

Water Management and Golf Course Design

BY LLOYD VON SCHELIHA

GOLF COURSE DESIGN AND CONDITIONING ARE A MAJOR INFLUENCE ON GOLFERS' ENJOYMENT OF THE GAME.

A recent Golf Enjoyment Scorecard conducted by the National Golf Foundation (NGF) found that course conditioning, course design and course aesthetics make up 42 percent of golfers' enjoyment of the game (*NGF, Inside the Ropes*, September 2008).

The way the course is designed has a significant impact on the way the course plays, the conditioning and the requirements of the irrigation system. "The irrigation system is the bloodstream of the golf course," says Bruce Charlton, president of the American Society of Golf Course Architects. "The playing conditions will certainly change depending on the amount of water applied to the course. More water does not necessarily mean better playing conditions."

The role of the irrigation system is to replace the amount of water that is lost from the turf through evaporation and transpiration. This is most efficiently accomplished by providing even distribution of water through proper sprinkler selection, location and operation.

Efficient distribution will provide a consistent playing surface that is both visually pleasing and enjoyable to play. An inefficient sprinkler system will cause areas of both firm/fast and soft/slow turf providing inconsistent playing surfaces. This inconsistency can be frustrating for golfers and detract from the enjoyment of the game. This can lead to member dissatisfaction and an increase in complaints.

The irrigation system must work with the design of the course to ensure a proper supply of water to achieve optimal playing conditions, such as firm fairways and fast greens.

Golf course architects will typically design the routing of a golf course to fit with the natural flow of the land and as the course routing follows the contours of the land, natural collection areas are formed. Gravity enables natural precipitation to gather in these collection areas out of play. This helps ensure the turf is receiving adequate precipitation while removing excess water, thus maintaining a firm playing surface.

Intelligent water management is important in many facets of a well-designed, well-maintained course.

- **Golf course design** – the course design is a key component to the effective management of water. "It's important to understand the natural patterns and flow of water throughout the site," Charlton says, "and then orient the golf holes to take advantage of these natural flows and potentially capture runoff and recycle excess water." For example, many courses try to locate water hazards in naturally occurring low points on the site. This allows for a natural flow of water into the hazard. Additionally, the way the course is designed will also have a major impact on the size of the irrigation system required to maintain the turf. The increase in the use of reclaimed or recycled water has added another design consideration. The proper storage of reclaimed water is an important issue. Also, the quality of the water requires many design considerations including making appropriations for leaching the accumulated salts from the soil.

- **Playability** – golf course design that provides for movement of water off the course and efficient irrigation dramatically impacts playability. However, irrigated turf is only one part of the design. Non-irrigated natural turf also provides playable areas that are equally challenging and enjoyable parts of the course. A reduction in irrigated turf areas can help to reduce water consumption. A design that reduces the amount of irrigated turf and increases the size of the natural area may actually increase the number of sprinklers in the irrigation system. This may seem counterintuitive, but more sprinklers may be required for a smaller acreage to provide the precision control necessary to effectively water only the irrigated area, while leaving the naturalized areas without supplemental water.

- **Water conservation** – Many courses are designed to capture as much natural precipitation as possible to be reused in the irrigation system. In addition, irrigation systems that

provide individual sprinkler head control provide the superintendent with maximum irrigation precision and help ensure that areas receive the correct amount of water. Capturing and reusing natural precipitation, and applying it efficiently, helps to ensure that a valuable resource is maximized while minimizing the cost of water. Technology can also play a major role in conservation. Products like computerized irrigation control systems that dynamically adapt to changing conditions using inputs from weather stations and soil moisture sensors help limit the amount of water used to the amount of water required to maintain the highly desired firm and fast playing conditions.

• **Maintenance** – The level of golf course maintenance required to achieve the desired playing conditions has a significant impact on the operational budget of the course. There is also a substantial impact on the capital investment required to build or renovate the course. For example: there has been a lot of research into turf grass varieties. The type of turf used on the course will dictate the time and resources required to maintain it. Decisions regarding the level of golf course maintenance are often dependent on environmental conditions, budgetary considerations and the

desired feel of the course. The type of turf used will impact the water requirements and consequently the demands on the irrigation system.

• **Stewardship** – Responsible use of the land and water resource is critical to successful water management. Incorporating wetlands into the course design will provide areas to capture and naturally filter potential contaminants and chemicals from runoff. Many golf course superintendents are already proactively managing the use of chemicals to minimize the applications on the golf course, helping to reduce the consequences on the property. Wetland areas also allow for water to percolate back into the ground and replenish aquifers. Many golf courses are participating in programs such as the Audubon Cooperative Sanctuary Program for Golf Courses, which demonstrates a commitment both to the environment and the game of golf.

As water scarcity, regulations, and costs increase around the world, it is

important for golf courses to consider how the course design impacts the water management needs of the facility, as well as the bottom line.

As golf courses incorporate successful water management tools into golf course design, including efficient irrigation systems, they can begin to be viewed as part of the solution to potential water issues. Clearly, it is possible for golf courses to use course design for effective water management, while also providing an enjoyable experience for the golfer. **BR**

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