OPERATION, INSPECTION, & MAINTENANCE PLAN FOR ST. VRAIN CREEK REACH 3 RESTORATION

Prepared by:

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Operation, Inspection, & Maintenance Plan

For

St. Vrain Creek Reach 3 Restoration

Prepared for:

Boulder County

Boulder County
Parks & Open Space

Prepared by:

ERC

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1.0 OVERVIEW

Significant flooding and damage occurred along the St. Vrain Creek during the September 2013 flooding in Boulder County, Colorado. The Engineering Analytics (EA) Team consisting of Engineering Analytics, Inc., Ecosystem Services, LLC (Ecos), and Ecological Resources Consultants, Inc. (ERC), was retained by Boulder County Parks and Open Space (BCPOS) to provide a design and to aid in the implementation of the St. Vrain Restoration Project for restoration of the St. Vrain Creek and the adjacent riparian corridor for the area known as "Reach 3" between US Highway 36 and Crane Hollow Road. Construction of St. Vrain Restoration Project (Project) was completed in May 2018 and to aid the maintenance and longevity of work these guidelines have been prepared.

A set of guidelines and recommendations similar to this report is based on past experience and anticipation of future problems. This set of guidelines should be maintained, updated and revised as the project ages and the unique environmental aspects are encountered. As the Project experiences large storm events or other significant events the features of the Project should be evaluated by Boulder County or the design engineers. Additionally, Boulder County and the design engineers should be kept abreast of any maintenance issues.

1.1 General Recommendations

The following recommendations are adapted from the NRCS National Operations and Maintenance Handbook and Boulder County documents.

- Inspections of the structures and plantings should be conducted to accomplish the following items
    - Assess performance structure;
    - Determine compliance with the O&M Plan;
    - Assess the adequacy of previous O&M activities;
    - Identify O&M needs;
    - Identify conditions that may threaten life and property;
    - Identify any changed conditions that may affect the integrity of the structure
    - Identify any changes that may affect performance
    - Develop a schedule to address O&M needs.
- Inspections should be conducted on an annual basis or following the occurrence of a major event such as floods, large flows, spring runoff, earthquakes, and or vandalism.
- Inspections should occur when the site conditions are safe typically following high flows and after the stream flow has returned to a safe level.
- Inspections of all structures including banks, rock, wood, and structures should include observations for accelerated weathering, displacement, or significant changes since the original construction.

- Inspections and monitoring of the channel banks and around structures for excessive scour, erosion, or aggradation that threatens to undermine critical constructed features and/or compromise project goals.
- Vegetation and plantings should be inspected every week or two during the first year after construction and regularly in subsequent years.
- To maintain and encourage growth of desired vegetation plant management including watering, weeding, mulching, reseeding, removal of invasive plans, and replanting may be required.
- In addition to plant management the vegetation should be monitored from damage from disease, animals and insects. Appropriate measure should be taken to protect the vegetation for disease, animals and insects as required.
- Damage from soil movement including settlement and/or large cracks should be investigated to determine the cause and if repairs are warranted.
- Debris that could cause damage to Project or structures should be removed.
- Burrowing animals ie. muskrats, voles, prairie dogs etc. should be controlled and prevented from establishing on the breach repairs and other project structures. Any damage caused by burrowing animals to the structures should be filled and repaired immediately.
- It is our recommendation that mowing and fertilizing does not occur within 35 feet of the stream.
- We recommend that a record of all inspections should be maintained and contain the following:
    - Date(s) of inspection;
    - Names of inspectors and participants;
    - Features of the practice that were inspected;
    - Description of conditions observed, including photographic documentation;
    - Maintenance work required; and
    - A schedule to address O&M needs.
- Review Boulder County's Noxious Weed Plan for additional information on weed control.

1.2 Additional Recommendations

- The design plans should be evaluated before conducting any maintenance activities
- Lateral movement of the creek and condition of the riffles, pools, glides and point bars should be monitored and documented. As with non-fixed structures, movement should be accepted, however excessive movement or erosions should be evaluated by the owner and an engineer.

- When excessive movement has occurred the structures should be analyzed to ensure that the new configuration is incompliance with the design and repaired as required.
- The riffles, pools, and point bars are expected to morph shape over time, however if head cuts occur and are starting to propagate upstream, an engineer's evaluation should take place.
- Monitor seeding areas to determine vigor and success of seeding efforts. Apply additional amendments and reseed areas that remain void of vegetation after initial seeding.
- Erosion control blankets should be monitored for the first three years to ensure that they do not dislodge and compromise the erosion they are designed to prevent.
- Walk through and look at all plants and cages. Replant, adjust, add cages as necessary to ensure plants and cages are complete and correct. Note plants flagged by BCPOS as needed to be fixed.
- Maintain breach repairs by removing trees from berms within a 40-foot buffer, or as otherwise specified by the engineer.

2.0 WHEN MAINTENANCE IS REQUIRED?

2.1 Examples of When Maintenance Is Required?

Adapted from the South St. Vrain Creek Operations and Maintenance Plan (Matrix, 2017)

Structure backfill is washing out. Backfill behind an in-channel or bank stabilizing structure will compromise the stabilizing function of the installed structure.	Boulders for an in-channel or bank stabilizing structure become dislodged or displaced. Displaced or failed portions of the structure could cause damage to the entire project reach.	Invasive species take over the disturbed area, outcompeting the native seeding, cuttings, and container plants that were installed at time of construction.
		
A property owner scavenges boulders from the in-channel structures for yard landscaping. All placed and installed features must remain intact throughout the duration of the O&M agreement.	Seeding and container plants do not survive due to circumstances outside the sponsor's control, for example extreme drought, fire, and/or high flows wash material away. Replacement of plant material that does not survive is highly recommended. Consult with an ecologist prior to replacement to confirm failure mechanism, timing, and planting strategies.	The river has compromised the function of the bioengineering or riprap.

2.2 Examples of When Maintenance Is Not Required

Adapted from the South St. Vrain Creek Operations and Maintenance Plan (Matrix, 2017)

Sediment and wood debris are deposited on a floodplain bench. Benches are designed to capture and hold these materials.	Bankfull channel dimension changes and/or minor bank erosion occurs. Minor lateral migration of the bankfull channel is expected as stream channels adjust and natural stream processes occur. Adjustments that do not compromise the project goals do not warrant intervention.	A significant flood event occurs beyond the projects design parameters and undermines or causes failure of installed structures.
		

3.0 REFERENCES

South St. Vrain Creek Operations and Maintenance Plan (Matrix design group, 2017)