APPLICATION NUMBER 9-
Salt Lake County Watershed Planning and Restoration Program
Project Title: Riparian Restoration and Streambank Stabilization on Red Butte Creek

UTAH DIVISION OF WATER QUALITY
195 North 1950 West| PO Box 144870 | Salt Lake City UT 84114-4870

Red Butte Creek Project Proposal Form

NOTE: Proposal must be no longer than 6 pages. Supplemental documents such as letters of support, information to demonstrate previous project implementation and other relative supportive documents may be submitted in addition to this form.

Applicant Name:	Salt Lake County Watershed Planning & Restoration Program
Project Title:	Riparian Restoration and Streambank Stabilization on Red Butte Creek
Mailing Address:	Salt Lake County, Suite N3100 PO Box 144575 Salt Lake City UT 84114-4575
Phone:	(801) 468-2796
E-mail:	lberni@slco.org

☐ Individual ☐ Non-Profit ☒ **Govt. Agency** ☐ Academic ☐ Commercial ☐ Other

1. **Estimated Project Costs:**

Labor & Materials*	$140,000	Contractor to install bioengineered design; monitoring and maintenance by SLCo staff
Labor	$60,000	Design and project management by SLCo staff
Administration	$10,000	
Equipment	$2,500	
TOTAL	**$212,500**	

Other sources of project funding
In-kind Time: Planning (already completed)

SLCo Staff	$14,000
Uof U Staff	$5,000

In-Kind Time: Coordination as needed, Plan Review

U of U Staff:	$10,000

Total project cost including other sources of funding: $241,500

**labor & materials for installation are based on approximate unit costs in the Salt Lake City Riparian Corridor Study: Final Red Butte Creek Management Plan (2010)*

2. **Describe the purpose and need of the project:**

Purpose
The riparian ecosystem of Red Butte Creek sustained serious damage as a result of the crude oil releases in 2010—whether from direct contact with toxic substances, or as a result of the cleanup activities performed by and on behalf of Chevron. The purpose of this project is to restore riparian vegetation in Red Butte Creek

to achieve the goals of: stabilizing streambanks to protect against erosion, protecting water quality, improving riparian habitat, and helping slow high flow velocities. The project reach includes the stretch of creek that flows through the University of Utah campus and Research Park, below the Red Butte Arboretum down to Foothill Boulevard, approximately 4,580 feet of stream length.

Need

Trees and shrubs play a critical role in riparian ecosystems: providing habitat and food for terrestrial and aquatic organisms; stabilizing streambanks with their extensive root systems; helping to protect water quality by preventing erosion and slowing overland flow of rain and snowmelt; and reducing instream flow velocities. Cleanup following the oil spills of 2010 consisted of 1) cutting and removing contaminated vegetation in the creek corridor and 2) physical scrubbing/rinsing of streambank soils and rocks to remove and flush contaminants downstream. While this may have served to remove toxic substances from the immediate area, there are long term detrimental effects of these activities. Eighteen months after the first spill of 2010, there are increases in bank erosion and virtually no regeneration of the native willow and dogwood plant communities.

In many areas along the project reach, Red Butte Creek is deeply entrenched with steep, vertical banks that are 10-20 feet high in some places. This makes access extremely difficult, virtually impossible for any kind of motorized equipment. To achieve the goals of bank stabilization and improvements to the natural habitat, this project will focus on streambank bioengineering techniques. Specifically, dormant woody plant cuttings (called live-stakes) will be used; native species of dogwood and willow that are naturally occurring in the riparian plant communities of Red Butte Creek. Due to the bank steepness, replanting will focus primarily on the bank zone between the average low water and average high water marks, to cover the range in fluctuating water levels and protect this area of bank that was damaged by Chevron cleanup activities. The live-stake cuttings will sprout and take root, stabilizing soils with a dense matrix of roots. Wherever possible, live-stakes will be the only bioengineering stabilization technique used, with the goal of providing maximum vegetation potential with minimal disturbance to the ecosystem.

Any work done to improve the health of the Red Butte Creek riparian ecosystem will have positive impacts on the ecosystems of the lower Jordan River watershed, and ultimately contribute to the overall health of the Great Salt Lake watershed. In addition, the restoration activities proposed are consistent with recommendations made by local stewardship and management plans. Specifically, the *Salt Lake Countywide Water Quality Stewardship Plan (2009)* identified the "continuation of stream restoration, enhancement and maintenance efforts" throughout Salt Lake County as one of its 15 priority implementation tasks. The *Salt Lake City Riparian Corridor Study: Final Red Butte Creek Management Plan (2010)* identified biotechnical slope stabilization and bank stabilization as recommended reach-wide improvement measures in the creek reaches identified in this proposal.

3. Estimated time frame of the project with significant milestones
(Note: Project must be completed with final reports filed by November 10, 2014):

Feb 2012	Project selection by DWQ
Feb-Apr 2012	Detailed site inventory & analysis Develop study design & detailed project plans
Apr 2012	Approval of detailed project plans by DWQ Issue RFP for consultant/contractor to install bioengineered design
Spring 2012	High-flow baseline data collection
Jun 2012	Select consultant/contractor

Sep 2012	Low-flow baseline data collection Establish photo-monitoring points Refine design as needed Apply for all necessary permits
Mar/Apr 2013	Installation of dormant plant material by contractor Begin project maintenance: inspect every other week for first 2 months
Jun 2013	Maintenance: begin monthly inspections for next 6 months
Sep 2013	Year 1 monitoring (photo points, vegetation)
Dec 2013	Maintenance: begin inspections every other month, for 2 years
May 2014	Year 2 monitoring (photo points, vegetation)
Sep 2014	Year 2 monitoring (photo points, vegetation, bank morphology) Develop project Fact Sheets for SLCo outreach & education
Nov 2014	Final Report to DWQ

4. **Describe the location of the project with attached location map, including details on the total area that will be directly enhanced by the project:**

This project will focus on the stretch of Red Butte Creek that flows through the University of Utah campus and Research Park, just below Red Butte Arboretum to Foothill Drive, approximately 4,580 feet of stream length. See attached map for project location and proposed pedestrian access points. This project will directly enhance almost one mile of stream habitat, as well as improve water quality within the project reach and downstream. In addition, any work done to improve the health of the Red Butte Creek riparian ecosystem will have positive impacts downstream within the creek corridor, as well as on the ecosystems of the lower Jordan River watershed, and ultimately the Great Salt Lake watershed.

5. **Describe how the project will specifically enhance and protect waterways affected by the Red Butte releases and improve the conditions of one or more of the following: wildlife, habitat, natural vegetation, water quality or emergency response:**

This project has the potential to improve the conditions for the ecosystem services provided by healthy riparian community: wildlife, habitat, natural vegetation, water quality, and flood control.

Loss of riparian vegetation poses multiple threats to the health of a stream corridor environment, including: 1) loss of terrestrial habitat for animals, birds, insects; 2) decreased shade leading to increased water temperatures which is detrimental to health and habitat of aquatic organisms including fish and insects; 3) decreased stability of streambank soils, which leads to increased potential of erosion and adverse impacts on water quality; 4) decreased potential to reduce instream flow velocities.

The bioengineering techniques identified in this project proposal will address the above mentioned stresses to the Red Butte Creek ecosystem. *Streambank bioengineering* can be defined as integrating living woody and herbaceous materials with organic and inorganic materials to increase the strength and structure of the soil. This is accomplished by a dense matrix of plant roots that hold the soil together. The above-ground vegetation increases resistance to flow velocities by dissipating energy. The biomass also acts as a buffer against the abrasive effect of transported materials and allows sediment deposition due to low shear stress near the bank. By using native vegetation to provide the necessary stabilization, bioengineering techniques blend into and become a part of the landscape, providing valuable habitat for fish and wildlife.

6. **Describe project's connectivity to other natural areas or projects that further enhance wildlife, habitat, natural vegetation, water quality or emergency response:**

From an ecosystem perspective, riparian corridors provide connectivity that allows the flow, exchange and pathways that move organisms, energy and matter throughout a watershed system. Healthy riparian ecosystems provide food and shelter for terrestrial and aquatic organisms. They provide ideal conditions for the native plants that are adapted to these ecosystems to grow and thrive, thus helping to prevent invasion by weed species. Finally, riparian vegetation helps to protect water quality and can help to slow instream flows. The stretch of Red Butte Creek identified in this proposal is just below, and thus directly connected to, the Red Butte Arboretum and Red Butte Canyon Research Natural Area. By improving the health and functioning of the riparian ecosystem in the proposed section Red Butte Creek, this project has the potential to expand the positive effect of those relatively undisturbed riparian corridors.

7. **Describe any additional social benefits of implementing this project:**

The need to improve the damaged ecosystem of Red Butte Creek has provided a serendipitous opportunity for long-term research, education, and outreach potential. Salt Lake County is currently collaborating with the University via the research side to explore opportunities for student projects related to the proposed restoration project. Where possible, Salt Lake County will work with project partners to explore volunteer and educational opportunities. Involving volunteers in the process to help repair and restore this creek ecosystem will, ideally, lead to a personal connection to Red Butte Creek, and an increase in long term stewardship. Developing and managing a volunteer monitoring program could be an excellent volunteer project, providing the opportunity to develop leadership and management skills, as well as learn about ongoing maintenance and success of stream restoration projects. In addition, a volunteer monitoring program would be a valuable resource for County staff.

8. **Project plans and details, including rights to work on specified piece of land:**

Revegetation will be conducted primarily in the bank zone between the average low water and average high water marks, to cover the range in fluctuating water levels. This area of bank, prone to erosion in general, received the most impact during the Chevron cleanup due to the physical abrading of the streambank which loosened soils and rocks. This is also the zone where contaminated vegetation cut and removed. Please see the attached Project Map and accompanying detail drawings.

Rights to perform maintenance in Red Butte Creek are provided via Salt Lake County Utah, Code of Ordinances, Title 17-Flood Control and Water Quality, specifically Chapters 17.04 and 17.08 (attached as supplemental documentation).

Salt Lake County is coordinating with the University of Utah on this project. Salt Lake County will seek approval from the University before performing any work or accessing the land. All administrative and project management duties will be performed by Salt Lake County staff. Once detailed project plans and planting designs have been developed, they will be submitted for review by the University, including its Red Butte Garden. Of note, safety and access issues are a concern. Salt Lake County is proposing to use an experienced contractor for the installation of plant materials.

All contracts for work to be performed on University property are subject to the University's prior written approval, not to be unreasonably withheld. On timing of the plant installations, late November to early December and/or late March to early April are the target dates. These time periods

correspond with seasonal low flow conditions in the creek and vegetation dormancy, and are therefore ideal both for success of the plantings and for safety.

9. Describe your experience in implementing projects of similar scope and magnitude:

The Salt Lake County Watershed Planning & Restoration Program has designed, installed and managed numerous stream restoration projects throughout the Jordan River watershed. These projects have incorporated a variety of restoration techniques, with a focus on regrading steeply eroding streambanks to recreate more gradual and natural bank angles, better connection with the floodplain, and revegetation with native plants to restore riparian habitat. In addition to structural bank stabilization and instream components (e.g. boulders placed to protect the toe of the bank, rock vanes, etc.), streambank bioengineering techniques have also been used over the years including vegetated soil lifts and live stake plantings. See attached SLCo fact sheets and documentation for more information.

10. Describe how ongoing maintenance of the project will be funded and carried out:

Maintenance inspections are critical to the success of bioengineering restoration projects and are recommended for a minimum of two years after installation. These types of projects are cost effective over the long term when compared with traditional engineered solutions, and as projects that have been properly maintained mature, little to no maintenance should be required. Maintenance tasks will include replanting as needed, weed control, and removal of debris from around plantings, especially after seasonal high flows. Of note, weed control will likely not be a major issue of concern for two reasons: 1) planting live-stakes, by hand, ensures minimal disturbance to streambank soils and the surrounding area, and 2) the stretch of Red Butte Creek identified in this proposal is relatively free of invasive weeds, as observed during a preliminary site inventory in October 2011. Monitoring is another important aspect of bioengineering restoration projects, providing valuable insight into the streambank stabilization process and important information for future projects. Periodic monitoring tasks will include photo monitoring, documentation of vegetation growth and mortality, water quality data collection, and channel capacity and stability measurements.

These tasks will be conducted by County staff. Development of a volunteer monitoring program will also be explored. County staff time estimated to complete the maintenance and monitoring necessary to the long term success of this restoration project has been included in the estimated project costs. Any time needed above and beyond will be funded in part by: 1) the budget designated by the Salt Lake County Council to complete the priority implementation tasks outlined in the Salt Lake Countywide Water Quality Stewardship Plan, and 2) potential future grant awards.

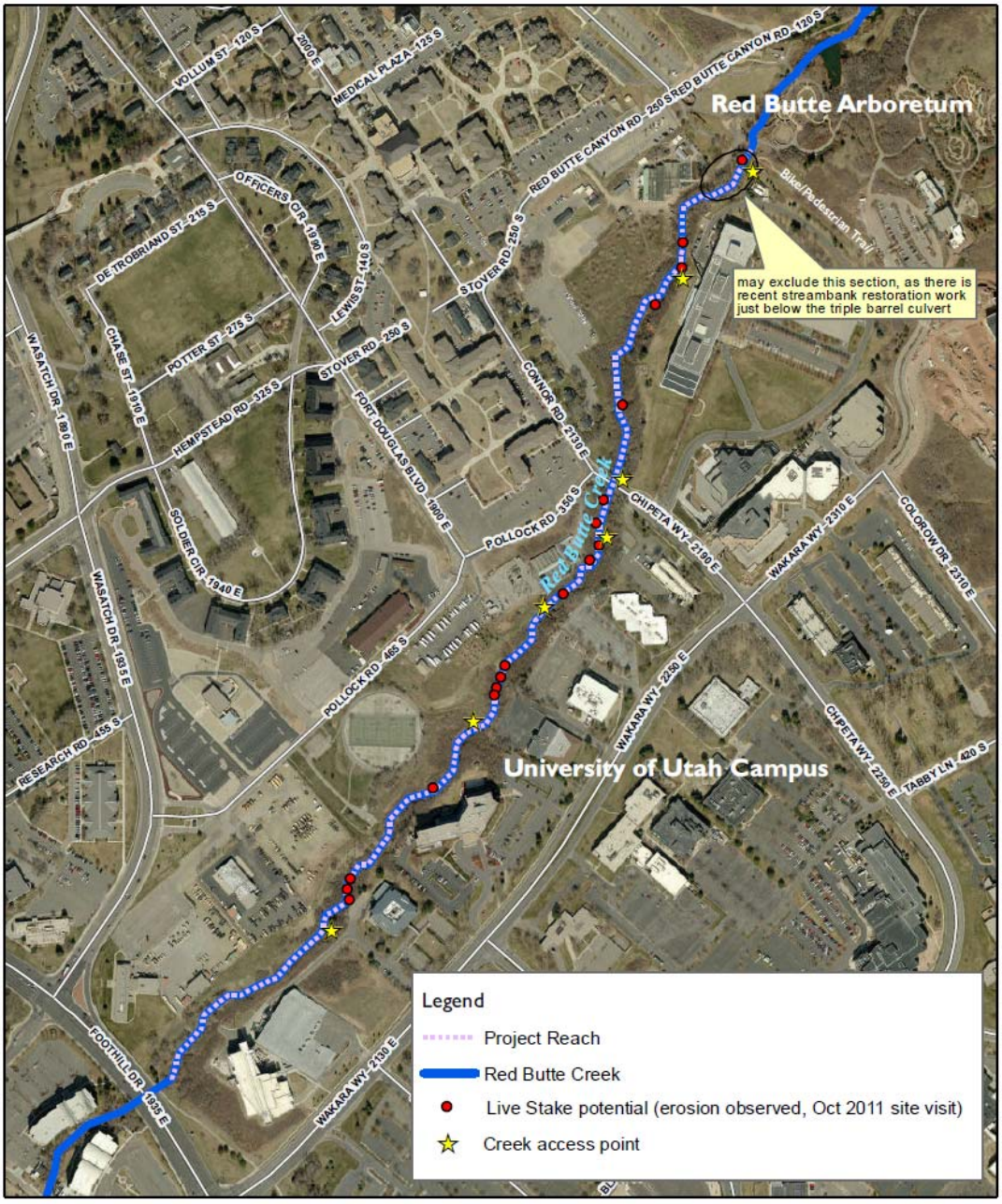
11. List consultants or agency partners that have participated in project development (below):

University of Utah
Salt Lake City, UT 84112

- The Urban Water Research Group
- ~~The Office of Sustainability~~
- ~~Campus Planning~~

Signature _____ Date 13 Dec 2011
Applicant, Salt Lake County

APPROVED AS TO FORM
Salt Lake County District Attorney's Office
By _____
Deputy District Attorney
Date 13 Dec. 2011

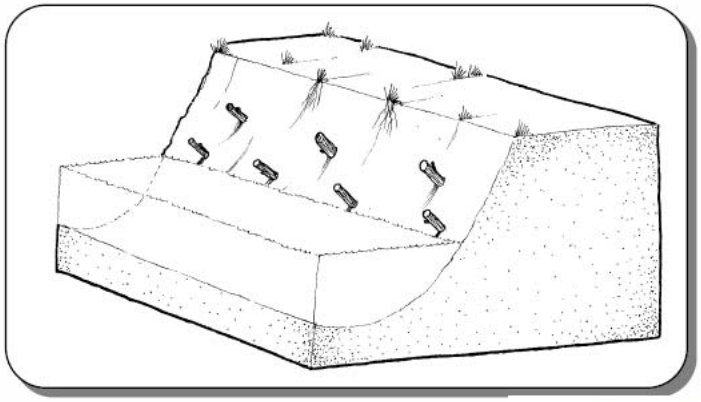


Riparian Restoration on Red Butte Creek: Project Map

Utah Division of Water Quality Request for Proposals

Proposal Submitted December 13, 2011
by Salt Lake County Watershed Planning & Restoration Program

Pole Plantings



Materials:

- willow or cottonwood cuttings
- poly twine
- chain saw or loppers (to harvest)
- auger or planting bar
- 1 person minimum

Description and Use

Pole plantings are cuttings from willow (*Salix* spp.) or cottonwood (*Populus* spp.) used to revegetate eroding streambanks. These cuttings will sprout and take root, stabilizing the streambank with a dense matrix of roots.

How To Install

1. Collect willow or cottonwood cuttings from a local, native stand that is in healthy condition. Thin no more than 2/3 of each total plant. Willow cuttings for pole plantings should generally be at least 1/2 inch in diameter or larger, depending upon the species.

Larger diameter cuttings have a greater supply of stored energy for rooting than smaller diameter cuttings. Bigger diameter and longer lengths are better suited for severely eroded areas and fluctuating water levels.

Ideally, cuttings should be collected during the dormant season to ensure the highest success rate. Cuttings can be collected during the growing season if all the leaves are removed from the stem, although establishment success will be lowered. Spring plantings are generally more successful than fall plantings.

2. Prepare cuttings by trimming off the top to remove the terminal bud, allowing a majority of the energy in the stem to be sent to the lateral buds for rooting and sprouting.

3. The cuttings can be tied into bundles for ease of transportation to the site.

4. Soak the bundles for 5 to 7 days. Cutting length is determined by site conditions. The cutting should extend several inches into the permanent water table to ensure adequate moisture for sprouting. At least 1/2 to 2/3's of the cutting should be below ground to prevent the cutting from being ripped out during high flows. Usually, at least 2 to 3 feet should be below ground. It should also be long enough to emerge above adjacent vegetation such that it will not be shaded out.

5. Pole plantings are usually planted with a power auger or a punch bar. It is critical to ensure the soil is packed around the cutting to prevent air pockets. "Mudding" (filling the hole with water and then adding soil to make a mud slurry) can remove air pockets .

6. It is often advisable to plant at least two rows of cuttings to cover the range in fluctuating water levels. The location of the cuttings will depend on the specific situation and hydrograph. In some cases where information is limited, one row can be planted at the low flow line and the other at the high flow line. Offset the rows to get better coverage (see illustration).

Pole Plantings

Inventory & Planning Considerations

1. Shrub willows such as coyote willow (*Salix exigua*) are used for planting within channel banks. Willow tree species and cottonwoods are normally planted along the upper bank and floodplain areas. Tree species usually provide more shade.

2. If this method is used in a highly erodible area, some protection will be required in front of the pole plantings. In particular, the toe of the slope is very susceptible to erosive flows and scour. Analysis and calculations of forces will provide guidance for suitable toe protection (refer to Chapter 3 of the Streambank Bioengineering Guide). In some cases, brush revetment or fiber rolls may be adequate (see other Technique Sheets), while other situations may require rock. If rock is used, careful application is required. Improperly placed rock can result in erosion problems on the opposite streambank as well as downstream.

3. As with all techniques, give careful attention to the upstream and downstream ends of the treatment area to prevent flows from getting behind the treatment. The key is to divert flows away from these endpoints. Tying into existing on site features such as trees, rocks, etc., or using brush revetment and rock barbs are some possible solutions.

4. It is important that the cuttings be placed in water immediately following harvesting if they are going to be planted during the next week. The cuttings can also be kept in cold storage (32 to 35° F) for up to 6 months. After removal from cold storage, soak the cuttings for 5 to 7 days prior to planting.

5. Rooting hormones and fertilizers do not significantly improved success compared to the cost of the materials.

6. Cuttings will often require initial protection from beaver. Fine wire screen or mesh can be secured around the cuttings to offer protection.

7. Never disturb the site unnecessarily. Remember the goal is to stabilize a site. The less it is disturbed, the easier it will be to restore.

Management

To ensure the highest success for the treated area, determine the land management practices that created the eroded streambanks and modify those practices as necessary.

If the area is grazed, restrict livestock from treated areas to allow the eroded section of streambank to heal. Exclosure fences are the most efficient means to accomplish this goal. Managers should resist the temptation to put the exclosure fences at the high water line. The exclosure areas should include enough of the riparian zone to allow the stream to shift naturally over time.

If the area is farmed, a riparian buffer strip should be established and maintained. A buffer strip on both sides of the stream should be set aside to allow for natural riparian vegetation and stream function. A wider buffer strip is strongly encouraged and will yield greater benefits.

Check with your local NRCS district conservationist for cost-share programs and volunteers for fencing, planting, and other restoration activities.

Finally, a stream is an interconnected system. Land use practices both upstream and downstream will affect the success of your bioengineering work. Talk with your neighbors and work together to create a healthier riparian and stream system that can benefit everyone.

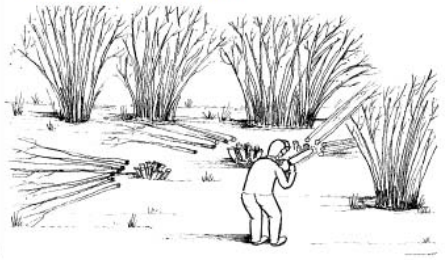
Monitoring & Maintenance

Do not ignore the project after it has been installed. Periodic monitoring of the project will provide valuable insight into the stabilization process and may offer important information for future projects.

Replanting will probably be necessary to fill in areas where plantings did not grow. It is not uncommon to have some cuttings die due to highly variable water flows from year to year or from wildlife predation. Flood debris lodged around the cuttings should be removed to prevent shading and to allow growth.

Procedure for Pole Plantings

Pole cuttings can be collected from large willows and cottonwoods.



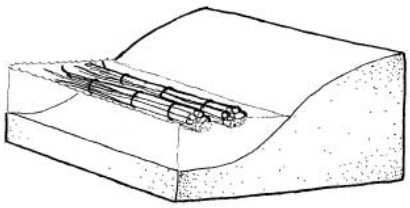
Step One: Harvest Willow Cuttings

Trim off all side and terminal branches

Tie cuttings into 8-12" diameter bundles using 2 pieces of twine to facilitate transportation.

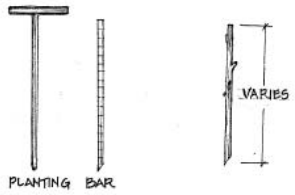
Step Two: Create Willow Bundles

Soak bundles for 5 to 7 days. Remove them from water before roots emerge.



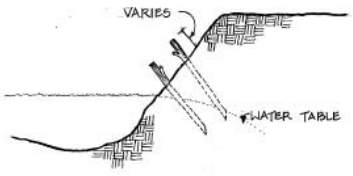
Step Three: Soak Willow Bundles

Final cutting length will vary (See "How to Install"). Punch bars or augers can be used for creating the holes.



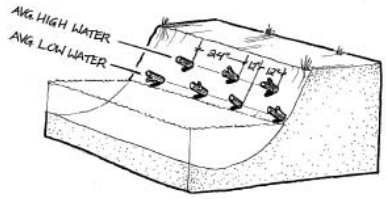
Step Four: Planting Preparation

Plant the pole such that the end of the cuttings extends into the water table. Above ground height varies (See "How to Install").



Step Five: Pole Planting

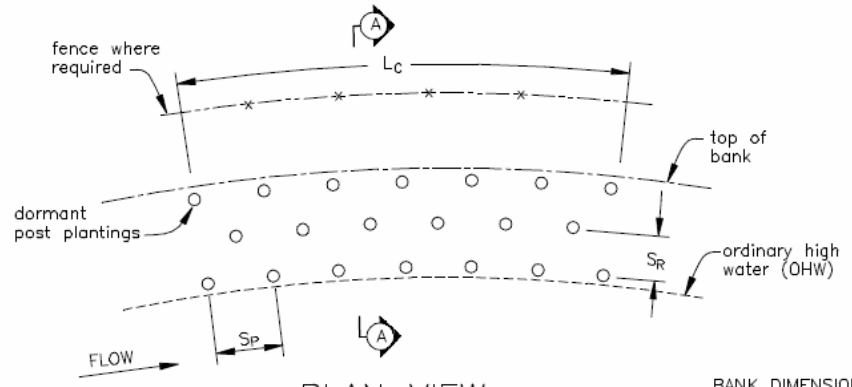
The following is a good spacing pattern to cover the variables of a fluctuating water level.



Step Six: Pole Placement

INTERAGENCY RIPARIAN/WETLAND PROJECT USDA-NRCS Plant Materials Center Aberdeen, ID 83210

WASHINGTON STANDARD DRAWING	BIOENGINEERING BANK PROTECTION DORMANT POST PLANTING	STANDARD DRAWING NO. BIO–0030 APPROVED BY: LAJ DRAWN BY: KLY ISSUE DATE: 2/99



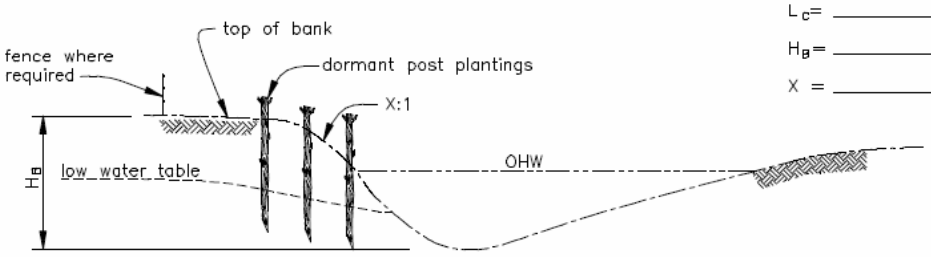
PLAN VIEW

BANK DIMENSIONS

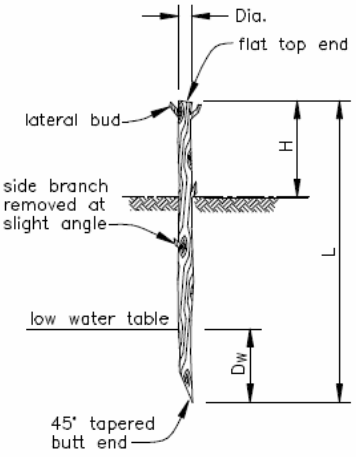
L_C= _____(ft)

H_B= _____(ft)

X = _____



SECTION Ⓐ



All lateral branches shall be trimmed to avoid damage.

A minimum of two lateral buds shall be above the planting depth.

PLANT DIMENSIONS

Species _____

Dia. = _____min (in)_____max (in)

D_W = _____min (in)_____max (in)

H = _____min (in)_____max (in)

L = _____min (ft)_____max (ft)

S_R (row spacing) = _____(ft)

S_P (plant spacing) = _____(ft)

Number of rows = _____

PLANT DETAIL

Drawing not to scale. Standardized drawing must be adapted to the specific site.

	JOB CLASS	Date
	CAD FILE NO. BIO–0030.DWG	Designed _____ _____
	SHEET OF	Drawn _____ _____
		Checked _____ _____
U.S.D.A. NATURAL RESOURCES CONSERVATION SERVICE		Approved _____ _____

SALT LAKE COUNTY, UTAH

Code of Ordinances

MUNICIPAL CODE
County of
SALT LAKE, UTAH

Codified through
Ordinance No. 1717, passed November 8, 2011.
(Supp. No. 21, UPDATE 2)

TITLE 17 - FLOOD CONTROL AND WATER QUALITY

Chapters:

Chapter 17.04 - ADMINISTRATION

Sections:

17.04.010 - Flood control and water quality division—Created.

There is created within the department of public works of the county a flood control and water quality division, referred to in this title as the "division." The division shall, through the director of public works, assist the county in the discharge of its responsibilities to gather, control and dispose of storm drainage and floodwater and to conserve such water for beneficial and useful purposes, and maintain a water quality management program. The division shall administer all county ordinances pertaining to drainage, flood control and water quality management planning.

(Ord. 1473 (part), 2001: Ord. 817 § 2 (part), 1982: prior code § 7-1-1)

17.04.020 - Flood control and water quality division—Director—Duties.

There is created the office of the director of the division of flood control and water quality. The director shall supervise and control, and be responsible for the satisfactory completion of all duties of the division and of the director, as set forth in this chapter. The engineering division director may be the flood control division director. The division shall:

A. Maintain a twenty-year master plan outlining, in general, long-range requirements for planning, designing, constructing, managing, operating and maintaining facilities in the county for the carrying away and safe disposal of stormwaters and floodwaters and for the preservation and enhancement of water quality;

B. Maintain a six-year capital improvements plan outlining financial needs, scheduling of construction and management programs which will implement the twenty-year master plan. The plan and the twenty-year master plan shall be submitted by the director of public works through the mayor on or before August 15th of each year for review, correction and adoption by the county council for funding;

C. Prepare and submit to the director of public works and the mayor on or before September 15th of each year an annual element of the capital improvement plan outlining, by proposed budget line items, work activities and expenditure of funds required to complete the current annual element of the approved capital improvement plan;

D. On or before January 1st of each year prepare a management plan, outlining by project and program, management agency responsibilities, schedules and proposed interlocal agreements and contracts necessary to carry out the budget for the current year and administer all county ordinances pertaining to flood control and water quality;

E. Provide to all municipal governments an annually updated map and list of flood control facilities maintained in each city and that portion of the annual management plan which relates to the activities of the division to be carried out in the respective city;

F. Provide for ongoing maintenance program and direct the cleaning and maintenance of natural channels, ditches, open drains and stormdrains which are included in the storm drainage and flood control system. Work in open channels and creeks where fisheries exist shall be limited to that necessary to remove immediate threats of flooding and existing rights shall be protected as specified in Section 17.08.050 in this title;

G. Pursue action before the Utah Legislature, in cooperation with other affected agencies, required to achieve effective water quality management or for effective flood control management as directed by the mayor;

H. Attend, at the request of the mayor, meetings or conferences dealing with water quality management or with the gathering, control and disposal of stormwater and floodwater within the county;

I. Determine the type and amount of storm drainage and flood control works which are needed within the county, and establish comprehensive sets of plans and specifications for the works and have such plans and specifications readily available for public inspection;

J. Arrange for public hearings regarding the installation of pipelines or other storm drainage facilities and such hearings as are required for administration of the Water Quality Management Plan;

K. Coordinate policies and water quality management plan implementation with other area-wide water quality programs, air quality programs, solid waste disposal planning, etc., which are the responsibility of the Salt Lake Valley health department;

L. Seek and obtain loans and grants for comprehensive water quality management planning by designated agencies and administer the same on behalf of the county in conjunction with designated management agencies;

M. Upon request, assist the mayor and all local agencies concerned with flood control, storm drainage, and water quality in communicating with state and federal government agencies;

N. Upon request, provide assistance to local entities in preparing and processing grant applications for flood control, storm drainage and water quality improvement projects;

O. Sponsor research and/or supervise contract research and development, in cooperation with appropriate management agencies, to develop best management practices (BMP's) in nonpoint source pollution control;

P. Assist management agencies in evaluating and improving water quality monitoring, testing and permit compliance activities;

Q.

Continually review new research in water quality which may be conducted by universities, industries or government/nonprofit agencies, and assure the availability of new information or developments to local agencies and organizations;

R. Conduct other activities and perform such other duties as directed by the mayor;

S. Establish criteria, engineering and otherwise, whereby applicants for building permits may be aware of, and plan for, the drainage requirements which must be met as a condition to receiving the division's approval for such permit.

(Ord. 1473 (part), 2001: Ord. 817 § 2 (part), 1982: prior code § 7-1-2)

17.04.030 - Flood control and water quality division—Staff.

The director of the division shall recommend the employees and staff necessary to discharge the duties of the division. The number of employees and their respective salaries and qualifications shall be established each year as part of the budget process in conformance with the merit system and personnel policies of the county.

(Ord. 817 § 2 (part), 1982: prior code § 7-1-3)

17.04.040 - Planning and development services division—Responsibilities.

The planning and development services division shall be responsible for the administration of drainage requirements for new development in the unincorporated territory of the county, including the collection and disposition of drainage fees and bonding. This section shall supersede any provisions in Sections 17.04.010 through 17.04.030 and Chapters 17.08 through 17.32 of this title placing such responsibilities with the flood control division.

(Ord. 1473 (part), 2001: Ord. 878 § 1, 1983: prior code § 7-9-1)

Chapter 17.08 - FLOOD CONTROL FACILITIES

Sections:

17.08.010 - Definitions.

As used in this chapter:

"Governmental entity" means the state and its political subdivisions.

"Political subdivisions" means any county, city, town, school district, public transit district, redevelopment agency, special improvement or taxing district, or any other political subdivision or public corporation.

"State of Utah" means the state of Utah or any office, department, agency, authority, commission, board, institution, hospital, college, university or other instrumentality thereof.

(Ord. 827 § 2. 1982: Ord. 817 § 2 (part). 1982: prior code § 7-2-1 (part))

17.08.020 - Permit—Required.

It is unlawful for any person, firm, corporation or governmental entity to interfere with, cause damage to, destroy or use for any purposes any flood control, storm drainage, water quality control, or water conservation structure, facility, appurtenance, or any other property owned, constructed, maintained or controlled by or on behalf of the county, as identified in Section 17.08.040 of this chapter, without having first received a written permit from the division. The division may impose such terms and conditions as may be necessary to provide for the carrying away and the safe disposal of natural stormwaters and floodwaters, and to prevent the destruction or obstruction of any such structure, facility, appurtenance, etc., and to insure the proper maintenance and restoration of any such structure, facility, appurtenance or property. Application for use of such structures, facilities, appurtenances or property shall be made to the director of the division and shall set forth the particular use desired and the purpose and duration of use. Permits shall be revocable when, in the discretion of the director of the division, the public interest and welfare so requires.

(Ord. 817 § 2 (part). 1982: prior code § 7-2-1 (part))

17.08.030 - Exemptions.

The provisions of the above section shall not apply to any entry or use in the course of duty by any peace or police officer or by a duly authorized employee of the county.

(Ord. 817 § 2 (part). 1982: prior code § 7-2-2)

17.08.040 - Specific facilities.

A. The following facilities, wherever located in the county, including open channel sections and sections in conduit, are declared to be part of the storm drainage and flood control system and are subject to the provisions of this chapter relating to such facilities:

1. The Jordan River;
2. City Creek;
3. Red Butte Creek;
4. Emigration Creek;
5. Parley's Canyon Creek;
6. Mountain Dell Canyon Creek;
7. Lamb's Canyon Creek;
8. Mill Creek;
9. Neff's Creek;
10. Big Cottonwood Creek;
11. Little Cottonwood Creek;
12. Dry Creek from Bell's Canyon Reservoir to Jordan River;

13. Big Willow Creek;
14. Little Willow Creek;
15. Corner Creek;
16. Beef Hollow Creek Downstream from Camp Williams Boundary;
17. Wood Hollow Creek Downstream from Camp Williams Boundary;
18. Rose Creek;
19. Butterfield Creek;
20. Copper Creek;
21. Midas Creek;
22. Bingham Creek;
23. Barney's Creek;
24. Harker's Canyon Creek;
25. Coon Canyon Creek;
26. Utah Lake Distributing Company Canal;
27. Utah and Salt Lake Canal;
28. South Jordan Canal;
29. North Jordan Canal;
30. Kennecott Canal;
31. Riter Canal;
32. Kersey Creek;
33. C-7 Ditch;
34. Lee Creek;
35. 8000 West Drain—Utah and Salt Lake Canal to C-7 Ditch;
36. Kearns-Chesterfield Drain—Utah and Salt Lake Canal to Jordan River including Decker Lake;
37. Lee Drain—Lee Drain Pump Station to Lee Creek;
38. Goggin Drain Surplus Canal to Great Salt Lake;
39. Surplus Canal;
40. 2700 West Drain—North Jordan Canal to I-215 Drain;
41. I-215 Drain—4700 South to 4100 South and 2700 West Drain to Decker Lake;
42. 4100 South Drain—3200 West to Jordan River;
43. 4700 South Drains—South Jordan Canal to I-215 Drain and North Jordan Canal to Jordan River;
44. 3200 West Drain—4700 South to 4100 South;
45. 5400 South Drain—Utah and Salt Lake Canal to Jordan River;
46. City Drain, West Branch from CWA 2 Drain to Sewage Canal;
47. Sewage Canal from City Drain to Great Salt Lake;
48. CWA 2 Drain from CWA 1 Drain to West Branch City Drain;
49. CWA 3 Drain from Brighton Canal Extension to CWA 2 Drain;
50. CWA 1 Drain from Roper Yard to CWA 2 Drain;
51. 4th Avenue Drain—Virginia Street to City Creek;
52. 8th South Drain—East High School Detention Basin to Jordan River;
53. 7200 South Drain—East Jordan Canal to Jordan River;
54. 9000 South Drain—Sandy Irrigation Canal to Jordan River;
55. The Upper Canal;
56. Salt Lake City Canal to Red Butte Creek;
57. East Jordan Canal;
58. East Jordan Canal Extension;
59. Union Jordan North and South Ditches from Little Cottonwood Creek to Jordan River;
60. 2700 South Storm Drain—Nibley Park Outfall to Mill Creek.

B. If not owned by the county, the rights of the county in and to canals and stormdrains specified above are limited to those included in specific agreements for their use with the owners of such facilities.

C. The provisions of this chapter shall also apply to the following classes of facilities:
   1. All collection stormdrains and subsurface collection systems installed in dedicated easements and other easements in which the county has a legal interest, and located in the unincorporated county area;
   2. All collection stormdrains and subsurface collection systems installed in dedicated easements and located in the incorporated areas of the county through contracts and agreements specifically outlining duties and responsibilities of the city and county on each facility.

(Ord. 1478 § 2. 2001: Ord. 1433 § 2. 1998; Ord. 918 § 1. 1985; Ord. 817 § 2 (part). 1982: prior code § 7-2-5)

17.08.050 - Existing use—Permit not required.

No permit shall be required for any existing use of natural channels within the county for such beneficial purposes as are approved by the Office of the State Engineer for the state; nor shall it affect any water rights established by the State Engineer or by any court of competent jurisdiction. No provision contained in this title shall be construed to interfere with or permit the regulation, allocation or reallocation of water rights or water right use or of any culinary water collection or distribution system or waters and facilities used in connection therewith.

(Ord. 817 § 2 (part). 1982: prior code § 7-2-6)

17.08.060 - Performance bond required.

The division may require a performance bond to assure proper and timely completion of work authorized under a permit issued pursuant to Section 17.08.020, or to assure timely completion of improvements required under Section 17.08.080.

(Ord. 817 § 2 (part), 1982: prior code § 7-2-7)

17.08.070 - Control by the county.

Any and all projects which involve the drainage of stormwaters and floodwaters or which affect the quality of water which flows through all natural channels to be performed on any such projects, either existing or to be completed subsequent to the effective date of the ordinance codified in this title, shall be under the control and discretion of the mayor, and shall be subject to approval by the county council during its annual review of the budget of the flood control and water quality management program as prepared by the division.

(Ord. 1473 (part), 2001: Ord. 817 § 2 (part), 1982: prior code § 7-2-8)

17.08.080 - Review of development plans.

All plans for public and private development that will alter the natural flow of surfacewater upon the lands involved in the development shall be submitted to the division for review and approval prior to the commencement of work thereon. Plans for a development which will drain into a flood control or storm drainage facility maintained by a city shall be the responsibility of that city and submission of the plans to the division shall not be required. The city shall review such plans to assure compliance with those provisions of Section 17.08.020 applicable to city facilities which connect to those facilities identified in Section 17.08.040 of this chapter. The division may require the design of erosion and sediment control or other measures to protect the capacity of any flood control or storm drainage facilities or the quality of the water flowing through any part of the flood control and storm drainage system as defined in Section 17.08.040. "Water quality" or "quality of water," whenever used in this section, refers to and incorporates those definitions and standards which are set forth in the county's then-current water quality management plan, as established by the division.

(Ord. 817 § 2 (part), 1982: prior code § 7-2-3)

17.08.090 - Replacement and new bridges and culverts—Design criteria.

A. Replacement and new bridges or culverts on the natural tributaries and open man-made channels, except irrigation canals, listed in Section 17.08.040, shall be sized for a frequency based on consideration of the benefits and costs derived from the improvements. As a minimum all such bridges and culverts shall be designed to pass the greater of the one percent annual chance flood discharge or the stormwater master plan design flow, where a master plan for the flood control facility has been adopted by the director of the division of flood control and engineering, unless the division director shall deem such level of protection unwarranted. In addition to the design flow, consideration shall be given to the freeboard necessary to pass debris and accommodate bed load and bulking.

B. The phrase "one percent annual chance flood" means the flood event having a one percent chance of being equaled or exceeded in any given year. The one percent chance flood is also referred to as the "base flood" or "100-year flood".

C. The phrase "master plan design flow" means the flow amount set by a regional or local storm drainage master plan study conducted by a registered profession engineer.

(Ord. No. 1702, § II, 5-3-2011; Ord. 921, § 1, 1985; prior code § 7-2-9)

17.08.100 - Obstruction of or damage to facilities prohibited.

It is unlawful for any person, firm or corporation, or governmental entity to place or cause to be placed in the channel or drain or within or upon any flood control channel, reservoir, detention basin, debris basin, spreading ground or other property over which the county has an interest, matter of any kind that may operate to impede, retard or change the normal direction of the flow of floodwaters, stormwaters, or other waters, or that may catch or collect debris carried by such waters, or that may be carried downstream by such waters to the damage and detriment of adjacent private or public property, or that may degrade the quality of the water, without first obtaining a written permit for such placement from the director of the division.

(Ord. 827 § 3, 1982: Ord. 817 § 2 (part), 1982: prior code § 7-2-4)

Riverbend Restoration Project
13000 South Jordan River

Project by:
Salt Lake County Engineering Division

Funded by:
Salt Lake County in cooperation with
Region VIII EPA
Kennecott Utah Copper

Total Cost: $364,552
Completed 2002

Before and after construction

An emergent bench was constructed along a half-mile-long actively eroding section of Jordan River. Features included site graded to within1' of seasonal high water, rock toe protection, one layer COIR (coconut fiber geotextile) fabric and over $80,000 in native trees, shrubs and hydroseeding. Funding for the site also included $40,000 in mitigation funds from Kennecott Utah Copper Corporation. A two-year temporary drip irrigation system helped with establishment during continued drought years. However, beaver damage to trees necessitated increases in protection measures for this site and specifications for future projects.

Before and after construction

COIR Fabric Revetment Demonstration Project near James Madison Park, 3600 S. Jordan River

Project by
Salt Lake County Engineering Division

Funded by:
Salt Lake County
in cooperation with Region VIII EPA and
Salt Lake County Economic Development

Total Cost: $40,000
Completed 1998

The existing 12-foot-high eroding vertical wall on the outside bank of the riverbend, approximately 450 linear feet long, was re-graded to a 3:1 slope (lower left). Toe protection of compacted 2'X5' rock toe and willow cuttings were installed. A total of eight terraces of COIR fabric (bio-degradable textile of coconut shell fibers) were installed (lower right photo shows six in place). The first layer was held in place by stakes and plywood forms, ground-stapled in place and backfilled with soil with a track hoe. After backfill compaction, the terrace was seeded and fabric is pulled back over the revetment and secured with ground staples in preparation for the next terrace. A final seeding and mulching completed the project. The bottom photo shows the site in early May 2004. The revetment is well vegetated with a stable shoreline.

SALT LAKE COUNTY

Midvale Slag/Bingham Junction
Technical Advisory Group (TAG) Meeting *February 3, 2010*

Walden Park Restoration Project
5400 to 5600 South Jordan River

Project by:
Salt Lake County
Murray City

Funded by:
Salt Lake County
Utah Transit Authority
Murray City

Total Cost: $200,000
Completed 2009

This was a cooperative project involving Murray City, Utah Transit Authority (UTA), and Salt Lake County to repair and enhance the steep and poorly vegetated banks along the Jordan River (upper photo). This project utilized the "emergent bench" concept. An emergent bench (left photo) was graded to an elevation within 12" of spring high water to support establishment of native riparian and wetland vegetation and creates floodwater storage. The banks were then revegetated with native shrubs, grasses and trees. As of May 2009, vegetation was well established and banks are stable (lower photo).

Jordan River Commission
195 North 1950 West, P.O. Box 144870
Salt Lake City, Utah 84114
801.536.4158
www.jordanrivercommission.org

December 13, 2011

Ms. Hilary Arens
Division of Water Quality
PO Box 144870
Salt Lake City, UT 84114

Re: Red Butte Creek Request for Proposals

Dear Hilary,

The riparian ecosystem of Red Butte Creek sustained serious damage as a result of the crude oil releases in 2010—whether from direct contact with toxic substances, or as a result of the cleanup activities performed by and on behalf of Chevron.

The Jordan River Commission supports the proposal made by the Salt Lake County Watershed Planning & Restoration Program to replace riparian vegetation that was killed and/or destroyed, with the goal of stabilizing streambanks that were degraded during the cleanup, enhancing riparian habitat, protecting water quality, and helping to reduce instream flow velocities. In particular, we are pleased that Watershed Planning is proposing a bioengineering restoration project that will provide maximum revegetation potential with minimal disturbance to the ecosystem.

The Salt Lake County Watershed Planning & Restoration Program has a history of watershed stewardship spanning a diversity of projects that include: streambank restoration at over 20 sites on the Jordan River and its tributaries; development and implementation of the 2009 Salt Lake Countywide Water Quality Stewardship Plan (WaQSP); outreach and education efforts in local communities throughout the county; hosting the annual Salt Lake Countywide Watershed Symposium; and coordination of Jordan River Watershed Council activities. Importantly, this project is consistent with recommendations made by the WaQSP, which has identified the "continuation of stream restoration, enhancement and maintenance efforts" throughout Salt Lake County as one of its 15 priority implementation tasks.

Please consider granting the funding for this Riparian Restoration Project on Red Butte Creek. If you have any questions regarding my organization's support of this project, please feel free to contact me at: 801-589-8479, or lahanson@utah.gov.

Sincerely,

Councilman Corey Rushton
West Valley City Council
Jordan River Commission Chair

Laura Hanson, AICP
Executive Director

OFFICE OF SUSTAINABILITY
THE UNIVERSITY OF UTAH

December 13, 2011

Ms. Hilary Arens
Division of Water Quality
PO Box 144870
Salt Lake City, UT 84114

Re: Red Butte Creek Request for Proposals

Dear Hilary,

The riparian ecosystem of Red Butte Creek sustained serious damage as a result of the crude oil releases in 2010—whether from direct contact with toxic substances, or as a result of the cleanup activities performed by and on behalf of Chevron.

The Office of Sustainability supports the proposal made by the Salt Lake County Watershed Planning & Restoration Program to replace riparian vegetation that was killed and/or destroyed, with the goal of stabilizing streambanks that were degraded during the cleanup, enhancing riparian habitat, protecting water quality, and helping to reduce instream flow velocities. In particular, we are pleased that Watershed Planning is proposing a bioengineering restoration project that will provide maximum revegetation potential with minimal disturbance to the ecosystem.

The Salt Lake County Watershed Planning & Restoration Program has a history of watershed stewardship spanning a diversity of projects that include: streambank restoration at over 20 sites on the Jordan River and its tributaries; development and implementation of the 2009 Salt Lake Countywide Water Quality Stewardship Plan (WaQSP); outreach and education efforts in local communities throughout the county; hosting the annual Salt Lake Countywide Watershed Symposium; and coordination of Jordan River Watershed Council activities. Importantly, this project is consistent with recommendations made by the WaQSP, which has identified the "continuation of stream restoration, enhancement and maintenance efforts" throughout Salt Lake County as one of its 15 priority implementation tasks.

Please consider granting the funding for this Riparian Restoration Project on Red Butte Creek. If you have any questions regarding my organization's support of this project, please feel free to contact me at: ashley.patterson@sustainability.utah.edu.

Sincerely,

Ashley J. Patterson

Ashley Patterson
Outreach & Education Coordinator
Office of Sustainability
University of Utah

THE UNIVERSITY OF UTAH
Department of Civil & Environmental Engineering
110 South Central Campus Drive, Suite 2000 Salt Lake City, Utah 84112 (801)581-6931

December 13, 2011

Ms. Hilary Arens
Division of Water Quality
PO Box 144870
Salt Lake City, UT 84114

Re: Red Butte Creek Request for Proposals

Dear Hilary,

Red Butte Creek is an important urban water resource in the Salt Lake Valley. The riparian ecosystem of the Creek sustained damage from multiple oil releases in 2010. The impacts were direct from contact with harmful substances as well as indirect during the clean-up activities completed by Chevron and its contractors. There is not only a need to improve the ecosystem, but also a serendipitous opportunity to take advantage of the improvement activities for long-term research, education, and outreach purposes.

The Urban Water Research Group at the University of Utah enthusiastically expresses our support for the proposal made by the Salt Lake County Watershed Planning & Restoration Program to replace riparian vegetation that was killed and/or destroyed, with the goal of stabilizing streambanks that were degraded during the cleanup, enhancing riparian habitat, protecting water quality, and helping to reduce instream flow velocities. In particular, we are pleased that Watershed Planning is proposing a bioengineering restoration project that will provide maximum revegetation potential with minimal disturbance to the ecosystem. We see this as an opportunity for our Urban Water Research Group to collaborate on the project in research, education, and outreach activities.

The Salt Lake County Watershed Planning & Restoration Program has a history of watershed stewardship spanning a diversity of projects that include: streambank restoration at over 20 sites on the Jordan River and its tributaries; development and implementation of the 2009 Salt Lake Countywide Water Quality Stewardship Plan (WaQSP); outreach and education efforts in local communities throughout the county; hosting the annual Salt Lake Countywide Watershed Symposium; and coordination of Jordan River Watershed Council activities. Importantly, this project is consistent with recommendations made by the WaQSP, which has identified the "continuation of stream restoration, enhancement and maintenance efforts" throughout Salt Lake County as one of its 15 priority implementation tasks. Moreover, the Program has collaborated on research, education, and outreach activities with the University of Utah

Urban Water Research Group previously providing a platform for collaboration on the proposed project.

Please consider granting the funding for this Riparian Restoration Project on Red Butte Creek. If you have any questions regarding my organization's support of this project, please feel free to contact me.

Sincerely,

Steven J. Burian, PhD, PE
Associate Professor, Department of Civil and Environmental Engineering
Urban Water Research Group
Co-Director, Sustainability Curriculum Development
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