FINAL REPORT:

Construction of the Robinson Diversion Modification Project was successfully completed in spring 2021. The in-channel work was completed by the USACE in-water work deadline of April 1, 2021 and the construction site restoration was completed in April and May 2021. See the included as-built survey map. One punch list item remains, a steel grate catwalk for the new headgate. Limited metal and fabrication availability due to supply and labor shortages have delayed this element. Fabrication and installation of the catwalk is expected to be completed by mid-July 2021.

Figure 1 - Completed in-channel work in early April 2021. Grade controls and engineered riffle on river left and the headgate and ditch improvements on river right.

The Roaring Fork has likely peaked for 2021, with a max flow of 1,770 cfs in the project reach on June 5, 2021. See Figure 2 for the hydrograph since May 1st. This is less than half the normal peak for the project reach. The County's consultant team has been monitoring the site through runoff, taking water surface elevation measurements and making general observations. The project reach appears to have remained stable during runoff and is functioning as designed. The County will be performing a more thorough inspection during low water in the fall.

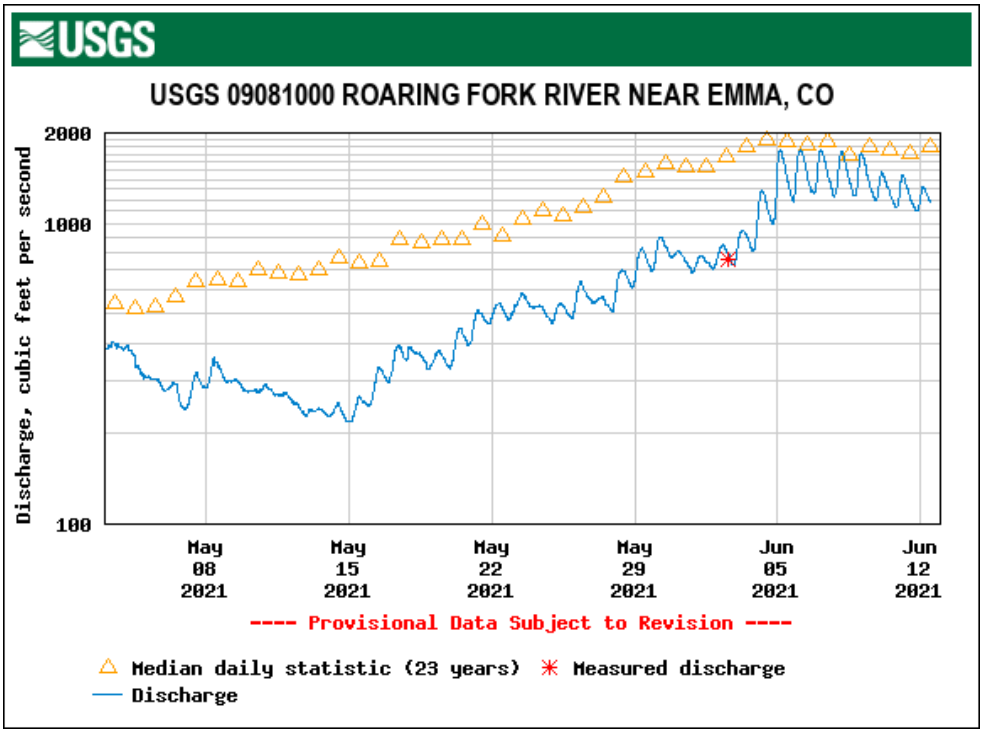

Figure 2 - Hydrograph through project reach since May 1st

There were four major components of the project, the upper grade control, the engineered riffle, the lower grade control, and the new headgate and ditch improvements. An overall layout of the project can be seen in the stamped plans and the as-built survey map. Each component is discussed in more detail below.

Task 3 - Upper Grade Control – Not funded by this grant

The upper grade control structure was constructed per plan and verified with RTK GPS survey equipment. The structure was designed to provide a stable control for water directed into the Robinson Diversion as well as define the starting point of the engineered riffle. The grade control crest elevation was built at existing river grade and backfilled with alluvium to function similar to the head of natural riffle. Habitat boulders were installed upstream and downstream of the wings to provide hydraulic roughness and aquatic habitat. To date, water delivered to the Robinson Diversion has been successful for a wide range of river flows (200 to 1800 cfs), so no modifications are anticipated at this time. See Figure 3 for an aerial photo of the constructed structure.

Figure 3 - Upper grade control as constructed, looking upstream. Taken on April 6, 2021 (~250 cfs)

Task 4 - Engineered Riffle and Bank Improvements – Not funded by this grant

The project's lower grade control structure crest elevation is approximately 3 feet lower that the original structure. This grade difference was made up through the middle of the project reach in an engineered riffle, which has a slope between 1.5 and 2%. Habitat boulders were installed along the right and left sides of the channel to provide aquatic habitat as well as hydraulic roughness. A deeper channel was left open in the middle of the river to provide a clear lane for watercraft. Both river banks were improved with regrading, sporadic boulders and heavily planted with willows. The riffle was built per plan, with the exception of a several of the habitat boulders, which were repositioned during construction after observing site conditions. A 1- to 2-foot-thick sand lens was discovered during the riffle construction along the right side of the channel. The channel was over-excavated in this location to remove the sand and backfilled with the appropriately sized cobble. The construction was verified with RTK GPS survey equipment. See Figure 4 and Figure 5 for photos of the constructed engineered riffle.

Figure 4 - Engineered riffle, looking downstream. Taken April 6, 2021 (~250 cfs)

Figure 5 - Engineered riffle, looking upstream. Taken April 6, 2021 (~250 cfs)

Task 5 - Lower Grade Control Structure – Funded by this grant.

The lower grade was constructed per plan, with the exception of a minor (~3 foot) downstream shift of the river right tie in point to better match in with the bank improvements. The location and elevations of the structure were verified with RTK GPS survey equipment. The lower grade control was designed to maintain stability of the river's longitudinal profile previously provided by the original boulder grade control in this location, as well as form an anchor point for the engineered riffle immediately upstream. See Figure 6 below for a photo of the completed structure.

Figure 6 - Lower Grade control as constructed, looking upstream. Taken on April 6, 2021 (~250 cfs)

Task 6 - Robinson Diversion Headgate Improvements – Not funded by this grant

As part of the project design, the original headgate was moved upstream to a new location. This placed the headgate at the hydraulic control in the river, providing the ditch company with more precise control of water entering the ditch. It also allowed the headwall to be configured in a way to reduce debris and sediment accumulation in front of the headgate. The rebuilt ditch inlet was narrowed to provide more width in the main river channel and defined maintenance access points were established. The concrete structure, gates, and ditch improvements were constructed per plan and verified with RTK GPS survey equipment.

Figure 7 - New Robinson Diversion headgate and improved inlet ditch - Taken on April 6, 2021

Conclusion

Overall, the project has been a success to date. Thanks to an outstanding contractor and a well thought out design, construction went as smoothly as these complex river project can go (especially considering local COVID restrictions), with all elements installed per plan within the USACE allowed in-water work window. Due to the low water year the project has not seen a true high water test, but the County will continue to monitor the site and are committed to the long term success of the project. A copy of the monitoring plan is included with this submittal.

Since completion of construction, the project has seen praise from the local community. The diversion was previously referred to as "Anderson Falls" and changed from year to year depending on boulder shifting and maintenance activities. The project reach was avoided by many commercial and private rivers users because of the potential navigation hazard. Commercial whitewater outfitters are now taking more duckie and raft trips through the reach. Commercial fish guides are also floating the reach more and taking clients on wading trips specifically to the project reach to take advantage of the increased aquatic habitat elements. The Robinson Diversion's water delivery is also working well and the Ditch Company are very pleased and appreciative of the improvements.

Figure 8 - Commercial inflatable kayak customer paddling through the lower grade control

Pitkin County would like to thank the Colorado Water Conservation Board for the financial support of the project, without which construction would likely have been delayed for further fundraising. Pitkin County looks forward to working with the CWCB on future projects to further improve the aquatic and riparian conditions of the Roaring Fork Valley.

Sincerely,

Lisa MacDonald
Pitkin County Healthy Rivers Administrator and Project Manager

AS-BUILT SURVEY

PROFESSIONAL ENGINEER STAMP

COLORADO LICENSED
QUINN L DONNELLY
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
AS-BUILT BASE MAP

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	AB01
Date: MAY 2021	
Scale: 1"=20' (FULL SIZE)	

ROBINSON DIVERSION MODIFICATION PROJECT

Monitoring Plan

Original - August 2020
Revision 1 – October 2020
Revision 2 – December 2020 – (added Obermeyer Properties as a stakeholder and as key personnel).

Prepared by:
RiverRestoration
P.O. Box 248
Carbondale, CO 81623

Contents

Figures

1. Project Goals

Modifications to the existing Robinson Diversion are proposed to improve downstream navigation, improve fish passage, and reduce in-channel maintenance conducted by the Robinson Ditch Company. The diversion is located on the Roaring Fork River between El Jebel and Basalt, CO. Proposed modifications and additions are designed to benefit recreational/commercial boaters in the community and reduce impacts to the aquatic environment associated with the configuration and maintenance of the existing structure. Primary project components include:

- Reconfiguring the existing main channel boulder grade control at the downstream end of the site
- Regrading the existing alluvial riffle between the two boulder grade control structures.
- Regrading the existing alluvial "island" to better separate the main channel from the diversion channel
- Constructing a new main channel boulder grade control at the upstream end of the site to maintain water surface elevations for diversion water delivery.
- Removal of the metal gates at the existing headgate – concrete headwall to remain.
- Constructing a new headgate for the diversion channel at the upstream end of the diversion inlet channel.

The focus of the plan presented herein is to evaluate the project effects to the aquatic environments. For this plan, effects to the aquatic environment will be characterized through three project objectives listed as follows:

a) Provide **boat** passage for typical river users that is in character with this Class II-III reach of the Roaring Fork River from Wingo Bridge to Hooks Bridge.
b) Maintain existing or improve on pre-project **fish passage** conditions the project reach.
c) Maintain **channel stability** through the project reach at or better than its current levels, with emphasis on protecting infrastructure in or adjacent to the Roaring Fork River.

2. Monitoring Plan Goals

A monitoring and adaptive management program shall be implemented for evaluation of the performance and efficacy of the project. An active monitoring plan is proposed to evaluate the in-channel improvements. The primary goals of this monitoring plan are as follows:

a) Assess the ability of the in-channel modification to maintain **boat passage** for river users.
b) Assess **fish passage** for resident species.
c) Monitor **channel stability** in regard to aggradation, degradation, deposition, scour and lateral erosion/migration.

a) Boat Passage

Boat passage performance is a function of both the hydraulic characteristics within the project reach and the perceived level of difficulty of the active community users. The International Scale of River Difficulty (ISRD) is a rating system for rivers based upon the consensus of river users of the degree of difficulty in passage (American Whitewater, 1998). Rivers are ascribed ratings from Class I (easiest) to Class VI (extreme difficulty) based on

the difficulty of the rapid hydraulics, remoteness of the river, and objective hazards. This reach of the Roaring Fork River, defined as from Wingo Bridge to Hooks Bridge, is characteristic of a Class III reach. Notable features that contribute to this rating include: the CO-82 bypass bridge upstream of Basalt, the Pitkin County Healthy Rivers Whitewater Park, and the existing Robinson Diversion structure. There are several other diversion structures and bridges through the river reach that require Class III comparable equipment and skill set.

The performance metric for boat passage will be the categorization of the in-channel improvements as **Class II** at typical spring/summer/fall flows with a potential bump to Class III during higher runoff flows. Due to the subjectivity of the ISRD, the community survey of boaters and river users will be analyzed to ascertain the consensual rating of the whitewater features. Failure to meet the Class II/III distinction will launch adaptive management to assess the problem and explore solutions.

Boat passage through the project reach is only required when water levels in the river reach (Wingo to Hooks) are sufficient to allow typical watercraft (rafts and dories) to float the river reach.

b) Fish passage

Successful fish passage will achieve the velocities, depths, and vertical drops to the same degree as the existing or baseline river conditions across all flow rates typical to the project reach. Target species for passage are those locally present in the river: brown trout, rainbow trout, mountain whitefish, sculpin, and bluehead suckers. Particular attention will be paid to low seasonal flows that often occur during critical spawning and juvenile fish distribution periods in late summer/early fall and later winter/early spring.

Maintaining acceptable fish passage shall be defined as the ability of the proposed channel modifications to permit passage of the target species.

c) Channel Stability

Components of channel stability for the project reach will be defined as:

Aggradation – is the raising or elevating of a channel bed or other low-lying parts of a stream channel through the process of alluvial deposition and typically refers to a reach-scale alteration to the channel morphology; conceptually it is the vertical component of accretion. (Osterkamp, 2008)

Degradation – is the lowering of a channel bed or other low-lying parts of a stream channel through the process of erosion and typically refers to a reach-scale alteration to the channel morphology; conceptually it is the opposite of the vertical component of aggradation (Osterkamp, 2008)

Deposition – is the constructive process of accumulation into beds or irregular masses of loose sediment or other rock material by any natural agent; it is especially the mechanical settling of sediment from suspension or tractive movement in water. Deposition refers to a localized and potentially transient process. (Osterkamp, 2008)

Scour – is the degradation of river banks and/or bed that is localized to a specific area due to a sudden change in the parameters associated with the river (i.e. change in geometry, slope, flow, or placement of a structure, etc.) and may be transient.
Lateral erosion/migration – is the failure and removal of channel bank materials through several geomorphic processes. Lateral erosion can be caused by the physical action of flowing water and the sediment that is carries. It can also be caused by human or natural causes related to the bank itself, including groundwater/saturated soils, vegetation removal, or human or animal traffic.

Channel stability will be monitored from approximately 200 feet downstream of the lower grade control structure to approximately 250 feet upstream of the upper grade control structure. Changes in channel geometry over time associated with the processes defined above will be evaluated on a case by case basis. The evaluation, which will include stakeholder input, will include:

i. Potential effects on hydraulics, i.e. boat passage and fish passage.
ii. Potential impacts to adjacent infrastructure and river banks.
iii. Potential impacts for the overall geomorphologic regime of the reach (i.e. adverse change in aggradation or degradation patterns or channel planform).

Monitoring is proposed to be conducted periodically for five years following the completion of construction. Results of monitoring will be summarized in a technical memo submitted to the US Army Corps of Engineers (USACE) and Colorado Parks and Wildlife (CPW) by December 31st of each year. A copy of the tech memo will also be submitted to Obermeyer Properties for review and comment no less than fifteen (15) days prior to its annual submittal to the US Army Corps of Engineers (USACE) and Colorado Parks and Wildlife (CPW). See Obermeyer Properties' contact info in Section 9. This memorandum will detail the monitoring site, data collection methods, and adaptive management strategy for the project.

3. Description of Monitoring Site

The monitoring site is illustrated in attachment Figure A1. Proposed improvements include removing the existing metal headgate, constructing a new headgate for the diversion channel, constructing a new main channel boulder grade control at the upstream end of the site, reconfiguring the existing main channel boulder grade control at the downstream end of the site, regrading the alluvial riffle between the two boulder grade control structures, and regrading the existing alluvial "island" to better separate the main channel from the diversion channel. The project goal is to remove the navigation hazard posed by the existing diversion headgate, enhance fish passage, and stabilize the alluvial island banks.

4. Data Collection

Site observations and photo documentation will be performed at least once per year, in late September/early October during low water. Annual data collection will typically include general site observation performed by Pitkin County and Robinson Ditch company staff or representative. CPW staff will be invited to evaluate fish passage performance. An online community survey through the County's website will also be performed annually. The County will conduct cross-section surveys of the project site. These will occur every other year (i.e.

Years 2 and 4), or if runoff peak flow rate exceeds the 10-year event (7,300 cfs). Baseline topographic data has been collected on the project site to document pre-project conditions and as-built survey will be performed post construction.

a) **General observations** recorded shall include:
   - Date of survey
   - Weather conditions
   - Approximate flow rate
   - Photo documentation
   - Written observations of site conditions.
   - Other pertinent information.

   Written notes shall include channel characteristics, hydraulic conditions, significant bank/bed changes as the general conditions of the site. The observer will also document, with photographs, controlled or uncontrolled drainage, vegetation, erosion, and other supplemental data that would aid in the annual monitoring technical memo.

   Approximate flows at the site will be based on the US Geological Survey (USGS) gage number 09081000 (Roaring Fork River near Emma, CO). Discharge determination should be performed the day of the site visit.

b) **Photo monitoring** should resemble preceding imagery as closely as possible for continuity. The use of GPS coordinates could be implemented for monitoring convenience. Collected photographs at each cross-section will include the minimum of 1) left edge of project (LEP) to right edge of project (REP); 2) Center of channel to upstream; 3) Center of channel to downstream; and 4) REP to LEP.

c) **Community surveys -** will be performed to assess the community's opinion on the ability for river users to pass through the reach. Pitkin County staff will contact and interview a variety of river users, including commercial and private boaters and anglers, to discuss the project reach and receive feedback. The community survey results will be the primary tool used for evaluating the established **boat passage** as discussed in the monitoring goals section above.

d) **Cross-section and Profile surveys** will be performed to monitor general aggradation, degradation, or alterations to the boulder structures and channel morphology. Surveys will be performed with a level and line technique, auto-level, total station, survey grade GPS, sounder, or other terrestrial methods suitable to collect riverbed bathymetry based on the flow conditions at time of survey. Major breaks in grade, vegetation, bed material, and bed form shall be noted in descriptions. Manmade and other unique features shall be noted. Water surface profiles will be recorded along the left and right bank. Water depths will be recorded at key locations. Survey tolerances for topography are 0.05 feet vertical accuracy.

   The team will survey a total of 7 cross-sections: 1 cross-section through the downstream control riffle crest, 1 cross-section through the downstream pool, 1 cross-section through

each of the two boulder grade control structures, 2 cross-sections through the center rifle and 1 cross-section across the river adjacent to the new headgate structure. The team will also survey 2 profiles, 1 along the top of the center island and 1 along the diversion inlet channel. See Figure 1 for the cross-section and profile locations.

The cross-section and profile locations shall be documented electronically in AutoCAD and input into the survey equipment, so the same location is surveyed each time for direct comparisons. All cross-section surveys shall be closed to better than 0.05 feet vertical and 1.0 feet total distance.

5. Reporting

A monitoring technical memo will be developed to detail monitoring efforts and report on the status of the overall project. The technical memo will be submitted by December 31st of each year for the duration of the monitoring efforts. The first report will be completed by December 31, 2021.

The report will include the following:

- General observations and photographs documenting **channel stability** and **fish passage.**
- Community survey overall results – **boat passage** evaluation will be primarily based on this information.
- If performed in that particular year, cross-section, and profile plots of each surveyed cross-section to document **channel stability** of the project reach through the course of the monitoring period.

The technical memo will also make recommendations for adaptive management of the project reach. These recommendations will be presented to the project's collaborators and a plan will be developed to implement needed changes to the project reach. See the adaptive management discussion below.

6. Adaptive Management

Adaptive management framework will be implemented following construction to evaluate the performance of the project in regards to **fish passage**, **boat passage** and **channel stability** described in the Monitor Plan Goals section, learn from the evaluation, develop a strategy to accordingly adjust monitoring efforts or physical changes to the project site, and implement changes before the next monitoring cycle.

If physical modifications are required on the project site, alterations would be made during the regular in-water work period of August 15th to September 30th unless otherwise coordinated with project stakeholder and state/federal regulatory agencies. Any performed modifications will be monitored in the next monitoring cycle to evaluate the effectiveness of selected alteration methods and adjusted structural performance thresholds.

The Pitkin County Healthy Rivers program will provide funding and resources as available to monitor and adaptively manage the project. Adaptive management will be a collaborative process with the project stakeholders following communication of annual monitoring efforts and

results. Likely stakeholders include Pitkin County, Eagle County, Robinson Ditch Company, CPW, Obermeyer Properties, and local river users.

7. Key Personnel

Robinson Ditch company and Pitkin County staff and their selected representatives will conduct periodic observations of the site to evaluate its channel stability performance. CPW staff will be invited to visit the site annually in the fall to evaluate the fish passage performance. Obermeyer Properties (the property owner on the south side of the river and bank) and its selected representatives will also be invited to participate in each of the periodic observations of the site by the Robinson Ditch company and Pitkin County staff to evaluate its channel stability performance, the annual CPW staff site visits to evaluate the fish passage performance, and will also be given the opportunity to will review the annual report and be consulted before any changes to the project are made. See Obermeyer Properties' contact information below. Local river users, and commercial whitewater and fishing guides will be contacted by Pitkin County staff each fall to evaluate the boat passage performance of the project improvements. Pitkin County will hire a hydrographic surveyor to perform cross section surveys, when required.

8. References

Fisheries (2016). "Adapting adaptive management for testing the effectiveness of stream restoration: an intensively monitored watershed example." *Fisheries* 41(2): 84-89.

Osterkamp, W. R., (2008), Annotated Definitions of Selected Geomorphic Terms and Related Terms of Hydrology, Sedimentology, Soil Science and Ecology: Reston, Virginia, Open File Report 2008-1217, pp 49

9. Contact Information

Notice/Contact information for Obermeyer Properties, LP

c/o Klaus Obermeyer and Mark Whalen
115 Aspen Airport Business Center
Aspen, CO 81611
Obermeyer: Tel: 970-925-5060; E-Mail: AP@obermeyer.com
Whalen: Tel: (970) 309-4743; E-Mail: mwhalen@obermeyer.com

With Copies To:
Robert M. Noone
The Noone Law Firm, P.C.
P.O. Drawer 39
Glenwood Springs, CO 81602
Tel: (970) 945-4500
E-Mail: rnoone@noonelaw.com

ROBINSON DIVERSION MODIFICATION PROJECT
ROARING FORK RIVER - EL JEBEL, CO
Revision 1 - NOVEMBER 12, 2020

SHEET INDEX

CONTACTS

Lisa MacDonald
Pitkin County Healthy Rivers and Streams Program Director
(970) 379-8654

Quinn Donnelly, P.E.
Project Manager
RiverRestoration.org, LLC.
(970) 947-9568

Bill Reynolds
President
Robinson Ditch Company
(970) 927-4077

LOCATION MAP

EXISTING DIVERSION:
LATITUDE: 39.369766° N
LONGITUDE: 107.070715° W

NTS N

VICINITY MAP

NTS N

BID SET - REVISION 1

PROFESSIONAL ENGINEER STAMP

COLORADO LICENSED
QUINN L DONNELLY
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION

COVER SHEET

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

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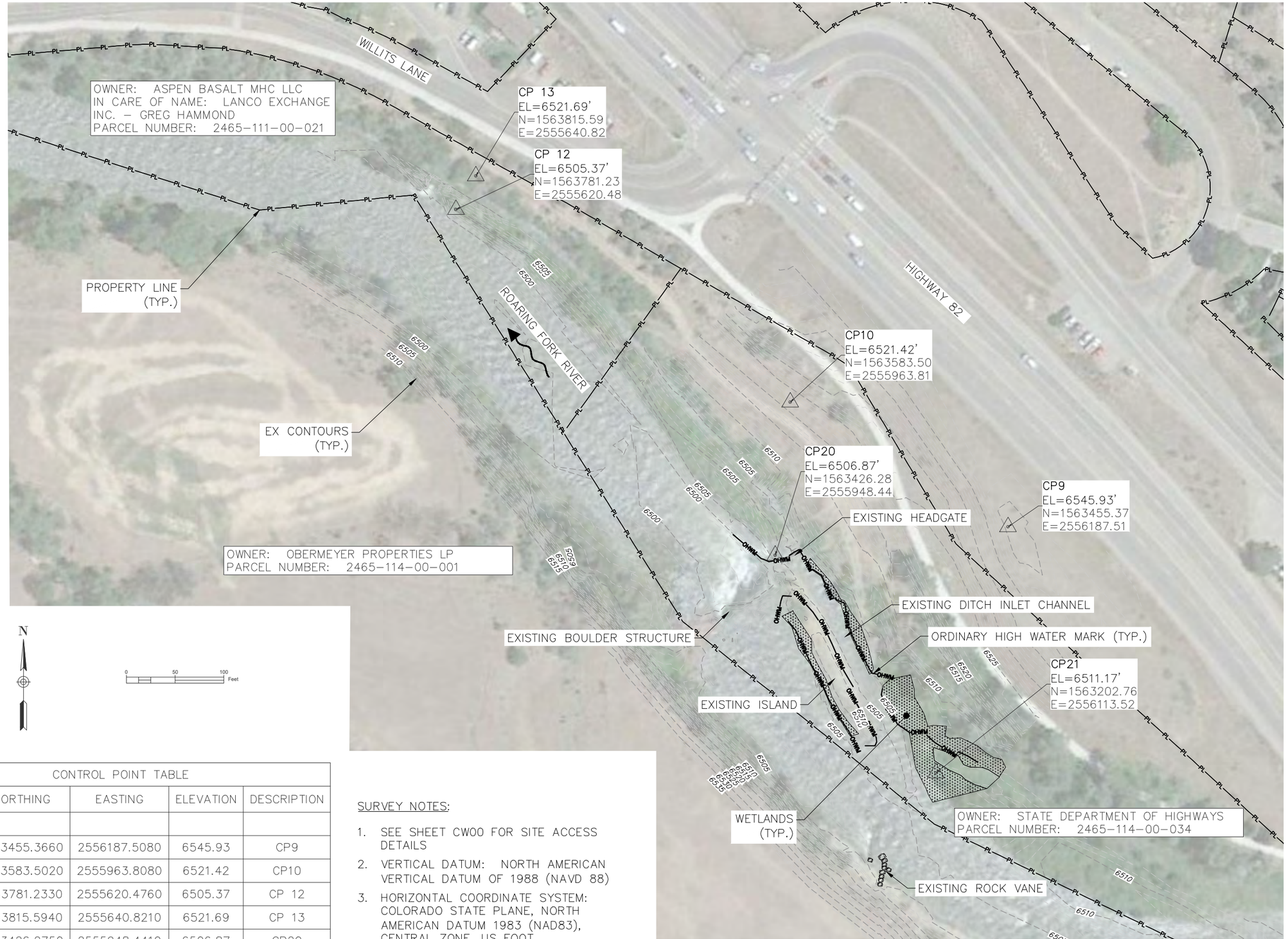

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10	1563583.5020	2555963.8080	6521.42	CP10
12	1563781.2330	2555620.4760	6505.37	CP 12
13	1563815.5940	2555640.8210	6521.69	CP 13
20	1563426.2750	2555948.4410	6506.87	CP20
21	1563202.7600	2556113.5200	6511.17	CP21

SURVEY NOTES:

1. SEE SHEET CW00 FOR SITE ACCESS DETAILS
2. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)
3. HORIZONTAL COORDINATE SYSTEM: COLORADO STATE PLANE, NORTH AMERICAN DATUM 1983 (NAD83), CENTRAL ZONE, US FOOT

BID SET - REVISION 1

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COLORADO LICENSED
QUINN L DONNELLY
56481
11/09/2020
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ROBINSON DIVERSION MODIFICATION
BASEMAP & HORIZONTAL CONTROL PLAN

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

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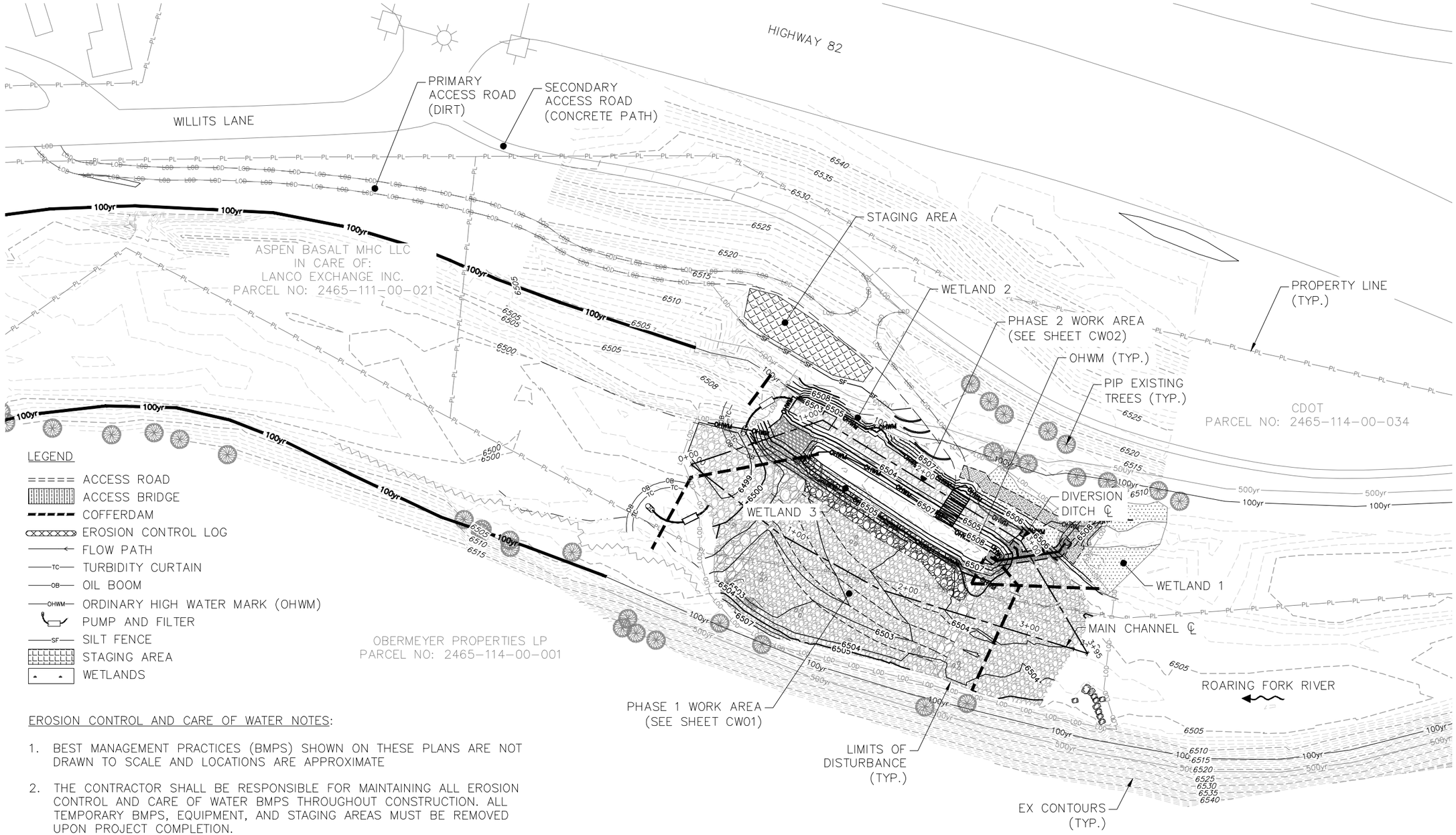

EROSION CONTROL AND CARE OF WATER NOTES:

1. BEST MANAGEMENT PRACTICES (BMPS) SHOWN ON THESE PLANS ARE NOT DRAWN TO SCALE AND LOCATIONS ARE APPROXIMATE
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION CONTROL AND CARE OF WATER BMPS THROUGHOUT CONSTRUCTION. ALL TEMPORARY BMPS, EQUIPMENT, AND STAGING AREAS MUST BE REMOVED UPON PROJECT COMPLETION.
3. ACCESS TO THE SITE SHALL BE FROM WILLITS LANE SOUTH OF ITS JUNCTION WITH HIGHWAY 82. ACCESS ROADS SHALL BE RETURNED TO EXISTING OR BETTER CONDITION UPON PROJECT COMPLETION.
4. THE STAGING AREA SHALL INCLUDE THE FOLLOWING:
   - JOB TRAILER
   - SPILL CLEANUP KIT
   - FUEL TANK
   - TRASH AND RECYCLING RECEPTACLES
   - TEMPORARY STOCKPILE

PLAN VIEW

WETLAND NOTES:

1. A WETLAND DELINEATION FIELD SURVEY WAS CONDUCTED BY DHM DESIGN ON JULY 29, 2020. REFER TO THE "AQUATIC RESOURCE DELINEATION REPORT" DATED JULY 31, 2020 FOR A FULL DESCRIPTION OF WETLANDS FOUND ON SITE.

BID SET - REVISION 1

PROFESSIONAL ENGINEER STAMP

COLORADO LICENSED
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56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
CARE OF WATER OVERVIEW AND NOTES

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

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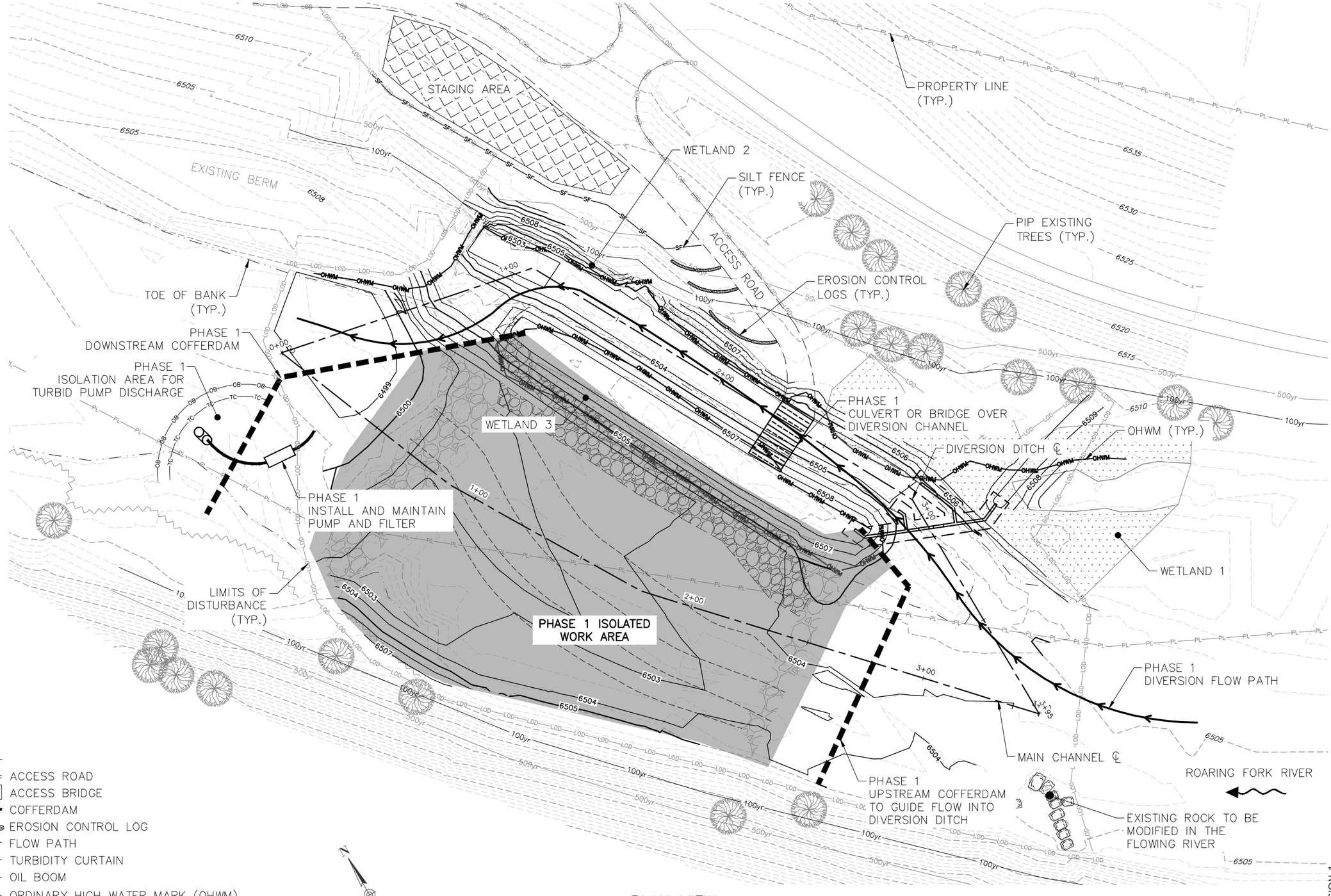

LEGEND

- ACCESS ROAD
- ACCESS BRIDGE
- COFFERDAM
- EROSION CONTROL LOG
- FLOW PATH
- TC — TURBIDITY CURTAIN
- OB — OIL BOOM
- OHWM — ORDINARY HIGH WATER MARK (OHWM)
- PUMP AND FILTER
- SF — SILT FENCE
- STAGING AREA
- WETLANDS

PLAN VIEW

BID SET - REVISION 1

PROFESSIONAL ENGINEER STAMP

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QUINN L DONNELLY
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
CARE OF WATER
PHASE 1

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
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ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
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Date: NOVEMBER 2020	
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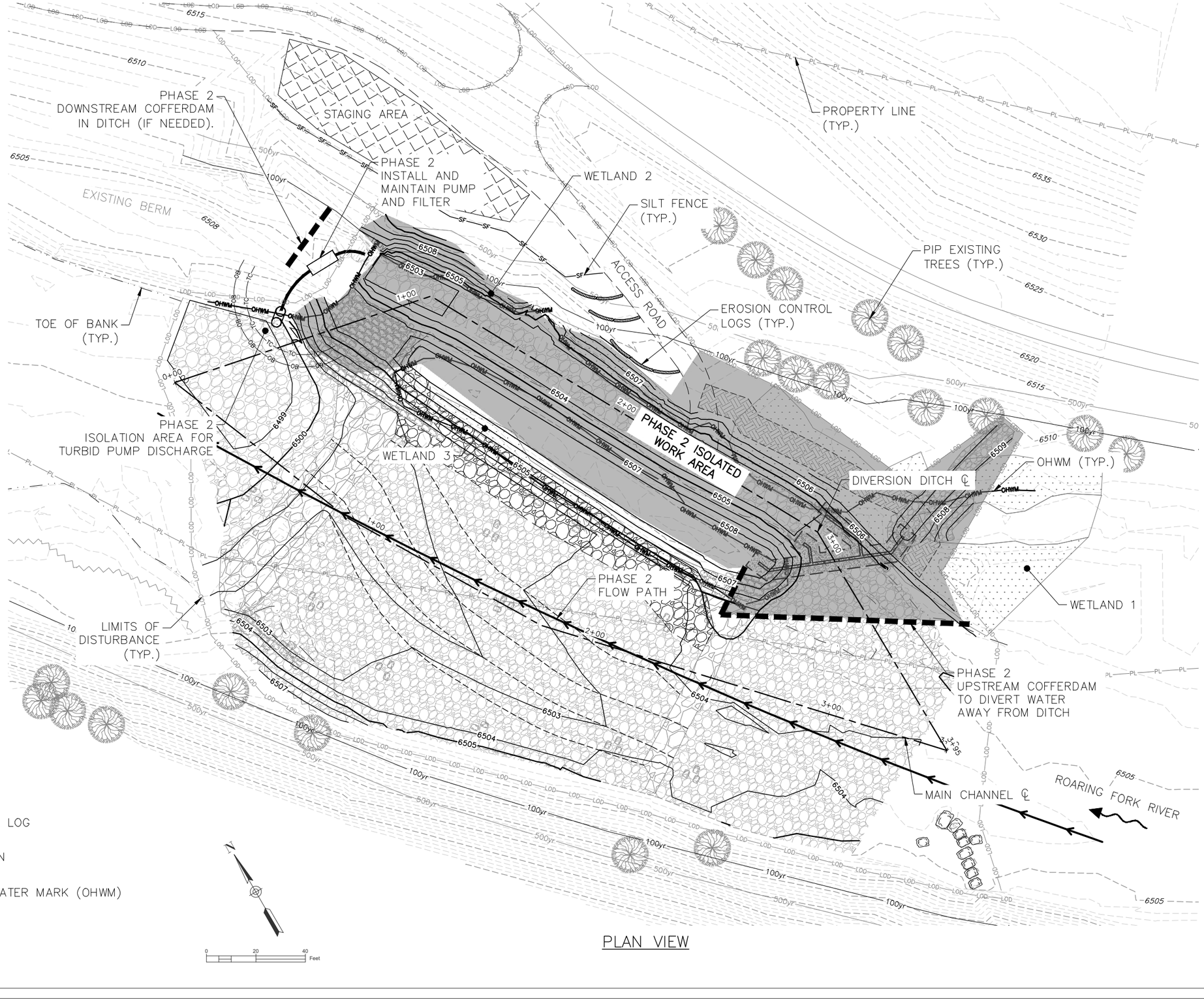

PLAN VIEW

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ROBINSON DIVERSION MODIFICATION
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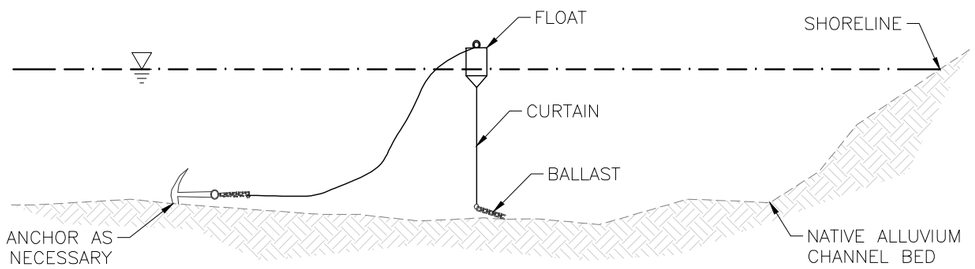
PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

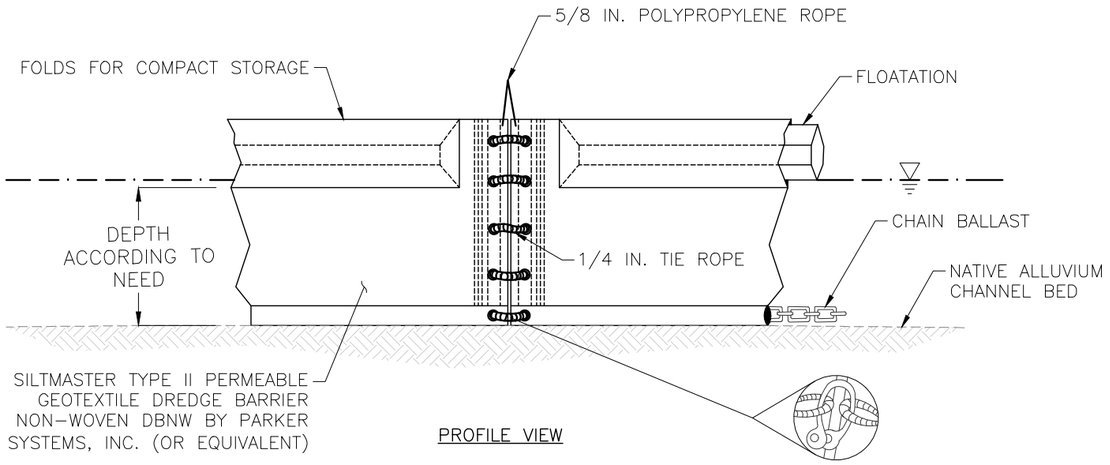
Project	Sheet
38043	CW02
Date: NOVEMBER 2020	
Scale: 1"=20' (FULL-SIZE)	

BID SET - REVISION 1

ORIENTATION WHEN INSTALLED

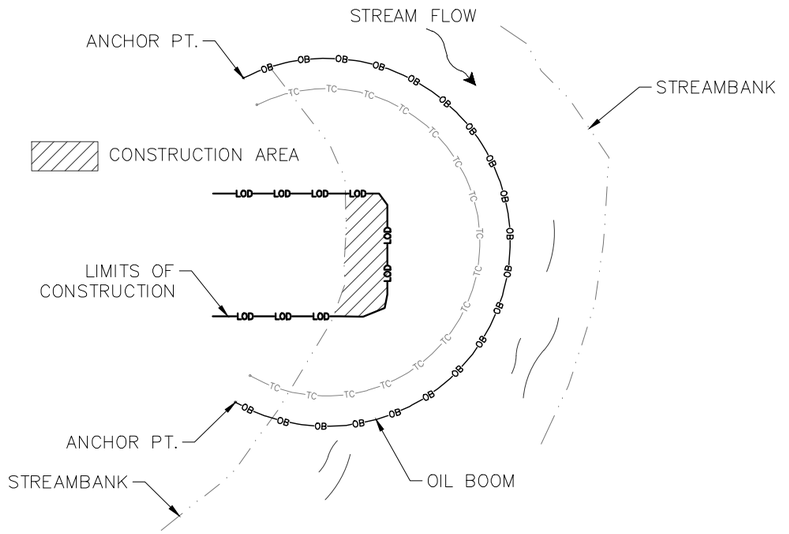


SECTION VIEW



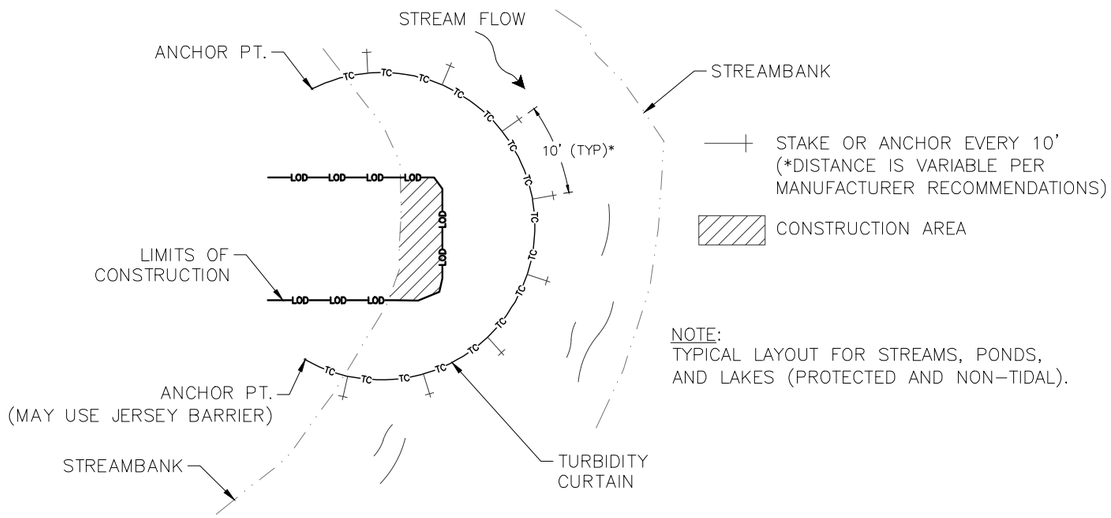
PROFILE VIEW

(BLOW-UP OF SHACKLE CONNECTION)



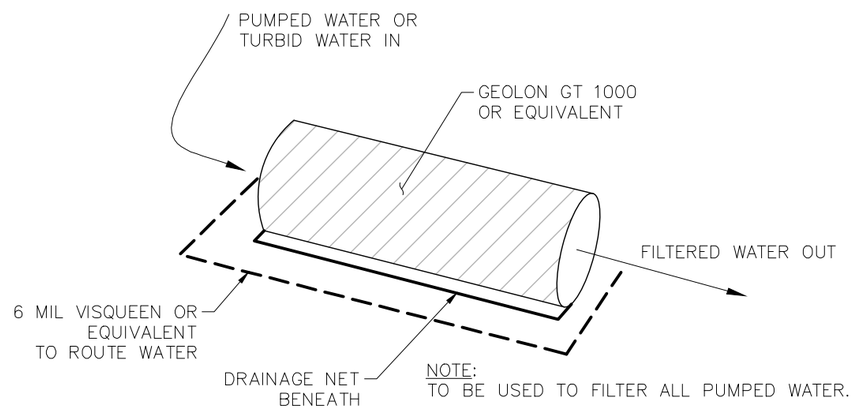
NOTE:
TYPICAL LAYOUT FOR STREAMS AND RIVERS. OIL BOOM TO BE PLACED BEHIND TURBIDITY CURTAIN AND DOWNSTREAM OF ANY EQUIPMENT WORKING IN THE WET.

2 / CW03 OIL BOOM (TYP)
PLAN VIEW – NTS



NOTE:
TYPICAL LAYOUT FOR STREAMS, PONDS, AND LAKES (PROTECTED AND NON-TIDAL).

1 / CW03 TURBIDITY CURTAIN (TYP)
PLAN VIEW – NTS



NOTE:
TO BE USED TO FILTER ALL PUMPED WATER.

3 / CW03 GEO-TUBE FILTER (TYP)
NTS

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QUINN L DONNELLY
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
CARE OF WATER DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

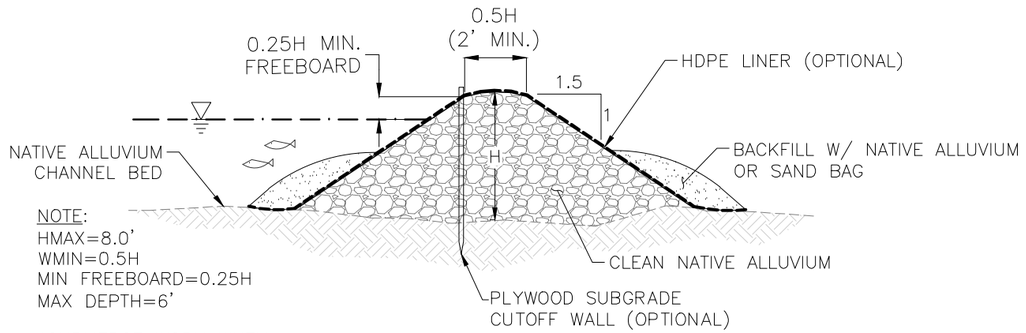
RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	CW03
Date: NOVEMBER 2020	
Scale: NTS	

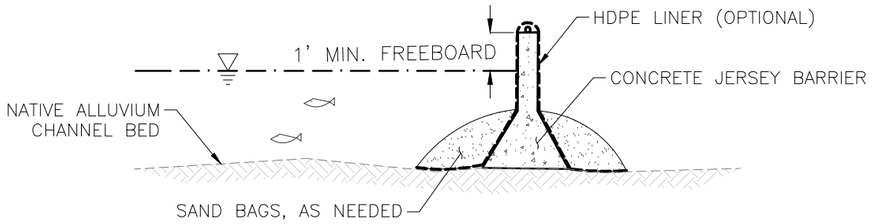
BID SET - REVISION 1



NOTE:
HMAX=8.0'
WMIN=0.5H
MIN FREEBOARD=0.25H
MAX DEPTH=6'

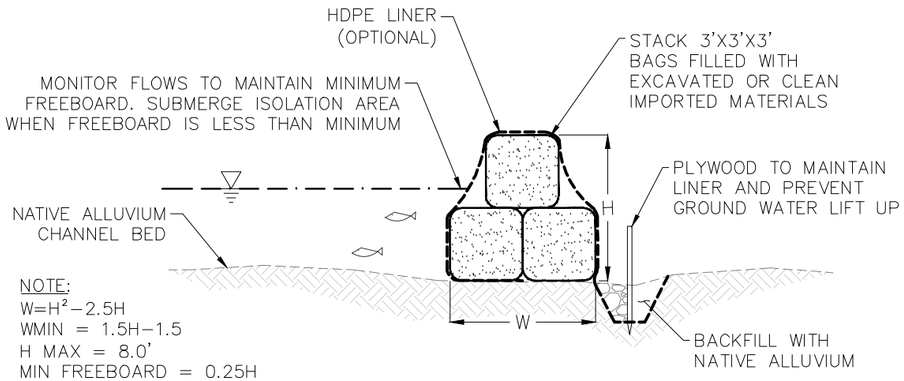
*SUBMERGE WORK WHEN
MAX DEPTH IS EXCEEDED

1 CW04 ALLUVIUM COFFERDAM (TYP)
SECTION VIEW – NTS



NOTE:
MONITOR FLOWS TO MAINTAIN A MINIMUM
1 FOOT OF FREEBOARD.

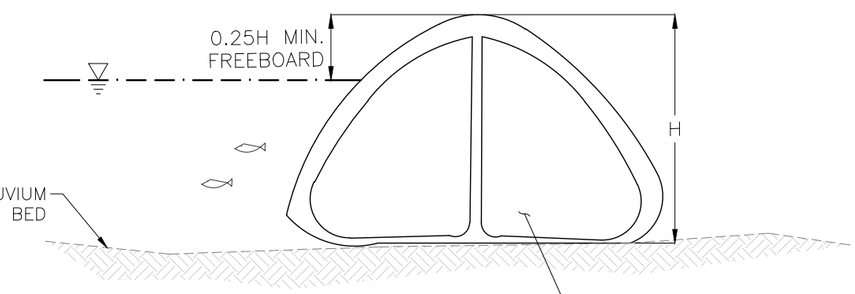
4 CW04 JERSEY BARRIER COFFERDAM (TYP)
SECTION VIEW – NTS



NOTE:
$W=H^2-2.5H$
WMIN = 1.5H–1.5
H MAX = 8.0'
MIN FREEBOARD = 0.25H
MAX DEPTH = 0.75H

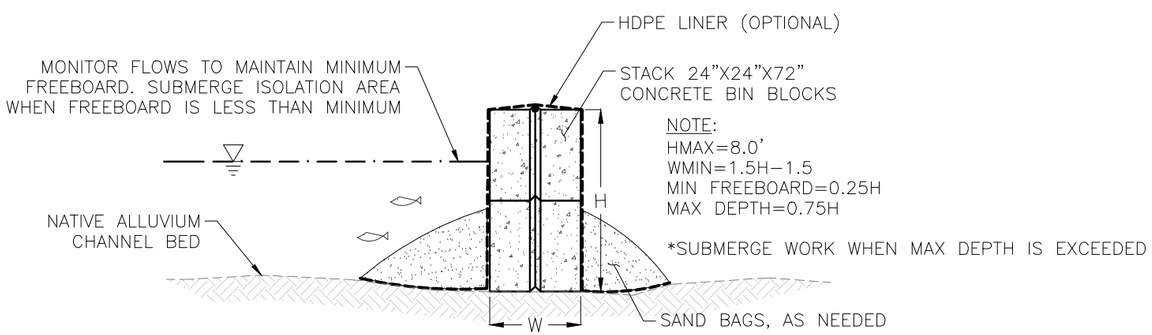
*SUBMERGE WORK WHEN
MAX DEPTH IS EXCEEDED

2 CW04 AGGREGATE BAGS COFFERDAM (TYP)
SECTION VIEW – NTS



NOTE:
MONITOR FLOWS TO MAINTAIN A MINIMUM
FREEBOARD.

5 CW04 WATER–FILLED COFFERDAM (TYP)
SECTION VIEW – NTS



NOTE:
HMAX=8.0'
WMIN=1.5H–1.5
MIN FREEBOARD=0.25H
MAX DEPTH=0.75H

*SUBMERGE WORK WHEN MAX DEPTH IS EXCEEDED

3 CW04 CONCRETE BLOCK COFFERDAM (TYP)
SECTION VIEW – NTS

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ROBINSON DIVERSION MODIFICATION
CARE OF WATER DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
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Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

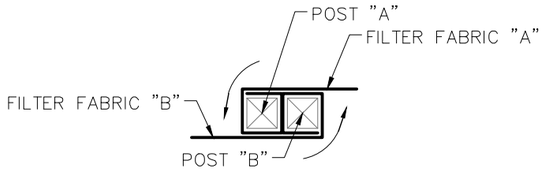
RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	CW04
Date: NOVEMBER 2020	
Scale: NTS	

BID SET - REVISION 1

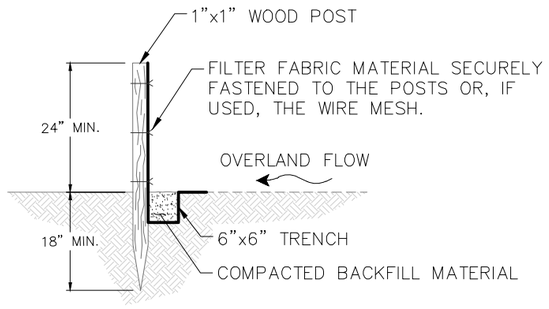


JOINING SECTION DETAIL (PLAN VIEW)

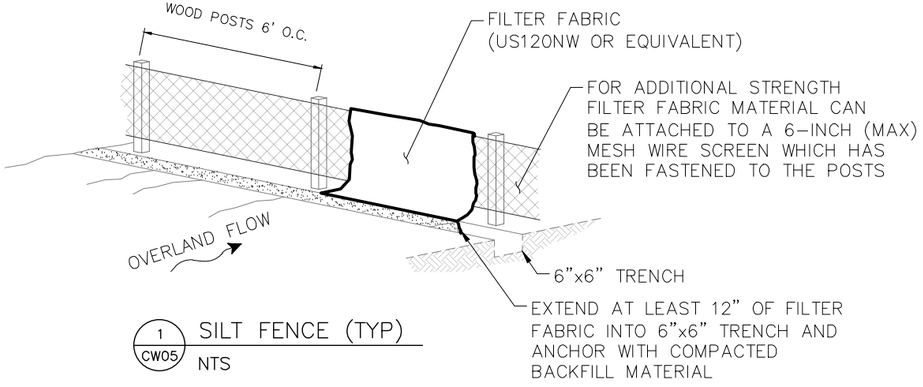
SILT FENCE JOINING NOTES:

1. WRAP APPROXIMATELY 6" OF FILTER FABRIC OF EACH END AROUND A WOODEN POST ONE FULL TURN, THEN SECURED ALONG THE POST WITH HEAVY DUTY WIRE STAPLES AT LEAST 1" LONG.
2. POST SHALL BE TIGHTLY ABUTTED WITH NO GAPS TO PREVENT POTENTIAL FLOW-THROUGH OF SEDIMENT AT JOINT.

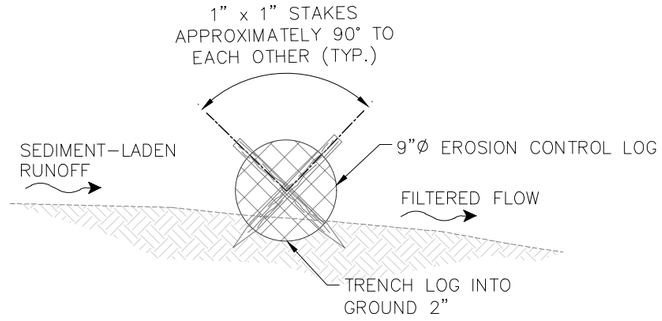
END SECTION DETAIL (PLAN VIEW)



SECTION VIEW



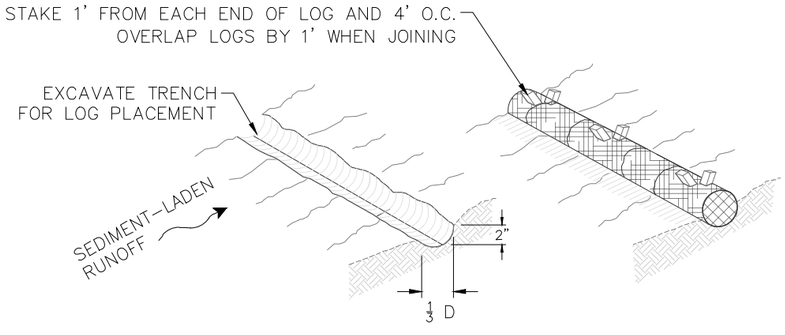
1 / CW05 SILT FENCE (TYP)
NTS



SECTION VIEW

EROSION CONTROL LOG INSTALLATION NOTES:

1. EXCAVATE TRENCH 2".
2. PLACE AND STAKE EROSION CONTROL LOG.
3. PLACE SPOILS UP-SLOPE FROM LOG, KNIFE-IN AND COMPACT.



2 / CW05 EROSION CONTROL LOG INSTALLATION (TYP)
NTS

BID SET - REVISION 1

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ROBINSON DIVERSION MODIFICATION
EROSION CONTROL DETAILS

No.	REVISION/UPDATE	Date

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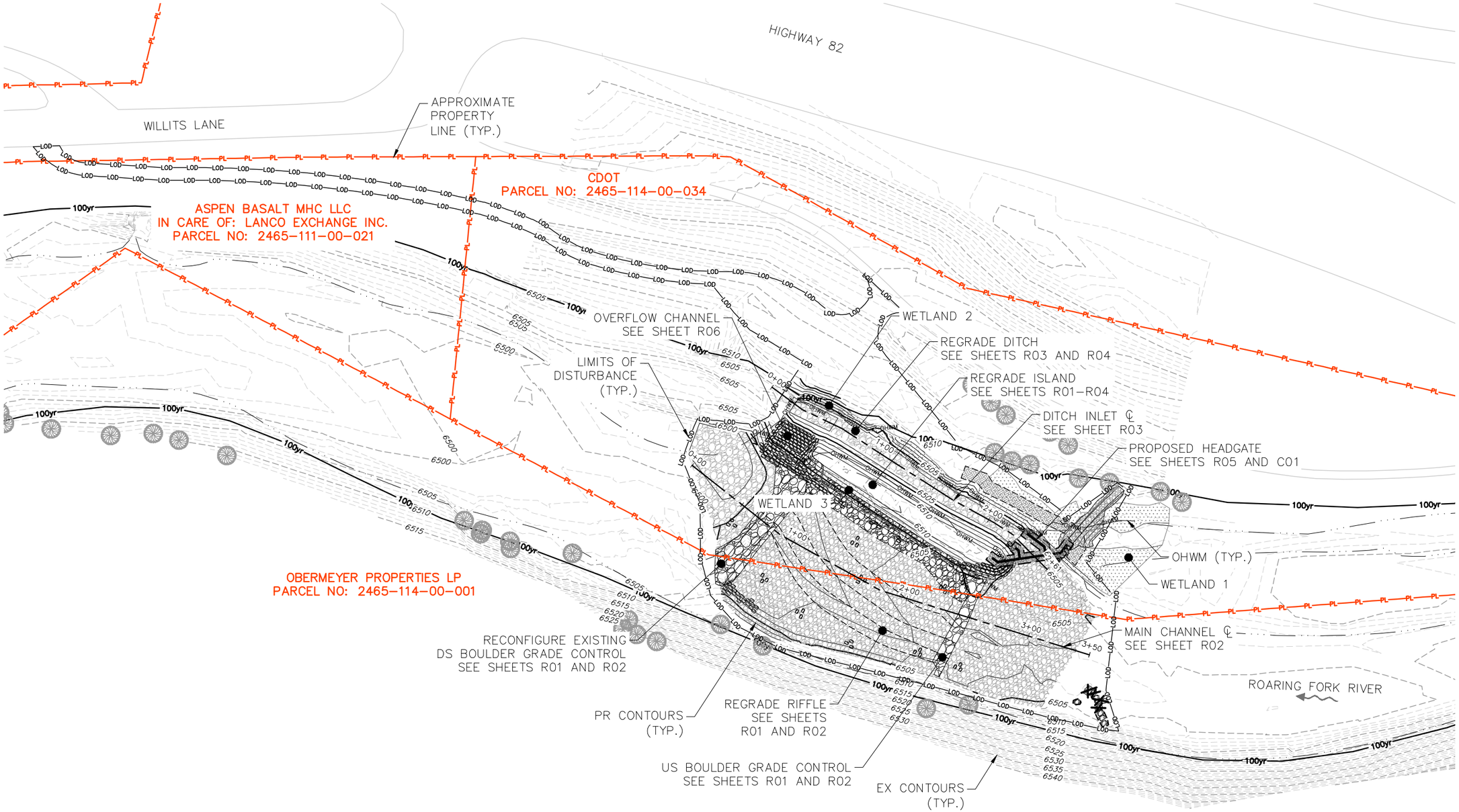
PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	CW05
Date: NOVEMBER 2020	
Scale: NTS	



PLAN VIEW

WETLAND NOTES:

1. A WETLAND DELINEATION FIELD SURVEY WAS CONDUCTED BY DHM DESIGN ON JULY 29, 2020. REFER TO THE "AQUATIC RESOURCE DELINEATION REPORT" DATED JULY 31, 2020 FOR A FULL DESCRIPTION OF WETLANDS FOUND ON SITE.

WETLAND IMPACTS	
ID	IMPACT AREA (AC)
WETLAND 1	0.06
WETLAND 2	0.01
WETLAND 3	0.02

BID SET - REVISION 1

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56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
OVERALL RIVER PLAN

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
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Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
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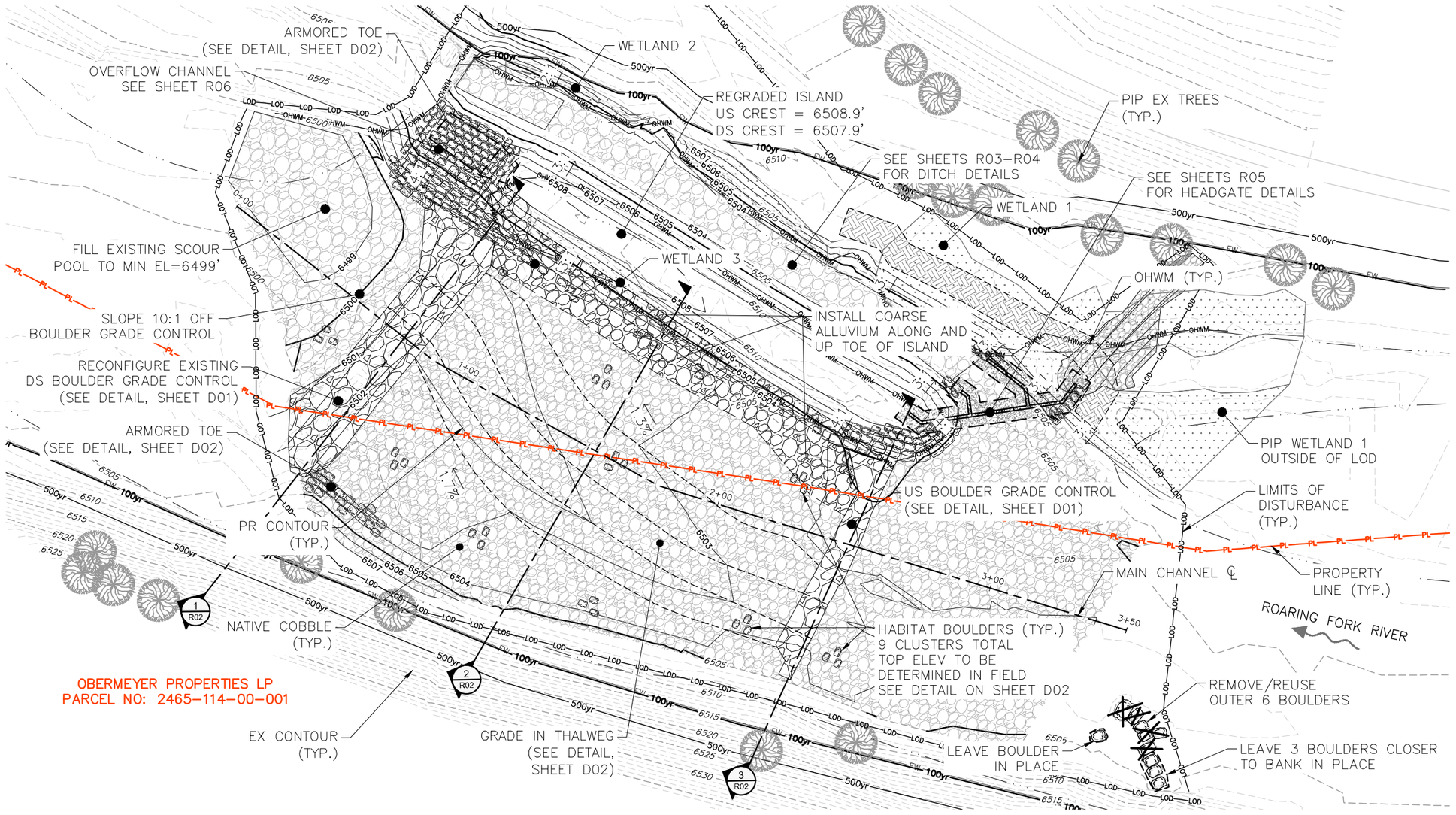
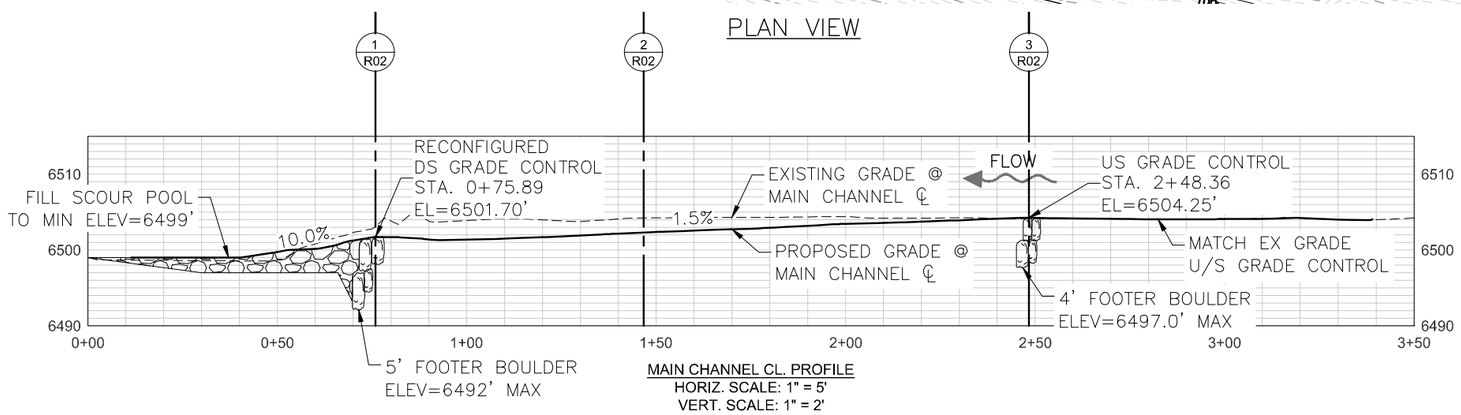
PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	R00
Date: NOVEMBER 2020	
Scale: 1"=40' (FULL-SIZE)	





MAIN CHANNEL CL. PROFILE
HORIZ. SCALE: 1" = 5'
VERT. SCALE: 1" = 2'

CONSTRUCTION NOTES:

1. COARSE ALLUVIUM MATERIAL WILL BE DEVELOPED ONSITE RUNNING EXCAVATED ALLUVIUM THROUGH A GRIZZLY OR OTHER SORTING METHOD TO CREATE GRADATION DETAILED IN THE TECHNICAL SPECIFICATIONS.
2. FINER EXCAVATED ALLUVIAL MATERIAL PASSING THROUGH THE SORTING PROCESS WILL BE HAULED OFF PER PLAN.

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COLORADO LICENSED
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56481
11/09/2020
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ROBINSON DIVERSION MODIFICATION
MAIN CHANNEL WORK
PLAN & PROFILE

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

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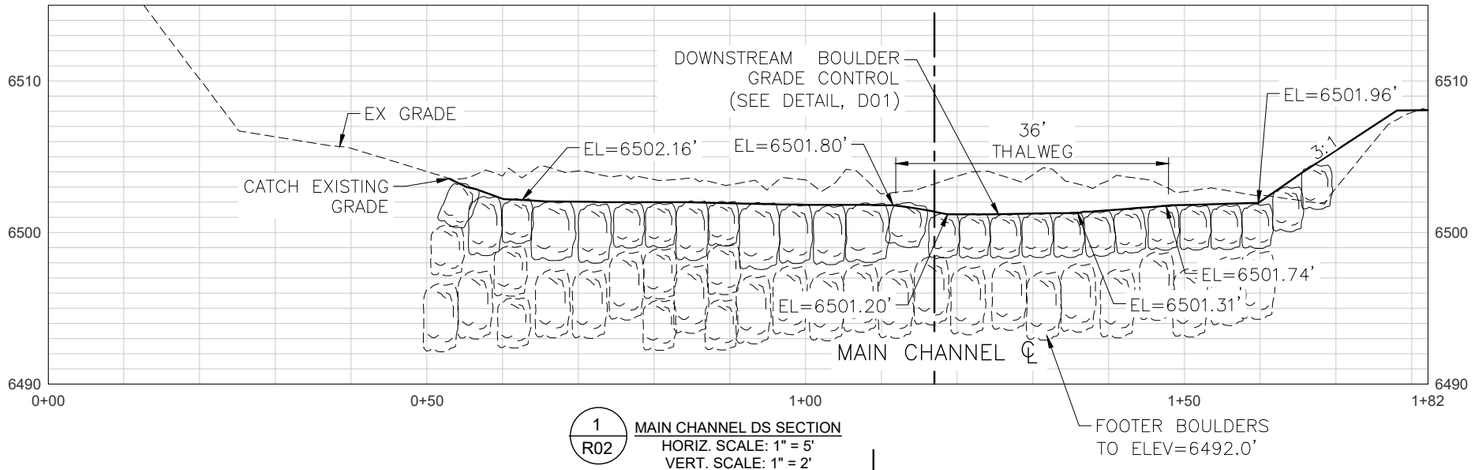
PROJECT NAME AND ADDRESS

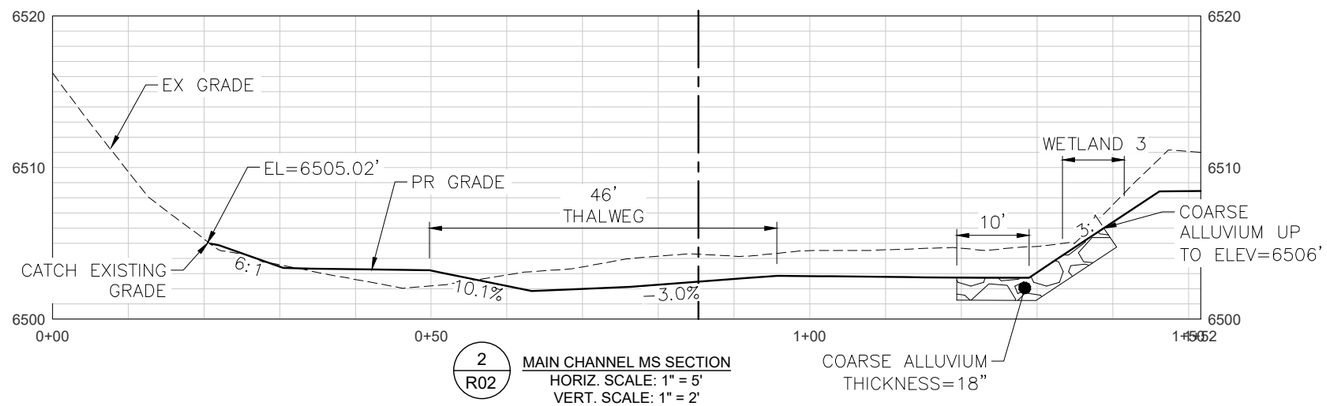
ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	R01
Date: NOVEMBER 2020	
Scale: 1"=20' (FULL-SIZE)	

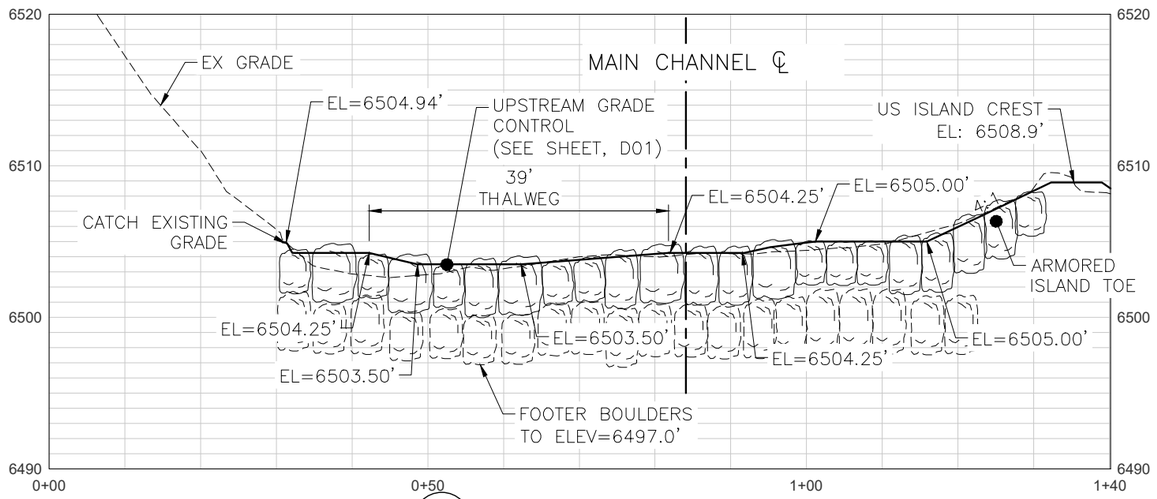
BID SET - REVISION 1



1 / R02 MAIN CHANNEL DS SECTION
HORIZ. SCALE: 1" = 5'
VERT. SCALE: 1" = 2'



2 / R02 MAIN CHANNEL MS SECTION
HORIZ. SCALE: 1" = 5'
VERT. SCALE: 1" = 2'



3 / R02 MAIN CHANNEL US SECTION
HORIZ. SCALE: 1" = 5'
VERT. SCALE: 1" = 2'

0 10 20 Feet

BID SET - REVISION 1

PROFESSIONAL ENGINEER STAMP

COLORADO LICENSED
QUINN L DONNELLY
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
MAIN CHANNEL SECTIONS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

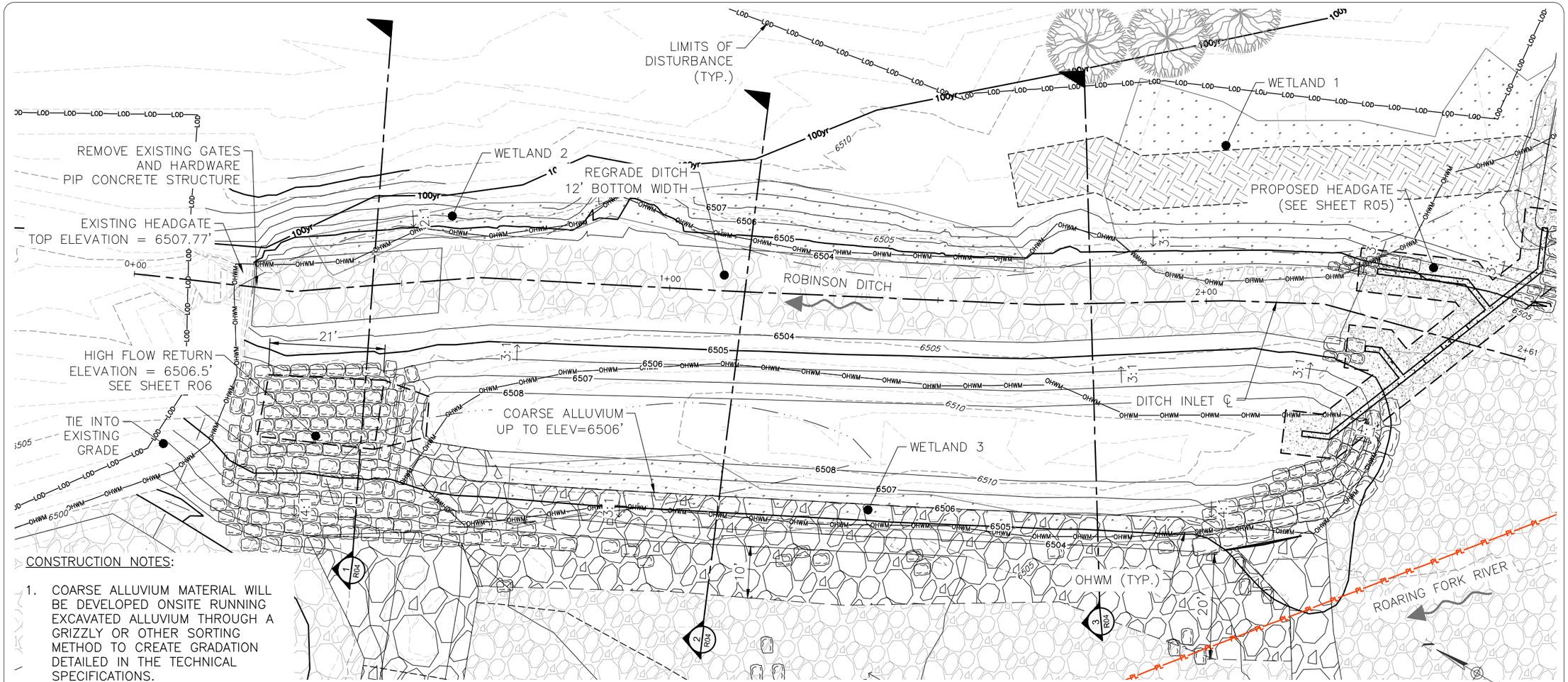
DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

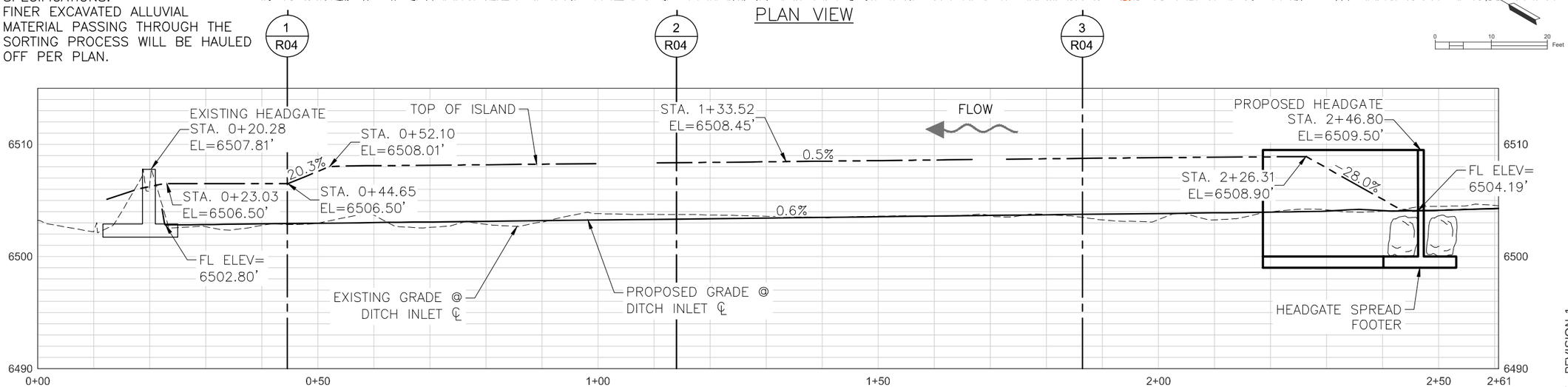
Project	Sheet
38043	R02
Date: NOVEMBER 2020	
Scale: 1"=10' (FULL-SIZE)	



PLAN VIEW

CONSTRUCTION NOTES:

1. COARSE ALLUVIUM MATERIAL WILL BE DEVELOPED ONSITE RUNNING EXCAVATED ALLUVIUM THROUGH A GRIZZLY OR OTHER SORTING METHOD TO CREATE GRADATION DETAILED IN THE TECHNICAL SPECIFICATIONS.
2. FINER EXCAVATED ALLUVIAL MATERIAL PASSING THROUGH THE SORTING PROCESS WILL BE HAULED OFF PER PLAN.



DITCH INLET CL PROFILE
HORIZ. SCALE: 1" = 5'
VERT. SCALE: 1" = 2'

BID SET - REVISION 1

PROFESSIONAL ENGINEER STAMP

COLORADO LICENSED
QUINN L DONNELL
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
DITCH INLET WORK PLAN & PROFILE

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
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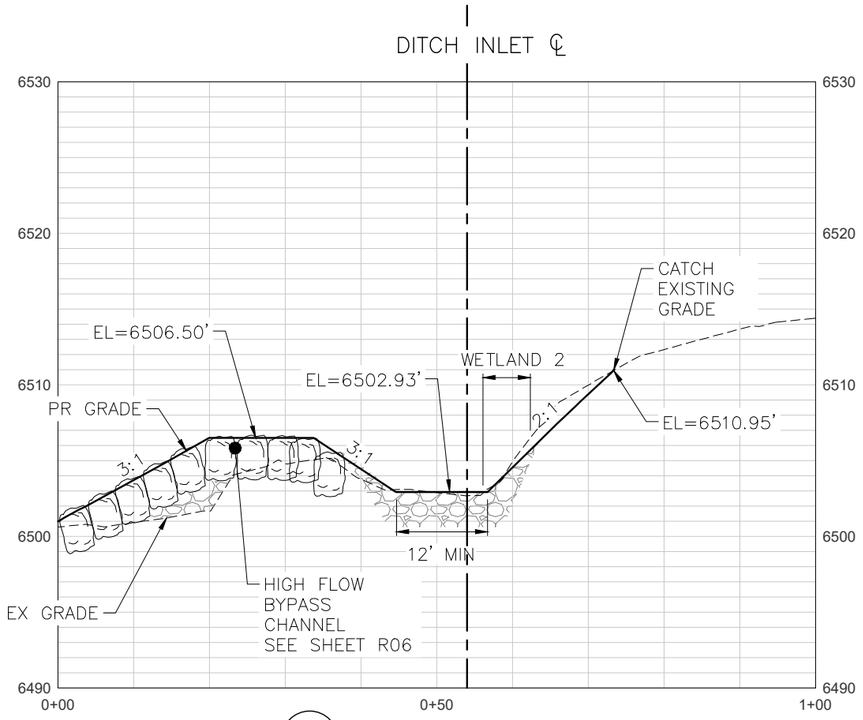
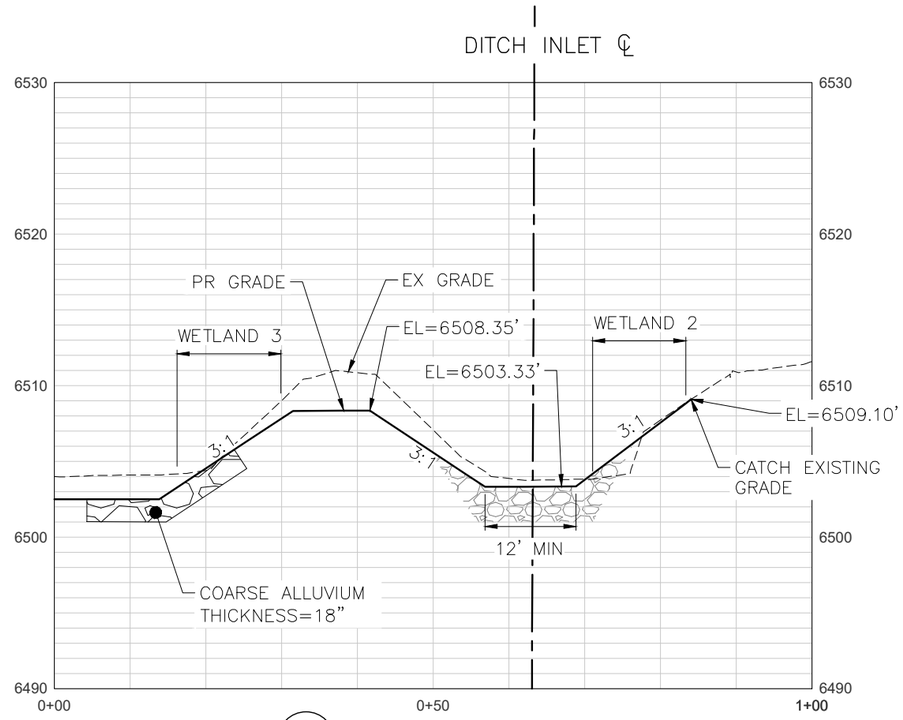
PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

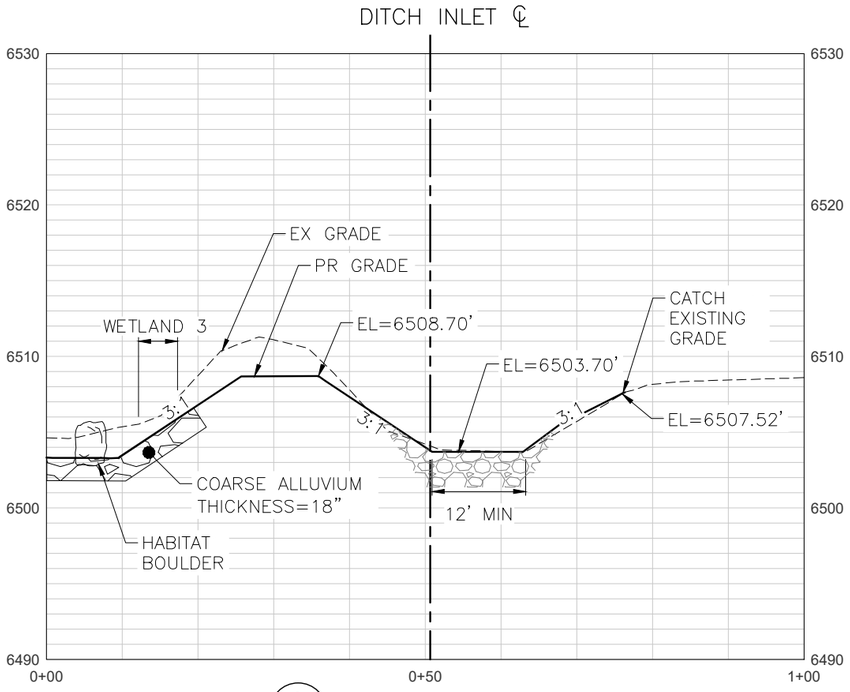
Project	Sheet
38043	R03
Date: NOVEMBER 2020	
Scale: 1"=10' (FULL-SIZE)	



1 / R04 DITCH INLET DS SECTION
HORIZ. SCALE: 1" = 5'
VERT. SCALE: 1" = 2'



2 / R04 DITCH INLET MS PROFILE
HORIZ. SCALE: 1" = 5'
VERT. SCALE: 1" = 2'



3 / R04 DITCH INLET US SECTION
HORIZ. SCALE: 1" = 5'
VERT. SCALE: 1" = 2'

CONSTRUCTION NOTES:

1. COARSE ALLUVIUM MATERIAL WILL BE DEVELOPED ONSITE RUNNING EXCAVATED ALLUVIUM THROUGH A GRIZZLY OR OTHER SORTING METHOD TO CREATE GRADATION DETAILED IN THE TECHNICAL SPECIFICATIONS.
2. FINER EXCAVATED ALLUVIAL MATERIAL PASSING THROUGH THE SORTING PROCESS WILL BE HAULED OFF PER PLAN.

0 10 20 Feet

BID SET - REVISION 1

PROFESSIONAL ENGINEER STAMP

COLORADO LICENSED
QUINN L DONNELLY
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
DITCH INLET SECTIONS

No.	REVISION/UPDATE	Date

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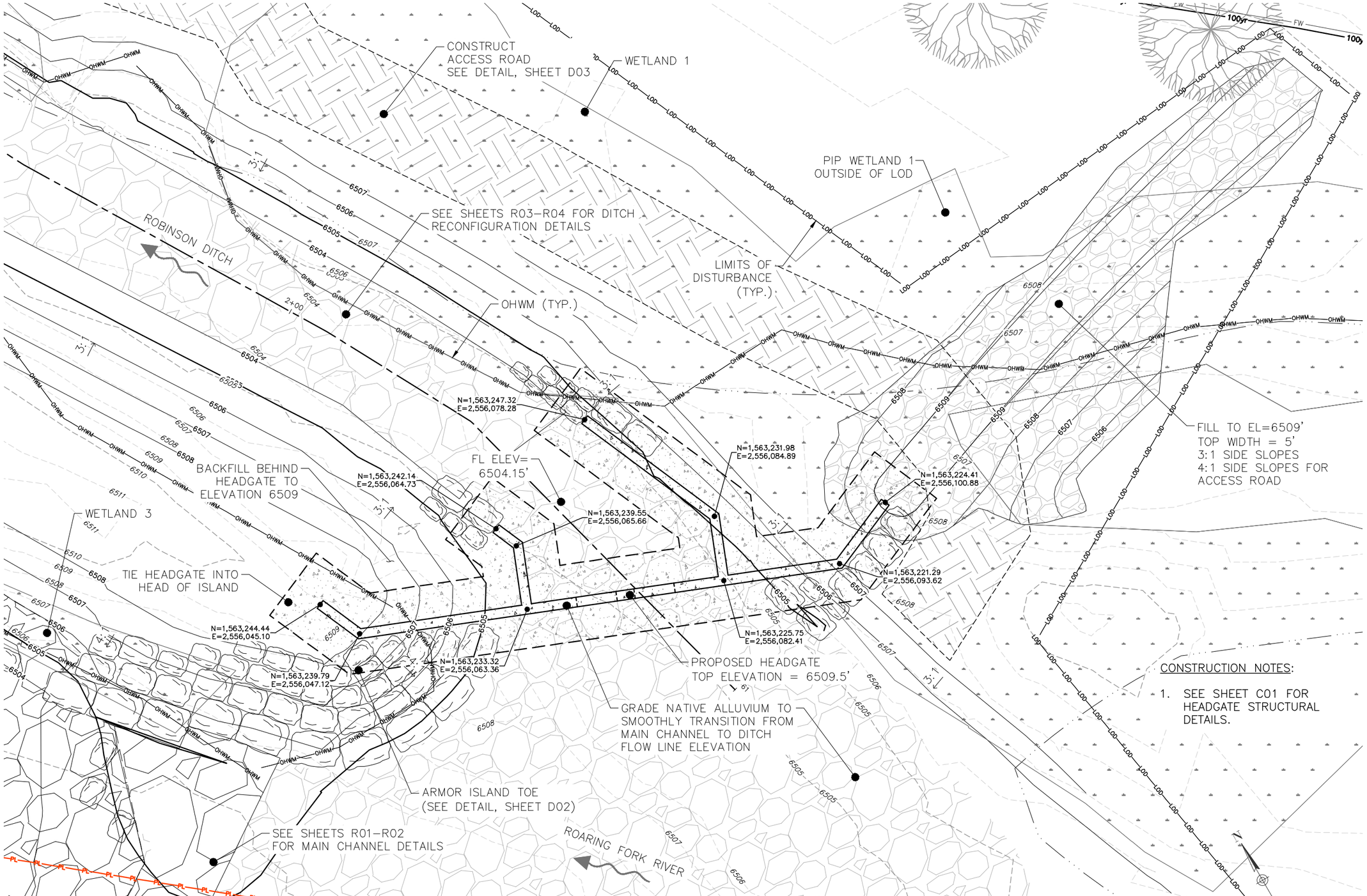
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	R04
Date: NOVEMBER 2020	
Scale: 1"=10' (FULL-SIZE)	



PLAN VIEW

CONSTRUCTION NOTES:

1. SEE SHEET C01 FOR HEADGATE STRUCTURAL DETAILS.

BID SET - REVISION 1

PROFESSIONAL ENGINEER STAMP

COLORADO LICENSED
QUINN L DONNELL
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
HEADGATE PLAN

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
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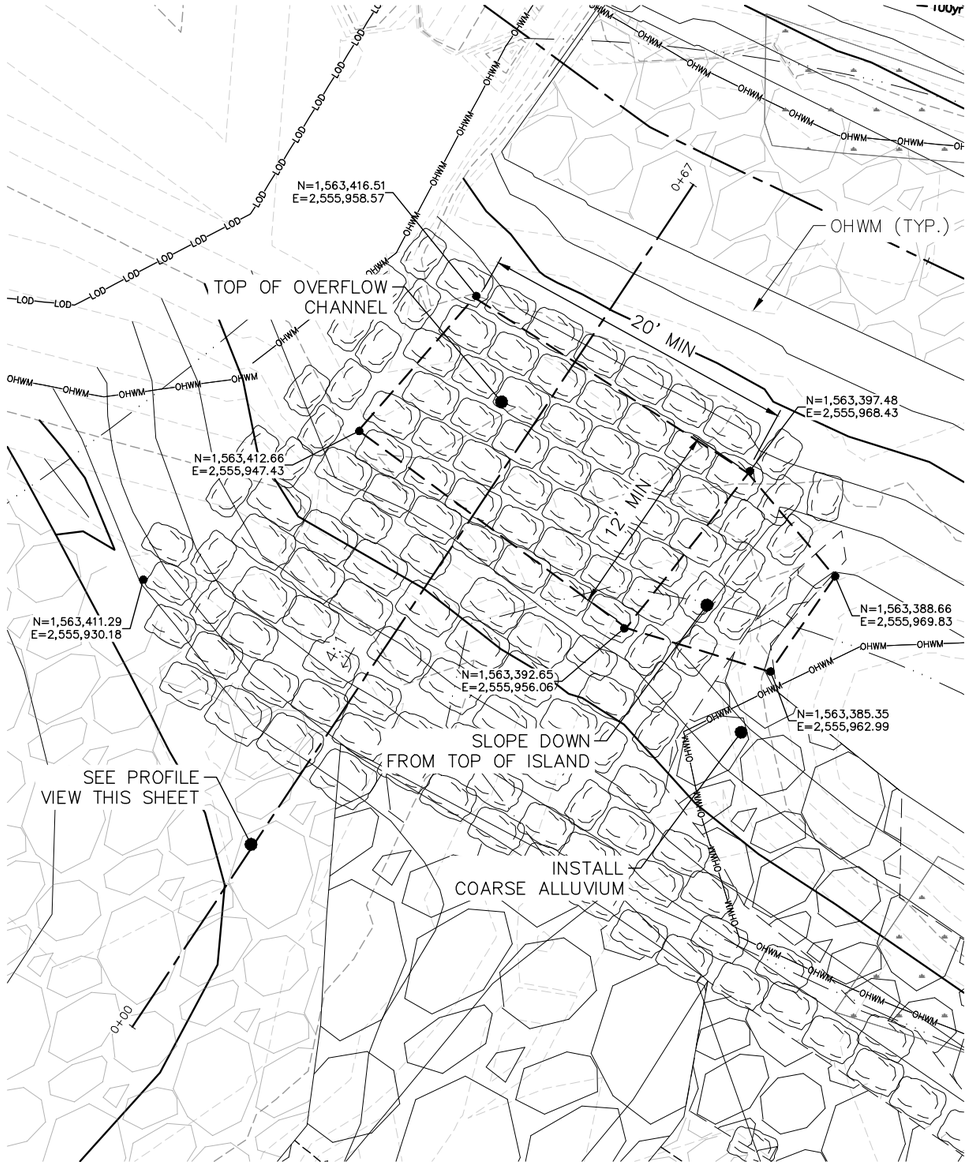
PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	R05
Date: NOVEMBER 2020	
Scale: 1"=5' (FULL-SIZE)	



PLAN VIEW

CONSTRUCTION NOTES:

1. COARSE ALLUVIUM MATERIAL WILL BE DEVELOPED ONSITE RUNNING EXCAVATED ALLUVIUM THROUGH A GRIZZLY OR OTHER SORTING METHOD TO CREATE GRADATION DETAILED IN THE TECHNICAL SPECIFICATIONS.
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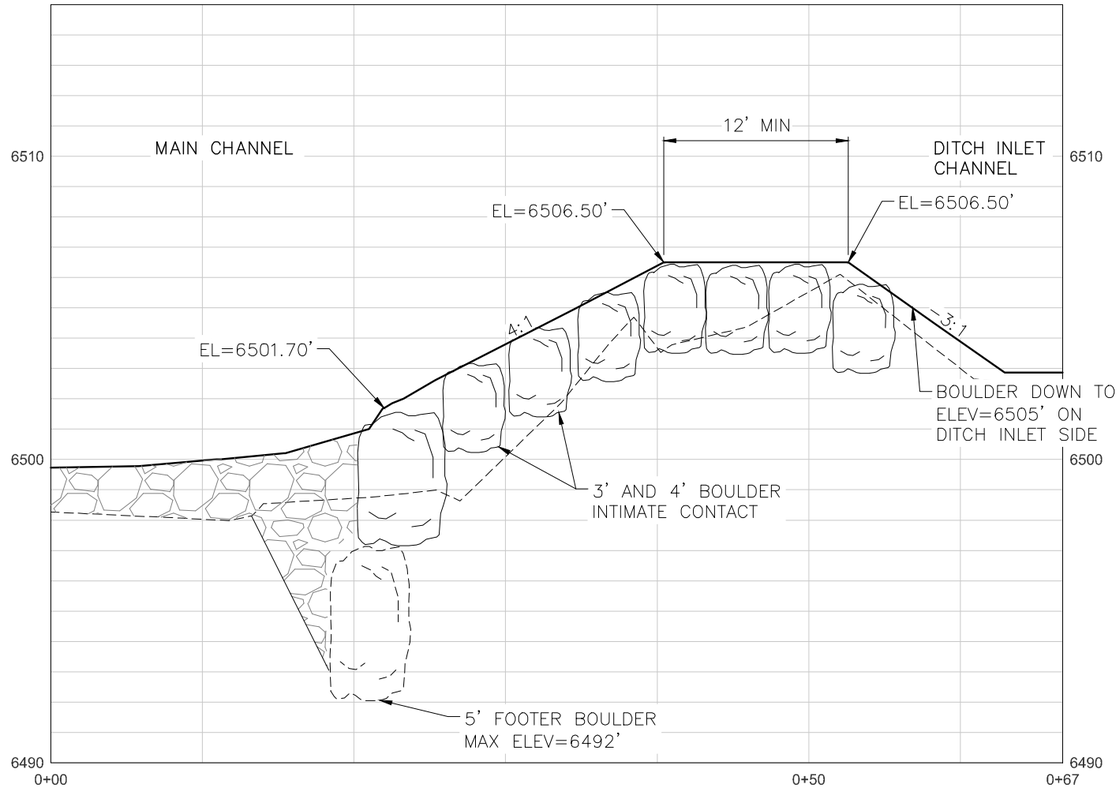
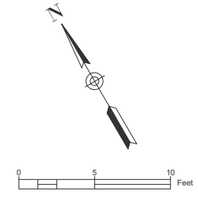


Overflow R06 PROFILE
HORIZ. SCALE: 1" = 5'
VERT. SCALE: 1" = 2'

PROFILE VIEW



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ROBINSON DIVERSION MODIFICATION
DITCH OVERFLOW PATH

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	R06
Date: NOVEMBER 2020	
Scale: 1"=5' (FULL-SIZE)	

GENERAL NOTES

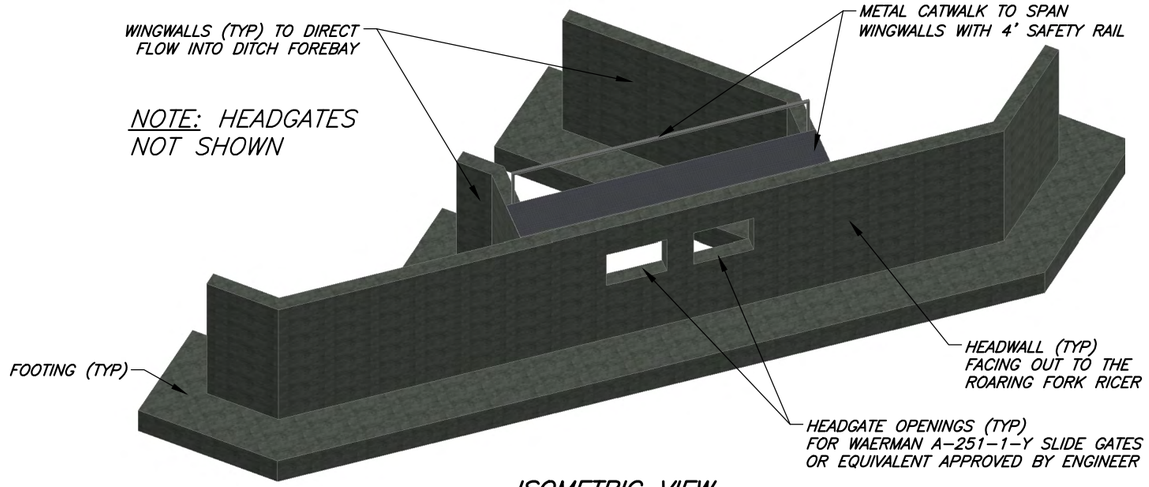
1. THOUGH EVERY EFFORT HAS BEEN MADE TO PROVIDE A COMPLETE AND CLEAR SET OF CONSTRUCTION DOCUMENTS, DISCREPANCIES OR OMISSIONS MAY OCCUR. RELEASE OF THESE DRAWINGS ANTICIPATES CONTINUED COOPERATION AND COMMUNICATION BETWEEN THE CONTRACTOR, ARCHITECT, AND ENGINEER TO PROVIDE THE BEST POSSIBLE PRODUCT.
2. THESE DRAWINGS HAVE BEEN PREPARED FOR THE USE OF A QUALIFIED CONTRACTOR EXPERIENCED IN THE CONSTRUCTION TECHNIQUES AND SYSTEMS DEPICTED.
3. PURVIEW OF SGM DESIGN IS LIMITED TO THE ROBINSON DITCH DIVERSION HEADAGATE STRUCTURE SHOWN ON THIS SHEET.
   3.1. SEE RIVER RESTORATION, LLC, PLANS FOR ALL OTHER PROJECT SPECIFICS AND DRAWINGS.
4. DIVERSION HEADGATE STRUCTURE DESIGNED FOR 50" WIDE X 36" WATERMAN A-251-1-Y SLIDE GATES. ANY SUBSTITUTIONS MUST BE APPROVED BY ENGINEER.

CONCRETE NOTES

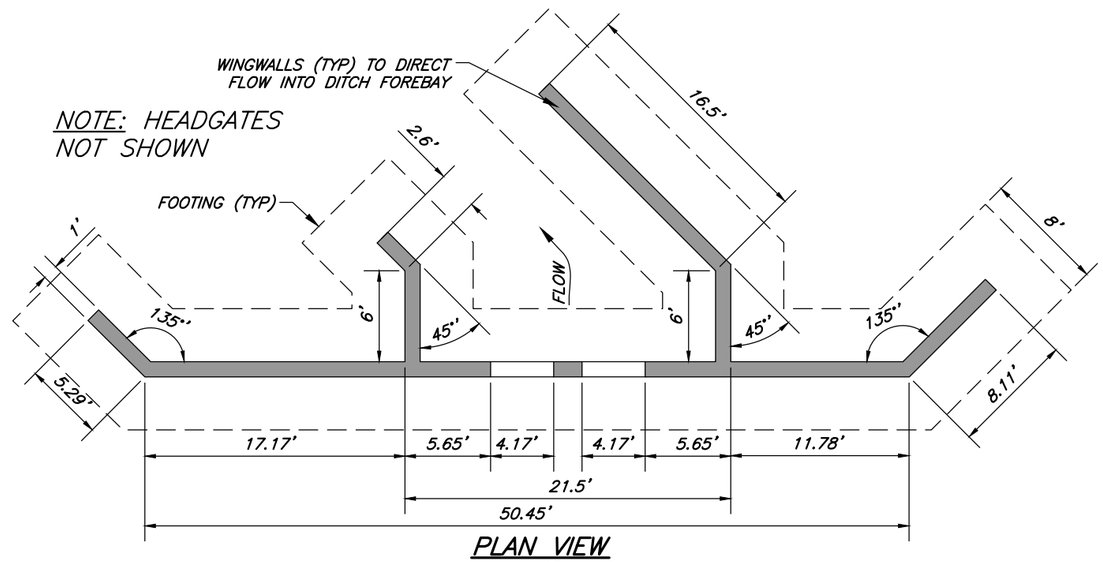
1. ENGINEER SHALL BE CONTACTED 24 HOURS PRIOR TO PLACEMENT OF CONCRETE
2. SEE SHEET S01 AND S02 FOR STRUCTURAL NOTES, DESIGN CRITERIA, ANALYSIS, AND REINFORCING DETAILS FOR THE HEADWALL AND FOR THE HEADGATE OPENINGS.
3. THIS DESIGN WAS BASED ON SIMILAR CONDITIONS OF THE SURROUNDING AREA, BUT THE VALUES INDICATED IN THE GEO-TECHNICAL DESIGN DATA IN THE GENERAL STRUCTURAL NOTES ON SHEET S01 SHALL BE VERIFIED BY A SITE-SPECIFIC SOILS INVESTIGATION BY A GEO-TECHNICAL ENGINEER AT THE TIME OF CONSTRUCTION.
4. CONTRACTOR SHALL FOLLOW NRCS STANDARDS AND SPECIFICATIONS #587 (STRUCTURE FOR WATER CONTROL) AND #432 (CONCRETE FOR MINOR STRUCTURES) FOR INSTALLATION.
5. ALL CONCRETE SHALL BE CONSOLIDATED WITH MECHANICAL CONCRETE VIBRATOR.
6. ALL EXPOSED EDGES SHALL BE CHAMFERED. ALL SURFACES SHALL BE FINISHED CLEAN, SMOOTH AND NEAT.
7. MINIMUM WALL THICKNESS SHALL BE 12" OR AS OTHERWISE SHOWN. MINIMUM REINFORCING SHALL BE DOUBLE MAT, REINFORCED WITH:
   7.1. #6 VERTICAL REBAR AT 8" O.C SPACING AND #6 HORIZONTAL REBAR AT 12" O.C. SPACING FOR WALL
   7.2. #6 REBAR ON 10" CENTERS FOR FOOTING
   7.3. STEEL SHALL BE COLD BENT AND CONTINUOUS AROUND CORNERS AND BETWEEN WALLS.
8. STRUCTURE SHALL BE COATED WITH CURING COMPOUND AND PROTECTED FROM FREEZING FOR ENTIRE CURING TIME (7 DAYS). CONCRETE SHALL BE ALLOWED 7 DAYS TO CURE BEFORE BACKFILL IS PLACED.
9. BACKFILL WITH NATIVE SOIL OR SUITABLE EQUIVALENT SHALL BE COMPACTED TO A DENSITY EQUAL TO, OR GREATER THAN, THE SURROUNDING UNDISTURBED SOIL UNLESS OTHERWISE SHOWN. COMPACT WITH HAND TAMPING OR MANUALLY DIRECTED TAMPERS WITHIN 2 FEET OF THE STRUCTURE.
10. CEMENT SHALL BE TYPE II AND AIR ENTRAINING ADMIXTURE SHALL BE USED. CONCRETE SHALL BE 6 SACK MIX WITH AGGREGATE MEETING ASTM NO. 67 (3/4" MAXIMUM).

CONCRETE VOLUME ESTIMATE

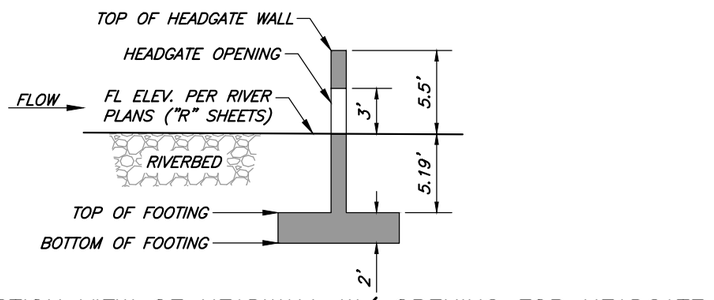
HEADWALL AND WINGWALLS:	36.6 CY
FOOTING:	60.4 CY
TOTAL CONCRETE VOLUME:	97.0 CY



ISOMETRIC VIEW
SCALE: 1" = 10'



PLAN VIEW
SCALE: 1" = 10'



SECTION VIEW OF HEADWALL W/ OPENING FOR HEADGATE
SCALE: 1" = 10'

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Glenwood Springs, CO 81601
970.945.1004 www.sgm-inc.com

Robinson Diversion Modification Project
Roaring Fork River - El Jebel, CO

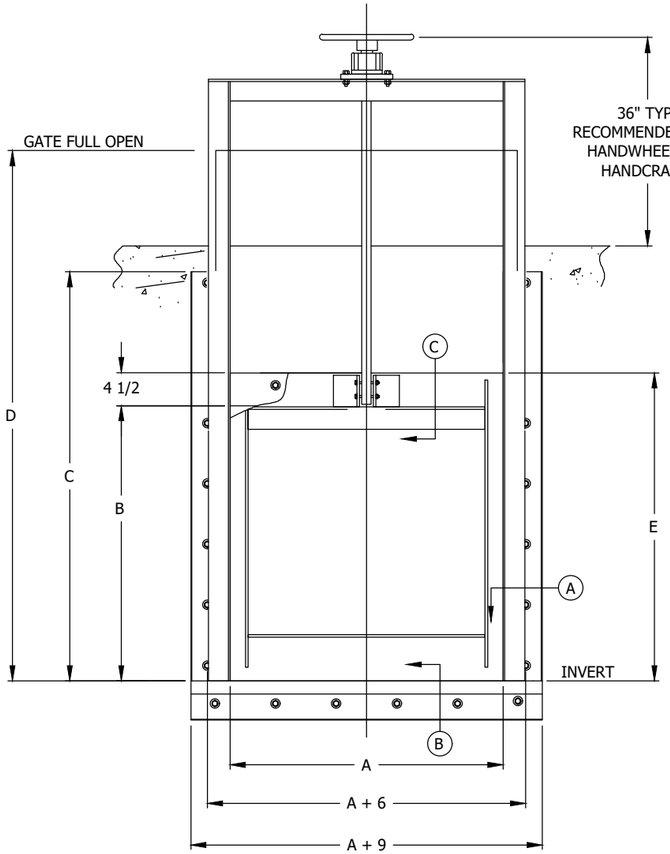
#	Revision	Date	By:
1	Project Milestone: Headgate Detail (90% DRAFT)		

Job No.	2020-490.001
Drawn by:	RPF
Date:	11.06.2020
QC: SK	PE: RPF
File:	RobinsonDitch-Headgate-Detail

Title: Headgate Detail (1)

Dwg No. C01

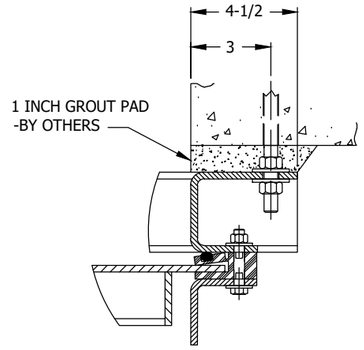
Of : 1



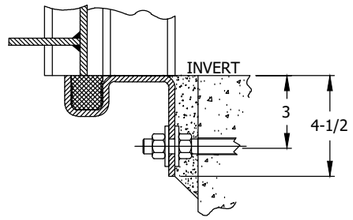
A = GATE OPENING WIDTH
B = GATE OPENING HEIGHT
C = GUIDE RAIL HEIGHT = B + 1/2 OF SLIDE
D = GATE FULL OPEN = 2B + 4-1/2
E = SLIDE HEIGHT = B + 4-1/2

NOTES: UNLESS OTHERWISE SPECIFIED

1. STEM DIMENSIONS SHOWN ARE FOR A RISING STEM UP TO 2 INCHES WITH 1/4" THICK SLIDE.



SECTION (A)



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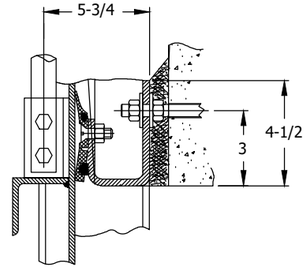
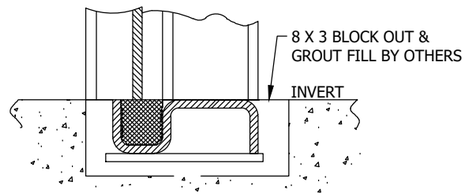


SECTION (C)



ALTERNATE "Q" BOTTOM

WATERMAN A-251-17-Y DETAIL

N.T.S

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Robinson Diversion Modification Project

Roaring Fork River - El Jebel, CO

#	Revision	Date	By:
1			

Project Milestone: Headgate Detail (90% DRAFT)

Job No.	2020-490.001
Drawn by:	RPF
Date:	11.06.2020
QC: KNH	PE: RPF
File:	RobinsonDitch-Headgate-Detail

Title: Headgate Detail (2)

Dwg No. C02

Of : 1

General Structural Notes:

Design Criteria:

Code Edition: *2015 IBC (International Building Code)*

Loads used in design are as follows:

Geotechnical Design Data

Allowable Soil Bearing Pressure	*2000 psf*
Frost Depth	*48 inches*
Submerged Active Lateral Pressure	*110 psf*
Lateral Bearing Pressure	*200 psf*

Geo-Technical Information

1. *The foundation design was prepared using an assumed allowable bearing pressure of 2000 psf. Unrestrained walls were designed for an active lateral pressure of 110 psf. Footings shall bear on undisturbed native soils 48 inches below adjacent finished grade. The soils are assumed to be uniform and non-expansive. The design was based on similar conditions of the surrounding area, but the values shall be verified by a site-specific soils investiation by a geotechnical engineer at the time of construction.*

Reinforcing Steel:

1. *All reinforcement detailing, fabrication and placement shall conform to the ACI Details and Detailing of Reinforcement (ACI 315).*
2. *Unless noted otherwise, all reinforcing bars #5 or larger shall be of deformed bars conforming to ASTM A615, Grade 60. #4 bars or smaller shall be ASTM A615, Grade 40. Welded reinforcing bars shall be ASTM A706, Grade 60.*
3. *Reinforcement shall be the longest lengths practical. Where splices are necessary, lap splices shall be a minimum of 60 bar diameters for Grade 60 reinforcing and 40 bar diameters for Grade 40 reinforcing, unless noted otherwise. Do not weld or use mechanical splicing.*
4. *At corners make bar continuous through discontinuity or provide corner bars with a full length lap splice each side of corner.*
5. *Place two #5's (per 8 inches of wall thickness) to extend a minimum of 38 inches around all openings walls. Provide #5 x 5'-0 diagonal at all corners of openings in walls.*

Reinforced Concrete:

1. *All structural concrete has been designed in accordance with ACI 318 and 350. All structural concrete construction work shall conform to ACI 301 unless noted otherwise.*
2. *Cast in place concrete shall be made with type II or V cement. Admixtures containing chloride salts shall not be used. All concrete walls and slabs exposed to the weather shall have 5-7% of entrained air. Concrete shall have minimum 28 day compressive strengths of:*

Element:	*Minimum Compressive Strength, f'c (psi)*
Footings and Retaining Walls:	*4000 psi*

3. *Concrete coverage for reinforcing steel shall provide the following:*

Unformed surfaces poured permanently against earth:	*3 inches*
Formed surfaces exposed to earth or weather:	
#5 bar or less:	*1 1/2 inches*
#6 bar or greater:	*2 inches*
Not exposed to earth, weather, or fluid:	
Slabs and walls, interior face:	*1 inch*
Beam and columns	*1 1/2 inches*

4. *Hot and cold weather concreting procedures shall conform to the recommendations in the ACI manual of Concrete Practice.*
5. *Contractor shall coordinate all embeds, penetrations, openings, and verify all plan dimensions prior to forming and pouring concrete.*
6. *Construction joints shall be laid out to minimize the number of construction joints in each individual structure. Construction joints in walls shall not occur close to wall corners or intersections such that the divide additional corner or intersection reinforcement.*

General Requirements:

1. *Structural erection and bracing: The structural drawings illustrate the completed structure with all elements in their final positions supported and braced. The contractor, in the proper sequence, shall provide shoring and bracing as may be required during construction to achieve the final completed structure. Contact engineer for consultation (not in contract) as required.*
2. *Dimensions: Check all dimensions against field and architectural drawings prior to construction. Do not scale drawings.*
3. *Construction practices: The general contractor is responsible for means, methods, techniques, sequences and procedures for construction of this project. Notify structural engineer of omissions or conflicts between the working drawings and existing conditions.*
4. *Coordinate requirements for mechanical/electrical/plumbing penetrations through structural elements with structural engineer. Prior to installation of such equipment or other items to be attached to the structure, the contractor shall obtain approval for connections and support. Contractor shall furnish required hangers, connections, etc. required for installation of such items, unless specifically noted on plans.*
5. *Jobsite safety is the sole responsibility of the contractor. All methods used for construction shall be in accordance with the latest edition of the IBC.*
6. *The structural engineer may make periodic observation visits to the jobsite for determination of general conformance with the construction documents. Such observation visits shall not replace required inspections by the governing authorities or serve as "special inspections" as may be required by the International Building Code.*
7. *Though every effort has been made to provide a complete and clear set of construction documents, discrepancies or omissions may occur. Release of these drawings anticipates cooperation and continued communication between the contractor, architect and engineer to provide the best possible structure. These drawings have been prepared for the use of a qualified contractor experienced in the construction techniques and systems depicted.*

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118 West Sixth Street, Suite 200
Glenwood Springs, CO 81601
970.945.1004 www.sgm-inc.com

Robinson Diversion Modification Project
Roaring Fork River - El Jebel, CO

#	Revision	Date	By:
1			

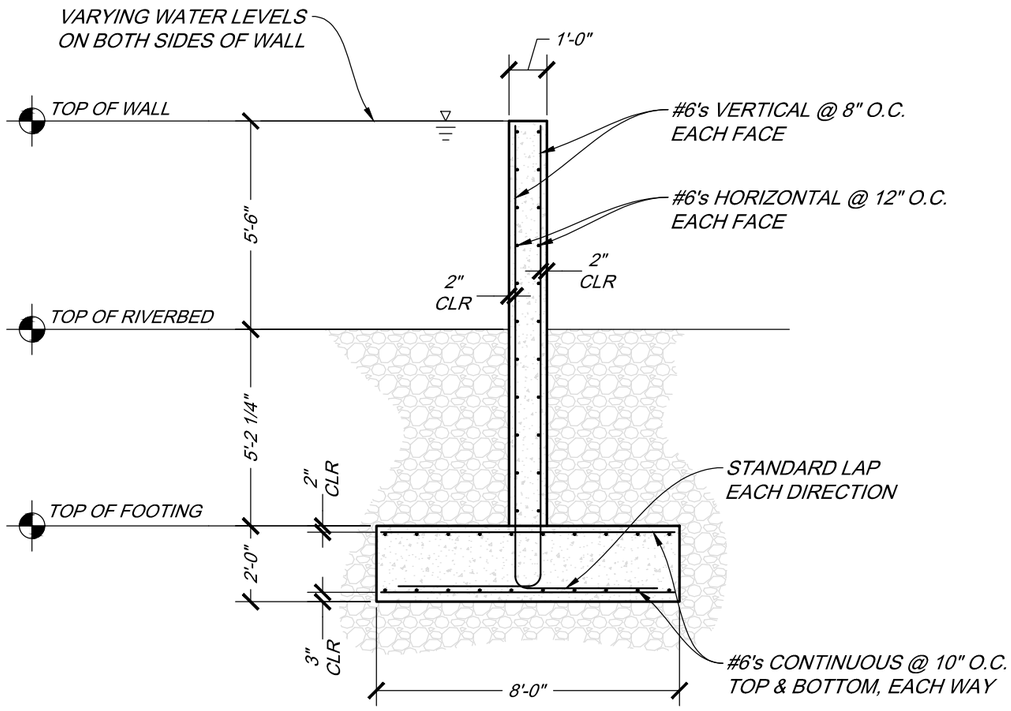
Project Milestone: Headgate Detail (90% DRAFT)

Job No.	2020-490.001
Drawn by:	KNH
Date:	11.06.2020
QC: JEP	PE: KNH
File:	Headgate Notes & Section

Title: Structural General Notes

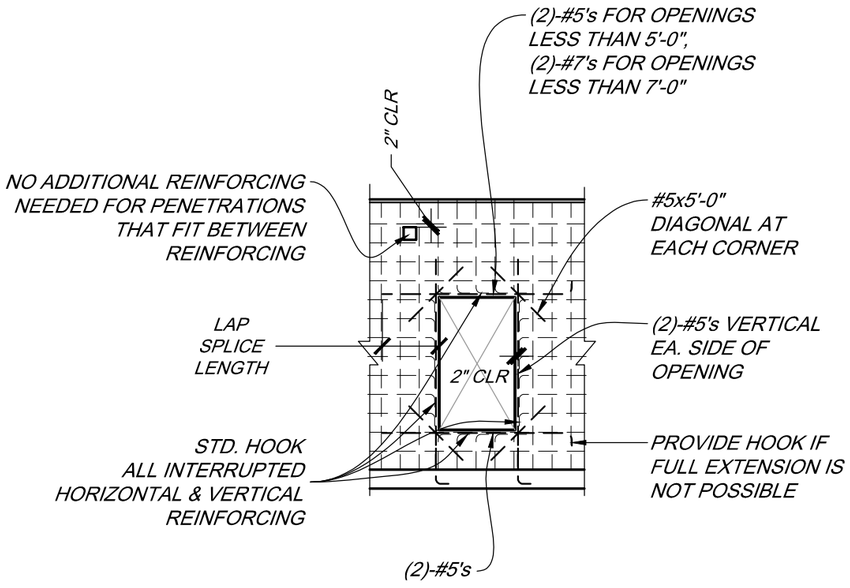
Dwg No. S01

Of : 1



1 S02 **TYPICAL RETAINING WALL DETAIL**

SCALE: 1/4" = 1'-0"



2 S02 **TYPICAL CONCRETE WALL ROUGH OPENING DETAIL**

SCALE: 1/4" = 1'-0"

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Glenwood Springs, CO 81601
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Robinson Diversion
Modification Project
Roaring Fork River - El Jebel, CO

#	Revision	Date	By:
1			

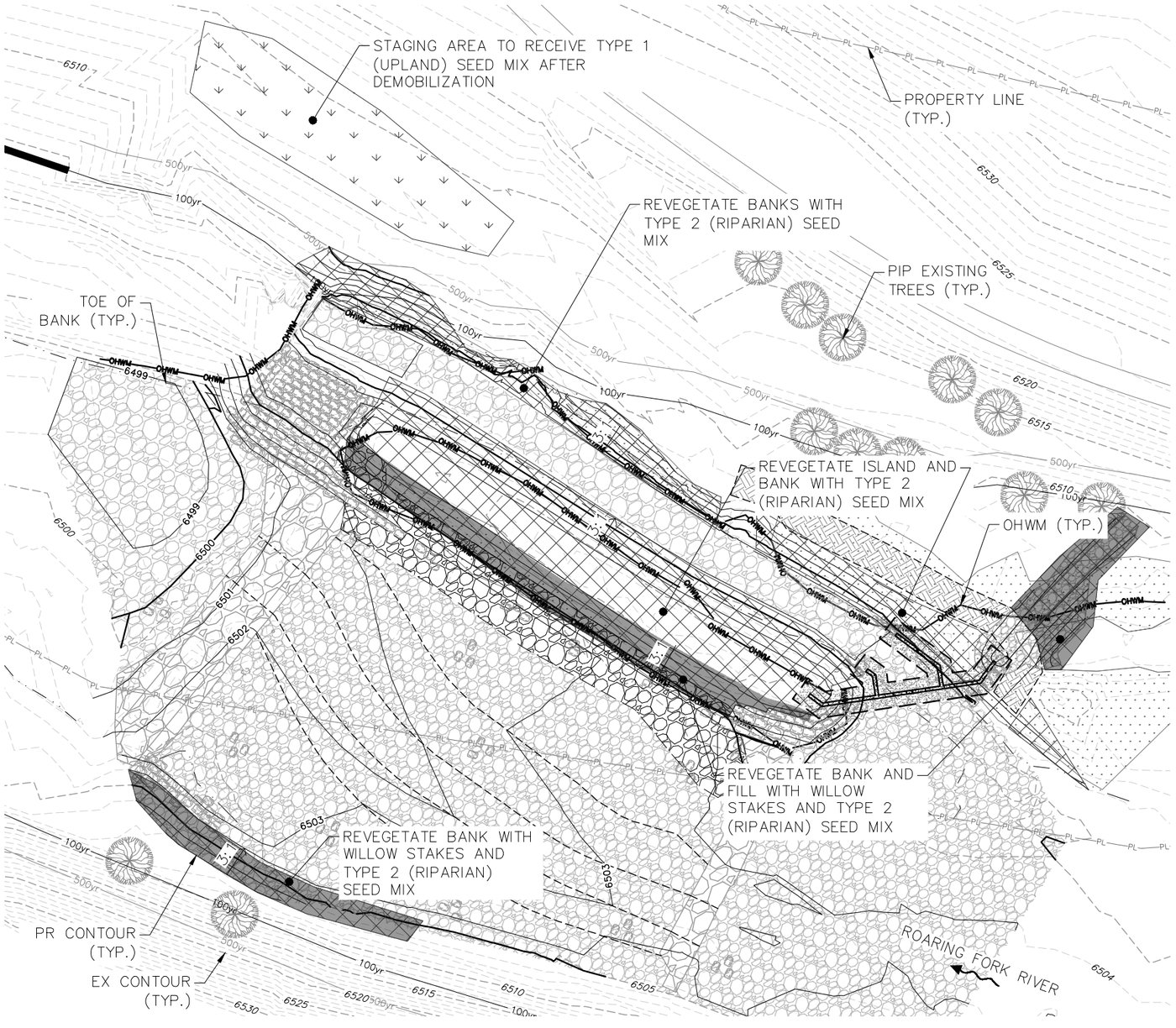
Project Milestone: Headgate Detail (90% DRAFT)

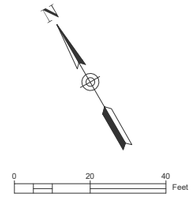
Job No.	2020-490.001
Drawn by:	KNH
Date:	11.06.2020
QC: JEP	PE: KNH
File:	Headgate Notes & Section

Title:
Structural
Headgate Details

Dwg No.
S02

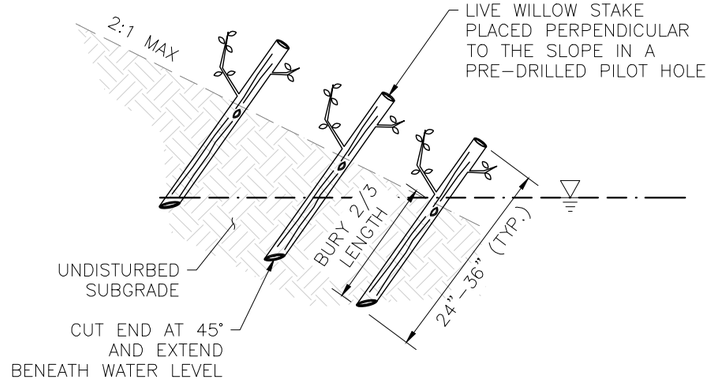
Of : 1





LIVE STAKING NOTES:

1. WILLOW STAKES SHALL BE PLACED RANDOMLY AT A RATE OF 2 HOLES PER SQUARE YARD. INSTALL 3 LIVE STAKES (WHERE POSSIBLE) PER HOLE.
2. WILLOW STAKES SHALL HAVE A MINIMUM DIAMETER OF 0.75"



1 / L01 LIVE STAKING (TYP)
NTS

REVEGETATION NOTES:

1. THE REGRADED ISLAND AND ALL BANK RESTORATION AREAS SHALL BE SEEDED WITH RIPARIAN SEED MIX AND HYDROMULCHED AFTER FINAL GRADING.
2. ALL DISTURBED UPLAND AREAS (STAGING AREA) SHALL BE GRADED TO PRE-DISTURBANCE ELEVATIONS, SEEDED WITH UPLAND SEED MIX, AND HYDROMULCHED AFTER DEMOBILIZATION. UPLAND AREAS SHALL BE CONSIDERED STABILIZED ONCE UNIFORM VEGETATIVE COVER OF AT LEAST 70% OF PRE-DISTURBANCE LEVELS IS ACHIEVED.
3. BEST MANAGEMENT PRACTICES (BMPS) SHALL BE MAINTAINED IN PLACE UNTIL VEGETATION IS ESTABLISHED.

LEGEND

- WILLOW STAKING AREA
- TYPE 2 (RIPARIAN) SEEDING AREA
- TYPE 1 (UPLAND) SEEDING AREA
- EXISTING WETLANDS

Planting Schedule				
Planting Zone	Surface Area (ac)	Seed Type	Application Rate (lb/ac)	Quantity (lbs)
Riparian	0.25	Riparian Seed Mix	15	3.75
Upland	0.10	Upland Seed Mix	60	6.00
	Surface Area (SY)	Plant Type	Planting Rate (stakes/SY)	Quantity (stakes)
Live Staking	300	Willow Stakes	2	600

PROFESSIONAL ENGINEER STAMP

COLORADO LICENSED
QUINN L DONNELLY
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
REVEGETATION PLAN

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

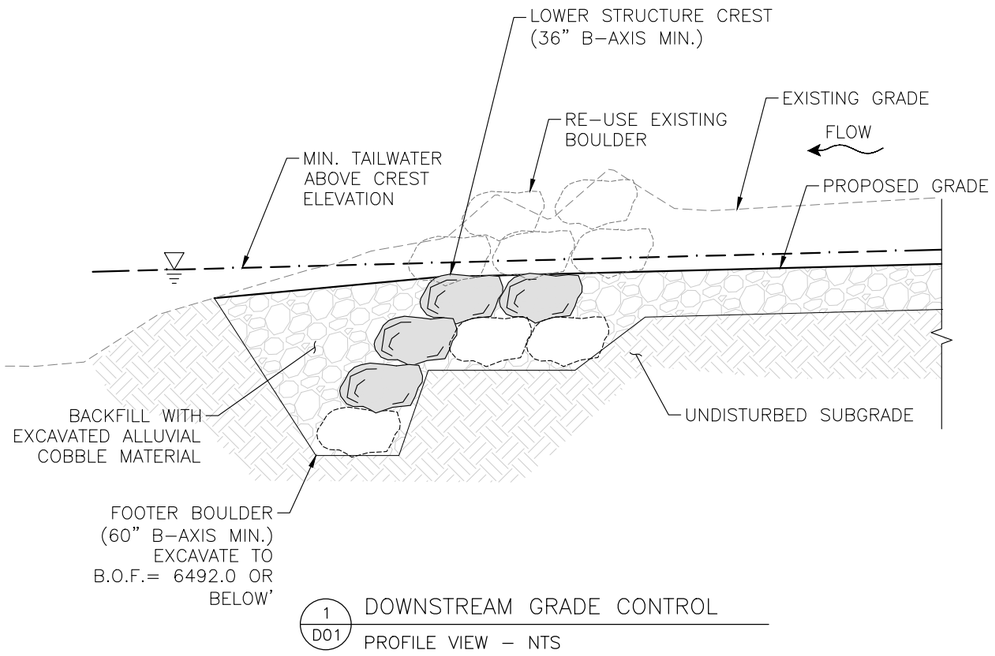
ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	L01
Date: NOVEMBER 2020	
Scale: 1"=20' (FULL-SIZE)	

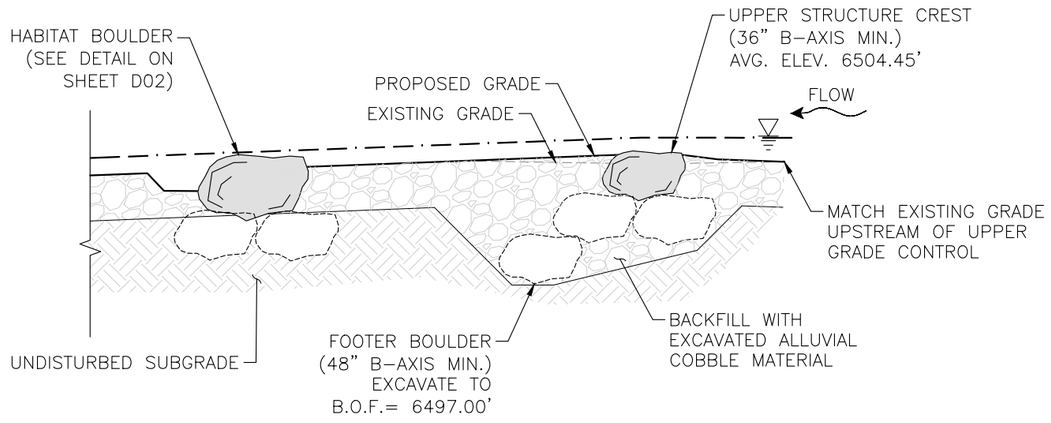
BID SET - REVISION 1

RIFFLE/GRADE CONTROL NOTES:

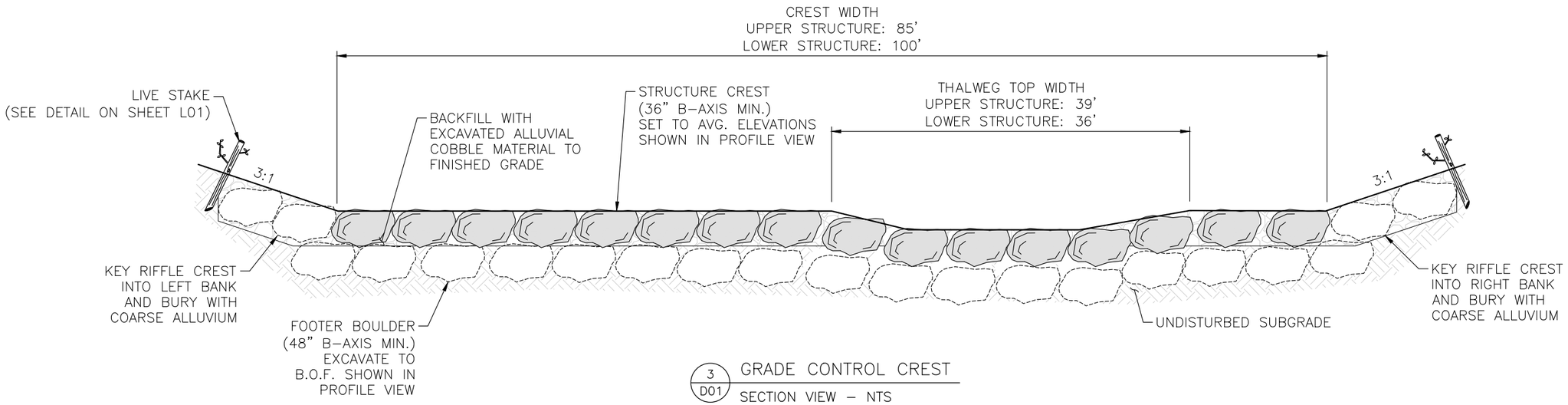
1. EXCAVATION MAY BE NEEDED TO PLACE RIFFLE FOOTER BOULDERS. REFER TO DETAILS 1 AND 2 FOR MAX. ELEVATION LIMITS OF EXCAVATION.
2. BOULDERS SHALL BE PLACED WITH THE LARGEST FACE DOWN WITH A–AXIS (LONGEST AXIS) PERPENDICULAR TO CHANNEL & C–AXIS (SHORTEST AXIS) VERTICAL.
3. AFTER RIFFLE CREST AND FOOTERS AND IN–PLACE, PLACE RANDOM HABITAT BOULDERS IN RIFFLE AND BACKFILL WITH COARSE ALLUVIUM TO FINISHED GRADE. SEE SPECIFICATIONS FOR COARSE ALLUVIUM GRADATION.
4. SPACING OF RANDOM HABITAT BOULDERS SHALL MAINTAIN 2' MIN. DISTANCE PERPENDICULAR TO FLOW AND 3' MIN. PARALLEL TO FLOW.



1 / D01 DOWNSTREAM GRADE CONTROL
PROFILE VIEW – NTS



2 / D01 UPSTREAM GRADE CONTROL
PROFILE VIEW – NTS



3 / D01 GRADE CONTROL CREST
SECTION VIEW – NTS

BID SET - REVISION 1

PROFESSIONAL ENGINEER STAMP

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QUINN L DONNELL
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
RIFFLE / GRADE CONTROL DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

HEALTHYRIVERS

Pitkin County Government
530 E. Main St.
Suite 301
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

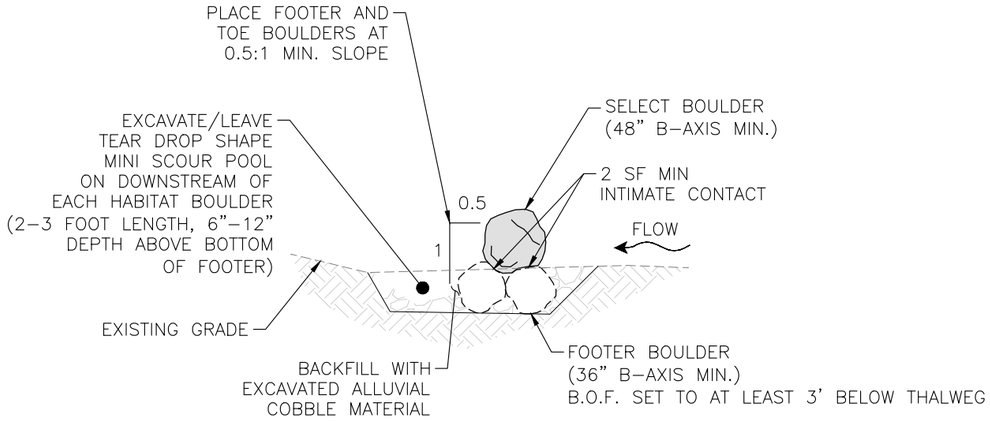
RIVER RESTORATION.ORG

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

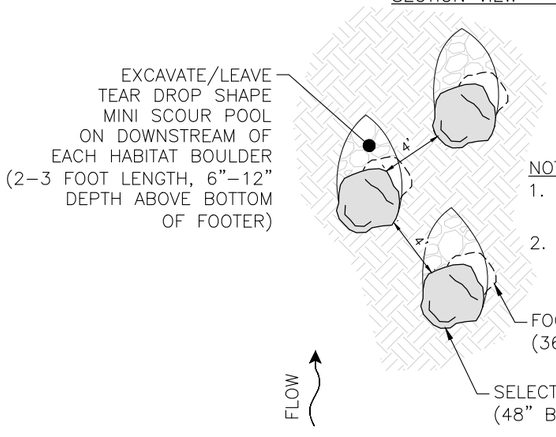
ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	D01
Date: NOVEMBER 2020	
Scale: NTS	



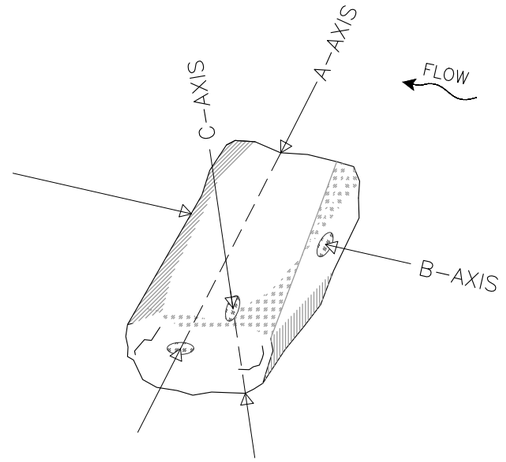
NOTES:
1. WHEN TOP BOULDER IS EXPOSED, OFFSET FOOTER BOULDERS IN THE UPSTREAM & DOWNSTREAM DIRECTIONS, PERPENDICULAR TO FLOW.
2. FOOTER BOULDERS ARE NOR REQUIRED IF BEDROCK IS PRESENT.

SECTION VIEW – NTS

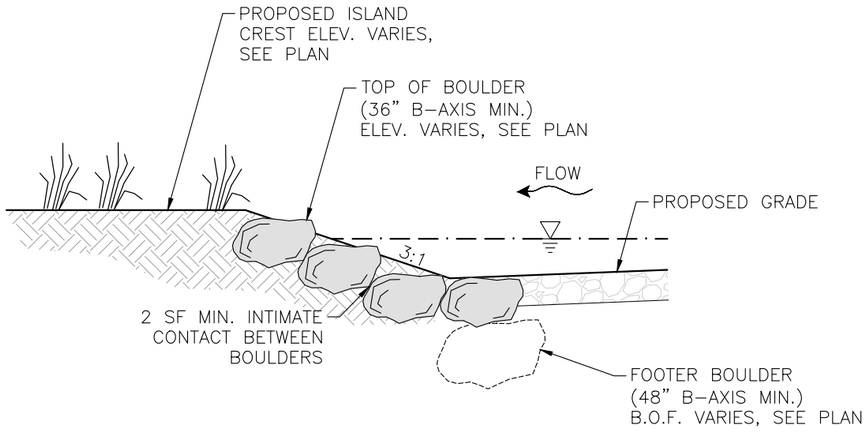


NOTES:
1. SPACE BOULDERS A MIN. OF 4' IN TRIANGLE PATTERN.
2. OFFSET BOULDERS FROM MAIN CURRENT.

1 / D02 HABITAT BOULDER CLUSTER (TYP)
PLAN VIEW – NTS



2 / D02 BOULDER AXIAL PLACEMENT (TYP)
NTS



3 / D02 ARMORED ISLAND TOE (TYP)
PROFILE VIEW – NTS

BID SET - REVISION 1

PROFESSIONAL ENGINEER STAMP

COLORADO LICENSED
QUINN L DONNELLY
56481
11/09/2020
PROFESSIONAL ENGINEER

ROBINSON DIVERSION MODIFICATION
BOULDER DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County Government
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Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

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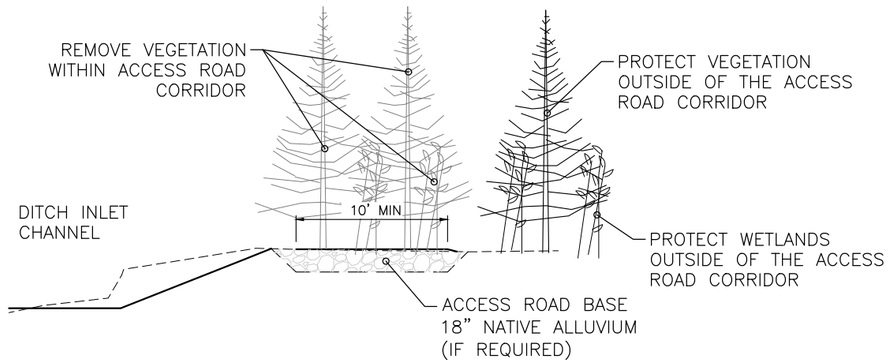
PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	D02
Date: NOVEMBER 2020	
Scale: NTS	



1 / D03 ACCESS ROAD

SECTION VIEW – NTS

BID SET - REVISION 1

PROFESSIONAL ENGINEER STAMP

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11/09/2020
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ROBINSON DIVERSION MODIFICATION
ACCESS ROAD DETAILS

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ROBINSON DITCH MODIFICATION
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El Jebel, CO 81621

Project	Sheet
38043	D03
Date: NOVEMBER 2020	
Scale: NTS	

TECHNICAL SPECIFICATIONS

Robinson Diversion Modification,
Roaring Fork River, Basalt, Colorado

Original - November 6, 2020
Rev 1 – November 12, 2020

OWNER:
Pitkin County
530E. Main Street
Aspen, CO 81611

ENGINEER:
RiverRestoration.org, LLC
P.O. Box 248
Carbondale, CO

Contents

SECTION 1 SCOPE OF WORK
1.01 GENERAL

The purpose of this project is to rebuild the diversion and headgate of the Robinson Diversion.

The scope of this project includes constructing and/or installing the following:

- 2 boulder grade control structures
- Riffle bed forms including the grading of Boulder and Cobble and Gravel Alluvial material.
- Headgate structure

The project scope also includes the following tasks associated with major in-channel installations:

- Identify and maintain Erosion Control Measures and Best Management Practices (BMPs) and provide a detailed Erosion and Sediment Control Plan (ESC) Plan to be submitted prior to construction and reviewed and accepted by the Owners Representative.
- Identify and maintain Care of Water (CW) plan and BMPs involved with protecting river from construction related activities
- Provide a detailed Spill Prevention Control and Countermeasure Plan (SPCC) Plan to be submitted prior to construction and reviewed and accepted by the Owners Representative.
- Identify and maintain measures necessary to Protect in Place (PIP) Trees, Wetlands, and other Natural Resources, and provide a detailed Natural Resource Protection Plan (NRP) Plan to be submitted prior to construction and reviewed and accepted by the Owners Representative.
- Identify and maintain Traffic Control Measures and BMPs involved with maximizing construction traffic efficiency, limiting interruption to public roadways, and protecting the public and construction personnel from construction related activities. Also provide a detailed Traffic Control Plan (TC) Plan to be submitted prior to construction and reviewed and accepted by the Owners Representative.
- PIP all driveways, utilities, parking lots, power lines, flood walls, and other structures not identified for removal.
- Install and enhance Riparian plants.
- Install Erosion Control Blankets with topsoil and seeding.
- Haul off and dispose of unclassified excavation removed from the channel and banks and dewater as necessary.
- Restore construction staging areas and access areas to equal or better than pre-construction condition.

In accordance with these Specifications and as shown on the Project Drawings.

1.02 KEY PROJECT PERSONNEL CONTACTS

References to the OWNER and/or OWNERS REPRESENTATIVE are to Pitkin County.

The following is a list of Project stakeholders and their contact information. CONTRACTOR shall notify all stakeholders 5 days prior to construction:

1. Pitkin County (OWNER)
Lisa MacDonald
Director
530E. Main Street 3rd Floor
Aspen, CO 81611
(970) 920-5190 - phone
(970) 920-5198 - fax
lisa.macdonald@pitkincounty.com

2. Quinn Donnelly, PE (ENGINEER)
RiverRestoration.org, LLC.
PO Box 248
Carbondale, CO 81623
(970) 947-9568 (w)
quinn.donnelly@riverrestoration.org

3. Bill Reynolds
Robinson Ditch Company President
c/o Mid Valley Metropolitan District
31 Duroux Lane, Suite A
Basalt, Colorado 81621
(970) 927-4077
breynolds@sopris.net

1.03 CONTRACTOR QUALIFICATIONS

Prospective bidders shall qualify as follows: A CONTRACTOR must possess adequate tenacity, perseverance, experience, integrity, reliability, timeliness, capacity, facilities, equipment, and credit. The determination of whether a CONTRACTOR possesses these criteria is at the sole discretion of the OWNER.

CONTRACTOR shall demonstrate record of successful and timely completion of river work completed during the last three years. CONTRACTOR shall submit a Statement of Qualifications (SOQ) that describes 3 relevant projects of similar scope and experience in River related work. Up to date project owner references shall be included. The SOQ shall demonstrate extensive experience in the care of natural river flows and Best Management Practices that significantly reduce environmental impacts associated with construction. The SOQ shall identify the key personnel and all subcontractors that shall perform work. The SOQ shall be submitted at part of the bid package.

1.04 BID SCHEDULES

1.04.A BID TABULATION

See Attached EXHIBIT 1

1.04.B GENERAL

i. Bidder submits quantities and prices of items aggregating the Contract Price. The following articles summarize the quantities and prices. The total of work to be completed is inclusive in the Bid Schedule.

ii. Bidder shall provide additional breakdown of quantities at the OWNER's request when considering Bidder's bid or authorizing future pay requests.

iii. Bid Schedule quantity approximations in the Bid Documents are stated as a basis for determining bids, and they do not fix the amount of work to be done or materials to be furnished. Stated quantities are estimates for the purpose of estimating the class of work required. Actual quantities may vary as Amended by OWNER in writing. The Owner may deviate in either direction from any indicated quantities. The Bidder shall have no claim for any variation in quantity, except to the extent permitted in the General Conditions or Amended by OWNER.

iv. Contract SHALL be awarded on a "TOTAL LUMP SUM" total contract amount, with-in available funds. OWNER may choose to omit items to fit work within available budget.

1.05 MEASUREMENT AND PAYMENT

1.05.A GENERAL

i. ENGINEER will compute all quantities based on measurements made by CONTRACTOR or ENGINEER.

ii. ENGINEER shall make limited and intermittent observations of the progress and content of the work to determine if the work is proceeding in general accordance with the Contract Documents.

iii. CONTRACTOR will provide equipment, workers, and survey crews to assist ENGINEER in making measurements.

iv. Units of measurement are listed in the bid schedule(s).

v. Refer to Technical Specifications and Details for more detailed information to the following bid items, if applicable.

vi. Bids shall encompass any costs associated with each bid item, which in aggregate, represent the complete bid.

vii. Payment for all Lump Sum (LS) items will be made on a percentage basis as follows.

Percent of Original Contract Amount Earned	Percent of Amount Bid Item to be Paid
5	20
20	20
40	20
60	20
100	20

1.05.B BID ITEM DESCRIPTIONS

Bid Item No. 1
MOBILIZATION/DEMOBILIZATION/BONDING/INSURANCE

A. Measurement is per Lump Sum (LS).

B. Work includes, but is not limited to: providing all required bonds and insurance; mobilization; demobilization; installation and removal of temporary facilities; bringing and removing all necessary construction equipment to and from the site; documenting the pre-construction site; restoring the site; and any and all incidentals.

Bid Item No. 2
APPROVALS

A. Measurement is per Lump Sum (LS).

B. Work includes, but is not limited to: seeking approvals; obtaining construction permits or licenses; associated fees; contractor submittals; meetings; maintaining licenses; adhering to requirements of permits and approvals; reporting; postings; and close out of permits as may be required; and any and all incidentals.

Bid Item No. 3
TRAFFIC CONTROL

A. Measurement is per Lump Sum (LS).

B. Work includes implementation, maintenance and restoration of the Project's approved traffic control plan and any and all incidentals. Work includes all materials, labor and equipment required to provide traffic control for vehicles, bicyclists, pedestrians and river users for the duration of construction. Traffic control shall meet all requirements of CDOT, Eagle County and Town of Basalt.

Bid Item No. 4
CONSTRUCTION SURVEY

A. Construction Survey. Paid per Lump Sum (LS).

B. Work includes furnishing all material, equipment, labor, and incidentals necessary to complete the work. This work will include locating and marking all utilities, buried or otherwise, that may be present with the project area. The CONTRACTOR is solely responsible for identifying and marking utilities present on the site. No separate or additional payment will be made for any temporary protection and direction of traffic measures including flaggers and signing necessary for the performance of the construction survey work. No separate or additional payment will be made for preparing surveying documents including but not limited to office time, preparing and checking survey notes, and all other related preparation work. Costs incurred caused by survey errors will be at no additional cost to the OWNER. CONTRACTOR is wholly responsible for any work, and damage, repair or modification thereof, caused by CONTRACTORS's survey errors.

Bid Item No. 5
EROSION AND SEDIMENT CONTROL

A. Measurement is per Lump Sum (LS).

B. Work covers the implementation and management of the project Erosion and Sediment Control program. This works includes all materials, equipment, labor and incidentals associated with implementing Erosion and Sediment Control plan, performing regular inspections and documentation of installed erosion and sediment control BMPs and cleanout and maintenance of erosion and sediment control BMPs as required during project construction.

Bid Items No. 6
SITE ACCESS

A. Measurement is per Lump Sum (LS).

B. Work includes the installation and maintenance of temporary access roads, ramps, temporary culverts/bridges and other access points required for construction of the project. Work covers furnishing all materials, equipment, labor, and incidentals necessary to complete the work as specified. The work also includes removal of all material and restoration of the site upon the completion of the project.

Bid Item No. 7
CARE OF WATER PRACTICES

A. Measurement is per Lump Sum (LS).

B. Payment covers complete cost of implementation of the Care of Water Plan, installation of structures and maintenance in place, to minimize environmental impacts and simultaneously maximize construction efficiency, for the work below the OHWL. Work includes installation of turbidity curtains, oil booms, temporary diversion structures, pumps and filters, and intermittent excavation operations during excessive turbidity, and all BMPs necessary to access open bank excavations and channel work in the wet, and permit conditions adherence. Payment covers methods, precautions, delays, installations, modifications, maintenance, replacement, and materials for water control structures and removal and disposal of BMP’s

and incidentals required to restore the site and complete work as shown on drawings and noted in specifications.

Bid Items No. 8
PROTECT IN PLACE

A. Measurement is per Lump Sum (LS).

B. Work covers taking necessary measures to mark in the field and ensure protection of existing utilities, structures, vegetation, wetlands, cultural resources, properties, and other resources, not specifically identified for disturbance (resources). This includes stoppages and notifications to evaluate buried utilities or resources not identified on the plans that may be discovered during the work. Work covers furnishing all equipment, labor, and incidentals necessary to protect the resources. Any cost associated with temporary outages, environmental damage, or repairing resources, as determined by OWNER, shall be wholly the responsibility of the CONTRACTOR.

Bid Item No. 9, 15, 21, 34
UNCLASSIFIED EXCAVATION AND STOCKPILE

A. Measurement per Cubic Yard (CY) of excavated material.

B. Payment covers complete cost of salvage, excavation, stockpiling, handling, sorting, stabilizing and dewatering onsite of existing alluvium and topsoil. Includes dewatering in a designated onsite stockpiling area and all incidental work or materials. Includes BMPs, care of water, handling of suitable materials for reuse including sorting and stockpiling and any other incidentals. Clear and grubbing of excavation areas is incidental to this work. Work covers furnishing all equipment, labor, and incidentals necessary to protect the resources.

Bid Item No. 10, 16, 23, 42
ALLUVIAL GRADING

A. Measurement per CY (CY) of alluvial material placed.

B. Payment covers complete cost grading or placing alluvial gravel cobble as shown on the plans and described in the technical specifications. Work includes but is not limited to all equipment, materials, labor and incidentals associated with: BMP's; care of water, vegetation clearing; loading, hauling, handling and stockpiling material; placement of material.

Bid Item No. 11, 17, 24, 35
HAUL OFF AND DISPOSAL

A. Measurement is per Cubic Yard (CY) of offsite disposal per limits of excavation defined in plans.

B. Payment covers complete cost of handling, dewatering materials onsite and disposing of materials off site. Work includes but is not limited to: BMP's; unclassified excavation per plans and specs; debris removal, sorting material; stockpiling material; supplying equipment; loading; hauling; handling; disposal fees; and any and all incidentals.

Bid Item No. 12, 19, 26, 39
FURNISH BOULDER

A. Measurement is per Ton (TON) of installed boulders per certified scale tickets.

B. Payment covers complete cost of furnishing imported boulder to the site as shown in the plans and described in the technical specifications. Work includes, but is not limited to all equipment, materials and labor required to purchase boulder, deliver boulder, stockpile boulder, sort boulder and disposal of excess boulder. Payment for this line item will only cover boulder installed at the site for the plans and the ENGINEERS direction. Excess, poor quality or rejected boulder delivered to the site will be at the CONTRACTOR's expense. Furnishing aggregate bedding and non-woven filter fabric as shown in plans is considered incidental to the work.

Bid Item No. 13, 20, 27, 41
PLACE BOULDER

A. Measurement is per Ton (TON) in place.

B. Payment covers complete cost of placement of existing or imported boulder in structures with furnished or stockpiled boulder as shown in the plans and described in the technical specifications. Work includes, but is not limited to all equipment, materials and labor required to sort boulder, boulder placement and disposal of excess boulder. Payment for this line item will only cover boulder installed at the site for the plans and the ENGINEERS direction. Excess, poor quality or rejected boulder delivered to the site will be at the CONTRACTOR's expense.

Bid Items No. 14
DEBRIS REMOVAL AND DISPOSAL

A. Measurement is per Lump Sum (LS).

B. Work includes the removal and disposal of woody debris and trash debris accumulated at the project site, primarily on the existing boulder grade control structure. Work covers furnishing all materials, equipment, labor, and incidentals necessary to complete the work as specified.

Bid Item No. 18, 22
REMOVE AND STOCKPILE EXISTING BOULDER

A. Measurement is per Ton (TON) in place.

B. Payment covers complete cost of excavating existing boulder from the project site and stockpiling for reuse in the proposed boulder grade control structures, as shown in the plans and described in the technical specifications. Work includes, but is not limited to all equipment, materials and labor required to excavate boulder, stockpile boulder, sort boulder and disposal of excess or rejected boulder.

Bid Item No. 25

COARSE ALLUVIUM GRADING

A. Measurement per CY (CY) of coarse alluvial material placed.

B. Payment covers complete cost sorting excavated alluvium, stockpiling coarse alluvium material and placing coarse alluvium as shown on the plans and described in the technical specifications. Work includes but is not limited to all equipment, materials, labor and incidentals associated with: BMP's; care of water, vegetation clearing; loading, hauling, handling and stockpiling material; placement of material.

Bid Item No. 28, 43
EROSION CONTROL BALNKET

A. Measurement is per square yard (SY) of installed erosion control blanket surface. Embedded lengths of erosion control fabrics, vertical faces, and overlapped fabric shall not be measured for payment.

B. Payment covers the complete cost of installing erosion control blankets. Work includes but is not limited to: BMP's; providing all necessary good quality materials; labor; excavation; installation; and any and all incidentals such as key downs at edges and stakes; differing fabrics and installations for appropriate application.

Bid Item No. 29, 44
FURNISH AND INSTALL TOPSOIL

A. Measurement is per Cubic Yard (CY) per plans.

B. Payment covers s complete cost of furnishing, stockpiling, and installing topsoil as final grading and in planting overcuts. Work includes but is not limited to: BMP's; erosion and sediment control; excavation; loading, hauling, handling and stockpiling material; placement of all materials; and any and all incidentals. Includes all equipment, labor, materials and incidentals needed to complete the work.

Bid Item No. 30, 45
TYPE 1 SEED MIX (UPLAND)

A. Measurement is per Square Yard (SY) of seeded area as measured in place.

B. Payment covers the complete cost of furnishing and installing Type 1 Seed Mix. Work includes: BMP's; loading, hauling, handling and stockpiling material; supplying equipment; seeding (drilling or raking); special guarantees; any and all incidentals such as initial watering. Includes all equipment, labor, materials and incidentals needed to complete the work.

Bid Item No. 31, 46
TYPE 2 SEED MIX (RIPARIAN)

C. Measurement is per Square Yard (SY) of seeded area as measured in place.

D. Payment covers the complete cost of furnishing and installing Type 2 Seed Mix. Work includes: BMP's; loading, hauling, handling and stockpiling material; supplying equipment;

seeding (drilling or raking); special guarantees; any and all incidentals such as initial watering. Includes all equipment, labor, materials and incidentals needed to complete the work.

Bid Item No. 32, 47
TRANSPLANT WILLOWS AND COTTONWOODS

A. Measurement is per square yard (SY) of installed bank surface.

B. Payment covers the complete cost of installing willow/dogwood and cottonwood stakes in the project reach as specified by the construction plans and marked by the ENGINEER in the field. Work includes but is not limited to: BMP's; gathering stakes; special guarantees, and any and all incidentals such as re-mobilization associated with seasonal constraints.

Bid Item No. 33
EXISTING HEADGATE REMOVAL AND DISPOSAL

A. Measurement is per Lump Sum (LS).

B. Payment covers the complete cost of removing and disposal of the existing metal headgate and hardware. Work includes, but is not limited to all equipment, material, labor and incidentals associated with the work.

Bid Item No. 36
CAST IN PLACE CONCRETE WITH STRUCTURAL STEEL

A. Measurement per Cubic Yard (CY) of cast in place concrete with structural steel.

B. Payment covers the complete cost of constructing and installing the reinforced concrete structure as shown in the plans and described in the technical specifications. Work includes, but is not limited to all equipment, material, labor and incidentals associated with: BMP's, preparing subgrade, creating concrete forms, furnishing and installing steel reinforcement, furnishing and placing concrete; concrete testing; geotextiles; epoxies and mastics; site clean-up; and any and all incidentals including control of ground water and shoring.

Bid Item No. 37
FURINSH AND INSTALL HEADGATE

A. Measurement is per Each (EA)

B. Payment covers complete cost of furnishing and installing pre-manufactured headgates as specified and per manufacturer's directions. Work includes but is not limited to all fasteners, steel modification, concrete modification, grout pads and grout filler, sealants, finishes, adjustments and startup and testing procedures and any and all incidentals such as disposal of wastes.

Bid Item No. 38
FURINSH AND INSTALL HEADGATE SAFETY EQUIPMENT

A. Measurement is per Lump Sum (LS)

B. Payment covers complete cost of furnishing and installing safety equipment, including catwalks and railings, to access headgates as specified and per manufacturer's directions. Work includes but is not limited to all fasteners, steel modification, concrete modification, grout pads and grout filler, sealants, finishes, adjustments and startup and testing procedures and any and all incidentals such as disposal of wastes.

Bid Item No. 39
STRUCTURAL BACKFILL

A. Measurement per Cubic Yard (CY) of structural backfill installed.

B. Payment covers complete cost furnishing, delivering, excavating, placing, and compacting structural backfill. Work includes but is not limited to: BMP's; care of water, vegetation clearing; loading, hauling, handling and stockpiling material; supplying equipment; sub-base preparation; base course installation and compaction; landscaping fabric, tread surface installation and compaction, installing and compacting. Cost includes all labor, equipment and materials required to complete the work.

SECTION 2 GENERAL CONSTRUCTION METHODS

2.01 PROJECT LIMITS

The Project Limits are defined in the plans. No construction related activities or impacts shall occur outside of the project limits, excepting road access, materials acquisition and spoils haul-off and deposal, unless otherwise authorized by the OWNER in writing. Protect in place all structures, vegetation, drainages and other within the Project Limits that are not specifically identified for construction. Mark, flag and sign all Project Limits.

2.02 PERMITS AND REQUIREMENTS

The CONTRACTOR shall comply with all applicable requirements set forth in all permits obtained for this project. Obtained permits, with associated terms and conditions, include:

U.S. Army Corps of Engineers 404 Permit number – SPK-2020-00618
Regional General Permit 12
Approval Date – November 10, 2020
Permit Expiration Date – October 12, 2022.

Eagle County Floodplain Permit – pending from Eagle County

Eagle County Grading Permit – pending from Eagle County

Town of Basalt Right of Way Permit – pending from Town of Basalt

2.03 CONTRACTOR SUBMITTALS

The CONTRACTOR shall submit for review by the OWNER the following plans, schedules, and documentation. All plans and documentation shall be submitted a minimum of 5 days prior to beginning construction. Rejected plans and documentation shall be modified per review comments and re-submitted. Plans shall incorporate detailed BMPs, means, methods, and materials necessary for achieving project performance, safety, and protection targets.

Spec Section	Submittal Item	Date Due
2.03.A	Erosion and Sediment Control (ESC) Plan	5 days prior to the start of construction
2.03.B	Spill Prevention, Control and Countermeasures (SPCC) Plan	5 days prior to the start of construction
2.03.C	Natural Resource Protection (NRP) Plan	5 days prior to the start of construction
2.03.D	Traffic Control (TC) Plan	5 days prior to the start of construction
2.03.E	Care if Water (CW) Plan	5 days prior to the start of construction
2.03.F	Look Ahead Construction Schedule	Each Monday by 10:00 AM

Spec Section	Submittal Item	Date Due
2.03.G	Construction Materials and Product forms for approval	5 days prior to delivery
2.03.H	Qualified Sub-Contractors List	At start of construction. Changes/additions should be submitted 3 days prior to start of work by specific sub-contractor
2.04	Existing Conditions Documentation	Prior to the start of construction activities.

2.03.A: Erosion and Sediment Control (ESC) Plan

CONTRACTOR shall submit an Erosion and Sediment Control (ESC) Plan which shall detail all of the proposed BMPs, means, methods, and materials used to prevent and/or control storm water and potential erosion and sediment mobilization above the OHWL including surrounding construction, dewatering and staging areas. The ESC Plan shall include a detailed narrative as well as specific Locations, Maps, and Schedules for all stages of construction, and shall identify and provide contacts for all Qualified Subcontractors and Notifications.

2.03.B: Spill Prevention, Control and Countermeasure (SPCC) Plan

CONTRACTOR shall submit a Spill Prevention, Control and Countermeasures (SPCC) Plan which shall detail all of the proposed BMPs, means, methods, and materials used to prevent and/or mitigate spills or other releases of fuels, chemicals, oils, sewage, and other contaminants within and surrounding all in-channel and upland construction and staging areas, and from entering Waters of the US. SPCC Plan shall include a detailed Narrative as well as specific Locations, Maps, and Schedules for all stages of construction, and shall identify and provide contacts for all Qualified Subcontractors. SPCC Plan shall identify and provide contacts for all Qualified Subcontractors, OWNER, and ENGINEER.

A. A Spill Cleanup Plan is wholly the responsibility of the CONTRACTOR and shall be posted and available at all times on site for all work areas prior to any construction activities and shall include coordination with local emergency response agencies. CONTRACTOR shall submit Spill Cleanup Plan to ENGINEER for review 5 days prior to the start of construction.

B. A release of any chemical, oil, petroleum product, sewage, etc., which may enter waters of the State of Colorado (which include surface water, ground water and dry gullies or storm sewers leading to surface water) shall be reported to the Colorado Department of Public Health and Environment immediately (25-8-601 CRS) and form http://www.cdphe.state.co.us/hm/spillselfreportform.pdf and/or Toll-Free 24-hour Environmental Emergency Spill Reporting Line 1-877-518-5608 may be used. Written notification to the Department shall follow within five (5) days (5 CCR 1002-61, Section 61.8(5)(d)). Releases of petroleum products and certain hazardous substances listed under the Federal Clean Water Act (40 CFR Part 116) must be reported to the National

Response Center as well as to Colorado Department of Public Health and Environment as required under the Clean Water Act and the Oil Pollution Act. Furthermore, contact must be made immediately, reporting any spill incident, with CPW, the OWNER and ENGINEER.

C. Any incident spills that do not threaten water resources shall be reported to: Colorado Emergency Planning Committee (CEPC)(members include Colorado Department of Health and Environment - Hazardous Waste Division, Colorado Department of Public Safety - Division of Homeland Security and Emergency Management, and Colorado Department of Public Safety - Colorado State Patrol), at **Toll-Free 24-hour Colorado Environmental Release and Incident Reporting Line 1-877-518-5608,** https://www.colorado.gov/pacific/cdphe/wq-environmental-spills. Furthermore, contact must be made immediately, reporting any spill incident, with the Eagle County Health Department, the OWNER and ENGINEER. The CONTRACTOR shall submit within 14 calendar days of knowledge of the release a written description of: the release (including the type and estimate of the amount of material released), the date that such release occurred, the circumstances leading to the release, the measures taken and/or planned to be taken to cleanup the release, and steps to be taken to minimize the chance of future occurrences to the Executive Secretary.

2.03.C: Natural Resource Protection (NRP) Plan

CONTRACTOR shall submit a Natural Resource Protection (NRP) Plan which shall detail all of the proposed BMPs, means, methods, and materials used to Protect-In-Place and maintain Vegetation, Wetlands, Riparian Corridor, Soils and Waters, Cultural Resources and Environmental Quality on and surrounding all Construction and Staging Areas prior to and during all stages of construction.

2.03.D: Traffic Control (TC) Plan

CONTRACTOR shall submit a Traffic Control (TC) Plan, to include the Roads, Parking Areas, Walking Paths, Boat Ramps, River Navigation, and Construction Access to be approved by the OWNER. The (TC) Plan shall detail all of the proposed BMPs, means, methods and materials used to maintain street traffic surrounding all construction and staging areas, and to isolate construction and staging areas from the public. TC Plan shall include Site Access, Traffic Control, and Public Safety plans for all stages of construction, and shall include a detailed Narrative as well as specific Locations, Maps, and Schedules. TC Plan shall identify and provide contacts for all Qualified Subcontractors, OWNER, ENGINEER, and 24-Hour Emergency Traffic Control Technician. No construction activities. shall impede public traffic patterns prior to written approval from the OWNER. If CONTRACTOR finds it necessary to close any Paths or re-route traffic, the OWNER shall work with CONTRACTOR approve a reasonable alternative route.

2.03.E: Care of Water (CW) Plan

CONTRACTOR shall submit a Care of Water (CW) Plan which details all of the proposed BMPs, means, methods, and materials used to manage and treat waters below the OHWL in order to access the work. The ENGINEER will provide a recommended construction sequencing strategy and typical on-site water management details in the project plans for reference; however, it is wholly the responsibility of the CONTRACTOR to design, submit for approval, and implement a comprehensive and site-specific CW Plan. The CW Plan shall include a detailed Narrative as well as specific Locations, Maps, and Schedules for all stages of construction, and shall identify and provide contacts for all Qualified Subcontractors. The Plan shall include a specific and detailed plan for returning on-site waters to the active channel which includes settling, pumping, and filtration methods and locations. The CW Plan should incorporate the details of the provided SW Plan. The final accepted CW Plan shall provide a reliable means to conform to allowable construction discharge turbidity regulations and shall include methods and schedules for turbidity monitoring.

2.03.F: Look Ahead Construction Schedule

The CONTRACTOR shall submit an updated construction Look Ahead Schedule each Monday morning by 10:00 AM during construction via email. The Look Ahead Schedule shall list activities for the next 2 weeks and should include the following:

- All forecasted tasks associated with in-channel and upland construction, mobilization, staging and access, and materials acquisition and delivery
- Completed construction tasks
- Report submittals
- Permit timeframes and deadlines
- Anticipated Inspections

2.03.G: Construction Materials and Products Form

All construction materials shall conform to the requirements detailed in project plans and specifications. All materials shall be submitted to the OWNER and ENGINEER for approval at least 5 days prior to delivery to the construction site.

2.03.H: List of Qualified Sub-Contractors Form

At the start of construction, the CONTRACTOR shall submit a list of all Qualified Sub-Contractors to be used during any and all stages of Mobilization, Site Access, and Construction. The List shall include contractor license numbers and contact phone numbers and email addresses. If changes or additions are needed, these modifications shall be submitted to the OWNER and ENGINEER for approval at least 3 days prior to that specific sub-contractor beginning work on the project.

2.04 SITE INTEGRITY

The CONTRACTOR is required to document the condition of Utilities, Adjacent Streets and Sidewalks, Recreation Area Facilities, Construction Access Areas on the banks, Wetlands, Mature Vegetation and the general area with pictures and video recordings, submitted to

OWNER and ENGINEER prior to any construction phase and after each phase of construction is completed. The pictures and video recording shall document the surface integrity of the structures with clear and recognizable reference features or established and repeatable reference markers in the field of view. The CONTRACTOR is responsible for rehabilitating, repairing or replacing, to better than pre-construction conditions, any damage to the structures, roads, and vegetation not specifically identified for disturbance.

2.05 UTILITIES

CONTRACTOR shall field-locate and mark all utilities within or adjacent to the Project. Any utility locations marked on plans are approximate and actual field location of any utility is wholly the responsibility of the CONTRACTOR. Any temporary interruption to utilities shall be planned and coordinated with the appropriate utility provider by the CONTRACTOR. OWNER shall be notified of any such interruptions 10 days prior. CONTRACTOR shall protect in place all utilities.

2.06 TEMPORARY FACILITIES

CONTRACTOR shall provide all temporary facilities required for performing the work. Temporary construction facilities and temporary utility connections are solely the CONTRACTOR's responsibility based on his selected method of operation and schedule. CONTRACTOR is responsible for providing a clean and safe environment for all workers on the job site. CONTRACTOR is responsible for providing sanitary facilities. CONTRACTOR shall follow Occupational Safety and Health Administration (OSHA) regulations. CONTRACTOR is responsible for providing all electrical, water and utility needs. CONTRACTOR shall keep the Project Limits in a neat and orderly manner. CONTRACTOR is responsible for removing temporary facilities and controls after completion of all Work.

2.06.A: Staging Areas

Preliminary Staging Areas are shown on the Plans. All construction staging, stockpiling of materials, equipment storage, equipment fueling and maintenance, and other, shall take place in designated areas with adequate barriers to protect the public from entry. Staging areas shall have a designated office or contact information posted for public inquires. Staging areas shall provide employees all necessary facilities, legal postings, and safety protocol. Staging area shall include temporary restroom facilities maintained and serviced as necessary. The CONTRACTOR is responsible for maintaining a clean and organized staging area and restoring all disturbed areas equal to pre project conditions.

2.06.B: Dewatering Areas

Construction activities are anticipated to produce clean fill materials, as well as some other waste materials. All excess materials produced by construction activities shall be properly disposed. Prior to construction activities CONTRACTOR shall report any materials disposal locations to the OWNER. All disposal locations, and means and methods of disposal, shall be in accordance with any applicable regulations and permits, and it is solely the responsibility of the

CONTRACTOR to acquire any applicable permits. Dewatering areas shall have adequate BMPs in place to stockpile material prior to disposal. Any temporarily stockpiled materials shall be covered and protected from wind and rain-drop erosion with durable plastic sheeting and sandbags prior to and during storm events. Dewatering areas may also be configured to include a Washout Area for concrete pours. Pours shall not be conducted during or before an anticipated storm event. All excess concrete and concrete washout slurries from the concrete mixer trucks and chutes shall be discharged off site, or temporarily into a washout area designated in an unvegetated upland location and completely isolated from stormwater and drainage. All concrete residues shall be hauled off-site and properly disposed. Returning water from dewatering areas to surface flow routes may require a dewatering permit from the CDPHE and is wholly the responsibility of the CONTRACTOR.

2.06.C. Equipment Fueling, Greasing, and Maintenance Areas

Any and all fueling and greasing of equipment shall be in designated upland locations, with adequate BMP's to contain any potential spill. All major equipment/vehicle maintenance shall be performed off-site. Fuel tank may be kept on-site in the staging area with drip pans underneath the fueling area. All equipment fluids generated from maintenance activities shall be disposed of into designated drums stored on spill pallets in accordance with hazardous waste management practices. Drip pans shall be placed under all equipment receiving minor or routine maintenance. All equipment shall be inspected daily for leaks and proper function. Leaking or otherwise improperly functioning equipment shall not be used in any capacity for construction activities. Any equipment found to be leaking upon inspection shall be immediately taken out of service for maintenance.

2.06.D. Hauling Routes

The import and export of materials from the project limits shall occur at designated locations on defined haul routes. The access routes to construction sites shall be maintained by the CONTRACTOR with standard maintenance activities, including minimizing and mitigating for equipment Track Out. Loads shall be covered while hauling where necessary. Haul routes shall be repaired, at the completion of the work, to pre project conditions as determined by OWNER.

2.06.E. Channel Access Areas

CONTRACTOR shall be responsible for establishing and maintaining channel access sites for equipment and workers within Project Limits defined on plans and for rehabilitating access sites once construction is complete. Channel access ramps will be graded per plan in order to protect flood walls and other bank structures from equipment damage. Gravel berms shall be installed at the top of the access ramp and other areas to eliminate sheet flow or drainage onto the exposed or disturbed Riverbanks. A silt barrier shall be erected along the toe of any and all out-of-channel open cuts to eliminate the migration of material outside of the limits of work. Straw Bales or wattles shall be used at the toe of the ramp when the access is not in use to prevent the migration of material into the River.

2.06. F. Temporary Bridges

Coffered, in-channel construction areas will require access through the use of temporary culvert or bridges spanning the remaining active channel. The CONTRACTOR is solely responsible for installing and maintaining temporary culverts/bridges where necessary. Culverts/bridges must adequately sized and load rated to safely accommodate the planned equipment traffic. The CONTRACTOR is responsible for obtaining any necessary permits for the installation and operation of temporary culverts/bridges and is responsible for facilitating any required inspections.

2.06. G. Disposal Area

CONTRACTOR to provide for an offsite disposal area for inert, clean fill materials required to be removed from the site such as alluvium and bank material.

2.07 CONSTRUCTION STAKING

The ENGINEER shall provide adequate horizontal and vertical control points for the CONTRACTOR to establish the lines and grades shown on the plans. The ENGINEER shall provide initial construction staking. Grade elevations and additional construction staking shall be wholly the responsibility of the CONTRACTOR.

Established control points shall be provided with special colored flagging and it shall be the responsibility of the CONTRACTOR to protect those control points. In the event they are lost, due to any cause, the CONTRACTOR shall re-establish adequate and permanent control markers.

The ENGINEER will provide a proposed XML compatible digital surface model and river alignment to the CONTRACTOR. The CONTRACTOR shall have the means to load the alignment and surface into a field survey controller, for use in layout, checking, and as-builts of any location in the project area. Surveyor shall be available for ENGINEER inspection to provide measurements in the field at ENGINEER'S request. Prior to construction grading activities, CONTRACTORs site localized survey/stake-out equipment will be validated as accurate with the ENGINEER or Surveyor's equipment to within the following tolerances:

See Sheet G02 for Control Network and Datums.

2.08 TURBIDITY MONITORING

During periods of in-river construction turbidity of the water 200 yards downstream of the Project Limits shall not be visually greater than the turbidity of the water upstream of the Project Limits. BMP's to limit turbidity increases shall include: intermittent excavation; construction during periods of elevated background turbidity; Care of Water, and structural BMP's such as turbidity curtains. CONTRACTOR shall regularly monitor and daily record any turbidity increases. ENGINEER or OWNER may stop construction during ineffective BMP's and visual increases of downstream turbid conditions CONTRACTOR is wholly responsible for time

delays associated with inadequate BMP's, inadequate Care of Water, or stopped work. CONTRACTOR is wholly responsible for environmental damage associated with uncontrolled sedimentation outside of the Project Limits.

2.09 UTILIZING IN-CHANNEL MATERIALS

Clean Native Alluvium that is excavated for structure placement and is to be backfilled in the channel may be utilized in channel as temporary cofferdams or for other water control practices. Exposed Alluvium resulting in noticeable downstream turbidity shall be isolated from the flow of the channel.

Excavated clean native alluvium, boulders and clean bedrock may be allowed to be backfilled in the channel around structures within the limits of excavation as defined in plans**.** All other excavated material including fines and bank material shall not be placed in any flow path, shall be properly disposed of in designated disposal area and shall have appropriate erosion control measures in place**.** All in-stream structures shall be constructed in sections sized to minimize open excavation area**.** Each day of work shall be a completed work and no excavations of the bank or streambed shall be left open to erosion**.**

2.10 TEMPORARY DIVERSION STRUCTURES

Control of the River stage and associated access to work during construction is wholly the responsibility of the CONTRACTOR. The CONTRACTOR is responsible for designing, installing and maintaining any temporary flow diversion structures and coffer dams. Some tasks may be performed in the wet or flowing channel, however, if the CONTRACTOR selects to construct any in-channel work in an isolated area, it is the responsibility of the CONTRACTOR to design, permit and implement any isolation and dewatering measures. The project plans provide a permitted means, method, and materials for coffer dam construction for CONTRACTOR's reference. However, the CONTRACTOR shall be wholly responsible for designing, permit compliance and implementing any final Care of Water plan.
In addition to controlling the stage of the river, seepage and ground water may require additional control methods, such as pumping and discharging. The CONTRACTOR shall be wholly responsible for the selection of suitable method(s), and for design, installation, and operation of the diversion and care of the river required during the performance of the work under these specifications. The CONTRACTOR is required to design and install adequate diversion and care of water facilities in a timely fashion in accordance with his/her schedule of construction and the requirements of these specifications. All means, methods, and materials used for work area isolation and for the care of on-site waters below the OHWL shall be included in the Care of Water (CW) Plan submitted by the CONTRACTOR.

Areas disturbed for temporary diversion practices shall be restored and stabilized to pre project conditions. Failure of the CONTRACTOR to become adequately familiar with and address the existing structures, access and river conditions which impact the work may result in unnecessary construction delays and associated increased efforts for which the CONTRACTOR shall be solely responsible. Pumping and returning of coffered water may require a dewatering permit from the CDPHE and is wholly the responsibility of the CONTRACTOR.

2.11 HYDROLOGY

Hydrology herein is based on Gage USGS 09081000 ROARING FORK RIVER NEAR EMMA, CO for water years 1999 thru 2020. The 09081000 gauge may be accessed online for daily discharge data and flood prediction.

https://waterdata.usgs.gov/co/nwis/uv?site_no=09081000

Real time data may be seasonal and is provisional, subject to change. Statistical Analysis of historical data is not a guarantee for the flow rates during construction and are provided herein solely for the information of the CONTRACTOR. Maintenance of the river flows, Care of Water, diversions, erosion, environmental protection, BMPs and river stages during the construction period, and damage or delays due to, are wholly the responsibility of the CONTRACTOR.

TABLE 3. ***Percent of record that average daily flows were exceeded on the Roaring Fork River near the Project Area (cfs)***

DATE	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
1-Jan	326	178	256	179	189	226	230	254	279	289	321	325
2-Jan	388	139	260	145	178	199	221	261	306	314	349	383
3-Jan	350	65.9	256	80	165	225	234	268	301	311	322	346
4-Jan	351	167	273	169	194	229	232	281	308	320	346	350
5-Jan	339	170	262	171	177	229	238	268	299	303	310	335
6-Jan	328	155	256	160	192	228	234	256	290	295	307	325
7-Jan	321	165	256	167	184	223	235	262	282	289	309	320
8-Jan	319	160	260	165	193	219	228	262	295	302	311	318
9-Jan	325	165	260	169	194	222	233	269	287	293	315	324
10-Jan	328	190	261	191	203	231	239	260	289	294	310	326
11-Jan	340	187	255	188	198	217	226	252	285	287	317	337
12-Jan	353	183	255	185	196	220	231	253	277	279	324	351
13-Jan	331	178	253	181	203	219	227	252	277	281	311	329
14-Jan	350	174	251	175	186	217	226	257	270	276	312	346
15-Jan	347	170	251	173	190	213	223	251	272	279	307	342
16-Jan	338	157	258	163	204	232	237	253	279	302	320	336
17-Jan	336	182	252	185	204	213	231	256	274	277	306	333
18-Jan	347	140	247	146	186	221	227	250	270	272	307	343
19-Jan	342	160	253	166	201	218	225	264	275	278	320	340
20-Jan	362	170	262	174	201	221	224	260	296	311	339	359
21-Jan	354	175	256	178	194	215	221	260	293	293	312	348

DATE	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
22-Jan	330	182	252	183	191	210	218	256	291	293	300	326
23-Jan	304	180	247	181	185	219	222	253	275	278	300	304
24-Jan	338	172	251	174	192	220	225	254	272	279	319	337
25-Jan	383	172	252	173	187	212	216	253	273	275	329	377
26-Jan	386	167	252	170	186	209	220	259	276	287	312	376
27-Jan	364	166	245	169	187	202	208	255	266	273	309	357
28-Jan	367	168	245	170	188	219	222	243	258	267	304	359
29-Jan	366	164	245	164	170	221	221	248	261	270	300	358
30-Jan	360	153	244	154	163	196	215	247	283	290	305	352
31-Jan	361	168	245	169	174	204	218	246	280	281	308	354
1-Feb	356	168	251	168	181	220	223	255	280	282	306	349
2-Feb	357	167	244	167	174	199	200	245	265	275	319	352
3-Feb	352	170	245	170	174	203	211	248	274	283	308	346
4-Feb	351	160	242	162	174	208	211	242	264	282	304	345
5-Feb	354	150	240	153	179	208	212	234	264	273	300	347
6-Feb	348	120	242	128	179	212	222	241	266	278	305	342
7-Feb	340	115	242	123	175	213	220	239	271	281	303	335
8-Feb	354	130	245	131	145	221	226	244	278	299	310	348
9-Feb	353	157	244	159	175	202	212	233	284	300	319	348
10-Feb	348	155	245	157	175	208	213	242	276	299	312	343
11-Feb	331	160	248	161	178	213	216	237	294	302	320	330
12-Feb	364	156	244	157	169	202	208	240	285	297	320	358
13-Feb	379	164	252	166	185	211	213	247	286	294	321	371
14-Feb	361	162	251	166	192	208	219	243	280	296	324	356
15-Feb	366	159	247	161	177	207	213	246	273	294	324	361
16-Feb	350	154	244	155	174	209	214	236	271	295	325	347
17-Feb	337	162	244	162	170	210	213	240	276	286	321	336
18-Feb	350	158	244	159	171	206	216	240	269	285	323	347
19-Feb	343	145	246	147	170	211	220	244	275	298	325	341
20-Feb	342	154	246	156	175	207	217	238	280	299	335	342
21-Feb	340	161	246	161	175	213	215	237	277	294	333	340
22-Feb	337	154	248	155	172	214	219	244	278	294	334	337
23-Feb	338	146	246	147	169	208	212	238	283	300	330	337
24-Feb	339	160	246	161	171	209	212	238	292	310	335	339
25-Feb	349	150	246	152	170	200	211	235	288	307	339	348
26-Feb	345	156	245	156	171	206	211	228	294	298	339	345
27-Feb	348	154	248	155	169	210	215	238	286	295	336	346
28-Feb	358	150	248	151	169	210	218	237	285	295	346	357
29-Feb	359	218	264			222	226	243	308	332		
1-Mar	379	158	254	160	183	213	216	232	283	300	370	378

DATE	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
2-Mar	381	152	250	153	168	204	208	234	287	301	359	378
3-Mar	367	154	248	155	173	201	210	233	285	301	340	363
4-Mar	374	163	250	164	173	201	212	236	293	303	337	369
5-Mar	366	150	248	152	166	207	213	241	297	303	337	363
6-Mar	372	159	249	160	171	202	210	243	300	304	335	367
7-Mar	382	162	254	163	172	211	216	247	300	305	347	378
8-Mar	380	163	253	164	174	208	214	243	295	305	341	374
9-Mar	363	162	250	163	169	207	220	235	290	303	335	359
10-Mar	364	164	255	164	169	207	221	236	301	317	340	361
11-Mar	355	163	255	164	173	207	220	237	307	315	347	354
12-Mar	402	170	265	171	178	211	218	257	311	334	352	393
13-Mar	414	170	268	172	186	214	219	256	325	335	351	403
14-Mar	422	176	270	177	185	215	219	260	341	342	357	410
15-Mar	432	178	275	179	183	204	209	267	333	358	388	426
16-Mar	447	180	277	181	186	204	209	257	339	348	387	436
17-Mar	453	178	283	179	185	212	218	251	356	361	415	448
18-Mar	458	176	286	176	180	208	216	261	351	361	431	457
19-Mar	508	173	286	173	175	208	212	272	345	361	416	492
20-Mar	463	169	286	170	175	215	219	271	356	368	420	455
21-Mar	448	179	290	180	185	215	224	264	347	372	429	444
22-Mar	450	170	295	171	185	214	223	272	363	373	431	449
23-Mar	488	171	301	172	188	221	224	293	375	380	433	481
24-Mar	531	152	304	160	195	225	231	289	351	395	451	518
25-Mar	593	151	306	158	191	216	228	300	358	387	444	567
26-Mar	607	177	309	178	187	222	224	319	370	388	423	572
27-Mar	609	178	315	181	196	224	237	322	375	398	431	574
28-Mar	568	176	313	176	191	224	239	307	380	404	453	546
29-Mar	533	165	310	168	197	232	240	290	387	391	455	522
30-Mar	489	171	310	174	202	230	236	295	401	408	455	488
31-Mar	499	175	310	178	204	230	232	291	391	407	472	498
1-Apr	517	181	310	185	206	230	231	288	378	394	453	508
2-Apr	505	190	315	192	209	233	238	301	383	397	469	505
3-Apr	495	192	321	193	210	243	245	306	404	413	443	486
4-Apr	499	185	321	188	211	248	251	318	398	399	433	486
5-Apr	543	177	333	182	214	251	256	305	413	425	479	535
6-Apr	600	185	339	190	220	249	257	298	420	427	483	581
7-Apr	569	181	343	187	220	240	263	324	431	438	481	556
8-Apr	567	174	359	179	217	245	275	371	439	450	504	556
9-Apr	602	177	370	184	219	261	278	384	446	454	502	584
10-Apr	635	186	378	187	208	258	271	397	462	467	516	612

DATE	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
11-Apr	652	191	379	193	206	255	270	415	453	473	541	635
12-Apr	647	189	382	196	225	249	274	387	441	475	592	641
13-Apr	705	185	386	195	237	263	266	368	453	466	605	690
14-Apr	761	220	391	225	249	272	280	361	471	495	559	722
15-Apr	833	219	402	223	245	269	290	373	499	505	549	779
16-Apr	765	219	410	224	243	270	292	402	495	527	580	734
17-Apr	779	225	412	227	236	271	283	406	510	524	543	733
18-Apr	801	200	413	204	227	252	271	415	517	539	567	757
19-Apr	749	191	423	195	220	246	280	432	544	580	645	731
20-Apr	717	208	434	211	226	268	281	441	574	588	696	717
21-Apr	801	210	446	214	229	260	273	440	562	666	715	787
22-Apr	892	217	460	219	235	253	274	445	588	664	798	878
23-Apr	964	211	477	214	244	274	276	428	627	657	857	943
24-Apr	957	207	494	207	230	268	294	452	632	661	940	954
25-Apr	1010	204	498	212	247	281	301	440	640	749	895	987
26-Apr	1080	206	494	216	260	292	294	441	644	697	847	1030
27-Apr	1040	214	498	222	263	307	326	435	624	748	840	1000
28-Apr	939	226	507	236	278	320	352	423	623	767	906	939
29-Apr	905	248	525	257	297	312	321	445	689	793	869	899
30-Apr	981	256	550	257	276	311	325	466	701	814	950	980
1-May	1040	257	562	264	301	328	330	485	748	798	955	1030
2-May	1010	299	572	301	314	342	352	510	736	776	916	992
3-May	980	283	574	291	322	345	370	545	739	799	934	973
4-May	983	276	588	283	314	359	402	519	831	856	961	980
5-May	1010	284	601	293	328	379	408	530	844	873	973	1010
6-May	1120	299	624	302	327	398	423	572	827	895	958	1090
7-May	1080	300	650	305	342	403	432	639	852	946	1030	1070
8-May	1270	286	672	294	336	411	441	652	830	929	1190	1270
9-May	1290	274	670	278	320	382	461	640	832	902	1080	1260
10-May	1260	277	681	279	304	399	516	701	808	863	1140	1260
11-May	1360	269	705	272	296	454	532	686	830	995	1100	1310
12-May	1570	262	723	274	326	427	524	676	849	963	1110	1480
13-May	1690	277	737	279	320	425	532	700	907	978	1110	1590
14-May	1650	288	767	289	326	444	523	770	1020	1070	1150	1550
15-May	1770	293	795	310	383	505	540	745	1010	1020	1190	1660
16-May	1970	329	846	348	434	503	515	750	1100	1140	1280	1840
17-May	2260	336	913	367	495	566	577	888	1170	1240	1340	2080
18-May	2630	395	955	418	525	576	621	864	1200	1290	1330	2370
19-May	3250	486	1020	490	554	635	662	882	1170	1310	1540	2910
20-May	3260	482	1070	497	566	658	669	887	1220	1350	1820	2990

DATE	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
21-May	3290	501	1130	517	591	648	677	993	1210	1490	2190	3090
22-May	2870	507	1170	511	568	771	797	913	1470	1530	2390	2780
23-May	3020	477	1190	493	628	757	778	1040	1280	1460	2300	2930
24-May	2670	440	1230	487	685	734	765	1100	1610	1650	2310	2660
25-May	2720	398	1230	437	641	751	816	1060	1530	1680	2270	2680
26-May	2710	390	1220	424	622	780	805	1140	1440	1590	2130	2620
27-May	2740	395	1250	434	644	815	856	1220	1510	1650	1960	2610
28-May	2530	446	1350	462	614	825	875	1440	1760	1790	2160	2490
29-May	3120	496	1500	500	638	876	892	1490	2050	2120	2270	2960
30-May	3680	590	1570	591	680	851	885	1590	2150	2390	2530	3450
31-May	3440	644	1570	652	709	809	959	1540	2090	2220	2610	3300
1-Jun	3860	671	1650	676	705	910	1090	1540	2140	2290	2820	3710
2-Jun	3350	653	1720	685	825	962	1040	1680	2070	2220	3050	3320
3-Jun	3470	732	1780	739	785	1040	1150	1810	2090	2250	2950	3410
4-Jun	3450	680	1800	696	797	1180	1250	1900	2110	2260	2870	3380
5-Jun	3330	588	1870	626	862	1210	1310	1880	2600	2660	2800	3230
6-Jun	3400	613	1980	650	875	1280	1360	1820	2620	2960	3220	3380
7-Jun	4550	651	2050	677	847	1240	1470	1890	2730	2800	3330	4330
8-Jun	5000	651	2060	670	817	1230	1310	1700	2740	2990	3220	4650
9-Jun	4960	651	2060	666	796	1230	1330	1800	2690	2760	3230	4630
10-Jun	5220	646	2040	656	770	1180	1250	1770	2620	2850	3300	4840
11-Jun	4260	585	1980	586	683	1120	1130	1720	2820	2970	3370	4080
12-Jun	3650	536	1920	537	635	1050	1100	1810	2480	2740	3500	3640
13-Jun	3400	522	1850	523	621	1030	1100	1680	2440	2740	3300	3390
14-Jun	3530	501	1810	504	618	1020	1170	1670	2550	2640	3390	3510
15-Jun	3690	483	1790	484	595	998	1170	1640	2440	2480	3340	3650
16-Jun	4110	451	1790	456	587	1030	1090	1510	2490	2650	3320	3950
17-Jun	4880	432	1880	439	616	1010	1050	1500	2630	2850	3820	4730
18-Jun	4300	413	1900	424	634	966	1020	1750	2730	3150	3990	4300
19-Jun	4250	398	1920	409	588	933	987	1770	2720	3230	4140	4230
20-Jun	4150	387	1940	395	551	903	976	1700	2830	3160	4070	4140
21-Jun	3990	384	1920	391	531	878	908	1660	3060	3210	3880	3990
22-Jun	3860	375	1880	387	526	869	874	1560	3000	3170	3650	3840
23-Jun	3790	362	1810	372	496	798	803	1720	2840	2840	3480	3730
24-Jun	4210	345	1770	357	482	782	802	1670	2500	2750	3410	4080
25-Jun	4530	371	1740	377	465	782	860	1550	2490	2640	3520	4350
26-Jun	4590	400	1750	406	474	786	847	1650	2510	2710	3670	4460
27-Jun	4480	394	1710	396	458	754	843	1610	2360	2620	3460	4320
28-Jun	4480	367	1680	370	435	734	794	1500	2390	2810	3340	4300
29-Jun	4710	359	1670	361	428	739	759	1490	2310	2680	3530	4490

DATE	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
30-Jun	5110	347	1680	350	423	723	779	1370	2210	2450	3760	4840
1-Jul	5130	332	1660	335	406	680	755	1360	2120	2310	4040	4970
2-Jul	4670	321	1590	324	402	654	694	1340	2020	2210	4000	4630
3-Jul	4610	313	1530	317	398	640	659	1300	1990	2230	3770	4550
4-Jul	4300	356	1440	356	413	625	653	1150	1830	2100	3580	4260
5-Jul	4260	358	1400	365	428	596	650	1060	1740	1990	3510	4210
6-Jul	4980	361	1400	364	420	571	628	983	1730	1900	3340	4760
7-Jul	4490	356	1350	367	439	563	640	1020	1600	1820	3280	4350
8-Jul	4480	344	1300	358	449	547	582	1000	1580	1790	3090	4310
9-Jul	4580	335	1290	346	427	533	594	1030	1580	1860	2900	4350
10-Jul	4530	327	1240	334	396	523	591	991	1630	1660	2740	4280
11-Jul	4010	317	1170	322	383	499	537	919	1460	1510	2690	3840
12-Jul	3830	290	1130	297	369	480	512	882	1360	1410	2620	3680
13-Jul	3560	285	1080	291	357	468	495	825	1270	1300	2530	3440
14-Jul	3200	283	1030	289	352	463	483	759	1220	1260	2470	3130
15-Jul	2780	311	991	314	359	447	537	726	1200	1260	2450	2770
16-Jul	2680	313	951	316	360	442	522	802	1120	1180	2210	2640
17-Jul	2590	306	929	311	351	419	491	851	1110	1140	2060	2540
18-Jul	2450	297	886	303	338	413	455	771	1070	1110	2070	2430
19-Jul	2370	295	858	295	308	429	456	747	1040	1070	1980	2340
20-Jul	2120	283	822	285	309	420	429	702	1020	1080	1840	2100
21-Jul	1960	289	806	291	311	400	410	719	1020	1070	1770	1950
22-Jul	1830	297	799	297	307	394	397	735	1030	1080	1730	1830
23-Jul	1730	295	767	295	303	387	427	703	969	1040	1620	1720
24-Jul	1680	295	763	295	305	376	427	665	981	998	1580	1670
25-Jul	1720	294	774	294	307	396	431	651	1060	1180	1430	1680
26-Jul	1540	285	766	289	311	420	440	663	1050	1170	1420	1530
27-Jul	1520	271	733	272	283	428	458	630	962	1030	1350	1500
28-Jul	1430	244	723	253	313	401	473	633	913	986	1360	1420
29-Jul	1350	240	717	252	323	355	379	700	962	1080	1250	1340
30-Jul	1310	233	684	245	315	338	366	635	946	1000	1160	1290
31-Jul	1430	227	667	238	304	337	369	617	881	972	1120	1390
1-Aug	1260	224	653	235	304	337	389	632	868	943	1100	1240
2-Aug	1180	243	636	253	312	334	399	630	815	904	1030	1160
3-Aug	1180	284	628	289	318	339	408	615	797	864	1040	1170
4-Aug	1190	285	624	287	305	357	436	608	785	819	998	1170
5-Aug	1390	286	639	287	294	361	421	647	799	833	959	1330
6-Aug	1290	288	633	288	294	358	430	669	740	813	989	1250
7-Aug	1160	301	617	302	318	349	407	628	704	789	976	1140
8-Aug	1190	303	611	305	321	338	412	624	710	834	1030	1180

DATE	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
9-Aug	1130	295	590	299	325	344	415	582	681	783	965	1120
10-Aug	1060	287	587	292	324	348	420	559	683	761	975	1060
11-Aug	1060	281	585	288	329	361	417	564	679	728	953	1050
12-Aug	1030	279	574	286	328	354	399	546	684	704	879	1010
13-Aug	946	277	561	283	321	356	404	567	658	724	819	928
14-Aug	876	278	549	283	316	343	393	551	637	715	807	869
15-Aug	853	276	550	281	312	338	380	550	672	723	800	846
16-Aug	882	283	542	285	301	340	375	578	634	678	770	866
17-Aug	861	275	533	278	297	347	365	569	631	666	748	845
18-Aug	821	276	521	279	301	345	373	547	615	653	728	808
19-Aug	791	275	514	277	298	353	370	548	609	627	700	780
20-Aug	818	288	531	288	293	342	354	550	637	666	766	811
21-Aug	857	290	523	291	299	333	345	551	617	633	735	842
22-Aug	868	285	517	287	305	339	348	541	618	622	708	848
23-Aug	854	297	512	301	327	342	350	531	609	622	695	834
24-Aug	838	310	511	313	332	351	361	513	601	627	700	819
25-Aug	784	298	502	302	327	348	360	508	585	611	691	772
26-Aug	703	292	495	296	322	342	367	513	571	593	647	696
27-Aug	699	294	499	297	319	339	344	533	579	613	651	693
28-Aug	685	300	497	303	323	334	343	516	595	615	661	682
29-Aug	675	294	490	298	324	333	341	517	570	590	664	675
30-Aug	664	290	481	294	322	341	344	506	549	573	642	661
31-Aug	667	291	475	294	317	341	358	490	539	560	623	661
1-Sep	666	294	475	295	311	339	392	496	550	565	611	658
2-Sep	667	293	473	294	307	336	385	485	563	574	595	657
3-Sep	653	296	470	296	307	361	383	484	570	573	602	646
4-Sep	636	307	465	309	319	350	390	475	560	569	597	630
5-Sep	631	308	467	310	327	365	390	476	561	570	604	628
6-Sep	630	300	467	301	315	368	382	477	544	569	611	629
7-Sep	671	305	474	306	316	375	408	481	528	554	625	665
8-Sep	652	309	472	310	315	376	406	473	549	555	617	648
9-Sep	643	304	472	306	319	368	395	482	543	560	635	643
10-Sep	795	301	480	303	313	377	398	482	532	559	650	774
11-Sep	704	303	473	304	311	362	384	490	537	576	652	698
12-Sep	654	284	468	289	320	358	366	486	558	603	636	652
13-Sep	646	249	466	259	322	359	368	488	557	593	612	641
14-Sep	633	251	459	259	319	362	369	468	543	572	609	630
15-Sep	657	253	460	261	314	353	370	459	561	569	606	651
16-Sep	667	249	458	257	308	336	350	453	562	566	600	658
17-Sep	676	255	458	262	306	335	346	453	552	557	627	670

DATE	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
18-Sep	696	297	466	300	318	353	373	463	539	556	659	694
19-Sep	669	303	464	303	311	350	386	466	539	550	585	657
20-Sep	678	275	460	284	334	349	384	465	530	545	597	668
21-Sep	685	229	453	242	320	379	399	447	517	536	589	673
22-Sep	667	226	455	239	330	386	395	449	524	554	575	653
23-Sep	641	270	456	274	302	355	381	457	543	548	593	635
24-Sep	600	265	450	267	290	345	356	460	539	548	581	598
25-Sep	668	268	442	268	280	333	350	452	516	525	578	655
26-Sep	630	262	435	269	308	336	344	448	493	509	572	622
27-Sep	592	257	426	264	303	339	345	431	485	496	555	587
28-Sep	634	266	426	270	291	309	341	421	500	511	570	626
29-Sep	570	287	422	287	291	320	335	424	505	519	546	567
30-Sep	569	269	423	273	299	329	341	415	504	512	541	566
1-Oct	569	253	425	257	279	323	338	432	514	519	559	569
2-Oct	608	246	428	247	262	316	350	442	518	531	574	604
3-Oct	567	209	423	216	266	317	356	432	522	527	555	566
4-Oct	631	210	422	217	266	318	348	437	501	512	538	617
5-Oct	601	212	421	220	269	335	347	434	501	517	540	592
6-Oct	648	211	425	219	269	330	334	425	507	537	571	637
7-Oct	596	209	420	218	273	324	331	431	502	521	571	594
8-Oct	584	207	415	216	277	327	334	424	481	516	553	580
9-Oct	579	206	413	214	272	325	330	417	486	501	557	578
10-Oct	571	200	411	210	274	324	331	426	490	513	547	569
11-Oct	570	203	402	210	261	313	322	407	479	501	530	565
12-Oct	548	206	400	212	260	313	330	394	469	488	534	547
13-Oct	579	226	396	229	261	314	318	395	461	474	520	571
14-Oct	575	222	393	225	262	317	338	401	452	459	496	565
15-Oct	571	221	386	224	264	319	322	396	425	444	503	563
16-Oct	569	221	369	224	259	309	318	357	422	440	471	555
17-Oct	555	223	363	226	258	308	316	350	418	437	485	547
18-Oct	565	222	363	225	258	306	314	354	407	420	477	554
19-Oct	575	218	359	219	245	299	314	354	402	425	469	559
20-Oct	573	216	357	217	235	297	306	353	410	430	462	557
21-Oct	583	214	357	215	230	296	305	348	415	425	462	567
22-Oct	582	212	354	213	229	300	308	339	399	413	463	564
23-Oct	593	208	352	211	237	291	310	335	410	416	454	572
24-Oct	583	206	349	209	239	285	308	336	398	413	453	564
25-Oct	562	213	347	214	235	287	293	347	397	400	448	546
26-Oct	553	218	351	218	230	287	306	343	405	410	448	539
27-Oct	545	219	344	220	233	287	299	336	394	404	428	528

DATE	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
28-Oct	541	223	341	223	232	271	301	332	389	397	433	526
29-Oct	568	220	337	221	232	274	287	329	374	391	430	549
30-Oct	547	219	336	221	236	275	291	323	382	397	427	530
31-Oct	556	230	338	232	247	278	290	323	380	392	413	535
1-Nov	552	243	338	244	255	281	291	334	373	376	405	531
2-Nov	476	249	336	250	257	273	289	346	356	370	429	470
3-Nov	464	227	338	230	257	288	299	346	365	371	429	461
4-Nov	425	214	335	219	254	279	298	337	379	382	416	424
5-Nov	433	217	338	222	253	283	298	343	383	396	414	430
6-Nov	433	207	330	213	251	273	297	329	373	379	411	431
7-Nov	438	209	326	214	246	270	287	329	369	378	393	431
8-Nov	435	214	328	218	240	269	288	334	370	377	395	429
9-Nov	423	223	325	226	247	272	281	332	368	371	381	417
10-Nov	431	225	321	226	238	264	273	333	366	369	381	424
11-Nov	409	219	318	221	236	261	270	336	363	365	386	406
12-Nov	416	200	315	202	217	268	271	330	355	367	398	413
13-Nov	405	210	313	212	227	264	268	328	352	353	395	404
14-Nov	415	232	321	232	237	267	270	332	356	358	406	414
15-Nov	424	227	314	228	237	266	274	320	340	344	389	420
16-Nov	396	207	310	211	235	264	274	321	342	344	379	395
17-Nov	380	218	312	220	237	266	273	326	349	359	374	379
18-Nov	394	222	309	224	241	255	264	318	346	353	368	391
19-Nov	394	210	305	213	231	250	256	317	339	347	375	391
20-Nov	396	215	306	217	229	244	260	320	339	350	380	395
21-Nov	398	216	307	217	229	252	265	306	348	351	385	397
22-Nov	393	213	306	214	227	258	272	304	346	354	382	392
23-Nov	399	220	302	220	223	249	258	314	340	345	377	397
24-Nov	387	217	297	217	221	241	252	302	341	344	374	386
25-Nov	392	215	297	217	229	241	246	309	338	342	361	388
26-Nov	374	193	295	193	200	247	256	304	339	346	366	373
27-Nov	370	179	291	182	210	248	254	296	329	335	352	368
28-Nov	381	197	297	198	211	253	256	295	341	343	365	379
29-Nov	389	207	292	208	220	250	259	292	324	327	362	386
30-Nov	383	201	289	201	207	239	259	287	330	336	365	381
1-Dec	392	197	290	199	213	234	254	285	324	330	376	390
2-Dec	361	200	288	201	207	233	252	294	325	338	358	361
3-Dec	377	154	286	162	207	238	247	282	332	337	361	375
4-Dec	369	158	281	164	200	226	245	291	319	324	358	368
5-Dec	369	187	277	189	204	224	231	280	317	326	347	366
6-Dec	362	192	276	194	210	238	250	272	311	317	345	360

DATE	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
7-Dec	365	189	278	191	205	242	244	278	312	315	347	364
8-Dec	360	171	277	174	194	221	246	281	315	321	353	359
9-Dec	355	175	276	177	199	239	241	272	316	334	347	354
10-Dec	384	149	268	153	179	210	231	271	303	314	345	378
11-Dec	359	171	276	173	189	236	249	278	309	330	344	357
12-Dec	351	191	278	194	213	242	251	283	314	319	344	351
13-Dec	362	203	280	204	214	233	246	283	318	322	352	360
14-Dec	363	172	278	174	192	237	243	288	314	316	344	361
15-Dec	342	198	270	199	212	245	246	267	300	306	329	341
16-Dec	330	190	273	190	194	234	250	278	304	314	326	330
17-Dec	349	186	271	188	203	223	234	275	302	308	336	348
18-Dec	342	184	271	185	191	237	238	271	303	319	340	342
19-Dec	339	167	268	169	184	227	228	280	306	316	332	338
20-Dec	346	117	272	123	177	233	252	282	310	312	337	346
21-Dec	351	144	273	152	201	232	243	277	318	324	336	349
22-Dec	351	165	270	168	186	231	239	273	307	323	337	349
23-Dec	348	139	260	141	159	204	220	272	301	304	331	346
24-Dec	325	169	256	170	182	209	217	261	289	296	313	324
25-Dec	357	176	270	180	208	232	239	276	298	302	321	352
26-Dec	372	161	269	164	192	235	241	272	299	317	331	366
27-Dec	378	166	262	169	189	212	220	264	302	306	327	370
28-Dec	318	170	261	172	191	217	224	267	298	300	313	318
29-Dec	334	140	264	146	186	240	245	269	286	293	327	333
30-Dec	326	180	265	180	193	231	246	269	297	303	322	326
31-Dec	322	160	260	166	201	237	242	268	286	295	307	320

2.12 APPROXIMATE WSEL

Water Surface Elevations (WSEL) are based on survey and hydraulic modeling. Actual WSELs in the field may vary from those listed herein. Approximate WSELs are provided herein solely for the information of the CONTRACTOR.

Water Surface Elevations would be affected an unknown degree with temporary flow obstructions of equipment, coffers, temporary alluvium placement or other construction activities. The CONTRACTOR is wholly responsible for monitoring and controlling WSELs during construction and any associated erosion, flooding, structure integrity or environmental damage.

Table 2-12a and 2-12b below provide estimated water surface elevations for the two care of water stages show in the plans.

TABLE 2-12a - Stage 1 Care of Water - Approximate Water Surface Elevations (feet)

Diversion Ditch CL Station	Approximate Water Surface Elevation*				
	200 cfs	389 cfs	415 cfs	566 cfs	969 cfs
0+00	6501.2	6501.6	6501.8	6502.1	6503.1
0+50	6501.2	6501.6	6501.8	6502.1	6503.3
1+00	6506.9	6507.4	6507.5	6508.0	6512.1
2+00	6507.0	6507.5	6507.6	6508.2	6513.1
3+00	6507.1	6508.2	6508.5	6509.1	6514.1
3+95	6507.6	6508.9	6508.9	6509.5	6514.2

** Based on two-dimensional hydraulic modeling results*

TABLE 2-12b - Stage 2 Care of Water - Approximate Water Surface Elevations (feet)

Main Channel CL Station	Approximate Water Surface Elevation*				
	200 cfs	389 cfs	415 cfs	566 cfs	969 cfs
0+00	6501.5	6502	6502.1	6502.4	6503.1
0+50	6501.5	6502.1	6502.2	6502.6	6503.3
1+00	6502.9	6503.4	6503.5	6503.6	6504.1
2+00	6504.2	6504.5	6504.6	6504.8	6505.1
3+00	6505.4	6506	6506.1	6506.3	6507
3+50	6505.6	6506.2	6506.3	6506.6	6507.2

** Based on two-dimensional hydraulic modeling results*

SECTION 3 BEST MANAGEMENT PRACTICES

3.01 GENERAL

The Work covered by this section includes the furnishing of all labor, materials, equipment and incidentals for installation, maintenance and inspection of all on shore and in-channel BMPs. Within the Project Limits all disturbed surfaces shall utilize best management practices such as Turbidity Curtains, Silt Fences, Construction Sequencing, Care of Water, etc.; to minimize potential environmental damage, turbid conditions, locations of ponding, sediment loading in any flow path, dust, noise, light, etc. Adequate numbers, locations and properly functioning BMPs and erosion control are wholly the responsibility of the CONTRACTOR. CONTRACTOR is responsible for maintaining all BMPs during construction activities, and for the removal post-construction activities and/or adequate stabilization periods. All construction activities shall be performed in accordance with; guidelines set out in the project plans and specifications, specifications in applicable permits, and any local, state, and federal regulations. CONTRACTOR shall inspect all BMPs daily. The OWNER or ENGINEER may stop work in any area due to improperly installed, inadequate, or non-functioning BMP's based on OWNER's or ENGINEER's sole discretion. CONTRACTOR is responsible for coordinating and participating in any inspections of BMPs by appropriate regulatory authorities.

3.02 CHANNEL ACCESS

Berms shall be installed at the top of the access ramp and other areas to eliminate sheet flow or drainage onto the exposed or disturbed banks. A silt barrier shall be erected along the toe of any and all out-of-channel open cuts to eliminate the migration of material outside of the limits of work. Straw Bales and/or wattles shall be used at the toe of the ramp when the access is not in use to prevent the migration of material into the body of water.

3.03 CONSTRUCTION SEQUENCING

Prior to starting construction, the CONTRACTOR shall notify the ENGINEER, and the OWNER of the date the CONTRACTOR intends to start construction with a written notice delivered a minimum 5 days in advance. Additionally, Look-Ahead schedules and updates shall be submitted every 7 days during active construction periods as described in Section 2.03F.

The sequence of the critical construction processes is defined by the ENGINEER and CONTRACTOR shall follow the sequence.

3.03 A. Initial Site Setup

1. Submit all required plan documentation and construction schedules.
2. Notify OWNER, and ENGINEER of start date.
3. Document with photographs and video the project vicinity, structures, haul road and vegetation and submit to ENGINEER.
4. Develop methods to prevent cement entering flowing waters.
5. Establish and post construction site safety protocol.

6. Place Barriers, Post Signs, Install Safety Fencing and Isolate Project Site.
7. Locate, in field, all Utilities.
8. Protect in place structures, roads, utilities, boulders, trees and other in accordance with submitted plans.
9. Install temporary erosion control measures.
10. Locate and isolate construction staging and stockpile areas.
11. Install oil booms across wet channel downstream of work area; replace used oil booms per manufacturer's specifications.
12. Locate area for storage of spare oil booms and designate oiling and petroleum handling areas with appropriate and adequate BMPs outside of the riparian zone.
13. Establish and post protocol for potential oil spill cleanup and emergency response.
14. Clean and inspect equipment for leaks, improper function and invasive species.

3.03 B. Staging

1. Install temporary portable toilet
2. Identify and mark out the location for a job trailer, concrete wash out area, stockpile area, dewatering area, and fueling area as needed.
3. Implement approved Traffic Control Plan.
4. Install BMPs
    i. Control erosion and concentrated runoff
    ii. Maintain and facilitate any and all existing Drainage Channels
    iii. Identify and install any other BMPs as necessary
5. Protect in Place Mature Vegetation, Wetlands and other Natural Resources
6. Locate, Mark, and Protect in Place utilities
7. Locate and Protect in Place Survey Control
8. Locate and Protect in Place public infrastructure such as signs, curbs, sidewalks, and lights
9. Grade Access and Staging Areas
10. Maintain, add and repair BMP structures as necessary throughout project

3.03 C. In-Channel Structure Construction

All construction activities shall follow U.S. Army Corps of Engineers permit. In-stream work shall be performed during annual low water periods. Best Management Practices (BMPs) shall be in place in order to minimize turbidity and sedimentation, as well as prevent pollution and the potential release of contaminants from equipment. Construction activities shall be sequenced and sized to minimize temporary impacts to flowing water.

1. Obtain all necessary approvals and permits, which may include CDPHE dewatering permit.
2. Pre-order materials and Structures and submit shop drawings as necessary.
3. Install any above water BMP's as per plans and specs.
4. Place Coffer structures to isolate designated in-channel areas.
5. Implement Care of Water Plan.
6. Install dewatering basins

7. Stage pump with sediment filter and adequate hose length to filter water before return flow.
8. Stake out grades, lines, offsets and spot elevations as necessary.
9. Remove all non-native channel debris including slag and metal.
10. Prepare in advance protocol for rapid removal of sections of cofferdam in the event of a flood flow, and stage or make available equipment, materials, and facilities necessary for such an event.
11. Install boulder structures.
12. Install Concrete Structures
13. Reset care of water and temporary storm-water measures as necessary.
14. Remove temporary diversion structures.
15. Finalize boulder structures and grading in wet.
16. Remove care of water and temporary storm-water structures.
17. Finalize work above ordinary high-water line.

3.03 D. Final Site Restoration

1. Remove water control structures in accordance with Project Specifications and Project Drawings.
2. Plant remaining stream-bank riparian vegetation areas.
3. Dispose of any excess materials at designated disposal location.
4. Restore Temporary Equipment and Haul Routes to original grade and vegetation if requested by OWNER.
5. Remove all materials from staging areas.
6. Re-grade or repair staging areas to pre-construction condition.
7. Remove un-necessary temporary erosion control measures.
8. Identify and install or maintain BMPs down-gradient from all disturbed areas until establishment of vegetation (approx. 1 yr).
9. Remove all waste materials.
10. Remove utilities protection.
11. Remove temporary signs, barriers and safety fencing.
12. Repair damage to any adjacent property, structures or vegetation.
13. Establish erosion control grasses in all disturbed areas above the Ordinary High Water Line.
14. Remove non-biodegradable BMPs after the establishment of vegetation (approximately 1 year).

3.04 EQUIPMENT OPERATING IN WET CHANNELS

Equipment shall be allowed to operate in the wet channels. Equipment operating in or adjacent to any wet channels shall be free of any fluid leaks and in excellent operating condition. Biodegradable hydraulic fluids shall be utilized for any equipment operating in the flowing river channel. CONTRACTOR shall submit a list of equipment operating with certified bio-degradable hydraulic fluids to the ENGINEER prior to use of the equipment in the flowing channel. No equipment shall be left unattended at any time in any wet channel or below the Ordinary High Water Line. Any and all fueling and oiling of equipment shall be in a designated

upland location, with adequate BMPs to contain any potential spill.

All equipment shall be cleaned prior to being on-site to minimize potential for spreading of invasive species. Equipment shall be power-sprayed and free of weeds, soil and untreated water. If any equipment being used for the Project has been previously working in another stream, river, lake, pond or wetland, one of the following disinfection practices is necessary prior to construction to prevent the spread of whirling disease, New Zealand mud snails, zebra mussels, didymosphenia, and other aquatic hitchhikers. These practices are also necessary after project completion, prior to the equipment being used in another stream, river, lake, pond, or wetland, for the same purpose:

> Offsite, remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, hand tools, boots, etc.) and spray/soak equipment in a 1:15 solution of Sparquat institutional cleaner and water. Keep equipment moist for at least 10 minutes; or
>
> Offsite, remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, hand tools, boots, etc.) and spray/soak equipment with water greater than 140 degrees Fahrenheit for at least 10 minutes.

The excavators and backhoes may need to be cleaned on site to remove excess native sediments stuck to the track or hoes. Sediments that are removed with a shovel shall be placed in designated clean fill material storage areas. Sediments removed with clean water shall be washed into the dewatering area. All dewatering areas shall have erosion control logs staked at flow lines before discharge into.

3.05 OIL BOOM

An adequate number of oil boom SPC 5510 manufactured by SPC (http://www.sorbentproducts.com) or equivalent shall be placed in a designated location onsite, visible and unobstructed at all times. Any spills shall be contained and cleaned by the CONTRACTOR. Oil booms shall be installed across the channel at the downstream end of the Project Limits at all times equipment is working in or crossing the flowing river. All Booms shall be replaced as needed, approximately weekly with new Oil Booms.

3.06 PERMEABLE TURBIDITY BARRIER

All exposed bank excavations not contained by coffer dams and disturbances shall be separated from the main flow of the river by a Permeable Turbidity Curtain. The turbidity curtain shall have a non-woven 8 oz filter fabric (Mirafi 180N or equivalent) for at least 50% of the curtain area between the float and the ballast.

3.07 STRAW BALES

Straw Bales shall be certified “Weed-Free” and not hay bales. Bales shall be secured with wood or metal stakes driven 2 feet into ground. 4 inches of 3 inch minus washed gravel shall be placed on the up-gradient toe of the bales. Bales can be removed when vegetation is established.

3.08 SILT FENCE

Silt Fences shall be placed to contain construction activities on land. Silt Fence shall be constructed with 4oz. Non-Woven Filter Fabric (Mirafi 140n or equivalent) with a 6 inch by 6-inch anchor trench up-grade (i.e. uphill) of the fence line and fence posts on 6 ft centers. The anchor trench shall be backfilled to existing grade with native material compacted to 95% of maximum as determined by the Standard Proctor Method (ASTM D-698-66T or AASHTO T 99).

3.09 FILTERING OF PUMPED WATER

Any pumped water being returned to the main flow of the river or other drainage shall first be processed through a Filter. Turbid waters that are clean of containments or concrete residue shall be filtered to prevent excessive turbidity. Waters with contaminants or concrete residue shall be filtered clean before returning to the natural flow. Dewatering permits may be required. It is the responsibility of the CONTRACTOR to obtain these permits.

3.10 REMOVAL OF BMPs

All BMPs below the Ordinary High Water Line are to be removed prior to the completion of the work. All BMPs above the Ordinary High Water Line are to remain in place until the establishment of vegetation, approximately one year. Any non- biodegradable BMPs shall be removed after the establishment of vegetation cover at least 70%, approximately one year. All non-biodegradable BMPs are the property of the CONTRACTOR. The locations of the BMP installations shall be graded, seeded and restored to preconstruction conditions after removal.

3.11 STRAW WATTLES

Straw Wattles (Wattles) shall be certified “Weed-Free” and in sound new condition. Temporary Wattles are to be removed within one year of installation. Any non-temporary Wattles shall be fully biodegradable and have Burlap or Jute fabric netting. Wattles shall be installed in an approximately 2” – 3” deep rounded trench. Spoils from the excavated trench should be deposited and “Knifed In” on the up-hill side of the Wattle to direct flow into the Wattle and prevent under-cutting. Ends should overlap by 1’. Wattles shall be staked at approximately 4’ o.c. and at every end with 1” width 16” long wood stakes.

3.12 RIPARIAN PROTECTION

Any and all riparian areas and riparian vegetation outside of the limits of excavation shall be protected in place. No construction supplies, fuels nor oils shall be stored in riparian areas, no vehicles nor heavy equipment shall be allowed into riparian areas other than the designated channel access sites. No discharge of any materials shall be allowed into any riparian areas. Riparian areas shall be traversed only by foot and leak free hoses may cross riparian vegetation. Any incidentally disturbed riparian areas shall be restored to better than pre-construction conditions.

3.13 MATURE TREE PROTECTION

The preservation of existing mature trees is an important component of the work and a measure of the successful completion thereof. The healthy mature native trees that are adjacent to excavating activities shall be Protected In Place. The work shall include the preservation from injury or defacement of all vegetation that is NOT designated for removal by the ENGINEER in the field. ENGINEER shall mark all trees and large shrubs approved for removal prior to excavation work. Areas of tree removal shall be determined and marked in collaboration between the CONTRACTOR and the ENGINEER.

a) CONTRACTOR shall develop and submit a Natural Resources Protection (NRP) Plan which details the means, methods, and materials to be used to protect in place all mature vegetation not designated for removal.
b) CONTRACTOR guarantees that care, caution and best management techniques are implemented to maximize the survivability of native mature trees not designated for removal.
c) All Protect in Place trees shall have 100% success rate, showing vigor and general health, for one year after PIP measures are conducted.
d) Post construction monitoring may recommend additional pruning, irrigation, or fertilizer to restore health to the marked tree. The CONTRACTOR is responsible for all measures to restore the health of trees for one year after construction disturbances around protect-in-palace trees.
e) If negligence results in potential mortality of trees, as determined by the ENGINEER, the CONTRACTOR shall replace all damaged trees with new native trees to reclaim an equivalent canopy cover at CONTRACTOR's sole expense.

CONTRACTOR shall notify the OWNER or ENGINEER if machine access is needed within the radius of a tree drip-line, and approval is needed to proceed. Special care shall be applied when working under driplines or near the toe of the riverbank. The majority of critical roots are expected to run parallel to the River. The CONTRACTOR shall take great care when any earth disturbing activities beneath the drip line of trees are conducted. Protect in Place mature trees shall follow the below guidelines:

3.13.A. Hand Excavations under the drip line

Under the drip line, or at a minimum of 10 feet from the base of a PIP Tree, all necessary excavating activities shall be done by hand to expose the roots.

a. Expose all roots greater than 1’’ and preserve.
b. If it is necessary for the removal of concrete litter, or for the installation of bank and in-channel features, the roots may be cleanly cut, and shall not be ripped or torn.

3.13.B. Treatment of cut and exposed roots

Backfill all cut and exposed roots the same day of root cutting, and water until backfilling is accomplished.

3.13.C. Root Care

Roots can be up to 2-3 times the diameter of the drip line.
The CONTRACTOR shall take as much care as possible to preserve roots.

a. All roots that are necessary to remove for excavation activities shall be cleanly cut.
b. The CONTACTOR shall apply all root cuts with approved root stimulator.

3.13. D. Areas of fill near PIP trees

a. If necessary, any fill material shall be held away from PIP trees with a boulder retaining wall with a discontinuous footing.
b. If fill is necessary adjacent to the PIP tree, then air vents shall be installed.
c. No soils shall be compacted under the drip line without ENGINEER approval.

3.14 ENVIRONMENTAL PROTECTION

The construction site shall be maintained to minimize dust, noise, erosion, and water ponding. Any and all fuel operated equipment near or within drainage areas, wetlands, riparian areas or open water areas shall be leak-free and in excellent operational condition. Equipment operating in the riparian zone shall also use biodegradable fluids when feasible. The CONTRACTOR shall incorporate all proposed means, methods, and materials utilized to protect the environment and natural resources into the Natural Resources Protection (NRP) Plan. The CONTRACTOR is wholly responsible for any environmental damage directly or indirectly related to storage of supplies and equipment, equipment operation, any fluid spills or any other construction activities.

3.15 BARRIERS

The CONTRACTOR shall furnish, install and maintain suitable barriers, as required to prevent public entry, and to protect the work, facilities, trees and wetland areas from any associated construction activities. Remove temporary barriers at the completion of work.

3.16 PROJECT SITE REHABILITATION

After all other construction activities are completed; all disturbed areas are to be rehabilitated to pre-construction conditions. Clean the site of trash and debris and remove all construction measures, equipment and supplies. Permanent riparian plantings and seeding shall be installed immediately after the final design grades are achieved, but no later than 14 days after construction activities have permanently ceased at the disturbed area.

3.17 CULTURAL RESOURCES

The project area has been disturbed by bank construction, road alignments, multiple utilities, pedestrian path construction and is within the main channel of the Roaring Fork River. No cultural resources are anticipated to be impacted by the project. If potential cultural resources in

the project area are discovered during construction and cannot be avoided, CONTRACTOR shall suspend construction activities in that area until the properties can be evaluated for listing in the National Register of Historic Places in consultation with Colorado State Historical Preservation Office. The CONTRACTOR shall notify the ENGINEER and OWNER immediately if potential cultural resources are discovered during construction.

SECTION 4 IN-CHANNEL AND BANK CONSTRUCTION

4.01 CONSTRUCTION OF IN-CHANNEL BOULDER STRUCTURES

All Boulder Structures constructed In-Channel or below the Ordinary High Water Line (OHWL) shall be constructed with Footer Rocks and Keying Techniques (See Project Drawings). Construction of Boulder Structures shall include selection, rotation, placement and adjustment of each individual rock to minimize void spaces and maximize interlocking of boulders. The ENGINEER shall identify each imported boulder that may affect surface flow and observe the placement of as SELECT BOULDERS.

Boulder Structures shall be constructed by placing individual boulders in designed cross-sections of the channel. Each cross-section has specific elevations and alignments for the placement of rock as shown on the Project Drawings. Each structure shall include footer boulders extending to the depths shown in the plans. Stacked boulders shall have a minimum 0.5:1 horizontal to vertical slope with the footer offset in the upstream direction when buried and footer offset in all directions when exposed.

Each individual boulder shall be set with the "B" axis in the direction of flow when exposed or the "A" or "B" axis when the boulder is interlocked between other boulders (See Drawing Details). Minimum acceptable boulder size is 36 inches along the B-axis. Larger boulder sizes are required in specific areas as shown in the plans.

4.02 IMPORTED BOULDERS SPECIFICATION

Imported Boulders may be quarried or excavated and generally smooth in shape with the largest rock faces being approximately flat. Boulders shall be of a consistent material for the entire project and shall be a color that is aesthetically neutral with the native landscape. Boulder gradations shall conform to Table 2 by number, and measurement of the intermediate axis ("B"-Axis). The minor axis (shortest dimension or "C"-Axis) shall not be less than indicated in Table 2. Boulders exposed in the grade controls and keyed into the toe of each structure shall have a minimum intermediate axis (B-Axis) of 48 inches unless specified in the plans.

Table 2. B-Axis Rock Gradations (inches)

Percent of Stones	Indicator	24 inch (2 foot)	36 inch (3 foot)	48 inch (4 foot)	60 inch (5 foot)
< 10%	Greater	36	48	60	72
> 75%	Between	32&18	42&30	54&36	54&72
0%	Less	15	21	28	48
C-Axis	Greater	10	15	20	30

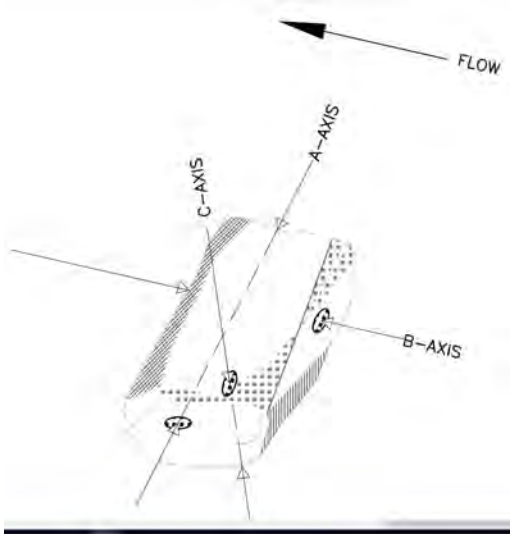


Fig 4.02-1 Dimensional axes of a boulder

Natural Boulders shall consist of hard, dense durable stone, resistant to weathering. Surface stones must have an aesthetic, neutral color and be consistent material throughout the project unless specified in plans. Stone shall be suitable for incidental human contact. CONTRACTOR shall submit source information and samples to ENGINEER.

The Engineer may require Contractor to furnish laboratory results if, in the Engineer's opinion, the material is marginal or unacceptable. At the request of the Engineer, the Contractor shall furnish laboratory test results indicating that the material meet the requirements including those for abrasion resistance and soundness as indicated below:

---Boulders shall have a minimum specific gravity of 2.65.

---Abrasion resistance by Los Angeles Machine; Test Method ASTM C535; Specification Requirement: 20% loss, maximum.

--Soundness by use of Sodium/Magnesium Sulfate, Test Method ASTM D5240-04 Standard Test Method for Testing Rock Slabs to Evaluate Soundness of Riprap by Use of Sodium Sulfate or Magnesium Sulfate; Specification Requirement: 5% loss, maximum.

--Soundness by Freezing and Thawing, Test Method ASTM D5312-04 Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions; Specification Requirement: 5% loss, maximum.

4.03 FILTER FABRIC SPECIFICATION

An undamaged Filter Fabric with Geo-Composite shall underlie all Exposed earthen embankment materials. Filter Fabric shall be placed to eliminate migration of fines through the boulder structures and allow water to drain from structure. A composite that provides drainage, **Hydrodrain 300** by**,** or approved equivalent shall be used at a minimum of 4 feet width on 10 feet center (approximately 40% of total Filter Fabric coverage). An acceptable non-woven 8oz

Filter Fabric, Mirafi 180N or equivalent, may be used for the bank coverage not overlaid by drainage. Filter Fabric shall be placed to have intimate contact with intact bank material. Washed Gravel bedding may be used to protect Filter Fabric from damage during boulder placement.

4.04 COARSE ALLUVIUM

Coarse alluvium is required in designated areas as shown on plans. The material will be produced by sorting excavated alluvium through a grizzly or other mechanical device. The spacing between the bars shall be set to 6 inches. Material not passing through the grizzly (i.e. diameter greater than 6 inches) shall be collected and used as Coarse Alluvium.

Coarse Alluvium shall be installed in areas shown on plans to a minimum thickness of 18-inches. Excavation of existing alluvium and replacement with Coarse Alluvium may be required to achieve the finished grade elevations shown on plans.

4.05 PROPOSED GRADING

CONTRACTOR shall establish and identify required lines, levels, contours and datum. Grade site to match all lines, elevations and grades shown on the Project Drawings. CONTRACTOR is required to accomplish all site grading through the use of GPS Control. The ENGINEER will provide a proposed XML compatible digital surface model and alignments to the CONTRACTOR. The CONTRACTOR shall have the means to load the alignments and surface into field survey controllers to establish proposed elevations and grades.

4.06 ACCEPTABLE AS BUILT ELEVATION VARIATIONS (feet)

Average Elevations across each Cross-Section shall be exact according to Plans. With natural building materials variances are expected and shall be allowed for average locations of individual particles. The following As-Built Variances are allowed.

Table 4.06-1. Acceptable As-Built Variances for Average Locations of Individual Particles (feet)

Description	Variance Elevation	Variance Horizontal
Top of CONCRETE Structure Bottom of GATE Structure	+0.1;-0.1	+/-0.5 bank alignment +/-0.5 channel alignment
Top of Stone Toe Protection (STP)	+0.5;-0.5	+/-2.0 bank alignment
Top of Wing Structures	+0.5;-0.5	+/-2.0 bank alignment
Cross Section Average	+0.0;-0.0	+/-0.0 bank alignment
Finished Grade – Alluvium*	+0.5;-0.5	Match average grading shown in plans
Finished Grade –Select Boulders*	+0.25;-0.25	+/-0.5

SECTION 5 CONSTRUCTION OF CONCRETE STRUCTURES

5.01 GENERAL

See Drawings CO1, CO2, SO1 and SO2 for specifications.

SECTION 7 LANDSCAPE INSTALLATION

7.01 PLANTINGS

The CONTACTOR is responsible to provide water suitable for establishment of vegetation. Water shall be free from pollutants harmful to plants.

7.01.A. Erosion Control Grasses

All upland soil areas within the Project Limits, disturbed by construction activities, shall be seeded with erosion control grasses. All mixes shall be Certified Seed that is weed free and native strands of Pure Live Seed (PLS). Table 7.01A provides the seed type and rate for all areas outside of the Riparian Corridor (Dryland Mix Species.)

Table 7.01.A – Type 1 Seed mix

Species	**PLS/Acre***
Western wheatgrass var. Arriba	35%
Thickspike wheatgrass var. Critana	25%
Alkali sacaton	10%
Bluebunch wheatgrass	10%
Indian ricegrass var. Rimrock	5%
Sideoats grama	5%
Bottlebrush squirreltail	10%
*drilled application=17lbs per acre, *broadcast application= 34 lbs. per acre.	

a) Soil Preparation: Place topsoil to a minimum of 6 inches in depth. Soil shall be graded and raked to 0.25'' to 0.5'' to create a seed bed. Soils must be moist prior to seed application. Sprinkle areas to be seeded with water, using fine spray to avoid washing or erosion of soil.
b) Seed Application: Within 48 hours of soil placement, broadcast seed at the specified rate and lightly rake into soil. Do not apply seeds when weather is too windy, hot or drying, or other adverse conditions exist. Immediately after seed application all areas shall have an Erosion Control Blanket overlaid and installed as specified in Section 3.8.
c) All areas that are not covered by erosion control blanket shall apply weed free straw 2 inches thick over the seeds to reduce erosion and wind losses. Do not use straw containing noxious weeds and foreign materials.
d) Broadcast hay or straw mulch and apply hydromulch in all seed areas except for areas covered by erosion control blanket.

7.01.B Riparian Plantings

All riparian areas shown in the plans shall be seeded with riparian transitional mix. All mixes shall be Certified Seed that is weed free and native strands of Pure Live Seed (PLS). Table 7.01B provides the mix for these application areas.

Table No 7.01.B. Type 2 Seed Mix

Species	**PLS/Acre***
Western wheatgrass var. Arriba	35%
Streambank wheatgrass var. Sodar	20%
Slender Wheatgrass var. San Luis	10%
Thickspike Wheatgrass 'Critana'	15%
Fowl Bluegrass vns	10%
Tufted Hairgrass vns	10%
*drilled application=19lbs per acre, *broadcast application= 38 lbs. per acre.	

Same soil and surface preparation and application instructions as listed above.

Any willows or native vegetation disturbed shall be replanted in equivalent coverage, at equivalent elevations, in existing open areas.

7.01.C Transplanting On-site Vegetation

Live willow/cottonwood pole plant harvesting. All live stakes shall be harvested during the dormant season from the gravel bar upstream of the project site on the north bank. All live stakes shall be harvested from a healthy parent that does not have serious injuries, insect pests, diseases or shriveled. No more than one-third of the donor shrub should be harvested. The CONTRACTOR shall take care to not damage the donor shrub; cuts shall be made smooth without damage to the bark of the donor shrub. Cuts shall be made at an angle of approximately 45 degrees, 6 to 8 inches above the ground, to assist rapid regeneration of donor plants. The minimum diameter of the cuttings should be 0.75 inch and the minimum length should be 40 inches; larger live stakes contain a greater amount of the stored energy required to form leaves, stems and roots. Recommended length of live stakes should be 72 to 96 inches, but site conditions will dictate final pole length. The top ends shall be blunt; butt ends shall be angled at 45 degrees. Stakes shall be stripped of all stems, leaders, and dry leaves, taking care to minimize scarring or bruising of the stakes. Immediately upon cutting, stakes shall be bundled and stored in a cool, dark, dry area at approximately 45°F or buried in snow. To increase success rates for planting, the harvested poles should be protected from exposure to wind or direct sunlight.

Live willow/cottonwood pole planting installation. All dormant willow/dogwood stakes shall be stored for less than 120 days and must remain free of mold and mildew. Stakes shall be soaked in water for 2-10 days prior to installation. Stakes shall be installed angle end

down to a depth equal to six inches below the low groundwater table (end of summer) and should not be planted in areas where there is no soil moisture.

7.01.D. Fertilizers

Planted trees shall be fertilized with a slow-release fertilizer, and placed deep into the planting hole and backfilled with soil to minimize fertilizer absorption by weeds and turf. Use a complete slow release fertilizer in a NPK ratio of 1:2:1, nitrogen, phosphate, and potash.

7.02 EROSION CONTROL BLANKET

All Natural biodegradable Erosion Control Blankets (ECB) shall be placed on all cut bank slopes as directed by the ENGINEER. Material shall be North American Green (800-772-2040) SC150BN, or approved equivalent that is all natural coir fabric with a tensile strength 164 lbs./ft, permissible shear force of 2.1 lbs./sqft, and mass of 0.5 lbs./sqyd.

Install per manufactures recommendations. Store all coir fabric elevated off the ground and ensure that it is adequately covered to protect the material from damage. Protect fabric from sharp objects that may damage the material. Materials damaged during transport, storage or placement shall be replaced at the CONTRACTOR expense. The ENGINEER shall inspect and approve all materials prior to installation.

7.03 TOP SOIL

Topsoil shall be salvaged a minimum of 6 inches in depth from all disturbed areas. Salvaged topsoil shall be stockpiled in areas that shall not interfere with construction phases and at least 15 feet away from areas of concentrated flows or pavement. The slopes of the stockpile shall not exceed 2:1 horizontal to vertical. A silt fence or other adequate erosion control shall be installed around the perimeter of each stockpile.

7.03. A. Top Soil Application

Top soil shall be applied to all areas for seeding and planting. Top soil shall be applied at a minimum of 6 inches depth on all seeded areas, and shall be used to backfill all shrub and tree plantings to the depth and twice the width of the root ball. Topsoil shall not be placed when the ground or Topsoil is frozen, or excessively wet. Following the spreading operation, the Topsoil surface shall be raked to final grades without surface irregularities that could contribute to concentrated waterflow downslope. Top soil shall be raked with 0.5 inch undulations for a seed bed.

7.03. B. Top Soil Material

Imported topsoil shall be a natural sandy loam that is weed free. Imported Topsoil shall be properly stored and protected, and shall be free of roots, hard clay and stones which shall not pass through a 1-inch square opening. It shall be a loamy mixture having at least 90 percent passing No. 10 sieve. Below list the soil properties:

1. Contain no less than 2 percent nor more than 13 percent organic matter, as determined by the test for organic matter in accordance with ASTM D2974.

2. Contain no less than 12 percent or more than 40 percent clay, as determined in accordance with ASTM D422.

3. Sand content shall not exceed 55 percent, as determined in accordance with ASTM D422.

4. The pH shall not be lower than 5.0 or higher than 8.0. The pH shall be determined with an acceptable pH meter on that portion of the sample passing the No. 10 sieve, in accordance with the ―Suggested Methods of Tests for Hydrogen Ion Concentration (pH) of Soils, included in the ASTM Procedures for Testing Soils issued December 1964.

5. One hundred percent shall pass the 1-inch screen; 97-100 percent shall pass the 1.5-inch screen, and 40-60 percent shall pass the No. 100 mesh sieve.

6. Topsoil shall be free of clods, gravel, and other inert material. It shall be free of thistle, reed canary grass, creeping foxtail, noxious vegetation and seed. Should such regenerative material be present in the soil, the CONTRACTOR shall remove, at his expense and in a manner satisfactory to the Owner's Representative, all such growth, both surface and root, which may appear in the imported Topsoil within 1 year following acceptance of the work.

7. All soil to be seeded shall be amended with Humate and fertilizer product. The method of incorporation of amendments shall result in a uniform application of material as approved. Humate shall be applied at a rate of 1500 pounds per acre. The humate shall be applied using approximately 1 gallon of water for 1 pound of dry powder. The fertilizer product shall be applied at a rate of 2000 pounds per acre.

SECTION 8 MODIFICATIONS TO TIME OF COMPLETION

8.1 CONSTRUCTION WINDOW

Construction is permitted through October 12, 2021. The IN-STREAM construction window is limited to December 1, 2020 through March 1, 2021. If IN-STREAM construction is anticipated to take place outside of these dates, CONTRACTOR shall notify OWNER in writing and seek approvals and extensions of permits. Upland construction may take place outside of these dates with OWNER approval. OWNER shall be notified 14 days in advance of any work anticipated outside of these dates.

All work on the headgate, ditch inlet channel and island shall be complete by the beginning of the 2021 irrigation season, which typically begins in April of each year. CONTRACTOR shall coordinate with the Robinson Ditch Company staff about the anticipated start of the 2021 irrigation season. The CONTRACTOR shall notify the owner 14 days in advance of any work anticipated within the irrigation season window.

No construction activities shall be performed on soil during periods when the soil is too wet to adequately support construction equipment as measured by ruts greater than 4 inches deep.

The date of beginning and the time for completion of the work are essential conditions of the Contract Documents and the work embraced shall be commenced on a date specified in the Notice to Proceed. The Contractor will proceed with the work at such rate of progress to ensure full completion within the Contract time. It is expressly understood and agreed, by and between the Contractor and the Owner, that the Contract time for the completion of the work described herein is a reasonable time, taking into consideration the climatic and other factors prevailing in the locality of the work. Every effort shall be made by the Contractor to complete the project within the "Contract Time" shown in the bid, quote or proposal. The "Contract Time" anticipates "Normal" weather and climate conditions in and around the vicinity of the Project site during the times of year that the construction will be carried out, which may include freezing conditions or high water.

SECTION 9 DEFINITIONS

B-Axis - The intermediate (and overturning) axis on a boulder.

Best Management Practices (BMPs) - Water and Soil Care Measures designed to prevent sediment soil erosion, minimize turbidity and protect wetlands.

Coffer Dam - Structure used to isolate an area for dewatering.

Ordinary High Water Line (OHWL) - Approximate Water Surface Elevation at the 1 ½ year Flood.

In-Channel Work - All construction work occurring below the ordinary high water line or one and a half year flood or in a wet channel.

Invert - The cross-section that controls water flow.

On-Shore Work - All construction work occurring above the ordinary high water line or one and a half year flood.

Protect-In-Place - Protection of Structures or Vegetation by not disturbing them with adjacent construction activities.

Thalweg - Lowest elevation of the river channel in cross section perpendicular to the direction of the main current flow.

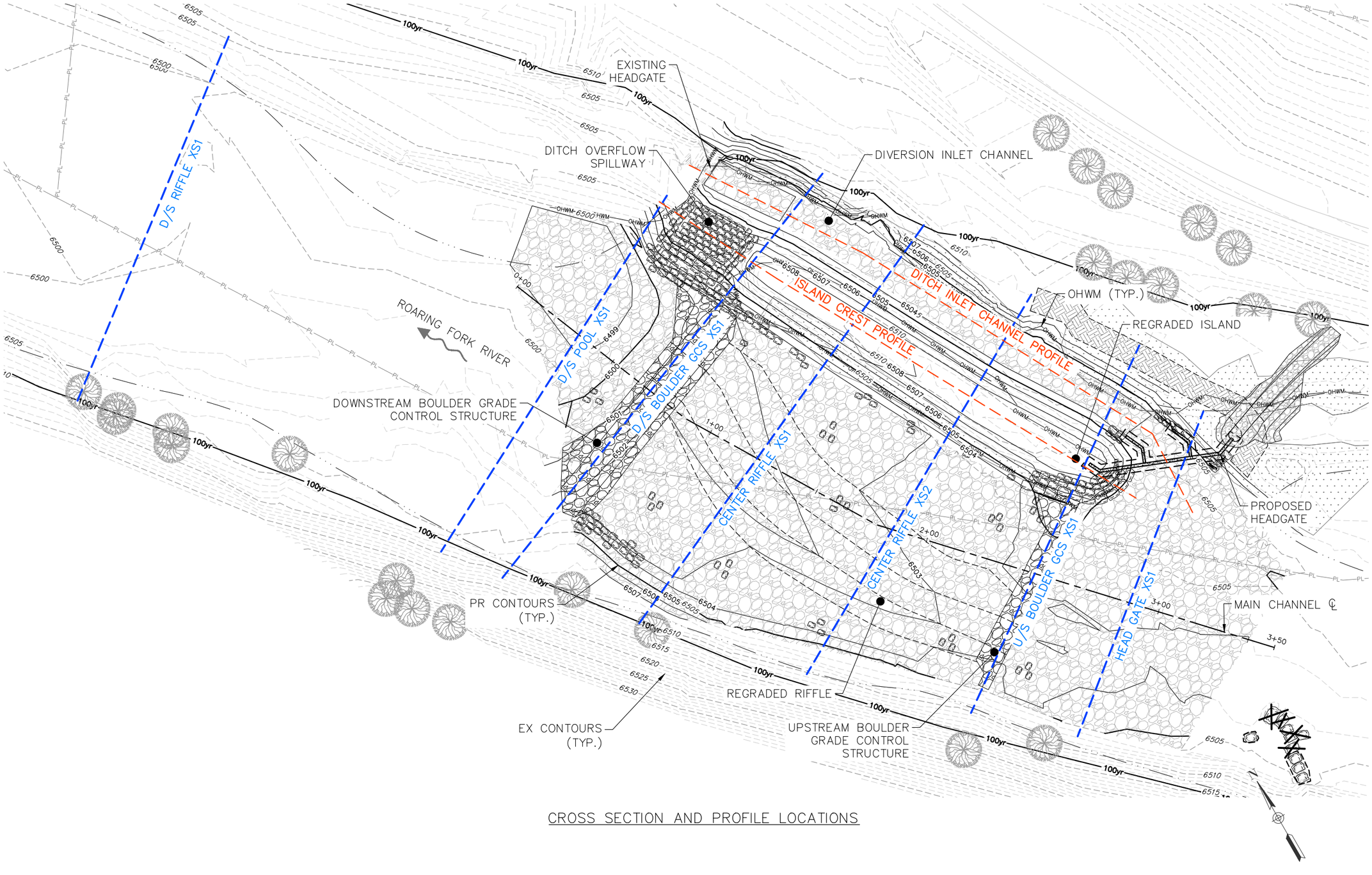
Toe - Point where a ground slope meets a low point and flattens out. Most commonly in rivers it refers to the point where the bank slope meets the channel bottom slope.

River Right - The right side of the channel when looking downstream.

River Left - The left side of the channel when looking downstream.

Riparian Vegetation - Vegetation which is rooted in the water table of the adjacent river.

Water Surface Elevation - Elevation on the project datum, of the surface of water at a specified location and flow rate.



CROSS SECTION AND PROFILE LOCATIONS

CONSTRUCTION SET

PROFESSIONAL ENGINEER STAMP

ROBINSON DIVERSION MODIFICATION

CROSS SECTION MAP

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Pitkin County
Courthouse Plaza
530 E. Main St. - 3rd Floor
Aspen, CO 81611

DESIGN FIRM NAME AND ADDRESS

RiverRestoration
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

PROJECT NAME AND ADDRESS

ROBINSON DITCH MODIFICATION
Roaring Fork River
El Jebel, CO 81621

Project	Sheet
38043	Fig 1
Date: OCTOBER 2020	
Scale: 1"=20' (FULL-SIZE)	

PROJECT: Robinson Diversion Modification Project ***Revision 2 -*** **11/16/2020**
Roaring Fork River - Eagle County, CO
BID SCHEDULE EXHIBIT -1

Item #	Description	Quantity	Unit	Unit Cost	Total Cost	Totals
	General					
1	Mobilization/ Demobilization/ Bonding/ Insurance	1	LS			
2	Approvals	1	LS			
3	Traffic Control	1	LS			
4	Construction Survey	1	LS			
5	Erosion and Sediment Control	1	LS			
6	Site Access	1	LS			
7	Care of Water Practices	1	LS			
8	Protect in Place	1	LS			
					Sub Total:	
	Upper Grade Control Structure					
9	Unclassified Excavation and Stockpile	486	CY			
10	Alluvial Grading	269	CY			
11	Hauloff and Disposal	216	CY			
12	Furnish Boulder	264	TON			
13	Place Boulder	264	TON			
					Sub Total:	
	Lower Grade Control Structure					
14	Debris Removal and Disposal	1	LS			
15	Unclassified Excavation and Stockpile	600	CY			
16	Alluvial Grading	428	CY			
17	Hauloff and Disposal	172	CY			
18	Remove and Stockpile Existing Boulder	240	TON			
19	Furnish Boulder	167	TON			
20	Place Boulder	407	TON			
					Sub Total:	
	Engineered Riffle and Bank Improvements					
21	Unclassified Excavation and Stockpile	965	CY			
22	Remove and Stockpile Existing Boulder	15	TON			
23	Alluvial Grading	377	CY			
24	Hauloff and Disposal	588	CY			
25	Coarse Alluvium Grading	138	CY			
26	Furnish Boulder	604	TON			
27	Place Boulder	619	TON			
28	Erosion Control Blanket	0	SY			
29	Furnish And Install Topsoil	0	CY			
30	Type 1 Seed Mix (Upland)	0	SY			
31	Type 2 Seed Mix (Riparian)	399	SY			
32	Transplant Willows and Cottonwoods	269	SY			
					Sub Total:	
	Robinson Diversion Headgate Improvements					
33	Existing Headgate Removal and Disposal	1	LS			
34	Unclassified Excavation and Stockpile	651	CY			
35	Hauloff and Disposal	184	CY			
36	Cast In Place Concrete With Structural Steel	100	CY			
37	Furnish and Install Headgate	2	EA			
38	Furnish and Install Headgate Safety Equipment	1	LS			
39	Structural Backfill	0	CY			
40	Furnish Boulder	154	TON			
41	Place Boulder	154	TON			
42	Alluvial Grading	467	CY			
43	Erosion Control Blanket	87	SY			
44	Furnish And Install Topsoil	15	CY			
45	Type 1 Seed Mix (Upland)	400	SY			
46	Type 2 Seed Mix (Riparian)	729	SY			
47	Transplant Willows and Cottonwoods	97	SY			
					Sub Total:	
	Added November 16, 2020					
48	Vehicle Tracking Pad/Construction Entance	1	LS			
49	Replace 6-inch Concrete Sidewalk	600	SF			
50	Replace Concrete Curb and Gutter	60	LF			
					Sub Total:	
	TOTAL LUMP SUM BID			**TOTAL:**		
	Signature:					
	Date:					

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT
1325 J STREET
SACRAMENTO CA 95814-2922

November 10, 2020

Regulatory Division (SPK-2020-00618)

Pitkin County Healthy Rivers and Streams
Attn: Ms. Lisa MacDonald
530 East Main Street, Suite 302
Aspen, CO 81611
Lisa.macdonald@pitkincounty.com

Dear Ms. MacDonald:

We are responding to your request for a Department of the Army (DA) permit for the Robinson Diversion Modification project. The approximately 1-acre project site is located on the Roaring Fork River, approximately 2 miles downstream of the confluence of the Frying Pan River, at Latitude 39.369682°, Longitude -107.070959°, Eagle County, Colorado.

Based on the information you provided to this office, the Robinson Diversion Modification project involves the discharge of dredged and/or fill material into waters of the United States for the purposes of improving ecological function, recreational boater passage, and fish passage, subject to Section 404 of the Clean Water Act. The specific activities that require DA authorization are the movement and placement of earthen materials to construct a permanent riffle with upstream and downstream boulder grade-control structures, grading and shaping of banks, removal or movement of existing boulders within the channel, and the construction of cofferdams to complete the work. These activities will result in permanent effects to 350 linear feet of the Roaring Fork River and 0.08 acre of palustrine emergent wetlands. The proposed activities would be conducted in accordance with the Regional General Permit 12 pre-construction notification and plans dated October 2020.

We have determined that activities in waters of the United States associated with the project are authorized by Regional Permit (RGP) 12 for Aquatic Habitat Improvements for Stream Channels in Colorado. Your work must comply with the terms and conditions of Regional General Permit 12, which are available on our website at http://www.spk.usace.army.mil/Missions/Regulatory/Permitting/Regional-and-Programmatic-General-Permits/. In accordance with General Condition 1, you shall submit a signed copy of the enclosed Compliance Certification upon completion of the work. In addition, your work must comply with the following **special conditions**:

1. You shall complete all work within waters of the United States, between December 1st and March 1st or between August 1st and October 1st of each year

this verification is valid. No cofferdams shall be left in place while work in waters of the United States is postponed due to these timing restrictions.

2. To ensure success of the stream enhancements, you shall conduct monitoring in accordance with your October 2020, Revised Monitoring Plan. You shall submit annual monitoring reports to this office for 5 years following completion of the project. Monitoring reports shall be submitted to this office by December 31 of each year and shall continue until the Corps has determined that the site is functioning as designed.

This verification is set to expire on October 12, 2021. However, you will have until October 12, 2022, to complete the work if, at the time the permit expires, you have commenced work or are under contract to commence work authorized by this verification. Failure to comply with the terms and conditions, including the project-specific special conditions of this authorization, may result in the suspension or revocation of your authorization.

We would appreciate your feedback on this permit action including your interaction with our staff and processes. For more information about our program or to complete our Regulatory Program national customer service survey, visit our website at www.spk.usace.army.mil/Missions/Regulatory.aspx.

Please refer to identification number SPK-2020-00618 in any correspondence concerning this project. If you have any questions, please contact me at the Colorado West Regulatory Section, 400 Rood Avenue, Room 224, Grand Junction, Colorado 81501, by email at Benjamin.R.Wilson@usace.army.mil, or telephone at 970-243-1199 ext. 1012.

Sincerely,

Benjamin R. Wilson
Project Manager
CO West Section

Enclosure

cc:
Quinn Donnelly, RiverRestoration, quinn.donnelly@riverrestoration.org
Morgan Beryl, Eagle County, Morgan.beryl@eaglecounty.us
Kendall Bakich, Colorado Parks and Wildlife, kendall.bakich@state.co.us
Joel Berschauer, Colorado Department of Transportation, joel.berschauer@state.co.us
Bill Reynolds, Robinson Ditch Company, breynolds@sopris.net

P.O. Box 850
500 Broadway
Eagle, CO 81631-0850
Phone: (970) 328-3560

Permit

Permit No. **FDP-019473-2020**
Permit Type: **Floodplain Permit**
Work Classification: **Major**
Permit Status: **Active**

Issue Date: **12/14/2020** Expires: **10/12/2021**

Project Address	Parcel Number
1900 WILLITS LN BASALT AREA, CO	**246511400034**

Contractor	Phone
Diggin It River Works, Inc. Brian Barackman	**(970) 306-2288**

Inspections:

For Inspections Call:
(970) 328-3560

Fees Due	Amount
Floodplain Application Fee (Major)	$500.00
Total:	**$500.00**

Invoice #	Total	Amt Paid	Amt Due
00075624	$500.00	$500.00	$0.00

Proposed Construction / Details: Floodplain Development Permit and consolidated Grading Permit for modification to the Robinson Diversion on the Roaring Fork River located ~700 feet downstream of the Highway 82 Bridge. The project includes:.
- Removal of the existing metal headgate
- Construction of:
-- new headgate for the diversion channel
-- a new main channel boulder grade control at the upstream end of the site
- Reconfiguring the existing main channel boulder grade control at the downstream end of the site
- Regrading the alluvial riffle between the two boulder grade control structures
- Regrading the existing alluvial "island" to better separate the main channel from the diversion channel.

All grading shall be in accordance with the Eagle County Land Use Regulations, the International Building Code and in accordance with this approved Grading Permit, signed by the Eagle County Engineering Department on December 14, 2020. Failure to comply with these conditions may result in the issuance of a Stop Work Order until compliance is achieved. The following conditions are the most common violations:
- Sediment must be prevented from running off the site through the use of best management practices (BMPs) described in the approved plans.
- Dust must be prevented from leaving the site through the use of BMPs described in the approved plans.
- Disturbed soils must be re-vegetated with an acceptable native seed mix within fourteen (14) days after the work is completed or if the work is suspended.

No slopes shall exceed a 2:1 slope, and this approved grading permit does not constitute review or approval of future plans.
All work must be performed within the limits as shown on this approved grading plan.
As per ECLUR Article 4, Section 4-665, any development within 100 feet of a stream must comply with Erosion Control Standards.
This floodplain development and grading permit has a start date of December 14, 2020, and will expire on October 12, 2021. If grading is not complete at that time, the permit holder must apply for an extension.

Please contact Nicole Mosby at the Eagle County Engineering Department (Nicole.Mosby@eaglecouty.us or 970-328-3564) to request and extension or when the work is complete for final inspection and permit closeout.

This permit expires and becomes null and void if any work authorized by this permit is not completed by the expiration date of 10/12/2021. One extension may be requested by contacting the Eagle County Engineering Department @ (970) 328-3560.

Permit is not valid unless accompanied by approved field set of construction plans.

Nicole Mosby		**December 14, 2020**
Issued by: Eagle County, CO	Authorized Signature	Date