BLUE LAKE
COMMUNITY DEVELOPMENT DISTRICT

LEE COUNTY

REGULAR BOARD MEETING
MAY 9, 2023
1:00 P.M.

Special District Services, Inc.
The Oaks Center
2501A Burns Road
Palm Beach Gardens, FL 33410

www.bluelakecdd.org
561.630.4922 Telephone
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AGENDA
BLUE LAKE
COMMUNITY DEVELOPMENT DISTRICT
Conference Room of the Offices of Lennar
10461 Ben C. Pratt, Six Mile Cypress Parkway
Fort Myers, Florida 33966
REGULAR BOARD MEETING
May 9, 2023
1:00 P.M.

A. Call to Order
B. Proof of Publication…….....Page 1
C. Establish Quorum
D. Additions or Deletions to Agenda
E. Comments from the Public for Items Not on the Agenda
F. Approval of Minutes
    1. April 11, 2023 Regular Board Meeting…….....Page 2
G. Old Business
H. New Business
    1. Discussion Regarding Wilson Retaining Wall Report……....Page 5
    2. Discussion on Hurricane Fence Damage……Page 29
    3. Consider Resolution No. 2023-01 – Adopting a Fiscal Year 2023/2024 Proposed Budget…...Page 32
I. Administrative Matters
    1. Manager's Report
    2. Engineer's Report
J. Board Members Comments
K. Adjourn

Public Notice

05/01/2023

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BLUE LAKE COMMUNITY DEVELOPMENT DISTRICT NOTICE OF REGULAR BOARD MEETING NOTICE IS HEREBY GIVEN that the Board of Supervisors of the Blue Lake Community Development District will hold a Regular Board Meeting in the Offices of Lennar located at 10481 Ben C. Pratt, Six Mile Cypress Parkway, Fort Myers, Florida 33966 at 1:00 p.m. on May 9, 2023. The purpose of the meeting is to address any business to properly come before the Board. The meeting is open to the public and will be conducted in accordance with the provisions of Florida law. A copy of the agenda for this meeting may be obtained from the District's website or by contacting the District Manager at 239-444-5790 and/or toll free at 1-877-737-4922 prior to the date of the meeting. From time to time one or two Supervisors may participate by telephone; therefore, a speaker telephone will be present at the meeting location so that Supervisors may be fully informed of the discussions taking place. Said meeting may be continued as found necessary to a time and place specified on the record. If any person decides to appeal any decision made with respect to any matter considered at this meeting, such person will need a record of the proceedings and such person may need to insure that a verbatim record of the proceedings is made at his or her own expense and which record includes the testimony and evidence on which the appeal is based. In accordance with the provisions of the Americans with Disabilities Act, any person requiring special accommodations or an interpreter to participate at this meeting should contact the District Manager at 239-444-5790 and/or toll free at 1-877-737-4922 at least seven (7) days prior to the date of the meeting. Meetings may be cancelled from time to time without advertised notice. BLUE LAKE COMMUNITY DEVELOPMENT DISTRICT www.bluelakecdd.org May 1, 2023 #5679695

BLUE LAKE COMMUNITY DEVELOPMENT DISTRICT
REGULAR BOARD MEETING
APRIL 11, 2023

A. CALL TO ORDER

The April 11, 2023, Regular Board Meeting of the Blue Lake Community Development District (the "District") was called to order at 1:01 p.m. in the Conference Room of the Offices of Lennar located at 10461 Ben C. Pratt, Six Mile Cypress Parkway, Fort Myers, Florida 33966.

B. PROOF OF PUBLICATION

Proof of publication was presented which showed that notice of the Regular Board Meeting had been published in the *Naples Daily News* on September 30, 2022, as part of the District's Fiscal Year 2022/2023 Meeting Schedule, as legally required.

C. ESTABLISH A QUORUM

It was determined that the attendance of the following Board Members constituted a quorum:

Chairman	Christ Hasty	Present
Vice Chairman	Scott Edwards	Present
Supervisor	Tommy Dean	Present
Supervisor	Walter Fluegel	Present
Supervisor	Barry Ernst	Present

Also virtually present were the following Staff Members:

District Manager	Kathleen Meneely	Special District Services, Inc.
District Counsel	Wes Haber (via phone)	Kutak Rock LLP
District Engineer	Carl Barraco (via phone)	Barraco and Associates, Inc.

Also present were the following District residents: Jim Guinan, Rick Poynter, Ted Towgood, John Reis and Steve Hamburger.

D. ADDITIONS OR DELETIONS TO AGENDA

There were no additions or deletions to the agenda.

E. COMMENTS FROM THE PUBLIC FOR ITEMS NOT ON THE AGENDA

There were no comments from the public for items not on the agenda.

F. APPROVAL OF MINUTES

1. February 14, 2023, Regular Board Meeting

The minutes of the February 14, 2023, Regular Board Meeting were presented for consideration.

A **motion** was made by Mr. Ernst, seconded by Mr. Dean and passed unanimously approving the minutes of the February 14, 2023, Regular Board Meeting, as presented.

G. OLD BUSINESS

There were no Old Business items to come before the Board.

H. NEW BUSINESS

1. Update on Wilson Retaining Wall Report

Mr. Hasty advised that the initial draft report had been received, but it was not comprehensive enough. He has sent Hans Wilson comments and an addendum/new draft is being developed. He added that he wants the report to be as thorough and comprehensive as possible and suggested that other Board Members get their comments to Mr. Wilson.

Discussion ensued between the Board Members and the District residents in attendance. Mr. Reis asked about docks and Mr. Hasty suggested that any dock repairs not be attached to the wall due to upcoming repairs. Mr. Edwards suggested the Board adopt a policy that docks cannot be attached to the wall and further stated that he would speak with the association about such a policy.

Mr. Hamburger brought up the fence damage that needed repairs. Ms. Meneely advised that there were no reserves in the CDD's budget to do the repairs outside of the hurricane repair project, but the Chair had asked that the cost be looked into. Mr. Hamburger stated that he would put together a list of the fence areas that needed repairs and would provide that to Ms. Meneely.

Mr. Towgood asked about storm drains and swale areas and Mr. Barraco stated he would put together an exhibit of CDD areas.

Mr. Reis asked about roads and Mr. Haber indicated that the roads were not paid for by the CDD and were given to the HOA. There was discussion on hard and soft gates and user fees if the community were to open their amenities to the public.

Ms. Meneely advised that she had applied for a grant in the amount of $8.5 Million from the Department of Environmental Protection (DEP) to fund beach erosion and water infrastructure projects in specified counties impacted by Hurricanes Ian and Nicole via the Hurricane Stormwater and Wastewater Assistance Grant Program. There is no guarantee of approval, but at least the District is now in the system before the deadline, which was March 31, 2023.

After discussion, it was the consensus of the Board that the meeting be continued to Friday, April 28 at 1:00 p.m., provided the report has been completed by then.

2. Consider Ratification of Proposal for a Flow-Way Exotic/Nuisance Analysis

Ms. Meneely advised that this proposal had been approved between meetings and was in the amount of $2,500 to Passarella & Associates.

A **motion** was made by Mr. Hasty, seconded by Mr. Edwards and passed unanimously ratifying the Passarella & Associates proposal in the amount of $2,500 for the flow-way exotic/nuisance analysis.

I. ADMINISTRATIVE MATTERS

1. Manager's Report

Ms. Meneely went over the upcoming meeting schedule of the continued meeting on April 28, 2023, and the Regular Meeting of May 9, 2023. She noted that she would be out of the country for the June meeting, so it can either be rescheduled or she can have her colleague, Michelle Krizen, handle it.

2. Engineer's Report

There was no report from the District's Engineer.

J. BOARD MEMBER COMMENTS

There were no Board Member comments.

K. ADJOURNMENT

There being no further business to come before the Board, a **motion** was made by Mr. Fluegel, seconded by Mr. Ernst and passed unanimously recessing the April 11, 2023, Regular Board Meeting until April 28, 2023, at 1:00 p.m., contingent upon the completion of the Retaining Wall Report.* That **motion** carried unanimously.

ATTESTED BY:

_____ _____

Secretary/Assistant Secretary Chairperson/Vice-Chair

* Note – the April 28th meeting was cancelled due to the aforementioned report not being completed

HWA
Hans Wilson & Associates

Marine Engineers and Environmental Consultants

Retaining Wall Failure Analysis – Blue Lake

Prepared For: Blue Lake Community Development District
c/o Kathleen Meneely, Manager

Prepared On: March 3rd, 2023

1938 Hill Avenue ▪ Fort Myers, FL 33901
Office: (239) 334-6870 ▪ Fax: (239) 334-7810
info@hanswilson.com

Executive Summary

On September 28th, 2023, Hurricane Ian generated sustained winds of at least 70 miles per hour at Blue Lake. As the winds traveled across the 1.1-mile fetch distance of Blue Lake they generated wave with a 3.1' significant height. The waves initially eroded the littoral shelf waterward of the retaining wall and then began impacting the retaining wall. Waves breaking directly on the retaining wall led to an increase in turbid action and scour at the toe of the structure. This scour increased the exposed face of the wall which led to the failure of 3,350 linear feet of retaining wall with additional sections suffering deflections.

HWA determined that the probable cause of the Blue Lake retaining wall failure was the designs failure to account for toe scour at the wall in conjunction with a cap designed with inadequate stiffness. The designer assumed that because the lake bank had experienced minor erosion the construction of a vertical wall would prevent future erosion, failing to realize that a vertical wall would alter the hydraulic dynamics of the lake bank and increase toe scour. The designers failed to analyze the retaining walls cap for deflection led to a premature failure of the wall in areas of relatively minor toe scour. While Hurricane Ian caused the majority of the wall's failure, a smaller storm could cause the wall to fail if remedial action is not taken.

HWA recommends constructing an offshore riprap breakwater along sections of shoreline exposed to wind and wave action to protect the retaining wall and prevent future failures. The riprap breakwater should be engineered to resist the expected wave action depending on each sections maximum fetch distance. Between the breakwater and retaining wall littoral plantings should be re-established to meet Lee County Development Orders. Sections not exposed to significant wave action may remain with littoral plantings.

HWA recommends replacing failed retaining wall sections and sections which have deflected greater than 2.5" with a stronger cap to resist future deflection. The soil behind the wall can be excavated and the cap removed allowing the wall to be realigned before a cap of sufficient strength may is installed.

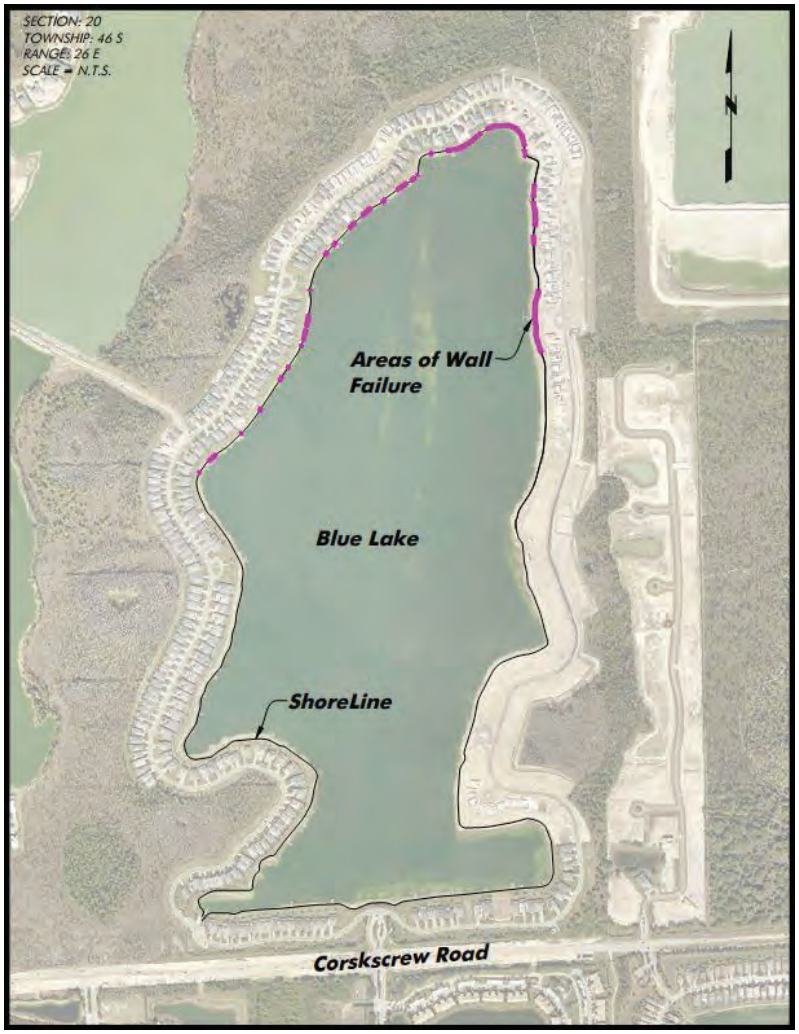
Any long-term repair option should be engineered for each sections expected wave action to provide a sufficient and economic design. The wall repair and remediation is likely to cost between $8,500,000 and $14,090,000 depending on the final engineered site-specific design.

PURPOSE

The purpose of this report is to determine the cause of failure and recommend repairs for 3.4 miles of retaining wall located at the Vista WildBlue Residential Community.

INTRODUCTION

The Vista WildBlue Community is centered around Blue Lake. Blue Lake was created during quarry operations which excavated the lake for commercial purposes. Lennar homes has since repurposed the land by developing a residential community centered around the lake. During the development process 3.4 miles of shoreline was stabilized with an engineered retaining wall which has since failed. The site is located inside of 13448 Blue Bay Cir, Estero, FL 33928.

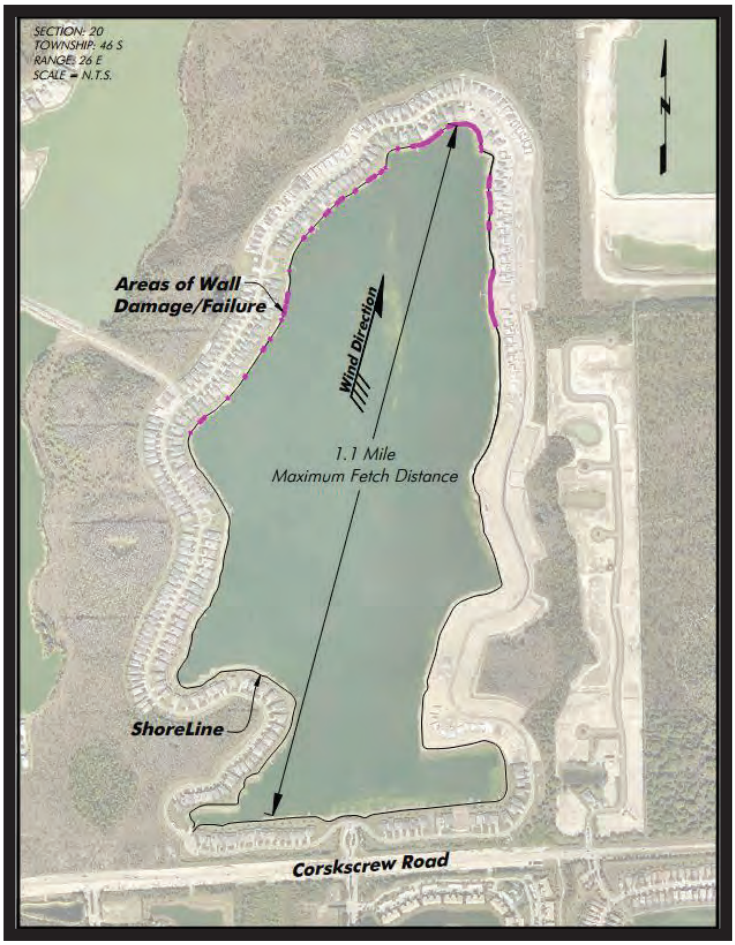


The drawing to the left shows 3,350 linear feet of retaining wall that suffered significant failure, with additional sections suffering more minor failures following Hurricane Ian.

HURRICANE IAN AND WAVE CONDITIONS

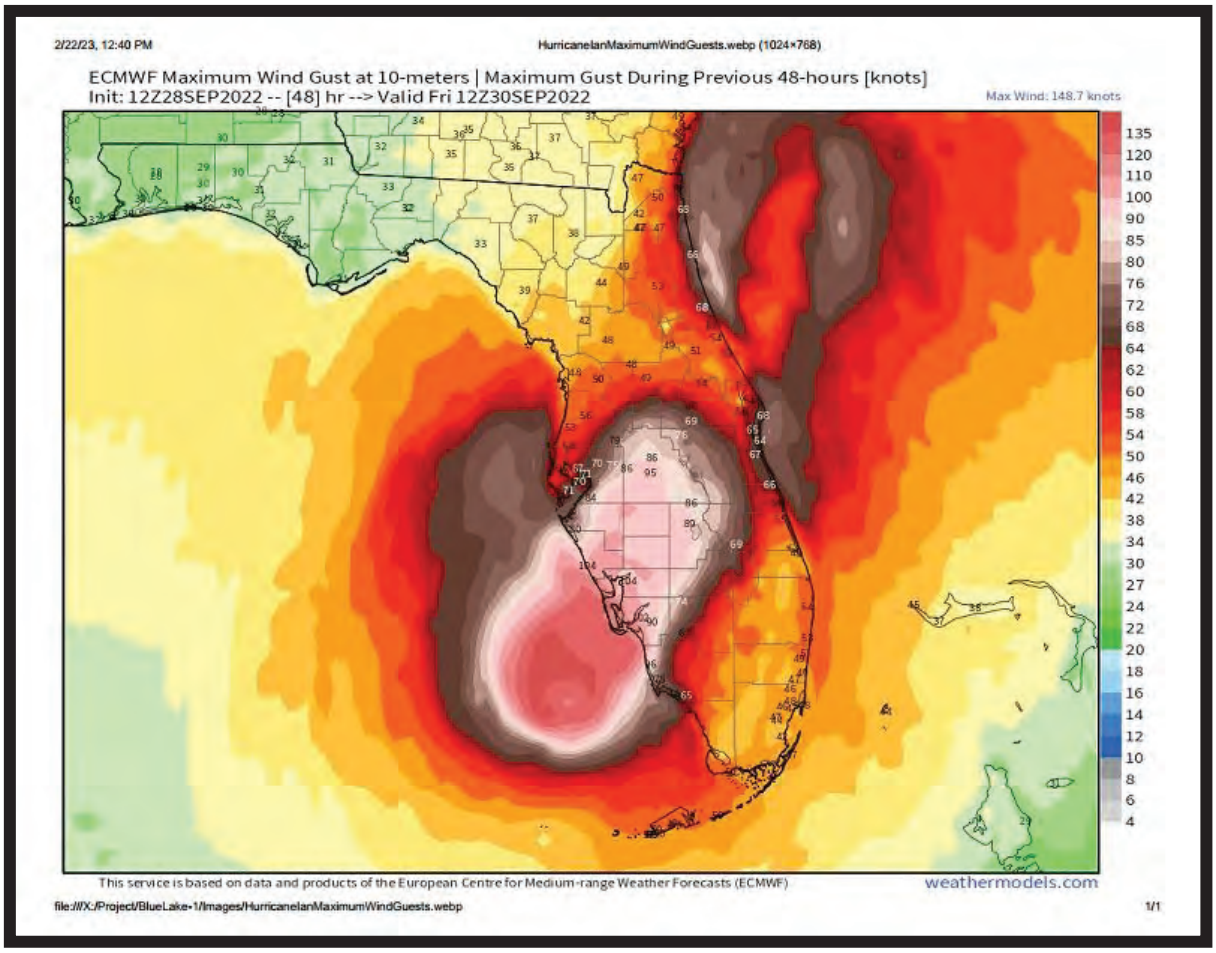
Hurricane Ian made landfall on September 28th as a Category 4 Hurricane with maximum sustained winds of 154 miles per hour. Determining exact wind speed and direction at the site is difficult because many weather monitoring stations failed during the hurricane. Based on available data it is reasonable to assume that the site was subject to sustained winds of approximately 70 miles per hour during the storm and gusts exceeding those values. As the Hurricane was rotating counterclockwise and passing northwest of the site the winds would have been blowing from the south to the north of the lake which generated waves.

The U.S. Army Corps of Engineers Shore Protection Manual Volume 1 provides tables (Figure 3-27 through 3-36) used to determine the wave height of wind generated waves based on fetch distance, water depth, and sustained wind speeds 30 feet from the water's surface. Based on a fetch distance of 1.1 miles, a typical depth of 20 feet (as reported by the site civil engineer), and a sustained wind speed of approximately 70 miles per hour we can calculate that the retaining wall was subject a significant wave height of 3.1 feet for the duration of the storm.



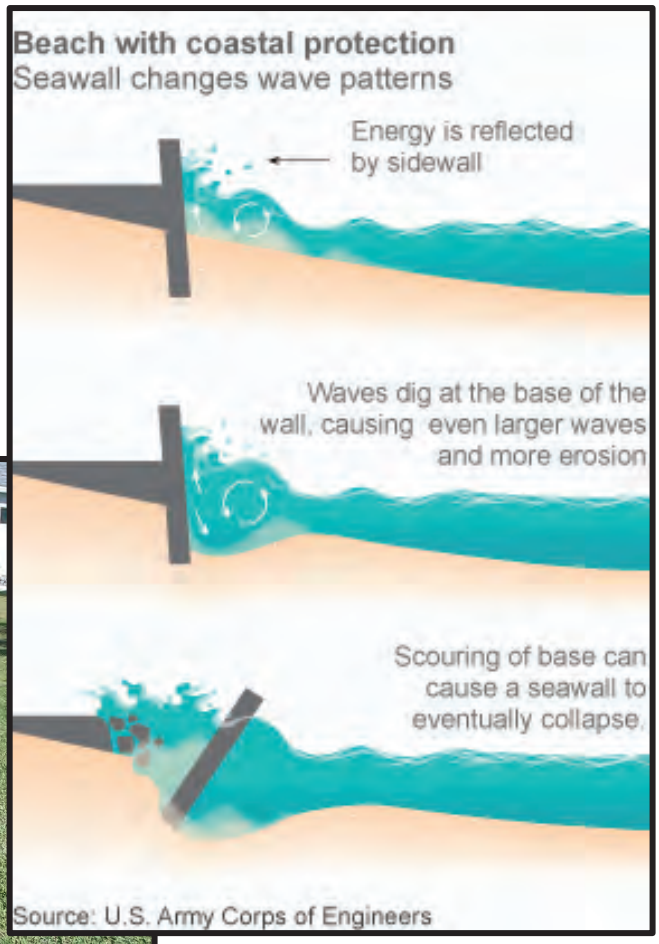
To the left is a drawing showing the maximum fetch distance and approximate wind direction during the hurricane.

Below is a map by the ECMWF wind prediction model for estimated maximum winds caused by Hurricane Ian showing gusts of 90 miles per hour at the site.



The wind generated waves impacted the northern shore of the lake and caused toe scour on the wall. Whereas a riprap revetment or natural shoreline with a slope gradually dissipates wave energy, a vertical wall provides a smooth surface which reflects the wave energy. As these waves are reflected turbulence is created at the base, which then lowers the shoreline profile, and in turn allows larger waves to impact the wall creating a cycle of erosion. This cycle stops when either the storm stops or the depth waterward of the wall has reached the maximum breaking depth of the waves. Toe scour on a vertical wall will result in erosion greater than if the waves were impacting a sloped lake bank or a riprap revetment. The lack of scour protection, steep drop off waterward of the lake, and vertical wall placement made this wall design especially susceptible to toe scour.

To the right is a diagram illustrating the process of waves causing toe scour on a vertical wall. As waves are reflected by the wall, they create turbulence which removes sediment from the toe of the wall. This effect on a vertical wall can lead to increased erosion when compared to a sloping shoreline left in its natural condition. Below is a photo showing substantial toe scour along the north shore of the lake. The sandbar waterward of the wall is a typical sign of toe scour.

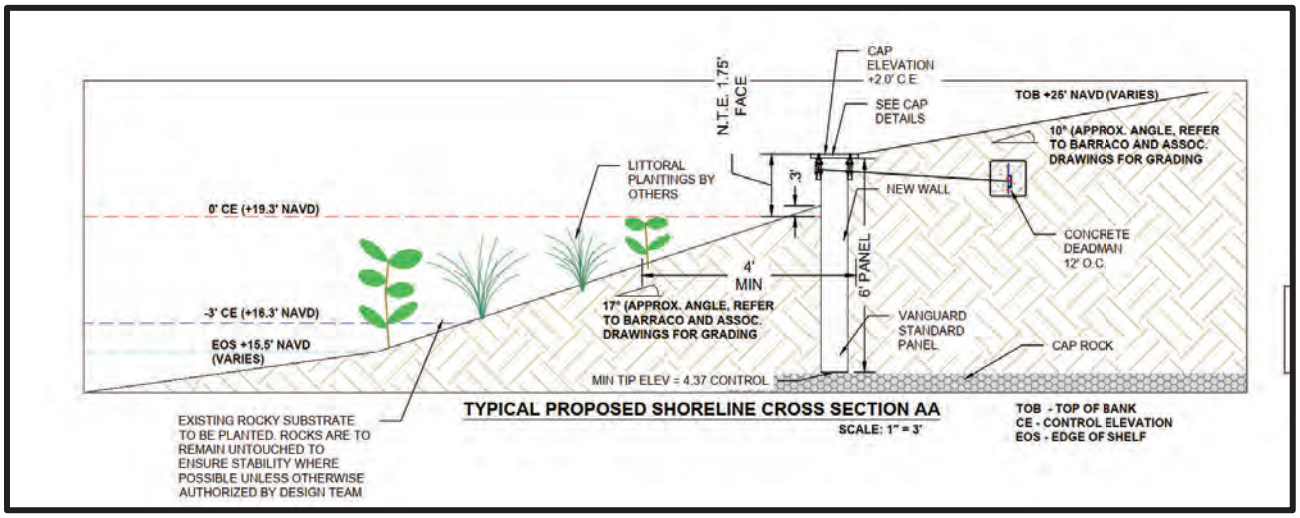


RETAINING WALL DESIGN ANALYSIS

Analysis Methodology – The purpose of this analysis is to determine if replacing the failed sections of wall with the originally designed wall will provide sufficient protection or if additional shoreline protection will be necessary.

To evaluate the design the expected service loads acting on the wall and the strength of the wall will be evaluated based on applicable codes, accepted engineering practices, and readily available information. For a category 1 structure where failure does not pose a direct threat to human life some level of risk is acceptable, and this analysis will reflect that.

Retaining Wall Plans – To stabilize the lake bank a retaining wall was constructed along the shoreline of Blue Lake. The retaining wall consisted of 6’ Vanguard Standard Vinyl sheet panels, a composite cap consisting of wood and Trex, and Concrete deadman on 12’ centers. The toe of the Vanguard panels was supported by passive earth pressure and the top of the wall was anchored by concrete deadman on 12’ centers with the composite cap distributing the horizontal loads between the earth anchors. The top of the wall featured a Trex walkway for aesthetics which provided no structural support to the wall.



Retaining wall engineered plans

Expected Storm – To determine if a replacement wall is likely to fail again, we must first predict the conditions which the wall will be subject to.

A retaining wall should have a minimum design life of 50 years. To determine the magnitude of storm likely to occur in the next 50 years we can perform a "hind-cast" of storms which have occurred at the site in the past. The SW International Airport has published wind recordings for the last 40 years. By filtering this data to wind blowing within 10° of the maximum fetch distance across Blue Lake we have the following data:

Wind Speed	Wind Direction	Date of Observation
119.6 MPH	0° (north)	3/13/1998
80.5 MPH	10° (north)	1/10/1998
65.5 MPH	360° (north)	9/4/1996
62.1 MPH	180° (south)	7/2/1993

Significant wind events as recorded by Fort Myers SW Regional Airport

These are the significant wind events occurring during the last 40 years which would produce waves over the maximum fetch distance of Blue Lake. There are 11 recordings of winds blowing 50 MPH or greater during this hind-cast. At a ***minimum***, the replacement wall should be sufficient to withstand the waves generated by a 50 MPH storm event, which is very likely to occur during the walls design life.

Wave Calculations – With an expected storm selected we can determine the size waves expected to impact the retaining wall. The U.S. Army Corps of Engineers Shore Protection Manual Volume 1 provides tables (Figure 3-27 through 3-36) used to determine the maximum wave height based on fetch distance, water depth, and wind speed 30 feet from the water's surface. The maximum fetch distance across Blue Lake is 1.1 miles in the north-south direction and the lake has a typical depth of 20 feet per Barraco and Associates. Given these design parameters we can expect waves of 2.2 feet in height to impact the north shore of Blue Lake.

To the right are equations 3-39 and 3-40 provided by the Shore Protection Manual used to calculate fetch limited and depth limited waves.

$$\frac{gH}{U_A^2} = 0.283 \tanh\left[0.530\left(\frac{gd}{U_A^2}\right)^{3/4}\right] \tanh\left\{\frac{0.00565\left(\frac{gF}{U_A^2}\right)^{1/2}}{\tanh\left[0.530\left(\frac{gd}{U_A^2}\right)^{3/4}\right]}\right\}$$

$$\frac{gT}{U_A} = 7.54 \tanh\left[0.833\left(\frac{gd}{U_A^2}\right)^{3/8}\right] \tanh\left\{\frac{0.0379\left(\frac{gF}{U_A^2}\right)^{1/3}}{\tanh\left[0.833\left(\frac{gd}{U_A^2}\right)^{3/8}\right]}\right\}$$

Toe Scour – The replacement wall should be designed to withstand the level of toe scour expected following the design storm. The level of toe scour to be expected is a function of the wave height impacting the shore, the level of scour protection provided, and water level during the storm.

For breaking waves occurring on a shallow vertical wall the Coastal Engineering Manual provides equation VI-5-259:

$$S_M = H_{Max}$$

Whereas:

S_M = the maximum scour depth at a vertical wall
H_{Max} = Nonbreaking wave height that can be supported by the water depth at the structure

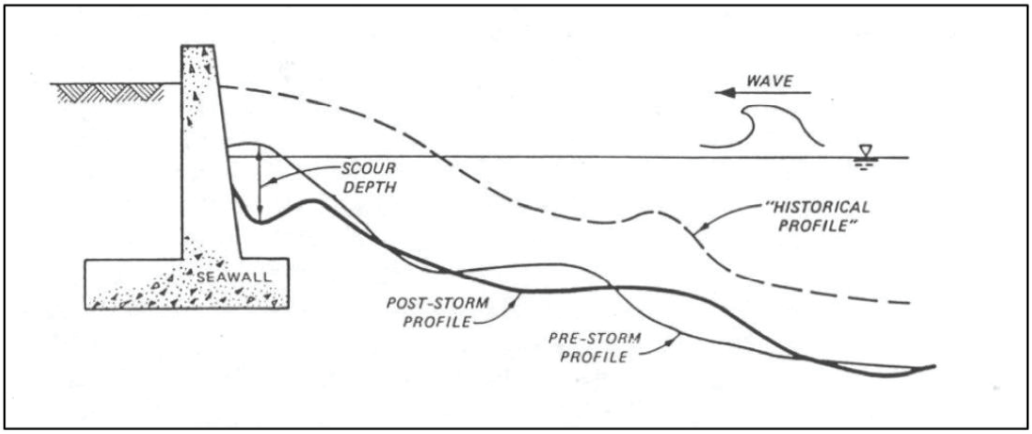


Figure VI-5-117. Scour due to breaking waves at a vertical seawall (Kraus 1988)

The control elevation for Blue Lake is set at 19.30' NAVD88 and the 25-year 3-day storm elevation is set at 20.98' NAVD88. The 25-year 3-day storm elevation referes to the expected water elevation following the maximum 3-day long rain event which will statistically occur once every 25 years. During the future expected storm, it is likely that the lakes water level will be higher than the control elevation but not at the elevation of a 25-year 3-day rain event. For this analysis we have assumed that during the design storm the water elevation will be 1' above control setting it at 20.30'. This would be consistent with our summer storm events when water levels are typically higher.

Waves will continue to break against the vertical wall until the depth in front of the wall exceeds the breaking depth of the waves at which point the waves will be reflected without creating turbulence and scour. To calculate the depth at which the expected 2.2' waves will no longer break we will utilize the Coastal Engineering Manual Equation II-4-3:

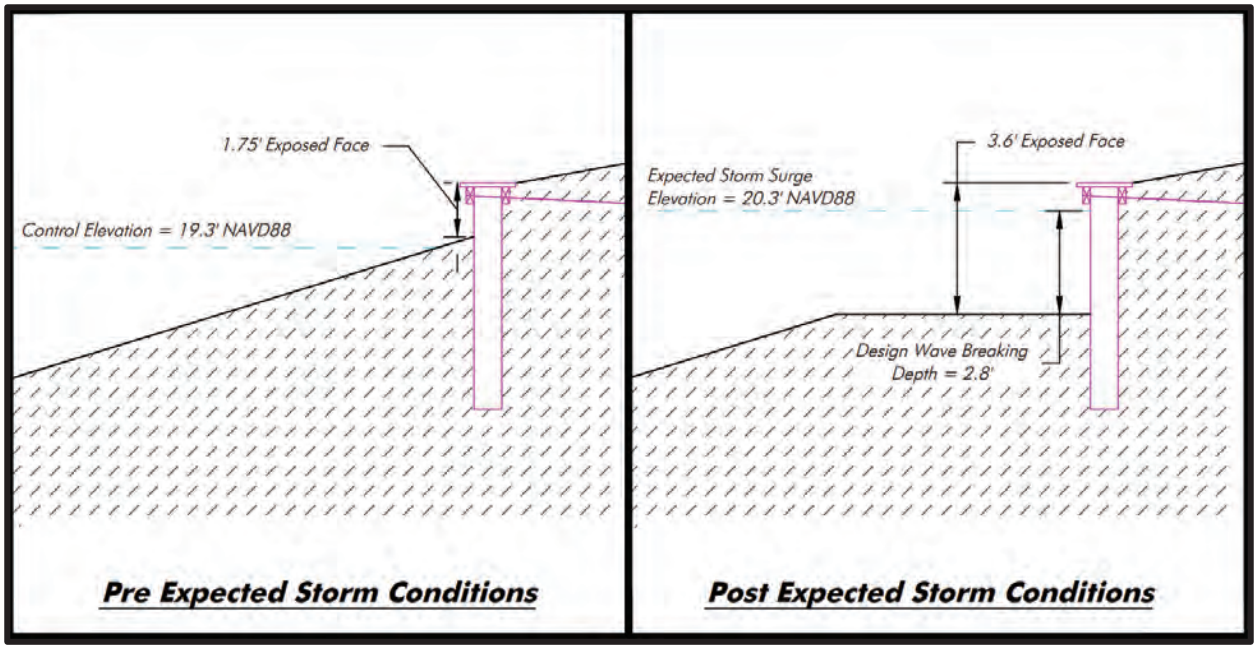
$$d_b = \frac{H_b}{\gamma_b} = \frac{2.2'}{0.78} = 2.8'$$

Whereas:

H_b = Wave of Expected Wave = 2.2'

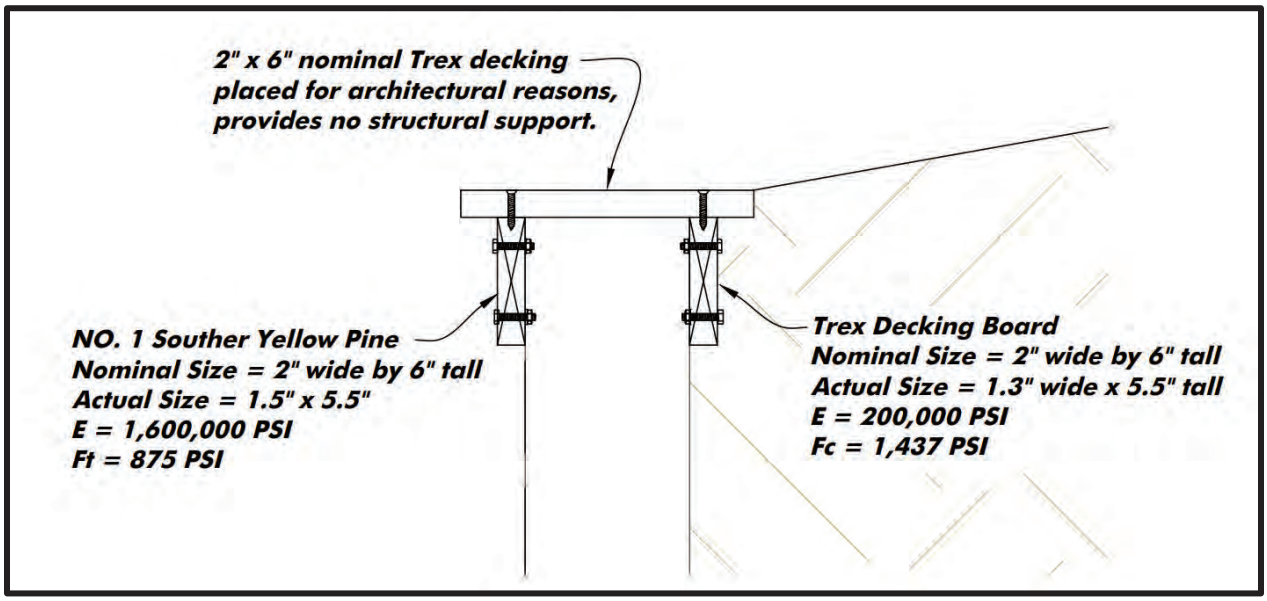
γ_b = breaker depth index for waves traveling on a horizontal bottom (McCowan 1891) = 0.78 (unitless)

d_b = Breaking Depth of the Expected Waves = 2.8'



The scour depth could be reduced if sufficient protection was provided. Sufficient protection would consist of a riprap revetment of which the thickness and size of rocks are determined through the CEM Manual. As little to no protection was provided at the site it is difficult to justify reducing the expected scour in specified by the Coastal Engineering Manual. Also note that if strong winds occurred while the lake was at a lower level, such as during a winter cold front, the expected toe scour would be greater.

Retaining Wall Cap Deflection – A composite cap refers to a cap consisting of two or more materials with different structural qualities. The cap of the retaining wall consisted of a pressure treated No. 1 Southern Yellow Pine wooden 2”x6” on the waterward side and a 2”x6” Trex board on the landward side. While resisting the lateral soil pressure and hydrostatic pressure imposed on the wall the waterward wooden board is put in tension and the landward Trex board is put in compression.



Labeled Retaining wall engineered plans.

Trex boards are not typically used in structural applications due to the products tendency to deform under load. The Modulus of Elasticity (E) quantifies a materials stiffness. The higher the Modulus of Elasticity the stiffer the material and less likely the material will deform while carrying a load. Trex has a Modulus of Elasticity 12.5% that of wood. Imposing the same load on a Trex board as a wooden board will cause the Trex to deform 7 times that of the wooden board. This boards tendency to deform while underload led to the wall’s premature failure.

Based on HWA’s field observations the cap suffered deformation at an exposed face of 2.4’. Given the expected scour a replacement wall would fail if 50 MPH winds occurred across the longest fetch distance of the lake. If remedial measures are not taken to prevent future toe scour a replacement cap board would fail prior to the design life of the wall.

Toe Kickout – Given the expected future scour creating a 3.60’ exposed face we can calculate if the wall will fail from toe kickout during a typical summer storm or if the panels are sufficiently embedded. If the toe of the retaining wall is not sufficiently embedded the toe of the will rotate waterward and the wall will fail again. The Florida Building Code (Section 1807.2.3) requires a minimum FOS of 1.5 be provided for overturning.

SPW911 software was utilized to calculate the FOS of the retaining wall following the expected storm conditions. This program uses Rankine’s earth pressure theory to calculate the lateral soil pressure and hydrostatic pressure acting on the wall. Assumptions were made regarding the soil unit weight, expected exposed face, and water depths based on the plans prepared by the design engineer and the previously calculated design storm event.

With an anticipated 3.60’ exposed face the 6’ Vanguard Panels provide 2.40’ of embedment. This produces a FOS less than 1 which SPW911 will not display as a safety precaution for designers. The following calculations are performed utilizing SPW911:

- Given the 6’ Long Panels the maximum exposed face would be 2.50’ to provide a FOS of 1.5 from overturning
- Assuming a 3.60’ exposed face the Vanguard Panels would need to be 7.7’ long to provide a FOS of 1.5 from overturning

The original retaining wall design was only sufficient for a maximum exposed face of 2.63’ which would account for less than 1’ of toe scour. If the wall was replaced as originally designed, it would fail again prior to the design life if the littoral shelves were eroded from wave energy. The two options for repair are to provide longer panels with sufficient embedment or to limit the size of waves impacting the retaining wall.

The design is limited in some capacity by a shallow layer of rock. To provide adequate protection the replacement wall could be “pinned” to the shallow layer of rock to effectively increase the FOS of the wall for toe kickout. The replacement could also provide 8’ long panels to increase the FOS of the wall for toe kickout. Alternatively, the existing wall could remain, and a riprap breakwater could be installed to limit the size of waves impacting the retaining wall and prevent future toe scour.

Vanguard Standard Vinyl Panels – Following the expected storm event and given the above conditions the moment action on the Vanguard Standard Vinyl Panels will be 2,110 foot-pounds while the Vanguard Standard Vinyl Panels have an ultimate moment capacity of 10,584 foot-pounds. These moments refer the bending forces imposed on the panels themselves. This provides the panels with a factor of safety of 5 for resisting the moment imposed on the panels. The original panels are sufficiently strong to resist bending, although not sufficiently embedded to resist overturning.

Concrete Deadman – The concrete deadman were not the weakest link in the design as observed by HWA on site. The concrete deadman earth anchors begin to fail as the wall approaches an exposed face of 4.2'. If the wall were replaced with a wall designed to support a larger designed face the earth anchors would need to be redesigned. However if toe scour protection was provided to limit the exposed face to less than 2.4' the existing earth anchors would provide adequate strength.

Discussion – The original retaining wall design did not provide a cap strong enough to resist the loads imposed on it following an expected storm with 50 MPH winds. The original cap would fail given toe scour of less than a foot. Additionally, the Vanguard Standard Vinyl panels were not sufficiently embedded to provide adequate toe protection. If the wall is replaced with the original design, it will fail again following seasonal storms.

SITE OBSERVATIONS

On February 10th, HWA conducted a site visit to assess the retaining walls condition. The initial site visit included collecting measurements of the exposed face, tiebacks, sheet piles, erosion control measures, and structural components to assess the retaining walls condition.

The retaining wall design specified a 1.75-foot exposed face at the time of construction. That is the height of soil the retaining wall is designed to hold back. Upon arriving at the site it became immediately clear that the exposed face of the retaining wall had greatly exceeded the design face. Toe scour eroded the lake bank waterward of the retaining wall and had increased the exposed face of the wall exceeding that of design. The toe scour was concentrated on the north shore of the lake where the wall had failed. It was determined that the condition of the retaining wall had a direct correlation with the depth of toe scour present and three distinct cases were identified based on the exposed face of the retaining wall.

Case 1 (1.75' to 2.4' exposed face): These sections were generally located along the southern shore of the lake and along coves protected from wave action on the lake. We observed no failures or deflections in the sections of the wall which maintained this level of exposed face. The lake bank waterward of the wall was sandy with some small rocks and sparce immature littoral shelf plantings. The lack of toe scour and erosion at these sections is attributed to a lack of wind and wave exposure.

To the left is an example of a Case 1 retaining wall located on the south side of the lake, unaffected by Hurricane Ian waves. The exposed face is 1.8' and little erosion has occurred. Some rocks are present in the lake bank, but their size is too small to prevent erosion and the Littoral Shelf Plantings are not present at the toe of the structure.

Case 2 (2.4’ to 4.2’ exposed face): These sections were located along the northern shore of the lake and were exposed to greater wave action. Substantial toe scour occurred as a result of wave action against the wall. At this height of exposed face, the soil pressure behind the wall surpassed the structural capacity of the cap boards. The cap boards did not surpass their ultimate structural capacity but reached a level of stress that caused them to fail through deflection. The cap board deflection created “wavy” walls where the retaining wall bows out waterward between the earth anchor tiebacks which hold the top of the wall upright. The lake bank waterward of the wall was sandy with some small rocks and littoral shelf plantings were likely removed by the erosion.

To the right is an example of the “wavy” wall effect observed as the exposed face increases more than 2.4’. Some small rocks are seen in front of the wall, but their small size and inconsistency cannot be relied on for erosion protection. Below is a photo showing more extreme waterward leaning with an exposed face of 4.2’ and is near complete failure.

Case 3 (4.2’ exposed face or greater): These sections of wall were generally located in areas of the lake where wave action would have been more concentrated, such as concave sections or protruding sections with greater exposure. At this amount of exposed face, the soil pressure behind the wall surpassed the structural capacity of the entire wall. In some instances the cap board snapped, in others the panel toes kicked out, and in others sections the concrete deadman were pulled forward. The only structural member to not fail were the Vanguard Corrugated Vinyl panels which did not break. These sections of shoreline have the same level of erosion protection as the rest of the lake but were exposed to more significant wave action. Any section of retaining wall subject to this level of wave action would have failed.

Above is an example of total retaining wall failure. This section was located on the north shore of the lake where the concaved shape concentrated wave action. The exposed face was estimated to be 4.6’ at this section. Some small scattered rocks and plantings are seen in front of the retaining wall.

These three cases were consistent throughout the site. No shoreline sections with an exposed face less than 2.4’ failed. Every shoreline section with an exposed face greater than 2.4’ developed “wavy” cap boards. No shoreline section with an exposed face greater than 4.2’ was left standing. This consistency demonstrates that the walls failure was due to a lack of toe scour protection given the size of waves generated on this lake.

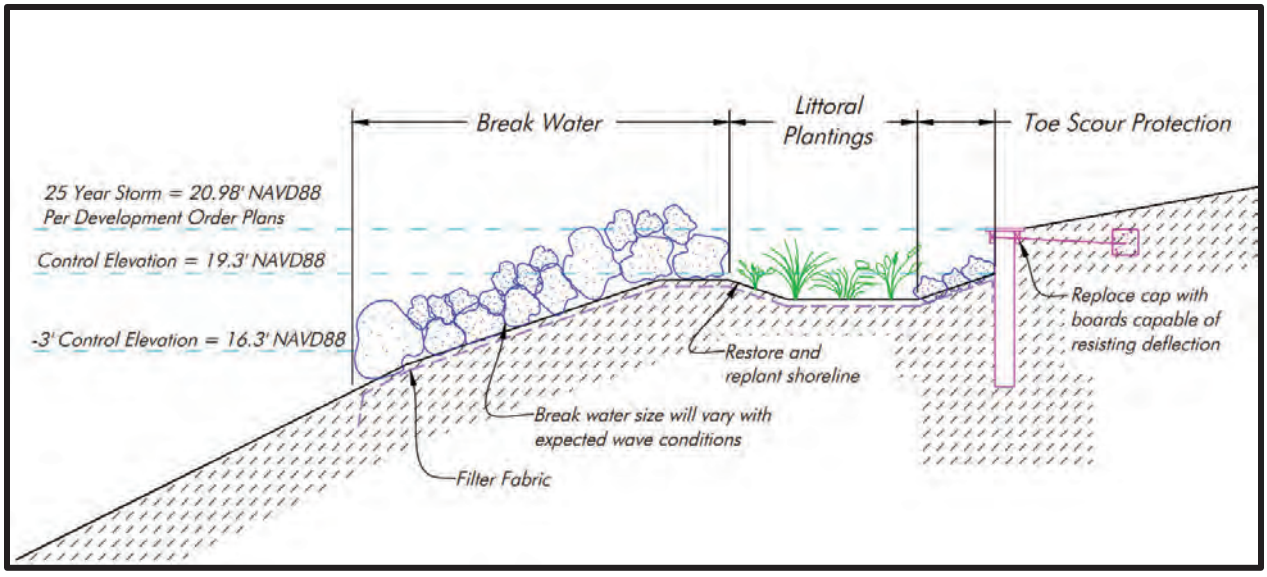
RECOMMENDED REPAIR

The originally designed wall is insufficient for the expected storm conditions at the site, particularly if the waves generated by the storm erode the littoral shelves, lowering the profile of the shoreline and reducing the passive soil pressure acting against the retaining wall. If the wall were rebuilt to the original design, it would fail again during a seasonal storm or due to daily wind generated waves and boat wakes eroding the shoreline over time, particularly if the littoral shelves are not replaced and stabilized.

Any repair executed for the long term should have considerable thought put into the expected wave conditions for annual and seasonal events. For example, the southern coves of Blue Lake have very short fetch distances and will not be exposed to very much wind and wave action. In these areas the mature vegetation alone would be sufficient to prevent toe scour. In areas with a greater fetch distance larger waves can be expected and greater protection from toe scour should be provided.

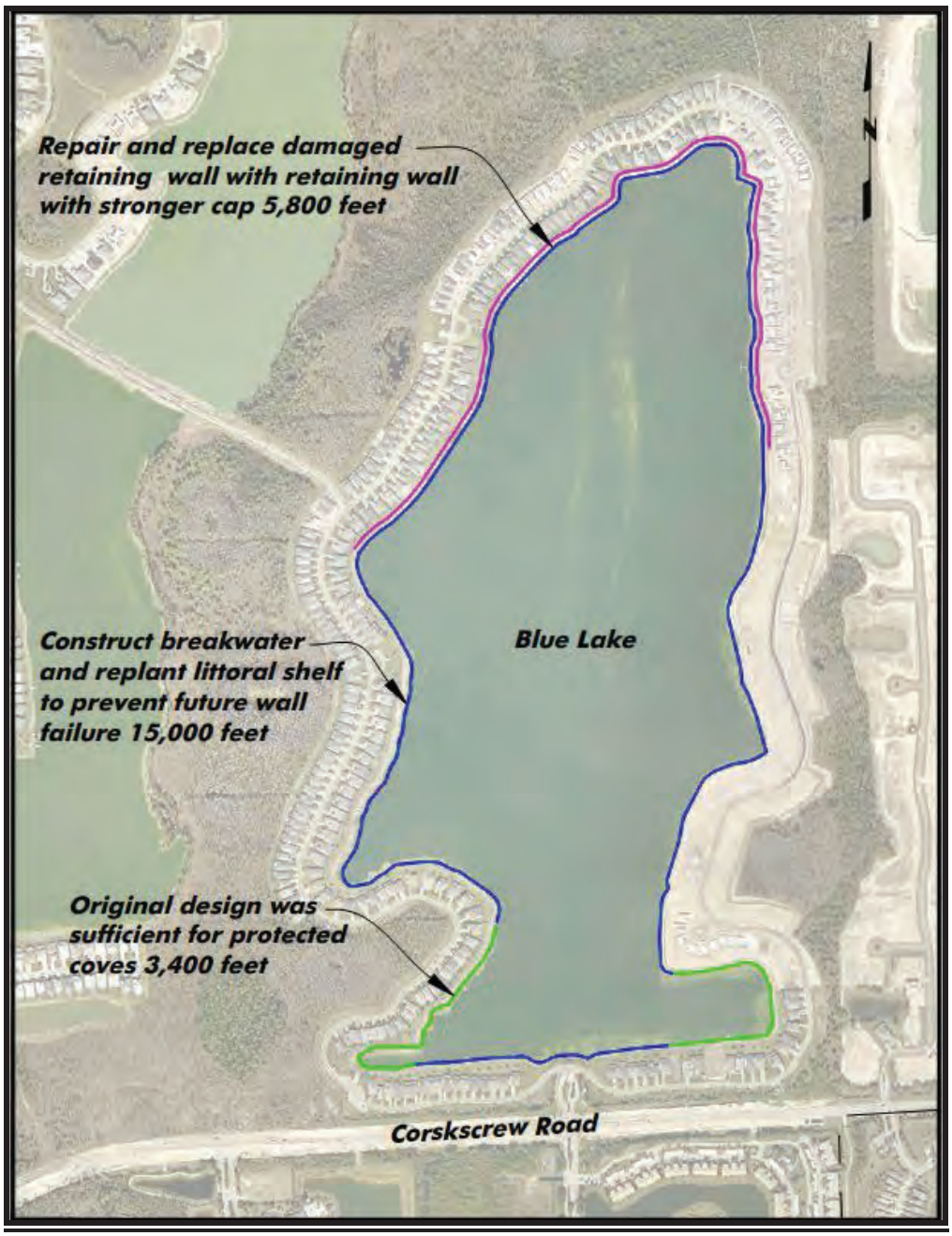
HWA recommends constructing an offshore riprap breakwater sized to resist the expected waves along each section of shoreline. The breakwater will prevent waves from impacting the retaining wall and allow for a littoral shelf to be restored and planted. The riprap breakwater would consist of boulders sized to withstand the expected wave action.

For sections of the wall which have already failed HWA recommends disassembling the wall and reinstalling panels with a cap sized to resist deflection. Many of the Vanguard panels may be reused. In sections of deflection greater than 2.5” the soil behind the panels would need to be excavated and the panels brought into alignment and a stronger cap board installed. These repairs would be in conjunction with an offshore breakwater to prevent future failures from occurring.



The drawing above illustrates a possible repair option for a section of the shoreline exposed to extreme wave action, such as the northern and southern shore.

The original retaining wall cannot withstand the waves expected to be generated on most of Blue Lake if the littoral shelf is eroded. If an offshore breakwater were constructed the size of wave impacting the wall would be limited which would prevent future failures of the retaining wall. While the waves generated by Hurricane Ian impacted the north shore future storms are expected to generate waves which would effect all areas of Blue Lake. The final design should be engineered to provide an appropriate amount of protection provided the fetch distance, expected winds, existing conditions, and littoral shelf planting requirements.



The drawing above illustrates areas of breakwater construction and retaining wall repair/replacement. The breakwater size will vary based on the fetch distance and the expected wave action to impact that shoreline.

OPINION OF PROBABLE COST

The repair cost will depend on the final engineered repair design. Please note that cost estimates have been difficult to determine post Hurricane Ian. Inflated material costs and a temporary spike in the construction industry have caused larger than typical variations in quotes. This cost estimate is to provide a rough estimate of the total cost of repair.

- Replacing the vinyl retaining wall panel applied to the current design will run between $600 and $700 a linear foot
- Demolition of the destroyed retaining wall would cost $25 a linear foot.
- Construction of a riprap breakwater will vary depending on the level of expected wave action at each section but will generally cost $500 a linear foot

The cost will vary depending on the selected design storm event. Once a work plan is selected, based on the level of protection the owner wants, a more specific Opinion of Probable Cost can be prepared.

CAVEAT

The information contained within this report is developed from various public information sources and is accurate to the best of our knowledge and understanding. This information package is intended to assist the client while evaluation retaining wall repair options and does not constitute an engineered design.

Prepared By:

Jack Walter

Jack Walter, Project Manager
Florida Engineering Intern
#1100024576

Reviewed By:

Hans JM Wilson

Digitally signed by Hans JM Wilson
Date: 2023.03.07 11:17:42 -05'00'

Hans Wilson, P.E.
Florida Registered Engineer #39680

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HWA
Hans Wilson & Associates
Marine Engineers and Environmental Consultants

April 26, 2023

To: Blue Lake Community Development District c/o Kathleen Meneely, Manager

From: Hans Wilson, P.E.

Subject: Blue Lake (aka Vista Blue) Retaining Wall Failure Addendum

Kathleen – Pursuant to our discussions regarding the report, instead of a re-write, I have elected to provide you with clarifiers regarding some of the issues. This should be attached to the main report for consideration by others. I want to be clear that our work scope was to assess the existing retaining wall relative to its failure resulting from the impacts of Hurricane Ian.

Design Standards – There are no “official” code requirements for the retaining wall design to withstand a minimum storm event. The design is based on a selection of factors that affect the shoreline and are vetted with the ownership. This includes design criteria for lake elevations and profiles, wind speeds, fetch distance, and evaluation of level of vulnerability of the site.

Design Assumptions – We spoke at length with Josh Maxwell at THA, the designer of the retaining wall. He spoke about the original design recommendations of using an offshore riprap breakwater to protect the littoral shelf, similar to our recommendations, so we were consistent with his thinking. To clarify the comments in the second paragraph of the Executive Summary, there was an assumption that the relative stability of the littoral shelves over the life of the lakes, and lack of any serious erosion, was assurance the littoral shelves would protect the retaining wall from failure. This was used as justification for the Deviation from LDC Section 10-329(d)(4). Unfortunately, failure to implement the offshore breakwater exposed the littoral shelves to erosion under the design storm event and compromised the retaining wall.

Qualifications – From our research it appears that Josh Maxwell (THA) was the only engineer of record for the retaining wall for Blue Lake. Brian Midolo (Marine Contracting Group) appears to have been the only marine contractor for the construction. Both firms are experienced in this type of work and were qualified to provide the services associated with the design and construction of the retaining wall.

Construction – Based on our observations post hurricane, it appears that the retaining wall was constructed in accordance with the permitted plans. There are areas where the exposed face exceeds the design criteria, but it is unknown if this condition existed before or after the impact from Hurricane Ian.

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Restoration Costs – We put together a big picture cost for the restoration, however, this is going to be driven by the CDD and associations and is simply an order of magnitude of what *could* be the cost. The dollar figures are based on comparable costs for similar construction. A final cost cannot be determined until it is resolved whether to build back the retaining wall, where, and how to re-establish the littoral shelves. This includes discussion regarding whether an offshore breakwater will be considered to protect the shelves and retaining wall.

Conclusion – The scope of our report was limited to the failure mode of the retaining wall and possible repair options, not the magnitude of wave action the design was capable of withstanding. We want to emphasize that the impacts to the retaining wall were all based on loss of the littoral shelves and whatever solution is pursued regarding the retaining wall, the littoral shelves and their stability should be of primary focus. This includes deciding on what level storm to re-design the littoral shelves for and whether to consider the retaining wall as a backstop to preventing any further erosion should the littoral shelves be damaged or destroyed in the future. The retaining wall would function as designed if the littoral shelves were stable and able to resist the design storm energy per the Turrell, Hall & Associates report dated April 6, 2017.

From: sah.vistabluetransition@gmail.com <sah.vistabluetransition@gmail.com>
Sent: Friday, April 21, 2023 3:21 PM
To: Kathleen Meneely <kmeneely@sdsinc.org>
Cc: 'Steve Hamburger' <sah.vistabluetransition@gmail.com>; 'John Reis' <jrr.vistabluetransition@gmail.com>
Subject: Final Inspection of Vista Blue Perimeter Fencing

Kathleen: This is an updated assessment of chain link fences as we were able to get access behind resident's houses. I assume that this will help the vendor when they assess for providing an estimate for repairs. Hope to discuss next steps next week. Have a great weekend, Steve

Location of damaged chain link fencing surrounding the Vista Blue community		
Address	**Street Address - Blue Bay Circle**	**Location & Damage Description**
13589	Preserve Behind 13589	Fence Damaged
13635	Preserve Behind 13635	Two separate areas
13727	Preserve Near 13727	Gate; behind common area
13987	Preserve Behind 13987	Fence Pushed Back
14031	Preserve Behind 14031	Fence Pushed Back
14041	Preserve Behind 14041	Fence Damaged
14053	Preserve Behind 14053	Fence Damaged
14159	Preserve Behind 14159	Fence Damaged
14175	Preserve Behind 14175	Fence Damaged
14257	Preserve Behind 14257	Fence Damaged
14269	Preserve Behind 14269	Fence Damaged
14329	Preserve Behind 14329	Fence Damaged
14357	Preserve Behind 14357	Fence Gate Damaged
14385	Preserve Behind 14385	Fence Damaged
14397	Preserve Behind 14397	Fence Damaged
14409	Preserve Behind 14409	Fence Pushed Back
14427	Preserve Behind 14427	Fence Gate Handles Missing
14439	Preserve Behind 14439	Fence Damaged
14445	Preserve Behind 14445	Fence Damaged
14445	Preserve Behind 14445	Fence Pushed Back
14451	Preserve Behind 14451	Fence Pushed Back
14457	Preserve Behind 14457	Fence Pushed Back
14511	Preserve Behind 14511	Fence Pushed Back & Fence Ripped
14523	Preserve Behind 14523	Fence Pushed Back
14550	Preserve Behind 14550	Fence Gate has No Latch
14583	Preserve Behind 14583	Fence Damaged
14583	Preserve Behind 14583	Fence Pushed Back & Fence Damaged
14607	Preserve Behind 14607	Fence Damaged
14607	Preserve Behind 14607	Fence Damaged
14643	Preserve Behind 14643	***Big Berm Washout & Fence Damaged***
14673	Preserve Behind 14673	Fence Damaged
14679	Preserve Behind 14679	Missing couple of Fence Sections
14703	North side of Breeze Bay *(behind 14703 BBC)*	Multiple spots; multiple panels
14703	Preserve Behind 14703	Bottom of Fence Damaged
14709	Preserve Behind 14709	Bottom of Fence Damaged
14775	Preserve Behind 14775	Fence Gate Missing Door Lock

14817	Preserve Behind 14817	Bottom of Fence Line Damaged
14871	Preserve Behind 14871	***Wash out on Berm***
14889	Preserve Behind 14889	Fence Gate Lock Missing
14979	Preserve Behind 14979	Bottom Fence Twisted
14985	Preserve Behind 14985	Top Bar of Fence Damaged
14997	Preserve Next to 14997	Fence Damaged from Trees
15008	Preserve side opposite 15008	This house is on Blue Lake - Fence Damaged
15014	Preserve side opposite 15014	This house is on Blue Lake - Fence Damaged
15044	Preserve side opposite 15044	This house is on Blue Lake - Fence Damaged
15170	Preserve side opposite 15170	This house is on Blue Lake - Fence Damaged
15176	Preserve side opposite 15176	This house is on Blue Lake - Fence Damaged
15182	Preserve side opposite 15182	This house is on Blue Lake - Fence Damaged
15194	Preserve side opposite 15194	This house is on Blue Lake - Fence Damaged
Boat Launch	Preserve Behind Boat Launch Parking Area	About 9 panels
Boat Launch	Preserve Opposite Boat Launch Area Mailboxes	In the preserve

RESOLUTION 2023-01

A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE BLUE LAKE COMMUNITY DEVELOPMENT DISTRICT APPROVING A PROPOSED BUDGET FOR FISCAL YEAR 2023/2024 AND SETTING A PUBLIC HEARING THEREON PURSUANT TO FLORIDA LAW; ADDRESSING TRANSMITTAL, POSTING AND PUBLICATION REQUIREMENTS; ADDRESSING SEVERABILITY; AND PROVIDING AN EFFECTIVE DATE.

WHEREAS, the District Manager has heretofore prepared and submitted to the Board of Supervisors ("**Board**") of the Blue Lake Community Development District (**"District"**) prior to June 15, 2023, a proposed budget (**"Proposed Budget"**) for the fiscal year beginning October 1, 2023 and ending September 30, 2024 (**"Fiscal Year 2023/2024"**); and

WHEREAS, the Board has considered the Proposed Budget and desires to set the required public hearing thereon.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF SUPERVISORS OF THE BLUE LAKE COMMUNITY DEVELOPMENT DISTRICT:

1. **PROPOSED BUDGET APPROVED.** The Proposed Budget prepared by the District Manager for Fiscal Year 2023/2024 attached hereto as **Exhibit A** is hereby approved as the basis for conducting a public hearing to adopt said Proposed Budget.

2. **SETTING A PUBLIC HEARING.** A public hearing on said approved Proposed Budget is hereby declared and set for the following date, hour and location:

DATE: July 11, 2023
HOUR: 1:00 p.m.
LOCATION: Conference Room of the Offices of Lennar
10481 Six Mile Cypress Parkway
Fort Myers, Florida 33966

3. **TRANSMITTAL OF PROPOSED BUDGET TO LOCAL GENERAL PURPOSE GOVERNMENT.** The District Manager is hereby directed to submit a copy of the Proposed Budget to Lee County at least 60 days prior to the hearing set above.

4. **POSTING OF PROPOSED BUDGET.** In accordance with Section 189.016, *Florida Statutes*, the District's Secretary is further directed to post the approved Proposed Budget on the District's website at least two days before the budget hearing date as set forth in Section 2, and shall remain on the website for at least 45 days.

5. **PUBLICATION OF NOTICE.** Notice of this public hearing shall be published in the manner prescribed in Florida law.

6. **SEVERABILITY.** The invalidity or unenforceability of any one or more provisions of this Resolution shall not affect the validity or enforceability of the remaining portions of this Resolution, or any part thereof.

7. **EFFECTIVE DATE.** This Resolution shall take effect immediately upon adoption.

PASSED AND ADOPTED THIS 9th DAY OF May, 2023.

ATTEST:

BLUE LAKE COMMUNITY DEVELOPMENT DISTRICT

_____
Secretary / Assistant Secretary

_____
Chair/Vice Chair, Board of Supervisors

Exhibit A: Proposed Budget

Blue Lake
Community Development District

Proposed Budget For
Fiscal Year 2023/2024
October 1, 2023 - September 30, 2024

CONTENTS

DETAILED BUDGET
BLUE LAKE COMMUNITY DEVELOPMENT DISTRICT
FISCAL YEAR 2023/2024
OCTOBER 1, 2023 - SEPTEMBER 30, 2024

REVENUES		FISCAL YEAR 2023/2024 BUDGET
O&M Assessments		445,556
Developer Contribution - O&M		0
Debt Assessments		663,697
Interest Income		240
TOTAL REVENUES	**$**	**1,109,493**
EXPENDITURES		
ADMINISTRATIVE EXPENDITURES		
Supervisor Fees		0
Management		29,688
Legal		14,000
Assessment Roll		4,000
Audit Fees		4,000
Arbitrage Rebate Fee		650
Insurance		6,700
Legal Advertisements		3,500
Miscellaneous		950
Postage		300
Office Supplies		1,050
Dues & Subscriptions		175
Trustee Fees		4,050
Continuing Disclosure Fee		1,000
TOTAL ADMINISTRATIVE EXPENDITURES	**$**	**70,063**
MAINTENANCE EXPENDITURES		
Engineering/Inspections		29,500
Mitigation Monitoring		138,500
Lake Maintenance		60,000
Flow Way Inspection Certification		5,000
Vista Dry Retention Area		45,000
Detention Area Maintenance		36,000
Miscellaneous Maintenance		35,000
TOTAL MAINTENANCE EXPENDITURES	**$**	**349,000**
TOTAL EXPENDITURES		419,063
REVENUES LESS EXPENDITURES	**$**	**690,430**
Bond Payments		(623,875)
BALANCE	**$**	**66,555**
County Appraiser & Tax Collector Fee		(22,185)
Discounts For Early Payments		(44,370)
EXCESS/ (SHORTFALL)	**$**	**-**

DETAILED PROPOSED BUDGET
BLUE LAKE COMMUNITY DEVELOPMENT DISTRICT
FISCAL YEAR 2023/2024
OCTOBER 1, 2023 - SEPTEMBER 30, 2024

REVENUES	FISCAL YEAR 2021/2022 ACTUAL	FISCAL YEAR 2022/2023 BUDGET	FISCAL YEAR 2023/2024 BUDGET	COMMENTS
O&M Assessments	139,722	253,701	445,556	Expenditures Less Interest/.94
Developer Contribution - O&M	167,500	0	0	Developer Contribution - O&M
Debt Assessments	648,254	663,697	663,697	Bond Payments/.94
Interest Income	90	120	240	Interest Projected At $20 Per Month
TOTAL REVENUES	**$ 955,566**	**$ 917,518**	**$ 1,109,493**	
EXPENDITURES				
ADMINISTRATIVE EXPENDITURES				
Supervisor Fees	0	0	0	
Management	27,996	28,824	29,688	CPI Adjustment (Capped At 3%)
Legal	5,158	14,000	14,000	FY 2021/2022 Expenditure Through 2/28/23 Was $4,463
Assessment Roll	4,000	4,000	4,000	As Per Contract
Audit Fees	3,800	3,900	4,000	Accepted Amount For 2022/2023 Audit
Arbitrage Rebate Fee	650	650	650	No Change From 2022/2023 Budget
Insurance	5,706	6,100	6,700	FY 2021/2022 Expenditure Was $6,134
Legal Advertisements	3,829	3,000	3,500	$500 Increase From 2022/2023 Budget
Miscellaneous	283	1,000	950	$50 Decrease From 2022/2023 Budget
Postage	330	300	300	No Change From 2022/2023 Budget
Office Supplies	538	1,100	1,050	$50 Decrease From 2022/2023 Budget
Dues & Subscriptions	175	175	175	Annual Fee Due Department Of Economic Opportunity
Trustee Fees	4,031	4,050	4,050	No Change From 2022/2023 Budget
Continuing Disclosure Fee	1,000	1,000	1,000	No Change From 2022/2023 Budget
TOTAL ADMINISTRATIVE EXPENDITURES	**$ 57,496**	**$ 68,099**	**$ 70,063**	
MAINTENANCE EXPENDITURES				
Engineering/Inspections	22,634	15,000	29,500	FY 2022/2023 Expenditure Through 3/31/23 Was $19,975
Mitigation Monitoring	153,300	73,000	138,500	Sandhill Environmental Services Proposal
Lake Maintenance	61,805	35,000	60,000	Lake Maintenance
Flow Way Inspection Certification	0	2,500	5,000	$5,000 Expenditure Every Other Year
Vista Dry Retention Area	0	45,000	45,000	Vista Dry Retention Area
Detention Area Maintenance	0	0	36,000	Solitude Lake Management Currently Charging $2,677 Per Month
Miscellaneous Maintenance	0	0	35,000	Includes Fence, Littoral & Wells Maintenance
TOTAL MAINTENANCE EXPENDITURES	**$ 237,739**	**$ 170,500**	**$ 349,000**	
TOTAL EXPENDITURES	**295,235**	**238,599**	419,063	
REVENUES LESS EXPENDITURES	**$ 660,331**	**$ 678,919**	**$ 690,430**	
Bond Payments	(632,675)	(623,875)	(623,875)	2024 Principal & Interest Payments
BALANCE	**$ 27,656**	**$ 55,044**	**$ 66,555**	
County Appraiser & Tax Collector Fee	(524)	(18,348)	(22,185)	Two Percent Of Total Assessment Roll
Discounts For Early Payments	(18,542)	(36,696)	(44,370)	Four Percent Of Total Assessment Roll
EXCESS/ (SHORTFALL)	**$ 8,590**	**$ -**	**$ -**	

DETAILED PROPOSED DEBT SERVICE FUND BUDGET
BLUE LAKE COMMUNITY DEVELOPMENT DISTRICT
FISCAL YEAR 2023/2024
OCTOBER 1, 2023 - SEPTEMBER 30, 2024

REVENUES	FISCAL YEAR 2021/2022 ACTUAL	FISCAL YEAR 2022/2023 BUDGET	FISCAL YEAR 2023/2024 BUDGET	COMMENTS
Interest Income	35	25	100	Projected Interest For 2023/2024
NAV Tax Collection	632,675	623,875	623,875	Maximum Debt Service Collection
Total Revenues	**$ 632,710**	**$ 623,900**	**$ 623,975**	
EXPENDITURES				
Principal Payments	195,000	205,000	210,000	Principal Payment Due In 2024
Interest Payments	428,988	418,575	411,313	Interest Payment Due In 2024
Bond Redemption	0	275	2,662	Estimated Excess Debt Collections
Transfer To Construction Fund	16	50	0	Transfer To Construction Fund
Total Expenditures	**$ 624,004**	**$ 623,900**	**$ 623,975**	
Excess/ (Shortfall)	**$ 8,706**	**$ -**	**$ -**	

Series 2019 Bond Information

Original Par Amount =	$10,400,000	Annual Principal Payments Due =	June 15th
Interest Rate =	3.50% - 4.5%	Annual Interest Payments Due =	June 15th & December 15th
Issue Date =	May 2019		
Maturity Date =	June 2049		
Par Amount As Of 1/1/23 =	$9,830,000		

Blue Lake Community Development District
Assessment Comparison

	Fiscal Year 2020/2021 Assessment*	Fiscal Year 2021/2022 Assessment*	Fiscal Year 2022/2023 Assessment*	**Fiscal Year 2023/2024 Projected Assessment***
O & M Assessment For 50' Single Family Units	$ 337.66	$ 337.66	$ 599.77	$ 1,053.33
Debt Assessment For 50' Single Family Units	$ 1,330.00	$ 1,330.00	$ 1,330.00	$ 1,330.00
Total For 50' Single Family Units	**$ 1,667.66**	**$ 1,667.66**	**$ 1,929.77**	**$ 2,383.33**
O & M Assessment For 60' Single Family Units	$ 337.66	$ 337.66	$ 599.77	$ 1,053.33
Debt Assessment For 60' Single Family Units	$ 1,596.00	$ 1,596.00	$ 1,596.00	$ 1,596.00
Total For 60' Single Family Units	**$ 1,933.66**	**$ 1,933.66**	**$ 2,195.77**	**$ 2,649.33**
O & M Assessment For 75' Single Family Units	$ 337.66	$ 337.66	$ 599.77	$ 1,053.33
Debt Assessment For 75' Single Family Units	$ 1,995.00	$ 1,995.00	$ 1,995.00	$ 1,995.00
Total For 75' Single Family Units	**$ 2,332.66**	**$ 2,332.66**	**$ 2,594.77**	**$ 3,048.33**

* Assessments Include the Following :
4% Discount for Early Payments
1% County Tax Collector Fee
1% County Property Appraiser Fee

Community Information:	
50' Single Family Units	182
60' Single Family Units	148
75' Single Family Units	93
Total Units	423