Radio Bridges the Gaps For Park Irrigation System

Syringe cycles can be activated by a button on the field station, from the central controller, or with a hand-held remote radio.

On-site weather station.

For centuries Americans have closely guarded their right to have a portion of this country's geography reserved for public use. Our history is filled with examples of people, such as landscape architect Frederick Law Olmsted, naturalist John Muir and President Theodore Roosevelt, who fought to save part of our natural heritage for future generations to enjoy.

Mountain ranges, estuaries, forests and other natural wonders were placed into a bank of protected land, out of reach of developers, industry and others who might place their personal gain above the public interest.

As communities grew, millions of acres of land were added to this bank—not necessarily for their natural beauty, but for their usefulness in serving many of the recreational activities popular with the public.

Instead of huge blocks of land, parks today often consist of many individual parcels distributed throughout a community. And, instead of being preserved in a completely natural state, they are converted into golf courses, baseball diamonds, football and soccer fields, tennis courts and numerous other sports facilities.

Maintaining these parks has become a strategic endeavor, requiring more than park rangers to guard natural resources. Often the land involved is reclaimed from previous use, or is simply impractical for commercial or residential use.

Landfills are converted to parks; flood plains are utilized for recreation much of the year; and rights-of-way near power lines, highways and pipelines are put to productive recreational use. The topography of such areas can often make installation of park utilities and communication cables difficult.

Decades ago, many of these utilities were not even necessary. The primitive nature of parks was part of their allure. Phones, plumbing, irrigation, and even electricity were only added as park use increased. Paved roads and parking areas, concessions, lights and irrigation enabled parks to carry a bigger load. As communities grew, their park departments had new standards to meet — with limited budgets to meet them.

Growth has not been the only source of pressure on public park systems. Recreation has taken on many new forms since the beginning of the century. Responsive park directors do their best to accommodate each new sport as its popularity grows. This has greatly changed the nature of parks and the resources necessary to maintain them.

Griffith Park in Los Angeles, CA, has been changing for more than 60 years in response to the recreational needs of residents and tourists alike. The park, once more than 4,200 acres of chaparral tucked between the canyons of the Santa Monica Mountains and the Los Angeles River, is today the site of four golf courses, the city zoo, a western art museum, a train museum, horse trails, tennis courts and numerous picnic areas.

To convert the desert canyons into recreational areas, the Los Angeles Department of Parks and Recreation had to come up with one primary ingredient: millions of gallons of water every week. If the Los Angeles River had not been dry most of the year, the problem would have been easy to solve. Instead, the park department was forced to depend upon the city water system to irrigate Griffith Park.

continued on page 16

Radio Bridges the Gaps

continued from page 14

In 1914, the parks and recreation department chose the park for its first municipal golf course, the Wilson Course. Golf was a new venture for the department. So they contacted golf course architect Tom Bendolow, a Scottish-born pioneer in park and municipal golf course design, to lay out the 18-hole course. Bendolow had designed the first municipal course in the country in the 1890s at Van Cortlandt Park in New York's Bronx.

Bendolow's concept of a golf course consisted of the bare essentials. The Scotsman, recalling his youth on the primitive links courses, did not attempt to change the desert landscape. He took what was there and added the necessary elements for the game. For a time, that included oiled sand greens.

Central irrigation computer.

Nine years later, George Clifford Thomas convinced the city to let him redesign the Wilson Course. The wealthy horticulturist and rose breeder was fascinated with the landscaping potential of golf courses. He had studied the work of prominent golf courses architects, such as Donald Ross, Albert Tillinghast, Hugh Wilson and George Crump. Thomas added trees, shrubs, and acres of turf to give Southern California golf the rich green appearance of courses back East.

Thomas' work had its desired effect. For a few hours, golfers could escape the desert to enjoy the green golf oasis. Transplanted easterners and vacationers could have their cake and eat it too, playing golf in the winter in springlike conditions.

The department gave Thomas 18 more holes to create in 1926. This became the Harding Course. The two side-by-side courses brought recognition to the city, especially since they were municipal golf courses. Eventually, they would be considered great enough to host the U.S. Open.

The price for Thomas' golf landscaping was not his fee, since it was rumored he never charged for his services. It was an increased dependence upon irrigation to satisfy the thirst of the bentgrass greens, the bermudagrass fairways and roughs, and the small forest that framed the 36 holes.

Installing an irrigation system that reached back into the canyons was a huge undertaking. Unlike eastern golf courses that could get by during the summer just by hosing down greens, the Griffith Park courses required water wall-to-wall most of the year. It was like setting up a water system for an entire community, with mains and laterals extending throughout both courses.

Sprinkler heads for turf were in their infancy. The picky Thomas wanted an irrigation system that would make his landscape possible without disrupting play or marring the beauty of the setting.

Irrigation consultants just didn't exist in the '20s. Each irrigation design was virtually an experiment, piecing together information from a limited number of manufacturers and existing installations. Surprisingly, the manual system that the department and Thomas came up with would serve the golf courses for more than 60 years and was expanded during that period throughout the park. It was a combination of quick couplers in the rough and a brand-new type of underground pop-up head in the fairways.

Since 1907, Thompson Manufacturing had been making irrigation valves and sprinklers in its small foundry, not far from Griffith Park. The company had just developed a cast iron and brass rotary head that could be buried in the ground. A series of these heads could be connected to a single valve.

When the valve was opened, water pushed the heads up above the surface and turned gears to rotate the nozzle. In this way, a rotating stream of water could cover a wide circle of turf, as large as a quick-coupler head covered. The advantage was that the gear-drive heads retracted into the ground when the valve was closed, out of sight of would-be vandals and protected from traffic.

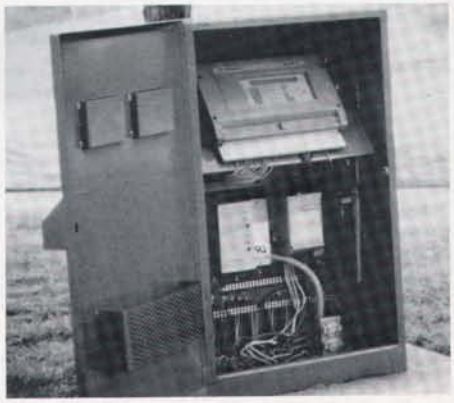
A night waterman with a set of yard-long keys would go from valve to valve in the dark turning on and off zones according to a schedule. The superintendents would leave notes for the night waterman, instructing him to extend or shorten cycles as needed. No one kept records or really knew how much water was being applied. Decisions were made by the appearance of the turf during the day.

As more of the park was developed for recreation, its need for water grew. Three nine-hole courses were added: the Roosevelt course in 1933, the Coolidge course in 1941, and the Los Feliz course in 1944. The Catch 22 of the whole situation was that the park was being developed to meet the needs of a booming population — a population that was using water as fast as, if not faster than, the park.

Pressure from the city water system started to fall below that necessary for the proper upkeep of the park. Booster pumps had to be added to make up for pressure drops and to get water into the upper canyons. *Poa annua* started to overtake the greens, while kikuyugrass began to dominate the wet fairways, frequently rutted by carts. The night waterman simply could not control the amount of water closely enough.

Pressure was on the park to switch from city water to treated effluent. Each year, more and more California cities were passing water conservation ordinances. Sheldon Jensen, assistant general manager of the Griffith Park region, realized that it was just a matter of time before they would have to tap into the water treatment plant across the river for irrigation. He also realized that automatic control could no longer be delayed. The old system had outlived its usefulness and now had to be totally updated.

The first step was to get the treated effluent to the park. A two-million-gallon storage tank was built in the mountains above the park. It was connected to the treatment plant by a 30-inch pipe. The



Field station.

effluent would be pumped to the tank, where gravity would take over and provide the pressure neccessary for irrigation.

By 1984, 60 years after the first system had been installed, irrigation consultants had assumed a vital role in designing large, complex irrigation systems. The park chose Roger Gordon to develop a two-phase plan to rebuild the systems on the Wilson and Harding courses.

The courses would receive all new mains, laterals, valves, heads and controllers. American Landscape, Inc., won the bid for the installation project, one that would take nearly four years to complete. American's crews moved off the site just this month.

At the same time, the landscape architecture section of the department of parks and recreation developed a master irrigation plan which would incorporate the golf course systems with those at all the other recreational areas in Griffith Park. The goal was to utilize effluent everywhere possible and to achieve maximum control over the entire park.

The golf courses would be updated in two phases, the first phase being the 24 holes on the west side of the main park drive. To give the superintendents the most control possible, all new sprinklers were valve-in-head. At the time, Thompson did not make valve-in-head sprinklers, so Toro 634 and 656 heads were specified.

continued on page 18

Radio Bridges the Gaps
continued from page 16

The old manual system often had up to 15 heads grouped into a single zone. There simply was no way to direct extra water to one location without overapplying it to all other areas included in the zone. This wasted water, encouraged disease outbreaks on the greens, and left portions of fairways mushy.

Each new head was essentially its own station. That meant more than 2,500 stations for the 36-hole layout. Only a highly sophisticated control system could handle such a load and provide the park crew with the ability to make necessary adjustments. That meant computerized control.

The golf course section foremen needed to make adjustments from the field, while the department wanted to make changes from a central controller. There were still sections of the park that required irrigation but were so remote that they did not have basic utilities. Finally, the system also had to allow for expansion.

The ultimate solution in the minds of the park department would be a system that was tied together by radio. In that way, all parts of the irrigation system could be managed from a central location without installing communication lines. Unfortunately, no such system existed at the time.

With radio control ultimately in mind, the park selected the Motorola MIR 3500 control system. Even though the system depended upon hard-wire communication between field satellites and a central computer, the company had 60 years of experience in radio. Motorola had agricultural irrigation systems utilizing radio in the field, but had not yet perfected this technology for turf irrigation.

The final ingredient for water conservation in the master plan was a weather station. The park staff wanted the ability to change irrigation cycles so that plants would have the water they required, but no more.

To do this, they needed an on-site gauge of rainfall, humidity, wind velocity, temperature and solar radiation. If they had this information, they could use a formula to determine how much water was needed each day to replace that used by plants or lost to the environment.

As phase one neared completion, the two remaining pieces of the puzzle were found. Motorola released its MIR 5000 radio-controlled system and Aqua Engineering of Ft. Collins, CO, developed a compatible weather station.

The decision was made to install the MIR 5000 on the 12 holes of phase two and retrofit the MIR 3500 from phase one with the new system. Griffith Park would become the first park or golf course to utilize radio control.

The night waterman continued his rounds as, one by one, sections of the park were converted to automatic control. It became clear to the park staff that one person had to be selected to comprehend all the changes a radio-controlled irrigation system would bring about. They selected six-year park veteran Tom McCall.

McCall immersed himself in details. The park was going to operate two separate radio-controlled systems. The first would link five controllers scattered across the park by "trunked radio." This is similar to the system used by companies to maintain communication between a home office and its delivery or service trucks.

Each field controller contains a radio. On the other end is an IBM PC connected to a radio base station. Coded radio signals are sent from either end to a mountaintop repeater station, where they are broadcast over the park. In this way, field controllers can communicate with the central.

McCall cites the example of Ferndale Park, located on the opposite side of a mountain, four miles away from the central computer. "I can check the status at Ferndale from the central in seconds," he explains, "without worrying about phone lines or someone cutting into a cable between here and there. The signal reaches anywhere in the park, so we can add new systems just by installing another controller and radio."

The Wilson and Harding golf courses

operate on an assigned UHF frequency, just like a "walkie talkie." While the range is less, radios on the field controllers can receive instructions from either the central computer or hand-held remotes.

The field controllers are essentially stand-alone units that contain all the information necessary to carry out irrigation. The field units and the central computer communicate at least three times each day to report conditions at each station. If a head or pipe breaks, pressure sensors alert the field controller, which is programmed to shut down that station and go to the next. When McCall arrives at the central in the morning, the computer shows him which station has shut down, so that repairs can be made.

McCall utilizes the weather station data to increase or decrease cycles system-wide each day. By entering one figure at the central, all field controllers receive the change and adjust automatically. "In the short period of time we have used the system, we've saved a tremendous amount of water," remarks McCall. "It's a big change from leaving notes for the night waterman!"

Five optional syringe cycles are programmed into field controllers for greens and tees. By pressing a button on the field controller housing, the golf course section foreman can instruct the unit to activate one, or all five, of the preprogrammed three-minute syringe cycles. The controller reports back to the central that the syringe cycles were activated so McCall can keep track of water use and keep the superintendents informed.

"The signal reaches anywhere in the park, so we can add new systems just by adding more controllers with radios."

McCall also downloads special "wash-down" instructions when crews are fertilizing. "As soon as the crews apply fertilizers to a fairway, they can hit the button to activate the appropriate heads to wash the fertilizers off the foliage and into the soil."

Since gravity provides up to 140 psi and Bermad pressure-regulating valves bring the pressure down to designed operating levels, the park no longer requires booster pumps. "We're saving all the way around," McCall points out. "The turf is noticeably improved, and we're saving both water and power. We also expect to be able to reduce our dependency on fungicides and cut back on fertilizer in the coming months."

James Ward, the superintendent of grounds maintenance for the Griffith Park region, is quite pleased to be in charge of the first radio-controlled park irrigation system in the country. Ward is familiar with the Motorola system, since it is primarily a higher-tech version of the MIR 3500 system. He was the first to install the MIR-3500 at a golf course in the park system's Valley region.

"It's important for management to understand how advanced irrigation control systems work," Ward believes. "It's too easy to say the system can't do something when you start using it, especially when you are the first customer. That is why Tom was appointed to work with Motorola's Dave MeGeath and American Landscape as the system was installed and brought on line. He keeps us all informed about all details. That's important, because we will be converting Rancho Park Golf Course to radio control next. Everything we learn here will be passed on to superintendent Ken Novak at Rancho."

From all reports, George Clifford Thomas would be pleased with the advances made in irrigation since 1924. Both radio and irrigation were new then. It seems only natural that the two would finally be merged, so that Thomas' avocation of golf course landscaping could continue in spite of growing water shortages.