LOWER FOURMILE CREEK STREAM RESTORATION

LOCATION: FOURMILE CANYON DRIVE
TYPE OF WORK: DRAFT 30% STREAM RESTORATION PLANS

NOTES:
1. RIFFLES TO BE CONSTRUCTED BETWEEN PT AND PC. SEE TYPICAL RIFFLE CROSS SECTION DETAIL AND CONSTRUCTED RIFFLE DETAIL.
2. RUN-POOL-GLIDE SEQUENCE TO BE CONSTRUCTED BETWEEN PC AND PT. SEE TYPICAL POOL CROSS SECTION DETAIL, TYPICAL PROFILE DETAIL, AND CONSTRUCTED POOL AND POINT BAR DETAIL.
3. POOL LENGTH, WIDTH, AND DEPTH VARY PER TYPICAL DETAILS. POOL LENGTH, WIDTH, AND DEPTH MUST VARY BETWEEN POOLS.
1. The contractor is required to install in-stream structures using an excavator or equivalent with a hydraulic thruster of sufficient size to place boulders, logs, and rootwads.

2. Work is being performed as an environmental restoration plan. The contractor should make all reasonable efforts to reduce sediment loss and minimize disturbance of the site while performing the construction work.

3. The contractor shall call utility notification center of Colorado 2 – business days in advance before digging, grading, or excavation for the location of underground member utilities.

4. Proposed channel alignment is intended to cause minimal disturbance to the existing trees and vegetation. The on-site engineer reserves the right to make field-fit changes to these plans and details to further reduce disturbance.

5. No field-fit changes shall be made without engineer being present on-site and without their concurrence.

6. This is a preliminary plan set that was completed to evaluate major design features prior to advancing to the design-build phase. Construction shall not begin, or continue, without engineer being present. As such, the engineer reserves the right to make design modifications to improve stream function and/or constructability. Modifications may not be limited to grading modifications, changes in materials, type, change in material size, change in material placement, etc.

7. Construction shall begin at the upstream end of the project and continue to the downstream end in order to avoid damaging previously completed work.

8. The contractor shall confirm the receipt of all necessary permits and approvals before the start of construction.

9. The contractor shall conduct their operations in such a way that the area of disturbance is minimized. All existing trees, shrubs and vegetation shall be protected unless otherwise noted on the drawings. No trees shall be removed without approval from landowner, Boulder County, and Fourmile Creek Coalition.

10. For all site grading, gradual, parabolic transitions shall be made between changes in slope.

11. The contractor shall be solely responsible for providing stable excavations and temporary slopes and for satisfying all applicable federal, state, and local regulations.

12. Construction of the proposed work will take place within the channel and water control measures will be required. The contractor shall be responsible for the acceptance and control of damages of water areas adjacent to crown crease and its tributaries due to soluble ions and soluble salts by following the methods and means of groundwater and surface water control. Appropriate for construction in accordance with the requirements of the project drawings and specifications and all applicable federal, state, and local regulations and all permits.

13. The contractor shall be responsible for protecting and maintaining in continuous operation, all existing structures, not all potentially impacted structures may be shown on the drawings and it is the contractor's responsibility to identify and protect all structures included but not limited to streets, curbs and gutters, bridge piers and abutments, creek bank protection of various types, creek drop structures, slope, pedestrian systems, retaining walls and fencing. In the event that a structural integrity is damaged during construction the contractor shall immediately notify Boulder County in writing and shall provide Boulder County with Boulder County requirements.

14. All structures shall be in accordance with the Boulder County, CDT standards and specs, Boulder County Multimodal Transportation Standards, Boulder County drainage criteria manual, and project special provisions, unless specified differently otherwise on these plans and associated specifications.

15. The contractor shall maintain at the site at all times one signed copy of the project drawings and specifications, one copy of Boulder County standards, CDT standards and specs, Boulder County Multimodal Transportation Standards, Boulder County drainage criteria manual, and project special provisions, and one copy of all required permits.

16. The contractor shall be responsible for preparing and submitting as built drawings to Boulder County.

17. The contractor shall prepare and maintain the Stormwater Management Plan and obtain the National Pollution Discharge Elimination System (NPDES) permit through the Colorado Department of Public Health (CDPH).

18. The contractor shall provide daily on-site survey control to the level of detail required to evaluate construction versus these design plans.

19. The project engineer shall be on-site during construction to help interpret design plans.

20. The proposed plans were based on November 2013 LiDAR information and not detailed survey data. As a result, existing topography information shown on this plan set is approximate only and actual conditions may vary.

21. Flood debris removal is part of this project and consists of woody material and alluvium. The location and quantity of flood debris removal has not been determined. Flood debris removal will be determined by the engineer during construction.

22. Root wads, logs, and other woody debris found on site which meets criteria to be used bank protection such as root wads or toe wood be placed on site and used for these structures based on engineer's guidance.

23. Some sections of creek may be left as a potential channel and will be channelized to conform to existing channel conditions. These locations will have been identified on the plans.

24. Roadway contractions and edges shown on proposed plans are approximate.

25. The contractor will work with the engineer to identify alluvium and floodplain debris to be removed.

26. The contractor will work with residents to identify access points.

27. Nine existing utilities run through the project site. In the event that these utilities are encountered the contractor shall notify Boulder County and reference Colorado Division of Mining Reclamation and Safety Procedure for Handling Hazardous Materials.

28. It is anticipated that structures will be harvested from the project site or from a nearby location. As directed by the engineer. Boulders will be held on site in either side in the same dimension, preferably the long dimension.

29. All equipment must be powered with a fire extinguisher, to prevent the transport of non-native species from previous construction sites. The equipment must be inspected by the Boulder County project manager prior to being used on the project.

30. Construction equipment, fuels, lubricants, and other petroleum distillates shall not be stored or stockpiled within 50 horizontal feet of the creek or other aquatic habitats. Equipment fueling and servicing shall occur only within designated areas.
**TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS**

**NOTES:**
1. Ensure construction corners of streambanks will be sealed and overlap the erosion control fabric.
2. Pool areas must be kept open with void pool only.

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**LOW FLOW POOL**

**LOW FLOW CHANNEL**

**BANKFULL CHANNEL**

**CONVERGING BOULDER CLUSTER**

**BOULDER TOE PROTECTION**

**REFERENCES**

1. Riffles to be constructed between PT and PC. See typical riffle cross section detail and constructed riffle detail.
2. Run-pool-glade sequence to be constructed between PC and PT. See typical pool cross section detail, typical profile detail, and constructed pool and point bar detail.
3. Pool length, width, and depth vary per typical details. Pool length, width, and depth must vary between pools.
EXCAVATE POOL AND APPLY EXCAVATED MATERIAL TO POINT BAR

BANKFULL FLOW

LOW FLOW

FLOW

BANKFULL CHANNEL

BOULDER STEP CREST

EXCAVATED POOLS

POOL

A'

B'

A

B

POOL LENGTH = 25' (MAX.)

STEP HEIGHT = 2.5' (MAX.)

PLACE EXCAVATED MATERIAL INSIDE OF CHANNEL BEND. COMPACT MATERIAL WITH EXCAVATOR BUCKET.

4' MINIMUM SILL ON-SITE ALLUVIUM

WELL GRADED ALLUVIUM WITH D50 = 6"

12' MIN.

30" HEADER BOULDER

30" FOOTER BOULDER

LARGER STONE MAY BE PLACED TO REDIRECT FLOW AT DIRECTION OF ENGINEER

MICRO SCOUR POOLS PLACED AT ENGINEERS DIRECTION

4. PLANT BANKS USING MATERIAL WITH EROSION CONTROL

PROTECT BANKS USING ROOT WADS, TRANSPLANTS, OR TOE WOOD WITH SOIL WRAPPED LIFTS. (SEE DETAIL)

MIN. 4' KEY

TOE OF CHANNEL

TOP OF BANK

BEGIN HEAD OF RIFFLE INVERT (PT) ELEVATION AND STATION

BEGIN TAIL OF RIFFLE INVERT (PC) ELEVATION AND STATION

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3. POOL LENGTH, WIDTH, AND DEPTH VARY PER TYPICAL DETAILS. POOL LENGTH, WIDTH, AND DEPTH MUST VARY BETWEEN POOLS.
NOTES:

1. TOE WOOD WITH SOIL WRAPPED LIFT TO BE USED AS NEEDED FOR BANK STABILIZATION WITH GUIDANCE FROM ENGINEER

2. BANK PROTECTION SHALL BE EXTENDED A MINIMUM OF 10 FEET UPSTREAM OF PC 10 FEET DOWNSTREAM OF PT UNLESS OTHERWISE NOTED.
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