Irrigation System Design

Irrigation systems should be designed to be efficient, distribute water uniformly, conserve and protect water resources, meet state and local code, and meet site requirements. Site specific characteristics and incorporation of water conservation practices and technologies should be evaluated in the design. The Irrigation Association lists 25 design-oriented BMPs. The figures below include examples of irrigation site-specific design and technologies to conserve water.

Irrigation site-specific designs and technologies help to conserve water. ***Source*****: Frank Rossi.**

Site Considerations

The design and operation of an irrigation system must be tailored to conditions on the course. Planning should account for different soil types, areas of irrigation, and turf species. Soil conditions dictate how much water is needed to complete deep and infrequent cycles to replenish water in the root zone. The areas of irrigation may also vary in their water requirements depending on site characteristics such as aspect to the sun, hill slopes, and degree of shade. For example, wind-exposed areas have greater transpiration losses than sheltered areas and therefore greater water requirements.

Infrastructure

Infrastructure design considerations include sprinkler and piping placement, sprinkler coverage and spacing, and communication options and serviceability. An irrigation system must be designed to match peak demand. The capacity to deliver more water in a short interval of time can be increased up to, but not exceeding, the infiltration rates of the soils. Any increase beyond the infiltration rate results in runoff.

The type of system used for irrigation influences the efficiency and effectiveness of water usage. Single head systems irrigate the areas closest to the head more than areas farther out. The difference in distribution uniformity presents a serious problem, as achieving planned water replacement on the outer reaches of the head results in excess water being applied in the middle and increases the risk of runoff. Double-row systems offer an improved efficiency over single-row coverage, although manual watering or other types of supplemental watering may be needed outside the fairway area and into the extended rough. Multi-row sprinkler systems provide the best method to control and conserve water, with the ability to respond to specific moisture requirements of a given fairway area. In addition, newer designs are available with multiple nozzle configurations, back and front, that provide the flexibility to more precisely size the system and improve distribution uniformity.

Advanced irrigation control systems are recommended when possible because they provide precision irrigation control. These systems provide specific schedules for each green, tee, and fairway and allow course managers to make adjustments for differences in microclimates and root zones. Weather stations can be integrated to calculate and automatically program water replacement schedules. Additional features may include rain stop safety switches that either shut down the system in the event of rain or adjust schedules based on the amount of precipitation. Advanced systems can connect soil moisture meters, temperatures gauges, and salinity probes installed on the course.