



2019 Golf Industry Show

Don't get Trapped in your Next Bunker Renovation

February 5, 2019
San Diego, California



Methods

Better Billy Bunker
Bunker Solutions
Capillary Concrete
ZLine
PolyLast



Better Billy Bunker



Better Billy Bunker Highlights

- Gravel sprayed with polymer
- Must use Certified BBB contractor
- Column test
- Sand selection
- Gravel must be dry to apply polymer
- Walk gravel after polymer is applied
- Gravel can be messy to transport
- Wet bottoms (appears to only be an issue with Florida sands)
- 'Modified' method (use approx. 60% for budgeting)
- Difficult to renovate

Capillary Concrete



Capillary Concrete Highlights

- Great job on holding steep faces during rain
- Very consistent, homogenous blended finished product
- Durability
- Can install year around and most weather
- No waste
- Concrete companies can be challenging to work with
- Ensure mix is right
- Difficult to renovate

Wet Bottoms



Bunker Solutions



Bunker Solutions Highlights

- Similar to indoor / outdoor carpet
- Permeable geotextile fabric long-pile fibers
- Delivered in rolls
- 'Modified' method (use approx. 60% for budgeting)
- Adhesive to 'glue' seams
- Continuous drainage installed around toe-of-slope (not required)
- Experienced contractor recommended

ZLine



ZLine Highlights

- Similar to Bunker Solutions
- Non-permeable system with stiff fiber design
- Uses EZ Edge system for bunker edges
- Sewing or adhesive of seams
- Delivered in rolls
- 'Modified' method not tested
- ZLine does most of installations
- Offers sand color matching

PolyLast



PolyLast Highlights

- Currently planning test bunker
- Easy Install
- Delivered in rolls
- Appears very durable
- Product originated in livestock industry
- Most warm-season turfgrasses will grow into liner

Summary / Tips

- All these methods do a great job minimizing washouts
- Very expensive
- Economics is questionable in drier climates
- 'Modified' method preferred in most situations
 - Flat areas use product similar to JM Spunbound geotextile fabric
- Longevity is unknown
- Minimal experience in freezing climates
- Highly recommend using minimum of 4" ADS N-12 double-walled pipe
- Discuss options with local course
 - What is or isn't working in the local market
- Test a variety of sands
 - Use labs to evaluate prior to the project
 - Use labs during the project to ensure sand is consistent
 - Make sure sand all comes from same mine
 - Have membership / GM test the sands playability and color
- Discuss with contractors you are considering
 - Some like or dislike to work with concrete companies
 - Some do not like being held hostage to the weather



Questions?

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BUNKER RENOVATION

Clayton A. DuBose, CGCS
Regional Golf Course Superintendent
Founders Group International



Golf Course was purchased by Founders Group International
in December of 2014 from a single local owner.



MYRTLE BEACH



FOUNDERS
GROUP INTERNATIONAL

Golf Channel was on site in February discussing course conditions during the 2018 Dustin Johnson World Junior Golf Championship. Bunker maintenance and playability has been a challenge for golf and we decided to make some changes that would be a better fit for the golfer and the golf course.





- Constructed in 1998 and built to annually host the Senior PGA Tour Championship –
- Opened on February 2nd 1999
- Top Ten New Courses in South Carolina
- Top Twenty New Courses in America
- Hosted the 2000 Senior Tour Championship – Tom Watson was the Champion
- 2008 Carolinas PGA Junior Championship
- 2015 Division II Collegiate Tournament
- 2016 – 2018 Dustin Johnson World Junior Championship, scheduled for March 2019 and beyond.
- 2019 NCAA Men's Regional Host





- Tom Fazio Course Architect alongside Lanny Wadkins as the PGA Tour player consultant.
- 5 Star Golf Course by Golf Digest – only 2 in South Carolina with the Ocean Course at Kiawah Island.
- Course Measures 6950 yards from the tips.
- Built on heavy Clay and Gumbo soil, with 2 holes on sand. Challenging for maintenance!
- Course Statistics – 72 bunkers that measured 81,000 sq. ft. with high flashed up faces with deteriorating structural surrounds that would wash out during minor rain events (1/2" and greater) causing poor aesthetics and terrible playing conditions for as many as 3 – 4 days.



MYRTLE BEACH

- Evaluated bunker down time and labor used to repair bunkers after washouts. Typically 130 – 150 man hours for each storm event.
- Annual rainfall for Myrtle Beach, SC (50 inches plus on average) 2018 - 70 inches plus as of late-December.
- Installed 2 test bunkers at the Driving Range chipping greens.
- Utilized the BBB system and Golf Agronomics G-Angle sand. Location of bunkers and 2 of the worst draining/washing bunkers on the property.
- Exceeded our expectations, member comments were extremely positive.

Bunker Repair

11/13/16 - 10/24/17

- 32.50 inches of rain that resulted in 45 days of poor bunker playing conditions for our customers.
- 2548 Man Hours/Year just to repair from rain events.

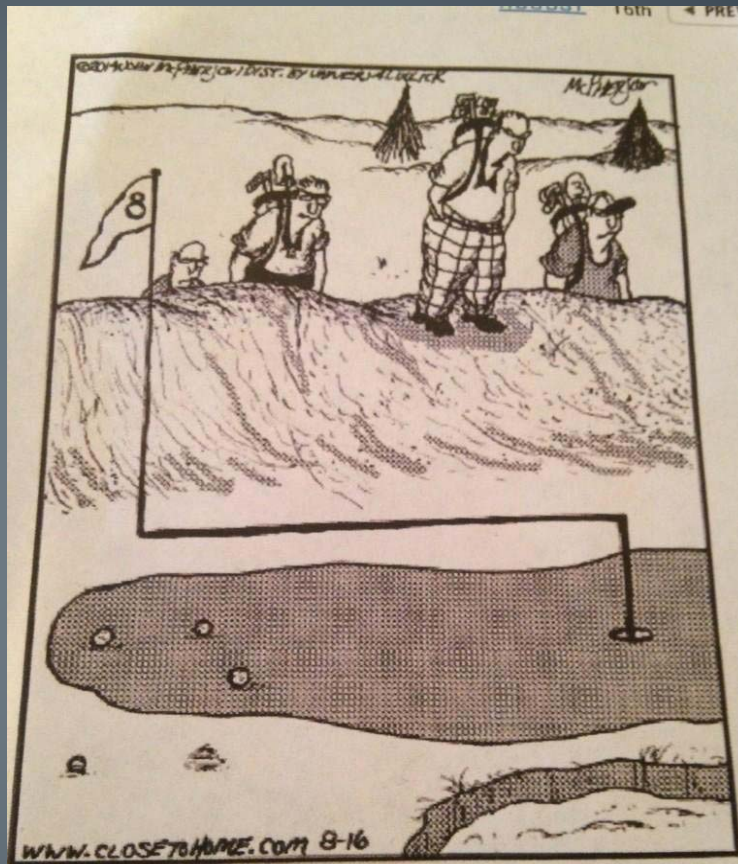
Date of Rain/Storm Event	Rain Total	Man Hours to Repair	Pump Bunkers	Total Hours	Cost to repair @ Avg \$10/Hour
11/13/2016 - Sunday *2 days with poor bunkers	1.75	84	9	93	930
12/6/2016 - Tuesday *3 days with poor bunkers	2.5	160	8	168	1680
1/23/2017 - Sun/Mon *2 days with poor bunkers	1.55	90	6	96	960
4/4/2017 - Tue/Wed *2 days with poor bunkers	1.2	90	8	98	980
4/6/2017 - Th/Fri *2 days with poor bunkers	1.4	110	8	118	1180
5/24/2017 - Wed/Thur *2 days with poor bunkers	1.3	120	8	128	1280
6/8/2017 - Wed/Thur/Fri *4 days with poor bunkers	2.25	180	14	194	1940
6/23/2017 - Fri/Sat *3 days with poor bunkers	1.5	100	6	106	1060
8/10/2017 Wed/Thu *3 days with poor bunkers	1.5	136	8	144	1440
8/14/17 Mon *2 days with poor bunkers	1	75	8	83	830
8/23/17 Wed *3 days with poor bunkers	2.4	170	10	180	1800
8/28/17 Mon *3 days with poor bunkers	2.5	200	16	216	2160
9/7/17 Thur *2 days with poor bunkers	0.8	75	8	83	830
9/12/17 Tue *3 days with poor bunkers	3	230	16	246	2460
10/10/17 Tue *4 days with poor bunkers	4.25	260	16	276	2760
10/16/17 Mon *2 days with poor bunkers	1	75	8	83	830
10/24/17 Mon *3 days with poor bunkers	2.6	220	16	236	2360
45 Golf Days with poor Bunkers	32.5			2548	25480

Chipping Green Bunkers prior to the renovation and following only a $\frac{3}{4}$ inch thunderstorm event.



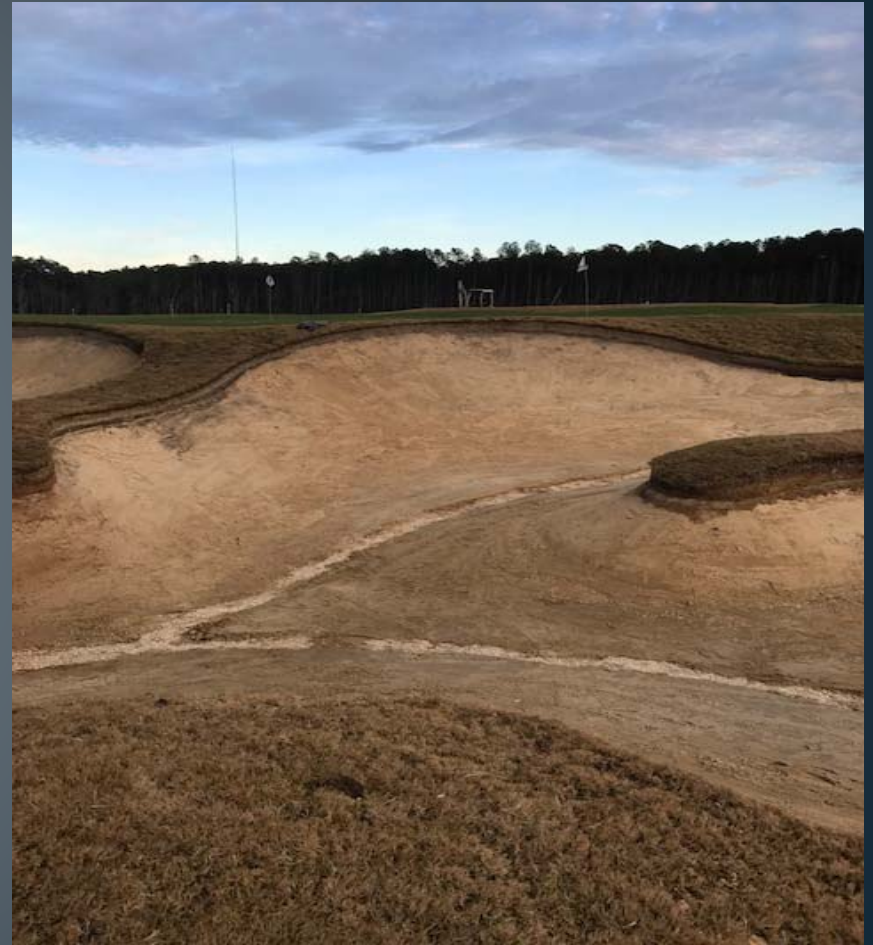


MYRTLE BEACH



"I hate the greenskeeper at this course."





Shelled them out, flushed the drain lines and the outfall, replaced drainage as needed.



- Gravel Layer and the BBB ST410 Polymer being applied in December of 2017 on the CG Bunkers.
- Polymer cures for 24 hours and then the sand can be added.



1

ForeFront

CONSTRUCTION





- Chipping Green bunker after 3 inches of rain in the spring of 2018.
- Surface water drains directly into this area of the bunker.
- Easy decision to renovate.







- Decided to move forward with the project and invited Tom Marzolf with Fazio Golf Designs to provide architectural input prior to and during the renovation work.
- Contractor bidding process. Total Turf Golf Services, McDonald & Sons, and Fore Front Golf Construction representatives visited the property and then submitted their bids for the project.
- Selected Fore Front Golf Construction out of Atlanta, GA. Reputable company with many good references and high end golf course experience and they had also done the initial work at the CG.
- Project started at the end of June 2018 and was completed by September 7th. We had 13 inches of rain from July 18th through July 31st and there was a period of 10 days where it was too wet to perform construction work.
- Construction process was very smooth and clean with minimal disruption to play. Typically 3 – 4 holes being worked on at a time during the renovation.
- Cleaning and shaping crew would only work on average 2 holes ahead of the Gravel and BBB installation process as to only interfere with play as little as possible.

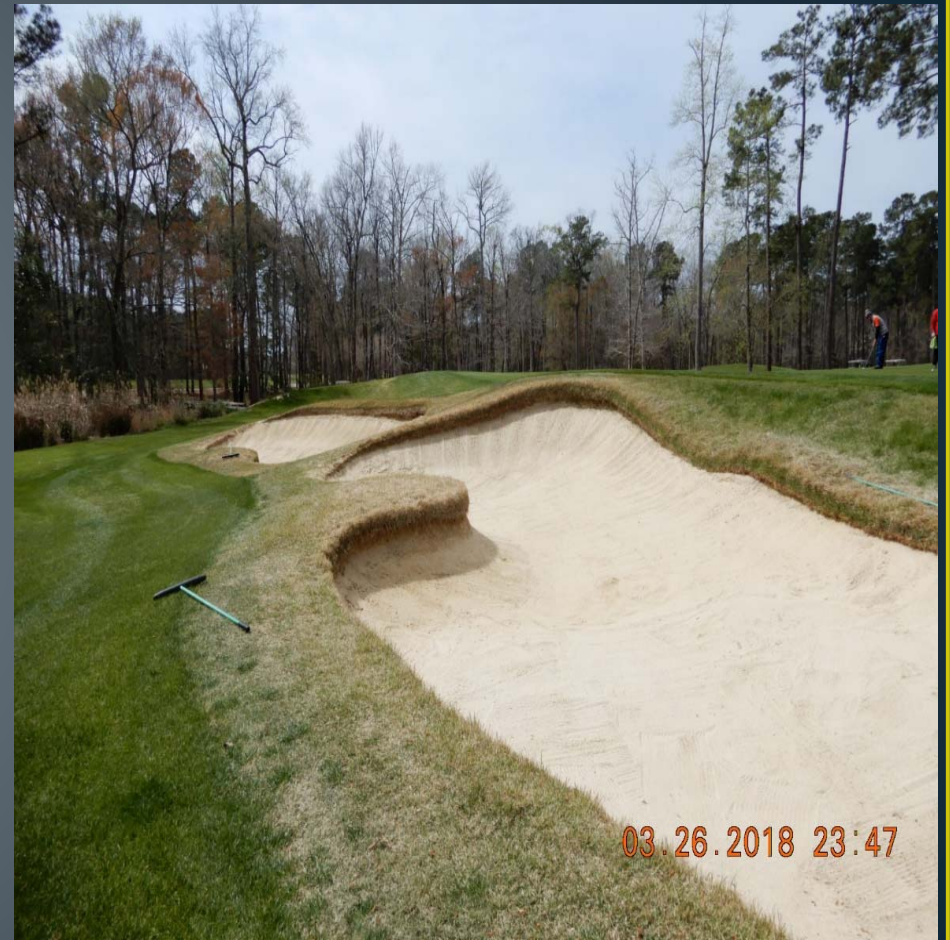
Golf Agronomics G-Angle Bunker Sand

- CRACKS, CRUSH, and GRIND course silica sand into angular particles
- Particles interlock to create, firmer, more playable bunkers that are less expensive to maintain.
- Provides greater wind resistance to decrease product loss
- Stays in place better on steep bunker faces due to the interlocking particles
- Provides excellent characteristics for drainage purposes
- Helps to reduce the frequency and severity of washouts
- DECREASE LABOR EFFORTS NEEDED TO COMPACT/FIRM-UP BUNKERS
- Industry standards today demand bunker sands with penetrometer readings of 2.4 or higher.
- G Angle products consistently has readings of 3.0 and above.
- This feature reduces the frequency and severity of “fried-egg lies.”
- G Angle is manufactured from course material, the product retains a larger particle size distribution than most traditional bunker sands.



Tom Marzolf from Fazio Golf Design providing insight
and direction to improve playability and restore the
bunkers to modern day standards.







2 Fairway Bunker



Chamber drains were left in place in some of the bunkers and extra gravel was used to raise the floor of the bunker and to increase the drainage potential.





07.11.2018 02:25

Hole 6 under construction, combining bunkers





7 Bunker and New Surrounds



10 Greenside before, during, and after a 4" rainfall



Post Hurricane Florence



Just a beautiful day in January!





Hole # 16 Greenside



ForeFront CONSTRUCTION



Fore Front Golf did a wonderful job in keeping their work area clean and their was minimal disruption to the golf course.



16 Greenside Bunker would washout with
only a $\frac{1}{2}$ - $\frac{3}{4}$ of an inch of rainfall



Finished project reduced our bunker size down to 70,000 square feet (15% reduction)

Removed 9 bunkers in the process for a new total of 63 bunkers on the golf course.



MAINTENANCE PROGRAM FOR BETTER BILLY BUNKERS

Sand Levels

- A minimum depth of **four inches** (102mm) of sand shall be maintained in **all bunkers at all times in order to achieve the best performance from the bunkers.**
- The selected sand for your bunkers has been lab tested. One of the tests completed may have been a “Column Test” or water release curve analysis which determines the level at which water perches in your sand’s profile and your sands recommended depth. For best performance, follow the lab’s recommendation so that you will have about 1/4 inch (6mm) of dry sand in the entire bunker and firm moist sand below. If a Column test was not performed, you may easily determine the proper depth based on field observations.
- Consistent depths of sand will give the best bunker playability. If the bottom area of a bunker is wet and edges are at the proper moisture during the entire day, adding 1” more sand to the wet area typically produces a consistent drying.
- All bunkers must be probed on a regular basis to ensure proper sand depth. If thin areas of sand are discovered by staff or by golfers, sand depth should be corrected immediately.
- If sand depths are insufficient, repetitive contact of the drainage layer with rakes (machine or hand), golf clubs, or foot traffic could cause single pieces of gravel to break loose. While not compromising the performance of the drainage layer, these loose pieces of gravel could be spread throughout the bunker sand if not addressed immediately. If any loose piece of gravel is identified anywhere in a bunker, it is a good indication to check sand depths- specifically around the edges.



Sand Addition

- All bunker construction methods will require the routine annual maintenance practice of adding bunker sand. Better Billy Bunker is no different. While washouts and sand contamination are greatly reduced, there are still factors that reduce the amount of sand initially placed in bunkers during construction - wind erosion, thousands of rounds of golf, etc. It is always a smart move to budget for a bit of additional bunker sand each year. This will ensure that appropriate sand depths are always able to be maintained and will freshen up any bunkers that may have experienced contamination from OUTSIDE factors.

Edging

- The first year of a new bunker's maintenance should not include much edging, but allow grass to encroach into the sand a few inches. In the second year, edging can occur into the white sand that will have established roots in the pure white sand.
- Edging bunkers should be accomplished with string trimmers only; do not use metal blade edging devices to trim around bunker edges.
- NEVER edge into soil. This will cause contamination of the sand with soil and void the warranty of your Better Billy Bunker system.

Herbicide Edging

- Superintendents have found products such as *Bayer's Spect(i)cle TOTAL* effective on cool season grasses. Other "top burn" type products may be as or more effective than mechanical edging.
- Growth regulators such as Primo may also reduce mowing and trimming intervals.

Raking

- You may rake your bunkers with a hand rake or power rake (Sand Pro Type) as often as you wish. Avoid hitting any edges and disrupting sod or soil that might cause contamination.
- Always rake the edges by hand to prevent potential contamination.
- Be cautious of entering and exiting bunkers with equipment so as not to disrupt edges.
- It is recommended that bunkers be raked with toothed leaf rake (hand or power rake) as often as needed to maintain proper aeration within the sand to avoid algae or weed buildup.
- Leaf rake attachments may help fluff wet areas and assist in drying to produce the desired playing surface. This also helps reduce algae.
- It is also recommend to remove scarifying blades and plows, or use with caution. If any kind of plow is utilized in any areas with shallow sand depths, damage to your BBB layer is possible. **If this occurs stop immediately** and add sand to the proper depths so further damage cannot occur during the mechanical raking process.
- Cultivating bunkers too deep and aggressively will also result in wet sand and fried egg lies. Keep bunkers firm below. You can manipulate how your sand plays by the frequency and depth of raking and type of implement used.
- Your new bunkers will require much less maintenance and it is encouraged to minimize raking to an “as needed” basis as opposed to raking daily or 3 or more times a week. Raking footprints only may be needed - this will not only save labor cost, but also provide great bunkers.



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Tournament Players Club



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CONNECT. **DISCOVER.** ELEVATE.



GCSAA EDUCATION CONFERENCE | TRADE SHOW | GCSAA GOLF CHAMPIONSHIPS

February 2-7 | San Diego Convention Center

PRESENTING PARTNERS



PARTICIPATING PARTNERS





Bunker Renovations

**Ahren Wonderlich, Golf Course Superintendent
The Players Club, Omaha, Nebraska**

**Steve Merkel, CGCS, Director of Agronomy
Landscapes Management Company, Lincoln, Nebraska**





The Players Club

27 hole private club

Opened in 2000 (2006)

750 members

Bentgrass greens, tees, and fairways

130 bunkers





Bunker Renovation Project

2011 Initiated an in-house bunker renovation
“Simple” remove and replace
Scope of work intensified

Goals

Reduce total number of bunkers
Reduce total area of sand surface
Maintenance friendly contours and slopes
Maintain architect integrity



2017 Evaluated Progress of the Project

70% of bunkers renovated

“Are we ever going to finish?”

New/better products and materials

Liners

Sand

Local competition

Re-evaluate project





2018 Contractor hired
Greenside bunkers only
75% Remove and Replace
25% Remodel
Team approach

2019 and beyond
Maintain and evaluate performance
Fairway bunkers to complete (24)





Renovation Project Re-cap

Project 2011 through 2017—In-house

Very successful

Outstanding team performing the work

Downsides—inconsistent playability, finish date?

Project 2018—Contractor

Team effort

In-house

Contractor

Not finished yet!



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ROI—Customer Satisfaction

Storm damage

Recovery efforts

Minimize downtime

Installed higher quality sand

Protect the investment

Competition





Factors to assist in the decision making process

Funding

Time

Size and scope

Skill level of the team

Desire

Labor

Equipment

Competition

