COMBINING THE REQUIRED DATA INTO A BASELINE IRRIGATION PROGRAM - PHASE II

You might recall from last month's article that the daily 'ET applied" (ETa) for healthy turf is equal to the daily evapotranspiration rate for the turf (ETc) minus the daily effective rainfall (E.R.), which can be expressed by the following equation: **ETa = ETc - E.R. = inches of water to apply/day**

This equation is to be calculated for each month of the year and we used an example for the month of March where ETc = .07" and ER = .05" which meant that our daily ETa = .07" - .05" = .02"/day in March.

The next step in the programming process involves calculating the approximate amount of time necessary to run the irrigation system in order to apply the proper amount of water to the turf. It is often easier to complete this calculation after converting from daily ETa to weekly ETa. This is accomplished by multiplying daily ETa X 7 days. Following March example equation the weekly ETa will be .14" of water per week. The following equation is used in determining the required run time for the sprinklers to provide this amount of water based on the ETa value and the precipitation rate(Pr) of the sprinklers.

ETa (inches/week) ÷ Pr (inches/hour) = Run Time (hours/week)

Applying this equation to our March example we can calculate the required weekly run time:

Weekly ETa = .14"/wk.; Pr = .53"/hr. (as calculated in a previous article)
Run time = .14 ÷ .53 =.264 hours/week

Because most irrigation control systems are set minutes of operation it is important to convert the run time into minutes per week. This is easily done by multiplying the hours per week figure X 60 mins./hr. = 16 minutes/ week. The weekly run time figure can then be divided by the number of days available for irrigation of the zone; in this example we'll assume that we want to water four days a week:

16 min./wk. ÷ 4 days/wk. = 4 minutes/water day.

This is an appropriate point to stop and review the programming process, variables, and equations that we have used so far.

The main environmental factors of the site to be considered for effective turf irrigation system programming are:

•Turf Water Requirement after adjusting for allowable water depletion stress (avg. inches per day for each month).

•Evapotranspiration Rate for turf on-site (avg. inches per day for each month) **ETc = inches/ day**

•Effective Rainfall on-site (avg. inches per day for each month)
ER = inches/day

The main physical characteristics of your irrigation system to be determined for effective turf irrigation system programming are:

•Precipitation Rates for each irrigation zone (inches per hour) Pr = in./hr.
*Number of Watering Days and Watering Time (minutes and hours) available for use.

These variables are put to use in the following programming calculation process:

1. Determine daily ET applied (ETa) on a monthly basis for the site by using monthly data and this equation:
ETa = ETc - ER = inches of water to be applied on a daily basis for the month.

2. Convert daily ETa into weekly ETa:
Weekly ETa = Daily ETa X 7 days/week = inches of water to be applied on a weekly basis for the month.

3. Determine approximate weekly run time for each zone from this equation:
weekly run time = weekly ETa ÷ Pr for zone = hours/week.

4. Convert weekly run time into minutes:
weekly run time (hrs./wk.) X 60 mins./hr. = weekly run time (mins./wk.).

5. Determine run time per water day:
weekly run time (mins./wk.) ÷ available water days = daily run time (mins./water day).

If you have accumulated accurate environmental data and physical characteristics for your irrigation system, and have calculated each step properly you should know the required run times for each irrigation zone on your golf course on a daily, weekly, and monthly basis. The next step is to incorporate this information into your irrigation control system.

Next Month: Using your Irrigation Control System Effectively

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