

MEMORANDUM

Date: 9 May 2013
To: P. Barrett – FDEP NRDA Project Coordinator
Cc: T. Day – Escambia County, FL
From: Albert E. Browder, Ph.D., P.E.
Senior Engineer *ABE*
Re: Six-Month Warranty Period Site Visit – 6/7 May 2013



olsen
associates, inc.
Coastal Engineering

Pensacola Beach, FL, Dune Restoration Project

In accordance with the terms of our contract, I visited the project site at Pensacola Beach, FL, on 6 and 7 May 2013 to observe the condition of the project components at the end of the six-month post-construction warranty period (November 2012 through April 2013). A thorough tour was taken of the entire length of the installation with P. Barrett, Glen Miley, and Jimmy McDaniel (plus an additional APFL employee).

Summary Findings:

The inspection revealed that as a whole the planting installation has satisfied the warranty period requirements for survivability, including survival pattern and plant growth. Losses of plantings and sand fencing, estimated to be 5% or less, were most frequently found to be related to localized beach erosion (beach cusp effects), and foot-traffic. It is noted that the specifications called for 9 inches of root penetration. This level was not generally achieved, however, it is noted that the six-month warranty period occurred over the winter season, during which little growth would be expected. Additionally, significant sand deposition occurred during the same period. Root growth of 6" to 9" was observed in the plants sampled. Given the circumstances of the winter period, the plant survivability and growth is considered quite successful.

Observations:

1) The project work area (e.g. the sand fencing) has experienced a significant volume of wind-blown sand accretion over the first six months of the project life. This period from November 2012 through April 2013 was dominated by strong winter weather. **Figures 1-3** illustrate the deposition of sand between and landward of the sand fencing sections. In general, deposition along the fence sections ranged from 4 to 6 inches of accretion, while the mounds of

sand between sections gained as much as 12 inches or more during this period. The accretion extends in waves landward of the fencing for 10 to 15 ft. The accretion likewise appears to extend along the entire length of the project (local exceptions noted below). A very rough estimate of the volume of accretion might conservatively be on the order of 10,000 to 15,000 cubic yards of sand accumulated¹.



Figure 1 Dune restoration project conditions at installation (0 months – November 2012) and at six months (May 2013) in the vicinity of R-116 and the White Sands Condominium. Note the significant deposition of sand in the vicinity of the sand fencing sections. The deposition has buried a noticeable fraction of the plants, however, inspection of the buried plants indicates continued survival and growth.



Figure 2 Dune restoration project conditions at installation (0 months – November 2012) and at six months (May 2013) in the vicinity of R-136 at Calle Bonita. Note the significant deposition of sand in the vicinity of the sand fencing sections.

¹ Estimate: 0.5 ft of average deposition over a 15-ft wide zone along 42,900 ft = 11,917 cubic yards.



Figure 3 Dune restoration project conditions at installation (0 months – November 2012) and at six months (May 2013) in the vicinity of R-140, just west of Portofino.

2) As a whole, plant survivability is judged to have been very good over the winter season of the 6-month warranty period. While above-ground growth has been somewhat limited, root growth is judged to be acceptable. Of the plants pulled for inspection, very few reached the 9” criteria, however, the majority of plants demonstrated adequate root growth over the winter. As suggested by **Figure 1-3**, the significant accretion witnessed along the length of the project appears to have outpaced the rate of plant growth in many areas.

3) Another factor in the growth of the plants appears to be the positioning of the sand fencing relative to the planting zone. The base design of the installation called for the placement of the sand fencing to lie Gulfward of the plants (e.g. **Figure 3**). Due to local concerns over excessive encroachment of the installation upon the recreational beach space, the sand fencing was shifted landward to different degrees, principally along the western portions of the project. At the six-month mark, the plants installed landward of the sand fencing appear to have experienced improved growth, while plants installed Gulfward of the fencing appear to be more stressed (**Figures 4 and 5**). Survivability of the plants installed Gulfward of the sand fence is very high, but growth has been limited. This condition is expected to improve in the subsequent six month warm period.

4) **Loss due to erosion** – Along the easternmost portions of the installation, in Acceptance Section #8 in the vicinity of Park East, several short segments of the project were severely impacted or completely eroded away over the winter and early spring. This possibility was discussed in the November 2012 post-construction report. As depicted in **Figures 6 and 7**, these losses are attributed to the formation and migration of beach cusps, arcuate or semi-sinusoidal shoreline features that include horns, where the beach is significantly wider, and embayments where the shoreline recedes and the beach becomes very narrow. In the Park East areas the beach as a whole has eroded over time to a point where the embayments of the cusps encroach so far landward that the dune features are adversely impacted. Frequently these areas

are correlated with breaks in the dunes, which form from repeated wave attack on the dune features.

Figure 6 depicts such a feature that developed just east of the parking lots at Park East near FDEP monument R-149.5. In this area the entire installation was lost along a 200-ft segment of the beach. At the time of the May 2013 site inspection, the area had recovered due to a significant shift in wave conditions from easterly to westerly. As shown in Figure 5, the area had been significantly impacted as recently as three weeks prior (probably even more recently). Despite the loss, the presence of the installation likely protected the pre-existing engineered dune from further damage. **Figure 7** depicts a similar, but less severe condition just west of Parking Lot F (R-146.5), in which the sand fencing and Gulfward half of the dune restoration was lost for a distance of roughly 200 ft. Overall, these areas represent roughly 1.0 to 1.5% of the total project.



Figure 4 Shoreline conditions near R-109 at Park West, in the vicinity of the newly established dog park (background). Here the sand fencing was installed closer to the existing dunes and the plants Gulfward of the fencing appear more stressed. Survivability did not appear to be significantly reduced but plant growth is more limited.



Figure 5 Shoreline conditions near R-115 at the Cross. Here the sand fencing was installed closer to the existing dunes, with a wide planting zone Gulfward of the fencing. Plants in this zone appear more stressed and growth is limited. Survivability did not appear to be significantly reduced but plant growth is more limited.



Figure 6 Impacts of beach cusp activity east of Park East (R-149.5). Note the distinct embayment of the cusp in the left frame and the narrow beach conditions, which eroded the installation away and left a localized dune scarp in the engineered dunes. Three weeks later (right frame), the wave conditions had shifted significantly and the beach had widened by roughly 100 ft.

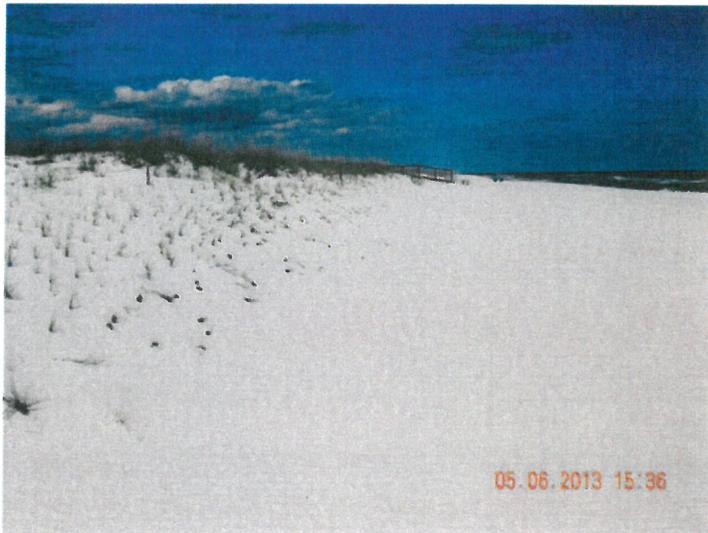


Figure 7 Dune restoration conditions just west of Parking Lot F near Park East, indicating the loss of the sand fencing and a portion of the plantings in this roughly 200-ft segment. The segment had been impacted by beach cusp activity over the winter.

5) Other areas of the project experienced similar, but less severe, erosion and loss of the Gulfward edge of the planting zone. Most notably, the area between Regency Towers and Calle Bonita (R-135.5 to R-136, **Figure 8**) appears to have experienced plant loss along the Gulfward edge. It is noted that in this area a transition occurred in the sand fencing location, moving the fence sections landward and exposing the plants to a higher level of stress and erosion. It is unknown whether the sand fencing would have survived the wave impacts as the cusp passed this area. Immediately east of the cusp-affected area, the fencing was installed on the Gulfward edge, and no losses were noted (**Figure 9**).



Figure 8 Loss of plants installed seaward of the sand fencing near Calle Bonita (R-135_5). It is opined that the losses are attributable to beach cusp activity, note the scarp remnant on the right edge of photo. It is further noted, however, that the sand fencing was installed in a landward position, with the plants installed Gulfward of the fencing.



Figure 9 Dune restoration conditions at Calle Traviesa, immediately east of the area shown in Figure 7. Note the accretion in the project area.

6) Within the highest-traffic hotel zone, a variety of installation patterns were implemented, depending on the input of the individual property owners. Many areas in the commercial core east of Casino Beach were planted without the protective benefit of sand fencing (to avoid encroachment on recreational space). A combination of the foot traffic, the concessionaire equipment, and the lack of fencing resulted in some small localized areas of plant loss (**Figure 10**). In areas that were undisturbed, however, plant survivability was high, but overall growth was limited (**Figure 11**). This may be a result of the winter weather of the first six months of the project life. As an example, the area fronting the Hampton Inn appears to have high survivability, but the plants appear to have limited growth. This area was noted in November 2012 as an area of concern, and bears continued attention. The sand fencing installed in the area does appear to be effective in preventing significant foot traffic damage.



Figure 10 Localized wind scour and damage to plantings due to concessionaire equipment placement (R-123.5).



Figure 11 Measuring plant root growth near R-123.5 in the hotel zone at Pensacola Beach, FL.

7) Similarly, at the fishing pier and at Park West the high-traffic areas produced some plant loss along the pathways leading to the beach. Elsewhere in these replanting areas, plant survivability appears to be high, but again growth is somewhat limited (**Figures 12 and 13**). These areas also experienced noticeable accretion.

8) Sand fencing – Inspection of the sand fencing revealed that the vast majority of the fencing sections were intact and in good condition. Localized areas of loss and/or damage were noted (see discussion above regarding cusp areas). The warranty period for sand fencing is 12 months, and discussions with the Contractor indicated that Aquatic Plants of Florida would return within a week or two to pick up fallen pieces and repair fencing where practical.

9) Signage – inspection of the signs indicated that the signs, posts, and hardware appear to remain in good order.

10) **Figures 14 through 19** provide additional photos from the May 2013 inspection.

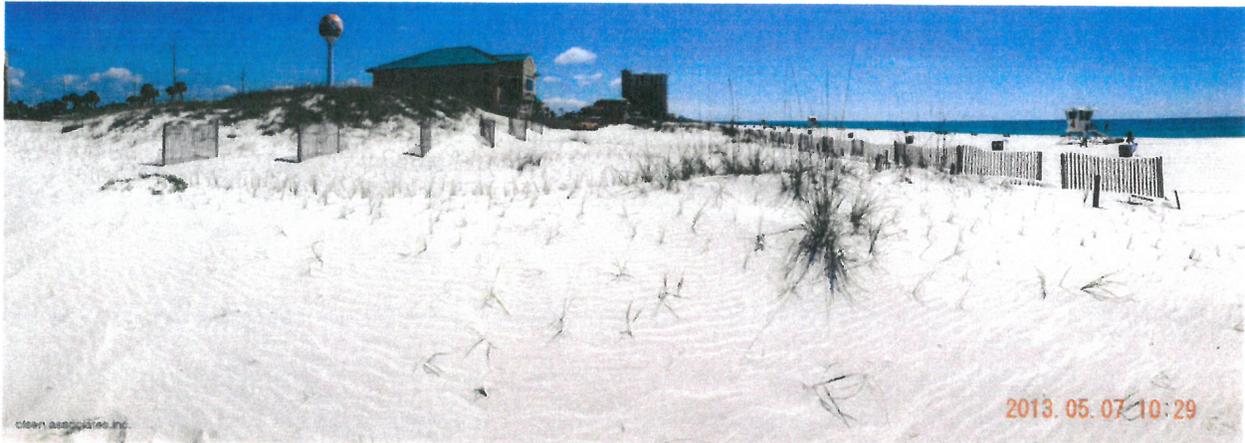


Figure 12 Dune restoration/replanting area between the fishing pier and the public safety building at Pensacola Beach. Note the wind-blown accretion across the area.



Figure 13 Dune replanting area at Park West (Ft. Pickens Gate Park). Some minor foot-traffic damage and loss of plantings was noted along the travel pathways.



Figure 14 Dune restoration conditions along Ariola Drive near Avenida 16 (R-128).



Figure 15 Dune restoration conditions east of the Holiday Inn Express (R-117.5).



Figure 16 Dune restoration conditions along Calle Hermosa (R-138).



Figure 17 Growth of sea purslane plant unit in depositional area near park East (R-150).



Figure 18 Sand burial and growth of plant unit in depositional area near Avenida 23 (R-135).



Figure 19 Dune restoration conditions along the Sans Souci shoreline (R-113).