

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

August 16, 2006

MEMORANDUM FOR THE RECORD

Subject: Preliminary Assessment of Floyd Bennett Field Coastal Restoration Grant Application and Shoreline Erosion Problems

TASK: Provide information to Jamaica Bay Institute (JBI) for use in applying for grant to create a coastal restoration plan for Floyd Bennett Field (FBF).

PROBLEM: JBI twice previously submitted grant application to National Park Service for fund to create a coastal recreation plan. It was rejected both times. However, the second rejection contained specific recommendations for improvements that would increase the competitiveness of the grant request within the NPS process. In responding to these specific critiques, several other questions were generated about shoreline erosion on FBF and the adjacent Jamaica Bay coastal impact zone. These remain to be answered by researching current and future shoreline restoration projects within the Jamaica Bay coastal impact zone.

PROPOSED SOLUTION:

A. Write a report that will do the following:

1. Answer NPS rejection critiques.
2. Identify current shoreline projects under construction on FBF and nearby Jamaica Bay coastal impact zones.
3. Identify future current shoreline projects under construction on FBF and nearby Jamaica Bay coastal impact zones.
4. Provide assessment of current FBF shoreline and adjacent Jamaica Bay coastal impact zones.
5. Identify current Army Corps of Engineers (ACE) erosion control solutions contained in the Shore Protection Manual that may apply to portions of the FBF shoreline and adjacent Jamaica Bay coastal impact zones.
6. Identify ACE programs that may apply to coastal erosion solutions for FBF.
7. Identify NPS policy positions that contravene current shoreline erosion control methods approved by the ACE.
8. Predict shoreline erosion from current data on erosion and transgressive sea level issues outward as far as 50 years (if possible).

B. After review by the Director of JBI, forward a copy of the report to select NPS staff within Gateway NRA for review in advance of a meeting. Convene a meeting of NPS staff to solicit input on various options that are available to Gateway NRA for FBF erosion control and shoreline restoration. Solicit a consensus among the staff for use as a baseline position to present at a meeting of stakeholders within the Jamaica Bay coastal impact zones.

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

BACKGROUND INFORMATION:

The conflicting issue for FBF is shoreline "softness" as preferred by NPS policy and erosion control as mandated by ACE. Currently, there is no shoreline technology that is completely erosion proof. Shoreline restoration must take into consideration the impact of current and planned coastal protection plans for Department of Defense (DoD) assets on Floyd Bennett Field (FBF) as well as the submerged areas of Jamaica Bay.

One solution is a hard shoreline design. Specifically, the Department of the Navy (DoN) is managing a shoreline protection plan at the USMC Reserve unit on FBF. This plan removes the corroded steel sheet piles above grade and sculpts the shoreline slope to accept a sediment fabric barrier (filter cloth) overlain by armor stone emplacement.

Another solution is a soft shoreline design using sediment pumping, coconut fiber mats and rolls, and extensive vegetation planting. Specifically, a current saltmarsh restoration project (Elders Point) is actively transpumping slurry sediment from the NE corner of FBF.

One problem with any soft shoreline design is sediment erosion from the filled site to anthropogenic sediment sinks such as borrow pits and dredged channels. The ACE permit process will examine all soft shoreline designs to ensure that such designs do not impact their dredging operations for navigable channels within the Jamaica Bay waterway system.

Typically, installation of soft shoreline design features requires release of sediment into the areas adjacent to the shoreline to allow sediment to drift along shore as the tide and currents dictate and behave "naturally" within the littoral environment. Placing sediment close to the edge of a dredged channel is not conducive to maintaining a navigable channel. Therefore, it is highly unlikely that ACE will allow this to occur as part of a soft shoreline solution.

One goal of a soft shoreline vision is to recreate the shoreline boundary as it was in 1972. However, instead of extending the FBF shoreline to recreate its 1972 boundary with a soft shoreline solution, ACE may only approve such a plan if the current shallow water shoreline is maintained in place instead of moving it seaward and encroaching on the boundary of the dredged channel. In that case, conversion of upland terrain to backshore would be at the expense of upland terrain not currently used as a backshore environment. This solution would not extend the shoreline to its 1972 boundary and would entail complete change of upland areas from current habitat to backshore habitat.

Another solution is to determine a "line in the sand" where erosion would not be allowed to transgress by building an erosion barrier solution at that line and overlay it with soft shoreline features (sediment and vegetation). Seaward of that line, sacrificial sediment and vegetation growth would be installed or allow to be naturally deposited by accretionary management practices to extend a natural soft shoreline appearance to the seaward limit allowed by ACE design standards. This seaward area is sacrificial in its design and allows for longshore sediment transport on a periodic basis and large energy storm impacts on an infrequent basis to act on this shoreline in a natural way. If the sacrificial sediment and vegetation areas are removed by such events and the shoreline is eroded back to the buried erosion barrier structure, it can be renourished at the convenience of the coastal manager and acquisition process timelines. No urgency is

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

required other than appearance issues and biological impact issues such as breeding seasons for various species that used the seaward sacrificial sediment zone for such habitat activities.

Current Information:

There are ten areas of consideration for coastal environment planning along the FBF shoreline: 1) from the Gateway Marina to Dead Horse Bay point; 2) from Dead Horse Bay point to the north side approach to the Gil Hodges Memorial Lift Bridge; 3) from there to the first seaplane ramp on the Marine Reserve Unit Training Center; 4) the DoN shoreline restoration project (1200' from the seaplane ramp); 5) from the end of the DoN restoration project to the seaplane ramp 500 meters north of the corner of the NYPD Aviation Unit property; 6) from the seaplane ramp on the NYPD Aviation Unit property, continuing along the Dept of Sanitation property and the FBF shoreline until terminating at the southern side of the seaplane ramp at the Hangar B parking ramp; 7) from the seaplane ramp at the Hangar B parking ramp to the end of the wooden bulkhead at the NE corner of the Hangar B parking ramp; 8) from the NE corner of the Hangar B parking ramp to the beginning of the wooden bulkhead at the NE corner of FBF; 9) the wooden bulkhead at the NE corner of FBF; and, 10) from the west end of the wooden bulkhead at the NE corner of FBF along the north shoreline of FBF and terminating at the southwestern approach to the Belt Parkway Bridge.

Each of these areas has a unique coastal property signature and erosion prevention requirements. The two biggest items that will impact planning for the FBF coastal restoration plan are the current armor stone project being done by the DoN and the dredged channel immediately offshore that is maintained by the ACE. Each of the areas will be discussed in terms of possible solutions to the problem of returning the shoreline to its 1972 boundary.

From Gateway Marina to Dead Horse Bay point

This is a long, scarped sand dune ridge trending NW-SE that is heavily vegetated along the top. Evidence of recent events that created severe undercutting, slump, and erosion is present. Dead Horse Bay is no longer an embayment, but rather it is a deeper slough flanked by the scarped dune line on the east and a drowned marsh on the west (Fig. 1).

There may be an ACE sponsored study underway to assess the feasibility of renourishing the Dead Horse Bay coastal marsh. Research is still pending on the status of this ACE sponsored study. Such a project would likely require several million cubic meters of sediment for fill, hundreds of thousands of plantings of salt marsh vegetation, and most likely involve the installation of a sediment erosion barrier that would prevent a recurrence of the loss of this marsh habitat.

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park



Figure 1. This circa 1933 image of Floyd Bennett Field shows Dead Horse Bay before the marsh was submerged due to erosion of the marsh sediments supporting vegetation. The dotted line represents the current shoreline.

.43 miles

From Dead Horse Bay point to the north side approach of the Gil Hodges Memorial Lift Bridge

This is a set of two crescent beaches created by the headlands of the Dead Horse Bay point, the old ferry landing area, and the bridge trestles immediately offshore. The old ferry landing area contains tar deposits poured onto the shoreline immediately around the ferry pilings in the swash and tidal zone. These tar deposits are still emitting volatile organic compounds (VOC) easily detected by the human nose. This section of shoreline would be a candidate for a soft shoreline design with a seaward terminus at the line of the old pilings which marks the beginning of steeply descending bottom leading to the edge of the dredged channel maintained by the ACE.

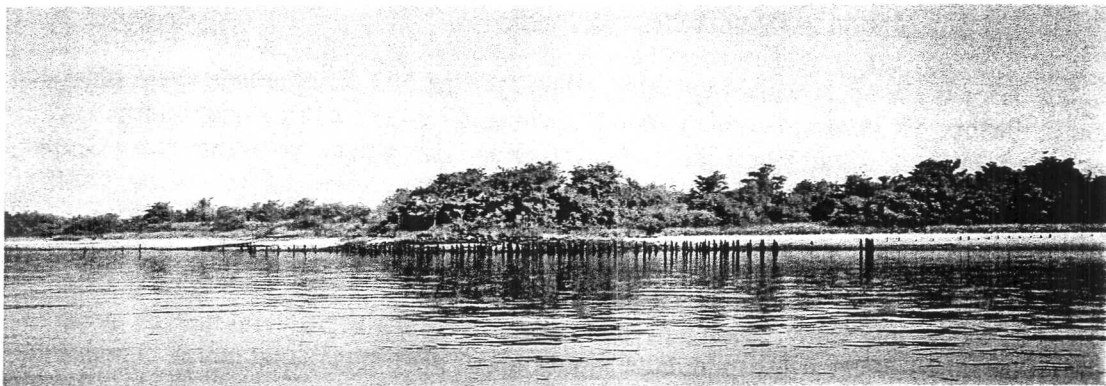


Figure 2. Candidate shoreline for soft shoreline design. This is the area where coal tar is present on the shoreface at the old ferry-landing site.

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

.30 miles From the north side approach of the Gil Hodges Memorial Lift Bridge to the first seaplane ramp on the Marine Reserve Unit Training Center

This section of narrow beach is an active depositional area for sediments eroded from the two crescent beaches immediately to the west of the bridge. The beach is also the site of the beginning of the steel sheet pile (SSP) installation that extends to the NYPD aviation area bulkhead. The SSP extends from a starting point several meters shoreward of the beginning of the shoreline traverse.

This corner displays an excellent example of what the shoreline would resemble with the SSP removed and no structure added to prevent erosion of the current shoreline boundary (Fig. 3). It is estimated that the back beach extends 50 meters shoreward with another 25-30 meters of upland terrain that is affected by infrequent high water associated with high-energy wave events. In total, some 75-80 meters of upland terrain and habitat would be converted to coastal shoreline habitat without the presence of the SSP shoreline structure or some replacement that defined the landward limit of an erosional boundary of some type.



Figure 3. Transition to the SSP bulkhead is shown on the right side of the image. A transitional back beach environment is present without the bulkhead.

The narrow beach along this stretch of shoreline terminates at the seaplane ramp leading to the USMC Reserve Training Unit property. Public access to the beach to the west of this seaplane ramp is allowed. However, it is adjacent to the USMC fence line maintained on top of the SSP bulkhead that is still serviceable along this section of their property. The seaplane ramp is fenced to prevent access beyond the western ramp edge.

.23 miles The DoN shoreline restoration project that extends 1200' from the west seaplane ramp

This project is currently underway. The project involves cutting the SSP at the mud line, shaping the shoreface to grade, laying sediment filter cloth, and covering that with successive layers of gravel, rock, and armor stone (Fig.4). This creates a hardened

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

366 meters

shoreline. The project runs for 1200 feet along the deteriorated SSP bulkhead from the east edge of the western seaplane ramp to a point where the new armor stone shoreline will be angled back into the upland terrain and terminated.



Figure 4. Emplacement of armor stone on the graded slope is underlain by filter cloth to prevent sediment washout through the armor stone face.

The cost for the DoN project was \$3,064,284.00 or \$2,553.57 per foot. A similar expense should be expected for all extensions of this armor stone shoreline solution. Public access walkovers or boardwalks installed above this armor stone would add to the cost of implementing such a solution.

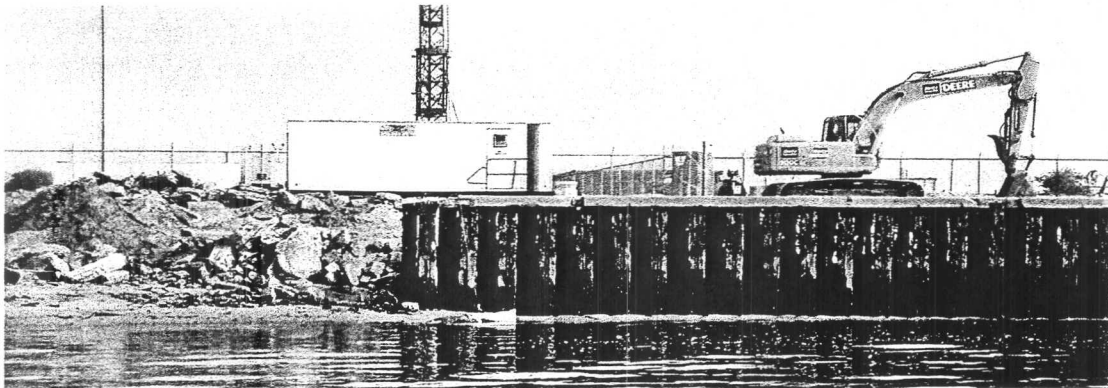


Figure 5. Removal of the SSP is done with an articulated bucket on a tracked excavator that grabs the exposed piling and bends it back and forth until metal fatigue allows failure of the uncorroded steel core. At low tide, a crew cuts the remaining stub flush to the mudline using a cutting torch.

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

The pre-construction research and engineering expenses included bonding, creating a draft design and work plan, creating a final design and work plan, and applying for a joint NYSDEC and USACE permit. The expense of these actions totaled \$131,975. The bonding and permit expenses were \$40,000 and \$10,000 respectively. The research and engineering effort to create a scope of work and final engineering plan was \$81,975.

81 miles
31 miles
From the end of the DoN restoration project to the seaplane ramp 500 meters north of the corner of the NYPD Aviation Unit property

Currently, this stretch of shoreline is a conglomerate of three owners, the USMC, NPS, and NYPD. The DoN shoreline restoration project terminates before reaching the end of the USMC property. Therefore, any continuation of this hardened shoreline will need to be coordinated with the USMC. From the end of the USMC property to the beginning of the NYPD property is NPS land. It is also a high-energy shoreline as is the USMC shoreline that was not included in the DoN shoreline restoration project (Fig. 6). All this shoreline would require a hard shoreline design compatible with the terminus of the DoN shoreline restoration project. If the terminal end of the DoN shoreline restoration project is not mated to future shoreline solutions designed to handle the high energy nature of this stretch of shoreline, extensive erosion along and possible failure of the terminal end of the DoN armor stone shoreface will likely occur within a decade.



Figure 6. This corner of the shoreline is an erosional hot spot due to the high energy of the corner design. The failure of the SSP bulkhead allowed erosion of the backfilled area behind the bulkhead.

In addition, failure to address this stretch of shoreline in a timely manner will result in several hundred feet of erosion on NPS property in less than a decade as the

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

DoN project will create a sediment starved condition immediately updrift of the NPS property. This condition will impact the NPS shoreline much more severely than the NYPD shoreline because the NYPD shoreline has been reinforced with rubble placed in front of the SSP bulkhead. This rubble has allowed the SSP to retain its concrete cap and tieback rods. Corrosion of the SSP, while present, is not as severe as the other sections of the SSP bulkhead because of this maintenance action to minimize erosion.

If a hard shoreline design, such as continuing the armor stone along the current SSP line is implemented, it is likely that sediment will accumulate or can be placed in front of the armor stone and planted with saltmarsh vegetation in the tidal zone. Use of walkovers or boardwalks would enhance the public use of this stretch of shoreline that is currently underutilized due to the poor access and safety issues associated with the danger posed by transiting the corroded SSP bulkhead. Local fishermen use this shoreline to fish during flood tide conditions. During low tide conditions, a few people can be seen digging for clams and other baits that live in the exposed tidal flat.



Figure 7. Looking south toward the hot spot corner shown in Fig. 6. This section could be designed to resemble a soft shoreline design by utilizing buried structure and other submerged sediment traps to prevent sediment deposition in the dredged channel just offshore.

.27 miles
From the seaplane ramp on the NYPD Aviation Unit property, continuing along the Dept of Sanitation property and the FBF shoreline until terminating at the southern side of the seaplane ramp at the Hangar B parking ramp

Along the NYPD and DOS property, access is limited to walking on the exposed tidal flat during low tide until the exposed tidal flat intersects with the rubble placed in front of the bulkhead. The SSP bulkhead, if present, has been covered or fronted by newer bulkheads. Specifically, the bulkhead along the DOS property is a concrete wall. These walls show signs of undermining and are no longer vertical in some places where

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

undermining of the sediment supporting the concrete walls has occurred. In areas where concrete and other rock or rubble has been placed, no such undermining of the bulkhead is apparent. It is noted that accessing the NYPD and DOS property is not allowed from the shoreline as the upland edge is clearly marked with NO TRESPASSING signs and other deterrents to access such as concertina wire at the NYPD property line. No tidal flat is exposed during low tide at the NYPD property and only a small section of the DOS property has any tidal flat deposits in front of the rubble and rock placed in front of the wooden bulkhead.

Somewhere along this bulkhead line a transition from the concrete wall bulkhead design to a wooden bulkhead design occurs. The transition spot is covered with rock and rubble, but where the rock and rubble terminate about 50 meters north of the DOS property line, the wooden bulkhead is visible and stretches along the entire extent of the Hangar B parking ramp edge.

.18 miles

From the seaplane ramp at the Hangar B parking ramp to the end of the wooden bulkhead at the NE corner of the Hangar B parking ramp

The wooden bulkhead is interrupted by the seaplane ramp that acts as a jetty-like obstacle to sediment flowing north along this section of shoreline. This is evident by the impoundment of sand on the updrift (southern) side. On the downdrift side of the seaplane ramp, sediment is being eroded.

The presence of an outflow drainage culvert approximately 75 meters north of the seaplane ramp provides a source of sediment from rain events that flush loose sediment from the uplands area into the storm water drainage system that empties here. This is evident from the small digitate delta formed from this outflow culvert sediment source. Sediment is then moved downdrift towards a marsh that starts at the northern terminus of the Hangar B parking ramp. The low tide flat is wider here than anywhere else along the FBF shoreline due to this sediment source.



Figure 8. Looking north past the Hangar B seaplane ramp. Note the wooden bulkhead on the backshore. Sediment has accreted on the south side of the ramp indicating that longshore sediment drift is predominantly northward. Sediment accretion on the north side of the ramp is from the drainage culvert source.

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

There are two concrete rubble piles along this wooden bulkhead. Where these are present, sediment has accumulated and *Phragmites* and *Spartina* are growing as dictated by the tidal influence and level. *Phragmites* and *Spartina* concentrations increase as the elevation and width of the backshore increases. Once the terminus of the wooden bulkhead is reached, marsh grass habitat and mud with high concentrations of organic material (muddy peat) begins. The sand moving downdrift into this area is shifted seaward and extends the tidal flat out towards the dredged channel edge. This causes a very steep bottom condition at this transition point.

.33 miles

From the NE corner of the Hangar B parking ramp to the beginning of the wooden bulkhead at the NE corner of FBF

As noted above, the marsh habitat quickly becomes dominant as the influence of the bulkhead is eliminated at the sharp transition point defined by the terminus of the wooden bulkhead. The immediate impact is the growth of marsh grass (*Spartina*) on the mud flats created by the roots of old *Phragmites* and subsequently flooded by the transgressing waters of the Jamaica Bay proper. Concurrently located with this organic root and mud tidal flat substrate are tidal mussels of various species attached to the exposed *Phragmites* root structure and peat substrate. This habitat is supporting several species as evidenced by the numerous bird and small mammal tracks in the freshly exposed tidal flat mud along with the shells of tidal and marine organisms.

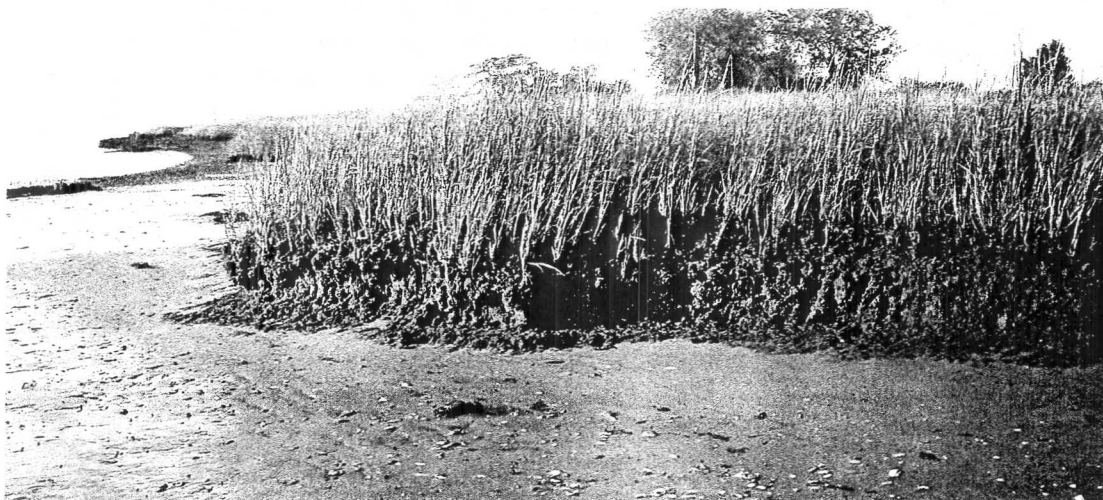


Figure 9. Looking south from the mudflats in the salt marsh north of the end of the Hangar B parking ramp. The marsh grass sediment between here and the next wooden bulkhead to the north appears to be eroding along the face of the peat line.

Moving north along the tidal boundary of this marsh habitat, the shoreline curves west to meet a drainage culvert. The presence of this large drainage culvert eliminated

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

previous marsh habitat by the introduction of fresh water and sediment pulses associated with high-volume storm water discharges causing large erosional impacts. A long meandering sub-tidal creek extends from the culvert face to the low tide line. This drainage channel is approximately 200 meters long. The culvert opening is partially submerged during high tide.



Figure 10. Fresh water discharging from this drainage culvert carries upland sediment. Vegetation growth in the drainage zone is inhibited by high volume storm water discharges and low salinity. Sediment from this drainage culvert is the main source of sediment being moved by the longshore drift in this section.

The presence of this drainage culvert provides sand for the large tidal flat immediately seaward of this area. North of this drainage zone, the marsh recovers to some degree, and then terminates at a crescent beach that is actively eroding due to the presence of the wooden bulkhead to the north and the marsh area to the south. The marsh to the south is capturing most of the sediment being released by the drainage culvert and the wooden bulkhead to the north has no sediment to release when conditions are present to create a southern direction of longshore sediment movement. There is no *Spartina* growing along this section of shoreline, but *Phragmites* is abundant on the backshore area. This tidal flat and beach continues until it intercepts the rocky layer that begins immediately south of the wooden bulkhead protecting the NE corner of FBF.

, 25 miles The wooden bulkhead at the NE corner of FBF

The crescent beach terminates at the beginning of the wooden bulkhead to the north. Beginning about 10 meters before the wooden bulkhead, a rocky surface layer is

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

present that consists of cobble and gravel-sized material that is smooth and rounded. However, 15%-25% of the material is anthropogenic such as old brick, glass, and other building construction debris that has become part of this armor layer. This armor layer extends from the vegetation line above the high water level to the wooden seawall backface. Approximately 0.5 meters of the seawall backface is exposed due to the erosion of the subaerial sediment supporting the armor layer and its subsequent settling in place. As a result, the bulkhead is subject to tidal flooding. Several places along this bulkhead have been breached due to the deterioration of the wooden structure from tidal submersion and removal of sediment from the shore side of the bulkhead through erosion. In places where small tidal pools form next to the breaches, *Spartina* populations have taken root along the eroded backside of the wooden bulkhead.



Figure 11. The backshore area behind the wooden bulkhead is tide dominated. Because the bulkhead maintains an elevated terrain behind it, *Spartina* is able to grow along the edges of the small tidal pools created by the bulkhead.

The wooden bulkhead was constructed to protect the end of the runway that extends to the NE corner of FBF. This structure has deep water immediately offshore of the wooden bulkhead with varying depths. It was not possible to determine an average depth due to the presence of equipment supporting the Elders Point Marsh Restoration Project operating at the end of the runway area. The operation is dumping sand dredged from Rockaway Channel by ACE maintenance and transpumping this material via slurry pipe almost 2 miles to the Elders Point marsh island. Until this operation ceases, no work can be done on this bulkhead or shoreline.

Along this wooden bulkhead area, given the proximity of the paved runway surface about 80 meters away, the only solution for shore protection on this high energy

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

point is a hard shoreline solution such as armor stone, repair or replacement of the existing wooden bulkhead structure, or use of buried structure such as sediment baskets. In addition, it would require emplacement of sediment to the south of this bulkhead in order to prevent failure of the southern terminus from erosion due to tidal influence and wave action. The design may end up being a hybrid that uses a center point of hard shoreline structure flanked by a soft shoreline design employing buried structure.

1.19 miles
West of the wooden bulkhead at the NE corner of FBF along the north shoreline of FBF and terminating at the southwestern approach to the Belt Parkway Bridge

This northern shoreline of FBF has several variations on the erosional theme of previous shorelines. Like the south side of the wooden bulkhead previously discussed, a crescent beach is present on the west side due to erosion of the sand from the dominant longshore sediment transport to the west. This terminates at a wooden jetty approximately 800 meters to the west. Between this wooden jetty and the crescent beach, sand has accumulated and a tidal pond is present behind a small sand dune covered with *Spartina* along its crests and most of its flanks. The drainage channel from this tidal pond is migrating to the west. At times, the berm on this section of beach will dam up the tidal pond. Surface drainage accumulates behind this and when combined with a high tide event or heavy rain event, creates a breach event as ebb tide occurs.



Figure 12. Looking east along the northern shoreline of FBF. Note the crescent shape of the shoreface immediately west of the wooden bulkhead in response to the dominant westerly longshore transport. In the foreground is a classic ridge and runnel created by tidal drainage behind the sand bar exposed by low tide.

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park



Figure 13. This is the tidal pond behind the small sand dune north of this position. During low tide, this pond does not drain completely.

From this wooden jetty to the next wooden jetty are several emplacements of concrete rubble designed to prevent erosion of the hard road and runway areas immediately upland of this shoreline. On the downdrift side of the first jetty, sand has eroded. However, there is a drainage culvert immediately west of this jetty that is dumping rainwater and sediment onto the backshore. This sediment source provides sufficient sediment to allow deposition on the updrift side of the next wooden jetty approximately 500 meters to the west.

A conglomeration of concrete rubble and other materials protects the immediate area north of the paved surface at upland elevation. These were dumped on the shoreline as erosion prevention measures. The amount of rubble decreases on the west side of the second jetty.

Traversing the shoreline to the west reveals a small crescent beach that has formed between the wooden jetty and the remains of a bulkhead made from SSP that was protecting what appears to be an old radar control building or some other avionics building for the landing system on this runway. Approximately 100 meters to the west is another cement structure that appears to be a base for a precision approach radar or radio aid to navigation. This structure is protected by the emplacement of concrete and other building material rubble.

The dumping of rubble along this section of shoreline is in response to the 4 meter high erosional scarp present where rubble is absent. The scarp is actively eroding where no rubble is present to deflect the waves at high tide. Where rubble was absent, the shoreline achieved equilibrium much like the shoreline immediately downdrift of the Gil Hodges Memorial Bridge before the SSP bulkhead began. The dominant pattern until the approach to the Belt Parkway Bridge occurs is marsh grass habitat with tidal flats and backshore expansion of *Phragmites* transitioning to upland vegetation. This approach is

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

marked by an armor stone jetty located approximately 25 meters from the bridge approach and first trestle. It is assumed this is the end of any FBF shoreline restoration planning effort, as the inlet on the other side of the bridge is a saltmarsh with a soft shoreline design already in place where no structures are present.

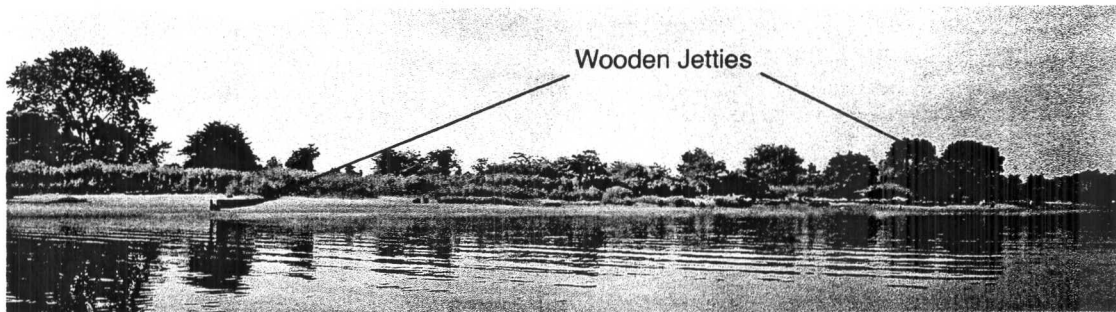


Figure 14. Looking south from the channel leading to Mill Basin. The tidal pond in Fig. 13 is just outside the left side of this image.

Of all the shoreline studied, the area immediately north of the paved parking area with the majority of the rubble emplaced was the most heavily used area in terms of people fishing and illegally swimming or wading. Many boats anchored just offshore in the mouth of the inlet and their crews were actively fishing. People were netting baitfish and digging for clams and other animals presumably for use as fish bait. In addition, this area appears popular for eating lunch probably due to the large trees that provide shade and the close proximity to the water.

Assessment of the Corroded Steel Sheet Piling

The steel sheet piling appears heavily corroded and frail with many sections curled over in apparent imminent danger of collapse if touched or tread upon. In reality, despite the highly corroded surface, the SSP is difficult to move and impossible to bend by hand or with manual effort. Small pieces may be wiggled back and forth until metal fatigue sets in and the piece breaks off in your hand, but most of the SSP is very sturdy, albeit highly corroded. Therefore, removal of the exposed, corroded steel sheet piling by hand is not an option. The SSP that appears curled and friable to the touch is metal that has been battered by large pieces of waterborne debris such as pilings, docks, and abandoned boats during high-energy storm events with large waves. The highly corroded SSP is the portion exposed to air and tidal flux.

The sheet pile is sunk to a depth of 28-30 feet. It originally was 40-foot Z planks approximately 3/8" thick. Below grade, the corrosion of the steel is not as bad as the tidal zone steel surface exposed to salt water and oxygen.

Removal of the corroded SSP material is not a job that can be done by NPS maintenance personnel as suggested by one critique comment in the grant rejection letter. It requires a tracked excavator with an articulated bucket to grab the exposed SSP and wiggle it back and forth until it breaks off. The broken material is then removed by this

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

same hydraulic machine. At low tide, a crew cuts the remaining exposed SSP at the mudline grade with a welding torch. The cut pieces can weigh up to 350 pounds and the scrap is piled for pick up by the tracked excavator after the exposed SSP has been trimmed to grade by the torch crew.

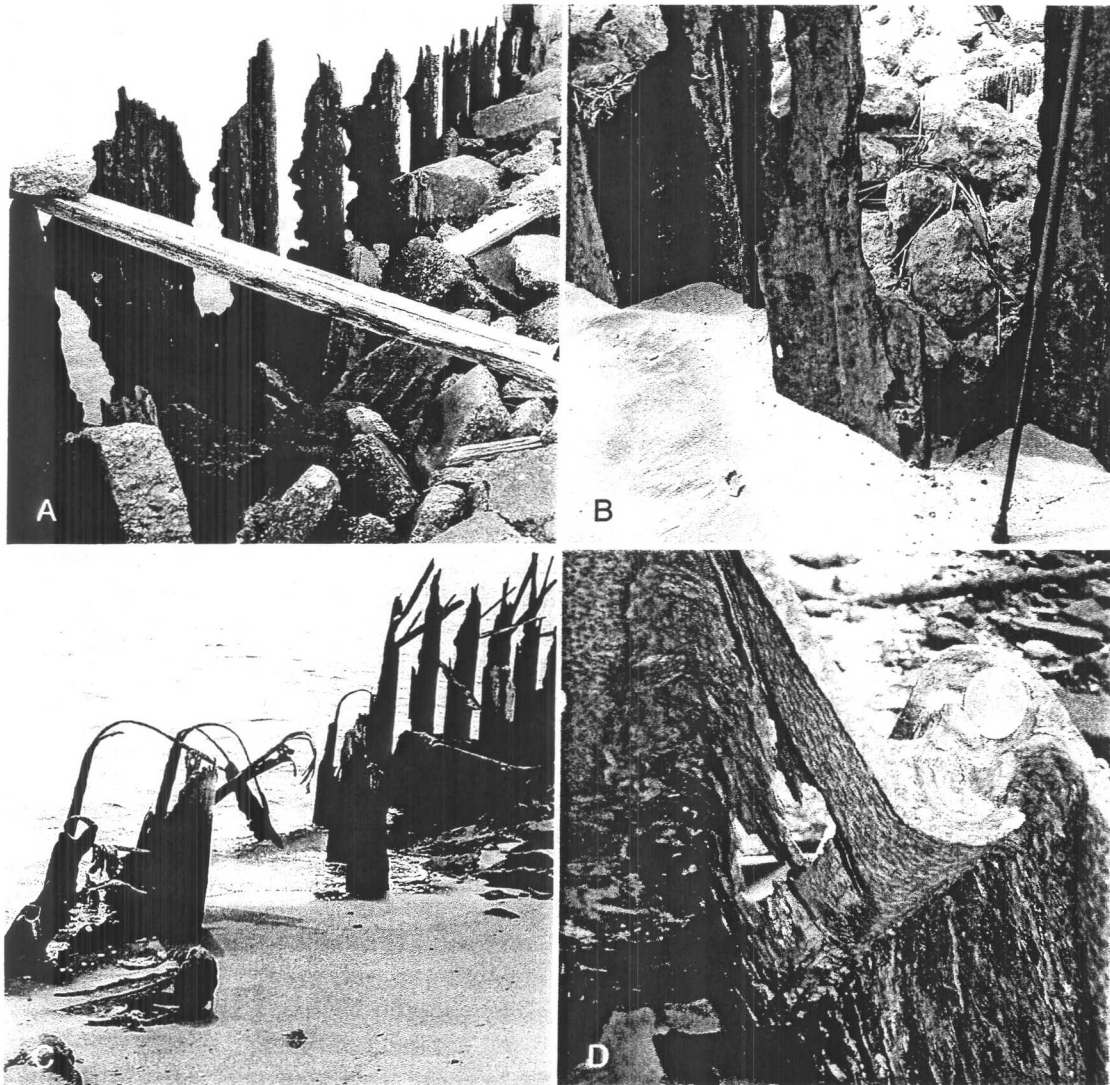


Figure 15. This is a series of images of different SSP sections. (A) Local fishermen often place driftwood planking on the vertical SSP to gain access for fishing. (B) Concrete and rock rubble has been placed behind the corroded SSP to reduce erosion. (C) Where rubble was absent, the SSP was bent from impact with storm driven debris such as drifting boats, docks, and other heavy floating material. (D) Note that the edges have corroded together like a weld. However, unlike a welded joint, this corrosion joint is not structurally sound.

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

Once cut, the remaining subaerial sections of SSP, which originally had a cement cap and steel tieback rods to maintain vertical alignment, would be held in a vertical position only by the sediments on either side of the SSP and the corroded contact along each joint. One issue is the failure of the SSP to retain upland shoreface sediment if the subaqueous sediment (mainly mud) is scoured out by tidal flux and the erosional action of large boat and ships transiting the dredged channel immediately offshore of the SSP wall. Essentially the weight of the upland sediment would have a cantilever effect on the subaqueous surface of the SSP causing it to fail if sufficient scouring of bottom sediment facing the SSP surface occurred. Monitoring of the stability of the subaqueous SSP wall will be needed to ensure structural integrity of the armor stone shoreline is maintained.

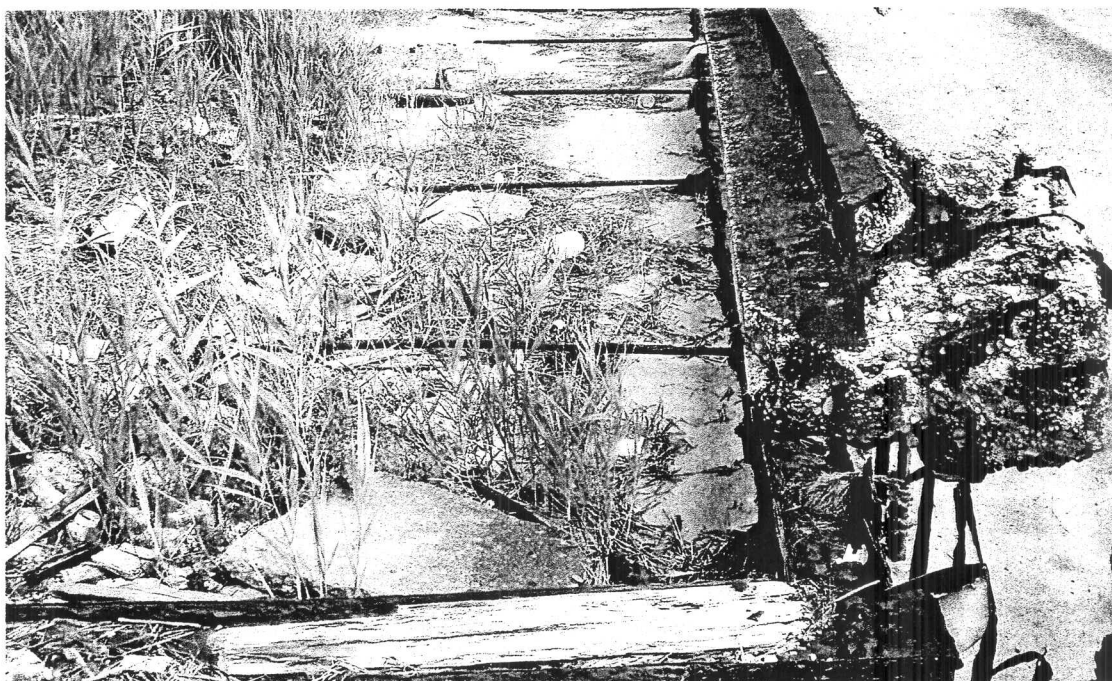


Figure 16. The SSP originally was engineered against cantilever failure by using steel tie back rods. In all instances along the remaining SSP line, the steel tieback rods have failed due to corrosion.

It is unlikely that the 1972 shoreline boundary exceeds the SSP bulkhead line. Considering this as the best case scenario for re-establishing the 1972 shoreline, the current hard shoreline design of the DoN shoreline restoration project is the most cost efficient remedy to the failing SSP structure. However, this remedy is not a soft shoreline solution. Buried structure could be used in place of the armor stone design used by the DoN shoreline restoration project. This would be more expensive than the armor stone design, but if designed properly, it could give the appearance of a soft shoreline design until exposed by a high-energy erosion event such as a nor'easter.

Floyd Bennett Field Coastal Restoration Plan

Preliminary Report by Rip Kirby, Geologist in Park

Recommendations

In sequence, the JBI Director should:

- 1) review and approve this report for limited distribution;
- 2) identify NPS staff that would attend a meeting to discuss the shoreline restoration options for FBF;
- 3) provide copies and distribute for review to the identified staff;
- 4) establish a meeting date and time and invite the identified staff to the meeting;
- 5) establish a date for a pre-meeting review of the report presentation for this meeting;
- 6) conduct a pre-meeting review of the report presentation and provide feedback for changes or approval;
- 7) confirm the agenda for the meeting in terms of time and discussion limits for participants;
- 8) review the list of contractors provided below and provide guidance on contacting specific contractors to discuss planning for future work on the FBF coastal restoration plan.

General Contractor:

TN and Associates, Inc.
Corporate Headquarters
1033 N. Mayfair Road, Suite 200
Milwaukee, WI 53226
Phone (414) 257-4200
Fax (414) 257-2492

Earth Engineering, Inc.
4877 Langfield, Houston, Texas 77040
Ph: (713) 681-5311
Fax: (713) 681-5411
<http://www.eartheng.com/>

Subcontractors:

Earthres Group Inc
7137 Old Easton Rd
Pipersville PA 18947-9701
215-766-1211

Earth Engineers, Inc
244 Mcleod St
Merritt Island, FL 32953-3464
Brevard County
(321) 453-8304

D'Huy Engineering, Inc.
453 Main Street
Bethlehem, PA 18018
Phone: (610)865-3000
Fax: (610)861-0181
Email: dei@dhuy.com