



Land Use

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302 • Tel: 303.441.3930 • Fax: 303.441.4856
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

BOARD OF COUNTY COMMISSIONERS

AGENDA ITEM

November 29, 2016 – 3:30 P.M.

Hearing Room, Third Floor, County Courthouse, Boulder

PUBLIC HEARING

STAFF PLANNER: Christian Martin, Staff Planner – Flood Recovery

Docket LU-16-0028: BOULDER COUNTY PARKS AND OPEN SPACE – Left Hand Creek Restoration (Bielins Hock)

Request: Limited Impact Special Use Review for a flood-related project to restore and stabilize an 800 linear feet length of Left Hand Creek on the Bielins-Hock property consisting of 9,260 cubic yards of earthworks.

Location: 9067 Ogallala Road, 849 N 95th Street, 8440 Diagonal Highway, and 0 RR Longmont.

Zoning: Agricultural

Applicant: Eric Lane, Boulder County Parks and Open Space

Property Owner: Boulder County

SUMMARY AND RECOMMENDATION:

The proposal seeks to undertake restoration and stabilization works consisting of 9,260 cubic yards of earthworks along approximately 800 linear feet of Left Hand Creek that suffered damage during the 2013 flood event. Staff finds the proposal, with the recommended conditions of approval, meets the applicable criteria and recommends **CONDITIONAL APPROVAL**.

DISCUSSION:

Proposal

Boulder County Parks and Open Space (POS) is proposing to undertake stream restoration and bank stabilization along an 800 linear feet stretch of Left Hand Creek on the county owned Bielins-Hock property. Approximately 9,260 cubic yards of earthworks are required. The project area is currently mapped as a regulatory floodplain.

The following works are proposed:

- Bank stabilization (buried rock riprap and revegetation) to reduce erosion to protect the Longmont-Boulder Regional Trail (LoBo) and the Burlington Northern and Santa Fe Railway;
- Establish a low flow channel along the post-flood alignment; and
- Re-vegetation.

Of the 9,260 cubic yards of earthworks, an excess of 1,223 will likely be hauled to another POS flood recovery project. Access to the site will be from the Diagonal Highway and the LoBo trail. A staging area is provided for adjacent to the LoBo trail. Closure of the LoBo trail is only expected for short periods. Final erosion and sediment control measures will be developed by the selected contractor; Best Management Practices have been provided as part of the application. Haul routes, a traffic management plan, and stormwater management have not yet been finalized but will be prior to construction commencing.

Construction is anticipated to commence in late winter or early spring 2017.

Site Description

The subject site is located just east of the Diagonal Highway approximately 1.5 miles south of Longmont. The surrounding area is primarily agricultural in character; three residences are located adjacent to the work area. The LoBo trail and the Burlington Northern and Santa Fe Railway line are located directly to the west of the work area.

Site History

During the 2013 flood event, an instream plug upstream of the subject site caused floodwaters to overflow the bank and cut a new channel. Stream flow has used the new channel since flood waters receded.

Directly after the 2013 event, debris was removed to reduce flood potential and an exposed gas pipe was removed. More debris was removed in 2016 via a POS and Lefthand Watershed Oversight Group joint project. Little reshaping or stabilization works have been attempted.

REFERRAL RESPONSES:

The application was referred to the standard agencies and adjacent property owners. Copies of all responses received by the Land Use Department are attached. A summary of each response follows:

Boulder County Building Safety and Inspection Services Team: Response states a Stream Restoration Permit (combined Grading Permit and Floodplain Development Permit) and observation reports from the design engineer (or other qualified engineer) will be required.

Boulder County Transportation Department – Development Review Team: Response requires the submission of a traffic control plan, restricted haul hours (8:30 a.m. – 4 p.m.), coordination with Boulder County’s Transportation Trails Planner regarding the LoBo Trail, and erosion control measures.

Boulder County Transportation Department – Floodplain Review Team: The project area is within the Left Hand Creek regulatory floodplains. A floodplain development permit is required (part of the stream restoration permit) and must include either a no-rise analysis or an approved Conditional Letter of Map Revision from FEMA. Demonstration of coverage under a USACE Nationwide or Individual 404 permit is also required.

Boulder County - Parks and Open Space (POS): This agency reviewed the proposal and noted the significant improvements that will likely result. Specific information regarding the delineation of existing vegetation, use of biodegradable hydraulic fluid and spill kit, steam cleaning of machinery, retention of some downed woody material, timing of dead tree removal, weed free material use, final staging areas, vegetation monitoring and protection responsibilities, and weed management practices was requested or required.

Boulder County Historic Review: The referral letter identified Left Hand Creek as Archeological Sensitive Travel Routes and requests a condition be included that any cultural resource inventories or background documentation are provided prior to construction commencing.

Boulder County Public Health – Environmental & Water Quality Divisions – This agency confirmed they had no concerns with the project as proposed.

Boulder County – Surveyor: This agency confirmed they had no concerns with the project as proposed.

Xcel Energy This agency requested caution and adherence to minimum clearance distances during construction from overhead electric distribution facilities. Overhead lines cross the subject properties in two locations.

City of Longmont: Significant sediment build up in the City of Longmont has been occurring since the 2013 flood. The City would like POS to consider using the Bielins Hock property as the site for mitigation works to reduce the amount of sediment reaching and having to be removed from the City of Longmont.

Left Hand Water District: No concerns noted; however, recommendation to locate a water transmission pipeline located just southwest of the project prior to work commencing.

Adjacent Property Owners: 54 referrals sent; one comment in opposition received.

Kelley (9067 Ogallala Road; neighbor to the south): Ms Elizabeth Anne Kelley objects to the proposal due to: lack of adequate notice or ability to respond; lack of involvement by POS; site disturbance will negatively impact natural areas and environmental resources; high intensity of work is inconsistent with surrounding environment; simplest solution is to reestablish the pre-flood alignment; the project is a poor allocation of county funds; Ms Kelley reserves claims to land due to channel relocation and does not grant permission for county employees or agents to enter her property; and the Commissioners should at least postpone consideration of the project to consider alternatives.

CRITERIA REVIEW:

Article 4-601 of the Boulder County Land Use Code sets the standards for Uses Permitted by Limited Impact Special Review. This proposal has been reviewed for earthworks in excess of 500 cubic yards per these criteria and finds the following:

- (1) Complies with the minimum zoning requirements of the zoning district in which the use is to be established, and will also comply with all other applicable requirements;***

The project is located within the Agricultural zoning district and the Floodplain Overlay district for Left Hand Creek.

The project includes work within an Area of State Interest as an area containing archaeological resources, an area containing natural resources, and a flood and geologic hazard area as per Article 8-308 of the Land Use Code. Such work would require a 1041 review and approval; however, Article 8-405.E requires the 1041 review “*unless the development is otherwise regulated with full and binding effect under other Articles of this code.*” The Land Use Department has in a number of instances substituted the Limited Impact process for 1041 review for earthwork projects in flood hazard areas as the scope of the projects are relatively small and typically the impacts of these projects are localized to the

site under consideration. In this case, Limited Impact Special Use review is therefore allowed as the substitute process given the proposed earthwork is greater than 500 cubic yards.

The application outlines that as an Emergency Watershed Project, US Fish and Wildlife and State Historic Preservation Office vetting is undertaken for compliance with federal regulation. Other applicable requirements, which have been incorporated as recommended conditions of approval, include obtaining a stream restoration permit (combined grading permit and floodplain development permit), and a 404 permit as required by the US Army Corps of Engineers.

With the proposed conditions of approval, this criterion is met.

- (2) ***The use will be compatible with the surrounding area. In determining compatibility, the Board should consider the location of structures and other improvements on the site; the size, height and massing of the structures; the number and arrangement of structures; the design of structures and other site features; the proposed removal or addition of vegetation; the extent of site disturbance, including, but not limited to, any grading and changes to natural topography; and the nature and intensity of the activities that will take place on the site. In determining the surrounding area, the Board should consider the unique location and environment of the proposed use; assess the relevant area that the use is expected to impact; and take note of important features in the area including, but not limited to, scenic vistas, historic townsites and rural communities, mountainous terrain, agricultural lands and activities, sensitive environmental areas, and the characteristics of nearby development and neighborhoods;***

The subject area and surrounds are primarily utilized for agricultural uses in addition to three major transportation routes (the Diagonal Highway, the LoBo Regional trail, and the BNSF rail line) directly to the west of the subject area. Three residences are in relatively close proximity to the site

The proposed works are designed to protect the adjacent rail line and LoBo trail via stabilization of the west bank of the stream with buried riprap and vegetation. This approach will, in time, appear consistent with the character of the surrounds. The loss of the natural cut banks that resulted from the flood are balanced by the significant benefit of infrastructure protection.

- (3) ***Will be in accordance with the Boulder County Comprehensive Plan;***

The subject property has various Comprehensive Plan designations including Riparian Area, Riparian Habitat Connector, Public Lands, Important Agricultural Lands of National Significance, Open Corridor (Roadside), and Archeological Travel Route. These designations highlight that creek corridors are important ecological areas which should be protected and preserved.

The rehabilitation of the project area will result in significant ecological benefits for Left Hand Creek in this area, thereby supporting the goals of the Boulder County Comprehensive Plan to restore ecosystems as outlined in the Environmental Resources Element.

A number of preferences and requirements were articulated in the referral letter (dated November 7, 2016) from Parks and Open Space (POS) that will be conditions of approval broadly covering specific construction practices, existing vegetation delineation, and revegetation practices.

A letter indicating no concerns from History Colorado has been submitted. A condition requiring submission of any cultural resource inventories or background documentation will also be imposed as a condition of approval.

Overall, the proposal meets this criterion.

- (4) ***The use will not result in an over-intensive use of land or excessive depletion of natural resources. In evaluating the intensity of the use, the Board should consider the extent of the proposed development in relation to parcel size and the natural landscape/topography; the area of impermeable surface; the amount of blasting, grading, or other alteration of the natural topography; the elimination or disruption of agricultural lands; the effect on significant natural areas and environmental resources; the disturbance of plant and animal habitat, and wildlife migration corridors; the relationship of the proposed development to natural hazards; and available mitigation measures such as the preservation of open lands, the addition or restoration of natural features and screening, the reduction or rearrangement of structures and land disturbance, and the use of sustainable construction techniques, resource use, and transportation management;***

The use of the land will not change. The disturbance to habitat will be for a limited period during construction and is not expected to unduly disrupt wildlife. Ecological benefits are anticipated in the long-term.

Overall, the proposal will not constitute an over-intensive use of land nor will it deplete natural resources on the site. With the proposed conditions of approval, this criterion can be met.

- (5) ***Will not have a material adverse effect on community capital improvement programs;***

No information has been presented or identified that indicates the proposal will have an adverse effect on community capital improvement programs. Consequently, staff finds the proposal meets this criterion.

- (6) ***Will not require a level of community facilities and services greater than that which is available;***

No adverse effect on community facilities and services are anticipated. Consequently, staff finds the proposal meets this criterion.

- (7) ***Will support a multimodal transportation system and not result in significant negative impacts to the transportation system or traffic hazards;***

The referral letter from the county's Transportation Department (dated November 1, 2016) outlines a number of conditions of approval, including the submission of a traffic control plan, hauling hours, oversize/overweight permits, and erosion control that will ensure no significant negative impacts will result on the transportation system. The applicant has coordinated with the county's trails planner with respect to impacts on the LoBo trail.

The imposition of appropriate conditions of approval, as outlined in the Transportation referral letter (dated November 1, 2016), will ensure this criterion is met.

- (8) ***Will not cause significant air, odor, water, or noise pollution;***

As noted above, the use of erosion control measures and appropriate haul hours as well as biodegradable hydraulic fluids in machinery, and spill kits (POS referral letter dated

November 7, 2016), will ensure that air, odor, water and noise pollution will be appropriately controlled.

(9) *Will be adequately buffered or screened to mitigate any undue visual impacts of the use;*

The work site will be visible from the Diagonal Highway, the LoBo Trail, and from adjoining properties. The construction period is limited and any undue visual impacts are correspondingly minor. Once completed, the area will appear consistent with the character of the surrounds and therefore this criterion is met.

(10) *Will not otherwise be detrimental to the health, safety, or welfare of the present or future inhabitants of Boulder County;*

The proposed works will result in a more resilient waterway and therefore improve the health, safety and welfare of future inhabitants. As such, the proposal meets this criterion.

(11) *Will establish an appropriate balance between current and future economic, environmental, and societal needs by minimizing the consumption and inefficient use of energy, materials, minerals, water, land, and other finite resources;*

The proposal is considered to strike an appropriate balance in terms of the resources required to undertake the work and the benefits that will result which are primarily the protection of infrastructure and increased stream resiliency. The proposal satisfies the above criterion.

(12) *The use will not result in unreasonable risk of harm to people or property – both onsite and in the surrounding area – from natural hazards. Development or activity associated with the use must avoid natural hazards, including those on the subject property and those originating off-site with a reasonable likelihood of affecting the subject property. Natural hazards include, without limitation, expansive soils or claystone, subsiding soils, soil creep areas, or questionable soils where the safe-sustaining power of the soils is in doubt; landslides, mudslides, mudfalls, debris fans, unstable slopes, and rockfalls; flash flooding corridors, alluvial fans, floodways, floodplains, and flood-prone areas; and avalanche corridors; all as identified in the Comprehensive Plan Geologic Hazard and Constraint Areas Map or through the Special Review or Limited Impact Special Review process using the best available information. Best available information includes, without limitation, updated topographic or geologic data, Colorado Geologic Survey landslide or earth/debris flow data, interim floodplain mapping data, and creek planning studies;*

The primary natural hazard of concern in the area of the project is flooding. The proposed works will increase the stability and resilience of the creek. The referral letter from Floodplain (dated October 24, 2016) has stated a floodplain development permit will be required. Evidence that no-rise will occur to the base flood elevation (or a Conditional Letter of Map Revision) will ensure that the proposal does not result in an unreasonably increased risk of flooding to people or property in the area.

The works proposed are consistent with respect to the Left Hand Creek Watershed Master Plan through bank stabilization, revegetation, maintaining the pre-flood channel as an overflow channel, and protecting nearby infrastructure. It is noted that the applicant (letter dated November 17, 2016) has stated the option of reinstating the pre-flood channel was explored but not selected to avoid the additional work of refilling the post-flood channel, installing stabilization in the pre-flood channel and to accept the natural behavior of the creek in this location rather than forcing it back to its pre-flood alignment.

Final staging areas shall be identified on plans submitted for approval before construction commences and shall be kept, as much as reasonably practical, away from the channel and floodplain of Left Hand Creek.

The City of Longmont commented about using the Bielins Hock property for sediment retention. Future uses of the site are not within the scope of this assessment and are best considered by the land owner.

With the proposed conditions of approval, the proposal satisfies the above criterion.

RECOMMENDATION:

For the reasons described above, Land Use staff recommends that the Board of County Commissioners **CONDITIONALLY APPROVE Docket LU-16-0028: Boulder County Parks and Open Space – Left Hand Creek Restoration (Bielins Hock)** with the following conditions:

- 1) *Prior to the commencement of site disturbance*, the Applicant shall obtain a Stream Restoration Permit (combined County Grading Permit from Building Safety and Inspection Services in the Land Use Department and a County Floodplain Development Permit from the Transportation Department). Additionally, plan review and inspections approval will be required.
- 2) Appropriate erosion control measures shall be installed downslope and parallel to contours for all disturbed areas including staging and burrow material areas. The location of erosion control shall be shown on site plans *submitted at the time of stream restoration permit application*.
- 3) *At the time of stream restoration permit application*, the location of staging areas and stream-access corridors shall be shown on the plans and submitted for approval. The staging areas shall be kept away from the channel and floodplain of Left Hand Creek as much as reasonably practical.
- 4) The applicant must submit a traffic control plan developed by a traffic control supervisor to the Transportation Department for review and approval *at the time of stream restoration permit application*. The traffic control plan shall conform to the specifications of the Manual on Uniform Traffic Control Devices and must include the locations and types of warning signs along CO-119 (Diagonal Highway).
- 5) Hours of hauling shall be limited to 8:30am – 4pm.
- 6) The applicant must obtain all necessary permits *before commencing operations*, including a stormwater permit from the State of Colorado (for over 1 acre of disturbance) and/or an Oversize/Overweight permit from the County, if applicable.
- 7) In accordance with the comments provided in the County Parks and Open Space referral letter dated November 7, 2016:
 - a. Biodegradable hydraulic fluids must be used in all heavy machinery.
 - b. All equipment must be steam cleaned prior to site entry.
 - c. A ‘spill kit’ and procedures must be on-site during all work with heavy machinery.
 - d. Any trees removed should be done so between September 1 and March 31, the non-nesting season for migratory birds.

- 8) *At the time of stream restoration permit application*, cultural resource inventories and background documentation (including site forms) shall be provided to the Land Use Department – see Historic Review referral letter dated October 18, 2016.
- 9) The Applicant shall be subject to the terms, conditions, and commitments of record and in the file **Docket LU-16-0028: Boulder County Parks and Open Space – Left Hand Creek Restoration (Bielins Hock)**



Parks and Open Space

5201 St. Vrain Road • Longmont, Colorado 80503
303.678.6200 • Fax: 303.678.6177 • www.bouldercounty.org

TO: Christian Martin, Land Use Department
FROM: Ron West, Natural Resource Planner
DATE: November 7, 2016
SUBJECT: Docket LU-16-0028, BOCO POS, Lefthand Creek Bielins Hock

Site Conditions

I have reviewed the submitted materials, and have visited the area in the past. The project area totals about 800 linear feet of Lefthand Creek. The 2013 flood heavily disturbed this reach, as described in the application.

County Comprehensive Plan Designations

The parcel has the following designations in the Boulder County Comprehensive Plan, and from other resource inventories.

- Riparian Area
- Riparian Habitat Connector
- Public Lands – county open space, Bielins Hock and Russell-Anderson-Schmidt properties
- Important Agricultural Lands of National Significance
- Open Corridor, Roadside
- Archeological Travel Route
- 100-year Floodplain/Floodway

Discussion

This project would restore a heavily flood-impacted stream section. None of the above-listed resources should be significantly impacted, and several would be improved in the long-term. The following discussion is divided into: 1) general comments relevant to all stream projects; and 2) questions and comments specific to the proposal. General comments are further divided into: A) planning and construction; B) revegetation; and C) permits.

General Comments

Planning and Construction --

How would areas of existing vegetation – areas that are not to be disturbed – be delineated in the field, so that heavy machinery is prevented from entering the areas? This is often accomplished with orange construction fencing, rather than silt fencing. The former is less expensive, easier to install, and reusable. If individual mature trees are to be protected, what

field technique would be used? Young cottonwood seedlings that have naturally sprouted since the flood should be avoided. If not possible, transplanting such seedlings back into the site is highly encouraged.

Void-filled riprap, instead of rock-only riprap, is being used. Fines need to be included within the riprap to allow for natural germination and establishment of plant roots in the long term. Would riprap rock be imported or would native material – large cobble and river boulder – be used?

As called for in the county's 2016 Storm Drainage Criteria Manual, biodegradable hydraulic fluids must be used in all heavy machinery.

Steam cleaning of all equipment is mandatory, before it enters the site, to remove both noxious plant seeds and aquatic nuisance species.

A "spill kit" must be on-site during all work with heavy machinery -- emergency pollutant isolation and clean-up materials, with procedures.

Some large downed woody material should remain on-site, particularly if embedded in stream deposits. Such material plays a critically important ecological role in the riparian community. Additionally, some standing dead trees (snags) should remain on-site, and not all removed simply because they are dead. Any trees removed should be done so between September 1 and March 31, the non-nesting season for migratory birds (federal Migratory Bird Treaty Act).

Final staging areas and stream-access corridors must be approved by POS before the grading permit is issued. These cannot be left to the discretion of the contractor. Fueling areas must be located in upland sites, as far away from the stream edge as possible, and preferably in areas without porous stream deposits such as sand or cobble. Such areas should be at least 50 feet from the creek, and preferably 100 feet. Appropriate BMPs for fueling areas must be utilized.

Revegetation --

The final list of graminoids, forbs, shrubs and trees must be approved by the county before the grading permit is issued.

Tree/shrub cuttings and container plantings should be monitored for three years. What is the protocol if plantings die? Will temporary irrigation be used?

Staff strongly encourages beaver protection for tree plantings and vole/small mammal protection for shrub plantings. This is often accomplished using plastic mesh collars.

Weed management needs to be incorporated into the project, both pre- and post-construction. Pre-construction, dense stands can be sprayed or mowed. Post-construction, weed control should continue for the three years of monitoring. Weed species targeted could be either those listed on the county's noxious weed list (a sub-set of the state list), or all species on the state's noxious weed lists (A, B, and C).

If straw mulch or straw bale barriers are used, all straw must be certified weed-free. Hay cannot be used as it contains invasive pasture grass seed.

Would topsoil be imported, or would seeding occur on existing fines? If topsoil is to be imported, where will it come from and how will the introduction of weed seeds be prevented? If used, how deep is the topsoil layer?

Hydroseeding should not be used; it is often unsuccessful in our climate. Grass seeds can be either broadcast or drilled, but rates doubled if broadcast. Hydromulching, after seeding, is encouraged.

Permits –

US Fish & Wildlife Service clearance is not necessary for this project.

Since the project includes about 3.8 acres of ground disturbance, a state Stormwater Management Plan is necessary.

Comments Specific to the Proposal

Unusually, after review of the drawings and narrative, staff has no additional comments beyond those above. Project planning and studies have been extensive, as reported in the Draft 30% Design Report. Staff notes that the revegetation species list appears adequate, and that it is still being refined by POS plant ecology staff.

Recommendations

- All items discussed above should be considered, and questions resolved.



Land Use

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Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

MEMO TO: Agencies and Adjacent Property Owners
FROM: Christian Martin, CFM, Planner II – Flood Recovery
DATE: October 18, 2016
RE: Docket LU-16-0028

Docket LU-16-0028: Boulder County Parks and Open Space (Left Hand Creek Restoration at Bielins Hock)

Request: Limited Impact Special Use review for a proposal to restore and stabilize an 800 linear feet length of Left Hand Creek on the Bielins-Hock property (9067 Ogallala Road) consisting of 9260 cubic yards of earthworks.
Location: Parcels 131520000044, 131520000054, 131520000025 & 131520000053, located at Left Hand Creek on the POS Bielins-Hock property near the intersection of the Diagonal Hwy and Ogallala Road, in Section 20 T2N, R69W.
Zoning: Agricultural (A) Zoning District
Applicant: Jesse Rounds, Boulder County Parks & Open Space

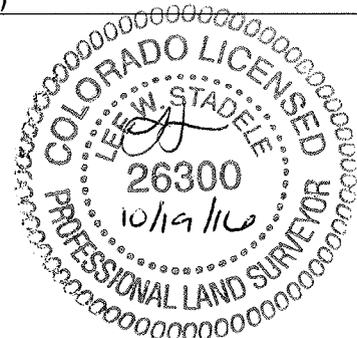
Limited Impact Special Review is required of proposed uses that may have greater impacts on services, neighborhoods, or the environment than those allowed by right under the Boulder County Land Use Code. This process will review conformance of the proposed use with the Boulder County Comprehensive Plan and the Land Use Code.

This process includes a public hearing before the Board of County Commissioners. Adjacent property owners and holders of liens, mortgages, easements or other rights in the subject property are notified of this hearing. The Land Use staff and County Commissioners value comments from individuals and referral agencies. Please check the appropriate response below or send a letter. Late responses will be reviewed as the process permits; all comments will be made part of the public record and given to the applicant. Only a portion of the submitted documents may have been enclosed; you are welcome to review the entire file at the Land Use Department. If you have any questions regarding this application, please contact me at (303) 441-3930 or cpmartin@bouldercounty.org.

Please return responses to the above address by **November 2, 2016**.

We have reviewed the proposal and have no conflicts.
 Letter is enclosed.

Signed  PRINTED Name LEE STADELE
Agency or Address BOW SURVEYOR





Transportation Department

2525 13th Street, Suite 203 • Boulder, Colorado 80304 • Tel: 303.441.3900 • Fax: 303.441.4594
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

November 1, 2016

TO: Christian Martin, Planner II, Land Use Department

FROM: Amelia Willits, Flood Recovery Planner

SUBJECT: Docket # LU-16-0028: Boulder County Parks and Open Space (Lefthand Creek Restoration at Bielins Hock)

The Transportation Department has reviewed the above referenced docket and has the following comments:

1. The applicant must submit a traffic control plan developed by a traffic control supervisor (TCS) to the Transportation Department for review and approval at the time of building or grading permit application. The traffic control plan shall conform to the specifications of the Manual on Uniform Traffic Control Devices (MUTCD), and must include the locations and types of warning signs along CO-119 (Diagonal Highway).
2. The applicant has coordinated with the Transportation Trails Planner regarding the use of the Lobo Trail, and has committed to informing all residents of the impact to the LoBo Trail. The project shall be coordinated with the Transportation Department's Communication Specialist, Andrew Barth (303-441-1032), throughout construction and staging.
3. Hours of hauling shall be from 8:30 AM to 4:00 PM to limit impacts on regular vehicular traffic, especially during peak commuter periods.
4. The applicant may need to obtain an Oversize/Overweight permits from the Transportation Department. Contact Rocky Milano at the Transportation Department about the potential need for permits (303-682-6737).
5. Appropriate erosion control measures shall be installed downslope and parallel to contours for all disturbed areas including staging and burrow material areas. The location of erosion control shall be shown on site plans submitted for building or grading permit approval.

This concludes our comments at this time.



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MEMO TO: Agencies and Adjacent Property Owners
FROM: Christian Martin, CFM, Planner II – Flood Recovery
DATE: October 18, 2016
RE: Docket LU-16-0028

Docket LU-16-0028: Boulder County Parks and Open Space (Left Hand Creek Restoration at Bielins Hock)

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Zoning: Agricultural (A) Zoning District
Applicant: Jesse Rounds, Boulder County Parks & Open Space

Limited Impact Special Review is required of proposed uses that may have greater impacts on services, neighborhoods, or the environment than those allowed by right under the Boulder County Land Use Code. This process will review conformance of the proposed use with the Boulder County Comprehensive Plan and the Land Use Code.

This process includes a public hearing before the Board of County Commissioners. Adjacent property owners and holders of liens, mortgages, easements or other rights in the subject property are notified of this hearing. The Land Use staff and County Commissioners value comments from individuals and referral agencies. Please check the appropriate response below or send a letter. Late responses will be reviewed as the process permits; all comments will be made part of the public record and given to the applicant. Only a portion of the submitted documents may have been enclosed; you are welcome to review the entire file at the Land Use Department. If you have any questions regarding this application, please contact me at (303) 441-3930 or cpmartin@bouldercounty.org.

Please return responses to the above address by **November 2, 2016.**

We have reviewed the proposal and have no conflicts.
 Letter is enclosed.

Signed PRINTED Name Jessica Fasick
Agency or Address Land Use Historic Review



Land Use

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Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

TO: Christian Martin, Land Use Department

FROM: Jessica Fasick, Historic Review, Land Use Department

DATE: October 18, 2016

SUBJECT: Docket LU-16-0028: Boulder County Parks and Open Space (Left Hand Creek Restoration at Bielins Hock)

The Left Hand Creek corridor has been identified as an Archaeological Sensitive Travel Route and therefore subject to Historic Review. The project narrative of docket LU-16-0028 states that “the design is being vetted by federal regulators at the U.S. Fish and Wildlife Service (USFWS) and the State Historic Preservation Office (SHPO) for compliance with federal regulations that protect Threatened and Endangered Species as well as historic features and structures.” Land Use Preservation Staff requests that a condition be included in the approval of docket LU-16-0028 that the applicant provides Land Use with the results of the SHPO’s vetting including any cultural resource inventories or background documentation (including site forms) before the issuance of a permit for construction.



Transportation Department

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Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

October 24, 2016

TO: Christian Martin, Planner II, Land Use

FROM: Harry Katz, Floodplain Permitting Specialist, Transportation

SUBJECT: Docket LU-16-0028: Boulder County Parks and Open Space (Left Hand Creek Restoration at Bielins Hock)

Request: Limited Impact Special Use review for a proposal to restore and stabilize an 800 linear feet length of Left Hand Creek on the Bielins-Hock property (9067 Ogallala Road) consisting of 9260 cubic yards of earthworks.

Location: Parcels 131520000044, 131520000054, 131520000025 & 131520000053, located at Left Hand Creek on the POS Bielins-Hock property near the intersection of the Diagonal Hwy and Ogallala Road, in Section 20 T2N, R69W.

The Transportation Department – Floodplain Management Program has reviewed the above referenced docket and has the following comments:

1. The proposed development is located within the Floodplain Overlay District. In accordance with Article 4-400 of the Boulder County Land Use Code, a Floodplain Development Permit (FDP) is required for this project.
2. The FDP application will require certification of the design by a Colorado Registered Professional Engineer.
3. The FDP application will require certification of no-rise in 100 year water surface elevations by a Colorado Registered Professional Engineer or an approved Conditional Letter of Map Revision (CLOMR) from FEMA.
 - a. CDOT/CWCB flows should be used for all modeling.
 - b. A Letter of Map Revision (LOMR) is required after project completion. This must include a floodway delineation for a target 0.50 ft rise in water surface elevation.

Additional Information:

1. The proposed development will need to meet all local, state, and federal regulations.
2. Demonstration of coverage under a USACE Nationwide or Individual 404 permit is required prior to FDP issuance.
3. Please contact Harry Katz (Floodplain Permitting Specialist; Transportation Department) at hkatz@bouldercounty.org or 720-564-2865 to discuss FDP including hydraulic analysis requirements.

This concludes our comments at this time.



Land Use

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302 • Tel: 303.441.3930 • Fax: 303.441.4856
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306 • www.bouldercounty.org

Building Safety & Inspection Services Team

MEMO

TO: Christian Martin, Staff Planner - Flood Recovery
FROM: Ron Flax, Chief Building Official
DATE: November 2, 2016

RE: Referral Response, Docket LU-16-0028: Boulder County Parks and Open Space (Left Hand Creek Restoration at Bielins Hock)

Limited Impact Special Use review for a proposal to restore and stabilize an 800 linear feet length of Left Hand Creek on the Bielins-Hock property (9067 Ogallala Road) consisting of 9260 cubic yards of earthwork.

Thank you for the referral. We have no conflicts with the proposal, but have the following information for the applicants:

1. **Grading Permit.** A grading permit and plan review and inspections approvals are required.

Please refer to the county's adopted 2015 editions of the International Codes and code amendments, including the most applicable portion, Appendix J (grading) of the International Building Code ("IBC"), which can be found via the internet under the link:

2015 Building Code Adoption & Amendments, at the following URL:

<http://www.bouldercounty.org/dept/landuse/pages/default.aspx>

2. **Engineering Observations.** Observation reports from the design engineer or another qualified engineer stating that the grading work has been accomplished in substantial conformance with the approved grading plans will be required to be submitted to Building Safety & Inspection Services for review and approval prior to final approval of the work covered by the grading permit.
3. **Plan Review.** The items listed above are a general summary of some of the county's building code requirements. A more detailed plan review will be performed at the time of grading permit application, when full details are available for review, to assure that all applicable minimum requirements are to be met. Our Building Safety publications can be found at:

<http://www.bouldercounty.org/property/build/pages/bldingdf.aspx>

If the applicants should have questions or need additional information, we'd be happy to work with them toward solutions that meet minimum building code requirements. Please call (720) 564-2640 or contact us via e-mail at building_official@bouldercounty.org

November 2, 2016

Via E-Mail (cpmartin@bouldercounty.org)

Boulder County Land Use Department
c/o Christian Martin, Planner II - Flood Recovery
2045 13th Street
Boulder, CO 80306

Baker&Hostetler LLP

1801 California Street
Suite 4400
Denver, Colorado 80202-2662

T 303.861.0600
F 303.861.7805
www.bakerlaw.com

Eben P. Clark
direct dial: 303.764.4042
eclark@bakerlaw.com

Request: Docket LU-16-0028: Boulder County Parks and Open Space (Left Hand Creek Restoration at Bielins Hock) (“**Application**”)

Location: Parcels 131520000044, 131520000054, 131520000025 & 131520000053, located at Left Hand Creek on the POS Bielins-Hock property near the intersection of the Diagonal Hwy and Ogallala Road, in Section 20 T2N, R69W.

Dear Mr. Martin:

This firm represents Ms. Elizabeth Anne Kelley (“**Ms. Kelley**”) and the Elizabeth Anne Kelley Living Trust with regard to the above-referenced Application submitted by Boulder County Parks and Open Space (“**Open Space**”). The Elizabeth Anne Kelley Living Trust is the record owner of the real property located at 9067 Ogallala Road, Longmont (“**Property**”). The Property is located directly to the south of the Bielins-Hock Open Space, where Open Space proposes to cut, grade, fill and redirect the channel of Left Hand Creek (“**Project**”).

As a preliminary matter, Ms. Kelley must object to the Project based on lack of adequate notice and opportunity to respond. Ms. Kelley first received any detailed plans of the Project on October 26, 2016. The notice received required this response by today, November 2, 2016. Based on this fact, Ms. Kelley submits the following objections only as an outline of issues and arguments to be presented to the Boulder County Commissioners (“**County Commissioners**”) at the public hearing on the Project. Ms. Kelley reserves all rights, arguments and remedies that may be raised at the time of the hearing or in the future.

In the Application, Open Space asserts that a first alternative was abandoned because “landowners to the south were not interested in participating with the required land owner agreements for the project.” This mischaracterizes the limited contact Ms. Kelley and her

husband have had with Open Space. When Open Space first approached Ms. Kelley and her husband, the request was simply for a blanket easement across the Property to access and “rehabilitate” Left Hand Creek. The agreement proposed by Open Space did not define the work to be done or give any timeline for completion. The proposed agreement requested access across the entire Property, when the Left Hand Creek bank is only on the furthest northern boundary. Both Ms. Kelley and her husband asked for any detail as to what was to be done on the creek bank and on the Property, but Open Space flatly refused to provide any additional information about the Project. Both Ms. Kelley and her husband requested project details several times and made it clear that they would consider working with Open Space on an acceptable plan. Despite this, they did not hear from Open Space again until receiving notice of the hearing last week.

As to the substance of the Project, Ms. Kelley has the following objections, based on the limited time allowed to review so far: (1) Project Engineering; (2) Impact on Local Environment; (3) Responsible Allocation of County Funds; (4) Impact on Open Space Property; and (5) Effect of Accretion and Reliction on Property Boundary.

First, we are presently researching an engineering and waterway specialist to review the Project plans. The Project involves a huge mechanical effort and the movement of large amounts of earth with the goal of allowing Left Hand Creek to remain in the new, post-flood channel. However, this new channel appears to be more contrived and less viable from a structural standpoint in the long run. Furthermore, it appears that any future flood event will force Left Hand Creek back into its former channel. In dispatching their duty to the public, the County Commissioners should at least consider the calculations and conclusions of a second opinion from a consulting engineer before deciding on the Application.

When reviewing any application, the County Commissioners must also consider the criteria set out in the Land Use Code. In the present case, the criteria for review of a Limited Impact Special Use Review in Section 4-601 (Review Criteria) of the Code include the impact of:

1. the proposed removal or addition of vegetation;
2. the extent of site disturbance, including, but not limited to, any grading and changes to natural topography;
3. the nature and intensity of the activities that will take place on the site;
4. the amount of blasting, grading, or other alteration of the natural topography;
5. the elimination or disruption of agricultural lands;
6. the effect on significant natural areas and environmental resources;
7. the disturbance of plant and animal habitat, and wildlife migration corridors;
8. the relationship of the proposed development to natural hazards;

9. available mitigation measures such as the preservation of open lands, the addition or restoration of natural features and screening, the reduction or rearrangement of structures and land disturbance;
10. the use of sustainable construction techniques, resource use; and
11. the proposed use and whether it will not otherwise be detrimental to the health, safety, or welfare of the present or future inhabitants of Boulder County.

The Application proposes the removal and addition of a substantial amount of vegetation and a large amount of site disturbance, including grading and changes to natural topography. The Application asserts that the removal and revegetation will revive the prior creek way, but this claim is reminiscent of the adage “a tree farm is not a forest”. As proposed, the Project will result in smooth, graded banks and organized, spaced plantings. This type of alteration cannot mirror natural creek banks. Therefore, as proposed, the Project will negatively impact natural areas and environmental resources and disturb plant and animal habitat, and wildlife.

Furthermore, the Application proposes a high intensity use to take place on dedicated open space and in an otherwise agricultural and natural environment. Open Space and the County Commissioners must be cognizant of the amount of grading and alteration that will occur in this previously natural topography. The Project, as proposed, will impact 3.8 acres or more of open space and will include access over and the closing of a County bike path during construction. Therefore, the Project will disrupt natural lands, as well as significant natural and environmental resources and result in the disturbance of wildlife and habitat. These activities will impact not only the vegetation and wildlife directly affected, but also the trees and wildlife located in the prior creek way. In fact, the permanent rerouting of Left Hand Creek will very likely result in the death of the large grove of trees that currently line the natural creek way. These trees act as buffer between Highway 119 on one hand and County open space and Ms. Kelley’s property on the other. This result will be detrimental to the health and welfare of the present and future inhabitants of the area.

Based on these facts, the Project appears to ignore the simplest solution. The simplest solution is to clear debris from and restore Left Hand Creek to its natural channel. The Application itself cites debris and human improvements as the principal cause of the creek jumping its banks in the 2013 flood event.

Restoring the natural creek way is also more in keeping with the Land Use Code. The Code requires consideration of available mitigation measures, preservation of open lands, restoration of natural features and screening, and the reduction of land disturbance. Restoring the prior creek way, is an easily available mitigation measure and would reduce the amount of land disturbed. This solution would also preserve open lands and restore natural features by reclaiming the meadow that the creek now bisects. In addition, as stated above, this simple solution would save the existing trees and screening of Highway 119.

The Project as proposed also ignores common sense in the allocation of County funds. Returning Left Hand Creek to its natural channel is a simple, low cost option to the Project which requires heavy grading and excavation, and extensive replanting in the new creek way. It

is clear in the Application that Open Space has failed even to consider this lower impact option on a cost basis. That failure is contrary to the Land Use Code and contrary to the Commissioners' obligation to govern responsibly and allocate public funds wisely.

Finally, based on the principles of avulsion, accretion and reliction, it appears the relocation of the natural channel of Left Hand Creek may have the effect of moving the Property's boundary to the north and into the area proposed to be used in the Project. Restoring the prior creek way might reverse this effect. At present however, we must reserve all rights in this regard. To that end, by this letter Ms. Kelley provides notice to Boulder County that she does not grant permission for County employees or agents to enter upon the Property or any land to which she has a claim without further consultation and express written consent. Ms. Kelley further reserves any claim she might have to lands based on changes to the channel of Left Hand Creek.

For the foregoing reasons, the County Commissioners should at least postpone consideration of the Application and require Open Space to consider additional options. The County Commissioners should direct Open Space to engage in meaningful dialogue with Ms. Kelley and other adjacent land owners to consider alternatives that are more aligned with the provisions and intent of the Boulder County Land Use Code.

Thank you for reviewing our comments. Please contact me with any questions you may have.

Very truly yours,



Eben P. Clark

c: client (email)

EPC

From: Laura Decker
To: [Rounds, Jesse](#); [Martin, Christian P.](#)
Cc: [Larry Wyeno](#); [Erin Fosdick](#); [David Bell](#); [Ian Colby](#); [Monica Bortolini](#); [Jessica Olson](#)
Subject: Comments to Referral Packet and Public Notice for LU-16-0028 County Parks and Open Space (Left Hand Creek Restoration at Bielins Hock)
Date: Monday, October 31, 2016 11:06:57 AM
Attachments: [BielinsHockSite-30%Plans_ACE_SedBasinOptComments_20161028.docx](#)

Dear Christian and Jesse,

We received the referral packet and Public Notice for LU-16-0028, Boulder County Parks and Open Space (Left Hand Creek Restoration at Bielins Hock).

Since the 2013 flood the City of Longmont (City) has been dealing with sediment deposition in Left Hand Creek (LHC). The sediment deposits in LHC are causing blockages to underpasses and reducing the flow area and drainage capacity within the channel.

Sediment deposition was not a problem in the City stretch of Left Hand Creek until after the 2013 flood. The City cleaned 30,000 cubic yards of sediment out the channel from Hover Street to the Confluence at the St. Vrain Creek in 2014.

After the May/June 2015 heavy spring runoff, a significant amount of sediment again deposited in LHC within the City. The City has an upcoming project to remove ~30,000 cubic yards of sediment in the channel within the City.

It is apparent that sediment being transported from above Longmont into the creek reach within Longmont will continue to be a problem.

The City of Longmont hired a consultant (Anderson Consulting Engineers (ACE)) to perform a sediment evaluation on LHC from North Foothills Highway (Hwy 36) to Hover Rd. and determine mitigation alternatives.

ACE is in the preliminary stages of determining mitigation alternatives to the sediment deposition in LHC within the City. One of their mitigation alternatives is using the Bielins-Hock property as a sediment detention basin. Please see the attached document from ACE with detail of this sediment mitigation alternative.

The City would be happy to meet with you to further discuss using the Bielins-Hock property as a sediment basin.

Sincerely,

Laura Decker | *Civil Engineer I*

City of Longmont | Public Works & Natural Resources
385 Kimbark Street, Longmont, CO 80501

T: (303) 774 - 4891 | M: (406) 490-8823
longmontcolorado.gov

BACKGROUND

Left Hand Creek (LHC) within the City of Longmont sustained damages during the September 2013 Flood, including bank erosion and large quantities of sediment deposition. The 2013 Flood damages were repaired during the winter of 2014 using a FEMA grant. During the heavy spring runoff in 2015 additional disturbance and sediment deposition within the City reach of LHC occurred. Damages sustained during the 2015 spring runoff require channel/bank repairs and sediment removal to again restore channel capacity required for flood protection and creek function. In addition to conducting post 2015 channel repair and sediment removal utilizing a second FEMA grant; the City has funded a detailed sediment transport evaluation of LHC between Foothills Parkway/U.S. 36 and the St. Vrain confluence. The sediment transport evaluation has been largely completed and the City is currently in the process of developing alternatives to mitigate continued sediment delivery during the creek's post 2013 Flood recovery.

PRELIMINARY RESULTS OF SEDIMENT TRANSPORT EVALUATIONS

The evaluation of existing sediment transport conditions in the LHC study reach are summarized as follows:

- Prior to 2013 Flood, Left Hand Creek was in a quasi-equilibrium state in which sediment supply was generally limited, making it a *supply limited system*.
- The 2013 Flood mobilized massive amounts of sediment within Left Hand Creek Watershed because of mud/debris flow, channel avulsions, bed erosion, bank erosion, etc. Between Foothills Parkway and Hover Street (the upstream limits of the City) it is estimated that approximately 197,000 cu yds of material was eroded. Approximately 278,000 cu yds of material was also deposited in this reach (1.4 times the amount of erosion).
- Sediment displaced by 2013 Flood that deposited in the area between Foothills Parkway and Hover Street remains in the system and is largely available for transport downstream.
- Sediments within the bed and overbanks that were deposited during the 2013 Flood were found to be the largest source of sediment currently available in the system. The contribution of sediment during river recovery from bank erosion was also considered but found, based on an evaluation of pre- and post-flood LiDAR data sets, to be relatively small when compared with available channel deposits. Stabilization of eroding banks, while beneficial, will not significantly reduce the potential sediment delivery to the City during creek recovery.
- Sediments deposited as a result of the 2013 Flood upstream of the City were remobilized during the 2015 spring runoff and subsequently deposited within the City. The volume of sediment deposition associated with the 2015 spring runoff was similar in magnitude to deposition occurring during the 2013 Flood.

- Since the 2013 Flood, Left Hand Creek has become, at least temporarily (possibly for up to 5 to 10 years depending on future creek flows), a *transport limited system*. Therefore, the City is expecting and planning for additional sediment inflow to continue as the creek recovers and sediment sources are stabilized.
- The preliminary findings of the sediment transport study have reinforced the need for the City to pursue alternatives to deal with continued sediment delivery to provide an acceptable level of flood protection and maintain river infrastructure for an interim period estimated to be on the order of 5 to 10 year assuming normal creek flows.

SEDIMENT MANAGEMENT OPTIONS

A range of sediment management options are currently being investigated to either trap sediment and/or increase sediment transport capacity of Left Hand Creek through the City of Longmont. One potential option that the City is exploring involves the placement of a sediment trap within the area of channel avulsion on the Bielins-Hock Boulder County property. The concept includes stabilization and modification of the area to provide interim sediment detention during creek recovery. After upstream portions of the creek have recovered (stabilized for normal flow events via armoring and/or vegetation reestablishment), sediment trapping would no longer be necessary and the Bielins-Hock avulsion reach would be fully restored. Other locations for sediment detention are being explored, however the Bielins-Hock avulsion reach upon initial screening seems to have significant advantages over other locations.

SEDIMENT DETENTION AT THE BIELINS-HOUCK AVULSION SITE

CONCEPT/DESCRIPTION: A sediment detention basin placed just downstream of the Diagonal Highway would trap inflowing sediment and reduce sediment delivery to the City. The large channel avulsion created by the 2013 Flood downstream of the Diagonal Highway on the Bielins Hock property (see Figure 1) is an ideal location for sediment detention. This area is currently unstable and could be stabilized and excavated for use as an interim sediment trap. The basin would be approximately 500 to 600 feet in length, 100 to 150 feet wide, and 10 to 15 feet in depth. Stabilization of the basin side slopes, inlet, and outlet would be required. The basin could provide an estimated 16,000 to 25,000 cu yds of sediment storage, depending upon selected alignment and depth. Flow in the creek could be fully routed through the basin up to a specified discharge or spilled into the basin laterally through a controlled spillway with the remaining flow routed through the pre-2013 Flood creek alignment. The current split flow channel configuration would provide flexibility in the design of discharge control structures to route flows through the basin. Varied flow routing could allow for targeting of a specific size of sediment for detention. Periodic maintenance would be required to remove sediment from the basin. Once upstream sediment sources have stabilized and sediment delivery subsides the area would be restored.

COST CONSIDERATIONS: Basin Design, Excavation, Stabilization, Maintenance Access Road Construction, Periodic Sediment Removal/Maintenance, Post Recovery Restoration

UNKNOWN: Cooperation with Boulder County Open Space/EWP Bielins Hock Bank and Channel Improvements Project, Operation (flow through or diversion), Trapp Efficiency, Railroad ROW Issues, Permitting, Water Rights, Access for Maintenance, Maintenance Frequency, Storage/Waste Site Location

ADVANTAGES: This location makes use of an area where channel alignment has already been significantly altered and stability is problematic. Placement of a detention basin would stabilize the eroding banks. The potentially available sediment detention volume is similar in magnitude to the amount of sediment removal required after the 2015 spring runoff. Variability in flow routing could be provided at this location which would allow for targeting of specific sediment sizes. After sediment detention is no longer required the channel avulsion could either be filled in and vegetated and the pre-flood creek alignment restored or the detention basin could be removed and a more natural river channel could be constructed through the avulsion area. Final restoration should be coordinated with the EWP's Bielins Hock Improvement Project.

DISADVANTAGES: May conflict with EWP's recently approved/funded Bielins Hock Bank and Channel Improvement Project. Trap efficiency of finer material (medium sands and finer) may be limited during larger events (trap efficiency of fine material is a function of basin length and flow routing).

Figure 1 – Channel Avulsion at Diagonal Hwy, Pre/Post Flood LiDAR Surface Comparison



Figure 2 Concept Sediment Detention Basin at Bielins-Hock Property



Right of Way & Permits

1123 West 3rd Avenue
Denver, Colorado 80223
Telephone: **303.571.3306**
Facsimile: 303. 571.3524
donna.l.george@xcelenergy.com

November 2, 2016

Boulder County Land Use
PO Box 471
Boulder, CO 80306

Attn: Christian Martin

Re: Boulder County Parks and Open Space – Left Hand Creek Restoration at Bielins Hock, Case # LU-16-0028

Public Service Company of Colorado's (PSCo) Right of Way & Permits Referral Desk has reviewed the limited impact special use plans for **Left Hand Creek Restoration at Bielins Hock**. Please be aware this project crosses two (2) locations where PSCo has existing overhead electric distribution facilities. Minimum clearance requirements must be observed - ten (10) feet between the highest point of construction and PSCo's lowest wires including the operation of large vehicles beneath the electric lines. It is further advised that all risk and responsibility for this work is unilaterally that of the property owner/developer/contractor.

Should the project require the modification to existing facilities, the property owner/developer/ contractor must contact the **Builder's Call Line** at 1-800-628-2121 or <https://xcelenergy.force.com/FastApp> (register, application can then be tracked) to complete the application process.

As a safety precaution, PSCo would like to remind the developer to call the **Utility Notification Center** at 1-800-922-1987 to have all utilities located prior to any construction.

Should you have any questions with this referral response, please contact me at 303-571-3306.

Donna George
Contract Right of Way Referral Processor
Public Service Company of Colorado



October 27, 2016

Christian Martin, CFM, Planner II
Courthouse Annex
2045 13th Street
Boulder, CO 80302

Re: LU-16-0028 – Boulder County Parks and Open Space – (LHC Restoration at Bielins Hock)

Dear Mr. Martin,

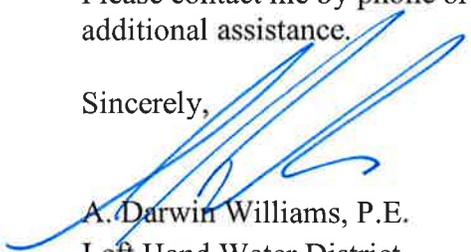
Left Hand Water District has reviewed the above mentioned project and has no issue.

Note: During review it was noticed that a Northern Colorado Water Conservancy District water transmission pipeline is located just southwest of this project. The pipeline crosses the Diagonal Highway approximately 1000 feet northeast of the Airport Rd intersection, and crosses Left Hand Creek on the west side of the Divided Highway.

I recommend calling 811 for complete utility locate determination three days prior to any excavation.

Please contact me by phone or email (dwilliams@lefthandwater.org) to discuss or if you require additional assistance.

Sincerely,



A. Darwin Williams, P.E.
Left Hand Water District

RECEIVED
NOV 01 2016
BOULDER COUNTY
LAND USE

Bielins-Hock Limited Impact Special Use Permit Application Narrative

Boulder County Parks and Open Space is seeking to restore an 800 foot long section of Left Hand Creek on the Bielins-Hock property (9067 Ogallala Road) east of the Diagonal Highway (CO 119). The project design calls for the creek banks to be made more resilient through grading and subsurface armoring. The banks will be revegetated to stabilize sandy soils and provide better habitat for both native fish and creek-dependent species like the Preble's Meadow Jumping Mouse.

Location

The Left Hand Creek Watershed was severely impacted by the 2013 flood event. The subject property, is county open space known as the Bielins-Hock property, is located just east of State Highway 119 and the project area is north and east of the Longmont to Boulder Regional Trail (Attachment B: Location Map). The properties below will be impacted by the project:

- 9067 Ogallala Road Longmont, CO 80503 (131520000044)
- 849 N 95th Street Longmont, CO 80503 (131520000025)
- 8440 Diagonal Highway Longmont, CO 80503 (131520000053)
- 0 RR Longmont, CO 80503 (131520000054)

Purpose & Need

During the 2013 flood event, debris in Left Hand Creek created an in-stream plug on a piece of property upstream (south) of the Bielins-Hock property. The creek water began to flow over its north bank and as it flowed over the Bielins-Hock pasture the force of the water began to cut into the sandy soil below. In a short period of time the creek had cut a new channel north across the pasture (see before and after images, Figures 1 & 2) with this more direct route and wide channel, the creek completely abandoned the pre-flood channel and has since flowed in the channel cut during the flood event.

The channel through which the creek now flows is composed of a sandy bottom and mostly sandy banks. Sandy banks and bottoms are prone to sudden collapse in high flow events and tend to send sand very far down the creek during normal flows. This can impact homes and infrastructure hundreds of feet downstream of the specific reach.

The Left Hand Creek Watershed Master Plan, completed in 2014, identified the Bielins-Hock reach as an area requiring specific designs. The plan states:

For this project, perform bank and headcut stabilization, re-vegetate the area, maintain the pre-flood channel as an overflow channel... The railroad should be protected from further migration. Options include a sequence of engineered log jams or setback riprap (p. 66), with conceptual design on Sheet 10 of the Map book. (Project LHCP-03-05)

Therefore, Boulder County Parks and Open Space sought and received funding from the Natural Resource Conservation Service through the Emergency Watershed Protection program to stabilize and vegetate the creek banks. This process should result in less erosion and increased habitat. Stabilizing

banks along the creek will reduce the chances of trees in this area falling into the creek and creating new plugs in future flooding events. By reducing erosion and minimizing the danger from debris, this project should reduce impacts to private and public property both upstream and downstream of the property as well as provide increased protection to the railway west of the creek.

Work in this area has been limited since the flood. Directly after the flood, debris was removed from the creek to reduce flood potential. This effort was carried out under Parks and Open Space supervision by FEMA-approved and funded contractors. Once debris was removed, a contractor hired by Xcel Energy removed a gas pipeline that had been exposed by the flooding. This effort was overseen by Parks and Open Space staff. In 2016, after a request from the City of Longmont, Parks and Open Space worked with Lefthand Watershed Oversight Group to remove debris that had fallen into the creek during 2015. These projects were carried out either from the bank or from within the creek in an attempt to minimize the shaping of the creek bank.

Scope of Work

Since the flood the flows in Left Hand Creek have continued to erode the channel and impact the sandy slopes on either side of the creek. The project proposed in this application would stop the creek bed from cutting through its layers of sediment creating a deeper and deeper channel of the creek through the establishment of a low-flow channel. The erosion of the slopes on either side of the post-flood channel would be addressed through planting on the east bank and a combination of buried rip-rap and planting on the west bank. The project will extend 800 feet which is the entire length of the post-flood “new” channel.

There is setback riprap that is there to arrest erosion during major floods. The riprap setback is approximately 770 feet long, 11 feet tall, and will be placed at 3 feet thick. This totals 941 cubic yards of import material. At the base, the riprap is set back 20-25 feet, at the top, it is buried a minimum of 1 foot. At this placement, the rock will likely never become exposed except for very large flood events.

As currently designed, the confluence of the pre-flood and post-flood channels (Figure 2) is at the north end of the project area. The confluence will be armored with small rip-rap imported from off-site. This hardening is proposed to minimize erosion at this location because of the sandy nature of the bank.

The proposed project will result in the following cut and fill on the site:

Cut: 5,240 cf

Fill: 4,020 cf

Gross: 9,260 cf

Net: +1,223 cf of excess that will be balanced on site during construction. If the excess must be hauled off it will be used at other Boulder County Parks & Open Space Flood Recovery Projects on Parks & Open Space properties. Details of the on-site work can be found on Sheet 9, of Attachment 4.

Access to the work site will be from Diagonal Highway (State Route 119). Parks and Open Space maintains an access and maintenance easement across the rail line. The access will then require the use of the LOBO regional trail. The access route and staging area are indicated on Sheet 10 of Attachment 4.

The disposal site for the remaining material has not yet been selected; however, Parks & Open Space will work with contractors to reuse materials on Parks & Open Space properties as other creek restoration projects move forward.

Work Impacts

The Bielins-Hock project is intended to reduce the hazard of wash-out to the railroad and Longmont-Boulder Regional Trail (LOBO Trail) by stabilizing the west bank of Left Hand Creek. Construction will occur adjacent to the trail and the railroad and will impact approximately 3.8 acres of Parks and Open Space managed land. If construction activities require the closure of the trail, the closure will be properly signed and publicly announced in accordance with standard Parks & Open Space policies. However, closure is not expected except for short periods during project mobilization and demobilization.

This project is slated to be funded through a grant from the Emergency Watershed Protection program (EWP) administered at the federal level by the Natural Resource Conservation Service (NRCS) and at the state level by the Colorado Water Conservation Board (CWCB). CWCB is providing the initial design for the project and will serve as construction administrator; this will ensure that the project is built to their specifications and to the specifications of the EWP program. Another benefit of this process is that the design is being vetted by federal regulators at the U.S. Fish and Wildlife Service (USFWS) and the State Historic Preservation Office (SHPO) for compliance with federal regulations that protect Threatened and Endangered Species as well as historic features and structures. Additional oversight will be provided by the Army Corps of Engineers, the Boulder County Floodplain Administrator, and the Parks and Open Space Resource Management Division. All of this review and oversight is done to ensure that the project is done properly and with the minimum impact to plants, wildlife, our history, and our neighbors.

No threatened or endangered species have been identified in this stretch of Left Hand Creek in past surveys. However, this project is designed to create fish habitat throughout the project area. There will be no “drop structures” installed that make movement through the reach difficult or impossible for fish. Drop structures are used to control elevation change in creeks. The sandy bottom and relatively flat section of the creek will not require such structures. In order to minimize impacts to the creek erosion controls will be in place and planting will be designed to reduce future erosion as noted on Sheet 5, Attachment 4. Final erosion and sediment control plans will be developed by the construction contractor in cooperation with the project design team. This allows the controls to be assessed just prior to construction. The controls in this plan are Best Management Practices (BMPs).

Floodplain Development Permit

Based on the project design and calculations provided by our design consultant this project will not change the shape or extent of the floodplain and is therefore considered to cause no-rise. A detailed *no rise* certification report is attached for reference.

Additional Information to be obtained

At this phase of design; haul routes, traffic management plans, staging areas, disposal sites, and Stormwater management and erosion control plans have not been finalized. Since this will now proceed to a design-build process with oversight from the EWP program of the NRCS, we will develop details as we move toward final design. A draft sketch is included within the attached 30% Draft Drawings that includes a proposed access road and staging location on sheet 10, Attachment 4. For additional background information, please refer to Attachment 5.

Project Timing

With 30% designs complete, we expect permitting to continue through the fall into early 2017. In early 2017, we will put the project out for bid as a design-build project. In that form, we expect to begin construction in the late winter/early spring of 2017.

Figures

Figure 1: Bielins-Hock Open Space Pre-Flood
Figure 2: Bielins-Hock Open Space Post-Flood

Attachments

Attachment 1. Application Form and Fee Schedules
Attachment 2. Grading Fact Sheet
Attachment 3. Vicinity Map
Attachment 4. 30% Designs
Attachment 5. 30% Design Report

Figure 1: Bielins-Hock Open Space Pre-Flood

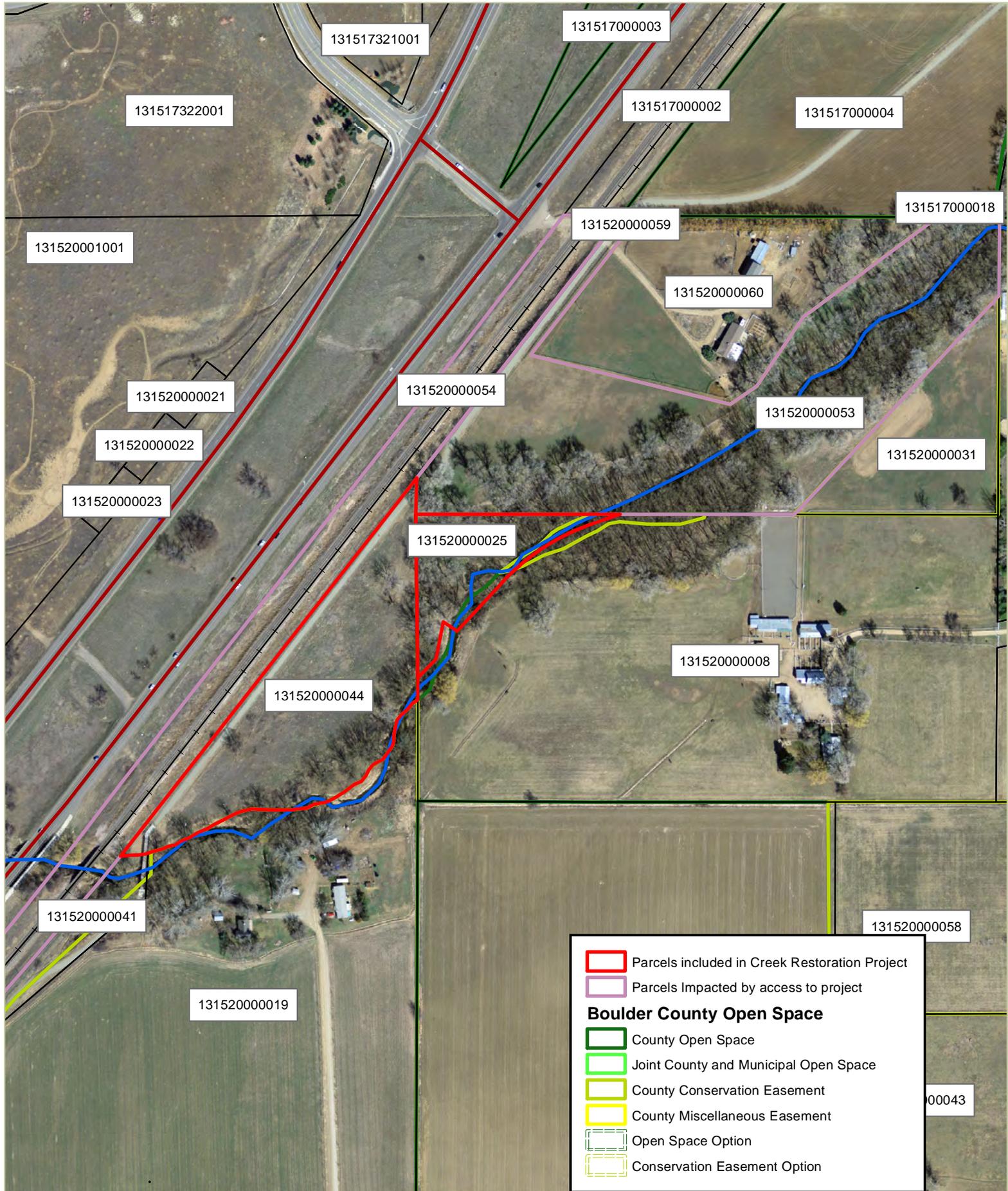
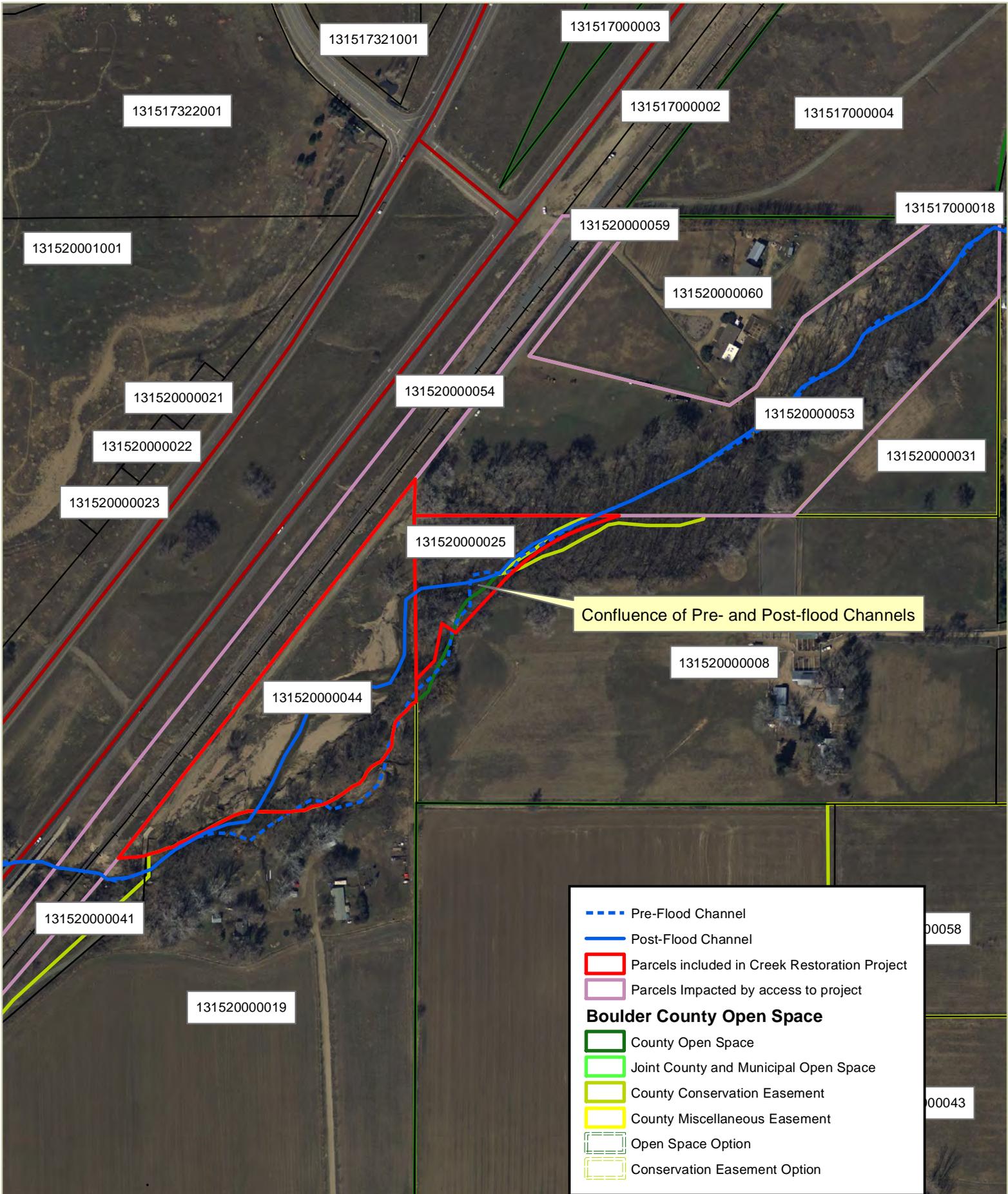


Figure 2: Bielins-Hock Open Space Post-Flood



Attachment 1



Boulder County Land Use Department

Courthouse Annex Building
 2045 13th Street • PO Box 471 • Boulder, Colorado 80302
 Phone: 303-441-3930 • Fax: 303-441-4856
 Email: planner@bouldercounty.org
 Web: www.bouldercounty.org/lu
 Office Hours: Mon., Wed., Thurs., Fri. 8 a.m. to 4:30 p.m.
 Tuesday 10 a.m. to 4:30 p.m.

Shaded Areas for Staff Only
Intake Stamp

Application Form

Project Number		Project Name	
<input checked="" type="checkbox"/> Limited Impact Special Use <input type="checkbox"/> Limited Impact Special Use Waiver <input type="checkbox"/> Modification of Special Use <input type="checkbox"/> Site Plan Review <input type="checkbox"/> Site Plan Review Waiver <input type="checkbox"/> Subdivision Exemption <input type="checkbox"/> Exemption Plat <input type="checkbox"/> 1041 State Interest Review <input type="checkbox"/> Other:		Application Deadline: First Wednesday of the Month <input type="checkbox"/> Variance <input type="checkbox"/> Appeal	
		Application Deadline: Second Wednesday of the Month <input type="checkbox"/> Sketch Plan <input type="checkbox"/> Preliminary Plan <input type="checkbox"/> Final Plat <input type="checkbox"/> Resubdivision (Replat) <input type="checkbox"/> Special Use/SSDP	
		<input type="checkbox"/> Rezoning <input type="checkbox"/> Road/Easement Vacation <input type="checkbox"/> Location and Extent <input type="checkbox"/> Road Name Change	
Location(s)/Street Address(es) 9067 Ogallala Road Longmont, CO 80503 (13152000044 and 3 additional properties [see attached])			
Subdivision Name			
Lot(s)	Block(s)	Section(s) 20	Township(s) 2n
Area in Acres	Existing Zoning Agricultural	Existing Use of Property	Range(s) 69W
Proposed Water Supply	Proposed Sewage Disposal Method		

Applicants:

Applicant/Property Owner		Boulder County Parks and Open Space		Email Address		jrounds@bouldercounty.org	
Mailing Address		5201 St. Vrain Road					
City	State	Zip Code	Phone	Fax			
Longmont	CO	80503		303-678-6180			
Applicant/Property Owner/Agent/Consultant		Jesse Rounds		Email Address			
				jrounds@bouldercounty.org			
Mailing Address							
City	State	Zip Code	Phone	Fax			
Longmont	CO	80503	303-678-6271	303-678-6180			
Agent/Consultant		Email Address					
Mailing Address							
City	State	Zip Code	Phone	Fax			

Certification (Please refer to the Regulations and Application Submittal Package for complete application requirements.)

I certify that I am signing this Application Form as an owner of record of the property included in the Application. I certify that the information and exhibits I have submitted are true and correct to the best of my knowledge. I understand that all materials required by Boulder County must be submitted prior to having this matter processed. I understand that public hearings or meetings may be required. I understand that I must sign an Agreement of Payment for Application processing fees, and that additional fees or materials may be required as a result of considerations which may arise in the processing of this docket. I understand that the road, school, and park dedications may be required as a condition of approval. I understand that I am consenting to allow the County Staff involved in this application or their designees to enter onto and inspect the subject property at any reasonable time, without obtaining any prior consent.

All landowners are required to sign application. If additional space is needed, attach additional sheet signed and dated.

X	Signature of Property Owner		Printed Name	Eric M. Lane	Date	10/12/16
	Signature of Property Owner		Printed Name		Date	

The Land Use Director may waive the landowner signature requirement for good cause, under the applicable provisions of the Land Use Code.

3 Additional Project Parcels – Street Number (Parcel ID)

- 849 N 95th Street Longmont, CO 80503 (131520000025)
- 8440 Diagonal Highway Longmont, CO 80503 (131520000053)
- 0 RR Longmont, CO 80503 (131520000054)

Attachment 2

Grading Calculation

Cut and fill calculations are necessary to evaluate the disturbance of a project and to verify whether or not a Limited Impact Special Use Review (LISR) is required. A Limited Impact Special Use Review is required when grading for a project involves more than 500 cubic yards (minus normal cut/fill and backfill contained within the foundation footprint).

If grading totals are close to the 500 yard trigger, additional information may be required, such as a grading plan stamped by a Colorado Registered Professional Engineer.

Earth Work and Grading

This worksheet is to help you accurately determine the amount of grading for the property in accordance with the Boulder County Land Use Code. Please fill in all applicable boxes.

Note: Applicant(s) must fill in the shaded boxes even though foundation work does not contribute toward the 500 cubic yard trigger requiring Limited Impact Special Use Review. Also, all areas of earthwork must be represented on the site plan.



Earth Work and Grading Worksheet:

	Cut	Fill	Subtotal
Driveway and Parking Areas			
Berm(s)			
Other Grading	5240	4020	9260
Subtotal	5240	4020	9260 <small>Box 1</small>
* If the total in Box 1 is greater than 500 cubic yards, then a Limited Impact Special Review is required.			
	Cut	Fill	Total
Foundation	0	0	0
Material cut from foundation excavation that will be removed from the property			

Excess Material will be Transported to the Following Location:

Excess Materials Transport Location:
Parks & Open Space Properties

Is Your Property Gated and Locked?

Note: If county personnel cannot access the property, it could cause delays in reviewing your application.

Certification

I certify that the information submitted is complete and correct. I agree to clearly identify the property (if not already addressed) and stake the location of the improvements on the site within four days of submitting this application. I understand that the intent of the Site Plan Review process is to address the impacts of location and type of structures, and that modifications may be required. Site work will not be done prior to issuance of a Grading or Building Permit.

Signature 	Date 10/12/12
---	------------------

Attachment 3

Attachment 4

EMERGENCY WATERSHED PROTECTION (EWP) PROGRAM

30% Draft Drawing Set for Internal Review
(NOT FOR CONSTRUCTION)

BIELINS HOCK BANK AND CHANNEL IMPROVEMENTS BOULDER COUNTY, COLORADO

PREPARED BY:
RESILIENT WATERSHED PARTNERS
10106 WEST SAN JUAN WAY, SUITE 215
LITTLETON, COLORADO 80127



VICINITY MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE
PROJECT LOCATION

SHEET INDEX

Sheet List Table	
Sheet Number	Sheet Title
1	COVER SHEET
2	CONTROL
3	PLAN AND PROFILE
4, 4A, 4B, 4C	TYPICAL CROSS SECTIONS
5	VEGETATION PLAN VIEW
6	PLANTING SCHEDULE TABLES
7	DETAILS (SET BACK RIPRAP AND SOIL WRAP_
8	DETAILS (TYPICAL CHANNEL SECTION)
9	CUT AND FILL PLAN
10	PRELIMINARY ACCESS AND STAGING PLAN

PREPARED FOR:
BOULDER COUNTY OPEN SPACE
5201 ST VRAIN RD
LONGMONT, CO 80503

PREPARED BY:
RESILIENT WATERSHED PARTNERS
10106 W SAN JUAN WAY
LITTLETON CO, 80127
PH : 303-872-9112
FX : 303-872-9104

DESIGNED:	REVISION	DESCRIPTION	BY	DATE
DRAWN:	(R-)			
CHECKED:	(R-)			
DATE:	(R-)			

BIELINS HOCK CHANNEL IMPROVEMENT
COVER SHEET

SHEET/REFERENCE NO.
43
1 OF 10

PROJECT CONTROL INFORMATION:

1.) HORIZONTAL CONTROL IS BASED ON A MODIFIED NAD 83-COLORADO STATE PLANE NORTH DATUM. DRAWING COORDINATES ARE SCALED TO GROUND BY A SCALE FACTOR OF 1.0001396944 UTILIZING THE FOLLOWING LOCATION AS THE POINT OF ORIGIN (AKA #1):
 LATITUDE=N40°07'38.42427"
 LONGITUDE=W105°08'30.01125"
 ELLIPSOID HEIGHT=4949.73'

2.) VERTICAL CONTROL IS BASED ON NAVD88 DATUM.

SITE CONTROL TO BE USED FOR CONSTRUCTION LAYOUT:

INFORMATION LISTED BELOW AS: POINT NUMBER, NORTHING, EASTING, ELEVATION AND DESCRIPTION.

- 1, 1835729.528, 3100213.550, 5004.39, SET NO. 5 REBAR WITH RED PLASTIC CAP "PSM CONTROL"
- 2, 1836030.8630, 3100444.1750, 5008.79, SET NO. 5 REBAR WITH RED PLASTIC CAP "PSM CONTROL"

BURIED UTILITY NOTE:

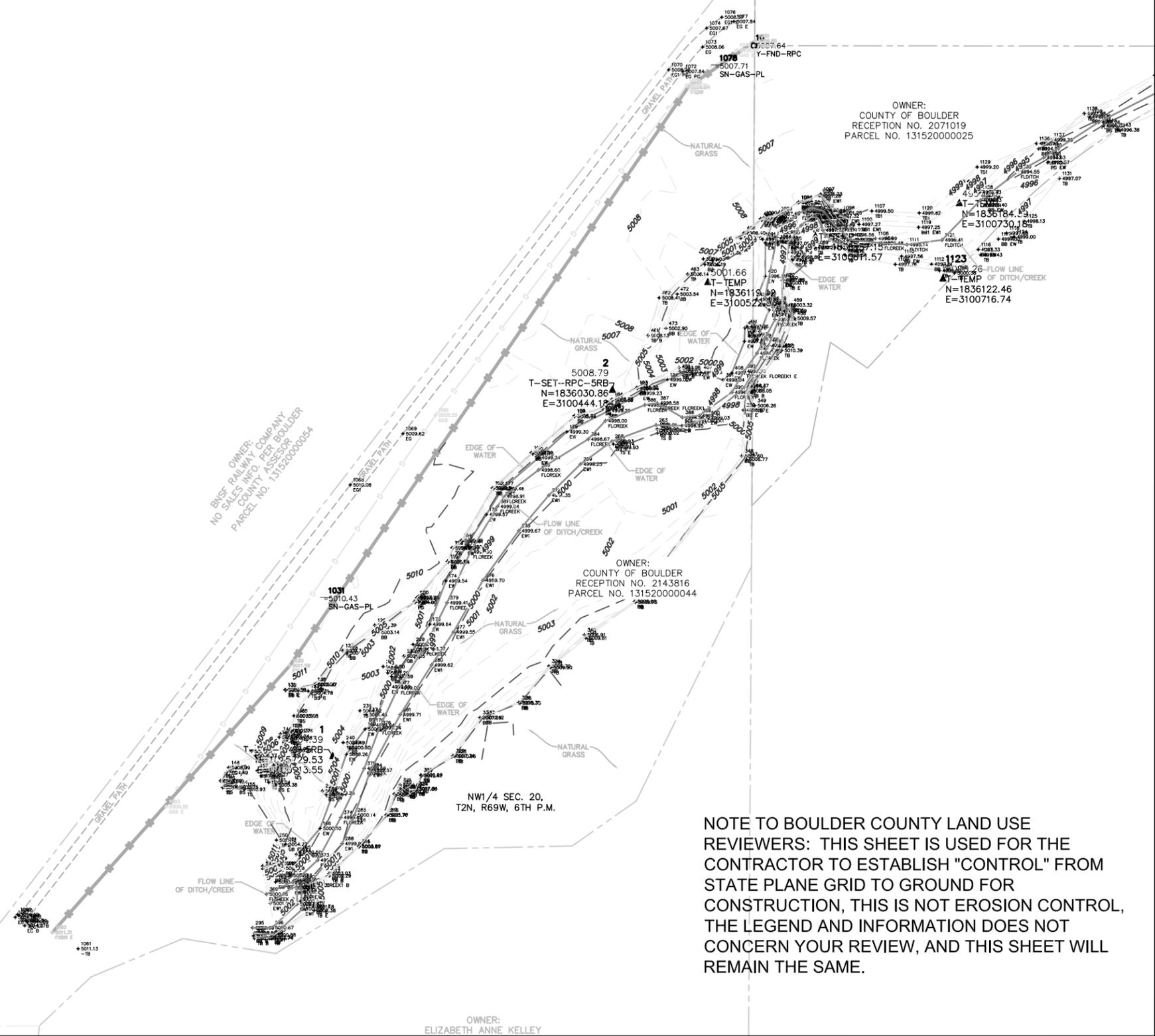
UTILITY LOCATES AS SHOWN HEREON ARE TO ASSIST IN THE PLANNING/DESIGN PROCESS ONLY. DUE TO THE METHODOLOGY OF ELECTROMAGNETIC LOCATING PROCESSES, LOCATING IS NOT AN EXACT SCIENCE AND IS ONLY ACCURATE TO APPROXIMATELY 18". THEREFORE, TO OBTAIN THE EXACT LOCATION OF ANY/ALL BURIED UTILITIES, THEY WOULD NEED TO BE POTHOLED. SAID MARKS ARE NOT INTENDED FOR CONSTRUCTION USE.

LEGEND

EXISTING INDEX CONTOUR		EXISTING WATER VALVE	
EXISTING INTERMEDIATE CONTOUR		EXISTING WATER METER	
EXISTING BUILDING/STRUCTURE		EXISTING ELECTRIC HANDHOLE	
EXISTING WATERLINE		EXISTING GAS VALVE	
EXISTING CABLE TV LINE		EXISTING TELEPHONE PEDESTAL	
EXISTING OVERHEAD UTILS		EXISTING UTILITY POLE	
EXISTING GAS LINE		EXISTING STREET LIGHTPOLE	
EXISTING ELECTRIC LINE		EXISTING MAILBOX	
EXISTING TELEPHONE LINE		EXISTING GAS METER	
EXISTING SANITARY SEWER		EXISTING SIGN	
EXISTING STORM SEWER		EXISTING SEWER MANHOLE	
EXISTING FIBER OPTIC		EXISTING VENT PIPE	
EXISTING CL DITCH		EXISTING STORM MANHOLE	
EXISTING WIRE FENCE		EXISTING WATER MANHOLE	
EXISTING SPLIT RAIL FENCE		EXISTING FIRE HYDRANT	
EXISTING CHAIN LINK FENCE		EXISTING TELEPHONE MANHOLE	
EXISTING METAL/WOOD FENCE		EXISTING ELECTRIC MANHOLE	
EXISTING GUARDRAIL		EXISTING GREASE MANHOLE	
EXISTING CULVERT		EXISTING CLEAN OUT	
EXISTING EDGE OF ASPHALT		EXISTING TRAFFIC HANDHOLE	
EXISTING EDGE OF GRAVEL/DIRT		EXISTING UTILITY HANDHOLE	
EXISTING SECTION LINE		EXISTING BOLLARD/POST	
EXISTING RIGHT-OF-WAY LINE		EXISTING CABLE TV PEDESTAL	
SECTION CORNER		EXISTING EVERGREEN TREE	
FOUND PROPERTY CORNER		EXISTING BUSH	
LOCAL SITE BENCHMARK		EXISTING DECIDUOUS TREE	
SURVEY TRAVERSE POINT		EXISTING ELECTRIC METER	
TESTHOLE (GEOTECH-DRILLED)		EXISTING TRAFFIC SIGNAL	
TESTPIT (GEOTECH-DUG)		EXISTING TREE STUMP	
UTILITY POTHOLE		EXISTING LANDSCAPE LIGHT	
EXISTING WELL		EXISTING IRRIGATION CONTROL VALVE	
EXISTING UTILITY MARKER		EXISTING ELECTRIC PEDESTAL	
EXISTING SPRINKLER HEAD		EXISTING TRAFFIC VALVE BOX	

POINT DESCRIPTION CODES:

- EA= EDGE OF ASPHALT
 OP= ON PAVEMENT
 OG= ON GROUND
 TS= TOP OF SLOPE
 TB= TOP OF BANK
 BB= BOTTOM OF BANK
 FLDITCH= FLOW LINE OF DITCH



NOTE TO BOULDER COUNTY LAND USE REVIEWERS: THIS SHEET IS USED FOR THE CONTRACTOR TO ESTABLISH "CONTROL" FROM STATE PLANE GRID TO GROUND FOR CONSTRUCTION, THIS IS NOT EROSION CONTROL, THE LEGEND AND INFORMATION DOES NOT CONCERN YOUR REVIEW, AND THIS SHEET WILL REMAIN THE SAME.

PREPARED FOR:
 BOULDER COUNTY OPEN SPACE
 5201 ST VRAIN RD
 LONGMONT, CO 80503

PREPARED BY:
 RESILIENT WATERSHED PARTNERS.
 10106 W SAN JUAN WAY
 LITTLETON CO, 80127
 PH : 303-872-9112
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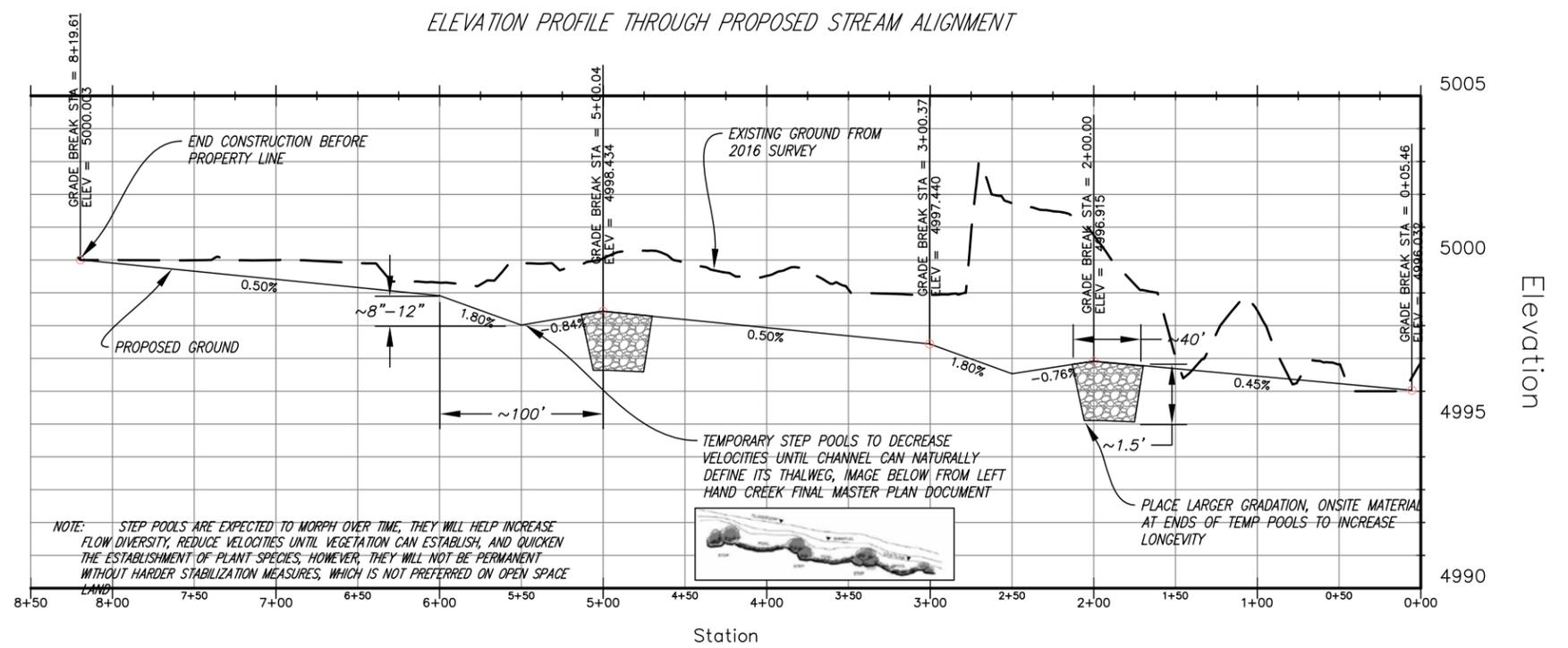
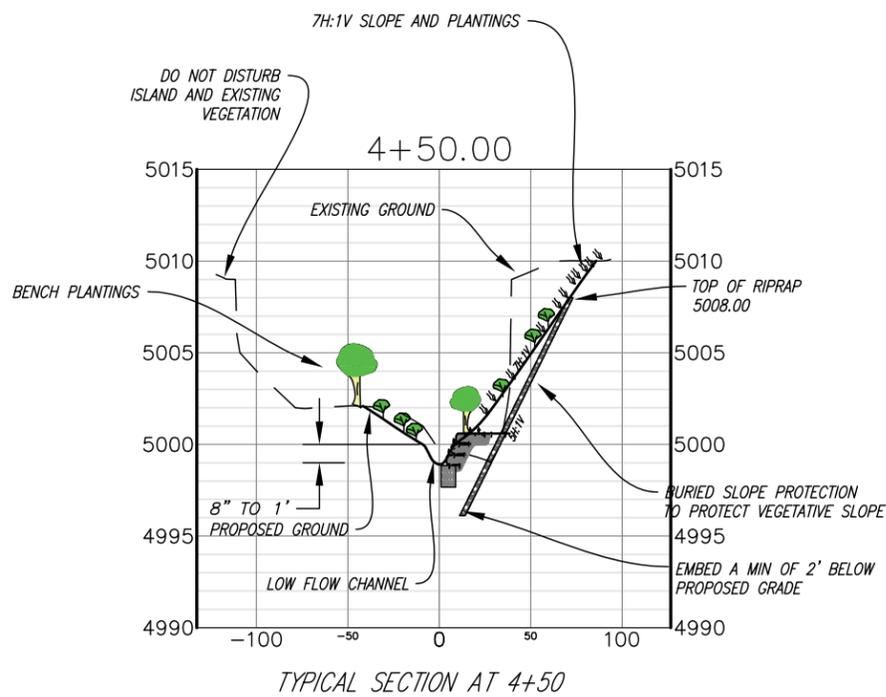
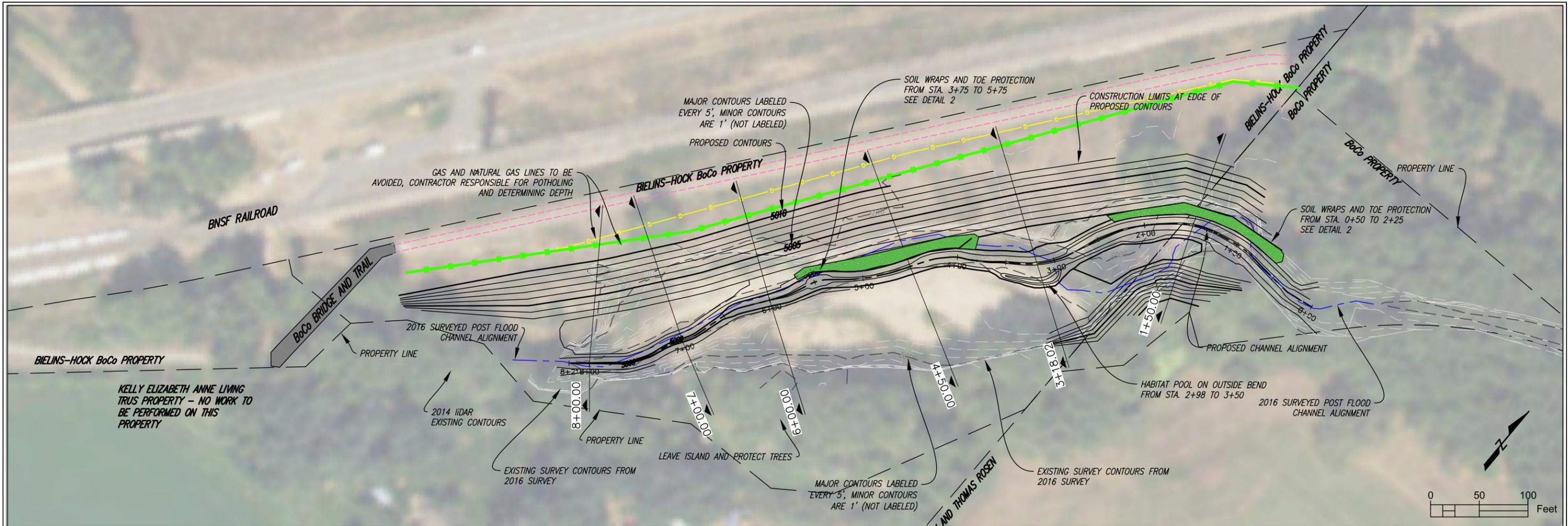
DESIGNED: GEB
 DRAWN: GEB
 CHECKED: JWS
 DATE: OCT 2016

REVISION	DESCRIPTION	BY	DATE
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30% DESIGN FOR INTERNAL REVIEW

BIELINS HOCK CHANNEL IMPROVEMENT CONTROL

SHEET/REFERENCE NO.
2 OF 10
 44



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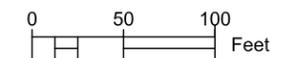
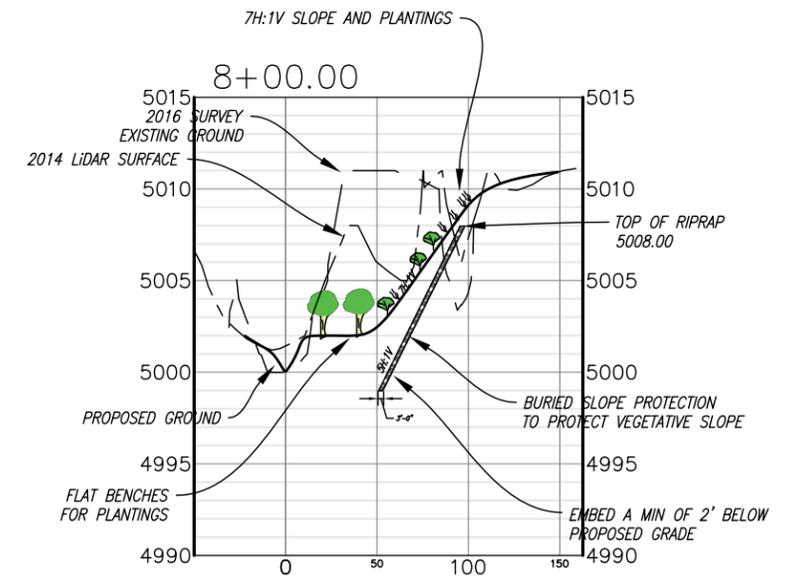
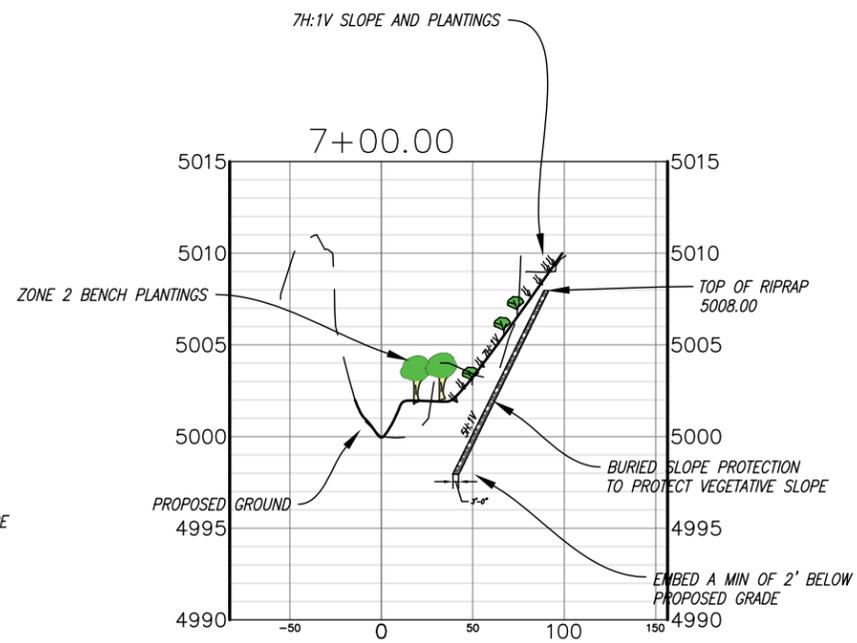
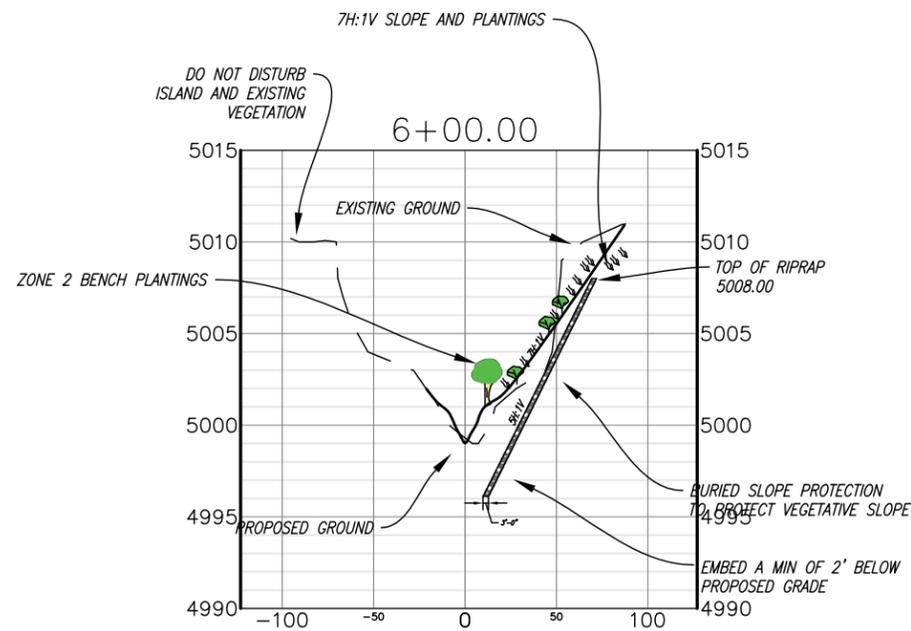
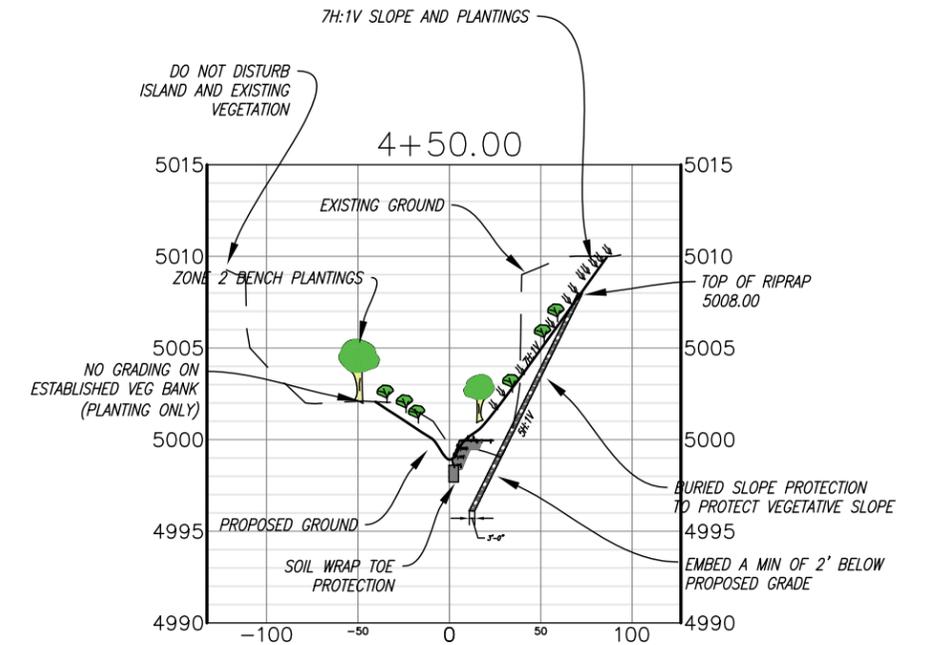
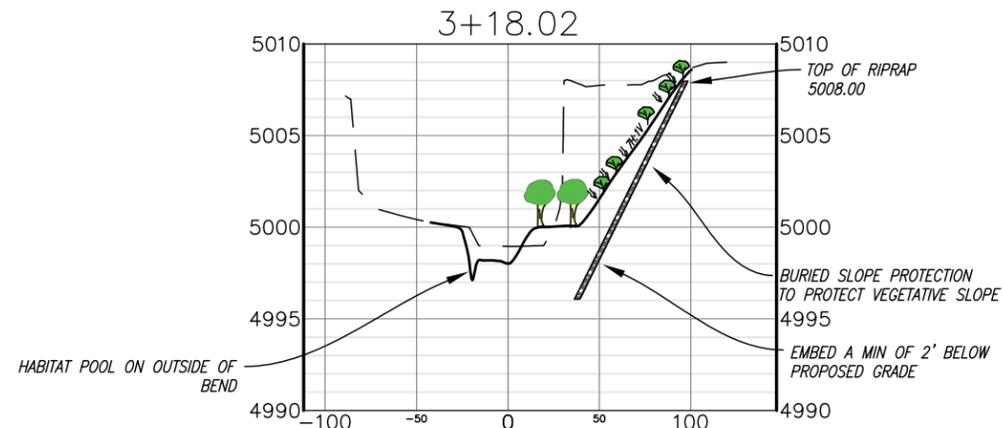
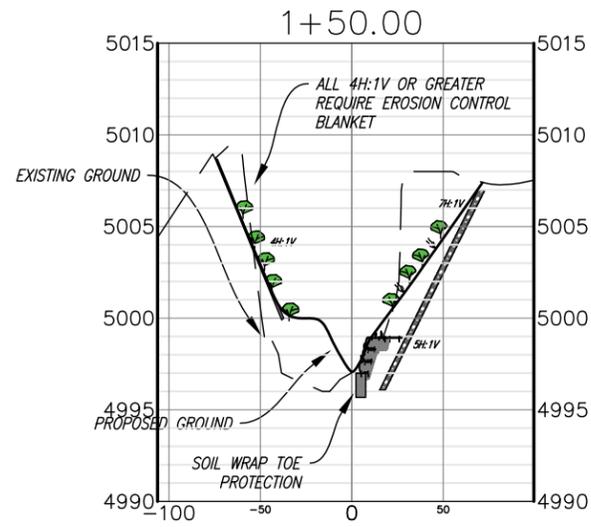
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REVISION	DESCRIPTION	BY	DATE
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BIELINS HOCK CHANNEL IMPROVEMENT CHANNEL PLAN AND PROFILE

SHEET/REFERENCE NO.
3 OF 10
45



PREPARED FOR:
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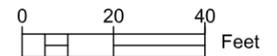
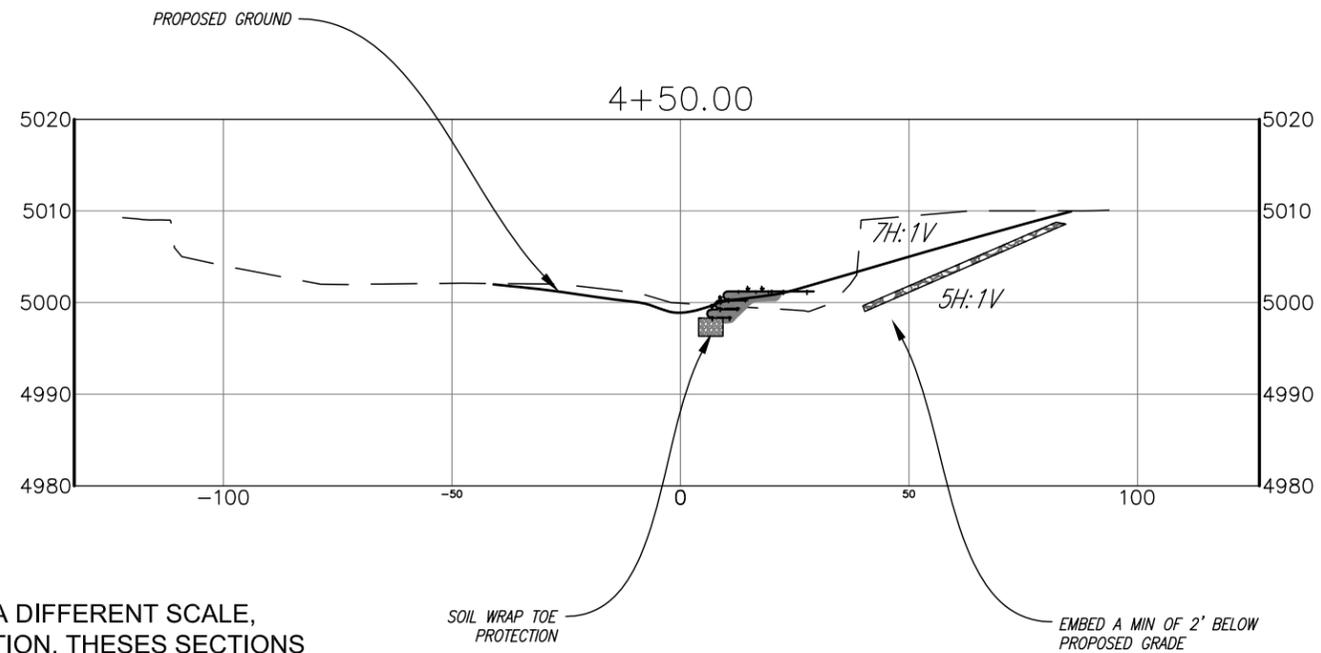
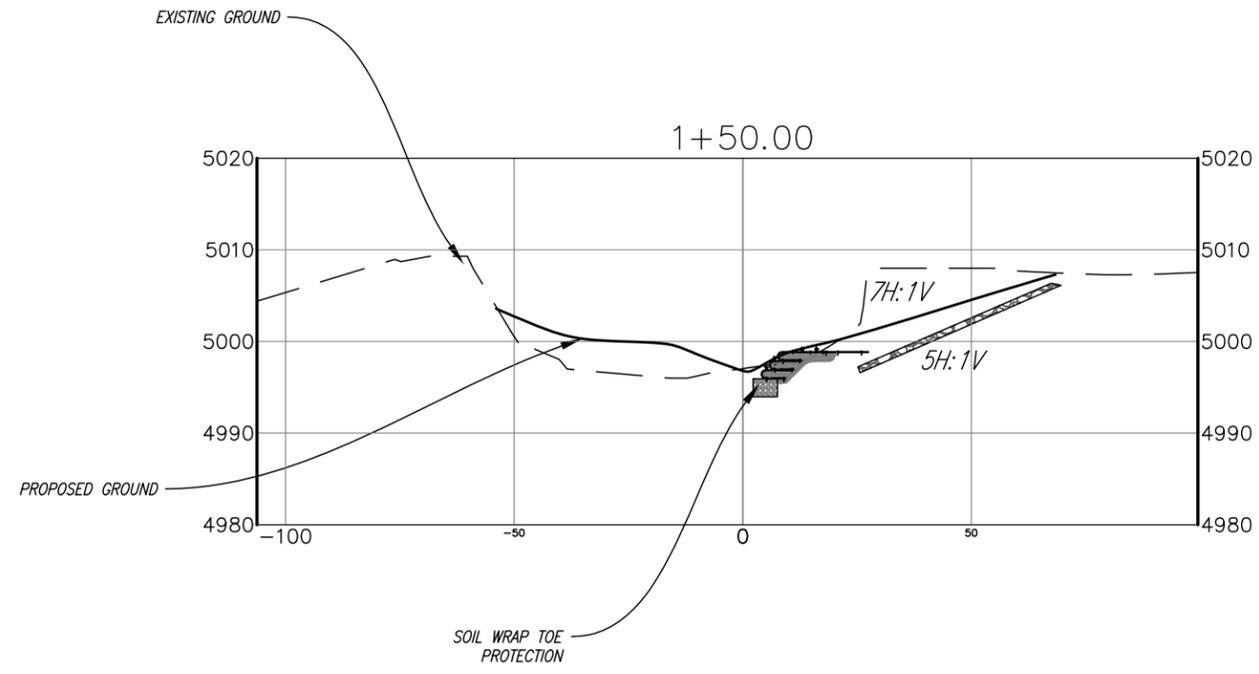
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REVISION	DESCRIPTION	BY	DATE
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BIELINS HOCK CHANNEL IMPROVEMENT CROSS SECTIONS

SHEET/REFERENCE NO.
4 OF 10



THESE SECTION SHEETS ARE INCLUDED TO SHOW THE SECTIONS AT A DIFFERENT SCALE, THIS SCALE IS 1"=20' FULL SCALE WITH A 2 TO 1 VERTICAL EXAGGERATION, THESE SECTIONS ARE THE SAME AS SHEET 4, EXCEPT THEY ARE EXAGGERATED AT A 2 VERTICAL TO 1 HORIZONTAL INSTEAD OF A 50 TO 1.

PREPARED FOR:
BOULDER COUNTY OPEN SPACE
5201 ST VRAIN RD
LONGMONT, CO 80503

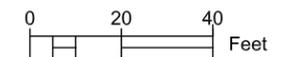
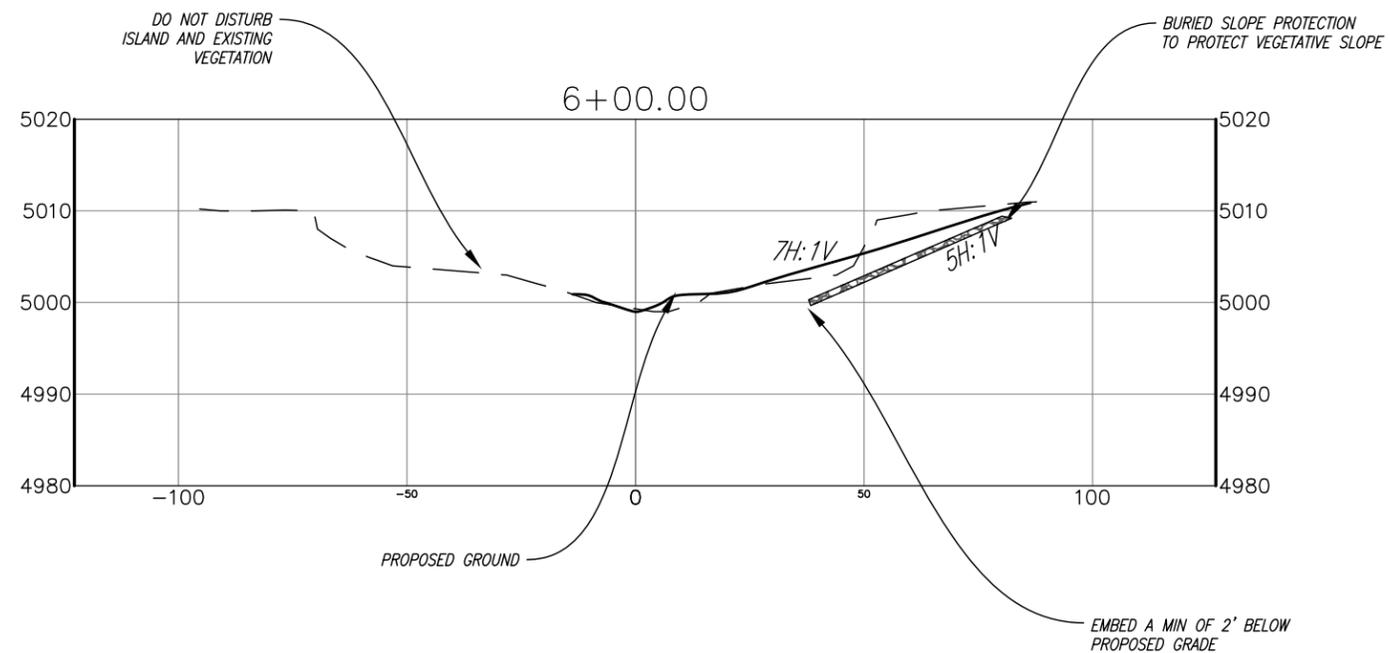
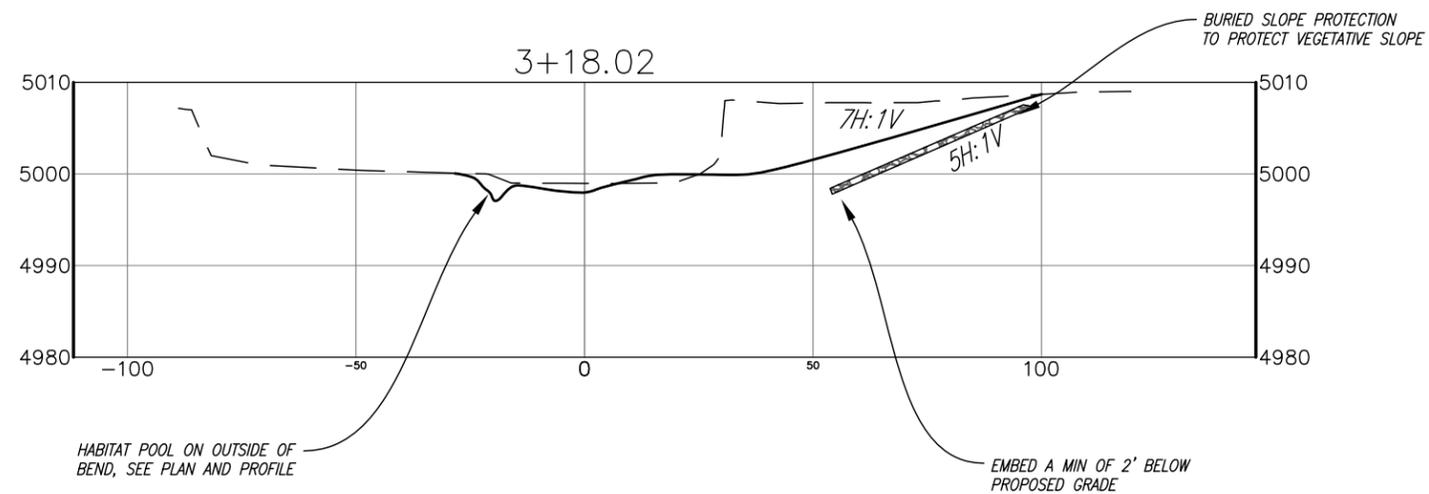
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DESIGNED:	GEB	REVISION	DESCRIPTION	BY	DATE
DRAWN:	GEB	(R-..)	
CHECKED:	JWS	(R-..)	
DATE:	OCT 2016	(R-..)	
		(R-..)	

30% DESIGN FOR INTERNAL REVIEW

**BIELINS HOCK CHANNEL IMPROVEMENT
CROSS SECTIONS (20 SCALE)**

SHEET/REFERENCE NO.
**4a
OF
10**



THESE SECTION SHEETS ARE INCLUDED TO SHOW THE SECTIONS AT A DIFFERENT SCALE, THIS SCALE IS 1"=20' FULL SCALE WITH A 2 TO 1 VERTICAL EXAGGERATION, THESE SECTIONS ARE THE SAME AS SHEET 4, EXCEPT THEY ARE EXAGGERATED AT A 2 VERTICAL TO 1 HORIZONTAL INSTEAD OF A 50 TO 1.

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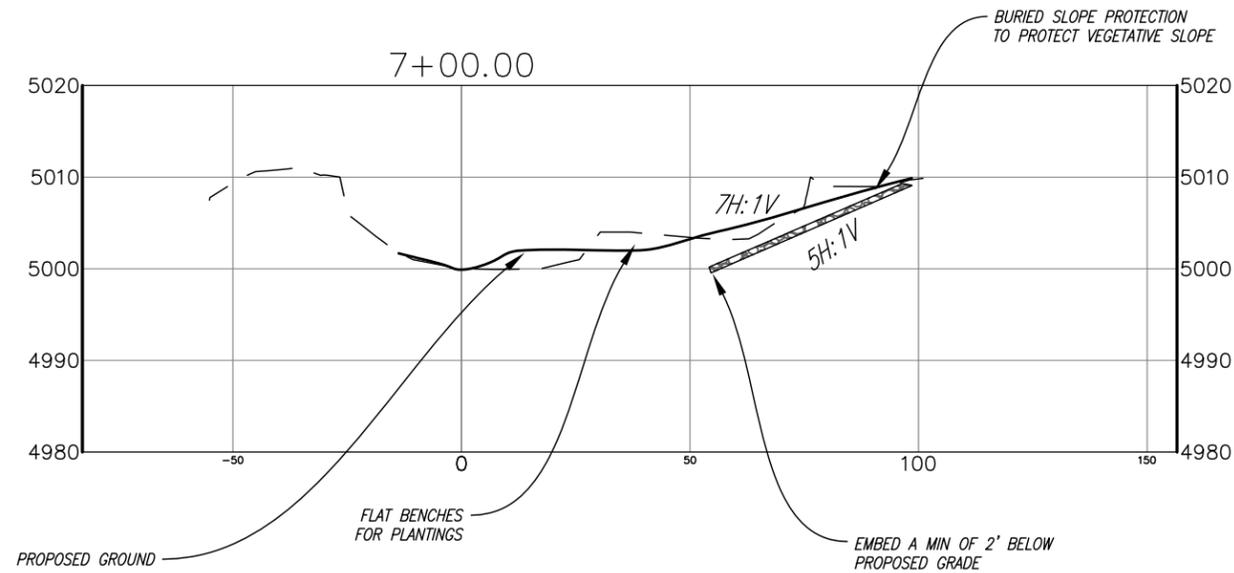
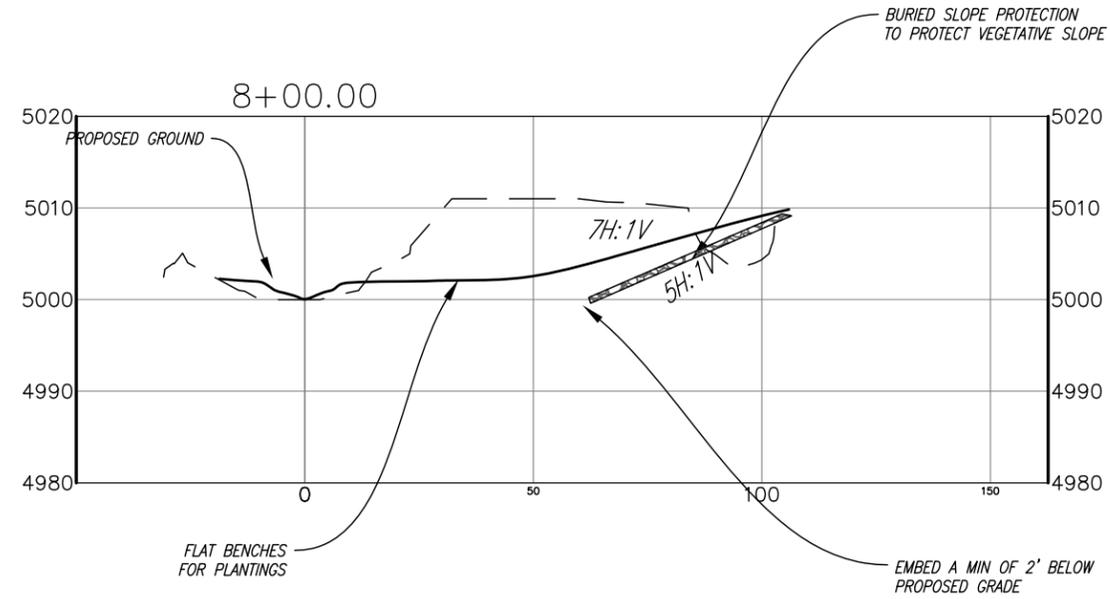
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30% DESIGN FOR INTERNAL REVIEW

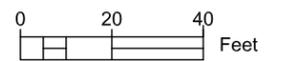
**BIELINS HOCK CHANNEL IMPROVEMENT
CROSS SECTIONS (20 SCALE)**

48

SHEET/REFERENCE NO.
**4b
OF
10**



THESE SECTION SHEETS ARE INCLUDED TO SHOW THE SECTIONS AT A DIFFERENT SCALE, THIS SCALE IS 1"=20' FULL SCALE WITH A 2 TO 1 VERTICAL EXAGGERATION, THESE SECTIONS ARE THE SAME AS SHEET 4, EXCEPT THEY ARE EXAGGERATED AT A 2 VERTICAL TO 1 HORIZONTAL INSTEAD OF A 50 TO 1.



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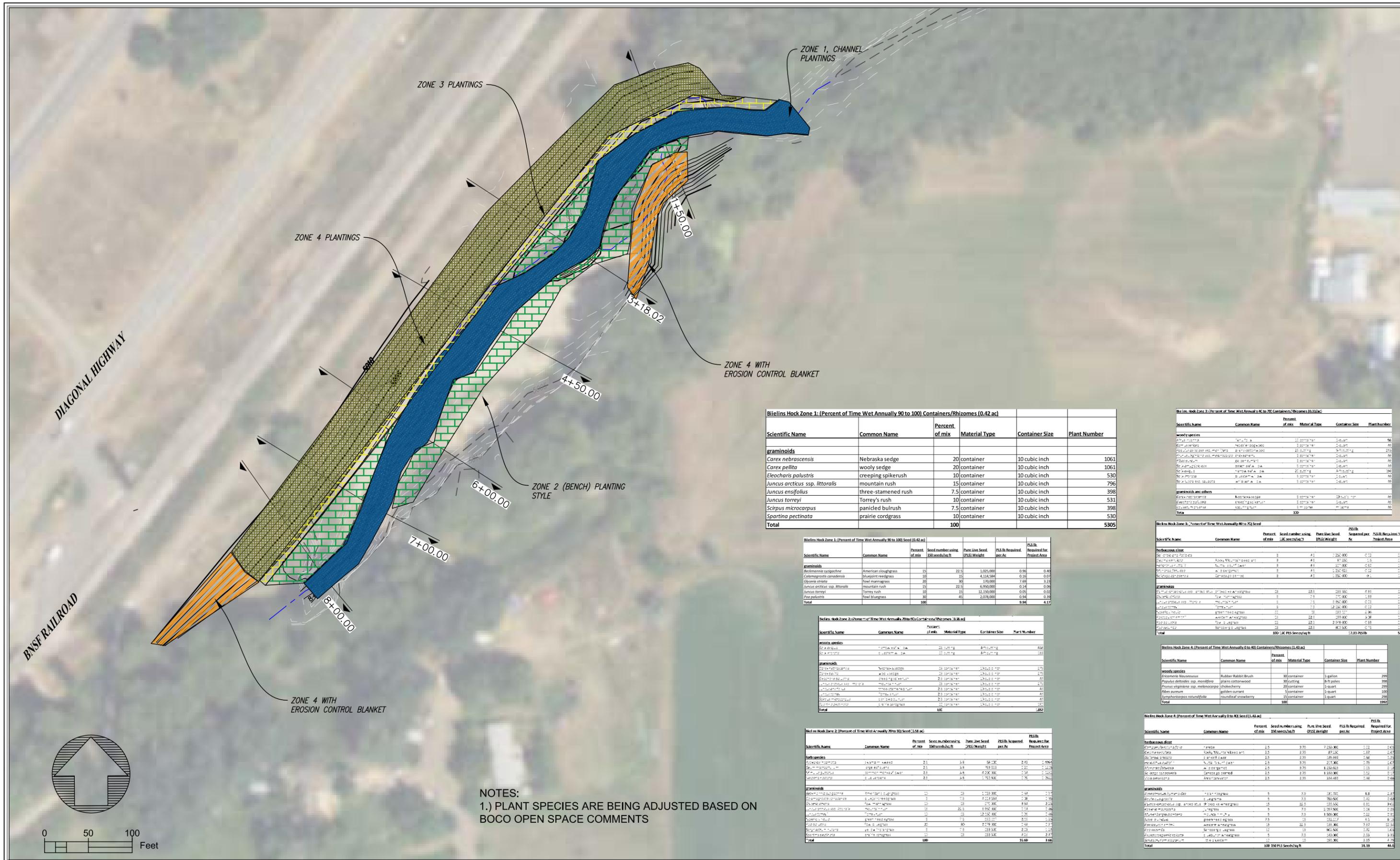
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DATE: OCT 2016

REVISION	DESCRIPTION	BY	DATE
(R-...)	

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**BIELINS HOCK CHANNEL IMPROVEMENT
CROSS SECTIONS (20 SCALE)**

SHEET/REFERENCE NO.
**4C
OF
10**



Bielins Hock Zone 1: (Percent of Time Wet Annually 90 to 100) Containers/Rhizomes (0.42 ac)

Scientific Name	Common Name	Percent of mix	Material Type	Container Size	Plant Number
graminoids					
<i>Carex nebrascensis</i>	Nebraska sedge	20	container	10 cubic inch	1061
<i>Carex pellita</i>	wooly sedge	20	container	10 cubic inch	1061
<i>Eleocharis palustris</i>	creeping spikerush	10	container	10 cubic inch	530
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	container	10 cubic inch	796
<i>Juncus ensifolius</i>	three-stamened rush	7.5	container	10 cubic inch	398
<i>Juncus torreyi</i>	Torrey's rush	10	container	10 cubic inch	531
<i>Scirpus microcarpus</i>	panicle bulrush	7.5	container	10 cubic inch	398
<i>Spartina pectinata</i>	prairie cordgrass	10	container	10 cubic inch	530
Total		100			5305

Bielins Hock Zone 1: (Percent of Time Wet Annually 90 to 100) Seed (0.42 ac)

Scientific Name	Common Name	Percent of mix	Seed number using 100 seeds/cu ft	Pure Live Seed (PLS) Weight	PLS lbs Required per Ac	PLS lbs Required for Project Area
graminoids						
<i>Betula papyrifera</i>	American bloughgrass	15	22.5	1,000,000	0.94	0.48
<i>Calamagrostis canadensis</i>	bluepoint reedgrass	10	15	4,114,584	0.16	0.07
<i>Glyceria striata</i>	foxtail mangrass	20	30	10,000,000	7.69	3.23
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	22.5	6,950,000	0.14	0.06
<i>Juncus torreyi</i>	Torrey's rush	10	15	12,150,000	0.09	0.04
<i>Poa polystris</i>	foxtail bluegrass	30	45	2,078,000	0.94	0.39
Total		100			9.94	4.17

Bielins Hock Zone 2: (Percent of Time Wet Annually 70 to 80) Containers/Rhizomes (3.8 ac)

Scientific Name	Common Name	Percent of mix	Material Type	Container Size	Plant Number
woody species					
<i>Rubus odoratus</i>	Blackberry	25	container	1-gallon	454
<i>Rubus strigosus</i>	Strawberry	10	container	1-gallon	181
graminoids					
<i>Carex nebrascensis</i>	Nebraska sedge	20	container	10 cubic inch	1061
<i>Carex pellita</i>	wooly sedge	20	container	10 cubic inch	1061
<i>Eleocharis palustris</i>	creeping spikerush	10	container	10 cubic inch	530
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	container	10 cubic inch	796
<i>Juncus ensifolius</i>	three-stamened rush	7.5	container	10 cubic inch	398
<i>Juncus torreyi</i>	Torrey's rush	10	container	10 cubic inch	531
<i>Scirpus microcarpus</i>	panicle bulrush	7.5	container	10 cubic inch	398
<i>Spartina pectinata</i>	prairie cordgrass	10	container	10 cubic inch	530
Total		100			5305

Bielins Hock Zone 2: (Percent of Time Wet Annually 70 to 80) Seed (3.8 ac)

Scientific Name	Common Name	Percent of mix	Seed number using 100 seeds/cu ft	Pure Live Seed (PLS) Weight	PLS lbs Required per Ac	PLS lbs Required for Project Area
woody species						
<i>Rubus odoratus</i>	Blackberry	25	37.5	1,250,000	1.12	0.43
<i>Rubus strigosus</i>	Strawberry	10	15	2,000,000	0.16	0.06
graminoids						
<i>Carex nebrascensis</i>	Nebraska sedge	20	30	10,000,000	7.69	3.23
<i>Carex pellita</i>	wooly sedge	20	30	10,000,000	7.69	3.23
<i>Eleocharis palustris</i>	creeping spikerush	10	15	4,114,584	0.16	0.07
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	22.5	6,950,000	0.14	0.06
<i>Juncus ensifolius</i>	three-stamened rush	7.5	11.25	3,656,250	0.03	0.01
<i>Juncus torreyi</i>	Torrey's rush	10	15	12,150,000	0.09	0.04
<i>Scirpus microcarpus</i>	panicle bulrush	7.5	11.25	4,725,000	0.04	0.02
<i>Spartina pectinata</i>	prairie cordgrass	10	15	12,150,000	0.09	0.04
Total		100			31.66	12.66

Bielins Hock Zone 3: (Percent of Time Wet Annually 40 to 50) Containers/Rhizomes (1.13 ac)

Scientific Name	Common Name	Percent of mix	Material Type	Container Size	Plant Number
woody species					
<i>Rubus odoratus</i>	Blackberry	25	container	1-gallon	454
<i>Rubus strigosus</i>	Strawberry	10	container	1-gallon	181
graminoids					
<i>Carex nebrascensis</i>	Nebraska sedge	20	container	10 cubic inch	1061
<i>Carex pellita</i>	wooly sedge	20	container	10 cubic inch	1061
<i>Eleocharis palustris</i>	creeping spikerush	10	container	10 cubic inch	530
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	container	10 cubic inch	796
<i>Juncus ensifolius</i>	three-stamened rush	7.5	container	10 cubic inch	398
<i>Juncus torreyi</i>	Torrey's rush	10	container	10 cubic inch	531
<i>Scirpus microcarpus</i>	panicle bulrush	7.5	container	10 cubic inch	398
<i>Spartina pectinata</i>	prairie cordgrass	10	container	10 cubic inch	530
Total		100			5305

Bielins Hock Zone 3: (Percent of Time Wet Annually 40 to 50) Seed (1.13 ac)

Scientific Name	Common Name	Percent of mix	Seed number using 100 seeds/cu ft	Pure Live Seed (PLS) Weight	PLS lbs Required per Ac	PLS lbs Required for Project Area
woody species						
<i>Rubus odoratus</i>	Blackberry	25	37.5	1,250,000	1.12	0.43
<i>Rubus strigosus</i>	Strawberry	10	15	2,000,000	0.16	0.06
graminoids						
<i>Carex nebrascensis</i>	Nebraska sedge	20	30	10,000,000	7.69	3.23
<i>Carex pellita</i>	wooly sedge	20	30	10,000,000	7.69	3.23
<i>Eleocharis palustris</i>	creeping spikerush	10	15	4,114,584	0.16	0.07
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	22.5	6,950,000	0.14	0.06
<i>Juncus ensifolius</i>	three-stamened rush	7.5	11.25	3,656,250	0.03	0.01
<i>Juncus torreyi</i>	Torrey's rush	10	15	12,150,000	0.09	0.04
<i>Scirpus microcarpus</i>	panicle bulrush	7.5	11.25	4,725,000	0.04	0.02
<i>Spartina pectinata</i>	prairie cordgrass	10	15	12,150,000	0.09	0.04
Total		100			21.33	8.37

Bielins Hock Zone 4: (Percent of Time Wet Annually 0 to 40) Containers/Rhizomes (1.43 ac)

Scientific Name	Common Name	Percent of mix	Material Type	Container Size	Plant Number
woody species					
<i>Rubus odoratus</i>	Blackberry	25	container	1-gallon	454
<i>Rubus strigosus</i>	Strawberry	10	container	1-gallon	181
graminoids					
<i>Carex nebrascensis</i>	Nebraska sedge	20	container	10 cubic inch	1061
<i>Carex pellita</i>	wooly sedge	20	container	10 cubic inch	1061
<i>Eleocharis palustris</i>	creeping spikerush	10	container	10 cubic inch	530
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	container	10 cubic inch	796
<i>Juncus ensifolius</i>	three-stamened rush	7.5	container	10 cubic inch	398
<i>Juncus torreyi</i>	Torrey's rush	10	container	10 cubic inch	531
<i>Scirpus microcarpus</i>	panicle bulrush	7.5	container	10 cubic inch	398
<i>Spartina pectinata</i>	prairie cordgrass	10	container	10 cubic inch	530
Total		100			5305

Bielins Hock Zone 4: (Percent of Time Wet Annually 0 to 40) Seed (1.43 ac)

Scientific Name	Common Name	Percent of mix	Seed number using 100 seeds/cu ft	Pure Live Seed (PLS) Weight	PLS lbs Required per Ac	PLS lbs Required for Project Area
woody species						
<i>Rubus odoratus</i>	Blackberry	25	37.5	1,250,000	1.12	0.43
<i>Rubus strigosus</i>	Strawberry	10	15	2,000,000	0.16	0.06
graminoids						
<i>Carex nebrascensis</i>	Nebraska sedge	20	30	10,000,000	7.69	3.23
<i>Carex pellita</i>	wooly sedge	20	30	10,000,000	7.69	3.23
<i>Eleocharis palustris</i>	creeping spikerush	10	15	4,114,584	0.16	0.07
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	22.5	6,950,000	0.14	0.06
<i>Juncus ensifolius</i>	three-stamened rush	7.5	11.25	3,656,250	0.03	0.01
<i>Juncus torreyi</i>	Torrey's rush	10	15	12,150,000	0.09	0.04
<i>Scirpus microcarpus</i>	panicle bulrush	7.5	11.25	4,725,000	0.04	0.02
<i>Spartina pectinata</i>	prairie cordgrass	10	15	12,150,000	0.09	0.04
Total		100			31.66	12.66

NOTES:
 1.) PLANT SPECIES ARE BEING ADJUSTED BASED ON BOCO OPEN SPACE COMMENTS

PREPARED FOR:
 BOULDER COUNTY OPEN SPACE
 5201 ST VRAIN RD
 LONGMONT, CO 80503

PREPARED BY:
 RESILIENT WATERSHED PARTNERS.
 10106 W SAN JUAN WAY
 LITTLETON CO, 80127
 PH : 303-872-9112
 FX : 303-872-9104

DESIGNED:	REVISION	DESCRIPTION	BY	DATE
DRAWN:	R--			
CHECKED:	R--			
DATE:	R--			

30% DESIGN FOR INTERNAL REVIEW

BIELINS HOCK CHANNEL IMPROVEMENT PLANTING ZONES
 50

SHEET/REFERENCE NO.
5 OF 10

Bielins Hock Zone 1: (Percent of Time Wet Annually 90 to 100) Containers/Rhizomes (0.42 ac)					
Scientific Name	Common Name	Percent of mix	Material Type	Container Size	Plant Number
graminoids					
<i>Carex nebrascensis</i>	Nebraska sedge	20	container	10 cubic inch	1061
<i>Carex pellita</i>	wooly sedge	20	container	10 cubic inch	1061
<i>Eleocharis palustris</i>	creeping spikerush	10	container	10 cubic inch	530
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	container	10 cubic inch	796
<i>Juncus ensifolius</i>	three-stamened rush	7.5	container	10 cubic inch	398
<i>Juncus torreyi</i>	Torrey's rush	10	container	10 cubic inch	531
<i>Scirpus microcarpus</i>	panicked bulrush	7.5	container	10 cubic inch	398
<i>Spartina pectinata</i>	prairie cordgrass	10	container	10 cubic inch	530
Total		100			5305

Bielins Hock Zone 1: (Percent of Time Wet Annually 90 to 100) Seed (0.42 ac)						
Scientific Name	Common Name	Percent of mix	Seed number using 150 seeds/sq ft	Pure Live Seed (PLS) Weight	PLS lb Required per Ac	PLS lb Required for Project Area
graminoids						
<i>Beckmannia syzigachne</i>	American sloughgrass	15	22.5	1,025,000	0.96	0.40
<i>Calamagrostis canadensis</i>	bluejoint reedgrass	10	15	4,114,584	0.16	0.07
<i>Glyceria striata</i>	fowl mannagrass	20	30	170,000	7.69	3.23
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	22.5	6,950,000	0.14	0.06
<i>Juncus torreyi</i>	Torrey rush	10	15	12,150,000	0.05	0.02
<i>Poa palustris</i>	fowl bluegrass	30	45	2,078,000	0.94	0.39
Total		100			9.94	4.17

Bielins Hock Zone 2: (Percent of Time Wet Annually 70 to 90) Containers/Rhizomes (0.58 ac)					
Scientific Name	Common Name	Percent of mix	Material Type	Container Size	Plant Number
woody species					
<i>Salix exigua</i>	narrowleaf willow	25	cutting	4-ft cutting	458
<i>Salix irrorata</i>	bluestem willow	10	cutting	4-ft cutting	183
graminoids					
<i>Carex nebrascensis</i>	Nebraska sedge	15	containere	10 cub' c inc"	275
<i>Carex pellita</i>	wooly sedge	15	containere	10 cub' c inc"	275
<i>Eleocharis palustris</i>	creeping spikerush	2.5	containere	10 cub' c inc"	46
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	containere	10 cub' c inc"	275
<i>Juncus ensifolius</i>	three-stamened rush	2.5	containere	10 cub' c inc"	46
<i>Juncus torreyi</i>	Torrey's rush	2.5	containere	10 cub' c inc"	46
<i>Scirpus microcarpus</i>	panicked bulrush	2.5	containere	10 cub' c inc"	46
<i>Spartina pectinata</i>	prairie cordgrass	10	containere	10 cub' c inc"	182
Total		100			1832

Bielins Hock Zone 2: (Percent of Time Wet Annually 70 to 90) Seed (0.58 ac)						
Scientific Name	Common Name	Percent of mix	Seed number using 150 seeds/sq ft	Pure Live Seed (PLS) Weight	PLS lb Required per Ac	PLS lb Required for Project Area
forb species						
<i>Asclepias incarnata</i>	swamp milkweed	2.5	3.8	68,100	2.43	1.4094
<i>Geum macrorhizum</i>	largeleaf avens	2.5	3.8	793,353	0.21	0.1218
<i>Mimulus guttatus</i>	common monkeyflower	2.5	3.8	4,200,000	0.04	0.0232
<i>Verbena hastata</i>	bl. ve. verbene	2.5	3.8	1,792,800	0.09	0.0522
graminoids						
<i>Beckmannia syzigachne</i>	American sloughgrass	10	15	1,025,000	0.64	0.37
<i>Calamagrostis canadensis</i>	bluejoint reedgrass	5	7.5	4,114,584	0.08	0.03
<i>Glyceria striata</i>	fowl mannagrass	10	15	170,000	3.84	2.23
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	15	22.5	6,950,000	0.14	0.08
<i>Juncus torreyi</i>	Torrey rush	10	15	12,150,000	0.05	0.03
<i>Nasella viridula</i>	green needlegrass	5	7.5	152,117	2.15	1.25
<i>Poa palustris</i>	fowl bluegrass	20	30	2,078,000	0.63	0.37
<i>Sorghastrum nutans</i>	yellow Indiangrass	5	7.5	153,000	2.13	1.24
<i>Spartina pectinata</i>	prairie cordgrass	10	15	153,500	4.26	2.47
Total		100			16.69	9.68

Bielins Hock Zone 3: (Percent of Time Wet Annually 40 to 70) Containers/Rhizomes (0.31/ac)					
Scientific Name	Common Name	Percent of mix	Material Type	Container Size	Plant Number
woody species					
<i>Alnus incana</i>	Tenuifolia	10	container	1-quart	98
<i>Cornus sericea</i>	redosier dogwood	5	container	1-quart	49
<i>Populus deltoides ssp. monilifera</i>	plains cottonwood	25	cutting	5-ft cutting	245
<i>Prunus virginiana ssp. melanocarpa</i>	chokecherry	5	container	1-quart	49
<i>Ribes aureum</i>	golden currant	5	container	1-quart	49
<i>Salix amygdaloides</i>	peachleaf willow	5	container	1-quart	49
<i>Salix exigua</i>	narrowleaf willow	20	cutting	4-ft cutting	196
<i>Salix irrorata</i>	bluestem willow	5	container	1 quart	49
<i>Salix lucida ssp. caudata</i>	whiplash willow	5	container	1-quart	49
graminoids and others					
<i>Carex nebrascensis</i>	Nebraska sedge	5	container	10 cubic inch	49
<i>Eleocharis palustris</i>	creeping spikerush	5	container	1-quart	49
<i>Equisetum arvense</i>	scauring rush	5	rhizome	rhizome	49
Total		100			

Bielins Hock Zone 3: (Percent of Time Wet Annually 40 to 70) Seed						
Scientific Name	Common Name	Percent of mix	Seed number using 150 seeds/sq ft	Pure Live Seed (PLS) Weight	PLS lb Required per Ac	PLS lb Required for Project Area
herbaceous dicot						
<i>Gaillardia and Radbida</i>		3	4.5	7,250,000	0.02	0.01
<i>Cleome serrulata</i>	Rocky Mountain beeplant	3	4.5	87,250	1.6	0.50
<i>Helianthus nuttallii</i>	Nuttall's sunflower	3	4.5	217,000	0.62	0.19
<i>Monarda fistulosa</i>	wild bergamot	3	4.5	1,250,625	0.12	0.04
<i>Solidago canadensis</i>	Canada goldenrod	3	4.5	1,350,000	0.1	0.03
graminoids						
<i>Elymus lanceolatus ssp. lanceolatus</i>	thickspike wheatgrass	15	22.5	155,350	4.35	1.35
<i>Glyceria striata</i>	fowl mannagrass	5	7.5	170,000	1.33	0.41
<i>Juncus arcticus ssp. littoralis</i>	mountain rush	5	7.5	6,950,000	0.03	0.01
<i>Juncus torreyi</i>	Torrey rush	5	7.5	12,150,000	0.02	0.01
<i>Nasella viridula</i>	green needlegrass	10	15	152,117	2.96	0.92
<i>Pascopyron smithii</i>	western wheatgrass	15	22.5	133,000	5.08	1.57
<i>Poa palustris</i>	fowl bluegrass	15	22.5	2,078,000	0.33	0.10
<i>Poa secunda</i>	Sandberg bluegrass	15	22.5	902,500	0.75	0.23
Total		100	150 PLS Seeds/sq ft		17.31 PLS lb	5.37

Bielins Hock Zone 4: (Percent of Time Wet Annually 0 to 40) Containers/Rhizomes (1.43 ac)					
Scientific Name	Common Name	Percent of mix	Material Type	Container Size	Plant Number
woody species					
<i>Ericameria nauseosus</i>	Rubber Rabbit Brush	30	container	1-gallon	299
<i>Populus deltoides ssp. monilifera</i>	plains cottonwood	30	cutting	8-ft poles	398
<i>Prunus virginiana ssp. melanocarpa</i>	chokecherry	20	container	1-quart	299
<i>Ribes aureum</i>	golden currant	5	container	1-quart	100
<i>Symphoricarpos rotundifolia</i>	roundleaf snowberry	15	container	1 quart	298
Total		100			1992

Bielins Hock Zone 4: (Percent of Time Wet Annually 0 to 40) Seed (1.43 ac)						
Scientific Name	Common Name	Percent of mix	Seed number using 150 seeds/sq ft	Pure Live Seed (PLS) Weight	PLS lb Required per Ac	PLS lb Required for Project Area
herbaceous dicot						
<i>Campanula rotundifolia</i>	harebell	2.5	3.75	7,250,000	0.02	0.03
<i>Cleome serrulata</i>	Rocky Mountain beeplant	2.5	3.75	87,250	1.87	2.67
<i>Gaillardia aristata</i>	blanketflower	2.5	3.75	189,959	0.86	1.23
<i>Helianthus nuttallii</i>	Nuttall's sunflower	2.5	3.75	217,000	0.75	1.07
<i>Monarda fistulosa</i>	wild bergamot	2.5	3.75	1,250,625	0.13	0.19
<i>Solidago canadensis</i>	Canada goldenrod	2.5	3.75	1,350,000	0.12	0.17
<i>Vicia americana</i>	American vetch	2.5	3.75	354,495	0.46	0.66
graminoids						
<i>Achnatherum hymenoides</i>	Indian ricegrass	5	7.5	181,741	1.8	2.57
<i>Bouteloua gracilis</i>	blue grama	5	7.5	780,500	0.42	0.60
<i>Elymus lanceolatus ssp. lanceolatus</i>	thickspike wheatgrass	15	22.5	155,350	6.31	9.02
<i>Koeleria macrantha</i>	junegrass	5	7.5	2,057,500	0.16	0.23
<i>Muhlenbergia montana</i>	mountain muhly	5	7.5	1,500,000	0.22	0.31
<i>Nasella viridula</i>	green needlegrass	7.5	15	152,117	4.3	6.15
<i>Pascopyron smithii</i>	western wheatgrass	15	22.5	133,000	7.37	10.54
<i>Poa secunda</i>	Sandberg bluegrass	10	15	902,500	0.72	1.03
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	5	7.5	140,000	2.33	3.33
<i>Schizachyrium scaparium</i>	little bluestem	10	15	195,000	3.35	4.79
Total		100	150 PLS Seeds/sq ft		31.19	44.6

NOTES:
1.) PLANT SPECIES ARE BEING ADJUSTED BASED ON BOCO OPEN SPACE COMMENTS

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LONGMONT CO 80503

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RESILIENT WATERSHED PARTNERS (RWP)
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LITTLETON CO 80127
PH : 303-872-9112
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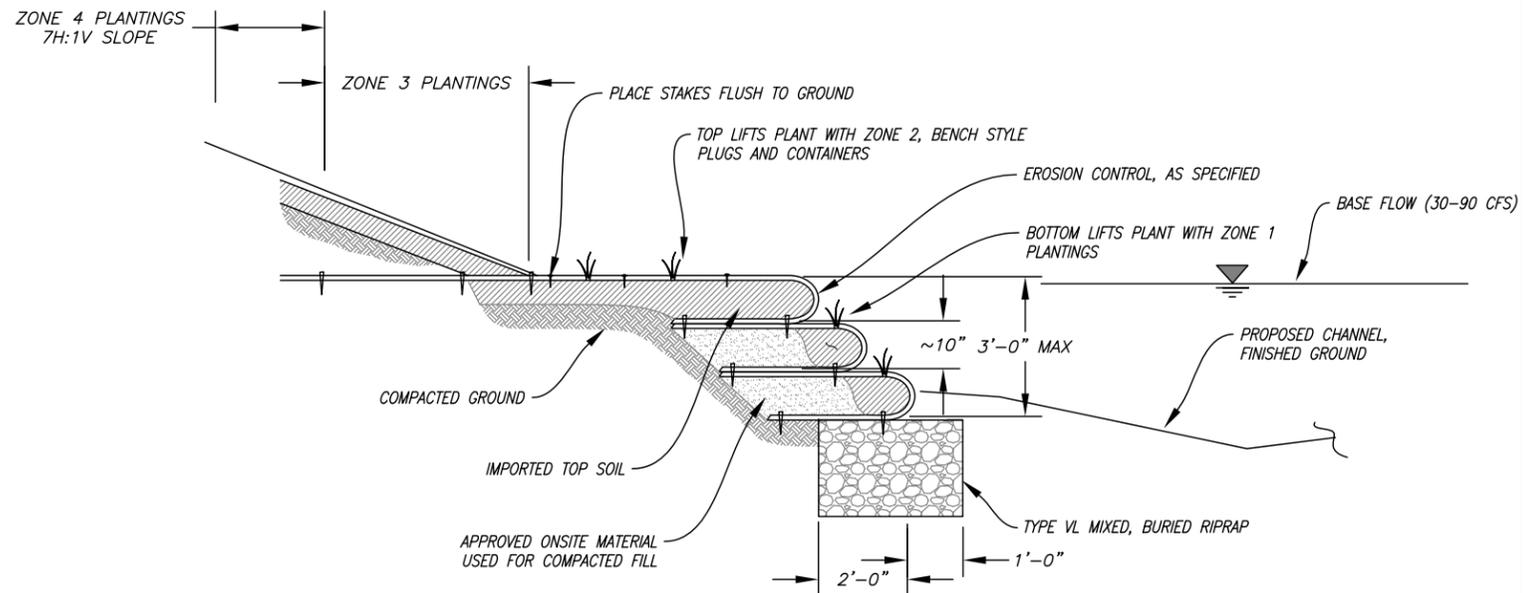
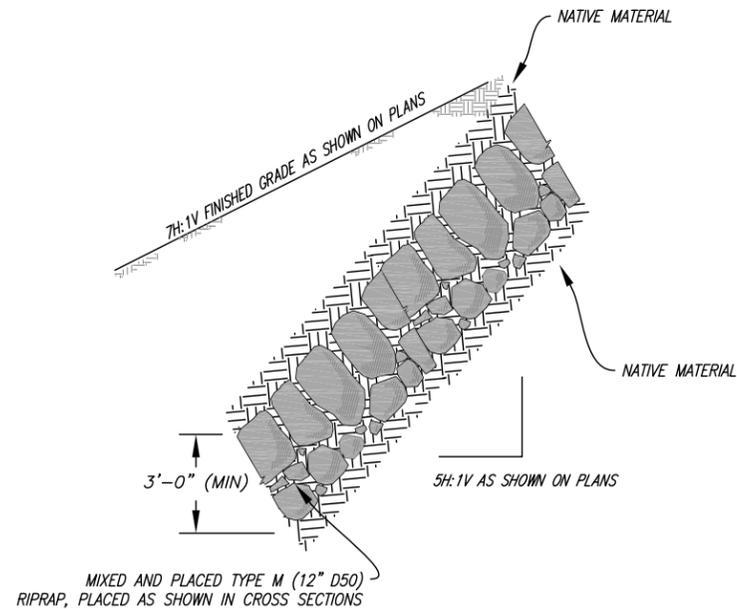
DESIGNED:
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DRAWN:
NRS
CHECKED:
JWS
DATE:
1/18/13

REVISION	DESCRIPTION	BY	DATE
(R-...)	

30% DESIGN FOR INTERNAL REVIEW

BIELINS HOCK CHANNEL IMPROVEMENT
PLANTING ZONE TABLES

SHEET/REFERENCE NO.
6
OF
10



1 SET BACK RIPRAP PROTECTION DETAILS

NTS

VOID-FILLED RIPRAP, ALSO REFERRED TO AS MIXED AND PLACED RIPRAP; PLACEMENT AND GRADATION NOTES:

- WHERE "VOID-FILLED RIPRAP" IS DESIGNATED ON THE CONTRACT DRAWINGS, RIPRAP SHALL BE MIXED WITH THE MATERIALS AND ASSOCIATED PROPORTIONS LISTED IN TABLES ABOVE TO FILL THE VOIDS OF THE RIPRAP.
- THE MIX PROPORTIONS PROVIDED IN TABLES ARE APPROXIMATE AND ARE SUBJECT TO ADJUSTMENT BY THE ENGINEER.
- THE RIPRAP AND VOID-FILLED MATERIALS SHALL BE STOCKPILED SEPARATELY AND THOROUGHLY MIXED PRIOR TO PLACEMENT AND SHALL BE INSTALLED AND COMPACTED SO THAT A DENSE, INTERLOCKED LAYER OF RIPRAP AND VOID-FILL MATERIAL IS PROVIDED WITH RIPRAP VOIDS COMPLETELY FILLED. THE LOOSE MATERIAL SHALL BE PLACED IN A SINGLE LIFT OF SUFFICIENT HEIGHT SUCH THAT FINAL GRADE WILL BE ACHIEVED UPON COMPACTED. IF THE COMPACTED MATERIAL IS BELOW FINAL GRADE, PLACEMENT OF ONLY THE SMALLER VOID-FILL MATERIALS TO ACHIEVE FINAL GRADE IS NOT PERMITTED. IN SUCH CASES IT IS NECESSARY TO ADD MORE STANDARD SIZED VOID-FILLED RIPRAP AND REMIX THE ENTIRE THICKNESS OF ROCK TO ACHIEVE THE DESIGN SECTION. SEGREGATION OF MATERIALS SHALL BE AVOIDED AND IN NO CASE SHALL THE COMBINED MATERIAL CONSIST PRIMARILY OF THE VOID-FILL MATERIALS. THE DENSITY AND INTERLOCKING NATURE OF RIPRAP IN THE MIXED MATERIAL SHALL ESSENTIALLY BE THE SAME AS IF THE RIPRAP WAS PLACED WITHOUT FILLING THE VOIDS.
- ALL VOID-FILLED RIPRAP THAT IS BURIED WITH TOPSOIL SHALL BE REVIEWED AND APPROVED BY THE ENGINEER PRIOR TO ANY TOPSOIL PLACEMENT.

VOID-FILLED RIPRAP PLACEMENT AND GRADATION			
RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D ₅₀ * (INCHES)
TYPE VL	70 - 100	12	6
	50 - 70	9	
	35 - 50	6	
	2 - 10	2	
TYPE M	70 - 100	21	12
	50 - 70	18	
	35 - 50	12	
	2 - 10	4	

*D₅₀ = MEAN ROCK SIZE

NOTE: MIX ON SITE AND PRIOR TO PLACEMENT

MIX REQUIREMENTS FOR TYPE M AND H VOID-FILLED RIPRAP (D ₅₀ = 12 TO 18 INCH)		
APPROPRIATE PROPORTIONS (BY VOLUME)	MATERIAL TYPE	MATERIAL DESCRIPTION
6 PARTS	RIPRAP	D ₅₀ = 12-INCH (TYPE M) OR D ₅₀ = 18-INCH (TYPE H), SEE TABLE 3
2 PART	VOID-FILL MATERIAL	7-INCH MINUS CRUSHED ROCK SURGE (100% PASSING 7-INCH SIEVE, 80-100% PASSING 6-INCH SIEVE, 35-50% PASSING 3-INCH SIEVE, 10-20% PASSING 1½-INCH SIEVE)
1 PART	VOID-FILL MATERIAL	VTC (VEHICLE TRACKING CONTROL) ROCK (CRUSHED ROCK WITH 100% PASSING 4-INCH SIEVE, 50-70% PASSING 3-INCH SIEVE, 0-10% PASSING 2-INCH SIEVE)
1 PART	VOID-FILL MATERIAL	4-INCH MINUS PIT RUN SURGE (ROUND RIVER ROCK AND SAND, WELL GRADED, 90-100% PASSING 4-INCH SIEVE, 70-80% PASSING 1½-INCH SIEVE, 40-60% PASSING ¾-INCH SIEVE, 10-30% PASSING #16 SIEVE)
1 PART	VOID-FILL MATERIAL	TYPE II BEDDING (CRUSHED ROCK WITH 100% PASSING 3-INCH SIEVE, 20-90% PASSING ¾-INCH SIEVE, 0-20% PASSING #4 SIEVE, 0-3% PASSING #200 SIEVE)
½ TO 1 PART	VOID-FILL MATERIAL	NATIVE TOPSOIL

2 SOIL LIFT DETAILS

NTS

MIX REQUIREMENTS FOR TYPE VL AND L VOID-FILLED RIPRAP (D ₅₀ = 6 TO 9 INCH)*		
APPROPRIATE PROPORTIONS (BY VOLUME)	MATERIAL TYPE	MATERIAL DESCRIPTION
6 PARTS	RIPRAP	D ₅₀ = 6 INCH (TYPE VL) OR D ₅₀ = 9 INCH (TYPE L), SEE TABLE 3
1 PART	VOID-FILL MATERIAL	VTC (VEHICLE TRACKING CONTROL) ROCK (CRUSHED ROCK WITH 100% PASSING 4-INCH SIEVE, 50-70% PASSING 3-INCH SIEVE, 0-10% PASSING 2-INCH SIEVE)
1 PART	VOID-FILL MATERIAL	4-INCH MINUS PIT RUN SURGE (ROUND RIVER ROCK AND SAND, WELL GRADED, 90-100% PASSING 4-INCH SIEVE, 70-80% PASSING 1½-INCH SIEVE, 40-60% PASSING ¾-INCH SIEVE, 10-30% PASSING #16 SIEVE)
1 PART	VOID-FILL MATERIAL	TYPE II BEDDING (CRUSHED ROCK WITH 100% PASSING 3-INCH SIEVE, 20-90% PASSING ¾-INCH SIEVE, 0-20% PASSING #4 SIEVE, 0-3% PASSING #200 SIEVE)
½ TO 1 PART	VOID-FILL MATERIAL	NATIVE TOPSOIL

*SEE RIPRAP DETAILS FOR FURTHER NOTES AND INSTRUCTIONS

PREPARED FOR:
BOULDER COUNTY OPEN SPACE
5201 ST VRAIN RD
LONGMONT, CO 80503

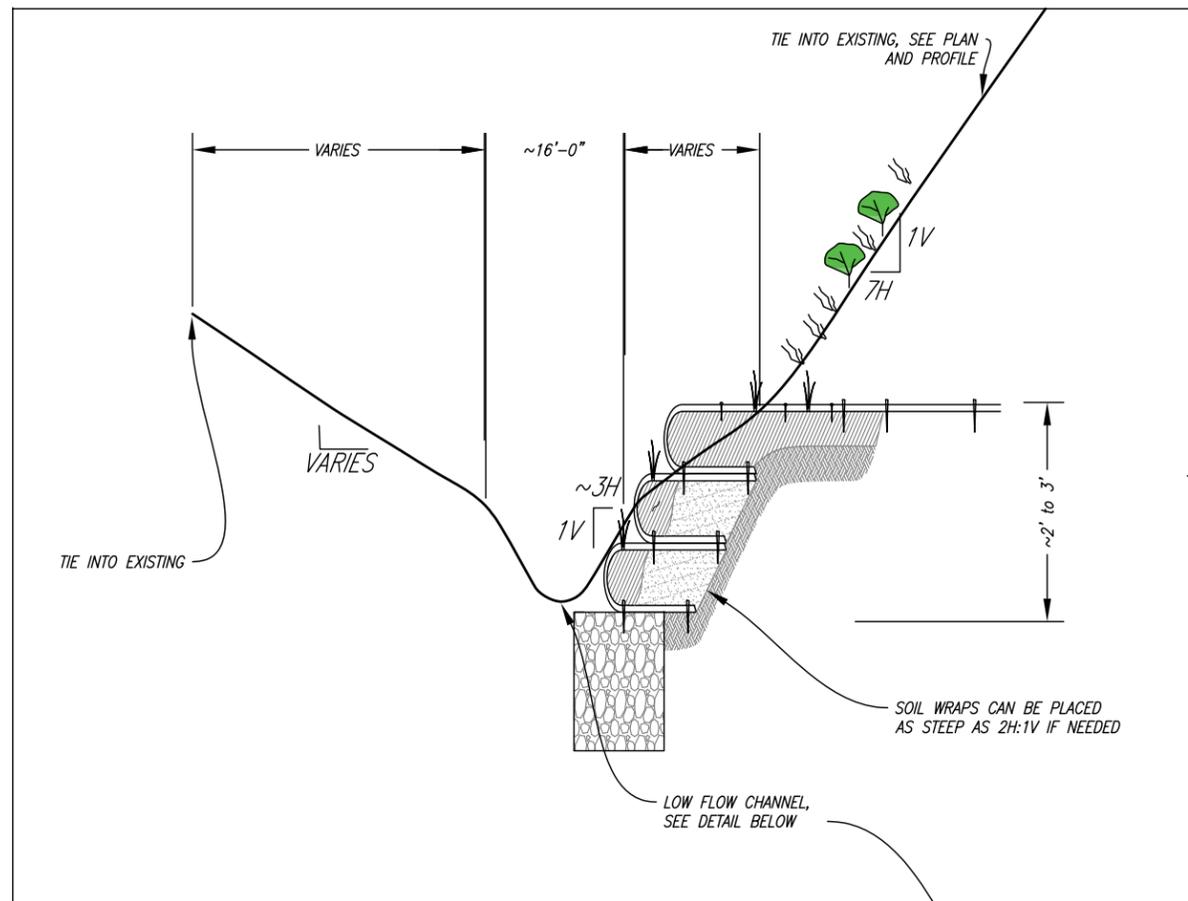
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PH : 303-872-9112
FX : 303-872-9104

DESIGNED: GEB
DRAWN: GEB
CHECKED: JWS
DATE: OCT 2016

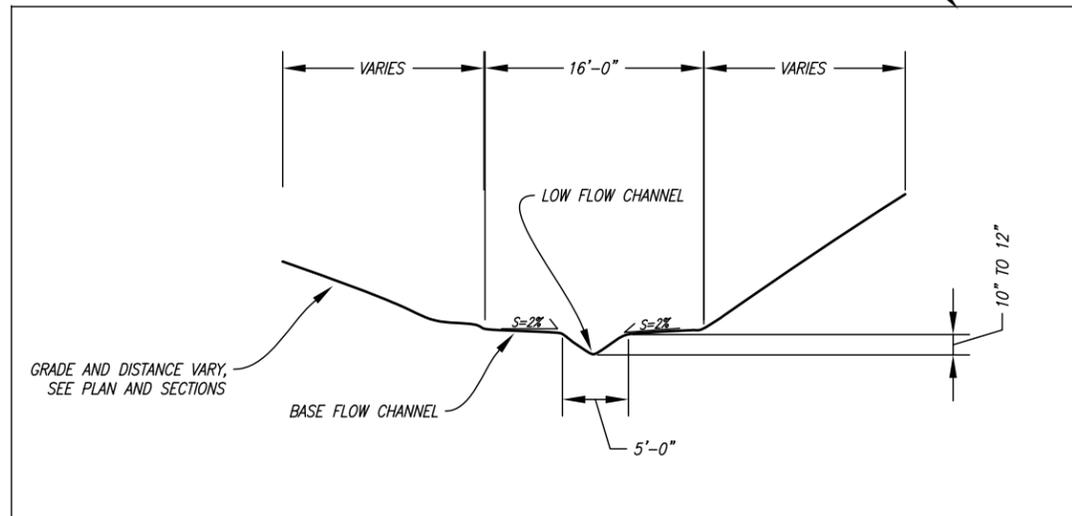
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(R-...)	

30% DESIGN FOR INTERNAL REVIEW

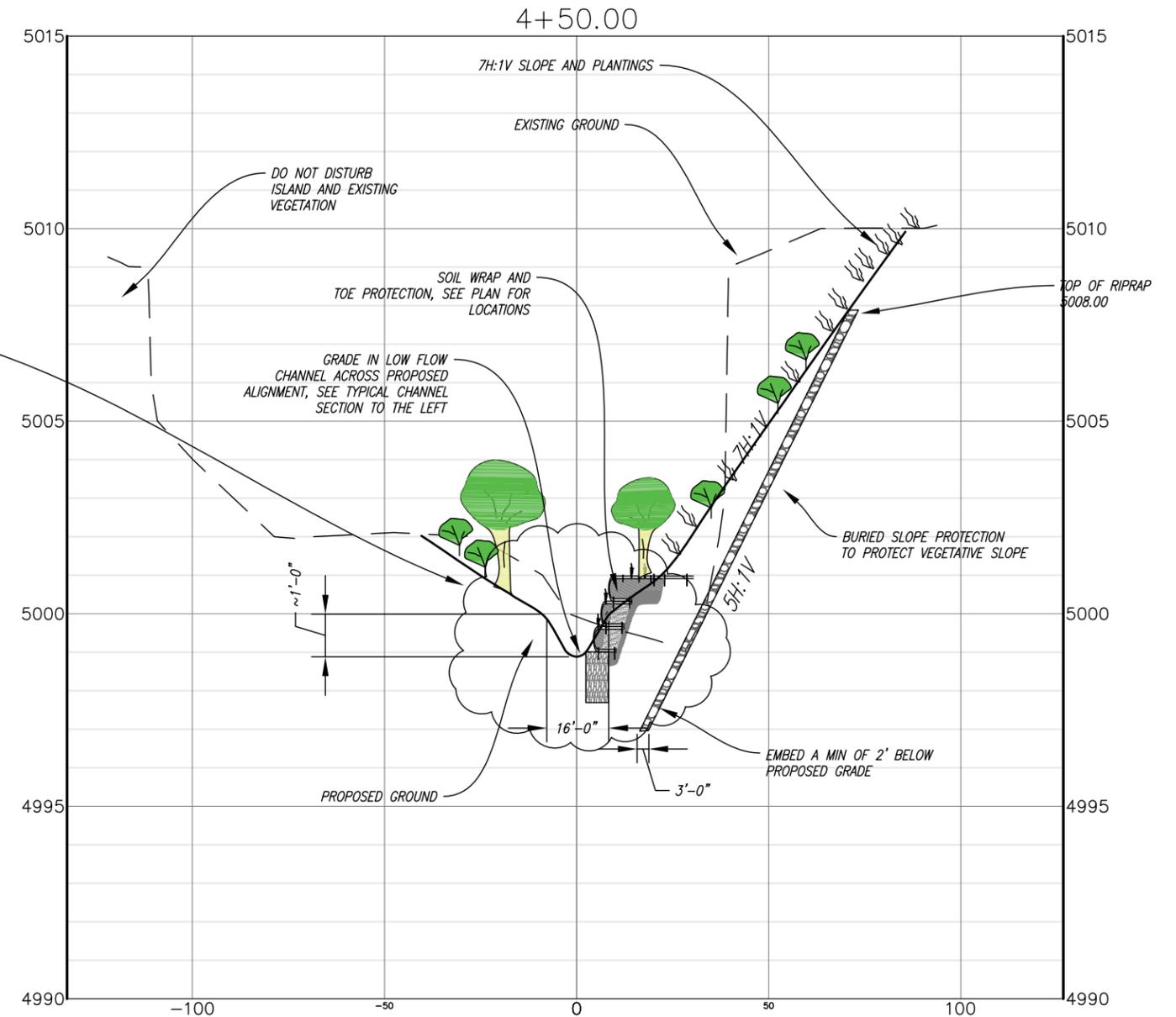
**BIELENS HOCK CHANNEL IMPROVEMENT
DETAIL SHEET**



TYPICAL CHANNEL SECTION



LOW FLOW AND BASE FLOW CHANNEL SECTION (SCALE IS EXAGGERATED AT 2 VERTICAL TO 1 HORIZONTAL)



TYPICAL SECTION AT 4+50

PREPARED FOR:
BOULDER COUNTY OPEN SPACE
5201 ST VRRAIN RD
LONGMONT, CO 80503

PREPARED BY:
RESILIENT WATERSHED PARTNERS
10106 W SAN JUAN WAY
LITTLETON CO, 80127
PH : 303-872-9112
FX : 303-872-9104

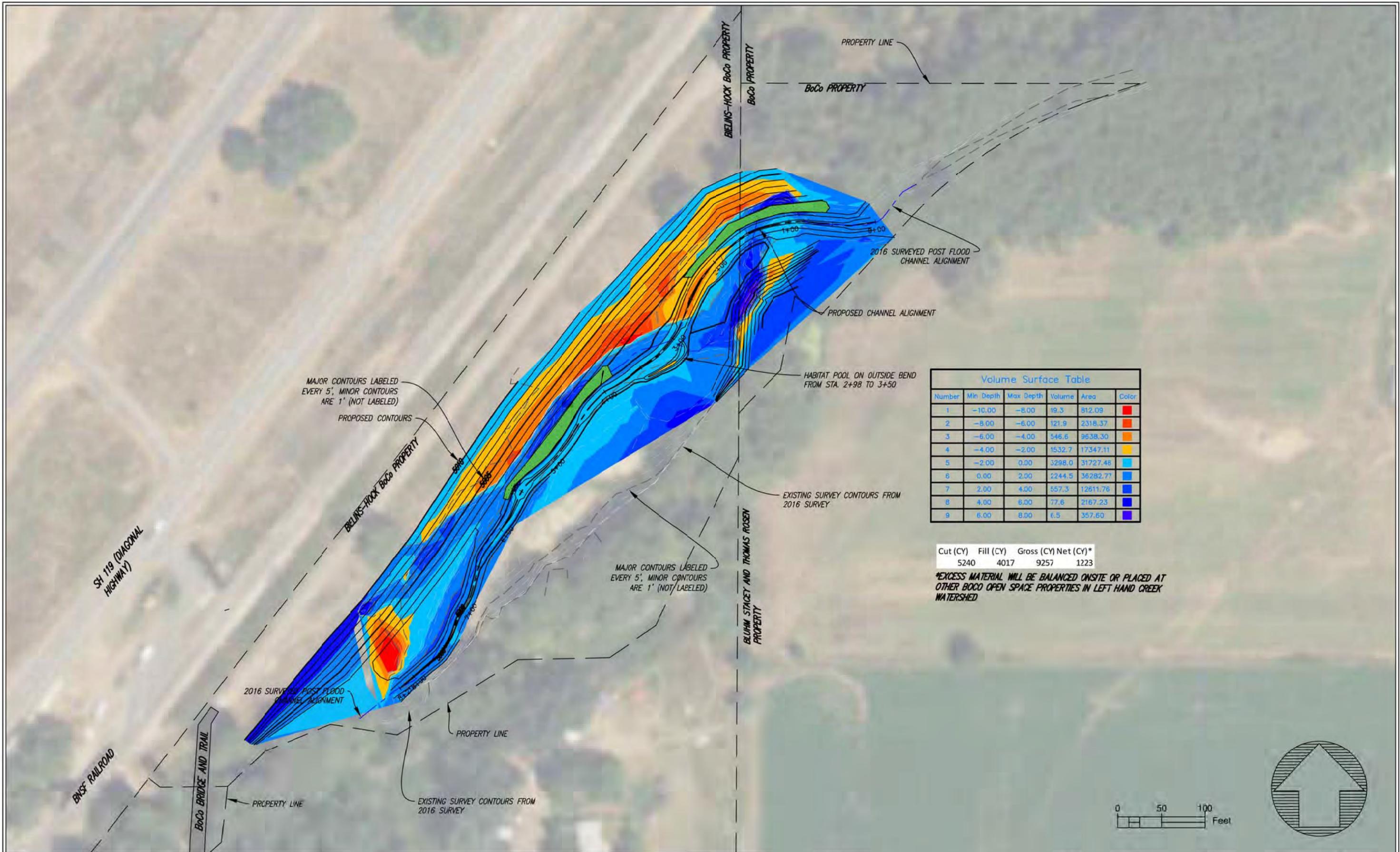
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DRAWN: GEB
CHECKED: JWS
DATE: OCT 2016

REVISION	DESCRIPTION	BY	DATE
(R-...)	

30% DESIGN FOR INTERNAL REVIEW

BIELENS HOCK CHANNEL IMPROVEMENT
DETAILS (CHANNEL SECTION)

SHEET/REFERENCE NO.
8
OF
10



MAJOR CONTOURS LABELED EVERY 5', MINOR CONTOURS ARE 1' (NOT LABELED)
PROPOSED CONTOURS

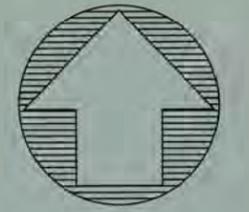
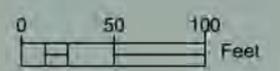
MAJOR CONTOURS LABELED EVERY 5', MINOR CONTOURS ARE 1' (NOT/LABELED)

Volume Surface Table

Number	Min Depth	Max Depth	Volume	Area	Color
1	-10.00	-8.00	19.3	812.09	Red
2	-8.00	-6.00	121.9	2318.37	Orange
3	-6.00	-4.00	546.6	9638.30	Yellow
4	-4.00	-2.00	1532.7	17347.11	Light Blue
5	-2.00	0.00	3298.0	31727.48	Blue
6	0.00	2.00	2244.5	36282.77	Light Blue
7	2.00	4.00	857.3	12811.76	Blue
8	4.00	6.00	77.6	2167.23	Dark Blue
9	6.00	8.00	6.5	357.60	Dark Blue

Cut (CY)	Fill (CY)	Gross (CY)	Net (CY)*
5240	4017	9257	1223

*EXCESS MATERIAL WILL BE BALANCED ONSITE OR PLACED AT OTHER BOCO OPEN SPACE PROPERTIES IN LEFT HAND CREEK WATERSHED



PREPARED FOR:
BOULDER COUNTY OPEN SPACE
5201 ST VRAIN RD
LONGMONT, CO 80503

PREPARED BY:
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10126 W SAN JUAN WAY
LITTLETON CO, 80127
PH : 303-872-9112
FX : 303-872-9104

DESIGNED	BY	DATE
GEB
GEB
JWS
OCT 2016

30% DESIGN FOR INTERNAL REVIEW

**BIELINS HOCK CHANNEL IMPROVEMENT
CUT FILL PLAN SHEET**

SHEET-REFERENCE NO.
9 OF 10
54



PREPARED FOR:
BOULDER COUNTY OPEN SPACE
5201 ST VRAIN RD
LONGMONT, CO 80503

PREPARED BY:
RESILIENT WATERSHED PARTNERS.
10106 W SAN JUAN WAY
LITTLETON CO, 80127
PH : 303-872-9112
FX : 303-872-9104

DESIGNED: GEB
DRAWN: GEB
CHECKED: JWS
DATE: OCT 2016

REVISION	DESCRIPTION	BY	DATE
R-01	
R-02	
R-03	
R-04	
R-05	

30% DESIGN FOR INTERNAL REVIEW

BIELINS HOCK CHANNEL IMPROVEMENT STAGING AND ACCESS (PRELIMINARY ONLY)

SHEET/REFERENCE NO.
10 OF 10
55

Attachment 5



DRAFT 30% Design Report

Bielins Hock Project – Left Hand Creek

30% Draft Submittal for EWP Team Review

Prepared by: Gerald Blackler, PE, PhD

as part of the Resilient Watershed Partners (RWP)Team

Prepared for: Emergency Watershed Protection Program (EWP) Review Team

October, 2016





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Attachment C - DRAFT 30% Design Drawing Set

Attachment D – Hydraulic Model Output

Attachment E – Biological Assessment

Introduction

Overview

Left Hand Creek experienced major flooding during one of Colorado's large flood events in September of 2013. Heavy rains lasting for 7 days over the foothills and eastern slope Rocky Mountain Range produced peak flows that made records for many front range streams. Hydrologic investigations of channel sections, high water marks, and critical depth estimates put the peak flow in Left Hand Creek around 3,500 cfs during that event.

Cause of the Problem

The flows alone were not the major cause of damage within the streams. Heavy sediment and debris loading clogged structures, developed avulsion zones, and in many locations the stream developed a new, permanent flood path where the stream did not return to its pre-flood channel after the floodwaters receded. These new channels (post flood channels) started a natural channel evolution process with new substrate, vegetation types, and channel geometry. This process occurred at Left Hand Creek downstream of Diagonal Highway (Highway 119), which is the subject location for this design and is herein referred to as the *project site*. Figure 1 below presents a before and after image showing how the new flood channel has carved a pathway into what was once a high overbank that held upland vegetation 10 to 15 feet above the previous channel bottom.



Figure 1 - Left - Image of Bielins Hock Project Site before 2013 Floods and Right - Image of Bielins Hock Project Site in 2015

Current Geomorphic Conditions

After Left Hand Creek jumped its pre flood bank, it began a new channel to the north west. Before the flood, this location consisted of wind-blown sands and silts, upland vegetation plants, and some gravelly substrates 2 to 3 feet below the sandy surface. As the channel carved through the banks, it removed 8-10 vertical feet of earth. At its new location, the channel evolution process has started again. Currently, the channel is down cutting and widening, picking up sediment from both the channel bottom and banks as the stream mechanics work to stabilize the slope, bed load, and to deposit a stable, hardened bottom. This could be classified as a Stage III and IV channel according to Schum’s Channel Evolution Model (Schum and Parker 1973)(Simon and Rinaldi 2006), where the stream is down-cutting and widening. This design intends to put the channel into a quasi-equilibrium sooner than natural processes through shaping the channel, adding vegetation, stabilizing the floodplain, and managing the stream mechanics for stable velocities and stresses.



Figure 2 – Photos of the Project Site existing conditions showing the cut bank and post flood channel conditions.

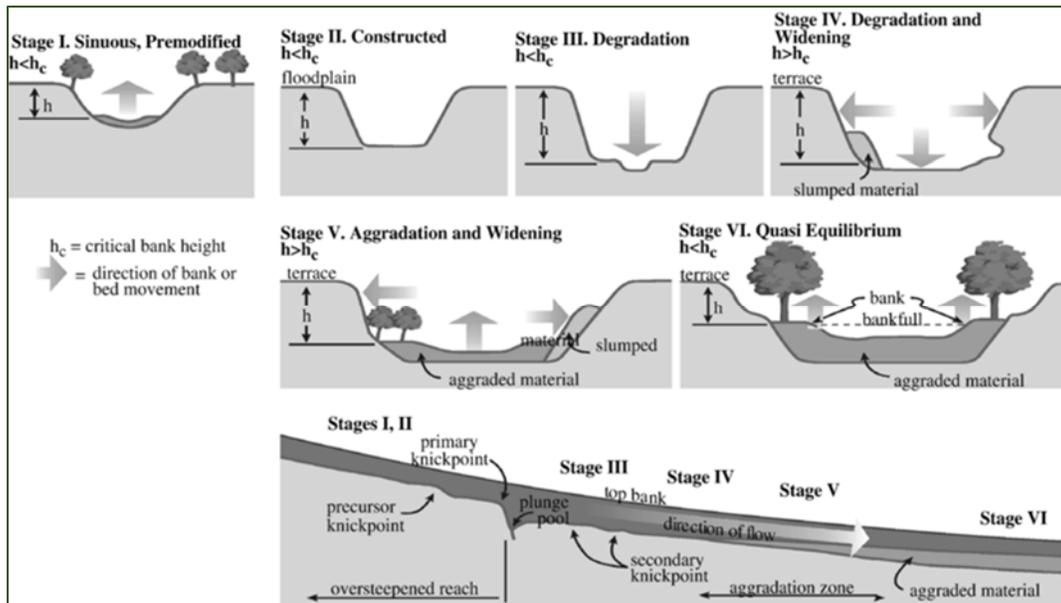


Figure 3 - Channel Evolution Model after Simon and Rinaldi (2006)

Purpose and Objective

The purpose and objective of this project is to:

- Stabilize the new channel path to eliminate major bank erosion and movement.
- Protect structures that are at risk from continued channel migration. These structures include:
 - o Boulder County Open Space Trail and Bridge.
 - o Railroad Embankments.
 - o Downstream Private Properties.
- Develop a design that incorporates heavy vegetation practices, floodplain restoration, and re-creation of a stable channel section and profile that eliminates continued bank erosion.
- Support the overall reduction in sediment supply on Left Hand Creek that is being transported to downstream communities.

Previous Recommendations within Project Site

The design and analysis performed under this work follow the general recommendations within the Left Hand Creek Watershed Master Plan, which was prepared for Boulder County and finalized in 2014.

These generally include:

- Set back riprap wall to protect infrastructure.

- Revegetation of banks and floodplain.
- Keeping post and pre flood channel for future flood conveyance.

The Figure below captures the recommendations from the Left Hand Creek Watershed Master plan document.

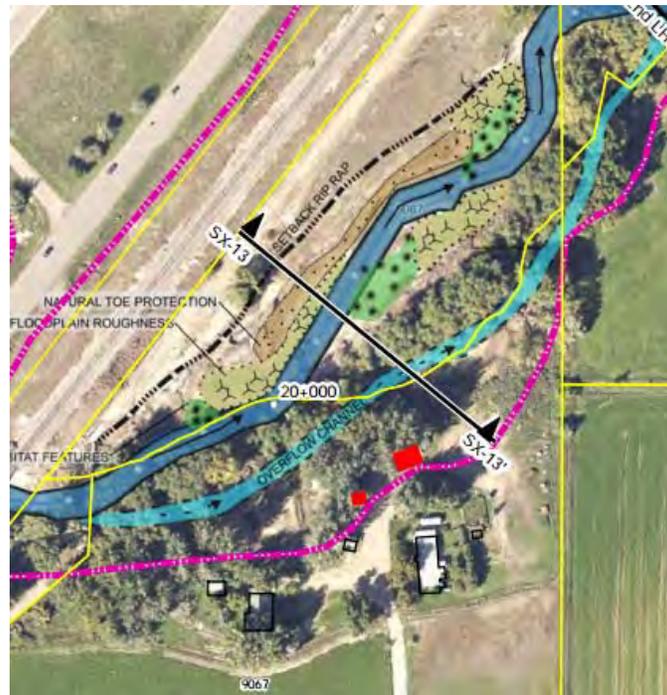


Figure 4 - Caption from the Left Hand Creek Watershed Master Plan

Alternatives Considered

Many alternatives were considered as part of this project. The main three include:

1. The first option encompassed grading and protection of properties to the south in addition to re-grading the north banks. This alternative quickly disintegrated as landowners to the south were not interested in participating with the required land owner agreements for the project. The Figure below is a caption of this alternative.

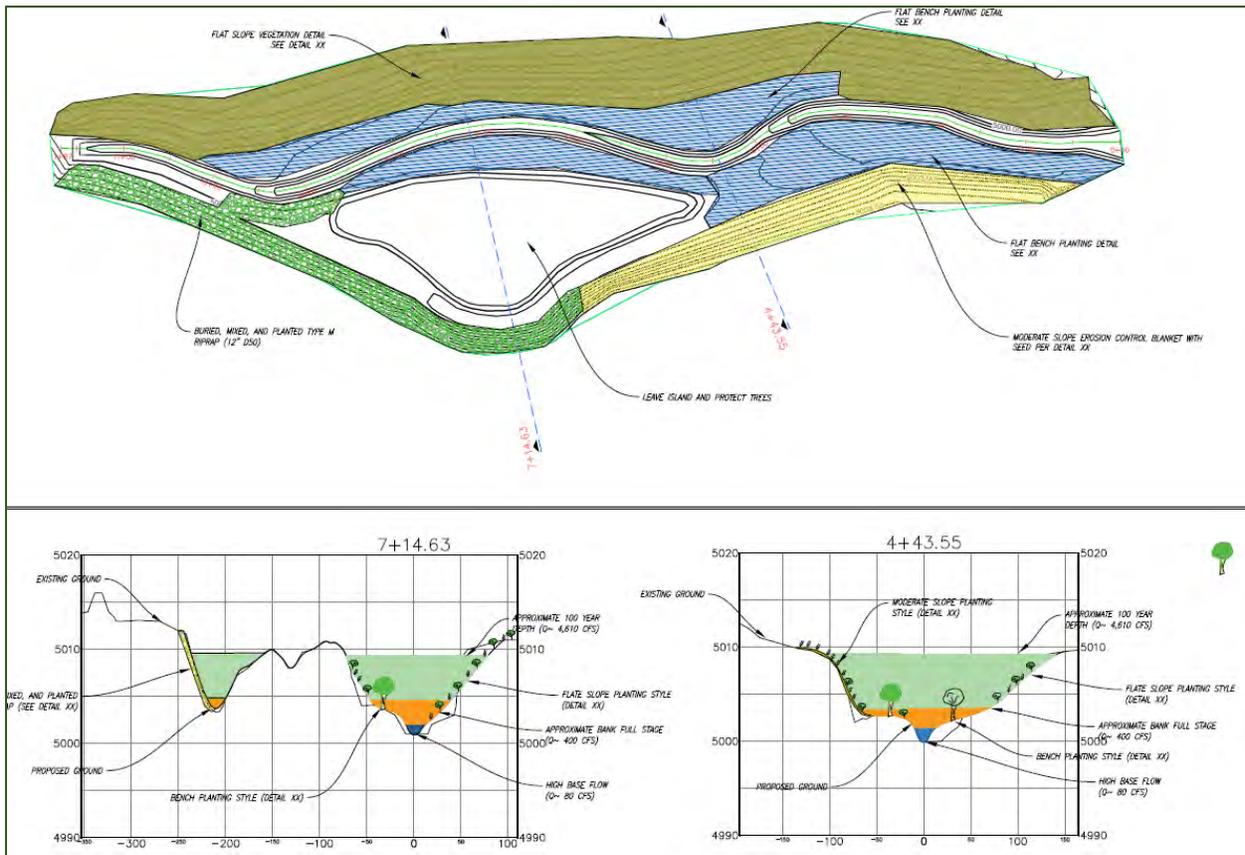


Figure 5 - Image of First Alternative Considered, where the entire project area would be re-established to protect houses to the South as well re-establishing the bank to the north.

2. The second alternative eliminated work on private land and only performed improvements on BoCo Open Space Property. This alternative laid back the bank, moved the post flood channel to the center of the newly carved flood path, and added some vertical stabilization of the creek bed. This alternative was modified based on the following comments from BoCo Open Space.
 - a. BoCo requested to keep the low flowing channel as close to its current location as possible.
 - b. BoCo does not want any exposed imported rock in the project.
 - c. BoCo does not want a “straight grade” profile.

The Figure below presents a caption of this alternative.

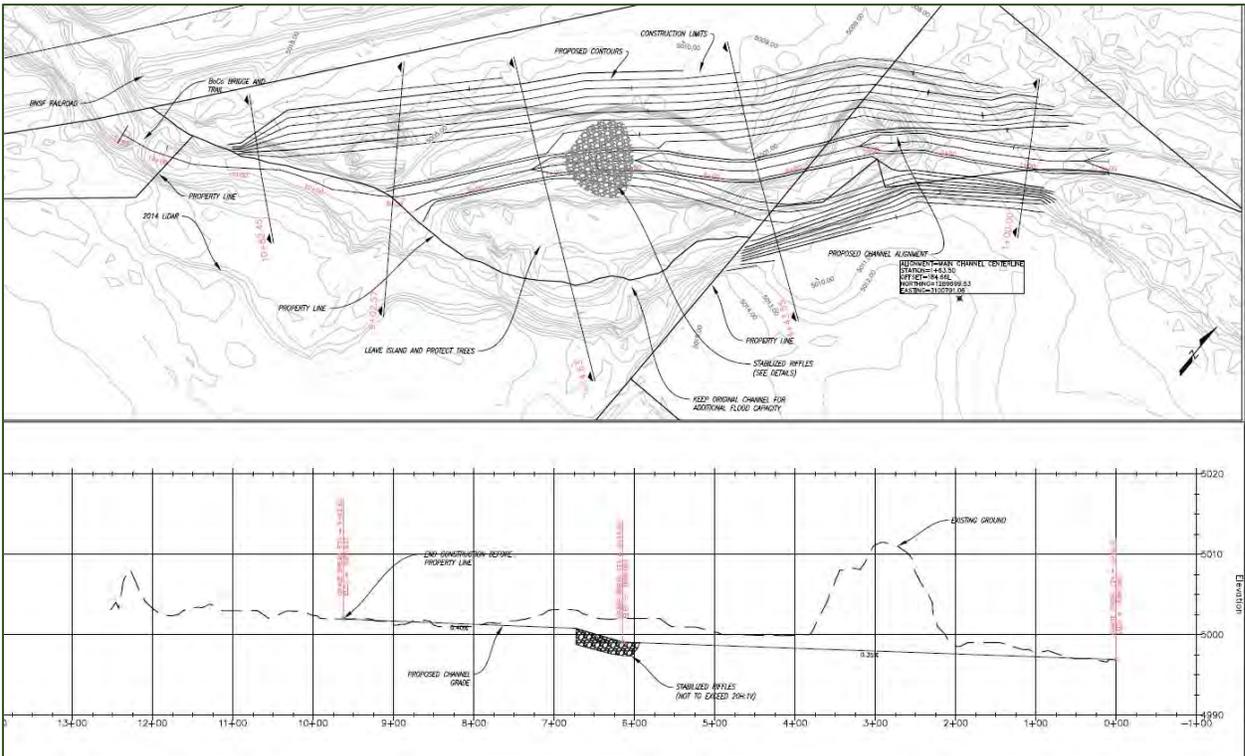


Figure 6 - Alternative 2 that graded a new channel towards the center of the new flood path to reduce the risk of eroding the toe of the newly graded and planted banks.

3. The third alternative presented in September of 2016 was a modification of Alternative 2 and included graded banks, bench style planting locations, and toe protection via soil lifts (sometimes referred to as soil wraps) to protect locations where the low flow channel approaches the toe of the newly graded and planted bank. Temporary drop pools were graded in to address the concerns of developing a “straight grade” channel profile, which was brought up by BoCo open space. These pools would have morphed and changed over time, but were included to help dissipate energy in the short time until vegetation could be established. A low flow channel was also shown in the grading and plans. The low flow channel was not re-enforced by any hardening, as such, the channel would have also taken a natural shape quickly after flows in the stream begin to move the fine sandy substrate and deposit material, which is a natural hardening process that occurs in streams, leading to the eventual shape and

establishment of a more defined low flow channel within the graded limits. The Figure below presents a caption of the third alternative.

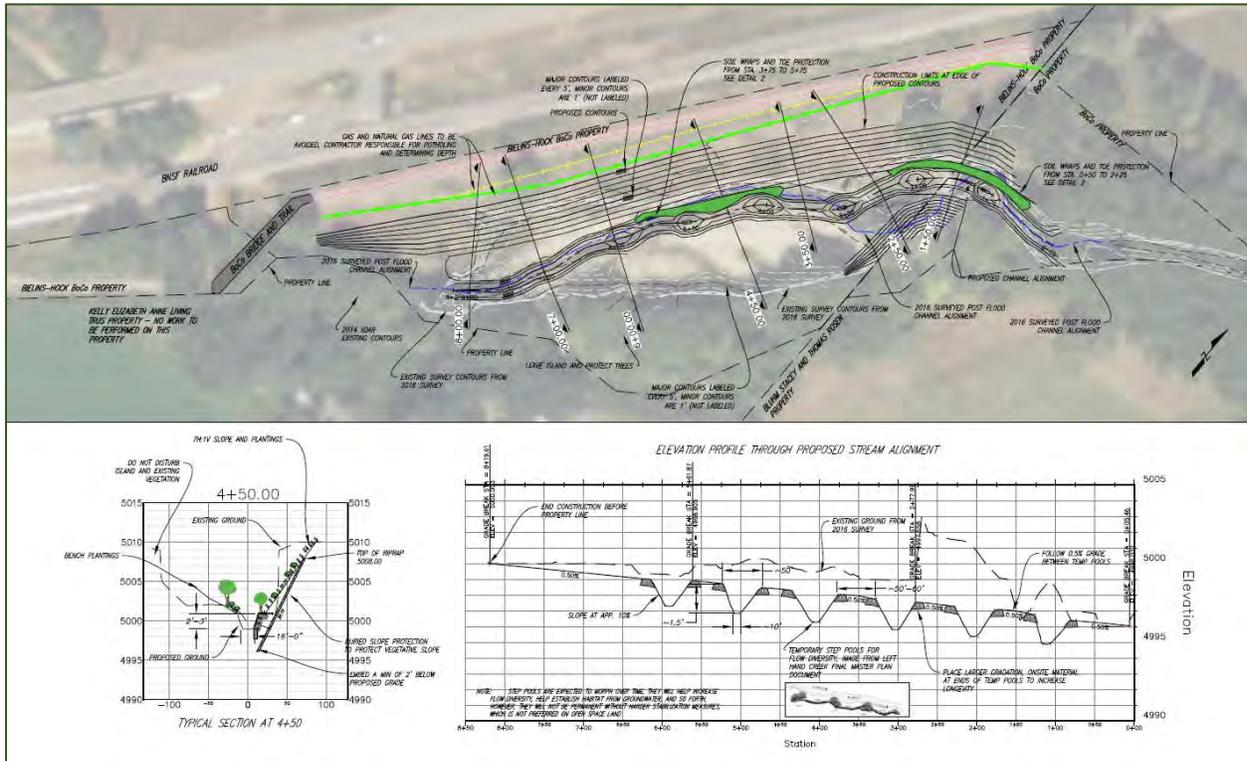


Figure 7 – Alternative 3 submitted September 2016

4. The final alternative being presented here is a modification of Alternative 3 and includes graded banks, bench style planting locations, and toe protection via soil lifts (sometimes referred to as soil wraps) to protect locations where the low flow channel approaches the toe of the newly graded and planted. Per comments from additional review, the drop pools were lessened in depth and slope, a habitat pool is added on the outside bend near station 3+18, a more refined low flow channel section was added. The Figure below is a caption if this final alternative being carried forward.

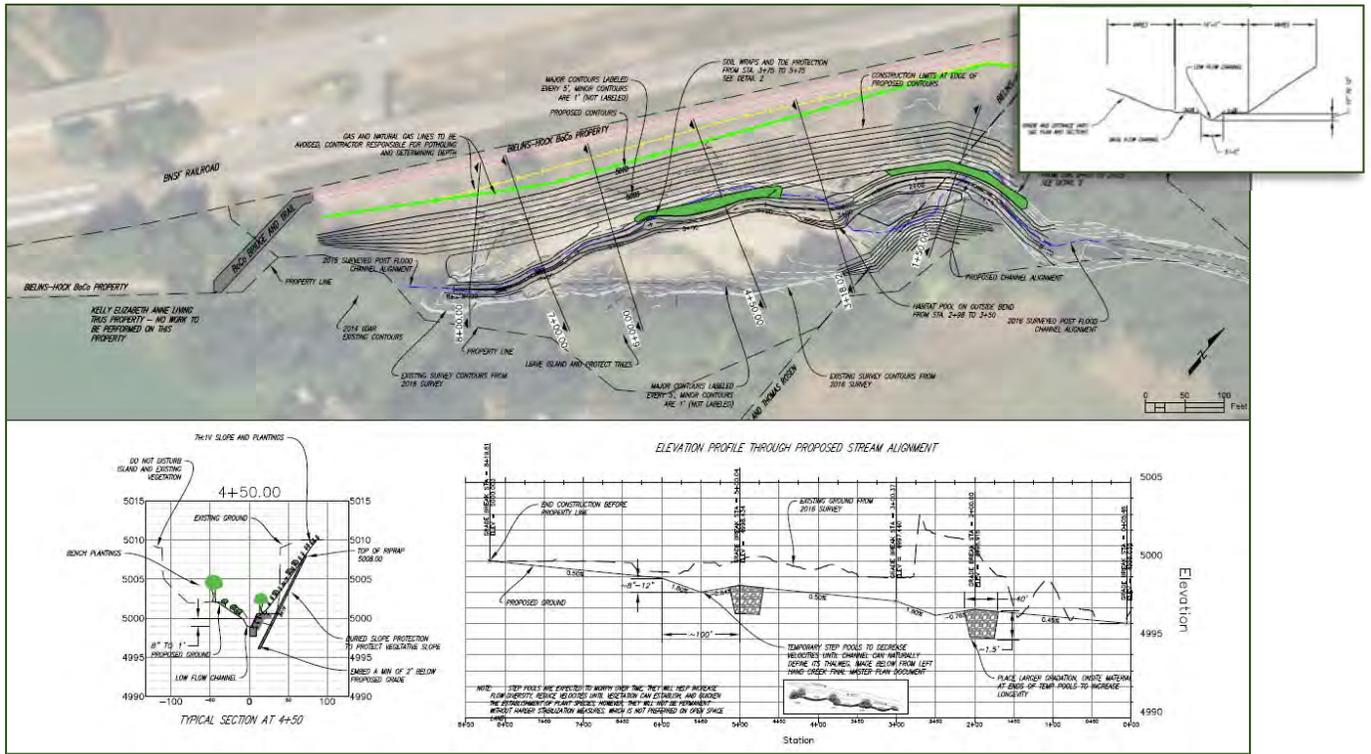


Figure 8 - Fourth Alternative, and final alternative being presented here

Project Benefits and Risks

This project will benefit downstream communities by reducing overall sediment loading in Left Hand Creek, re-establish a healthy floodplain bench and slope that will protect properties from future flooding, increase the capacity of the channel reach by leaving both the pre and post flood channels, and incorporate a heavy vegetation schedule that will enhance the aesthetic aspects of the location.

This project does not include heavy toe protection that would commonly be designed and engineered for streams as large as Left Hand Creek. This enhances the risk of eroding the newly graded bank and planted vegetation if a flood event occurs before much of the vegetation is fully established. This is being partially mitigated by soil wraps and very little riprap (VL Riprap) at locations where the stream is approaching the bank. The set-back riprap wall will eventually protect property if a flood erodes the bank back that far, however, the grading work and vegetation will be jeopardized at that point.

Hydrology

All hydrologic estimates were taken from previously conducted studies and regional regression equations. No new hydrology was performed as part of this study. Boulder County provided the 1982 Flood Insurance Study (FEMA 1982) for comparison of flood flows in the Plains Reaches. As shown in the figure below, the 1982 Hydrology peaks at the mouth of Left Hand Creek as it exits Left Hand and Geer Canyon. The flow attenuates as it progresses downstream, implying the controlling time to peak and flood wave originates from a storm resting over the mountain canyons and progressing slowly east to the plains.

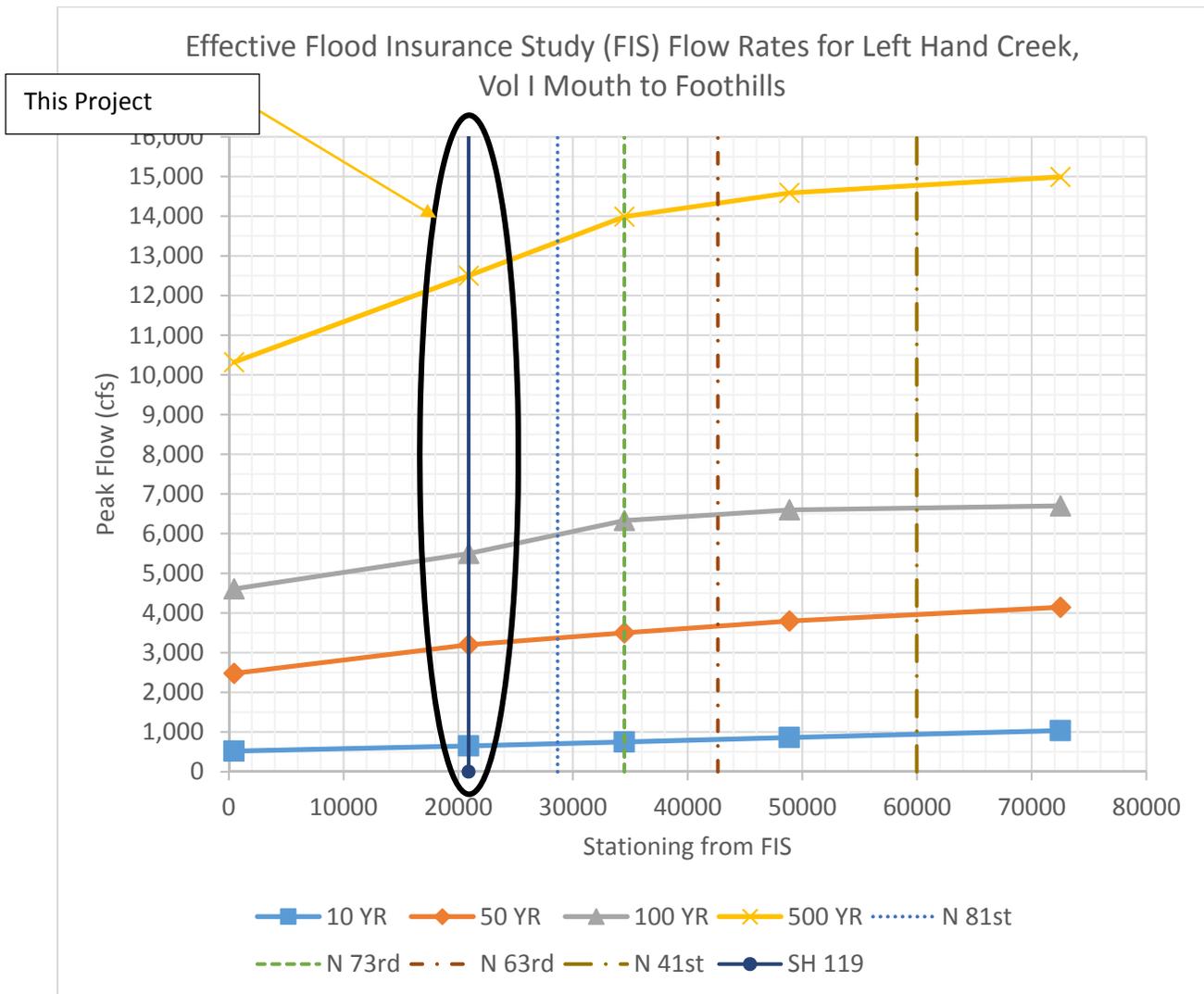


Figure 9 - FIS Flood Flows for Left Hand Creek Plains Regions

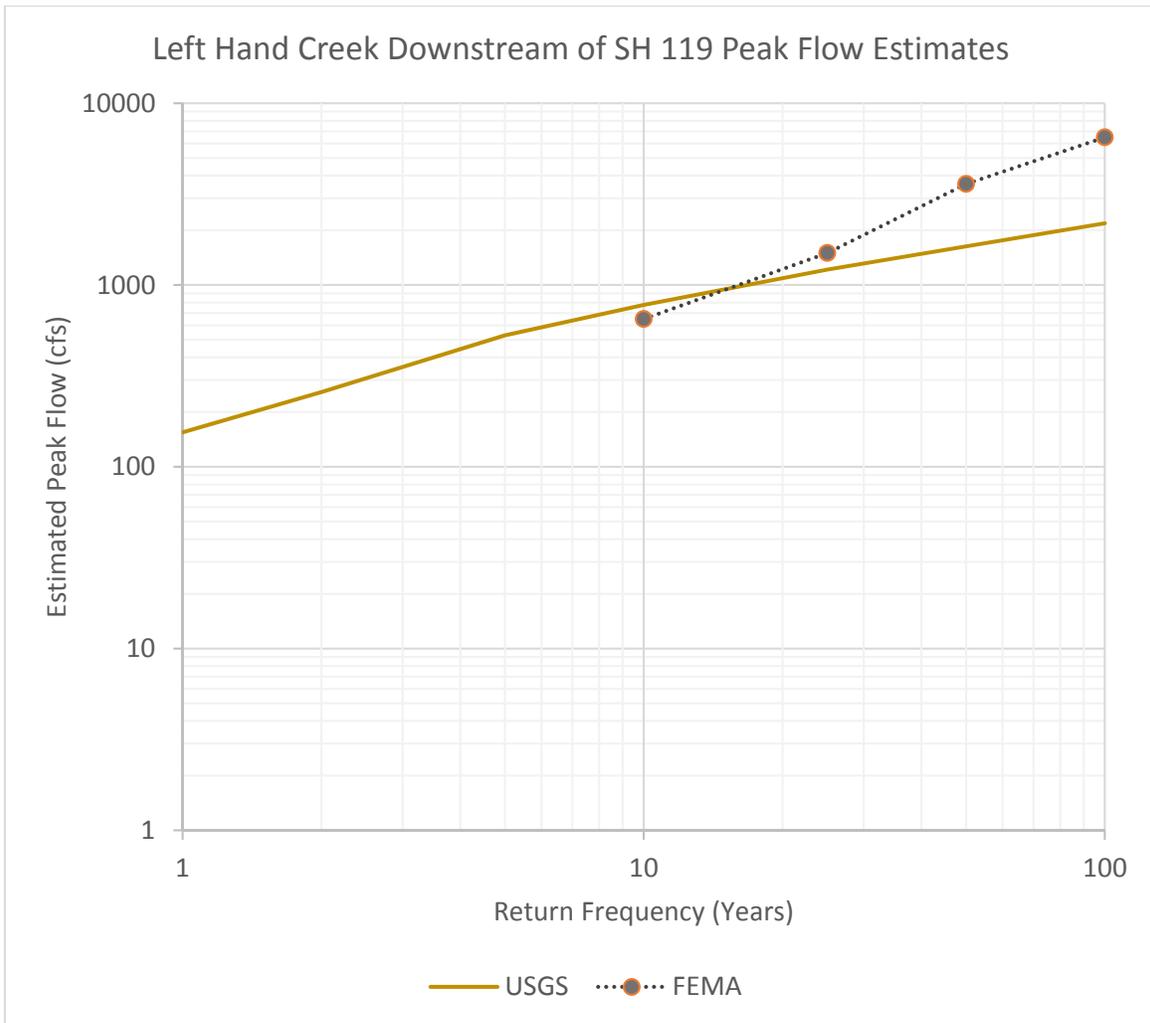


Figure 10 – Comparison of FEMA and USGS Flood Hydrology at Project Site.

The US Geological Survey (USGS) once had three stream gages located on Left Hand Creek and all of those gages are no longer in service. The length of record on those gages is not sufficient nor recent enough to warrant a detailed analysis. Based on the comparison of published flows by FEMA and regional regression equations, the following flows were selected for design of this project.

Table 1 - Selected Design Flows for Bielins Hock Project (All Values in CFS)

Base Flow (High)	Annual Flood	2-yr	5-Yr	10-Yr	50-Yr	100-Yr
90	150	260	530	650	3,200	5,500

Hydraulic Analysis and Design

Stream Design Hydraulic Summary

Hydraulic design was conducted to accomplish floodplain management, healthy stream design, and ecological goals. Floodplain analysis was performed to ensure that a “no rise” situation occurs from existing ground conditions to the proposed design conditions. Healthy stream design approach was

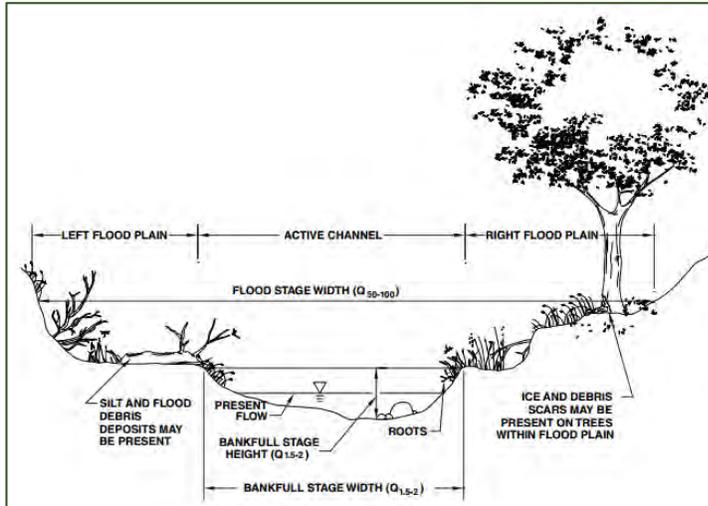


Figure 11 - Typical cross section of a healthy stream design, from the NRCS Stream Corridor Restoration Manual (Natl. Eng. Handbook 653, and 654)

taken to ensure that base flows, annual flood flows, and moderate flood flows (2-5 year) are distributed across the channel section to encourage healthy riparian growth and reasonable design velocities and shear stresses. The figure to the left is a caption of how these flows should be distributed across a natural channel section. While the figure below presents the design grade and water surface elevations for this design.

There is a side split flow from the post to pre flood channel that required hydraulic analysis to appropriately model flood flows as they travel through the project site. A 2-Dimensional hydraulic model was developed to estimate the split flows under a range of flood events. Then the side spill weir coefficient within the 1D HEC RAS model (Floodplain Model) was adjusted to achieve a realistic split flow analysis. The 1D model then optimizes split flows to balance energy between the two channels.

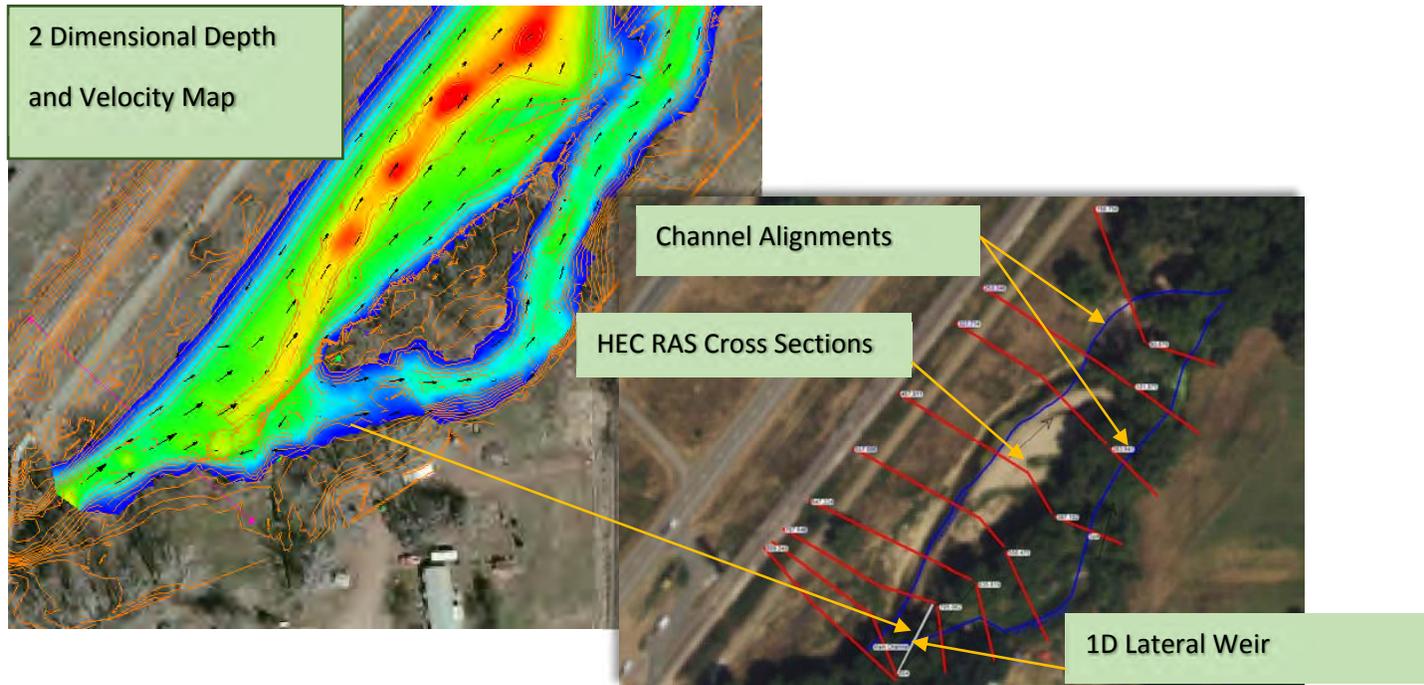


Figure 12 - Image of 2D and 1D Hydraulic Models developed for the Project Site's Existing and Proposed Conditions

Peak velocities during the 100 year flows are expected to reach upwards of 10 feet per second in the channel and 4-5 feet per second in the overbanks. Shear stresses in the channel may reach as high as 2 pounds per square foot and 1.5 pounds per square foot in the overbanks. However, through most of regraded channel, these shears are lower than 1.0 for even very high flows. With these levels of shears and velocities over a fine to medium sandy substrate, it is expected that the channel will continue to adjust and move, especially during flood events. For this reason, set back protections are incorporated into the design. This includes the setback riprap that is approximately 10 to 11 feet high, at a 5H:1V slope, and is set back into the bank per Boulder County Open Space's Requests that any imported rock be put as far back from the active channel as possible. The riprap is designed to function if a flood event scours away the vegetation and bank, then the void filled riprap will be a hardened stop point that will arrest the bank erosion. Until a large flood event, the rock will be buried deep in the bank and not noticeable.

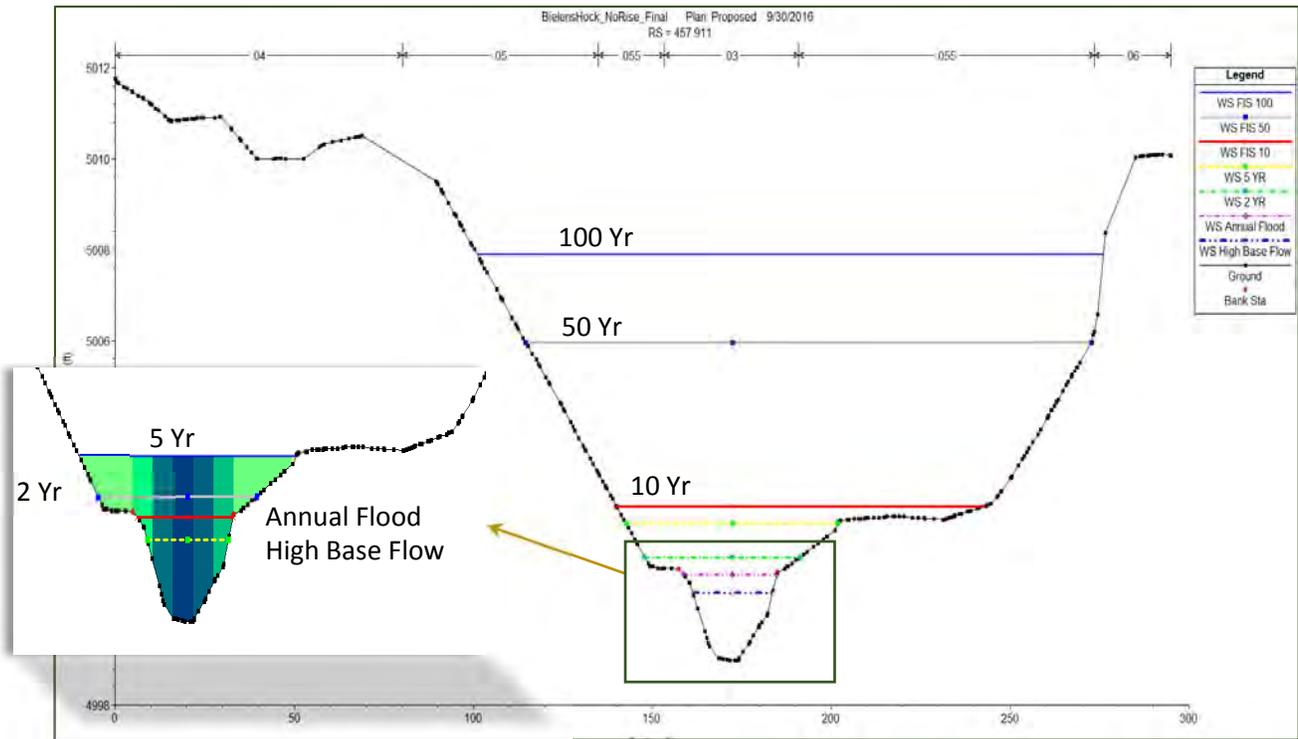


Figure 13 - Hydraulic Cross Section for the Proposed Conditions Typical Channel Section at Approximately Sta 4+57 in the Design Plans (NOTE: This section has a vertical exaggeration, which is very common from HEC RAS Output and in Engineering Design, for a less dramatic vertical exaggeration, please see the below figures.)

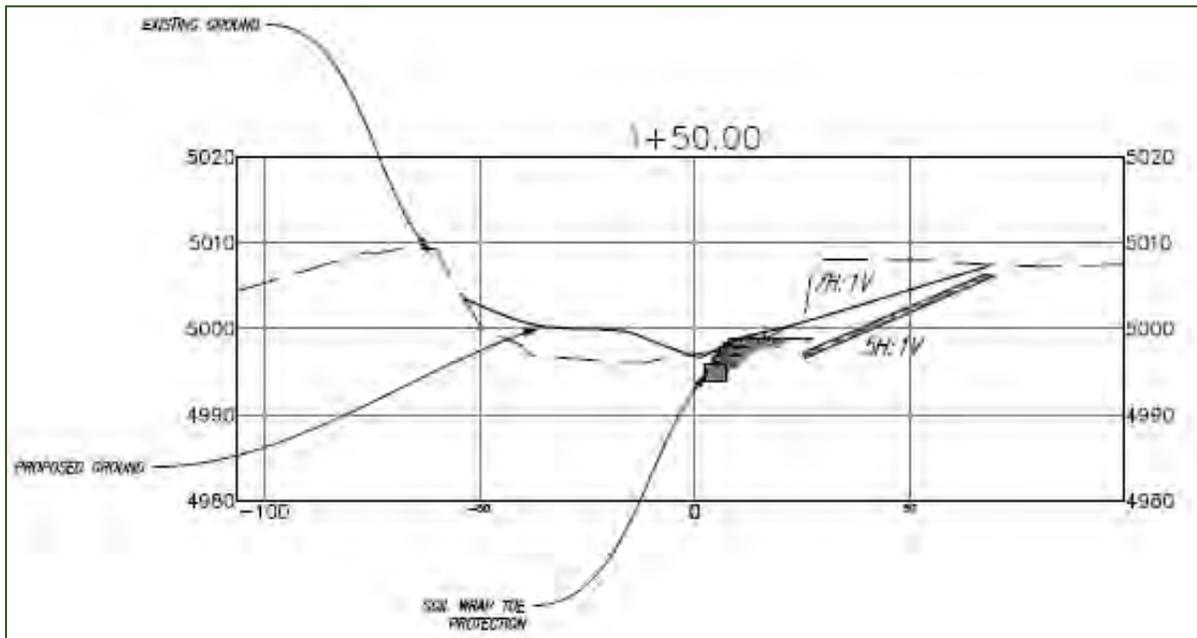


Figure 14 - Cross section with a 2 to 1 vertical exaggeration at station 1+50

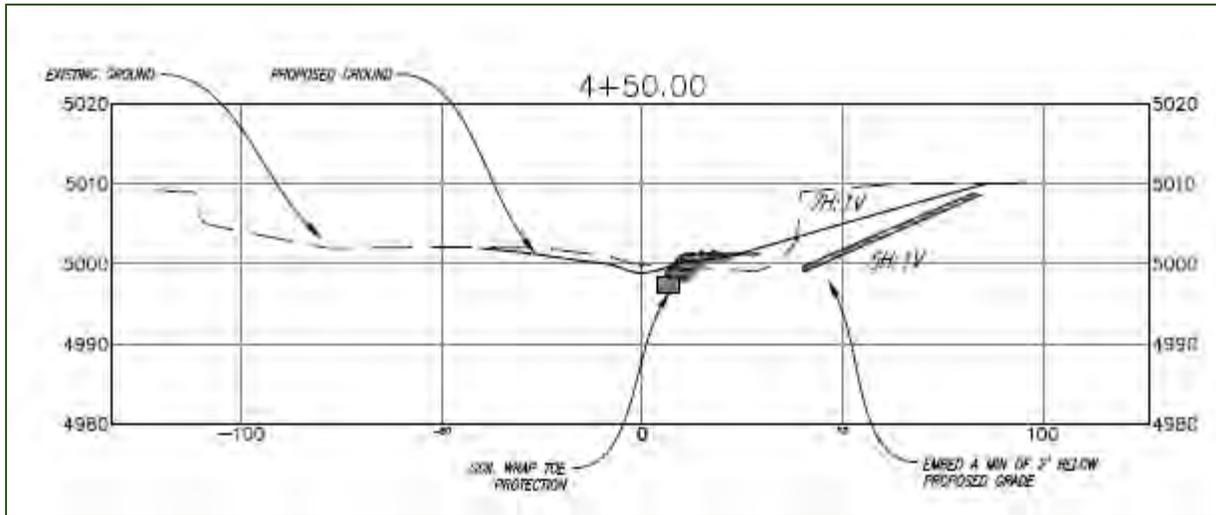


Figure 15- Cross section with a 2 to 1 vertical exaggeration at station 4+50, similar location to the HEC RAS Plot in Figure 13

Floodplain Analysis

A detailed floodplain analysis was conducted within regulations defined in the 44th Volume of the Code of Federal Regulations (CFR), Chapter 60.3 subpart (c) and (d), which define floodplain regulations for floodplains with designated special flood hazard zones and base flood elevations (BFEs). Subpart (c) outlines the requirements for these special flood hazard zones that do not have a regulatory floodway, while subpart (d) outlines the requirements for these special flood hazard zones the do have a regulatory floodway.

Adherence Floodplain Management Regulations

According to the formal FEMA FIS and FIRM, the floodplain designation at the project site is a Zone AE without a regulatory floodway. This would fall under the regulatory requirement of 44 CFR 60.3(c) and not subpart (d), which would allow the following language found in 44 CFR 60.3(c)(10):

*(10) Require until a regulatory floodway is designated, that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water **surface elevation of the base flood more than one foot** at any point within the community.*

Within the 44 CFR, FEMA allows local communities to enforce stricter floodplain regulatory standards. As such, Boulder County’s floodplain department may enforce stricter standards that would be more in line with a Zone AE Special Flood Hazard Zone that includes a regulatory floodway. Even in this event, our hydraulic analysis shows that the proposed grading will not increase base flood elevations for the 100-year flood event by any level within the project site, and therefore will be eligible for a *no rise* certificate from the local floodplain management group under either CFR regulation (44 CFR 60.3(c) or (d)). Additionally, a *no rise* satisfies all requirements within Boulder County’s land use development code Article 4-407.

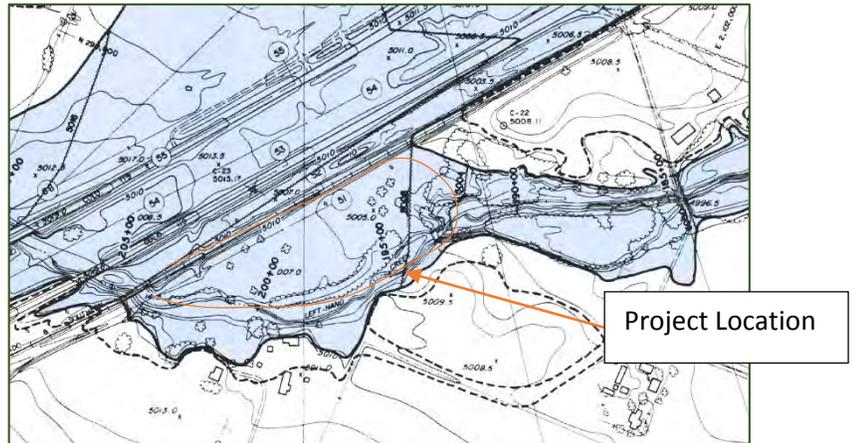


Figure 16 - Caption of the published floodplain from the 1982 FIS

The BFE recorded on the FEMA Flood Map is 5006 feet North American Vertical Datum 29 (NAVD29). A conversion to NAVD 88 for 40 deg 07' 38.79" N and 105 deg 08' 22.85" W is 0.984 meters or 3.2285 feet according to the USGS Vertcon Website. This makes the published BFE through the site 5009.23, which is equal to or greater than the highest computed water surface elevation within the proposed conditions hydraulic model.

Findings from this analysis are:

- The Project will cause a *no rise* condition from proposed to existing conditions, where the existing conditions are surveyed ground in 2016 and the proposed are constructed ground after the site.
- This project will not have impacts on the published BFEs.

This project is certifiable as a *no rise* condition under both Local and Federal Floodplain Regulations.

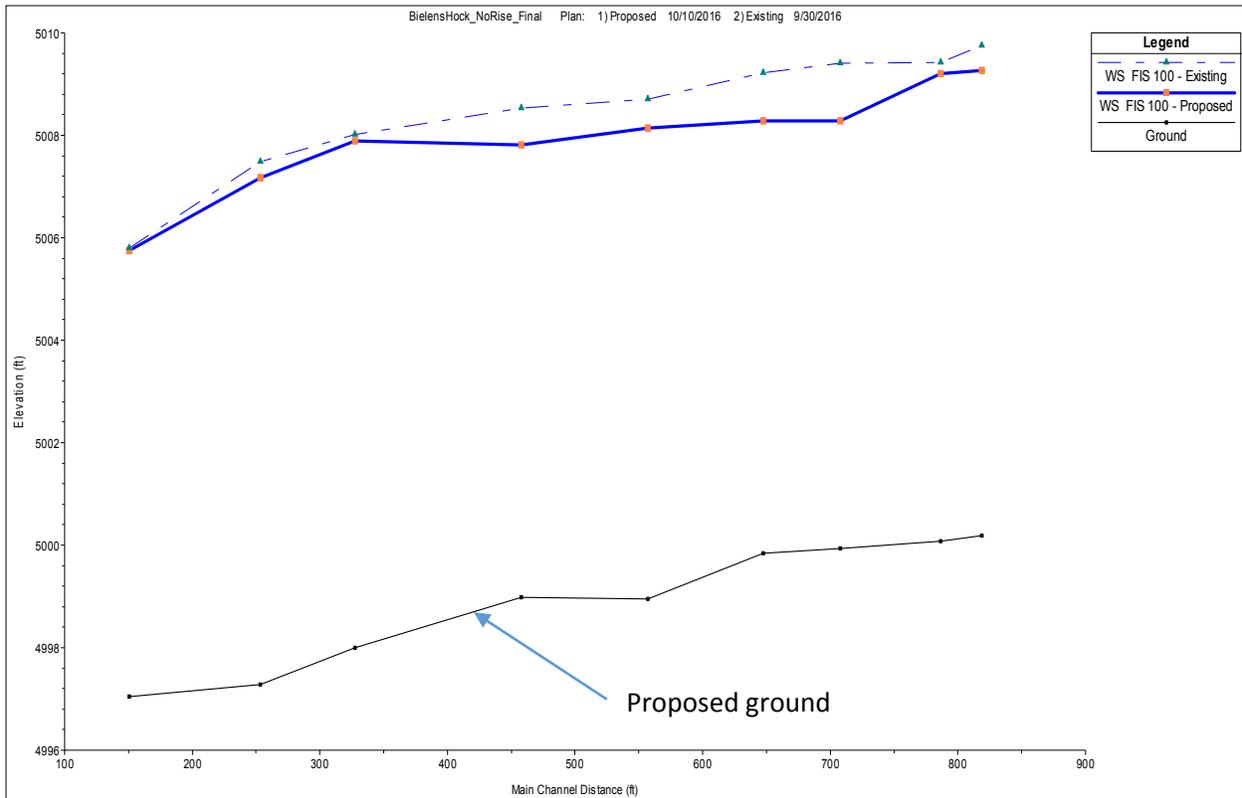


Figure 17 – Existing (Red Dash Line) and Proposed (Blue Line) 100 Year Water Surface Elevations from HEC-RAS No Rise Hydraulic Model



Table 2 - HEC RAS Output for Project Site

Station	Existing or Proposed	Ground El	Water Surface Elevation (WSE)	Velocity (ft/sec)	Difference in WSE (Proposed to Existing)
809.249	Proposed	5000.18	5009.26	9.74	-0.49
809.249	Existing	5000	5009.75	8.31	
805.766	Proposed	5000.08	5009.2	9.62	-0.22
805.766	Existing	4999.99	5009.42	9.89	
804	Lateral weir				
707.646	Proposed	4999.93	5008.28	12.17	-1.13
707.646	Existing	4999.92	5009.41	7.11	
647.334	Proposed	4999.84	5008.29	10.5	-0.94
647.334	Existing	4999.87	5009.23	6.36	
557.006	Proposed	4998.95	5008.15	7.8	-0.56
557.006	Existing	4999.74	5008.71	7.63	
457.911	Proposed	4998.98	5007.82	8.95	-0.71
457.911	Existing	4999.01	5008.53	6.37	
327.714	Proposed	4998	5007.89	5.9	-0.13
327.714	Existing	4999.03	5008.02	6.5	
253.346	Proposed	4997.28	5007.17	9.96	-0.31
253.346	Existing	4997.1	5007.48	6.61	
150.756	Proposed	4997.04	5005.76	13.66	-0.04
150.756	Existing	4997.35	5005.8	12.8	



Recommended Plantings

The recommended planting schedule varies by location and the proximity to base or high flows.

Locations were separated into four (4) zones for channel and locations wet most of the year (Zone 1), benches (Zone 2), midland (Zone 3) and upland plantings (Zone 4). These are presented within the 30% Draft Drawings in the attachments.



References

FEMA (1981) “Floodplain Information Report, Lefthand Creek Mouth to Foothills Highway” Prepared for Boulder County, the City of Longmont, and the Colorado Water Conservation Board.

Joseph P. Capesius and Verlin C. Stephens (2009) *Regional Regression Equations for Estimation of Natural Streamflow Statistics in Colorado*, Prepared in cooperation with the Colorado Water Conservation Board and the Colorado Department of Transportation

Schumm, A. and Parker, R. S., (1973), Implications of complex response of drainage systems for quaternary alluvial stratigraphy: *Nature (Physical Science)* v. 243, p. 99-100.

Simon, A., Rinaldi M., 2006. Disturbance, stream incision, and channel evolution: The roles of excess transport capacity and boundary materials in controlling channel response. *Geomorphology* 79 (2006) 361-383.

Attachments

Attachment A – Floodplain Development Permit Application

Attachment B – Location Map

Attachment C - DRAFT 30% Design Drawing Set

Attachment D – Hydraulic Model Output

Attachment E – Biological Assessment



Parks and Open Space

5201 St. Vrain Road • Longmont, Colorado 80503
303.678.6200 • Fax: 303.678.6177 • www.bouldercounty.org

November 17, 2016

TO: Christian Martin, Planner, Boulder County Land Use

FROM: Jesse Rounds, Resource Planner, Boulder County Parks & Open Space

RE: LU-16-0028

Mr. Martin,

Thank you for forwarding the stakeholder and referral comments for “Docket LU-16-0028, Lefthand Creek Bielins-Hock” restoration project. Parks & Open Space staff would like to comment on specific requests and concerns raised by both stakeholders and referral agencies. We feel that many of the comments will be addressed through the remaining stages of the design and permitting effort and look forward to working with the responsible agencies. Any comments not addressed in this memo will be addressed at the hearing on November 29. In addition, we intend to reach out to our concerned neighbors in an effort to address comments addressed to Parks & Open Space as part of this process.

Process Comments

The Parks & Open Space project team will continue to work closely with Land Use and Transportation staff to ensure that we obtain all required permits and provide any missing information to regulators. We intend to seek the Stream Restoration Permit from Boulder County as soon as we can address the requirements of said permit and we believe that that process will address many of the remaining concerns raised by our partner agencies.

Attached to this memo are some aspects of the process that will help address some of the comments provided by reviewers. Attachment A includes the specifications for contractors working in streams on Parks & Open Space properties. These specifications reflect many of the concerns expressed by Ron West and, it should be noted, are concerns shared by many within our own department. We appreciate Mr. West’s suggestion regarding filling voids in the riprap and have communicated such to our design team. Furthermore, we have identified and specified large woody debris onsite that must be replaced in the upland of the site to continue to provide habitat features. We plan to include his revegetation suggestions in the specifications where appropriate.

In accordance with Ms. Willits’ recommendations we will communicate with both the County Trails Planner and the Transportation Department’s Communications Specialist as the project’s start time nears. Our project team plans to work with our consultant and contractor to develop a traffic control plan and apply for oversize/overweight permits as necessary. We will also coordinate with the state and county on erosion control and stormwater management permits before construction.

With regard to Ms. Fasick's comments, Attachment B is the finding from the State Historic Preservation Office. Left Hand Creek is a valuable cultural as well as natural resource in Boulder County and we intend to maintain the creek in as natural a state as possible.

The process of obtaining the Stream Restoration Permit and Floodplain Development Permit should address many of the outstanding issues raised in these referral comments. Furthermore our designed, Gerald Blackler will serve as our design engineer and will prepare, stamp, and submit as-built drawings at the conclusion of the project.

Adjacent Property Owner Comments

Boulder County Parks & Open Space is committed to being a good neighbor to our private, public, and institutional neighbors. Immediately post-flood we worked with our neighbors to remove debris and stabilize emergent conditions in and around our properties. In the years since the flood we have continued that work through regular communication and attempts to create partnerships that will maintain good relationships with our neighbors. We believe that the project, as planned and designed is in accordance with the Left Hand Creek Watershed Master Plan. It is also designed to minimize engineering by allowing the creek to remain in its post-flood location.

We believe that the design will minimize hazard to our neighbors and will help stabilize the creek as it continues to recover after the devastating floods. However, we recognize that many in the community have differing opinions and we hope to have the opportunity to work with them in the future to incorporate their ideas and address their concerns.

In particular two respondents proposed alternative designs at Bielins-Hock. One proposed rerouting the creek into its pre-flood channel. This option was explored, but considered unsuitable because of its impacts such as: refilling the post-flood channel, disconnecting the creek from its floodplain, it would require significant stabilization in the pre-flood channel, and disregard the natural behavior of the creek in the flood. The project at Bielins-Hock as currently proposed is consistent with the Left Hand Watershed Master Plan, the proposal in that plan recognized the value of maintaining a creek in its current state as opposed to forcing it back into a previous channel.

The second proposal was to create a sediment detention basin on the property. This would conflict with our mission as Boulder County Open Space and disregards the on-going stabilization of Left Hand Creek after the flood. While the proposed project may conflict with the proposals of our neighbors, we believe that we can address their concerns within our current design and will seek to coordinate and cooperate with them.

ATTACHMENT A

**BOULDER COUNTY PARKS & OPEN
SPACE RECLAMATION SPECIFICATIONS**

**SECTION 1 - PART 1
SOIL PREPARATION**

1.1.1 DESCRIPTION - The extent of soil preparation work includes relieving compaction by means of chiseling or ripping, incorporating soil amendments such as fertilizer, compost, or topsoil, and finished grading of all seeding areas as described on plans and details. Operation of heavy machinery on the project areas shall be limited to as few passes as possible to prevent further compaction of soils. The use of soil amendments will be determined by the Project Manager. Soil amendments shall be incorporated where shown on the project plans.

1.1.2 SUBMITTALS

A. Samples and Product Certification: Submit to Project Manager prior to scheduled delivery of these materials.

1. Compost:

- a. Compost producer's U.S. Compost Council Seal of Testing Assurance (STA) certification.
- b. Copy of lab analysis, performed by an STA-certified lab, verifying that the compost meets the requirements.
- c. Feedstock by percentage in the final compost product.

B. Delivery Tickets: Submit delivery tickets with material quantities of the following to the Project Manager with invoice.

1. Compost
2. Fertilizer

1.1.3 PROJECT/SITE CONDITIONS

A. Environmental Requirements: No soil work shall occur when soil is frozen, or in an extreme wet or dry condition, causing damage to the soil structure.

B. Store equipment and materials where designated by the Project Manager. Prior to entering the project site, equipment will be thoroughly power washed, including the undercarriages and tires. Equipment must be clean of mud, vegetative matter, and other debris to prevent importation of non-native and noxious weed seeds from other project sites.

1.1.4 DELIVERY, HANDLING AND STORAGE – Commercial fertilizer shall conform to the applicable State fertilizer laws. It shall be uniform in composition, dry, and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer’s guaranteed analysis. Fertilizer which becomes caked or damaged will not be accepted.

**SECTION 1 - PART 2
PRODUCTS**

1.2.1 MATERIALS - Soil Amendments:

A. Compost: Thoroughly composted organic matter that is US Composting Council STA certified, consisting of a carbon to nitrogen ratio between 10:1 and 20:1, pH not greater than 8.0 and soluble salts not greater than 10 Mmhos/cm tested on a saturated paste. Compost may consist of one or more of the following, or include other appropriate composts:

1. Well-aged dairy cattle manure
2. Well aged municipal sludge
3. Composted yard wastes

B. Fertilizer: One or more of the following fertilizers may or may not be specified depending on the project needs:

1. Biosol® brand of fertilizer shall be used, or a similar product of the following description; a slow release organic fertilizer composed of dried granulated fungal biomass. Chemical analysis shall be 6% nitrogen (N), 1% phosphoric acid (P₂O₅), 1% potassium (K₂O).
2. Biosol® Forte brand of fertilizer shall be used, or a similar product of the following description; a slow release organic fertilizer composed of dried granulated fungal biomass. Chemical analysis shall be 7% nitrogen (N), 2% phosphoric acid (P₂O₅), 1% potassium (K₂O).
3. Humates should be mined from fresh water, sand matrix source. This material shall conform to the following properties:
 - d. Organic Matter >85%
 - e. Humic Acid >50%
 - f. Inert Material <15%
 - g. pH 3.5 - 4.0
4. Super Triple Phosphate: Chemical analysis shall be 0% nitrogen (N), 46% phosphoric acid (P₂O₅), 0% potassium (K₂O).

SECTION 1 - PART 3 EXECUTION

1.3.1 INSTALLATION

- A. Topsoil Removal: After the construction area and its access have been delineated, the vegetation should be mowed to a maximum height of 4 inches over the area to be disturbed. If the amount of vegetation exceeds what can be incorporated into the soil without interfering with establishing a proper seedbed, then excess vegetation shall be removed. Noxious and undesirable weeds should be treated and moved prior to topsoil removal.

Topsoil should be removed by a front-end loader (preferred method) or grader. **Under no circumstances should topsoil be removed under wet soil moisture conditions.** The County's Revegetation Project Manager can provide assistance in determining topsoil depth and proper removal. The depth of the topsoil layer may vary. Topsoil may be delineated from the subsoil by a higher organic matter content (usually, but not always, indicated by a darker color) **and** a relatively loose and friable soil structure. The Revegetation Project Manager should be present at the site as topsoil removal is initiated to determine average topsoil depth. Typically, topsoil is between 4 and 8 inches in depth. Topsoil should be placed to one side of the construction area.

Any subsoil removed should be placed separate from the topsoil. **Under no circumstances shall subsoil be mixed with topsoil, and subsoil shall not be placed on top of the topsoil.** The topsoil shall be protected from contamination by subsoil material, weeds, etc. and from compaction by construction equipment and vehicles.

- B. Relieving Compaction: Areas that are compacted by heavy equipment will be relieved by subsoiling, ripping, or deep chiseling, **prior to redistribution of topsoil.** Construction areas and other compacted areas will be chiseled to a minimum depth of 10 inches, with no more than 10 inches between chiseled furrows. Two passes with a chiseler may be necessary, with the second pass chiseling between the first furrows, or perpendicular to original furrows.
- C. Redistribution of Topsoil and Application of Amendments: The salvaged topsoil should be redistributed uniformly over the disturbed areas, minimizing compaction by equipment. **Topsoil redistribution shall not occur under wet soil conditions.** If topsoil is contaminated, compacted or otherwise improperly handled, topsoil should be amended with compost at a rate of 3 cubic yards per 1000 square feet of disturbed area to provide a suitable seedbed. Compost shall consist of at least 40 % organic matter, with a pH not to exceed 8.0, and soluble salts not greater than 10 Mmhos/cm. The carbon to nitrogen ratio of the compost shall be between 10:1 and 20:1. Compost shall be incorporated evenly throughout topsoil.

- D. Seedbed Preparation: Following redistribution of topsoil, the disturbed areas shall be chiseled again to a minimum depth of 12 inches, with no more than a 10 inch interval between chiseled furrows. Seedbed should be well settled, firm, and friable to facilitate seed placement at required depths. Harrowing, disking, or other operation may be required to breakdown large soil clods greater than four inches in diameter and provide an acceptable seedbed. Uneven grading of the soil surface is acceptable and encouraged to prevent further compaction from excess heavy machinery operation.
- E. Fertilizer: Apply Biosol® or Biosol® Mix or a similar, approved product at 500 to 1,800 lbs. per acre and/or apply Super Triple Phosphate at 60 lbs. per acre. Fertilizers shall be incorporated into the top 4 inches of soil after broadcasting.
- F. Compost: Apply at three (3) cubic yards per 1000 square feet where specified on the project plans. Compost will be worked into areas shown on the plans and incorporated into the top 4 inches of soil after spreading.

1.3.2 ADJUSTING - Repair all damaged areas before seeding.

1.3.3 PROTECTION - Existing native or established desirable vegetation within the project area will be flagged by the Project Manager and avoided by the Contractor.

End of Section 1 - SOIL PREPARATION

**SECTION 2 - PART 1
NATIVE SEEDING**

2.1.1 DESCRIPTION - Native Seeding: The square footage/acreage of seeding work with the seed mix(es) of native grasses will be shown on the project plans.

2.1.2 SUBMITTALS - The Contractor shall furnish the following items to the Project Manager prior to or at the submittal of the project invoice.

A. Product Certification: Seed Certification Papers and Tags; All seed shall be furnished in dealer sealed bags or containers, unopened, and clearly labeled with the dealer's tags with warranty analysis. Dealer's statement of seed analysis shall state for each seed type the name and address of seller, lot number, test date, seed type and variety, origin, the guaranteed percentage of purity and germination, weed seed content, pounds of pure live seed (PLS) per species, and total PLS pounds and bulk pounds of the seed mix. Maximum crop and weed content shall follow the Colorado Seed Certification Standards for certified seed; prohibited noxious weeds - none, restricted noxious weeds less than 0.1%, total other crop seed less than 1.0%. Seed shall be free of prohibited noxious weeds including, but not limited to, Canada thistle, diffuse knapweed, spotted knapweed, Russian knapweed, field bindweed, hoary cress, jointed goatgrass, leafy spurge, musk thistle, and yellow toadflax. Seed and seed labels shall conform to all current State and Federal regulations and will be subject to the testing provisions of the Association of Official Seed Analysis. Boulder County Parks and Open Space reserves the right to test seed mixes and refuse any seed not conforming to these specifications. The Contractor shall be responsible for replacing any refused seed.

B. Delivery Tickets and Analysis Seed Tags: Submit delivery tickets or copy of the seed invoice and all tags removed from each bag of seed to the Project Manager. Tags attached to bags of seed will not be removed until the bag is opened on site at the time of seeding.

2.1.3 DELIVERY, HANDLING AND STORAGE

A. Deliver seed in original, unopened bags or containers with an analysis tag attached to each. The Contractor must request that the seed vendor provide seed certification papers (see section 1.3. A.) above.

B. Protect materials from animals and moisture. Wet, moldy, opened or damaged bags will not be accepted.

2.1.4 PROJECT/SITE CONDITIONS - Environmental Conditions: **Seeding shall take place between September 1 to March 1 on the plains, or October 1 to April 15 at higher elevations.** Seeding at any other time must be approved by the Project Manager. No work shall occur when the soil is frozen, or in extremely wet or dry conditions. Moist soil conditions are ideal for seedbed preparation and seeding.

2.1.5 WARRANTY - Seeding: Warrant seeded areas for a period of one (1) year against defects, including unsatisfactory germination or growth due to improper materials or installation, except for defects resulting from neglect by owner abuse or damage by others, or unusual phenomena or incidents that are beyond the Contractor's control (i.e. drought). Reseeding shall occur within the soonest appropriate time frame and conditions.

**SECTION 2 - PART 2
PRODUCTS**

2.2.1 MATERIALS

A. Native Seed: Product comparison shall be made on the basis of pure live seed (PLS) in pounds. Certified, blue-tagged seed shall be supplied where a named variety is specified (i.e., Arriba, Vaughn, etc. Native or VNS is not a named variety). If a specified type or variety of seed is not available, substitutions must be approved by the Project Manager.

Table 2.1: **Sample** Dryland Plains Native Seed Mix; #PLS/A = Pounds of Pure Live Seed per acre.

	Common Name <i>Species</i> "Variety"	Approx. Seeds/#	% of Mix	# PLS/ft2	PLS#/Acre
1	Side Oats Grama <i>Bouteloua curtipendula</i> "Vaughn"	191000	18	80	3.28
2	Blue Grama <i>Bouteloua gracilis</i> Native	825000	20	80	0.84
3	Buffalograss <i>Buchloe dactyloides</i> "Native"	56000	15	80	9.33
4	Slender Wheatgrass <i>Elymus trachycaulus</i> "San Luis" or "Pryor"	159000	10	80	2.19
5	Western Wheatgrass <i>Pascopyrum smithii</i> "Arriba"	110000	10	80	3.17
6	Western Wheatgrass <i>Pascopyrum smithii</i> "Native"	110000	10	80	3.17
7	Little Bluestem <i>Schizachyrium scoparium</i> "Cimarron or Pastura"	260000	10	80	1.34
8	Green Needlegrass <i>Stipa viridula</i> "Lodorm or Native"	181000	7	80	1.35
	Totals		100		24.68

SECTION 2 - PART 3 EXECUTION

2.3.1 EXAMINATION - Examine site conditions to verify acceptability for seeding. Do not proceed with work until unsatisfactory conditions have been corrected.

2.3.2 PREPARATION

A. Seedbed Preparation: See Section 100 - Soil Preparation.

B. Notify Project Manager 24 hours in advance and request inspection of seeding areas prior to installation.

2.3.3 INSTALLATION

A. Seeding Conditions and Timing: Seeding shall not occur during windy weather, or when ground is frozen or otherwise untillable, such as in extremely wet or dry soil conditions. Seeding shall occur within the appropriate time frame, from **October 1 to March 15**. Seeding at any other time must be approved by the Project Manager.

B. Seeding Method: Seed must be applied with a grass or no-till drill that is specifically designed to accommodate variability in size and physical characteristics of native grass seeds. Applying seed by the broadcast method is also acceptable if the seeding rate is doubled and the seed is lightly covered with soil by means of harrowing, chaining, or raking. **Hydro-seeding will not be accepted.**

Seed shall be drilled between $\frac{1}{2}$ and $\frac{3}{4}$ inch depth below the soil surface. Drill spacing should be no wider than 8 inches between rows. Packer wheels that firm the soil over the drill row are required. Dragging chains behind the drill to cover seed is not an acceptable substitute. **Seed drills must be clean of seed from previous seeding jobs before any seeding begins.**

Broadcast seeding shall proceed on freshly disturbed (raked or harrowed) soil surface. Following seeding, seed will be **immediately** raked or harrowed into the surface. Raking shall be accomplished using metal-tined garden or landscape rakes; no plastic leaf rakes shall be allowed. If harrowing is used, an English harrow or its equivalent shall be required.

C. Seeding Rate: Drill native grasses at the rate provided in the seed mix (see sample seed mix in Table 2.1 in Materials Section). Rates will be doubled for broadcast seeding.

2.3.4 ADJUSTING - Repair all damaged areas by the Contractor's operations after seeding. Any trail surfaces impacted by seeding shall be returned to its previous condition.

End of Section 2 - NATIVE SEEDING

**SECTION 3 - PART 1
MULCHING/EROSION CONTROL**

- 3.1.1 DESCRIPTION** - This item consists of mulching the seeded areas, and/or installation of erosion control materials on slopes greater than 3:1. Specific mulching and/or erosion control methods will be designated in the project plans.
- 3.1.2 SUBMITTAL** - The Contractor shall provide documentation with each delivery or bulk material delivery, stating source, quantity, and type of material. All materials shall conform to specification requirements. All certificates shall be submitted to the Project Manager prior to or at the time of invoicing.
- 3.1.3 DELIVERY, HANDLING AND STORAGE**
- A. Deliver and store packaged materials in original, unopened, labeled containers.
 - B. Wet, moldy, opened or broken packages or materials will not be accepted.
- 3.1.4 PROJECT/SITE CONDITIONS** - No work shall occur when soil is extremely wet.

**SECTION 3 - PART 2
PRODUCTS**

- 3.2.1 MATERIALS** - Mulch/Erosion Control: Different mulch and erosion control products are available that vary in their degree of protection. The following types of mulch will be applied according to the project plans. In general, options A and B are for flat terrain or gentle slopes less than 3:1. One option from choices C through E shall be used on slopes greater than 3:1.
- A. Native Hay or Straw Mulch: Materials for mulching shall consist of Certified Weed Free field or marsh hay or straw of, wheat, sorghum, sorghum-sudan, milo, or millet certified under the Colorado Department of Agriculture Weed Free Forage Certification Program as “Weed Free Mulch” and inspected as regulated by the Weed Free Forage Act, Title 35, Article 27.5, CRS. Unacceptable straw mulch materials include: barley and rye. Preference will be given to straw from irrigated fields and to straw from current or previous year’s harvest. Each certified weed free mulch bale shall be identified by one of the following:
- (1) One of the ties binding the bale shall consist of blue and orange twin, or
 - (2) The bale shall have a regional Forage Certification Program tab indicating the Regional Forage Certification Program Number.”

Mulching containing **cheatgrass** (*Bromus tectorum* and *Bromus japonicas*) will **not be accepted**. Excessive amounts of problematic weeds not on the Colorado Weed Free

Forage list will be rejected, including, but not limited to all Colorado State listed noxious weeds, kochia (*Bassia scoparia*) and prickly lettuce (*Lactuca serriola*).

The Contractor shall provide a transit certificate for each truckload that has been filled out and signed by the grower and by the Department of Agriculture inspector. The transit certificate shall contain the inspection certificate number, the producer's name, the type of straw, the origin, and the quantity purchased in number of bales and estimated weight.

Straw must be from the State of Colorado and comply with the Colorado Department of Agriculture Weed Free Forage regulations.

B. Wood fiber hydromulch with a guar gum tackifier: The hydromulch shall be of virgin wood cellulose fiber that is thermally produced and air dried. A standard rate of 3000 lbs. per acre of hydromulch will be appropriate for most projects unless otherwise specified on the project plans. A guar gum base tackifier shall be included at 80 lbs. per acre.

C. Erosion control blankets: The blanket shall consist of a machine produced mat of 100% biodegradable materials, including the netting. Mat materials may include curled wood excelsior, or a combination of straw (certified weed free) and coconut fibers. Photodegradable polypropylene (plastic) netting will **not be** accepted. Mats must be designed for erosion control on 2:1 slopes and able to handle moderate water velocities of at least 7 ft. /sec. Erosion blankets must have a functional longevity of two years.

Soil Retention Blanket: (Straw and Coconut). Soil Retention Blanket (Straw/Coconut) shall be a machine produced mat consisting of 70 percent agricultural straw and 30 percent coconut fiber. The blanket shall be of consistent thickness with the straw and coconut fiber evenly distributed over the entire area of the mat. The blanket shall be covered on the top side with jute or equivalent 100% biodegradable netting having an approximate 5/8 inch x 5/8 inch mesh and on the bottom with biodegradable netting with an approximate 1/4 inch x 1/4 inch to 1/2 inch x 1/2 inch mesh. The blanket shall be sewn together with cotton, biodegradable thread.

Soil Retention Blanket: (Woven Coconut). Soil Retention Blanket (Woven Coconut) shall be a machine produced woven mat consisting of 100 percent coconut fiber. The blanket shall be of a 0.35 in (9 mm) thickness evenly distributed over the entire area of the mat. The open weave in the blanket shall be 0.5 in x 0.5 in.

D. Bonded Fiber Matrix Hydromulch: Bonded fiber matrix hydromulch, such as the Soil Guard® brand from Mat Inc., shall be used, or a similar product of equal capability. Bonded fiber matrix hydromulch shall be applied by a manufacturer certified contractor at a minimum of 3,200 lbs. per acre according to manufacturer's specifications. The bonded fiber matrix shall be applied in successive layers as to achieve 100% coverage of all soils, and the matrix shall have no holes greater than 1mm. Application must be applied in at least two angles to meet cover requirements this application shall be strictly required. The bonded fiber matrix shall not be applied immediately before, during or after rainfall, such

that the matrix will have an opportunity to dry for up to 24 hours after installation. Applicators must provide proof of certification to apply this product.

E. Jute netting: For use on sites where overland water flow is likely; typically comprised of coconut fibers, woven together (without nylon netting) and available in various weights and grades. Soil Guard® may be applied over jute netting for extra protection.

SECTION 3 - PART 3 EXECUTION

3.3.1 INSTALLATION - After seeding has been completed, the mulch or erosion control materials shall be applied or installed according to the project plans. The seeded area shall be mulched and erosion control installed within 24 hours after seeding. Areas not mulched within 24 hours after seeding shall be reseeded with the specified seed mix at the Contractor's expense, prior to mulching or installation of erosion control.

A. Native Hay or Straw Mulch: Applied evenly at a rate of 3000 lbs. per acre over the designated seeded areas. Mulch may be crimped in or sprayed with a tackifier according to the project plans.

B. Wood fiber hydromulch with guar gum tackifier: A standard rate of 3000 lbs. per acre of hydromulch and 80 lbs. per acre of guar gum tackifier will be appropriate for most projects unless otherwise specified on the project plans. The operator shall spray apply the slurry of wood fiber mulch according to the manufacturer's specifications in a uniform manner over the designated seeded areas. **Seed shall not be incorporated and applied simultaneously with the hydromulch slurry.**

C. Erosion control blankets: Soil Retention Blanket (Woven Coconut), and (Straw and Coconut). The area to be covered with Soil Retention Blanket (Woven Coconut) and (Straw/Coconut) shall be properly prepared, fertilized, and seeded before the blanket is placed. When the blanket is unrolled, the heavyweight bio-compostable netting shall be on top and the lightweight bio-compostable netting shall be in contact with the soil. In ditches and on slopes, blankets shall be unrolled in the direction of the flow of water. Installation shall be in accordance with manufacturer's recommendations.

The blanket shall be placed smoothly but loosely on the soil surface without stretching. The upslope end shall be buried in a trench 6 inches wide by 6 inches deep beyond the crest of the slope to avoid undercutting. For slope applications, there shall be a 6 inch overlap wherever one roll of blanket ends and another begins with the uphill blanket placed on top on the blanket on the downhill side. There shall be a 4 inch overlap wherever 2 widths of blanket are applied side by side. Insert staples in a pattern according to the manufacturer's recommendation at approximately 2 staples per square yard. At terminal ends, and every 35 feet, Soil Retention Blanket (Woven Coconut), and (Straw/Coconut) placed in ditches shall be buried in a trench approximately 6 inches deep by 6 inches wide. Before backfilling, staples shall be placed across the width of the

trench spaced at 6 inches on center in a zigzag pattern. The trench shall then be backfilled to grade and compacted by foot tamping.

For installation of Woven Coconut Soil Retention Blanket next to a stream channel, use wooden stakes constructed of 2" x 4" lumber cut on the diagonal such that the long end of the stake is at least 12" and the short end of the stake is 3" (refer to the Urban Drainage Flood Control District Construction Criteria Manual, Volume 3, BMP Fact Sheet EC-6 Rolled Erosion Control Products (RECP) for wooden stake details).

D. Bonded Fiber Matrix Hydromulch: Installed according to the manufacture's specifications by a certified applicator in designated areas at 3,200 lbs. per acre. Two angle application of hydromulch will be strictly required.

E. Jute netting: Installed according to the manufacture's specifications in designated areas. Bonded fiber matrix hydromulch may be applied over jute netting for extra protection.

3.3.2 MAINTENANCE: The Contractor shall maintain the blanket, fabric, or netting areas until all work on the Contract has been completed and accepted. Maintenance shall consist of the repair of areas where damage is due to the Contractor's operations. Maintenance shall be performed at the Contractor's expense. Repair of those areas damaged by wind, fire, or other causes not attributable to the Contractor's operations shall be repaired by the Contractor and will be paid for at the contract unit price. Areas shall be repaired to reestablish the condition and grade of the soil prior to application of the covering and shall be fertilized, seeded, and mulched as directed.

3.3.4 ADJUSTING: Areas not properly mulched, or areas damaged due to the Contractor's negligence, shall be repaired and remulched as described above, at the Contractor's expense. Mulch removed by circumstances beyond the Contractor's control shall be repaired and remulched as ordered.

3.3.5 PROTECTION: Avoid driving on areas that have been mulched. Avoid walking on the seedbed after the application of hydromulch and bonded fiber matrix.

End of Section 3 - MULCHING/EROSION CONTROL

REFERENCES

1. Colorado Department of Transportation, Standard Specifications for Road and Bridge Construction, project Development Branch, Standards and Specifications Unit, Denver Colorado, 2011.
<https://www.codot.gov/business/designsupport/2011-construction-specifications/2011-Specs/standard-special-provisions/sections-200-500-revisions/216src/view>
2. Urban Storm Drainage Criteria Manual, Volume 3, Best Management Practices, Updated November 2010, Urban Drainage Flood Control District, Copyright 2011, Denver, Colorado, www. Udfcd.org,
<http://www.udfcd.org/downloads/pdf/critmanual/Volume%20%20PDFs/120%20Chapter%2012%20Revegetation%202001-01.pdf>



June 9, 2016

Andrew M. Williamson
NRCS Utah State Cultural Resources Specialist
Natural Resource Conservation Service
Denver Federal Center
Bldg. 56, Rm.2604
P.O. Box 25426
Denver, Colorado 80225-0426

Re: 11 NRCS Colorado Emergency Watershed Protection Undertakings in Boulder County, Colorado (HC #70299)

Dear Mr. Williamson:

Thank you for your correspondence dated May 23, 2016 and received on May 25, 2016, regarding the above referenced project under Section 106 of the National Historic Preservation Act (Section 106).

After review of the provided documentation, we do not object with the proposed Area of Potential Effect (APE). We note your identification of the National Register of Historic Places field eligible Faivre Ranch (5BL.4244) within the APE. We also note that the project will stabilize stream embankments, remove sediment and debris, and repair related infrastructure within and immediately adjacent to the active stream channel. Since supporting features of the aforementioned resource will be avoided, we concur that the projects will result in a finding of no adverse effect (36 CFR 800.5 (d) (1)) under Section 106.

Should unidentified archaeological resources be discovered in the course of the project, work must be interrupted until the resources have been evaluated in terms of the National Register eligibility criteria (36 CFR 60.4) in consultation with our office pursuant to 36 CFR 800.13. Also, should the consulted-upon scope of the work change please contact our office for continued consultation under 36 CFR 800.

We request being involved in the consultation process with the local government, which as stipulated in 36 CFR 800.3 is required to be notified of the undertaking, and with other consulting parties. Additional information provided by the local government or consulting parties might cause

our office to re-evaluate our eligibility and potential effect findings. Please note that our compliance letter does not end the 30-day review period provided to other consulting parties.

If we may be of further assistance, please contact Katie Arntzen, our Section 106 Compliance Manger, at (303) 866-4608.

Sincerely,



Steve Turner, AIA
State Historic Preservation Officer