

Koolau Golf and Country Club

Carving A Golf Course Out of a Rain Forest

By James Gregory

Sean Hoolehan, the superintendent at the Koolau Golf and Country Club on the windward side of Oahu in the Hawaiian Islands, is playing a waiting game. He's waiting for the Pennecross bentgrass and the 328 hybrid bermudagrass to finish growing in this October at the new club.

Koolau will have its grand opening next year, though some light playing is already taking place. By then the clubhouse will be ready to welcome golfers to the exclusive country club being built by Minami Group USA, a Japanese company.

It's a breathtakingly beautiful site for a golf course, situated at the foot of the Koolau Mountains that divide the leeward and windward sides of Oahu. A dozen or so "disappearing" waterfalls suddenly appear during rain showers, enhancing the many streams on the emerald-green landscape, and then abruptly vanish soon after the rain has abated.

The Koolau Golf and Country Club has a prime location, carved out of a tropical rain forest below the windswept Pali Lookout known to all tourists. However, the

weather at Koolau posed a real erosion threat to the course during and after construction. Fortunately, everyone involved was prepared, the club's young superintendent reveals.

The Road to Hawaii

Hoolehan is a native of the Midwest and completed a specialized two-year program in turfgrass management at Rutgers University in New Brunswick, NJ. His first golf course job as assistant superintendent at a club in Hinsdale, IL, where he met Dick Nugent, the golf course architect for the

Extensive erosion control was necessary to meet the opening deadline. Hole growing in this past March (left). Erosion devices in place on November 1990 (right). Hydromulching, blankets, silt fences, and sand bags held the sprigged turf in place.



Hawaiian club. Nugent was impressed by his knowledge of bentgrass and later recommended him to the owners at Koolau. By that time, Hoolehan was the superintendent at the golf course on the military reservation at Pearl Harbor, on the other side of Honolulu from Koolau, and had become very familiar with the unique problems caused by the Hawaiian weather.

"Construction here began in 1988," says Hoolehan, "and I came on board in 1989. We just wrapped up construction this spring, and now we're busy with the grow-in. Winter is our rainy season here, and not a great time to establish bermudagrass. We only have about five months of optimum bermudagrass weather. But it should be looking good in October. We already have some light play on the course, even though we won't have our grand opening until approximately March of next year."

Stormy Weather

Hoolehan confides, "We have an exceptional erosion problem here. The last two years, we've had over 130 inches of rain each year! We've done a lot of different things to try to control erosion, and we've been fairly successful with the different methods.

"Hazama Corporation was the general contractor and Wadsworth Golf Course Construction Company was the golf course feature contractor. They were very cooperative about getting the erosion control materials down in a timely manner. But their responsibility stopped right after grassing. They had to basically sprig the course, and we accepted the project from there.

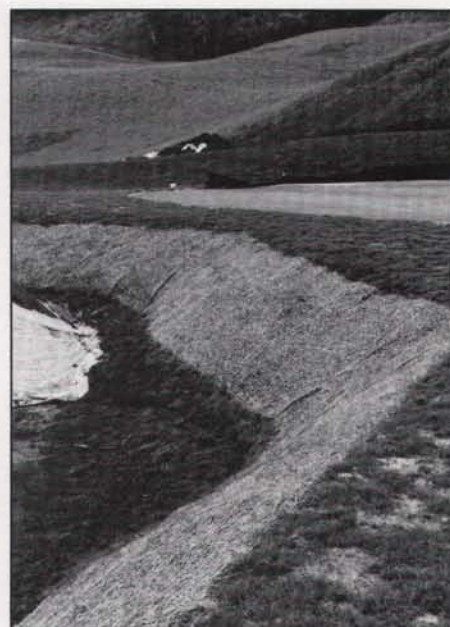
"The first hole was turned over to us back in August of last year, and the last hole—actually, the driving range—was turned over about the middle of April this year," he notes. "Once Wadsworth had grassed and capped the course, then it was our responsibility to water it."

How Hydromulch Helped

"The contractor didn't have any responsibility for erosion control once the sprigs had been planted. We were presented with a site that gets a tremendous amount of rain in the wintertime. Our program was to come in behind the contractors, or sometimes alongside of them, and do various methods of erosion control. Often there would be a small overlap. For instance, we'd be putting our materials down, and they would hydromulch over that material. The hydromulching, which was done by Wadsworth, was more to keep the sprigs moist than to control erosion," Hoolehan comments.

In case you're wondering why the sprigs had to be kept moist in an area that averages almost half an inch of rain a day, Hoolehan has a ready explanation. "It might rain half an inch in the morning and then be bright and sunny for the rest of the day. Young sprigs don't have much of a root system, and the tropical sun and winds can dry them out quickly."

On some occasions, the hydromulch had bermudagrass mixed into it for the very steep slopes that could not be planted any other way, Hoolehan explains. When you're working with a mountain, you learn to adapt to it—but the results can be beautifully rewarding.



Bunker slope lined with double netted straw blanket.

Instant Waterfalls

"When it rains, cutoff ditches above the club keep the water on the mountainside from rushing down onto the course," Hoolehan explains. "From the cutoff ditches, it runs down a whole series of beautiful streams. You might see a dozen or more waterfalls on the mountain above the course during a rain shower, and none after it finishes raining."

Working in such changeable weather conditions made it more important than ever to work in concert with the contractor. "Their operation would go something like this," says Hoolehan. "They'd do all their forming on the hole, grading and raking and putting in the amendments. And then they would plant the sprigs. They would either use a sprigging machine or hand sprig difficult areas, like around the greens. Only the bentgrass greens are seeded. The rest of it is all 328 hybrid bermuda."

Hoolehan continues, "After that, they would go back and put a hydromulch cap over all their grass, within an hour or two after they had planted it. Then at that point it became the responsibility of the owner.

"Our problem was that we might get rains of more than an inch an hour during the winter. There were periods where we had 20 inches of rain over a 24-hour period! Between mid-November, 1990 and the end of December that same year, we had 45 to 50 inches of rain. Warm air comes in off the ocean, hits the mountain, goes up, meets cold air, and the result is rain. Not just rain-buckets of it.



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Superintendent Sean Hoolahan (r) and Gilbert Araki from Pacific Agricultural Sales look over green protected by blankets and silt fence.

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Erosion Control Strategies

"So we used a number of different erosion control materials that we found available," Hoolahan continues. "Our main source was North American Green. They

supplied three different types of erosion control blankets made of nylon netting that contained straw and solid coconut fibers."

Before the blankets were installed the sprinkler system was run for a short time after final grading to reveal potential problem areas on each hole. A plan was then

developed to provide high-performance erosion control where needed.

The rainfall, much of it coming down at tremendous intensities, was not the only problem. The silty clay volcanic soils which dominate the site are easily eroded. In fact, says Hoolahan, "Irrigation alone is enough to create erosion."

Double-netted straw erosion control blankets were installed on steep undulations and bunker faces to control soil loss and hold sprigs in place. A heavy-duty blanket made from a combination of wheat straw and coconut fiber was used to line drainage swales and cover steep slopes. For those high-flow channels designed to carry runoff water from large drainage areas on the course, the coconut and nylon channel liners provided maximum scour protection. "Wherever we successfully used the erosion control blankets, we had good compaction of the soil first," says Hoolahan.

At Koolau, only 10 percent of the total course area required erosion control blankets to ensure the stability of the meticulously sculpted landscapes. The remaining acreage was hydromulched to cover the sprigs and hold moisture. Although blankets may initially cost more than other forms of erosion protection, Hoolahan be-

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lieves a little extra effort up front is cheaper in the long run: "If you get grass established the first time, you don't have to go back."

Hoolehan's theory was substantiated through a comparison of the first and second fairways of the Koolau course after erosion control measures were applied. On the first fairway, where hydromulch provided the only protection, a two-foot-by-200-foot gully was formed by rainfall and irrigation runoff. It required expensive reworking and reshaping of the landscape.

On the second fairway, where erosion control blankets were used, no significant erosion occurred. According to Hoolehan, "If we had not used blankets on the second fairway, the amount of finish work would have been a lot greater. Since the blankets effectively controlled the erosion, we can concentrate our efforts on fine-tuning the hole."

Annual Ryegrass Also Worked

Ryegrass was another useful choice in staving off erosion, says Hoolehan. "On very severe slopes of three to one and greater, we used annual ryegrass to stabilize the soil in the winter months until the bermuda became strong enough to fill in. We also used ryegrass to fill in a lot of other areas until we could come back and revegetate them to the natural conditions that existed before the construction. The rainy season is not a very conducive time to establish bermuda. The grass doesn't go dormant in Hawaii, but the sprigs don't start to spread because of the cooler temperatures and shorter days.

"We're right on the side of a mountain that casts a tremendous amount of shade on the golf course in winter," Hoolehan notes. "That's one of the reasons we went with bentgrass greens. Bermudagrass wouldn't have made a very good greens surface in winter, but we feel that for fairways, tees, and roughs the bermuda will be fine. We expect the course to be playable in the winter despite the rain.

"We've imported silica sand from Australia for the greens construction, because we couldn't get as good a sand here," says Hoolehan. "Most sands in Hawaii are basically coral, and marginal for use in greens construction."

Protecting the Ecology

For ecology's sake, "we had a grading permit that only allowed us to clear 15 contiguous acres. We had to selectively clear the golf course, because it's a sensitive area around her. We tried to eliminate all

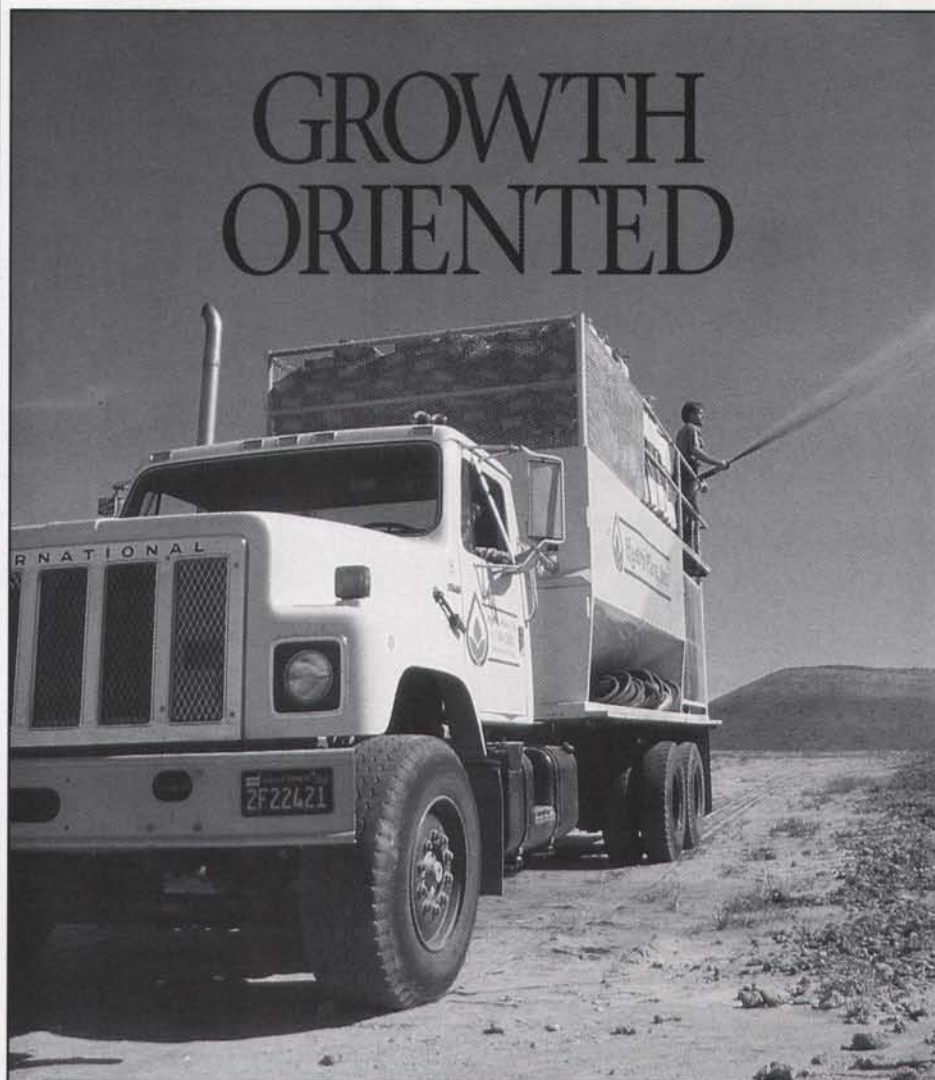
the runoff we could from the golf course, in order to help control the erosion," Hoolehan recalls.

"Although we had a lot of rain during the construction phase, the contractor built large siltation basins to protect against the runoff of silt from the project. He also utilized silt fences and other material. But as I said, that was not my responsibility," he notes. "My job was to worry about erosion control after construction, not while it was underway."

As soon as they have grown them in, it will be the responsibility of the grasses to

keep erosion under control, Hoolehan observes. The golf course superintendent has every confidence they'll be up to the task. If they do as good a job as he and the contractor have done, Koolau Golf and Country Club should be making its formal debut next spring intact and on schedule. It should fit beautifully into its spectacular surroundings, with no harm to the delicate ecology.

"Before this course was built, the area was a tropical rain forest," says Hoolehan with a smile. "Now we have a country club, and the rain forest is still here!"



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