



CB&I Environmental & Infrastructure, Inc.  
2481 NW Boca Raton Blvd  
Boca Raton, FL 33431  
Tel: +1 561 391 8102  
Fax: +1 561 391 9116  
www.CBI.com

August 11, 2014

Michael Crotty  
Town Manager  
Town of Surfside  
9293 Harding Avenue  
Surfside, FL 33154

**Subject: Opinion of Probable Construction Costs**

Dear Mr. Crotty:

This letter is in response to your request to more fully describe and develop probable construction costs for the various options discussed during the Sand Project Community Monitoring meeting on August 5. These options included:

1. Tilling the beach.
2. Scraping the new sand off the beach and placing it in the dunes or street access areas.
3. Cover the Surf Club sand with more sand from an upland source.
4. Scrape, remove, and replace the Surf Club sand.
5. Scrape the Surf Club sand into the ocean.
6. Scrape the Surf Club sand and place it in Bal Harbor or City of Miami Beach.

These costs are based on similar projects put out to bid over the last 2 years in southeast Florida and the central east coast of Florida. The costs express an opinion of the probable construction cost should the Town put the work out to bid.

**1. Tilling the Beach**

Tilling the beach involves a dragging a beach tiller behind a bulldozer to mechanically mix the sand placed by the Surf Club with the pre-existing beach sand. A beach tiller is composed of numerous 3-foot long "teeth" that extend below the beach surface, which when dragged lifts and mixes the sand. This work would be performed only after the FDEP has determined that Surf Club has removed all non-beach compatible material (material greater than ¾") from the beach. This work would have to be performed outside of sea turtle nesting season. A current County permit allows beach tilling between November 1 and April 15. A similar construction window can be anticipated if the Town were to undertake this effort.

The benefit of beach tilling is that it will mix the Surf Club sand with the pre-existing sand, lightening the color of the sand by averaging the color of the darker new sand and whiter pre-existing sand. It is the least expensive option. Beach tilling will not address some residents concern about the overall quality of the material or completely address their color concerns. A Coastal Construction Control Line (CCCL) permit to allow tilling should be relatively easy to obtain.



We have observed unit costs for beach tilling as high as \$4,400/acre to as low as \$455/acre. Looking at the average for several projects, a probable construction cost to till the beach of \$750/acre was applied. The beach acreage to be tilled is estimated at 6.5 acres, assuming tilling from the seaward edge of the dunes to mean high water and from 96<sup>th</sup> St to 87<sup>th</sup> Terrace. Thus, the cost for beach tilling is approximately \$5,000.

**2. Scraping the Surf Club sand off the beach and placing it in the dunes or street access areas.**

Scraping the Surf Club sand off the beach and placing it in the dunes or street access areas seaward of the Coastal Construction Control Line (CCCL) would address some residents’ concerns about the color of the beach. As with tilling (and all other alternatives), this work would have to be conducted outside of sea turtle nesting season and after FDEP determination that the Surf Club has removed all non-beach compatible material from the sand that they placed along the beach. It must be recognized that by November 1, it may be difficult to separate the Surf Club sand from the pre-existing sand due to natural mixing of material, especially if the Town is impacted by large wave events.

Given the limited sand offshore sand resources in southeast Florida, it is recommended that the Town retain as much sand as possible within the Town’s boundaries. This alternative meets this objective. Placing the material within the dune system would improve storm damage protection.

The cost to scrape the beach and place it in the dunes is approximately \$156,000. The breakdown of this cost is shown in Table 1. This alternative assumes that the existing dune vegetation is buried and must be replanted. It is assumed that a bulldozer will simply push material up the face of the beach and into the dune. Some excavation of the material, placement in trucks and hauling a short distance to the street ends is also included.

**Table 1. Opinion of Probable Cost to Scrape the Beach and Place Sand in the Dune**

<b>Item</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Cost</b>	<b>Unit Total</b>
Mobilization/Demobilization	1	LS	\$25,000.00	\$25,000.00
Scrape Sand into Dunes	10,000	cy	\$1.50	\$15,000.00
Load and Transport to Accesses	1,000	cy	\$2.25	\$2,250.00
Dune Vegetation	9.1	acres	\$11,700.00	\$106,470.00
Site Restoration	1	LS	\$2,500.00	\$2,500.00
Surveys	2	LS	\$2,500.00	\$5,000.00
<b>Total</b>				<b>\$156,220.00</b>

The placement of sand in currently vegetated dunes could damage or destroy the existing dune vegetation. The concept of thin layers or “lifts” (4” to 12”) was discussed as being a method to limit the impact to vegetation though it also limits the volume of sand that can be placed in the dunes. Constructing one lift in November and a second lift in March could allow vegetation to grow through the lift. However, there is not much guidance as to vegetation survivability verses the thickness of the lift. Normally, the material is placed in one lift event and followed by dune revegetation. However, a cost is provided in Table 2 for general comparison purposes.



**Table 2. Opinion of Probable Cost to Scrape the Beach and Place Sand in the Dune in Two Lifts**

<b>Item</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Cost</b>	<b>Unit Total</b>
Mobilization/Demobilization	2	LS	\$25,000.00	\$50,000.00
Scrape Sand into Dunes	10,000	cy	\$4.75	\$47,500.00
Load and Transport to Accesses	1,000	cy	\$2.25	\$2,250.00
Dune Vegetation	0.0	acres	\$0.00	\$0.00
Site Restoration	1	LS	\$2,500.00	\$2,500.00
Surveys	2	LS	\$2,500.00	\$5,000.00
<b>Total</b>				<b>\$107,250.00</b>

The cost of revegetating the dune is based on costs for a contractor to perform similar work. A less expensive solution for revegetating the dunes can be to mobilize a group such as the Youth Environmental Alliance.

### **3. Cover the Surf Club sand with more sand from an upland source**

Covering the Surf Club sand with more sand from an upland source that is lighter in color would resolve the immediate concerns. Over time, there will be mixing of the whiter upland sand with the sand that's on the beach, including the sand placed by the Surf Club. The white sand would gradually become darker as it mixes with the Surf Club sand though the final result will be a lighter color than currently exists on the beach. This approach has the added benefit of placing additional sand in the system, which provides greater storm damage protection.

The volume of sand that could be placed from an upland sand source may be limited by the remaining volume within the previously approved template. This approach assumes that the sand is placed above mean high water in order to limit the permitting effort. It is unlikely that a permit to place sand below mean high water could be obtained in time for material to be placed prior to May 2015.

The upland sand would be tested prior to placement on the beach to ensure that it meets both FDEP requirements for beach compatible material and the Town residents' color preference.

An accurate volumetric estimate of the fill volume that could be placed within the template was not available at this time. It was assumed that a 0.5-foot thick layer could be placed from the base of the dune down to the mean high water line (~50 feet) and along the length of the Town (~1 mile). This assumption provides an accommodation volume of approximately 5,000 cubic yards (6,750 tons).

There are several mines that can provide upland sand. When cost is not the primary concern, we recommend that the Ortona mine be used due to its bright color and physical characteristics. The Ortona mine is located approximately 120 driving miles from the Town. Locating a mine within 50 miles of the Town would significantly decrease the cost as the unit cost to transport one ton of sand one mile is \$0.16. The cost to purchase and transport sand from the Ortona mine is shown in Table 3.



**Table 3. Opinion of Probable Cost to Cover the Surf Club Sand with White Sand**

<b>Item</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Cost</b>	<b>Unit Total</b>
Mobilization/Demobilization	1	LS	\$75,000.00	\$75,000.00
Supply Sand	6,750	Ton	\$9.00	\$60,750.00
Transport Sand	6,750	Ton	\$20.90	\$141,075.00
Place Sand	6,750	Ton	\$2.00	\$13,500.00
Sediment Sampling	2	Each	\$400.00	\$800.00
Scarp Management	5,300	LF	\$0.70	\$3,710.00
Beach Tilling	7	Acre	\$500.00	\$3,500.00
Site Restoration	1	LS	\$2,500.00	\$2,500.00
Surveys	2	LS	\$2,000.00	\$4,000.00
<b>Total</b>				<b>\$304,835.00</b>

Using a sand source located within Miami-Dade County could reduce this cost by as much as \$100,000. However, the quality of the sand would have to be carefully reviewed.

#### **4. Scrape, remove and replace the Surf Club sand with upland sand**

The state would require that any sand that was scraped and removed from the beach would have to be replaced by beach compatible sand. This option obviously addresses the concerns with the Surf Club sand. However, this option assumes that the beach is still “layered” and that the Surf Club sand can be easily distinguished from the pre-existing beach sand. Given that this alternative could not be instituted prior to November 1 due to limitations of sea turtle nesting, there is a chance that the pre-existing sand and the Surf Club sand will be well-mixed.

Assuming that the beach is still sufficiently layered to remove the Surf Club sand, this option provides additional room within the likely permitted template, which was a potential restriction in Alternative 3.

The cost of this alternative is much greater than Alternative 3 because the Surf Club sand must be excavated and then trucked to a landfill. The closest landfill is located in Hallandale, approximately 10 miles from the Town. It is assumed that the sand can be used as cover for the landfill and the landfill would not charge a tipping fee.

The cost to scrape, remove and replace the Surf Club sand with sand from the Ortona mine is shown in Table 4. This assumes that 14,000 cubic yards (18,900 tons) will be scraped and removed from the beach. This is similar to the volume placed by the Surf Club. Should a sand source within 50 miles of the Town of Surfside be used, then the cost of this alternative would be reduced from approximately \$800,000 to \$580,000.



**Table 4. Opinion of Probable Cost to Cover the Surf Club Sand with Ortona Sand**

<b>Item</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Cost</b>	<b>Unit Total</b>
Mobilization/Demobilization	1	LS	\$100,000.00	\$100,000.00
Remove Surf Club Sand	18,900	Ton	\$4.00	\$75,600.00
Supply Sand	18,900	Ton	\$9.00	\$170,100.00
Transport Sand	18,900	Ton	\$20.90	\$395,010.00
Place Sand	18,900	Ton	\$2.00	\$37,800.00
Sediment Sampling	5	Each	\$400.00	\$2,000.00
Scarp Management	5,300	LF	\$0.70	\$3,710.00
Beach Tilling	13	Acre	\$500.00	\$6,500.00
Site Restoration	1	LS	\$2,500.00	\$2,500.00
Surveys	2	LS	\$2,000.00	\$4,000.00
<b>Total</b>				<b>\$797,220.00</b>

## 5. Scrape the Surf Club sand into the ocean

The option to scrape the sand from the beach into the ocean is the easiest one from a construction perspective but poses a greater challenge from a permitting perspective. The placement of sand below mean high water requires a Joint Coastal Permit (JCP) application. As these types of projects are generally more complex than upland projects, the review time increases. Placing sand below mean high water also required Federal authorization. Obtaining a permit to scrape the Surf Club sand into the ocean may not be obtained prior to the start of the 2015 sea turtle nesting season.

Even if this option were employed, natural mixing and movement of sand from the offshore section to the dry beach and back could still result in the Surf Club sand being redeposited along the dry beach, though at lower densities than currently exists. Thus, the beach would appear brighter in color following scraping but could darken over time.

This option would still retain sand within the Town of Surfside, an approach that is strongly recommended.

The estimated construction cost for scraping sand into the ocean is shown in Table 5.

**Table 5. Opinion of Probable Cost to Scrape the Surf Club Sand into the Ocean**

<b>Item</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Cost</b>	<b>Unit Total</b>
Mobilization/Demobilization	1	LS	\$10,000.00	\$10,000.00
Scrape Sand into Ocean	18,900	Ton	\$2.00	\$37,800.00
Beach Tilling	13	Acre	\$500.00	\$6,500.00
Surveys	1	LS	\$2,000.00	\$2,000.00
<b>Total</b>				<b>\$56,300.00</b>



**6. Scrape and remove the Surf Club Sand and place it below mean high water in Bal Harbor or City of Miami Beach**

The primary drawback of Alternative 5, is that neither the Town nor County holds a permit allowing this work to proceed. However, the County holds a permit to place beach compatible sand below mean high water in six discrete locations within the County. One of these permitted locations is in Bal Harbor (within 2,00 feet of the Haulover Inlet), four are located within City of Miami Beach (27<sup>th</sup>, 44<sup>th</sup>, 55<sup>th</sup>, and 65<sup>th</sup> Streets) and one within Sunny Isles. The FDEP has indicated that they would be amenable to allowing the Surf Club sand to be scraped from the beach and placed within the Bal Harbor or City of Miami Beach sites. This would need to be discussed further with the County, Bal Harbor and City of Miami Beach.

It would be preferable from a coastal engineering perspective to place the sand in Bal Harbor if this option was exercised. The net movement of sand is from north to south so any sand placed in Bal Harbor would work its way south to Surfside. During the public comment period of the August 5 Sand Committee meeting, a member of the public expressed a preference for the sand to be placed to the south to avoid the Surf Club sand moving through the Town in the future.

It is likely that this option could be permitted and constructed prior to the start of the 2015 sea turtle nesting season.

The cost of this option was based on trucking the sand to 55<sup>th</sup> Street as it has a larger available volume within the permitted template. Given that there are two separate sites, the cost of surveys and site restoration have doubled, though their impact on total cost is minimal. The length of scarp management has increased and the area of beach tilling has also increased. The opinion of the probable construction cost is shown in Table 6.

**Table 6. Opinion of Probable Cost to Scrape the Surf Club Sand and Place it at 55<sup>th</sup> Street**

<b>Item</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Cost</b>	<b>Unit Total</b>
Mobilization/Demobilization	1	LS	\$25,000.00	\$25,000.00
Remove Surf Club Sand	18,900	Ton	\$2.70	\$51,030.00
Place Sand	18,900	Ton	\$2.00	\$37,800.00
Scarp Management	7,300	LF	\$0.70	\$5,110.00
Beach Tilling	19	Acre	\$500.00	\$9,500.00
Site Restoration	2	LS	\$2,500.00	\$5,000.00
Surveys	4	LS	\$2,000.00	\$8,000.00
<b>Total</b>				<b>\$141,440.00</b>

**Chateau Sand**

The Chateau currently holds a permit to place 20,855 cubic yards (approximately 28,155 tons) of sand excavated from their property along the Town’s shoreline. The characteristics of the Chateau sand are



assumed to be similar to the Surf Club sand. Given that the FDEP requires that the Chateau place the sand they excavated seaward of the CCCL and the Chateau has a permit to do so, a similar situation to that encountered following placement of the Surf Club sand is imminent. It is recommended that the Town engage the Chateau and discuss potential options prior to the Chateau placing the sand along the Town's beaches. Note that the Chateau is required by permit to place an equivalent volume of sand excavated from seaward of the CCCL along the beach. This sand has already been excavated and stockpiled. The Chateau is waiting for the completion of sea turtle nesting season to return this sand to the beach. While the Chateau already holds a permit to place the sand along the beach, there are still several options available as outlined below.

1. Request that the Chateau place sand that meets the Town's approval from an upland borrow source rather than the sand actually excavated from their property. Note that there is an increase in cost to the Chateau associated with this option, as shown in Table 7. No additional permits should be required to affect this change though additional coordination with the FDEP will be required. This option could provide the whiter sand discussed in Alternatives 3 and 4 above.

**Table 7. Opinion of Probable Cost to Dispose of Already Excavated Sand and Provide White Sand**

<b>Item</b>	<b>Quantity</b>	<b>Units</b>	<b>Unit Cost</b>	<b>Unit Total</b>
Mobilization/Demobilization	1	LS	\$75,000.00	\$75,000.00
Supply Sand	28,155	Ton	\$9.00	\$253,395.00
Transport Sand	28,155	Ton	\$20.83	\$586,468.65
Place Sand	28,155	Ton	\$2.00	\$56,310.00
Dispose of Excavated Sand	28,155	Ton	\$2.00	\$56,310.00
Sediment Sampling	7	Each	\$400.00	\$2,800.00
Scarp Management	5,300	LF	\$0.70	\$3,710.00
Beach Tilling	13	Acre	\$500.00	\$6,500.00
Site Restoration	1	LS	\$2,500.00	\$2,500.00
Surveys	2	LS	\$2,000.00	\$4,000.00
<b>Total</b>				<b>\$1,046,993.65</b>

2. Request that Chateau place the material in the Town's dunes and access areas rather than along the beach. The volume available for placement in the dunes may be limited and may require a separate CCCL permit.
3. Request that the Chateau place sand below mean high water in one of the County's pre-approved disposal locations (Alternative 6 above).

Options 2 and 3 do not address any issues with the sand already placed by the Surf Club.



## Summary

The Town has several alternatives available to address the concerns with the color of the sand placed along the beach by the Surf Club. These alternatives vary in construction cost, level of effort to permit, and eventual effectiveness (color) of the beach sand. A summary of the costs is provided in Table 8.

**Table 8. Summary of Alternative Cost, Permitting Effort and Effectiveness**

Alternative	Description	Cost	Permit Effort	Effectiveness
1	Till the beach	\$5,000.00	Low	Low
2	Scraping the Surf Club sand off the beach and placing it in the dunes or street access areas	\$156,220.00	Medium	Medium
3	Cover the Surf Club sand with more sand from an upland source	\$304,835.00	Low	Medium
4	Scrape, remove and replace the Surf Club sand with upland sand	\$797,220.00	Low	High
5	Scrape the Surf Club sand into the ocean	\$56,300.00	High	Medium
6	Scrape and remove the Surf Club Sand and place it below mean high water in Bal Harbor or City of Miami Beach	\$141,440.00	Medium	High

Please call me if you have any questions.

Sincerely,

Gordon Thomson, PE, D.CE.

CB&I Environmental & Infrastructure, Inc.

Please Reply To: Gordon Thomson

Phone: 561.361.3147

E-Mail Address: [Gordon.Thomson@cbi.com](mailto:Gordon.Thomson@cbi.com)

cc: Joseph Kroll, Town of Surfside