



The use of 2" x 4" planks proved most effective for installing a uniform intermediate layer on the new 15th green.

USGA Greens - On a Limited Budget

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WHY SPEND the money to build greens according to the USGA method? Perhaps the money can be better spent on new equipment, an additional employee or a new parking lot. We found ourselves faced with that question, as do proprietors of many small golf course operations when undertaking a major greens renovation program. The decision for us really was not so difficult. For the past 10 years we had taken hours cutting cups, using a chisel and hammer to penetrate the compacted clay and gravel underlying the greens. We had watched our more recently constructed sand-on-soil greens rapidly wilt

on hot summer days, and we have seen brief thunderstorms leave the greens unplayable for hours.

These factors helped persuade us to use the USGA method of green construction for a green renovation project. We would like to share our experiences and perhaps provide a different perspective on this construction technique.

The original nine holes at Genegantslet Golf Club were built in 1954 by my father on a portion of his farm. The construction was done with his farm equipment. Green construction consisted of disking sand and peat moss into the native topsoil. Today, these

greens have a decent root zone mix in the upper 3" due to our aeration and topdressing programs. Below that level lies the mix of gravel, clay, and sand which hardens during the summer to the consistency of concrete. When the golf course was expanded in 1964, the newer greens were constructed with 12 inches of a sand root zone mix placed upon the ground. The greens average about 2,500 sq. ft. and receive approximately 35,000 rounds of golf during our relatively short season.

Several of the original holes were constructed along the state highway, and this was a major factor leading to our decision to

renovate. Our main concern was the par-3, 200-yard 10th hole, which played to incoming traffic. Traffic on the highway had increased, along with play, and was creating a major hazard. We decided to completely reposition this hole to end the potential hazard and to reposition other holes to better utilize 20 acres of available land and provide a more interesting design.

We realized that a project of this magnitude would require the services of an architect, but our limited budget made us afraid of the cost. We were fortunate to find Larry Reistetter, a local architect who had worked with the late William Mitchell. Larry agreed to work with us on an hourly basis in designing the new greens and holes. Our plan called for holes to be relocated and lengthened where possible. A master plan was developed, detailing the design of

greens, fairways, and tees, and showing the location of drainage berms, mounding, bunkers, and ponds. Green design was detailed to scale, providing size, shape, contouring, and drainage. Mr. Reistetter also convinced us of the merits behind the USGA method of green construction. The design cost for each green was between \$600 and \$800.

We decided to keep the majority of work in-house to limit costs. A local paving contractor, and club member, offered his crew for work in the fall when his business slowed. This was very beneficial to both parties. We were fortunate with respect to equipment, as we had a small dozer, backhoe/loader, stone rake, and roller in our possession. We did purchase a leveling transit to help with the contouring work, and later we purchased a larger D-3 dozer that

became available at a very good price. The large dozer now enables us to complete the major shaping work required. The money for construction originates from each season's profits and from past years' savings, so outside funding is minimal. The layout for the new nine holes was planned to minimize interference with existing play. We hope to construct at least two greens per year, completing the project within five years.

Green construction work was initiated late last summer. Completing the green's subgrade to the final contour was most challenging. Initial shaping grade work was done with a D-3 dozer rented daily for the operation. Final shaping was completed with our small dozer. This portion of the operation was closely monitored by the architect and me to assure that contouring conformed to the design plan. The subgrade

Turf covers have been a valuable tool for establishment on newly seeded greens.



contour was completed and hand raked to finish the surface, and the grade was rechecked. The subgrade was watered and rolled for compaction. We knew this phase had been successful when we attempted to manually install drainage trenches. The installation required three men and eight hours of labor to complete a 40-foot trench. We quickly realized that a power trencher was in order. Polyethylene pipe was installed in the trenches on a small layer of crushed stone. The trench was then backfilled with stone to cover the pipe and trench. Grade stakes were then marked in preparation for the gravel and coarse sand layer installation. With the part-time labor and unpredictable weather, it required two to three weeks to complete the shaping and trenching for both greens.

The pea stone and coarse sand layer were purchased from a local concrete plant. The materials matched USGA particle size specifications. This worked well for us because we were able to get a good price and quick delivery. With the grade stakes in place, we began to install manually the gravel and coarse sand layers. This proved very time consuming with our sporadic labor. However, four men completed the installation of the pea stone for the two greens in two days. The loader was used to place the pea stone around the greens' perimeters, where it was then carefully spread manually and with the help of our small dozer. The coarse sand was initially dumped in piles along the greens' perimeters and spread manually using 2"-by-4" studs and the grade stakes as a guide. We have since used our small dozer to help spread the coarse sand from the perimeter areas. Care is taken to avoid operating the dozer directly over the drain trenches.

The root zone material was purchased pre-mixed, as we knew we would not have the time or people available to complete the mixing properly. Several samples from various vendors were obtained and sent to Cornell University for physical and chemical analysis. The cost for each sample was approximately \$50, which we considered minimal for the help it provided in selecting a proper mix. Again, a local vendor was able to provide a mix meeting specifications at \$25 per cubic yard. We made room in the parking lot to store the material, which then could be used whenever labor was available.

The paving contractor's 5-yard dump truck was cleaned and used to transport the mix to the greens. The mix was roughly spread and compacted with the small dozer, according to the grade stakes. Too much

mix was used on the first green constructed, as we found we had overcompensated for anticipated compaction. We have since adjusted our grade marks to a 14" depth, assuming compaction during installation. The mix was feathered from the collar into the rough. We smoothed the surface with landscape rakes and used the float to complete the final grade.

The greens were irrigated and rolled with a small hand roller in preparation for fertilization and seeding. I think the best part of the finished job was looking at the smooth contoured surface and watching water actually coming out of the drain tile following irrigation. We then knew that something had been done right!

A blend of certified PennCross, PennLinks, and Putter creeping bentgrasses was seeded at the end of September, which is late for our region. Knowing that the growing season was nearly complete, we installed protective covers over the seeded greens. Within two weeks we had decent growth and the blankets were removed until late November, when the new greens were covered permanently for winter. The greens survived the

winter well under the covers, and mowing was initiated in spring at 1/2-inch. The greens matured slowly until we became more familiar with their fertility requirements.

The two new greens and fairways are expected to be ready for play by early next summer.

The cost of each new green was about \$15,000 to \$16,000, including materials, equipment rental, and outside labor. Our greatest savings could be attributed to the availability of local sands and gravel which met specifications, as well as our arrangement with the architect and use of seasonal outside labor. Yes, we are fortunate to have the materials and labor available at reasonable cost. However, a lot of leg work and preparation were required to locate the materials, an architect, and labor without compromising quality. So, do not be intimidated when it comes to constructing a USGA green. With a little ingenuity, close scrutiny, and patience, this method of construction is within reach of any golf course. The extra effort and cost are not too high for a green that should be trouble-free for many years to come.

Cost Analysis Per Green (5,800 sq. ft. average)

Pea Stone	71 yds. @ \$ 8.80	=	\$ 625.00
Coarse Sand	63 yds. @ 6.50	=	370.00
Rootzone Mix	270 yds. @ 25.00	=	6,750.00
Drain Pipe	500 ft. @ .44	=	220.00
Covers		=	650.00
Seed/Fertilizer		=	125.00
Labor/Equipment Rental		=	5,500.00
Architect		=	700.00
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	Total	=	\$14,940.00

To-Do's

- Consult a golf course architect.
- Have all gravel, sand, or organic components analyzed by a reputable laboratory.
- Have delivered mix analyzed to assure it is consistent with the original sample.
- Set grade stakes and check and recheck grades continuously during construction.
- Install sod strip around the perimeter of greens to prevent soil contamination (or install a plastic vertical barrier).
- Use certified seed and proven varieties — this is not the place to cut cost.
- Stockpile materials on a clean site so they are available when labor is available.