

7040-015 Saylor Creek Sub-Watershed Final Report

The City of Ankeny is pleased to submit this final report for the Saylor Creek Sub-Watershed Channel Improvements Project. The project, which focused on stream channel restoration, is now complete. A variety of repair methods were selected based on their suitability to the stream and the particular streambank characteristics at particular locations. Best management practices included slope pullback, riffle dams, toe armoring that consisted of the A-Jacks® toe armor product as well as Filtrexx® filter socks filled with rock and native seed mixed with compost. Constructed wetlands were added, and existing wetlands were protected and enhanced. Selective harvesting was done of less desirable trees to open up the stream channel and banks to sunlight, while preserving trees that were providing slope stability. Seeding with deep-rooted native plant species was completed and provides improved stream buffers.

Financial Accountability

Grant Agreement Budget Line Item (WIRB Funds)	Total WIRB Funds Approved (\$)	Total WIRB Funds Expended (\$)	Available Funds (\$)
Creek Toe Armor	113,900	121,941	(8,041)
Soil Retention Structures	18,200	18,200	
Riffle/Pool	60,000	60,000	
Tree and Shrub Clearing	60,000	60,000	
Tree Protection	3,920	3,920	
Large Boulders	3,000	3,000	
Erosion Stone	12,260	12,260	
Earthwork	92,080	92,080	
Topsoiling	24,000	24,000	
Geotextile	9,840	9,840	
Lawn Seeding + Compost	21,000	21,000	
Native Seeding + Compost	57,600	49,559	8,041
Total	475,800	475,800	0

All of the WIRB-funded line item costs exceeded budget with the exception of the native seeding. The quantities changed quite a bit between the preliminary assessment and the final design, mainly due to the more detailed topographic survey and actual cross-sections of the existing and proposed streambanks. The City of Ankeny paid for the costs that exceeded the grant amount. The next table shows the total project spending.

The City of Ankeny costs include the line items shown in the original application as being funded by the City (engineering, short term maintenance, tree planting, temporary erosion control and educational signage.) It also included additional work that was necessary to complete the project such as constructed wetlands with water control structures, and storm sewer to repair and improve existing stormwater discharge points at the creek. Additionally, the City of Ankeny had administrative costs (staff time, legal fees and recording costs) not included in the table below.

Funding Source	Approved Application Budget (\$)	Actual (\$)
WIRB	475,800	475,800
City of Ankeny	284,500	878,324
Total	760,300	1,354,124

Watershed Improvement Fund contribution:	Approved application budget:	63%
	Actual:	35%

Environmental Accountability

The following table summarizes the installed quantities versus what was planned to be completed as listed in the approved application budget.

Practice	Unit	Approved/Amended Goal	Accomplishments	Percent Completion
Creek Toe Armor	Linear Feet	2,440	3,220	132
Soil Retention Structures	Linear Feet	2,600	2,634	101
Riffle/Pool	Structures	12	12	100
Tree/Shrub Clearing	Acres	8	14.8	185
Tree Protection	Linear Feet	4,000	8,000	200
Large Boulders	Tons	30	84	280
Erosion Stone	Tons	450	450	100
Earthwork	Cubic Yards	18,000	19,500	108
Topsoiling	Acres	15	17.6	117
Geotextile (under rock)	Square Yards	0	0	0
Geotextile	Square Yards	2,400	2,245	94
Lawn Seeding + Compost	Acres	3	9	300
Native Seeding + Compost	Acres	8	8.6	108
Prairie Planting Plugs	Flats	0	0	0

The prairie planting plugs were eliminated during design (and an amendment was approved by the WIRB) so that funds from that line item could be used to increase the seeded areas and add a high

quality mulch for quick establishment of the vegetation. The geotextile under rock was a separate line item in the initial application but was deleted through an amendment because this material was included in the creek toe armor construction detail and bid price.

In addition to the line items above, the project also constructed five areas of new wetlands and protected three areas of existing wetlands. These BMPs were included in the project to mitigate wetlands in the stream channel disturbed with this project and in other developing areas upstream. They also provide additional water quality benefits. Wetlands slow the incoming flow to the stream and temporarily detain minor storm events, allowing sediment to settle and remove pollutants from the water. Wetlands also support a wide array of plants and wildlife.

Waste or debris consisting of wire fence and fence materials, scrap metal, miscellaneous junk, brick rubble, lumber, broken concrete, culverts, standpipes, food or beverage containers, paper, fabric, plastic sheeting, and woody debris was removed from the creek and disposed of offsite as a part of the construction project.

IOWATER volunteers registered new monitoring sites at the north end and the south end of the project area in 2010, with only one or two data sets recorded to date. There is not yet sufficient monitoring data to determine the water quality effects of the project.

The primary pollutant to be reduced with this project was sediment. To determine the soil loss prior to the project, aerial photos from the 1930s-1940s were reviewed that showed little evidence of a defined stream. Therefore erosion has occurred over the past 50 years. From a cross-sectional sampling of the stream prior to the project, the volume of eroded soil lost in that 50 year timeframe was 12,630 cubic yards, or 14,500 tons. That provides an annual soil loss rate of 290 tons per year, or 65.9 tons per acre per year. The Revised Universal Soil Loss Equation for the post-construction condition ($R=160$, $K=0.28$, $LS=1.86$, $C=0.01$ and $P=1.0$) gives a post-project soil loss of 0.83 tons/acre/year, or a 98.8 percent reduction.

The photo on Page 4 was taken when the work was in progress, in the fall of 2009. Note the white strips along the stream meanders. Those are the A-Jacks® toe armoring. The orange construction fence is protecting trees and wetland areas from damage. The orange fence in a straight line across the construction area is designating the route of a high-pressure gas main, and restricted the construction equipment to only cross over the gas main where additional protection measures were provided. The areas cleared of trees were locations where the formerly vertical banks were sloped back to a stable angle. The attached drawing labeled as Figure 6 shows the improvements as they were proposed in the conceptual design plan and submitted with the initial application for WIRB funding. The next drawing, entitled South Channel Area, shows the actual constructed improvements based on as-built surveys.

Program Accountability

An educational sign (copy attached) was installed along the stream corridor, adjacent to a multi-purpose trail. The sign explains the various BMPs and how they improve water quality and habitat.

The Ankeny Register ran an article on July 2, 2009 regarding the project. The Ankeny Register is an insert to the Des Moines Register delivered to residents of Ankeny, Polk City and northern Polk County. In addition, the Ankeny Register is delivered free to non-subscribers of the Des Moines Register within the same area.



Photo courtesy of DRA Properties, LLC

The Spring 2010 issue of the Ankeny Report included an article on the project, explaining the scope of the improvements, as well as an explanation of “What is a watershed?”. The WIRB was noted as providing funding for the improvements. The Ankeny Report is a newsletter published by the City of Ankeny and mailed to all addresses with 50021 and 50023 zip codes.

The Ankeny Stormwater Stakeholders Group (citizen volunteers) toured the project on June 16, 2010, as a part of a stormwater best management practices tour that included several locations in Ankeny. The Iowa Stormwater Education Program (membership organization of MS4 jurisdictions) took a tour of the project on September 9, 2010. On September 27, the Ankeny City Council toured the site. The tour was reported in an article in the Ankeny Register. The tour also included the earlier Saylor Creek improvements funded by WIRB and the site of the recent remediation action of the former Des Moines Ordnance Plant landfill/wastewater treatment plant. The site is also in the Saylor Creek watershed. The landfill was capped and the remainder of the site was cleaned up with oversight by the EPA.

Restrictive covenants were recorded that established minimum 20 feet wide stream buffers as measured from the top of banks. These restrictive covenants affect property owned by the Des Moines Area Community College and DRA Properties, LLC. Wetland Preservation Easements were also created on DRA property to protect the constructed wetlands for perpetuity. As development occurs, ownership of the stream corridor will be transferred to the City of Ankeny.

This project was the first that the City of Ankeny used the A-Jacks® toe armor and Filtrexx® filter socks for streambank stabilization. The design engineer and the city staff are all very impressed with how well the Filtrexx® filter socks performed. The socks are 18" diameter and are filled with a mixture of compost, rock, and native seed. They were installed above the A-Jacks® toe armor in one or two layers, depending on the height needed. The socks were secured with straps that were anchored into the soil behind. The A-Jacks®, while a good product, were a little more problematic. It requires a lot of hand labor and gentle handling to prevent the material from breaking. There was a definite learning curve for the contractor, and the construction methods improved as the work progressed downstream, once they figured out what worked best. In particular, they determined it was important to follow the manufacturer's recommendation to key the A-Jacks® into the slope on the upstream end of the bend. Although not recommended by the manufacturer, if we use the product again, we will also require the A-Jacks® to be keyed into the slope on the downstream end.

The seemingly never-ending and heavy rain events during the summer of 2010 resulted in some damage to the improvements, primarily in failure of the A-Jacks®, although our consultant feels that the failure was not so much the A-Jacks®, but the soil below the A-Jacks® lacking sufficient stability to support the materials above. In some areas, the A-Jacks® remained in place locked together, but the streambank above the A-Jacks® experienced wash-outs. Although the vegetation appeared to be well established prior to the extreme rain events, it is likely that the root systems were still immature and not yet able to withstand the extreme force of the flood velocities. The damaged areas were subsequently repaired in the fall of 2010. In most cases, the damaged areas were repaired with riprap, rather than attempting to re-install the A-Jacks® and re-grade the slope above. It will be interesting to compare the performance of the riprapped areas with the A-Jacks®/Filtrexx® areas in the future.

Stream degradation and bank erosion has become a big, and very expensive concern for the City and its citizens. Historically, streams were left untouched as development filled in adjacent to them. We now know the effects of urbanization on water quality, and that leaving a stream in a natural condition is not

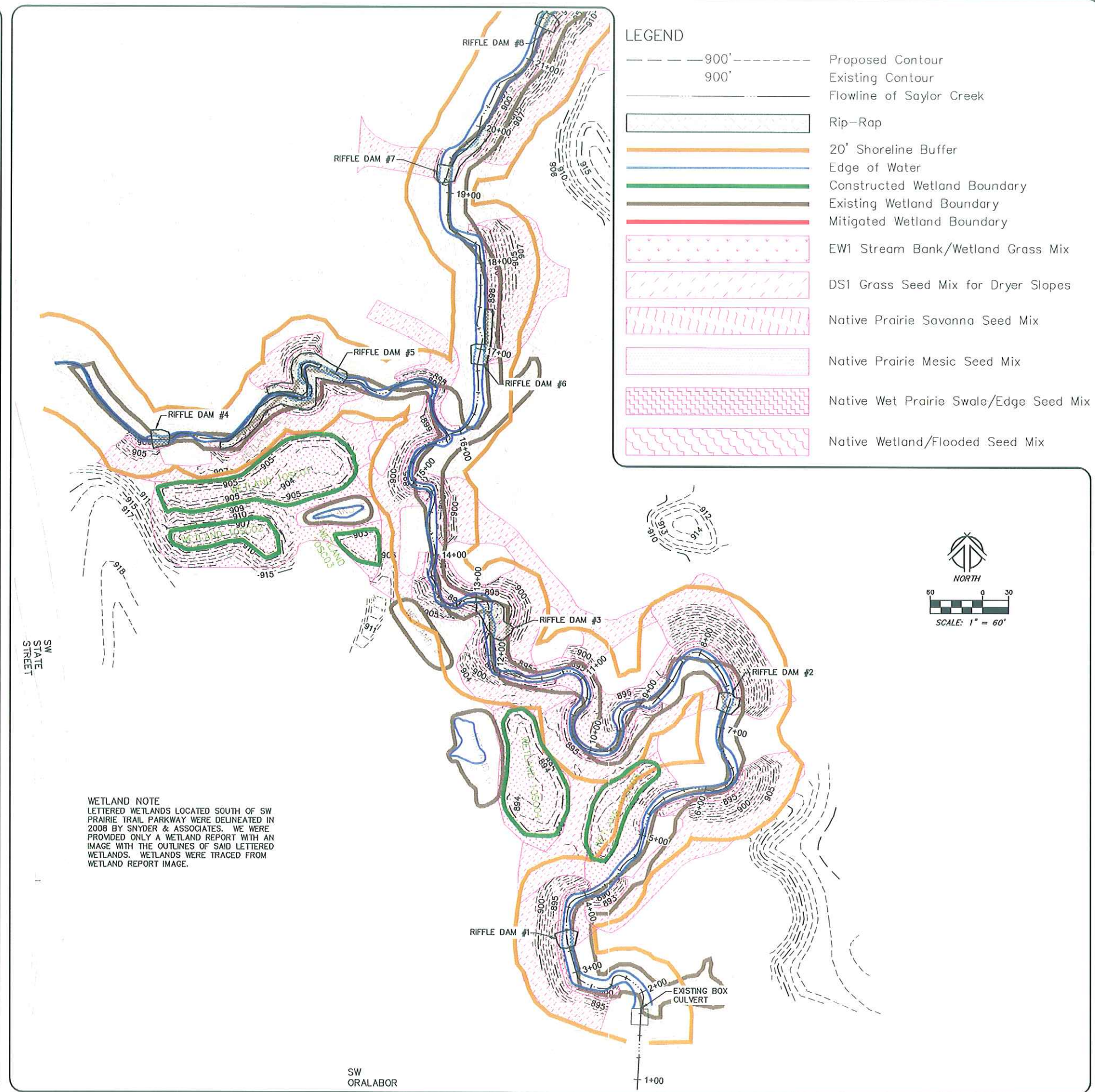
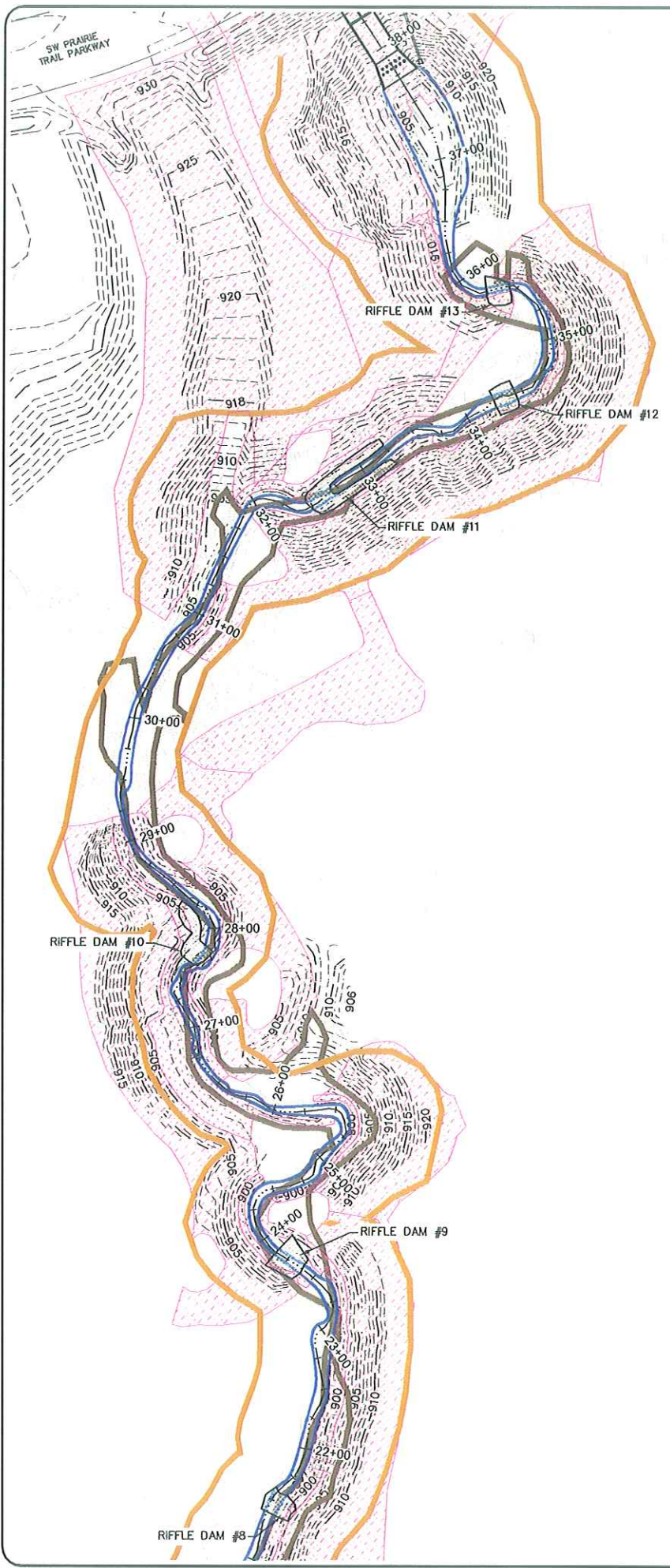
the same as leaving it in a stable condition. The WIRB funds provided the City the opportunity to clean up, repair and protect this particular stream in advance of development.

The City of Ankeny recently adopted a new comprehensive plan that establishes goals and principles for developing as a sensitive and sustainable community. The comprehensive plan highlights the need to protect and enhance the significant stream corridors in developing areas for flood protection and containment, for drainage paths and non-erosive velocities, for protection of landforms, features and vegetation that reduce surface runoff, for maintenance, for slope stability, for enhanced habitat and limitation of invasive species, for water quality, and to provide recreational and educational opportunities. The plan establishes new policies for stream buffer widths and slopes, as well as ownership and access for maintenance.

While we realize that developers will not want to spend money to repair an existing creek, being able to show an example of a restored creek (this project) compared to a creek left untouched (of which we have several examples) will go a long ways to help educate the landowners. We think it will be obvious why the City is changing its approach to stormwater management from historic practices.

The City of Ankeny extends its appreciation and thanks to the Watershed Improvement Review Board for supporting this water quality project, and to the legislature for supporting the WIRB mission. There is much work left to do in Iowa's watersheds, so we hope the WIRB will be able to continue its good work for many years to come.

Attachments: Drawing of Proposed Improvements
Drawing of Constructed Improvements and Buffers
Educational Sign Graphic
Ledger



WETLAND NOTE
LETTERED WETLANDS LOCATED SOUTH OF SW PRAIRIE TRAIL PARKWAY WERE DELINEATED IN 2008 BY SNYDER & ASSOCIATES. WE WERE PROVIDED ONLY A WETLAND REPORT WITH AN IMAGE WITH THE OUTLINES OF SAID LETTERED WETLANDS. WETLANDS WERE TRACED FROM WETLAND REPORT IMAGE.

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REVISIONS:

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PROJECT: Saylor Creek Channel Improvements
Ankeny, Iowa

TITLE: South Channel Area

PLAN No.: 08113
DATE: 08-26-2010
DRAWN BY: ADS/T.H.
CHECKED BY: RJS
SCALE: AS NOTED
DWG No.: AS-5
SHEET No.: 5/6

Saylor Creek Restoration



Each improvement to the Saylor Creek Watershed (pictured) has a corresponding colored symbol showing where these improvements were made on the site.

Saylor Creek Needed Help

Saylor Creek was a slow moving country stream that was overwhelmed by man and nature.

Over time, large clusters of brush and trees grew along the stream turning it into a dense, dark, dumping ground. Sun starved, the ground plants vanished. Without their protective roots the soil banks eroded. Sediment filled the stream turning it into a narrow channel that water raced through. This raised flood elevations and the erosive, down-cutting cycle continued.

Saylor Creek Got Help

These improvements are designed to control the erosive water conditions in Saylor Creek

- **Bend armor** – stacked, interlocking concrete "jacks" protect the base of creek bends from water flow erosion
- **Outlet protection** – structural reinforcements slow heavy storm water flows exiting the pipe to prevent erosion
- **Slope pull back** – harsh, vertical banks are shaped into stable slopes that spread water out so it rises slower in big rains

These improvements are designed to establish a high quality water, plant and wildlife habitat.

- **Constructed wetland** – prairie grasses and wetland plants hold water, filter it and make great refuges for wildlife
- **Native planting** – beautiful, deep-rooted plants absorb, retain and re-distribute water; they hold soil in place
- **Riffle dams** – water "ruffles" over these gravel/rock dams creating oxygenated still pools where aquatic life thrives

It's Good for Everyone

The Saylor Creek restoration protects Ankeny's residents and water resources. It provides lasting value now.

As bountiful as it can seem, it's crucial to remember that water is our most valuable natural resource. The restoration of Saylor Creek provides stormwater management that improves water quality, reduces stormwater volume, preserves and protects native vegetation, provides habitat for wildlife, and has the potential to reduce infrastructure and maintenance costs.



Phase 2 Improvements
Figure 6