



# Town of Southern Shores

5375 N. Virginia Dare Trail, Southern Shores, NC 27949

Phone 252-261-2394 / Fax 252-255-0876

[www.southernshores-nc.gov](http://www.southernshores-nc.gov)

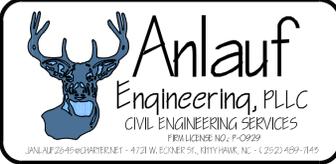
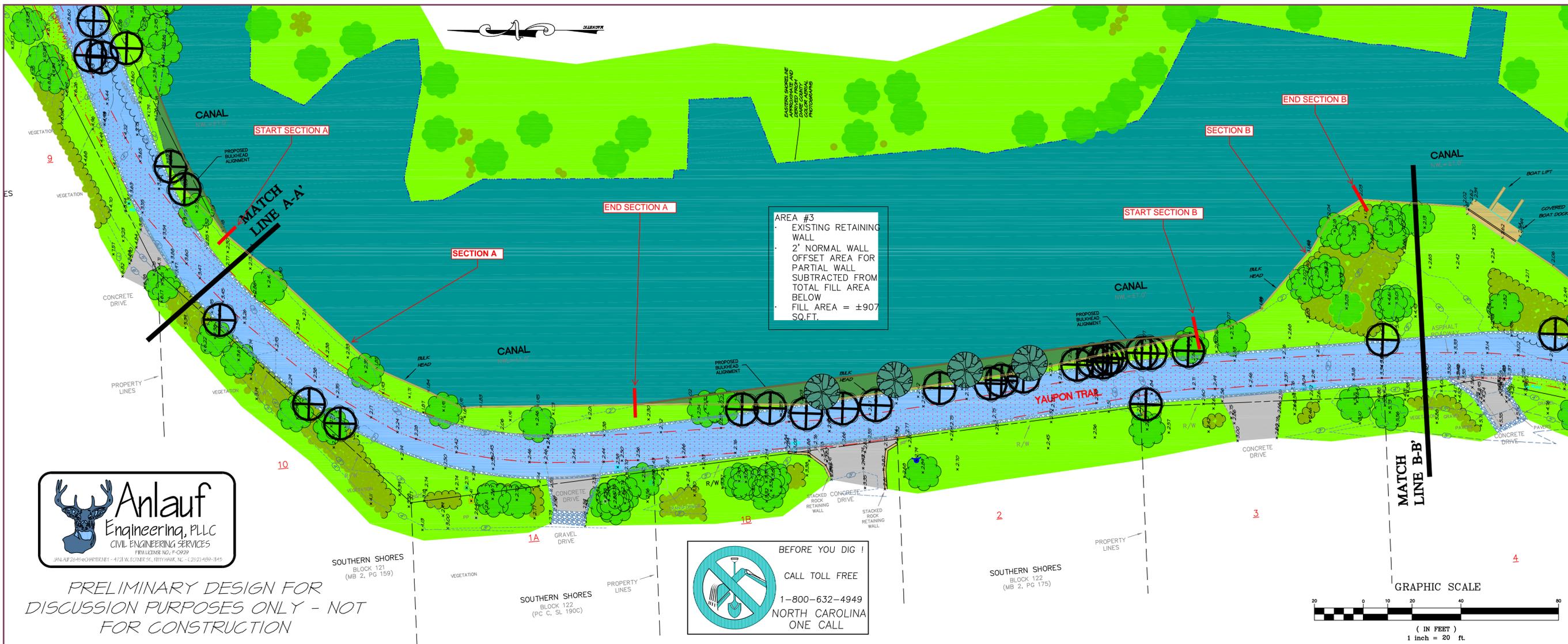
September 27, 2016

The Town of Southern Shores is seeking informal bids for the replacement of sections of Town-owned bulkhead on Whistling Swan canal adjacent to Yaupon Trail. Bidders should list lump sum pricing for each numbered item below:

1. Bulkhead replacement of Section "A" as shown on plan- lump sum amount  
\$ \_\_\_\_\_
2. Bulkhead replacement of Section "B" as shown on plan- lump sum amount  
\$ \_\_\_\_\_
3. Bulkhead replacement of Section "C" as shown on plan- lump sum amount  
\$ \_\_\_\_\_

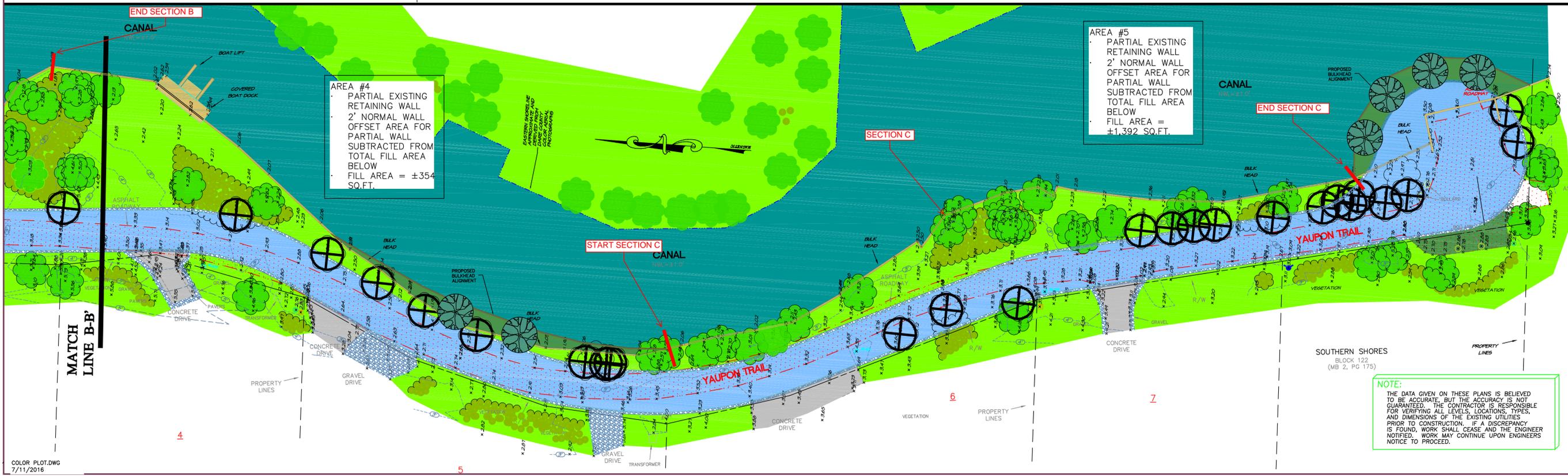
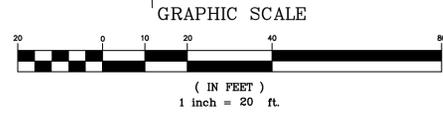
Please note that the plan included in this informal bid document displays a separate future road alignment project for Yaupon Trail, and the existing road alignment varies from this plan. A recent survey of the existing road is also included as an attachment to this informal bid document. Please refer to the attached structural report which includes an engineered design section. The Town intends to do a full replacement of the bulkhead in these areas on Yaupon Trail with **vinyl bulkhead with tiebacks**. Do not include tree removal in your pricing as the Town will handle that separately prior to bulkhead work. **Please include any fill necessary to complete the bulkhead replacement.** Bidders must include a copy of their NC Contractor's License with their bid response. Please direct all questions to the Public Works Director, Rachel Patrick, at (252) 261-2394, extension 5.

Informal bids to be submitted in writing by 3:00 p.m. on October 11, 2016 to the Public Works Director, Rachel Patrick, at the Southern Shores Town Hall, 5375 N. Virginia Dare Trail, Southern Shores, NC 27949.



PRELIMINARY DESIGN FOR DISCUSSION PURPOSES ONLY - NOT FOR CONSTRUCTION

**BEFORE YOU DIG!**  
CALL TOLL FREE  
1-800-632-4949  
NORTH CAROLINA  
ONE CALL



**NOTE:**  
THE DATA GIVEN ON THESE PLANS IS BELIEVED TO BE ACCURATE, BUT THE ACCURACY IS NOT GUARANTEED. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL LEVELS, LOCATIONS, TYPES, AND DIMENSIONS OF THE EXISTING UTILITIES PRIOR TO CONSTRUCTION. IF A DISCREPANCY IS FOUND, WORK SHALL CEASE AND THE ENGINEER NOTIFIED. WORK MAY CONTINUE UPON ENGINEERS NOTICE TO PROCEED.

DEEL ENGINEERING, PLLC  
CIVIL ENGINEERING SERVICES  
FIRM LICENSE P-1045  
P.O. BOX 3901  
WELLSVILLE, NC 27986  
Phone: (252) 207-3803 E-Mail: dcohen@deel.com

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NO.	DATE	REVISIONS

CERTIFICATION

PRELIMINARY DESIGN  
YAUAPON TRAIL  
TOWN OF SOUTHERN SHORES  
SOUTHERN SHORES DARE NORTH CAROLINA

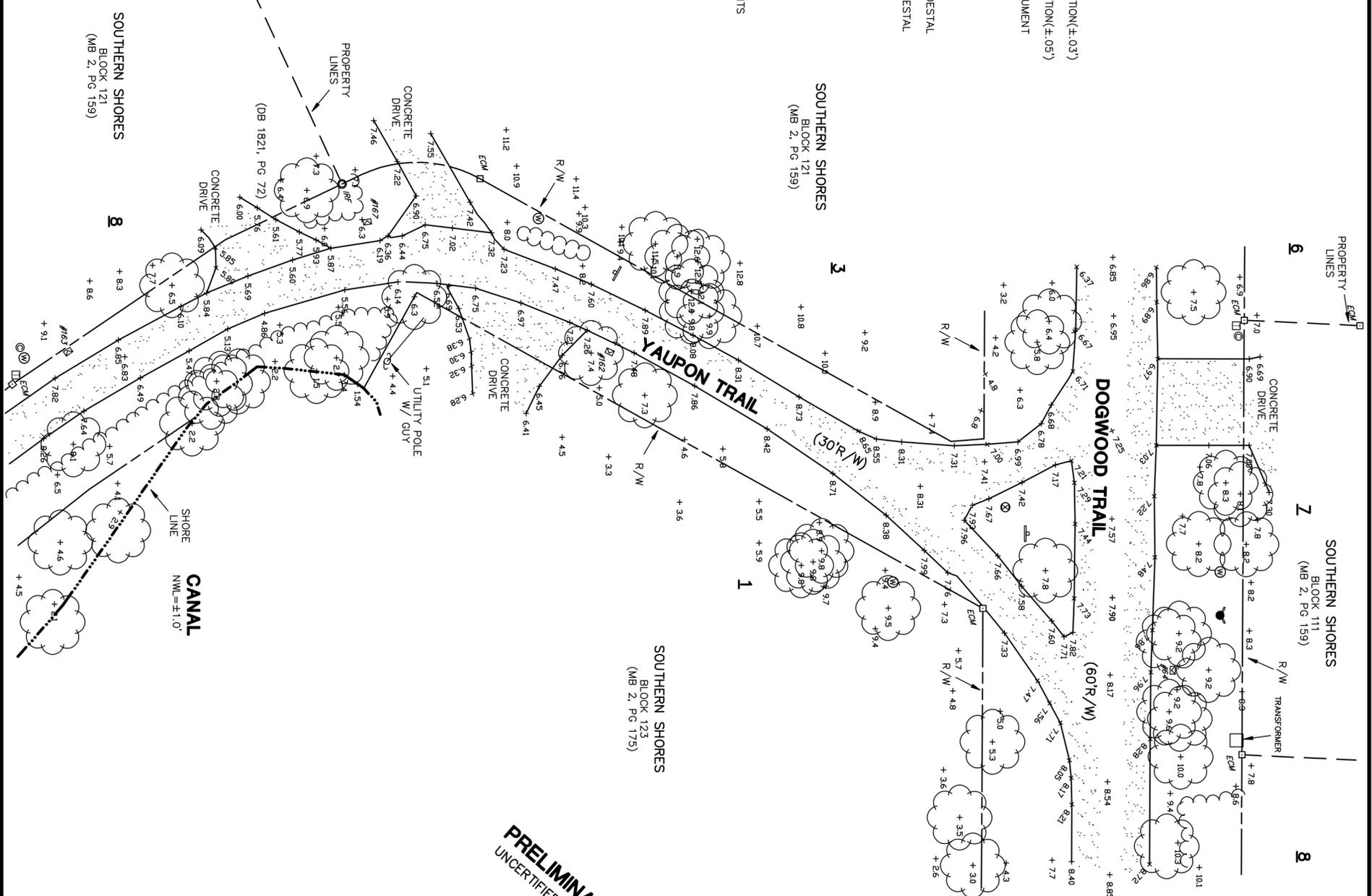
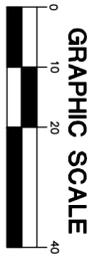
COMMISSION NO.	P16001.3
DESIGNED BY	DAD
DRAWN BY	JJA
CHECKED BY	DAD
ISSUE DATE	7/11/16
SHEET NO.	

P2  
OF 2 SHEETS

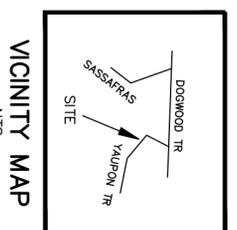


**LEGEND**

- + 1305 EXISTING ELEVATION(±.03')
- + 130 EXISTING ELEVATION(±.05')
- CONCRETE MONUMENT
- IRON ROD/PIPE
- ⊙ WATER METER
- ⊗ WATER VALVE
- TELEPHONE PEDESTAL
- ⊙ TELEVISION PEDESTAL
- ⊙ MAIL BOX
- ⊙ TRAFFIC SIGN
- ⊙ UTILITY POLE
- ⊙ LIGHT POLE
- ⊙ HYDRANT
- R/W
- VEGETATION LIMITS
- ☁ TREE



**PRELIMINARY**  
UNCERTIFIED COPY



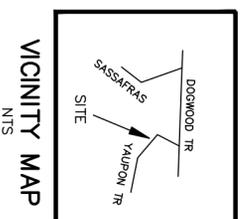
- NOTES**
- THIS MAP DEPICTS TOPOGRAPHY AND EXISTING FEATURES ON YAUPON TRAIL AND A PORTION OF DOGWOOD TRAIL. NORTH DATUM, R/W LINES AND PROPERTY LINES FROM MB 2, PG 159/MB 2, PG 175 AND PC C, SI 190C. THIS IS NOT A COMPLETE BOUNDARY SURVEY OF THE R/W OR ADJACENT PROPERTIES
  - ELEVATIONS SHOWN PER NAD 88 DATUM
  - SURVEYS OF PROPERTIES ADJACENT TO YAUPON TRAIL PROVIDED CURRENT R/W AND PROPERTY LINE INFORMATION FOR THE REFERENCED PROPERTIES:
  - LOT 3, BLK 121 (WILLIAM S. JONES, JR. PLS 8/13/98)
  - LOT 3, BLK 121 (WILLIAM S. JONES, JR. PLS 11/13/12)
  - LOT 3, BLK 122 (RICHARD OUBLE, NLS 7/17/86)
  - LOT 4, BLK 122 (M. DOUGLAS STTONS, JR. PLS 3/1/12)
  - LOT 5, BLK 122 (KIRRY R. FOREMAN, PLS 3/8/98)
  - LOT 6, BLK 122 (WILLIAM S. JONES, JR. PLS 8/8/7)
  - LOT 1, BLK 123 (WILLIAM S. JONES, JR. PLS 3/8/99)

TOPOGRAPHIC BASE MAP FOR:			
<b>THE TOWN OF SOUTHERN SHORES</b>			
<b>STREET IMPROVEMENTS</b>			
YAUPON TRAIL			
SOUTHERN SHORES	ATLANTIC TRNSP.	DARE CO.	N. CAROLINA
SCALE 1"=20'	FILE NO. 3586	CADD FILE 3586A	DATE 8/13/14
<b>B.I.V.D.</b>			
BARNETTE INTEGRATED LAND DEVELOPMENT			
POB 7159 KDH, NC 27948 (252)441-5154 F-0594			
			<b>1 OF 5</b>

SOUTHERN SHORES  
BLOCK 121  
(MB 2, PG 159)

8

CANAL  
NWL=±1.0'



**LEGEND**

- + 1305 EXISTING ELEVATION(±.03')
- + 130 EXISTING ELEVATION(±.05')
- CONCRETE MONUMENT
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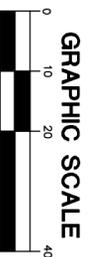
SOUTHERN SHORES  
BLOCK 121  
(MB 2, PG 159)

9

CANAL  
NWL=±1.0'

**NOTES**

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- ELEVATIONS SHOWN PER NAVD 88 DATUM
- NO OWNERSHIP OR USE IS DESIGNATED FOR THE "OPEN SPACE" ON THE SUBDIVISION PLATS, UPON WHICH IT IS DEPICTED(MB 2, PG 175 & MB 2, PG 159)



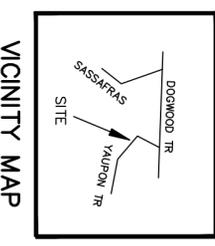
TOPOGRAPHIC BASE MAP FOR:  
**THE TOWN OF SOUTHERN SHORES  
STREET IMPROVEMENTS**

YAUPON TRAIL

SOUTHERN SHORES	ATLANTIC TRSP.	DARE CO.	N. CAROLINA
SCALE 1"=20'	FILE NO. 3586	CADD FILE 3586A	DATE 8/13/14

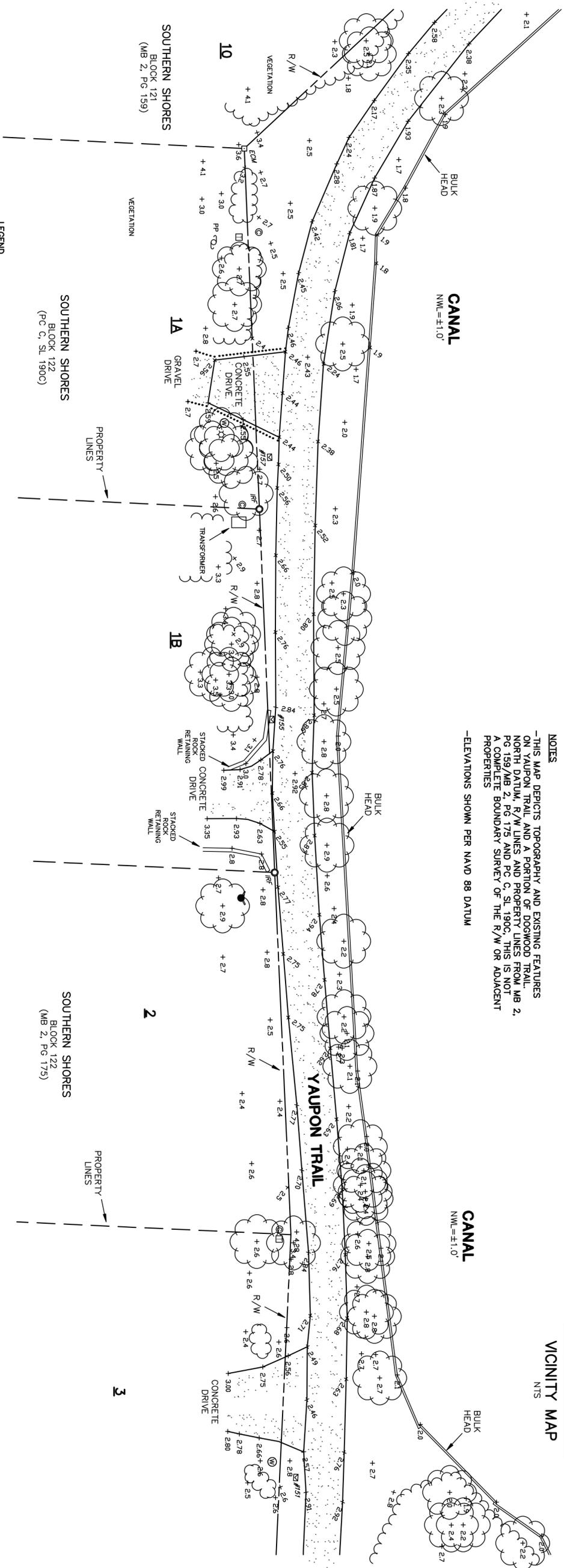
**B.I.L.D.**  
BARNETTE INTEGRATED LAND DEVELOPMENT  
POB 7159 KDH, NC 27948 (252)441-5154 F-0594

**PRELIMINARY  
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VICINITY MAP  
N.T.S.

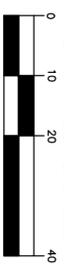
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 - ELEVATIONS SHOWN PER NAVD 88 DATUM



**LEGEND**

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- ⊗ WATER METER
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- ⊙ TELEVISION PEDESTAL
- ☐ MAIL BOX
- ⊥ TRAFFIC SIGN
- ⊥ UTILITY POLE
- ⊙ LIGHT POLE
- ⊙ HYDRANT
- R/W
- VEGETATION LIMITS
- ☁ TREE

**GRAPHIC SCALE**

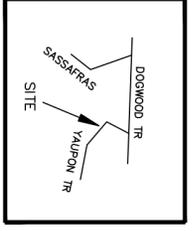


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TOPOGRAPHIC BASE MAP FOR:			
<b>THE TOWN OF SOUTHERN SHORES</b>			
<b>STREET IMPROVEMENTS</b>			
YAUPON TRAIL			
SOUTHERN SHORES	ATLANTIC TMSR.	DARE CO.	N. CAROLINA
SCALE 1"=20'	FILE NO. 3586	CADD FILE 3586A	DATE 8/13/14

**B. I. L. D.**  
 BARNETTE INTEGRATED LAND DEVELOPMENT  
 POB 7159 KDH, NC 27948 (252)441-5154 F-0594

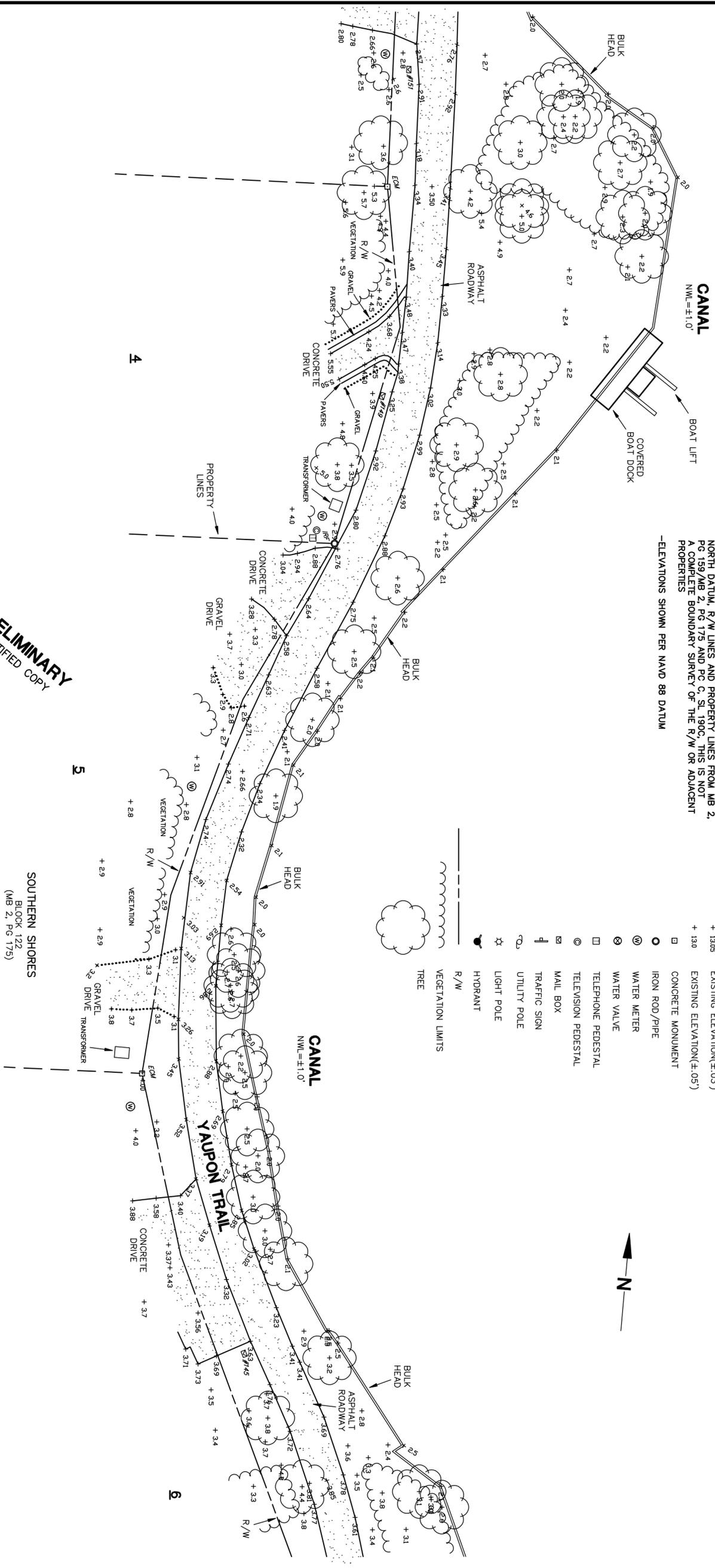
**3 OF 5**



VICINITY MAP  
NTS

**NOTES**  
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 - ELEVATIONS SHOWN PER NAVD 88 DATUM

- LEGEND**
- + 13.05 EXISTING ELEVATION(±.05')
  - + 13.0 EXISTING ELEVATION(±.05')
  - ▣ CONCRETE MONUMENT
  - IRON ROD/PIPE
  - ⊙ WATER METER
  - ⊗ WATER VALVE
  - TELEPHONE PEDESTAL
  - ⊕ TELEVISION PEDESTAL
  - ⊞ MAIL BOX
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  - VEGETATION LIMITS
  - ☁ TREE



**PRELIMINARY**  
 UNCERTIFIED COPY



TOPOGRAPHIC BASE MAP FOR:			
<b>THE TOWN OF SOUTHERN SHORES</b>			
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SOUTHERN SHORES	ATLANTIC TRNSP.	DARE CO.	N. CAROLINA
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<b>B. I. L. D.</b>			
BARNETTE INTEGRATED LAND DEVELOPMENT			
POB 7159 KDH, NC 27948 (252)441-5154 F-0594			
			<b>4 OF 5</b>



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# YAUPON TRAIL BULKHEAD STRUCTURAL REPORT

September 22, 2016

Rachel Patrick  
Public Works Director  
Town of Southern Shores  
5375 N. Virginia Dare Trail  
Southern Shores, NC 27949  
252-261-2394



## ***Introduction:***

This report has been prepared for Rachel Patrick and the Town of Southern Shores to address the condition of the Town's bulkhead adjacent to Yaupon Trail in Southern Shores, NC

## ***Observations:***

### **Trees**

There are numerous trees, tree stumps and tree roots adjacent to the bulkhead as shown in the photos below. The tree roots have likely contributed to the current leaning condition of the bulkhead in several locations. Several of these trees have been recently removed.



Some of the existing 6x6 pilings are currently leaning away from the backfill toward the water at about a 15 degree angle.



Horizontal members consist, for the most part, of (3)-4x6's, one at the top of the pilings, one in the middle and one at the bottom/sand/water elevation on the water side spanning between the 6x6 pilings which are spaced at approximately 7'-6" oc.



Two layers of 1x8 sheathing span vertically between the 4x6's and hold back the retained sand.



At least one area of the bulkhead has suffered a “blowout” where the 1x8 sheathing has been compromised and the retained sand has eroded into the canal during rain events. It appears some of the 1x8 sheathing members have been replaced and the “blowout” holes patched.



Water depth along the bulkhead ranges from two to three feet while the retained sand height ranges from four to five feet.



Most if not all of the pilings have steel tiebacks at the top which are severely corroded, some of which appear to have been replaced.



Some of the horizontal members are (2)-2x6's as opposed to (1)-4x6.



While many of the trees adjacent to the existing bulkhead and perhaps more importantly, adjacent to the existing road, have been removed, a few still remain. These should be removed because their roots will only complicate the new bulkhead installation, weaken it over time and shorten the bulkheads useful life.



## ***Recommendations:***

Many of the pilings, walers, sheathing and tieback rods are in extremely poor condition. The size and condition of the buried tieback anchors, the wood members the tieback rods attach to, is unknown. Significant excavation would be required to determine their size and condition. Replacement of the entire bulkhead or at least the portions in the worst condition is recommended. Should portions of the bulkhead or the entire bulkhead be replaced the current design should be modified as described:

1. 2.50 CCA treated 8" diameter pilings instead of 6" square pilings to better protect piling heartwood against shipworm and for better and more complete treatment penetration.
2. 6' on center piling spacing instead of the current 7'-6" spacing.
3. 12' minimum piling embedment depth below canal sand, current embedment depth unknown.

4. 3/4" diameter epoxy coated tieback anchors with sacrificial zinc anodes, current tieback anchor size unknown.
5. The greater the tieback distance the more effective the tieback as it will engage more sand to help resist pile sliding and rotation. 8' tieback distance with 8x8x8' long verticals and 6x6x4' horizontals. All trees and tree roots interfering or in close proximity with the bulkheads should be removed in order to better protect the structural integrity and longevity of the bulkhead and its structural components.
6. 3/4" diameter tieback rods shall tie into horizontal and vertical members buried a minimum of 2' deep.
7. Tieback rods shall be angled downward at 15-20 degrees from the horizontal and epoxy coated for corrosion protection.
8. All wood shall be pressure treated Southern Pine or equal. All metals shall be hot dipped galvanized.



8" diameter pilings with vinyl sheets and top whaler with architectural boardwalk finish-boardwalk finish not part of this project.

## *Aesthetics*

The use of vinyl sheet piles is recommended but could be an issue from an aesthetic perspective given the history of all wood bulkheads in the Southern Shores area. However, the benefit of vinyl sheet piles in terms of longevity should be a significant factor in determining whether or not to use vinyl instead of wood.

## *Limitations*

All costs are estimated and based on current market conditions and local contractors at the time of this report. Costs are subject to change over time as market conditions change. The costs are intended as an estimate to be used for budgeting purposes but are subject to change. There may be additional, unforeseen costs associated with the project. No wind or seismic calculations have been completed for this report. Any opinions expressed in this report are based upon the site observations, engineering judgment and experience. Professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineers practicing in the structural engineering field in this or similar localities at this time. No other warranty, expressed or implied, is made as to the professional advice included in this report. Estimated repair costs have not been provided in this report.

This report has been prepared for Rachel Patrick and The Town of Southern Shores to be used solely in their evaluation of the subject facility areas and may not contain sufficient information for purposes of other parties or other uses. There may be additional other substantial deficiencies not visible from the facility visit. Recognition that this document may not capture all the potential structural vulnerabilities at this time should be acknowledged by the reader and factored accordingly into the decision making process. The report has not been prepared for use by other parties and may not contain sufficient information for purposes of other parties or other uses.

Please don't hesitate to contact me if you have any further questions, comments and/or concerns.

Sincerely,

*Barrett C. Crook*

Barrett C. Crook, PE, LEED AP

Kitty Hawk Engineering, PLLC

2036 Creek Rd

Kitty Hawk, NC 27949

252-655-1056

[barrettcrook@kittyhawkengineering.com](mailto:barrettcrook@kittyhawkengineering.com)

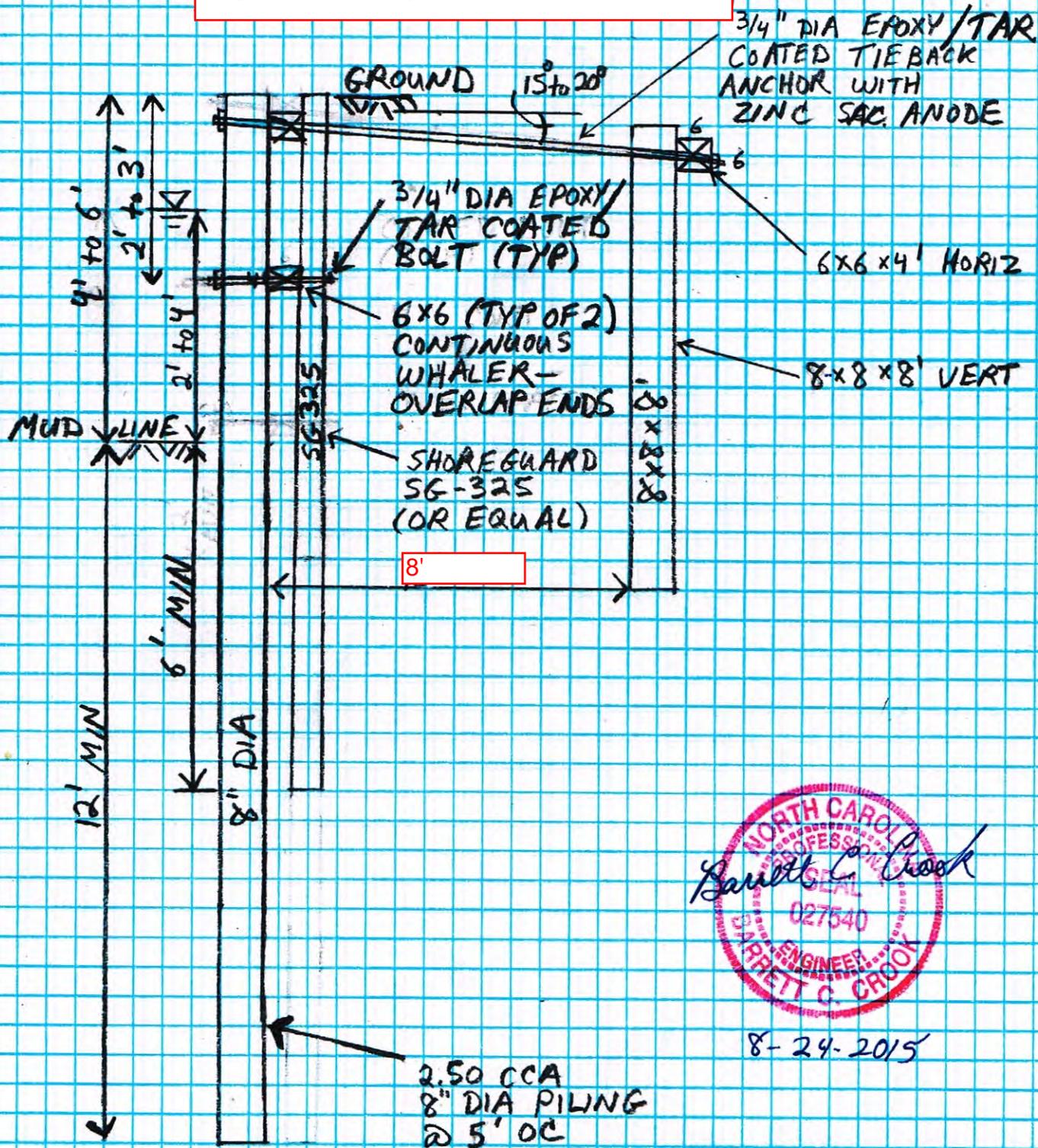
[www.kittyhawkengineering.com](http://www.kittyhawkengineering.com)

NC License P-1281



9-22-2016

**YAUPON TRAIL BULKHEAD**



*David C. Crook*  
 NORTH CAROLINA PROFESSIONAL ENGINEER  
 027540  
 DAVID C. CROOK

8-24-2015

- NOTES:
- 1) ALL WOOD SHALL BE PRESSURE TREATED SOUTHERN PINE (OR EQUAL) UNDO
  - 2) ALL METALS SHALL BE HOT DIPPED GALVANIZED
  - 3) NON-TRAFFIC-RATED BULKHEAD - ROAD DISTANCE GREATER THAN 10' HORIZONTAL AWAY FROM BULKHEAD