Last Updated: June 2018

Colorado Water Conservation Board

Water Plan Grant Application

Instructions

To receive funding for a Water Plan Grant, applicant must demonstrate how the project, activity, or process (collectively referred to as "project") funded by the CWCB will help meet the measurable objectives and critical actions in the Water Plan. Grant guidelines are available on the CWCB website.

If you have questions, please contact CWCB at (303) 866-3441 or email the following staff to assist you with applications in the following areas:

Water Storage Projects	Anna.Mauss@state.co.us
Conservation, Land Use Planning	Kevin.Reidy@state.co.us
Engagement & Innovation Activities	Ben.Wade@state.co.us
Agricultural Projects	Alexander.Funk@state.co.us
Environmental & Recreation Projects	Chris.Sturm@state.co.us

FINAL SUBMISSION: Submit all application materials in one email to *waterplan.grants@state.co.us*
in the original file formats [Application (word); Statement of Work (word); Budget/Schedule (excel)]. Please do not combine documents. In the subject line, please include the funding category and name of the project.

Water Project Summary

Name of Applicant	Denver Parks and Recreation
Name of Water Project	Denver Parks Central Control Build-out
CWP Grant Request Amount	$120,000
Other Funding Sources Denver Water	$120,000
Other Funding Sources _____	$
Other Funding Sources _____	$
Applicant Funding Contribution	$164,437
Total Project Cost	$404,437

Last Updated: June 2018

Applicant & Grantee Information
Name of Grantee(s) Denver Parks and Recreation
Mailing Address 201 W. Colfax, Denver, CO 80202
FEIN
Organization Contact: Demian Wetzel
Position/Title: Water Conservation Program Administrator
Email: demian.wetzel@denvergov.org
Phone: 720-470-8958
Grant Management Contact: Megan Allsop
Position/Title: Contract Administrator
Email: megan.allsop@denvergov.org
Phone: 720-913-0670
Name of Applicant (if different than grantee)
Mailing Address
Position/Title
Email
Phone

Description of Grantee/Applicant
Provide a brief description of the grantee's organization (100 words or less).
Denver's Parks and Recreation Department boasts one of the most expansive and diverse park systems in the Rocky Mountain West. The system offers more than 350 urban parks and parkways, 7 golf courses, and over 14,000 acres of mountain parks. The urban park system has around 3000 irrigated acres (1728 acres are on potable water) and over 1000 controllers for these areas. We have initiated a Central Control Mater Plan in 2010, and have installed over 500 central control units in irrigated areas and are continuing our goal to be 100% central control.

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Type of Eligible Entity (check one)	
X	**Public (Government):** Municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.
	Public (Districts): Authorities, Title 32/special districts (conservancy, conservation, and irrigation districts), and water activity enterprises.
	Private Incorporated: Mutual ditch companies, homeowners associations, corporations.
	Private Individuals, Partnerships, and Sole Proprietors: Private parties may be eligible for funding.
	Non-governmental organizations (NGO): Organization that is not part of the government and is non-profit in nature.
	Covered Entity: As defined in Section 37-60-126 Colorado Revised Statutes.

Type of Water Project (check all that apply)	
	Study
X	Construction
	Identified Projects and Processes (IPP)
	Other

Category of Water Project (check the primary category that applies and include relevant tasks)		
	Water Storage - Projects that facilitate the development of additional storage, artificial aquifer recharge, and dredging existing reservoirs to restore the reservoirs' full decreed capacity and Multi-beneficial projects and those projects identified in basin implementation plans to address the water supply and demand gap.. *Applicable Exhibit A Task(s):*	
X	Conservation and Land Use Planning - Activities and projects that implement long-term strategies for conservation, land use, and drought planning. *Applicable Exhibit A Task(s):*	
	Engagement & Innovation - Activities and projects that support water education, outreach, and innovation efforts. Please fill out the Supplemental Application on the website. *Applicable Exhibit A Task(s):*	
	Agricultural - Projects that provide technical assistance and improve agricultural efficiency. *Applicable Exhibit A Task(s):*	
	Environmental & Recreation - Projects that promote watershed health, environmental health, and recreation. *Applicable Exhibit A Task(s):*	
	Other	Explain:

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Location of Water Project	
Please provide the general county and coordinates of the proposed project below in **decimal degrees**. The Applicant shall also provide, in Exhibit C, a site map if applicable.	
County/Counties	City and County of Denver Parks, East Operating District, Congress Sub-District & Rosamond Park
Latitude	
Longitude	

Water Project Overview
Please provide a summary of the proposed water project (200 words or less). Include a description of the project and what the CWP Grant funding will be used for specifically (e.g., studies, permitting process, construction). Provide a description of the water supply source to be utilized or the water body affected by the project, where applicable. Include details such as acres under irrigation, types of crops irrigated, number of residential and commercial taps, length of ditch improvements, length of pipe installed, and area of habitat improvements, where applicable. If this project addresses multiple purposes or spans multiple basins, please explain. The Applicant shall also provide, in Exhibit A, a detailed Statement of Work, Budget, Other Funding Sources/Amounts and Schedule.

Last Updated: June 2018

The Denver Parks Central Control Build-out project has many benefits to the water managers of the city. Central Control helps Parks employees conserve water, conserve fuel, and increase safety to field personnel. It achieves this by enabling Water Managers to control irrigation functions and programming from a desktop computer or hand held remote. Water consumption is monitored in real time with the combination of Hydrometers in the central control systems. Systems are shut down when line breaks occur, and staff is alerted to no-flow and electrical problems. Central Control is also a beneficial component for positive public perception through the ability to diagnose necessary repairs quickly and shut down entire systems during rain events.
Denver Parks Water Conservation Department installs, maintains, and monitors the Central Control Network and Parks water consumption. Parks Water Conservation is requesting $120,000 for the continuation of the Central Control Build-out in our East Operating District, Congress Sub-District and Rosamond Park. With a matching $120,000 grant from Denver Water pending signatures, we will purchase 26 Toro Sentinel Central Control Irrigation Controllers which irrigate 79 acres of parks with potable water. This investment will cost around $2,900 per acre-foot of water from the conservative estimate of 41.3 AF saved per year irrigating with Central Control.

Measurable Results

To catalog measurable results achieved with the CWP Grant funds, please provide any of the following values as applicable:

	New Storage Created (acre-feet)	
	New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive	
	Existing Storage Preserved or Enhanced (acre-feet)	
	Length of Stream Restored or Protected (linear feet)	
41.3 AF/year	Efficiency Savings (indicate acre-feet/year OR dollars/year)	
	Area of Restored or Preserved Habitat (acres)	
	Quantity of Water Shared through Alternative Transfer Mechanisms	
	Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning	
	Number of Coloradans Impacted by Engagement Activity	
	Other	Explain:

Last Updated: June 2018

Water Project Justification
Provide a description of how this water project supports the goals of Colorado's Water Plan, the most recent Statewide Water Supply Initiative, and the applicable Roundtable Basin Implementation Plan and Education Action Plan. The Applicant is required to reference specific needs, goals, themes, or Identified Projects and Processes (IPPs), including citations (e.g. document, chapters, sections, or page numbers). The proposed water project shall be evaluated based upon how well the proposal conforms to Colorado's Water Plan Framework for State of Colorado Support for a Water Project (CWP, Section 9.4, pp. 9-43 to 9-44;)
According to SWSI, "Colorado's population is projected to nearly double by the year 2050. Because the major driver for water use is population growth, M&I water usage is also expected to nearly double, even with savings from passive conservation." The Colorado Water Plan builds on SWSI to set a goal of reducing the projected 2050 municipal and industrial gap from as much as 560,000 acre-feet to zero acre-feet by 2030." Denver Parks is a leader in water use efficiency. Since 2012 Denver Parks has reduced water consumption from 17.41 GPSF to 12.73 GPSF, reflecting a drop in use by 4.7 GPSF. This has resulted in a current annual savings of 1084 AF compared to 2012. Denver Parks has set standard design construction guidelines to utilize Central Control and the newest parks in the system are hydro-zoned and landscaped to match the use typology of the site. These designs result in parks that meet the needs of our growing community and environment. The buildout of the Central Control system is foundational to converting the Parks system to a proactively managed system. Central control with flow sensing allows water managers to detect leaks, adjust water requirements based on changing weather conditions and report on water use efficiency. This system sets up a network of real-time water meters, similar to an AMI system, to connect the parks district manager with the water use at the site. These advanced controls enable Denver Parks to be a leader in water use efficiency and a model for efficient water use throughout Denver. Converting the Congress sub-district and Rosamond Park will result in approximately 41.3 acre-ft annually of M&I water savings.

Related Studies
Please provide a list of any related studies, including if the water project is complementary to or assists in the implementation of other CWCB programs.

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Previous CWCB Grants, Loans or Other Funding
List all previous or current CWCB grants (including WSRF) awarded to both the Applicant and Grantee. Include: 1) Applicant name; 2) Water activity name; 3) Approving RT(s); 4) CWCB board meeting date; 5) Contract number or purchase order; 6) Percentage of other CWCB funding for your overall project.

Taxpayer Bill of Rights
The Taxpayer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect your application.

Last Updated: June 2018

Submittal Checklist	
X	I acknowledge the Grantee will be able to contract with CWCB using the Standard Contract.
Exhibit A	
X	Statement of Work(1)
X	Budget & Schedule(1)
	Engineer's statement of probable cost (projects over $100,000)
	Letters of Matching and/or Pending 3rd Party Commitments(1)
Exhibit C	
	Map (if applicable)(1)
	Photos/Drawings/Reports
	Letters of Support (Optional)
	Certificate of Insurance (General, Auto, & Workers' Comp.) (2)
	Certificate of Good Standing with Colorado Secretary of State(2)
	W-9(2)
	Independent Contractor Form(2) (If applicant is individual, not company/organization)
Engagement & Innovation Grant Applicants ONLY	
	Engagement & Innovation Supplemental Application(1)

(1) Required with application.
(2) Required for contracting. While optional at the time of this application, submission can expedite contracting upon CWCB Board approval.

Last Updated: Jan 16, 2018

Colorado Water Conservation Board
Water Plan Grant - Exhibit A

Statement Of Work	
Date:	**July 30, 2018**
Name of Grantee:	**Denver Parks and Recreation**
Name of Water Project:	**Denver Parks Central Control Build-out**
Funding Source:	**Denver Water, Denver Parks and Recreation**

Water Project Overview:

The Denver Parks Central Control Build-out project has many benefits to the water managers of the city. Central Control helps Parks employees conserve water, conserve fuel, and increase safety to field personnel. It achieves this by enabling Water Managers to control irrigation functions and programming from a desktop computer or hand held remote. Water consumption is monitored in real time with the combination of Hydrometers in the central control systems. Systems are shut down when line breaks occur, and staff is alerted to no-flow and electrical problems. Central Control is also a beneficial component for positive public perception through the ability to diagnose necessary repairs quickly and shut down entire systems during rain events.
Denver Parks Water Conservation Department installs, maintains, and monitors the Central Control Network and Parks water consumption. Parks Water Conservation is requesting $120,000 for the continuation of the Central Control Build-out in our East Operating District, Congress Sub-District and Rosamond Park. With a matching $120,000 grant from Denver Water pending signatures, we will purchase 26 Toro Sentinel Central Control Irrigation Controllers which irrigate 79 acres of parks with potable water. This investment will cost around $2,900 per acre-foot of water from the conservative estimate of 41.3 AF saved per year irrigating with Central Control.

Project Objectives:

The Central Control Build-out has many objectives including but not limited to:
Water Conservation
Labor and Fuel reduction
Improving worker safety
Improved Public Perception towards Water Conservation efforts

Last Updated: Jan 16, 2018

Tasks
Task 1 – [Name] Install Toro Sentinel Central Control Irrigation Controllers
Description of Task:
Parks properties including parks, parkways, and medians which have “stand-alone” irrigation controllers will have Toro Sentinel Central Control irrigation controllers installed. Toro Sentinel controllers have radios which communicate with the Parks Antenna and Network communication system which delivers information to the individual water manager’s computers. All aspects of irrigation programming, maintenance, and monitoring are done through the information exchange between Toro Sentinel Central Controller and Central Control Computer Database.
Method/Procedure:
Denver Parks Water Conservation Construction crew will install all the equipment requested from the CWP Grant. The crew checks all current power and wire conditions at the Parks “stand-alone” controllers before proceeding with demolition. New concrete pads with electrical conduit and grounding which are up to modern code are installed. Toro Sentinel controllers are then mounted and then the power and valve wires are reconnected. Everything is tested and then certified, optimized, and programmed before turning over to District maintenance staff.
Deliverable:
Denver Parks Water Conservation installs a product which makes Parks water management and consumption much easier and more efficient than traditional “stand-alone” units. Water Conservation is staffed to maintain the Central Control network with a highly skilled group of technicians which respond to repair requests from a work order system. This ensures the entire system is functioning, updated, efficient, sustainable, and effective. We also provide trainings which assist Irrigation Tech in maximizing their skills in utilizing all of the features Central Control offers. This includes real time water consumption monitoring, alarm and activity monitoring, and flow monitoring. All these activities translate into large water savings.

Last Updated: Jan 16, 2018

Tasks
Task 2 – [Name] Install Netafim Hydrometers at Central Control Sites
Description of Task:
Hydrometers are installed at all the sites which contain Toro Sentinel Central Control. Hydrometers are wired into the Central Control controller so that consumption and flow can be monitored in real time and/or daily, weekly, monthly, and yearly intervals. Flow monitoring also provides an alarm warning system which notifies a technician of a leak, break, or abnormally high flow. This enables timely repairs and prevents catastrophic wasting of water. Hydrometers prevent catastrophic loss of water by shutting down the entire irrigation system when it senses prolonged or multiple “high or unexpected” flows with the activation of a Master Valve.
Method/Procedure:
Water Conservation staff plumbs the Hydrometers at or near the Irrigation point of connection after the backflow device. The hydrometer is then wired directly or through a CST pathway to the controller. Flow is then “learned” for all of the individual zones and then monitored during irrigation activity.
Deliverable:
Flow and water consumption monitoring at all Central Control sites similar to similar to Advanced Metering technology.

Repeat for Task 3, Task 4, Task 5, etc.

Last Updated: Jan 16, 2018

Budget and Schedule

This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

Reporting Requirements

Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that:

- Summarizes the project and how the project was completed.
- Describes any obstacles encountered, and how these obstacles were overcome.
- Confirms that all matching commitments have been fulfilled.
- Includes photographs, summaries of meetings and engineering reports/designs.

The CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

Payment

Payment will be made based on actual expenditures and must include invoices for all work completed. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions.

Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to CWCB in hard copy and electronic format as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following:
(a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in Exhibit B. Per Water Plan Grant Guidelines, the CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.
(b) Accountability: Per Water Plan Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per Water Plan Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment.

Last Updated: Jan 16, 2018

Performance Measures

(c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary.
(d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.

COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan Grant - Exhibit B
Budget and Schedule

Date: July 30, 2018

Name of Applicant: Denver Parks and Recreation

Name of Water Project: Denver Parks Central Control Build-Out, Congress and Rosamond Section

Project Start Date: March 1,2019

Project End Date: March 1, 2020

Task No.	Task Description	Task Start Date	Task End Date	Grant Funding Request	Match Funding	Total
1	Install Toro Sentinel Central Control	April 1,2019	Oct. 1,2019	$85,000	154,775	$239,775
2	Install Netafim Hydrometers	July 1, 2019	December 1, 201	$35,000	$36,662	$71,662
	"In-Kind" Labor			$0	$60,000	$60,000
	Miscellaneous Additional Material			$0	$33,000	$33,000
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
			Total	$120,000	$284,437	$404,437

More Detailed Budget in attachment

5-YEAR AVERAGE INCHES FOR POTABLE SITES IN CONGRESS

5-yr Ave Inches	**30.0**	**gallons=**	**65,020,400**
5-yr Ave GPSF	**18.7**		
Annual gal at 24" or 15 GPSF	**51,548,422**		
Annual savings @ 24" or 15 GPSF	**13,471,978** gals	**41.3 AF per year savings**	

2017

Name	YTD Cons	IrrigAc	Inches Used	Shop	LOC	CC/w Flow
6th & Josephine	108	0.1	31.69	Congress	344	NO
Alamo Placita	3,719	5.2	26.34	Congress	301	no flow
City of Karmiel	5,786	3.0	70.28	Congress	341	No flow
City of Takayama	6,177	6.1	37.56	Congress	331	No flow
Congress (West)	641	0.6	42.92	Congress	314a	NO
Downing St (Speer to 3rd)	350	0.8	15.73	Congress	352	NO
E 1st Ave (Lafayette to University)	2,097	1.5	52.55	Congress	325	NO
E 7th Ave	5,225	6.4	30.13	Congress	306	No flow
E Alameda Ave (Colorado to Jackson)	9	0.1	3.71	Congress	334	No flow
Franklin St	870	0.6	51.34	Congress	304	NO
Gilpin St	685	0.6	43.85	Congress	383	NO
High St	729	0.5	53.73	Congress	384	NO
Manley	1,564	1.4	42.02	Congress	337	No flow
Pulaski	5,942	7.7	28.35	Congress	319	No flow
Speer Blvd (1st to 6th)	11,491	7.7	55.13	Congress	307a	NO
Steele St	501	0.4	44.90	Congress	336	NO
University Blvd (1st to 2nd)	595	0.4	51.27	Congress	328	NO
Williams St Island	90	0.1	48.92	Congress	381	NO
Rosamond	18,774	36.0	19.21	Yale	621	NO
Totals:	**65,353**	**79.1**	**30.43**			

2016

Name	YTD Cons	IrrigAc	Inches Used	Shop	LOC
6th & Josephine	169	0.1	49.59	Congress	344
Alamo Placita	3,023	5.2	21.41	Congress	301
City of Karmiel	9,869	3.0	119.87	Congress	341
City of Takayama	8,181	6.1	49.75	Congress	331
Congress (West)	493	0.6	33.01	Congress	314a
Downing St (Speer to 3rd)	343	0.8	15.42	Congress	352
E 1st Ave (Lafayette to University)	2,163	1.5	54.21	Congress	325
E 7th Ave	3,271	6.4	18.86	Congress	306
E Alameda Ave (Colorado to Jackson)	51	0.1	21.00	Congress	334
Franklin St	856	0.6	50.52	Congress	304
Gilpin St	547	0.6	35.01	Congress	383
High St	771	0.5	56.82	Congress	384
Manley	1,216	1.4	32.67	Congress	337
Pulaski	4,629	8.3	20.55	Congress	319
Speer Blvd (1st to 6th)	350	7.7	1.68	Congress	307a
Steele St	290	0.4	25.99	Congress	336
University Blvd (1st to 2nd)	5,973	0.4	514.73	Congress	328
Williams St Island	50	0.1	27.18	Congress	381
Rosamond	20,004	36.0	20.46	Yale	621
	62,249	**79.7**	**28.77**		

2015

Name	YTD Cons	IrrigAc	Inches Used	Shop	LOC
6th & Josephine	253	0.13	74.23	Congress	344
Alamo Placita	2,846	5.20	20.16	Congress	301
City of Karmiel	5,256	3.03	63.84	Congress	341
City of Takayama	7,027	6.06	42.73	Congress	331
Congress (West)	368	0.55	24.64	Congress	314a
Downing St (Speer to 3rd)	435	0.82	19.56	Congress	352
E 1st Ave	1,534	1.47	38.44	Congress	325
E 7th Ave	2,662	6.39	15.35	Congress	306
E Alameda Ave (Colorado to Jackson)	19	0.09	7.83	Congress	334
Franklin St	479	0.62	28.27	Congress	304
Gilpin St	413	0.58	26.44	Congress	383
High St	400	0.50	29.48	Congress	384
Manley	1,038	1.37	27.89	Congress	337
Pulaski	6,114	8.30	27.14	Congress	319
Speer Blvd (1st to 6th)	4,825	7.95	22.35	Congress	307a
Steele St	494	0.41	44.28	Congress	336
University Blvd (1st to 2nd)	319	0.43	27.49	Congress	328
Williams St Island	50	0.07	27.18	Congress	381
Rosamond	14,831	36.00	15.17	Yale	621
	49,363	**79.95**	**22.74**		

2014

Name	YTD Cons	IrrigAc	Inches Used	Shop	LOC
6th & Josephine	305	0.13	89.49	Congress	344
Alamo Placita	2,469	5.20	17.49	Congress	301
City of Karmiel	6,568	3.03	79.78	Congress	341
City of Takayama	3,873	6.06	23.55	Congress	331
Congress (West)	278	0.55	18.61	Congress	314a
Downing St (Speer to 3rd)	181	0.82	8.14	Congress	352
E 1st Ave	1,530	1.47	38.34	Congress	325
E 7th Ave	3,833	6.39	22.10	Congress	306
E Alameda Ave (Colorado to Jackson)	4	0.09	1.65	Congress	334
Franklin St	537	0.62	31.69	Congress	304
Gilpin St	329	0.58	21.06	Congress	383
High St	277	0.50	20.42	Congress	384
Manley	817	1.37	21.95	Congress	337
Pulaski	4,577	8.30	20.32	Congress	319
Speer Blvd (1st to 6th)	5,014	7.95	23.22	Congress	307a
Steele St	130	0.41	11.65	Congress	336
University Blvd (1st to 2nd)	554	0.43	47.74	Congress	328
Williams St Island	43	0.07	23.37	Congress	381
Rosamond	45,926	36.00	46.98	Yale	621
	77,245	**79.95**	**35.58**		

2012

Name	YTD Cons	IrrigAc	Inches Used	Shop	LOC
6th & Josephine	127	0.13	37.26	Congress	344
Alamo Placita	3,884	5.17	27.67	Congress	301
City of Karmiel	8,497	3.03	103.21	Congress	341
City of Takayama	5,837	6.06	35.49	Congress	331
Congress (West)	450	0.55	30.13	Congress	314a
Downing St (Speer to 3rd)	218	0.82	9.80	Congress	352
E 1st Ave	1,596	1.47	40.00	Congress	325
E 7th Ave	6,350	6.39	36.61	Congress	306
E Alameda Ave (Colorado to Jackson)	372	0.09	153.21	Congress	334
Franklin St	598	0.62	35.29	Congress	304
Gilpin St	567	0.58	36.29	Congress	383
High St	416	0.50	30.66	Congress	384
Manley	1,167	1.37	31.36	Congress	337
Pulaski	5,987	8.30	26.58	Congress	319
Speer Blvd (1st to 6th)	7,459	7.95	34.55	Congress	307a
Steele St	201	0.41	18.02	Congress	336
University Blvd (1st to 2nd)	1,258	0.43	108.41	Congress	328
Williams St Island	43	0.07	23.37	Congress	381
Rosamond	25,865	36.00	26.46	Yale	621
	70,892	**79.92**	**32.67**		

City of Denver
Parks and Recreation
Central Control Plan

Final / Prepared September 30, 2010

AECOM

Table of Contents

LIST OF FIGURES/TABLES

Acknowledgements

AECOM and the Denver Parks Water Conservation group would like to acknowledge the many Denver Parks department staff members who have provided the critical input needed to develop this plan. We especially thank those who participated as members of the internal advisory committee for sharing their valuable experience and expertise.

Executive Summary

Denver Parks and Recreation Department currently manages 2,900 acres of irrigated landscapes at more than 350 sites. These sites include community parks and open space, community centers, street medians and athletic fields and other city maintained properties. Irrigation to maintain these sites requires approximately two billion gallons of water annually. Maintenance staff utilizes a variety of control systems to manage irrigation operations. Central control-capable control units are installed at only 58 park sites, some of which have multiple control units, with the remaining sites using standalone control systems of various makes and models.

Parks staff is aware that numerous technologies are available that could improve water efficiency and enhance maintenance efforts. Appropriate technologies could be implemented to either augment or replace current systems. It is important to understand various control system capabilities, implementation costs and potential benefits in order to develop an intelligent master plan.

In order to develop this Central Control Master Plan, AECOM updated the City's GIS database with specific site information and controller types currently in use within Denver parks. This data, collected by parks staff, was used to identify sites that are currently utilizing the existing central control system and those that are using standalone control units. Controller data, along with available park classification, irrigated area and historical water use, was utilized to prepare the control system implementation framework. Park information from the City GIS database was used to prepare an overall system analysis based on the established implementation priorities. The analysis considered 10 central control systems with the necessary capabilities to meet the needs of the City's irrigation systems, including the existing Toro Sentinel system. The Calsense ET2000 system was identified as the system that best met the needs and priorities identified, followed closely by the Toro Sentinel system. Given that the City already has a significant investment in the Toro system in terms of equipment and training of staff, and that Toro's Eicon division has committed to specific system upgrades and enhancements that address most of the systems weaknesses in comparison to the Calsense system, it was determined that the Toro Sentinel system should remain the system of choice (see Appendix A, Central Control Analysis).

The implementation framework for the chosen system includes a summary of existing park data and overall central control systems management and provides a prioritized list of central control system features required to meet the needs of the City. These recommendations are summarized as follows.

1. Establish standards for the maintenance level replacement of existing standalone control units that will accommodate future central control system expansion.

2. Establish standards for the maintenance level replacement and installation of new irrigation master valves and flow sensors based on maintenance level recommendations. The ability to assess actual irrigation efficiency will only be possible if water use is quantified by proven technologies and methods. The ability to understand actual efficiency of systems will be critical in identifying opportunities for improvements.

3. Communications Improvements: Develop a communications master plan that will guide the development of communication infrastructure needed to serve existing as well as future system expansion.

4. Weather Data: Implement "Weather Reach" units to enable real-time automatic ET (evapotranspiration) based scheduling.

5. Replace existing stand-alone control units with appropriate Toro Sentinel field units.

6. Implement staffing additions and/or adjustments that will put in place management personnel with the expertise to provide the required level of irrigation system management. This will include city-wide, district and sub-district level staff.

7. Implement training guidelines that include initial and ongoing in-house training as well as specialized training from outside experts as needed.

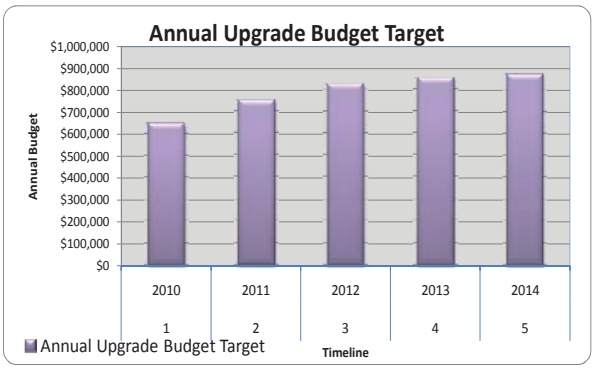
Priority levels were established for all sites in order to develop an implementation timeline for the recommended system improvements and additions. The City has identified a five-year implementation timeline. Given the estimated implementation costs associated with each site, we have estimated the total capital investment that will be required for each year of the timeline.

The costs indicated in the timeline are based on the detailed implementation schedule and costs (See Appendix J, Implementation Schedule and Costs). The implementation schedule identifies the specific sites and associated irrigation control system improvements and additions to be addressed during each year of implementation in order to provide a basis for funding needs.

CENTRAL CONTROL SYSTEM IMPLEMENTATION TIMELINE AND BUDGET

Timeline Years	5	1	2	3	4	5
Start Year		2010	2011	2012	2013	2014
Annual Upgrade Budget Target		$650,000	$750,000	$825,000	$850,000	$872,000

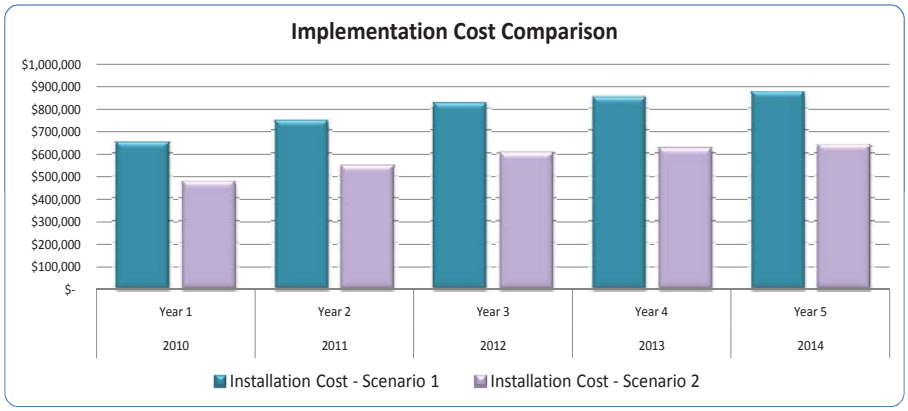
Total Project Costs	$3,933,239.09
Current Outstanding Costs	$0.00
Average Annual Budget Target	$786,647.82
Actual Average Annual Budget	$789,400.00



The following implementation cost summary tables indicate the expected capital costs and potential water savings, as well as the estimated labor and overhead costs, associated with the installation of the recommended system upgrades and additions. The related labor and overhead costs are presented in two scenarios to compare cost variations. The first scenario shows the implementation costs if the installation of system components is completed by outside contractors. Note that the labor and overhead costs indicated in the Implementation Schedule and Costs (Appendix J) are based on installation by outside contractors. The second scenario indicates the system installation costs and potential savings if installation is completed by parks staff.

IMPLEMENTATION COST SUMMARY

		Timeline (Years)	1 2010	2 2011	3 2012	4 2013	5 2014
Capital Costs							
Project Annual Capital Costs			$ 432,820	$ 496,207	$ 547,451	$ 564,958	$ 580,723
Project Total Capital Costs			$ 2,622,159				
Installation Cost - Scenario 1	**Installation By Contractor**						
Contracted Labor & Overhead Cost Factor			0.50				
Project Labor & Overhead Costs	Contracted Labor		$ 216,410	$ 248,103	$ 273,726	$ 282,479	$ 290,361
Total Labor & Overhead Costs	Contracted Labor		$ 1,311,080				
Total - Implementation Costs	Contracted labor		$ 649,231	$ 744,310	$ 821,177	$ 847,437	$ 871,084
Project Total Costs	Contracted labor		$ 3,933,239				
Installation Cost - Scenario 2	**Installation By Parks Staff**						
Parks Staff Labor & Overhead Cost Factor			0.10				
Project Labor & Overhead Costs	Parks Staff Labor		$ 43,282	$ 49,621	$ 54,745	$ 56,496	$ 58,072
Total Labor & Overhead Costs	Parks Staff Labor		$ 262,216				
Total - Implementation Costs	Parks Staff Labor		$ 476,102	$ 545,828	$ 602,196	$ 621,454	$ 638,795
Project Total Costs	Parks Staff Labor		$ 2,884,375				

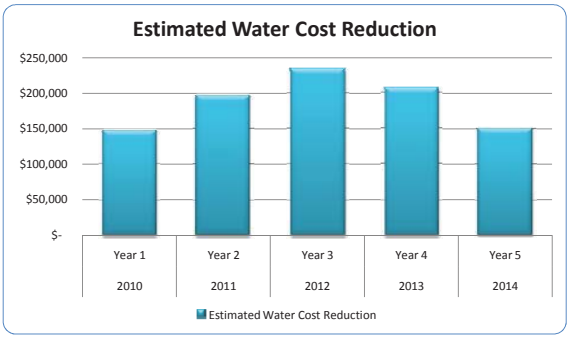


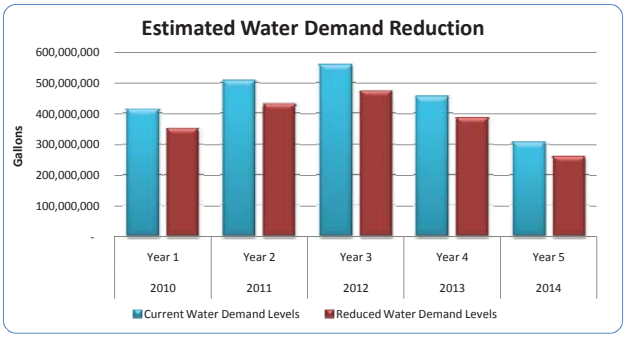
The water use and savings summary provides a comparative overview of the expected annual water use of the sites to be upgraded during each year of the implementation timeline. The annual estimates do not reflect the total Denver Parks usage. Annual water use and water cost during implementation reflect the estimated water demand reduction percentages for each year of the implementation timeline.

WATER USE SUMMARY

		Timeline (Years)	1 2010	2 2011	3 2012	4 2013	5 2014
Water Demand & Cost Reduction							
Estimated Water Demand Reduction			15%	15%	15%	15%	15%
Annual Water Use Estimate (gallons)	Pre Implementation		414,202,620	508,634,054	558,844,239	455,752,919	306,501,870
Annual Water Use Estimate (gallons)	During Implementation		352,072,227	432,338,946	475,017,603	387,389,981	260,526,590
Estimated Water Cost Reduction	During Implementation		$ 147,870	$ 196,654	$ 234,000	$ 206,673	$ 150,527
Accumulated Water Cost Reduction	During Implementation		$ -	$ 147,870	$ 492,394	$ 1,070,918	$ 1,856,115
Total Water Cost Savings Through	**2014**		$ 935,724				
Estimated Water Cost Savings Through	**2019**		$ 14,894,920				

Annual water use indicated only reflects the estimated water use for the sites to be upgraded during each year of implementation.

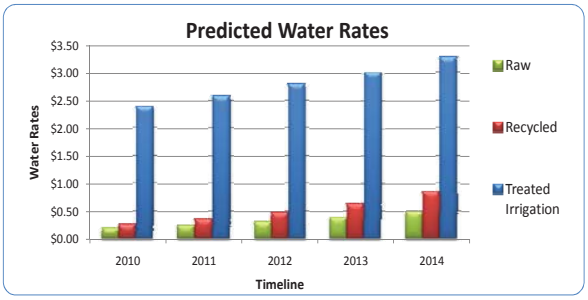




WATER RATES

WATER SOURCE	UNIT		2010	2011	2012	2013	2014
Treated Irrigation (Potable)	1000 gallons		$2.38	$2.58	$2.79	$3.02	$3.27
Summer		% Increase	8.3%	*Estimated Annual Rate Increase*			
Recycled (Treated Sewage Effluent)	1000 gallons		$0.26	$0.35	$0.47	$0.63	$0.85
		% Increase	34.6%	*Estimated Annual Rate Increase*			
Raw (Ditch, Lake, Well)	1000 gallons		$0.19	$0.24	$0.30	$0.38	$0.48
		% Increase	26.3%	*Estimated Annual Rate Increase*			

Source: Adoption of 2011 City and County of Denver Water rates, revised 8/31/09



The project cost benefits are summarized indicating the annual return on the capital investment for each of the installation scenarios. The cost benefit summary table shows the total implementation costs, the accumulated water cost reduction based on the expected water demand reduction, annual return on investment for each year of implementation, and the total return on investment over the 5 year timeline.

Installation Scenario 2, Installation by Parks Staff, will result in a potential reduction in total implementation cost. The potential savings is presented for each year of the implementation timeline and as a total savings over the timeline.

Improved irrigation system management through proper implementation of the selected central irrigation control system will facilitate an overall reduction in irrigation water use based on the estimated water demand reduction percentages. The potential water cost savings, based on the reduced demand and current and future water rates, will result in an overall cost savings in excess of the required system capital improvement costs over the 5 year implementation timeline and will continue to provide a substantial savings over the long term.

COST BENEFIT SUMMARY

		Timeline (Years)	1 2010	2 2011	3 2012	4 2013	5 2014
Annual Return - Scenario 1	**Installation By Contractor**						
Total - Implementation Costs	Contracted labor		$ 649,231	$ 744,310	$ 821,177	$ 847,437	$ 871,084
Accumulated Water Cost Reduction	During Implementation		$ -	$ 147,870	$ 492,394	$ 1,070,918	$ 1,856,115
Annual Return on Investment	Contracted labor		$ (649,231)	$ (596,440)	$ (328,782)	$ 223,481	$ 985,031
Total ROI Over Timeline	Contracted labor		$ (365,941)				
Annual Return - Scenario 2	**Installation By Parks Staff**						
Total - Implementation Costs	Parks Staff Labor		$ 476,102	$ 545,828	$ 602,196	$ 621,454	$ 638,795
Accumulated Water Cost Reduction	During Implementation		$ -	$ 147,870	$ 492,394	$ 1,070,918	$ 1,856,115
Annual Return on Investment	Parks Staff Labor		$ (476,102)	$ (397,957)	$ (109,802)	$ 449,464	$ 1,217,320
Total ROI Over Timeline	Parks Staff Labor		$ 682,923				
Potential Savings	Parks Staff Labor		$ 173,128	$ 198,483	$ 218,980	$ 225,983	$ 232,289
Potential Savings Over Timeline	Parks Staff Labor		$ 1,048,864