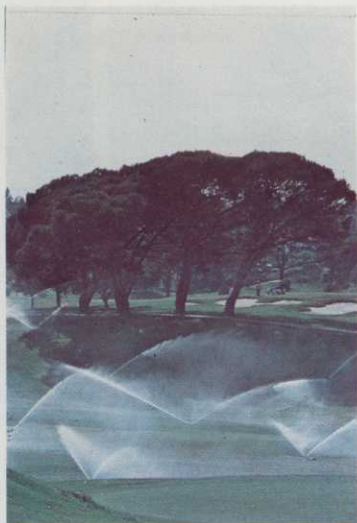


THE GREENING OF GOLF

Automatic irrigation masters even the toughest courses



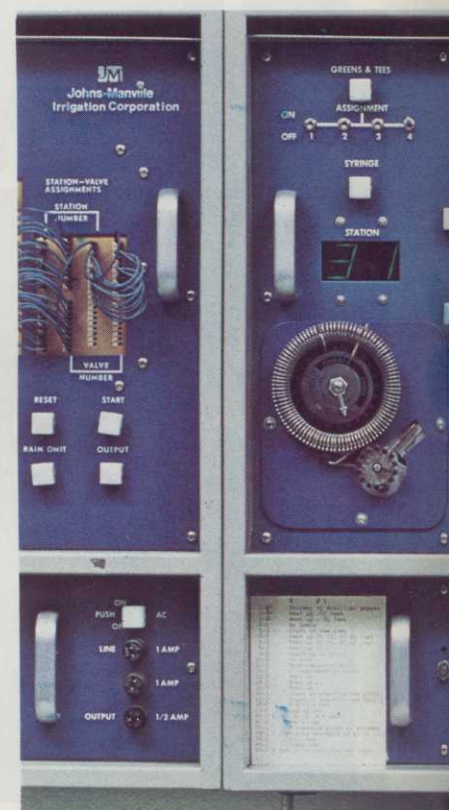
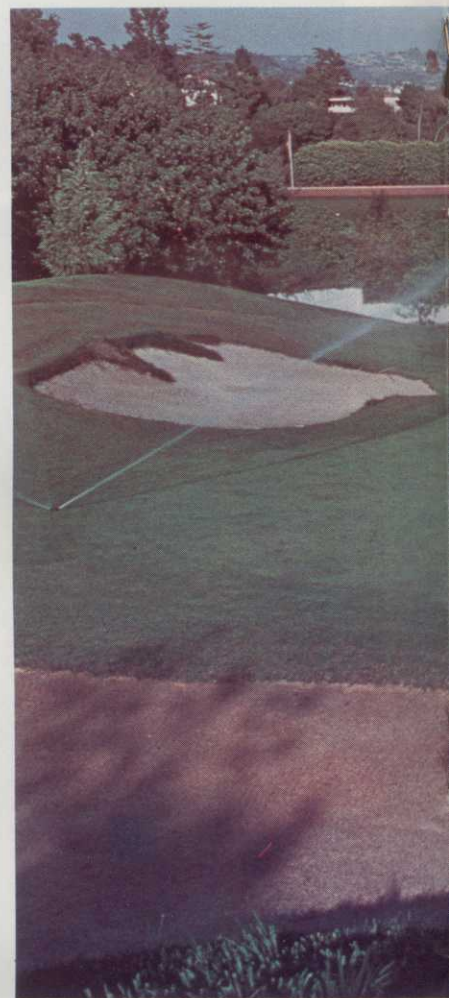
Virtually all golf courses today employ some sort of irrigation or sprinkler system to water their turf, but many of these systems are really not up to handling the task demanded of them.

In most of these cases, the system is simply timeworn. It may have been fine when the course was built or the sprinklers installed, but time has very deleterious effects on irrigation systems. The pipes and other components corrode and deteriorate; rust, silt, sand, and other impurities build up inside the system; and the water pressure amplifies even the smallest breaks and cracks. Tree roots, burrowing rodents, and careless maintenance personnel can wreak havoc on the underground (which is to say **most**) parts of a water system. Unfortunately, the cost in time and money and inconvenience to golfers keeps many superintendents from digging up the old system for renovation or replacement.

Many other systems are old and, although not in too bad condition, outdated. A survey of golf course superintendents across the country conducted by GOLF BUSINESS earlier this year showed that more than half were still using hose and/or quick-coupler watering systems. There's nothing wrong with these systems in themselves, and in areas where little watering is done or few changes in watering patterns and schedules must be made, they work just fine. But on courses requiring fairly complicated timing and spacing of sprinklers — frequently combined with necessary adaptability to changes in weather — automatic irrigation is practically a must. Placing and replacing sprinkler components manually just requires too much time and labor (which equals money).

A third consideration in re-thinking a golf course watering system is that of the requirements of the terrain. Often automatic irrigation can help a superintendent overcome problems he actually had thought would prevent him from using an automatic system. The two stories that follow are cases in point.

Even though your course may not be as extreme a case as either of these two — or even if it's worse — there's still a lesson to be learned here. That is: before you make up your mind on what to do about irrigation, ask an expert. Ask a consultant or a manufacturer's representative what he thinks would be the best type of system for your course, for your individual situation. Unlike a greensmower or a golf car, an irrigation system can't be bought off the shelf, delivered to the course, and put to work. It requires knowledge and planning, but the results will be worth it.





Irrigation rises above the hills of Bel Air

by A. R. Twombly

What was wrong with Bel Air Country Club's previous irrigation system was summed up by our assistant superintendent, Charles "Bud" McDonald, as well as anyone could: "You had to water everything or shut everything off was about what it amounted to."

That just wouldn't do. Bel Air is a proud golf club, celebrating its 50th anniversary this year. Members include some of Los Angeles' most distinguished business and professional people as well as some of the best-known names in the film industry. The site of this year's U.S. Amateur Championship, Bel Air is a beautiful course, and members and staff are eager to keep it that way.

Although within the City of Los Angeles, the course is in Bel Air, near Beverly Hills in the scenic Santa Monica Mountains. Golfers on the 10th hole tee off across the canyon, following the ball — if they are good enough or lucky enough to get it across — by crossing over a suspension bridge. On other parts of the course, they drive their golf cars through tunnels dug under high hills to get from green to tee.

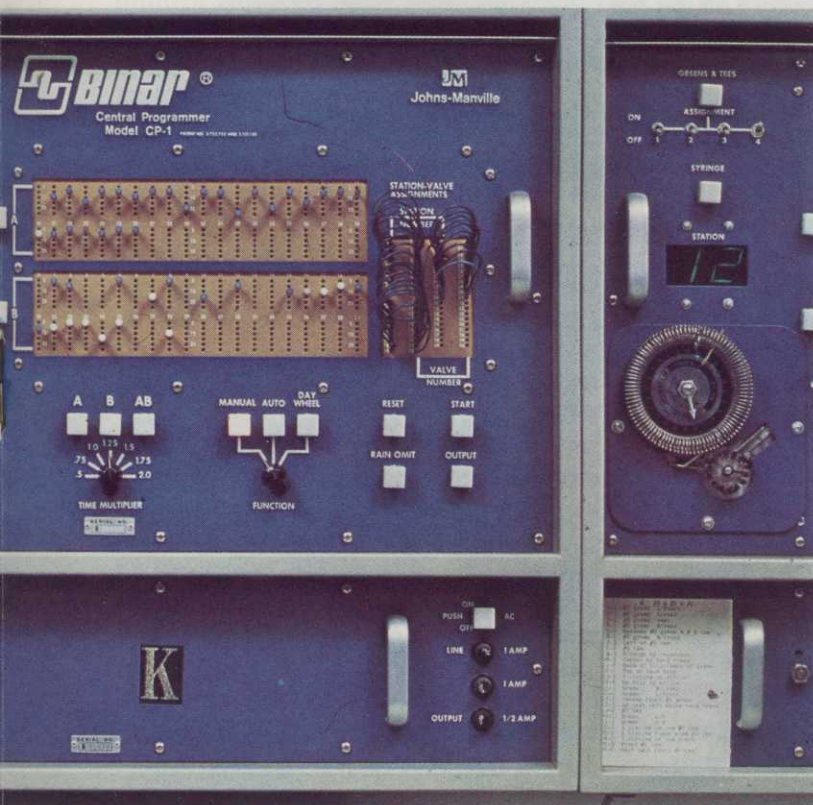
To enhance this setting, we have taken particular pains with the plantings. Although many golf courses don't, we water wall-to-wall — everything within bounds, including the roughs. This has been difficult because we don't want any brown within the play area but we also don't want to water so much as an inch out of bounds. The course is adjacent to many fine homes, including those of such personalities as Alfred Hitchcock, Mary Tyler Moore, and Charles Bronson. These properties frequently contain exotic plants, with their own strict watering needs, and our irrigation might be too much for them. On other sides the course borders highways, and we have to be careful not to spray motorists.

But our biggest problem throughout the course's years of operation has

ABOVE: Bel Air Country Club installed a new automatic irrigation system to handle problems created by lovely setting in Santa Monica Mountains.

LEFT: Binar programmers, located in superintendent's office, control irrigation automatically once they have been set.

Ardyce Twombly received a 1976 Citation of Performance Award from the GCSAA in recognition of his superior course preparation. He has been course superintendent at Bel Air Country Club for five years.



been the hilliness of the terrain. Elevations vary from a low of 429 feet to a high of 662 feet — a difference of 233 feet. In irrigating the hills, as in irrigating the edges of the course, control has been important, but hard to attain.

Although Bel Air has experimented with irrigation systems since the 1920's, when it installed some old steel pipe from an oil rig, we continually found we were getting too many wet spots and too many dry spots. We installed many gate valves — we eventually lost count — each operating up to 16 sprinkler heads, but control remained too crude. Eight months of the year we employed two people just as night irrigators. They had to go out and physically attach sprinkler heads to quick couplers, then walk back up the fairway to a main valve and open it up. This needless to say, got costly.

Many of the fairways are level, or reasonably level, but where the rough starts the terrain changes quite severely. A system which watered too much on the high rough in too short a time would produce a runoff down to the fairway, making the course too wet for normal play, for cutting, or for operation of the golf cars.

To solve this we needed a system that could water lightly at least twice in one night, so that in between doses the water would have a chance to soak in. We also needed a system which, instead of having 16 sprinkler heads to the control valve as we had before, would have only one to three sprinkler heads.

And we needed a system with which we could react quickly to changes in the weather.

The solution we found is an automatic irrigation system with a high sensitivity to our changing needs. Made by Johns-Manville, it is based on their Binar control system.

How the system works:

There are 21 Binar central programmers in my office in the grounds maintenance building. Each controls 26 to 28 valves out on the golf course. In setting up our irrigation plan, we first decide how long we want each sprinkler to run, a factor of both the terrain and the type of vegetation. Plantings at Bel Air range from pine

trees (which should get very little water) to azaleas, African daisies, and willows (which require quite a lot). On the programmer, each set of two sprinkler heads can be individually set for times varying from 2½ to 60 minutes.

On our hills we can water for 15 or 20 minutes before we begin to get runoff, but that usually does not give enough water for the vegetation there. So we give these points 15 minutes on the programmer's "A" program, as described above, then set these heads for another 20 minutes on the identical "B" program. This way, the hill will get about half of its water the first time around, enough to loosen up the top, and will get the rest three or four hours later, avoiding runoff. It all soaks in.

Early in the season, when days are short, we are able to start our irrigation at about 7 o'clock at night, but later in the year golfers are able to see to play later, so we don't start until 9 or 10 o'clock. A 14-day clock can be set to start A and/or B programs at whatever time we want, in any sequence we want, each day over a 14-day period.

Sometimes we find that the greens are programmed to be watered near the end of the night's cycle, but we would rather irrigate them earlier in the evening, so they will be drier in the morning. Sequence of activation of individual sprinkler heads is set on a patchboard on the programmer; moving plugs around gives the sequence desired.

For everything, there is a setting

We can set broad seasonal patterns for irrigation, but even Southern California weather is unpredictable. We frequently get periods of three or four weeks where nothing has to be changed. We've gone months without rain, when the temperatures are holding about the same day after day, and there's not too much wind. Under such circumstances, we can stay fully automatic, without tinkering with the settings.

But then, one day, it might get a little bit cloudy, there's no wind, and the course doesn't dry out. We still want to give it some water, but not as much. When that happens, we set the multiplier switch at three-quarters. The

whole irrigation plan will proceed as set, but each sprinkler will only operate three-fourths as long.

Perhaps then we will have a bad day — cloudy, with a little morning fog — so we'll turn it down to one-half.

On the other hand, we might get extreme wind — so we move it up to one and a half. This probably won't be true for the whole course, so we change a few pins where the wind isn't as strong or the need for water not so great. Turning the wheel will do it for a great percentage of the board. When we get the hot, dry, strong Santa Ana winds, we almost double the watering times.

When you are irrigating a golf course such as ours, you run into more climate variations than might be expected in Los Angeles. We do get frost, for example. That makes it difficult for early players, for operation of the golf cars, or for cutting the grass. But if it is not cold enough for ice to form, we can clear the whole 124-acre course of frost in an hour and 25 minutes by hitting the syringe button on the panel, giving each sprinkler the necessary 2½ minutes of wash.

We also get rain. In the past this was sometimes more of a problem than a blessing. Without central controls in our previous irrigation system, when it rained we had no way to turn sprinklers off except by going around the course and turning valves. Many times we were unable to get golf cars or other motorized equipment through the soggy ground and had to walk the course in the rain. Otherwise, we'd have the sprinklers running with two inches of water on the ground.

But with the system we have now, we don't even have to come to the course. Both Bud McDonald and I live up in the San Fernando Valley, and there can be rain on the course without our knowing it. We might have heard thunder and thought there might be rain here, but we wouldn't be sure.

On the roof of the maintenance building there is a rain gauge set so that the entire sprinkler system automatically shuts off as soon as there is a quarter inch of rain. We know what has happened when we arrive in the morning and see that the "rain omit" setting has been activated and everything is shut down.

I don't want to create the false impression that we can ignore our irrigation and just let the machinery take care of it. This is no more true than saying that every inch of the course needs water every day. What our setup does do for us is to give us a norm we can depart from in various orderly ways. It takes care of most situations for us automatically, so we can concentrate on finding and correcting the trouble spots.

Emergency measures

There are two quick couplers on every green, one on every tee, and additional ones every 150 to 200 feet down the fairways. These are under pressure and even if something happened to the system, they could be used. The Bermuda grass on the fairways could miss watering a few days during a dry spell but, of course, the greens and tees are more critical.

If we were at the far end of the golf course and saw a green that needed a little watering, we could hook up a quick coupler. But there is an easier way. We have underground control boxes to which we can connect portable units. If the manual override button has been pushed before we left the central programmers, the portable units can be used to set off groups of sprinkler heads for time periods of up to a half-hour. We can set them and go about other business.

Bel Air has obtained a new piece of equipment which permits us to override the central programmers without setting the manual button ahead of time. This takes power from the battery terminals or cigarette lighter of a truck or other vehicle to run the portable units.

Bel Air put in all new sprinkler heads and valves, and virtually all new piping: it is a new system from underground up. We were looking for dependability, important when you can go seven months with little more than a half-inch of rain, as we did recently.

The course has more than 1,300 sprinkler heads. More than 1,100 are full-coverage heads. The other 200 or so are part-circle sprinkler heads for placement near adjoining property and roads, where it is vital not to let water go outside our boundaries.

We installed 135,200 feet — more

than 25 miles — of new pipe. We put in 72,000 feet of 200-pounds-per-square-inch PVC solvent-weld pipe ranging from 1¼ to 2½ inches in diameter; 63,200 feet of 160-psi Ring-tite PVC pipe ranging from 1½ to 6 inches; and 1,100 feet of 10-inch Transite asbestos cement pipe to supplement existing Transite pipe on the number 4, 7, and 14 fairways. We put in 90,000 feet of Binar cable for the control system.

Los Angeles city water comes in to the course at three points: a six-inch meter by the number 3 hole; a four-inch meter between 11 and 14; and a three-inch meter near the suspension bridge by the clubhouse. In our old system, the four-inch meter, which irrigated the number 11 through 16 holes, was isolated from the rest of the irrigation system. If something happened to it, we were in deep trouble — there was no other way to get water there. But now they are all tied together. If the six-inch and the four-inch were both out we would still have enough water in the line to take care of our greens. As long as we still have the six-inch, we can irrigate the whole course.

Bel Air also kept dependability in mind while installing the irrigation system. The very first thing put in was the Binar control system. By running the control system 24 hours a day before the pipes were in, we were able to make sure there were no problems. There were none, so when the piping was finished for any portion of the system we were able to use it immediately. This was generally none too soon; each portion would have been without water for a few days during the transition.

Part of the Bel Air grounds crew was always available to help with the installation, which took five months, from November to April. This way, I think we got a better job — and when we were finished we had three or four men who knew where every valve was.

Construction would have been faster except we determined to keep the course open throughout construction. Friday afternoons we tried to clean up as much as possible for the weekends, but we let people play weekdays as well. Nine holes had to be closed one day, but that was all.



Before we started, people told us that this kind of automated irrigation would never work in Southern California: "You'll never be able to get as much water as you need." We did have to be careful. Instead of the 40 decoders on each central programmer allowed by the manufacturer's design, which would probably be fine for New England or the middle West, we only put on 26 to 28. Since we have to give each location a half-hour per night frequently, 40 locations on a programmer would take 20 hours to go through.

But we have found that the automatic system will do anything we want it to do, providing it is installed properly and we don't ask it to do too much. Having just gone through a seven-month drought, we can safely say we've proved it will operate in California. □



TOP PHOTO shows typical difficulty encountered in trenching coral rock in the Florida Keys. It's not hard to imagine the work necessary to turn that rock pile into a lush looking golf course. BOTTOM PHOTO gives a look at the results of all that hard work, as well as illustrating one of the main reasons for the courses' beautiful appearance: automatically controlled sprinkler rotors. Turf gets very thirsty off the tip of Florida, but automatic irrigation takes good care of its needs.



ABOVE: Getting enough water to feed a golf course — let alone three of them — can be even a bigger problem than distributing it. The Ocean Reef Club had plenty of water available, but it all had salt in it. So a desalinization plant was built, complete with the million-gallon-capacity holding pond shown.

Irrigation conquers coral on the Keys

On the Ocean Reef Club's golf courses on Key Largo, the northern-most of the Florida Keys, golfers play on coral — but they would never know it from the way the ball behaves. The gently undulating fairways are lush with grass, and the greens are smooth and true.

All of which took pioneer planning and landscape engineering to retain the special beauty of the coral country — with its white rocky texture, lagoons, and lush mangrove swamps — and at the same time develop and maintain courses that pass the muster of the discriminating golfer.

Creating a golf environment on Florida coral requires overcoming a

variety of rather unique problems. Coral itself can be a formidable base for growing grass, and the Keys have more than their share of lightning which can damage automatically controlled irrigation systems.

Fortunately, these unusual difficulties have been mastered at Ocean Reef, as has an additional one that is common to golf establishments — that of acquiring plenty of good water. Golf courses have tremendous thirsts off the south tip of Florida, where temperatures are in the 70's and 80's in winter and in the 80's and 90's during summer. Although humidity averages 75 to 90 percent year-round, the rainfall of about 30 inches a year isn't nearly enough. That, of course, is because of the consistently high temperatures.

Why build on the northern Keys?

Because nature has made them a beautiful, remote setting which is ideal for the kind of living demanded by members of the exclusive Ocean Reef Club.

The club has two courses in operation now and is laying out a third. The original 18 holes are called the Dolphin Course. It is built on solid coral rock, the prevalent soil of the Keys. The fact that there's no topsoil on the fairways has put the hybrid bermuda to a severe test. However, coral has advantages as a medium on which to grow plant life. It is a fine absorber of

organic material and particulates that are good plant food, and it provides unexcelled drainage.

At one time the bermuda was maintained by Ocean Reef Superintendent Tom Grondski on only 50,000 gallons of water a week. The one water source was a main line from the city of Homestead, which also supplied the resort's homes, condominiums, clubhouses, and other facilities — as well as cities all the way down to and including Key West.

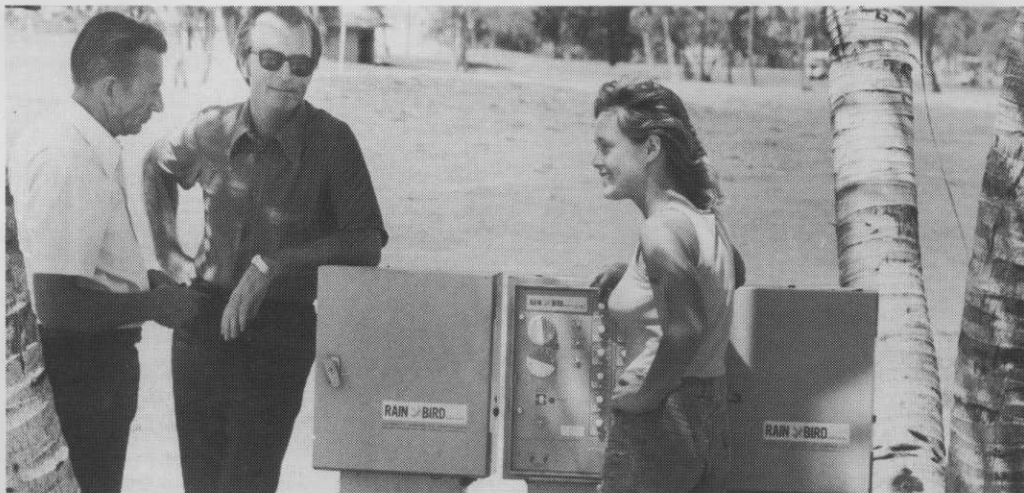
When construction began in 1973 on the second 18 holes, the 6,600-yard Barracuda Golf Course, a seep well was drilled and a desalinization plant was built that has a capacity of 900,000 gallons a day. A million-gallon water tank was assembled beside it. The desalted water is mixed in the big tank with fresh water from Homestead. The combination provides the entire Ocean Reef complex, not alone the Barracuda Golf Course. The well water contains up to 15,000 parts per million of salt, but the reverse-osmosis desalinization plant takes this salt content way down.

Incidentally, some land plants do well in ocean water which averages 30,000 parts per million of salt. The mangrove trees that are native to the Florida Keys grow in it. University of Arizona plant scientists have found an alfalfa seed that tolerates 16,000 ppm of salt. And some other plants can tolerate salinity up to 15,000 ppm.

Water may not be plentiful at ground level in the Keys, but it is abundant in the depth of the coral reefs. The difficulty lies in the fact that it is ocean water. However, paleoecologist Heinz Lowenstam of Caltech points out that the rain water which percolates through the coral forms a lens on top of the subterranean ocean water. Salt water, being heavier, will remain beneath the fresh water unless a disturbance mixes them. Careful extraction of water in the lens area could further reduce the salt problem.

Irrigation helps

The Barracuda Course, designed by golf course architects Von Hagge & Devlin, Inc., also was laid out on solid coral rock. However, Karl Litten, the chief designer of Barracuda and the third course — the Harbour Course, which is under construction — put in a



Ocean Reef Superintendent Tom Grondski, course designer Karl Litten, and maintenance crew foreman Kathy Austin discuss operation of the programmable sprinkler controller.

mixture of native muck and imported sand as a topsoil mix for the tees, greens, and fairways.

A fully automatic, electric, double-row Rain Bird sprinkler system was installed on the Barracuda Course by Camstaff Construction Co., the general contractors for all construction at Ocean Reef. Superintendent Grondski described the job as excellent, even though it was the first installation of a golf course irrigation system ever attempted by the firm. The 12-inch, cement-asbestos mains were laid in sand to prevent the coral from scratching or cutting them. The sprinklers are all pop-ups, located 65 to 75 feet apart. The close spacing virtually eliminates dry spots which might otherwise develop due to the prevailing winds typical of Florida's Keys.

The irrigation equipment is completely protected from lightning, which is common in the Keys. Arrestors and other devices have been developed by the manufacturer to do that job. The equipment never has been damaged by lightning.

Superintendent Grondski finds that because of the versatility of the controllers and the uniformity of distribution of water by the rotary pop-up sprinklers, he is able to make maximum use of his limited water supply. In addition, his assistant finds the system easy to understand and simple to program. The sprinklers are all operated automatically and electrically from field controllers located strategically throughout the course.

This, plus the very low upkeep and maintenance costs incurred with the sprinkler system on the Barracuda Course, is the reason Grondski chose the same kind of system for his third course — the Harbour Course.

The new Harbour Course will have Tifgreen bermuda grass on the greens and No. 419 bermuda on the tees and fairways. The roughs will be common bermuda. It will also use some 100,000 cubic yards of imported marl for turf-grass topsoil to prevent drainage into the surrounding mangrove swamps. The greens will have 12 inches of marl; the tees and fairways, three to four inches. The mangrove trees, 30 to 50 feet high, border parts of the course and are so dense that you can't penetrate a grove of them. Ecologists want to preserve the groves to keep the balance of native wildlife undisturbed. Ocean Reef and Camstaff Construction are cooperating fully in that program.

With the help of irrigation and desalinization, the coral reefs will stay green for golfers. □