

RESOLUTION NO. 12- 2103

A RESOLUTION OF THE TOWN COMMISSION OF THE TOWN OF SURFSIDE, FLORIDA ("TOWN") APPROVING ASSISTANCE UNDER THE FLORIDA INLAND NAVIGATION DISTRICT WATERWAYS ASSISTANCE PROGRAM, AUTHORIZING CALVIN GIORDANO ASSOCIATES TO PREPARE GRANT APPLICATIONS AND TO DESIGN THE PROJECT, AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the Town Commission of the Town of Surfside, Florida has determined to carry out the following described project for the protection of public property of the Town of Surfside and the State of Florida:

**Project Title: Bulkhead Grant Application and Construction Application (CGA Project No.: 12-4952)**

**Total Estimated Cost: \$1,061,600**

**Brief Description of the Project:** Town of Surfside municipal bulkheads inspection, grant application and repair for structural condition. (See Attachment "A"); and

WHEREAS, Florida Inland Navigation District financial assistance is required for the program mentioned above, and

WHEREAS, the deteriorated condition of the bulkheads located at various street ends has created a dangerous situation putting both public and private property at risk.

NOW THEREFORE, BE IT RESOLVED BY THE TOWN COMMISSION OF THE TOWN OF SURFSIDE, FLORIDA, AS FOLLOWS:

**Section 1. Recitals.** The above and foregoing recitals are true and correct and are incorporated herein by reference.

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT (1950-1951) THE UNIVERSITY OF CHICAGO

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**Section 2. Authorization.** The design and grant application process described above is hereby authorized and further that the Town shall make application to the Florida Inland Navigation District in the amount of 50% of the actual cost of the project on behalf of the Town.

**Section 3. Certification and Approval.** The Town of Surfside approves and certifies the following:

1. That the Town will accept the terms and conditions set forth in FIND Rule 66B-2 F.A.C. and which will be a part of the Project Agreement for any assistance awarded under the attached proposal.
2. That the Town is in complete accord with the attached proposal and that it will carry out the Program in the manner described in the proposal and any plans and specifications attached thereto unless prior approval for any change has been received from the District.
3. That the Town has the ability and intention to finance its share of the cost of the project and that the project will be operated and maintained at the expense of said Town for public use.
4. That the Town will not discriminate against any person on the basis of race, color or national origin in the use of any property or facility acquired or developed pursuant to this proposal, and shall comply with the terms and intent of the Title VI of the Civil Rights Act of 1964, P.L. 88-352 (1964) and design and construct all facilities to comply fully with statutes relating to accessibility by handicapped persons as well as other federal, state and local laws, rules and requirements.
5. That the Town will maintain adequate financial records on the proposed project to substantiate claims for reimbursement.

6. That the Town will make available to FIND if requested, a post-audit of expenses incurred on the project prior to, or in conjunction with, request for the final 10% of the funding agreed to by FIND.

**Section 4.** The Town Commission reserves final approval of the construction phase of this project until its true cost of construction and the amount of grant funds is known.

**Effective Date.** This Resolution shall become effective immediately upon its adoption.

**PASSED** and **ADOPTED** on this 15 day of August 2012.

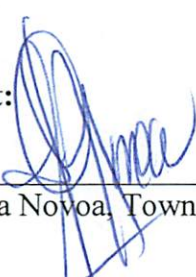
Motion by Vice-Mayor Karu Kin, Second by Commissioner Olchy K.

FINAL VOTE ON ADOPTION


Commissioner Michelle Kligman NO  
Commissioner Marta Olchyk YES  
Vice Mayor Michael Karukin YES  
Mayor Daniel Dietch YES

  
\_\_\_\_\_  
Daniel Dietch, Mayor

**Attest:**

  
\_\_\_\_\_  
Sandra Novoa, Town Clerk

**Approved as to form and legal sufficiency  
For the Town of Surfside only:**

  
\_\_\_\_\_  
Lynn M. Dannheisser  
Town Attorney

# TOWN OF SURFSIDE, FL

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## **Bulkhead Inspection**

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Town of Surfside, Miami-Dade County

CGA Project No.: 12-4952

July 2012

Prepared by



**Calvin, Giordano & Associates, Inc.**

EXCEPTIONAL SOLUTIONS

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Phone: 561.684.6161 • Fax: 561.684.6360

David Frodsham, EI

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## EXECUTIVE SUMMARY

### I INTRODUCTION

This report summarizes an inspection performed on municipally owned bulkheads in the Town of Surfside and makes recommendations for their repair or replacement.

### II INSPECTION

All known municipal bulkheads within the Town of Surfside were examined and assessed for structural and aesthetic condition. This was accomplished via land-side and water-side visual inspections and the excavation of tieback rods. The bulkheads were inspected for washouts, tipping, toe-outs, concrete degradation, tieback condition, and other signs of deterioration.

### III SUMMARY

Most of the bulkheads owned by the Town are in a state of disrepair and some are failing. This report labels them into the following categories:

1. Severe damage to structural integrity and/or aesthetics:
  - a. Bulkhead 1: Carlyle Ave. & 88<sup>th</sup> St.
  - b. Bulkhead 5: End of 88<sup>th</sup> St. on Isle of Biscaya
  - c. Bulkhead 11: 95<sup>th</sup> St. and Bay Dr.
2. Moderate damage to structural integrity and/or aesthetics:
  - a. Bulkhead 2: Froude Ave. & 88<sup>th</sup> St.
  - b. Bulkhead 7: 90<sup>th</sup> St. and Bay Dr.
  - c. Bulkhead 9: 93<sup>rd</sup> St. and Bay Dr.
  - d. Bulkhead 12: Surfside Park
3. Minor damage to structural integrity and/or aesthetics:
  - a. Bulkheads 3 & 4: 88<sup>th</sup> St. Bridge
  - b. Bulkhead 6: Irving Ave. & Bay Dr.
  - c. Bulkhead 8: 92<sup>nd</sup> St. and Bay Dr.
  - d. Bulkhead 10: 94<sup>th</sup> and Bay Dr.

### III RECOMMENDATIONS

The bulkheads addressed in this study have been in place for an estimated 40+ years. Based upon the estimated usable life of a typical bulkhead, it is recommended that all of the bulkheads be replaced except for the two bulkheads located beneath the 88<sup>th</sup> St. Bridge to Isle of Biscaya, which should be repaired. In so doing, the Town will be able to take advantage of lower shared costs such as mobilization. The bulkheads are not failing to a degree that funding cannot be sought over the course of the upcoming year to replace them all under the same contract.

That stated, it is understood that the Town may wish to replace only the bulkheads in the worst condition, or make repairs to extend whatever usable life the bulkheads may possess. As an alternative to replacing all of the bulkheads and based upon the categorization described in the summary above, the following recommendations are made:

1. Where severe damage to the structural integrity of the bulkhead has been observed, it is recommended that the bulkhead be replaced entirely.



2. Where the structural integrity of the bulkhead appears to be in salvageable condition but damage is moderate, it is recommended that the bulkhead be either repaired or replaced.
3. Where the bulkhead exhibits minor cracking or degradation, it is recommended that the bulkhead be repaired.

#### **IV OPINION OF PROBABLE COST**

Assuming that the Town chooses to replace all bulkheads within the scope of this investigation, it is estimated that approximately \$960,000 in construction fees will be needed to complete the construction of the required replacements.





## SECTION ONE

### INTRODUCTION

#### PURPOSE & SCOPE OF WORK

On Tuesday, June 19<sup>th</sup>, 2012, staff from Calvin, Giordano & Associates, Inc. performed an on-site inspection of municipally-owned bulkheads in the Town of Surfside, FL. The purpose of this inspection was to qualitatively evaluate the structural and aesthetic characteristics of the existing bulkheads and provide recommendations for maintenance/repair. Recommendations for repair or replacement of bulkheads are based upon conditions that were observed in the field.

It is important to note that every bulkhead within the scope of this inspection is unique. Bulkheads may differ in materials, age, design, dimensions, repairs, quality of workmanship, and many other variables. While there are similarities between many of the bulkheads and they may have been originally constructed around the same time frame, some have experienced repairs while others have been left to deteriorate at differing rates.

This project included coordination with the City in an effort to locate copies of the construction plans for the bulkheads. To date, we have been informed that there are no such plans available. As a result, no firm assessment was made as to the depth of embedment of sheet piles, exact age of bulkheads or dates of repairs. However, observations have been made with regard to visible states of failure and possible causes thereof.



## SECTION TWO

### INSPECTION

#### Inventory of Bulkheads Inspected

- Bulkhead 1: Carlyle Ave. & 88<sup>th</sup> St.
- Bulkhead 2: Froude Ave. & 88<sup>th</sup> St.
- Bulkhead 3: East Side of 88<sup>th</sup> St. Bridge
- Bulkhead 4: West Side of 88<sup>th</sup> St. Bridge
- Bulkhead 5: End of 88<sup>th</sup> St. on Isle of Biscaya
- Bulkhead 6: Irving Ave. & Bay Dr.
- Bulkhead 7: 90<sup>th</sup> St & Bay Dr.
- Bulkhead 8: 92<sup>nd</sup> St. & Bay Dr.
- Bulkhead 9: 93<sup>rd</sup> St. & Bay Dr.
- Bulkhead 10: 94<sup>th</sup> St. & Bay Dr.
- Bulkhead 11: 95<sup>th</sup> St. & Bay Dr.
- Bulkhead 12: Surfside Park



Bulkhead 1, Carlyle Ave & 88<sup>th</sup> St.

Approximate Length of Bulkhead:	49'
Approximate Height of Bulkhead Above Mudline:	4-7'
Bulkhead Material:	Native Stone with Concrete Cap

This native-stone bulkhead is failing. The bulkhead is comprised of large, porous native stone and mortar with a concrete cap (*See Photo 1.1*). The bulkhead contains a 36" concrete culvert near its midpoint, and the cap above the culvert is cracked (*See Photo 1.2*). The remainder of the cap appears to be in reasonably good condition. There is a plastic conduit line penetrating the bulkhead toward its west end.

Many of the stones and mortar in the bulkhead have broken away with time. In no place is this more apparent than on the eastern portion of the bulkhead where a 3 foot wide section of geofabric may be seen through a hole in the bulkhead where the stones have fallen away (*See Photo 1.3*). The geofabric appears to be in good condition, and may have been part of a previous repair to reduce erosion through the bulkhead.

There appear to be a few washouts behind the bulkhead where the soil behind the bulkhead has escaped through the voids in the stones. A great deal of shoaling and varying depths can be noted at the mudline of the bulkhead on the waterward side, indicating that there has been a deposition of soil there over time from seepage through the bulkhead and/or tidal sediments. There is also some scour near the outfall itself. The bulkhead is quite old, with the geofabric material, cap, and possible tie-back system having been added later. The neighboring bulkheads are also comprised of native stone, so any possible repair will have to take that into consideration.

It is recommended that this bulkhead be replaced entirely. Replacing the wall with a different material will have to take into consideration the joints with neighboring native stone bulkheads.





*Photo 1.1: Native Stone Wall*





*Photo 1.2: Crack above Concrete Outfall*



*Photo 1.3: Geofabric Witnessed Through Wall*

Bulkhead 2, Froude Ave & 88<sup>th</sup> St.

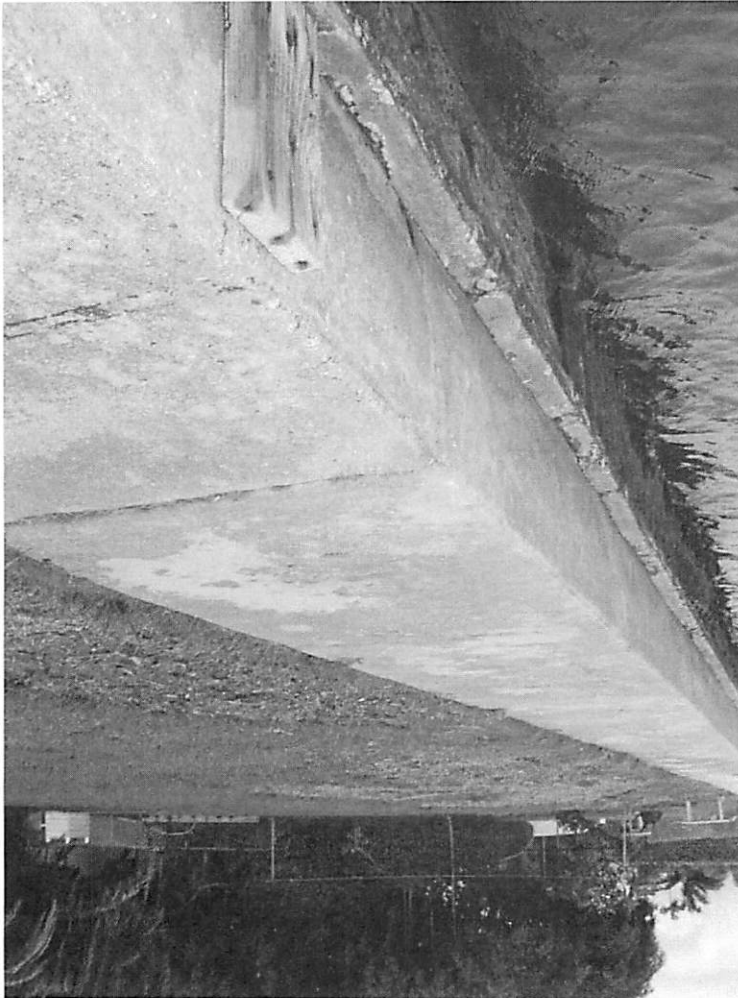
Approximate Length of Bulkhead:	49'
Approximate Height of Bulkhead Above Mudline:	5'
Bulkhead Material:	Monolithic Concrete with Non-Structural Asbestos-Concrete Sheets

This concrete bulkhead was formed with two monolithic pours, separated by a cold joint toward the bulkhead's east end (*See Photo 2.1*). There are a number of cracks throughout the top of the bulkhead. At some point after the initial construction, asbestos-concrete sheet piles were driven immediately in front of the concrete bulkhead, and topped with a small concrete cap (*See Photo 2.2*). As a result, it is difficult to see the face of the bulkhead to inspect for cracking or other areas of water infiltration. These asbestos-concrete sheets and small concrete cap are very brittle and may be broken with little force.

Being as they are of no apparent structural benefit, it is assumed that the asbestos-concrete sheet piles were placed in front of the larger concrete bulkhead to curtail the seepage of soils from behind the bulkhead. The ground behind the bulkhead is very soft and irregularly eroded. Only recently before the field observation was conducted, a large amount of fill was added above the sod in some low lying areas in an apparent effort to replace the eroded soils (*See Photo 2.3*). All of these observations indicate that the soil behind the bulkhead is seeping through cracks in the bulkhead.

It is recommended that the bulkhead be repaired to prevent soils from washing through the bulkhead, or that the bulkhead be replaced entirely. This bulkhead may be repaired by adding a geofabric layer behind the bulkhead and backfilling to inhibit the migration of soils through the bulkhead with seepage.





*Photo 2.1: Concrete Bulkhead with Asbestos-Concrete-Sheets*



Photo 2.2: Asbestos-Concrete Sheet Piles In Front of Wall



*Photo 2.2: Recently Placed Imported Fill*



Bulkheads 3 & 4, East and West Sides of 88<sup>th</sup> St. Bridge

Approximate Length of Bulkhead:	50' Each Side
Approximate Height of Bulkhead Above Mudline:	5''
Bulkhead material:	Concrete Sheets with Concrete Cap and H-Piles

The 88<sup>th</sup> St. Bridge appears to have been built or repaired more recently than all the bulkheads in this study and is marked 1989, indicating the year of its initial construction. The bridge is affixed on its east and west ends to concrete abutments (*See Photo 3.1*). Each of these abutments is located behind a concrete bulkhead, with the area between each bulkhead and abutment being backfilled with soil and cement-filled sacks.

The caps on the bulkheads under the bridge appear to be relatively new, and there is minimal cracking on the concrete sheets. However, in three locations behind the concrete bulkheads (one on the east side, two on the west side), there are deep depressions in the backfill area (*See Photo 4.1*). At each of these locations, on the bottom of the bulkhead sheets near the mudline, there is a rectangular hole with approximate dimensions of 2' wide by 1' tall. It is unknown whether these holes are directly correlated to the depressions in backfill witnessed behind them.

The abutments themselves have weep holes which are used to convey stormwater from behind the abutments or other areas to the backfilled area. It is possible that this stormwater from the bridge deck and/or tidal water infiltrating the bulkhead are liquefying the backfill and allowing it to escape through the aforementioned holes. It could also be that settling by the bridge caused these backfilled soils to shift.

The presence of the bridge above the 88<sup>th</sup> St. bulkheads complicates their repair or replacement. It is unknown whether the bulkheads provide any structural stability to the abutments themselves. In any scenario, the bulkheads should be repaired with geofabric and/or epoxy grout to curtail further soil migration, and backfilled to match the existing level of fill elsewhere behind the bulkheads.





*Photo 3.1: Concrete Cap In Front of Abutment with Backfill*



*Photo 4.1: Sunken Area between Concrete Bulkhead and Bridge Abutment*

Bulkhead 5, End of 88<sup>th</sup> St on Isle of Biscaya

Approximate Length of Bulkhead:	49'
Approximate Height of Bulkhead Above Mudline:	6-7'
Bulkhead material:	Concrete Sheets, H-Piles, Batter Piles, Concrete Cap

This bulkhead, like Bulkhead 1, is in a state of considerable disrepair. When it was originally constructed, the bulkhead was comprised of concrete sheets, H-piles, and a concrete cap. There is at least one tie-back rod that has pulled through the concrete sheet pile (*See Photo 5.1*) indicating that at some point the bulkhead was leaning forward enough to compromise the tie-back system.

Later on, batter piles and a newer concrete cap were added to laterally support a bulkhead that was tipping forward. The batter piles and cap were installed to provide lateral support to the top of the bulkhead, and tilted the bulkhead back toward vertical. This may have been done to defer the cost of a full bulkhead replacement. Riprap was added to prevent scour along the mudline.

At least two of the batter piles appear to be exhibiting signs of failure. The westernmost batter pile is tilted at an angle that is not perpendicular to the bulkhead face. This causes non-axial loading and reduces the effectiveness of the batter pile. It is not known whether the pile was constructed in this fashion, or whether the pile shifted as the result of an impact or shifting subgrade.

At the other end of the same bulkhead, the joint at which the easternmost batter pile connects with the cap has corroded to such a point that the steel is entirely exposed and rusted and the concrete that should be surrounding it is absent (*See Photo 5.2*). This batter pile is not likely providing optimal support to the bulkhead.

Presently, the concrete sheets themselves are highly weathered, (*See Photos 5.3, 5.4, 5.5*). The concrete binder in the sheets has eroded away, showing loose aggregate in the concrete sheets where the bulkhead is exposed to tidal fluctuations. There is a 12" metal water pipe that enters the wall at its midpoint, so any repair would have to make considerations for it.

It is recommended that this bulkhead be replaced.

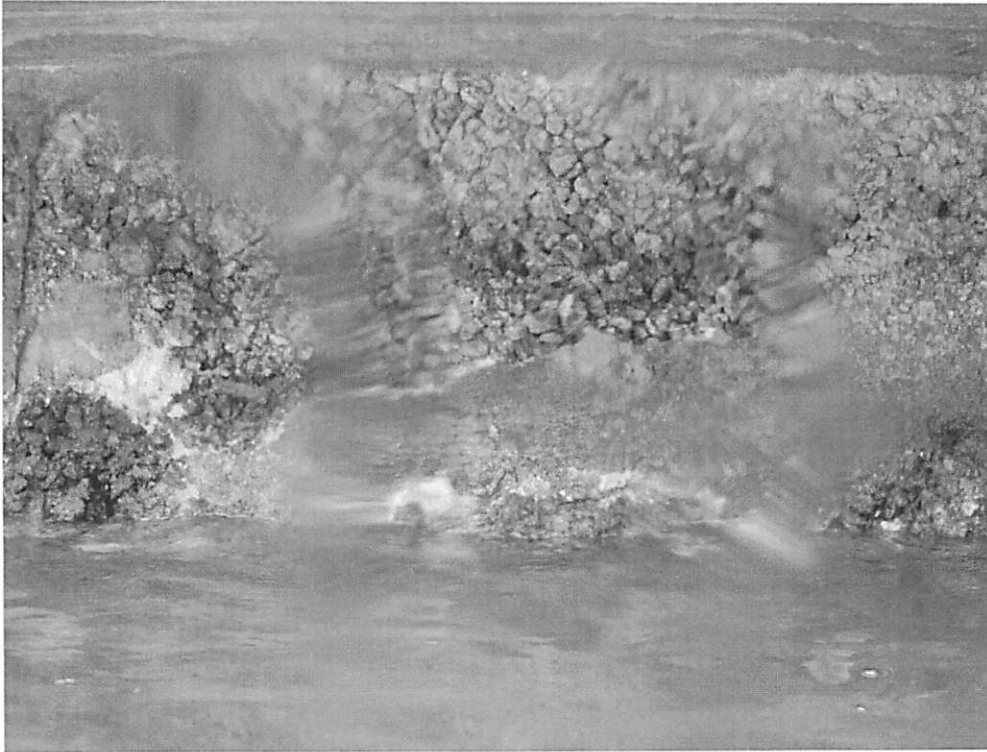




*Photo 5.1: Tie Rod Pulled Through Sheet Pile*



*Photo 5.2: Exposed Steel Reinforcement in Batter Pile*



*Photo 5.3: Degraded Concrete Sheet Piles*



*Photo 5.4: Degraded Concrete Sheet Piles*



*Photo 5.5: Degraded Concrete Sheet Piles*

Bulkhead 6, Irving Ave. & Bay Drive

Approximate Length of Bulkhead:	47'
Approximate Height of Bulkhead Above Mudline:	6-7'
Bulkhead material:	Concrete Sheets, H-Piles, Batter Piles, Concrete Cap

This bulkhead is similar in type and size to Bulkhead 5, but without the same degree of deterioration. The same batter pile system with a new cap is in place and it is supporting concrete sheet piles with H-pile supports, along with the 12" water main, just like the previously Bulkhead 5.

Unlike the previously mentioned bulkhead, the sheets themselves appear to be in good condition and the tieback systems show no signs of failure. There is some rust bleeding through the concrete that should be repaired with an epoxy grout and monitored for future degradation. In two other locations, some of the supporting concrete has broken away and exposed the underlying steel. These locations will need to be patched to prevent further corrosion (*See Photos 6.1, 6.2*). Some minor soil subsidence can be seen behind the wall.

It is important to note when considering repairing Bulkheads 5 and 6 that there is a 50' navigable waterway between them, so any major repairs would have to take that into consideration.





*Photo 6.1: Exposed Steel Reinforcement*



*Photo 6.2: Exposed Steel Reinforcement*



Bulkhead 7, 90<sup>th</sup> St. and Bay Dr.

Approximate Length of Bulkhead:	47'
Approximate Height of Bulkhead Above Mudline:	6-7'
Bulkhead material:	Interlocking Concrete Sheet Piles with Concrete Cap

This bulkhead is comprised of interlocking concrete sheets piles. The sheets themselves are not connected by any H-piles or batter piles but as interlocking sheets sealed with hydraulic cement (*See Photo 7.1*). The sheets appear to be in good condition. The area behind the bulkhead is exhibiting sunken areas indicative of seepage between the joints, though no such cracks between the joints could be located. The sheets themselves fit together somewhat angularly; they are not aligned in parallel as a bulkhead face. It is possible that they have twisted over time under lateral stresses, that they became contorted when the new cap was installed, or that they were installed as described. The cap appears to be in good condition. There is riprap at the base of the sheets which helps to prevent scour along the toe of the bulkhead.

Efforts were made to locate a tieback rod on this bulkhead. An 8' long trench was dug behind the bulkhead to a depth of 4', but no tie rods were encountered. No areas of seepage were observed within the trenched area behind the wall, though the trench did not traverse the entire length of the wall.

Although the wall does not appear to be in need of immediate repair, the twisted sheet piles along with the washouts are a matter of concern and the Town may wish to include this wall in a comprehensive repair/replacement plan.





*Photo 7.1: Joint between Concrete Sheet Piles*

Bulkhead 8, 92<sup>nd</sup> St. and Bay Dr.

Approximate Length of Bulkhead:	62'
Approximate Height of Bulkhead Above Mudline:	7'
Bulkhead material:	Concrete Sheet Piles with Batter Piles, H-Piles, and Concrete Cap

This bulkhead is comprised of concrete sheet piles with batter piles supporting the sheets on the southern half of the bulkhead and H-piles supporting the sheets on the northern end of the bulkhead. There are two large metal pipes that belong to FDOT passing over the bulkhead and connecting to a pump station on the property. There is also a drainage outfall pipe that passes through the bulkhead.

The cap and batter piles are newer than the sheets, and some patch work exists along the bulkhead. There do not appear to be any sunken areas behind the bulkhead, and generally the bulkhead is in good condition.

There are some existing tie back rods that are rusting and exposed to tidal fluctuations (*See Photo 8.1*). It is recommended that these areas and others that are exhibiting rusting be patched with an epoxy grout to prolong the useful life of the wall. Additional repairs should be made to some cracking that can be seen in the supporting H-piles (*See Photo 8.2*).





*Photo 8.1: Rusted Tie-back Rod End*



*Photo 8.2: Cracks Observed in H-piles*



Bulkhead 9, 93<sup>rd</sup> St. and Bay Dr.

Approximate Length of Bulkhead:	35'
Approximate Height of Bulkhead Above Mudline:	8'
Bulkhead material:	Concrete Sheet Piles with H-Pile Supports and Concrete Cap

This bulkhead is comprised of concrete sheet piles with H-piles supporting them. Like the previous bulkhead, the sheets are in good condition. The cap is relatively new, but displays “honeycombing” on its underside (*See Photo 9.1*), indicating that it was not properly vibrated to allow the voids to be filled before the concrete was allowed to cure. The tieback rods that pass through the H-piles have been covered with mortar to prevent corrosion. Some of this mortar has chipped away, and may require replacement.

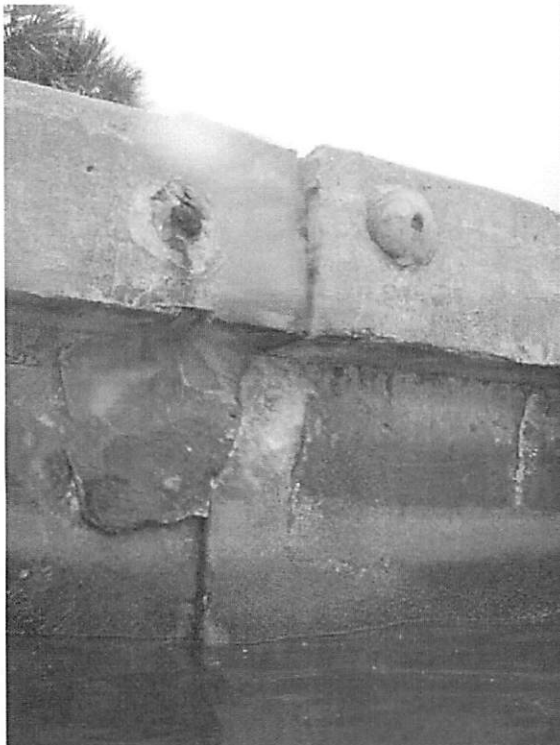
Of greater consequence to the structural integrity of the overall bulkhead is the presence of a very large vertical shear crack running from the top of the cap to at least the mudline at the bulkhead’s center (*See Photos 9.2, 9.3*). The bulkhead has split via shearing, and the sections are offset from one another by a couple of inches. Two tieback rods were installed in the cap, one on each side of the crack, as a means of repairing the crack, but the crack provides an avenue for soils to wash away from behind the bulkhead.

Though there are no buildings or other significant sources of dead loading in the vicinity of the crack, it was likely caused by temporary overloading, possibly a vehicle driven close to the bulkhead edge. In any case, the crack should either be sealed from both sides or the bulkhead may need to be replaced.

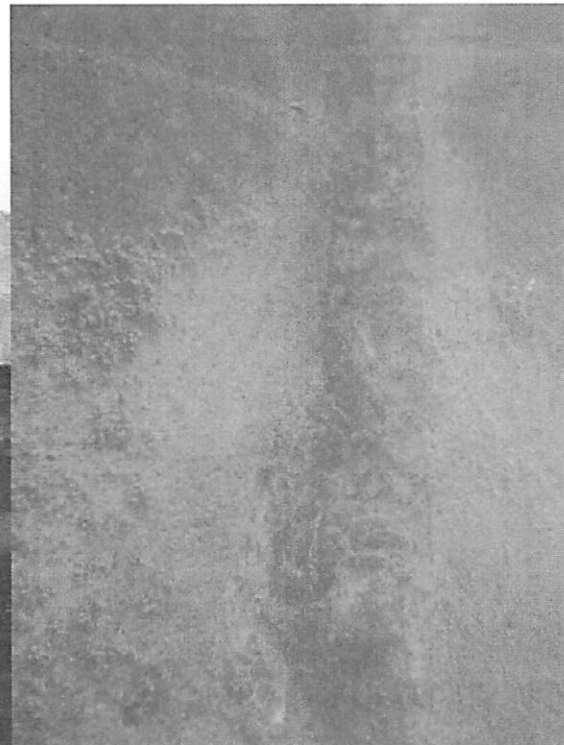




*Photo 9.1: Honeycombing in Concrete Cap*



*Photo 9.2: Vertical Shear Crack in Wall Face and Cap*



*Photo 9.3: Vertical Shear Crack*

Bulkhead 10, 94<sup>th</sup> St. and Bay Dr.

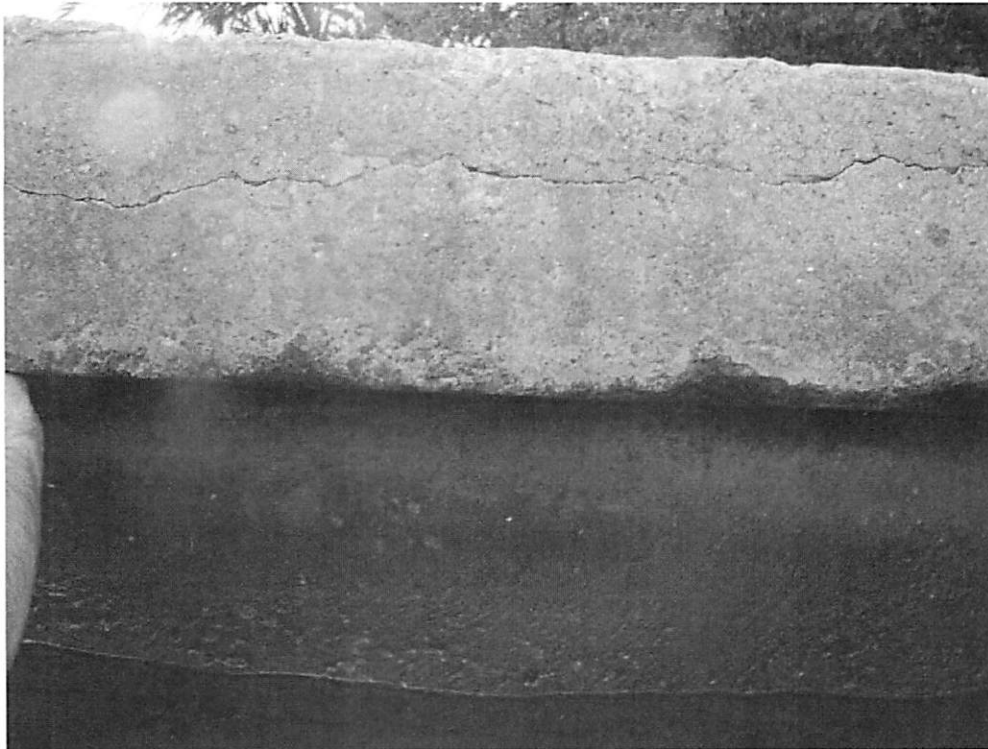
Approximate Length of Bulkhead:	40'
Approximate Height of Bulkhead Above Mudline:	6'
Bulkhead material:	Concrete Sheet Piles with H-Piles and Concrete Cap

This bulkhead has concrete sheet piles with an older concrete cap and H-piles. There is a drainage outfall in the center of the bulkhead that is overgrown with mollusks. There doesn't appear to have been any repairs conducted on this bulkhead and the soil behind it is badly washed away. There is some longitudinal cracking along the cap (*See Photo 10.1*), but there is almost no seepage of rust from the reinforcement, so the cracks may be fairly new.

Efforts were made to excavate a tie rod for inspection. The rod was found to be encased in a thick layer of concrete (*See Photo 10.2*). It is assumed that this was part of the bulkhead's plans as a means of protecting the tie rod from corrosion.

This bulkhead is a candidate for repair, rather than replacement. An epoxy-grout may be used to seal some of the cracks that have appeared in the cap and prolong the bulkhead's useful life.





*Photo 10.1: Longitudinal Cracking Along Cap*



*Photo 10.2: Concrete-Encased Tieback Rod*



Bulkhead 11, 95<sup>th</sup> St. and Bay Dr.

Approximate Length of Bulkhead:	45'
Approximate Height of Bulkhead Above Mudline:	7'
Bulkhead material:	Concrete Sheet Piles with King Piles with Concrete Cap

This bulkhead contains king piles supporting concrete sheet piles. Many of the king piles are severely cracked (*See Photos 11.1, 11.2*) around the tiebacks to the extent of sacrificing structural viability. Much of the steel reinforcement contained within all parts of the bulkhead is corroded with rust exiting through cracks in the bulkhead (*See Photos 11.1-11.6*).

In some areas, the binder has eroded away from the sheets piles, exposing the aggregate (*See Photos 11.3, 11.4*). A newer cap was added at some point, but the bottom of the cap has broken away due to spalling, exposing the lower layer of steel reinforcement and subjecting it to further corrosion (*See Photos 11.3, 11.4*). Though the cap appears to be younger than the king piles and sheet piles, there are cracks in the cap that run perpendicular to the face and pass all the way through the cap.

The sheet piles are severely degraded, with the binder having been worn away and the aggregate showing in a large area. There is rust leaking through a number of cracks throughout the bulkhead.

This bulkhead is highly deteriorated and should be replaced.

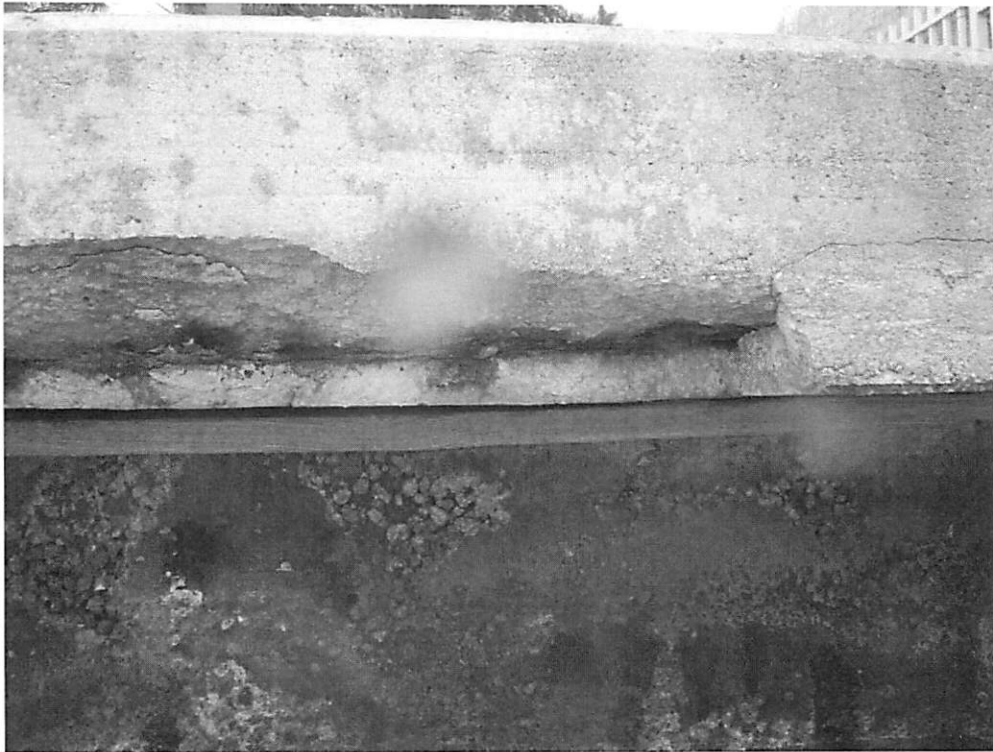




*Photo 11.1: Cracking in King Pile*



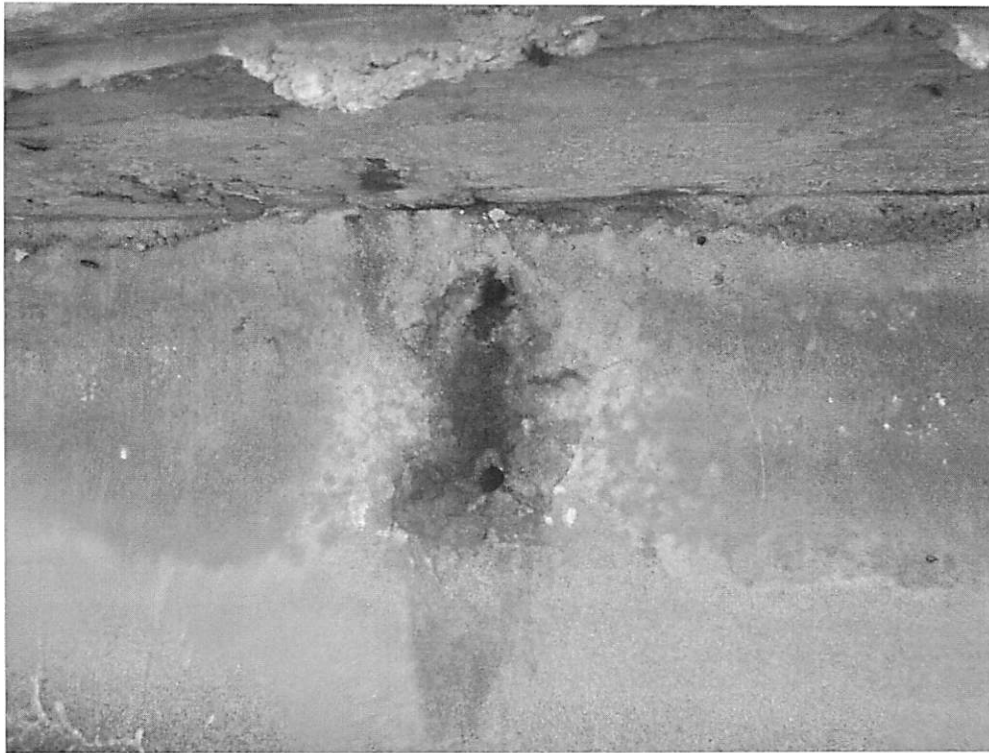
*Photo 11.2: Cracking in King Pile, Spalling Cap*



*Photo 11.3: Degraded Sheet Piles, Spalling Cap*



*Photo 11.4: Cracking in King Pile & Cap, Degraded Sheet Piles*



*Photo 11.5: Rusted Steel Reinforcement Leaking Through Wall*



*Photo 11.6: Spall Cracking in Cap, Rusted Reinforcement*

## Bulkhead 12, Surfside Park

Approximate Length of Bulkhead:	250'
Approximate Height of Bulkhead Above Mudline:	6-10'
Bulkhead material:	Concrete Sheet Piles with H-Piles and Concrete Cap

The section of bulkhead running along Surfside Park is made up of concrete H-piles and concrete sheet piles. The bulkhead is in fair condition with some cracking and rusting present in the sheet piles and around the tiebacks. Some patchwork exists throughout the bulkhead. Many of the tieback rods pass through the bulkhead at abnormal locations (*See Photo 12.1*), rather than through the conventional center of the H-pile supports. Most of the tieback ends have been covered with mortar that is now chipping away (*See Photos 12.1, 12.2*). This mortar may need to be chipped away and replaced. One tieback rod was dug up, and appeared to be in good condition, though the area around it had washed away considerably (*See Photo 12.3*).

The bulkhead is in very close proximity to athletic facilities in the park, including basketball courts. There is perhaps a foot of clearance between the back of the cap and the beginning of the paved area. Within this foot, there are large sink holes that extend underneath the pavement and indicate seepage through the wall. These holes should be filled to prevent further erosion. The installation of a geofabric behind the wall would serve to mitigate this erosion in the future, though it would be impossible to excavate the soil behind the bulkhead without disrupting the foundation to park facilities.

Another apparent failure existing in the bulkhead is a longitudinal crack beneath the central axis of the cap that runs nearly the entire length of the bulkhead (*See Photos 12.1, 12.2, 12.4-12.6*). This crack is likely due to improper coverage of concrete over the steel reinforcement. As with other areas discussed in this report, cracks like this allow rain and saltwater to enter the concrete cap. When this water reaches the steel reinforcement, it causes it to swell and rust. This rust is present on nearly the entire length of the crack.

At a minimum, the concrete should be broken away from the steel where the longitudinal crack is present and the cap should be cast to provide adequate coverage to the steel reinforcement. This should help to prevent saltwater and freshwater intrusion. It should also be noted that there are areas of spalling beneath the Kane Concourse/96<sup>th</sup> St. Bridge which adjoins Surfside Park bulkhead to the north (*See Photo 12.7*). Some of the concrete has been broken away so much that the entire steel reinforcement cage may be seen. It is assumed that the portion of the bulkhead belongs to FDOT and is not the immediate responsibility of the Town of Surfside.





*Photo 12.1: Longitudinal Spall Cracking in Cap, Rusted Reinforcement, Tieback Not Centered*



*Photo 12.2: Longitudinal Spall Cracking in Cap, Rusted Reinforcement*





*Photo 12.3: Excavated Tieback Rod in Good Condition*



*Photo 12.4: Longitudinal Spall Cracking in Cap, Rusted Reinforcement*

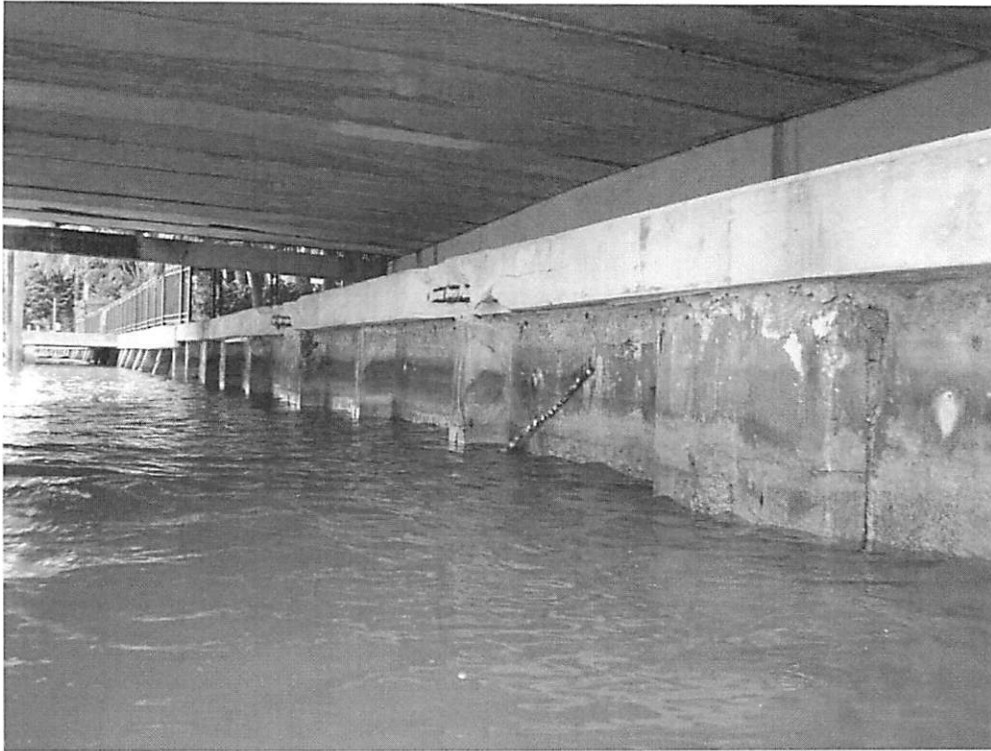


*Photo 12.5: Longitudinal Spall Cracking in Cap, Rusted Reinforcement*



*Photo 12.6: Longitudinal Spall Cracking in Cap, Rusted Reinforcement*





*Photo 12.7: Longitudinal Spall Cracking in Cap beneath FDOT Bridge*

## SECTION THREE

### SUMMARY

Most of the bulkheads within the scope of this inspection are due for repair or replacement. With proper design, construction, and maintenance, a seawall or bulkhead can last for up to 50 years, though many require replacement as soon as 30 years or even earlier. It is estimated that many of the bulkheads mentioned in this report are 40+ years old and have exhausted their usable life.

As a means of prioritizing the bulkheads for remediation, the following categories have been assigned:

1. Severe damage to structural integrity and/or aesthetics:
  - a. Bulkhead 1: Carlyle Ave. & 88<sup>th</sup> St.
  - b. Bulkhead 5: End of 88<sup>th</sup> St. on Isle of Biscaya
  - c. Bulkhead 11: 95<sup>th</sup> St. and Bay Dr.
  
2. Moderate damage to structural integrity and/or aesthetics:
  - a. Bulkhead 2: Froude Ave. & 88<sup>th</sup> St.
  - b. Bulkhead 7: 90<sup>th</sup> St. and Bay Dr.
  - c. Bulkhead 9: 93<sup>rd</sup> St. and Bay Dr.
  - d. Bulkhead 12: Surfside Park
  
3. Minor damage to structural integrity and/or aesthetics:
  - a. Bulkheads 3 & 4: 88<sup>th</sup> St. Bridge
  - b. Bulkhead 6: Irving Ave. & Bay Dr.
  - c. Bulkhead 8: 92<sup>nd</sup> St. and Bay Dr.
  - d. Bulkhead 10: 94<sup>th</sup> and Bay Dr.



## SECTION FOUR

### RECOMMENDATIONS AND OPINION OF PROBABLE COST

Measures should be taken to replace most of the bulkheads. Under ideal circumstances, the Town of Surfside should consider a comprehensive replacement plan for the bulkheads to reduce shared costs for construction items such as mobilization. If the cost to repair a bulkhead that is 40+ years old are half the cost of replacing the wall entirely, and a repair will afford the town 10 years of useable life while the replacement will provide 50 years of useable life, it is in the Town's best long-term interest to replace the bulkheads. Assuming that the Town chooses to replace all bulkheads within the scope of this investigation except for the two beneath the 88<sup>th</sup> Street Bridge, which are recommended for repair, it is estimated that approximately \$960,000 in construction costs will be needed to complete the construction of the required replacements. This quote is based upon an average unit cost of \$1,200/LF provided by two local marine contractors.

It is understood that the Town may wish to replace only the bulkheads in the worst condition and make repairs to extend whatever usable life the remaining bulkheads may possess. As an alternative to replacing all of the bulkheads and based upon the categorization described in the summary above, the following recommendations are made:

1. Where severe damage to the structural integrity of the bulkhead has been observed, it is recommended that the bulkhead be replaced entirely.
2. Where the structural integrity of the bulkhead appears to be in salvageable condition but damage is moderate, it is recommended that the bulkhead be either repaired or replaced.
3. Where the bulkhead exhibits minor cracking or degradation, it is recommended that the bulkhead be repaired.





**Calvin, Giordano & Associates, Inc.**  
EXCEPTIONAL SOLUTIONS

Date: August 28, 2012

Mr. Roger M. Carlton  
Town Manager  
**TOWN OF SURFSIDE**  
9293 Harding Avenue  
Surfside, FL 33154

**RE: Work Authorization No. 56**  
**Seawall Design, specifications & Grant application and presentation**  
**CGA Proposal No. 12-5247**

Dear Mr. Carlton,


Enclosed for your review and approval is Work Authorization No. 56 for Seawall Design, Specifications & Grant Application and Presentation. The scope of the project includes complete design for seawall repair and FIND grant application process.

The Scope of Services to be furnished under this Work Authorization includes Civil Engineering, Construction Administration, Environmental Permitting and Government Consulting as shown on the attached Work Authorization.

The Basis of Compensation is hourly based upon the established rates pursuant to the Professional Services Agreement between the Town and CGA, plus reimbursables, for a total not to exceed \$81,627.00.

Sincerely,

**CALVIN, GIORDANO & ASSOCIATES, INC.**

  
Dennis J. Giordano  
President

Building Code Services  
Code Enforcement  
Construction Engineering & Inspection  
Construction Services  
Contract Government  
Data Technologies & Development  
Emergency Management Services  
Engineering  
Governmental Services  
Indoor Air Quality  
Landscape Architecture & Environmental Services  
Municipal Engineering Planning  
Public Administration  
Redevelopment & Urban Design  
Surveying & Mapping  
Transportation Planning & Traffic Engineering  
Utility & Community Maintenance Services

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[www.calvin-giordano.com](http://www.calvin-giordano.com)

## **TOWN OF SURFSIDE**

### **Seawall Design, specifications & Grant application and presentation**

#### **PROJECT DESCRIPTION**

#### **1. SCOPE OF SERVICES**

##### **I. Professional Engineering Services**

###### **A. Civil Engineering**

###### **1. Preliminary Engineering Services**

- Collect geotechnical borings/soil samples to determine soil characteristics behind each bulkhead.
- Perform retaining wall design for four separate wall conditions presenting dimensions for repairs and requirements for materials.
- Prepare conceptual plans to construct a new sheet pile bulkhead with an associated wall tie-back system for review by the Town. These plans will support the permitting process and serve as the basis for producing an opinion of probable costs for the project.
- Prepare construction details and specifications for the bulkhead system including sheet piles, wall cap, tie-back, or anchor system.
- Prepare an opinion of probable cost for repair of bulkheads.

###### **2. Permitting**

- Provide support for permit applications

###### **3. FIND Grant Application**

- Prepare and make application for FIND grant funds to be used for the proposed installations.
- Coordination and Meetings as required.

#### 4. Assumptions

- It is assumed that the design can be completed referencing existing wall alignment and no detailed land survey will be required.
- Bulkheads are to be replaced by placing new concrete, steel, or vinyl sheet piles in front of the existing sheet pile bulkheads and backfilling with an appropriate tieback system.
- Design plans, and details for up to four typical repair sections will be prepared considering the bulkheads near the following intersections in the Town of Surfside:
  - Carlyle Ave. & 88th St.
  - Froude Ave. & 88th St.
  - End of 88th St. on Isla Biscaya
  - Irving Ave. & Bay Dr.
  - 90th St. & Bay Dr.
  - 92nd St. & Bay Dr.
  - 93rd St. & Bay Dr.
  - 94th St. & Bay Dr.
  - 95th St. & Bay Dr.
  - Surfside Park

#### 5. The following items are NOT included in this scope:

- Designs will NOT consider repair/replacement of the following bulkheads:
  - East side of 88th St. Bridge to Isla Biscaya
  - West side of 88th St. Bridge to Isla Biscaya

- Successful award of grant funding through FIND.

## **II. Professional Environmental Services**

- A.** Coordinate with the project team and compile the documents, data and plans to submit applications to and obtain environmental resource (ERP) permits from the U.S. Army Corps of Engineers (ACOE) and the Miami-Dade Permitting and Environmental Regulatory Affairs (PERA) Department for installation of new seawall at the face of existing degrading seawall. All ERP permitting will run concurrently and begin as soon as a plan details are available.
- B.** Coordinate and attend meetings with the ERP permitting and commenting agencies, both pre and post application submittal and on-site when necessary.
- C.** Compile data and respond to requests for additional information from the ERP permitting and commenting agencies as required.
- D.** Coordinate ERP permit close-out or conversion processes post construction.

## **III. Professional Government Consulting Services**

- A.** Project Management-Meetings
  - 1. Attend preliminary/conceptual meetings with all permitting agencies.
  - 2. Attend Town Staff Meetings
  - 3. Attend Public/Resident Meetings
  - 4. Attend periodic construction progress meetings
- B.** Project Management - Design & Grant Application
  - 1. Review 30%/60%/90% and final drawings for QC and constructability.
  - 2. Review and respond to permitting agencies Request for Additional Information (RAI).
  - 3. Manage and Assist in the completion of the FIND Grant Application.

4. Prepare and present the FIND Grant Presentation.

#### IV. Professional Construction Services

##### A. Project Bidding

1. Prepare front end documents. Submit to Town and work with Clerk and Town Attorney for advertising, scheduling etc.
2. Schedule and attend pre-bid conference. Address all Contractors inquiries and concerns.
3. Prepare and distribute all bid RFI, produce pre-bid meeting minutes, distribute all as addendum to bid documents.

##### B. Construction Inspection

1. Attend periodic progress meetings with Owner and Contractor.
2. Perform field inspections, coordinate building department permit inspections for duration of the project.
3. Attend Town and resident outreach meetings.


#### 2. BASIS OF COMPENSATION:

Hourly rates with an estimated fee of \$77,740.00 plus reimbursables at \$3,887.00 with a total not to exceed amount of \$81,627.00. Payments to be made monthly. The FIND Application fee of \$8,500 will not be billed until FIND's approval of at least \$250,000 in construction costs.

#### 3. TIME OF PERFORMANCE:

#### 4. SUBMITTED


Submitted by:

  
\_\_\_\_\_  
Dennis J. Giordano

Date: 8/28/12

#### 5. APPROVAL

Approved by:

  
\_\_\_\_\_  
Roger M. Carlton, Town Manager

Date: 9/14/12



**TOWN OF SURFSIDE**  
**WORK AUTHORIZATION ESTIMATE DATE**

**WORK AUTHORIZATION NO.** 56  
**PROJECT NAME** Seawall Design, specifications & Grant application and presentation  
CGA Proposal No. 12-5247  
**DESCRIPTION** complete design for seawall, repair and FIND grant application process

<b>TITLE</b>	<b>RATE</b>	<b>HOURS/UNITS</b>	<b>COST</b>
Clerical	\$74.26	25	\$1,856.50
Construction Management Director	\$127.31	25	\$3,182.75
Director Engineering V	\$159.14	16	\$2,546.24
Eng Sr CADD Tech Manager	\$106.09	55	\$5,834.95
Engineer II	\$106.09	177	\$18,777.93
Environmental Administrator	\$116.70	100	\$11,670.00
Inspector	\$83.00	13	\$1,079.00
Project Manager IV	\$137.92	127	\$17,515.84
Sr Inspector	\$95.48	160	\$15,276.80
			<b>\$77,740.01</b>

**SUB-CONSULTANTS** **COST**

**LABOR SUBTOTAL** \$77,740.01  
**REIMBURSABLE SUBTOTAL** \$3,887.00  
**TOTAL** \$81,627.01

Reviewed by:   
Roger M. Carlton, Town Manager