to RCB Split	25626	100yr	Plan 02	5854.17	5853.25	0.92	1.80	0.01	4096.54	16706.52	8097.94	2283.11
LBS to RCB Split	25626	100yr	Plan-Without-Pits	5854.51	5853.37	1.14	1.89	0.04	516.60	16297.85	10295.75	2215.89
LBS to RCB Split	25613	100yr	Plan 02	5852.31	5851.31	1.01	0.41	0.03	1456.72	23485.79	4175.50	2109.77
LBS to RCB Split	25613	100yr	Plan-Without-Pits	5852.31	5851.31	1.01	0.40	0.03	1456.72	23485.79	4175.50	2109.77
LBS to RCB Split	25451	100yr	Plan 02	5851.74	5850.47	1.28	4.02	0.18	26956.42	2403.58		1547.47
LBS to RCB Split	25451	100yr	Plan-Without-Pits	5851.75	5850.49	1.26	4.64	0.00	26721.46	2378.54		1596.96
LBS to RCB Split	24726	100yr	Plan 02	5845.91	5845.23	0.68	2.15	0.01	3135.37	14289.23	11675.40	3584.02
LBS to RCB Split	24726	100yr	Plan-Without-Pits	5847.11	5845.84	1.27	3.30	0.00		28503.00	507.00	1967.31

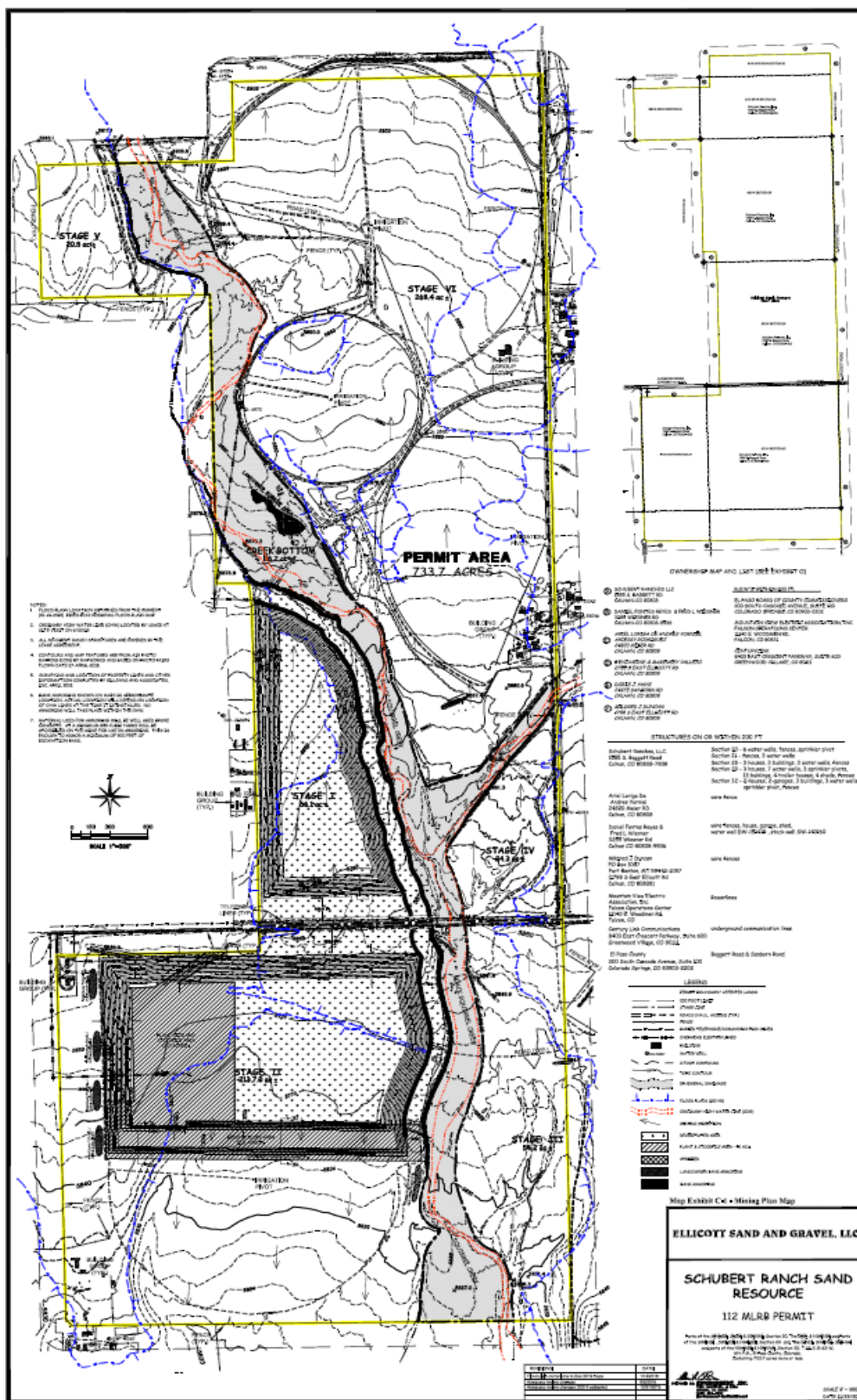
HEC-RAS Profile 100yr (Continued)

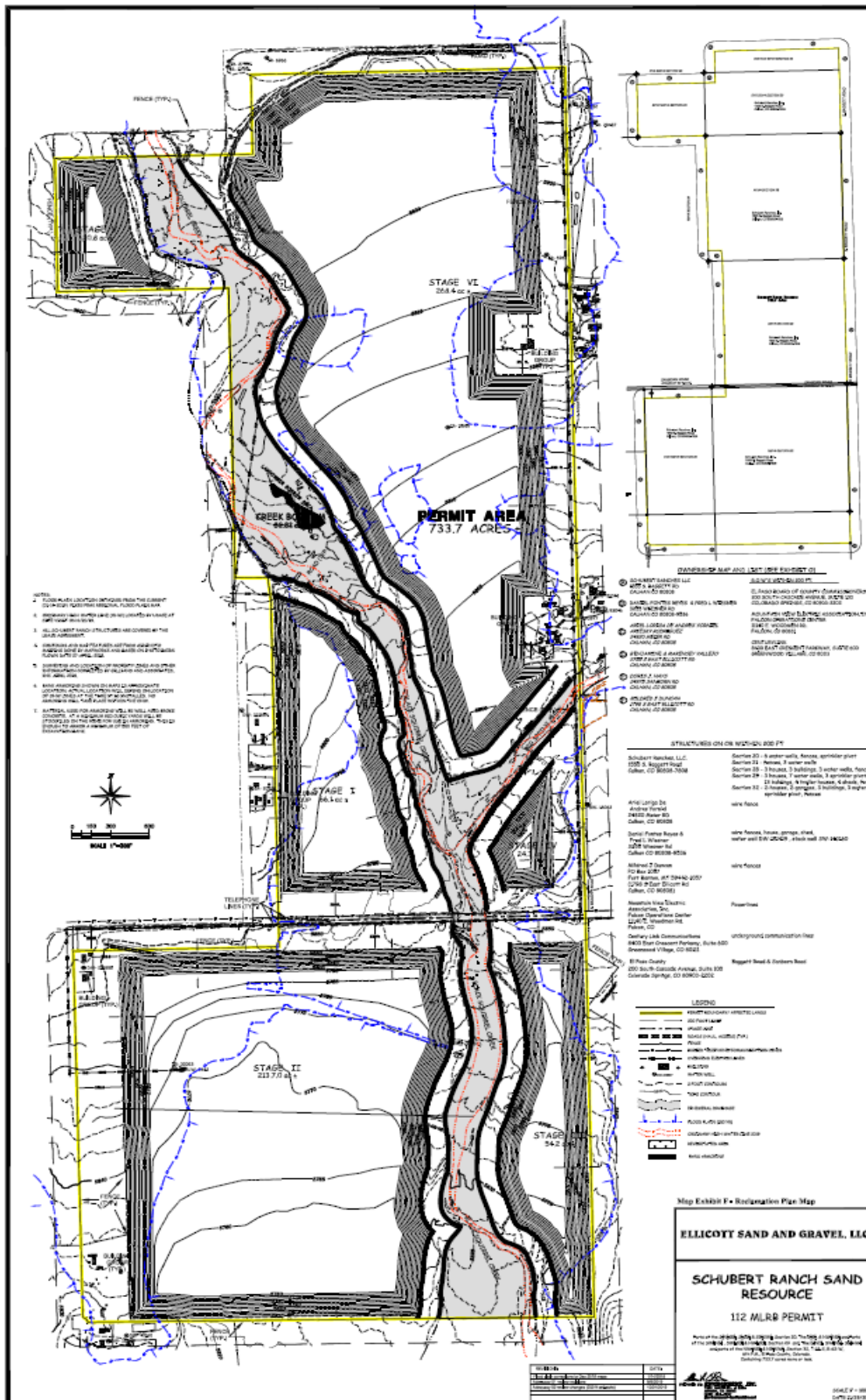
Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Friction Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
LSS to ROB Split	24167	100yr	Plan 02	5642.56	5641.92	0.64	1.54	0.00	2090.28	16737.79	10301.93	3393.76
LSS to ROB Split	24167	100yr	Plan-Without-Pits	5643.73	5642.46	1.27	1.60	0.02	43.67	25050.94	5.39	972.76
LSS to ROB Split	23956	100yr	Plan 02	5641.02	5640.35	0.67	2.20	0.00	2576.81	14069.18	12052.01	3631.93
LSS to ROB Split	23956	100yr	Plan-Without-Pits	5642.11	5640.90	1.22	2.51	0.15		25100.00		2724.26
LSS to ROB Split	23657	100yr	Plan 02	5636.45	5637.79	0.65	2.66	0.00	3040.89	14183.00	11676.12	3636.45
LSS to ROB Split	23657	100yr	Plan-Without-Pits	5639.10	5636.39	0.71	2.52	0.06		25100.00		2666.96
LSS to ROB Split	23156	100yr	Plan 02	5635.36	5634.70	0.66	2.79	0.06	4048.09	11996.84	13096.07	3523.86
LSS to ROB Split	23156	100yr	Plan-Without-Pits	5636.53	5636.26	1.27	3.22	0.21		25100.00		2765.14
LSS to ROB Split	22579	100yr	Plan 02	5632.50	5632.06	0.44	1.90	0.02	3304.77	14963.81	10841.42	3638.49
LSS to ROB Split	22579	100yr	Plan-Without-Pits	5633.06	5632.48	0.58	1.62	0.01		27256.64	1844.36	3554.89
LSS to ROB Split	22196	100yr	Plan 02	5630.59	5629.91	0.67	1.86	0.10	1400.38	17671.96	10027.64	3515.24
LSS to ROB Split	22196	100yr	Plan-Without-Pits	5631.42	5630.70	0.72	1.96	0.02		22953.03	6146.97	3099.76
LSS to ROB Split	21870	100yr	Plan 02	5626.69	5626.36	0.32	1.54	0.02	1409.03	13065.39	14605.56	3549.98
LSS to ROB Split	21870	100yr	Plan-Without-Pits	5629.42	5628.53	0.89	2.19	0.11		20412.44	8667.56	2579.38
LSS to ROB Split	21514	100yr	Plan 02	5627.12	5626.60	0.52	2.94	0.04		16327.36	12772.63	3070.38
LSS to ROB Split	21514	100yr	Plan-Without-Pits	5627.12	5626.60	0.52	2.94	0.04		16327.36	12772.63	3070.38
LSS to ROB Split	21063	100yr	Plan 02	5624.16	5623.24	0.91	5.01	0.14		20136.41	8964.59	3014.72
LSS to ROB Split	21063	100yr	Plan-Without-Pits	5624.16	5623.24	0.91	5.01	0.14		20136.41	8964.59	3014.72
LSS to ROB Split	20250	100yr	Plan 02	5619.01	5618.56	0.45	5.15	0.03		6965.18	22534.82	2412.04
LSS to ROB Split	20250	100yr	Plan-Without-Pits	5619.01	5618.56	0.45	5.15	0.03		6965.18	22534.82	2412.04
LSS to ROB Split	19500	100yr	Plan 02	5613.62	5613.06	0.77	3.17	0.09		5113.71	23896.25	1968.30
LSS to ROB Split	19500	100yr	Plan-Without-Pits	5613.62	5613.06	0.77	3.17	0.09		5113.71	23896.25	1968.30
LSS to ROB Split	19000	100yr	Plan 02	5610.57	5610.09	0.48	3.23	0.03		5479.28	23620.72	2120.46
LSS to ROB Split	19000	100yr	Plan-Without-Pits	5610.57	5610.09	0.48	3.23	0.03		5479.28	23620.72	2120.46
LSS to ROB Split	18400	100yr	Plan 02	5607.31	5606.56	0.75	1.89	0.15		5002.25	24097.75	1914.56
LSS to ROB Split	18400	100yr	Plan-Without-Pits	5607.31	5606.56	0.75	1.89	0.15		5002.25	24097.75	1914.56
LSS to ROB Split	17902	100yr	Plan 02	5605.27	5605.02	0.25	2.67	0.03		11270.70	17629.30	2962.38
LSS to ROB Split	17902	100yr	Plan-Without-Pits	5605.27	5605.02	0.25	2.67	0.03		11270.70	17629.30	2962.38
LSS to ROB Split	17102	100yr	Plan 02	5709.66	5709.08	0.59	4.96	0.04	2139.37	3719.66	23690.97	2072.72
LSS to ROB Split	17102	100yr	Plan-Without-Pits	5709.66	5709.08	0.59	4.96	0.04	2139.37	3719.66	23690.97	2072.72
LSS to ROB Split	16116	100yr	Plan 02	5705.07	5704.63	0.44	1.62	0.03	13613.49	12961.80	3274.70	2506.34
LSS to ROB Split	16116	100yr	Plan-Without-Pits	5705.07	5704.63	0.44	1.62	0.03	13613.49	12961.80	3274.70	2506.34
LSS to ROB Split	15676	100yr	Plan 02	5703.22	5702.88	0.33	6.96	0.07	17670.56	9256.26	2723.18	3106.22
LSS to ROB Split	15676	100yr	Plan-Without-Pits	5703.22	5702.88	0.33	6.96	0.07	17670.56	9256.26	2723.18	3106.22
LSS to ROB Split	14323	100yr	Plan 02	5706.20	5705.20	1.01	4.28	0.02	11330.12	18466.68	7601.21	2290.48
LSS to ROB Split	14323	100yr	Plan-Without-Pits	5706.20	5705.20	1.01	4.28	0.02	11330.12	18466.68	7601.21	2290.48
LSS to ROB Split	13646	100yr	Plan 02	5701.91	5700.74	1.17	3.36	0.09	8630.77	23962.71	4666.52	2000.40
LSS to ROB Split	13646	100yr	Plan-Without-Pits	5701.91	5700.74	1.17	3.36	0.09	8630.77	23962.71	4666.52	2000.40
LSS to ROB Split	12828	100yr	Plan 02	5776.26	5775.38	0.88	2.30	0.07	12990.23	24449.77		1362.62
LSS to ROB Split	12828	100yr	Plan-Without-Pits	5776.26	5775.38	0.88	2.30	0.07	12990.23	24449.77		1362.62
LSS to ROB Split	12316	100yr	Plan 02	5773.90	5772.35	1.55	3.76	0.14	16156.32	21211.74	29.94	1162.25
LSS to ROB Split	12316	100yr	Plan-Without-Pits	5773.90	5772.35	1.55	3.76	0.14	16156.32	21211.74	29.94	1162.25
LSS to ROB Split	11794	100yr	Plan 02	5769.99	5768.89	1.10	5.27	0.02	21819.40	15980.60		1193.83
LSS to ROB Split	11794	100yr	Plan-Without-Pits	5769.99	5768.89	1.10	5.27	0.02	21819.40	15980.60		1193.83
LSS to ROB Split	11152	100yr	Plan 02	5764.69	5763.35	1.35	3.54	0.00	18146.08	18990.83	261.09	1593.46
LSS to ROB Split	11152	100yr	Plan-Without-Pits	5764.69	5763.35	1.35	3.54	0.00	18146.08	18990.83	261.09	1593.46
LSS to ROB Split	10796	100yr	Plan 02	5761.15	5760.77	1.38	3.79	0.04	6995.79	23121.56	7322.67	1789.10
LSS to ROB Split	10796	100yr	Plan-Without-Pits	5761.15	5760.77	1.38	3.79	0.04	6995.79	23121.56	7322.67	1789.10
LSS to ROB Split	10341	100yr	Plan 02	5756.63	5756.39	1.24	2.68	0.00		30840.96	6959.45	1342.86
LSS to ROB Split	10341	100yr	Plan-Without-Pits	5756.63	5756.39	1.24	2.68	0.00		30840.96	6959.45	1342.86
LSS to ROB Split	9906	100yr	Plan 02	5753.95	5752.71	1.23	4.92	0.06		29042.96	8057.05	1227.84
LSS to ROB Split	9906	100yr	Plan-Without-Pits	5753.95	5752.71	1.23	4.92	0.06		29042.96	8057.05	1227.84
LSS to ROB Split	9056	100yr	Plan 02	5746.96	5747.14	1.83	5.17	0.17	4677.69	32522.31		968.95
LSS to ROB Split	9056	100yr	Plan-Without-Pits	5746.96	5747.14	1.83	5.17	0.17	4677.69	32522.31		968.95
LSS to ROB Split	8267	100yr	Plan 02	5743.50	5742.22	1.28	3.91	0.06	1667.78	35732.22		1262.03
LSS to ROB Split	8267	100yr	Plan-Without-Pits	5743.50	5742.22	1.28	3.91	0.06	1667.78	35732.22		1262.03

HEC-RAS Profile 100yr (Continued)

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frcn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
LSS to ROB Split	7960	100yr	Plan 02	5739.53	5738.43	1.10	3.98	0.02	39.06	37333.40	27.54	1371.11
LSS to ROB Split	7960	100yr	Plan-Without-Pits	5739.53	5738.43	1.10	3.98	0.02	39.06	37333.40	27.54	1371.11
LSS to ROB Split	6915	100yr	Plan 02	5735.53	5734.19	1.34	2.54	0.03	191.01	31564.59	5624.40	2429.45
LSS to ROB Split	6915	100yr	Plan-Without-Pits	5735.53	5734.19	1.34	2.54	0.03	191.01	31564.59	5624.40	2429.45
LSS to ROB Split	6925	100yr	Plan 02	5732.54	5730.87	1.68	2.96	0.01		35603.59	1796.41	1989.57
LSS to ROB Split	6925	100yr	Plan-Without-Pits	5732.54	5730.87	1.68	2.96	0.01		35603.59	1796.41	1989.57

Appendix E. Construction Plans and
Stream Bank and Pit Armoring Details





BANK PROTECTION PLAN

This bank protection plan is presented to explain the bank armoring on both side of the Black Squirrel Creek and the tops of the excavated slope that run parallel to the channel. This armoring is being proposed to keep the Black Squirrel Creek within in the historic banks so the excavated area will not capture if a epic flood event were to occur after reclamation is complete. The minimum width of the top of the armored banks will be 150 feet.

We have followed the 2013 Urban Drainage and Flood Control District (UDFCD) Publication guideline document for planning and design of the armoring on the mining side bank and the bank armoring on the creek channel side. Ellicott Sand & Gravel LLC has no way or predict is or when a storm event could occur that would cause flooding outside the historic channel. The armor is intended to define the channel and protect the banks should a 100 year event occur after an area has been mined. All armoring done in or along the dry channel will be done outside the Ordinary Highwater Line (OHW) to avoid needing a U.S. Army Corps of Engineers permit. The existing OHW is shown on all map exhibits in the permit packet as an orange line. If this changes a mining advances around the permit area the armoring locations will change to meet the conditions at that time. The armoring will be covered with a 6 inch layer of growth medium and seeded with the approved seed mix

We have no information on the flow velocities or volume of flows for a 100 year event in this stretch of Black Squirrel Creek. Black Squirrel Creek is a true ephemeral drainage where the only water that travels down the drainage is during isolated storm events that create mini floods. In most cases the OHW is 10 feet or less across. The 100-year Floodplain information provided by El Paso County has been added to all of the Map Exhibits in the Reclamation Packet and is shown as a blue line.

There are general items that will be common to both armoring areas. In general, all armoring material will be recycled concrete fragments with surface rebar removed that meets the definition of Inert Materials, there will be no exposed rebar in the concrete and it will be sized 12 to 24 inches with a few larger pieces and fines mixed in to fill voids. The toe of the armoring will be a minimum of 3 feet below the existing creek channel thalweg as described below. ESG will keep enough material stored on the mine to complete armoring needed on an area as it is mined and ready for armoring. At a minimum, 850 cubic yards will be stockpiled on the mine for use in armoring. This is enough to armor a minimum of 500 feet of excavation bank. The stockpile of armoring material will be placed parallel to the water flow so it will not interfere with flows in the flood plain

if flooding occurs and within the 150 foot setback so it is close to the area where it will be placed.

The attached **Figure 1** shows the cross section~~s~~ of the areas discussed below and details of the armoring to protect the banks along Black Squirrel Creek and Big Spring Creek. **Map Exhibit F - Reclamation Plan Map** has been revised to show the location of the areas to be armored in the mine.

Channel Bank Armoring.

Along the banks of Black Squirrel Creek and Big Springs Creek bank~~s~~ armoring will be placed wherever mining will take place within 400 feet of the bank. The armoring will be done as mining advances in each stage so that if mining ended along the channels before mining reached the 400 foot line no armoring would need to be done. As mining approaches the 400 foot limit the channel adjacent to mining area will be armored following the UDFCD Guidelines.

Bank armoring will be done, using the concrete recycle material described above. The armored face of the bank will extend to 5 feet below the thalweg of the dry channel to the top of the existing bank and will be a minimum of 2 feet thick. This will leave an armored face along the surface that is 29 feet wide. On average this will require 2.77 cu-yds per linear foot. The armoring will not take place in the OHW but rather along the historic bank of the creeks. The face of the armoring will be sloped 2.5h to 1v per the guidelines.

Excavation Bank Armoring.

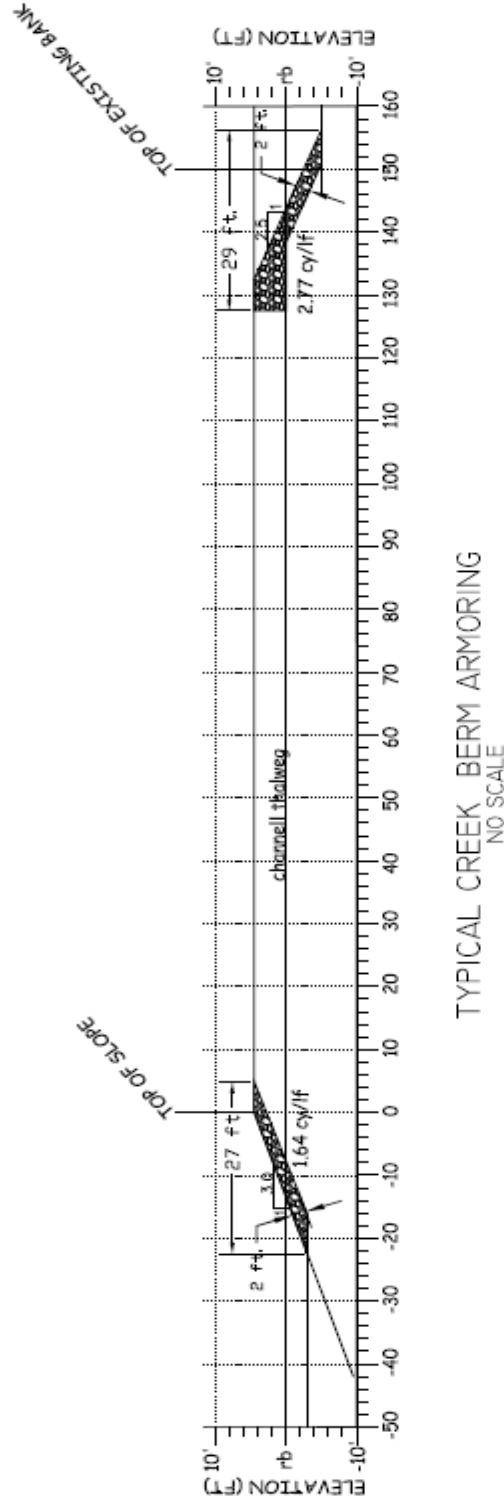
On the inside of the mined area adjacent to the creek channels the armoring will be placed from the existing elevation so the toe of the armoring will be a minimum of 3 feet below the creek thalweg and will be 2 feet or more thick. This is approximately 1.64 cyd/lft along the excavation bank slopes. The armoring will cover the bank slopes from the original ground surface to a depth of 3 feet below the channel thalweg and parallel to the channel. Once sloping begins the armoring will be installed on 500 foot sections until completed. This will leave an armored face along the surface that is 27 feet wide.

Supplied supporting documents

Figure 1 - Bank Protection Plan cross section (Revised 10-30-19)

BANK ARMORING PLAN

FIGURE 1



NOTES:


1. BANK ARMORING SHOWN ON MAPS IS APPROXIMATE LOCATION. ACTUAL LOCATION WILL DEPEND ON LOCATION OF OHW LINES AT THE TIME IT IS INSTALLED. NO ARMORING WILL TAKE PLACE WITHIN THE OHW.
2. MATERIAL USED FOR ARMORING WILL BE WELL AGED BROKE CONCRETE. THAT HAS ALL EXPOSED SURFACE REBAR REMOVED. AT A MINIMUM 850 CUBIC YARDS WILL BE STOCKPILED ON THE MINE FOR USE IN ARMORING. THIS IS ENOUGH TO ARMOR MATERIAL TO ARMOR A MINIMUM OF 500 FEET OF EXCAVATION BANK.
3. STOCKPILE OF ARMORING MATERIAL WILL BE PLACED PARALLEL TO THE WATER FLOW SO IT WILL NOT INTERFERE WITH FLOWS IN THE FLOOD PLAIN IF FLOODING OCCURS AND WITHIN THE 150 FOOT SETBACK SO IT IS CLOSE TO THE AREA WHERE IT WILL BE PLACED.
4. BANK ALONG THE EXCAVATED AREA WILL ARMORED FROM THE EXISTING SURFACE TO A POINT AT LEAST 3 FEET BELOW THE CREEK CHANNEL THALWES. THE BANK ALONG THE CREEK SIDE WILL BE ARMORED FROM THE SURFACE TO AT LEAST 5 FEET BELOW THE THALWAS. OF THE CREEK CHANNEL.
5. CHANNEL SIDE ARMORING WILL BE DONE PRIOR TO MINING WITHIN 400 FEET OF THE AREA TO BE ARMORED IN ADVANCE OF MINING IN EACH STAGE.
6. THE SIZE OF THE MATERIAL WILL FALL IN THE RANGE OF 12 TO 24 INCHES OR GREATER AND WILL BE PLACED BELOW GRADE.
7. THE ARMORING WILL BE COVERED WITH A 6 INCH LAYER OF GROWTH MEDIUM AND SEEDED WITH THE APPROVED SEED MIX.

Cannot grant approval without approval of the air quality permit (1)

Subject: Cloud+

- impacts are determined by Federal, State, regulations. For example, typical county light, and visual impacts.
- Air Pollution:
 - Section 6.3.3 of the El Paso County operator comply with County, standards, they may request a special approval under permit(s).
 - By definition, this is not a continuing operation.
 - In a typical sand and gravel mine operation, the expected air pollution will be dust from trucks and mining equipment.
 - There will be some emissions (trucks and mining equipment) and fugitive dust are subject

Cannot grant approval without approval of the air quality permit

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