PHYSICAL PROPERTIES INVOLVED IN IRRIGATION SYSTEM PROGRAMMING

Last month this article described some of the important environmental factors that determine how much water needs to be applied for effective irrigation of your turf. This month the focus will be on the properties of your irrigation system that affect how much water can physically be applied during a specific watering period.

The system components that have the greatest impact on the amount of water applied to the turf during an irrigation cycle are the controllers and the sprinkler heads. The controllers are programmed to signal the heads to open and allow irrigation for a certain length of time and in a specific sequence. When the sprinklers are allowed to open, they are designed to automatically distribute water over an area by using the available force of water that is supplied to them through the pipe network. The amount of water that is supplied to a given area by a group of sprinklers during a period of operation is termed the "precipitation rate" of those sprinklers. Precipitation rates are expressed in inches per hour units to maintain consistency with rainfall, evapotranspiration, and soil moisture data measurements. The two main variables involved (expressed as a flow rate in gallons per minute or "GPM"), and the area of coverage within a group of uniformly spaced sprinklers. Precipitation rate formulas are normally based on flow rates from full circle sprinkler patterns because part circle sprinklers with similar flow rates will make more passes over an irrigated area and therefore provide a proportionally greater amount of water to that area over the same watering period. For sprinklers that are installed in a uniformly square pattern with head-to-head spacing, precipitation rates within the square area formed by four sprinklers can be calculated as:

$$= \frac{\text{Flow from one full circle sprinkler (GPM)} \times 96.3}{(\text{Typical spacing between two sprinklers})^2}$$

For sprinklers that are installed in a uniformly triangular pattern with head-to-head spacing, precipitation rates within the equilateral triangle area formed by three sprinklers can be calculated as:

$$PrT = \frac{\text{Flow from one full circle sprinkler (GPM)} \times 96.3}{(\text{Typical spacing between two sprinklers})^2 \times .866}$$

For example: If your course has sprinklers installed uniformly at 65' spacing in a triangular pattern, and the sprinklers are each providing a flow of 20 GPM through the nozzles, you can calculate your precipitation rate as:

$$PrT = \frac{20\ (GPM) \times 96.3}{(65')\ (65') \times .866} = \frac{1926}{3659} = .53 \text{ inches/hour}$$

Each of these formulas depends on uniformity of sprinkler spacing and layout pattern, matched nozzle flow and operating pressure, and rotation speed uniformity at each sprinkler.

An alternative method to determine actual precipitation rates at your golf course is presented by the California Department of Water Resources "Landscape Water Management Program". This method involves the placement of catch basins in a uniform pattern throughout an irrigation zone that has similar sprinkler characteristics. Each catch basin must have a uniform "catch area opening" and should be transparent with the sides marked in milliliters for easy "catch volume" measurement. These catch basins are laid out in a uniform grid within the irrigation zone and the zone is turned on for a designated length of time (long enough to determine a measurable volume from the irrigation water stream). The precipitation rate for the zone can then be calculated using the following formula:

$$Pr = (CVavg \times 3.66) / (Tr \times CDA) = \text{inches per hour}$$

with the variables in this formula being:

CVavg =Average of Volume in Catch Basins (milliliters)
Tr = Testing runtime (minutes)
CDA = Catch Device opening area (square inches)

Instruction for proper methods of data collection using this procedure (and a computer software package for automatic calculation of precipitation rates from the field data) is provided by the California Department of Water Resources during their two day seminar course in "Landscape Irrigation Auditor Training".

At this point in the irrigation system programming process you will have accumulated the necessary information for your golf course that indicates how much water the turf needs and how much water your sprinklers will provide. The next step is to combine this data and effectively use the capabilities of your control system to provide the water in an efficient manner.

Next Month: Combining the required data into a baseline Irrigation Program

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NAUMANNS NORCAL NEWS

Gary Williams is the new superintendent at Meadowood CC in Saint Helena. Gary is replacing Dana Waldor who moved to Hidden Valley lake CC...**Ed Manry** has replaced Steve Good at Napa Muni Golf Course. Ed most recently was working in Fresno...**Bob Painter** has accepted the Superintendent position at La Rinconada CC. Bob was working in the Scottsdale area prior to his move...**Charles Pratt** is the new Superintendent at Sequoyah CC in Oakland replacing Blake Swint, now at Castlewood CC. Chuck was the Superintendent California Golf Club before moving across the bay...**Bob Costa** has been promoted to Assistant Vice President, Director of Golf Course Maintenance for the Lombardo Group. The Lombardo Group manages Laguna Seca Golf Ranch, Pajaro Golf Course, Old Brockway Golf Course, Rancho Canada Golf Course and Fig Garden Golf Course.

A LOOK AHEAD

April 27	Palo Alto Hills CC
May 4,5	CGCSA Annual Meeting Ojai Valley Inn
June 19	U.S. Open-Pebble Beach
July 13	Lake Merced-Supt/Pro
August 14	Marin CC
September 14	Pasitiempo CC
October 9	Sierra Nevada Chapter joint meeting
November 11,12	GCSANC /UC CooperativeExtension Golf Course Institute
December 4	Christmas Party