Allan Hancock College Overcomes Drought Challenges

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Abstract. The Governor of California declared a State of Emergency in January 2014 in response to the prolonged drought conditions plaguing the State. All Californians were asked to reduce water use by 20%. Allan Hancock College began evaluating ways to conserve water to comply with the emergency and help manage both their labor and water costs.

One of the top priorities during the evaluation was to maintain the playability of the sports fields which was challenging due to their constant use, resulting in a limited water window.

To overcome their challenges, the staff installed the latest in cloud-based irrigation technology including smart irrigation controllers, on-site weather devices, and master valves and flow sensors to detect and shut down leaks and breaks, manage flow, and record water usage. The controllers automatically operated to the full capacity of the system by dynamically determining how many valves could be energized at a time based on actual measured flow rates.

The result was a savings of over 40% of their historical water use while maintaining the sports field turf quality. Furthermore, the labor savings was calculated at 3-hours per staff member, per week, time previously spent on manual watering and programming their previous controllers. The water and labor savings paid back the cost of the control system in less than one year.

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Background

In response to the prolonged drought affecting the State of California, Governor Jerry Brown declared a State of Emergency in 2014. His proclamation “that conditions of extreme peril to the safety of persons and property exist in California due to water shortage and drought conditions with which local authority is unable to cope” was primarily driven by 2014 being the driest year on record, diminishing water supplies. The resulting regulation mandated that Californians reduce water usage by 20 percent.

Allan Hancock College is in northern Santa Barbara County and is part of the California Public Community College system. The college serves the community well with over 98% of its students coming from the local area. It is one of the five best community colleges in the state and has four locations in Santa Maria, Lompoc, Solvang and at Vandenberg Air Force Base. The college is well known for its accomplished athletic programs including intercollegiate football, basketball, soccer, tennis, baseball,

softball, golf, volleyball, cross country, and track and field. The college offers opportunities for those who want to begin a bachelor's degree (university degree), earn an associate degree (two-year degree), prepare for a career, or upgrade skills. The college offers degrees and certificates in more than 100 areas of study. Allan Hancock College is well-known for its English as a second language program, its professional theatre program, and for providing superior support services for its students, including counseling and tutoring.

Although Allan Hancock College was not mandated to achieve the State-wide conservation goal of 20% because the Santa Maria Valley Groundwater Basin's storage was plentiful, the college felt the need to reduce water usage to comply with the local and state restrictions and protect their water supplies for future generations. The College also saw this as an opportunity to reduce their consumption in the face of continued increases to their water costs, thereby saving money.

Challenges

The primary challenge for Allan Hancock College was the maintenance and care of its sports fields. The quality and playability of the turf needed to be maintained, despite the ongoing drought. The need for regular, consistent watering was further hampered by the fields' constant use, both day and night. This prevented the maintenance staff from being able to effectively manually water the fields and their existing irrigation system was unable to apply the necessary water during the allotted time at night.

Although the local water utility had groundwater water available without restrictions, the supply was still limited, and the availability window was short. Furthermore, the City of Santa Maria, in which Allan Hancock College is located, has an average annual rainfall of only 9-inches, further requiring management of the groundwater in the event the basin is not recharged fully and the aquifer begins to be over-drafted.

At the time, the College had not invested in a centralized irrigation system, relying on traditional timers and manual watering to manage the campus. There were no master valves or flow sensors which meant there was no systemized leak or line break detection.

Solution

A system evaluation was conducted by the staff which determined the introduction of master valves and flow sensors as a necessary step to monitor irrigation lines for leaks and breaks. Furthermore, due to the limited access to the sports fields, the nightly water window needed to be carefully managed to optimize the water source availability.

After the evaluation, a smart irrigation system was select to provide a better way of monitoring and maintaining the College's irrigation systems. Flow sensors were installed at each point of connection to automatically monitor the system's water use and shut down valves and master valves in situations when breaks occurred.

The campus also implemented daily weather adjustments using an on-site evapotranspiration (ET) gauge and tipping rain bucket. Since most of the irrigated area was turf, the maintenance staff started

by allowing the system to irrigate based on 100% of ET campus-wide. After careful monitoring through the new system's cloud-based management portal, the various irrigation valves were adjusted up or down as needed, maintaining the plant's quality.

Coupling the daily weather adjustments and the controllers' ability to automatically water to the irrigation system's fullest capacity allowed for the water being applied not only as needed, but also within the allotted time each day that it was scheduled to water.

Results

In short order, the irrigation staff began to see improvements in the sports field turf. The technology the college had invested was paying off. The time previously spent on manually watering and adjusting controller programming was reduced weekly by three hours per staff member per week. The water management reports in the year following installation showed that same areas used over 40% less water the previous year (Table 1). The new technology automating the irrigation system, and the more efficient use of the less expensive well water, resulted in significant savings. In fact, the savings achieved resulted in a return on investment on the irrigation system improvements within the very first year.

Month	Days in Month	Historical ET	Actual ET	Budget (gal)	Adj. Budget (gal)	Usage (gal)	Savings (gal)	Percent Saved
Jul 2017	31	5.13	4.46	1,630,002	1,416,437	1,211,654	204,783	14%
Aug 2017	31	5.13	3.85	1,630,002	1,223,916	942,983	280,933	23%
Sep 2017	30	4.49	4.13	1,426,649	1,312,848	911,271	401,577	31%
Oct 2017	31	3.54	4.62	1,124,797	1,469,159	988,217	480,942	33%
Nov 2017	30	2.36	3.04	749,865	966,747	433,441	533,306	55%
Dec 2017	31	1.71	3.32	543,334	1,056,067	648,622	407,445	39%
Jan 2018	31	1.83	2.38	581,463	756,633	177,270	579,363	77%
Feb 2018	28	2.2	3.07	699,026	976,347	379,359	596,988	61%
Mar 2018	31	3.17	2.72	1,007,233	864,741	204,166	660,575	76%
Apr 2018	30	4.02	3.54	1,277,312	1,126,909	636,554	490,355	44%
May 2018	31	5	3.06	1,588,696	973,590	678,296	295,294	30%
Totals	**335**	**38.58**	**38.19**	**12,258,379**	**12,143,394**	**7,211,833**	**4,931,561**	**44%**

Table 1 Realized Savings from July 2017 through May 2018

Campus staff are cognizant of the necessity to allow technology to function as designed to maximize reduction in water use, and to shorten the time it takes to apply the necessary water. The athletic turf quality has improved greatly making the fields safer and more playable for students.

Conclusion

The effect of Allan Hancock's adoption of the latest in smart irrigation technology not only helped them conserve of the plant's most precious resource, but also allowed them to use that water as efficiently as possible.