Flood Planning & Preliminary Design Services for South St. Vrain Creek Restoration at Hall Ranch

Coalition Meeting

Prepared for:
Boulder County, Colorado

RFP No. 6412-16

Matrix DESIGN GROUP

In association with:
Otak, THK, ERO, and Blue Mountain

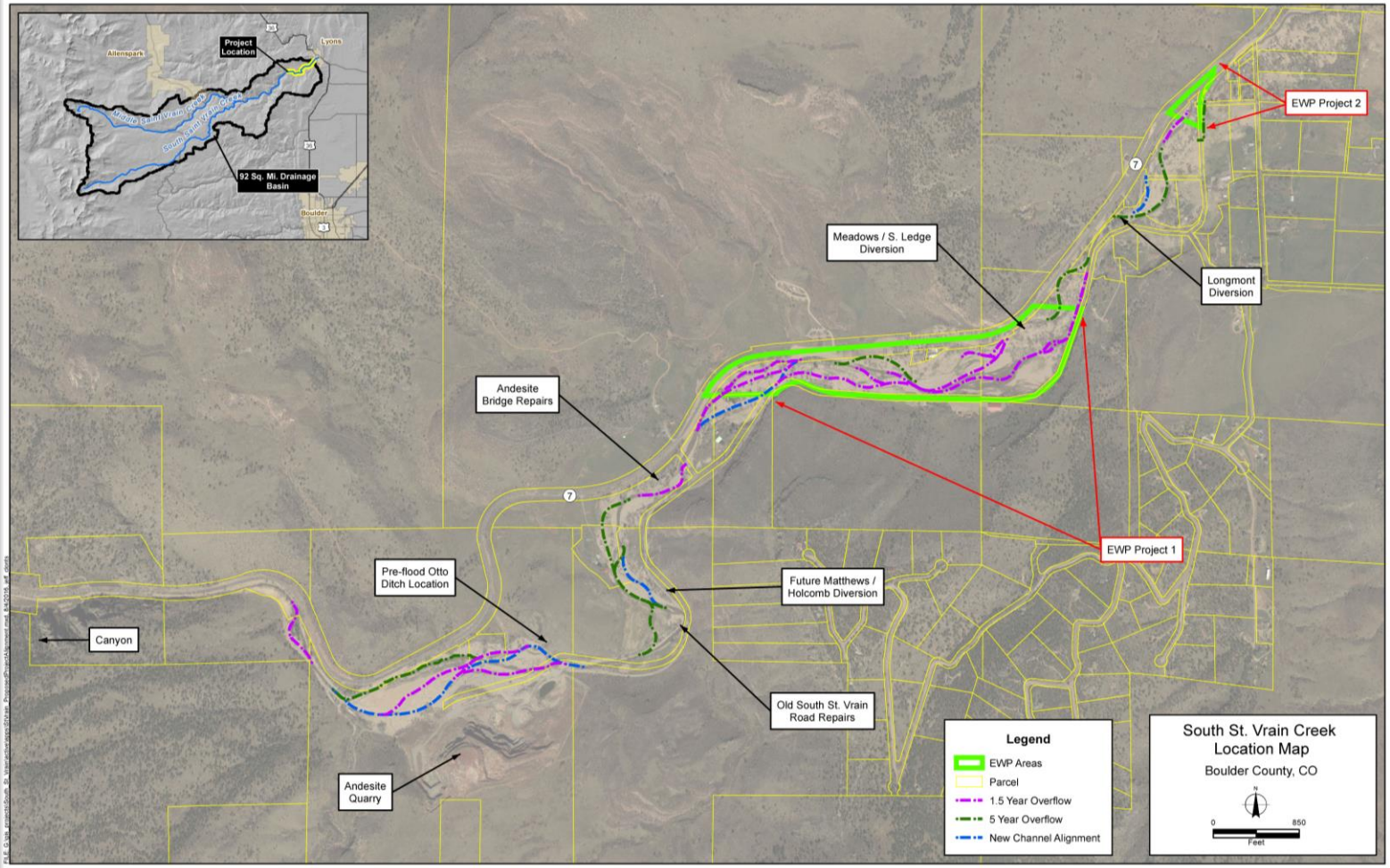
Draft 30% Design Plans and Report

- Posted to Boulder County Project Website
  - http://www.bouldercounty.org/os/openspace/pages/ssv.aspx
- 30% Design Plans
  - 65 Sheets (and more to come)
    - Plan and Profile of Main and Overflow Channels
    - Channel Design Details
    - Revegetation Plans
    - Revegetation and Bio-Engineering Details
    - Additional Planning Elements
- 30% Preliminary Basis of Design Report
  - 117 Pages (without appendices)
  - Some analysis still to be refined and completed
- Provide Comments to Ernst Strenge of BCPOS

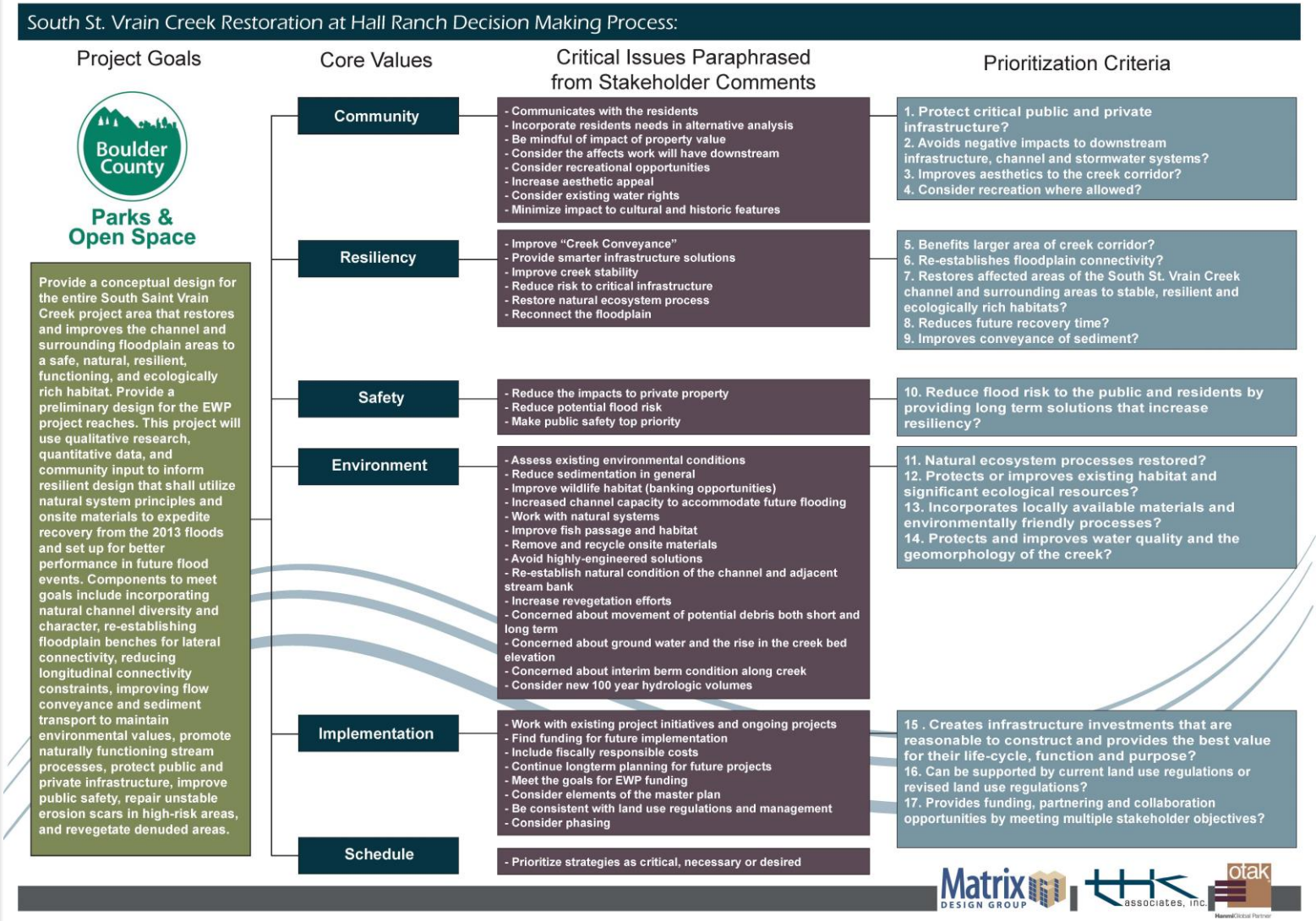
3.2 Mile Plan and EWP Project

- Boulder County Parks and Open Space Contract
  - To develop stream restoration plans for 3.2 mile reach
- Emergency Watershed Protection (EWP) Project
  - EWP Reach 1 (Hall Meadows): $1,573,189
  - EWP Reach 2 (Upstream of Old St Vrain Road): $161,630

3.2 Mile Plan and EWP Project



Decision Making Process



Prioritization Criteria

SOUTH ST. VRAIN CREEK RESTORATION AT HALL RANCH DECISION MATRIX - FOR THE PRIORITIZATION OF THE PREFERRED ALTERNATIVE 7/12/2016

Fair | Better | Best

ID	Critical Issues	Prioritization Criteria	Alternatives Evaluation: Floodplain Connectivity	Channel Complexity	Revegetation	Infrastructure Protection
Prioritization Criteria						
1	Community	Protect critical public and private infrastructure?	The best way to increase flood volume and reduce flood energy throughout the system. Note: (Detention ponds can not provide enough volume to mitigate flood impacts. Water rights are needed to detain water. Detention ponds would fill full of sediment. There is physically not enough room to detain the appropriate amount of water needed.)	Can provide some channel stability.	Once vegetation is established can provide some flood-plain stability.	Can provide immediate site specific protection to infrastructure. No system wide mitigation.
2	Community	Avoids negative impacts to downstream infrastructure, channel and storm water systems?	Returns the river corridor to a more natural channel condition with minimal downstream impacts.	Minimal downstream negative impacts.	Minimal downstream negative impacts.	While the technique might provide protection for the immediate element of infrastructure being protected, the technique can cause negative impacts downstream.
3	Community	Improves aesthetics to the creek corridor?	Returns the river corridor to a more natural channel condition. Time needed for naturalization of vegetation	Improves the aesthetics of the channel.	Jump starts revegetation of the entire river corridor.	Most techniques appear engineered.
4	Community	Consider recreation where allowed? [1]	Improves the quality of the recreational experience.	Provides instream structures that could act as a recreational amenity to kayakers and fishermen.	Improves the quality of the recreational experience.	Recreational objectives could be included with infrastructure protection.
5	Resiliency	Benefits larger area of creek corridor?	Benefits the larger creek corridor by jump starting the natural systems.	Benefits the channel by moderating sediment load.	Benefits the larger creek corridor but without floodplain connectivity the results will be diminished.	Very site specific benefits at the point where the improvement is made.
6	Resiliency	Re-establishes floodplain connectivity?	Yes. Floodplain connectivity is the most holistic approach to re-establish a functioning floodplain.	Yes. Cannel complexity would contribute to inundation of floodplain benches.	Yes. Revegetation provides roughness to slow floodwater down and establishes long lasting ecosystem benefits.	No
7	Resiliency	Restores affected areas of the South St. Vrain Creek channel and surrounding areas to stable, resilient and ecologically rich habitats?	Yes	Yes	Jump starts terrestrial and riparian habitat.	Makes certain reaches more stable.
8	Resiliency	Reduces future recovery time?	Jump starts the natural systems of the corridor most holistic approach.	Not a holistic approach, focuses on channel.	Not a holistic approach. Some established vegetation, soil structure and seedbanks would survive a flood event and secondary succession would occur.	Not a holistic approach. Infrastructure protection would protect existing features and reduce future work needed after a flood event.
9	Resiliency	Moderates conveyance of sediment?	Yes for the entire reach.	Yes for the entire reach.	Traps sediment during a flood and minimizes erosion.	Could be part of the strategy at diversions, bridges and culverts.
10	Safety	Reduce flood risk to the public and residents by providing long term solutions that increase resiliency?	Increases flood storage volume and reduces flood energy throughout the system.	Provides some creek channel resiliency.	Once allowed to mature the vegetation provides some resistance to future floods.	Hardened points are created in the corridor not always resilient.
11	Environment	Natural ecosystem processes restored?	Most holistic approach.	Partial approach, not all ecosystems addressed.	Partial approach, not all ecosystems addressed.	Least holistic approach.
12	Environment	Protects or improves existing habitat and significant ecological resources?	Improves both terrestrial and aquatic habitat.	Improves aquatic habitat.	Improves terrestrial and riparian habitat	Not the focus of infrastructure protection techniques.
13	Environment	Incorporates locally available materials and environmentally friendly processes?	Not a differentiator. All alternatives can incorporate locally available materials and environmentally friendly processes.			
14	Environment	Protects and improves water quality and the geomorphology of the creek?	Protects geomorphology and jump starts natural systems of the corridor.	Protects geomorphology and jump starts natural systems of the creek.	Reduces erosion.	Reduces erosion in site specific areas.
15	Implementation	Creates infrastructure investments that are reasonable to construct and provides the best value for their lifecycle, function and purpose?	Because it jump starts the corridor's natural systems it is the best value for their life-cycle.	Reasonable to construct and jump starts natural system of the creek.	Without regrading, the revegetation effort will have diminished results.	Protects infrastructure but requires on-going maintenance.
16	Implementation	Can be supported by current land use regulations or revised land use regulations?	Not a differentiator. All alternatives can be supported by the current land use regulations.			
17	Implementation	Provides funding, partnering and collaboration opportunities by meeting multiple stakeholder objectives?	Not a differentiator. There are opportunities with all alternatives for partnering.			

Notes:

Definitions:
Fair - What is thought to be right acceptable
Better - Higher in quality
Best - Better than all others in quality or value

Additional Design Aspects Being Evaluated

- Old St Vrain Road Bridge
  - Required capacity and road overtopping
- Longmont Diversion
  - Relocation of diversion and floodplain conveyance
- South Ledge/Meadows Ditch
  - Sedimentation issues
- Hazardous Vegetation Management
- Pre-Flood vs Post-Flood Capacity

Large Woody Material and Vegetation

- Site Visit with Boulder County Emergency Management (OEM)
- Guidance from OEM and NRCS
- In Vicinity of Infrastructure to Protect
- Biological and Ecological Benefits

Geomorphology

- Available Data
- Geomorphic Assessment
  - Desktop Analysis
  - Field Assessment
  - River Styles

Sediment Transport

- Base Bed Mobility
- Sediment Transport Capacity and Balance
- Effective Discharge
- Stream Evolution Model

Design Process

- Design Models (Existing and Proposed)
  - 1-D HEC-RAS
    - Floodplain modeling and initial design parameters
  - 2-D Sedimentation and River Hydraulics
    - Final design parameters and sediment transport
- Iterative Process
  - Existing Conditions Topography
  - Existing Conditions Modeling
  - Initial Proposed Conditions Topography
  - Initial Proposed Conditions Modeling
  - Back and Forth to Refine Proposed Conditions Model

Preferred Alternative

- Issue Based: BCPOS and Community
- Floodplain Connectivity, Revegetation, Channel Complexity, Infrastructure Protection
- Channel Alignment
  - Lateral Movement of Channel
- Overflow Channels
- Reach by Reach Evaluation (in Design Report)

Draft 30% Design Plans and Report

- Review of Draft 30% Design Plans and Details
- Plan and Profile Views
- Bio-Engineering Details
- Report Topics:
  - Project Funding
  - Goals and Objectives
  - Relevant Background Information
  - Watershed Site Assessment
  - Hydrology and Hydraulics
  - Geomorphology

Draft 30% Design Plans

- Main Channel Planform
  - Pre-Flood or Existing Alignments
- Overflow Channel Planform
  - Pre-Flood or Existing Alignments
- Channel and Floodplain Dimensions
  - Multi-Stage Channel
  - Bankfull

Description	Top Width (ft)	Bed Width (ft)	Max. Depth (ft)	Bank Slopes
Straight Reach	40 - 55	31 - 44	2.1 - 2.5	3:1 - 5:1
Transition Reach	40 - 55	N/A	2.1 – 4.4	3:1 - 5:1
Meander Reach	40 - 55	N/A	3.6 – 4.4	3:1 - 5:1

  - Low Flow

Description	Top Width (ft)	Typ. Depth in Straight Reach (ft)	Typ. Depth in Meander Reach (ft)
Low Flow Channel	26 - 32	0.76	2.5

Riffle Structure Design

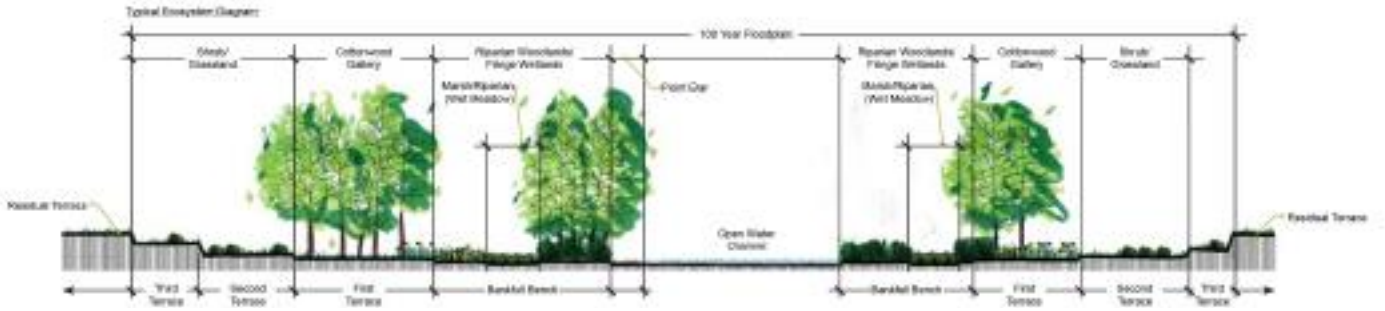
1.5 and 5 Year Overflow Channels

- Along Existing and/or Pre-Flood Channel Alignments
- On Average 25’ Bottom Width with Gentle Side Slopes
- Vegetation Lined (Not Stream Bed Material)

Large Wood Structure Design

Revegetation

- Preserve Existing Vegetation
- Planting Diversity Based Upon Proximity to Water Table (Iterative Design Process)
- Upland Seeding, Riparian Seeding, Willow Stakes, Cottonwood Poles, Tree and Shrub Planting, Wetland and Riparian Sod



Next Steps

- Final 30% Plans and Report Submitted on September 16th
- Available for review and comment
- Working Group 4B Meeting
- 100% Design Drawings or Design Build
- Permitting
- Construction