

## Survey of Sand Bunker Maintenance & Costs

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Trying to tell you what it is going to cost you to maintain your sand bunkers is like trying to tell you what the weather will be like the next day, especially if you live in the Chicago area. I can't tell you exactly what the weather will be the next day, and I can't tell you the exact cost of maintaining your sand bunkers. What I can do is give you some average costs, some ball park figures, and some estimates of what I have found that it may cost you. There are so many variables to contend with such as: number of bunkers on course, degree of maintenance required, age of bunkers, steep slopes, no slopes, capes or bays, equipment required, man power, budget, weather, type of sand, where course is located, where you get your sand, cost of trucking, time of year, and on and on and on. Unfortunately, I have left out as many variables as I have just mentioned. I believe you may be getting the picture of what I am trying to point, that what I have to say about the cost of maintaining sand bunkers is not an absolute figure. But I do believe that you may have a better understanding of what the costs might be after this report.

I sent a survey to 16 private, 18 hole golf clubs. I picked private clubs and clubs with only 18 holes of golf for a comparison of sand bunker maintenance. The questions asked were: number of bunkers on course, how many hours required to rake bunkers per day, how many times per week are they raked during the golf season, how many men used, how many machines used, number of times the bunkers are edged, number of hours required to edge and trim, average rate per hour of manpower for bunker maintenance, if they knew the square footage of their bunkers, and how often the sand is added.

The results of this survey show that out of the 17 clubs, including my own club, they average 66 bunkers per club. With the low being 37 bunkers and the high being 39. The average hourly rate for bunker maintenance is \$4.50 per hour with the low rate of \$3.50 and the high rate of \$5.25 per hour.

The clubs average 4.8 hours per day to rake their bunkers. This is not man-hours but total hours for the job to get done. The next question was, "How many men were needed to rake the bunkers?" The average came out to 2 men. With this information, it costs, on the average of 9.6 man-hours per day and at the average rate of \$4.50 per hour will equal \$43.00 per time or day to rake sand bunkers.

Next question asked was, "How many times per week in season do you rake your sand bunkers?" The average is 5½ times per week during the playing season. Then this cost per week would be \$225 for bunker raking.

Another question asked, "Do you have soft or firm sand?" The results are: 10 had soft and the others had firm sand.

The next cost item on sand bunker maintenance is the number of times the bunkers are edged and the manpower and hours used for this chore. The average number of times they are edged is 3½ times per year. One club edges only once per year and another club stated that they did it 7 times. In the hours spent edging, there is a great difference from the low hours of 16 to the high of 320 hours, with the average of 90 hours to complete the job. At this point, I regret to add that I didn't ask the number of men needed to do this chore, so I do not have

an average from the group I surveyed. But from my own records it takes 20 to 25 hours with a crew of 4 to complete edging our 74 bunkers. If I use this figure, the cost using the 25 hours times 4 (which is the number of men used on the job), would equal 100 man-hours. Multiplying 100 man-hours by the hourly rate of \$4.50, equals \$450 per time to edge the sand bunkers. \$450 times the average of 3½ times per year that the survey states the sand bunkers are edged gives us a cost of \$1,500 per year.

Other added chores of maintenance of sand bunkers would be the shoveling up of sand that has been washed down after heavy rains and the raking of debris and leaves out of the bunkers. The weeding of traps I felt was done when the traps were edged. The question of shoveling up of sand was not asked in the survey, but through my own records over the past couple of years, we seem to do it on the average of 5 to 6 times per year. That is outside of the times that the bunkers are edged. In my own case, we use a Toro trap rake with a plow on the front to push up the sand. My man-hours for this chore average 12 hours, and the cost would be \$54 per time or yearly cost of about \$325. Of course, there are those times when we have all done it 3 to 4 times in one week.

To sum up the yearly costs of raking, edging, weeding, and pushing sand back up the slopes, we have the following costs:

\$225 per week for raking, times 20 weeks (during season) equals \$4500.

\$129 per week for raking, times 6 weeks (spring & fall) equals \$774.

\$450 per time for edging, times 3½ per year equals \$1575.

\$54 per time for pushing sand, times 6 per year equals \$324.

Average total cost per year equals \$7173.

With the total average maintenance cost of \$7,173, the average maintenance cost per bunker would be \$108 per year.

To be included in the cost of sand bunkers, you must add the equipment used for their maintenance. Mechanical power trap rakes will cost about \$7,300 per machine and the survey shows that most private clubs have two machines for a total of \$14,600. Besides the power trap rakes, you must have hand rakes, both for the golfers and for the crew. The cost of these rakes will run from \$4.25 to \$21.95, with the average rake costing \$10.75. With the average of 66 bunkers per course, you have an investment of \$4,257 in rakes for the bunkers, if you would put an average of 6 rakes per bunker. Add to this cost the number of rakes you have in your maintenance building and the number of shovels, and you can add another \$300 to the maintenance of sand bunkers.

You will also need the equipment to edge and weed your bunkers. There are various tools to use for this job - anything from a sod knife to a motorized trap edging machine to string trimmers.

Costs of these tools will run from \$35 for the sod knife/edger to \$325 for a power sand edger or string trimmer.

The next question, "Do you know the total area of sand in your bunkers?" Out of all of the clubs, only 6 knew the square footage of the bunkers. It is surprising to see the total area one has and the individual sizes of the various traps. Out of the 6 clubs, the average square footage was 140,000. The low was 93,600 and the high was 300,000 square feet of sand. With the average of 66 sand bunkers per course and the average of 140,000 square feet per course, the average sand bunker in our survey is 2,120 square feet. (cont'd. on page 9)

(Survey of Sand Bunker cont'd.)

When asked when and how frequently they added sand the results were: 10 added sand as needed, 3 do it yearly, and the rest do it every 2-3 years. The average cost of sand replacement in the budgets was \$3,000 per year and the low budget was \$500, with the high being \$7,200 per year.

When asked if sand is just added to your bunkers, 11 responded yes and the others no.

So far, all I have discussed is the daily and seasonal maintenance of our bunkers and their related approximate costs. Now I would like to cover the areas of construction and the addition of sand to the bunkers.

One of the first items that might be done is to have sand samples that you are considering to use, be analyzed. The cost of sand analysis is rather inexpensive when you stop to consider the overall cost of adding sand to your bunkers, and you certainly want to make sure that you will be adding the right sand. The spring of 1985 I had three samples analyzed at a cost of \$150 or \$50 per sample plus shipping. Shipping costs were \$28 by UPS. If you are going to be spending thousands of dollars on sand you do want to be sure it is the proper sand for your bunkers. This analysis will give you both the sieve and mechanical analysis of your samples. One hint I have for you, if you have the time to send your samples in, try to dry the sand first to make it lighter for shipping. Most labs will ask for about a gallon sample, and this can get heavy if wet.

Now the cost of sand replacement. Again, all of the variables come into play: how many bunkers, what size, how far from the source of your sand, type of sand, where you are located, etc., etc.

I found sand prices per ton to vary from \$2.85 per ton to \$9.00 per ton. This price does not include shipping. Shipping prices depend on the distance from the source of the sand, how much competition in trucking is in your area, if you are located in the inner city, suburbs or boon docks, or if there is a return load the trucker may pick up. Some trucking firms will charge a flat fee of say \$1.75 per ton for the first couple of miles, then maybe \$.25 per ton after "X" number of miles. Again it is difficult to say what the cost of sand will be until all of the variables are checked.

To find out what the sand is going to cost you, you must first know how much sand will be needed. You had better find out the square footage of the trap or traps that will be requiring sand. Then you can figure out the tons of sand required.

To figure out the quantity of sand required, you should remember or jot down that:

1. Sand weighs about 96 pounds per cubic foot
2. One ton of sand will cover 22 cubic feet
3. This one ton of sand will cover 44 square feet at a depth of 6 inches or cover 66 square feet at a depth of 4 inches.

The formula to determine the amount of sand required in a sand bunker is this: length x width x depth needed (expressed in a decimal such as .5 = 6 inches, .33 = 4 inches, .25 = 3 inches) x 96 (which is the weight of a cubic foot of sand) divided by 2000 (which is the number of pounds of sand in a ton) will give you the total tons required.

With this formula then, if we take our survey results that state the average trap to be 2,120 square feet, and we have removed all of the old sand and need to replace it with clean sand to a depth of 6 inches, we need to multiply the 2,120 square feet

by the depth of .5 (which is 6 inches) and times that by 96 pounds per cubic foot. That figure then needs to be divided by 2,000 pounds to give us the 51 tons of sand needed to replace the old sand in the bunker. Fifty-one (51) tons of sand times an average price of say \$7.50 per ton will give us a cost of \$382 for sand in that one bunker. This cost is for sand alone with no labor included.

The cost of labor and equipment needed to remove sand from a sand bunker will run about \$800 to \$1200 per day for a loader tractor and 2 dump trucks if an outside contractor is hired. If sand is to be removed from a bunker, a crawler tractor, or at least a 4 wheel drive tractor, is needed if you are going to get any production out of the equipment. A regular tractor loader that most golf courses have will do the job, but it will be slow and the tractor will get stuck many times. If you are just doing a couple of traps, then the course tractor could be used and the cost would then be just the man-hours in labor involved. But to remove sand from many bunkers calls for the more specialized and heavier equipment that outside contractors would have.

Two clubs in our area did extensive remodeling the summer and early fall of 1985. I have some construction costs on sand bunkers that they were able to give me. The one club was charged \$2.74 per square yard for the shaping and grading construction. The 4" perforated or non-perforated tile was quoted at \$2.85 per linear foot. The installed price of 6" of bunker sand was charged at \$15 per cubic yard, including the labor to spread it. The finish grading, seeding and sodding was charged at \$2.95 per square yard.

The second club paid \$150,200 for 29 bunkers that had a total area of 72,670 square feet. This figures out to be about 2,500 square feet per bunker and the cost of construction for these bunkers came out to \$2.05 per square foot. This figure includes 4" drain tile with an average of 50 feet per bunker, a filter fabric, pea gravel backfill over tile and 6" of sand. Sod was laid all around the bunkers out to a distance of 6 feet and all else was seeded.

Many clubs are starting to use filter fabrics in lining their bunkers before placing sand in them. This prevents the sand from becoming contaminated from underneath. I have the cost of one club that kept records when doing one of their bunkers. The bunker size was 1800 square feet, and 39 man hours at \$5 per hour were used to do the following: remove the existing sand; re-contour to original outline; trench and tile; apply the fabric; which was terra bond, replace the sand; sod the banks; and clean up. The cost for this came out to \$542 in labor. They also figured in the costs of materials and equipment and this cost was \$195 for a total cost of \$737 for that one particular bunker.

Many other clubs have used a filter cloth in their sand bunkers, but they didn't keep detailed records of labor and supplies. A typical roll that would be 300 feet long by 6½ feet wide would cost about \$196. This would come out to about 9½ cents per square foot. For our average size bunker of 2,120 square feet the cost would be about \$200 or less depending on the square footage you might be doing. The more you use, the less the cost becomes when buying this product.

I feel that I have pretty much covered the costs of sand bunkers maintenance in this report, but for the most part the surface was just skimmed when I got into the cost of replacing sand and bunker construction.