



Arapahoe Plaza
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Date: January 9, 2024

To: Kevin Reidy and Jacqueline Daoust, CWCB

From: Lisa VanderHeyden, Senior Project Manager

Re: Final Grant Report for Arapahoe County Grant 2021-2023 – Grant #POGGI,PDAA,202200003276 (CMS175546)

Period of this grant: 05/10/2022 through December 31, 2023

Intent of Grant: Turf Conversion and Conservation Planning for Additional Existing Sites. Scope to include:

- Reduce potable water irrigation. Priority 1 target savings 1.5 million gallons/yr reduction.
- Demonstrate environmental stewardship and leadership at County facilities by planning and implementing water-conserving landscape design. Promote the Priority 1 project within the community as a large-area turf conversion and as a water conservation project through signage, newsletter postings, and through project partners or supporting organizations. Promote Priority 2 projects as they are developed through similar communication means to further demonstrate leadership in water conservation.
- Provide each site included in this request with the flow meters, tie-ins to smart controllers and alarms to allow for real-time monitoring and modification of irrigation to ensure measurement and verification of savings generated.

Through this report Arapahoe County is pleased to describe the successful completion and outcomes of this project by task.

Priority 1: County Administration Facility – West Side Turf Area Conversion. This site originally consisted of 3 acres of irrigated nonfunctional turf, with many mature historical trees across the site and on an island dividing parking areas.

County was engaged in a constant struggle to properly irrigate this nonfunctional turf at its public entry, wasting millions of gallons of potable water in an attempt to maintain an impractical aesthetic.



West Side Irrigation Pre-Project



West Side Irrigated Turf Near Building



West Side Irrigated Island

Planned Activities:

- Plan and implement conversion of irrigated nonfunctional bluegrass lawn to non-irrigated native area.
- Provide dedicated irrigation to existing mature trees and plantings to replace turfgrass irrigation.
- Implement native planting area to enhance visual transition and stakeholder acceptance.

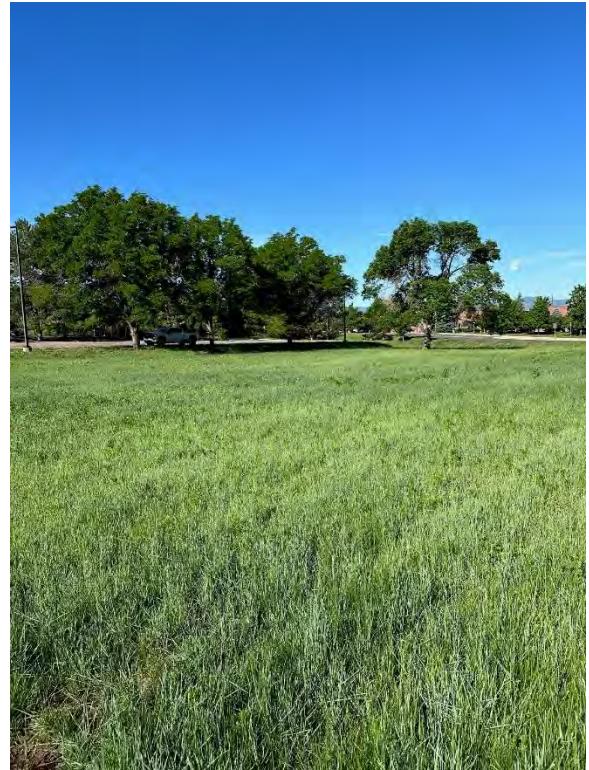
Work Performed:

The grant enabled the County to leverage funds that were to be dedicated solely for replacement of the irrigation system at the site. Expanded work scope included the following:

- Prepared site for large area turf conversion by eliminating non-desired vegetation, aerating and preparing soil;
- Repaired, rezoned and mapped irrigation mains and laterals; replaced most irrigation heads;
- Installed additional backflow and dedicated flow meter; tied to, programmed and set alarms in smart controllers;
- Implemented and maintained native seed area;
- Implemented dedicated irrigation to trees; mulched under trees; installed dry river bed at island;
- Implemented native planting area for visual transition;
- Closely managed irrigation;
- Managed weed control;
- Established ongoing site maintenance plan

Deliverables:

- After a 2-season effort to extinguish the existing turf, weeds and tree shoots, the site was prepared and seeded with a native prairie mix (Green Needlegrass; Sideoats Grama; Western Wheatgrass; Buffalograss; Blue Grama; Sand Dropseed) that will be maintained as non-irrigated except in the most extreme drought conditions after establishment (estimated 2024). The conversion occurred during an unusually hot and dry season 2022, requiring irrigation well into the fall and reseeding the following spring. Nature provided an unusually high rate of natural precipitation in spring 2023, but establishment of the new seed still required irrigation 10 minutes, two times daily from June 19 through July 19 and 20 minutes daily, 2 times per week from August 17 through September 12, 2023.



Native Grasses 2023-06-10



- The grassy area closest to the building was converted to a native planting area to create a welcome visual transition. Due to the excessive heat in the season of planting (fall 2022), some of the species were/will be replaced under warranty fall 2023 into spring 2024 so some supplemental irrigation is anticipated in irrigation year 2024. Following that establishment period this area is anticipated to be non-irrigated except in excessively dry conditions.



Dry River Bed at Parking Island

- The irrigated parking island was converted with pop-up irrigation over horse-hair mulch to provide for the mature trees, with a dry stream bed for visual interest.

Measureable results: This grant enabled County to leverage funds that it had encumbered for multiple sites, greatly enhancing its ability to permanently reduce irrigation at those sites while improving visual appeal and acceptance of the conversions.

At the Administration facility (Task/Priority 1), the goal was a 64% (1.5 million gallon) reduction in site irrigation at the west side of the facility. The year 2023 was an establishment year so we had anticipated a need to irrigate through a good part of the growing season. Due to unusually high precipitation the new seeds thrived without supplemental irrigation until mid-summer and then required irrigation only briefly (as indicated above). Despite being an establishment year, ***actual irrigation reduction on this site during 2023 was over 91%***. Irrigation for this site was reduced from 2,357,000 gallons in baseline year 2021 to 232,000 gallons in 2023. Adjusting for a 14.3% increase (ET rate for the irrigation year varied by 14.3%) to equalize for evapotranspiration, that number could be seen as the equivalent of 265,000 gallons (88.7% reduction). Because the intent on this site is not to irrigate except in exceptional drought circumstances, County anticipates that it will continue to exceed target water use reduction even with a planned reseeding in spring 2024.

A part of this project was a study to determine other impacts of this large site conversion. Site mowing was reduced from weekly to 2 times per year. Chemical applications for weed management are still being fine-tuned but are anticipated to be nearly eliminated after 2024 as the native grasses establish. Fertilizer applications are still being determined but are also expected to decrease significantly. County staff is able to reallocate sparse resources to other sites and is learning a new maintenance paradigm around weed management and maintenance of drip irrigation to native plantings.

Priority 2: Future Waterwise Design and potential Construction over additional sites including Administration east side, Arapahoe Plaza, Centrepont Plaza and Sheriff/Coroner Administration Facility.

At the time of the development of the grant application the County had allocated a small amount to irrigation or landscape projects at the several facilities. Rather than simply replacing irrigation and landscape elements like for like, the grant enabled County to leverage those funds to plan and in some cases implement permanent irrigation reductions.

Planned Activities:

- Administration Facility East Side: Develop plan for eventual replacement of 3 acres of irrigated turf at east side of County Administration Facility.
- Arapahoe Plaza Site: Develop plan and implement irrigation reduction project at Arapahoe Plaza with target reduction from 30 gallons/sq ft/yr to 13 gallons/sq ft/yr (56.67% reduction).
- Centrepont Plaza: Develop overall site plan for future waterwise landscape reductions.
- Sheriff/Coroner Administration: Develop and implement modified irrigation plan to support mature trees on site.

Work Performed:

Administration Facility East Side:

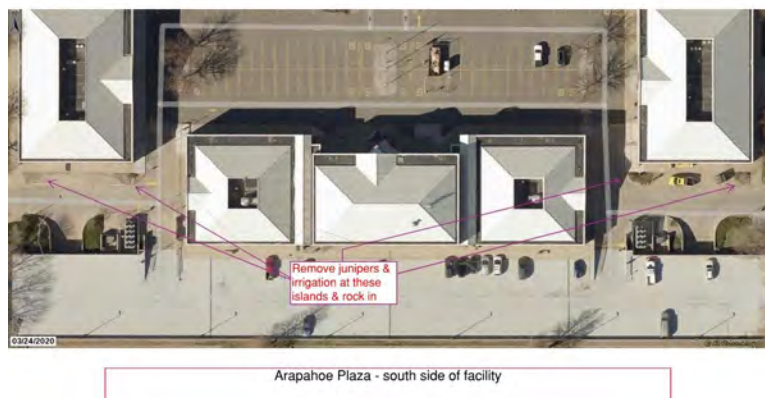
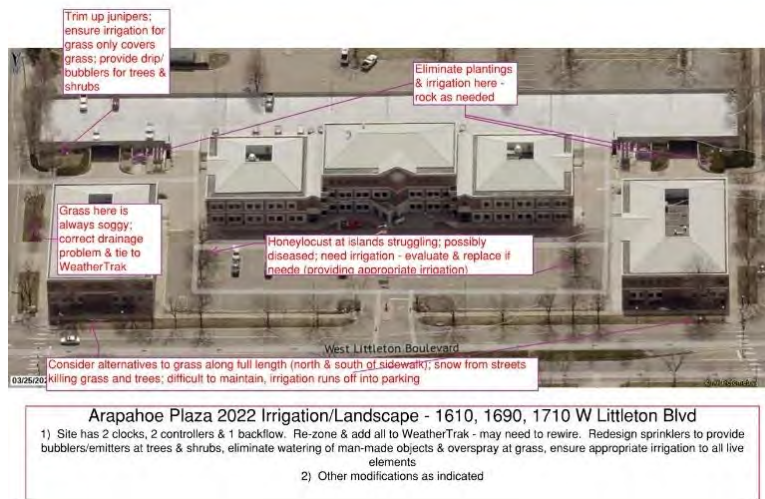
- Developed recommendation to replace irrigated nonfunctional turf at east side of County Administration Facility with a short native seed blend in a future funding year. This recommendation differs from the west side in its intent to reduce but not eliminate irrigation and to reduce but not eliminate mowing. Implementation will be pending leadership approval and budget availability.
- Through separate County funding the irrigation system at east side of Administration facility was fully upgraded and a flow meter tied to smart controllers was installed.
- High slope areas at the east side of Administration Facility where turf grasses could not be adequately irrigated were blanketed and seeded with native seed mix, reducing irrigated turf area and reducing erosion.
- Two dying trees were removed, replaced with three, and provided with dedicated irrigation.

Arapahoe Plaza:

- Arapahoe Plaza site had multiple small, struggling and somewhat neglected irrigated nonfunctional turf or planting areas as well as a number of dead or dying trees. Modifications included:
 - o Extensive repair of a leaky irrigation system and installation of a French-style drain in an irrigated turf area to correct constant soggy conditions;
 - o Removal of irrigated nonfunctional turf at parking islands and along roadway where salts/sands constantly destroyed the turf;

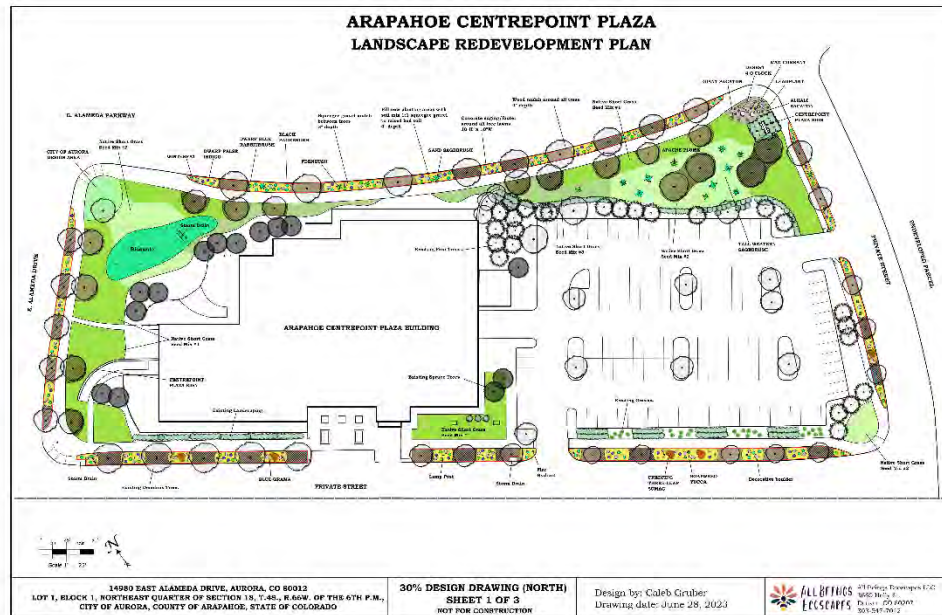
- o Smart irrigation controllers using custom programs and monitoring ET inches were installed irrigation season 2022.
- o Implementation of dedicated irrigation for trees, and
- o Aesthetic improvement of planting beds as described on the graphics below.

A flow sensor was installed in 2022 but worked only a few weeks before failing. County has identified that the irrigation system wiring is degraded beyond repair and the costs to replace beyond reasonable means due to anticipated disruption across the full site including the parking lots. Until such time as the system can be replaced County is manually controlling the zones that are not controlled by the Smart Controller system and actively monitors for signs of unexpected irrigation activity.



Centrepont Plaza: As a part of this grant scope, Centrepont Plaza has been the focus of landscape planning for multiple future budget cycles. During this cycle, the County:

- Commissioned and received a tree appraisal/survey;
- Commissioned site master planning through conceptual design as a tool to use in determining future funding need and phasing opportunities (a partial conceptual draft is attached for reference);
- Reduced irrigation to a sloped nonfunctional, irrigated turf area distant from user areas;
- Collaborated with City of Aurora's Xeric Landscape Team on development of a potential plan for a high profile corner of the site;
- Continued participation in a City of Aurora program to receive immediate e-mail notification of any constant flows over a 24-hour period. This conveys information about a potential leak to County facilities staff, who prioritize resolution of unexpected water flows.



Sheriff/Coroner Administration:

Sheriff/Coroner facility modifications were initially targeted to protection of non-thriving trees, some in irrigated zones and others in non-irrigated spaces around the perimeter of the property.

After analysis the project team determined that many of the targeted trees were beyond recovery and well beyond any aesthetic functionality and that the best outcomes and irrigation reductions could be achieved through other means. Actions taken included:

- Eliminating trees in non-irrigated spaces far from use areas that were dead and beyond recovery or considered invasive species;

- Reducing or eliminating nonfunctional irrigated turf and capping irrigation at parking islands; replacing some nonfunctional turf areas with native plantings;
- Replacing 8 trees and focusing irrigation systems on desired trees to be retained;
- Allowing some zones already adjacent to native grasses to become non-irrigated native themselves;



Nonfunctional Turf at Parking Islands



- Replacing trees in beneficial areas adjacent to site usage areas and
- A flow meter was installed at the site and tied to the electronic irrigation control system.

DELIVERABLES - RESULTS:

Each of the sites has an improved aesthetic appearance, ability to manage irrigation systems and unexpected water flows, and elimination of a portion of its nonfunctional turf. Photos showing some of the site transitions are provided below. The metrics related to these measures follow.

Administration East Side:

County has not conducted measurement and verification of the outcomes of the interim measures since they were not a part of targeted reductions and these changes are considered stop-gap until transformation of that portion of the site is approved and implemented. The focus of scope for this portion of the site was on development of a plan for future implementation.



Admin. East Side slope areas blanketed for erosion



Native Seed/New Trees in Blanketed Slope Area

Arapahoe Plaza:



Nonfunctional Turf Eliminated; Irrigation targeted to trees

At Arapahoe Plaza the parking areas and public boulevard have been transformed from patchy turf to maintained gravel with properly irrigated trees. The planting areas that were removed added nothing to the aesthetics of the site and utilized significant maintenance time and wasted irrigation. These modifications are allowing the County to focus its irrigation efforts on the mature trees and the remaining grassy nonfunctional areas at the east and west sides of the campus and have improved the overall aesthetics of the site.

The targeted irrigation reduction from 30 gallons/sq ft/yr to 13 gal/sq ft/yr (56.67%) has been exceeded. Baseline year 2021 irrigation water usage was measured as 407,976 gallons. In 2023 County utilized 83,970 gallons for irrigation at this site, achieving an irrigation savings of 324,006 gallons or 79.42%. Adjusting based on a 14.3% evapotranspiration rate would equate water usage to approximately 96,000 gallons or savings of 311,976 gallons (76.47%). County has high confidence that it will continue to consistently exceed the targeted reduction at this site.

Sheriff/Coroner Administration:



Nonfunctional Parking Irrigation Removed



Parking Island Conversion In Progress



Converted area near staff entrance

Goals for the Sheriff-Coroner Administration facility were targeted toward removal of non-thriving trees and supporting desired trees. Further evaluation of remaining trees and plantings led the team to implement reduction of irrigated nonfunctional turf in parking lot islands, rezoning of irrigation to support trees in desired planted areas, and replacement of overgrown and non-thriving shrub areas with native plantings with minimal irrigation requirements through drip systems. Through these modifications, **2023 water usage was reduced from baseline year 2021 usage of 2,757,000 gallons to 963,000 gallons – a savings of 1,794,000 gallons or 65%.** ET difference for that site was 4.68” or 14.3%

which would normalize the gallons used to 1,100,709 gallons or 60.08% irrigation savings. While County has no rule of thumb to estimate how much water saved in 2023 was directly attributed to weather vs retrofits and leaks avoided with water sensor, the County is confident that years 2024 and beyond will continue in a similar vein.

ENGAGEMENT AND INNOVATION:

A major goal of Arapahoe County's large site conversion project at its Administration facility was to demonstrate good stewardship of resources and to educate the public about alternatives to large expanses of nonfunctional irrigated turf. County's intent has been and continues to be to explore and demonstrate different solutions appropriate to different sites.

This was truly a learning experience and required consultation with many partners, including CSU Extension through its turf specialist Tony Koski, Pawnee Buttes Seed Company and the selected landscape contractor Elite Industries. County and its consultants drew on the knowledge shared in numerous webinars and articles regarding native plantings and site conversions.

Through this project Arapahoe County became engaged in the Colorado Native Grass Working Group and a collaborator to the *Colorado Native Grass Installation and Maintenance Guide*.

County's Energy Manager convened and led two meetings of a working group of Public Sector metro-area landscape maintenance practitioners to share best practices.

County's Senior Project Manager spoke of the site conversion project and irrigation monitoring and correction practices in a Sustainability Learning Lab presented at the International Facility Management Association's Facility Fusion conference in San Francisco April 2023.

Arapahoe County received the "Large Project of the Year" award from the Denver Chapter of the International Facility Management Association for the Administration Turf to Native conversion project.

The turf to native conversion project was widely publicized before, during and after the project through the combined efforts of the Arapahoe County Communications team and Denver Water. These efforts included:

- Outreach to residents via weekly electronic newsletter
- Posts on social media channels
- Signage at the site during and after the replacement
- Outreach to employees via electronic newsletter
- Information posted on County web site
- Recorded short spots produced by Denver Water Public Affairs
- Newsletter articles and online videos produced by Denver Water Public Affairs.
- Every major news outlet in the Metro Denver market sent live crews to cover the seeding of the site.

- For discussions about the planned future conversion at the east side of the Administration facility County engaged a consultant to survey facility occupants and nearby residents about their use of the site.



ARAPAHOE COUNTY

Sustainability in Action

As water-saving native
grasses establish they'll
push out weeds

County has elected to use simple, easily-customizable signage at sites undergoing landscape conversion and will continue to customize and place signs as appropriate to the work underway and the condition of the site.

The lack of public comment demonstrates that County's outreach efforts have been successful. Throughout the turf to native conversion, a year during which the site at times appeared to be dying off, untended or out of control, the County received only one written or verbal complaint from an individual unaware of the project. No public comments have been received in response to site conversions at Arapahoe Plaza or the Sheriff/Coroner Administration facility.

Samples of some of the outreach products are shown or linked below.

[Making the switch to save water | Denver Water](#)

[Going back to their roots to prepare for the future | Denver Water](#)

[Landscape makeover underway in Arapahoe County | Denver Water](#)

Continued next page

From County Line 06-30-2023



Rain: Bad for Roads Lately, Great for Native Grasses

Remember last year when we began the [lawn conversion](#) on the west side of the Administration Building to native prairie grass? The new knee-high grasses are growing fantastically, thanks to the wet spring. The weather also means that the field is green—we won't regularly irrigate the area so the grasses will typically be a more natural color.

Weeds and tree shoots are thriving now, but that was an anticipated part of the implementation. The landscaper has been working closely with the seed company and following their recommendations precisely regarding mowing, irrigation and weed control. Mowing too much or at the wrong time eliminates the shade that we need to help newer grasses take and eliminates the seed heads that must form and release to build thickness in the new native grasses. Spraying for weeds too early can kill off desired growth, so please be patient over the coming months.

Earlier this month 150 pounds of additional seeds were planted to fill out bare areas. As the grass begins to thicken over the coming years, it will choke out many of the weeds that are now visible. Additional weed control will also be done later this summer.

Overall, the project is looking as we expected and we're saving thousands of gallons of water (and dollars).

From County Line December 8, 2023 Edition:

Sustainability Initiative Updates

The County was selected to host a stop on the Water Resources and Agriculture Review Committee Denver Metro Area tour in October. The committee, made up of Colorado legislators, learned about our turf replacement project at the Admin building. Read about the visit and check out energy-saving tips and tricks in our fourth quarter Sustainability Initiative Newsletter.



**ARAPAHOE COUNTY
SUSTAINABILITY INITIATIVE**



Arapahoe County Sustainability Initiative (ACSI) Newsletter

4th Quarter 2023

View Your Building's Monthly Energy, Water, & Carbon Footprint

- [All FFM](#)
- [Administration](#)
- [Altura](#)
- [Arapahoe Plaza](#)
- [Clerk & Recorder—Aurora](#)
- [Court House 1](#)
- [Court House 2](#)
- [CentrePoint](#)
- [District Attorney](#)
- [Deer Trail Shops](#)
- [Detention Center](#)
- [Detention Center Warehouse](#)
- [Eastern Service Center](#)
- [ACH Englewood](#)
- [Federal Warehouse](#)
- [Lima 100](#)
- [Lima 200](#)
- [Lima 300](#)
- [Lima 400](#)
- [Lima 500](#)
- [Lima 600](#)

Landscape Water

Arapahoe County a Leader in Landscape Water Conservation

Arapahoe County was selected to host a stop on the Water Resources and Agriculture Review Committee Denver Metro Area tour in October. The committee, made up of Colorado legislators, wanted to learn about our turf replacement project at the Admin building. The Committee studies the conservation, use, development, and financing of the water resources of Colorado for the general welfare of its inhabitants and reviews and proposes water resources legislation.

The County was recently awarded a second grant from the State Water Conservation Board to continue our landscape modifications at four county locations: the east side of the Admin building, CentrePoint Plaza, the Justice Center, and the Lima campus.



EDUCATION AND LEARNING:

Arapahoe County is grateful for the funding provided by the Colorado Water Conservation Board and the assistance with grant administration by Kevin Reidy and Jacqueline Daoust. It is our intent to continue to build on successful outcomes in landscape water savings.

This grant allowed the County to initiate and bring into practice whole new maintenance practices.

County recognizes that full establishment of the new native grasses is a three to five year process. We had anticipated a need to utilize increased irrigation at the Administration site for establishment, and in fact had not anticipated Measurement and Verification on any of the projects until 2024 or 2025. In part because the solutions implemented are designed to be no to low-water once established, the outcomes achieved even during establishment exceed the project goals. The County anticipates that the projected savings for all projects under this grant will be exceeded in every year forward.

County landscape maintenance staffing and practices are being realigned with new maintenance realities, and the resources assigned to maintaining each site will be properly educated in and held accountable for maintaining the new landscape and tightly monitoring and controlling irrigation systems. We eagerly await the opportunity to implement new projects with different measures to further increase irrigation water savings and demonstrate other low-water landscape options.

Sincerely,



Lisa L. VanderHeyden
Senior Project Manager
Arapahoe County Facilities & Fleet