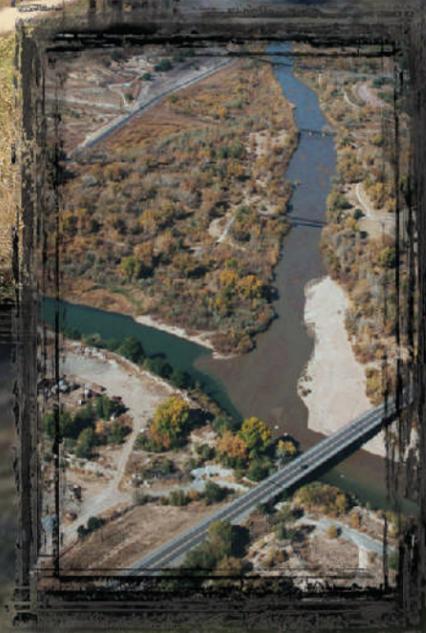


# The Fountain Creek Corridor Restoration Master Plan

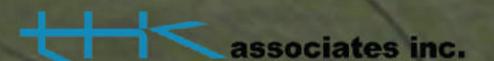
October 18, 2011



Lower Arkansas Valley Serving Best, Cheaper, Closer, Prouder and Poshly  
WATER CONSERVANCY DISTRICT



Prepared By:



2953 South Peoria Street, Ste 101  
Aurora, Colorado 80014  
303-770-7201 FAX 770-7132



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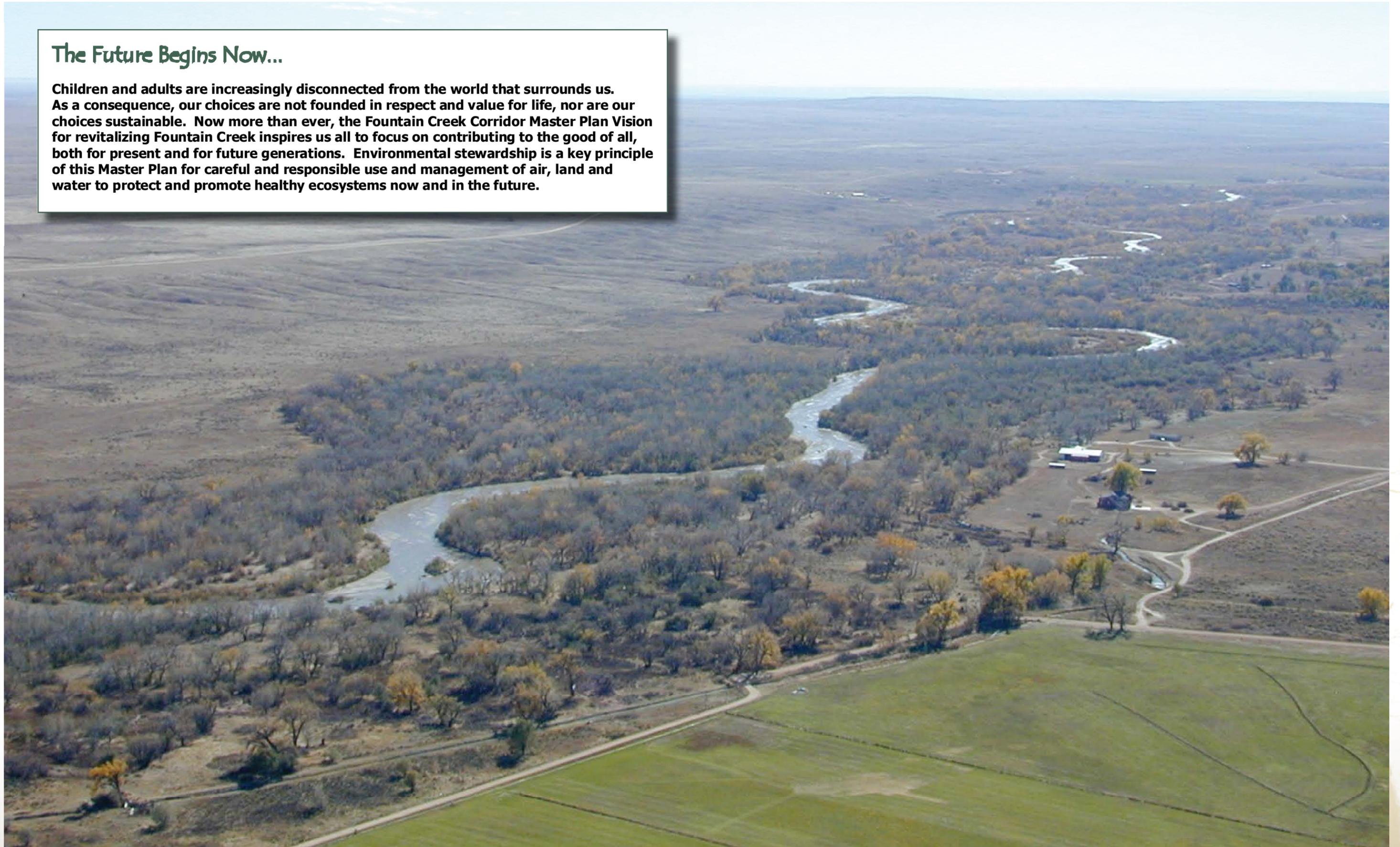
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## The Future Begins Now...

**Children and adults are increasingly disconnected from the world that surrounds us. As a consequence, our choices are not founded in respect and value for life, nor are our choices sustainable. Now more than ever, the Fountain Creek Corridor Master Plan Vision for revitalizing Fountain Creek inspires us all to focus on contributing to the good of all, both for present and for future generations. Environmental stewardship is a key principle of this Master Plan for careful and responsible use and management of air, land and water to protect and promote healthy ecosystems now and in the future.**





- and side detention areas during flood flows.
  - c. Helping slow flood flows and protecting the wide natural floodplain from further infringement.
2. Naturally filtering runoff and thus improving water quality in the Creek, improving existing wetlands and adding new wetlands in the floodplain.
  3. Establishing performance criteria that can be applied to the design of future sediment removal projects in the Creek, installing a sediment removal system and collector in the levee area of Pueblo as an initial demonstration project.
  4. Stabilizing eroding banks along the Creek that contribute large quantities of sediment downstream.
  5. Narrowing the Creek channel in areas where sediment is deposited so that the sediment can be carried out.
  6. Adding additional sustainable riparian vegetation to help stabilize the Creek.
  7. Through development of new stormwater management and land use regulations, encourage stormwater management standards and techniques to reduce runoff, peak flows and runoff volumes that result from development within the watershed.

When successfully applied, these strategies improve wildlife habitat, protect productive agricultural land and improve recreational opportunities.

## 1.C. Management

### 1. A New District

The Fountain Creek Watershed, Flood Control and Greenway District was established to manage, administer and fund the capital improvements necessary in the Fountain Creek Watershed and the Fountain Creek Watershed Management Area. See Figure 1.2. Specifically, the District was formed to:

- a. Prevent and mitigate flooding, sedimentation and erosion
- b. Improve water quality and otherwise address water quality and water quantity issues
- c. Improve stormwater management
- d. Develop public recreational opportunities including parks, trails and open space
- e. Improve wildlife and aquatic habitat and restore, enhance, establish and preserve wetlands

The Fountain Creek Corridor Restoration Master Plan is a tool developed for District use to manage and improve the Fountain Creek Corridor.

## 2. District Structure

In 2009, Colorado Senate Bill 09-141 established the Fountain Creek Watershed, Flood Control and Greenway District. The District was created through an amendment to Title 32 of the CRS (Colorado Revised Statutes). The district boundaries include all of El Paso and Pueblo Counties.

Nine (9) directors serve two (2) year terms. The terms are staggered every other year and rotate between four (4) and five (5) board position appointments during a two-year cycle. The directors are comprised of the following:

- a. One Pueblo County Commissioner
- b. One El Paso County Commissioner
- c. One City of Pueblo City Council Member or the Mayor
- d. One City of Colorado Springs Council Member or the Mayor
- e. One City of Fountain City Council Member or the Mayor
- f. One Director appointed by the Pueblo County Board of County Commissioners from Lower Arkansas Valley Water Conservancy District or east of the confluence
- g. One Director representing small EPC municipalities
- h. One Director appointed jointly by the Pueblo City Council and the Pueblo County Board of County Commissioners
- i. One Director, who is also a member of the Citizens Advisory Group, appointed jointly by the El Paso County and Pueblo County Boards of County Commissioners

The board may conduct business given that a quorum is present. A quorum represents the majority of directors in attendance. With the exception of spending and other fiscal policy resolutions, the affirmative vote of a majority of a quorum of the Board of Directors is sufficient to conduct the business of the board. Spending and other fiscal policy resolutions require the affirmative vote of a super-majority of a quorum for adoption.

## 3. Revenue Sources

All legal and available funding sources are available to the district including, but not limited to, mill levies, services fees, special assessments, gifts, grants and donations from public, private and not-for-profit sources. Of the items listed, there are three possible long-

term revenue sources for operating, maintaining and constructing capital improvements:

- a. *Property Tax Mill Levy (Maximum of 5 mills)* – A property tax increase would include all taxable property in El Paso County and Pueblo County. A mill levy increase will require a vote of the registered electorate within both counties.
- b. *Service Charges and Special Fees* – Service charges may be charged to and collected from any owner or occupant of real property within the watershed management area that directly or indirectly is, has been or will be connected with facilities or from which or on which originates or has originated rainfall.
  1. Service charges shall be imposed at rates reasonably calculated to defray only the costs of facilities for which they are imposed that are not defrayed by other district revenues.
  2. Service charges shall be uniform, as deemed practical by the district, throughout the watershed management area for the same type, class and amount of use of facilities or related services.
  3. Service charges may be based or computed. Service charges can only be charged to properties within the watershed management area.

- c. *Improvement Districts and Special Assessments* – Assessments can be levied district wide (El Paso County and Pueblo County) or within smaller public improvement districts. In either event, the area impacted by the assessment would require a vote of the registered electorate within the affected special assessment area.

## 4. Debt Instruments

The district cannot enter into multiple year debt or other long-term financial obligations without a vote of the eligible electors of the district or special assessment area. Upon approval by the eligible electorate, the district can enter into long-term, multiple year debt instruments to carry out its purpose.

## 5. Next Steps

Great work is already underway to develop demonstration projects along the watershed corridor to educate the public, promote the benefits of the district and to persuade voters to approve funding sources and district indebtedness. Obviously, there are many housekeeping and procedural items requiring attention that need to be resolved.

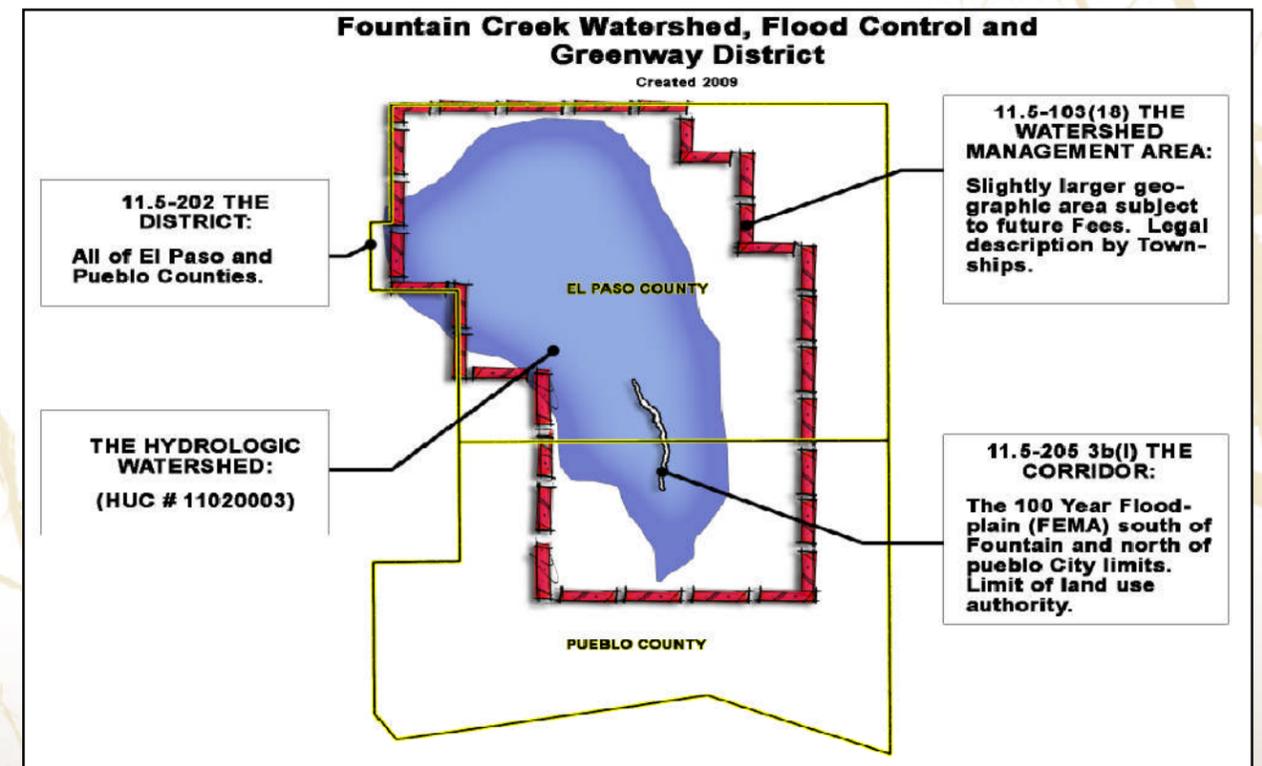


Figure 1.2

As a recommendation of this Master Plan, there are a few overarching tasks that need to commence if the District is to be successful in accomplishing its mission.

- a. Develop a district financial plan that incorporates operating costs, maintenance costs and a capital improvement program.
- b. Based upon the financial plan, identify funding strategies, mill levies, special assessments, etc.
- c. Assess public opinion in El Paso County and Pueblo County related to the district purpose and new taxation.
- d. Develop public education strategies.
- e. Develop political strategies related to election initiatives and timing.

### 1.D. Planning Philosophy

The Master Plan goals establish the starting point and framework for the entire Fountain Creek Corridor Restoration Master Plan. See Figure 1.3 for the basic Master Plan framework development.

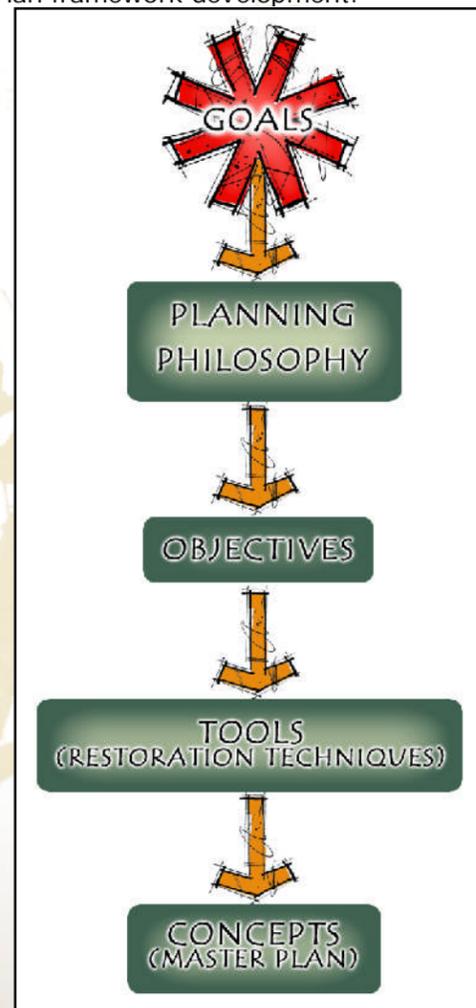


Figure 1.3

The Planning Philosophy for the Master Plan includes providing an overall concept for establishing a relatively stable Fountain Creek that is self-maintaining, cost-effective and sustainable. This approach envisions the Creek as relatively stable with healthy ecosystems requiring minimal resources to maintain them. Achieving this vision requires a balance in **Ecosystem Health, Social and Political Will** to prioritize the Creek and a level of **Funding and Financing** to champion efforts to restore and conserve the Creek. Figure 1.4 diagrams this sustainability vision for Fountain Creek.

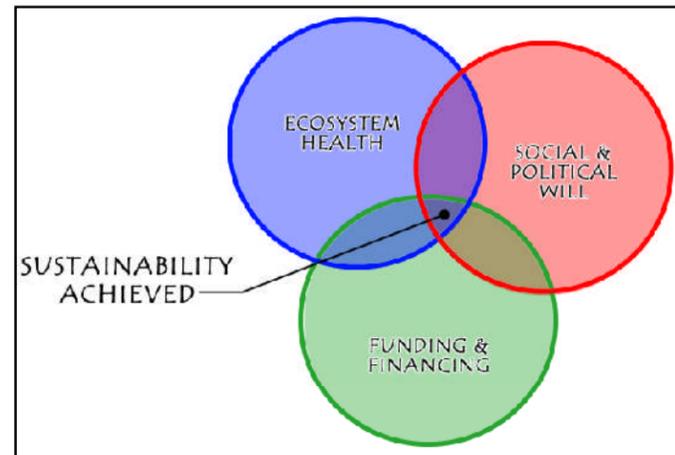


Figure 1.4

Over the last five years, the three elements of sustainability have been initiated for Fountain Creek. The Fountain Creek Vision Task Force established the **Social and Political Will** through the development of the Strategic Plan for the Fountain Creek Watershed in March, 2009 it helped to establish the long-term champion for the Creek with the legislative establishment of the Fountain Creek Watershed, Flood Control and Greenway District.

In 2007, the Lower Arkansas Valley Conservancy District reached an intergovernmental agreement with Colorado Springs Utilities on the **Funding and Financing** elements of the sustainability vision by funding the Fountain Creek Corridor Restoration Master Planning effort. In addition to establishing a restoration vision for the southern most 46 miles of Fountain Creek, this effort initiated 12 demonstration projects that required the establishment of partnerships to fund the projects. This created momentum locally, regionally and nationally to invest money, time and energy in the health of Fountain Creek.

The final of the three elements needed to create the sustainability vision for Fountain Creek is **Ecosystem Health**. The Army Corps of Engineers Fountain Creek Watershed Study provides the most complete

database of existing environmental conditions within the watershed. This watershed-wide study established a list of potential priority projects based on environmental issues identified in the study. The Fountain Creek Corridor Restoration Master Plan continues to build on the work from the Army Corps of Engineers Fountain Creek Watershed Study by identifying and initiating projects on Fountain Creek that improve ecosystem health.

This Master Plan is based on the idea that ecosystem health, along and within Fountain Creek, is based on the following physical characteristics of the Creek including:

- Water quality
- Water quantity and flow
- A level of natural stability

The Creek is constantly seeking a balance of these characteristics. The Master Plan concept proposed by this plan seeks to help the Creek jump start its natural ability to find this balance. See Section 1. E. 1 of this plan for a discussion of the Conservation and Restoration Concept. As this balance is achieved, flora and fauna will thrive. This is very important because according to the U.S.G.S. Northern Prairie Wildlife Research Center, wetlands and riparian areas comprise < 1% of the land area in the western United States, yet they support a tremendous diversity and abundance of wildlife. For example, in Arizona and New Mexico at least 80% of all animals use riparian areas at some stage of their lives. In the interior Columbine River basin 64% of Nontropical migratory land birds depend on riparian vegetation during the breeding season. This habitat may harbor from 2 to 10 times as many individual birds as does adjacent, non-riparian vegetation. (U.S.G.S., 2006 Birds as Indicators of Riparian Vegetation Conditions in the Western United States). Also, in the Journal of Soil and Water Conservation, it was reported that stream and riparian ecosystem areas compose only 0.5% – 1.0% of the overall western landscape, a disproportionately large percentage (70%-80%) of all desert, shrub, grassland plants and animals depend on them. (A.J. Belsky, A. Matzke, S. Uselman, 1999 Survey of Livestock Influences on Stream and Riparian Ecosystems in the Western United States). Finally, although they represent only 0.5% – 1.0% of the surface area of western area lands, riparian zones are critically important to over 75% of terrestrial species. (E. Channey, W. Elmore, W.S. Platts, 1993 Livestock Grazing on Western Riparian Areas).

Therefore, it is important that the Fountain Creek Corridor Restoration Master Plan provide the direction to accomplish the following objectives:

- Improve health and safety
- Improve water quality
- Improve wildlife habitats
- Improve stream bed and bank stability
- Improve fisheries
- Improve general creek health
- Reduce flooding magnitude and incidents
- Reduce sedimentation
- Improve access and visibility

These objectives will be accomplished by first understanding the difference between an unstable and relatively stable Fountain Creek. See Section 1.E.1. for a more detailed discussion of this idea as a part of the Conservation and Restoration Concept. Secondly, this plan recommends a course of action for making unstable portions of the Creek relatively stable. See Section 1.E.2. for a discussion of the tools or restoration techniques to be used. Finally, a Conservation and Restoration Concept is identified for the entire 46 miles of the Fountain Creek Corridor, defined by the study area of the Master Plan. See Section 1.E.3.

### 1.E. The Plan

#### 1.E.1. Conservation and Restoration Concept

The Conservation and Restoration Concept is based on understanding the differences between an unstable and relatively stable Fountain Creek. To make the unstable portions of the Creek relatively stable, the Conservation and Restoration Concept includes both the tools (restoration techniques) and the overall corridor long restoration vision (concept) for the southern most 46 miles of Fountain Creek.

Photographs of both an unstable reach of Fountain Creek and a relatively stable reach of Fountain Creek have been provided to help illustrate the differences. The unstable reach is at the southern end of Clear Spring Ranch and the relatively stable reach is downstream of the unstable reach, roughly at the El Paso and Pueblo County line. See Figure 1.5 and 1.6.

The relatively stable Fountain Creek is a system with resiliency and the ability to adapt to some degree of change as it seeks to find its balance in dimension (cross section), plan form (pattern) and profile or

slope. This balance is affected by water quality, development encroachment and velocities. When in balance, the Creek is more naturally stable, as seen in the photograph. There are no large aggradation or degradation areas, there is a healthy riparian buffer zone, a narrower channel width and the Creek is staying within its natural belt width. Other reasons this section of Creek is relatively stable, include the fact that there are no major human encroachments in the form of infrastructure (utilities or transportation) and land use. All of this results in a healthy ecosystem with flourishing flora and fauna. There is no disconnect either vertically or horizontally from the floodplain allowing flood water to dissipate energy and flood water depth across the natural floodplain.

This is in stark contrast to the unstable reach, which is dramatically out of balance. What is most obvious is the lateral migration of the Creek into the residual terrace, outside of the Creek's natural belt width. This is not natural degradation and it is caused by encroachment on the Creek by infrastructure and land use. The dimension (cross section) of the Creek is dramatically wider than it should be naturally in locations as the Creek tries to seek a balance between energy in the flowing water and work in the form of sediment transport. A number of things are impacting plan form (pattern) causing the Creek to move dramatically. These include both the railroad and automobile bridges and just off the left edge of the photograph, several hundred yards of railroad bed that encroaches on the Creek that has caused a straightening of the Creek. When a Creek is straightened, it becomes shortened in length, increasing the profile or slope of the Creek. This increases velocity and energy causing the Creek to change plan form as it tries to balance work and energy. This unbalanced system has resulted in a very unstable Creek, without healthy riparian buffer zones and a vertical disconnect from the floodplain of almost 20'. This will not allow flood water to enter the floodplain thus increasing flood depth and sheer stress that can cause damage to the corridor. The types of encroachment that can be seen in this photo include:

- Crossings of the Creek that became non-movable hard points
- Land use that removes the riparian buffer zone
- Parallel encroachment of transportation
- Infrastructure that cut off the Creek from the floodplain, increasing flood depth and sheer stress
- Residential encroachment that creates a health and safety issue
- Irrigation diversions that change water quantity and upset the water sediment balance

From this knowledge of what is relatively stable and what is unstable, a series of tools or restoration techniques are proposed to help jump start the Creek's ability to reach a more natural stability. They include:

- Conservation
- Riparian buffer zones
- Maximizing the floodplain
- Side detention
- Wetland filtration basins
- Creek realignment
- Bankfull bench
- Bank sloping
- Revegetation and habitat restoration
- Access and visibility
- Water quality

A more detailed description of the restoration techniques are provided in Section 1.E.2. of this Master Plan. It should be noted that several types of restoration techniques, such as large drop structures and concrete lined channels, are not included as part of the recommendations of this plan. These types of techniques are not recommended because they do not fit within our planning philosophy of self maintaining, cost effective and sustainable. For example, major drop structures of 3 feet in height across Fountain Creek would cost between \$800,000 and \$900,000 for a single structure 200 to 240 feet long.

The Conservation and Restoration Concept for the southern most 46 miles of Fountain Creek reflects the use of the 11 restoration techniques. The restoration vision or concept is illustrated on the maps in Section 1.E.3. of this Master Plan. Future planners and designers need to realize that this concept is based on pattern only, with no consideration given to ownership and land use. On all future projects in addition to pattern, cross section analysis, profile analysis, ownership and land use analysis will need to be included in the design. Not just through the specific project reach but also well above and below the project. All projects should take a systems approach to planning and design. They should be reach based solutions, avoiding site specific or compartmentalized design that only looks at part of the overall system. Every project should, at a minimum include:

- Hydrology
- Hydraulics
- Geomorphology
- Sediment balance
- Vegetation analysis
- Wildlife habitat analysis

- Land use
- Site specific issues
- Water quality

This Master Plan strongly recommends the analysis of a relatively stable reach of Creek to develop existing conditions design criteria for the use as a part of every future project. Remember, the Creek is a system, so for every action there is a subsequent reaction. This fact is easily understood when looking at the unstable photograph in this section. See Figure 1.5. All of man's activities have resulted in subsequent reactions by the Creek and these activities have made the Creek very unstable. As a final point, future planners and designers should never look at band-aid single objective projects. Always remember that the flow of water in Fountain Creek not only includes water but natural sediment and bio-mass.

It is the recommendation of this Plan that the Fountain Creek Watershed, Flood Control and Greenway District develop performance measures for the watershed as a whole. In the interim, design engineers must consider the development of performance criteria on a project by project basis relative to that specific project's impact on the watershed. This performance and criteria should demonstrate and support how the project will comply with the goals and objectives of the Vision Task Force Strategic Plan and the recommendations of the U.S. Army Corps. of Engineers' Fountain Creek Watershed Study.

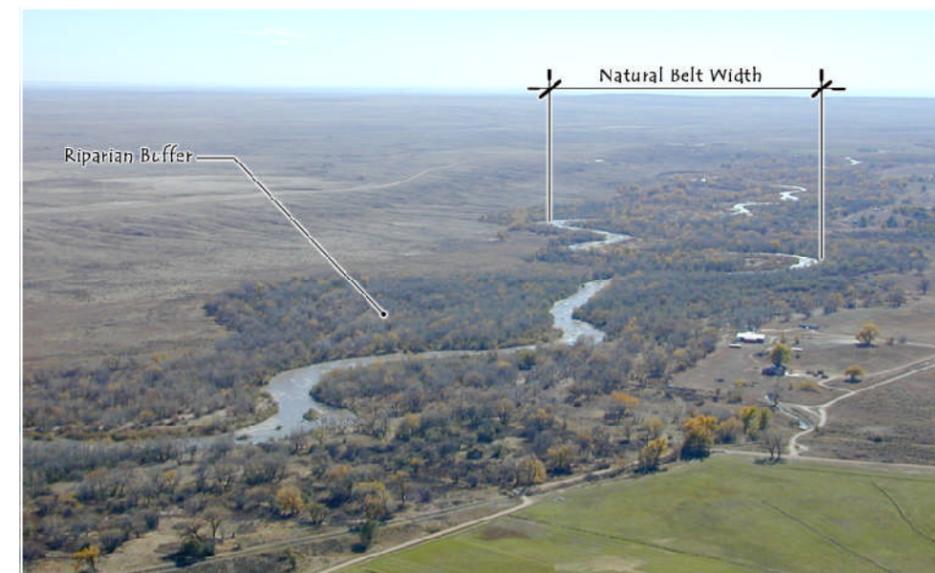


Figure 1.5 - Relatively Stable Reach of Fountain Creek

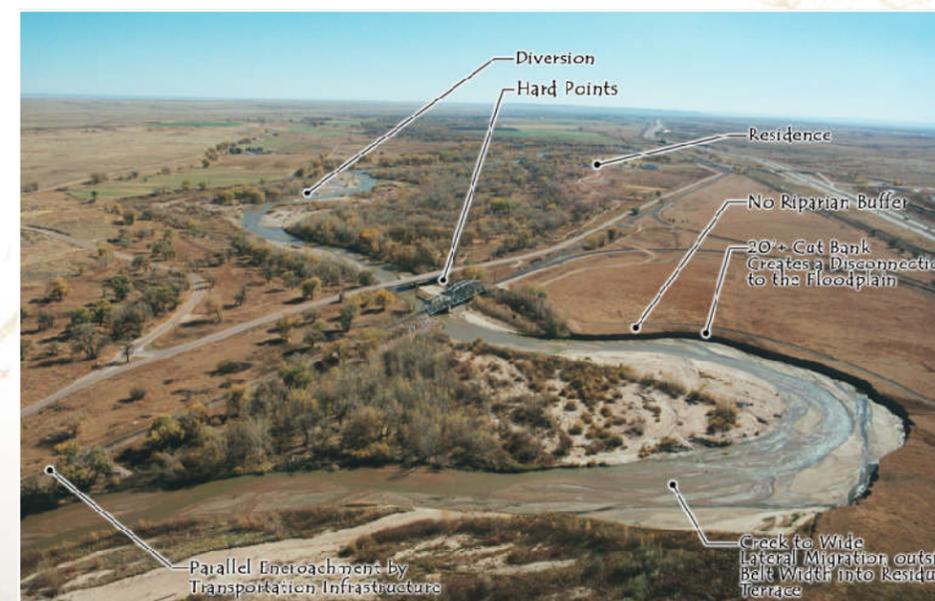


Figure 1.6 - Unstable Reach of Fountain Creek

## 1.E.2. Proposed Conservation and Restoration Techniques

### 1.E.2.a. Conservation

Conservation involves property acquisition with the primary intent being to preserve and protect the floodplain and adjacent lands. This is accomplished through direct property purchases and placing the purchased lands in public ownership to be managed as open space or through the purchase of a conservation easement on private property that mandates management as open space or agricultural use.

As a rule, it can be generally stated that the more property that can be managed as an open space conservation area, the healthier the Creek corridor. Conservation areas allow the natural functions of the Creek to continue uninterrupted by man. Generally, one of the strategies of this Master Plan would be to manage all the 100 year floodplain as a conservation area, allowing no encroachment. See Figure 1.7 to get an understanding of this minimum conservation area.

Areas being managed as conservation areas will:

- Preserve floodplain connectivity
- Preserve agricultural land
- Preserve many existing cultural heritage sites
- Preserve relatively stable, sustainable Creek segments
- Maintain pervious land and the natural infiltration process
- Reduce and slow storm runoff
- Improve water quality
- Improve Creek stability
- Preserve terrestrial and aquatic wildlife habitat
- Provide a buffer between development and the Creek
- Increase recreation and education opportunities (provide a community and regional amenity)

This is the most cost effective strategy for protecting Fountain Creek. This approach should always be considered when working in the Fountain Creek Corridor.

### 1.E.2.b. Riparian Buffer Zones

Riparian buffer zones, when maintained, reduce land use encroachment and fill or structures being located too close to the Creek. Providing riparian buffers are often an option when easement or acquisition of lands

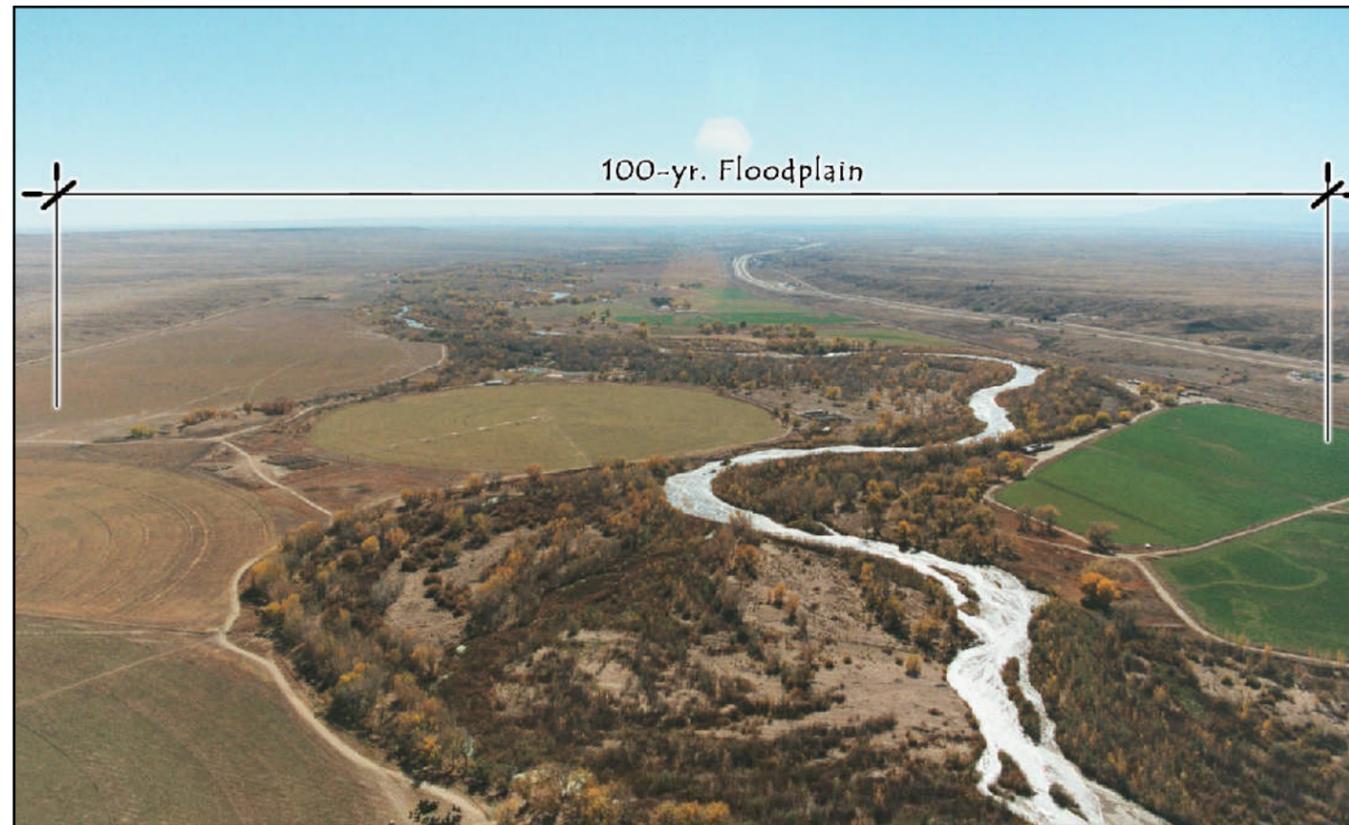


Figure 1.7 - Potential Conservation Areas - 100 Year Floodplain Minimum

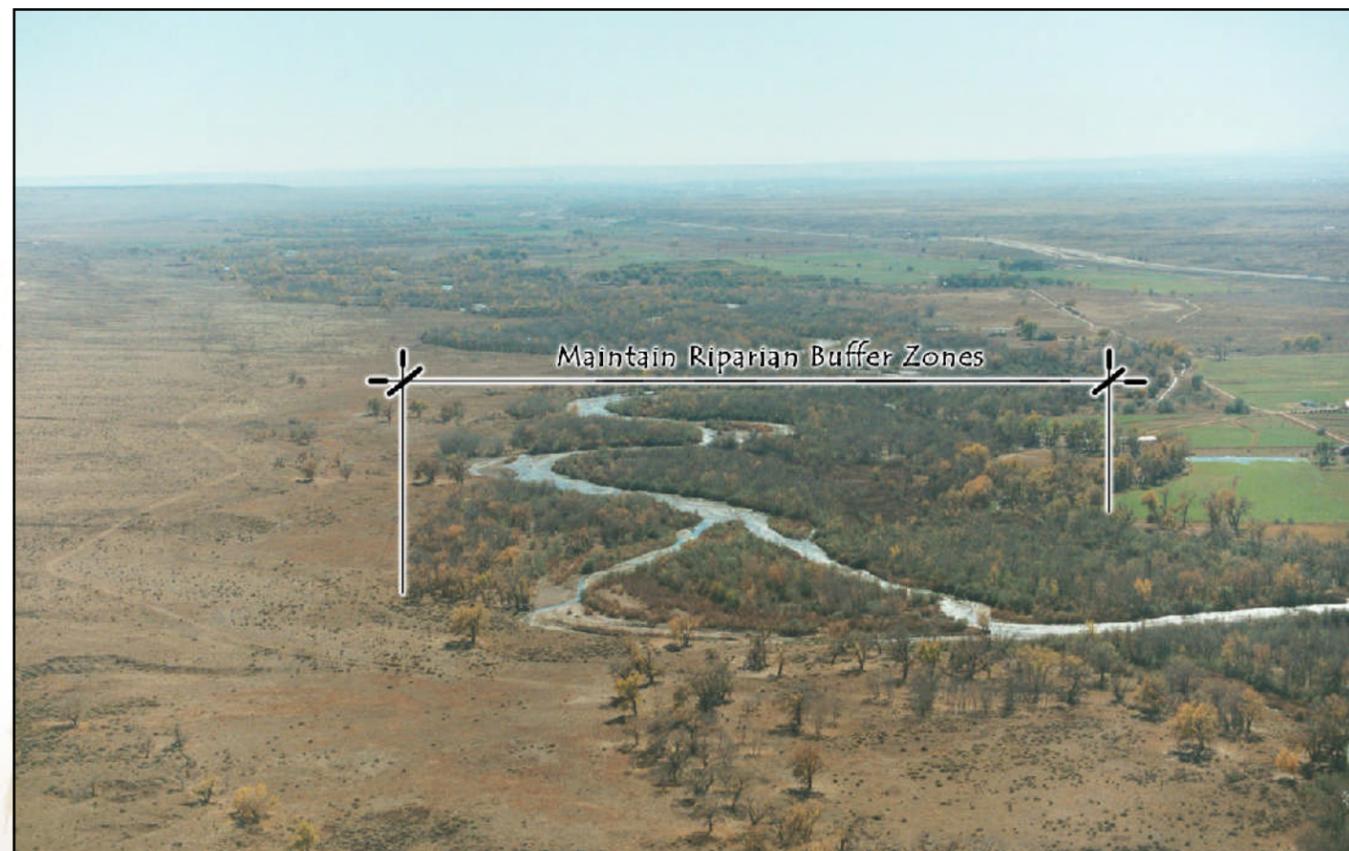


Figure 1.8

for conservation preservation is not possible. Generally, the riparian buffer zones provide most of the same positive attributes as land conservation but since they are narrower, the full benefit is reduced proportionally to width reduction. Please see Figure 1.8.

Areas being managed as riparian buffer zones will:

- Maintain pervious land and the natural filtration process
- Reduce and slow storm runoff
- Improve water quality
- Improve Creek stability
- Preserve terrestrial and aquatic wildlife habitat
- Provide a buffer between development and the Creek
- Increase recreation and education opportunities (provide a community and regional amenity)

### 1.E.2.c. Maximize Floodplain

Maximizing floodplain increases flood storage, reduces flood depth and the sheer stress that damages the Creek corridor. The net effect is a reduced flood wave. This can be achieved many different ways through excavating side detention areas (see section 1.E.2.a. of this Master Plan), reconnecting to disconnected historical floodplain remnants (see Figure 1.9), avoid channelizing of the Creek (see Figure 1.10) and avoid land use and infrastructure encroachment (see Figure 1.11).

Maximizing the floodplain wherever possible to:

- Improve connectivity of the Creek to its floodplain in urban and suburban settings to reduce flood depth and velocity
- Increase flood storage and slow the flood wave
- Increase vegetation and wildlife habitat
- Increase floodplain capacity using a practical combination of construction techniques

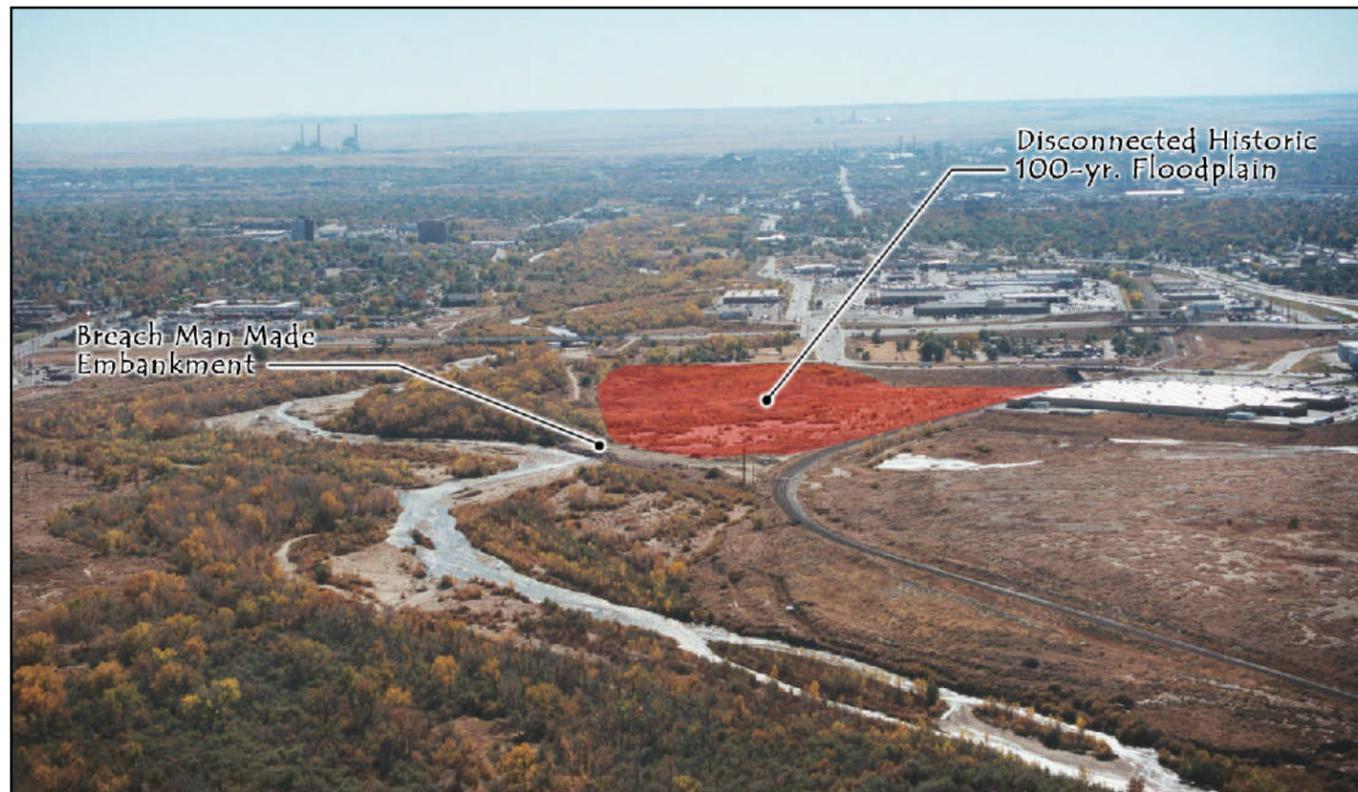


Figure 1.9



Figure 1.11 - Avoid Encroachment of Parallel Boundaries that Disconnect Fountain Creek from its Floodplain

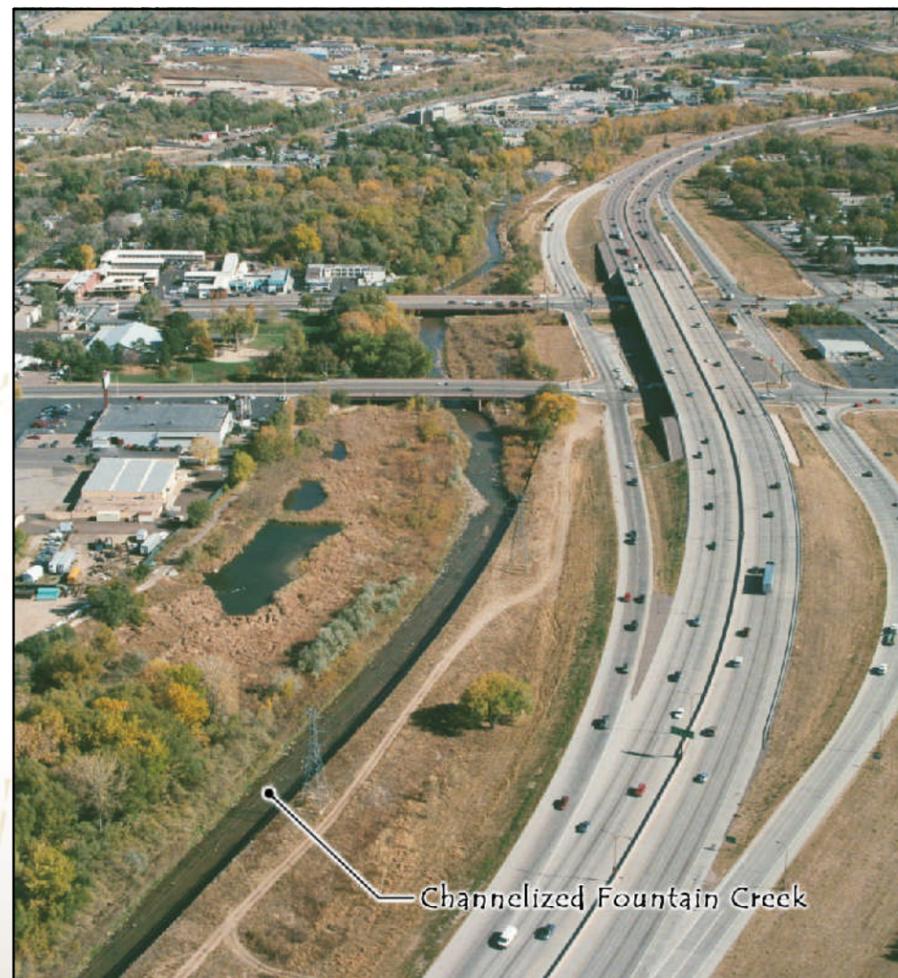


Figure 1.10

#### 1.E.2.d. Side Detention

Side detention increases flood storage by providing additional volume, preferably above the floodplain (see Figure 1.12). Also, reconnecting to historical floodplain that has been disconnected from the Creek can provide an opportunity for side detention. Please see the Pueblo Side Detention Project 4.B.2. in this Master Plan to get a more detailed description of developing a side detention area. Detailed construction documents of this project are provided in the Appendix.

The side detention reconstruction techniques work best if it is located significantly above the Creek on a terrace that does not routinely flood. Often the side detention basin can also double as a wetland filtration basin for adjacent storm water runoff, improving water quality through physical infiltration. This was part of the approach to the Pueblo Side Detention Project.

#### 1.E.2.e. Wetland Filtration Basins

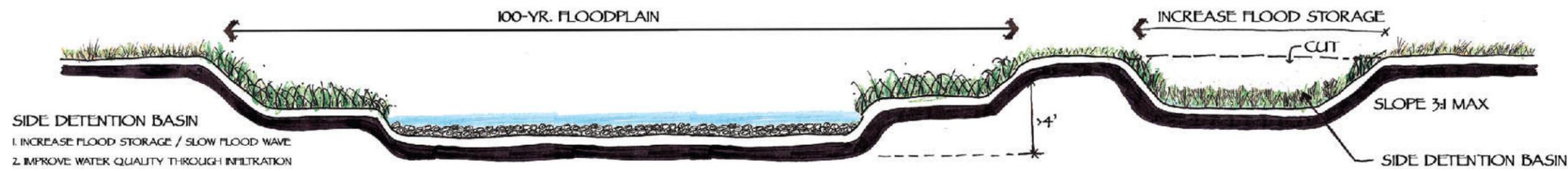
Wetland filtration basins are intended to improve water quality through bio-chemical and physical processes. They are located in areas where storm water runoff or

tributary water can be intercepted in a wetland before the water runs into Fountain Creek. They have to be in floodplain locations with access to hydrology. (Please see Figure 1.13). Besides excavation into the floodplain, another opportunity for wetland creation is within the old creek channels or oxbows that are left after the area has changed alignment, either naturally or man-made. (Please see Figure 1.14).

The Pueblo Side Detention Demonstration Project has a wetland filtration basin in it to capture and treat storm water runoff from adjacent development. See section 4.B.2. of this Master Plan.

Wetland Filtration basins will:

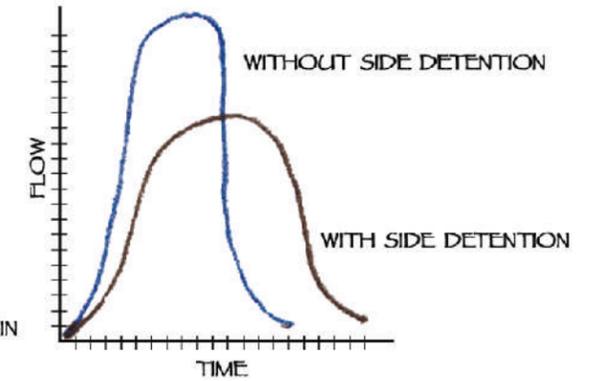
- Improve water quality
- Increase flood storage and slow flood wave
- Improve aquatic and terrestrial habitat
- Enhance passive recreational and educational opportunities



- SIDE DETENTION BASIN**
1. INCREASE FLOOD STORAGE / SLOW FLOOD WAVE
  2. IMPROVE WATER QUALITY THROUGH INFILTRATION
  3. NEED TO CONSIDER WATER RIGHTS ISSUES
  4. TYPICALLY LOCATED ON TERRACE ABOVE FLOODPLAIN

## SIDE DETENTION BASIN

Figure 1.12



- WETLAND FILTRATION BASIN**
1. IMPROVE WATER QUALITY
  2. INCREASE FLOOD STORAGE / SLOW FLOOD WAVE
  3. IMPROVE VEGETATION AND WILDLIFE HABITAT
  4. ENHANCE PASSIVE RECREATION OPPORTUNITIES
  5. TYPICALLY LOCATED IN FLOODPLAIN
  6. NEED TO CONSIDER WATER RIGHTS ISSUES

## WETLAND FILTRATION BASIN

Figure 1.13

### 1.E.2.f. Creek Realignment

Creek realignment is a restoration technique to restore the natural shape and form (morphology) of the Creek. Figure 3.9 illustrates the general natural Creek meander characteristics of Fountain Creek. This will help the Creek become a balanced system that is foundational to creating a stable, sustainable and self maintaining healthy ecosystem. The key to this restoration technique is to measure and study a relatively stable reference reach of Fountain Creek to develop the design criteria needed for developing any Creek realignment project on an unstable reach of Fountain Creek. The Fountain Creek / Clear Spring Ranch Realignment Demonstration Project is an example of this restoration technique. In section 4.B.12. of this Master Plan, there is a description of this project.

To provide detailed information about applying this technique, construction documents for this project are included in the Appendix.

Creek realignment as recommended by this Master Plan will:

- Restore natural shape and form (morphology) to create a stable, healthy and balanced system
- Establish the foundation for full riparian ecosystem restoration
- Slow the flood wave
- Improve aquatic and terrestrial habitat
- Enhance passive recreation and education opportunities

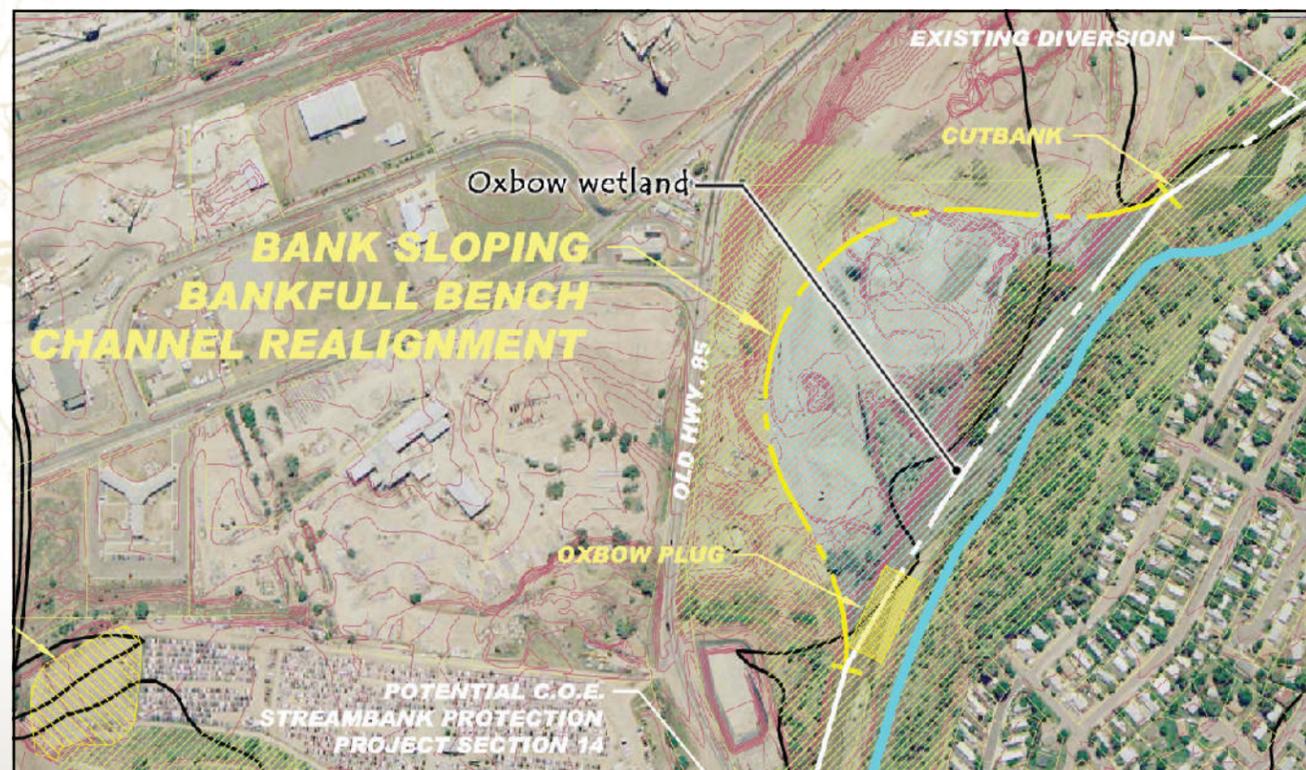


Figure 1.14

### 1.E.2.g. Bankfull Bench

Bankfull bench is a vegetated bench constructed at the toe of an eroding cut bank at approximately "bankfull" or floodplain elevation. The intent is to reduce erosion and the resulting downstream sedimentation. This can be accomplished by either cutting the bank back or filling in at the existing cut bank. See Figure 1.15. When aesthetics and safety concerns about falling of the cut bank are not a major issue of the project, this technique has a lower cost than bank sloping.

Creating a bankfull bench will:

- Move the channel away from the cut bank
- Reduce velocity at the toe of the cut bank
- Reduce erosion of the cut bank and the resulting downstream sedimentation
- Narrow the channel width to improve sediment transport (lower width to depth ratio)
- Increase flood storage and slow the flood wave
- Increase vegetation and wildlife habitat

### 1.E.2.h. Bank Sloping

Bank sloping is a vegetated slope constructed along an eroding cut bank. The intent is to reduce erosion and resulting downstream sedimentation. When employing this technique, it is recommended to include terracing that reflects the three (3) natural floodplain terraces typical to all western rivers and creeks. See Figure 1.16.

Implementing bank sloping will:

- Reduce velocity at the toe of the cut bank
- Reduce erosion of the cut bank and the resulting downstream sedimentation
- Increase flood storage and slow the flood wave
- Increase vegetation and wildlife habitat
- Enhance passive recreation

### 1.E.2.i. Revegetation and Habitat Restoration

The intent of revegetation is to restore native riparian ecosystems along Fountain Creek. It is critical to combat invasive species and promote native species by planting and management so native species can out compete the invasive species.

The 46 mile corridor encompasses a multitude of riparian and terrestrial ecosystems. These ecosystems help to stabilize Fountain Creek while protecting water quality, preventing erosion and protecting wildlife. The specific benefits of revegetation include:

- Stabilizes banks
- Contributes to overall Creek stability
- Helps to slow the flow wave
- Improves water quality by filtering out "harmful" substances
- Improves terrestrial and aquatic wildlife habitat
- Promotes natural plant succession, reduces invasive species
- Provides visual buffering

Even though this corridor has a multitude of riparian and terrestrial ecosystems, the physical composition of the plant varieties that grow in the corridor is fairly consistent. The plants that make up each of these ecosystems are virtually the same from Colorado Springs to Pueblo. The one notable difference is the plants that comprise the upland environs are more xeric in nature as Fountain Creek approaches Pueblo. The hot, semi-arid environment that is unique to the Pueblo area allows for yucca, cactus and rabbit brush to be included in the upland plant palette.

As future restoration plans are developed for individual projects, future designers should understand the various existing ecosystems in the Fountain Creek Corridor. Section 3.D., Typical Ecosystems of this Master Plan provides a discussion of each ecosystem, a plant list and a diagram of ecosystems in the western river terraces. It is very important to understand ecosystems or landscape position. The different ecosystems rely on their relative position to open water and the water table. Designers must understand this relationship and choose the plant palette that is appropriate for that ecosystem's position relative to the open water and water table. Also, as seeding mixes are being specified for herbaceous plants in the riparian area, designers should create mixes that reflect the natural mix of plants. A number of species have been identified that make up the vast majority of the bio-mass in these riparian areas. See section 3.D.

Managing invasive species is a key component of successful revegetation and habitat restoration. Fountain Creek has several types of harmful invasive species. These species have been introduced as a result of changes in the hydrology of the Creek. Base flow increases due to increasing stormwater run off, rapid development that replaces riparian areas with impervious surfaces and livestock degradation of the Creek edge.

The previously mentioned factors all contribute to the introduction of the following invasive species:

- Russian Olive (*Elaeagnus angustifolia*)
- Salt Cedar (*Tamarix ramosissima, chinensis or parviflora*)
- Reed Canary Grass (*Phragmites australis*)
- Siberian Elm (*Ulmus pumila*)
- Broadleaf Cattail (*Typha latifolia*)

The methodology needed to remove each of these plants varies with the site conditions and plant varieties. Each species creates a unique challenge for eradication. Early detection and rapid response is always the preferred method of eradication. Once these plants have developed into large stands, eradication becomes much more problematic.

Selecting a method for control will depend on a variety of factors including budget, size of infestation, herbicide applications and prescribed burn rules and regulations. All of these are important in determining the method of control to be used.

The following is a description of each invasive plant species from above, the problem that it creates and a recommended way to eradicate it.

#### • Russian Olive (*Elaeagnus angustifolia*)

##### The Problem:

This plant can out compete the native vegetation and impacts natural plant succession, nutrient cycling and taxes water reserves. This tree provides a valuable food source for birds. The seeds are disseminated by these birds, causing a rapid advancement of this species.

##### Recommended Eradication Method:

Mechanical methods, such as mowing or cutting of the tree followed by the application of an environmentally sensitive herbicide with a brush to the stump is the recommended way to control small stands. Another method includes the girdling (cutting the bark layer) of the tree and spraying with an herbicide application along the girdle line.

For larger stands, controlled burns followed by an herbicide application helps to prevent new tree crowns from forming.

#### • Salt Cedar (*Tamarix ramosissima, chinensis or parviflora*)

##### The Problem:

Salt Cedar forms dense monotypic stands that increase salinity of surface soil, dries up wetlands and riparian areas, clogs stream channels and increases sediment deposition. This plant produces massive quantities of small seeds that can propagate from buried or submerged stems.

##### Recommended Eradication Method:

The most effective form of eradication is physically removing the plant coupled with an herbicide application. Repeated cutting and herbicide treatments may be required to successfully eradicate large stands of salt cedar.

#### • Reed Canary Grass (*Phragmites australis*)

##### The Problem:

This refers to the non-native *Phragmites* that has invaded the waterways of North America. This plant forms dense stand colonies that spread quickly from seed and rhizomes. They threaten biodiversity by introducing a monoculture stand that is devoid of wildlife.

##### Recommended Eradication Method:

Cutting, mowing and burning followed by an application of an environmentally friendly herbicide, such as Aquamaster or other glyphosphate based herbicides. Dense stands may require multiple applications of cutting / mowing and herbicide applications.

#### • Siberian Elm (*Ulmus pumila*)

##### The Problem:

Aggressive tree species that can invade and out complete native vegetation. It can dominate an ecosystem in only a few years. It reproduces by seed.

##### Recommended Eradication Method:

Cutting and girdled trees generally result in the tree dying within 2 years. Large stands can be cut and treated with glyphosphate or a similar herbicide. This will generally control large stands of Siberian Elm.

#### • Broadleaf Cattail (*Typha latifolia*)

##### The Problem:

An aggressive species that creates large stands of monotypic areas that can dominate a wetland plant community. Cattails spread by seed and rhizomes. A

single seed head of a cattail can contain as many as 250,000 seeds. Seeds can remain viable for over 100 years in a dormant state.

**Recommended Eradication Method:**

Refer to Reed Canary Grass (*Phragmites australis*) above for the same eradication steps to use on this plant.

The key to controlling invasive species can be as simple as eliminating individual plants that are transported down the Creek and first appear in the Sandbar / Gravel Bank Ecosystems. By eliminating these individual plants, their ability to expand into adjacent ecosystems and become a problematic species is controlled.

For invasive species found above the riparian ecosystems, primarily bindweed and Canadian Thistle, herbicide treatments seem to be most effective. Each of these noxious weeds has extensive root systems, so "hand pulling" is not an effective way of controlling them. Depending upon their location, the herbicides 2:4:D and Round-up seem to work well. These plants should be treated early in their growth cycle, before the plants are able to flower. Because their extensive root systems have the ability to produce new shoots after the top growth has been eliminated, repeated applications are necessary.

**1.E.2.j. Access and Visibility**

Access and visibility is a very important restoration technique. In order for the community to value Fountain Creek as something that is beautiful and worth saving, the community has to be able to experience it. Right now the biggest issue in protecting Fountain Creek and motivating the community to use resources to restore the Creek, is the fact that the community, in general, sees the Creek as a liability. As an ugly drainage ditch with dirty water, eroding banks and the danger of flash flooding. Many have this misconception because the community currently has very limited access to the Creek except in very unbalanced, unstable reaches. Section 3.B. and Figure 3.2, show that from the north end of Pueblo all the way to Clear Spring Ranch, just south of the City of Fountain, approximately 20 miles, there is no community access. This is some of the most beautiful and relatively stable reaches of Fountain Creek. The community in general does not appreciate this fact, thus making it the most endangered reach. Therefore, to instill responsibility in the community for the health of Fountain Creek, the community must be provided access to these beautiful areas so that they will want to protect the Creek and contribute to creating a

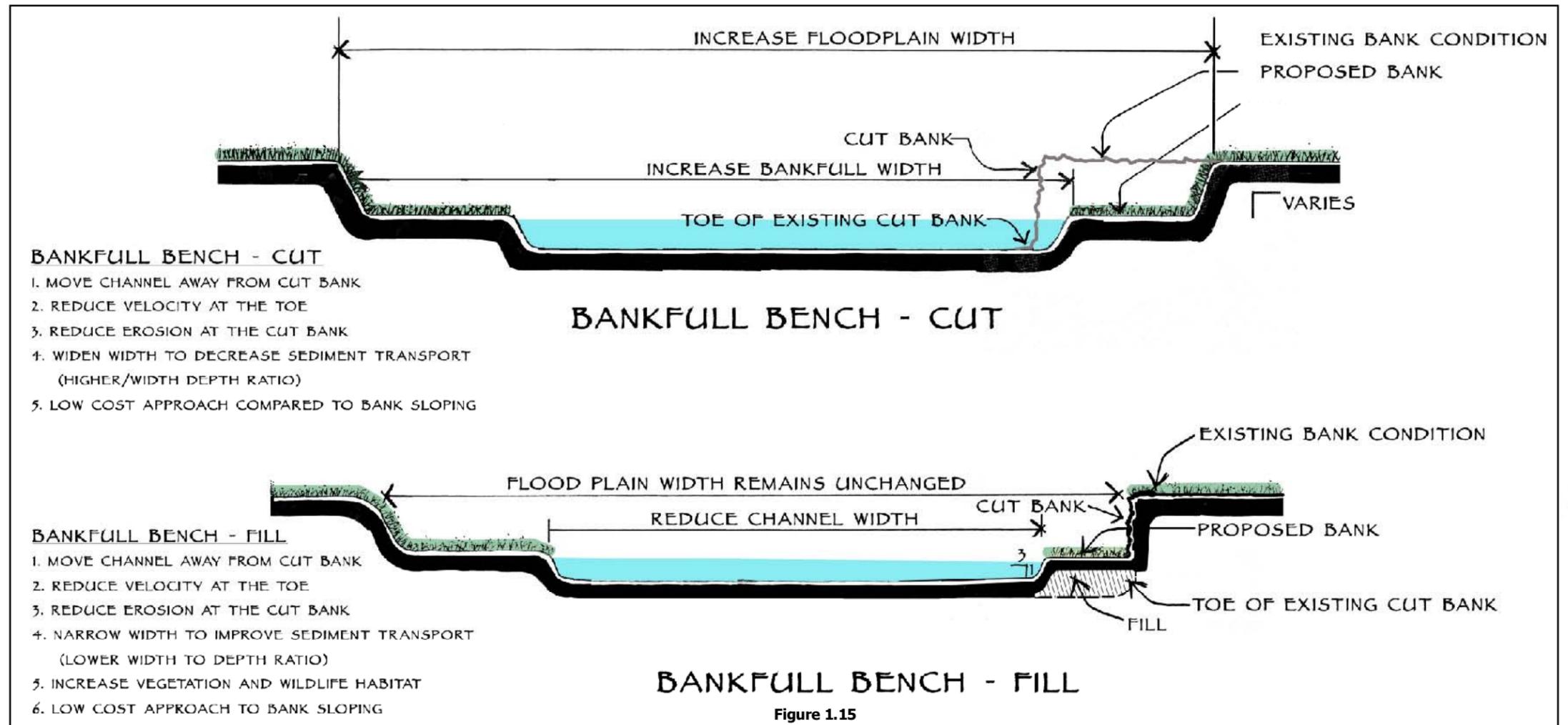


Figure 1.15

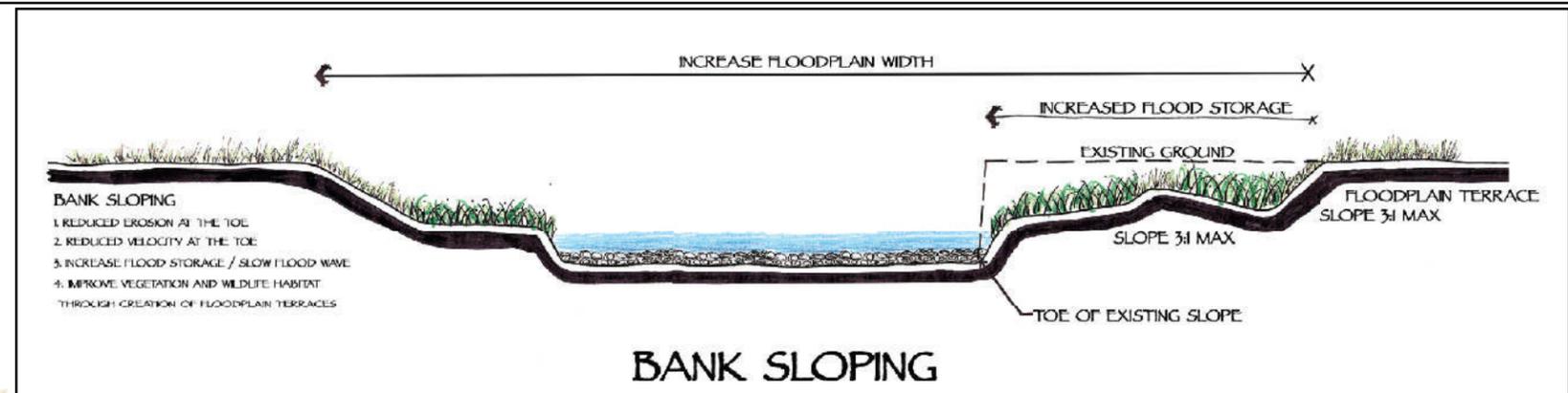


Figure 1.16

community asset. The most supportive and successful demonstration projects include access and visibility to the Creek as a part of the overall goals of the project. **It is the recommendation of this Master Plan to make community access and visibility a priority of every project on Fountain Creek.**

It was public access to the South Platte River through Denver that helped bring public attention to the horrible conditions that existed along the South Platte River in the late 1970's. Once public attention was focused on

the River, it only took 10 to 15 years for the South Platte River Greenway to become the model for Greenways throughout the United States. Now, 20 years later, the realization that the South Platte River Greenway could be an even greater community asset is occurring again in Denver. Momentum, partnerships and funding are building to improve the River to an even higher vision. This dramatic example and model in our own state makes it very clear that access and visibility are key to Fountain Creek Corridor restoration.

**1.E.2.k. Water Quality**

Just like access and visibility, water quality best management practices should be a part of every Fountain Creek project. Currently, the volume of storm water runoff into Fountain Creek has increased. Much of this increased runoff is untreated and runs directly into Fountain Creek carrying increased sediment and pollutant loads. In order to start reversing this trend, best management practices must be utilized. At the time of publication, the most current stormwater criteria

manual available in the watershed for best management practices is the Colorado Springs Stormwater Criteria Manual, due for publication in early 2012.

Fundamentally, there is a five (5) step process to protecting the water quality in Fountain Creek (Please see Figure 1.17).

This plan recommends the creation of a Watershed Wide Stormwater Criteria Manual for use throughout the watershed. This will reduce storm water runoff throughout the watershed. The most cost effect way to do this is to start with the Colorado Springs Stormwater Criteria Manual and supplement it with additional design criteria that address issues throughout the watershed. At the time of this Master Plan publication, there is no schedule for developing the Watershed Wide Stormwater Criteria Manual. In the interest of Fountain Creek, all projects should consider addressing the five (5) steps identified in Figure 1.17.

As a part of the public review process, all Fountain Creek projects should explain how the proposed project will address the five (5) steps. This goes back to the system wide design approach proposed for every project as a part of the Planning Philosophy (Section 1.D.1.) and described in the Conservation and Restoration Concept (Section 1.E.1.).

Fountain Creek is listed as a water quality impaired water body on the Colorado 303(d) list for selenium and E. coli (Colorado Department of Public Health and Environment, Regulation #93 5 CCR 1002-93, April 30, 2010). Two segments of Fountain Creek within the project area are identified as impaired as outlined in the following table:

ID	Description	Portion	Impairment	303(d) Priority
COARFO02a	Fountain Creek from Monument Creek to Hwy 47	All	<i>E. coli</i>	High
COARFO02b	Fountain Creek from Hwy 47 to the Arkansas River	All	Se, <i>E. coli</i> (seasonally from May – October)	Low (for selenium), High (for <i>E. coli</i> )

Segment 2a above was previously listed as on the State's monitoring and evaluation list as potentially impaired for selenium; however, new data reviewed by the Water Quality Control Division shows attainment of the selenium standard allowing that segment to be removed from the monitoring and evaluation list.

Listing of a stream segment on the Colorado 303(d) list mandates the development of a Total Maximum Daily Load (TMDL) in compliance with Section 303(d) of the

federal Clean Water Act. As stated in Regulation #93:

"Once listed, the State is required to prioritize these water bodies or segments (rivers, streams, lakes and reservoirs) based on the severity of pollution and other factors. It will then determine the causes of the water quality problem and allocate the responsibility for controlling the pollution. This analysis is called the TMDL Process and results in the determination of: 1) the amount of a specific pollutant that a segment can receive without exceeding a water quality standard (the TMDL) and 2) the apportionment to the different contributing sources of the pollutant loading (the allocation). The TMDL must include a margin of safety, waste load allocation (for point sources) and a load allocation (for non-point sources and natural background). The TMDL must include upstream loads in the assessment and apportionment process."

While sedimentation is often cited as a primary issue in Fountain Creek, the Creek is not listed as impaired by sediment on the Colorado 303(d) list. It is also worth noting that, Fountain Creek and Monument Creek tributaries upstream of the project area include segments listed as impaired for selenium and E. coli on the 303(d) list. Information regarding those segments is available in Regulation #93.

As noted in Section 2.C. - Other Fountain Creek Plans and Studies, several completed studies and an extensive ongoing data collection effort on water quality are available from the USGS. In addition, the Colorado Water Conservation Board is embarking on a project to develop a decision support system (DSS) for the Arkansas River Basin. The Arkansas Basin Round Table Technical Advisory Committee has requested that all

of the efforts to study water quality in the basin be incorporated into the new DSS.

Additionally, at CSU Pueblo, multiple theses,

presentations and a journal article including study information pertaining to Fountain Creek, have been developed. Citations for these studies are listed below:

Catherine M. McGarvy, Biololgy -2011 "Mercury and Selenium Bioaccumulation in Fish Tissues of the Fountain Creek Watershed, Colorado, USA" (Colorado State University-Pueblo).

Jason A. Turner, Biology-2009 "Characterization and In-Situ Bio-Accumulation of Selenium Utilizing the Bryophyte *Hygrohypnum ochraceum* in Fountain And Monument Creek Colorado"

Thomas Brown, Chemistry-2010, "Pressurized liquid and microwave assisted extraction and analysis of anthropogenic compounds in river sediments."

Cecelia Stuckert, Biochemistry-2011, "Part I: The Timescale of Mutarotation of Monosaccharides and Equilibrium of p-nitrophenol and p-nitrophenoxide ion in sodium bis(2-ethylhexyl) sulfosuccinate/ Isooctane Microemulsions  
Part II: The Toxicity of Triclocarban in *Ceriodaphnia dubia* ; Accumulation of Triclosan and Triclocarban in *Anacharis*, *Corbicula*, *Pimephales*, and Sediment in Microcosms

Cecelia Stuckert\*, James Carsella, Scott J. Herrmann, DelWayne R. Nimmo, Chad A. Kinney. 2011. Toxicity of Triclocarban in *Ceriodaphnia dubia* and Bioaccumulation of Triclosan and Triclocarban in Aquatic Microcosms. EmCon 2011 3rd International Conference on Occurrence, Fate, Effects, and Analysis of Emerging Contaminants in the Environment, August 23-26, Copenhagen, Denmark.

Brown, T. J. \*, Kinney, C. A. 2009. Rapid Lab-Scale Extraction and Analysis of Anthropogenic Chemicals Found in River Sediments. ACS Fall 238th American Chemical Society National Meeting, August 16-20. Washington, D.C.

Brown, T. J. \*, Kinney, C. A. 2009. Rapid Lab-Scale Extraction and Analysis of Anthropogenic Chemicals Found in River Sediments. 2nd International Conference on Occurrence, Fate, Effects, and Analysis of Emerging Contaminants in the Environment, August 4-7, Fort Collins, CO.

Bemis, D.W. \*, Gurung, P. \*, Kinney, C.A. 2008. Organic Wastewater Contaminants in Fountain Creek and Monument Creek Sediments (June 18, 2008). 4th Annual Science and Math Research Symposium, October 17, 2008, CSU-Pueblo.

Brown, T.J. \*, Kinney, C.A. 2008. Developing a Microwave Extraction Method for a Wide Range of Anthropogenic Chemicals in River Sediments. 4th Annual Science and Math Research Symposium, October 17, 2008, CSU-Pueblo.

Brown, T.J. \* and Kinney, C.A. 2011. Rapid Lab-Scale Microwave-Assisted Extraction and Analysis of Anthropogenic Organic Chemicals in River Sediments. International Journal of Geosciences, 2, 267-273.

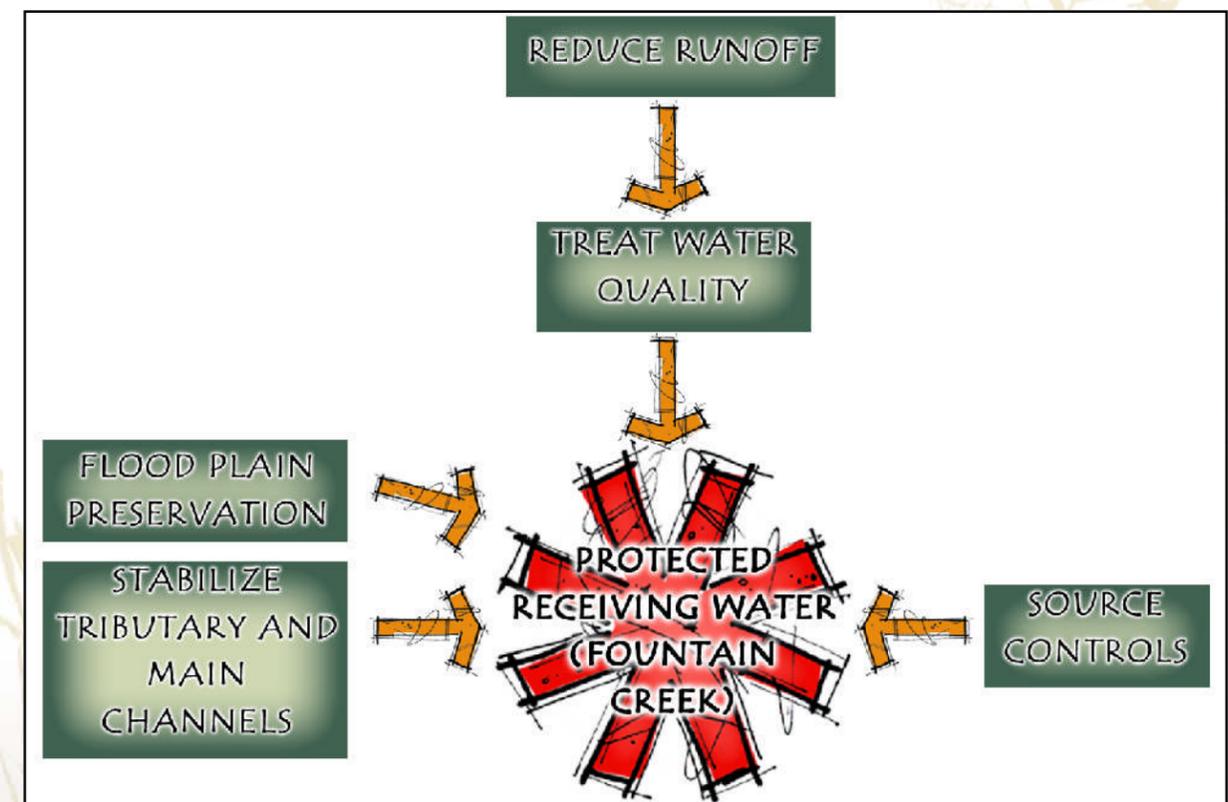


Figure 1.17









# LEGEND

EXISTING CONTOURS	
100 YR FLOODPLAIN	
EXISTING CREEK CENTERLINE	
PROPOSED CREEK CENTERLINE	
REFINED FRONT RANGE TRAIL**	
PROPOSED FRONT RANGE TRAIL PHASE 1*	
PROPOSED SIDE DETENTION	
PROPOSED WETLAND AREA	
PROPOSED CONSERVATION AREA	
EXISTING PARCELS	

\*\* THE PUEBLO CREEKSIDE WALK (FRONT RANGE TRAIL MASTER PLAN PHASE 1) BRIDGE TO S. 1400TH BLVD. JUNE, 2011) PREPARED BY THE LOWER ARKANSAS VALLEY WATER CONSERVANCY DISTRICT AND THE CITY OF PUEBLO.  
 \* INFORMATION FROM "COLORADO FRONT RANGE TRAIL FROM SOUTH FOUNTAIN TO NORTH PUEBLO" DATED DECEMBER, 2009. PREPARED BY COLORADO OPEN LANDS.

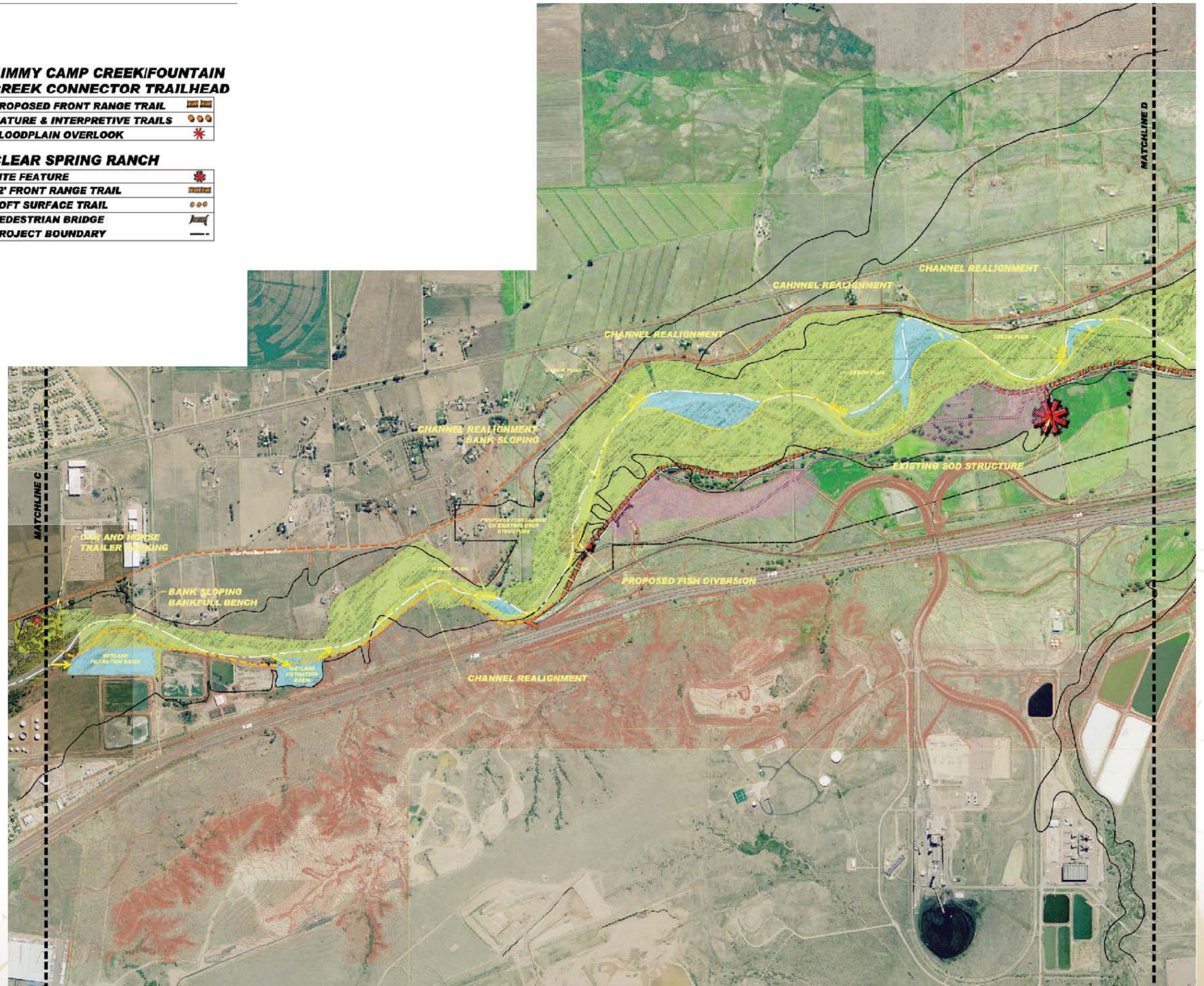
## JIMMY CAMP CREEK FOUNTAIN CREEK CONNECTOR TRAILHEAD

PROPOSED FRONT RANGE TRAIL	
NATURE & INTERPRETIVE TRAILS	
FLOODPLAIN OVERLOOK	

## CLEAR SPRING RANCH

SITE FEATURE	
12' FRONT RANGE TRAIL	
SOFT SURFACE TRAIL	
PEDESTRIAN BRIDGE	
PROJECT BOUNDARY	

**D**



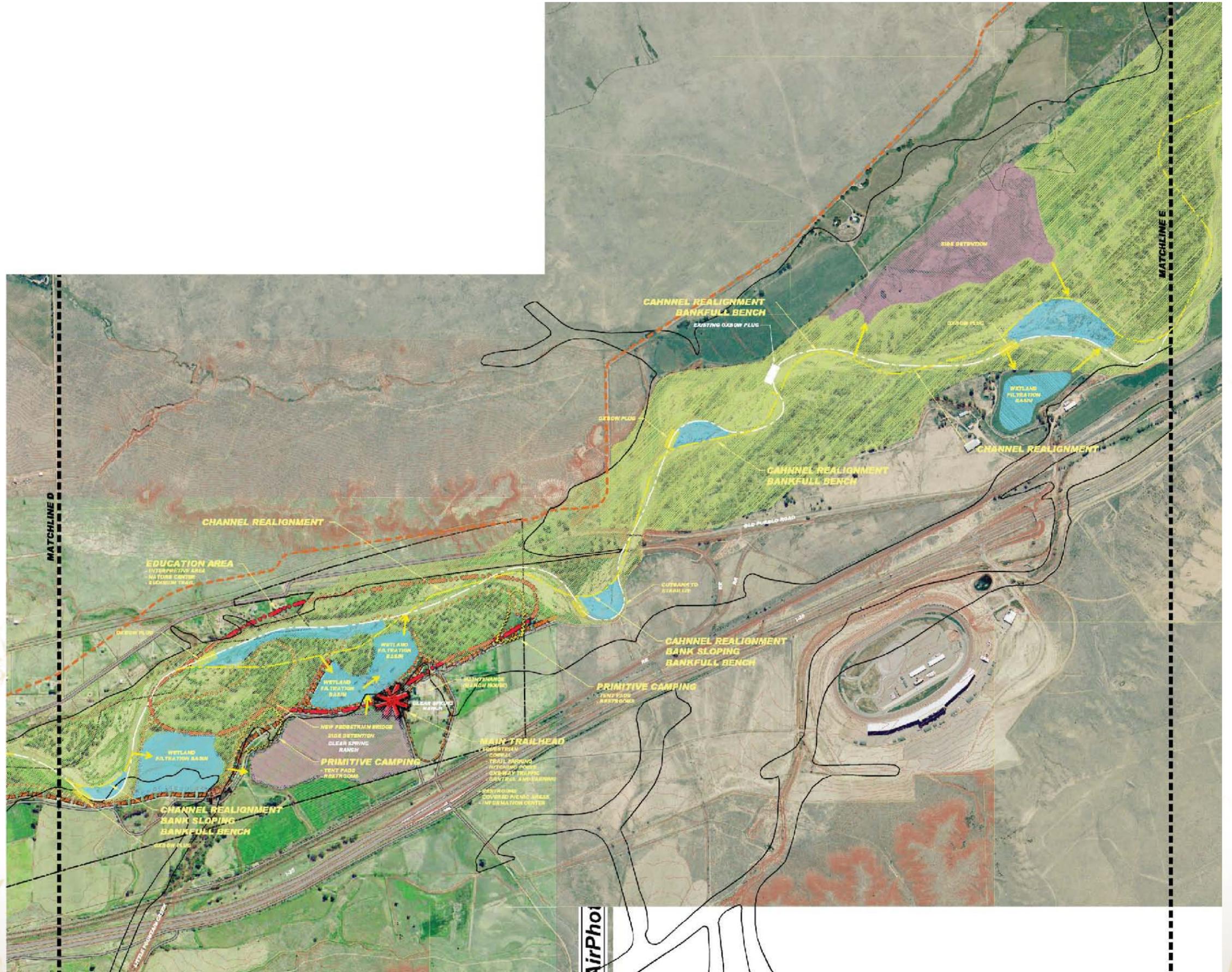


# LEGEND

- EXISTING CONTOURS
- 100 YR FLOODPLAIN
- EXISTING CREEK CENTERLINE
- PROPOSED CREEK CENTERLINE
- PROPOSED FRONT RANGE TRAIL PHASE 1\*
- PROPOSED SIDE DETENTION
- PROPOSED WETLAND AREA
- PROPOSED CONSERVATION AREA
- EXISTING PARCELS

\*\* THE PUEBLO CREEKSIDE WALK (FRONT RANGE TRAIL MASTER PLAN FROM BRIDGE TO S.R. 2047 DATED JUNE, 2011) PREPARED BY THE LOWER ARKANSAS VALLEY WATER CONSERVANCY DISTRICT AND THE CITY OF PUEBLO.  
 \* INFORMATION FROM "COLORADO FRONT RANGE TRAIL FROM SOUTH MOUNTAIN TO NORTH PUEBLO" DATED DECEMBER, 2008. PREPARED BY COLORADO OPEN LANDS.

**E**





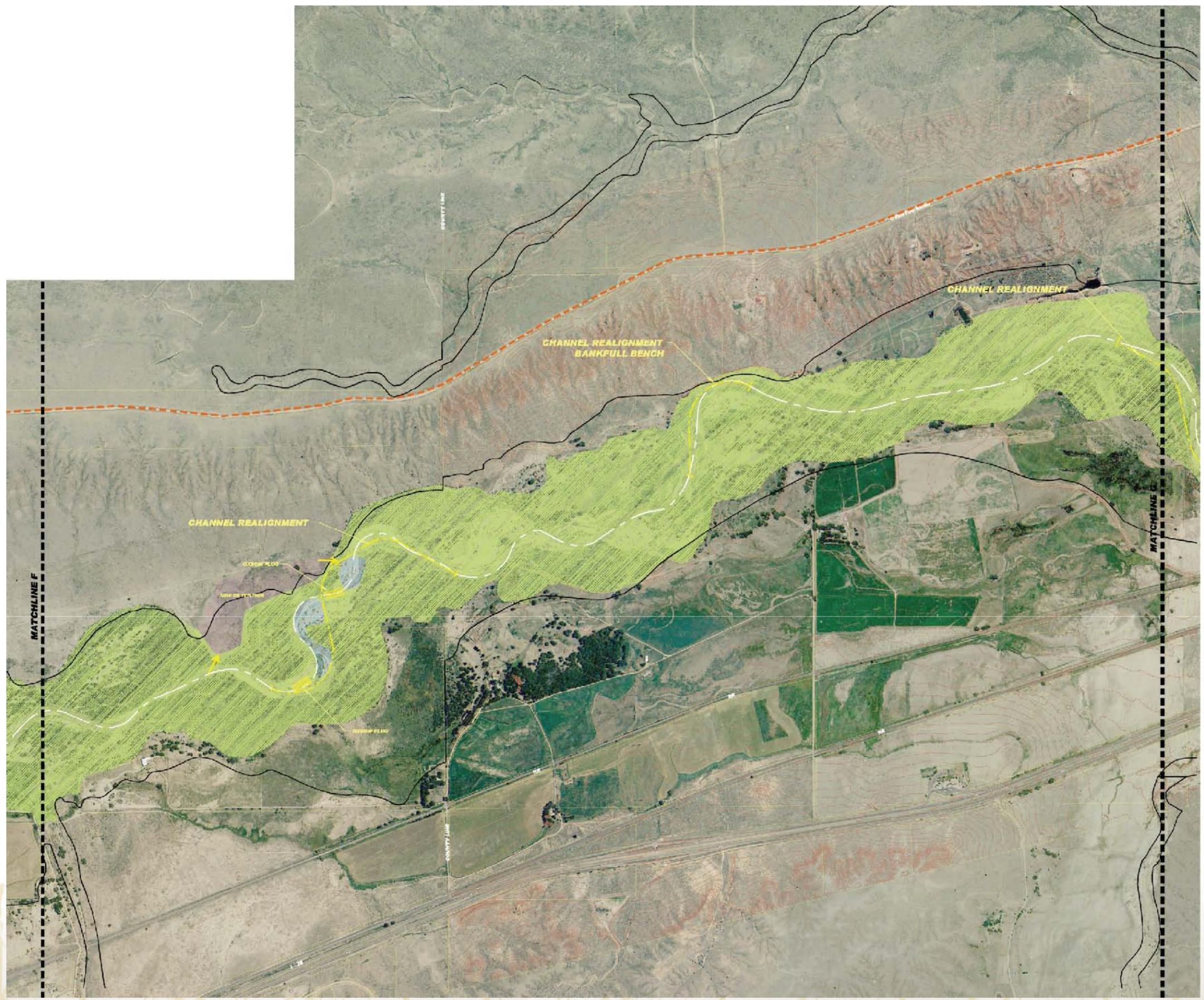


**LEGEND**

EXISTING CONTOURS	
100 YR FLOODPLAIN	
EXISTING CREEK CENTERLINE	
PROPOSED CREEK CENTERLINE	
PROPOSED FRONT RANGE TRAIL PHASE 1*	
PROPOSED SIDE DETENTION	
PROPOSED WETLAND AREA	
PROPOSED CONSERVATION AREA	
EXISTING PARCELS	

\* INFORMATION FROM "COLORADO FRONT RANGE TRAIL FROM SOUTH FOUNTAIN TO NORTH PUEBLO" DATED DECEMBER, 2009. PREPARED BY COLORADO OPEN LANDS.

**G**





**LEGEND**

EXISTING CONTOURS	
100 YR FLOODPLAIN	
EXISTING CREEK CENTERLINE	
PROPOSED CREEK CENTERLINE	
PROPOSED FRONT RANGE TRAIL PHASE 1*	
PROPOSED SIDE DETENTION	
PROPOSED WETLAND AREA	
PROPOSED CONSERVATION AREA	
EXISTING PARCELS	

\* INFORMATION FROM "COLORADO FRONT RANGE TRAIL FROM SOUTH FOUNTAIN TO NORTH PUEBLO" DATED DECEMBER, 2004. PREPARED BY COLORADO OPEN LANDS.

**H**





# LEGEND

	EXISTING CONTOURS
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	PROPOSED CREEK CENTERLINE
	REFINED FRONT RANGE TRAIL**
	PROPOSED FRONT RANGE TRAIL PHASE 1*
	PROPOSED SIDE DETENTION
	PROPOSED WETLAND AREA
	PROPOSED CONSERVATION AREA
	EXISTING PARCELS

THE PUEBLO CREEKSIDE WALK (FRONT RANGE TRAIL MASTER PLAN PINON BRIDGE TO S.K. SMITH) DATED JUNE, 2011. PREPARED BY THE LOWER ARKANSAS VALLEY WATER CONSERVANCY DISTRICT AND THE CITY OF PUEBLO.

\* INFORMATION FROM "COLORADO FRONT RANGE TRAIL FROM SOUTH MOUNTAIN TO NORTH PUEBLO" DATED DECEMBER, 2009. PREPARED BY COLORADO OPEN LANDS.

## ENVIRONMENTAL STEWARDSHIP CENTER AT PUEBLO SPRINGS RANCH

	STEWARDSHIP NATURE TRAIL
	FRONT RANGE REGIONAL TRAIL
	COLLECTOR TRAIL
	BICYCLE/PEDESTRIAN BRIDGE
	OBSERVATION TOWER
	UNDERPASS
	BOARDWALK





**LEGEND**

- EXISTING CONTOURS
- 100 YR FLOODPLAIN
- EXISTING CREEK CENTERLINE
- PROPOSED CREEK CENTERLINE
- REFINED FRONT RANGE TRAIL \*\*
- PROPOSED FRONT RANGE TRAIL PHASE 1\*
- PROPOSED SIDE DETENTION
- PROPOSED WETLAND AREA
- PROPOSED CONSERVATION AREA
- EXISTING PARCELS

\*\* THE PUEBLO CREEKSIDE WALK (FRONT RANGE TRAIL MASTER PLAN DATED JUNE 6, 2011. PREPARED BY THE LOWER ARKANSAS WATER CONSERVANCY DISTRICT AND THE CITY OF PUEBLO.  
 \* INFORMATION FROM "COLORADO FRONT RANGE TRAIL FROM SOUTH FOUNTAIN TO NORTH PUEBLO" DATED DECEMBER, 2006. PREPARED BY COLORADO OPEN LANDS.





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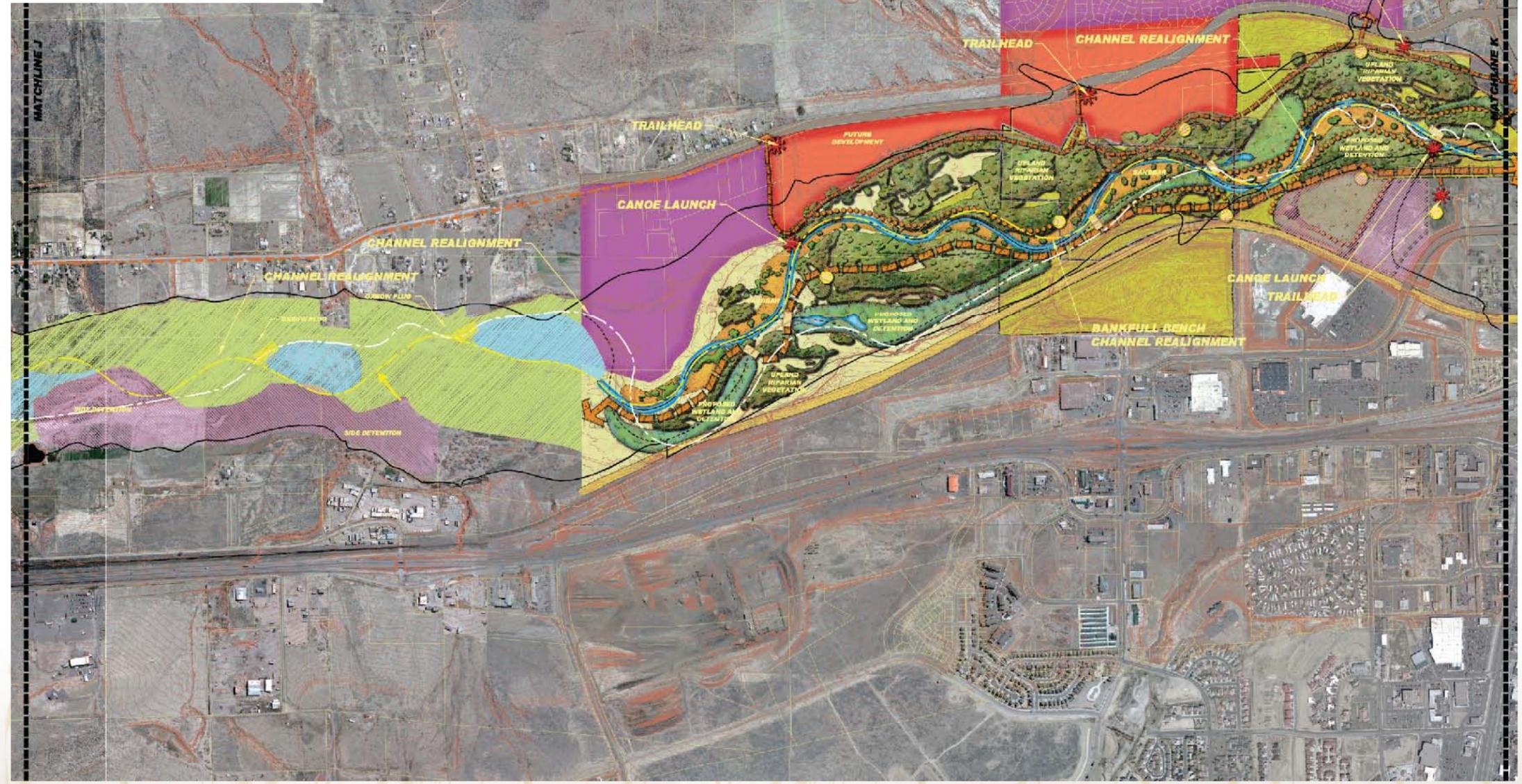
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PROPOSED CREEK CENTERLINE	
REFINED FRONT RANGE TRAIL**	
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PROPOSED SIDE DETENTION	
PROPOSED WETLAND AREA	
PROPOSED CONSERVATION AREA	
EXISTING PARCELS	

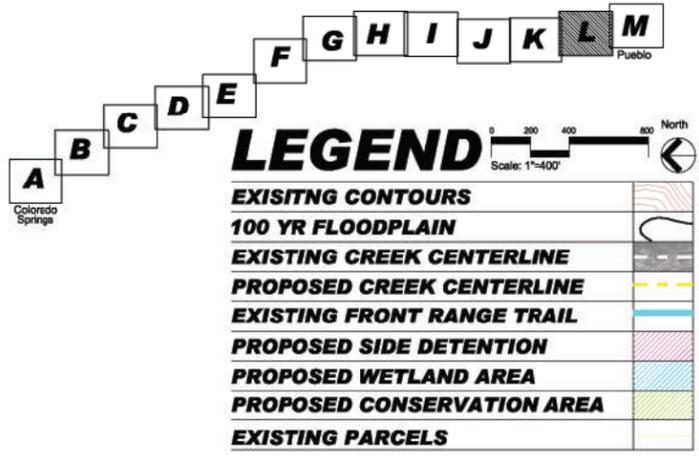
\*\* THE PUEBLO CREEK SIDE WALK (FRONT RANGE TRAIL MASTER PLAN PINON BRIDGE TO S.J.L5047) DATED JUNE 6, 2011. PREPARED BY THE LOWER ARKANSAS VALLEY WATER CONSERVATION DISTRICT AND THE CITY OF PUEBLO.

\* INFORMATION FROM "COLORADO FRONT RANGE TRAIL FROM SOUTH FOUNTAIN TO NORTH PUEBLO" DATED DECEMBER, 2009. PREPARED BY COLORADO OPEN LANDS.

## PUEBLO SIDE DETENTION

FRONT RANGE REGIONAL TRAIL	
COLLECTOR TRAIL	
NATURE TRAIL	
EXISTING TRAIL	
TRAILHEAD	
OBSERVATION POINT	
OBSERVATION TOWER	
BOARDWALK	
PEDESTRIAN BRIDGE	
OXBOW PLUG	
CITY OF PUEBLO PROPERTY	
POTENTIAL PUEBLO OPEN SPACE	
PROPERTY TO BE PURCHASED	

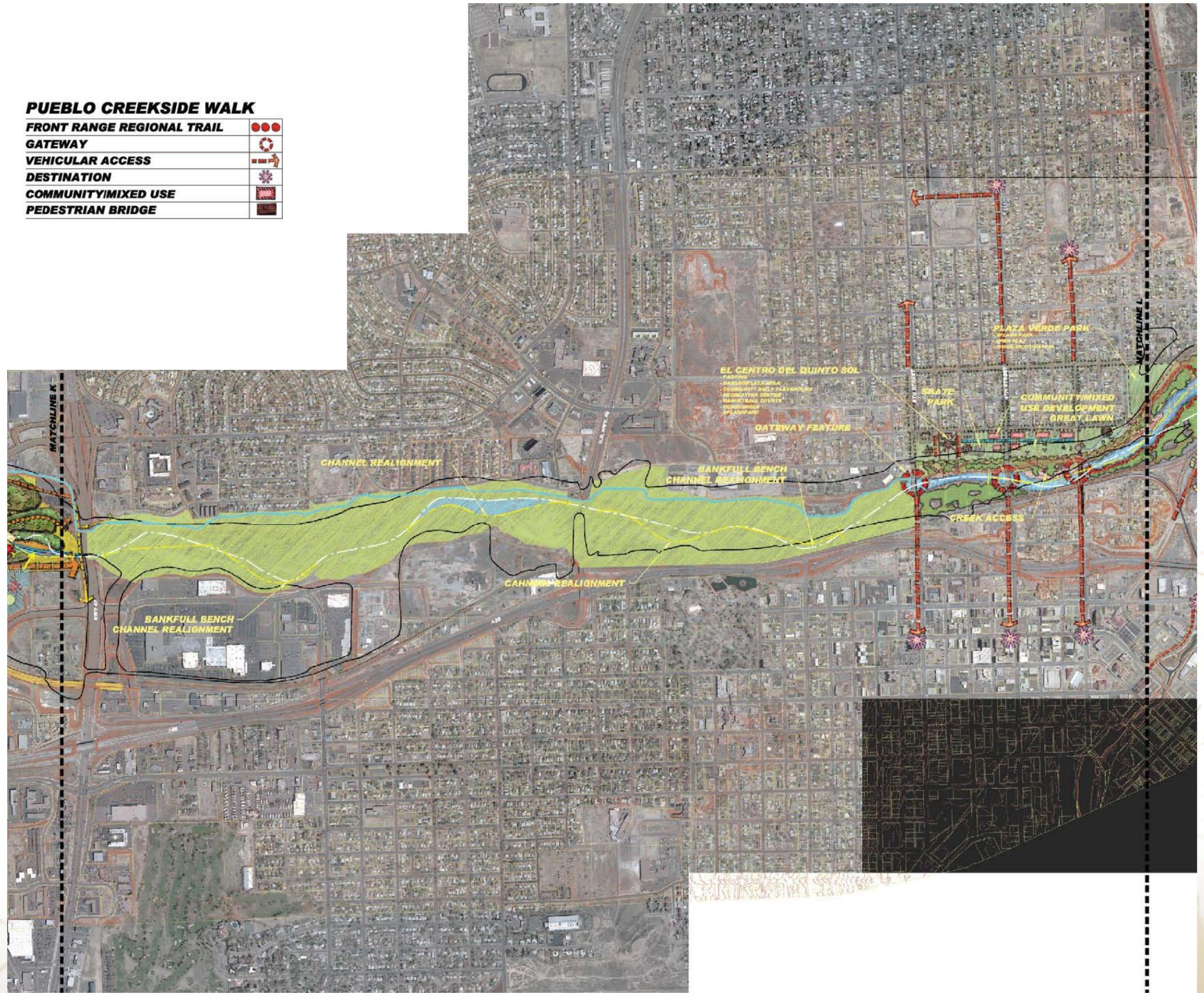


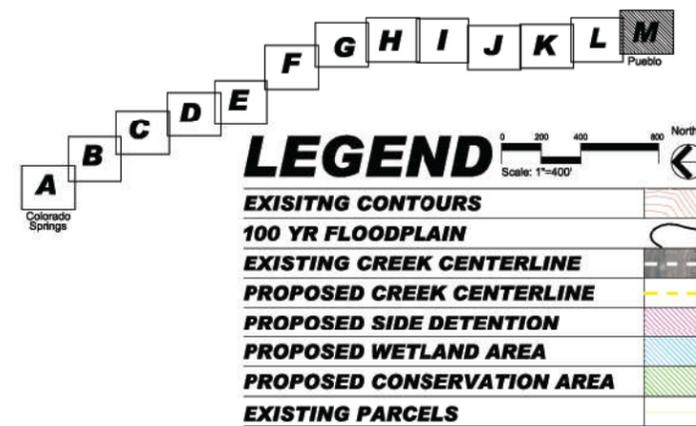
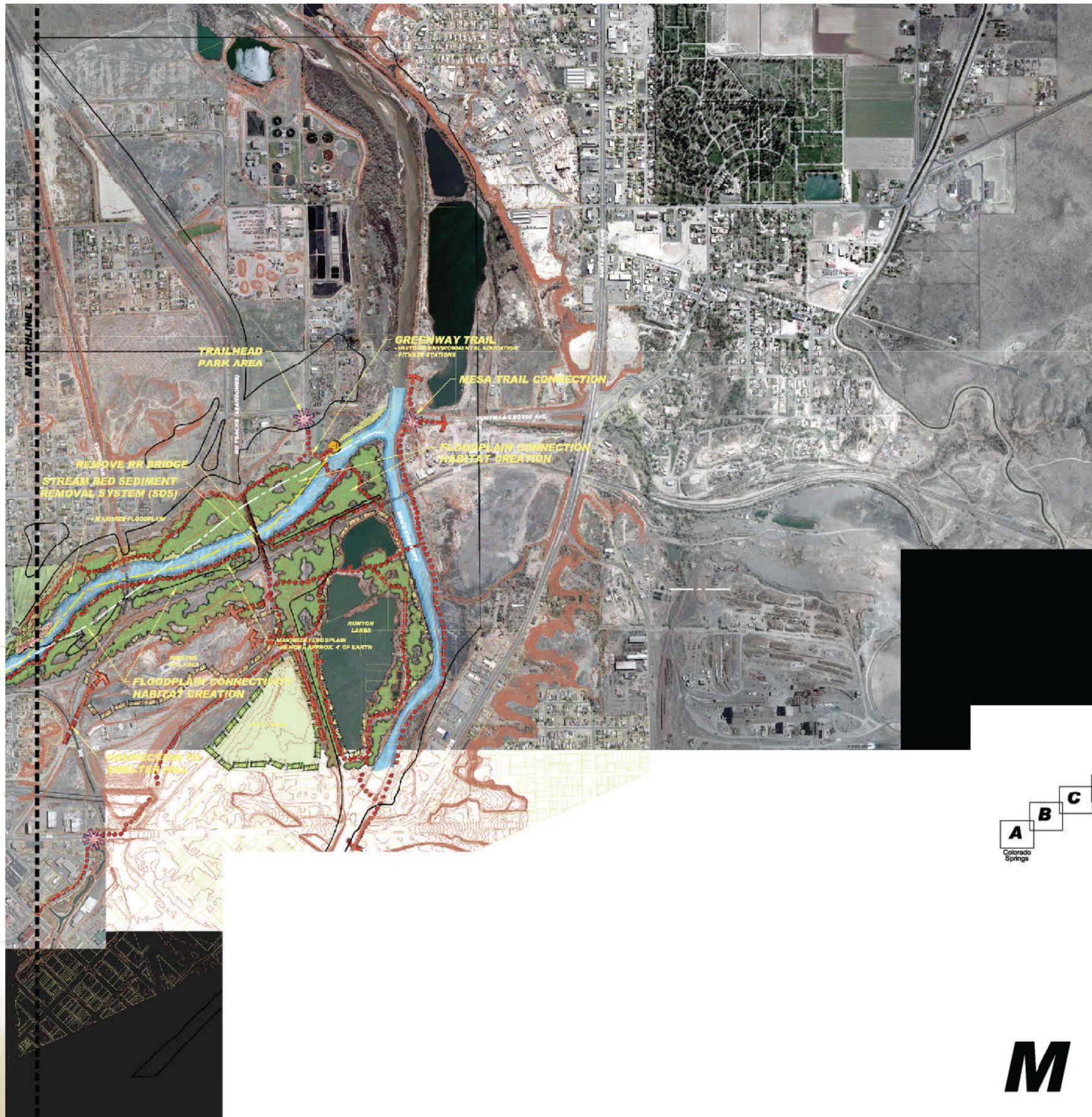


**PUEBLO CREEKSIDE WALK**

FRONT RANGE REGIONAL TRAIL	[Symbol]
GATEWAY	[Symbol]
VEHICULAR ACCESS	[Symbol]
DESTINATION	[Symbol]
COMMUNITY MIXED USE	[Symbol]
PEDESTRIAN BRIDGE	[Symbol]

**L**





**PUEBLO CREEKSIDE WALK**

<b>FRONT RANGE REGIONAL TRAIL</b>	●●●
<b>VEHICULAR ACCESS</b>	→
<b>DESTINATION</b>	★
<b>COMMUNITY/MIXED USE</b>	■
<b>PEDESTRIAN BRIDGE</b>	■
<b>SMELTER HILL AREA</b>	■
<b>BALLFIELDS</b>	■

**M**

## CHAPTER 2: The Process

### 2.A. Acknowledgements

- **Fountain Creek Watershed, Flood Control and Greenway District**

- Board of Directors:
  - Dennis Hisey, El Paso County
  - Jeff Chostner, Pueblo County
  - Tim Leigh, City of Colorado Springs
  - Gabriel Ortega, City of Fountain
  - Larry Atencio, City of Pueblo
  - Max Stafford, EPC Small Municipalities
  - Richard Skorman, Citizens Advisory Group
  - Jane Rhodes, Fountain Creek Land Owner
  - Leroy Mauch, Lower Arkansas Water Conservancy District
- Executive Director:
  - Larry Small

- **Lower Arkansas Valley Water Conservancy District**

- Board of Directors:
  - Pete Moore, Chairman, Crowley County
  - Lynden Gill, Vice-Chair, Bent County
  - Melissa Esquibel, Secretary, Pueblo County
  - Wayne Whittaker, Treasurer, Otero County
  - Leroy Mauch, Director, Powars County
  - Anthony Nunez, Director, Pueblo County
  - Reeves Brown, Director, Pueblo County
  - Jay Winner, General Manager

- **Colorado Springs Utilities**

- Board of Directors:
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  - Jan Martin, Vice-Chair, At-Large
  - Merv Bennett, At-Large
  - Lisa Czelatdko, District 3
  - Angela Dougan, District 2
  - Bernie Herpin, District 4
  - Tim Leigh, At-Large
  - Val Snider, At-Large
  - Brandy Williams, At-Large
- Fountain Creek Project Manager:
  - Carol Baker

- **Fountain Creek Vision Task Force Consensus Committee**

- Tom Autobee, Pueblo Board of Water Works
- Gary Barber, El Paso County Water Authority
- Mary Barber, Fort Carson
- Vickie Broerman, Senator Wayne Allard
- Jeff Chostner, Pueblo County Board of County Commissioners
- Sallie Clark, El Paso County Board of County Commissioners
- John B. Cordova, Sr., Pueblo County Board of County Commissioners
- Jane Green, Landowner
- Kim Headley, Pueblo County Department of Planning and Development / PACOG
- Dan Henrichs, Landowner
- Dennis Hisey, El Paso County Board of County Commissioners
- Jeri Howells, Mayor, City of Fountain
- Juniper Katz, Colorado Open Lands
- Loretta Kennedy, Congressman John Salazar
- Dennis Maroney, City of Pueblo Stormwater Utility
- Bruce McCormick, Colorado Springs Utilities
- Rex Miller, Landowner
- Bob Miner, Town of Palmer Lake Watershed Study
- Margaret Montano, Colorado Progressive Coalition
- Rich Muzzy, Pikes Peak Area Council of Governments
- Annie Oatman-Gardner, Senator Salazar
- Vera Ortegón, City of Pueblo City Council
- Sal Pace, Colorado State Representative
- Latty Patterson, City of Fountain
- Tom Ready, Colorado State Parks Board
- Jane Rhodes, Landowner on Fountain Creek, Pueblo County
- Richard Skorman, Director, Colorado Springs Conservation Corps.
- Larry Small, Vice-Mayor, City of Colorado Springs
- Thomas Warren, Fort Carson
- Barb Vidmar, City of Pueblo City Council
- Jay Winner, Lower Arkansas Valley Water Conservancy District
- Ross Vincent, Sierra Club

- **Demonstration Project Partners (A special thanks to the funding partners)**

- City of Colorado Springs
- City of Fountain
- City of Pueblo
- Colorado Department of Health
- Colorado Division of Wildlife
- Colorado Open Lands
- Colorado Springs Utilities
- Colorado State Parks
- Colorado State University
- Colorado Water Conservancy Board
- El Paso County
- Fountain Creek Foundation
- Great Outdoors Colorado
- Lower Arkansas Valley Water Conservancy District
- Natural Resources Conservation Service
- Pueblo County
- Union Pacific Foundation
- U.S. Army Corps. of Engineers
- U.S. Geological Survey

- **Consultants**

- Kevin Shanks, Project Manager, THK Associates, Inc.
- Mark Wilson, THK Associates, Inc.
- Kelly Bish, THK Associates, Inc.
- Julie Gamec, THK Associates, Inc.
- Merle Grimes, MDG Inc.
- Graham Thompson, Matrix Design Group, Inc.
- Eric Smith, Matrix Design Group, Inc.
- Ken Conyers, Matrix Design Group, Inc.
- Glen Ballantyne, Kreativo

- **A special thanks to the Colorado Springs Police Department for their assistance photographing the aerial images of Fountain Creek.**



This plan is dedicated to the memory of Merle D. Grimes, a true champion for healthy rivers everywhere.

### 2.B. The Planning Process

In March of 2007, the Lower Arkansas Valley Water Conservancy District and Colorado Springs Utilities entered into an Intergovernmental Agreement (IGA). The IGA expressed a shared interest in revitalizing Fountain Creek and developing a regional project encompassing recreational opportunities, an improved environment for plants and wildlife, productive agricultural lands and flood control and water quality improvements. It was agreed to fund equally, a process to obtain resolution of issues of mutual concern regarding Fountain Creek and the creation of a Regional IGA among all parties with interests in Fountain Creek.

A steering committee was formed with individuals from both Colorado Springs Utilities and the Lower Arkansas Valley Water Conservancy District. Their responsibility was to manage the selection of a project coordinator and once selected, manage the project coordination until such time that a regional IGA was executed.

In August of 2007, THK Associates Inc. was selected in an advertised selection process as the consultant team to act as a project coordinator and develop the Fountain Creek Corridor Master Plan for the lowest 46-mile reach of Fountain Creek, from Colorado Springs south, to the confluence with the Arkansas River in Pueblo. The tasks identified in the consultant's agreement included developing a master plan vision for Fountain Creek and the development of an implementation strategy including long term management, funding and coordination with key stakeholders.

The Fountain Creek Vision Task Force meetings, including the sub-committee meetings and the consensus committee meetings, became the forum in which the Fountain Creek stakeholders were engaged in the Master Planning effort. The Fountain Creek Vision Task Force helped to craft the master plan goals, as described in Section 1.B.

In 2008, restoration techniques were developed to meet the goals established with the Fountain Creek Vision Task Force. By the fall of 2008, with input from the Fountain Creek Vision Task Force and from a series of public meetings with property owners along Fountain Creek, a Master Plan concept for Fountain Creek was developed. Simultaneously, with the Master Plan concept development, the THK Team provided technical assistance to the Fountain Creek Vision Task Force as they developed concepts for a watershed Management Authority. The THK Team facilitated several field trips for the Fountain Creek Vision Task Force to visit the Denver Urban Drainage and Flood Control District and the Greenway Foundation. These field trips were conducted to give the Fountain Creek Vision Task Force insight into techniques for management and implementation.

It was determined early in the Master Planning process with the Fountain Creek Vision Task Force, that going beyond developing an implementation strategy and actually initiating projects on Fountain Creek would be the best approach. These projects were intended to be demonstration projects, highlighting the restoration techniques along with partnership and funding strategies. Twelve (12) demonstration projects were initiated between the Spring of 2009 and the Spring of 2011. Please see Section 4.B. for a detailed discussion of these demonstration projects. The criteria used to identify demonstration projects included stakeholder interest, existing project funds, additional funding availability, identification of a project owner that would maintain the project and the ability of the project to meet Master Plan goals and inspire additional project funding partners.

In 2009, the Fountain Creek Watershed, Flood Control and Greenway District was formed legislatively as an intergovernmental entity to manage the future of Fountain Creek. In the fall of 2009, the THK Team was retained to finish the Fountain Creek Corridor Restoration Master Plan and continue the demonstration project development effort. Carol Baker, Colorado Springs Utilities; Jay Winner, The Lower Arkansas Valley Water Conservancy District and the Interim Director

of the Fountain Creek Watershed, Flood Control and Greenway District became the Steering Committee for completion of the Master Plan and demonstration project development. By late summer 2011, several of the demonstration projects were constructed and operating including the Pueblo Sediment Removal System and the Pueblo Side Detention projects. The acquisition of seven properties south of the City of Fountain were underway and numerous projects were planned and designed with partners working on construction funding.

It should be noted that during the development of the demonstration projects, countless project specific meetings were held with the public and many of the funding partners. This has created tremendous momentum locally, regionally and state wide around Fountain Creek and created the desire to fund and implement projects. Many of the funding partners, such as GOCO, CWCB, CDOW, USGS, Colorado Open Lands, State Parks and numerous non-profit organizations are engaging with the Master Plan Team to strategize projects and funding for the future. The Fountain Creek Restoration Master Plan is the vision for Fountain Creek around which all funding partners have rallied and agreed to partner. The Final Master Plan was reviewed by stakeholders in August of 2011, with the final Master Plan completed in September, 2011.

## 2.C. Other Fountain Creek Plans and Studies

The purpose of this section is to describe documents that are closely related to this master plan. These documents were key references in the preparation of this plan. In addition, the user of this plan should refer to these documents when planning and designing projects along the Fountain Creek Corridor.

This section does not include other documents such as zoning, land use and design criteria. As a part of planning and design along Fountain Creek, these documents should also be referenced subject to the governing jurisdiction.

### 2.C.1. The Fountain Creek Watershed Plan

*The Fountain Creek Watershed Plan* was published by the Pikes Peak Area Council of Governments (PPACG) in February, 2002 and updated in November, 2003. The plan was developed through a collaborative effort between PPACG and the Pueblo Area Council of Governments (PACOG) and adopted by both Councils. It was the first cooperative agreement between PPACG and PACOG and the first truly regional effort on

Fountain Creek. Funding for the plan was provided by local governments, the Colorado State Conservation Board, the Colorado Water Conservation Board and the U.S. Environmental Protection Agency. The plan was developed to “address the need expressed by local governments, soil and water conservation districts, and private property owners for a more comprehensive understanding of the Fountain Creek Watershed.”

The vision for the plan was to “recognize the watershed as a regional asset supporting diverse interests and to promote the health of Fountain Creek and its tributaries.” The plan provides an overview of the history of the watershed and identifies and describes watershed-wide problems including erosion, flooding, sedimentation, infrastructure impacts, channel instability and water quality and characterizes those problems on a sub-watershed and reach basis.

The plan was the first attempt to consider the watershed holistically including technical, public outreach and education, funding, and policy aspects of watershed management. The effort included not only development of the plan document, but also incorporated the first comprehensive public outreach and education process, as well as development of a comprehensive geospatial information system (GIS) database and watershed maps.

The plan and the collaborative effort to develop it served as the foundation for much of the progress achieved in the watershed to date through subsequent planning activities. The plan helped foster broad stakeholder support for addressing watershed and Creek health that was galvanized by the 1999 flood on Fountain Creek. The plan was instrumental in establishing public and government interest and generating funding for the subsequent U.S. Army Corps of Engineers Watershed Study. The plan remains the best source for understanding the history of the watershed and provides a good overview of watershed issues and concerns.

### 2.C.2. The U.S. Army Corps of Engineers Fountain Creek Watershed Study

*The U.S. Army Corps of Engineers (Corps) Fountain Creek Watershed Study* began in April 2003 and culminated in the publishing of the Fountain Creek Watershed Study Watershed Management Plan in January, 2009. The Corps study was developed under a Feasibility Cost Sharing Agreement between the Corps and the lead local sponsor, the City of Colorado Springs. Eleven local government sponsors worked together through an Intergovernmental Agreement including the

8 municipalities of Colorado Springs, Pueblo, Fountain, Woodland Park, Manitou Springs, Monument, Palmer Lake, and Green Mountain Falls and the 3 counties of El Paso, Pueblo, and Teller. Funding for the Corps study was shared 50% by the federal government and 50% by the 11 local governments along with the Colorado Department of Local Affairs and the Colorado Water Conservation Board.

The purpose of the study was to complete a comprehensive analysis of erosion, sedimentation and flooding issues in the Fountain Creek Watershed that establishes and evaluates existing conditions and identifies an array of problems and opportunities in the form of watershed management plan. A primary objective of the study was to recommend potential projects and establish whether a sufficient federal interest existed to provide funding through Corps programs.

The following interim documents were published through the course of the Corps study and are available to the public. In addition to these documents, a comprehensive GIS database for each of the electronic data sets was developed.

1. *Environmental Baseline Reports, March, 2006* – Completed to document characteristics, general conditions and the current overall health of the watershed and presented in 9 individual reports including:
  - a. Soils
  - b. Water Quality
  - c. Wetlands
  - d. Threatened and Endangered Species
  - e. Fish
  - f. Wildlife
  - g. Migratory Corridors
  - h. Hazardous Materials
  - i. Planned Projects Inventory
2. *Hydrology Report, March, 2006* – Included the development of hydrologic models based on existing (circa 2005) and future (circa 2025) land use conditions to generate flood hydrographs and estimate peak discharges at selected points throughout the watershed for a range of storm events (2-year through 500-year recurrence intervals). Individual hydrologic models were constructed for the composite Fountain Creek Watershed as well as 21 individual sub-watersheds.

3. *Hydraulics Report, March, 2006* – Included the development of hydraulic models to evaluate stream flow characteristics (e.g. depth and velocity) for existing and future stream flows for a range of flood events. The focus of the modeling was preparation of flood profiles and for use in subsequent sediment transport modeling. Individual hydraulic models were constructed for 21 streams within the Fountain Creek Watershed.
4. *Geomorphology Report, July, 2007* – Completed to document existing channel conditions, evaluate channel characteristics (e.g. cross-section dimension, planform patterns, and profile) and their change over time, assess relative stability and develop sediment transport models. This report includes detailed geomorphic analyses including:
  - a. Field investigations with photo documentation (836 photos) and bulk bed material samples (54 samples) compiled into a GIS database.
  - b. Time-series aerial photography analysis using aerials from the 1950s, 1980s, and early 2000s
  - c. Field stream survey and bankfull flow analysis at 6 U.S. Geological Survey gage stations
  - d. Sediment Transport Analysis along 20 streams within the watershed including the determination of relative sediment balance between 30 individual stream segments to assess general aggradation/degradation tendency.

The watershed management plan was prepared to integrate all of the existing conditions information, along with a description of the problems and opportunities present in the watershed, and establish the objectives for improved management of the Fountain Creek Watershed. The plan included a list of 17 general recommendations for improved management of the watershed. The general recommendations were divided into 4 focus areas: development, rehabilitation/preservation, modeling/project design and administration. The Corps general recommendations include:

#### Development

1. Review and modify development policies as necessary to include appropriate consideration of open space needs in development (focus on more habitat development within traditional parks).
2. Limit sediment sources during construction by minimizing overlot grading.
3. Review and modify development policies and landscape ordinances as necessary to include

appropriate low impact development techniques (lowimpactdevelopment.org) such as those put forth by organizations such as the Center for Watershed Protection (cwp.org).

4. Review and modify development policies as necessary to require post development hydrographs match predevelopment hydrographs for peak, volume and timing to the extent practicable.
5. Review and modify development policies as necessary to require post-development sediment transport matches pre-development sediment transport to the extent practicable.
6. Review and modify development policies as necessary to require assessment of upstream/downstream impacts (particularly impacts due to small frequently occurring storm events such as the 2-yr event).
7. Review and modify development policies as necessary to ensure involvement by regulatory agencies and stakeholders as soon as possible in the development process.
8. Entities must follow through with review of development plans, adherence to approved plans through the construction process, and inspection/maintenance of completed projects.

#### Rehabilitation/Preservation

9. Rehabilitate riparian areas to a healthy, functioning condition where opportunities exist to the extent practicable.
10. Preserve existing wetlands and create additional wetlands where opportunities exist to the extent practicable.
11. Entities constructing remedial projects in the watershed should develop a consistent approach and methodology for project design and construction while considering site specific conditions and latest design methodologies.

#### Modeling/Project Design

12. Collect sediment load data for the Fountain Creek Watershed so that appropriate sediment transport modeling can be calibrated for all future development in the watershed.
13. Entities should use the hydrologic and hydraulic models developed as a part of the Fountain Creek Watershed Study as a basis for updating FEMA floodplains on the main stems of Fountain Creek and Monument Creek.
14. Entities should use the models developed as a part of the Fountain Creek Watershed Study as a basis for certifying their levees on the main stem of the Creek.

15. Remedial projects that affect Fountain Creek or its tributaries should utilize stable channel design principles.

#### Administration

16. Designers and reviewers should be educated/trained in the principles of geomorphology and sediment transport to support the design and review process for new development.
17. Create a Fountain Creek Watershed entity to promote cooperation and partnerships, to establish a set of watershed standards, to serve as a funding source for the construction and maintenance of large scale projects and to assist entities with training and review.

To address site-specific problems a list of 46 potential projects was developed. These projects were intended to reduce flooding, improve channel stability or restore the riparian ecosystem. These potential projects were ranked and prioritized using criteria developed in conjunction with the sponsors. The top 13 ranked potential projects were analyzed in greater detail. Potential project features for the top ranked projects were briefly discussed. An implementation matrix listing different agencies and programs that could assist in funding or constructing projects was also developed.

Recommendations for Corps spin-off projects include:

- A large-scale ecosystem restoration project through the Corps' General Investigations (GI) program on the main stem of Fountain Creek from Colorado Springs to Pueblo, similar to the Fountain Creek Crown Jewel Project envisioned by Senator Salazar
- A Section 216 Review of Completed Projects for the Pueblo Levees
- A Section 205 flood risk reduction project on Fountain Creek from the Monument Creek confluence to the city limits in Colorado Springs
- A potential Section 205 or GI program flood risk reduction project on Highway 24
- Two Section 14 emergency stream bank restoration projects at the Highway 85/87 Bridge and Rainbow Bridge.

The Corps study remains the best source for technical information related to environmental, hydrology, hydraulics, geomorphology, and sediment transport elements of individual planning and design projects. The general recommendations are used as guiding principles for the Fountain Creek Watershed, Flood Control and Greenway District. The recommended projects warrant

further consideration for pursuit of Corps project funding.

#### **2.C.3. The Fountain Creek Vision Task Force Strategic Plan**

Beginning in July, 2006, the Fountain Creek Vision Task Force was a collaborative effort of government officials, advocacy groups, and residents who began working together to develop a strategic plan to develop strategies and specific implementation goals and objectives. The mission of the Task Force was to turn the Fountain Creek Watershed "into a regional asset that adds value to our communities." The culmination of the task force effort was the signing of an Intergovernmental Agreement that led to the formation of the Fountain Creek Watershed, Flood Control and Greenway District.

The *Strategic Plan for the Fountain Creek Watershed* was published in March, 2009 and documents 9 topic areas for which goals, objectives and strategies were prepared by the Task Force working groups. An implementation plan is provided for each strategy with target completion dates, recommended responsible entity, and partners. The 9 topic areas include:

1. Water Quality and Sedimentation
2. Flooding and Stormwater Management
3. Municipal Water Supplies and Return Flows
4. Land Use Planning and Development
5. Recreation
6. Wetlands
7. Wildlife
8. Agriculture
9. Outreach

The strategic plan is used as a guidance document for the Fountain Creek Watershed, Flood Control and Greenway District.

#### **2.C.4. City of Colorado Springs Stormwater Management Assessment and Standards Development**

The City of Colorado Springs (City) is investigating ways to improve its approach to stormwater management. The overall project goal is to Complete a comprehensive assessment of the City's stormwater management policies and practices and revise appropriate documents to provide an integrated, "watershed wise" approach that is technically sound, cost effective and practical to implement.

The Project will advance watershed stewardship and economic viability through the implementation of stormwater planning and design that incorporates forward-thinking, yet proven methods to enhance our stream corridors and promote them as amenities that provide improved flood protection and water quality, create aesthetic and habitat significance, and offer recreational opportunities to augment the City's quality of life and economic vitality.

The key recommendations developed as part of the initial stages of the project were to:

1. Use Douglas County and UDFCD drainage manuals by reference or inclusion and modify as needed.
2. Change the detention storage policy to "sub-regional, full spectrum" concept.

The primary product of the effort will be a new stormwater criteria manual that will provide the engineering standards for stormwater planning and design of projects. An annotated outline of the new manual has been prepared and includes the following chapters:

1. GENERAL PROVISIONS
2. STORMWATER MANAGEMENT POLICY AND PRINCIPLES
3. STORMWATER MANAGEMENT AND DEVELOPMENT
4. DRAINAGE REPORT AND CONSTRUCTION DRAWING SUBMITTAL REQUIREMENTS
5. FLOODPLAIN MANAGEMENT
6. HYDROLOGY
7. STREET DRAINAGE
8. INLETS
9. STORM SEWERS
10. CONDUIT OUTLET STRUCTURES
11. CULVERTS AND BRIDGES
12. OPEN CHANNEL DESIGN
13. STORAGE
14. REVEGETATION

A comprehensive analysis of stormwater management standards along the Front Range and across the country has been completed, along with an evaluation of related city policies and guiding documents. Technical analysis of specific topic areas including channel design and sediment transport, hydrology and rainfall/runoff calibration, detention, streets/inlets/storm sewers and revegetation are underway.

Draft chapter text is being prepared and distributed for public review and comment. A community participation

process is ongoing. A final manual is scheduled to be completed in the first quarter of 2012.

The City of Colorado Springs has identified 4 potential spin-off projects that they believe would be necessary to accomplish a more integrated, watershed wise stormwater management approach consistent with the overall project goal. These potential spin-off projects would:

1. Evaluate site planning and design standards
2. Evaluate floodplain administration policies
3. Evaluate improvement phasing policy
4. Evaluate watershed-wide issues to allow adoption of the manual throughout the Fountain Creek Watershed

These spin-off projects are currently unfunded and efforts are underway to work with other municipalities and counties in the watershed to partner in their completion.

### 2.C.5. U.S. Geological Survey Reports and Data

There are numerous U.S. Geological Survey (USGS) publications available that provide essential information relevant to proposed planning and design projects. These publications include scientific investigations of hydrology, sediment transport, water quality, macroinvertebrates and stream morphology elements of Fountain Creek. More recent USGS publications are available on the USGS Colorado Water Science website via the "Publications" link below by searching "Keyword: Fountain Creek".

<http://co.water.usgs.gov/publications/>

An example of the results from this search can be seen in Figure 2.1.

The USGS also directs a substantial ongoing data collection effort jointly funded by the City of Colorado Springs on Fountain Creek stream flow and water quality. These data are available on the USGS Colorado Water Science website via the "Information/Data" link below.

<http://co.water.usgs.gov/infodata/>

The user can find both real-time and historical data.

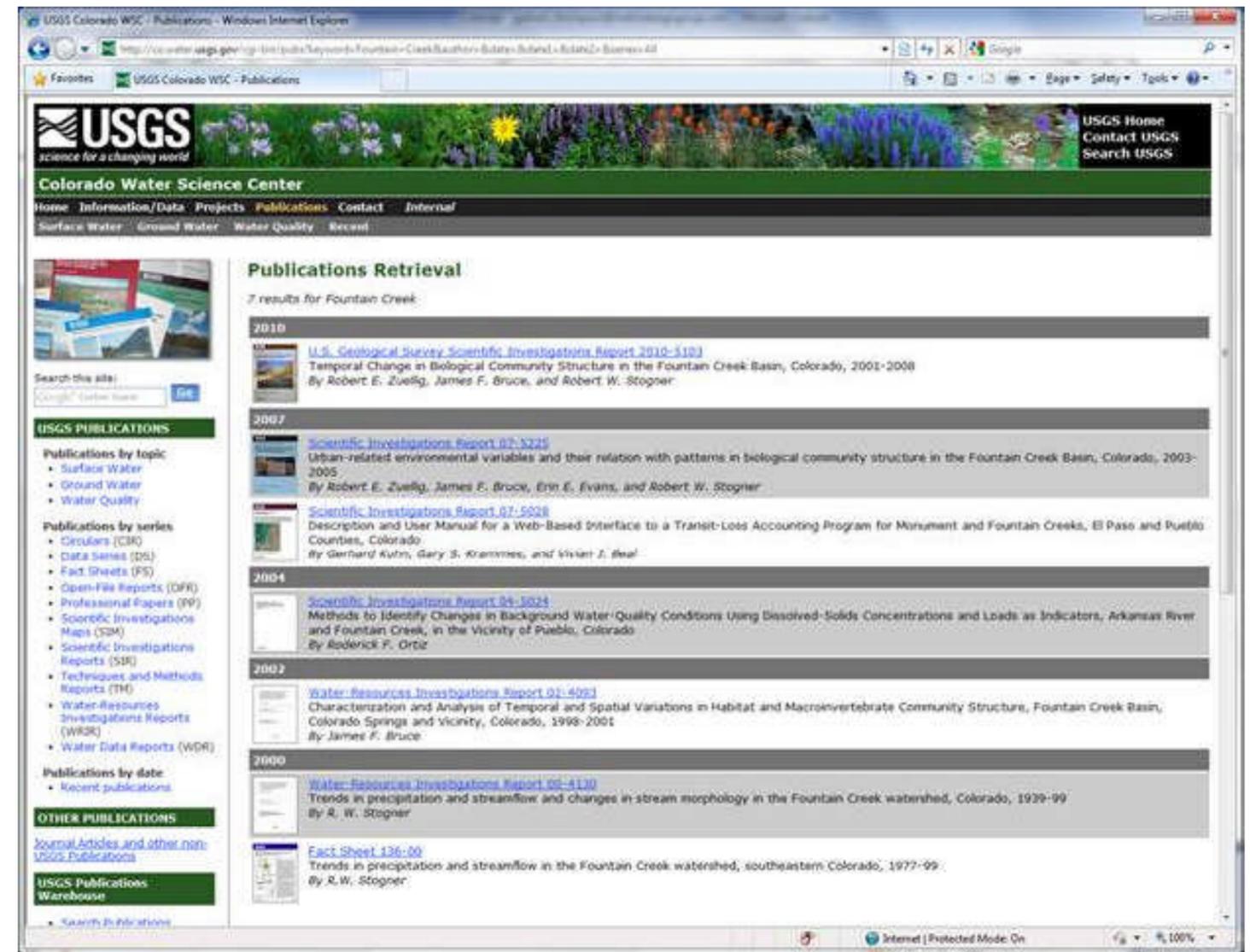
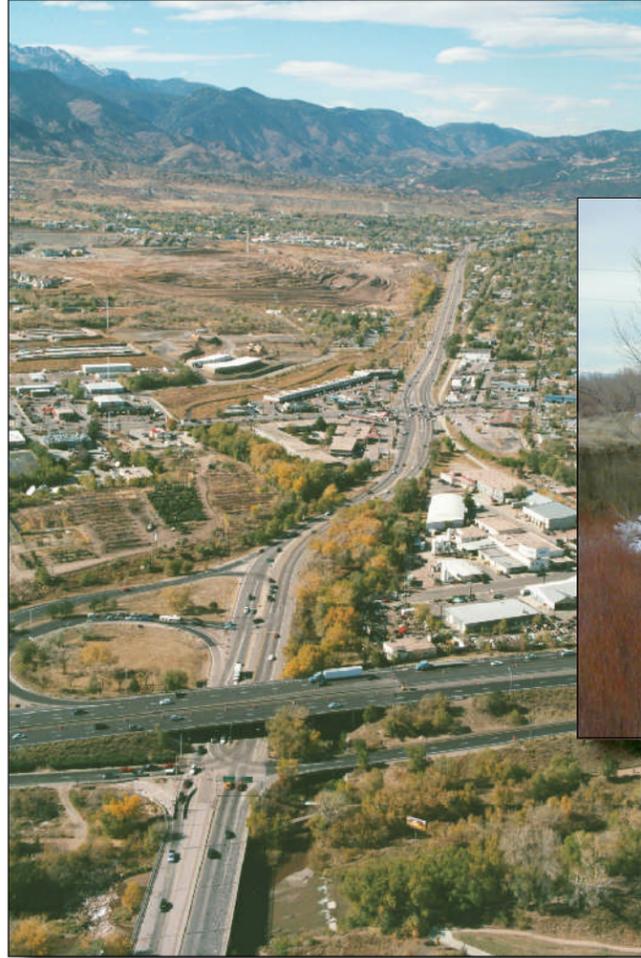


Figure 2.1

# CHAPTER 3: Existing Conditions



### 3.A. Type of Landownership Adjacent to Fountain Creek

Figure 3.1 is a map that shows the type of land ownership immediately adjacent to the Creek. The different types of ownership classifications are shown in the legend of Figure 3.1. This map shows who currently controls the floodplain of Fountain Creek. The majority of the floodplain south of the City of Fountain is in private ownership. Some of the land is in trusts and some is owned by corporations. Within the City of Pueblo and from the City of Fountain north, there is a large percentage of the floodplain in public ownership. Naturally, the reaches of Fountain Creek that are privately owned have little public access while most of the public access occurs in the City of Pueblo and from the City of Fountain north to the City of Colorado Springs. Some of the healthiest reaches of Fountain Creek occur in areas where the floodplain is in private ownership, while many of the unstable reaches of Fountain Creek occur in areas of public ownership. This simple fact has contributed to a negative community misconception about the condition and beauty of Fountain Creek.

Also, it is clear that with the majority of the Fountain Creek floodplain in private ownership, the most effective approach to restoration projects will be public / private partnerships that include conservation easements and government programs / grants for private property owners. Section 4.C Funding discusses different programs and grant opportunities.



Public Owned Floodplain

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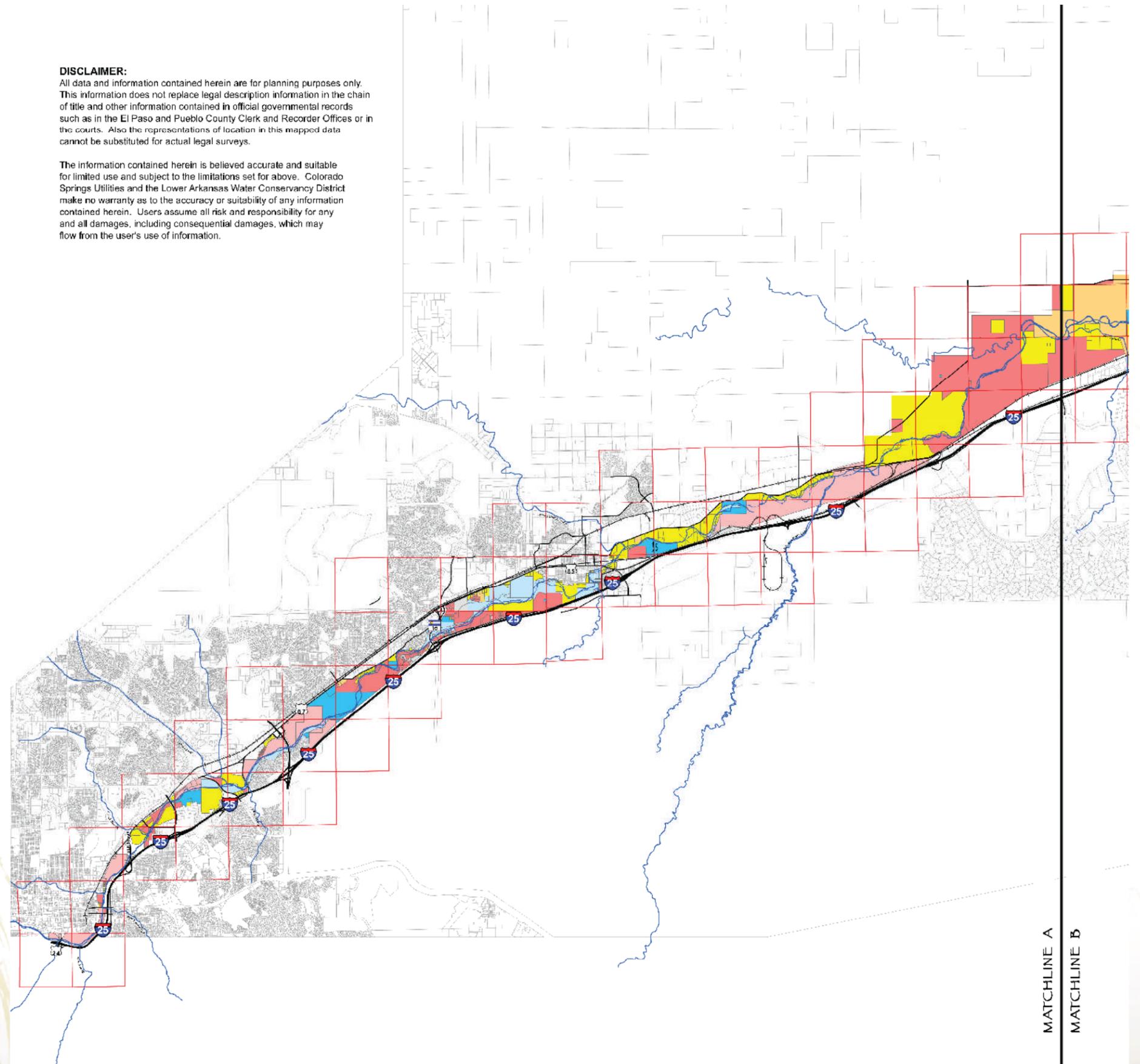
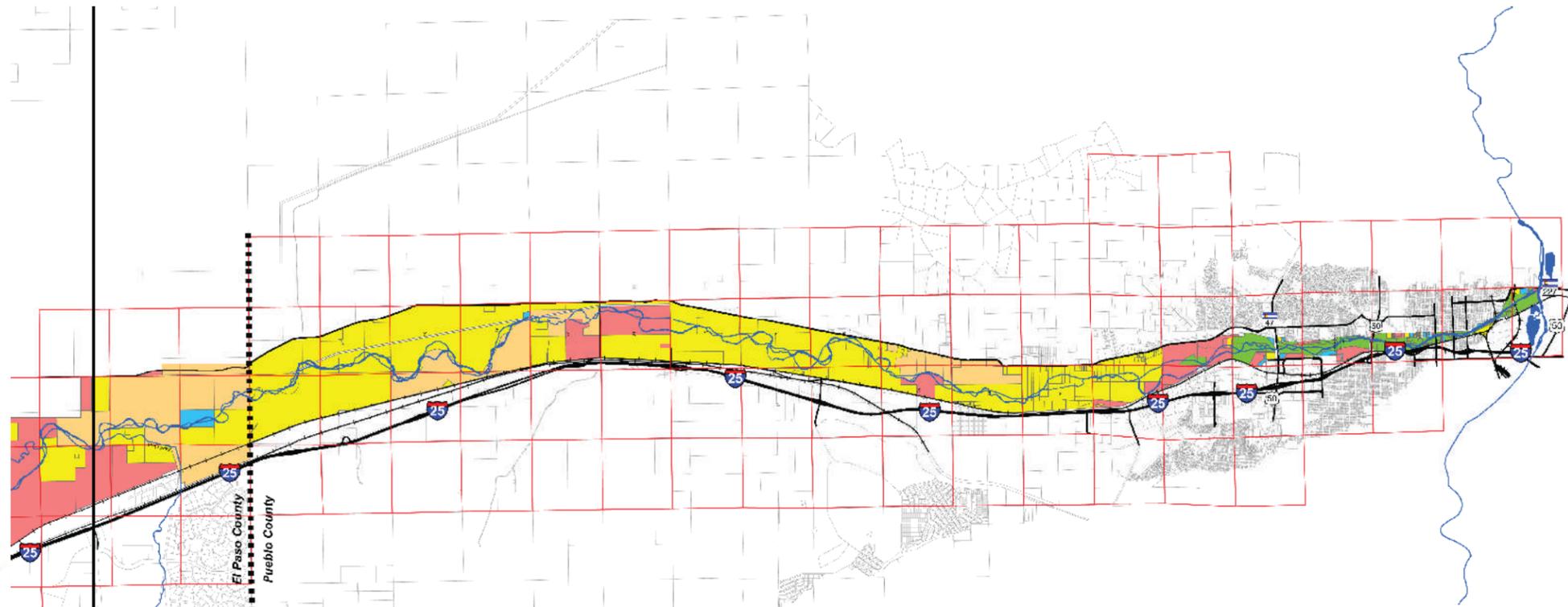


Figure 3.1



### TYPES OF OWNERSHIPS ADJACENT TO FOUNTAIN CREEK IN THE CORRIDOR

#### Ownership Classification

-  City of Pueblo
  -  City of Colorado Springs
  -  El Paso County
  -  Other Public
  -  Corporate
  -  Held in Trusts
  -  Private
-  Section Lines - each section represents an area of approximately one square mile.

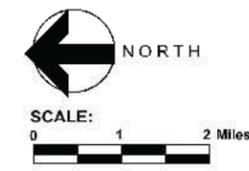


Private Owned Floodplain

MATCHLINE A  
MATCHLINE B

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The Lower Arkansas Water Conservancy District**

PREPARED BY:  
  
THK  
2951 South Florida Street, Suite 101  
Aurora, Colorado 80014  
303.770.7201 Fax 303.770.7132



July, 2011

## FOUNTAIN CREEK CORRIDOR MASTER PLAN

**El Paso and Pueblo Counties, Colorado**

### 3.B. Factors Influencing the Opportunities and Constraints in the Fountain Creek Area

Figure 3.2 is intended to provide a more regional view of opportunities and constraints in the Fountain Creek area that would have an influence on restoration concepts for Fountain Creek. When analyzing this map, the large land ownerships, both public and private, are immediately apparent. The concept behind the "Peak to Prairie Initiative" managed by Colorado Open Lands is very clear. With so many large property owners, it makes sense, as this Master Plan recommends, to prioritize the acquisition of conservation easements. With several strategic acquisitions, major sections of the Fountain Creek Corridor can be conserved. Also, with major State Land Board holdings east of Fountain Creek and Fort Carson Military Reservation on the west side of Fountain Creek, planning habitat linkage zones across and along Fountain Creek is a major opportunity that must be considered as a part of conservation easement acquisition and on all restoration projects.

Therefore, it is the recommendation of this Master Plan that a "Green Infrastructure Plan" be developed for the Master Plan study area. The emphasis of this plan would be to reconnect habitats by insuring connectivity of drainage corridors and connectivity to large tracts of publicly owned open space.



This map also shows areas where there are existing trails within the Fountain Creek Corridor and where trails currently do not exist. Clearly, public access to Fountain Creek through the project study area is very limited. Therefore, public access should be a priority in developing restoration projects for Fountain Creek.

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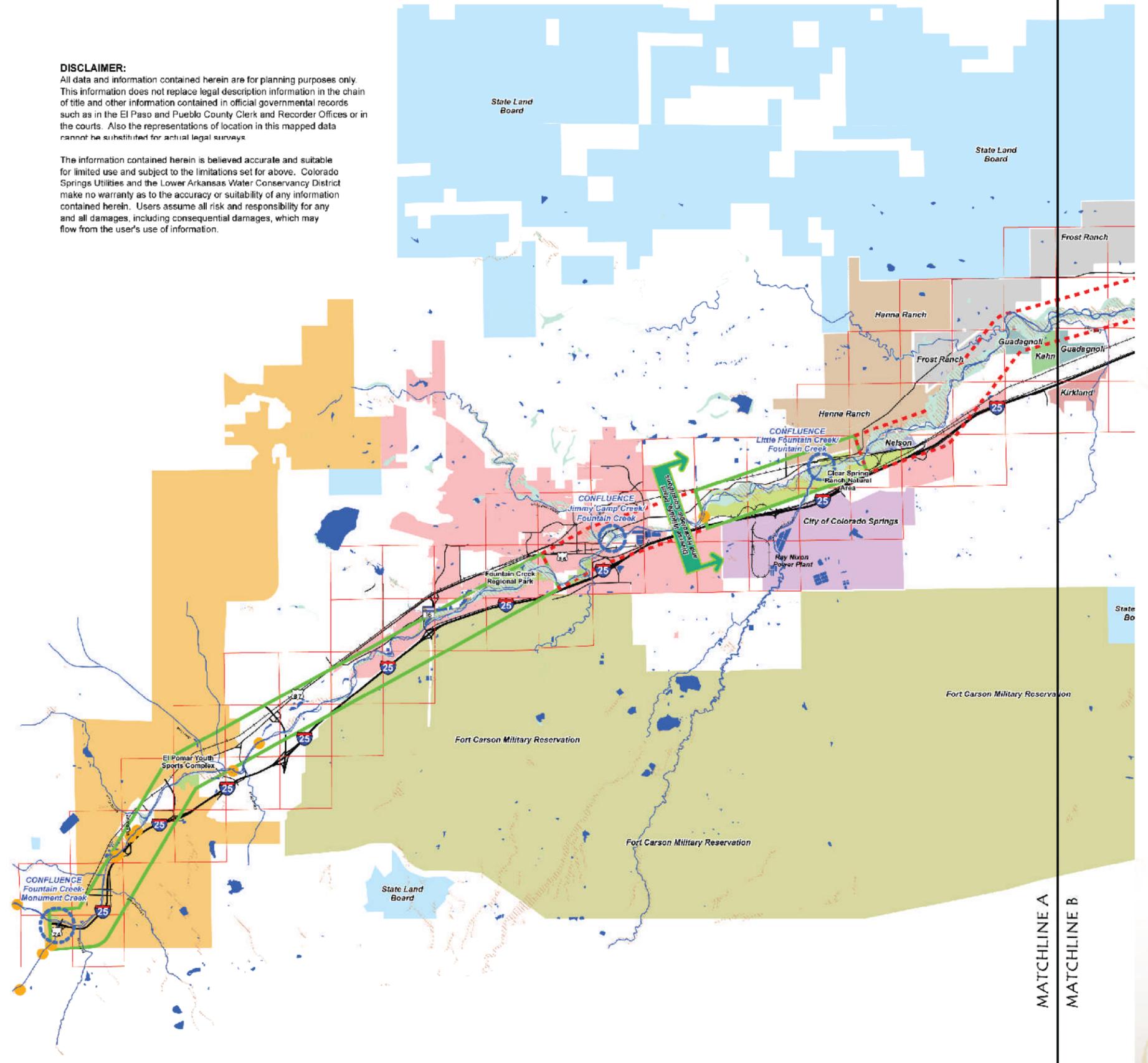
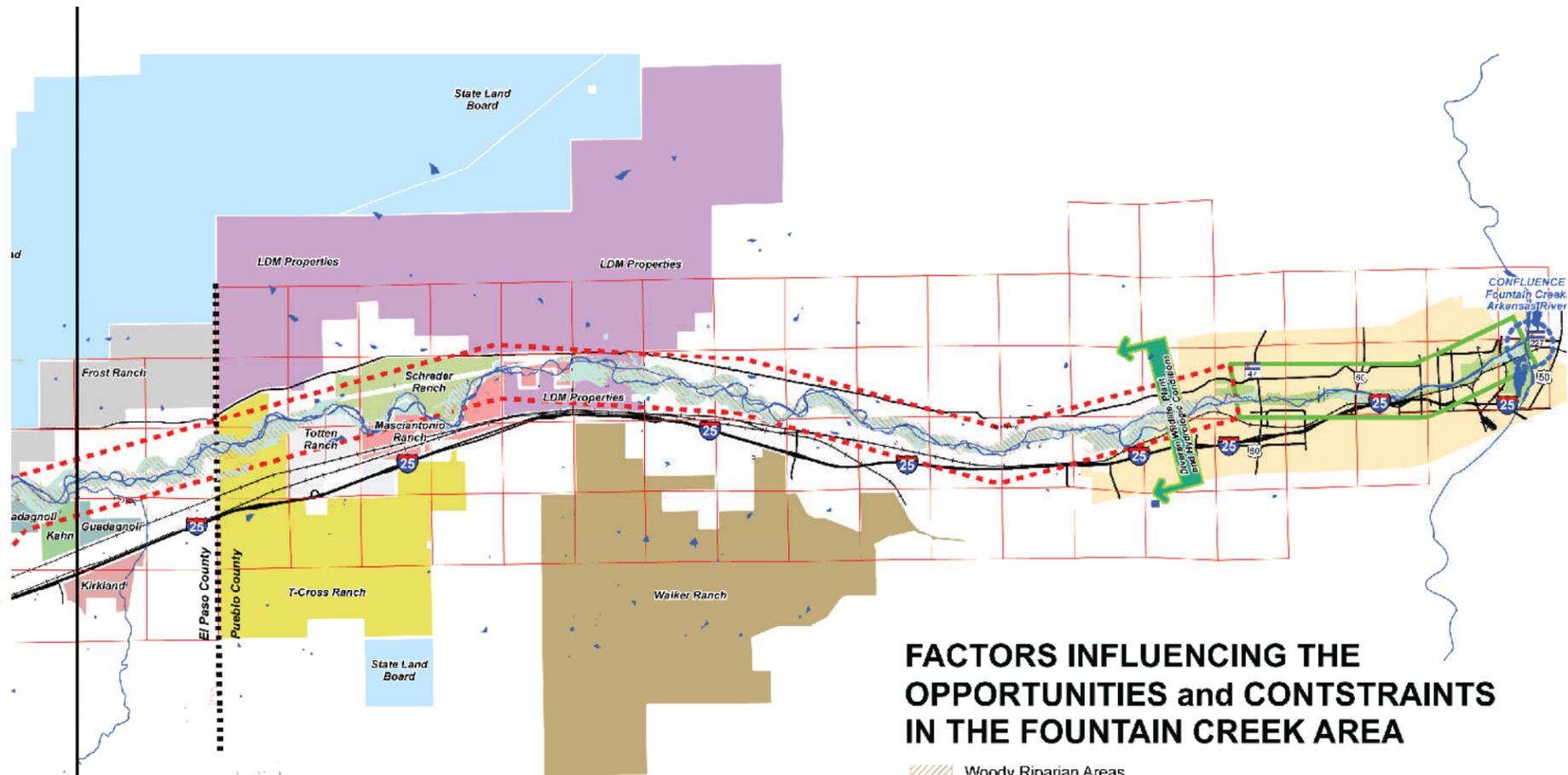


Figure 3.2

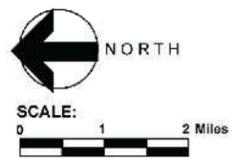


### FACTORS INFLUENCING THE OPPORTUNITIES and CONSTRAINTS IN THE FOUNTAIN CREEK AREA

- Woody Riparian Areas
- Current Wetland Areas
- Dedicated or Identified Park Sites
- Clear Spring Ranch Natural Area
- Fish Barriers
- Areas with Built Trails - Access to Fountain Creek
- No Trails Currently Exist - No Access to Fountain Creek
- Confluence Areas - Streams and Rivers
- El Paso/Pueblo County Line
- City of Pueblo Municipal Boundaries
- City of Colorado Springs Municipal Boundaries
- City of Fountain Municipal Boundaries
- Fort Carson Military Reservation
- Properties of Influence - Various Colors and Labeled (Large Tracts, Conserved Properties, "Anchor Properties" Identified by Colorado Open Lands)
- Section Lines - each section represents an area of approximately one square mile.

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 The Lower Arkansas Water Conservancy District**

PREPARED BY:  
  
 THK ASSOCIATES, INC.  
 2955 South Nevada Street, Suite 100  
 Aurora, Colorado 80014  
 303.770.7888 fax 303.770.7132



July, 2011

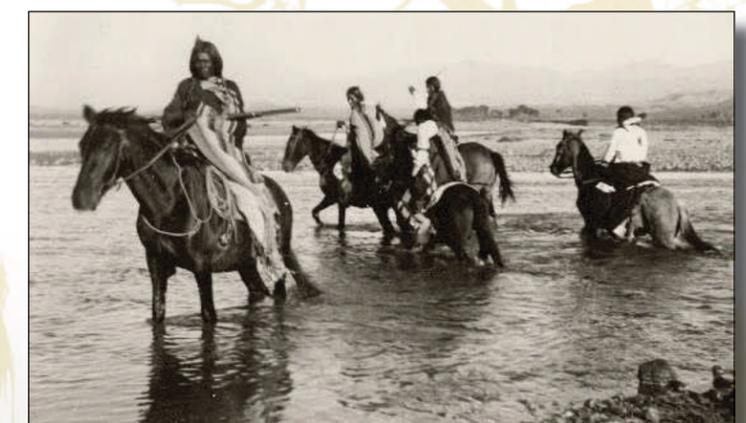
## FOUNTAIN CREEK CORRIDOR MASTER PLAN

**El Paso and Pueblo Counties, Colorado**

It can be seen that much of the existing woody riparian areas and wetland areas that occur within the Fountain Creek Corridor do not have public access. Within the Master Plan study area, the floodplain is mostly in private ownership. This makes these areas the most valuable resources for conservation. Fish barriers are also identified. These barriers are locations within Fountain Creek where native species of fish are blocked from making their natural migration upstream and downstream; thus, disconnecting the aquatic habitats. This Master Plan represents the need to create fish passages that will reconnect aquatic habitats and allow migration within the Creek.



Finally, this map identifies the major confluence areas of Fountain Creek within the project study area. The confluence areas present opportunities for major habitat restoration, developing a key cross road for trail networks and open spaces that can become major elements of a Fountain Creek Greenway system. Creek confluences are significant to human history and life on Fountain Creek. They were meeting places, trail cross roads and the sites for town and village development. Therefore, the confluence areas provide an opportunity as a cultural resource to interpret human history on Fountain Creek.



### 3.C. Creek Character

#### 3.C.1. Channel Character

Fountain Creek was divided into 13 segments for evaluation in the Fountain Creek Watershed Study (FCWS) Geomorphology Report (USACE, 2007). See Figure 3.3. These segments were divided based on changes in hydrology, changes in longitudinal slope and changes in geomorphic characteristics. A description of the existing geomorphic conditions for each of these segments is provided below. Sections depicting the existing condition of the Creek are located in Figures 3.4 through 3.8.

**Segment 1** is located between the confluence of Upper (West) Fountain Creek and Monument Creek to upstream of Fountain Boulevard. This section of Fountain Creek is an unhealthy ecosystem and relatively unstable with a tendency to degrade.

- Channel Cross Section – Typical Urban Incised Channel
- Channel Pattern – Low sinuosity (<1.2) due to channelization
- Relatively Steep Slope (>0.0043ft/ft)

**Segment 2** is located upstream of Fountain Boulevard to upstream of HWY 85/87 at the Sand Creek confluence. This section of Fountain Creek is an unhealthy ecosystem and relatively unstable with a tendency to degrade.

- Channel Cross Section – Typical Rural Incised Channel
- Channel Pattern – Low sinuosity (<1.2) due to channelization
- Relatively Steep Slope (>0.0043 ft/ft)

**Segment 3** is located upstream of HWY 85/87 at the Sand Creek Confluence to downstream of Mesa Ridge Parkway. This section of Fountain Creek is an unhealthy ecosystem and relatively unstable with a tendency to degrade.

- Channel Cross Section – Typical Rural Incised Channel
- Channel Pattern – Moderate sinuosity (1.2-1.5) constrained by vertical entrenchment
- Relatively Steep Slope (>0.0043 ft/ft)

**Segment 4** is located downstream of Mesa Ridge Parkway to downstream of Santa Fe Avenue at the Jimmy Camp Creek confluence. This section of Fountain Creek is an unhealthy ecosystem and relatively unstable

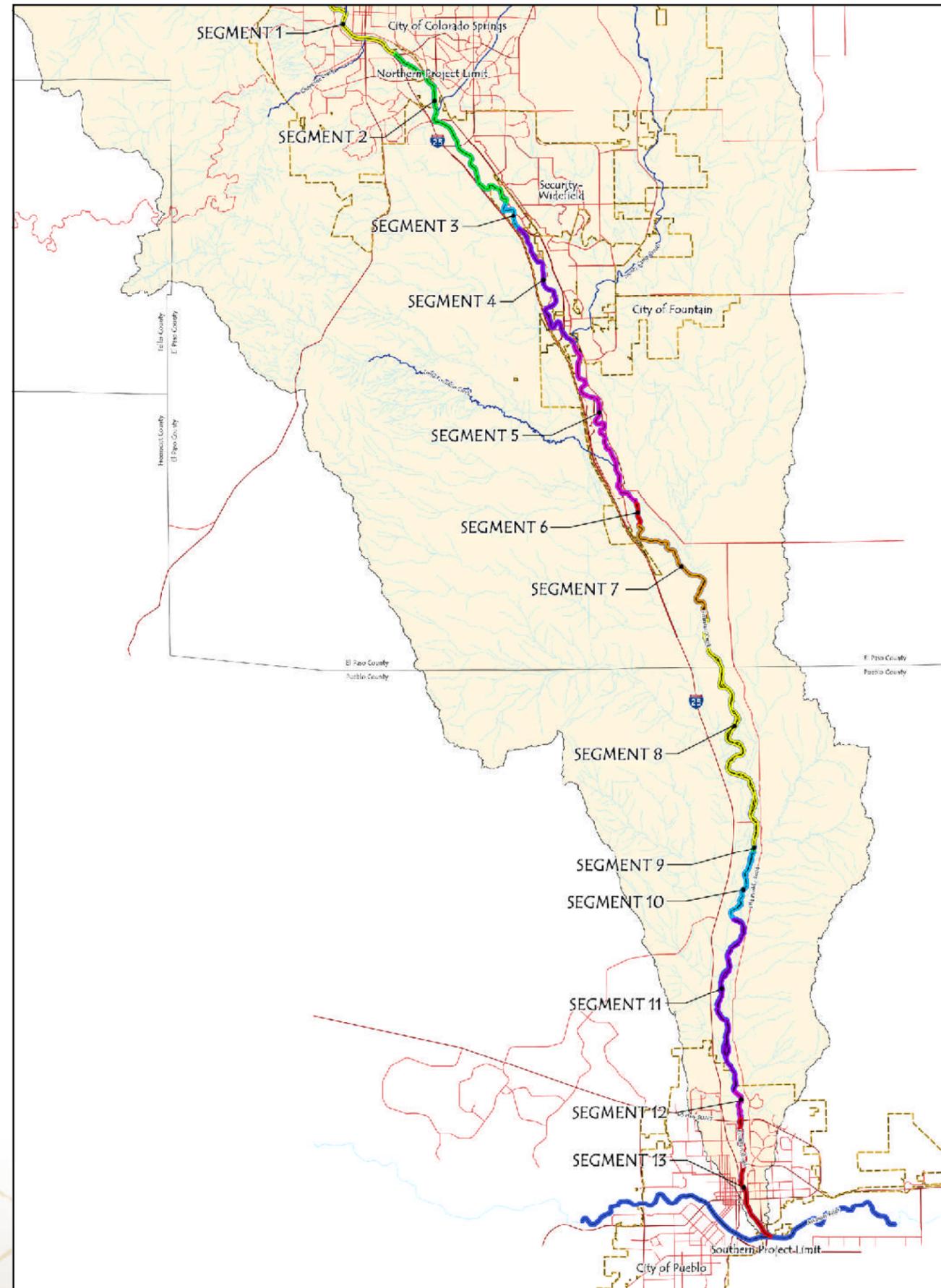


Figure 3.3

with zones of aggradation and degradation.

- Channel Cross Section – Typical Rural Incised and Depositional Channels
- Channel Pattern – Moderate sinuosity (1.2-1.5) constrained by vertical entrenchment
- Relatively Steep Slope (>0.0043 ft/ft)

**Segment 5** is located downstream of Santa Fe Avenue at the Jimmy Camp Creek confluence to northeast of Pikes Peak International Raceway. This section of Fountain Creek is an unhealthy ecosystem and relatively unstable with zones of aggradation and degradation.

- Channel Cross Section – Typical Rural Incised and Depositional Channels
- Channel Pattern – Moderate sinuosity (1.2-1.5) has increased over time due to lateral migration
- Moderate Slope (0.0040-0.0043ft/ft)

**Segment 6** is located northeast of Pikes Peak International Raceway to southeast of Pikes Peak International Raceway. This section of Fountain Creek is an unhealthy ecosystem and generally stable with a tendency to aggrade.

- Channel Cross Section – Typical Rural Depositional Channel
- Channel Pattern – Moderate sinuosity (1.2-1.5)
- Moderate Slope (0.0040-0.0043 ft/ft)

**Segment 7** is located southeast of Pikes Peak International Raceway to the Williams Creek Confluence. This section of Fountain Creek is an unhealthy ecosystem and generally stable with a tendency to aggrade.

- Channel Cross Section – Typical Rural Depositional Channel
- Channel Pattern – Moderate sinuosity (1.2-1.5) consistent over time
- Mild Slope (<0.0040ft/ft)

**Segment 8** is located downstream of the Williams Creek Confluence to the Young Hollow Confluence. This section of Fountain Creek is an unhealthy ecosystem and generally stable with a tendency to aggrade.

- Channel Cross Section – Typical Rural Depositional Channel
- Channel Pattern – Moderate sinuosity (1.2-1.5) has increased over time due to meander compression
- Mild Slope (<0.0040 ft/ft)

**Segment 9** is located at the Young Hollow Confluence to southeast of Pace Road. This section of Fountain Creek is a healthy ecosystem and generally stable with a tendency to aggrade.

- Channel Cross Section – Typical Stable Channel

- Channel Pattern – Moderate sinuosity (1.2-1.5) increased over time due to meander compression
- Mild Slope (<0.0040 ft/ft)

**Segment 10** is located southeast of Pace Road to east of Gobatti Road at the Steele Hollow Confluence. This section of Fountain Creek is a healthy ecosystem and generally stable with a tendency slight to degrade.

- Channel Cross Section – Typical Stable Channel
- Channel Pattern – Moderate sinuosity (1.2-1.5)
- Mild Slope (<0.0040 ft/ft)

**Segment 11** is located east of Gobatti Road at the Steele Hollow Confluence to west of Randall Road. This section of Fountain Creek is a healthy ecosystem and generally stable with a tendency to aggrade.

- Channel Cross Section – Typical Stable Channel
- Channel Pattern – Moderate sinuosity (1.2-1.5) has increased over time due to meander compression
- Moderate Slope (0.0040-0.0043 ft/ft)

**Segment 12** is located west of Randall Road to upstream of U.S. 50. This section of Fountain Creek is a healthy ecosystem and generally stable with a tendency to aggrade.

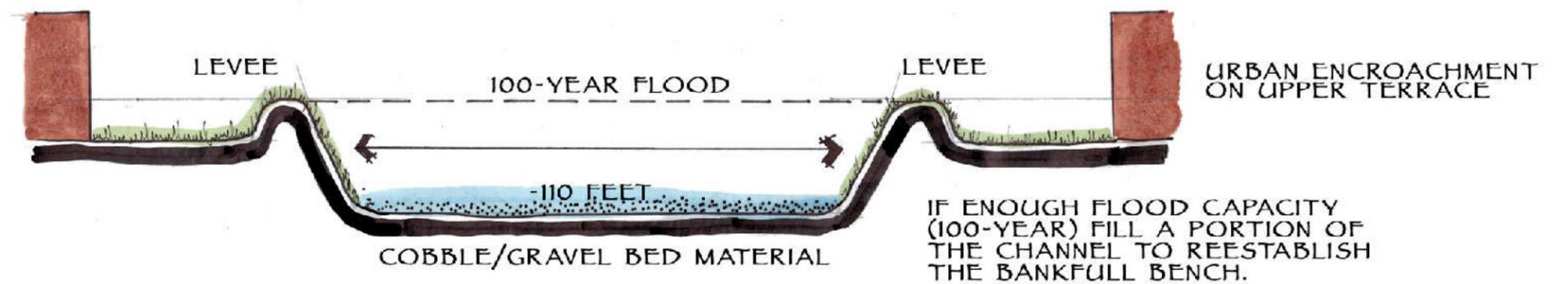
- Channel Cross Section – Typical Stable Channel
- Channel Pattern – Moderate sinuosity (1.2-1.5)
- Relatively Steep Slope (>0.0043 ft/ft)

**Segment 13** is located upstream of U.S. 50 to the Arkansas River Confluence. This section of Fountain Creek is an unhealthy ecosystem with pronounced aggradation.

- Channel Cross Section – Typical Urban Depositional Channel
- Channel Pattern – Low sinuosity (<1.2) due to channelization
- Moderate Slope (0.0040-0.0043 ft/ft)

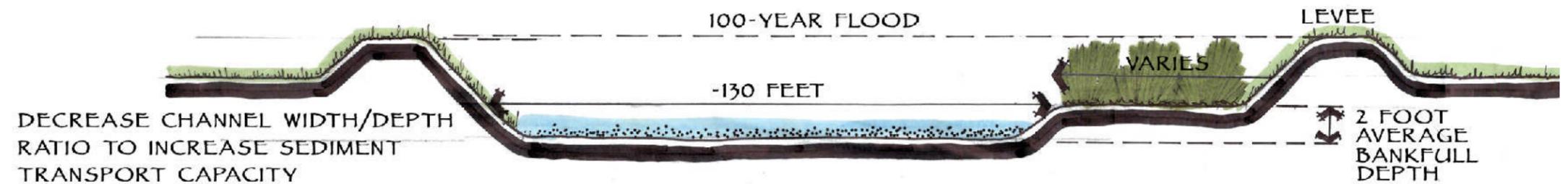
### 3.C.2. Geology and Landforms

The project corridor of Fountain Creek lies in the Piedmont Province, an erosional valley separating the Rocky Mountain Province from the High Plains Province. Surface deposits in the Fountain Creek valley consist of Quaternary sediments eroded mainly from the Rocky Mountains to the west. These sediments were deposited within the valley as floodplains and terraces over older Cretaceous Pierre shale. As a result, the channel bed and banks of the Creek are made up of Quaternary sands and gravels. Where bedrock is exposed along the Fountain Creek channel, it is Pierre shale.



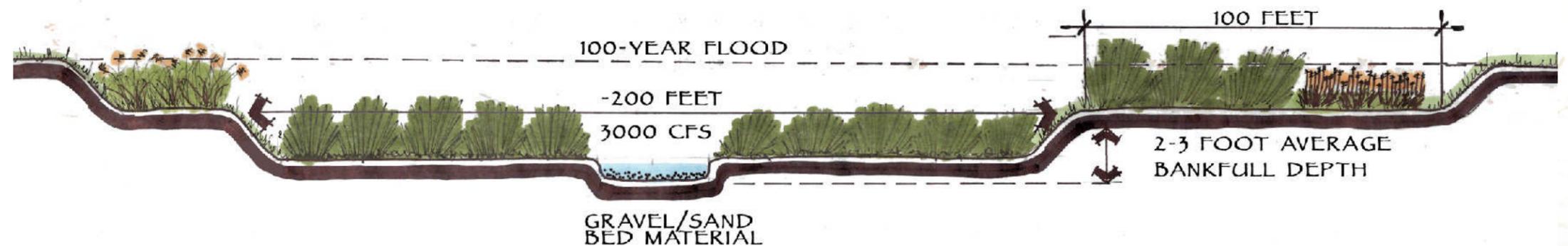
**TYPICAL URBAN INCISED CHANNEL**  
ENCROACHMENT AND HYDROLOGY CHANGE CAUSES DOWNCUTTING

Figure 3.4



**TYPICAL URBAN DEPOSITIONAL CHANNEL**  
ENCROACHMENT AND DEPOSITION

Figure 3.5



**TYPICAL STABLE CHANNEL**  
ENERGY AND DEPTH FOCUSED WITHIN THE BANKFULL CHANNEL

Figure 3.6

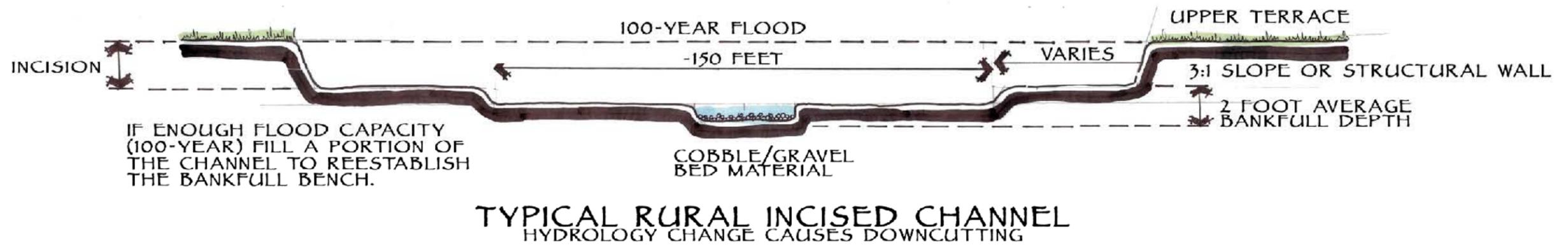


Figure 3.7

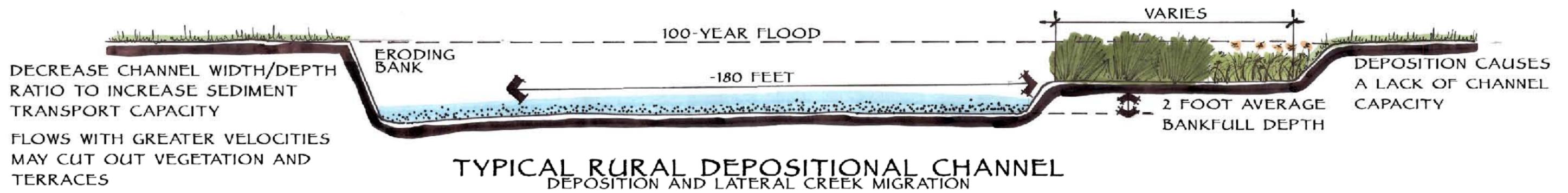


Figure 3.8

The "active" floodplain, where bars are actively building and eroding, is about 2 to 3 feet above the current channel along stable reaches. Above the active floodplain are terraces that are older, abandoned floodplains. The valley exhibits 3 primary terraces typical of alluvial fill valleys in Colorado and the western states. A gross oversimplification of these terrace levels along Fountain Creek would place them at approximately 5 feet, 10 feet, and 20 to 30 feet above the current channel. Large 20'-30' cut banks are occurring in unstable segments of the Creek where the Creek is moving and cutting into the upper terrace.

### 3.C.3. Soils

Consistent with the landforms described in the previous section, soils along the Fountain Creek corridor formed in terraces and floodplains from alluvial parent material. Soils are shallow to moderately deep and are comprised of sandy clay loam, sandy loam or silt loam textures.

### Restoration Soils

Two soil mapping units were identified in the Fountain Creek Watershed Study as having high potential for restoration projects. Fluvaquent Haplaquolls in El Paso County (NRCS mapping unit No. 29) and Apishapa Silty Clay in Pueblo County (NRCS mapping unit Ap) are hydric soils located on terraces and the higher portions of floodplains with continual sources of alluvial groundwater. Mapping of these soils is provided in the Fountain Creek Watershed Study, as well as NRCS Soil Survey data. They are generally located in close proximity to the riparian corridor and are easily accessible. Due to their landscape positions, these soils are elevated out of the immediate floodplain and are consequently not as prone to erosion. Another appealing characteristic of these soils is that they readily support riparian and wetland vegetation. When considering restoration projects along Fountain Creek, the information on Fluvaquent Haplaquolls and Apishapa Silty Clay soils should be considered along with other project planning.

### Erodible soils

The Fountain Creek Watershed Study also identifies soils that are highly susceptible to erosion. Figure 2-3 of the Soils report (March 2006) presents the water erosion potential for soils in the Fountain Creek watershed. It is notable that on long reaches of the project corridor, particularly in Pueblo County, soils of the adjacent terraces exhibit severe erosion potential. Examples of this potential are readily observable in the field, where nearly vertical cut banks, up to 30 feet tall, can be seen where the channel has eroded laterally against a high terrace. Terrace cut banks and associated highly erodible soils are particularly important for project planning along the Fountain Creek corridor. These eroding terraces have the potential to contribute enormous amounts of sediment downstream. Restoration of eroding terraces should be considered as a primary means of reducing downstream sediment supply. At the same time, given that they are highly erodible and have low fertility and water availability, these sites pose significant challenges to restoration.

### 3.C.4. Planform

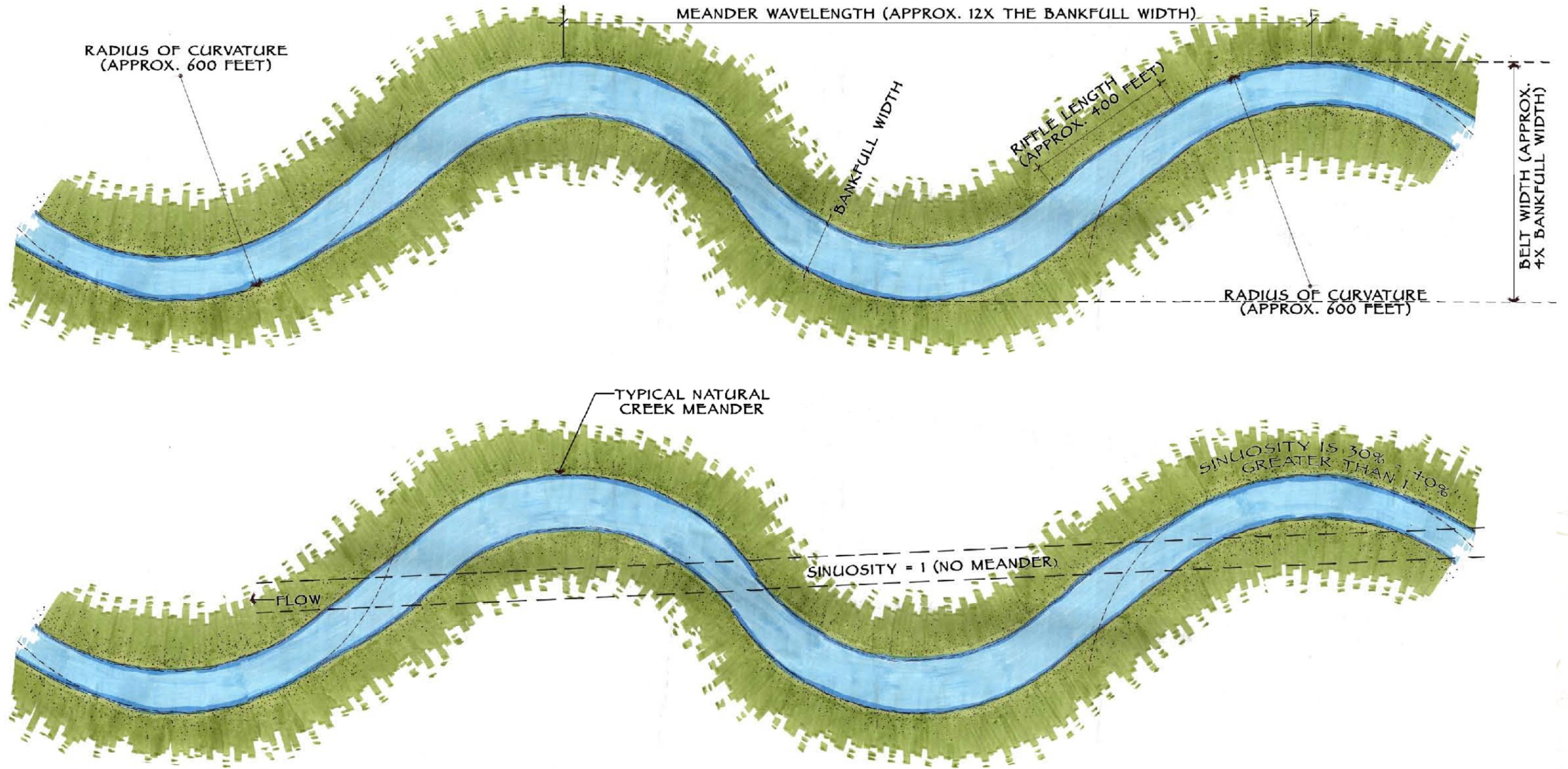
Geomorphologic parameters representing hydraulic planform features along the project corridor were referenced from the Fountain Creek Watershed Study. Planform features represent the meandering pattern of the stream channel as observed via aerial photography. Typical parameters are defined below.

#### Sinuosity

Stream sinuosity is a measure of the meandering nature of a stream and is determined by dividing the stream length by the valley length measured from the same longitudinal endpoints.

#### Bankfull Flow

Bankfull flow is defined as the stream discharge when a stable river is about to spill onto its floodplain. The extent (width) of the active channel is the areal representation of bankfull in plan view. The elevation of the floodplain at bankfull can be referred to as a bankfull bench or floodplain bench.



**Meander Belt**

The meander belt is defined as the area between lines drawn tangential to the extreme limits of fully developed meanders. The meander belt outlines the zone along the valley floor across which a meandering stream might shift its channel during a certain time period.

**Meander Wavelength**

The meander wavelength is defined as the linear distance between two corresponding points on the same phase of two successive meanders. Meander wavelength provides an indication of meander scale, stream width and stream sinuosity.

Figure 3.9 - General Natural Creek Meander Characteristics

**Meander Radius of Curvature**

The meander radius is defined as the radius of the circular arc that best describes the outside bend of a stream meander. The meander radius of curvature is related to stream width, stream flow and meander wavelength and is an important parameter used in channel classifications. See Figure 3.9.

### 3.D. Typical Ecosystems

#### 1. Introduction

The Fountain Creek Corridor includes many healthy ecosystems that support an abundance of plant and animal life. As you move away from the Creek in either direction, a cross-section of the Creek reveals a variety of ecosystems. See Figure 3.10. These ecosystems include:

- The Creek (Open Water Channel)
- Sandbar / Gravel Creek Bank
- Riparian Woodlands/Fringe Wetland
- Marsh Riparian
- Pond
- Cottonwood Gallery
- Shrub / Grassland

#### a. The Creek (Open Water Channel) Ecosystem

– This is the area where open water flows. This open water channel can be narrow and deep or wide with meandering channels separated by gravel sandbars that are sparsely vegetated. Vegetation that relates to this zone is described in the Sandbar / Gravel Creek Bank ecosystem below.

#### b. Sandbar / Gravel Creek Bank Ecosystems

– Sandbars and gravel banks / gravel benches exist along the entire Fountain Creek Corridor. These alluvial areas are comprised of sand, gravel and rock benches that capture trees and debris along the Creek.

These areas are free draining with little or no organic material. They exist at or just above the Creek flow elevation (0 – 12" above the Creek). Non-invasive species include willow shrubs, native grasses and herbaceous plants (weeds). This ecosystem has limited vegetation and includes several invasive species. The invasive species also include small stands of cattails, salt cedar and phragmites.

Sandbar / Gravel Bank Ecosystems existing plant list:

##### Trees

- Peach-leaf Willow (*Salix amygdaloides*)
- Narrow-leaf Cottonwood (*Populus angustifolia*)

##### Shrubs

- Sandbar Willow "Coyote" (*Salix exigua*)
- Whiplash Willow (*Salix lasiandra*)

##### Invasive Species

- Salt Cedar (*Tamarix chinensis, ramosissima & parviflora*) See Figure 3.11
- Cattails (*Typhus latifolia*)
- Reed Canary Grass (*Phragmite australis*)
- Russian Olive (*elaegnus angustifolia*)



Figure 3.11 - Salt Cedar

#### c. Riparian Woodland/Fringe Wetland Ecosystem

– Due to its proximity to the existing water table, this is the most prolific ecosystem of the Fountain Creek Corridor.

It generally occurs 12" to 24" above creek elevation. This area is immediately adjacent to the Creek and it includes trees, shrubs grasses, rushes and sedges. Because of the abundance of water, the plant species are numerous and diverse. It is one of the "greenest" ecosystems that parallels the entire Fountain Creek Corridor.

Invasive species are prevalent. Large stands of cattails, phragmites and Salt Cedar exist in this zone. Because these invasive species are large and cover vast areas of the Riparian Woodlands ecosystem, they are difficult to control.

Riparian Woodlands/Fringe Wetland Ecosystems existing plant list:

##### Trees

- Peach-leaf Willow (*Salix amygdaloides*)
- Narrow-leaf Cottonwood (*Populus angustifolia*)

##### Shrubs

- Sandbar Willow "Coyote" (*Salix exigua*)
- Whiplash Willow (*Salix lasiandra*)
- Western Chokecherry (*Prunus ssp.*)
- Wild Plum (*Prunus americana*)

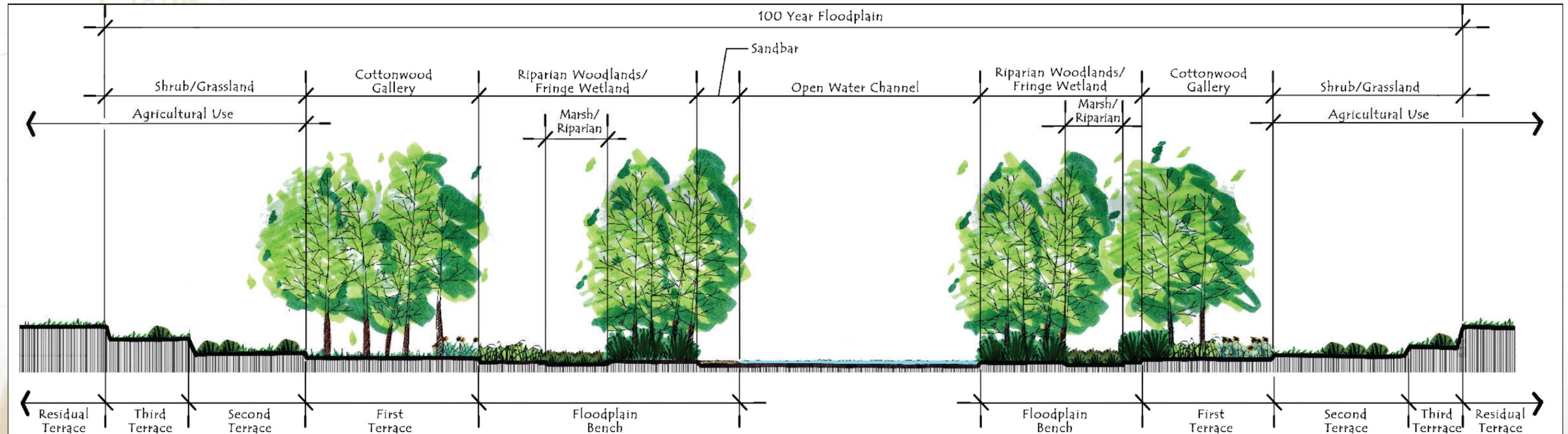


Figure 3.10 - Typical Ecosystems

## Herbaceous Plants

The most common herbaceous species, making up 90-95% of the total herbaceous plant mass in Fountain Creek are:

- Creeping spikerush (*Eleocharis palustris*)
- Baltic rush (*Juncus balticus*)
- Bottlebrush sedge (*Carex hystericina*)

Making up about 4-6% of the total herbaceous plant mass are:

- Woolly sedge (*Carex lanuginosa*)
- Hardstem bulrush (*Schoenoplectus acutus*)

The remainder of the herbaceous plants, making up about 1% of the herbaceous plant mass found are:

### Submerged

- Sweet Flag (*Acoras calamus*)
- Tufted Hairgrass (*deschampsia cespitosa*)
- Least spikerush (*Eleocharis acicularis*)
- Soft Rush (*Juncus effuses*)
- Arrowhead (*Sagittaria latifolia*)
- Three Square Bulrush (*Scirpus pungens*)
- Small Fruit Bulrush (*Scripus microcarpus*)
- Giant Burreed (*Sparganium eurycarpum*)

### Emergent

- Blackcreeper sedge (*Carex praegracilis*)
- Beaked sedge (*Carex utriculata*)
- Arctic rush (*Juncus arcticus*)
- Threestamen rush (*Juncus ensifolium*)
- Slender rush (*Juncus tenuis*)
- Broadfruit burreed (*Sparganium eurycarpum*)
- Water sedge (*Carex aquatalis*)

### Aquatic Fringe

- Sloughgrass (*Beckmannia syzigachne*)
- Blue Joint Reed Grass (*Calamagrostis canadensis*)
- Bebb's sedge (*Carex bebbi*)
- Smallwing sedge (*Carex microptera*)
- Rocky Mountain sedge (*Carex scopulorum*)
- Fox sedge (*Carex vulpinoidea*)
- Inland Saltgrass (*Distichlis spicata*)
- Fowl Managrass (*Glyceria striata*)

### Invasive Species

- Salt Cedar (*Tamarix chinensis, ramosissima & parviflora*)
- Cattails (*Typhus latifolia*) See Figure 3.12

- Reed Canary Grass (*Phragmite australis*)
- Russian Olive (*elaegnus angustifolia*)



Figure 3.12 - Cattails

- d. **Marsh Riparian Ecosystem** – The marsh ecosystems include the transitional areas adjacent to the riparian woodlands, etc. These areas are at or below the normal flow elevations of the Creek. This area includes shrubs, grasses, rushes and sedges. The biodiversity of this ecosystem is large and contains a diverse array of plant species. Soils are usually moist and open water can exist at certain times of the year. Plant species need to be tolerant of being submerged and exposed to seasonal flooding that occurs several times a year.

### Marsh Ecosystems existing plant list:

#### Woody Plants

#### Trees

- Peach-leaf Willow (*Salix amygdaloides*)
- Narrow-leaf Cottonwood (*Populus angustifolia*)
- Plains Cottonwood (*Populus deltoides*)

#### Shrubs

- Sandbar Willow "Coyote" (*Salix exigua*)
- Whiplash Willow (*Salix lasiandra*)
- Western Chokecherry (*Prunus ssp.*)
- Wild Plum (*Prunus americana*)

#### Herbaceous Plants

#### Aquatics

- Marsh milkweed (*Asclepias incarnata*)
- Nuttall's sunflower (*Helianthus nuttallii*)
- Cardinal flower (*Lobelia cardinalis*)
- Common monkeyflower (*Mimulus guttatus*)

- Broadleaf arrowhead (*Sagittaria latifolia*)
- Swamp verbena (*Verbena hastata*)

### Grasses

- American sloughgrass (*Beckmannia syzigachne*)
- Sodar wheatgrass (*Elymus lanceolatus ssp.*)
- Fowl managrass (*Glyceria striata*)
- Green needlegrass (*Nassella viridula*)
- Western wheatgrass (*Pascopyrum smithii*)
- Fowl bluegrass (*Poa palustris*)

### Grass-Like Plants

- Bottlebrush sedge (*Carex hystericina*)
- Woolly sedge (*Carex lanuginosa*)
- Smallwing sedge (*Carex microptera*)
- Nebraska sedge (*Carex nebrascensis*)
- Blackcreeper sedge (*Carex praegracilis*)
- Beaked sedge (*Carex utriculata*)
- Fox sedge (*Carex vulpinoidea*)
- Creeping spikerush (*Eleocharis palustris*)
- Arctic rush (*Juncus arcticus*)
- Threestamen rush (*Juncus ensifolius*)
- Slender rush (*Juncus tenuis*)
- Torrey's rush (*Juncus torreyi*)
- Hardstem bulrush (*Schoenoplectus acutus*)
- Broadfruit burreed (*Sparganium eurycarpum*)
- Baltic Rush (*Juncus balticus*)
- Water Sedge (*Carex aquatalis*)

### Invasive Species

- Salt Cedar (*Tamarix chinensis, ramosissima & parviflora*)
- Cattails (*Typhus latifolia*)
- Reed Canary Grass (*Phragmite australis*) See Figure 3.14
- Russian Olive (*elaegnus angustifolia*) See Figure 3.13



Figure 3.13 - Russian Olive



Figure 3.14 - Reed Canary Grass

- e. **Pond Ecosystems** – Several small ponds exist along the Fountain Creek Corridor. They primarily serve or have served as agricultural ponds for livestock or as irrigation ponds for agricultural production. The ponds are usually void of vegetation except for grasses adjacent to the pond edge. When ponds no longer serve agricultural uses, designers should concentrate on making these water elements more bio-diverse with riparian plantings that will attract wildlife and other users. There is no known plant list for these pond ecosystems. The Riparian Woodlands and Marsh / Wet Meadow ecosystems mentioned above should assist designers when revegetating these pond areas.

- f. **Cottonwood Gallery Ecosystems** – This ecosystem parallels each side of Fountain Creek from Colorado Springs to Hanna Ranch. See Figure 3.15. South of Hanna Ranch, the Cottonwood Gallery becomes more sporadic, but concentrated in certain areas. The cause of this vanishing Cottonwood Gallery is due in part because of development and agricultural uses. Development and agricultural uses adjacent to the Creek have changed the creek/water hydrology.

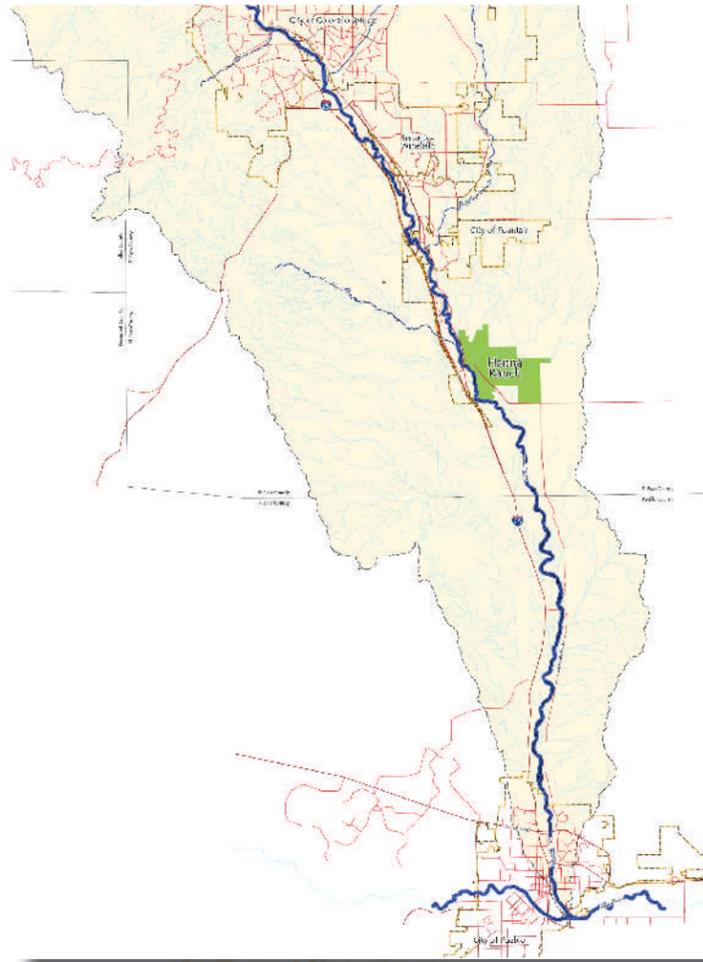


Figure 3.15 - Hanna Ranch Location Map

The Cottonwood Gallery exists on the upper floodplain bench that parallels Fountain Creek. These large Cottonwoods have a dense understory of shrubs and native grasses. The Gallery protects Fountain Creek from eroding its banks and is a very important wildlife ecosystem. Several rookeries of nesting Blue Herons have been identified here.

Cottonwood Gallery Ecosystems existing plant list:

Woody Plants

Trees

- Plains Cottonwood (*Populus deltoides*)

Shrubs

- Snowberry (*Symphoricarpis occidentalis*)
- Wild Rose (*Rosa* ssp.)
- Golden Currant (*Ribes aureum*)
- Buckbrush (*Ceanothus cuneatus*)
- Sage Brush (*Artemisia tridentata*)

Shrubs (Southern Corridor-Pueblo area)

- Rabbitbrush (*Chrysothamnus* ssp.)
- Yucca (*Yucca glauca*)
- Cholla cactus (*Cholla* ssp.)

Grass/Cover Crop

- Western Wheatgrass, (*Pascopyrum smithii*)
- Switch Grass (*Panicum virgatum*)
- Slender Wheatgrass (*Elymus trachycaulus* ssp. *trachycaulus*)
- Pubescent Wheatgrass (*trigia intermedia* ssp. *trichophorum*)
- Indian Grass (*Achnatherum hymenoides*)
- Big Bluestem (*Poa ampla*)
- Blue Grama (*Bouteloua gracilis*)
- Switchgrass (*Panicum virgatum*)
- Side Oat Grama (*Bouteloua curtipendula*)
- Needle and Thread (*Hesperostipa comata* ssp. *Comata*)

- g. **Shrub / Grassland Ecosystems** – This ecosystem lies at the top of all ecosystems of the Creek. It is usually the ecosystem that adjoins agricultural / private property along the Creek.

This ecosystem is vegetatively rich and includes trees, shrubs and upland grasses. The Cottonwood Gallery may be contained within this ecosystem. It is above the available water table and is generally 24" + above the Creek. Plants within this ecosystem are also referred to as upland plants.

Shrub/Grassland Ecosystems existing plant list:

Woody Plants

Trees

- Plains Cottonwood (*Populus deltoides*)
- White Ash (*Fraxinus americana*)
- Hackberry (*Celtis occidentalis*)
- New Mexico Locust (*Robinia neomexicana*)
- Wild Plum (*Prunus Americana*)

Shrubs

- Snowberry (*Symphoricarpis occidentalis*)
- Wild Rose (*Rosa* ssp.)
- Golden Currant (*Ribes aureum*)
- Buckbrush (*Ceanothus cuneatus*)
- Sage Brush (*Artemisia tridentata*)
- Shrubs (Southern Corridor-Pueblo area)
- Rabbitbrush (*Chrysothamnus* ssp.)
- Yucca (*Yucca glauca*)
- Cholla cactus (*Cholla* ssp.)

Grass/Cover Crop

- Western Wheatgrass, (*Pascopyrum smithii*)
- Switch Grass (*Panicum virgatum*)
- Slender Wheatgrass (*Elymus trachycaulus* ssp. *trachycaulus*)
- Pubescent Wheatgrass (*trigia intermedia* ssp. *trichophorum*)
- Indian Grass (*Achnatherum hymenoides*)
- Big Bluestem (*Poa ampla*)
- Blue Grama (*Bouteloua gracilis*)
- Switchgrass (*Panicum virgatum*)
- Side Oat Grama (*Bouteloua curtipendula*)
- Needle and Thread (*Hesperostipa comata* ssp. *Comata*)

Invasive Species

- Canadian Thistle (*Cirsium arvense*) See Figure 3.16.
- Bindweed (*Convolvulus arvensis*) See Figure 3.17



Figure 3.16 - Canadian Thistle



Figure 3.17 - Bindweed

## CHAPTER 4: Detailed Recommendations

### 4.A. Proposed Restoration Techniques as used in the Demonstration Projects

In addition to establishing the overall revitalization vision for Fountain Creek between Colorado Springs and Pueblo, the Master Planning effort set into motion a series of early action demonstration projects to showcase the proposed restoration techniques. See Figure 4.1. The Demonstration Project Matrix shows all the proposed restoration techniques and on which projects they were used. This information is provided for future planners and designers as real world examples of restoration technique applications.

All these projects are on-going and are an opportunity for continued effort and expansion. Key conclusions that came out of each of these demonstration projects are discussed in the description of each project. However, there are some overall lessons learned that are worth mentioning here. There are three restoration techniques that became a part of almost every demonstration project; Conservation, Revegetation and Habitat Restoration and Access and Visibility. This was not a planned outcome but rather an observation after the fact. It would appear that at a minimum, projects must include these three restoration techniques and then include combinations of the other techniques, as needed, to be successful. This is true for a number of reasons.

1. Much of Fountain Creek is relatively stable today. The most cost effective way to protect the Creek is to place as much of it as possible into conservation easements and public ownership that allows the Creek and floodplain to remain in its natural configuration.
2. Very little of Fountain Creek is accessible to the public and the few areas that are accessible are typically the damaged areas. So the average person does not appreciate how tremendous a natural resource Fountain Creek really is. By providing access wherever possible, the public will come to realize this fact and thus, public sentiment toward protecting Fountain Creek will grow. This is key to the long term preservation of Fountain Creek.

3. Key elements of the Fountain Creek Corridor are its native ecosystems and wildlife habitat. This is what makes the Creek a tremendous natural resource. Therefore, projects that work to restore and enhance native vegetation are often seen as an imperative part of restoring Fountain Creek.

Local, regional and national funding partners recognize these three simple facts. Therefore, projects that include these three techniques, at a minimum, attract support and money more quickly. The future planners and designers should always try to include these ideas in future projects to increase the likelihood of success and to create the momentum and support needed for the project.

### 4.B. Demonstration Projects

This section of the Master Plan includes a description of the 12 demonstration projects that are moving forward as a part of the Fountain Creek Corridor Restoration Master Plan in partnerships that include the Lower Arkansas Valley Water Conservancy District, Colorado Springs Utilities and 17 other funding partners that have invested in these projects. See Figure 4.2 for the Demonstration Project locations within the Master Plan study area.

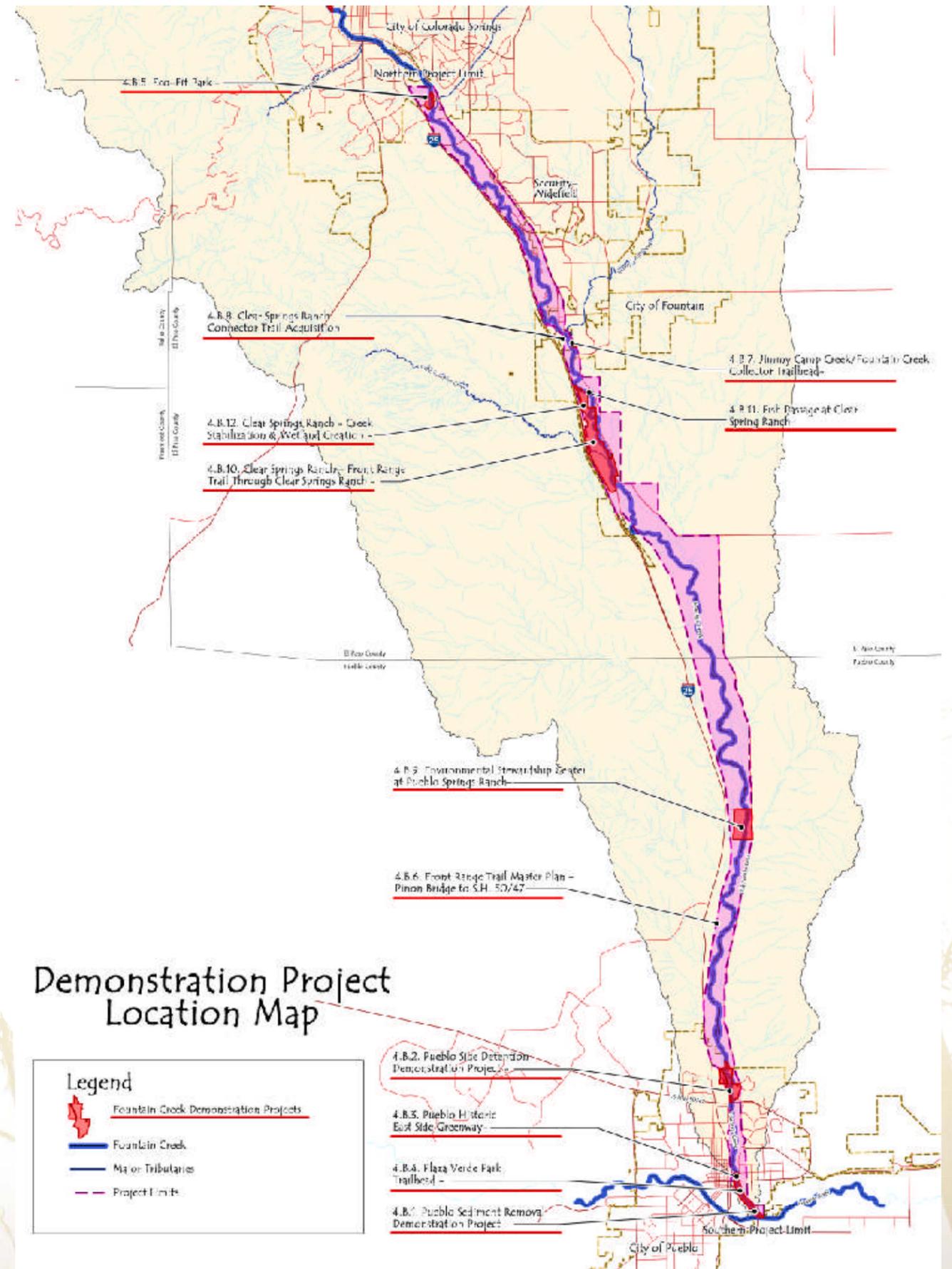
To establish the vision and goals for each project, all projects have or will include a public involvement process. Each demonstration project described here includes:

1. Location of the Project
2. Description of the Project
3. Goals of the Project
4. Strategies being Employed
5. Lessons Learned or Anticipated Lessons Learned
6. Current partners
7. Project Status
8. Next Steps
9. Cost Estimates (using current 2011 dollars)
10. Maintenance cost/ Responsibilities

For the following Demonstration Projects, complete Construction Documents are provided in the Appendix:

- 4.B.1. Pueblo Sediment Removal
- 4.B.2. Pueblo Side Detention
- 4.B.11. Clear Spring Ranch Fish Passage
- 4.B.12. Fountain Creek/Clear Spring Ranch Realignment

This will provide future designers with detailed "how-to" information about the restoration techniques employed on these four (4) Demonstration Projects.



Demonstration Project Matrix		Techniques										
		Conservation	Riparian Buffer Zone	Maximize Flood Plain	Side Detention	Wetland Filtration Basin	Creek Realignment	Bankful Bench	Bank Sloping	Revegetation & Habitat Restoration	Access & Visibility	Water Quality
Project												
4.B.1.	Pueblo Sediment Removal			X						X	X	X
4.B.2.	Pueblo Side Detention			X	X	X				X	X	X
4.B.3.	Pueblo Historic East Side Greenway	X	X			X				X	X	X
4.B.4.	Plaza Verde Park Trailhead									X	X	
4.B.5.	Eco-Fit Park	X	X	X	X	X				X	X	X
4.B.6.	Front Range Trail - Pinyon Bridge to S.H. 50/47 (Pueblo Creek Side Walk)	X								X	X	
4.B.7.	Jimmy Camp Creek/Fountain Creek Connector Trailhead	X	X			X				X	X	X
4.B.8.	Clear Spring Ranch - Connector Trail Acquisition	X	X							X	X	
4.B.9.	Environmental Stewardship Center	X	X	X	X	X	X	X	X	X	X	X
4.B.10.	Front Range Trail through Clear Spring Ranch	X								X	X	
4.B.11.	Clear Spring Ranch - Fish Passage									X		
4.B.12.	Fountain Creek/Clear Spring Ranch Realignment	X	X	X	X	X	X	X	X	X		X

Figure 4.1

Figure 4.2

## 4.B.1. Pueblo Sediment Removal

(See the Appendix for detailed construction drawings)

### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve water quality
- Reduce sedimentation

#### 1. Location of the Project

The Pueblo Sediment Removal project is located on Fountain Creek immediately adjacent to South Joplin Avenue (S.H. 227) at the intersection with County Road. The sediment removal device will be located in Fountain Creek immediately north of the abandoned Missouri Pacific railroad bridge that spans Fountain Creek. The sediment removal separator equipment will be located on the east bank. See Figure 4.5.

#### 2. Description of Project

The project involves the installation of a sediment removal device that will selectively remove problem sediments, direct downtown sediment deposits, evaluate changes in stream morphology and re-establish a primary channel thalweg.



Figure 4.3 In-Stream Sediment Collector

The sediment will be piped to an auger/separator unit that will remove the sediment and return the water to Fountain Creek. The sediment will be stockpiled on the east bank of the Creek. The City of Pueblo will provide the equipment and the staff to move the sediment to City owned locations. Included in this project is a one-year monitoring plan to measure effectiveness along with quantifying the impacts to water quality and macro-invertebrates.



Figure 4.4 Sediment Separator

#### 3. Goals of the Project

The specific goal for this project is to collect performance data to be used in planning and design of future installations along Fountain Creek. The ultimate goal is to remove sediment and improve water quality, while increasing channel flood capacity and restoring Fountain Creek.

#### 4. Strategies Being Employed

The introduction of a sediment removal device to Fountain Creek is a new approach to improving water quality, restoring Creek geomorphology and increasing flood capacity of Fountain Creek. Original plans called for dredging to restore the Creek and flood capacity, but this was seen as only a temporary solution. The sediment removal system supplied by Streamside Systems, Inc. can provide an ongoing solution to removing sediment and improving the water quality.

#### 5. Lessons Learned or Anticipated Lessons Learned

The sediment removal system resolves sediment transport and deposition issues by directly removing it from the Creek. However, this approach does not address the source of the sediment, which is caused by sections of unstable Creek. Thus, a sustainable solution to sedimentation must include Creek stabilization techniques. On all future projects, a Water Augmentation Plan will be required for evaporative losses associated with sediment collection. From this demonstration project, it is anticipated that an understanding of this system's performance will provide the information needed to help determine the most effective use of these systems along Fountain Creek.



#### 6. Current Partners

The City of Pueblo, The Colorado Water Conservation Board (CWCB), The Colorado Department of Health (CDPHE), The Fountain Creek Watershed, Flood Control and Greenway District, National Resources Conservation Services (NRCS), Lower Arkansas Valley Water Conservancy District and Colorado Springs Utilities are the current partners on the project.

#### 7. Project Status (Planning, Construction Documents, Construction, Acquisition, etc.)

Construction to be completed July, 2011. First year of monitoring to be completed July, 2012.

#### 8. Next Steps

- Develop performance criteria from the monitoring and analysis information.
  - Based on the performance criteria, identify and develop additional sediment removal projects along Fountain Creek.
  - Approach potential funding partners to fund additional sediment removal systems including Pueblo County, City of Pueblo, Army Corps of Engineering and the Fountain Creek Watershed, Flood Control and Greenway District.

#### 9. Cost Estimates (2011 dollars)

Mobilization	\$3,630.00
Streamside Systems Equipment	\$319,096.40
Placement of Collector, Separator & Controller	\$12,712.00
Site Improvements	\$78,575.00
<b>Total Project Cost</b>	<b>\$414,013.40</b>

#### 10. Maintenance Costs / Responsibilities

Maintenance and operations of the sediment removal site will be the responsibility of the City of Pueblo Stormwater Department. In 2011 dollars, yearly maintenance costs are estimated at the following:

Management	\$50,000.00
Removal and Trucking of Sediment	\$100,000.00 +/-

During the first year of operation, once actual quantities of sediment can be determined, the actual cost of trucking will be determined. As part of this demonstration project, maintenance costs is one of the factors being studied and quantified.

#### 4.B.2. Pueblo Side Detention

(See the appendix for detailed construction drawings)

##### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve water quality
- Reduce flooding magnitude and incidents

to the backwater effects, as the flood event subsides. The water that entered the side detention area will flow back into Fountain Creek. The site has been designed to accommodate the largest volume of flood water possible, approximately 43 acre feet of water. A substitute water supply plan (SWSP) was prepared that substantiates a "no injury" or "absence of injury" to vested water rights on Fountain Creek.

invasive species, such as Tamarisks and Russian Olive. As part of this project, extensive specifications and drawings were developed to eradicate a large stand of invasive phragmites. Specifications outlined the timing of mechanical removal of the phragmites, coordinating a control burn and the application of an environmentally safe herbicide.

#### 3. Goals of the Project

The specific goal of this project was to demonstrate how the side detention restoration technique can increase floodplain capacity and improve water quality. Additionally, this project was intended to demonstrate to future designers how to design and construct this type of facility.

A one-year monitoring plan is included in the project to measure and quantify water quality improvement.

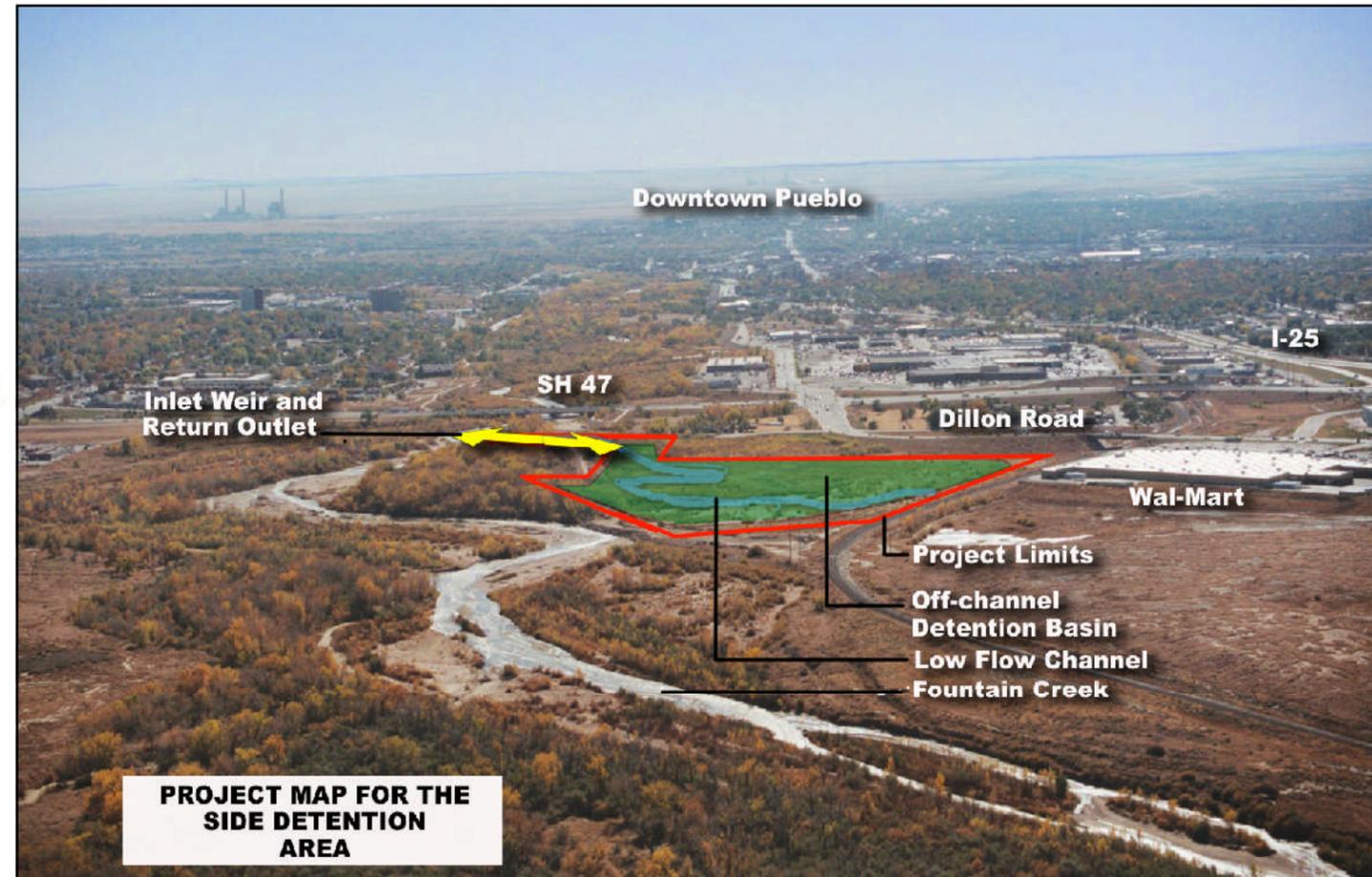


Figure 4.6

#### 1. Location of the Project

The Pueblo Side Detention site is located in northern Pueblo, just north of State Highway 50/47 and east of Interstate 25. This 24 acre site is owned by the City of Pueblo and is immediately adjacent to Fountain Creek, east of the existing Wal-Mart. See Figure 4.6.

#### 2. Description of Project

The approximate 22-acre Side Detention Demonstration project has two primary functions. The first, to serve as a detention area that will reduce the initial flood surge in Fountain Creek through Pueblo. A reinforced concrete pipe through the existing embankment along the west side of Fountain Creek will allow initial flood flows to back into the site at a rate of 36 cfs. Once the pond area is full, diversion through the pipe will cease, due

The second function of the side detention project is water quality improvement. Surface stormwater from adjacent commercial developments will also be diverted into the detention area. The detention area will retain existing vegetation and support a wetland environment. The aquatic plants in the wetlands will filter the surface stormwater before entering Fountain Creek, helping to improve water quality.

Special attention was paid to the proposed finished grade elevations and its relationship to the water table. Each surface was computer modeled to ensure the water table was not exposed and that the relationship of the finished grade and the water table was approximately 12"-18". Plant material was selected that thrived at this depth to the water table and it also helps control

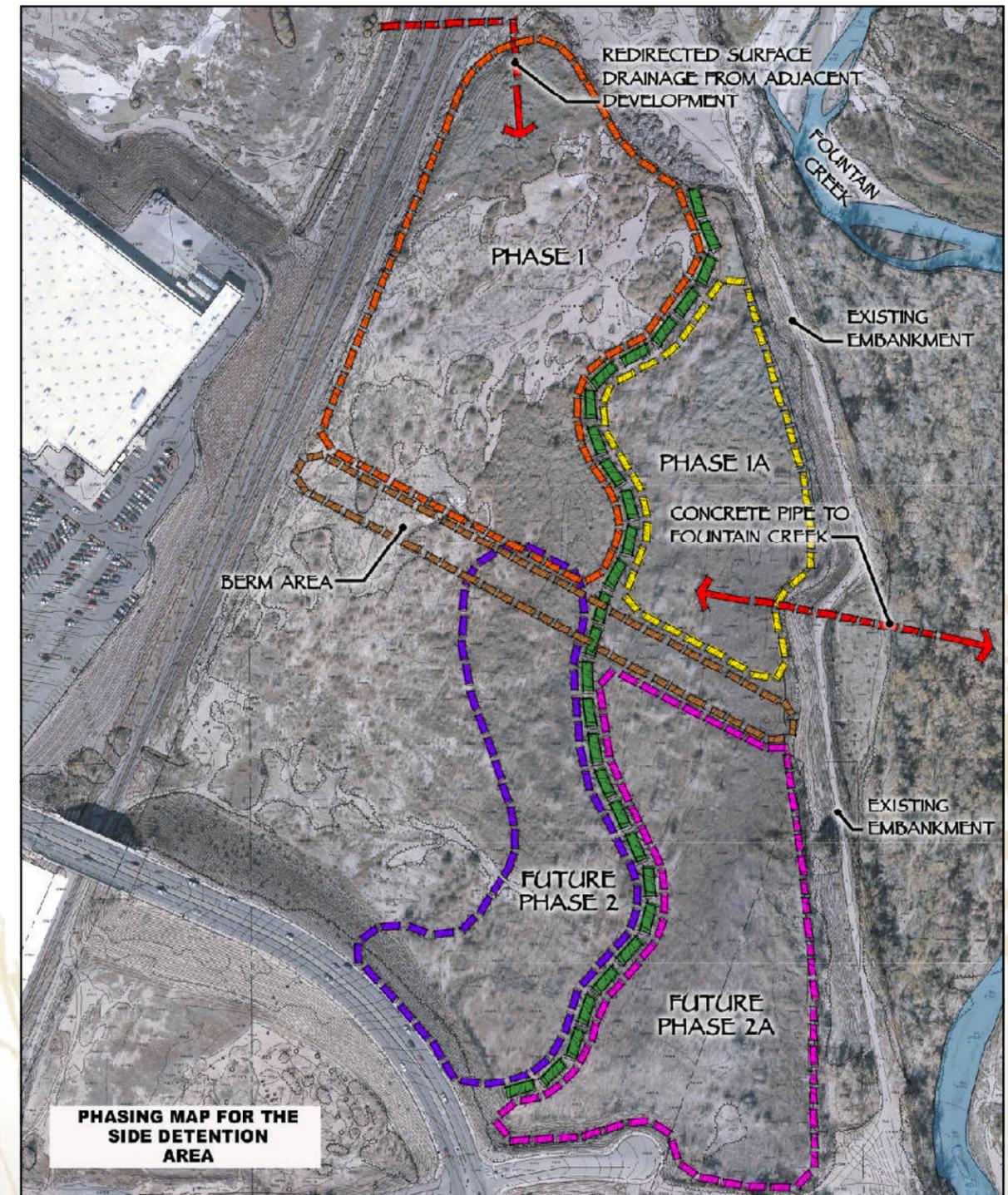


Figure 4.7

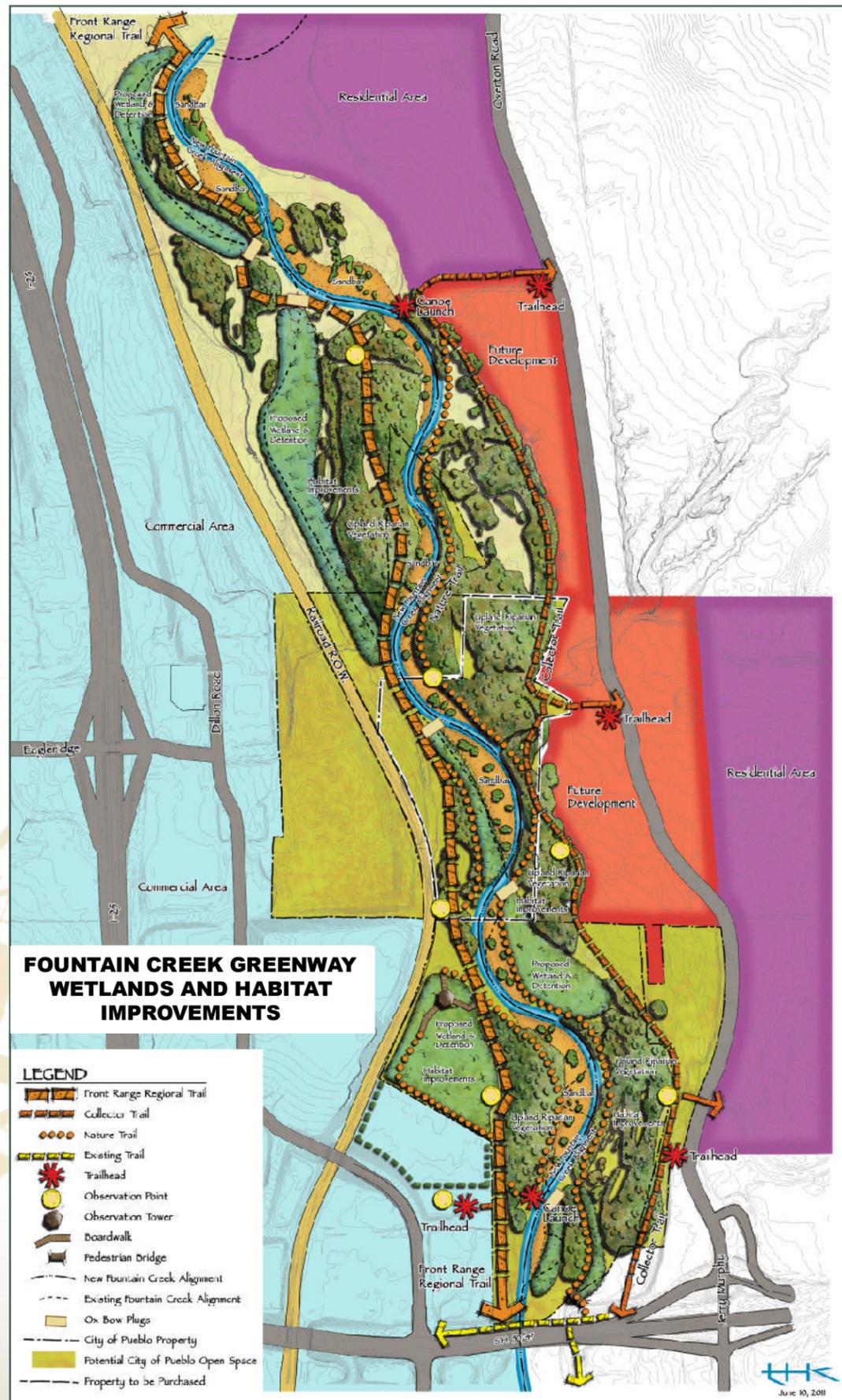


Figure 4.8

#### 4. Strategies Being Employed

As a part of this project, a number of restoration techniques are being employed.

- Maximize floodplain by connecting the project area to the Fountain Creek floodplain with a pipe that allows for free flow of flood water.
- Maximize capacity by excavating the project site and provide a 43 acre foot detention area to accommodate flood flows.
- Create a wetland filtration basin within the project area for treatment of surface stormwater from adjacent developed areas.
- Revegetation and habitat restoration of the project site, which was a borrow area for fill dirt used to develop areas west of the project site. This project will re-establish native species and riparian habitat.
- As a Demonstration Project, to make the site very visible to the community, the side detention effort was located on City of Pueblo Open Space in close proximity to the proposed Front Range Trail location and Dillon Road. The alternate plan is to provide interpretive signage. The long range plan is to provide a trailhead on or near this site. See Figure 4.8.

#### 5. Lessons Learned or Anticipated Lessons Learned

Phase 1 of the Side detention can reduce the initial flood peaks of a two-year event. This was demonstrated as a part of the Substitute Water Supply Plan. We anticipate that water quality testing of the surface stormwater from the adjacent development will reflect an improvement in water quality because of the wetland filtration basin. As this concept only attempts to re-establish floodplain volume that has been lost over the last 100 years, due to floodplain encroachment, we anticipate that this project will demonstrate that side detention is a viable flood mitigation tool that has "no injury" to water rights on Fountain Creek. On all future projects, a Water Augmentation Plan will be required for wetlands development and plantings.

#### 6. Current Partners

The City of Pueblo, Natural Resources Conservation Service (NRCS), Colorado State University (CSU), the Colorado Department of Health (CDPHE), the Colorado Water Conservancy Board (CWCB), Lower Arkansas Valley Water Conservancy District, Colorado Springs Utilities, and the Fountain Creek Watershed, Flood Control and Greenway District are current partners on the project.

#### 7. Project Status (Planning, Construction Documents, Construction, Acquisition etc.)

Construction of Phase 1 to be completed September, 2011. Monitoring to be completed September, 2012.

#### 8. Next Steps

- Acquisition of the approximate 12-acre Graco site for development of Phase 2 of the project just south of Phase 1. See Figure 4.7.
- Planning of the Front Range trail and other interpretive trails on the City of Pueblo owned site.
- Obtain funding for design and construction of Phase 2 of the Side Detention area and the trail improvements. This effort should start with the current project partners and include others like Colorado State Parks, Colorado Division of Wildlife and GOCO.

#### 9. Cost Estimates (2011 dollars)

Site Grading	\$147,000.00
Storm Stormwater management	\$192,500.00
Revegetation	\$104,000.00
<b>Total Project Cost</b>	<b>\$443,500.00</b>

#### 10. Maintenance

Maintenance of the Side Detention Project will be the responsibility of the City of Pueblo Stormwater Department. In 2011 dollars, yearly maintenance costs are estimated at the following for Phase I and Phase IA areas:

Inspection	\$3,000.00
• Spring	
• Fall	
• After Major Flood Event	
Weed Control	\$6,000.00
Infrastructure Repair (Annual Average)	\$10,000.00
Sediment and Debris Removal	\$7,000.00

### 4.B.3. Pueblo Historic East Side Greenway

#### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve health and safety
- Improve water quality
- Improve wildlife habitats
- Reduce flooding magnitude and incidents
- Improve access and visibility

#### 1. Location of the Project

The Pueblo Historic East Side Greenway encompasses the 1.6 mile reach of Fountain Creek from 8th Street in Pueblo to the Confluence with the Arkansas River. See

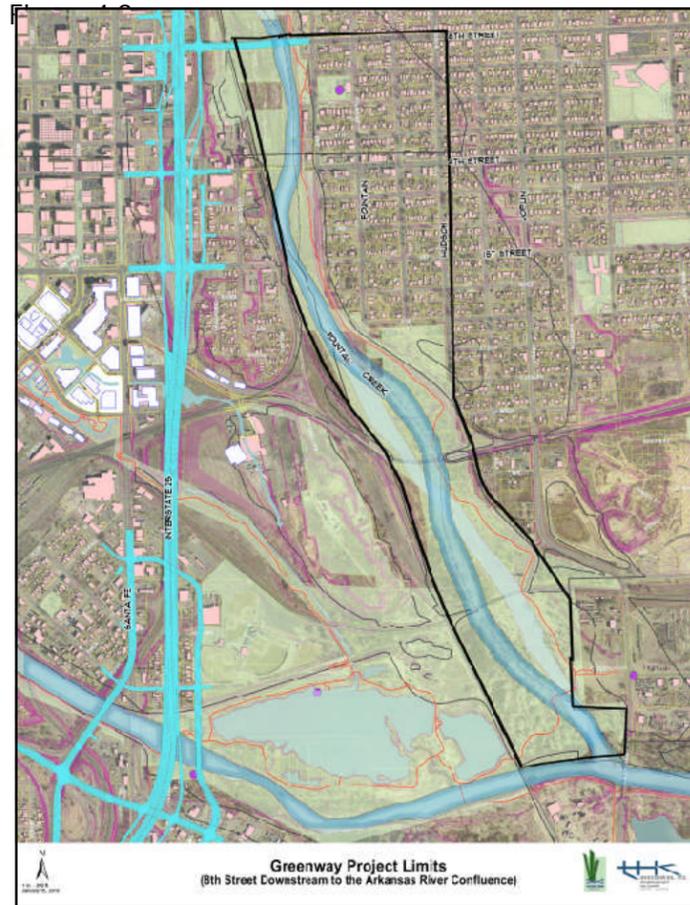


Figure 4.9

#### 2. Description of the Project

The East Side Neighborhood of Pueblo reflects a low-income community. With an annual average income of \$27,000, this neighborhood is physically and visually separated from the greater Pueblo area by Interstate 25, Fountain Creek and the railroad. As a result, the East Side Neighborhood does not benefit from economic growth and prosperity, as have the western neighborhoods. Fountain Creek is an under utilized

natural resource that is currently disconnected from the East Side Neighborhood. This effort developed a plan to reclaim the River and develop a community focal point by highlighting neighborhood parks, recreation, community gathering, natural open spaces and education. The plan:

- Identified and fostered project partners who will be part of the implementation of the Master Plan.
- Engaged the East Side Neighborhood in developing a plan that reflect their needs.
- Provided safe bicycle and pedestrian connection to Downtown Pueblo, HARP and the Arkansas River.
- Provided affordable recreation opportunities.
- Improved the ecological health and flood capabilities of Fountain Creek.
- Completed an Implementation and Funding Plan including community-built recreation projects that engage East Side residents.
- Provided guidance in how to make Fountain Creek compliment other plans being conducted by the City of Pueblo.

#### 3. Goals for the Project

- Develop a diverse and creative Master Plan that integrates recreation, redevelopment, education, safety and health concerns.
- Create a plan that is community driven and serves as a "magnet" for the people of Pueblo and the Historic East Side Neighborhood.
- Celebrate the history of Pueblo's Historic East Side Neighborhood.
- Facilitate implementation and maintenance with long term funding and gain public and private support through partnerships.
- Build excitement and momentum, provide a plan that includes "quick wins" or "shovel ready" projects.
- Create a relatively stable Fountain Creek that addresses flood control, water quality and natural plant and wildlife ecosystems.

#### 4. Strategies Being Employed

- Conservation of open space and re-establishing the riparian buffer zone within the levees and outside the levees can be seen in Figure 4.10.
- As a part of the Creek restoration work within the levees, wetland filtration basins will be established on the emergent bench of the Creek. See Figure 4.11.
- Revegetation of the levees by adding fill and establishing native vegetation to restore habitat is shown using several different techniques in Figure 4.12.

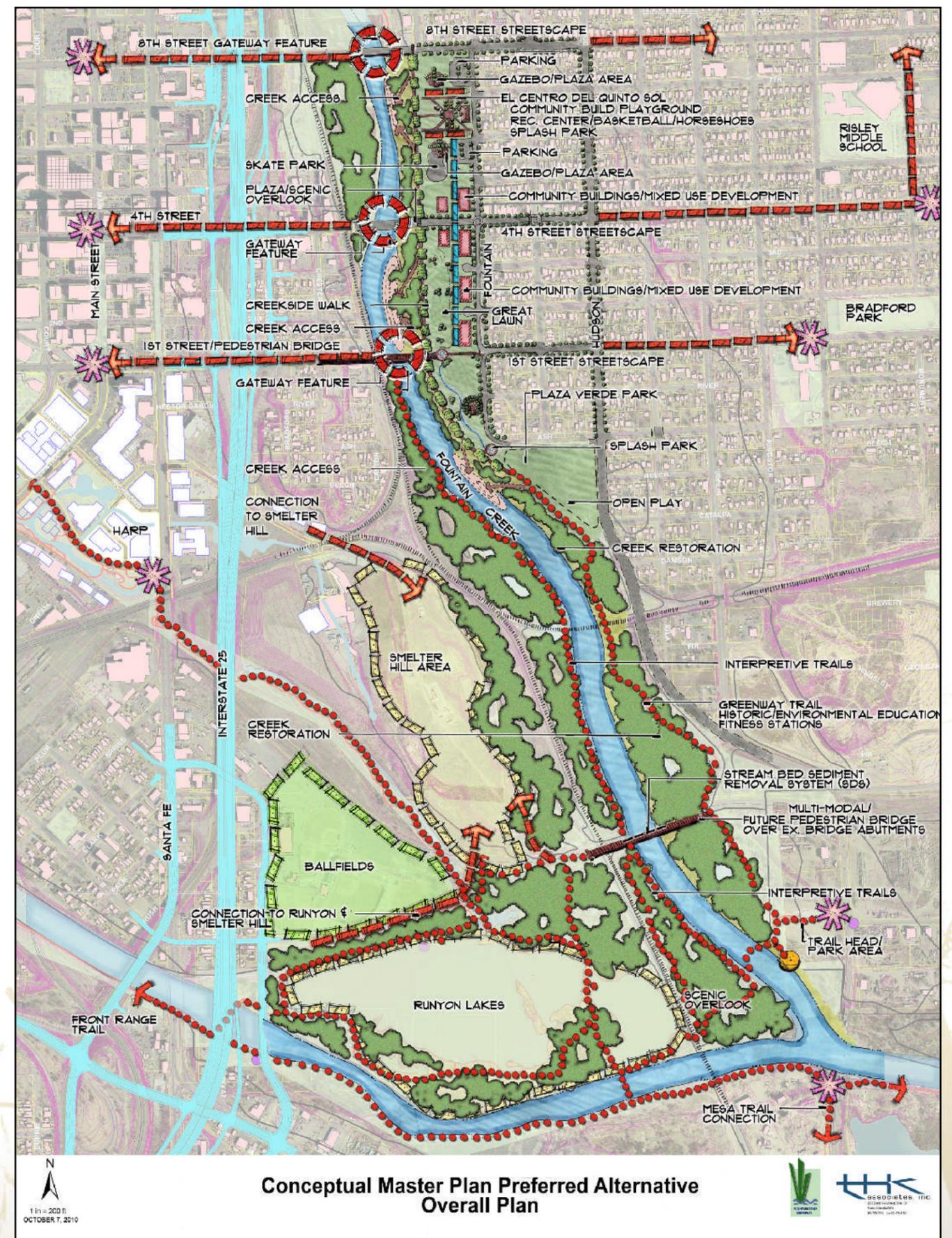


Figure 4.10

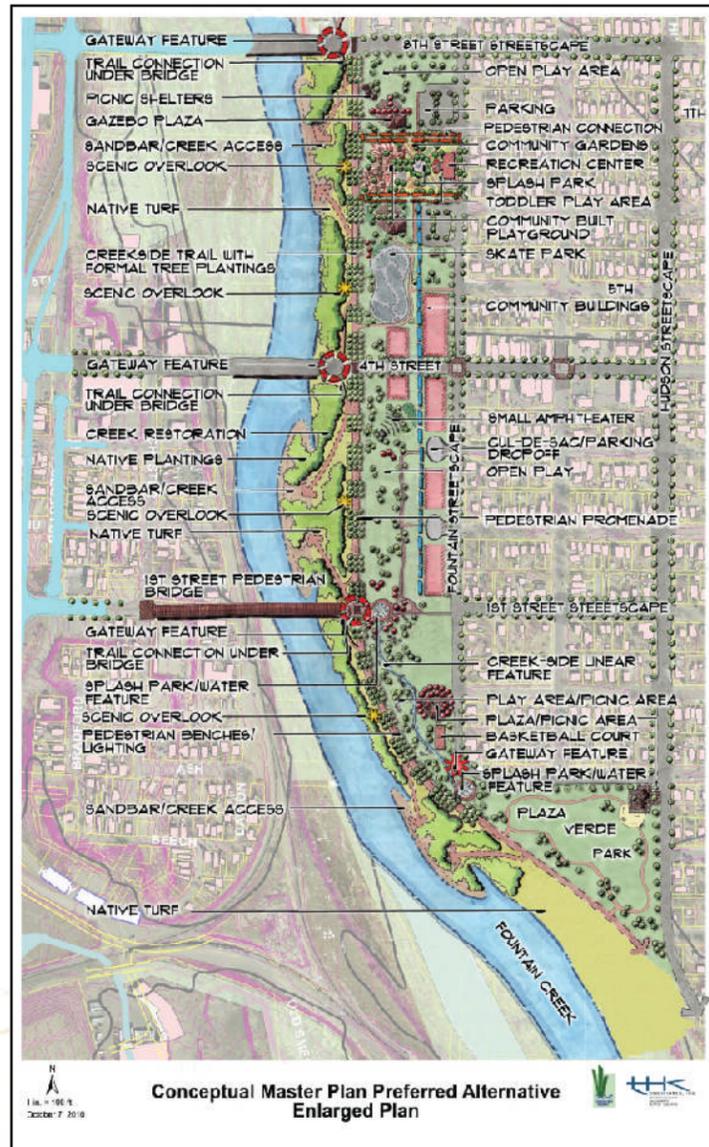


Figure 4.11

- d. Access and visibility to the Creek will be provided through a new Creek side walk. See Figure 4.13.
- e. Filling behind levee will fortify them and greatly reduce their chance of failure.
- e. Improving water quality is planned through the use of bio-filters, wetland basins, wetland channels, grass swales and grass buffers.

**5. Lessons Learned or Anticipated Lessons Learned**

Connecting people and entire neighborhoods to Fountain Creek by improving the Creek as an amenity and focal point will develop a sense of personal responsibility of the Creek by the community. Establishing long term stewardship of the Creek by the community is a key concept of the Fountain Creek Corridor Master Plan.

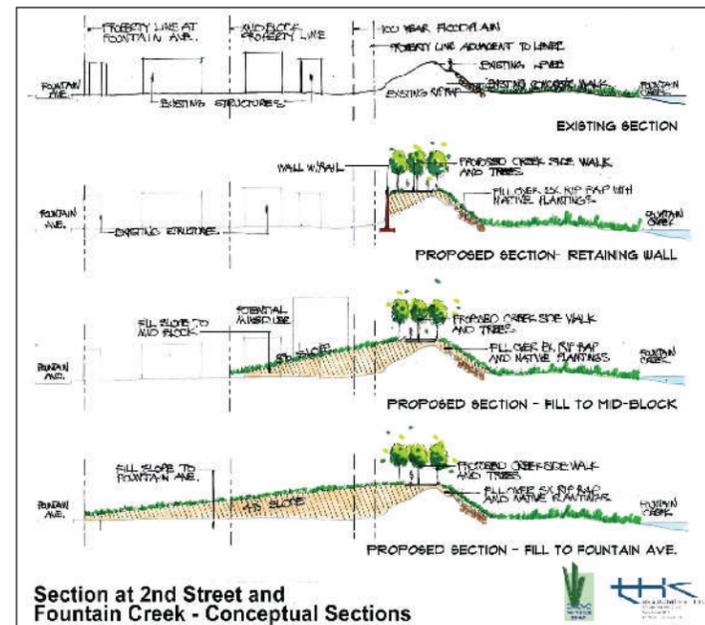


Figure 4.12

**6. Current Partners**

Great Outdoors Colorado (GOCO), City of Pueblo, Colorado Springs Utilities, Lower Arkansas Valley Water Conservancy District, The Fountain Creek Foundation, Fountain Creek Watershed, Flood Control and Greenway District, Urban Renewal Authority of Pueblo, East Side Neighborhood Association and the Fountain Creek Watershed District.

**7. Project Status (Planning, Construction Documents, Construction, Acquisition etc.)**

The Master Plan has been completed. Currently, the City of Pueblo is identifying projects to be constructed. Funding is available for the design and construction of the skate park. A grant for a trail connection at Plaza Verde Park (GOCO) has been received. Several urban renewal grants by Pueblo Urban Renewal Authority have been applied for. Construction for some of these projects should begin in 2012.

**8. Next Steps**

Utilize this Master Plan as a guide for prioritizing and planning for future development projects.

**9. Cost Estimate (2011 dollars)**

Creek Side Walk, Pueblo River Trail and Pedestrian Bridge	\$17,182,475.56
Park Improvements	\$7,683,690.66
Creek Revegetation	\$3,541,827.55
Skate Park and Parking Area	\$1,915,197.78
4th Street Community Buildings	\$2,333,669.33
Streetscape Improvements (1st, 4th and 8th Streets)	\$18,666,969.60
Mixed Use Development (Between 1st and 4th Streets)	\$2,933,944.89
<b>Total Project Cost</b>	<b>\$54,257,775.37</b>

**10. Maintenance**

An agreement was reached on general areas of maintenance responsibility. The maintenance of each area will be the responsibility of that area's funding partner.

Potential maintenance partners in each category are as follows:

- a. Greenway Trail and Revegetation
  - City of Pueblo Parks Department
  - City of Pueblo Storm Water Department
  - Fountain Creek Watershed, Flood Control and

- Greenway District
  - Volunteer Programs (Adopt-a-Trail)
- b. Greenway Parks
  - City of Pueblo Parks Department
  - Improvement District (yet to be formed)
  - Volunteer Programs (Adopt-a-Park)
- c. Urban Renewal / Redevelopment
  - Urban Renewal Authority of Pueblo
  - Improvement District (yet to be formed)
  - City of Pueblo Parks Department

See the Maintenance Responsibility Plan for areas of responsibility, Figure 4.14.

The maintenance partners agreed to develop maintenance cost estimates during individual, sub-project development. Before each individual project is constructed, their effort will be a part of agreeing on final maintenance responsibilities.

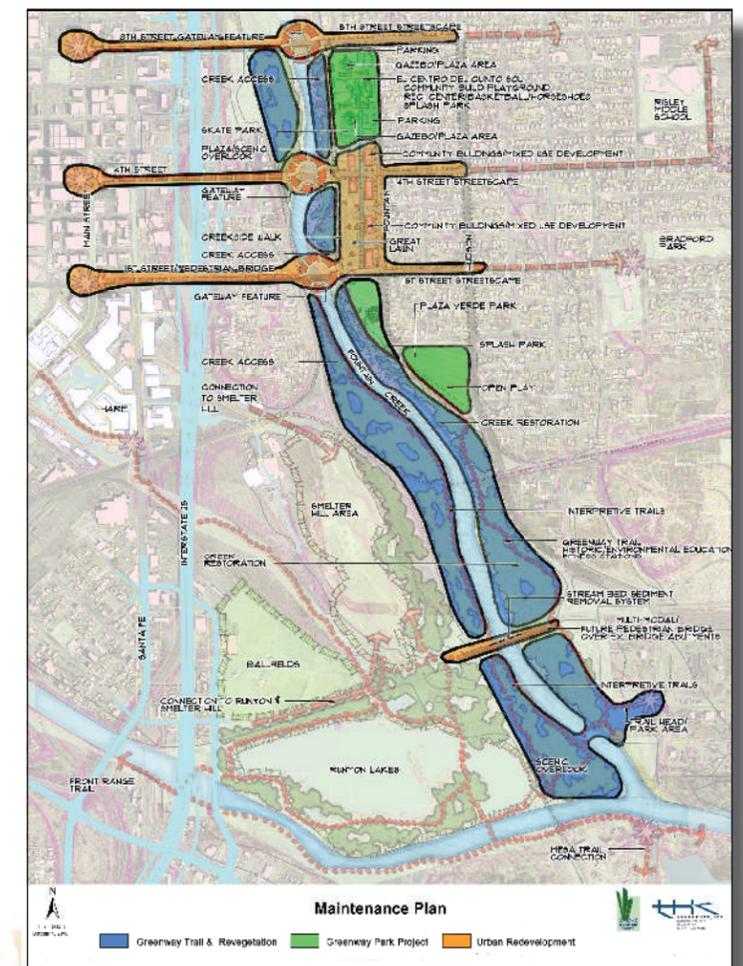


Figure 4.14

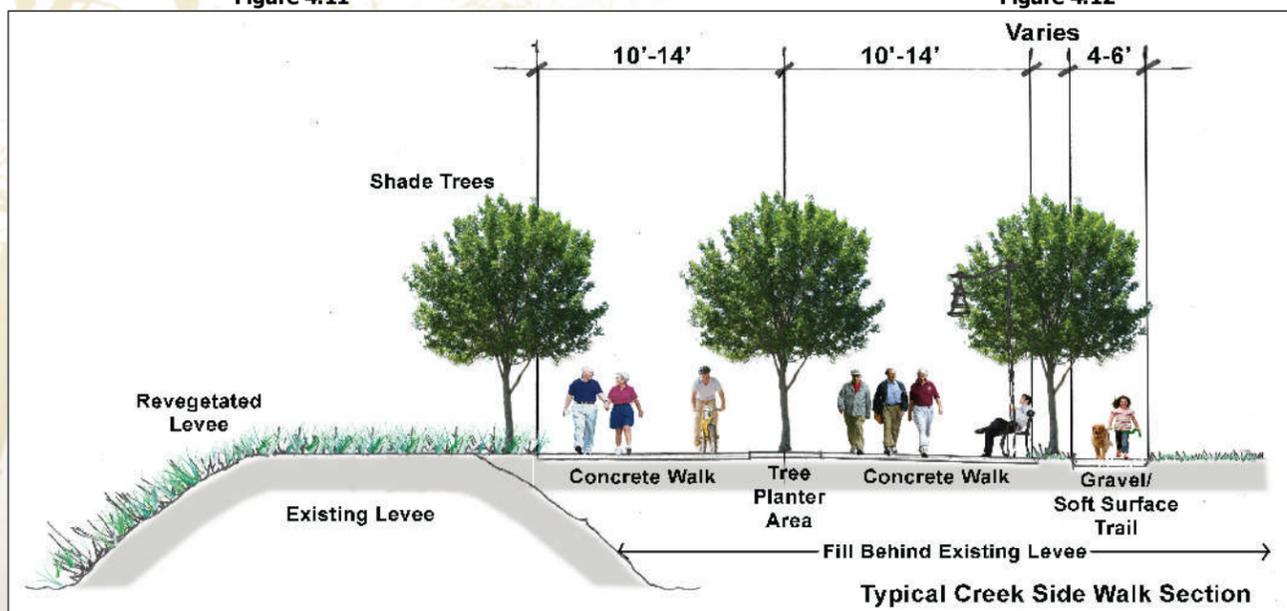


Figure 4.13

#### 4.B.4. Plaza Verde Park Trailhead

##### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve access and visibility

The existing flood control levee through the park is a major barrier. See Figure 4.15. One of the concepts from the Pueblo Historic East Side Greenway Master Plan is to fill behind the levee into Plaza Verde Park. This would gradually increase the elevation of the park to the elevation of the levee and eliminate the barrier

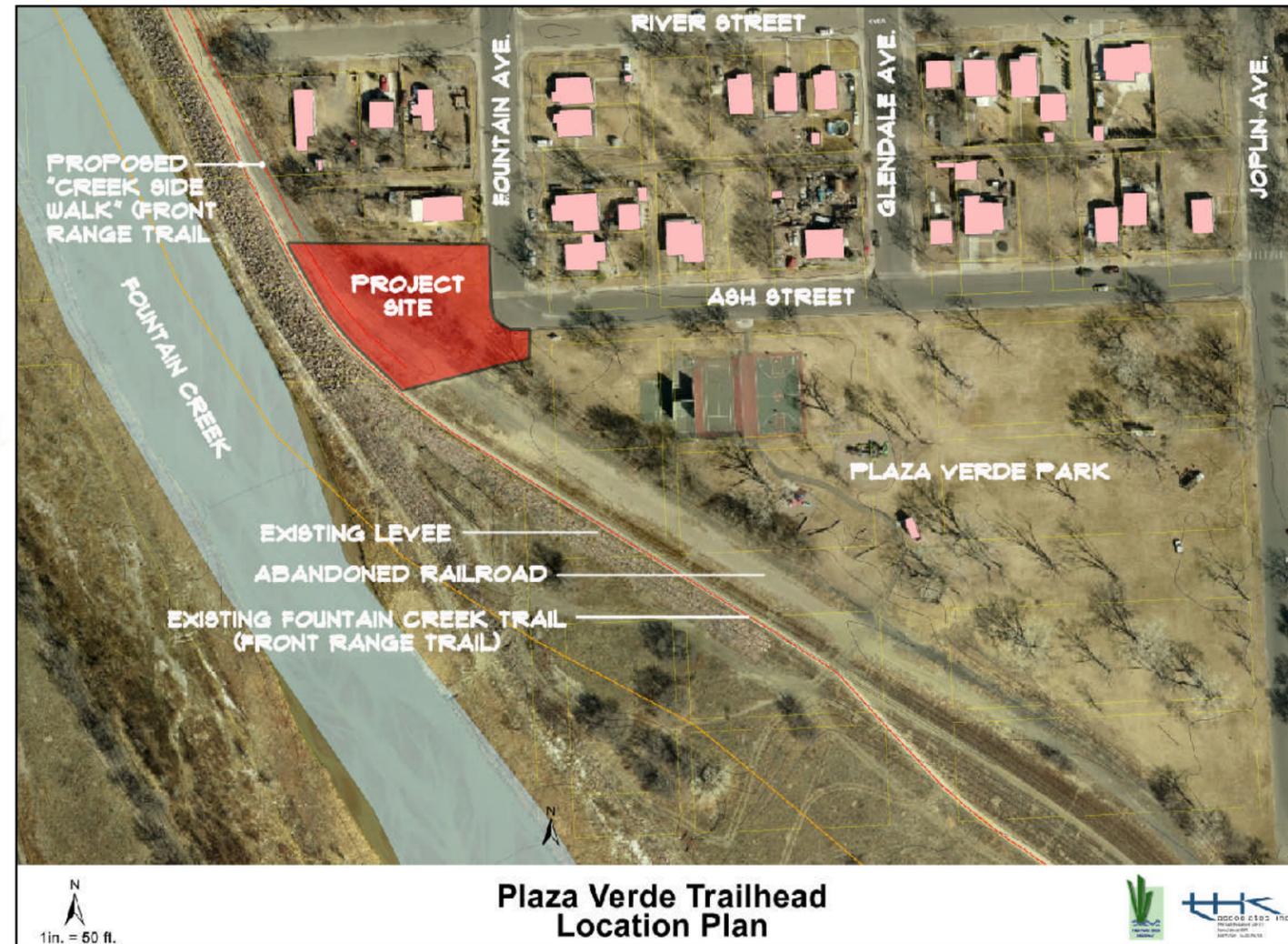


Figure 4.15

##### 1. Location of the Project

The Plaza Verde Trailhead is located at the northwest corner of Plaza Verde Park. The site is located immediately west of the intersection of Fountain Avenue and Ash Street. See Figure 4.15.

##### 2. Description of the Project

The Pueblo Historic East Side Greenway Master Plan identifies recreational improvements within this Historic East Side and provides new opportunities to reunite Fountain Creek with the neighborhood. The Plaza Verde Park Trailhead is the first construction project being developed from the Pueblo Historic East side Greenway Master Plan.

to Fountain Creek and the Front Range Trail. The fill for this project will come from another demonstration project, the Pueblo Sediment Removal Project.

This project will create a trailhead, with a trail through the park, while also improving the Front Range Trail and Fountain Creek. To reflect the concept developed in the Pueblo Historic East Side Greenway Master Plan, improvements will include a 10 foot concrete paved connector trail and reconstruction of the Front Range Trail. See Figure 4.16. A scenic over-look with benches, interpretive signage and revegetation of the levee and railroad grade using native riparian species is planned.

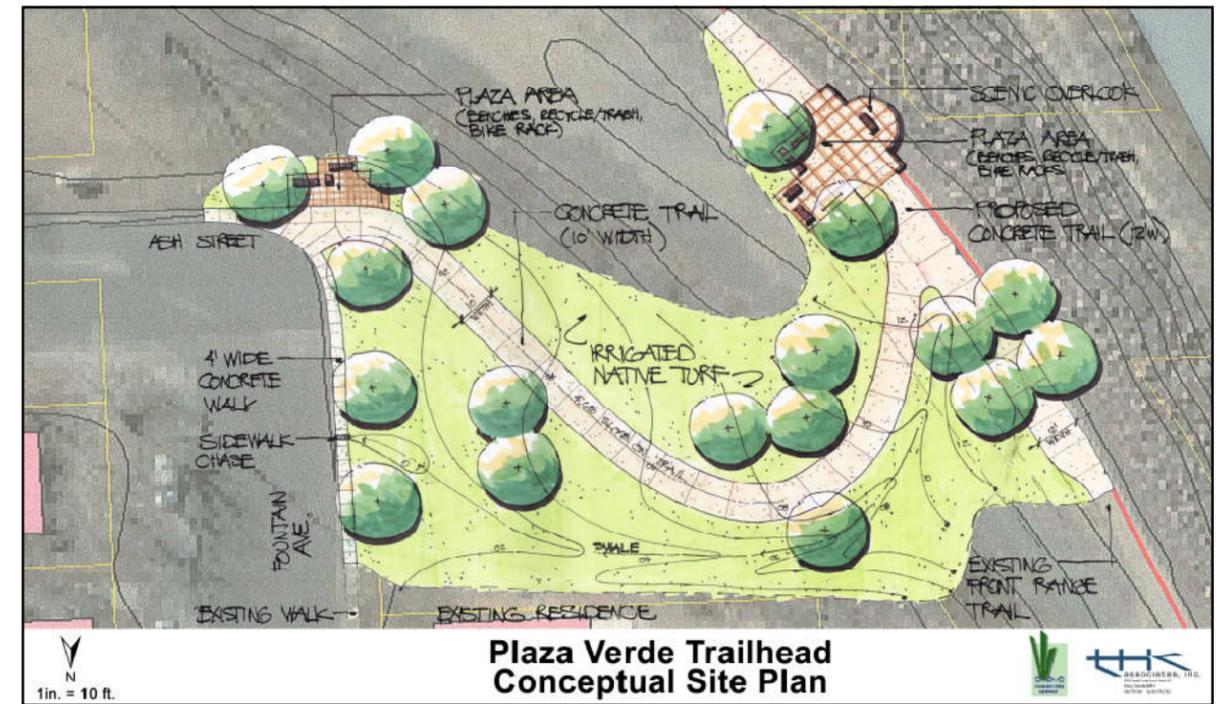


Figure 4.16

##### 3. Goals for the Project

The main goal of this project is to reconnect the community to Fountain Creek by eliminating the barrier created by the flood control levee. Another goal is to demonstrate the effective use of sediment removed from Fountain Creek with the Streamside Systems sediment removal collector. See Demonstration Project 4.B.1. Pueblo Sediment Removal for more information.

##### 4. Strategies Being Employed

This project could be the first to utilize the sediment removed from Fountain Creek for creating a stable and affordable trail connection. This sediment is virtually free and the supply is never ending. This provides access and visibility to Fountain Creek, one of the restoration techniques. Also, the sediment will be mixed with organics and used as fill over levee rip-rap and on old railroad grade. This will allow for revegetation of these areas using native riparian vegetation. This will ultimately, improve wildlife habitat.

##### 5. Lessons Learned or Anticipated Lessons Learned

An understanding of what methods need to be used to make this sand fill stable and structurally sound for placement of pavements and structures. Also, an understanding of revegetation techniques using the sediment as a growing medium will be developed.

##### 6. Current Partners

Great Outdoors Colorado (GOCO), City of Pueblo, Lower Arkansas Valley Water Conservancy District, Colorado Springs Utilities and the Fountain Creek Watershed, Flood Control and Greenway District.

##### 7. Project Status (Planning, Construction Documents, Construction, Acquisition etc.)

A GOCO Grant was awarded to the City of Pueblo on June 14, 2011. Design will be completed in 2011. Construction will be completed in 2012.

##### 8. Next Steps

Design and then construction.

##### 9. Cost Estimates (2011 dollars)

Total project budget is \$127,000

##### 10. Maintenance

The City of Pueblo Parks Department will maintain this segment of the trail. The City of Pueblo is already maintaining Plaza Verde Park. The addition of this trailhead to the park will add an estimated 2-3% increase to the overall existing maintenance budget.

#### 4.B.5. Eco-Fit Park

##### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve health and safety
- Improve water quality
- Improve wildlife habitats
- Improve fisheries
- Improve access and visibility

##### 1. Location of the Project

The site is approximately 30 acres, located on the old Vineyard Golf Course site just south of the El Pomar Youth Sports Park on the west side of Fountain Creek. See Figure 4.17.

##### 2. Description of the Project

Eco-Fit is a concept that combines the instinctive need of children to play with education and improved health.

The proposed Fountain Creek Eco-Fit Education Park provides an exciting place where children and their parents or guardians can be active in play while learning valuable lessons about their culture, history, the environment around them and the importance of fitness in their personal lives.

The Park is intended to be interactive and hands-on, while providing a sense of adventure for those who visit here, time and time again. Activities that are inviting, exciting and fun enhance learning and fitness!



Highlights of the Eco-Fit Park include the village play area that is comprised of three interconnected villages including Ute Indian Village, Pioneer Village and Wild Life Village. These villages are important contributors to the history of Fountain Creek and the greater Colorado Springs area. The villages are connected with a long, serpentine art wall that displays ceramic artwork created by local school children. The resulting mural tells the Fountain Creek story, from a time before humans to present day.



LOCATION MAP  
ECO-FIT EDUCATION PARK

Figure 4.17



Musical play is provided through instruments that are designed for outdoor park settings. These durable musical instruments will invite all who visit here to compose their own songs or as collaborative effort with others.



Health is promoted through active play. A child's movement through swinging, climbing, running and sliding can be expressed in total calories used over time for a particular body weight.

The calories can also be displayed in consumption terms. For example, a child who has been active in a particular play activity for 30 minutes can be estimated to have burnt approximately 250 calories or the equivalent of one chocolate candy bar. Both the child and parent or guardian learn first-hand what the impact of eating a popular snack has on the body, as well as the required effort to burn the resulting calories.

Stations will be set up throughout the Park to provide information on a myriad of play activities, consumption of common foods and how this all relates to their personal fitness.



The Park is also a case study of how the ecology of Fountain Creek can be improved through innovative design techniques, such as backwater channels and wetlands that act as water quality filtration ponds and flood storage. They also provide beauty, wildlife habitat and recreational opportunities. Hands-on educational displays will teach park visitors about the Fountain Creek watershed basin and how floods occur and can be safely avoided. See Figure 4.18.

##### 3. Goals for the Project

Creating and enhancing the stewardship of Fountain Creek is an important and consistent principle for the entire Fountain Creek Corridor. The proposed Eco-Fit Park will be connected with internet and webcam technology to other facilities located along Fountain Creek. Thus, making it an integral educational amenity for citizens and visitors alike.

The Fountain Creek Eco-Fit Educational Park provides an important function as a part of the greater Fountain Creek Environmental Stewardship Center system of parks, open space, natural areas and research sites.

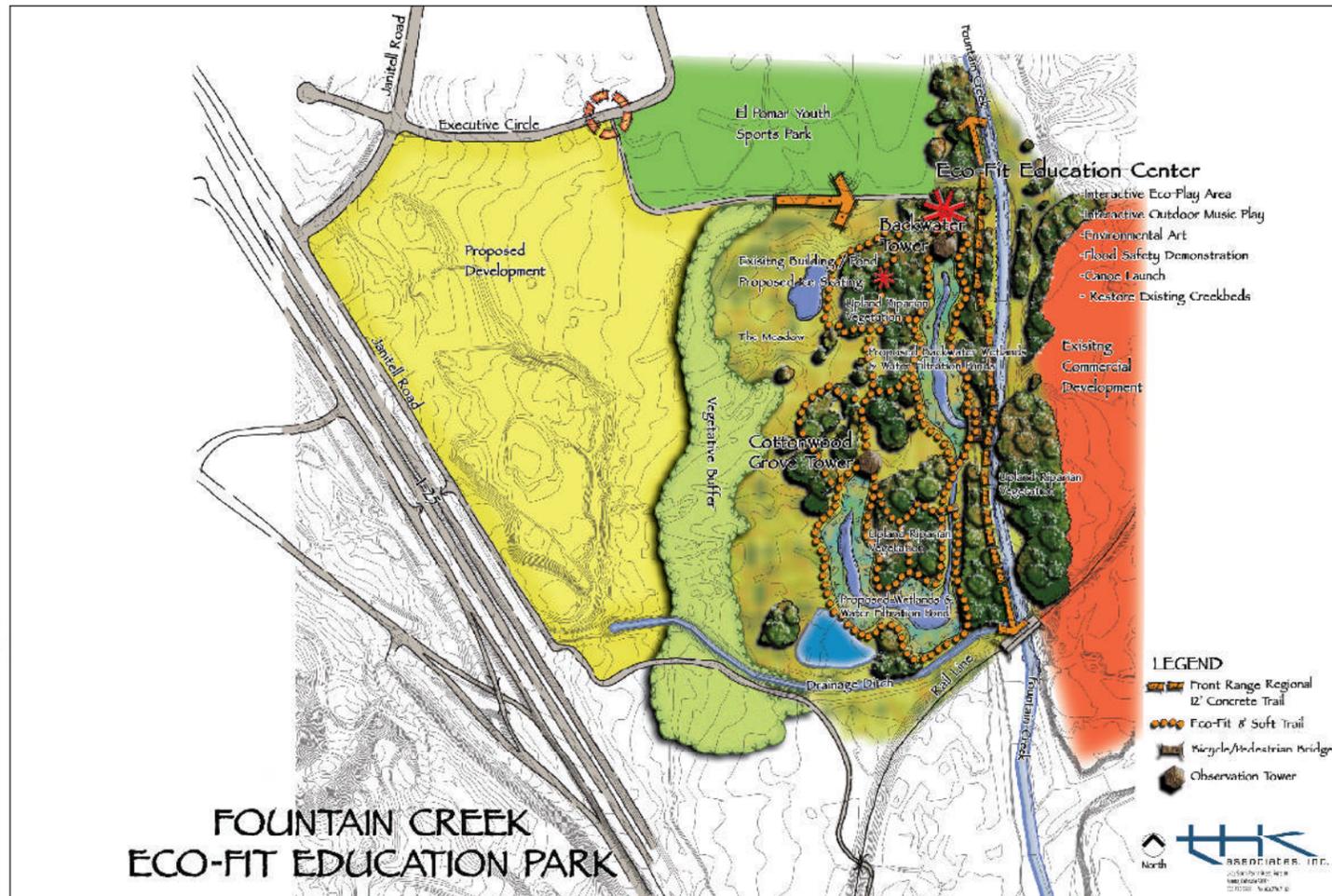


Figure 4.18

#### 4. Strategies Being Employed

- Conservation of floodplain.
- Enhance an existing riparian buffer zone.
- Maximize floodplain by adding volume with backwater channels and detention areas.
- Create side detention areas for temporary flood storage.
- Create wetland filtration basins for surface stormwater from adjacent development.
- Extensive native revegetation and habitat restoration.
- Provide access and visibility with extensive trail system, interpretive signs and interactive play.
- Water quality techniques will be displayed throughout the site. See Figure 4.19.

#### 5. Lessons Learned or Anticipated Lessons Learned

A core study of how the ecology of Fountain Creek can be improved through innovative design techniques while providing an opportunity for play, education and improving health.

#### 6. Current Partners

Colarelli Construction, City of Colorado Springs, the Fountain Creek Watershed District, the Fountain Creek Foundation, Colorado Springs Utilities and Lower Arkansas Valley Water Conservancy District.

#### 7. Project Status (Planning, Construction Documents, Construction, Acquisition etc.)

Initial visioning has been completed for this project.

#### 8. Next Steps

- Land acquisition or donation negotiations with Colarelli Construction
- Funding discussion with GOCO, City of Colorado Springs, El Pomar Foundation, Fountain Creek Foundation and Colarelli Construction.

#### 9. Cost Estimates (2011 dollars)

Eco-Fit Educational Center	\$2,143,413.13
Trails and Bridges	\$755,126.80
Park Amenities	\$177,100.00
Bank Restoration and Wetlands	\$1,707,600.39
Design and Engineering, Permitting and Construction Management	\$753,054.67
<b>Total Project Cost</b>	<b>\$5,536,294.99</b>

#### 10. Maintenance

Maintenance costs/responsibilities still need to be determined among the project partners. In 2011 dollars, yearly maintenance costs are estimated as follows:

30 Acres of Park Land	\$261,000.00
• Mowing	
• Trash and Debris Removal	
• Irrigation Management	
• Minor Repair of Landscape	
• Weed Management	



Figure 4.19

## 4.B.6. Front Range Trail Master Plan - Pinon Bridge to S.H. 50/47 (Pueblo Creek Side Walk)

### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve wildlife habitats
- Improve stream bed and bank stability
- Improve access and visibility

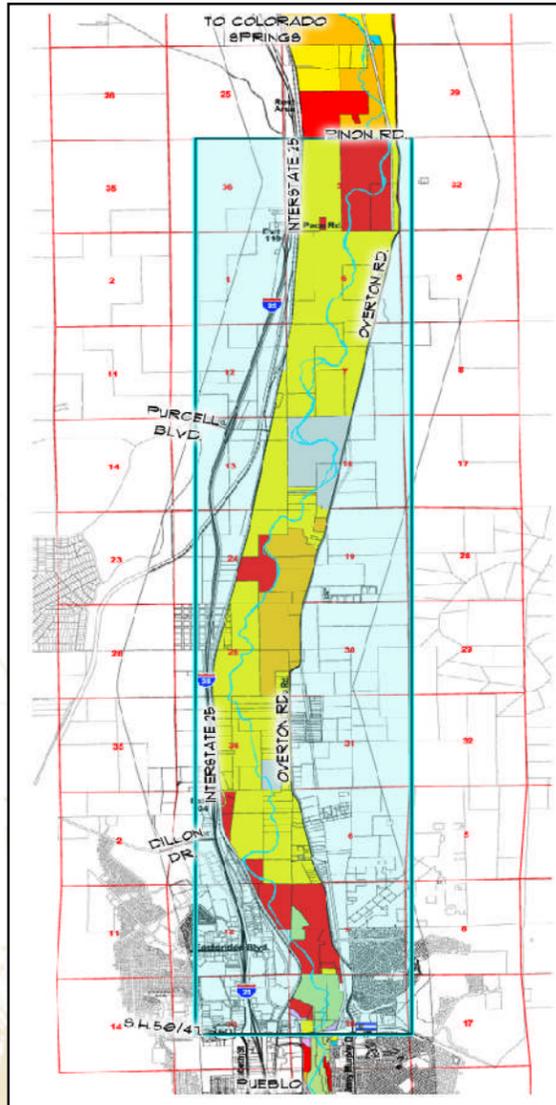


Figure 4.20

### 1. Location of the Project

The Front Range Trail Master Plan located the Front Range Trail along Fountain Creek, from the Pinon Bridge south to S.H. 50/47 in Pueblo. This Master Plan encompasses the entire floodplain within this reach and is approximately 9.4 miles in length. See Figure 4.20.

### 2. Description of the Project

This Master Plan is a more detailed continuation of the Front Range Trail Master Plan (FRTMP) developed in 2009 by Colorado Open Lands, between the City of Fountain and north Pueblo. This master planning effort is a more site specific approach to advance the FRTMP and fulfills the long-term vision of the Front Range Trail. By understanding site opportunities and constraints, a more accurate and feasible trail alignment was developed.

The 9.4 mile section of Fountain Creek included in the project study area joins to a 6 mile section of Front Range Trail running through the City of Pueblo and connecting to the Arkansas River Trail system. Once complete, the Front Range Trail project will link together communities from Wyoming to New Mexico. See Figure 4.21.

### 3. Goals for the Project

The proposed Master Plan goals include locating the Front Range Trail in accordance with the proposed Creek realignment from the Fountain Creek Corridor Restoration Master Plan. The proposed trail alignment follows a natural flood bench behind large stands of Cottonwoods on each side of the Creek. Conservation of these Cottonwood galleries also became a major goal of the Master Plan. Identifying property acquisition, trail head location and bridge locations were also goals of the effort.

### 4. Strategies Being Employed

- Conservation of floodplain land through acquisition of property, as needed for trail construction.
- Preserve existing native Cottonwood galleries. During construction of the trail, revegetation and habitat restoration will be a part of every project.
- In areas that currently have no public access, the Front Range Trail will provide access and visibility to the Fountain Creek Corridor. Four new trailheads are planned between the Pinon Bridge and north Pueblo.

### 5. Lessons Learned or Anticipated Lessons Learned

To connect communities along the Front Range, there is tremendous state and local support for development of the Front Range Trail. With this momentum, and to take advantage of the funding opportunities that are currently available, the partners should continue working together.

### 6. Current Partners

Colorado State Parks, City of Pueblo, Lower Arkansas Valley Water Conservancy District, Colorado Springs Utilities and the Fountain Creek Watershed District.

### 7. Project Status (Planning, Construction Documents, Construction, Acquisition etc.)

The Master Plan was completed in December 2010.

### 8. Next Steps

Obtain funding for property acquisition, final design and construction. At the state level, there is great interest in developing the Front Range Trail. Therefore, funding opportunities exist with Great Outdoors Colorado, Colorado State Parks and local jurisdictions.

### 9. Cost Estimates (2011 dollars)

The Front Range Trail Master Plan discusses the Trail being incrementally built. For the purpose of this Master Plan, the cost has been presented in two scenarios, the minimum required to achieve connectivity and the ultimate build-out.

Minimum Required:	
12' Crusher Fines Trail	\$3,672,000.00
Low Water Crossing with Railing	\$90,000.00
Pedestrian Bridges	\$2,250,000.00
<b>Total Project Cost</b>	<b>\$6,012,000.00</b>

Ultimate Build-Out:	
12' Concrete Trail with 4' Gravel Shoulders	\$12,240,000.00
Pedestrian Bridge Crossings (<100L.F.)	\$1,200,000.00
Pedestrian Bridges	\$2,250,000.00
<b>Total Project Cost</b>	<b>\$15,690,000.00</b>

### 10. Maintenance

This section of the Front Range Trail is located in both Pueblo County and the City of Pueblo. Final maintenance responsibilities will be defined as specific projects are developed. In 2011 dollars, yearly maintenance costs are estimated as follows:

14 Miles of Trail (Pinon Bridge to the Arkansas River)	\$106,442.00
• Mowing	
• Weed Control	
• Minor Repairs	
• Trash and Debris Removal	

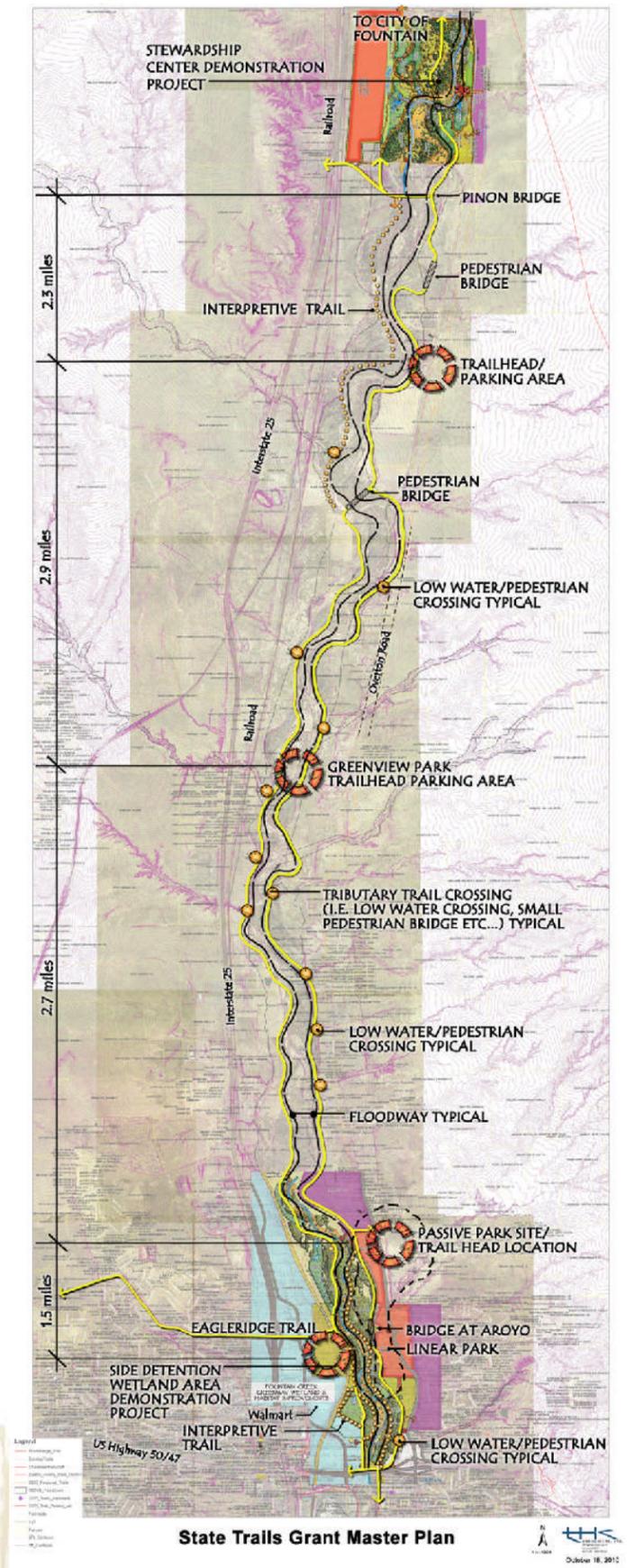


Figure 4.21

#### 4.B.7. Jimmy Camp Creek/Fountain Creek Connector Trailhead

##### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve wildlife habitats
- Improve access and visibility

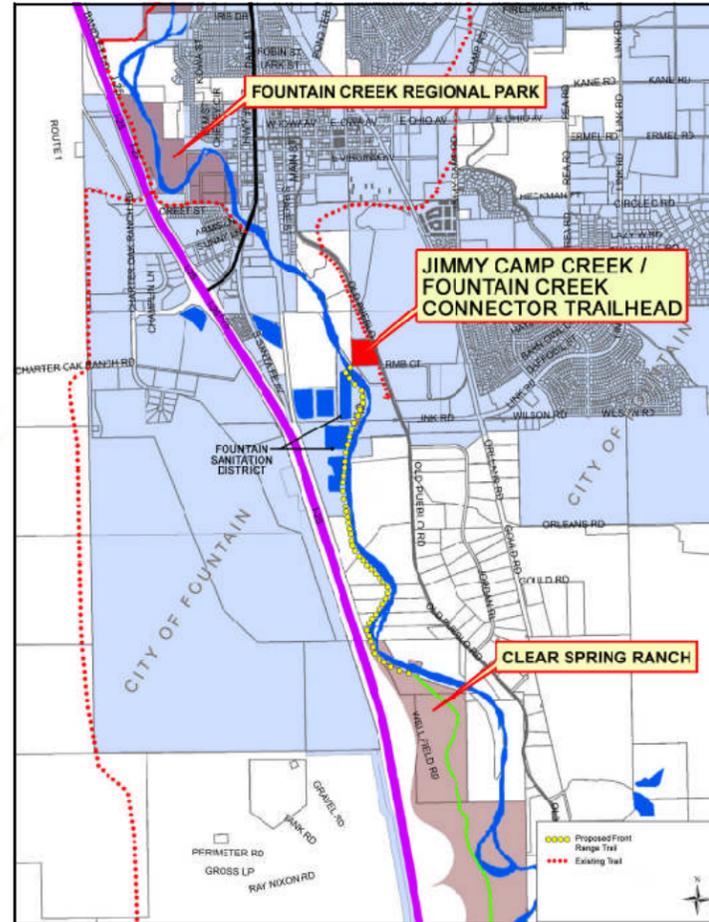


Figure 4.22

##### 1. Location of the Project

The trailhead is located midway between the Fountain Creek Regional Park to the north and Clear Spring Ranch to the south. It is approximately one-quarter mile south of Jimmy Camp Creek, on the west side of Old Pueblo Road adjacent to Fountain Creek. See Figure 4.22.

##### 2. Description of the Project

The 8.5 acre parcel is strategically located near Jimmy Camp Creek, a tributary to Fountain Creek, with an existing trail that connects to downtown Fountain. The trailhead property is the first step in connecting the City of Fountain with the planned trail and amenities on Clear Spring Ranch, via the multi-use Front Range Trail. See Figure 4.23. Currently, access to Clear Spring Ranch is restricted to a secluded vehicular access point along

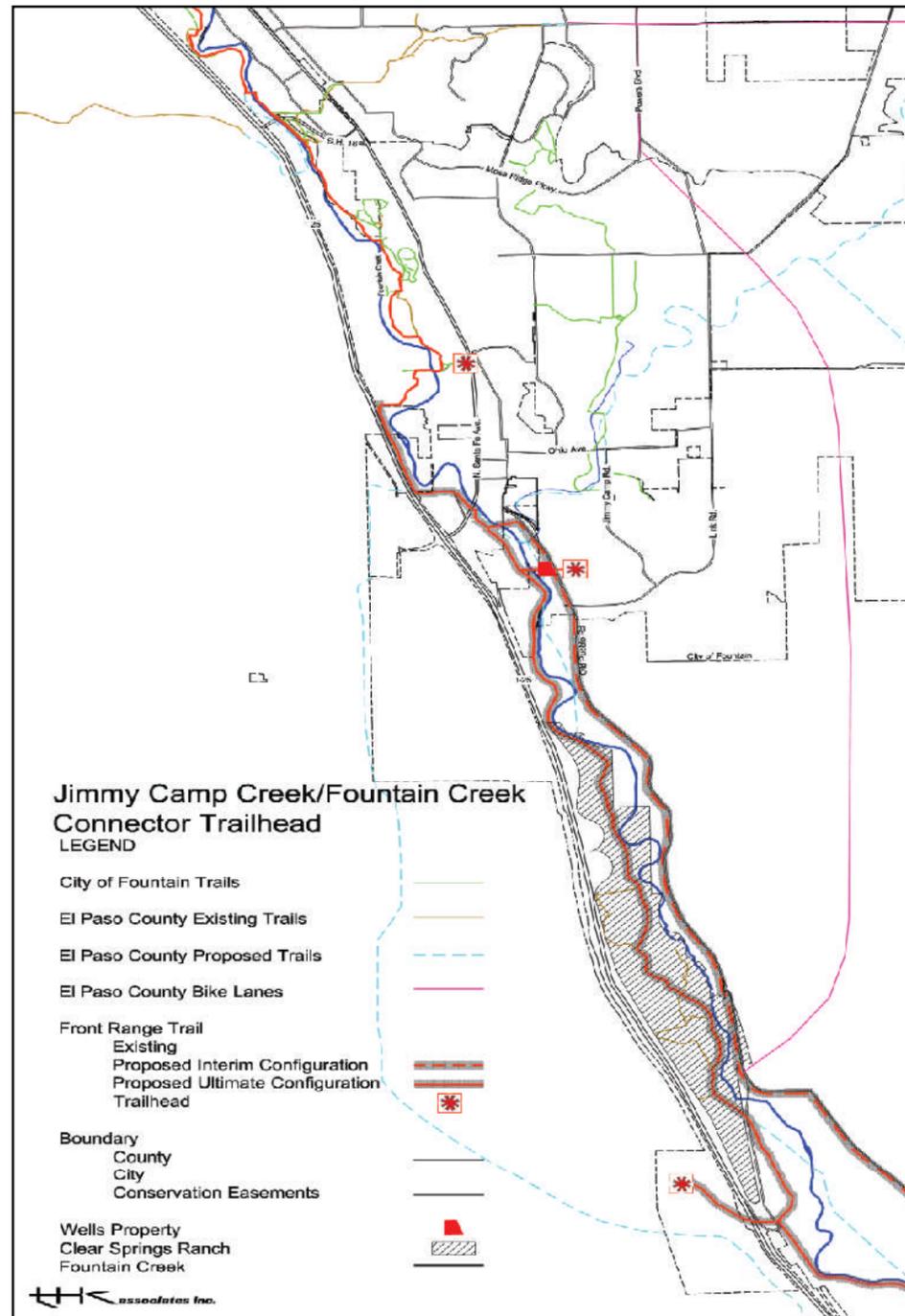


Figure 4.23

Interstate 25 and the western boundary of Clear Spring Ranch. Clear Spring Ranch is a 900+ acre open space owned by Colorado Springs Utilities. The recreational elements of Clear Spring Ranch are managed by El Paso County.

Instead of the previously proposed option to locate the Front Range Trail on Old Pueblo Road, this trailhead provides the opportunity to have the Front Range Trail cross Fountain Creek and be located along the west side of Fountain Creek.

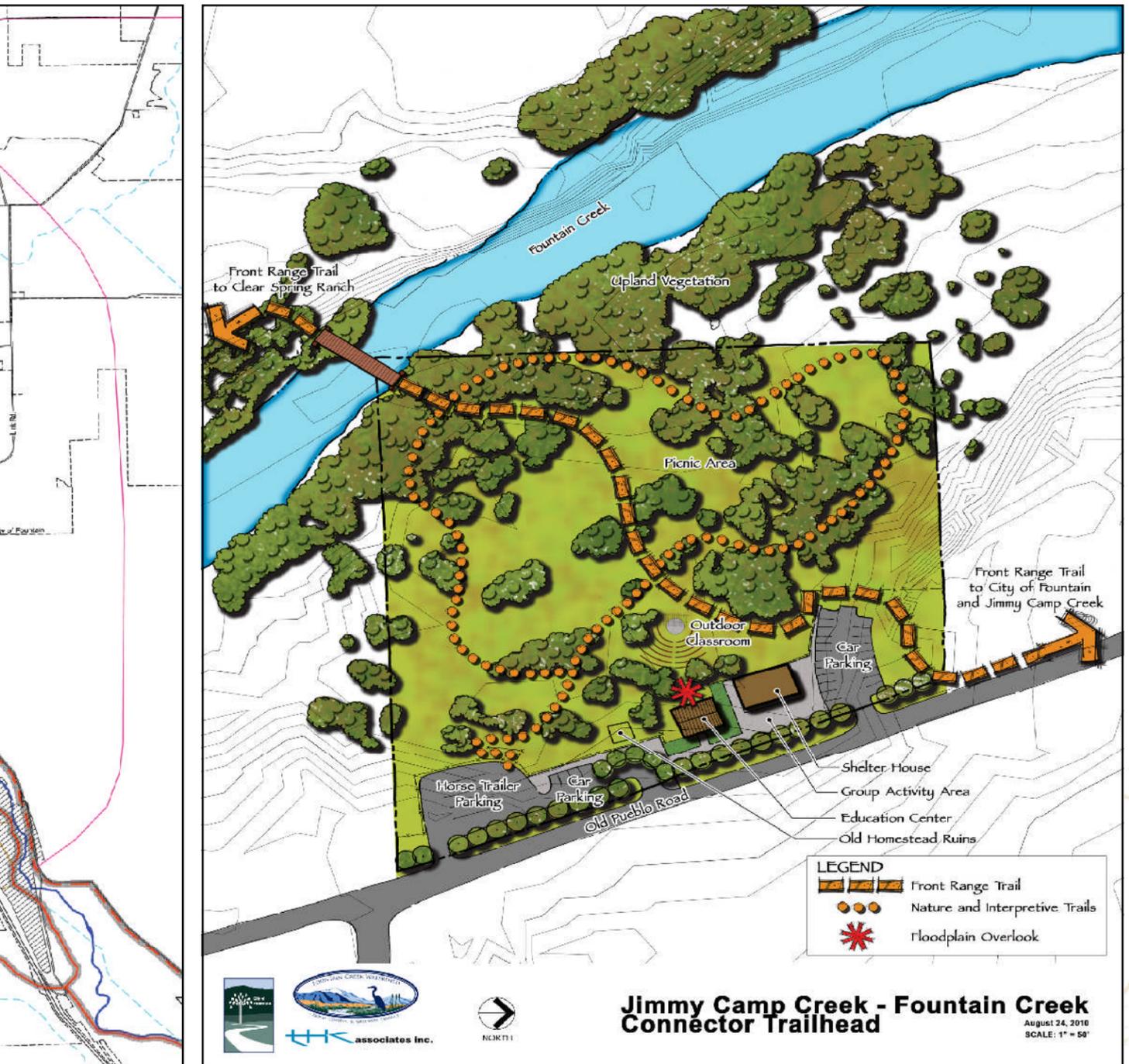


Figure 4.24

Roughly 5 acres of the 8.5 acre parcel lies within the 100-year floodplain of Fountain Creek. This adjacency to an active river, coupled with topographic complexity, provides the foundation for a diverse suite of habitats in a relatively small area. Mature vegetation includes cottonwood snags and downed coarse wood debris. The farm structures sit on a bench out of the 100-year floodplain dominated by prairie grassland. The main structure is an historic residence, a Sears and Roebuck and Co. catalog home, thought to be one of only several hundred in Colorado. The historic significance of the home adds to the attractiveness of the property and

as a community attribute worthy of protection. The City of Fountain and its partners envision the residence to be used primarily as a historic, environmental and farming historical education facility and to be a standing testament to the history and diversity of the property and its uses. In addition, a large 3,300 square foot barn accompanies the residence on its northern side. The City of Fountain intends to utilize the structure as a multi-purpose facility for public meetings, conferences and other similar sized events. See Figure 4.24.

### 3. Goals for the Project

In 2010, a series of public meetings were conducted to establish goals for the project. They included the following:

- Complete an important pedestrian and equestrian link in the Front Range Trail.
- Celebrate proximity and access to Fountain Creek.
- Provide a trail connection to Clear Spring Ranch.
- Acquire a key location for a Front Range Trail trailhead.
- Preserve the Sears and Roebuck and Co. house.
- Provide gathering space for community activities.
- Increase recreational and equestrian uses.
- Provide accessibility for all.
  - Fountain Creek
  - Agriculture and Farming



- Community Roots
- Environmental Stewardship

### 4. Strategies Being Employed

- Conservation of floodplain land through acquisition of property, as needed for trail construction.
- Preserve existing riparian buffer zone. During development of the trailhead, landscape plans will call for the enhancement of the existing riparian buffer.
- As an environmental education site, demonstrating effective and appropriate revegetation and habitat restoration will be showcased. Interpretive materials will be developed and available to the public.
- In an area that currently has no public access,

the trailhead will provide access and visibility to the Fountain Creek Corridor. This project will also provide an opportunity for the public to access environmental and historical information about the Fountain Creek Corridor.

- This project will showcase the use of a wetland filtration basin to treat runoff from the impervious surfaces developed as part of the trailhead.

### 5. Lessons Learned or Anticipated Lessons Learned

This project is the prototype Front Range Trail trailhead that will demonstrate the appropriate development techniques for a trailhead within the Fountain Creek Corridor, both functionally and environmentally.

### 6. Current Partners

City of Fountain, El Paso County, Colorado Open Lands, Great Outdoors Colorado, Fountain Creek Watershed, Flood Control and Greenway District and the Union Pacific Foundation.

### 7. Project Status (Planning, Construction Documents, Construction, Acquisition etc.)

Currently, the project is in the acquisition phase. Funds have been appropriated and the City of Fountain and Colorado Open Lands are working on acquiring the property. The City of Fountain will be the owner of the property and El Paso County will be constructing the trail component for the Front Range Trail.

### 8. Next Steps

Complete the property acquisition and then begin the design of the trailhead. The City of Fountain will lead the design effort.

### 9. Cost Estimates (2011 dollars)

The anticipated cost of the trailhead is \$500,000.00

### 10. Maintenance

The City of Fountain will maintain the trailhead site improvements and El Paso County will maintain the Front Range Trail. In 2011 dollars, yearly maintenance costs are estimated as follows:

- |                                 |             |
|---------------------------------|-------------|
| 8.5 Acres of Park Land          | \$73,950.00 |
| (Excludes building maintenance) |             |
| • Mowing                        |             |
| • Trash and Debris Removal      |             |
| • Irrigation Management         |             |
| • Minor Repair of Landscape     |             |
| • Weed Management               |             |

## 4.B.8. Clear Spring Ranch Connector Trail Acquisitions

### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve access and visibility

#### 1. Location of the Project

The Clear Spring Ranch connector trail acquisitions are located on the west side of Fountain Creek, south of the Jimmy Camp Creek/Fountain Creek Connector Trailhead (See 4.B.7.) and the Fountain Sanitation District property. See Figure 4.25. The six properties that are part of the acquisitions will complete the 1.5 mile section of the Front Range Trail, between the Jimmy Camp Creek/Fountain Creek Connector Trailhead and Clear Spring Ranch.

#### 2. Description of the Project

The Clear Spring Ranch Connector Trail Acquisitions will connect existing open space amenities along Fountain Creek. Acquired property will ultimately serve as a corridor for the Front Range Trail. Currently, the implementation plan for the Front Range Trail shows a trail alignment adjacent to Old Pueblo Road south of the City of Fountain. This project will bring the trail alignment adjacent to Fountain Creek, which is a more desirable location for both adjacent property owners and trail users alike. In addition to creating a trail corridor, the property acquisitions will protect 1.5 miles of Creek land, on the west side of Fountain Creek, from activities detrimental to river riparian corridor health.

#### 3. Goals for the Project

- Increase state wide regional trail connectivity by providing a critical 1.5 mile segment of the Front Range Trail.
- Provide under utilized connections from the City of Fountain to the 900 acres of open space at Clear Spring Ranch.
- Provide a second public access point to Clear Spring Ranch. Currently, there is only one access point to Clear Spring Ranch, Exit No. 123 on I-25.
- Provide additional protection of the Fountain Creek floodplain by purchasing private property for use as public open space and trail connections.
- Provide environmental education opportunities for the public, provide public access to Clear Spring Ranch Fish Passage (See 4.B.11) and Clear Spring Ranch Creek Stabilization and Wetland Creation (See 4.B.12).

- Provide a myriad of opportunities to educate the public about the Creek and associated resources like historic places, riparian vegetation, varied wildlife habitats and beautiful natural places.
- Ultimately, foster community responsibility and stewardship of the Creek by providing public access where there is none, increasing the community awareness and understanding and appreciation of Fountain Creek.
- Provide scenic and enjoyable recreation opportunities.

#### 4. Strategies Being Employed

- Conservation of floodplain land through acquisition of property needed for trail construction.
- Preserve existing riparian buffer zone by creating public open space for a trail connection.
- During construction of this trail, revegetation and habitat restoration will be a part of the trail connection project.
- In areas that currently have no public access and other areas with very poor public access, the Front Range Trail will provide access and visibility to the Fountain Creek Corridor.

#### 5. Lessons Learned or Anticipated Lessons Learned

- There is tremendous state and local support for development of the Front Range Trail. With the momentum, partners should continue working together to take advantage of the funding opportunities that are available now.
- By providing public access and exposure to the resources of Fountain Creek, we will see an increased sense of community responsibility for the Creek that will strengthen the community commitment to protecting and enhancing Fountain Creek. This is critical to the long term stewardship of Fountain Creek.

#### 6. Current Partners

City of Fountain, El Paso County, Colorado State Parks, Great Outdoors Colorado, Union Pacific Foundation, the Fountain Creek Watershed, Flood Control and Greenway District and Colorado Open Lands.

#### 7. Project Status (Planning, Construction Documents, Construction, Acquisition etc.)

Currently property acquisitions are being negotiated to purchase the six private properties.

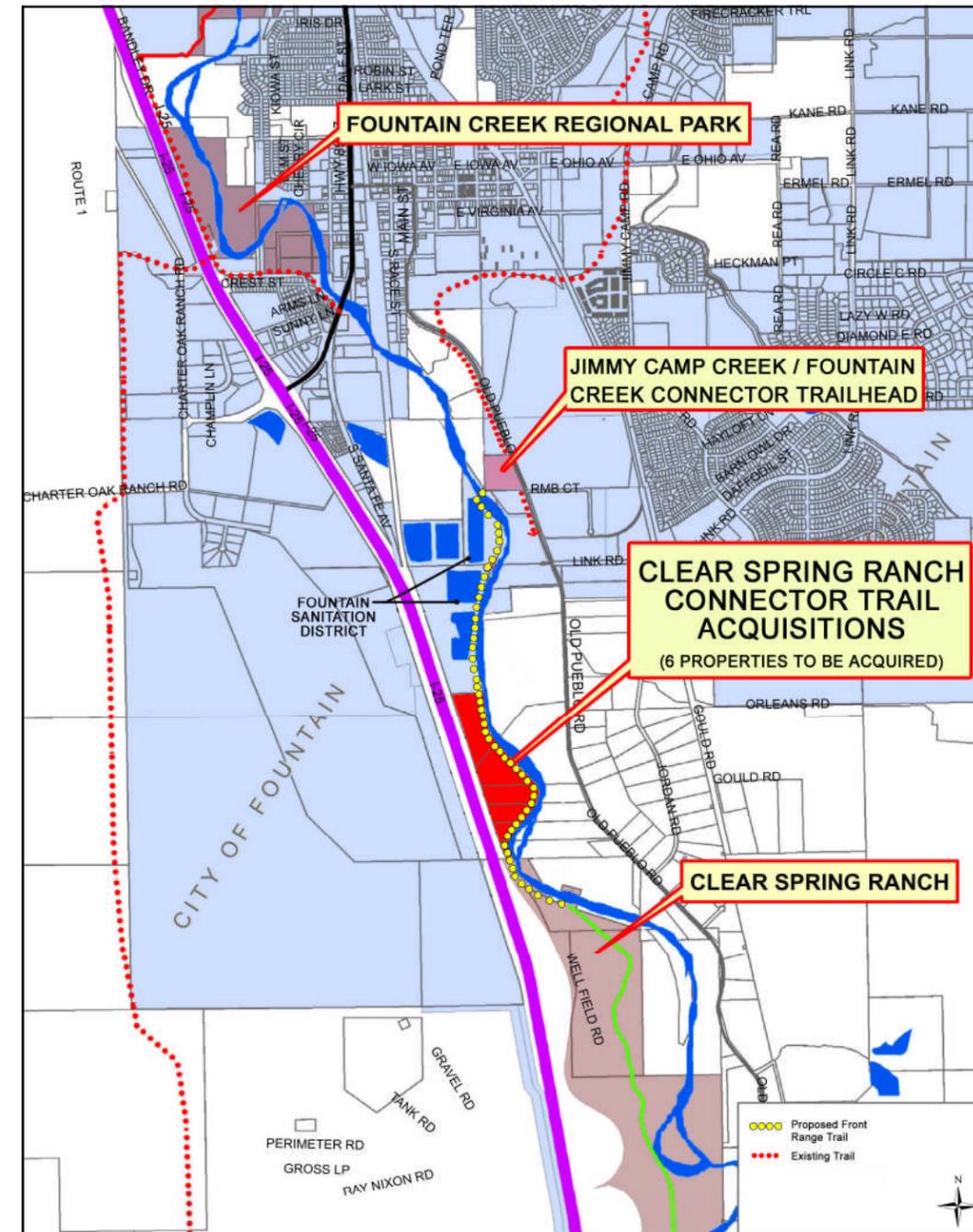


Figure 4.25

#### 8. Next Steps

- Complete property acquisitions.
- Develop a trail alignment design and construction cost estimate.
- Seek funding for trail construction.

#### 9. Cost Estimates (2011 dollars)

Property acquisitions, including professional services, is budgeted at \$260,000.00

#### 10. Maintenance

El Paso County will be maintaining the Front Range Trail. In 2011 dollars, yearly Maintenance costs are estimated as follows:

1.5 Miles of Trail	\$15,206.00
• Mowing	
• Weed Control	
• Minor Repair	
• Trash and Debris Removal	

## 4.B.9. Environmental Stewardship Center at Pueblo Springs Ranch

### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve water quality
- Improve wildlife habitats
- Improve stream bed and bank stability
- Improve general creek health
- Improve access and visibility



Figure 4.26

### 1. Location of the Project

The project area includes all the Fountain Creek 100-year floodplain between the old Pinon Bridge and the new Pinon Bridge, approximately a 1-mile reach of Fountain Creek. See Figure 4.26.

### 2. Description of the Project

The proposed Environmental Stewardship Center, "Fountain Creek Center at Pueblo Springs Ranch", will be designed to promote natural resource management practices. The facility will promote closer working relationships among all stakeholders in a broad range of activities, such as water quality improvements, wildlife habitat improvements and recreational management. See Figure 4.28.

#### a. Environmental Stewardship Center

1. *Nature Center (Preservation) Ecosystems* - So visitors can get a birds-eye perspective of

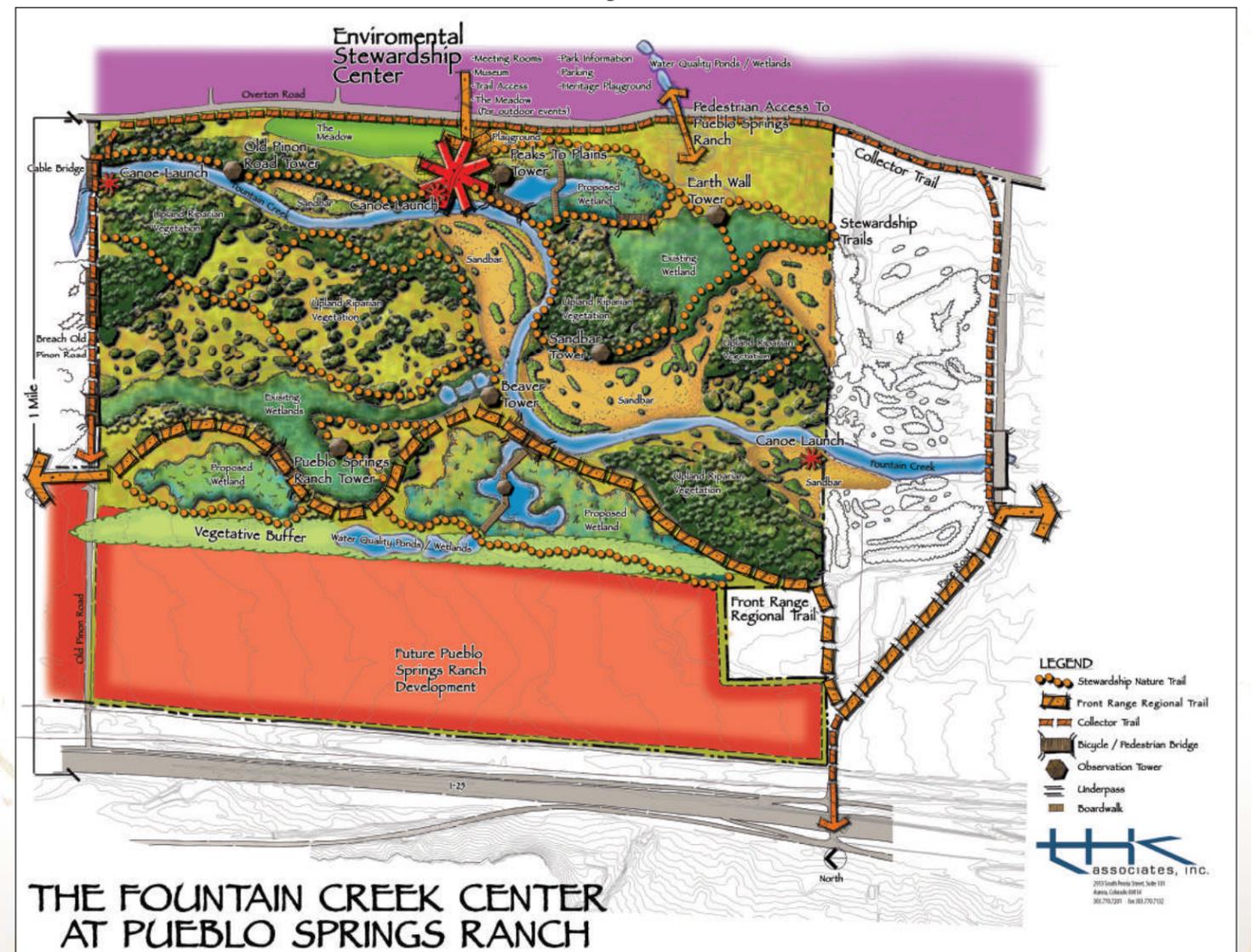
the different ecosystems and wildlife habitat that is so typical to Fountain Creek, six Observation Towers will be constructed on the site. See Figure 4.27. The geomorphology of the Creek will also be interpreted so the viewer can understand how these unique ecosystems were created. The emphasis will be on preservation and the unique richness of the Fountain Creek watershed. Due to development along the Front Range of



Figure 4.27

Colorado, very little river habitat, like what is found along Fountain Creek, still exists in its natural condition.

- *Earthwall Tower* - Overlooks an old river oxbow and cut bank that is now a significant wetland.
- *Sandbar Tower* - Overlooks a large deposition area "sandbar" formed by the Creek.
- *Beaver Tower* - Overlooks a series of beaver ponds and dams that are an active beaver habitat.
- *Plains to Peak Tower* - Overlooks the river and upland riparian areas with long-range views of the prairie and the mountains.
- *Pueblo Springs Ranch Tower* - Overlooks an upland riparian area and man made wetlands created by springs developed for agricultural uses.
- *Pinon Bridge Tower* - Overlooks the Old Pinon Bridge Site. The bridge was washed out in a flood and provides an opportunity to discuss unsuccessful interactions with the Creek.



THE FOUNTAIN CREEK CENTER AT PUEBLO SPRINGS RANCH

Figure 4.28

## b. Wildlife

Extensive wildlife is present along Fountain Creek and at this site. This provides tremendous opportunity for education and interpretation. The wildlife includes, but is not limited to; Raptors, Coyotes, Song Birds, Mountain Lions, Elk, Beaver, Deer, Raccoons, Fox, Skunks and Wild Turkeys.



The Fountain Creek Center at Pueblo Springs Ranch provides the perfect opportunity to work with the Army Corps of Engineers to create backwater habitat for the Arkansas Darter, a fish that is on the threatened and endangered species list.



The Colorado Division of Wildlife uses the wild turkey population in the Fountain Creek watershed as an indicator of overall habitat health. Currently, due to human encroachment on the river, the turkey population is on the decline. The Stewardship Center would highlight the information around these issues to educate visitors, property owners, elected officials and others on practices and techniques that should be used along Fountain Creek. These practices will

protect and preserve the wildlife habitat. In the process, it would create a sustainable wild turkey population to be used as a direct reflection of habitat health.



## c. The Creek

The Creek is a dynamic ever-changing system that man has unsuccessfully tried to control. One of the main objectives of the Stewardship Center is to help people understand what is a truly healthy and sustainable river corridor and how man can coexist with the river. Through education, study, demonstration and implementation in partnership with property owners, Fountain Creek will become a national model for river stewardship.

## d. Cultural Heritage Center

Present the history of man's interaction and connection with Fountain Creek.

1. *Southern Ute Indian Tribe* - The Ute name for Fountain Creek in Shoshone dialect is Nattahsun Paa. This means medicine water. The tribe has a long history of using this valuable resource in many different ways.



2. *French Influence* - The French are responsible for naming the Creek "Fountain Creek". The U.S. French Embassy Education Office is in touch with every school across the United States who offers French programs and French curriculum. French programs are offered to students in public primary and secondary schools. French programs could be incorporated into Fountain Creek's Environmental Stewardship Programs.
3. *Agricultural Heritage* - Active farms and ranches still exist in the Fountain Creek Watershed. Many are still operated by decedents of original European homesteaders. The Cultural Heritage Center would work with local historical societies to interview these decedents and capture the rich farming and ranching heritage. This is very important as much of the Fountain Creek Watershed is transitional from agricultural land uses to urban land uses.



4. *Education Center* - Environmental stewardship curriculum would be developed for all age groups. Partnerships and joint efforts are being explored with CSU Pueblo and local public schools, The Windstar Foundation and Earthcamp program and FACE (French American Cultural Exchange), a non-profit organization dedicated to supporting contemporary creativity within the context of French-American cultural and educational exchange.
5. *On Site* - A 6000 square foot building with meeting rooms, museum, library, office space and a 100-car parking lot is planned. This

facility would house on-site operations and be the Gateway to Fountain Creek, providing interpretation of the entire Fountain Creek restoration and stewardship effort.

## e. Interactive Web Site

The environmental stewardship curriculum would be accessible on a Fountain Creek Center Environmental Stewardship Center Interactive Web Site. Also, through the use of Web Cameras and other technologies, visitors will be able to experience the site from remote locations. This will also make the experience more friendly for visitors with disabilities.



## f. Demonstration Areas

The Fountain Creek Center is a case study of how the ecology of Fountain Creek can be improved through innovative design techniques such as backwater channels and wetlands that act as water quality filtration ponds and flood storage. They also provide beauty, wildlife habitat and recreational opportunities. Hands-on educational displays will teach center visitors about the Fountain Creek watershed basin and how floods occur and can be safely avoided.

Creating and enhancing stewardship of Fountain Creek is an important and consistent principle for the entire Fountain Creek Corridor.

1. *Sustainability of Creek Geomorphology* - A relatively stable Creek is a dynamic system with the main channel moving over time. Demonstrating how man should minimize efforts to channelize and control the Creek

will be a part of the geomorphologic demonstration. Appropriate buffer widths will also be demonstrated and explained. Many segments of the Creek are relatively stable, with an appropriate amount of erosion and deposition occurring. These areas will be identified and interpreted for visitors. The reconstruction of the Creek into a more stable configuration will be demonstrated at a number of locations.

The importance of sustainable river geomorphology to land use, wildlife habitat and sediment control will be a key message in all demonstration projects.

2. *Wildlife Habitat Preservation and Restoration*  
The Fountain Creek Center, in partnership with the Colorado Division of Wildlife and the U.S. Army Corps of Engineers, will identify high quality existing habitat and demonstrate preservation techniques to create new habitat, such as the off line wetland detention areas. These off line wetland detention areas are a key element of the overall Fountain Creek Master Plan Vision for habitat restoration, water quality and flood control.
3. *Relatively Stable Riparian and Wetland Ecosystems* - Techniques to develop healthy riparian and wetland ecosystems will be demonstrated.
4. *Outdoor Laboratory* - The Fountain Creek Center provides the perfect opportunity to study Creek geomorphology and riparian health. Studying base line existing conditions will give researchers a starting point from which to understand a relatively stable system, since much of the Creek is in good condition. From this initial data, researchers can then study potential techniques for improvement of other reaches of the Creek. This potential for research creates a fertile environment for partnerships and grant opportunities with CSU Pueblo and the Jones Research Center in Georgia.

**g. Recreation (Always with an Environmental Stewardship Message)**

The Fountain Creek Center at Pueblo Springs Ranch will be a key link in the Fountain Creek

Greenway and Front Range Trail, a regional amenity between Colorado Springs and Pueblo. The Center will serve as a community gathering place, host to community and demonstrative events, shows, weddings, family reunions, etc. In addition to all the recreational opportunities presented as a part of the nature, cultural and educational center, other interactive and hands-on activities will exist to kindle a sense of adventure with canoeing, cable bridges and eco-playgrounds.

The Fountain Creek Center at Pueblo Springs Ranch will be an exciting place where children and adults can be active in play, while at the same time learning valuable lessons about their culture, history and the environment around them.

**3. Goals for the Project**

- a. The ultimate goal of the project is to create and enhance a stewardship ethic for Fountain Creek within the community that will ultimately save the Creek.
- b. One of the main goals of the Stewardship Center is to help people understand what is a truly healthy and sustainable river corridor and provide information about how man can coexist with the river.
- c. Present the history of man's interaction and connection with Fountain Creek. This includes documenting, for future generations, the rich farming and ranching heritage in the area.
- d. Develop an environmental stewardship curriculum and classroom.
- e. Demonstrate and showcase innovative restoration techniques including those presented in the Master Plan.
- f. Preserve one of the healthiest and bio-diverse reaches of Fountain Creek.
- g. Provide public access where none exists today.
- h. Be an outdoor laboratory for researching restoration techniques. Partner with research institutions.

**4. Strategies Being Employed**

The intent of this project is to showcase all eleven (11) restoration techniques presented in this Master Plan. Also, as an outdoor laboratory, be on the leading edge of developing new additional restoration techniques.

**5. Lessons Learned or Anticipated Lessons Learned**

The Fountain Creek Center will inform the public of the important role that Fountain Creek plays in nature, as well as in everyone's daily lives. By celebrating the rich history and valuable resources the Creek offers, Colorado will enjoy a new and significant tourist attraction, education facility, diverse recreational area and national model for community cooperation and success.

**6. Current Partners**

The property owners, the Fountain Creek Foundation, the City of Pueblo and the Fountain Creek Watershed District.

**7. Project Status (Planning, Construction Documents, Construction, Acquisition etc.)**

Initial visioning has been completed for the project.

**8. Next Steps**

Land acquisition through donations or dedications from the property owners to the Fountain Creek Foundation or the City of Pueblo. This could occur as a part of a future annexation and development approval through the City.

**9. Cost Estimates (2011 dollars)**

Environmental Stewardship Center	\$2,513,325.00
Observation Towers (6)	\$1,196,000.00
Trails, Boardwalks, Pedestrian Bridges and Low Water Crossings	\$4,458,545.40
Bank Stabilization, Wetlands and Vegetation	\$6,366,888.75
Park Amenities	\$262,775.00
Design and Engineering, Permitting and Construction Management	\$3,069,462.22
<b>TOTAL PROJECT COST</b>	<b>\$17,866,996.37</b>

**10. Maintenance**

Maintenance costs/responsibilities still need to be determined among the project partners. In 2011 dollars, yearly maintenance costs are estimated as follows:

Approximately 300 Acres of Open Space	\$500,000.00
• Mowing	
• Trash and Debris Removal	
• Irrigation Management	
• Minor Repair of Landscape	
• Weed Management	

## 4.B.10. Front Range Trail Through Clear Spring Ranch

### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve access and visibility
- 

### 1. Location of the Project

The project includes 4.3 miles of the Front Range Trail, along the west side of Fountain Creek through Clear Spring Ranch. It is a 900-acre open space area owned by Colorado Springs Utilities, 1.5-miles south of the City of Fountain city limits. See Figure 4.29.

### 2. Description of the Project

Clear Spring Ranch is a 900-acre, under utilized natural resource along Fountain Creek that has only restricted automobile access from Interstate 25 off Exit No. 123. The design of the Front Range Trail through Clear Spring Ranch will add an additional 1.3 miles of trail along Fountain Creek. During the fall of 2010, the City of Fountain received a GOCO grant for the acquisition of the Jimmy Camp Creek/Fountain Creek Connector Trailhead. See Demonstration Project 4.B.7.

Additionally, in the Winter of 2011, the City of Fountain received land acquisition funds from Colorado State Parks for additional trail easement from the trailhead to Clear Spring Ranch. These two trail acquisition grants, along with Clear Spring Ranch, will extend the trail 6 miles further from the City of Fountain. This trail site design effort will connect the Front Range Trail and the City of Fountain to the Clear Spring Ranch trailhead that is currently managed by El Paso County as a stand alone nature trail system. The Clear Spring Ranch Master Plan, prepared in 2008, shows the Front Range Trail located on the west side of Fountain Creek within Clear Spring Ranch. See Figure 4.30. This project is being designed simultaneously with Demonstration Project 4.B.12., the Fountain Creek/Clear Spring Ranch Realignment Project.

### 3. Goals for the Project

The primary goal of this project is to provide better access to Clear Spring Ranch and regional connectivity of the Front Range Trail. Additional goals include:

- Renovation/enhancement of existing outdoor recreation facilities
- Environmental education
- Connect the new Jimmy Camp Creek/Fountain Creek Connector Trailhead to the existing Clear Spring Ranch Trailhead
- Create multiple, diverse recreational opportunities to benefit not only local and regional residents, but visitors to the state
- Enhance and renovate the existing nature trail system by providing the opportunity for an expanded interpretive system
- Connect the environmental education facilities at the new Jimmy Camp Creek/Fountain Creek Connector Trailhead with Clear Spring Ranch nature trails
- Provide additional and better access opportunities to the under utilized resources of Clear Spring Ranch

### 4. Strategies Being Employed

- Conservation of floodplain land needed for trail construction.
- During construction of the trail, revegetation and habitat restoration of disturbed areas will be part of the effort.
- In areas that currently have very poor public access, the Front Range Trail will provide access and visibility to the Fountain Creek Corridor.

### 5. Lessons Learned or Anticipated Lessons Learned

There is tremendous state and local support for the development of the Front Range Trail to connect communities along the Front Range. With the momentum, partners should continue working together to take advantage of the funding opportunities that are currently available.

### 6. Current Partners

City of Colorado Springs Parks and Recreations and Cultural Services Departments, Colorado Springs Utilities, El Paso County, Great Outdoors Colorado (GOCO) and The Fountain Creek Watershed, Flood Control and Greenway District.

### 7. Project Status (Planning, Construction Documents, Construction, Acquisition etc.)

The design effort has been funded as of July, 2011.

### 8. Next Steps

- Begin the design phase with final drawings completed by Spring, 2012.
- Coordinate with the design team preparing the Fountain Creek Clear Spring Ranch Realignment project.
- Work with project partners to identify future funding for construction of the trail.
- Determine maintenance responsibilities.

Front Range Trail Design Through Clear Spring Ranch

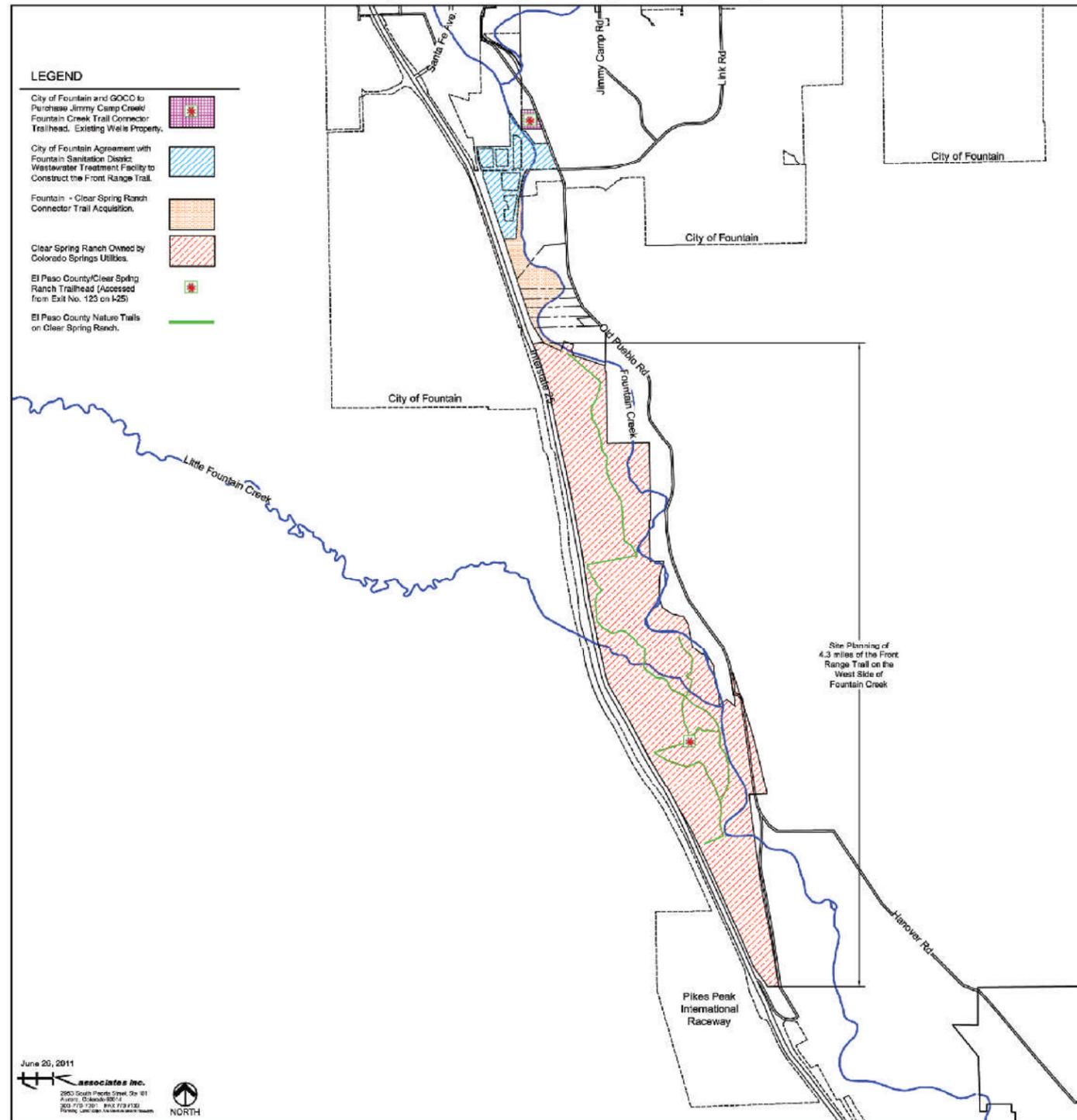


Figure 4.29

9. Cost Estimates (2011 dollars)

12' Concrete Trail with 4' Soft Shoulder	\$1,600,000.00
-OR-	
12' Soft Surface Nature Trail, Trailhead and Interpretive Signage	\$1,000,000.00
	\$475,000.00

10. Maintenance

Final maintenance responsibilities for the trail will be discussed as a part of the design of the trail. Maintenance responsibilities will be agreed upon prior to proceeding with construction funding procurement. In 2011 dollars, yearly maintenance costs are estimated as follows:

4.3 Miles of Trail	\$38,015.00
• Mowing	
• Weed Control	
• Minor Repair	
• Trash and Debris Removal	

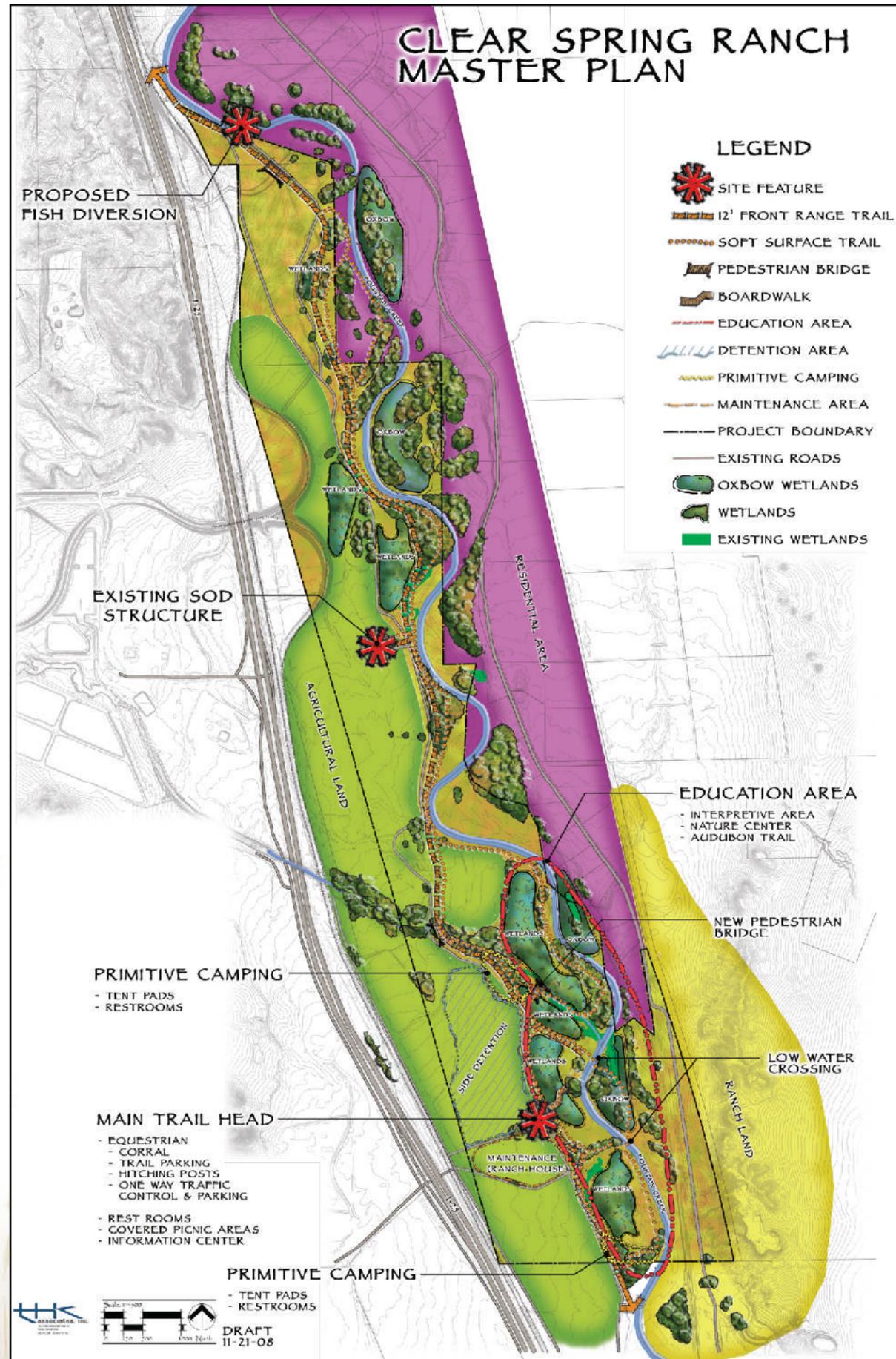


Figure 4.30

#### 4.B.11. Clear Spring Ranch Fish Passage

(See the Appendix for detailed construction drawings)

##### KEY PROJECT OBJECTIVES

Based on the overall Planning Philosophies (Section 1.D.)

- Improve health and safety
- Improve water quality
- Improve wildlife habitat
- Improve fisheries
- Improve access and visibility

#### 3. Goals for the Project

"The streams of Colorado's transition zone and eastern plains are unique environments. Streams with headwaters in the Rocky Mountains receive a predictable snow melt peak, and those lacking mountain headwaters receive a peak resulting from spring rains and groundwater discharge. This peak varies greatly in magnitude and duration between years. Additional precipitation arrives during the monsoon season (June - August) in the form of short duration, high-intensity rainstorms. This results in a hydrograph that varies

markedly within the year as well as between years. This highly variable hydrograph creates a changing mosaic of resources and habitats... Unfortunately for many plains fishes, urban and agricultural land use and water development along Colorado's Front Range has resulted in the construction of thousands of instream structures including culverts, diversion dams, and grade-control structures. These structures transform continuous systems into a series of potentially fragmented habitats and restrict the ranging and migration behaviors that are central to the success of many plains fishes (e.g. Ficke and Myrick, 2009). As a result of this and other

human impacts to streams, 14 species of plains fishes are listed in the state of Colorado as threatened, endangered, or of special concern, largely because of dramatic population declines. Six of Colorado's 38 native plains species have been extirpated from the state (Scheurer et al. 2003a). Numerous studies have documented the importance of habitat connectivity to stream fishes (Fausch et al., 2002, Nesler et al., 1988) and others have implicated fragmentation as potential causes of extinction (Toepfer et al., 1999b., Winston et al., 1991b)...

Two species of particular concern in the Arkansas River drainage are the Arkansas darter (*Etheostoma cragini*), and flathead chub (*Platygobio gracilis*).



Figure 4.31

#### 1. Location of the Project

This project is located at the Clear Spring Ranch diversion dam on Fountain Creek, at the north end of Clear Spring Ranch. See Figure 4.31.

#### 2. Description of the Project

At the 8 foot height Clear Spring Ranch diversion dam, design and construct a fish passage for Flathead Chub (*hypnanis gradis*), Arkansas Darter (*Etheostoma cragini*) and other plains fish. A precast panel system was designed so that the fish passage system will be an off the shelf item for use at all in stream fish passage barriers in Fountain Creek. See Figure 4.32. The design criteria for the fish passage design was established from a swimming and jumping analysis completed at Colorado State University on the Flathead Chub (see Figure 4.34) and Arkansas Darter (see Figure 4.33). Results were presented in the report "Swimming Performance of two Fountain Creek Fishes: Implications for fishway design at the Clear Spring Ranch diversion" by Dr. Ashley Ficke, M.S. and Christopher A. Myrick, PHD, January, 2010. See Figure 4.35.

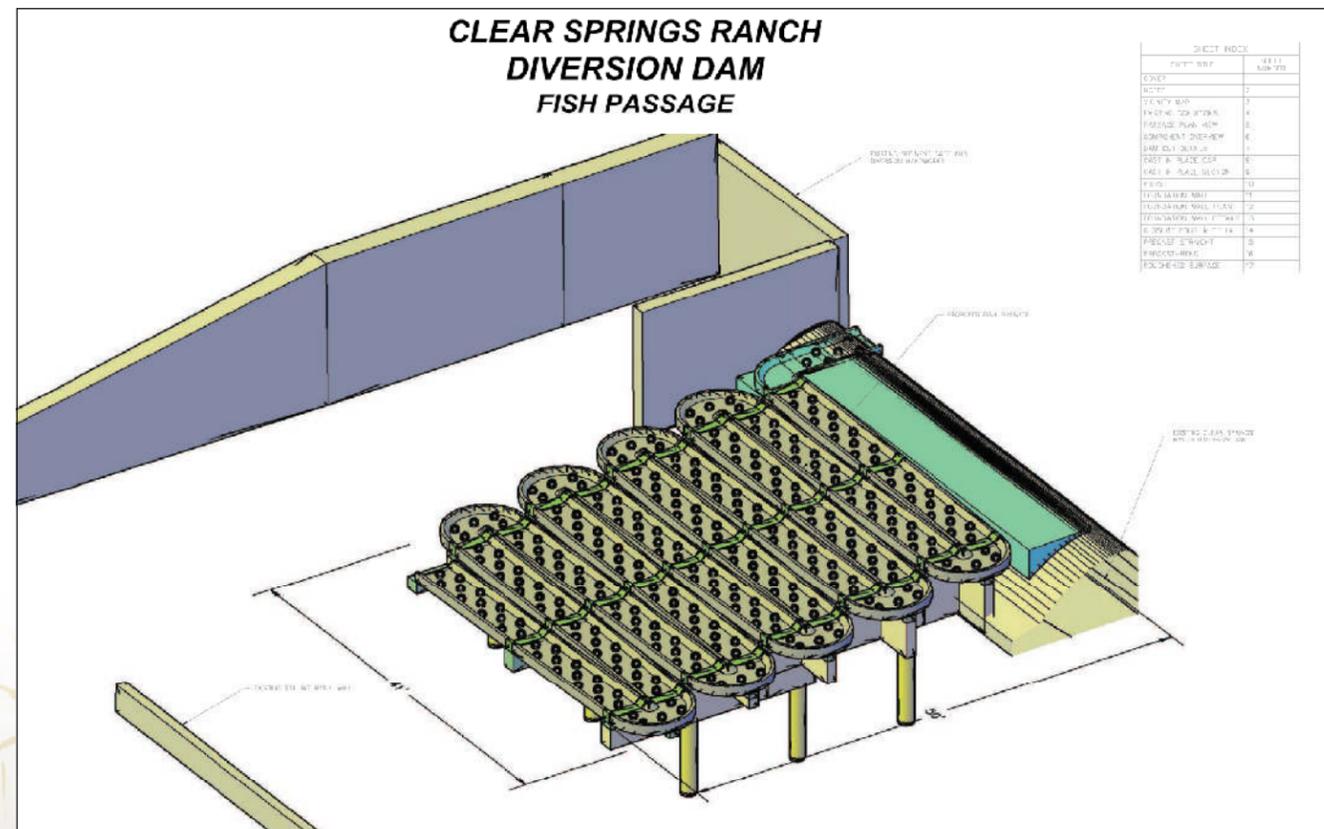


Figure 4.32



The Arkansas darter is listed as threatened, and the flathead chub is of special concern by the Colorado Division of Wildlife. Growing efforts are being made to protect and stabilize remaining populations...

Because persistence of these plains fishes depends upon stream system connectivity, fragmentation must be reversed in order to prevent further declines and allow species recovery." (Ficke and Myrick et al., 2010).

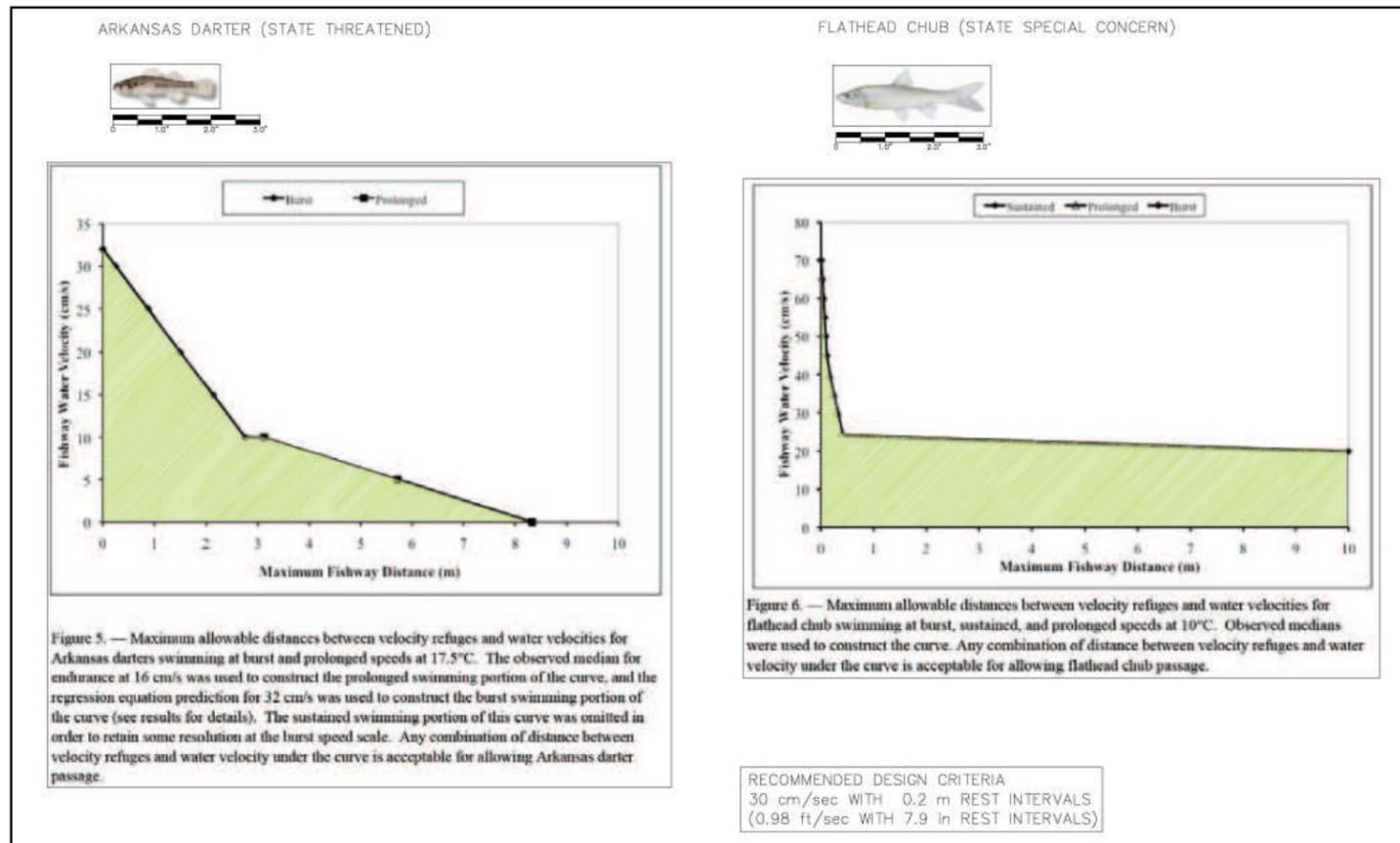


Figure 4.35

#### 4. Strategies Being Employed

Habitat restoration is the main strategy being employed to provide stream system connectivity and eliminate the fragmentation of habitat for plains fishes in Fountain Creek. This allows for the migration behaviors central to the success of many plains fish species.

#### 5. Lessons Learned or Anticipated Lessons Learned

“Traditionally, efforts elsewhere have focused on larger fishes, many of which are anadromous game species. To our knowledge, no fishways on Colorado’s Front Range have been evaluated for their ability to allow upstream and downstream fish passage. Until recently, there [was] virtually no data on the swimming and jumping ability of small-bodied fishes. Therefore, it is likely that any fishways in this region were built based on the abilities of other fish species, or that they were designed without consideration of swimming or jumping data from resident non-game fishes. Locally relevant data must be used in fish ladder design if we are to effectively reverse stream fragmentation and the resulting declines in native fish populations.” (Ficke and Myrick et al., 2010).

This project will develop fish passage design guidelines for future native, small-bodied fish passage projects on Fountain Creek and throughout the Colorado Plains.

In addition to the performance data developed from the CSU analysis, the CDOW and USGS have been monitoring fish movement, both downstream and upstream from the diversion dam, to establish baseline data on fish movement without the passage. Monitoring will continue after the construction of the fish passage so that the change in fish migration can be qualifiable. Additionally, performance monitoring of the passage itself will also be analyzed to determine if the design criteria used can be improved and/or enhanced. This is intended to be a demonstration project to provide in the field data to be used in future fish passage projects throughout the Fountain Creek Corridor and the Colorado Plains.

#### 6. Who are the Current Partners

Colorado Water Conservancy Board (CWCB), Colorado Department of Wildlife (CDOW), U.S. Geological Service (USGS), Colorado Springs Utilities, Colorado State University (CSU), U.S. Army Corps of Engineers (USACE), Lower Arkansas Valley Water Conservancy District (LAVWCD) and Fountain Creek Watershed, Flood Control and Greenway District (FCWFCDG).

#### 7. Project Status (Planning, Construction Documents, Construction, Acquisition etc.)

Construction Documents were completed in June, 2011.

#### 8. Next Steps

- Preparation of the CLOMP/LOMR
- Work with project partners to procure construction funding
- Identify potential additional funding partners (i.e., the U.S. Fish and Wildlife services and Bureau of Reclamation).

#### 9. Cost Estimates (2011 dollars)

Fish Passage Structures  
 Natural Function Restoration of the Creek Downstream from the Fish Passage

**Total Project Cost \$500,000.00**

#### 10. Maintenance

Colorado Springs Utilities will continue to maintain the diversion dam. CDOW and USGS will be responsible for an on-going monitoring plan of the fish passage once the passage is constructed. In 2011 dollars, yearly maintenance costs are estimated as follows:

Monitoring Spring	\$5,000.00
• Fall	
• After Major Flood Event	
• Twice a Month May through August (Fish Migration Period)	
Debris Removal	\$8,000.00
• Twice a Year	

#### 11. Literature Cited

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#### 4.B.12. Fountain Creek/ Clear Spring Ranch Realignment (Pending Project Design Fall, 2011 - Winter, 2012)

## 4.C. Funding

Below is a list of viable funding sources for consideration when implementing the Fountain Creek Corridor Master Plan. These funding opportunities directly relate to the implementation of the goals described earlier in this document. They provide a means of improving Creek stability, water quality, habitat restoration, improving watershed health by reducing erosion, sedimentation and flooding and by increasing recreation and educational opportunities along the Creek.

The funding sources or entities responsible for allocating funds have been placed under one of two funding types, grants or loans. The first list consists of one of five potential grant categories. These categories are: wildlife habitat conservation, river stabilization and flood control, land acquisition/easement purchase, trails and recreation and environmental education. The following is a brief description of the applicability of a particular funding category, as well as a description of each available funding opportunity, along with the potential funding amount and contact information. Following this initial list are sources available as loans. Additional sources of funding for private land owners has been added to the end of the list as a separate category.

### 4.C.1. Grant Sources of Funding

#### 1. Wildlife Habitat and Conservation

Projects from the Master Plan that seek funding in this category would include those that encompass all phases of wetland and riparian creation and restoration and enhancement, as well as those projects that entail the development of aquatic resources including habitat development, migration corridor studies and the removal or bypass of existing barriers to fish movement.

##### a. Colorado Division of Wildlife (CDOW)

*1. Wetland Wildlife Conservation Program* - Colorado's Wetland's for Wildlife Program is a voluntary, collaborative and incentive-based grant program to protect, restore, enhance and create wetlands and riparian areas in Colorado. Funds are allocated annually to the program for funding of all phases of wetland and riparian creation and restoration and enhancement that provide significant benefits to priority wildlife species, as identified in the programs strategic plan. Projects are selected by a Division of Wildlife committee consisting of biologists and field operations staff. Contact: Brian Sullivan (303) 291-7158. Funding ranges between \$10,000

and \$100,000 and a 1:1 match is required for lands administered by other land management agencies. Funding announcement not on a set schedule.

*2. Fishing is Fun* - Provides federal funds (grants) to local Colorado communities and organizations for the development of Colorado's aquatic resources. Funding reimburses project sponsors up to 75% of approved expenses. The four categories of funding include angler access, habitat development and site improvements, fishing site improvements and motorboat access. A minimum 25% match is required. Contact: Jim Guthrie (303) 291-7563. Announced in the fall.

##### b. Colorado Water Conservation Board (CWCB)

*1. Fish and Wildlife Resources Fund* - Monies are granted to existing water supply facilities to help preserve a balance between development of the states resources and the protection of the state's fish and wildlife resources. River restoration feasibility studies and construction projects designed to directly mitigate or significantly improve the environmental impacts of existing water facilities are typically funded. Also funded is an appropriate combination of river restoration and water rights acquisition or appropriation. Funding amounts vary and applicants are encouraged to discuss their projects with staff. Contact Chris Sturm (303) 866-3441 Ext. 3236. You may apply at any time.

*2. Water Supply Reserve Account* - Provides grants and loans to assist Colorado water users in addressing their critical water supply issues and interests. The funds help eligible entities complete water activities that may include competitive grants for technical assistance regarding permitting, feasibility studies and environmental compliance, studies or analysis of structural, non structural, consumptive and non consumptive water needs, projects or activities and structural and non structural water projects or activities. Contact Todd Doherty (303) 866-3441 Ext. 3210. Must apply by July 15 for September roundtable approval.

*3. Species Conservation Trust Fund* - Designed to conserve native species that have been listed as threatened or endangered under state or federal law or are candidate species or are likely to become candidate species. The Colorado Water Conservation Board, the Colorado Wildlife Commission, the director of the Colorado Division of Wildlife and the Department of Natural Resources create a

species conservation eligibility list that also describes the programs and associated costs eligible for funding. The following are the current list of recommended programs for FY 2011-10: Colorado Water Conservation Board: Platte River Recovery Implementation Program, Upper Colorado River Fish Recovery Program and Instream flow rights acquisition, the Division of Wildlife: Native grouse conservation, Native Fish conservation, wildlife disease management, wildlife climate adaptation; State Parks: Rare species inventory and protection within designated natural areas, rare species inventory and protection within State Parks. For more information contact Chris Sturm (303) 866-3441 Ext. 3236.

##### c. U.S. Fish and Wildlife Service

*1. National Fish Passage Program* - A program to provide funding and technical assistance toward removing or bypassing barriers to fish movement. A 50% match including in-kind contributions is desired. Funding is variable and can be as high as \$300,000, but usually ranges between \$50,000 to \$100,000. Contact Scott Roth, Program Manager at (303) 236-4219 and Bruce Rosenlund, Project Coordinator at (303) 236-4255. The review process begins in October and applicants are notified in late winter. You may apply at any time.

*2. National Fish Habitat Program* - Funds allocated from this program are typically awarded to projects that deal with game fish. However, there has been a push within the department to fund non-game fish species projects. This program is reviewed for funding concurrently with applications for the National Fish Passage Program. The review process begins in October and applicants are notified in late winter. You may apply at any time.

##### d. The National Fish and Wildlife Foundation

*1. Bring Back The Natives* - Monies are allocated for restoration, protection and enhancement of native populations of sensitive or listed aquatic species and their migration corridors. Projects should focus on habitat needs of species of fish. Projects that protect or re-establish migration corridors between breeding populations are encouraged. Fish passage improvements are supported. A 2:1 non-federal to federal match is required. Average grant size is \$60,000. Contact Krystyna Wolniakowski at (503) 417-8700 ext. 6005, Cell (503) 702-0245. Announced in October.

*2. Five Star Restoration Program* - Provides financial assistance from EPA, but is administered by the National Fish and Wildlife Foundation. Monies are provided for wetland, riparian and coastal habitat restoration projects. In order for a project to be funded, it must restore wetland, riparian and/or coastal habitats and it must integrate education into the restoration project through community outreach and must have measurable results in ecological, educational/social benefits. Grant amounts will range from \$10,000 to \$40,000 depending upon whether the project is a one year or two year project. A minimum 1:1 match of either in-kind goods or services to funds requested is expected. Contact Carne Clingan at (202) 942-4246 or local Region 8 (303) 312-6312. Announced in late fall.

##### e. U.S. Department of Interior – Bureau of Reclamation

*1. WaterSMART: Water and Energy Efficiency Grant* – Grant monies are allocated for projects that address endangered species and can be used to construct fish bypasses, fish screens and hatchery improvements. Monies awarded can not exceed 50% of the total project costs. Cost sharing is expected and can be in the form of cash, in-kind contributions from the applicant or third party organizers. Projects must be completed within two years of award. Funding can occur as one of two funding groups. Funding Group 1 up to \$300,000 per agreement and Funding Group II \$300,001 to \$1,000,000. Contact Josh German at (303) 445-2839. Announcement for 2011 July/August. Applications due 45 days after announcement.

##### f. U.S. Army Corps of Engineers

*1. General Investigations* – This program is designed to improve the riparian ecosystem degraded by channel instability, channel straightening, encroachment and invasive species. Funding is available as 65% Federal/ 35% non-federal. Contact: Deb Foley of the Albuquerque District (505) 342-3428

*2. Continuing Authorities Program Section 206* – This program is for aquatic ecosystem restoration and monies are used to restore degraded aquatic ecosystem structure, function and dynamic processes to a less degraded, more natural condition. Funding is available as 65% federal, 35% non-fed-

eral. Maximum federal cost is \$5,000,000. Contact: Deb Foley of the Albuquerque District (505) 342-3428

## 2. River Stabilization, Flood Control and Water Quality

**Projects from the Master Plan that seek funding in this category should include watershed, river and stream restoration planning, engineering or feasibility studies.**

### a. Colorado Water Conservation Board (CWCB)

1. *The Healthy Rivers Fund* - Consists of two types of grants. The first is project grants that are awarded for flood protection, channel stability, riparian, stream bank and habitat restoration efforts. The second are planning grants for implementation of watershed restoration or protection projects. Monies are given to watershed groups. Funding for project grants is \$50,000 maximum and for planning grants \$25,000 maximum with a 20% in-kind match required. Contact Chris Sturm at (303) 866-3441 ext. 3236. Announced early spring.

2. *Watershed Restoration Program* - This program provides grants throughout the state for watershed/stream restoration and flood mitigation projects. Grant money may be used for planning and engineering studies, including implementation measures, to address technical needs for watershed restoration and flood mitigation projects. Special consideration is reserved for planning and project efforts that integrate multi-objectives in restoration and flood mitigation. CWCB costs shall not exceed 50% of the total cost of the project or study. Contact Chris Sturm at (303) 866-3441 ext. 3236. Announced in the early fall.

3. *Fish and Wildlife Resources Fund* - Grants are appropriated to new or existing water rights to preserve or improve the natural environment or to mitigate the impacts of an existing facility. Funded activities include conducting river restoration feasibility studies, constructing river restoration projects to mitigate or improve environmental impacts of existing water facilities and any combination of river restoration and water right acquisition or appropriation. Requests up to a maximum of 25% of the total project cost, with the total request not to exceed \$250,000. Contact Chris Sturm at (303) 866-3441 Ext. 3236. You may apply at any time.

4. *Non-Reimbursable Project Investment Program* - Funding is available for projects or feasibility studies designed to address statewide, region wide or basin wide issues. River restoration, floodplain management projects affecting agriculture, recreation or other industries that economically impact significant areas of the state can be funded. Approximately 10% of the annual funds available will be set aside for feasibility studies and demonstration projects. Feasibility study and demonstration project investments will be limited to 50% of the total study or project cost, up to a maximum of \$100,000. Matching funds are encouraged. Contact Tim Feehan at (303) 866-3441 Ext. 3211. Announced in the Summer.

5. *Floodplain Technical Services Program* - Small grant funds for technical services; typically hydrology & hydraulic studies in support of floodplain maps or projects. Limited funds available. Cost share amounts vary, but typically 50% if federal partners are involved. Contact: Kevin Houck, Flood Protection Section (303) 861-3219.

6. *Colorado Watershed Protection Fund* - Implementation of on-the-ground projects to restore and protect the lands and natural resources within Colorado watersheds. Two categories of grants are available: Planning and Project. A minimum 20% cash or in-kind match is required.

### b. Colorado Department of Public Health and Environment (CDPHE)

1. *Act 319 Clean Water Act - Colorado nonpoint source management area (NPS program)* - This grant funds projects that address water quality impairments due to nonpoint source pollution, updates to watershed plans and provides educational and outreach activities that help maintain or restore water quality impacted by nonpoint source pollution. A non-federal, local match of no less than 40% of the total project funding is required. The match can be accrued as cash or in-kind services. Projects should have an educational component to increase nonpoint source pollution awareness within the watershed. Application material is available in September. Contact: Lucia Machado (303) 692-3583.

### c. U.S. Army Corps of Engineers

1. *General Investigations* - This program is for flood damage reduction measures. Monies are

used to examine structural and non structural measures to reduce recurring flood damages. Funding is available for 65% Federal/35% non-federal. Contact: Deb Foley of the Albuquerque District (505) 342-3428.

2. *Continuing Authorities Program Section 14* - This program provides funding for emergency stream bank erosion protection measures. The program is designed to prevent erosion damage to public facilities by the emergency construction or repair of stream bank protection works. Funding is available for 65% Federal/35% non-federal. Max. Federal cost is \$1,500,000. Contact: Deb Foley of the Albuquerque District (505) 342-3428.

3. *Regional Priority Grant Program* - A multi-program/funding opportunity request for proposals. Includes regional geographic initiative and total maximum daily load program opportunities related to water quality. Funding/cost share varies by program. This program is an annual competition that is usually posted in October. Proposals may be submitted under more than one grant program, but individual proposals must be submitted for each.

4. *Community Action for a Renewed Environment (CARE)* - A multi-media competitive grant program that offers an innovative way for a community to organize and take action to reduce toxic pollution in its local environment. A match is optional. Funding can not be for projects that duplicate the Targeted Watershed Grant Program activities. More information is available at <http://www.epa.gov/CARE/index.htm>.

### d. Trout Unlimited

1. *Home Rivers Initiatives* - Projects that address fish conservation and native species restoration on a watershed wide basis. The program is a collaborative multi-year effort that combines scientific and economic research, community outreach, on-the-ground restoration and the development of long-term conservation and management strategies and tools. Typically Trout Unlimited works in cold water fisheries, but may be interested in partnering in fish and habitat conservation projects on Fountain Creek. Contact Warren Colyer, Watershed Programs Director (406) 542-3304.

### e. U.S. Environmental Protection Agency (EPA)

1. *Targeted Watershed Implementation Grant* -

The program provides funding to implement 3-5 year protection or restoration projects. Monies are used for implementation of on-the-ground restoration and protection activities designed to achieve quick, measurable environmental results, based on a technically sound watershed plan. A 25% minimum non-federal match is required.

2. *Five Star Restoration Grant* - Community based multi-partner projects that restore wetland, riparian and coastal habitat. No minimum funding amounts however, multiple partners are expected to contribute funding or in-kind services. Grant amounts tend to be small in the range of \$5,000-\$20,000.

3. *Water Quality Cooperative Agreements* - This program is for research, investigations, experiments, training, environmental technology demonstrations, surveys and studies related to the causes, effects, extent and prevention of pollution. The match requirement varies. For more information go to <http://www.epa.gov/owm/cwfinance/waterquality.htm>.

4. *Nonpoint Source Pollution* - This program is to address water quality impacts from non-permitted, diffuse sources. Federal monies are provided to the states and the states then select and manage individual projects. A 40% minimum match is required. The requests for proposal usually comes out in September. Contact: EPA Region 8 Marcella Hutchinson (303) 312-6753.

### F. Colorado Water Conservation Board

1. *Rivers of Colorado Water Watch Network (River Watch)* - This program is for water quality monitoring and assessment. There are no cost share matches however; a contract must be signed for commitment. Contact: Barb Horn (303) 291-6667 or Curtis Hartenstine (303) 291-7412.

2. *Instream Flow Protection* - Qualification of in situ water needs for environmental purposes. No cost share required. Contact: Jeffrey Baessler (303) 866-3906 or Mark Uppendahl (303) 291-7467.

### 3. Land Acquisition/Conservation Easement Purchase

**Projects from the Master Plan that seek funding in this category would be for easement purchase**

**only. Various easement types are possible and include those for habitat protection and wildlife related recreational access, restoration, enhancement and protection of wetlands and flood prone lands.**

**a. Natural Resources Conservation Service (NRCS)**

*1. Wetlands Reserve Program* – This program is to protect, restore and enhance wetlands and to establish wildlife habitat. Three enrollment options: Permanent easement, 30 yr. easement and restoration cost share agreement. Contact: Greg Langer at (719) 632-9598 for the Colorado Springs area and Rich Rhoades at (719) 543-8386 for the Pueblo area.

*2. Emergency Watershed Protection Program (Floodplain Easement)* – Provides funding for the purchase of a permanent floodplain easement as an emergency measure on any floodplain lands that have been impaired within the last 12 months or that have a history of repeated flooding (i.e. flooded at least two times in the last 10 years). Floodplain restoration is completed by NRCS at their cost. Contact Gary Finstad at (720) 544-2820.

**b. Colorado Division of Wildlife (CDOW)**

*1. Wildlife Habitat Protection Program* – This program involves the purchase of permanent conservation easements for habitat protection and/or wildlife-related recreational access. Projects that separately convey to CDOW restricted or year-round public access for wildlife-related recreation, in addition to placing a conservation easement on the project property, will be eligible to receive compensation for public access, in addition to compensation for a conservation easement. Contact: Diane Gansauer at (303) 291-7217. Announced in early summer.

**c. Ducks Unlimited (DU)**

Ducks unlimited offers two options for the preservation of lands that are vital to duck habitat: land acquisition and conservation easement. The land acquisition option allows landowners that are not willing to consider an easement to sell their intact waterfowl habitat to Ducks Unlimited. The second option is a perpetual conservation easement that allows land owners the option to protect key natural habitats of a property while continuing to use

the area for economic gain or recreation. Those that participate in this option will be asked to make a tax deductible cash donation to DU's endowment fund to help provide for monitoring of the easement in perpetuity. The easement must be held by a public agency or a conservation organization. Contact: Great Plains Regional Office (701) 355-3500.

**4. Trails and Recreation**

**Projects from the master plan that seek funding in this category would include those for new trail or trail head construction, creation of a new park, park land acquisition, expansion, enhancement and improvement of existing parks, maintenance, re-route or reconstruction of existing trails, as well as enhancements or upgrades to existing trails. In addition, funding is available for planning support that includes design, engineering, environmental reviews, use studies, master plans and feasibility studies.**

**a. Colorado State Parks**

*1. Non-Motorized Trail Grant* – Grant monies are awarded for new trail or trail head construction, maintenance, re-route or reconstruction of existing trails, enhancements or upgrades to existing trails, land acquisition or easement purchase. Funding is also available for planning support that includes design, engineering, environmental reviews, use studies, master plans and feasibility studies. Grant awards are made in one of the three following categories: Small \$45,000, large \$200,000 or planning/support \$45,000. A 30% match is required as part of the grant award and can be cash or in-kind services. Contact Nancy Matchett at (303) 791-1957. Announced in late summer.

**b. Great Outdoors Colorado (GOCO)**

GOCO offers each of its grant programs biannually, in the spring and fall. The spring cycle is typically announced in December and due in early March. Fall applications are announced in mid June and due in late August.

*1. Local Government, Parks, Outdoor Recreation & Environmental Education Facility Grants* – Grant monies are available to fund park land acquisition, the expansion, the enhancement and improvement of existing parks, recreation and outdoor education facilities and the creation of a new park facility.

The maximum grant request is \$200,000. GOCO will only fund 70% of the grant request and 30% must be non-GOCO funds. 10% of the 30% must be cash match. Contact Jackie Miller at (303) 226-4524 or Jake Houston at (303) 226-4517.

*2. Local Government Mini Grants* - Grant monies are available to fund park land acquisition, the expansion, the enhancement and improvement of existing parks, recreation and outdoor education facilities and the creation of a new park facility. Maximum grant request is \$45,000. GOCO will only fund 75% of the grant request and 25% must be non-GOCO funds. 10% of the 25% must be cash match. Total project cost can not exceed \$60,000.00. Contact Jackie Miller at (303) 226-4524 or Jake Houston at (303) 226-4517.

*3. Planning Grants* – Grant monies are available to fund projects that identify and/or plan for the acquisition of local park lands and master planning for entities to include parks, outdoor recreation elements and trails. Additional funding will be directed to projects that incorporate trail access and connectivity. Planning grants may also be used for the renovation and enhancement of existing outdoor recreation facilities. The maximum grant request is \$75,000. GOCO will only fund 75% of the projects eligible project costs. 25% must be non-GOCO funds. 10% of the 25% must be cash match. Contact Jake Houston at (303) 226-4517.

*4. Legacy* – Offered periodically when GOCO's financial position allows. Funding is to be used for projects that are of regional or statewide significance. This would include projects that preserve water and land, enhance wildlife habitat, create new state and local parks, construct trails and provide environmental education. Offered by request only. Contact Kathleen Staks at (303) 226-4500.

**5. Environmental Education**

**Projects from the Master Plan that seek funding in this category would include those that focus on outdoor education or programs that promote an understanding of environmental issues and enhance environmental awareness.**

**a. Environmental Protection Agency (EPA)**

*1. Environmental Education Regional Grants* – Funding is available to increase awareness and knowledge about environmental issues and provide the skills that participants in its funded projects

need in order to make informed environmental decisions and take responsible actions toward the environment. Two grants per region are awarded with minimum awards around \$15,000 and maximum is \$100,000. Non-federal cost sharing in the amount of 25% of the total project cost is expected. Eligible applicants can include a local education agency, college, university, state education or environmental agency, nonprofit organization or a noncommercial educational broadcasting entity. Applications are due in December. Contact Wendy Dew at (303) 312-6605.

**b. National Fish and Wildlife Foundation**

*1. Native Plant Conservation Initiative* – Grant monies focus on the conservation of native plants and pollinators under any of the following six focal areas: conservation, education, restoration, research, sustainability and data linkages. Preference is given to on-the-ground projects that provide plant conservation benefits. A 1:1 non-federal match is required in the form of cash and /or in-kind services. Typical grant awards range from \$15,000 to \$75,000. Applications are due by end of June. Contact Teal Edelen at (202) 857-0166.

**c. Anschutz Family Foundation**

*1. General Grant Request* – The Foundation grants monies for outdoor or environmental education plans or programs that will improve community development. They must have community buy-in and involvement and programs must be sustainable in the future. Grant amounts range from \$2,500 to \$10,000. Applications are due on January 15 and August 1. Contact the Anschutz Family Foundation at (303) 293-2338.

**d. Cornell Douglas Foundation**

*1. General Grant Request* – The Foundation grants requests that support environmental health and justice, land conservation, sustainability of resources, environmental education and visionary design. Grants range from \$2,500 to \$5,000. The application deadline is ongoing. Contact the Foundation at (301) 229-3008.

**e. The Lauren Townsend Memorial Wildlife Fund**

*1. General Grant Request* – Funds grants to nonprofit organizations that focus on animal welfare or

wildlife preservation. One to five grants are made each year. Funding amounts vary and range from \$1,500 to \$7,000. Grant requests are due at the beginning of May. Contact Karen Bellina at 303-996-7348.

#### **f. SmartWool Corporation**

*1. Smartwool Advocacy Fund* – Grant amounts range from \$500 to \$5,000 and support organizations/projects that promote or demonstrate environmental stewardship principles. Applications are due on March 1. Contact [advocacy@-smartwool.com](mailto:advocacy@-smartwool.com).

#### **g. The Colorado Health Foundation**

*1. Project and General Operating Grants* – The Foundation supports partners that encourage healthy eating, active living and increased access to adequate health care coverage. Grants are awarded if projects fit into one of three funding goal areas. On occasion, capital funding is considered if the proposed activity has a demonstrable link to one or more of the measurable goals of one of the three funding areas. Contact the Grants Manager at (303) 953-3630. Applications are accepted four times a year on January 15, April 15, July 15 and October 15. Past grant amounts have been from \$15,000 to \$1,300,000.

#### **h. Great Outdoors Colorado**

*1. Conservation Excellence* – Applicants can receive funding in order to create a pilot program for improving access and education for children on GOCO funded properties for environmental and conservation education through partnerships between urban and statewide conservation organizations. Grant requests are limited to \$75,000. GOCO will fund up to 75% of the proposed projects eligible costs and the remaining minimum 25% match must be from other sources. At least 12.5% must be cash. Once the grant is awarded, the successful grantee will have 24 months to complete the project. This grant is only available by request from Kathleen Staks at (303) 226-4515.

#### **i. Colorado Department of Public Health and Environment (CDPHE)**

*1. Act 319 Clean Water Act* – Colorado nonpoint source management area (NPS program) – Funds

projects that address water quality impairments due to nonpoint source pollution, updates to watershed plans and provides educational and outreach activities that help maintain or restore water quality impacted by nonpoint source pollution. A non-federal, local match of no less than 40% of total project funding is required. Match can be accrued as cash or in-kind services. Projects should have an educational component to increase nonpoint source pollution awareness within the watershed. Application materials are available in September.

### **4.C.2. Loan Sources of funding**

#### **1. Raw Water Supply Projects**

##### **a. Colorado Water Conservation Board**

- 1. Water Project Loan Program* – Provides loans for raw water supply projects. Monies allocated can be used for one of three eligible project types:
- Reservoir/dam enlargement and repairs
  - Water supply system rehabilitation or construction of agricultural or municipal raw water supply systems such as diversion structures, ditches, headgates, pipe lines, wells, hydro-power etc.
  - Water rights acquisition to purchase additional water rights for an existing need or shortage. 90% of the total engineering and construction costs are eligible for the loan. A 1% loan service fee will apply. Available in mid summer. Contact Kirk Russell P.E. at (303) 866-3441 ext. 3232 or Anna Mauss, P.E. at (303) 866-3441 ext. 3224.

#### **2. River Stabilization, Flood Control and Water Quality**

##### **a. U.S. Environmental Protection Agency (EPA)**

- Clean Water State Revolving Loan Program – This program provides loans for water pollution projects to the states. Go to the following web site for program information <http://www.epa.gov/owm/cwfinance/cwsrf/index.htm>.

#### **3. Construction Loan Funding**

##### **a. Colorado Water Conservation Board (CWCB)**

- Construction Loan Program – provides low interest loans for flood related projects. The applicant must complete a feasibility study and demonstrate

financial capability to repay the loan. 90% loans are available. Contact: Kirk Russell, CWCB Water Supply Planning and Finance Section. (303) 866-3441.

### **4.C.3. Private Land Owner funding Sources**

#### **1. Conservation Practices**

##### **a. Natural Resource Conservation Service**

*1. Environmental Quality Incentives Program (EQUIP)* – Provides financial and technical assistance payments to eligible producers (farmers and ranchers) install or implement structural and management practices on eligible agricultural land. Payments are based on a portion of the average cost associated with practice implementation. Payments help plan and implement conservation practices that address natural resource concerns for opportunities to improve soil, water, plant, animal, air and related resources on agricultural and non-industrial private forestland. Eligible owners that have a natural resource concern on land may participate. Applications are accepted on a continuous basis. Funding amounts depend upon the practice implemented typically 50% Federal. Contact: Pueblo – Service Center - Rich Rhoades (719) 543-8386, Colorado Springs – Service Center – Greg Langer, District Conservationist (719) 632-9598 Ext. 196.

*2. Conservation Innovation Grants* – Provides financial assistance to stimulate the development and adoption of innovative conservation approaches and technologies to address a natural resource concern. Six resource concerns have been identified for the FY 2011 application cycle and include 1. Atmospheric Resources, 2. Energy Conservation and Renewable Energy Sources, 3. Forest Health, 4. Grazing Land, 5. Organic Agriculture, 6. Wetlands and Wildlife Habitat Projects. Selected applicants may receive up to 50% of the total project cost, not to exceed \$75,000. Selected projects must participate for between one and three years in duration. Contact: Jodi Hastings, Resource Conservationist (720) 544-2821.

*3. Conservation Stewardship Program (CSP)* – Encourages agricultural and forestry producers to maintain existing conservation activities and adopt additional ones on their operations. It provides financial and technical assistance to promote the conservation and enhancement of soil, water, air,

related natural resources on their land. Funding may not exceed \$40,000 in any year and \$200,000 during a five year period. Contact: Pueblo - Service Center - Rich Rhoades (719) 543-8386, Colorado Springs – Service Center – Greg Langer, District Conservationist (719) 632-9598 Ext. 196.

*4. Emergency Watershed Protection/EWP Program* – This program helps to protect lives and property threatened by natural disasters such as floods, hurricanes, tornadoes and wildfires. Owners of public, private or tribal lands are eligible for assistance if their watershed area has been damaged by a natural disaster. The program is designed to help those property owners by implementing emergency measures to relieve imminent hazards to life and property created by a natural disaster. Technical and financial assistance is provided to remove debris from streams, to protect destabilized stream banks, establish cover on critically eroding lands and purchase floodplain easements. Contact: Pueblo - Service Center - Rich Rhoades (719) 543-8386, Colorado Springs – Service Center – Greg Langer, District Conservationist (719) 632-9598 Ext. 196.

*5. Wildlife Habitat Incentive Program (WHIP)* – The program provides both technical and financial assistance up to 75% federal cost share to improve fish and wildlife habitat. The cost share agreements last for up to 10 years. Applications must address traditional natural resource issues such as water quantity, water quality, grazing lands, forest health, soil management, emerging natural resource issues and climate change. Applications are accepted continuously. Contact: Dawn Jackson, (720) 544.2805.

*6. Wetlands Reserve Program (WRP)* – This program is to protect, restore and enhance wetlands and to establish wildlife habitat. Three enrollment options: Permanent easement, 30 yr. easement and restoration cost share agreement. Funding is available up to 100% federal for perpetual easements, 75% for 30-yr easements & restoration only agreements. Contact: Greg Langer at (719) 632-9598 for the Colorado Springs area and Rich Rhoades at (719) 543-8386 for the Pueblo area.

*7. Grassland Reserve Program (GRP)* – Funding for this program is for the management of grasslands to improve forage quality, control invasive species and conserve fish and wildlife habitat.

Perpetual and 30 year easements, restoration agreements and 10-, 15, 20- and 30-year rental agreements are possible. Easement and rental rate terms vary by length of agreements. Restoration cost share of 75%-90%. Contact: Greg Langer at (719) 632-9598 for the Colorado Springs area and Rich Rhoades at (719) 543-8386 for the Pueblo area.

8. Farm and Ranch Land Protection Program – A perpetual easement program administered in cooperation with qualified land trusts and local units of government to protect working agricultural lands. Funding by NRCS is typically matched with land trust or local funding, sometimes with Great Outdoors Colorado funds. Contact: Greg Langer at (719) 632-9598 for the Colorado Springs area and Rich Rhoades at (719) 543-8386 for the Pueblo area. Gary Finstadd: Easements Prog. Coord. (720) 544-2820.

#### 4.D. Implementation

This section addresses not only project recommendations for the 46-mile study area, but also provides some insight into overall watershed priorities based on the Fountain Creek Watershed Plan, dated February 2002, the U.S. Army Corps of Engineers Fountain Creek Watershed Study, dated January 2009 and the goals of this Master Plan. It is important to understand that the projects and areas of action identified upstream from the Master Plan study area have an impact on the lowest downstream 46-mile section of Fountain Creek, the study area of this Master Plan.

The watershed-wide recommendations are based on technical issues and are NOT intended to be seen as a recommendation to be included as a part of current funds or anticipated resources

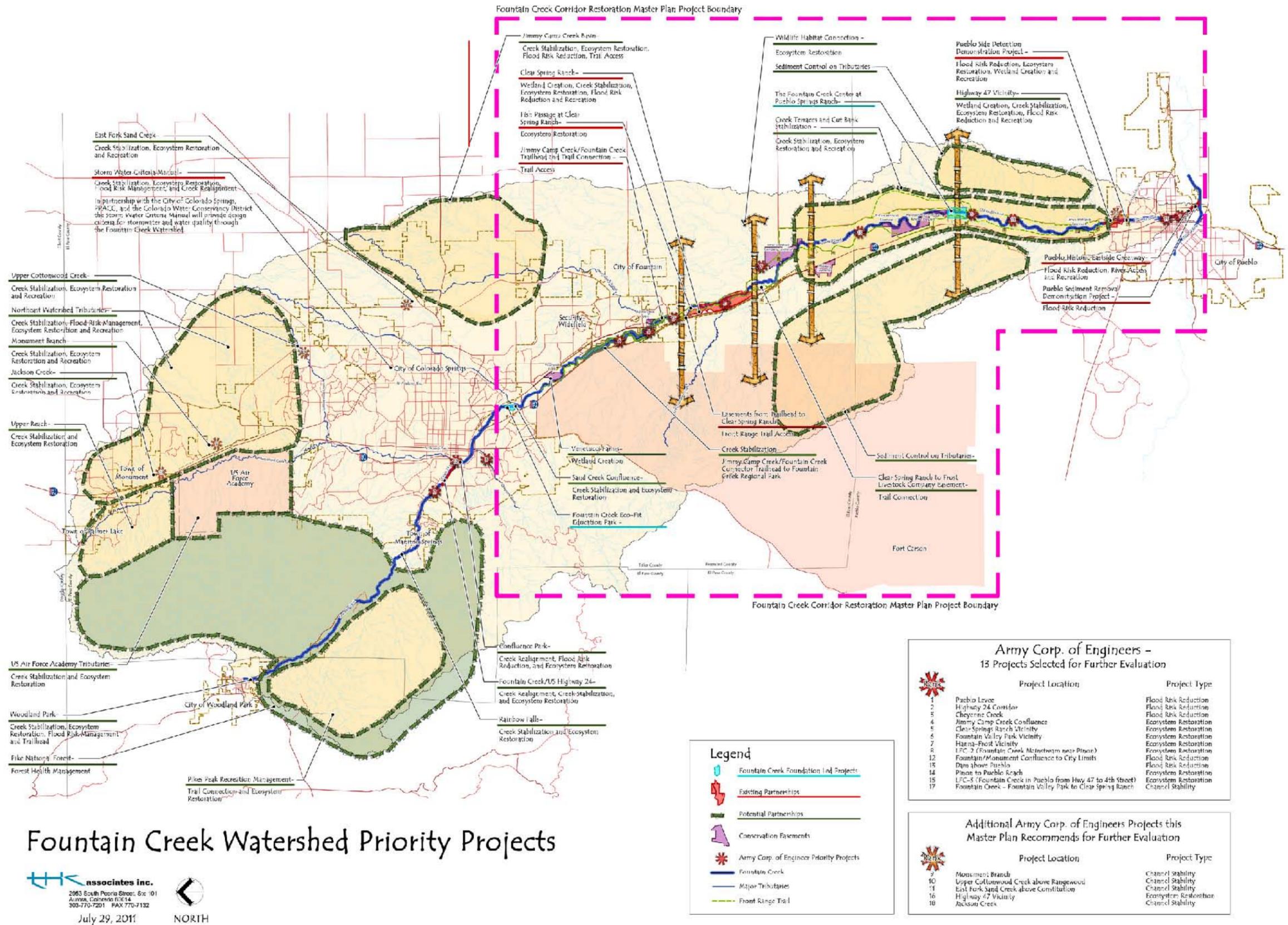


Figure 4.36

## U.S. Army Corps. Of Engineers 18 Priority Projects

From the Fountain Creek Watershed Study

Project Location	Notes	Rationale
1 Pueblo Levee	Sedimentation and vegetation in channel, reducing effectiveness of levee and covering drain outlets. Four areas within levee reach could be used for ecosystem restoration projects.	Pueblo levee is a high priority to address in the watershed study due to sedimentation above the Arkansas River confluence reducing channel capacity and covering drain outlets that could lead to flooding of protected areas behind the levee.
2 Highway 24 Corridor	CDOT proposing to reduce flood risk to Highway 24. Potential to also reduce flood risk to structures within the corridor.	The Highway 24 corridor from Colorado Springs to Manitou Springs was identified in a number of studies as having flooding issues. The Colorado Department of Transportation (CDOT) is currently looking at plans to take Highway 24 out of the floodplain. Opportunities exist to further address flooding in this corridor in tandem with the CDOT project.
3 Cheyenne Creek	Previously identified as potentially meeting Corps project requirements.	Flooding concerns on Cheyenne Creek were previously identified under Section 205 prior to the start of the watershed study. Development on Cheyenne Creek has encroached on the floodplain.
4 Jimmy Camp Creek Confluence	Approx. 141 ac. Oxbow connection/restoration potential. City of Fountain might already own some of this. Use GOCO funds to develop? A larger area could be preserved. This project is the same as URS CSC-2 project. Stormwater discharge outfall comes into the area.	Project here would provide habitat for a globally and regionally significant rare species, would establish a wetland and riparian corridor with other properties and projects in the vicinity.
5 Clear Spring Ranch Vicinity	Potential upstream fish passage for federal candidate and Colorado state threatened Arkansas Darter, also for native Plains Killifish and Rid Shiner. Oxbow reconnection and backwater/wetland restoration possible here as well. Possible additional wwtp water available. The Arkansas darter is ranked by Colorado Natural Heritage Program (CNHP) as G3, which means globally vulnerable either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation or extinction. Typically, 21 to 100 occurrences or between 3,000 and 10,000 remaining individuals. CNHP also ranks the species at the subnational/state/province level as S2, which means imperiled because of rarity or because of some factor(s) making it very vulnerable to extirpation or extinction. Typically, 6 to 20 occurrences or between 1,000 and 3,000 remaining individuals.	Project here would provide longitudinal movement opportunity for a globally and regionally significant rare species, would establish a wetland and riparian corridor with other properties and projects in the vicinity.
6 Fountain Valley Park Vicinity	Bridge may need to be modified. Entire Park could be expanded. Same as Jimmy Camp Confluence for restoration.	Project here would provide habitat for a globally and regionally significantly rare species, would establish a wetland and riparian corridor with other properties and projects in the vicinity
7 Hanna-Frost Ranch Vicinity	915 ac. Under conservation easement. Two miles of frontage on Creek. Wetland restoration and oxbow connection.	Project here would provide habitat for a globally and regionally significant rare species, would establish a wetland and riparian corridor with other properties and projects in the vicinity
8 LFC-2 (Fountain Creek Mainstream near Pinion)	Large area, over 1,029 ac. Approx. Restoration needed includes removal of Old Pinion Rd., removal of Salt Cedar and Russian olive invasive. Connect this area with recreational trail. Plant natives	Large project opportunity for rehabilitation of native vegetation, establishment of new trail and riparian corridor.
9 Monument Branch	A top priority site for stabilizing stream before it degrades.	All of these stream reaches were recently developed or are in development. Current changes in hydrology have already resulted in negative impacts on the streams via downcutting.
10 Upper Cottonwood Creek - Above Rangewood	A top priority site for stabilizing stream before it degrades. There is available land adjacent to channel for floodplain restoration.	All of these stream reaches were recently developed or are in development. Current changes in hydrology have already resulted in negative impacts on the streams via downcutting.
11 Upper Cottonwood Creek - Above Constitution	Channel is generally aggrading, but with lateral migration, possibly indicating upland sediment sources. City already working on this reach.	This tributary is one of the largest contributors of sediment to the watershed.
12 Fountain/Monument Confluence to City Limits	Infrastructure susceptible to flooding within this reach. Bridge overtopping. A combination of structural and non structural solutions may be cost effective. City already working on this reach.	The Fountain/Monument Creek confluence reach and the Old Pueblo Road corridor reach both have issues with infrastructure that could be damaged in flood events as well as damages to homes and businesses. The Old Pueblo Road corridor is a more rural setting, while the Fountain/Monument Creek confluence reach is heavily urbanized.
13 Dam above Pueblo	Strong political/public interest. Minimal B/C ratio. Construction of dam might have benefit to moving sediment downstream at the cost of potentially harming a rare fish species.	The possibility of a dam on Fountain Creek above Pueblo was considered in many previous studies. Ultimately the high cost and low benefit/cost ratio made other alternatives more attractive and resulted in the construction of the levees in Pueblo. During the course of the watershed study the concept of a dam on Fountain Creek was popularized by a number of stakeholders. The intent of the dam is to provide water supply, regulate flows, and provide recreation opportunities.
14 Pinion to Pueblo Reach	Connectivity with Pike's Peak Greenway Trail System a potential plus. Main emphasis of this project is trails.	Fits well with Crown Jewel Concept of Fountain Creek Trail System from CS to Pueblo. Would establish or connect riparian corridor in some segments and provide rehabilitation of vegetation in other segments
15 LFC-3 (Fountain Creek In Pueblo from Hwy 47 to 4th St.)	Large area, over 243 ac. Possible lowering of terraces and reconnection to hydrology, removal of invasive and planting of natives.	Large project opportunity reconnection of floodplain, rehabilitation of vegetation corridor.
16 Highway 47 Vicinity	Former borrow area with high water table. Existing wetland with invasive species. Excellent recreation opportunities. Could be used for stormwater detention.	Prime area for wetland creation. The high water table has already resulted in establishment of a wetland ecosystem, but with a great deal of invasive/exotic species. Also potential use for detention of stormwater flows via inclusion of a weir on the downstream end. Excellent recreational opportunities exist.
17 Fountain Creek - Fountain Valley Park to Clear Spring Ranch	Potential for increased flows in this reach from proposed wwtps. Infrastructure threatened by lateral migration or downcutting.	Roads, bridges, railroads, sewer lines, electrical utilities, and wastewater treatment plants are all threatened in these stream reaches.
18 Jackson Creek	Possibility to save this creek from current headcut that has not moved up the system. Has room to do channel/floodplain improvements.	All of these stream reaches were recently developed or are in development. Current changes in hydrology have already resulted in negative impacts on the streams via downcutting.

Figure 4.37

to be used in the lower section of Fountain Creek. These recommendations are only provided for future designers, as a regional perspective on issues, so as they work on more detailed site specific projects, they can be ever mindful of the larger watershed issues.

#### 4.D.1. Phasing

In a perfect technical world, river restoration work should be phased, starting from the top of the watershed and work downstream. Any issue that exists in the watershed typically causes impacts downstream. For example, an eroding cut bank effects downstream location with sediment deposition, filling in the channel, impacting wildlife habitat and in severe conditions, reduces flood capacity.

However, starting work at the top of the watershed is not always possible. The reality of creek restoration efforts is that they require a very long term commitment including many smaller projects, a lot of resources and many partners. Thus, what often makes sense is a phasing plan based on resource availability and stakeholder's willingness and interest in partnerships to resolve a particular issue. One example of this is the Pueblo Sediment Removal Demonstration project. It is located in the most downstream segment of the Fountain Creek Watershed. It does not address the long term cause of erosion upstream, which is Creek instability. Instead, it addresses the immediate problem of sediment deposition within the Pueblo Flood Control levee system, with the intent to increase flood capacity and reduce flood risk. In this case, many partners agreed that reducing the immediate flood risk in Pueblo needed to be addressed, so resources were pooled to place a sediment removal devise in the Creek. This project will establish a performance curve for the use of sediment collectors in Fountain Creek. From this information, the U.S. Army Corp. of Engineers is hoping that not only flood risk will be reduced in Pueblo, but the sediment collector can become a viable alternative to dredging. Even though it is in the lower reaches of Fountain Creek, this is an example of "the right project at the right time". Phasing on a large project, like restoring Fountain Creek, really should be based on the concept of identifying current resources and partners to advance projects that have strong support.

#### 4.D.2. Priorities

It is possible to identify priority projects based on the severity of the issues at hand. The U.S. Army Corp. of Engineers Fountain Creek Watershed Study identified, based on a number of attributes, 13 priority projects to

be further analyzed. The projects addressing the most attributes received the highest score. These attributes were organized into three general categories including flood risk reduction, channel stability and ecosystem restoration. These 13 priority projects are identified in the Fountain Creek Watershed Priority Projects map, Figure 4.36. Because they address channel stability, it is the recommendation of this Master Plan to also include the next 5 priority projects identified in the U.S. Army Corp. of Engineers Fountain Creek Watershed Study. These projects will start to address some of the major erosion areas causing the sedimentation problems in Fountain Creek. Descriptions and the rational behind each of the 18 priority projects are provided in the U.S. Army Corp. of Engineers 18 priority projects table, see Figure 4.37. This information is paraphrased from the original Project Ranking effort compiled as a part of the January, 2009 Fountain Creek Watershed Study.

Another group of priority projects would be the Demonstration Projects identified in Section 4.B. of this Master Plan. All of these projects have interested partners and some level of funding. Therefore, these projects already have momentum. A recommendation of this Master Plan would be to build on these efforts to move these Demonstration Projects forward into additional phases of development. Within the Demonstration Project descriptions are project goals, strategies, current partners, status, next steps and cost estimates. These Demonstration Projects are shown on Figure 4.36. Fountain Creek Watershed Priority Projects map.

Additionally, there are several other priority efforts that must be mentioned. These efforts are being recommended because they are projects that respond directly to the Fountain Creek Corridor Restoration Master Plan Goals, discussed in Section 1.B. These recommended efforts include six basic strategies:

1. Procure conservation easements
2. Stabilize the Creek to reduce sedimentation
3. Storm water management
4. Reduce flood risk
5. Reconnecting habitats
6. Provide public access and education

These priority efforts and/or projects are shown on Figure 4.36, Fountain Creek Watershed Priority Projects. **Procuring conservation easements** should always be foremost on the list of priorities. Existing conservation easements are shown on the map. Continuing to build on the existing conservation easement acreage will have a significant positive impact on Creek corridor health.

Acquiring additional conservation easements is by far one of the most cost effective strategies. Conserve the existing resource and protect it from encroachment and further degradation. This opportunity exists throughout the Watershed. Colorado Open Lands, NRCS, GOCO and the Lower Arkansas Valley Water Conservancy District are ready partners to continue the efforts of conserving the Fountain Creek Corridor. There must be an on-going dialog with all property owners along Fountain Creek.

#### Stabilizing the Creek to Reduce Sediment

The largest contributors to the sedimentation problem are the cut banks into the residual terrace, which is significantly amplified by the highly erodible soils in the terrace. As a first step, all these cut banks should be identified and located on a map. These locations can be cross referenced with property ownership. A lot of these cut banks occur on private property. This means that many of the NRCS programs for stream stabilization are available to these private property owners in the form of Grants. Section 4. C. Funding of this Master Plan discusses these programs. Many of these programs are under utilized. Therefore, an effort to inform and educate property owners of this opportunity should be organized. The NRCS has the information materials but a partnership with the Counties to get the word out amongst the residents is needed to really kick start this effort. The techniques to stabilize these cut banks are discussed in Section 1.E.2. of this Master Plan including bank sloping along with both cut or fill bankfull bench techniques. Other projects identified on Figure 4.36. as prioritized efforts include:

1. Working with the Pike Forest on forest health management
2. Working with the U.S. Air Force Academy to stabilize tributaries
3. Working with El Paso County, the City of Colorado Springs and property owners to stabilize tributaries in the northeast section of the watershed
4. Working with Pueblo County and property owners to stabilize tributaries in the lower reaches of the watershed

#### Stormwater Management

Developing and adopting a Watershed Wide Stormwater Criteria Manual is imperative to the health of Fountain Creek. This will put all governing jurisdictions on the same playing field. The Fountain Creek Watershed, Flood Control and Greenway District should be the Owners of this document and responsible for its' updates. This could be achieved by taking advantage of the current Colorado Springs Stormwater Criteria

Manual up-date effort. This manual will be state-of-the-art. The Colorado Springs Manual could be the starting point and modified to become the watershed wide manual. Additional information could be added to cover all the watershed wide issues. The Colorado Water Conservation Board has provided a Grant to the Fountain Creek Watershed, Flood Control and Greenway District to initiate this effort in 2011 and 2012.

#### Reduce Flood Risk

In addition to the projects recommended for further study by the U.S. Army Corp. of Engineers, this Master Plan has proposed the locations of numerous side detention areas. By adding these side detention areas, floodplain volume is increased; thus, decreasing the initial flood wave. Demonstration Project 4.B.2. Pueblo Side Detention in this Master Plan is one of these detention areas that was constructed in 2011. Additionally, the idea of maintaining existing floodplain volume is also important so that the flooding problem does not become worse. There should be no further encroachment into the 100-year floodplain of Fountain Creek, at a minimum, maintaining current flood volumes. The Fountain Creek Watershed, Flood Control and Greenway District has development review control over floodplain land, south of the City of Fountain.

#### Reconnecting Habitats

Reconnecting habitats, both up and down the Creek, as well as providing a cross link between state owned lands east of Fountain Creek with Fort Carson land on the west side of the Creek. Fish passages on dams and grade control structures will restore the natural migration of aquatic species. Conservation easements, open space, parks and trail easements allow for the movement to terrestrial species along the Creek.

Little Fountain Creek and other tributaries on both sides of Fountain Creek must be viewed as potential wildlife corridors to allow for the lateral movement between major government owned open lands on either side of the Fountain Creek Corridor.

#### Providing Public Access and Education

It is the recommendation of this Master Plan to make community access and visibility a priority of every project on Fountain Creek. Section 3.B. shows that from the north end of Pueblo all the way to Clear Spring Ranch, just south of the City of Fountain, approximately 20 miles, there is no public access. This is some of the

most beautiful and relatively stable reaches of Fountain Creek. The community, in general, does not appreciate this fact, thus making it the most endangered reach. To instill responsibility in the community for the health of Fountain Creek, the public must be provided access to these beautiful areas so that they will want to protect the Creek and contribute to creating a community asset.

#### 4.D.3. Potential Leveraging

As funding becomes available for any type of project discussed in the previous section of this Master Plan, leveraging additional funds should always be considered. There are many organizations, including government agencies and non-profit organizations, which should be considered as potential sources for additional funding, man power and other non-financial resources. Often, multiple sources can be considered because most organizations are proportionally more interested as the number of partners increase. More partners equal more interest. The following are lists of potential leveraging partners, organized by areas of interest and identified by the goals and missions of their organization.

##### Conservation Easements

- Colorado Open Lands
- Trust for Public Lands
- Natural Resources Conservation Services (NRCS)
- Colorado Division of Wildlife (CDOW)

##### River Stabilization, Flood Control and Water Quality

- City and County Public Works Departments
- Environmental Protection Agency (EPA)
- United States Geological Survey (USGS)
- Colorado Water Conservation Board (CWCB)
- Colorado Department of Public Health and Environment (CDPHE)
- U.S. Army Corps of Engineers
- U.S. Department of Interior-Bureau of Reclamation
- Colorado Department of Transportation (CDOT)

##### Wildlife Habitat and Conservation

- Colorado Division of Wildlife (CDOW)
- Colorado Water Conservation Board (CWCB)
- U.S. Fish and Wildlife Service
- The National Fish and Wildlife Foundation
- U.S. Department of Interior
- Trout Unlimited

- Ducks Unlimited
- U.S. Army Corp. of Engineers
- Colorado State University
- United States Geological Survey (USGS)

##### Trails and Recreation

- Great Outdoors Colorado (GOCO)
- Colorado State Parks
- Colorado Division of Wildlife (CDOW)
- Local Parks and Recreation Districts
- City and County Parks and Recreation Departments
- El Pomar Foundation
- Fountain Creek Foundation

##### Environmental Education

- Environmental Protection Agency (EPA)
- National Fish and Wildlife Foundation
- Anschutz Family Foundation
- Cornell Douglas Foundation
- The Lauren Townsend Memorial Wildlife Fund
- Smart World Corporation
- The Colorado Health Foundation
- Great Outdoors Colorado (GOCO)
- Colorado State University
- The Catamount Institute
- The Fountain Creek Foundation
- The El Pomar Foundation
- Colorado Department of Public Health and Environment (CDPHE)
- Colorado Division of Wildlife (CDOW)

See Section 4.C of this Master Plan for a description of some of the key funding opportunities for the Fountain Creek Corridor.

#### 4.D.4. Next Steps

The next steps recommended by this plan cover management, strategic plan to address current conditions and specific projects. In Section 1.C. Management of this Master Plan, there are recommended next steps provided for the Fountain Creek Watershed, Flood Control and Greenway District management efforts.

From a more technical standpoint, the Strategic Plan for the Fountain Creek Watershed, dated March 10, 2009 and prepared by the Fountain Creek Vision Task Force, defines goals, objectives and strategies to address current conditions in the Fountain Creek Watershed. They include the following issue areas:

- Water Quality and Sedimentation
- Flooding and Stormwater Management
- Municipal Water Supplies and Return Flows
- Land Use Planning and Development
- Recreation
- Wellness
- Wildlife
- Agriculture
- Outreach

As a part of the Strategic Plan detailed strategies for moving forward, detailed next steps, timing, responsible entities and partners in implementation are provided. This is a tremendous resource for future managers, stakeholders, consultants and government entities to understand the watershed stakeholders collective vision for resolving current conditions.

From a more project specific standpoint, this Master Plan has identified a number of priority projects that included the U.S. Army Corp of Engineers priority projects, as well as a number of additional projects that are discussed in Section 4.D.2. Priorities and shown in Figure 4.36.

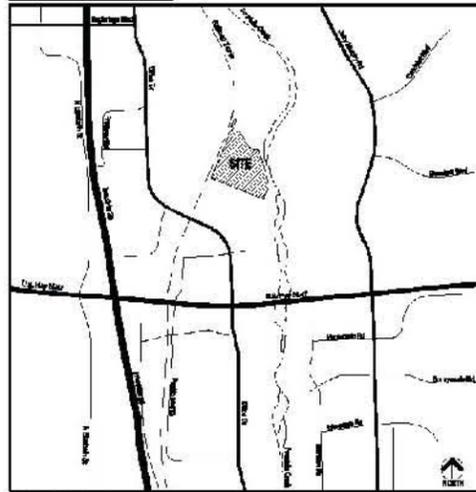
There are a lot of things to be addressed as the restoration of Fountain Creek proceeds. It may even seem overwhelming at times, but most communities across the Country will attest that saving our creeks and rivers is an on-going effort that requires a long term commitment. The Creek is a dynamic, ever changing system and the process of conserving and protecting the Creek will also be a dynamic and ever changing process that will require multi-generational stewardship and effort. In the last few years, tremendous momentum has been generated around managing Fountain Creek as a major community asset. Establishing a long term champion for the Creek, in the form of the Fountain Creek Watershed, Flood Control and Greenway District along with establishing a vision for the Creek, as described in this Master Plan, is the beginning of a new future for Fountain Creek.

**APPENDIX**  
**A.1. Pueblo Side Detention**  
**Construction Documents**

**SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT**  
**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT**

MARCH 15, 2011

PROJECT VICINITY MAP:



**AGENCIES:**

**RESTORATION AND SEDIMENT CONTROL:** FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT  
P.O. BOX 1976  
COLORADO SPRINGS, COLORADO 80901  
MR. GARY BARBER (719) 560-0948

**PROJECT FUNDING:** NATURAL RESOURCES CONSERVATION OFFICE - PUEBLO FIELD OFFICE  
200 SOUTH SANTA FE AVENUE  
PUEBLO, COLORADO 81003  
MR. RICH RHOADES (719) 543-8386 #110

**CITY ENGINEERING:** CITY OF PUEBLO STORMWATER  
211 E. D STREET  
PUEBLO, COLORADO 81003  
MR. DARYL WOOD (719) 583-2350

**CIVIL ENGINEER:** MATRIX DESIGN GROUP  
2435 RESEARCH PARKWAY, #300  
COLORADO SPRINGS, COLORADO 80920  
MR. GRAHAM THOMPSON (719) 575-0100

**LANDSCAPE ARCHITECT:** THK ASSOCIATES, INC.  
2953 S. PEDRIA STREET, SUITE 101  
AURORA, COLORADO 80014  
MR. MARK WILSON (303) 770-7201

**GAS COMPANY:** XCEL ENERGY  
MR. KEVIN JOHNSON (719) 549-3616

**ELECTRIC COMPANY:** BLACK HILLS ENERGY  
MR. TED DIAZ (719) 540-6463

**TELEPHONE COMPANY:** QUEST  
MR. LARRY GURULE (719) 562-4748

PROJECT SITE:



**APPROVALS:**

EARL WILKINSON, CITY OF PUEBLO PUBLIC WORKS DIRECTOR \_\_\_\_\_ DATE \_\_\_\_\_

**GENERAL NOTES:**

1. ALL CONSTRUCTION OF PUBLIC IMPROVEMENTS SHALL COMPLY WITH THE MOST CURRENT EDITION OF THE "STANDARD CONSTRUCTION SPECIFICATIONS AND STANDARD DETAILS FOR THE CITY OF PUEBLO, COLORADO". THESE SPECIFICATIONS ARE AVAILABLE AT THE PUBLIC WORKS OFFICE, LOCATED AT 211 EAST "D" STREET IN PUEBLO.
2. ALL PIPE WILL BE SUBJECT TO INSPECTION UPON DELIVERY TO THE JOB SITE. PLASTIC JOINT MATERIAL DAMAGED IN ANY WAY WILL BE CAUSE FOR REJECTION OF THE PIPE.
3. ALL UTILITY EASEMENTS MUST REMAIN UNOBSTRUCTED AND FULLY ACCESSIBLE ALONG THEIR ENTIRE LENGTH FOR MAINTENANCE EQUIPMENT.
4. THE CONTRACTOR SHALL CONTACT THE CITY OF PUEBLO PRIOR TO THE BEGINNING OF ANY CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ANY EXISTING UTILITIES (INCLUDING VERTICAL LOCATIONS) WHICH MAY CONFLICT WITH PROPOSED CONSTRUCTION. ALL EXISTING UTILITIES SHALL BE PROTECTED FROM DAMAGE BY THE CONTRACTOR. DAMAGED UTILITIES SHALL BE REPAIRED BY THE CONTRACTOR AT HIS OWN EXPENSE. THE TYPE, SIZE, LOCATION, AND THE NUMBER OF ALL UNDERGROUND UTILITIES SHALL BE SHOWN. FIELD VERIFIED ELEVATIONS AND LOCATIONS ARE REQUIRED FOR EXISTING UNDERGROUND UTILITIES WHICH WILL POTENTIALLY AFFECT THE PROPOSED CONSTRUCTION.
5. ALL EXISTING UTILITIES SHOWN WERE COMPILED USING THE BEST AVAILABLE INFORMATION AND FIELD OBSERVATION. THE LOCATIONS OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND NOT ALL UTILITIES MAY BE SHOWN. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY AND PROTECT ALL EXISTING UTILITIES, INCLUDING THOSE SHOWN INCORRECTLY ON THE PLANS. ANY DAMAGE TO EXISTING UTILITIES SHALL BE REPAIRED IN A TIMELY FASHION TO THE SATISFACTION OF CITY AND THE OWNER OF THE IMPACTED UTILITY AT THE CONTRACTOR'S EXPENSE.
6. CITY OF PUEBLO PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH CITY OF PUEBLO DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF PUEBLO, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
7. THE CONTRACTOR SHALL HAVE ONE SIGNED COPY OF THE PLANS (APPROVED BY THE CITY OF PUEBLO), ONE COPY OF THE APPROPRIATE STANDARDS AND SPECIFICATIONS AT THE JOB SITE AT ALL TIMES, AND A COPY OF ANY PERMIT AND EXTENSION AGREEMENTS NEEDED AT THE JOB SITE AT ALL TIMES.
8. CONTRACTOR IS RESPONSIBLE FOR CLEARING/GRADING AND RECLAIMING AREAS UTILIZED FOR STOCKPILING AND LOADING.
9. CONTRACTOR IS RESPONSIBLE FOR SUBMITTING TRAFFIC CONTROL PLAN TO CITY OF PUEBLO PRIOR TO COMMENCEMENT OF SEDIMENT REMOVAL OPERATIONS.
10. ELECTRIC SERVICE SHALL PROVIDE 480/380 @ 100 AMP5 AND SHALL BE COORDINATED WITH BLACK HILLS ENERGY PRIOR TO CONSTRUCTION. CONTACT: JOHN CREEK, (719)546-6439.

100% CONSTRUCTION DOCUMENT SUBMITTAL



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT**  
**SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT**

PUEBLO, COLORADO

**THK ASSOCIATES INC.**  
2023 South Pueblo Street, Ste 101  
Aurora, Colorado 80014  
303-770-7201 FAX 770-7132  
Planning, Engineering, and Construction Services

**Matrix Design Group, Inc.**  
1400 North 10th Street, Suite 207  
Aurora, Colorado 80012  
Phone: 303-770-7201  
Fax: 303-770-7132

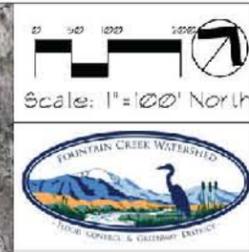
**REVISIONS:**

80% SUBMITTAL	02-04-2011
100% SUBMITTAL	03-15-2011

**DATE:** Feb. 7, 2011

**JOB No.:** 6880-000

**COVER SHEET 1 OF 18**



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT**  
**SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT**  
**PUEBLO, COLORADO**

**associates inc.**  
 2563 South Peoria Street, Ste 101  
 Aurora, Colorado 80014  
 303-770-7201 FAX 770-77-32  
 Planning, Landscape Architecture & Design

**Matrix Design Group, Inc.**  
 Licensed Design Group  
 303 North 34th, Suite 27  
 Aurora, CO 80018  
 Phone: 773-644-8800  
 Fax: 773-679-8208

**REVISIONS:**

90% SUBMITTAL	02-04-2011
100% SUBMITTAL	03-15-2011

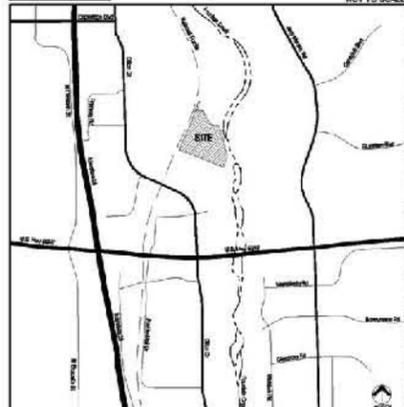
**DATE: Feb. 7, 2011**

**JOB No.: 6880-000**

**L1 - AERIAL**  
**SHEET 2 OF 18**

**100% CONSTRUCTION DOCUMENT SUBMITTAL**

VICINITY MAP NOT TO SCALE



**NOTES:**

1. ALL CONTRACT DOCUMENTS SHALL CONFORM TO THE MOST CURRENT EDITION OF THE STANDARD CONSTRUCTION SPECIFICATIONS AND DETAILS FOR THE CITY OF PUEBLO, COLORADO (DATED MAY, 2005) AND THE STORM DRAINAGE DESIGN CRITERIA AND DRAINAGE POLICIES OF THE CITY OF PUEBLO, COLORADO (DATED JUNE 9, 1997).

**SURVEY CONTROL DATA:**

**BASIS OF BEARINGS:** BEARINGS ARE GRID BEARINGS, COLORADO SOUTH ZONE AND 83 (NORS 2007) BASED UPON GPS OBSERVATIONS OF THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 7, TOWNSHIP 20 SOUTH, RANGE 64 WEST OF THE 6TH P.M., BEING MONUMENTED AT THE WEST END BY A 2-1/2" ALUMINUM CAP STAMPED "PLS 16128 1960" AND AT THE EAST END BY A 2-1/2" PIPE WITH A 3-1/4" ALUMINUM CAP STAMPED "LS10895 1984" FOUND TO BE NORTH 88°56'00" EAST.

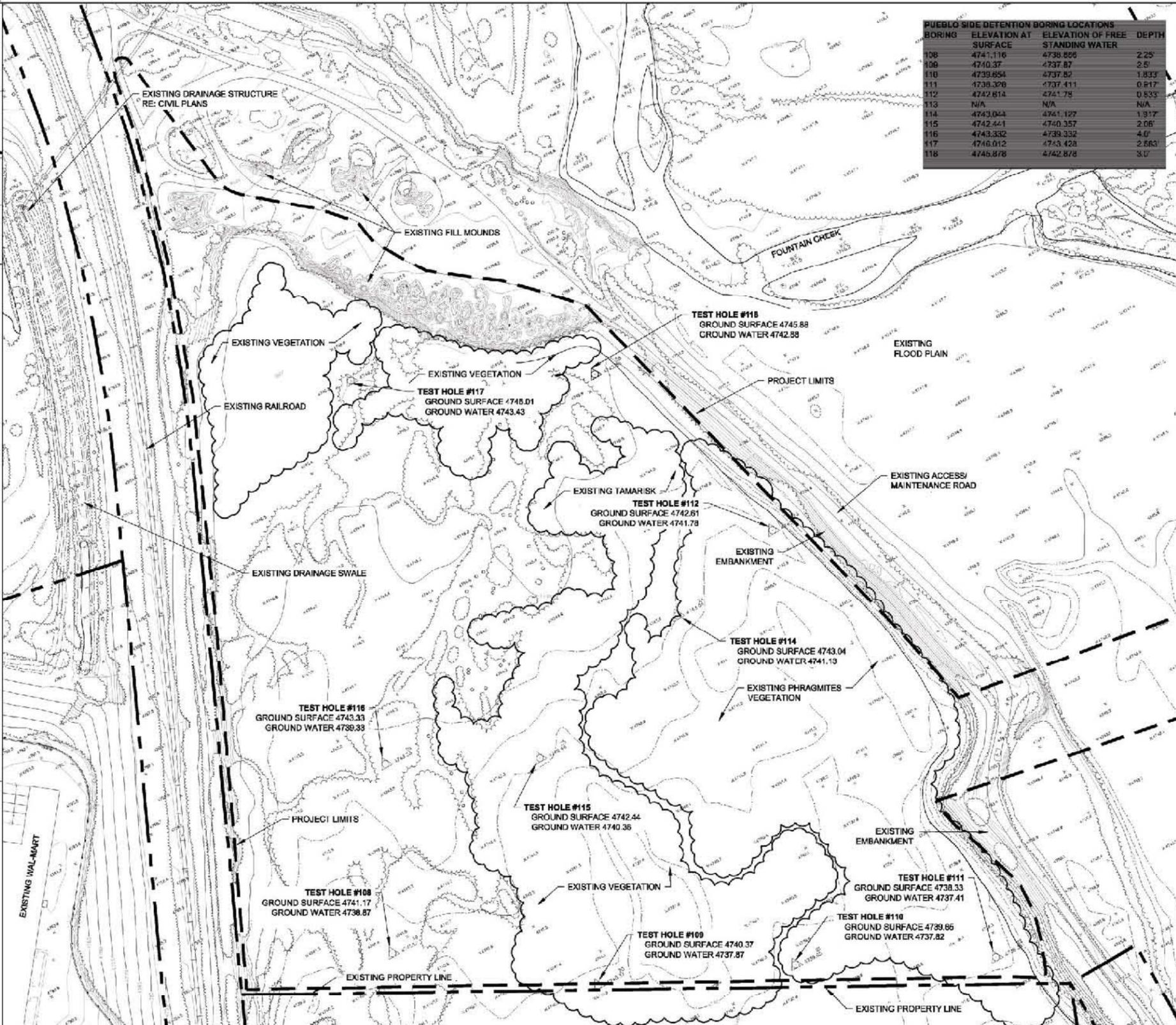
**PROJECT BENCHMARK:** THE BENCHMARK IS NGS MONUMENT PID JK0619, BEING A STEEL ROD IN A PLASTIC SLEEVE, FOUND AS DESCRIBED BY NGS DATA SHEET AND AS FOLLOWS: DESCRIBED BY NATIONAL GEODETIC SURVEY 1983 IN PUEBLO, AT THE INTERSECTION OF THE DENVER AND RIO GRANDE RAILROAD AND 29TH STREET, 101.0 METERS (331.4 FT) SOUTH OF THE CENTERLINE OF THE EAST BOUND LANES OF THE STREET, 18.1 METERS (59.4 FT) WEST OF THE NEAR RAIL, 13.8 METERS (45.3 FT) EAST OF THE CENTERLINE OF A FRONTAGE ROAD, 8.5 METERS (28.2 FT) EAST-SOUTHEAST OF THE SOUTHEAST CORNER OF A MAN HOLE COVER, 3.6 METERS (11.8 FT) WEST OF A FENCE, AND 2.0 METERS (6.6 FT) EAST OF A UTILITY POLE WITH ONE GUY WIRE. NOTE-ACCESS TO THE DATUM POINT IS THROUGH A 5-INCH LOGO CAP. THE MARK IS 2.0 METERS E FROM A WITNESS POST. THE MARK IS 0.9 M BELOW THE TRACKS. ELEVATION: 4,725.82 FEET (NAVD 88)

**PROJECT COORDINATE DEFINITION:** THE COORDINATE SYSTEM USED FOR THIS PROJECT IS A MODIFIED GROUND VERSION OF THE COLORADO STATE PLANE SOUTH ZONE SYSTEM. THE GROUND COORDINATES HAVE BEEN TRUNCATED BY 1 MILLION IN THE NORTHING AND 3 MILLION IN THE EASTING.  
 FALSE NORTHING: 1,000,000.00  
 FALSE EASTING: 3,000,000.00  
 POINT OF ORIGIN: 0,0,0  
 COMBINED SCALE FACTOR: 1.0002248150

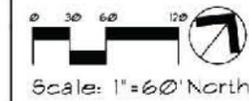
**LEGEND:**

- EXISTING SPOT ELEVATION
- EXISTING CONTOUR
- SOIL BORE LOCATION
- EXISTING VEGETATION LIMITS

**100% CONSTRUCTION DOCUMENT SUBMITTAL**



BORING	ELEVATION AT SURFACE	ELEVATION OF FREE STANDING WATER	DEPTH
108	4741.116	4738.886	2.25'
109	4740.37	4737.87	2.5'
110	4739.654	4737.82	1.833'
111	4738.398	4737.411	0.987'
112	4742.814	4741.79	0.833'
113	N/A	N/A	N/A
114	4743.044	4741.127	1.917'
115	4742.441	4740.357	2.08'
116	4743.332	4739.332	4.0'
117	4740.012	4743.428	2.663'
118	4745.878	4742.878	3.0'



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT**  
**SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT**  
 PUEBLO, COLORADO

**associates inc.**  
 2955 South Platte Street, Ste 101  
 Aurora, Colorado 80014  
 303-770-7201 FAX 303-770-7132  
 Planning, Landscape Architecture, Urban Research

**Matrix Design Group, Inc.**  
 Integrated Design Solutions  
 361 North 10th, Suite 127  
 Pueblo, CO 81001  
 Phone: 719-541-1841  
 Fax: 719-541-0888

**REVISIONS:**

90% SUBMITTAL 02-04-2011  
 100% SUBMITTAL 03-15-2011

**DATE: Feb. 7, 2011**

**JOB No.: 6880-000**  
**L2 - EXISTING CONDITIONS**  
**SHEET 3 OF 18**

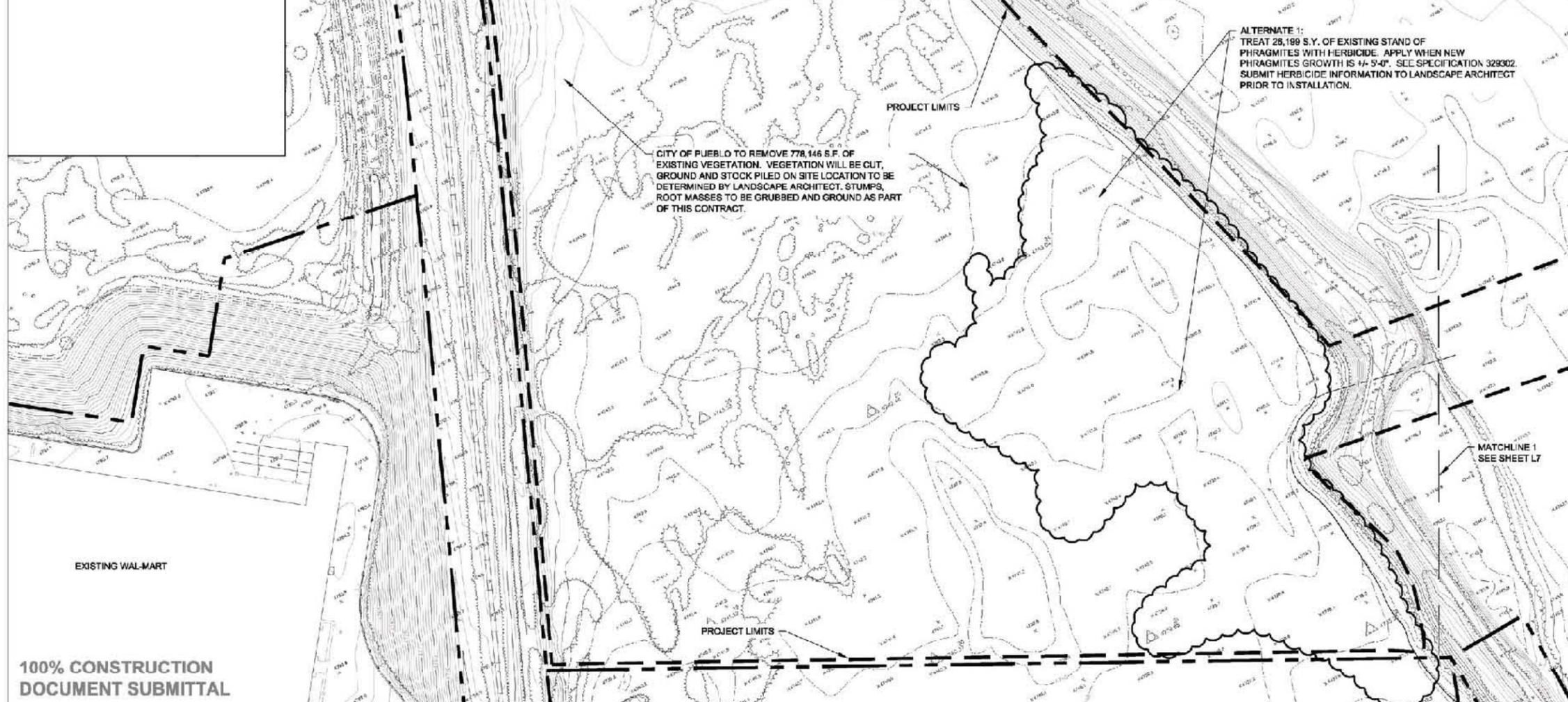
VICINITY MAP



NOT TO SCALE

NOTES:

1. CLEARED VEGETATION TO BE STOCK PILED ON SITE BY THE CITY OF PUEBLO.
2. CONTRACTOR TO GRIND EXISTING VEGETATION TO WOOD CHIP MULCH SMALLER THAN 1-1/2" IN DIA.
3. CONTRACTOR TO GRUB ENTIRE SITE AND CLEAR ROOTS FOR GRADING OPERATIONS. ROOTS MAY BE GROUND AND ADDED TO WOOD CHIP STOCK PILE.
4. WOOD CHIP MULCH TO BE INCORPORATED INTO FINISHED GRADE. RE: REVEGETATION PLAN.



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT**  
**SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT**  
**PUEBLO, COLORADO**

100% CONSTRUCTION DOCUMENT SUBMITTAL

**associates inc.**  
 2953 South Peoria Street, Ste 101  
 Aurora, Colorado 80014  
 303-770-7201 FAX 770-1832  
 Planning, Landmarks, Professional, Water Resources

**Matrix Design Group, Inc.**  
 5615 N. Meade, Suite 127  
 Aurora, CO 80016  
 Phone: 303-444-4266  
 Fax: 303-444-4266

**REVISIONS:**  
 90% SUBMITTAL 02-04-2011  
 100% SUBMITTAL 03-15-2011

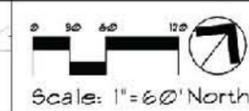
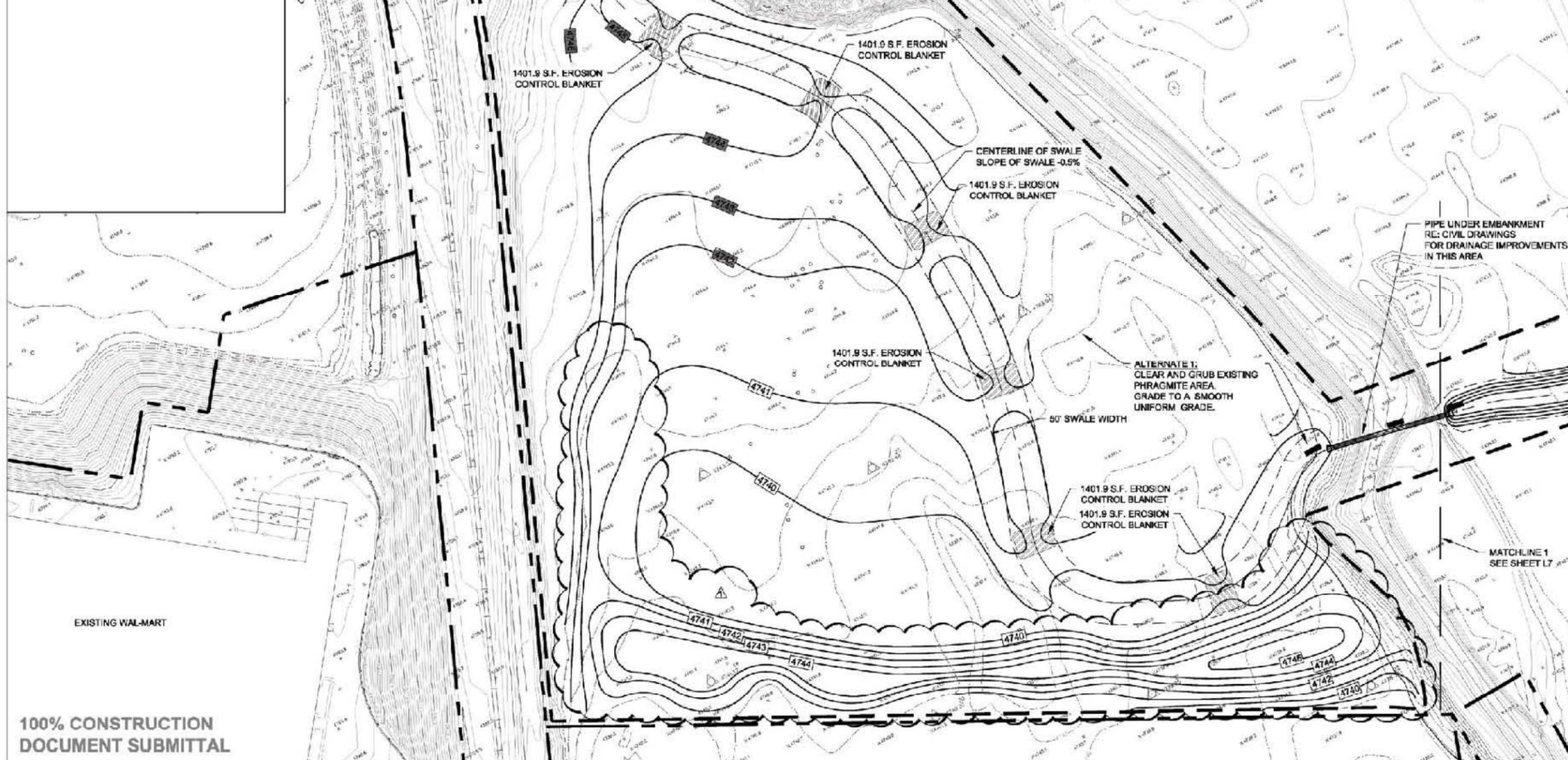
**DATE: Feb. 7, 2011**  
**JOB No.: 6880-000**  
**L3 - DEMOLITION PLAN**  
**SHEET 4 OF 18**

VICINITY MAP NOT TO SCALE



**NOTES:**

1. EROSION CONTROL FENCE AS PER THE CITY OF PUEBLO SPECIFICATION AND DESIGN CRITERIA SHALL BE INSTALLED AROUND THE PERIMETER OF THE PROJECT BOUNDARY.



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT  
SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT  
PUEBLO, COLORADO**

**associates inc.**  
2955 South Peoria Street, Ste 101  
Aurora, Colorado 80014  
303-770-7221 FAX 770-7132  
Pueblito Landscape Architecture/Assoc

**Matrix Design Group, Inc.**  
200 North Meade, Suite 217  
Pueblo, CO 81001  
Phone: 719-544-0000  
Fax: 719-544-2008

90% SUBMITTAL 02-04-2011  
100% SUBMITTAL 03-15-2011  
CHANGE ORDER No. 1 04-07-2011

**DATE: Feb. 7, 2011**  
**JOB No.: 6880-000**  
**L4 - SEDIMENT & EROSION CONTROL**  
**SHEET 5 OF 18**

**100% CONSTRUCTION DOCUMENT SUBMITTAL**



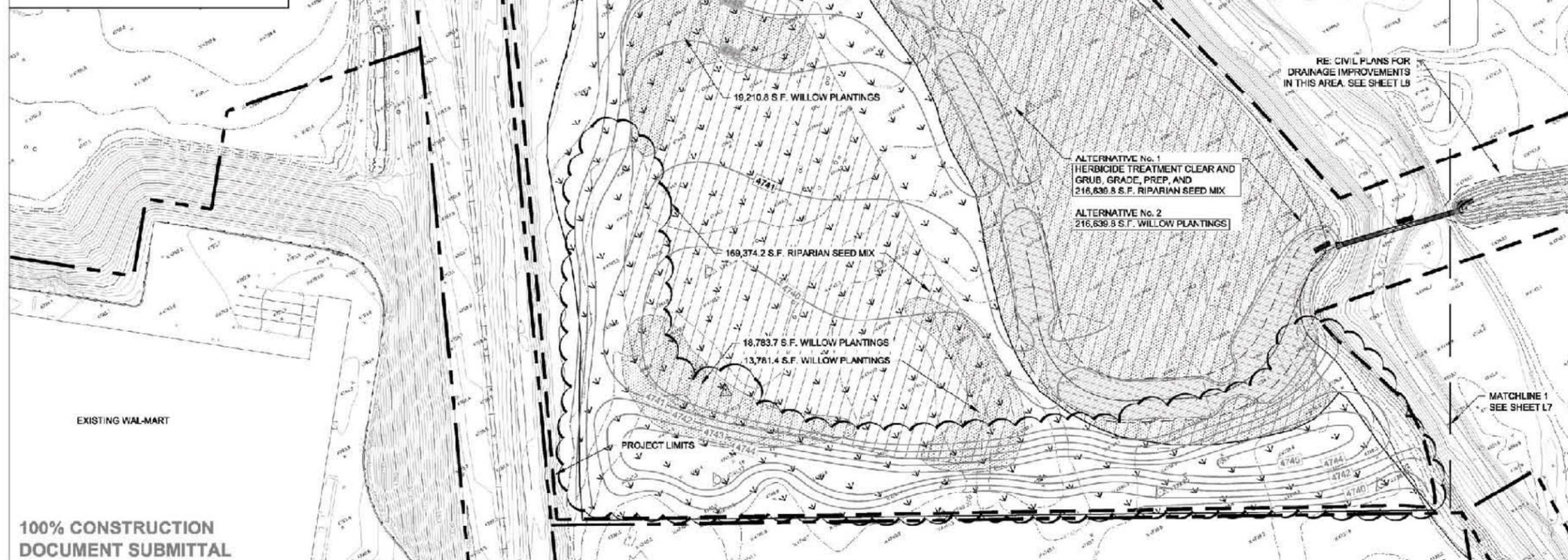
VICINITY MAP NOT TO SCALE



**NOTES:**  
 1. CONTRACTOR SHALL UTILIZE STOCK PILED WOOD CHIPS AS SOIL AMENDMENT FOR ENTIRE PROJECT. SPREAD WOOD CHIPS EVENLY OVER ENTIRE SITE AND DISC IN. SEE SPECIFICATIONS.

**LEGEND:**

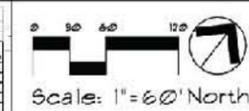
	WILLOW PLANTINGS
	RIPARIAN SEED MIX
	TRANSITIONAL SEED MIX
	WETLAND PLANTS



100% CONSTRUCTION DOCUMENT SUBMITTAL

**Summary of Available Plant List**

Quantity	% Mix	Plant Description	Common Name	Size	Species	Reference
100	2.00%	Agave attenuata	Century Plant	10" SP	SP	M
100	2.00%	Adiantum species	Wetland Fern	10" SP	SP	M
100	2.00%	Asplenium platyneuron	Wetland Fern	10" SP	SP	M
100	2.00%	Asplenium nidus	Wetland Fern	10" SP	SP	M
100	2.00%	Asplenium nidus	Wetland Fern	10" SP	SP	M
100	2.00%	Asplenium nidus	Wetland Fern	10" SP	SP	M
100	2.00%	Asplenium nidus	Wetland Fern	10" SP	SP	M
100	2.00%	Asplenium nidus	Wetland Fern	10" SP	SP	M
100	2.00%	Asplenium nidus	Wetland Fern	10" SP	SP	M
100	2.00%	Asplenium nidus	Wetland Fern	10" SP	SP	M



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT  
 SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT  
 PUEBLO, COLORADO**

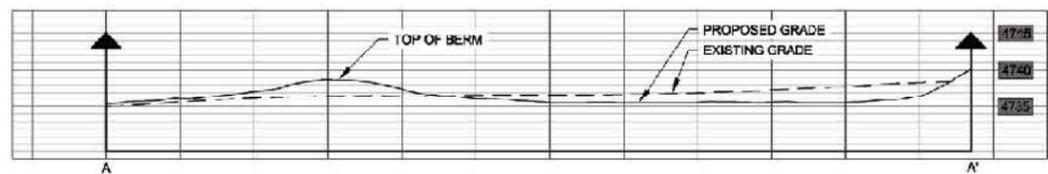
**associates inc.**  
 2083 South Peoria Street, Ste 101  
 Aurora, Colorado 80014  
 303-770-7201 FAX 770-7152  
 (Not for Construction or Contract Documents)

**Matrix Design Group, Inc.**  
 1417 W. 1st Ave., Suite 100  
 Aurora, CO 80015  
 Phone: 303-770-7201  
 Fax: 303-770-7202

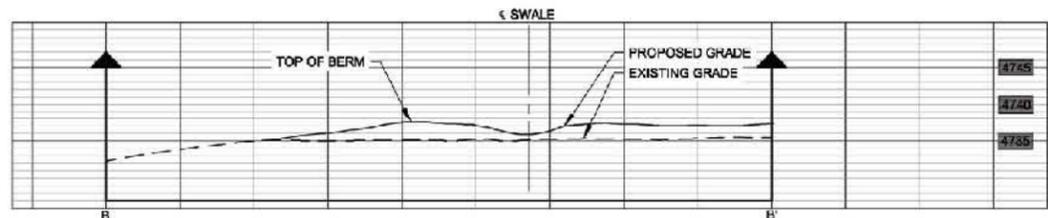
**REVISIONS:**  
 90% SUBMITTAL 02-04-2011  
 100% SUBMITTAL 03-15-2011  
 CHANGE ORDER No. 1 04-07-2011

**DATE: Feb. 7, 2011**  
**JOB No.: 6880-000**  
**L6 - REVEGETATION PLAN & SCHEDULE SHEET 7 OF 18**

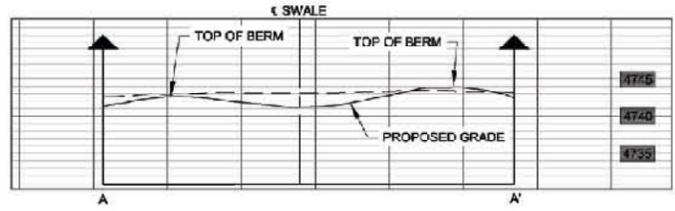




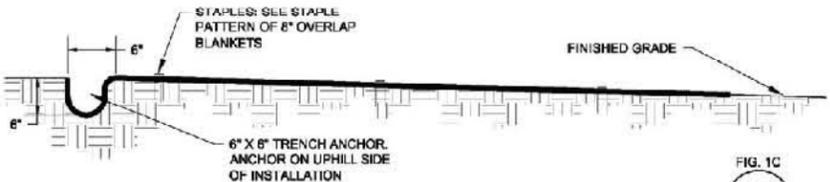
**GRADING SECTION A**  
 HORIZONTAL SCALE: 1"=30'  
 VERTICAL SCALE: 1"=10'  
 REFER TO SHEET L5 FOR SECTION LOCATIONS



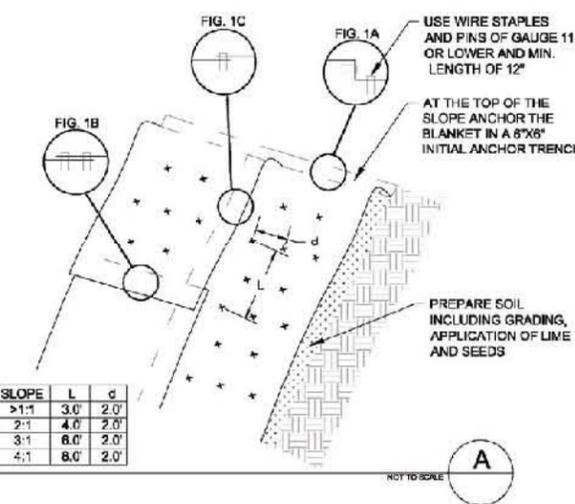
**GRADING SECTION B**  
 HORIZONTAL SCALE: 1"=30'  
 VERTICAL SCALE: 1"=10'  
 REFER TO SHEET L5 FOR SECTION LOCATIONS



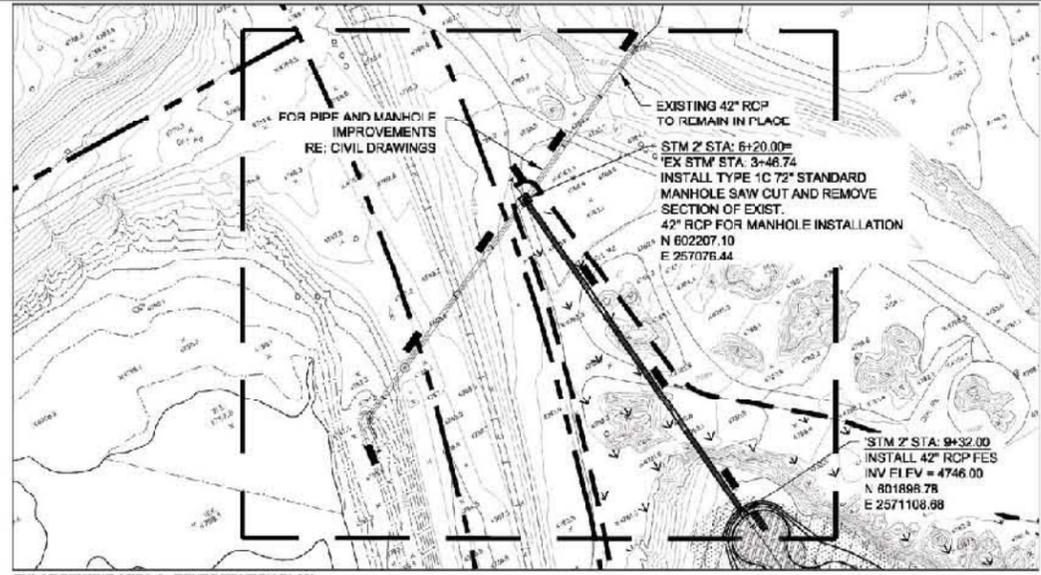
**BIOSWALE SECTION**  
 HORIZONTAL SCALE: 1"=30'  
 VERTICAL SCALE: 1"=10'  
 REFER TO SHEET L5 FOR SECTION LOCATIONS



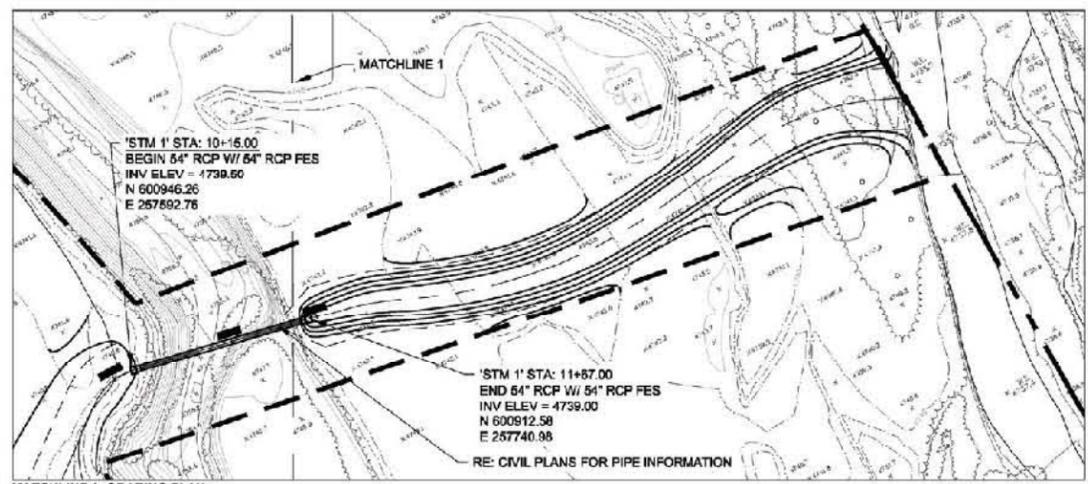
- GENERAL INSTALLATION INSTRUCTIONS FOR TRM AND BLANKET IN SLOPES**
1. PREPARE SOIL, INCLUDING GRADING, APPLICATION OF LIME, FERTILIZER AND SEEDS. THE SURFACE OF THE SOIL SHOULD BE SMOOTH AND FREE OF ROCKS, ROOTS AND OTHER OBSTRUCTIONS.
  2. START AT THE TOP OF THE SLOPE BY ANCHORING BLANKETS IN A 6" DEEP AND 6" WIDE ANCHOR TRENCH. PLACE BLANKETS, STAPLE (8" STAPLES RECOMMENDED), BACKFILL AND COMPACT (FIGURE 1).
  3. ROLL THE BLANKETS DOWN THE SLOPE OR ACROSS THE SLOPE. STAPLE THE OPEN BLANKET EDGE USING ONE ROW OF STAPLES AT 1'-6" TO 2'-0" INTERVALS. THE MIDDLE OF THE BLANKETS SHOULD BE STAPLED USING A PREFERRED STAPLE PATTERN. BE SURE TO LAY BLANKETS LOOSELY ON THE GROUND ALLOWING A GOOD CONTACT BETWEEN THE SOIL AND BLANKETS.
  4. WHEN BLANKET SPLICING IS NECESSARY, USE AN 8" OVERLAP. USE TWO ROWS OF STAPLES TO ANCHOR BLANKETS. A 12" STAPLE SPACING WITH A STAGGERED PATTERN IS RECOMMENDED. OVERLAP SIDES OF BLANKETS AT LEAST 6" AND USE STAPLES ALONG THE OVERLAP AT 12" SPACING (FIGURE 1C).
  5. PROVIDE A 6" DEEP AND 6" WIDE ANCHOR TRENCH AT THE TOE OF THE SLOPE.
  6. USE WIRE STAPLES OF GAUGE 11 OR LOWER AND A MINIMUM LENGTH OF 8". ANCHORS SHOULD BE LONG ENOUGH TO PROVIDE A STRONG BOND BETWEEN THE BLANKET AND THE GROUND.



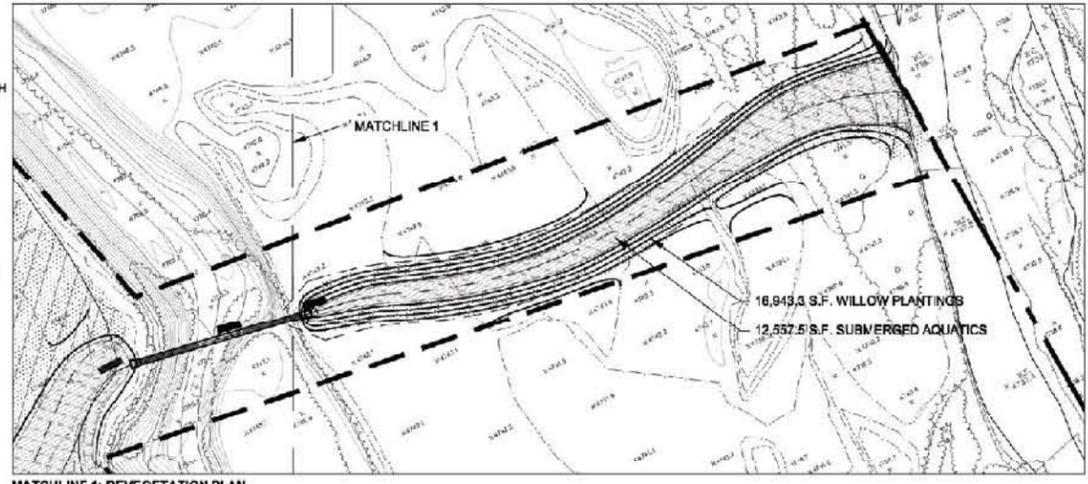
**EROSION CONTROL  
 BLANKET**  
 100% CONSTRUCTION  
 DOCUMENT SUBMITTAL



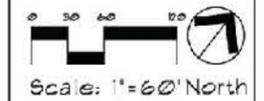
ENLARGEMENT AREA A: REVEGETATION PLAN



MATCHLINE 1: GRADING PLAN



MATCHLINE 1: REVEGETATION PLAN



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT  
 SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT  
 PUEBLO, COLORADO**

**associates inc.**  
 2933 South Pacific Street, Ste 101  
 Aurora, Colorado 80014  
 303-770-7201 FAX 770-7132  
 PRRWA, Landscape Architecture & Survey

**Matrix Design Group, Inc.**  
 201 14th Street, Suite 107  
 Pueblo, CO 81001  
 Phone: 719-744-6000  
 Fax: 719-744-6000

**REVISIONS:**  
 90% SUBMITTAL 02-04-2011  
 100% SUBMITTAL 03-15-2011

**DATE: Feb. 7, 2011**  
**JOB No.: 6880-000**  
**L7 - ENLARGEMENT AREAS**  
**SHEET 8 OF 18**



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT**  
**SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT**  
**PUEBLO, COLORADO**

**associates inc.**  
 2223 South Peoria Street, Ste 101  
 Aurora, Colorado 80014  
 303-770-7701 FAX 770-7190  
 HERRING, LANDSCAPE ARCHITECTURE & PLANNING

**Matrix Design Group, Inc.**  
 1402 1/2th Main, Suite 227  
 Pueblo, CO 81001  
 Phone: 719-544-6282  
 Fax: 719-544-6288

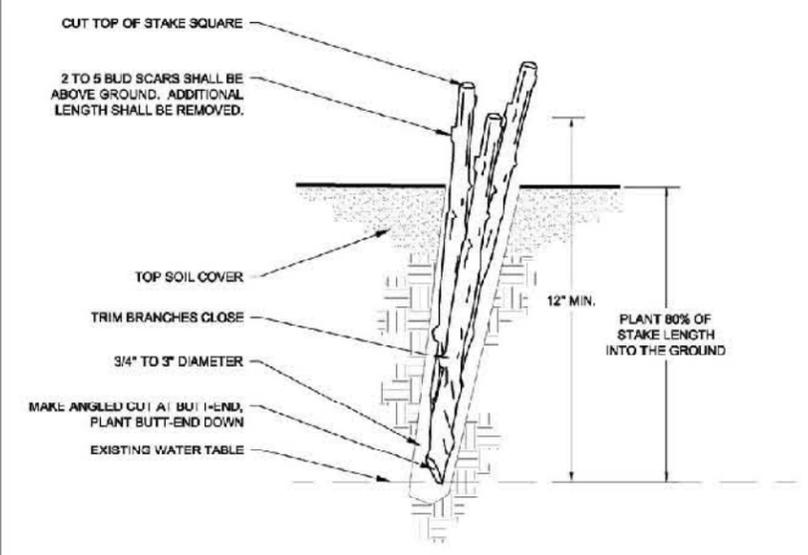
**REVISIONS:**

90% SUBMITTAL	02-04-2011
100% SUBMITTAL	03-15-2011

**DATE: Feb. 7, 2011**

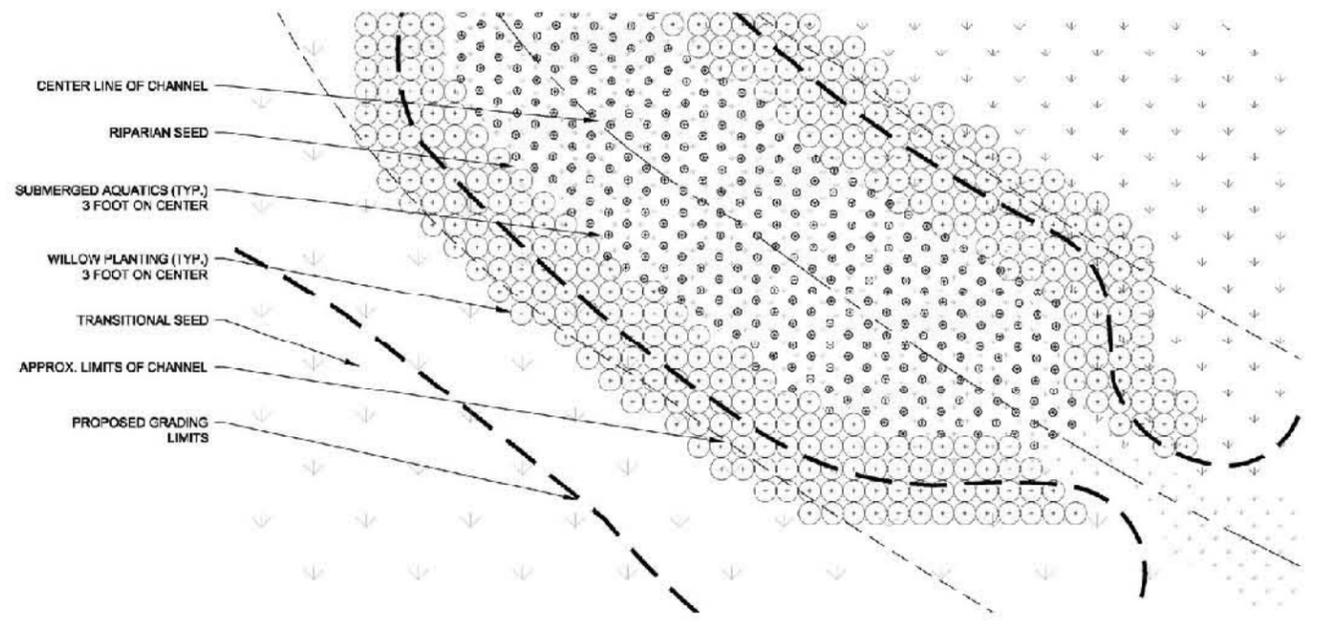
**JOB No.: 6880-000**

**L8 - DETAILS SHEET 9 OF 18**

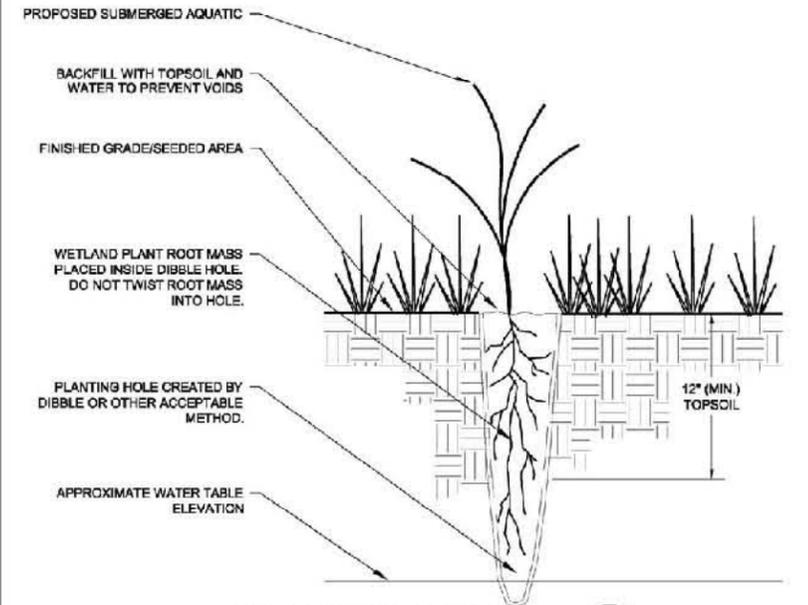


- NOTES:**
- HARVEST AND PLANT STAKES DURING THE DORMANT SEASON.
  - USE HEALTHY, STRAIGHT AND LIVE WOOD AT LEAST ONE YEAR OLD.
  - MAKE CLEAN CUTS AND DO NOT DAMAGE STAKES OR SPLIT ENDS DURING INSTALLATION. USE A PILOT BAR IN FIRM SOILS.
  - SOAK CUTTINGS FOR 24 HOURS (MIN.) PRIOR TO INSTALLATION.
  - TAMP THE SOIL AROUND THE STAKE OR BACKFILL WITH MUD SLURRY.

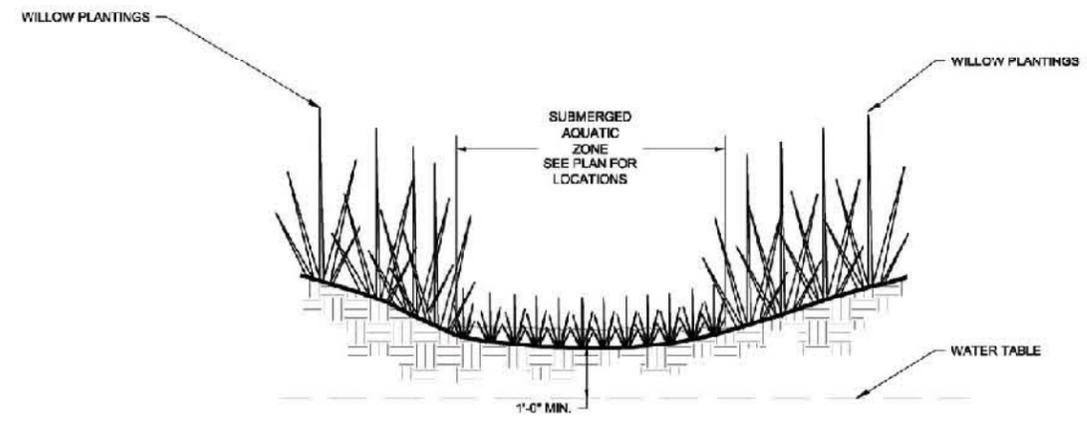
**WILLOW STAKE PLANTING DETAIL** NOT TO SCALE **A**



**TYPICAL SUBMERGED AQUATIC AREA PLANTING PLAN** SCALE 1"=10' **B**



**SUBMERGED AQUATIC PLANTING DETAIL** NOT TO SCALE **C**



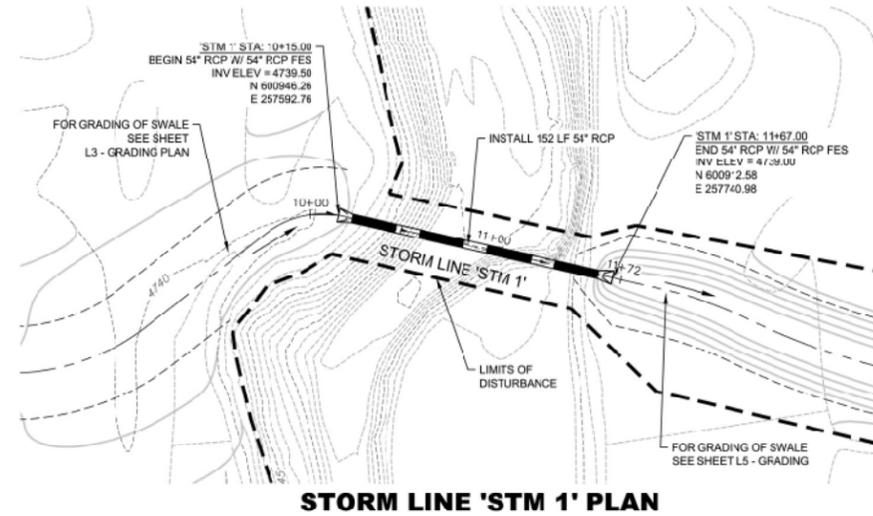
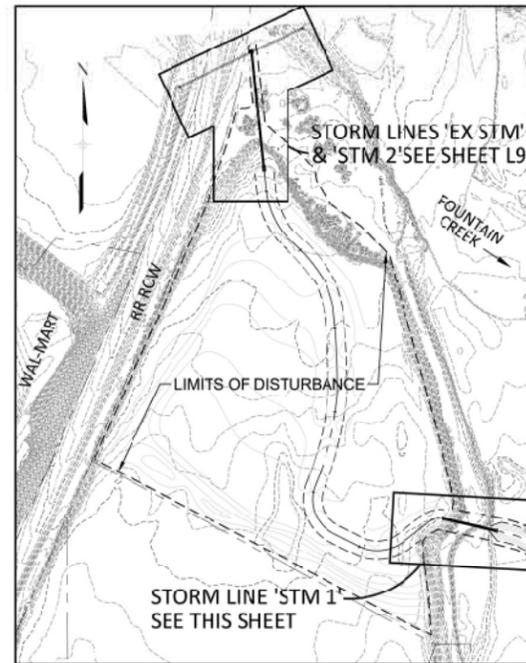
**TYPICAL SUBMERGED AQUATIC AREA PLANTING SECTION** NOT TO SCALE **D**

**100% CONSTRUCTION DOCUMENT SUBMITTAL**





## SIDE DETENTION STORM DRAIN PLANS



### GENERAL NOTES:

1. ALL STORM DRAIN INSTALLATIONS SHALL COMPLY WITH THE MOST CURRENT EDITION OF THE "STANDARD CONSTRUCTION SPECIFICATIONS AND STANDARD DETAILS FOR THE CITY OF PUEBLO, COLORADO". THESE SPECIFICATIONS ARE AVAILABLE AT THE PUBLIC WORKS OFFICE LOCATED AT 21" E "D" STREET IN PUEBLO.
2. ALL PIPE WILL BE SUBJECT TO INSPECTION UPON DELIVERY TO THE JOB SITE.
3. THE CONTRACTOR SHALL CONTACT THE CITY OF PUEBLO PRIOR TO THE BEGINNING OF ANY CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ANY EXISTING UTILITIES (INCLUDING VERTICAL LOCATIONS) WHICH MAY CONFLICT WITH PROPOSED CONSTRUCTION. ALL EXISTING UTILITIES SHALL BE PROTECTED FROM DAMAGE BY THE CONTRACTOR. DAMAGED UTILITIES SHALL BE REPAIRED BY THE CONTRACTOR AT HIS OWN EXPENSE. THE TYPE, SIZE, LOCATION, AND THE NUMBER OF ALL UNDERGROUND UTILITIES SHALL BE SHOWN. FIELD VERIFIED ELEVATIONS AND LOCATIONS ARE REQUIRED FOR EXISTING UNDERGROUND UTILITIES WHICH WILL POTENTIALLY AFFECT THE PROPOSED CONSTRUCTION.
4. CITY OF PUEBLO PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH CITY OF PUEBLO DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF PUEBLO, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
5. THE CONTRACTOR SHALL HAVE ONE SIGNED COPY OF THE PLANS (APPROVED BY THE CITY OF PUEBLO), ONE COPY OF THE APPROPRIATE STANDARDS AND SPECIFICATIONS AT THE JOB SITE AT ALL TIMES, AND A COPY OF ANY PERMIT AND EXTENSION AGREEMENTS NEEDED AT THE JOB SITE AT ALL TIMES.
6. THE CONTRACTOR WILL OBTAIN STATE APPROVAL OF THEIR EPA STORM WATER PERMIT APPLICATION TO INCLUDE A STORM WATER POLLUTION PREVENTION PLAN, 30 DAYS PRIOR TO CONSTRUCTION START.

### LEGEND

- EXISTING MANHOLE
- PROPOSED MANHOLE
- PROPOSED STORM DRAIN
- PROPOSED FES

### BASE OF BEARINGS:

BEARINGS ARE GRID BEARINGS, COLORADO SOUTH ZONE NAD 83 (NSRS 2007) BASED UPON GPS OBSERVATIONS OF THE NORTH LINE OF THE NORTHWEST QUARTER OF SECTION 7, TOWNSHIP 20 SOUTH, RANGE 64 WEST OF THE 6TH P.M., BEING MONUMENTED AT THE WEST END BY A 2-1/2" ALUMINUM CAP STAMPED "P151612R 1990" AND AT THE EAST END BY A 2-1/2" PIPE WITH 3-1/4" ALUMINUM CAP STAMPED "LS 10895 1984" AND FOUND TO BE NORTH 88°55'00" EAST.

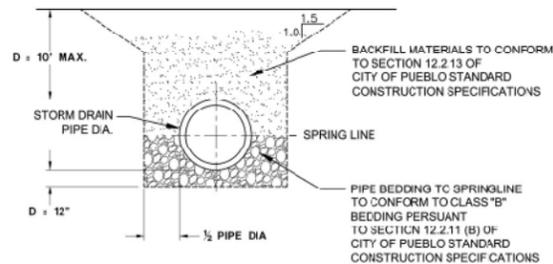
### PROJECT BENCHMARK

THE BENCHMARK IS NGS MONUMENT PID JK0813, BEING A STEEL ROD IN A PLASTIC SIFVEE, FOUND AS DESCRIBED BY NGS DATA SHEET AND AS FOLLOWS:

DESCRIBED BY NATIONAL GEODETIC SURVEY 1983 IN PUEBLO, AT THE INTERSECTION OF THE DENVER AND RIO GRANDE RAILROAD AND 29TH STREET, 101.0 METERS (331.4 FT) SOUTH OF THE CENTERLINE OF THE EAST BOUND LANES OF THE STREET, 18.1 METERS (59.4 FT) WEST OF THE NEAR RAIL, 13.8 METERS (45.3 FT) EAST OF THE CENTERLINE OF A FRONTAGE ROAD, 8.9 METERS (29.2 FT) EAST-SOUTHEAST OF THE SOUTHEAST CORNER OF A MAN HOLE COVER, 3.6 METERS (11.8 FT) WEST OF A FENCE AND 2.0 METERS (6.6 FT) EAST OF A UTILITY POLE WITH ONE GUY WIRE. NOTE-ACCESS TO THE DATUM POINT IS THROUGH A 5-INCH LOGGED CAP. THE MARK IS 2.0 METERS E FROM A WITNESS POST. THE MARK IS 0.9 M BELOW THE TRACKS.

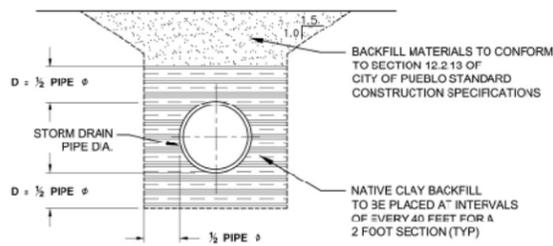
ELEVATION: 4,725.82 FEET (NAVD 88)

### KEY MAP



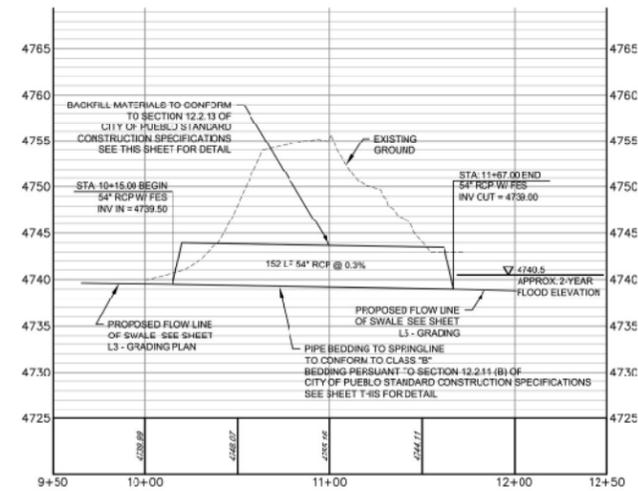
### TRENCH BACKFILL DETAIL

NTS

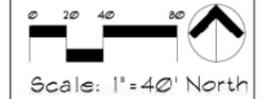


### CLAY BACKFILL DETAIL

NTS



### STORM LINE 'STM 1' PROFILE



# FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT

PUEBLO, COLORADO

**associates inc.**  
2953 South Peoria Street, Ste 101  
Aurora, Colorado 80014  
303-770-7201 FAX 770-7132

**Matrix Design Group, Inc.**  
Integrated Design Solutions  
503 North Main, Suite 102  
Pueblo, CO 81001  
Phone: 719-544-0300  
Fax: 719-544-0308

### REVISIONS:

DATE: Mar. 15, 2011

JOB No.: 6880-000

L9  
SHEET 10 OF 18



## A.2. Pueblo Sediment Removal Construction Documents



# CITY OF PUEBLO, CO FOUNTAIN CREEK SEDIMENT REMOVAL FINAL PLANS

### SURVEY NOTES:

#### BASIS OF BEARINGS:

BEARINGS ARE GRID BEARINGS, COLORADO SOUTH ZONE NAD 83 (NRS 2007) BASED UPON GPS OBSERVATIONS OF THE SOUTH LINE OF SECTION 31, TOWNSHIP 20 SOUTH, RANGE 64 WEST OF THE 6TH P.M., BEING MONUMENTED AT THE WEST END BY A STONE MONUMENT IN A STEEL BOX AND AT THE EAST END BY A STONE MONUMENT WITH A LEAD PLUG AND TACK IN A CAST IRON BOX AND FOUND TO BE SOUTH 89°37'47" EAST.

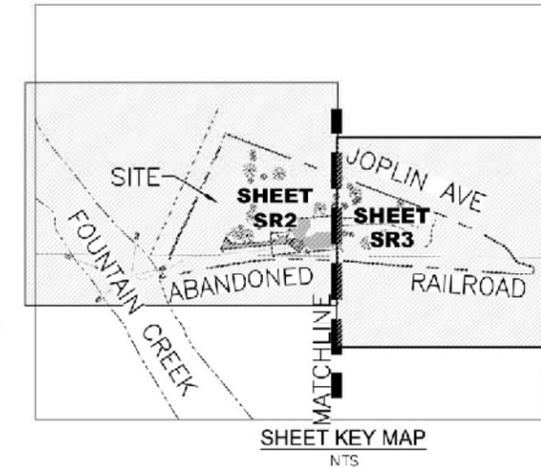
#### PROJECT BENCHMARK

THE BENCHMARK IS NGS MONUMENT PID JK0819, BEING A STEEL ROD IN A PLASTIC SLEEVE, FOUND AS DESCRIBED BY NGS DATA SHEET AND AS FOLLOWS:

DESCRIBED BY NATIONAL GEODETIC SURVEY 1983

IN PUEBLO, AT THE INTERSECTION OF THE DENVER AND R/O GRANDE RAILROAD AND 29TH STREET, 101.0 METERS (331.4 FT) SOUTH OF THE CENTERLINE OF THE EAST BOUND LANES OF THE STREET, 18.1 METERS (59.4 FT) WEST OF THE NEAR RAIL, 13.8 METERS (45.3 FT) EAST OF THE CENTERLINE OF A FRONTAGE ROAD, 8.9 METERS (29.2 FT) EAST-SOUTHEAST OF THE SOUTHEAST CORNER OF A MAN HOLE COVER, 3.6 METERS (11.8 FT) WEST OF A FENCE, AND 2.0 METERS (6.6 FT) EAST OF A UTILITY POLE WITH ONE GUY WIRE. NOTE=ACCESS TO THE DATUM POINT IS THROUGH A 5-INCH LOGO CAP. THE MARK IS 2.0 METERS E FROM A WITNESS POST. THE MARK IS 0.9 M BELOW THE TRACKS.

ELEVATION: 4,725.82 FEET (NAVD 88)



### GENERAL NOTES

- ALL CONSTRUCTION OF PUBLIC IMPROVEMENTS SHALL COMPLY WITH THE MOST CURRENT EDITION OF THE "STANDARD CONSTRUCTION SPECIFICATIONS AND STANDARD DETAILS FOR THE CITY OF PUEBLO, COLORADO". THESE SPECIFICATIONS ARE AVAILABLE AT THE PUBLIC WORKS OFFICE, LOCATED AT 211 EAST "D" STREET IN PUEBLO.
- ALL PIPE WILL BE SUBJECT TO INSPECTION UPON DELIVERY TO THE JOB SITE. PLASTIC JOINT MATERIAL DAMAGED IN ANY WAY WILL BE CAUSE FOR REJECTION OF THE PIPE.
- ALL UTILITY EASEMENTS MUST REMAIN UNOBTSTRUCTED AND FULLY ACCESSIBLE ALONG THEIR ENTIRE LENGTH FOR MAINTENANCE EQUIPMENT.
- THE CONTRACTOR SHALL CONTACT THE CITY OF PUEBLO PRIOR TO THE BEGINNING OF ANY CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ANY EXISTING UTILITIES (INCLUDING VERTICAL LOCATIONS) WHICH MAY CONFLICT WITH PROPOSED CONSTRUCTION. ALL EXISTING UTILITIES SHALL BE PROTECTED FROM DAMAGE BY THE CONTRACTOR. DAMAGED UTILITIES SHALL BE REPAIRED BY THE CONTRACTOR AT HIS OWN EXPENSE. THE TYPE, SIZE, LOCATION, AND THE NUMBER OF ALL UNDERGROUND UTILITIES SHALL BE SHOWN. FIELD VERIFIED ELEVATIONS AND LOCATIONS ARE REQUIRED FOR EXISTING UNDERGROUND UTILITIES WHICH WILL POTENTIALLY AFFECT THE PROPOSED CONSTRUCTION.
- ALL EXISTING UTILITIES SHOWN WERE COMPILED USING THE BEST AVAILABLE INFORMATION AND FIELD OBSERVATION. THE LOCATIONS OF EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND NOT ALL UTILITIES MAY BE SHOWN. IT IS THE CONTRACTORS RESPONSIBILITY TO FIELD VERIFY AND PROTECT ALL EXISTING UTILITIES, INCLUDING THOSE SHOWN INCORRECTLY ON THE PLANS. ANY DAMAGE TO EXISTING UTILITIES SHALL BE REPAIRED IN A TIMELY FASHION TO THE SATISFACTION OF CITY AND THE OWNER OF THE IMPACTED UTILITY AT THE CONTRACTOR'S EXPENSE.
- CITY OF PUEBLO PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH CITY OF PUEBLO DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF PUEBLO, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
- THE CONTRACTOR SHALL HAVE ONE SIGNED COPY OF THE PLANS (APPROVED BY THE CITY OF PUEBLO), ONE COPY OF THE APPROPRIATE STANDARDS AND SPECIFICATIONS AT THE JOB SITE AT ALL TIMES, AND A COPY OF ANY PERMIT AND EXTENSION AGREEMENTS NEEDED AT THE JOB SITE AT ALL TIMES.
- CONTRACTOR IS RESPONSIBLE FOR CLEARING/GRADING AND RECLAIMING AREAS UTILIZED FOR STOCKPILING AND LOADING.
- CONTRACTOR IS RESPONSIBLE FOR SUBMITTING TRAFFIC CONTROL PLAN TO CITY OF PUEBLO PRIOR TO COMMENCEMENT OF SEDIMENT REMOVAL OPERATIONS.
- ELECTRIC SERVICE SHALL PROVIDE 480/3/60 @ 100 AMPS AND SHALL BE COORDINATED WITH BLACK HILLS ENERGY PRIOR TO CONSTRUCTION. CONTACT: JOHN CREEK, (719)546-6439.
- THE CONTRACTOR WILL OBTAIN STATE APPROVAL OF THEIR EPA STORM WATER PERMIT APPLICATION TO INCLUDE A STORM WATER POLLUTION PREVENTION PLAN, 30 DAYS PRIOR TO CONSTRUCTION START.

### SHEET INDEX

12	SR1	COVER SHEET/NOTES
13	SR2	AERIAL PHOTOGRAPH
14	SR3	SITE PLAN
15	SR4	SITE PLAN
16	SR5	EROSION CONTROL DETAILS
17	SR6	PIPE CONNECTION DETAILS
18	SR7	MISC. DETAILS

### ABBREVIATIONS

C	CENTERLINE
C&G	CURB & GUTTER
ELEV	ELEVATION
EOA	EDGE OF ASPHALT
EOC	EDGE OF CONCRETE
EOP	EDGE OF PAVEMENT
FL	FLOWLINE
F I	LINEAR FEET
HBP	HOT BITUMINOUS PAVEMENT
HCL	HORIZONTAL CENTERLINE
HP	HIGH POINT
IRR	IRRIGATED
LF	LINEAR FEET
LP	LOW POINT
N	NORTHING/NORTH
NTS	NOT TO SCALE
PC	POINT OF CURVATURE
PCR	POINT OF CURB RETURN
PGL	PROFILE GRADE LINE
PI	POINT OF INTERSECTION
PT	POINT OF TANGENCY
PVC	POINT OF VERTICAL CURVATURE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
R	RADIUS
RR	RAILROAD
SQFT	SQUARE FEET
STA	STATION
SW	STORM SEWER
TCE	TEMPORARY CONSTRUCTION EASEMENT
TYP	TYPICAL
VC	VERTICAL CURVE
HDPE	HIGH DENSITY POLYETHYLENE

### LEGEND (EXISTING)

---	EDGE OF PAVEMENT
X-X	SINGLE POST ROADWAY SIGN
--- ---	BARB WIRE FENCE
--- ---	EXISTING LEVEE WALL
--- ---	WOOD FENCE
--- ---	ELECTRIC UTILITY LINE
--- ---	OVERHEAD ELECTRIC UTILITY LINE
--- ---	LINE UTILITY POLE
--- ---	ELECTRICAL TRANSFORMER
--- ---	FIBER OPTIC UTILITY LINE
--- ---	GAS UTILITY LINE
--- ---	GAS METER
--- ---	GAS VALVE
--- ---	UTILITY SANITARY SEWER LINE
--- ---	SANITARY SEWER CLEANOUT
--- ---	STORM SEWER LINE
--- ---	STORM SEWER INLET
--- ---	TELEPHONE UTILITY LINE
--- ---	TELEPHONE PEDESTAL
--- ---	WATER MAIN
--- ---	WATER LINE VALVE
--- ---	FIRE HYDRANT
--- ---	WATER METER
--- ---	WELL LOCATION
--- ---	DRAINAGE ARROW
--- ---	LIGHT STANDARD
--- ---	EXISTING TREES & SHRUBS
---	EXISTING CONTOUR
---	EXISTING DEPRESSION

### LEGEND (PROPOSED)

[Pattern]	AVAILABLE STOCKPILING AREAS
---	PROPOSED JERSEY BARRIERS
[Symbol]	SILT FENCE
[Symbol]	VEHICLE TRACKING CONTROL
[Symbol]	INLET PROTECTION

THESE PLANS HAVE BEEN REVIEWED FOR CONCEPT ONLY. THE REVIEW DOES NOT IMPLY RESPONSIBILITY BY THE UNDERSIGNED, THE REVIEWING DEPARTMENT, OR THE CITY OF PUEBLO FOR ACCURACY AND CORRECTNESS OF THE INFORMATION PRESENTED HEREON. REVIEW IS EXCLUSIVELY LIMITED TO CITY OF PUEBLO PUBLIC IMPROVEMENTS.

CITY OF PUEBLO, STORMWATER COORDINATOR \_\_\_\_\_ DATE \_\_\_\_\_  
CITY OF PUEBLO, PUBLIC WORKS DIRECTOR \_\_\_\_\_ DATE \_\_\_\_\_



## FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT

PUEBLO, COLORADO

**associates inc.**  
2802 South Meola Street, Ste 101  
Aurora, Colorado 80014  
303-770-7201 FAX 770-7152

**Matrix Design Group, Inc.**  
Regional Design Solutions  
573 North 4th Street, Suite 100  
Pueblo, Colorado  
Phone: 719-546-0000  
Fax: 719-546-0000

### REVISIONS:

DATE: Mar. 15, 2011

JOB No.: 6880-000

SR1-COVER SHEET  
SHEET 12 OF 18

**VICINITY MAP**



**NOTES:**

SITE IS LOCATED IN SECTION 31, TOWNSHIP 20S, RANGE 64N, 6TH PRIME MERIDIAN, PUEBLO COUNTY, COLORADO.  
 PROPERTY IS OWNED BY THE CITY OF PUEBLO.

THE SITE IS UNDEVELOPED AND COVERED IN VARIOUS TYPES OF VEGETATION RANGING FROM NATIVE GRASSES TO TREES. THE SOILS ARE SANDY IN NATURE AND WILL FACTOR INTO CONSIDERATION OF EROSION CONTROL BEST MANAGEMENT PRACTICES.

ANTICIPATED START DATE: 04/01/2011  
 ANTICIPATED COMPLETION DATE: 04/15/2011  
 SEE SHEET SR5 FOR NPDES NOTES



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT**

**SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT**

PUEBLO, COLORADO

**associates inc.**  
 2963 South Prairie Street, Ste 101  
 Aurora, Colorado 80014  
 303-770-7201 FAX: 770-7132

**Matrix Design Group, Inc.**  
 300 South Meade Street, 27  
 Pueblo, CO 81001  
 Phone: 719-544-8844  
 Fax: 719-544-8808

**REVISIONS:**


**DATE: Mar. 15, 2011**

**JOB No.: 6880-000**

**SR2-AERIAL**

**SHEET 13 OF 18**





**NOTES:**

SITE IS LOCATED IN SECTION 31, TOWNSHIP 20S, RANGE 64W, 6TH PRIME MERIDIAN, PUEBLO COUNTY, COLORADO. PROPERTY IS OWNED BY THE CITY OF PUEBLO.

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ANTICIPATED START DATE: 04/01/2011  
 ANTICIPATED COMPLETION DATE: 04/15/2011

SEE SHEET SR5 FOR NOTES.

① INDICATES A FOUND CONCRETE MONUMENT WITH LEAD AND TACK  
 ② INDICATES REMAINS OF CONCRETE MONUMENT  
 ③ INDICATES A SET #5 REBAR WITH ALUMINUM CAP STAMPED "MATRIX PLS 34977"

N 581297.8760 E 262416.7090  
 N 581412.5360 E 262148.2300  
 N 581558.0566 E 261191.4537

UNDERLINED INSTALLATION CALLOUTS ON SITE PLAN SHEETS INDICATES CITY OF PUEBLO TO PROVIDE AND ARE NOT IN CONTRACT

**SEDIMENT COLLECTOR AND SEPARATOR REQUIREMENTS:**

SEDIMENT REMOVAL/COLLECTION EQUIPMENT SHALL MEET THE FOLLOWING PERFORMANCE REQUIREMENTS:

1. MINIMUM SYSTEM CAPACITY SHALL BE 50 CY/HOUR AT 120 CFS BASE
2. FLOW PUMP SHALL HAVE 800 GPM CAPACITY, 20' STATIC HEAD CAPACITY, AND HAVE VARIABLE FREQUENCY DRIVES.
3. OPERATING FLOW RATES: LOW FLOW=60CFS, BASE FLOW=120CFS, BANKFULL FLOW=3,000CFS
4. SYSTEM SHALL BE ABLE TO REMOVE SOLIDS IN A HIGH FLOW CONDITION, 24 HOURS/DAY, FOR AN EXTENDED PERIOD OF TIME (ONE WEEK)

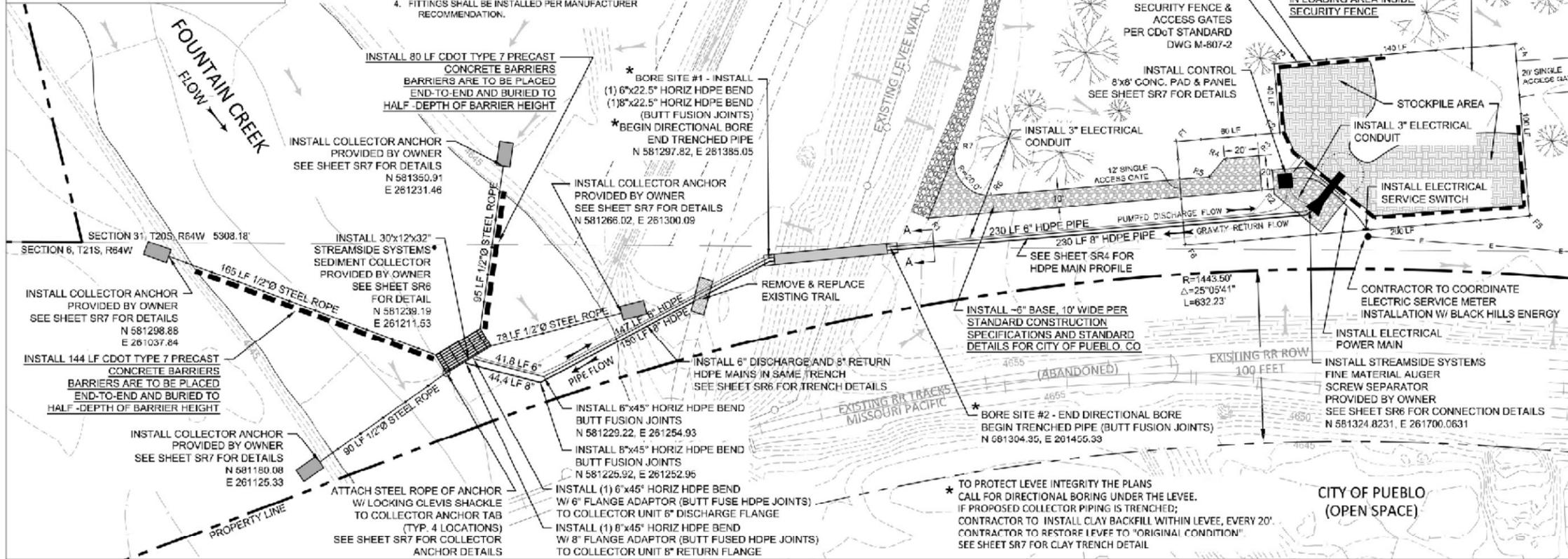
SEDIMENT REMOVAL/COLLECTION AND SEPARATOR EQUIPMENT SHALL MEET THE FOLLOWING EQUIPMENT REQUIREMENTS:

5. COLLECTOR SHALL BE 30"x12"x32", HIGH CAPACITY, AND FABRICATED OF URETHANE COATED, WELDED MILD STEEL.
6. THERE SHALL BE INTEGRAL SUBMERSIBLE PUMP MOUNTING.
7. THERE SHALL BE FOUR (4) INTEGRAL LIFTING POINTS.
8. THERE SHALL BE FOUR (4) EXTERNAL ANCHOR POINTS.
9. THERE SHALL BE TWELVE (12) LARGE CAPACITY HOPPERS.
10. THERE SHALL BE TWELVE (12) INTEGRAL URETHANE SUCTION ORIFICES (REPLACEABLE).
11. THERE SHALL BE TWELVE (12) INTEGRAL URETHANE INJECTION ORIFICES (REPLACEABLE).
12. THERE SHALL BE 6" HDPE DISCHARGE CONNECTION AND 8" RETURN FLOW CONNECTION.
13. THERE SHALL BE SIX (6) 20"x5" STAINLESS STEEL GRATE SECTIONS W/ 3/8" GAPS.
14. THERE SHALL BE URETHANE WEAR COATING ON THE UPSTREAM RAMP.
15. MAIN COLLECTOR PUMP SHALL BE RATED AT 460/360 AT 160 AMPS. THE FINE MATERIAL WASHER SEPARATOR SHALL BE RATED AT 460/260 AT 40 AMPS.
16. PRIOR TO PROJECT COMPLETION A TEST RUN SHALL BE PERFORMED. COLLECTOR SHALL BE OPERATED UNTIL 300CY OF SEDIMENT HAS BEEN REMOVED. CONTRACTOR SHALL BE RESPONSIBLE FOR MONITORING:
  1. CHANNEL CUT
  2. TIME TO REMOVE TEST AMOUNT
  3. OVERALL OPERATION OF THE COLLECTOR

MONITORING DATA SHALL BE SUPPLIED TO THE OWNER PRIOR TO COMMENCEMENT OF SEDIMENT REMOVAL OPERATIONS.

**DISCHARGE AND RETURN FLOW PIPING REQUIREMENTS:**

1. HDPE PIPING SHALL BE PRESSURE RATED TO PE 4710 DR11
2. ALL HDPE PIPING SHALL BE INSTALLED PER CHAPTER 9 OF THE "COLORADO SPRINGS UTILITIES LINE EXTENSION AND SERVICE STANDARDS, 2010"
3. PIPE SHALL BE SMOOTH
4. FITTINGS SHALL BE INSTALLED PER MANUFACTURER RECOMMENDATION.



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT**

**SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT**

PUEBLO, COLORADO

**associates inc.**  
 2363 South Peoria Street, Ste 101  
 Aurora, Colorado 80014  
 303.770.7261 FAX 770.7132

**Matrix Design Group, Inc.**  
 Integrated Design Solutions  
 800 North Meade Street  
 Pueblo, CO 81004  
 Phone: 719.246.0100  
 Fax: 719.246.0100

**REVISIONS:**

NO.	DATE	DESCRIPTION

**DATE: Mar. 15, 2011**

**JOB No.: 6880-000**

**SR3-SITE PLAN**

**SHEET 14 OF 18**



**NOTES:**

SITE IS LOCATED IN SECTION 31, TOWNSHIP 20S, RANGE 64W, 6TH PRIME MERIDIAN, PUEBLO COUNTY, COLORADO. PROPERTY IS OWNED BY THE CITY OF PUEBLO.

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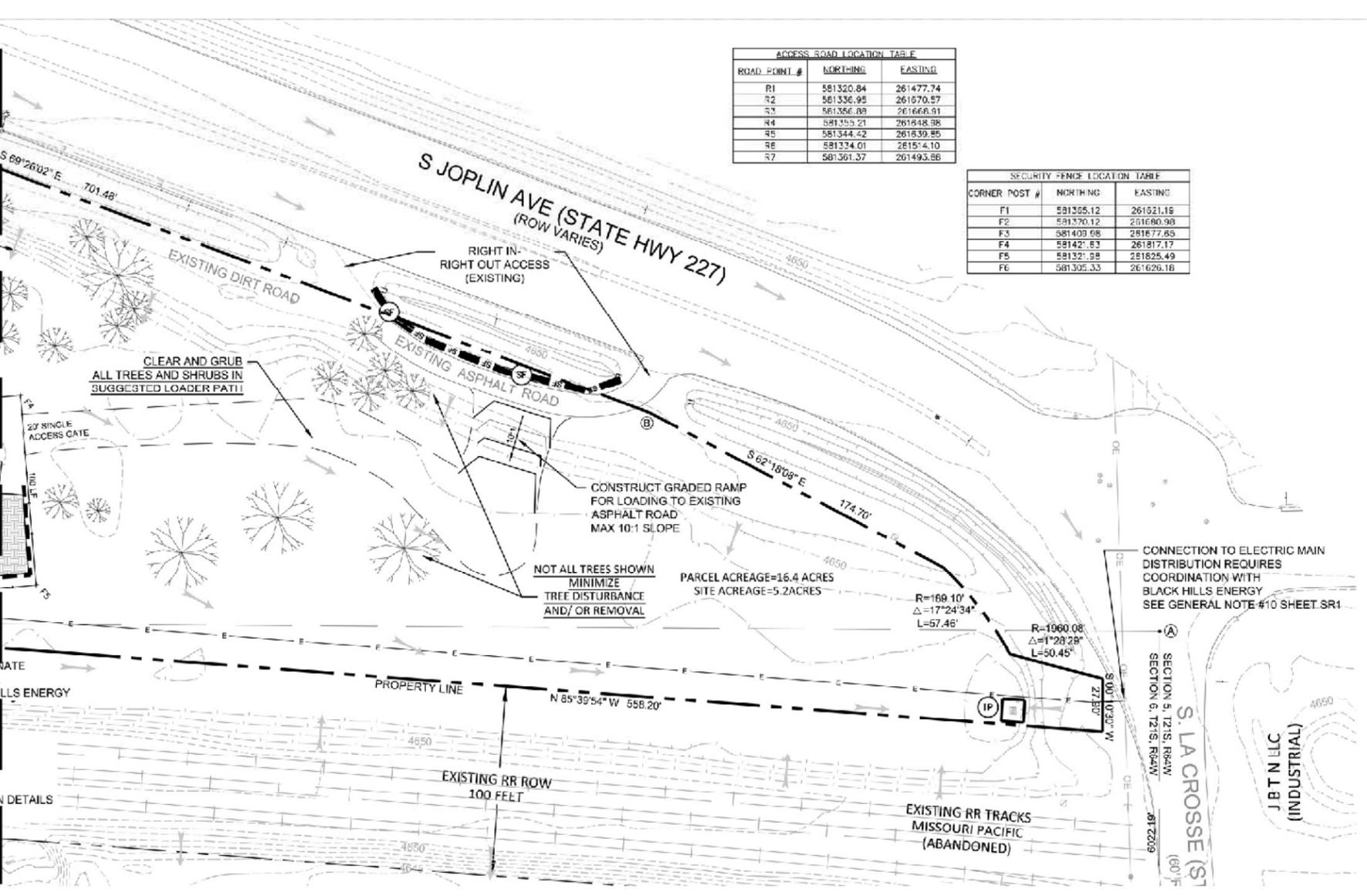
ANTICIPATED START DATE: 04/01/2011  
ANTICIPATED COMPLETION DATE: 04/15/2011

SEE SHEET SR5 FOR NPDES NOTES

- Ⓢ INDICATES A FOUND CONCRETE MONUMENT WITH LEAD AND TACK
- Ⓣ INDICATES REMAINS OF CONCRETE MONUMENT
- Ⓤ INDICATES A SET #S REBAR WITH ALUMINUM CAP STAMPED "MATRIX PLS 34877"

UNDERLINED INSTALLATION CALLOUTS ON SITE PLAN SHEETS INDICATES CITY OF PUEBLO TO PROVIDE AND ARE NOT IN CONTRACT

**NOTE:**  
RESEED ALL DISTURBED AREAS WITH APPROVED CITY OF PUEBLO SEED MIX.



**ACCESS ROAD LOCATION TABLE**

ROAD POINT #	NORTHING	EASTING
R1	581320.84	261477.74
R2	581336.95	261570.57
R3	581356.88	261668.91
R4	581355.21	261648.98
R5	581344.42	261639.85
R6	581334.01	26154.10
R7	581361.37	261493.86

**SECURITY FENCE LOCATION TABLE**

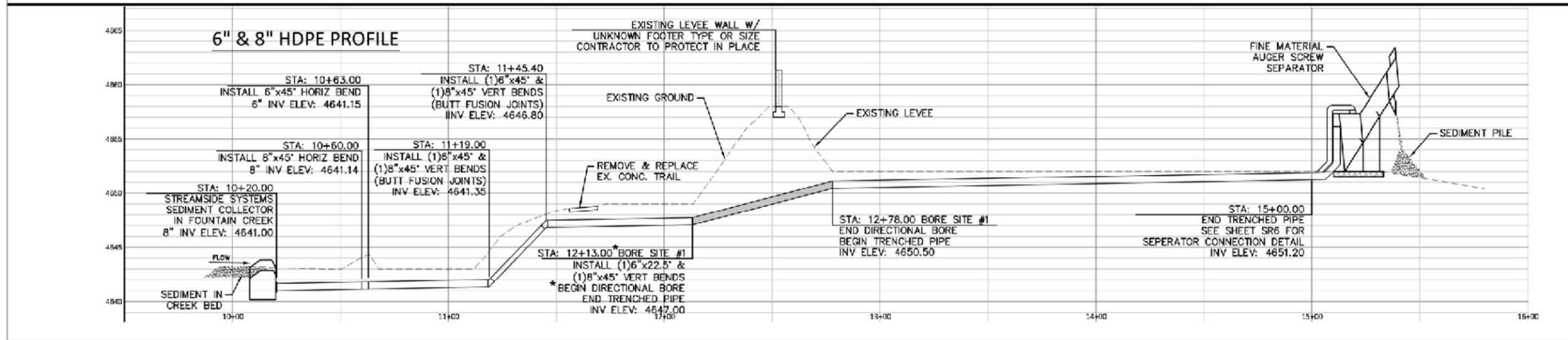
CORNER POST #	NORTHING	EASTING
F1	581355.12	261521.19
F2	581370.12	251680.98
F3	581409.98	251677.65
F4	581421.83	261817.17
F5	581321.98	251825.49
F6	581305.33	261626.18



**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT**

**SIDE DETENTION AND SEDIMENT REMOVAL DEMONSTRATION PROJECT**

PUEBLO, COLORADO



**associates inc.**  
2953 South Prairie Street, Ste 101  
Aurora, Colorado 80014  
303-773-7261 FAX: 773-7132

**Matrix Design Group, Inc.**  
2010 S. W. 10th St., Suite 207  
Tampa, FL 33606  
Phone: 813-888-3338  
Fax: 813-888-3338

**REVISIONS:**


**DATE: Mar. 15, 2011**

**JOB No.: 6880-000**

**SR4-SITE PLAN SHEET 15 OF 18**



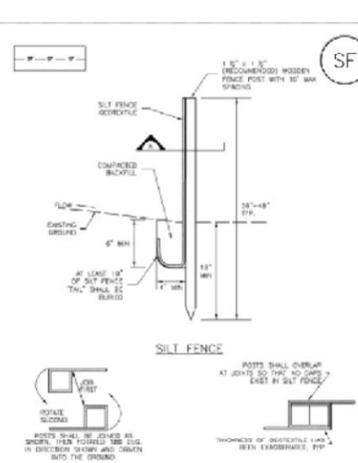
**NOTES:**

ALL DETAIL SHOWN HEREON CONFORM TO CRITERIA PERTAINING TO "STORM DRAINAGE DESIGN CRITERIA AND DRAINAGE POLICIES FOR CITY OF PUEBLO, COLORADO".

DOCUMENT REFERS TO UDFCD, DCM, VOLUME 3.

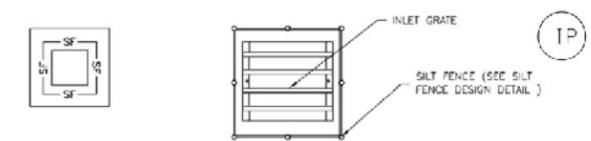
**NPDES NOTES**

1. THE CONTRACTOR SHALL REMOVE ALL SEDIMENT, MUD, AND CONSTRUCTION DEBRIS THAT MAY ACCUMULATE IN THE FLOWLINES AND PUBLIC RIGHTS OF WAY AS A RESULT OF THIS CONSTRUCTION PROJECT. SAID REMOVAL SHALL BE CONDUCTED IN A TIMELY MANNER, OR AS DIRECTED BY THE ENGINEER.
2. THIS CONSTRUCTION ACTIVITIES STORMWATER MANAGEMENT PLAN HAS BEEN SUBMITTED AS PART OF AN APPLICATION FOR AN EROSION AND SEDIMENT CONTROL PERMIT FILED WITH THE CITY OF COLORADO SPRINGS. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED OF THE CONTRACTOR DUE TO UNFORSEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT FUNCTION AS INTENDED. THE REQUIREMENTS OF THIS PLAN SHALL BE THE OBLIGATION OF THE LAND OWNER AND/OR HIS SUCCESSORS OR HEIRS, UNTIL SUCH TIME AS THE PLAN IS PROPERLY COMPLETED, MODIFIED, OR VOIDED.
3. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR REMEDIATION OF ANY ADVERSE IMPACTS TO ADJACENT WATERWAYS, WETLANDS, ETC., RESULTING FROM WORK DONE AS PART OF THIS PROJECT.
4. THE CONTRACTOR SHALL PREVENT SEDIMENT, DEBRIS AND ALL OTHER POLLUTANTS FROM ENTERING THE STORM SEWER SYSTEM DURING ALL DEMOLITION, EXCAVATION, TRENCHING, BORING, GRADING OR OTHER CONSTRUCTION OPERATIONS THAT ARE PART OF THIS PROJECT.
5. A LAYER OF SUITABLE MULCH SHALL BE APPLIED TO ALL DISTURBED PORTIONS OF THE SITE WITHIN 7 DAYS OF THE COMPLETION OF GRADING. SAID MULCH SHALL BE APPLIED AT A RATE OF 2 TONS PER ACRE AND SHALL BE TACKED OR FASTENED BY AN APPROVED METHOD SUITABLE FOR THE TYPE OF MULCH USED. ROUGH-OUT STREETS SHALL BE MULCHED UNLESS A LAYER OF AGGREGATE ROAD BASE OR ASPHALT PAVING IS TO BE APPLIED TO SAID ROUGH-OUT STREETS WITHIN THE 21 DAY PERIOD AFTER COMPLETION OF OVERLOT GRADING.
6. THE CONTRACTOR SHALL LOCATE, INSTALL, AND MAINTAIN ALL EROSION CONTROL AND WATER QUALITY "BEST MANAGEMENT PRACTICES" AS INDICATED IN THE APPROVED CONSTRUCTION ACTIVITIES STORMWATER MANAGEMENT PLAN. BMP'S SHALL BE MAINTAINED AND KEPT IN GOOD REPAIR FOR THE DURATION OF THIS PROJECT.
7. AT A MINIMUM, THE CONTRACTOR SHALL INSPECT ALL BMP'S WEEKLY AND AFTER SIGNIFICANT PRECIPITATION EVENTS. ALL NECESSARY MAINTENANCE AND REPAIR SHALL BE COMPLETED IN A TIMELY MANNER. ACCUMULATED SEDIMENT AND DEBRIS SHALL BE REMOVED FROM A BMP WHEN THE SEDIMENT LEVEL REACHES ONE-HALF THE HEIGHT OF THE BMP, OR, AT ANY TIME THAT SEDIMENT OR DEBRIS ADVERSELY IMPACTS THE FUNCTIONING OF THE BMP.
8. THE CONTRACTOR SHALL PROPERLY COVER ALL LOADS OF CUT AND FILL MATERIAL IMPORTED TO OR EXPORTED FROM THIS SITE TO PREVENT LOSS OF THE MATERIAL DURING TRANSPORT WITHIN PUBLIC RIGHTS OF WAY.
9. THE USE OF REBAR, STEEL STAKES, OR STEEL FENCE POSTS TO STAKE DOWN STRAW OR HAY BALES, OR TO SUPPORT SILT FENCING USED AS AN EROSION CONTROL MEASURE, IS PROHIBITED. THE USE OF OSHA APPROVED COLORED WARNING CAPS ON REBAR OR FENCE POSTS USED WITH EROSION CONTROL MEASURES IS NOT ACCEPTABLE.



- SILT FENCE INSTALLATION NOTES**
1. SILT FENCE MUST BE PLACED AWAY FROM THE TOE OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVERAL FEET (2-5 FT) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.
  2. A UNIFORM 6" X 4" ANCHOR TRENCH SHALL BE EXCAVATED USING TRENCHER OR SILT FENCE INSTALLATION DEVICE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.
  3. CONTRACT ANCHOR TRENCH BY HAND WITH A "JUMPING JACK" OR BY WHEEL ROLLING. CONTRACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING FILLED W/ET OF ANCHOR TRENCH BY HAND.
  4. SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE SAG BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.
  5. SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1" HEAVY DUTY STAPLES OR NAILS WITH 1" HEADS. STAPLES AND NAILS SHOULD BE PLACED 3' ALONG THE FABRIC DOWN THE STAKE.
  6. AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J-HOOK." THE "J-HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10' - 20').
  7. SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
- SILT FENCE MAINTENANCE NOTES**
1. INSPECT BMP'S EACH WEEKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMP'S SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMP'S AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
  2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMP'S IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
  3. WHERE BMP'S HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
  4. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6".
  5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.
  6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.
  7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.
- (DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, NOT AVAILABLE IN ADOBE)
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

SECTION A  
SF-1. SILT FENCE



IP-4. SILT FENCE FOR SUMP INLET PROTECTION

- SILT FENCE INLET PROTECTION INSTALLATION NOTES**
1. SEE SILT FENCE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
  2. POSTS SHALL BE PLACED AT EACH CORNER OF THE INLET AND AROUND THE EDGES AT A MAXIMUM SPACING OF 3 FEET.
  3. STRAW MATS/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF SILT FENCE FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.

**FOUNTAIN CREEK WATERSHED, FLOOD CONTROL AND GREENWAY DISTRICT**

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**PUEBLO, COLORADO**

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Fax: 719-542-0388

**REVISIONS:**


**DATE: Mar. 15, 2011**

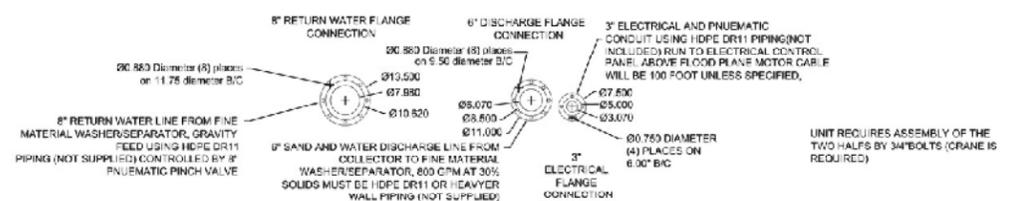
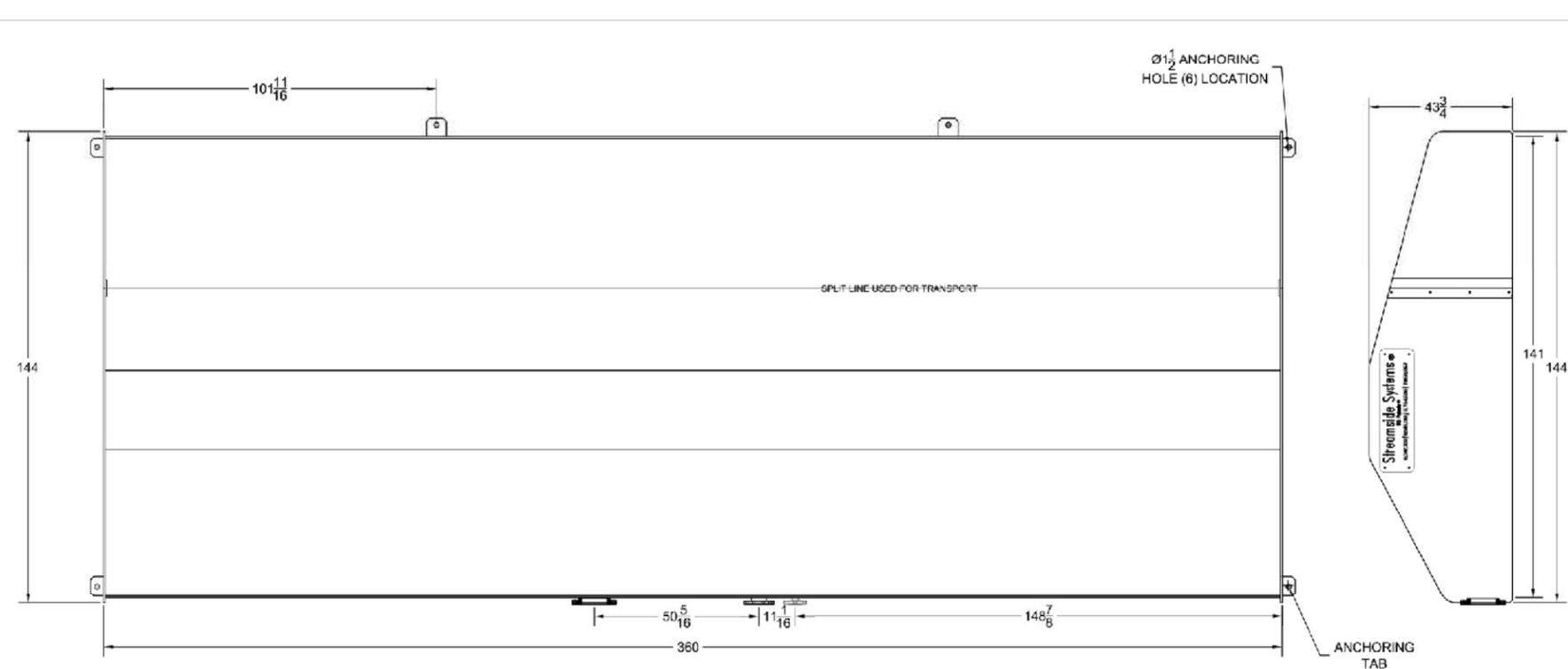
**JOB No.: 6880-000**

**SR5-EC DETAILS**

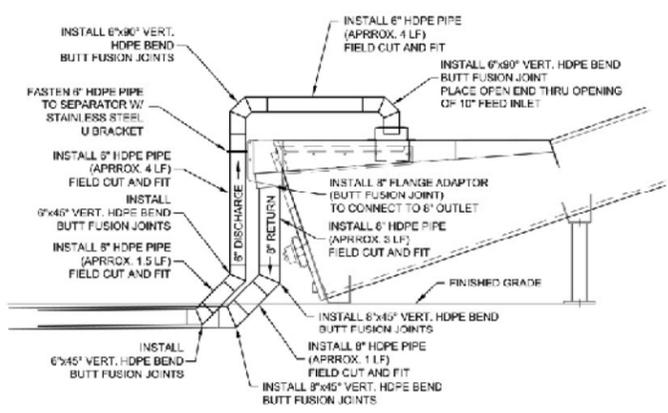
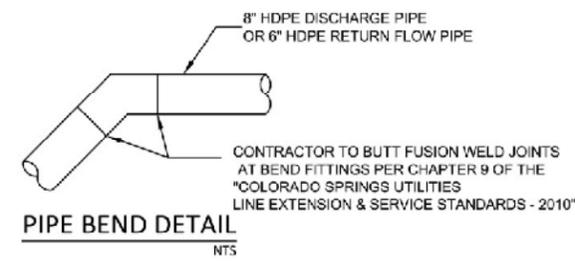
**SHEET 16 OF 18**



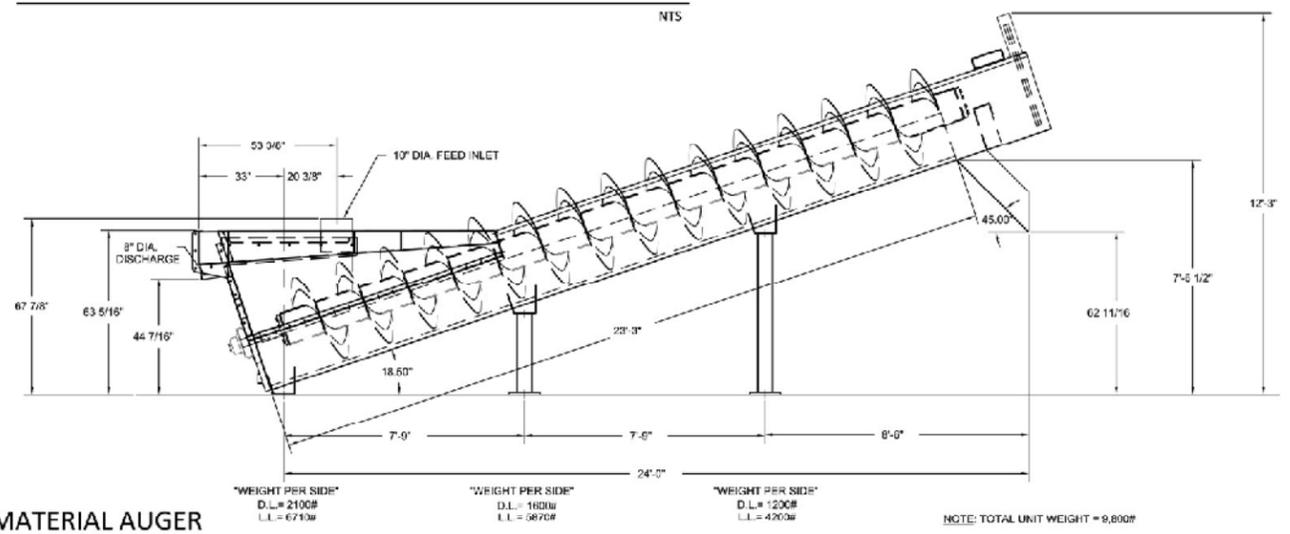
**NOTES:**



**STREAMSIDE SYSTEMS  
COLLECTOR INSTALLATION & PIPE CONNECTION DETAILS**  
NTS



**STREAMSIDE SYSTEMS FINE MATERIAL AUGER  
SCREW SEPARATOR INSTALLATION & PIPE CONNECTION DETAILS**  
NTS



**FOUNTAIN CREEK WATERSHED, FLOOD  
CONTROL AND GREENWAY DISTRICT  
SIDE DETENTION AND SEDIMENT REMOVAL  
DEMONSTRATION PROJECT**

PUEBLO, COLORADO

**associates inc.**  
2363 South Peoria Street, Ste 101  
Aurora, Colorado 80014  
303-776-7261 FAX 773-7132

**Matrix Design Group, Inc.**  
Integrative Design Solutions  
171 New York Ave., Ste. 100  
Pueblo, CO 81001  
Phone: 719-246-2100  
Fax: 719-239-0028

**REVISIONS:**


**DATE: Mar. 15, 2011**  
**JOB No.: 6880-000**  
**SR6-PC DETAILS**  
**SHEET 17 OF 18**



**A.3. Fish Passage Construction Documents**



Colorado Springs Utilities  
It's how we're all connected

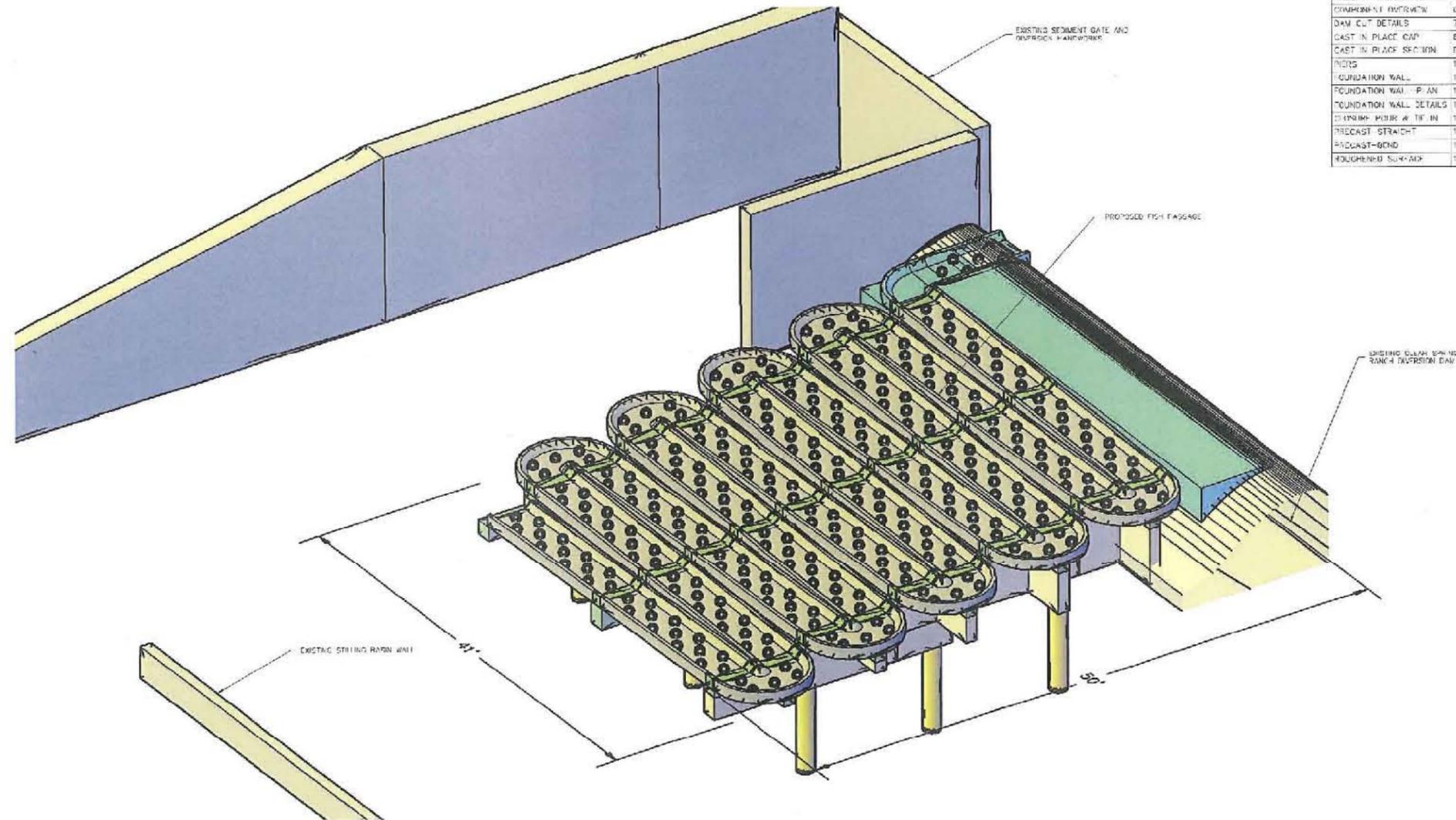
**WASTEWATER SERVICES DIVISION  
PLANNING AND DESIGN**

Approved for Construction

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Colorado Springs Utilities

**CLEAR SPRINGS RANCH  
DIVERSION DAM  
FISH PASSAGE**

SHEET INDEX	
SHEET TITLE	SHEET NUMBER
COVER	1
NOTES	2
LOCATION MAP	3
EXISTING CONDITIONS	4
PASSAGE PLAN VIEW	5
COMBINATION ENTIREVIEW	6
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CAST IN PLACE CAP	8
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FOUNDATION WALL	11
FOUNDATION WALL - PLAN	12
FOUNDATION WALL DETAILS	13
DYKING PIER & TIE IN	14
PRECAST STRAIGHT	15
PRECAST-BEND	16
ROUGHENED SURFACE	17



DATE STARTED

DATE COMPLETED

DESIGNED BY

CHECKED BY

CONTRACTOR

**CLEAR SPRINGS RANCH  
DIVERSION DAM  
FISH PASSAGE**

PROJECT RELATED INFORMATION

AREA WORK ORDER NUMBER: 411

PROJECT NUMBER: 411

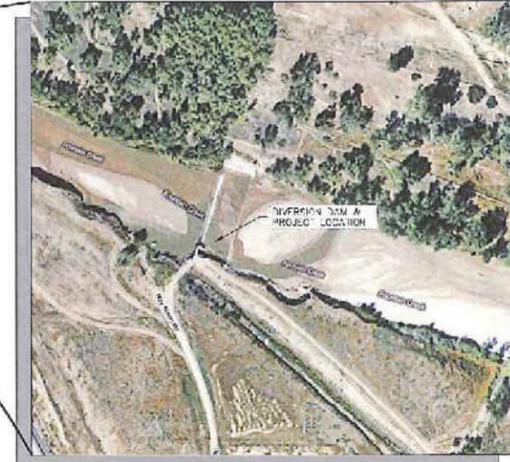
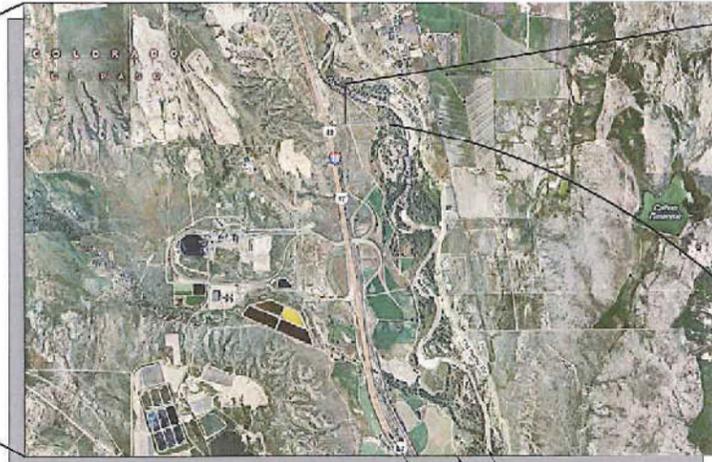
THIS DRAWING IS THE PROPERTY OF CLEAR SPRINGS UTILITIES. IT IS TO BE USED ONLY FOR THE PROJECT AND LOCATION SPECIFICALLY IDENTIFIED HEREON. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.

SHEET NO. 1 OF 17

NETWORK LOCATION & DRAWING TITLE:  
CLEAR SPRINGS RANCH DIVERSION DAM FISH PASSAGE

REVISIONS





CLEAR SPRINGS RANCH

FOUNTAIN CREEK  
RAY NIXON RD.

**VICINITY MAP**

**TARGETED FISH SPECIES**

ARKANSAS DARTER (STATE THREATENED)

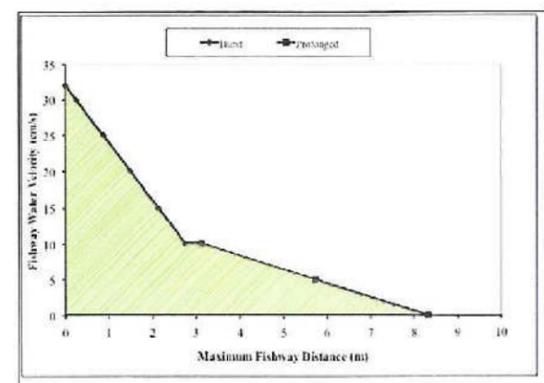


Figure 5. — Maximum allowable distances between velocity refuges and water velocities for Arkansas darters swimming at burst and prolonged speeds at 17.5°C. The observed median for endurance at 16 cm/s was used to construct the prolonged swimming portion of the curve, and the regression equation prediction for 32 cm/s was used to construct the burst swimming portion of the curve (see results for details). The sustained swimming portion of this curve was omitted in order to retain some resolution at the burst speed scale. Any combination of distance between velocity refuges and water velocity under the curve is acceptable for allowing Arkansas darter passage.

FLATHEAD CHUB (STATE SPECIAL CONCERN)

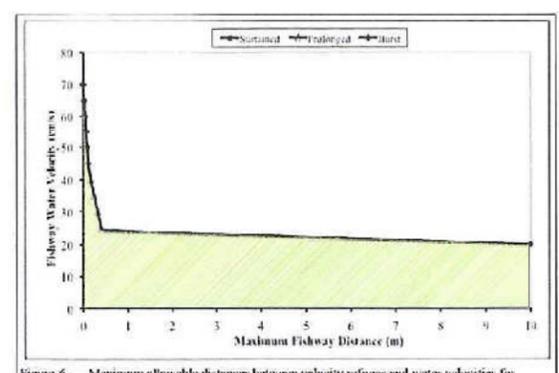
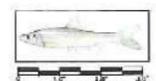
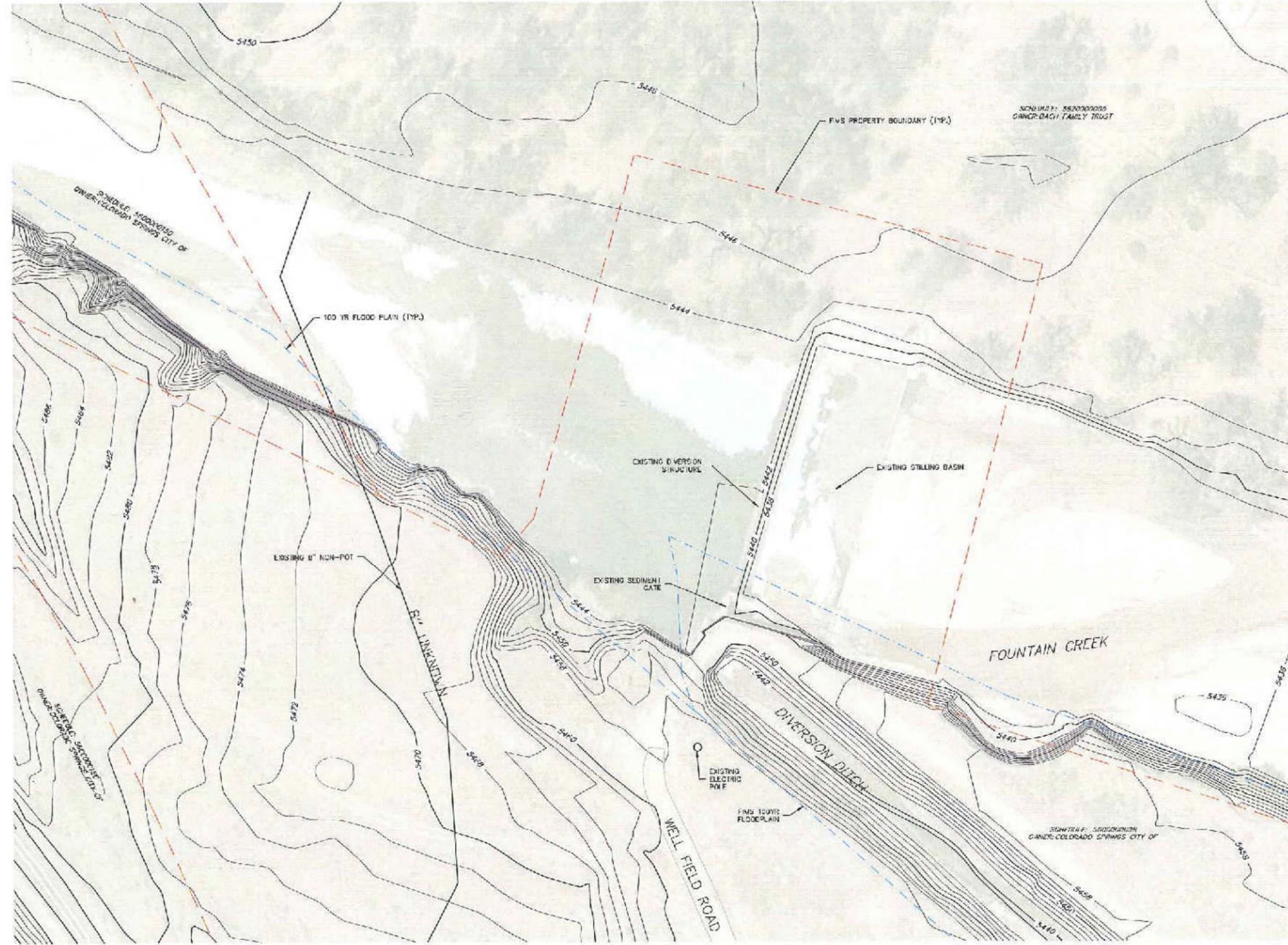


Figure 6. — Maximum allowable distances between velocity refuges and water velocities for flathead chub swimming at burst, sustained, and prolonged speeds at 10°C. Observed medians were used to construct the curve. Any combination of distance between velocity refuges and water velocity under the curve is acceptable for allowing flathead chub passage.

**RECOMMENDED DESIGN CRITERIA**  
30 cm/sec WITH 0.2 m REST INTERVALS  
(0.98 ft/sec WITH 7.9 in REST INTERVALS)

FROM THE REPORT: "SWIMMING PERFORMANCE OF TWO FOUNTAIN CREEK FISHES: IMPLICATIONS FOR FISHWAY DESIGN AT THE CLEAR SPRINGS DIVERSION", ASHLEY D. FICKE M.S. AND CHRISTOPHER A. MYRICK, PH.D. JANUARY 2010

PROJECT RELATED INFORMATION		GENERAL NOTES AND MATERIALS	
DATE STARTED:	NO. D.I.T. VOLUMES:	<b>CLEAR SPRINGS RANCH DIVERSION DAM FISH PASSAGE</b> W/ (size & material) W.L.	GENERAL NOTES AND MATERIALS
DATE COMPLETED:			
DESIGNER:			
INSPECTOR:			
CONTRACTOR:			
PARENT WORK ORDER NUMBER: VALUE			
PROJECT NUMBER: VALUE			
DWG. NO. VALUE			
SHEET NO. 3 OF 17			
NETWORK LOCATION & DRAWING TITLE			
C:\P\WORK\ASSOC\Clear Springs Ranch\Project\Drawings\REGIONS\CB-02.dwg			
3/25/2008			



1 EXISTING CONDITIONS: PLAN VIEW  
Scale: 1" = 40'



(PROJECT RELATED INFORMATION)

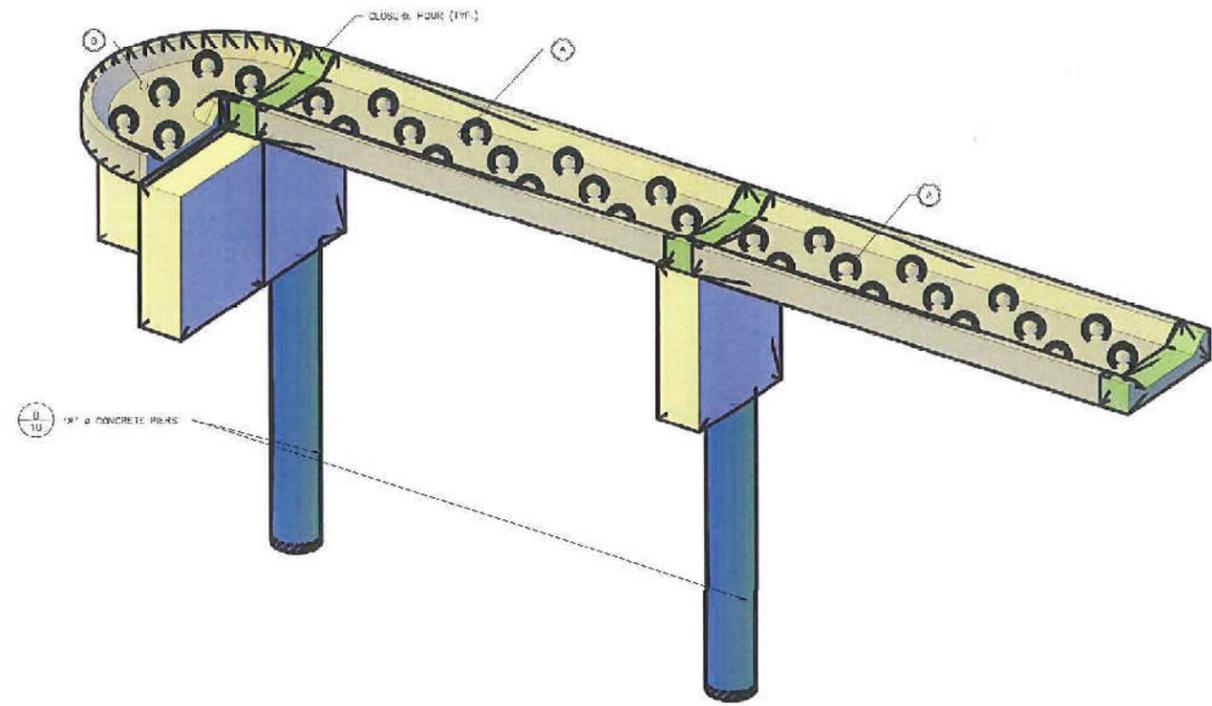
PARENT WORK ORDER NUMBER	VALUE
PROJECT NUMBER	VALUE
FMS MAP NUMBER	VALUE
SHEET NO.	4 OF 17
DATE WORK LOGGED & DRAWN	DATE
DESIGNED BY	NAME
CHECKED BY	NAME
APPROVED BY	NAME

**CLEAR SPRINGS RANCH  
DIVERSION DAM  
FISH PASSAGE**

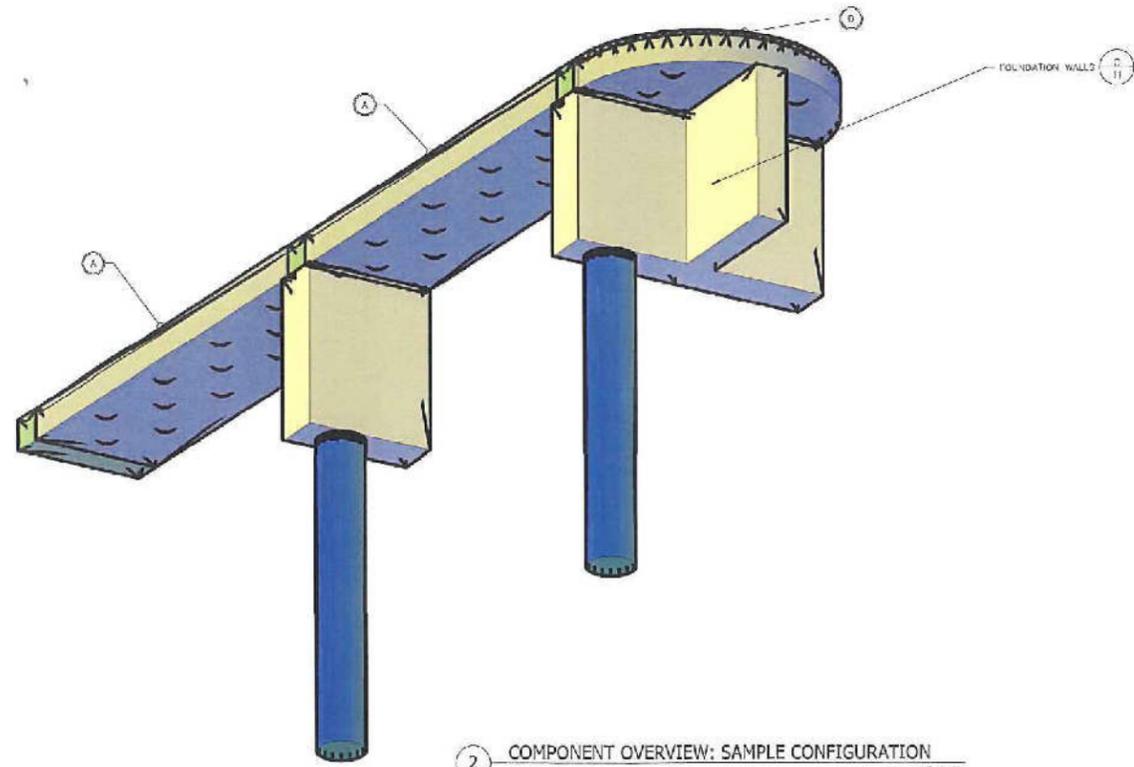
EXISTING CONDITIONS

DATE STARTED	
DATE COMPLETED	
FORFEIT	
INSPECTOR	
CONTRACTOR	





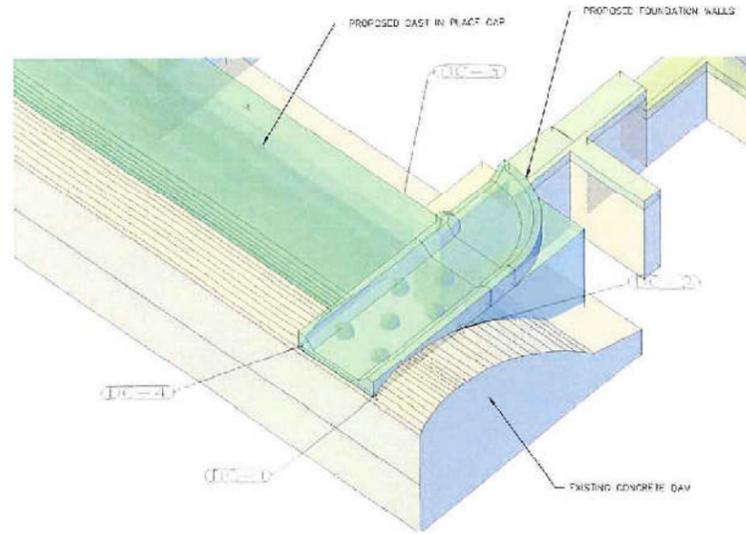
1 COMPONENT OVERVIEW: SAMPLE CONFIGURATION TOP VIEW  
Scale: NA



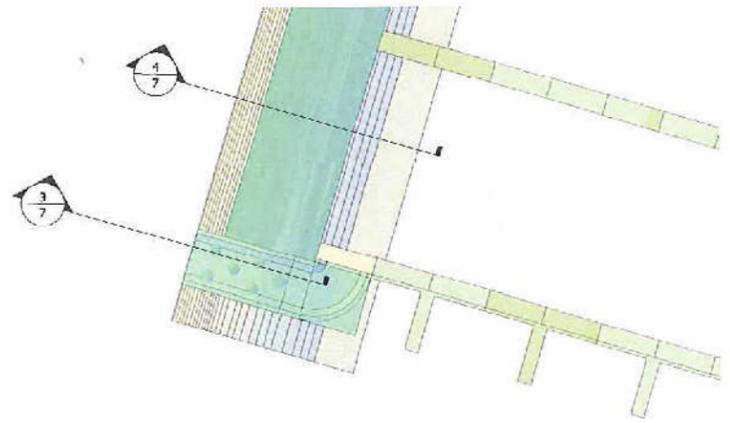
2 COMPONENT OVERVIEW: SAMPLE CONFIGURATION  
Scale: NA

BAR	NAME	DETAIL SHEET
1	STRAIGHT SECTION	SHEET 16
2	180° BEND SECTION	SHEET 16

<p>PROJECT REVISION INFORMATION:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>EXISTING WORK CHECK NUMBER:</td> <td>VALUE</td> </tr> <tr> <td>PROJECT NUMBER:</td> <td>VALUE</td> </tr> <tr> <td>DATE:</td> <td>VALUE</td> </tr> <tr> <td>SHEET NO.:</td> <td>3 OF 17</td> </tr> </table> <p>NETWORK: LOCA 104 &amp; 104A/103 TIE          PROJECT: WPPSS/Clear Springs Ranch Project, WISCONSIN          REVISION: 001-001-001-001-001-001          REVISIONS:</p>	EXISTING WORK CHECK NUMBER:	VALUE	PROJECT NUMBER:	VALUE	DATE:	VALUE	SHEET NO.:	3 OF 17	<p style="text-align: center;">CLEAR SPRINGS RANCH          DIVERSION DAM          FISH PASSAGE</p> <p style="text-align: center;">COMPONENT OVERVIEW</p>
EXISTING WORK CHECK NUMBER:	VALUE								
PROJECT NUMBER:	VALUE								
DATE:	VALUE								
SHEET NO.:	3 OF 17								
<p>DATE STARTED:</p> <p>DATE COMPLETED:</p> <p>FORMER:</p> <p>INSPECTOR:</p> <p>CONTRACTOR:</p>	<p>AS BUILT INFORMATION:</p>								

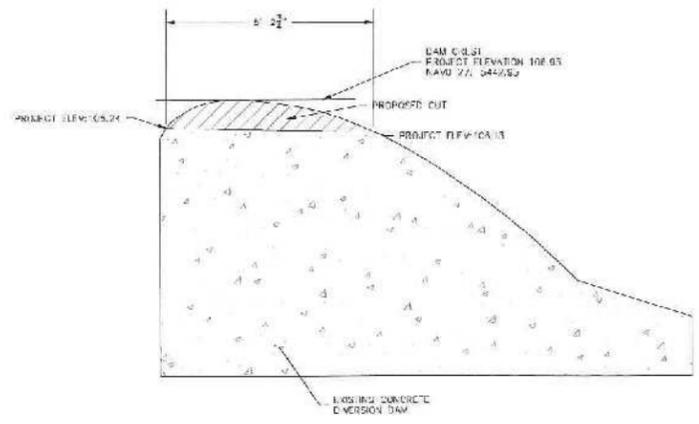


**B** DAM CUT DETAILS: MODEL VIEW  
Scale: 1/4"

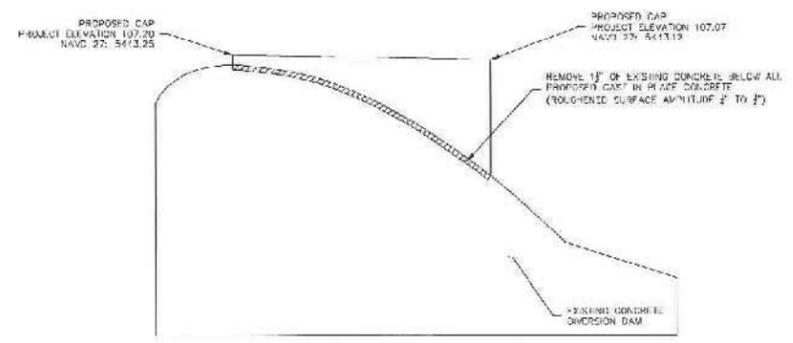


**2** DAM CUT DETAILS: PLAN VIEW  
Scale: 1/4"

Point #	Elevation	Northing	Easting	Description
104	106.24	122.79	44.29	DC-4
101	106.24	118.28	41.11	DC-1
102	108.13	117.31	48.13	DC-2
103	108.13	121.31	49.29	DC-3



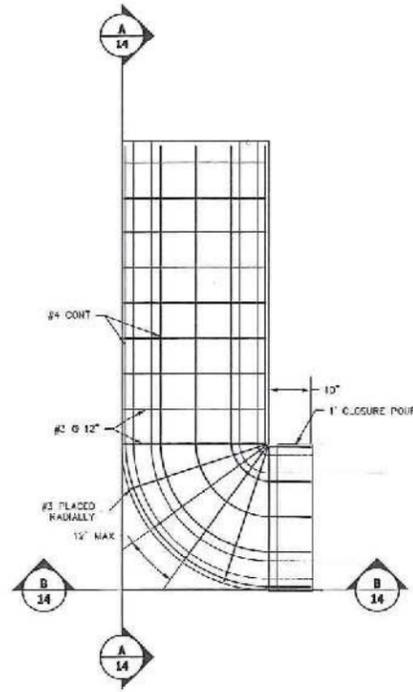
**3** DAM CUT DETAILS: SECTION VIEW  
Scale: -



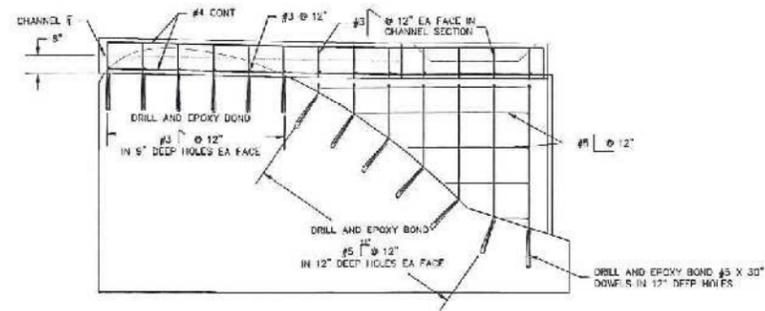
**4** DAM CUT DETAILS: CONCRETE REMOVAL SECTION VIEW  
Scale: -

[PROJECT RELATED INFORMATION]		[AS BUILT INFORMATION]	
PROJECT NUMBER: 0612	PROJECT TITLE: CLEAR SPRINGS RANCH DIVERSION DAM FISH PASSAGE	DATE STARTED:	DATE COMPLETED:
DRAWN BY: J. J. [REDACTED]	CHECKED BY: [REDACTED]	DESIGNED BY: [REDACTED]	CONTRACTOR: [REDACTED]
PROJECT RELATED INFORMATION		AS BUILT INFORMATION	
PROJECT NUMBER: 0612	PROJECT TITLE: CLEAR SPRINGS RANCH DIVERSION DAM FISH PASSAGE	DATE STARTED:	DATE COMPLETED:
DRAWN BY: J. J. [REDACTED]	CHECKED BY: [REDACTED]	DESIGNED BY: [REDACTED]	CONTRACTOR: [REDACTED]

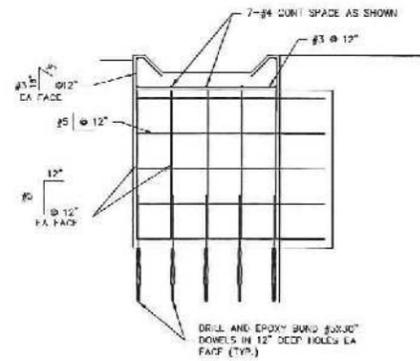




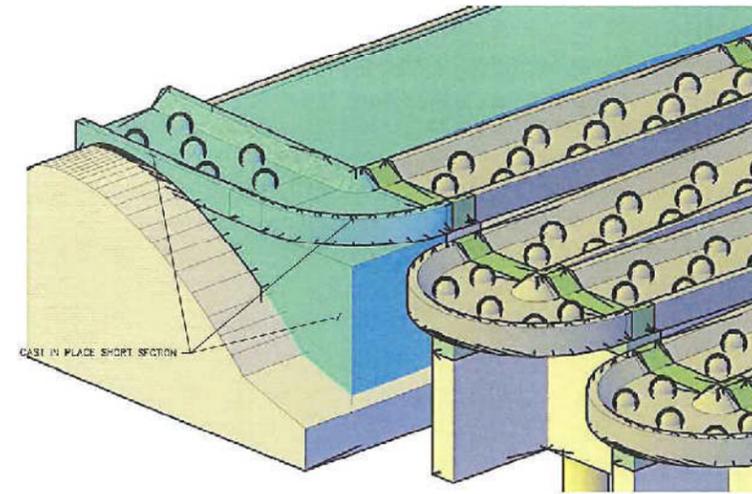
1 CAST IN PLACE CHANNEL (PLAN)  
Scale: 1/2"=1'



A CAST IN PLACE CHANNEL (SECTION A-A)  
Scale: 1/2"=1'



B CAST IN PLACE CHANNEL (SECTION B-B)  
Scale: 1/2"=1'



2 CAST IN PLACE CHANNEL (MODEL)  
Scale: N/A

(NO BUILT INFORMATION)

DATE STARTED: \_\_\_\_\_  
DATE COMPLETED: \_\_\_\_\_  
FORWARD: \_\_\_\_\_  
INSPECTOR: \_\_\_\_\_  
CONTRACTOR: \_\_\_\_\_

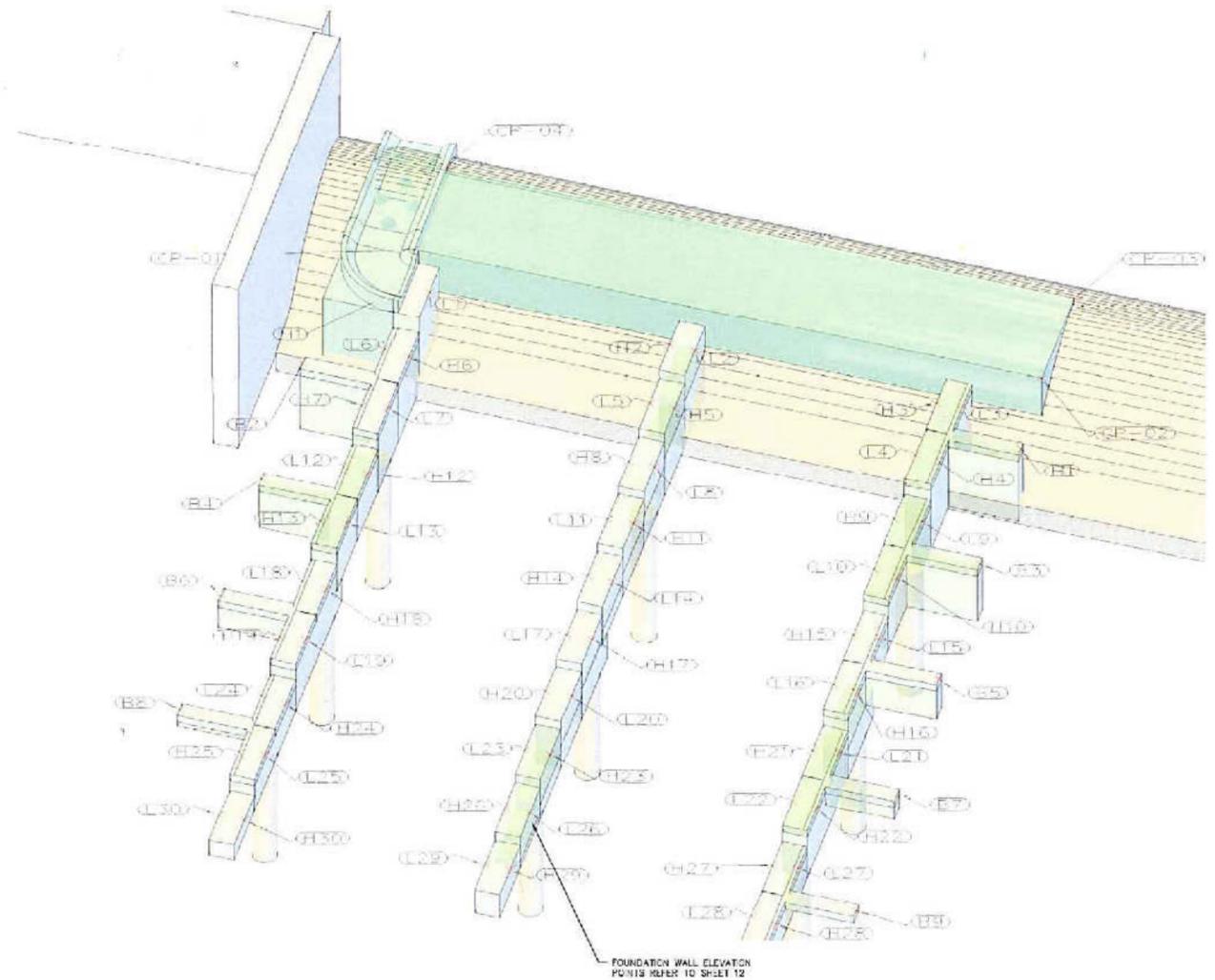
**CLEAR SPRINGS RANCH  
DIVERSION DAM  
FISH PASSAGE**

CAST IN PLACE SECTION

(PROJECT RELATED INFORMATION)

PROJECT NUMBER: VALUE \_\_\_\_\_  
PROJECT NAME: VALUE \_\_\_\_\_  
SHEET NO: 6 OF 17  
NETWORK LOCATION & DRAWING TITLE:  
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REVISED:





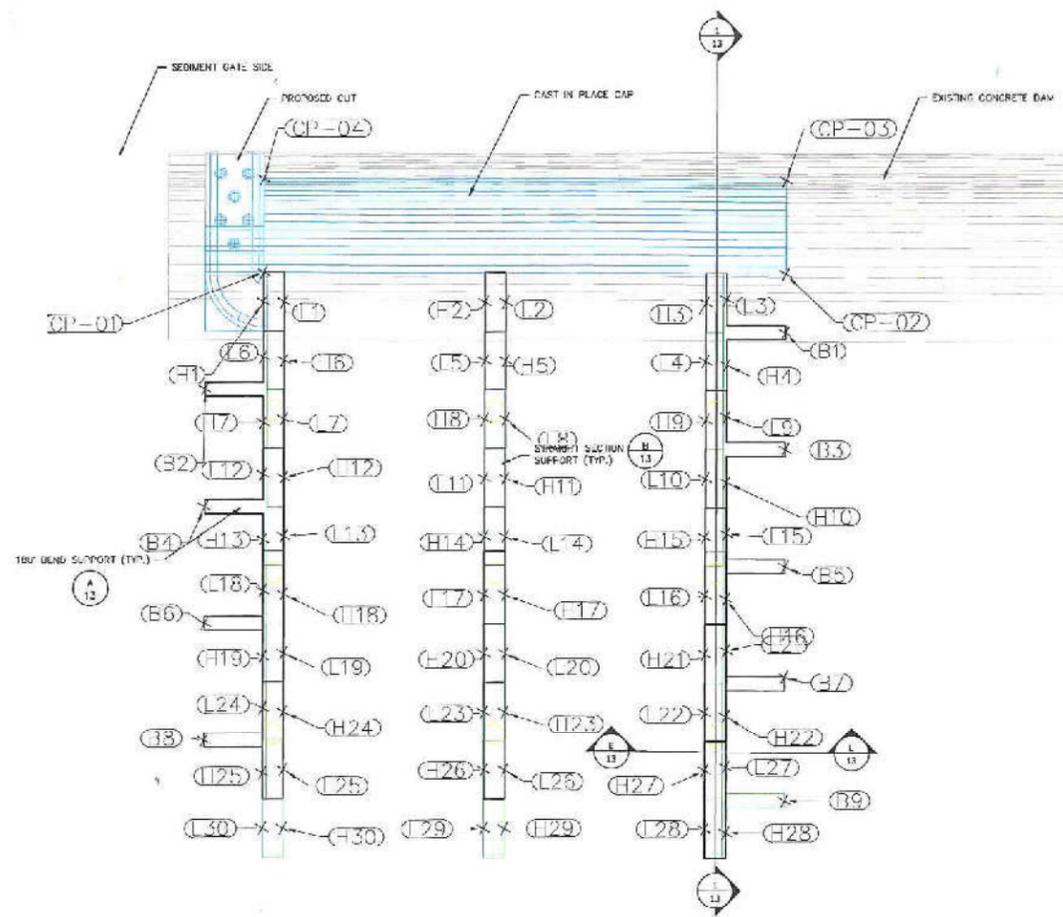
**C** FOUNDATION WALL: MODEL VIEW  
From: NA

FOUNDATION WALL ELEVATION  
 POINTS REFER TO SHEET 12

DATE STARTED:	AS BUILT (FORMATION)
DATE COMPLETED:	
FORCAMAN:	
INSPECTOR:	
CONTRACTOR:	

**CLEAR SPRINGS RANCH  
 DIVERSION DAM  
 FISH PASSAGE**  
 FOUNDATION WALL

PARENT WORK ORDER NUMBER: NA-12	PROJECT RELATED INFORMATION
PROJECT NUMBER: NA-12	
LINE AND VALUE	
SHEET NO: 11 OF 17	
NETWORK LOCATION & DRAWING TITLE	
US:VA:WATERWAYS:Clear Springs Dam:Project:PROJ:0000000000:RUELS:10/18/2011:SW-11:100	
REVISIONS:	



(C) FOUNDATION WALL PLAN VIEW  
SCALE: 1"=8'

Point #	Elevation	Northing	Eastng	Description
201	105.07	119.82	54.39	H11
202	103.04	121.25	54.81	L1
203	105.76	134.93	58.82	H2
204	105.73	136.37	59.24	L2
205	105.14	150.00	63.24	H3
206	105.41	151.55	63.42	L3
207	105.41	154.80	66.02	B1
208	105.41	150.25	67.90	H4
209	105.36	148.66	67.24	L4
210	105.10	135.20	63.24	H5
211	105.07	133.76	62.82	L5
212	104.76	120.09	58.81	H6
213	104.75	118.72	58.15	L6
214	104.75	114.08	59.23	B2
215	104.75	117.41	62.63	H7
216	104.73	118.02	62.81	L7
217	104.14	132.59	66.81	H8
218	104.41	131.03	67.24	L8
219	104.13	147.71	71.24	H9
220	104.10	149.22	71.42	L9

Point #	Elevation	Northing	Eastng	Description
261	100.15	140.89	55.23	H27
262	100.16	142.20	55.41	L27
66	107.07	120.40	52.19	CP-01
67	107.07	150.07	62.83	CP-02
68	107.20	157.94	56.49	CP-03
69	107.20	122.27	45.02	CP-04
207	95.83	124.40	94.81	L29
265	99.54	110.73	90.81	H30
267	93.51	109.20	87.34	L30
265	100.14	139.52	89.23	L28
264	100.16	143.89	89.89	H28
263	100.16	143.52	89.82	D9
266	96.86	125.84	55.23	H20

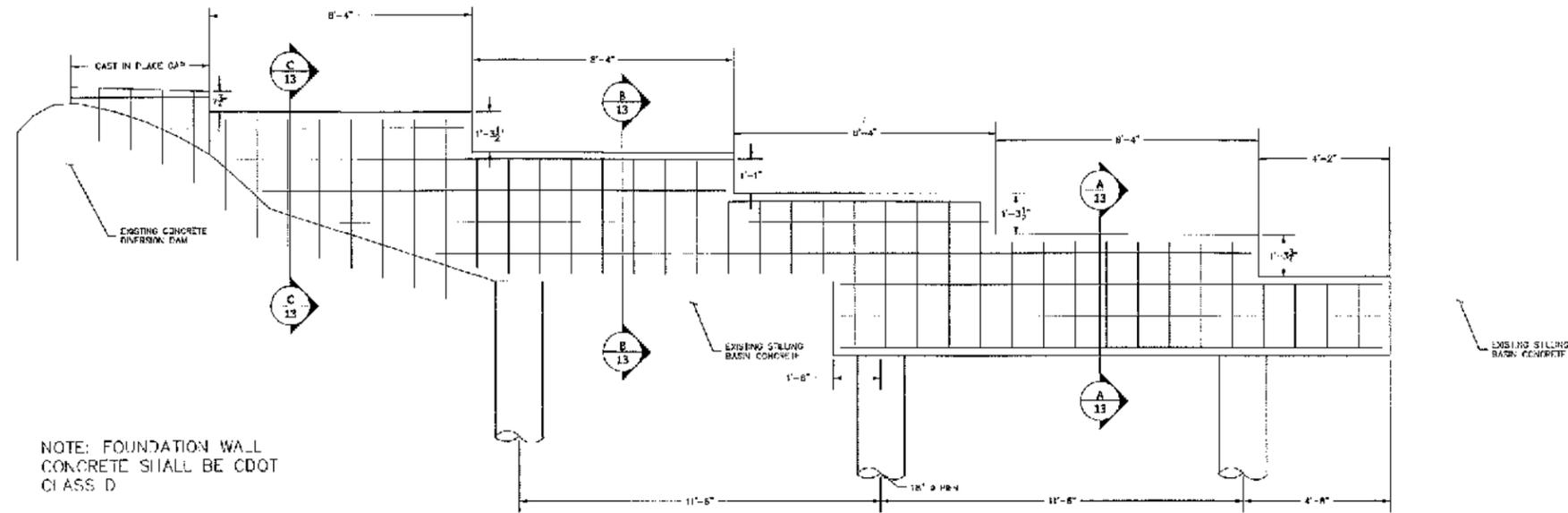
Point #	Elevation	Northing	Eastng	Description
221	104.10	152.54	74.82	B3
222	104.10	147.91	75.90	H10
223	104.07	146.54	75.74	L10
224	103.73	132.85	71.21	H11
225	103.75	131.42	70.81	L11
226	103.47	117.73	66.81	H12
227	103.44	116.30	66.15	L12
228	103.44	111.74	67.23	B4
229	103.44	115.07	70.63	H13
230	103.42	116.58	70.81	L13
231	103.13	130.25	74.81	H14
232	103.10	131.89	75.92	L14
233	102.82	140.37	78.24	H15
234	102.78	145.68	79.42	L15
235	102.79	150.20	82.82	B5
236	102.79	145.57	83.00	H16
237	102.76	144.20	83.23	L16
238	102.48	130.52	68.23	H17
239	102.45	129.06	78.61	L17
240	102.19	115.41	74.61	H16

Point #	Elevation	Northing	Eastng	Description
241	102.13	114.04	74.15	L18
242	102.13	109.40	75.22	B6
243	102.15	112.71	78.63	H19
244	102.11	114.24	78.81	L19
245	101.82	127.91	82.81	H20
246	101.78	129.35	83.22	L20
247	101.51	143.03	87.23	H21
248	101.48	144.54	87.41	L21
249	101.22	148.00	90.84	H7
250	101.16	143.23	91.69	H22
251	101.16	141.86	91.23	L22
252	101.17	128.18	87.23	H23
253	101.14	126.74	86.81	L23
254	100.85	113.07	82.81	H24
255	100.82	111.70	82.15	L24
256	100.82	107.06	83.22	B8
257	100.80	110.39	86.63	H25
258	100.80	111.80	86.81	L25
259	100.51	125.57	90.81	H26
260	100.43	127.01	91.23	L26

AS BUILT SURVEYING  
DATE SHEET:  
DATE COMPLETED:  
FORMAN:  
INSPECTOR:  
CONTRACTOR:

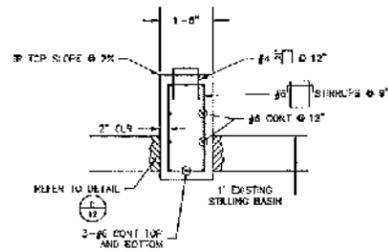
**CLEAR SPRINGS RANCH  
DIVERSION DAM  
FISH PASSAGE**  
**FOUNDATION WALL-PLAN**

PROJECT RELATED INFORMATION  
PROJECT WORK ORDER NUMBER: WA LF  
PROJECT NUMBER: WA LF  
TMS VAP: WA LF  
SHEET NO: 12 OF 17  
NETWORK LOCAL DATA & DRAWING TITLE: \\NETWORK\PROJECTS\CLEAR SPRING Ranch Project\Drawings\FOUNDATION WALL-PLAN-00.dwg  
REVISIONS:

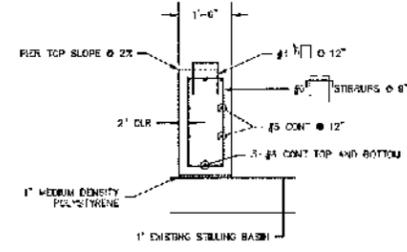


NOTE: FOUNDATION WALL CONCRETE SHALL BE CDOT CLASS D

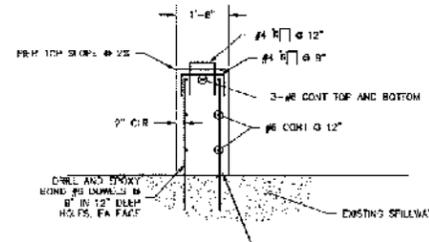
1 FOUNDATION WALL DETAILS: TYPICAL SECTION  
Scale: 1/2"=1'



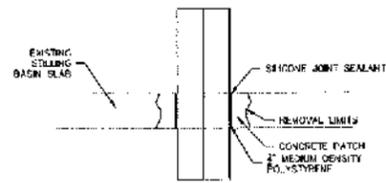
A FOUNDATION WALL DETAILS: SECTION A-A  
Scale: 1/2"=1'



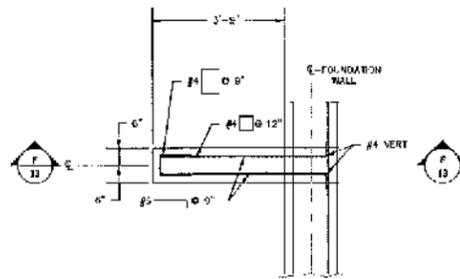
B FOUNDATION WALL DETAILS: SECTION B-B  
Scale: 1/2"=1'



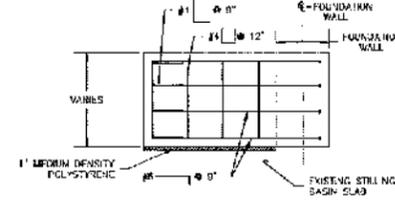
C FOUNDATION WALL DETAILS: SECTION C-C  
Scale: 1/2"=1'



D FOUNDATION WALL DETAILS: SECTION  
Scale: 1/2"=1'



E FOUNDATION WALL DETAILS: 180 BEND (PLAN)  
Scale: 1/2"=1'



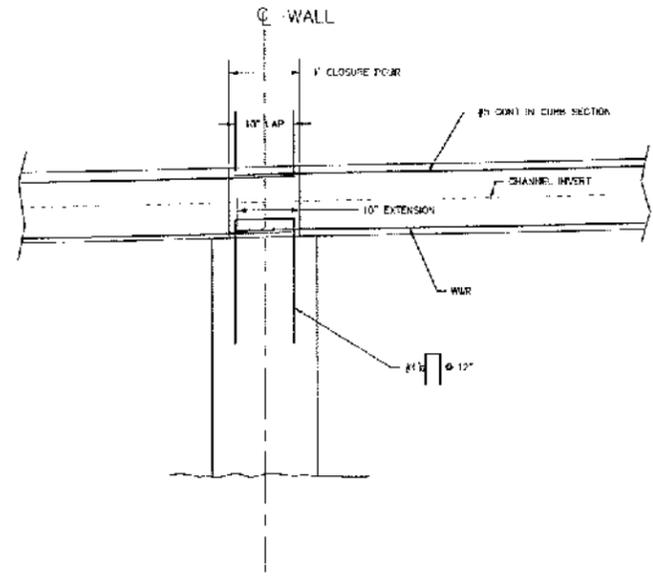
F FOUNDATION WALL DETAILS: 180 BEND (SECTION E-E)  
Scale: 1/2"=1'

DATE SHAFED:	(AS BUILT (B2/1/14/11))
DATE COMPLETED:	
DESIGNER:	
INSPECTOR:	
CONTRACTOR:	

**CLEAR SPRINGS RANCH  
DIVERSION DAM  
FISH PASSAGE**

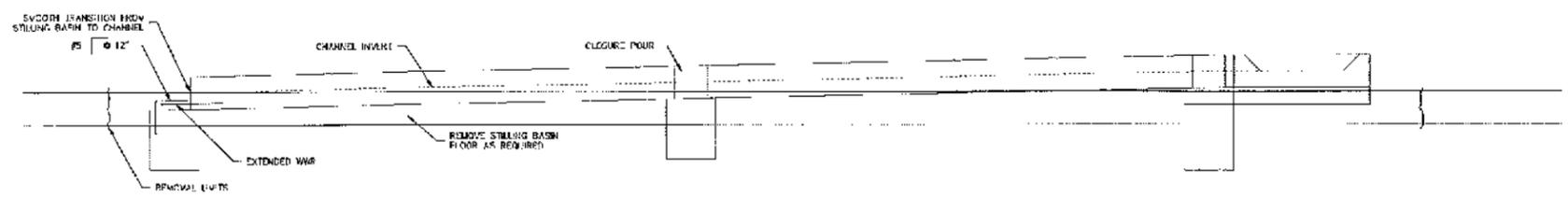
**FOUNDATION WALL DETAILS**

GENERAL RELEASE INFORMATION:	
PARENT WORK ORDER NUMBER: VALUE	
PROJECT NUMBER: VALUE	
ISS. DATE:	10/17/11
SHEET NO.:	13 OF 17
PROJECT LOCATION & DRAWING TITLE:	CLEAR SPRINGS RANCH DIVERSION DAM FISH PASSAGE
DESIGNER:	



NOTE: CLOSURE POUR  
CONCRETE SHALL BE  
CDOT CLASS D.

1 CLOSURE POUR (SECTION)



2 LOWEST CHANNEL TIE IN (SECTION)

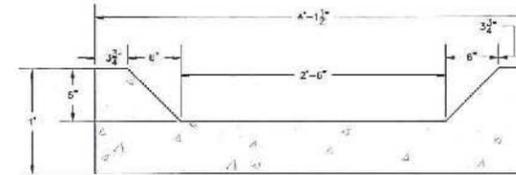
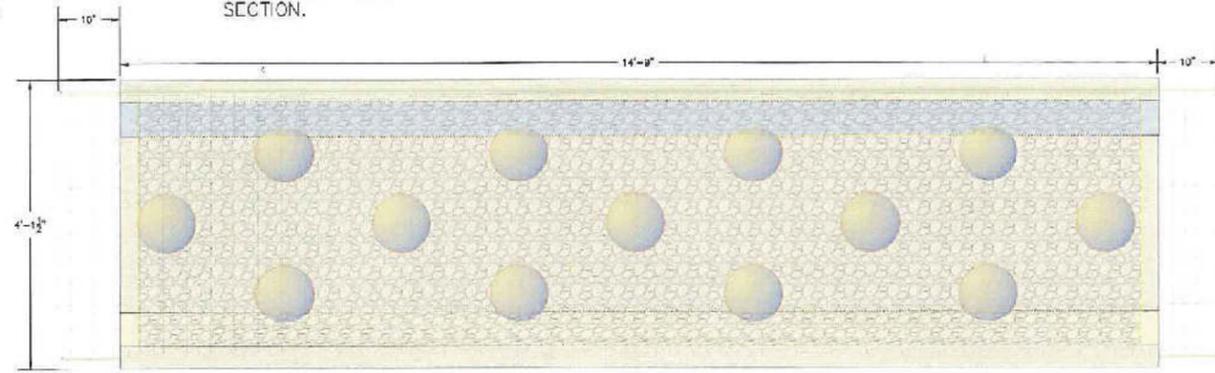
[AS BUILT OR WATER]	
DATE:	
DATE:	
DATE:	
DATE:	

**CLEAR SPRINGS RANCH  
DIVERSION DAM  
FISH PASSAGE**

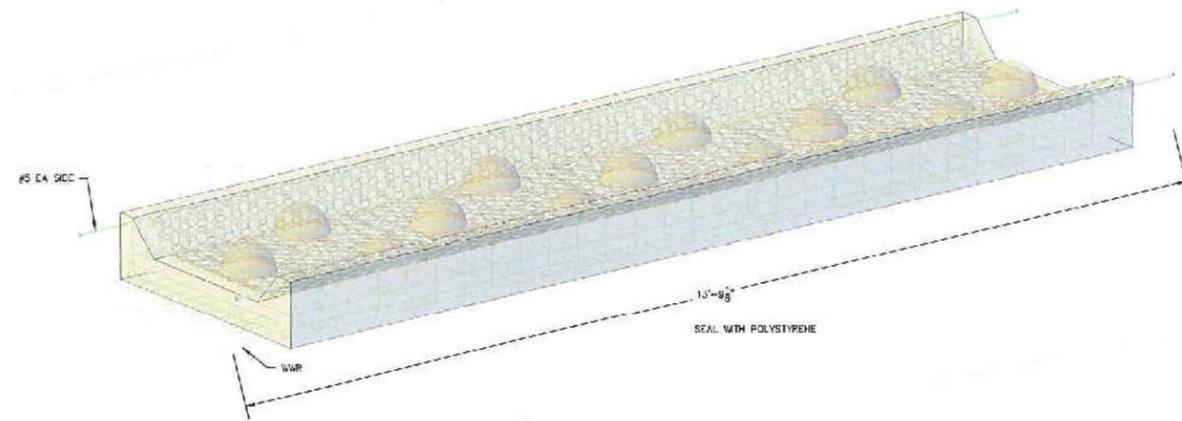
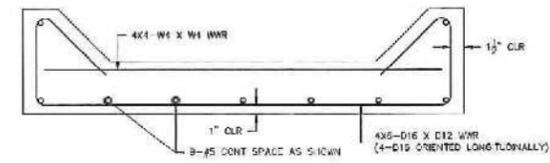
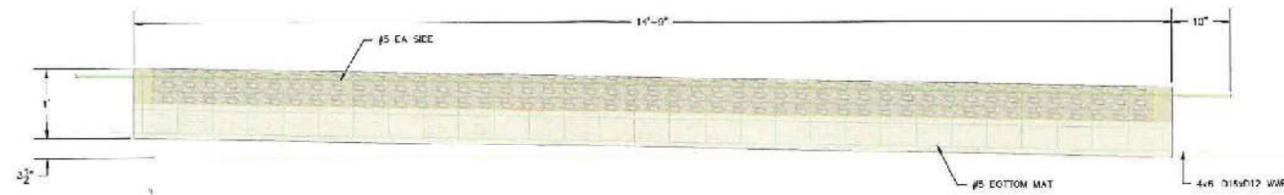
CLOSURE POUR & TIE IN

PARENT SPEC. ORDER NUMBER:	VALUE
PROJ. NO. NUMBER:	VALUE
PROJECT NAME:	VALUE
SHEET NO.:	14 OF 17
REVISIONS:	

NOTE: THE FOLLOWING SECTION PATTERN SHALL START WITH TWO PROTRUDING CAST IN PLACE BOULDERS. ALTERNATE PATTERN EVERY OTHER SECTION.



CHANNEL ROUGHENING NOT SHOWN



(AS BUILT INFORMATION)

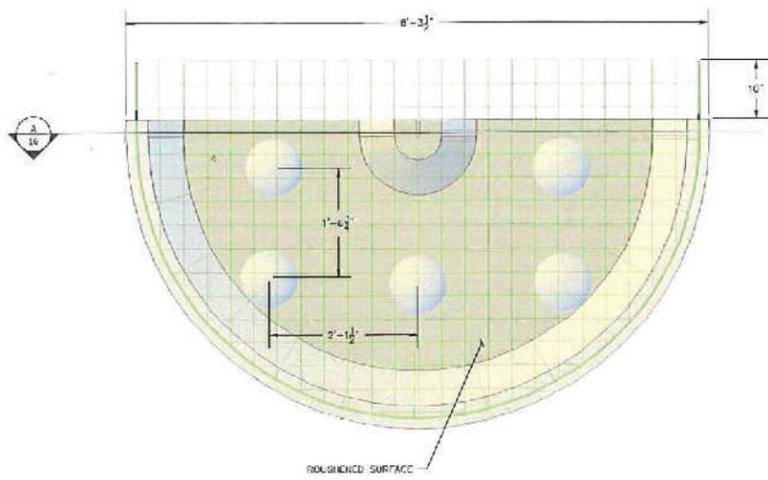
DATE STARTED:	
DATE COMPLETED:	
FOREMAN:	
INSPECTOR:	
CONTRACTOR:	

**CLEAR SPRINGS RANCH  
DIVERSION DAM  
FISH PASSAGE**

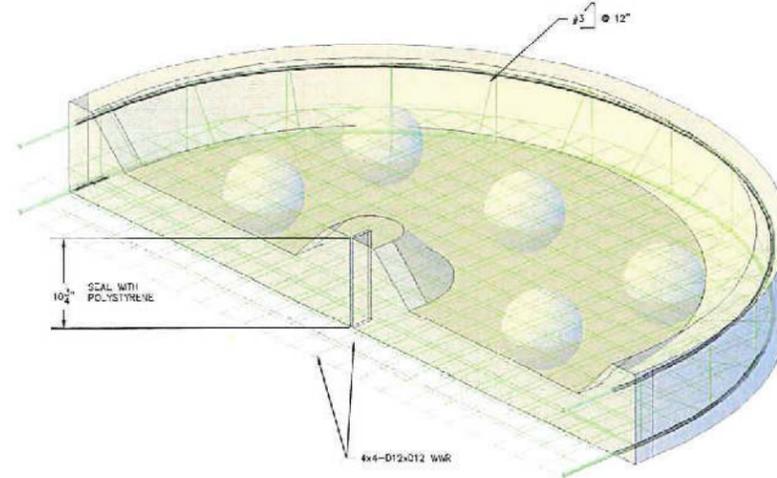
**PRECAST-STRAIGHT**

(PREPARED BY FIELD REPRESENTATIVE)

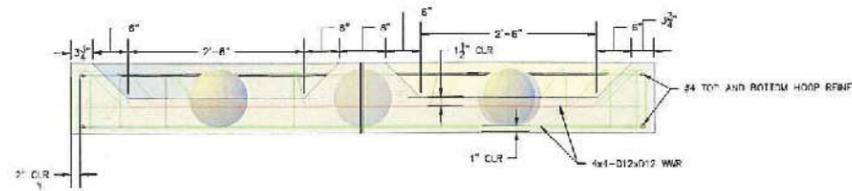
PARENT WORK ORDER NUMBER:	VALUE
PROJECT NUMBER:	VALUE
LINE MAP:	VALUE
SHEET NO.:	15 OF 17
REVISION:	ADD SECTION TO DRAWING FROM PROJECT WORK ORDER FOR CLEAR SPRINGS RANCH DIVERSION DAM FISH PASSAGE
REVISIONS:	



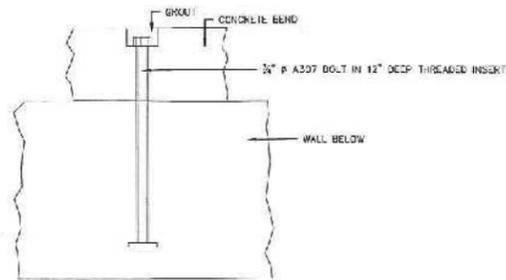
1 180 BEND (PLAN)  
Scale: 1" = 1'



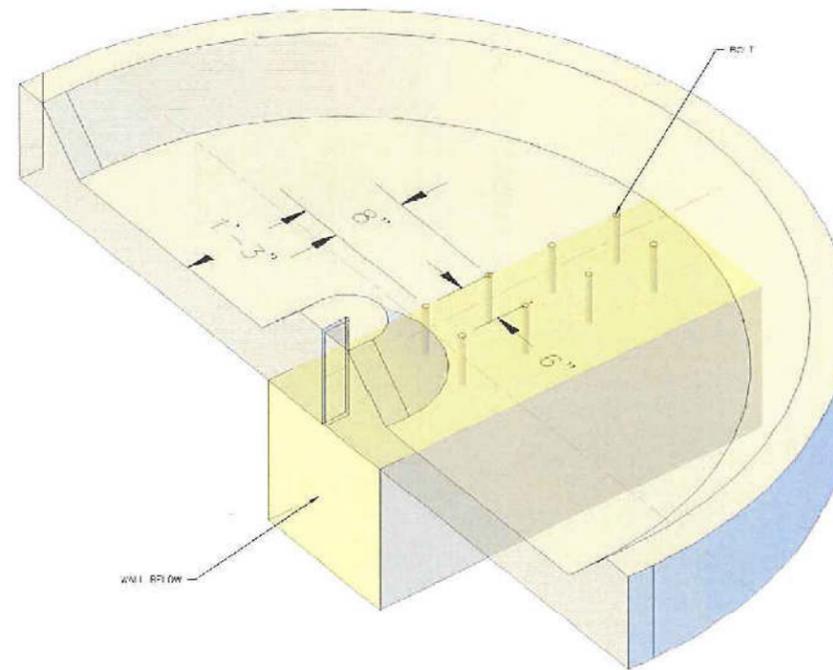
2 180 BEND (MODEL)  
Scale: -



A 180 BEND (SECTION)  
Scale: 1" = 1'



4 BOLT DETAIL  
Scale: -

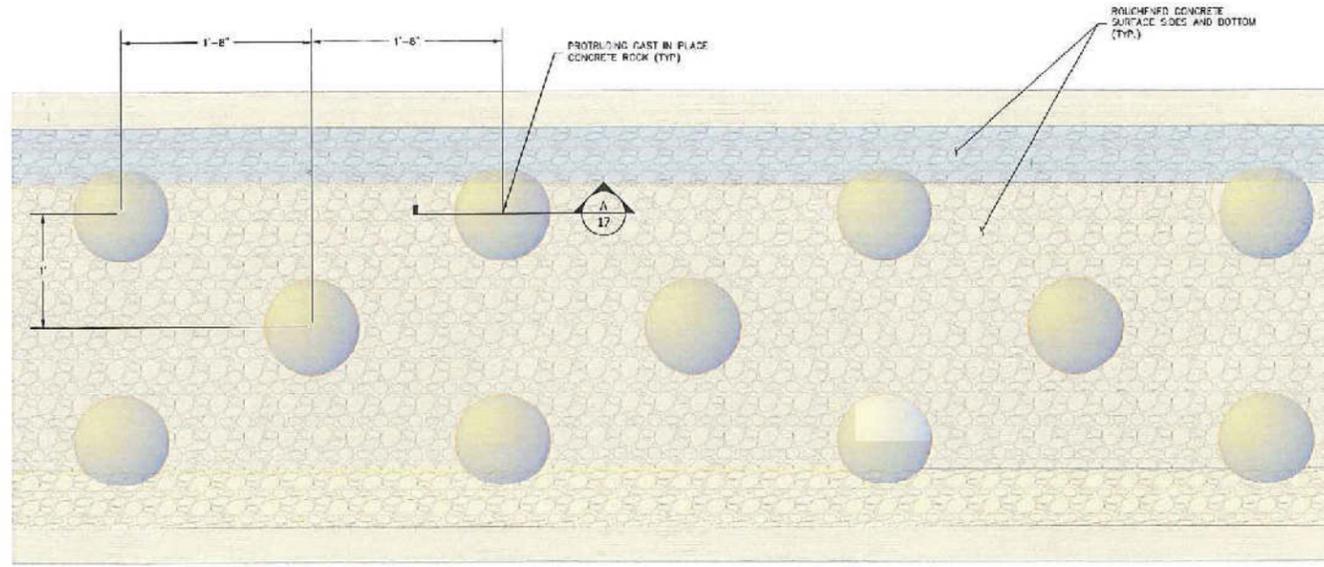


3 180 BEND BOLT TO FOUNDATION WALL (MODEL)  
Scale: -

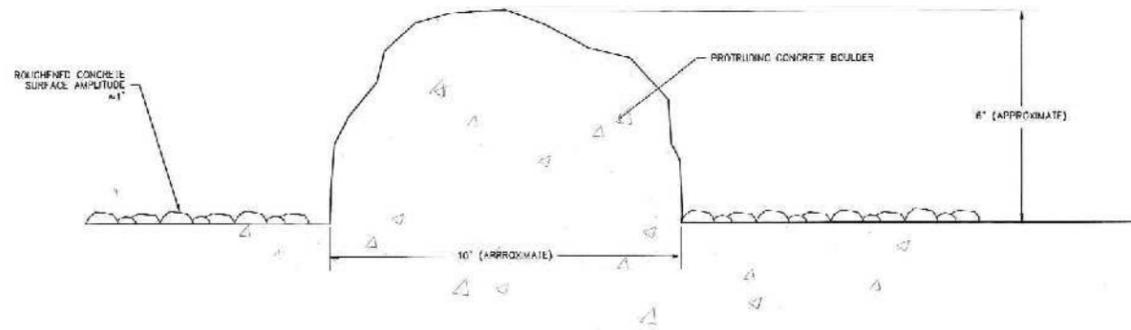
(AS BUILT INFORMATION)	
DATE STARTED	
DATE COMPLETED	
FOR DRAWN	
INSPECTOR	
CONTRACTOR	

CLEAR SPRINGS RANCH  
DIVERSION DAM  
FISH PASSAGE  
PRECAST-BEND

PROJECT RELATED INFORMATION	
PROJECT NUMBER	VALUE
PROJECT NUMBER	VALUE
DATE	VALUE
SHEET NO.	18 OF 17
NETWORK LOCATION & DRAWING TITLE	
C:\PROJECTS\2011\Clear Springs Ranch\Drawings\PRECAST-BEND-SECTION	
REVISIONS:	



① ROUGHENED SURFACE: PLAN  
Scale: NA



Ⓐ ROUGHENED SURFACE: CONCRETE BOULDER SECTION  
Scale: NA

(FOR BUILT INFORMATION)

DATE:	
PROJECT:	
CLIENT:	
DESIGNER:	
CONTRACTOR:	

**CLEAR SPRINGS RANCH  
DIVERSION DAM  
FISH PASSAGE**

**ROUGHENED SURFACE**

(FOR BUILT INFORMATION)

PAPER WORK ORDER NUMBER:	VALUE
PROJECT NUMBER:	VALUE
PROJECT NAME:	VALUE
SHEET NO.:	17 OF 17
DATE:	10/18/2011
DESIGNER:	NAME
CONTRACTOR:	NAME

#### **A.4. Fountain Creek / Clear Spring Ranch Realignment (Pending Project Design Fall, 2011 - Winter, 2012)**

#### **A.5. Strategic Plan for the Fountain Creek Watershed - Mission and Vision**

Prepared March 10, 2009 by the Fountain Creek Vision Task Force.

##### **Mission:**

The members of the Fountain Creek Vision Task Force have come together to turn the Fountain Creek Watershed into a regional asset that adds value to our communities. We are working to create a relatively stable waterway with appropriate erosion, sedimentation and flooding that supports diverse economic, environmental and recreational interests. We will cooperate to enhance and protect Fountain Creek, promoting sustainable use by members of our watershed community and by the visitors we know this wonderful natural amenity will attract.

##### **Vision:**

Our vision for the Fountain Creek Watershed is a strong, resilient and sustainable ecosystem that supports a variety of interests and activities. Our vision includes a number of issues:

- In terms of water quality, we see a waterway that supports fish and other aquatic species, is safe for recreation and protects public health.
- Regarding water quantity, we see successful stormwater management to better control flooding and erosion.
- For the larger natural environment, we see healthy, contiguous habitat for a diversity of wildlife species, including the threatened and endangered species that make their homes here. We envision migration corridors into and out of the watershed, allowing species safe and free movement from north to south and from east to west throughout the region.
- With respect to land use planning, we see great opportunities for recreation, including a state park as an integral part of the Front Range Trail. We expect residents and visitors alike to engage in biking, hunting, cycling, fishing, cycling, cross-country skiing, camping and other activities that foster healthy lifestyles and a greater quality of

life. We will continue to respect landowners' rights and envision ongoing opportunities for sustainable agriculture and ranching and responsible growth. We anticipate thoughtful and sustainable development that benefits local economies, supports Ft. Carson, encourages the creation of local jobs, builds neighborhoods and neighbors, promotes alternative transportation and provides green infrastructure and ecosystem services. Throughout the watershed, we envision open space, parks, and other green areas that connect our residents but separate our cities, allowing each community to create and sustain its own visual and cultural identity.

- Our vision entails achieving all of these things for the entire Fountain Creek Watershed. However, we acknowledge that doing so might not be possible or practical in every case and that some vision elements may be confined by necessity to Fountain Creek itself.
- Our vision for the work of the Task Force is to model successful collaboration in watershed clean-up and stewardship. We hope to demonstrate that by working together and striking a balance between short-term and long-term thinking, communities can create and realize a shared vision, turn problems into opportunities and choose their own future. Solutions that benefit different communities, different species and different land uses are possible. Working together to find and implement them empowers communities and creates lasting relationships. We know it is our responsibility to educate the public about our work and promote sound community stewardship of the watershed.