AN EXERCISE IN IRRIGATION PROGRAMMING....

Over the past year I've written a series of articles for "Thru The Green" describing the variables and calculation processes involved in developing an effective irrigation programming schedule. I'll try to wrap up the series this month by running through some simple sample calculations for a theoretical irrigation system program.

Let's assume you work at a course that has the following existing conditions:

-Pump station capacity = 1800 GPM. The pump station is centrally located between front and back nines and provides adequate pressure to all sprinklers at maximum demand conditions.

-Each nine is serviced by a leg of 10" mainline that splits into three legs of 6" mainline each servicing three holes. Each hole has a grid of 2" submain servicing the sprinklers in the fairway and rough.

-Full circle and part circle valve-in-head sprinklers are used, all with nozzle flow rate of 22 GPM. Two sprinklers are typically wired to operate concurrently (as one zone) in fairways and roughs, sprinklers at tees and greens are wired individually.

-You have determined that your peak season watering times for various turf zones are as follows:

- Full circles in fairways @ 20 minutes/night
- Full circles in rough @ 15 minutes/ night
- Part circles in rough @ 8 minutes/night
- Full circles at greens @ 30 minutes/night
- Full circles at tees @ 20 minutes/night

-Your course has 500 sprinkler zones in fairways, 300 rough zones (200 zones for fulls, 100 zones for parts), 100 zones @ tees. The total number of sprinklers on your course in approximately 1700 heads. You have 48 satellite controllers on your course (24 @ each side).

-You can irrigate for 8 hours per night during peak season.

If you want to verify that your pump station can provide the theoretical volume necessary to irrigate within the 8 hour water window you can use the following process:

Fairway fulls = 500 zones x 20 min. = 10,000 min./night x 44 GPM = 440,000 Gal./night

Rough fulls = 200 x 15 min. = 3000 min./night x 44 GPM = 132,000 Gal./night

Rough parts = 50 x 8 min. = 400 min./night x 44 GPM = 17,600 Gal./night

Green fulls = 100 x 30 min. = 3000 min./night x 22 GPM = 66,000 Gal./night

Tee fulls = 100 x 20 min. = 2000 min./night x 22 GPM = 44,000 Gal./night

Therefore, total nightly water use is approximately 699,600 Gal./night. 699,600 Gal./night divided by 8 hours = 87,450 Gal/Hr. divided by 60 min./Hr = 1457.50 gallons/ minute demanded on a nightly basis at your course. Therefore you 1800 GPM pump station should be adequate if your pipe network allows you to operate all controllers concurrently.

To calculate a theoretical program to operate all controllers concurrently you need to determine how many controllers will operate on each mainline leg, and the maximum number of sprinklers that could possibly operate at each controller. In our example lets assume that 8 controllers will be operating concurrently on each 6" mainline leg and a maximum of 2 sprinklers (one zone) will be operating at each controller.

8 controllers x 2 sprinklers = 16 sprinklers x 22 GPM = 352 GPM.

Since 6" CL200 PVC will provide up to 450 GPM at around 5 feet per second (the maximum velocity recommended), it appears that all 8 controllers can run concurrently on each 6" mainline leg. Continue back to the pump station, if all three legs of 6" pipe come together into the 10" mainline the volume of water flowing through the 10" pipe will be approximately 1056 GPM (352 GPM x 3 legs = 1056 GPM). This is acceptable because the velocity of 1056 GPM in 10" CL.200 PVC is approximately 4.5 feet per second. But hold on there! What happens when we get back to the pump station and the other side of the golf course meets this leg? Theoretically we're trying to p[illegible] 2112 GPM from the pump station that is rated for 1800 GPM! somehow you have to reduce your total flow by 312 GPM in the program. You should be able to accomplish this fairly easily by making sure that you never run a series of programs where all operating controllers will be activating greens and tees programs on some controllers while fairways and roughs are operating elsewhere on the course. In this example you will have to run at least 15 controllers that have only one sprinkler activated while all the rest of the controllers are running zones with two sprinklers activated (312 GPM + 22 GPM/zone = 14.2 zones).

If you add up the total theoretical nightly irrigation time calculated earlier you will find that your system needs to run for a cumulative time of 18,400 minutes per night. That equates to 306 hours and 40 minutes per night which is divided among 48 controllers. If each controller has a similar mix of control zones types, your

nightly irrigation time under this peak season condition should be approximately 6 hours and 25 minutes. Since you have 8 hours available to irrigate, you can use the extra 1 hour and 35 minutes for activating lower priority zones that may not have fit into the maximum pump station capacity programming time frame.

By starting with a "worst case" scenario in your theoretical programming calculations you can identify potential problem and develop fine tuning procedures to create an efficient seasonal irrigation program at your golf course before any potential problems become a costly reality. Continuing advancement in the field of computer irrigation control system technology has made it possible for the superintendent to monitor, analyze, and quickly adjust the field controllers to respond to varying water requirements for the irrigation zones on the course. In order to program and operate any control system effectively however, you need to know how much water is required by each irrigation zone, how much water your system can effectively provide to each zone, how may zones the system has and how long it takes to irrigate effectively, and how much time is available to irrigate. After these variables are known it['s just a matter of putting everything together into a logical program sequence. Good luck.

Next month: State Assembly Bill #325 and the Water Conservation Model Ordinance; How Might It Affect Your Course.

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NAUMANN'S NORCAL NEWS

Skip McCaslin has accepted the supt. position at San Jose CC. Skip was the assistant prior to his promotion. He is replacing **Bob Dauterman**...**Ed Miller** has left his position of Superintendent of Golf Course Maintenance for the Pebble Beach Company to become the Director of Grounds maintenance for Desert Highlands Golf Club in Scottsdale, Az...**Dave Davies** has left his supt. position at Dry Creek GC in Galt to become the Supt. at Palo Alto Muni GC under the direction of **Paul Dias.** Paul was recently promoted to the Director of Golf Course and Parks.

AUTOMATIC RAIN TURF DAY

Automatic Rain will hold a Turf Day on March 24, 1993 at the Alameda County Fairgrounds, Pleasanton, Calif.

Seminar topics to include the following: Pesticide Laws and Regulations; Common Diseases and Insect Problems in Landscape Trees; Pest Management and Water; Weed Control in Turf; Nutrient Management for Healthy Turf; Improving Vegetation Control Program; Spray Calibration, Why and How; Precipitation Rates and Sprinkler Irrigation; Troubleshooting Irrigation Systems; Troubleshooting Irrigation Control Valves; Troubleshooting Irrigation System Wiring. Also Toro "Red Iron" Equipment and outdoor demonstrations on irrigation equipment, over 30 manufacturers exhibits and more. CDFA credits have been applied for. Contact any of the 12 local Automatic Rain locations for registration info. There is no charge for the event by registration by March 17th is required.

For further information contact Pam Grady at 415-323-5161.