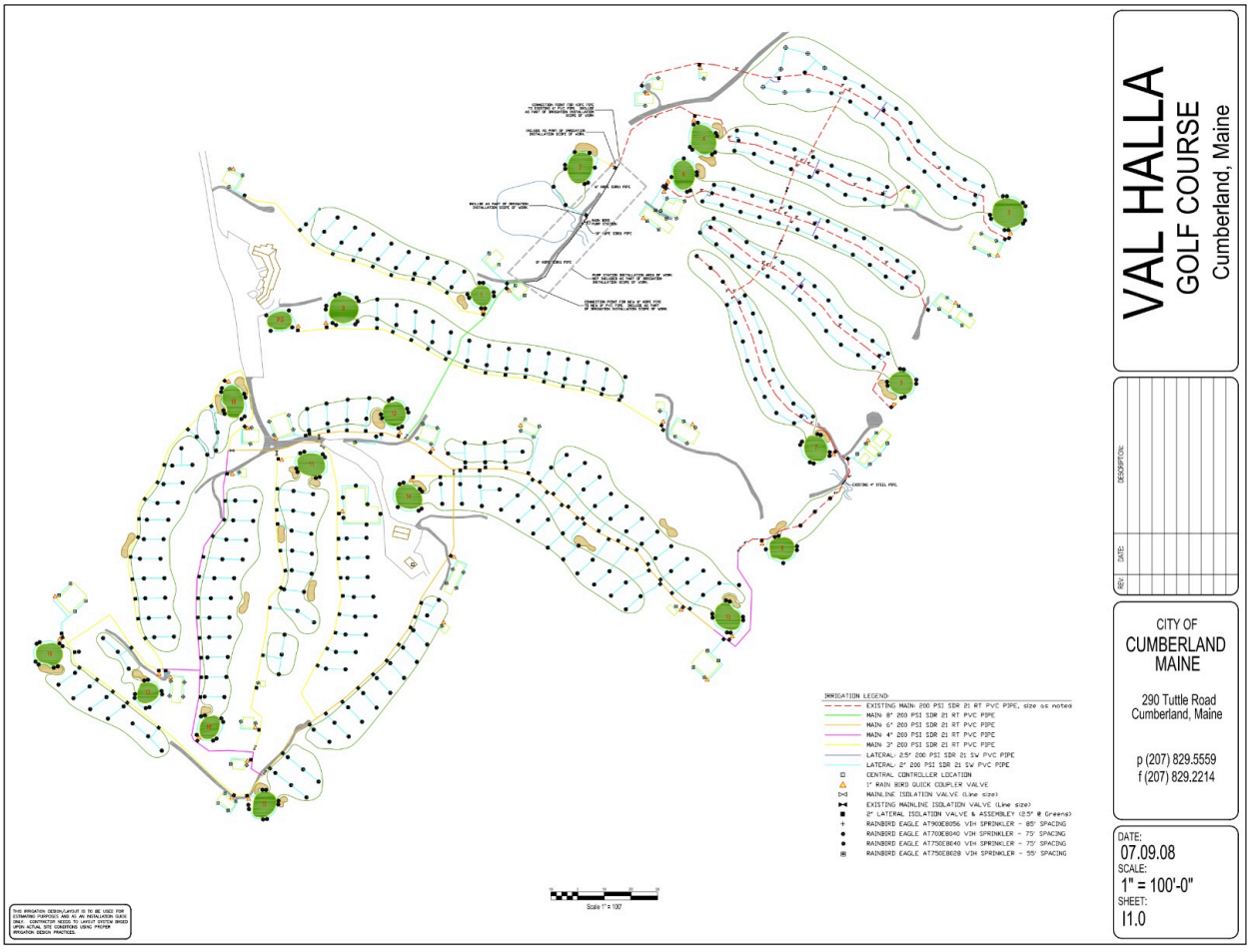
Facility Adoption of Water Conservation & Efficient Use BMP's

Double Row & Independent Head Control
In the fall of 2008, Val Halla installed a new, state of the art, irrigation system. The new system was designed with increased control, efficiency and conservation in mind. The system is comprised of more than 600 irrigation heads - more than double the amount of heads as the previous system. The increase in the number of heads allows us to apply water more precisely. For example, rather than ask a single head to cover a large area of a fairway when perhaps only a small area warrants water, the new system was built on a double-row, grid system where each head is designed to 'throw' water to the other heads. Having more heads cover the same square footage, allows us to run only the head(s) that impact the desired area - which conserves both water and electricity.

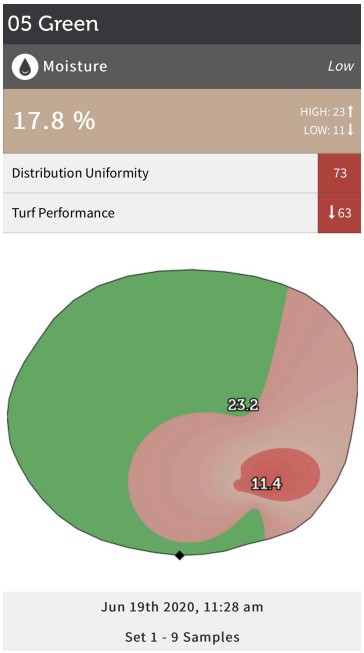
Along with the double-row system in the fairways, the greens, tees and greens surrounds also revolve around the same box principle. These areas use part-circle heads instead of older, full-circle patterns. In lieu of one head next to a green that spins 360° watering the green and the greens surrounds, the system utilizes part-circle heads that have an adjustable turning radius from 5° - 350°. Two heads are placed within close proximity to each other; one to water the green and one to water the surrounding area. Again, this conserves resources by giving us more control over where water is applied.

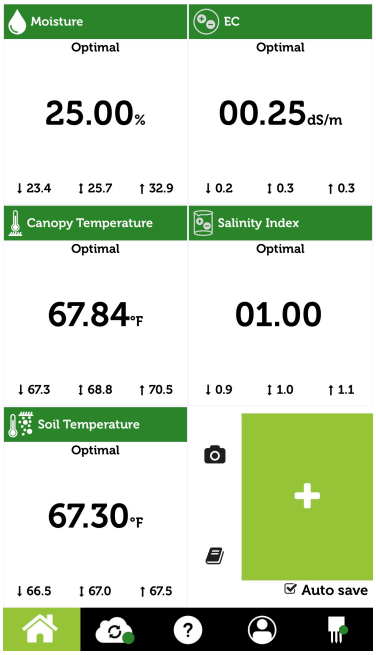
The old system was a 'block-style' design that sometimes had up to 5 heads fed off the same valve in the ground. This means that when you turned on that valve, all 5 heads came up even if you only needed to use one. The new system utilizes 'valve-in-head' technology, meaning every single head on the course can be controlled independently by having its own valve and again, allows us to only put water where it is needed.

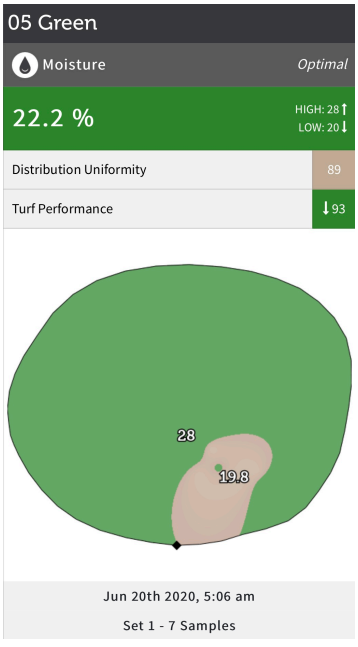


System Control
The new system is a 'Decoder' based system and uses a single, 2-wire cable (MAXI cable) to communicate with the central computer. Similar to the valve-in-head concept, every head on the golf course has its own decoder spliced into the line that contains a unique address. Once all of the location/station data is entered into the central computer, it is similar to the way phone lines work. When you want to turn a head on, the computer knows the decoder address (phone number) and sends a signal to (dials) the exact head. The old system used traditional wiring methods which meant every head had two wires running to a near by control box in the field. These control boxes all had wires which then ran back to the central computer. By utilizing decoder technology, we used approximately 60% less wire than conventional systems.

Moisture Meters & Meteorological Data
The central control computer software allows us to run irrigation cycles manually or automated overnight. Before running automated programs overnight, numerous factors are considered. Staff monitors the course throughout the day for wet areas and 'hot spots' through the use of extremely accurate, GPS based, moisture meters (POGO's). Every area of the course is GPS surveyed, geo-tagged with a location name and the data is uploaded into special software. Once the initial setup is complete, staff can then take the POGO's around to any area of the course, stick the probe in the ground, retrieve the information within two seconds and upload it to the software. The end result is an accurate, color coded, 'map' highlighting any areas that are not within our predetermined parameters. The POGO's have sub-meter GPS accuracy and provide us with volumetric water content, salinity, electrical conductivity, surface canopy temperature as well as root-zone temperature. We also utilize an on-site weather station and ET gauge; a gauge that measures evapotranspiration - how much ground water was lost through evaporation. All of these metrics are reviewed, considered and then head run times are independently adjusted prior to running any automated program.





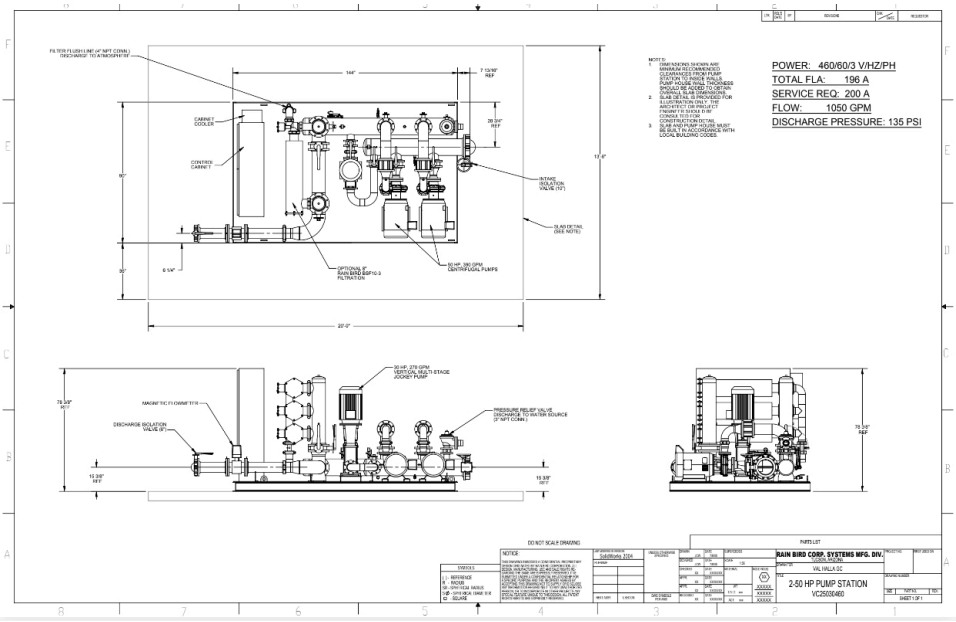


1st photo: POGO visual representation of a hot spot and dry portion of the 5th green warranting irrigation. 2nd photo: POGO data readings the morning after an irrigation cycle. 3rd photo: POGO visual representation of the 5th green the morning after an irrigation cycle.

Wetting Agents
We also regularly apply specialty products known as wetting agents to all areas of the golf course. Wetting agents are sprayable polymers that coat soil particles and change the properties of how water behaves through cohesion and adhesion. In other words, we can change the surface tension of water or, how water molecules cling to other water molecules and soil particles. By using a combination of penetrates and surfactants in different areas of the course, at different times of the year as weather patterns change, we can provide consistent infiltration (in wet spots) and hydration (in hot spots). Through our use of wetting agents, we have increased the soils ability to retain water, minimizing the need for supplemental irrigation and saving millions of gallons of water annually.

Relative Humidity & Hand Watering
There is the common misconception that golf courses water every night but this could not be further from the truth. We may endure a long stretch of hot and humid weather with heat indexes well above 100° and we may not water for several days - sometimes up to a week. The assumption is that because it feels so hot, we must be watering. This is where ET comes into play; if the relative humidity is oppressive, then there is almost no water being lost to evaporation. Using the POGO's, we can find any hot spots that may need water and these areas can then be watered by hand. We have the ability to plug hoses in at every green and tee, as well as into every single head on the golf course. Staff hand waters regularly during the summer months which ensures we are only putting water exactly where it is needed. Applying water to turf that doesn't need it only prolongs the period of leaf tissue wetness and increases the chance of disease and thus, our chemical inputs.

Pump Station & Energy Conservation
When the irrigation system was updated, we also installed a brand new pump station. The pump station was custom designed for efficiency at our property specifically. It consists of two main pumps and a pressure maintenance pump. All three are VFD (variable frequency drive) pumps controlled by a computer. The old pump station had pumps that would run wide open regardless of how many heads were running; they were either off or on. VFD's will only run at the RPM desired by the computer. This means if we turn on one or two heads, the pump motor will run at a very low RPM - whatever is needed to maintain system pressure - instead of running at 100%. With sophisticated central control software and VFD pumps, we were able to lower our electric usage by almost 25% annually. The pump station is also equipped with extremely accurate flow meters as well as high-flow and low-pressure sensors which help us monitor the system of any leaks. Should a substantial leak occur overnight, it would cause an abnormally high flow that the pumps can't maintain (triggering a sensor) which would then cause an excessive drop in system pressure (triggering the low pressure sensor) and shut the station down.



Native Areas
In an effort to create more natural habitat for wildlife to live and move through the golf course, we have converted over 6 acres of maintained turf to naturalized areas. These areas were out of the way, minimally used areas by golfers but areas that were being mowed at 1.5” tall regardless. The side benefit to creating these naturalized areas is that they did not need irrigation. Some were established in areas that were already lacking irrigation, however in other areas, like tee surrounds, irrigation heads were adjusted to keep water from reaching them.

Summary
Moisture plays a critical role in healthy turf as well as the overall playability of the sport. Golfers enjoy firm and fast playing conditions - conditions which can’t occur when the ground is saturated. Through our dedication to moisture monitoring, meteorological observations, the use of wetting agents and hand watering as well as a state of the art irrigation system and pump station, we are able to conserve resources and minimize chemical inputs while simultaneously providing the best playing conditions possible.