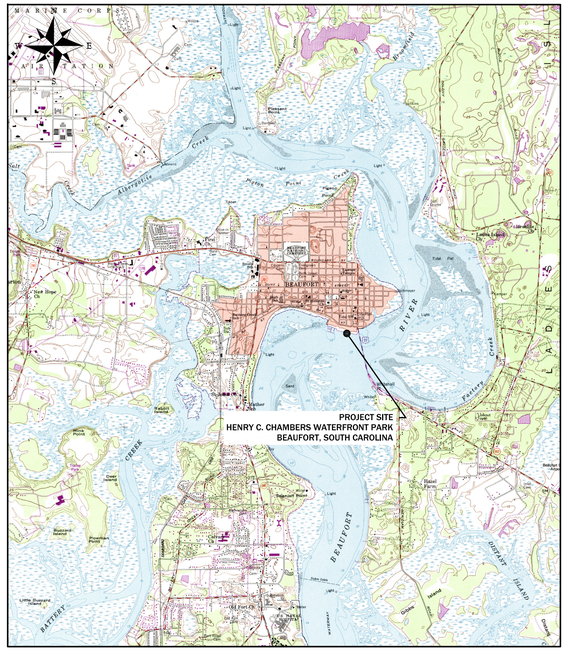
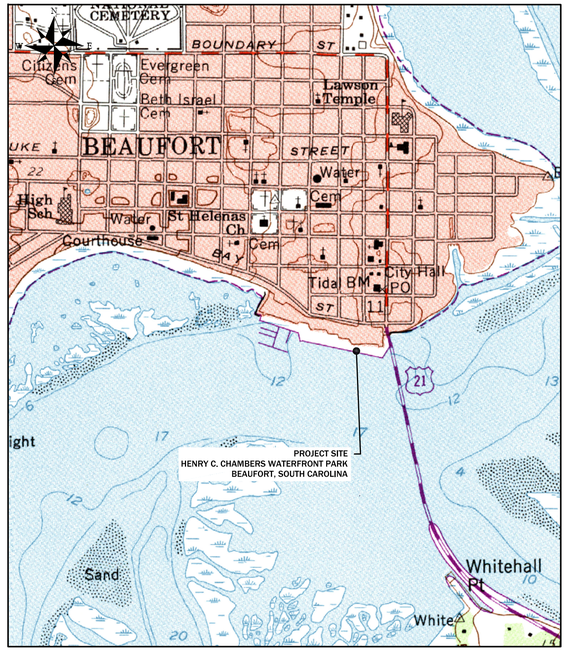
# CITY OF BEAUFORT
# 2019 RELIEVING PLATFORM PILE ENCAPSULATION AT HENRY C. CHAMBERS WATERFRONT PARK




**PROJECT VICINITY**
**SCALE: N.T.S.**




**PROJECT LOCATION**
**SCALE: N.T.S.**

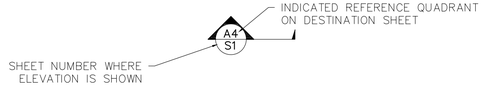
## PROJECT SUMMARY

THE PROJECT CONSISTS OF PILE ENCAPSULATION OF THE PRESTRESSED CONCRETE PILING SUPPORTING THE RELIEVING PLATFORM AT HENRY C. CHAMBERS WATERFRONT PARK FOR THE CITY OF BEAUFORT, SOUTH CAROLINA. 33 PILES ARE INDICATED FOR REPAIR. THE DESIGN FOR PILE ENCAPSULATION FOR THIS PROJECT CONSISTS OF SQUARE FRP JACKETS WITH MARINE EPOXY GROUT. TWO PILES ARE TO BE JACKETED WITH 20" FRP JACKETS AND SUPPLEMENTAL STEEL REINFORCEMENT.

CONTRACTORS SHALL SUBMIT LUMP SUM PRICING TO COMPLETE THE WORK. IN ADDITION TO PROVIDING A LUMP SUM COST TO PERFORM THE WORK, CONTRACTOR SHALL ALSO SUBMIT A UNIT PRICE (IN LINEAR FEET) FOR PILE ENCAPSULATION. ANY CHANGES IN SCOPE (ADDITIONS OR DEDUCTIONS) WILL BE BASED ON THE PROVIDED UNIT PRICING.

CONTRACTORS ARE ENCOURAGED TO VISIT THE SITE AND ARE ADVISED THAT ACCESS IS LIMITED DUE TO THE LOW CLEARANCE (FREEBOARD) OF THE RELIEVING PLATFORM. PROSPECTIVE CONTRACTORS ARE ALLOWED TO DIVE THE SITE, AT THEIR OWN COST, PRIOR TO THE BID PROVIDED ARRANGEMENTS ARE MADE WITH THE CITY OF BEAUFORT.

## ELEVATION, SECTION OR DETAIL SYMBOLS

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RELIEVING PLATFORM PILE ENCAPSULATION
HENRY C. CHAMBERS WATERFRONT PARK
CITY OF BEAUFORT, SOUTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL No. 25057 WILLIAM D. BASH 4/22/19

| | |
|---|---|
| DESIGNED BY: | WDB |
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**T1**
TITLE AND LOCATION


**SITE PLAN**
**SCALE: 1 : 50**

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HENRY C. CHAMBERS WATERFRONT PARK
CITY OF BEAUFORT, SOUTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL No. 25067 WILLIAM D. BARKA 4/22/19

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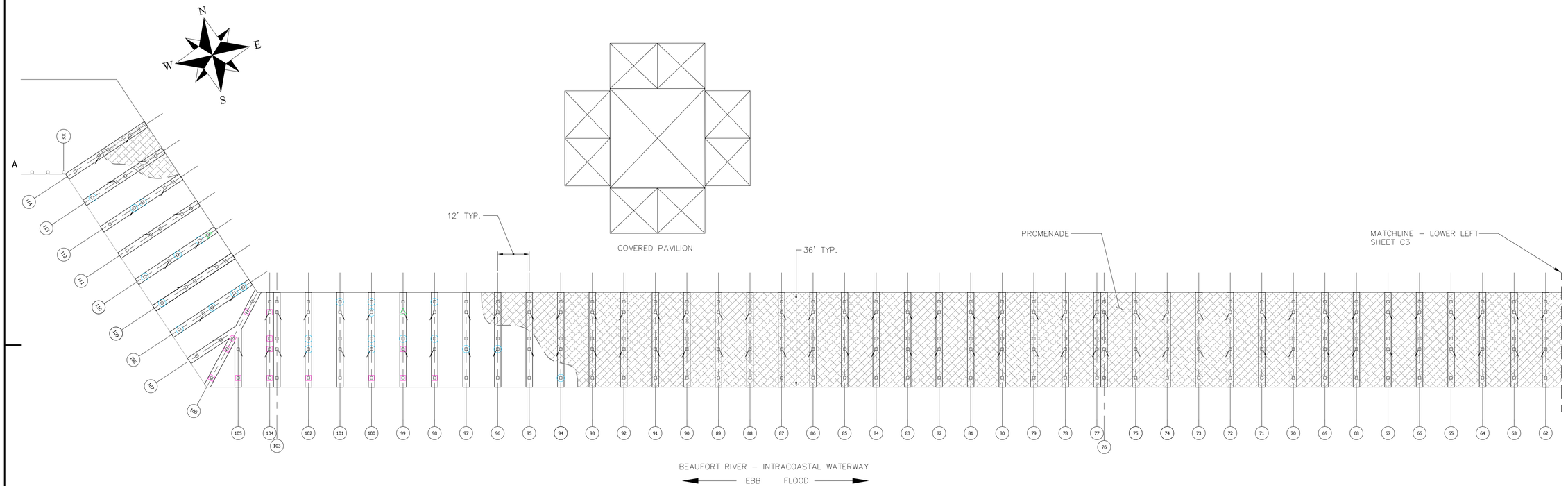
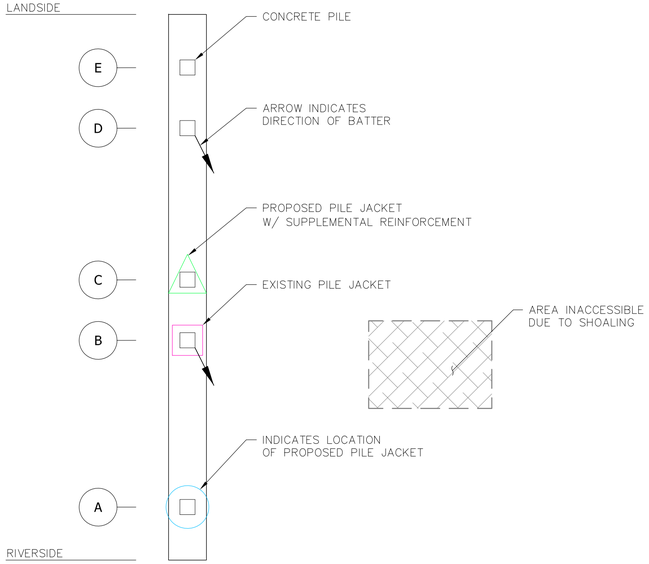
**C1**
SITE PLAN




## PILE PLAN 1
**SCALE: 1 : 20**




## TYPICAL BENT LAYOUT
**SCALE: 1 : 5**

| BENT | PILE | JACKET LENGTH (FT) |
|---|---|---|
| 31 | A | 13 |
| 34 | A | 12 |
| 35 | A | 12 |
| 37 | A | 11 |
| 38 | A | 9 |
| 41 | A | 9 |
| 42 | A | 7 |
| 94 | A | 8 |
| 96 | B | 8 |
| 97 | B | 8 |
| 98 | C | 8 |

| BENT | PILE | JACKET LENGTH (FT) |
|---|---|---|
| 98 | E | 7 |
| 99 | C | 10 |
| 99 | D | 7 |
| 100 | B | 15 |
| 100 | C | 13 |
| 100 | D | 8 |
| 100 | E | 8 |
| 101 | E | 9 |
| 102 | B | 19 |
| 102 | C | 17 |
| 108 | A | 18 |

| BENT | PILE | JACKET LENGTH (FT) |
|---|---|---|
| 108 | C | 20 |
| 108 | D | 19 |
| 108 | E | 17 |
| 109 | A | 17 |
| 110 | A | 15 |
| 110 | C | 15 |
| 110 | D | 16 |
| 110 | E | 12 |
| 112 | B | 13 |
| 112 | C | 11 |
| 113 | A | 9 |

400 TOTAL LF

## PILE REPAIR SCHEDULE
**SCALE: NTS**

***NOTE***
PILES 99D AND 110E REQUIRE ADDITIONAL REINFORCEMENT. SEE DETAIL ON SHEET S2.

NOTE:

LENGTHS PROVIDED IN TABLE WERE OBTAINED DURING DIVE FROM 3/25/19 – 3/26/19 AND ARE APPROXIMATE LENGTHS FROM THE BOTTOM OF THE PILE CAP TO 1 FT BELOW THE MUDLINE. CONTRACTOR SHALL FIELD VERIFY PRIOR TO INSTALLATION.

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HENRY C. CHAMBERS WATERFRONT PARK
CITY OF BEAUFORT, SOUTH CAROLINA


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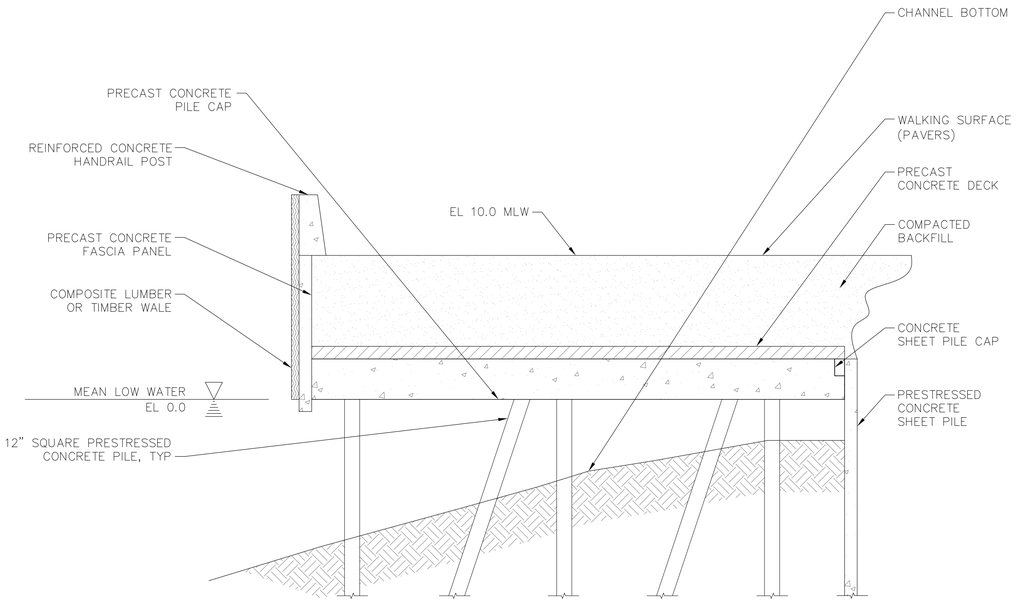
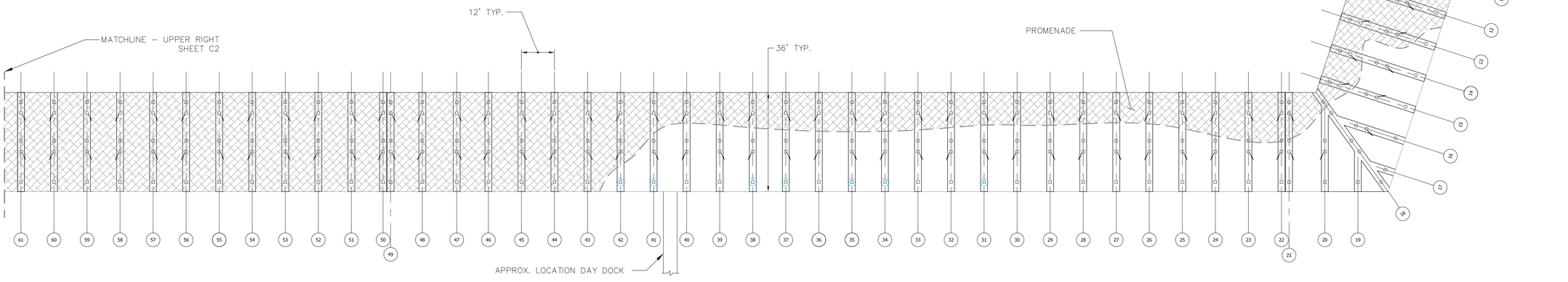
**C2**
PILE LAYOUT 1




## TYPICAL CROSS SECTION OF RELIEVING PLATFORM

**SCALE: 1:5**




## PILE PLAN 2

**SCALE: 1 : 20**

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CITY OF BEAUFORT, SOUTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL No. 25067 WILLIAM D. BARR 4/22/19

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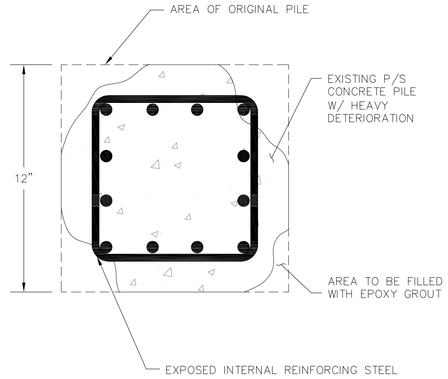
**C3**

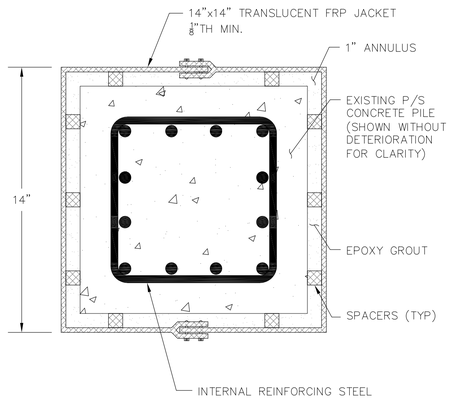
PILE LAYOUT 2




## TYP DETERIORATED PILE CROSS SECTION

A1/S1

**SCALE: 1:4**




## 14" PILE JACKET CROSS SECTION

B1/S1

**SCALE: 1:4**

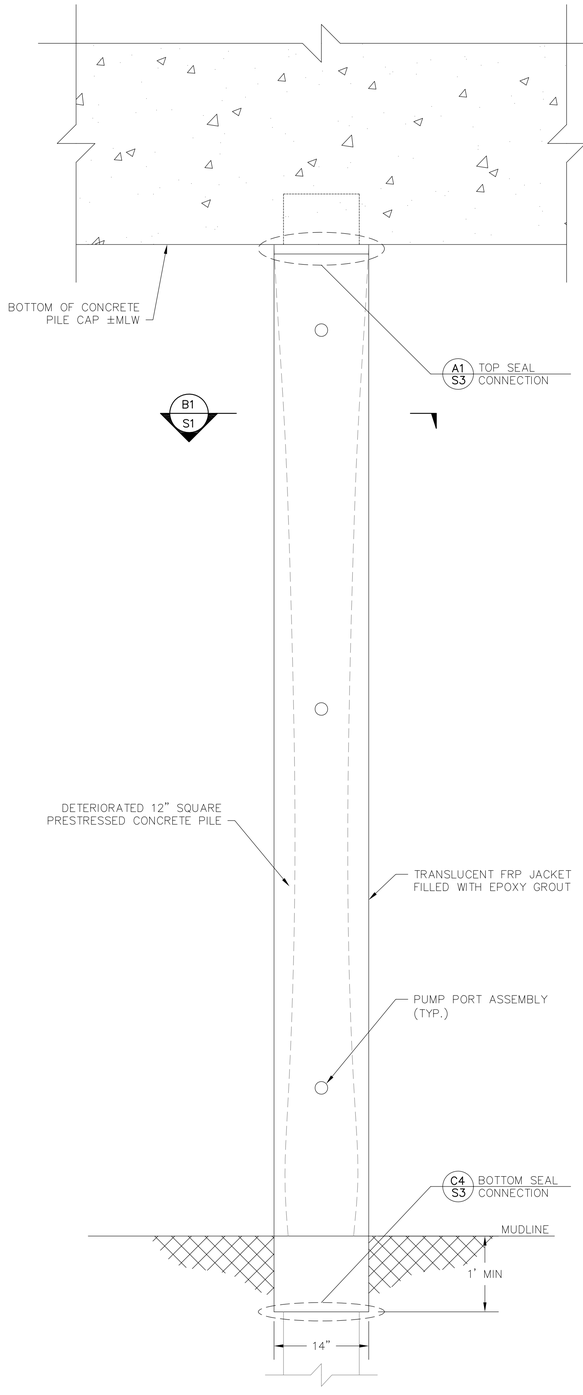
## MATERIALS NOTES:

THE FRP PILE JACKETS MUST MEET OR EXCEED THE FOLLOWING PROPERTIES:

| | |
|---|---|
| FLEXURAL STRENGTH, ASTM D 790 | 34,000 PSI |
| FLEXURAL MODULUS, ASTM D 790 | 1,000,000 PSI |
| ULTIMATE TENSILE STRENGTH, ASTM D 638 | 20,000 PSI |

THE EPOXY GROUT MUST MEET OR EXCEED THE FOLLOWING PROPERTIES:

| | |
|---|---|
| COMPRESSIVE STRENGTH, ASTM C 579 B | |
| 1 DAY | 2,000 PSI |
| 7 DAYS | 8,500 PSI |
| 28 DAYS | 9,500 PSI |
| TENSILE STRENGTH, ASTM C 307 | |
| 7 DAYS | 2,000 PSI |
| BOND TO CONCRETE, ASTM C 882 | |
| 7 DAYS | 2,200 PSI |
| FLEXURAL STRENGTH, ASTM C 580 | 3,000 PSI |
| BOND STRENGTH TO STEEL, ASTM C 882 | 2,000 PSI |




## TYPICAL PILE JACKET ELEVATION

**SCALE: 1:1**

## PILE JACKET GENERAL NOTES:

1. ALL MATERIALS SHALL MEET THE PROJECT SPECIFICATIONS.
2. SEE SHEETS C2 AND C3 FOR NEW PILE JACKET LOCATIONS WHERE PILE JACKETS ARE TO BE INSTALLED.
3. ALL PILE JACKETS ARE TO CONSTRUCTED OF FIBER REINFORCED POLYMER (FRP) AND BE TRANSLUCENT.
4. THE JACKET SHALL BE A MINIMUM OF 1/8 INCH IN THICKNESS. PROVIDE ADDITIONAL JACKET THICKNESS FOR FLUID PRESSURES AS REQUIRED BY THE MANUFACTURER.
5. THE JACKET SEAM SHALL BE DESIGNED SUCH THAT A POSITIVE CONNECTION BETWEEN TWO HALVES OF THE JACKET IS MAINTAINED DURING CONSTRUCTION.
6. EACH PILE JACKET MUST HAVE A PROVISION FOR INSTALLING A BOTTOM SEAL.
7. PATTERNS OF STANDOFFS TO MAINTAIN THE ANNULUS BETWEEN THE EXISTING PILE AND JACKET SHALL BE DUPLICATED AT INTERVALS NOT TO EXCEED 18 INCHES ALONG THE ENTIRE LENGTH OF EACH JACKET. THE HORIZONTAL SPACING BETWEEN STANDOFFS SHALL NOT EXCEED 6 INCHES. WHERE VOIDS IN THE PILE EXIST DUE TO CONCRETE REMOVAL, SUPPLEMENTARY STANDOFFS MAY BE REQUIRED.
8. TEMPORARY BRACING OR STRONG-BACKS SHALL BE PLACED OVER EACH RING OF STAND-OFFS. DESIGN BRACING FOR ANTICIPATED FLUID PRESSURES AND LOADS ANTICIPATED DURING CONSTRUCTION OF THE JACKET.
9. TEMPORARY BRACING/SHORING SHALL BE PLACED BELOW EACH PILE JACKET TO SUPPORT IT UNTIL THE EPOXY GROUT FILL HAS CURED. ALL ELEMENTS OF THE TEMPORARY SHORING ARE REQUIRED TO BE REMOVED FOLLOWING PILE JACKET CONSTRUCTION.
10. ALL SHORING, BRACING, OR STRONGBACKS SHALL BE DESIGNED BY THE CONTRACTOR AND BE CAPABLE OF FULLY SUPPORTING CONSTRUCTION LOADS WITHOUT CAUSING DISTORTION TO THE PILE JACKET.

## GENERAL NOTES:

1. ALL EXISTING DIMENSIONS, ELEVATIONS AND CONDITIONS RELATING TO THE WORK SHALL BE FIELD VERIFIED BY THE CONTRACTOR AND OWNER. ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE ORDERING MATERIALS AND STARTING THE WORK.
2. THE SIZE AND LOCATION OF ALL EXISTING UTILITIES IMPACTED BY THE WORK SHALL BE FIELD VERIFIED AND PROTECTED BY THE OWNER/CONTRACTOR.
3. IT IS THE CONTRACTOR'S/OWNER'S RESPONSIBILITY TO DETERMINE ERECTION PROCEDURES AND SEQUENCE TO ENSURE MAXIMUM SAFETY. THE CONTRACTOR IS RESPONSIBLE TO ERECT, MAINTAIN AND REMOVE TEMPORARY SHORING TO COMPLETE THE WORK. ALL PROPOSED STAGING AREAS SHALL BE COORDINATED WITH THE OWNER BEFORE STARTING THE WORK.
4. THE CONTRACTOR/OWNER SHALL FOLLOW ALL APPLICABLE FEDERAL, STATE, AND MUNICIPAL REGULATIONS DURING THE COURSE OF THE PROJECT.

## PILE REPAIR AND ENCAPSULATION NOTES:

THE STEPS LISTED BELOW ARE FOR REFERENCE AND DO NOT OVERRIDE THE JACKET OR EPOXY GROUT MANUFACTURER'S WRITTEN INSTRUCTIONS.

STEP 1

A. THE CONTRACTOR SHALL USE CONTAINMENT/CATCHMENT DEVICES TO PREVENT CONCRETE CHIPS, DEBRIS, ETC. FROM FALLING INTO THE WATER DURING THE PREPARATION/REPAIR WORK. CONTAINMENT/CATCHMENT DEVICES SHALL BE APPROVED BY THE OWNER PRIOR TO BEGINNING WORK. SEE THE SPECIFICATIONS FOR ADDITIONAL INFORMATION REGARDING SUBMITTALS.

B. CONCRETE SURFACES TO BE REPAIRED SHALL BE THOROUGHLY CLEANED BY REMOVING ANY MARINE GROWTH, LOOSE PARTICLES, AND DUST.

C. THE AREAS TO BE REPAIRED SHALL HAVE ALL LOOSE, UNSOUND CONCRETE REMOVED COMPLETELY BY THE USE OF CHIPPING HAMMERS OR HYDRO-DEMOLITION EQUIPMENT.

D. THE CONCRETE REMOVAL SHALL EXTEND ALONG THE REINFORCEMENT BAR(S) AND STRAND(S) UNTIL THE REINFORCEMENT IS FREE OF BOND INHIBITING CORROSION.

STEP 2

THE OWNER SHALL HAVE THE OPPORTUNITY TO VERIFY AND PHOTO DOCUMENT THE LEVEL OF DETERIORATION OF EACH PILE AFTER REMOVAL OF THE UNSOUND CONCRETE AND PRIOR TO THE JACKET INSTALLATION.

STEP 3

INSTALL ENCAPSULATION JACKET AROUND THE PILE, VERIFY PROPER FIT, AND SEAL THE LONGITUDINAL SEAMS. CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING AND MAINTAINING THE JACKET IN THE PROPER LOCATION DURING GROUT INSTALLATION AND CURING. ANY DAMAGE CAUSED BY FAILURE TO SECURE THE JACKET IN PLACE SHALL BE REPAIRED TO THE SATISFACTION OF THE OWNER AT THE CONTRACTOR'S EXPENSE.

STEP 4

INSTALL BOTTOM SEAL GASKET AND SECURE WITH EPOXY PASTE. ALLOW BOTTOM SEAL TO CURE AS RECOMMENDED BY THE MANUFACTURER. THIS STEP MAY NEED TO TAKE PLACE PRIOR TO STEP 3 DEPENDING ON THE TEMPORARY SHORING USED TO CONSTRUCT THE JACKETS.

STEP 5

ATTACH THE GROUT UMBILICAL TO THE BOTTOM-MOST INJECTION PORT/GROUT VALVE AND PUMP EPOXY GROUT FOR 30 SECONDS. STOP PUMPING GROUT AND CHECK JACKET FOR LEAKS. PLUG ALL UPPER INJECTION PORTS/GROUT VALVES AND RESUME PUMPING THE EPOXY GROUT UNTIL IT REACHES THE TOP OF JACKET. THE UPPER INJECTION PORTS/GROUT VALVES SHALL ONLY BE USED IF PUMPING FROM THE LOWER PORTS BECOMES DIFFICULT, AS DIRECTED BY THE OWNER. "TOPPING OFF" OF THE JACKET EPOXY GROUT IS ALLOWED FOLLOWING INITIAL EPOXY GROUT CURING AND SET.

STEP 6

CONSTRUCT THE PILE TOP SEAL USING TYPE 1 OR TYPE 2 DETAILS SHOWN ON SHEET S3.

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# RELIEVING PLATFORM PILE ENCAPSULATION

HENRY C. CHAMBERS WATERFRONT PARK

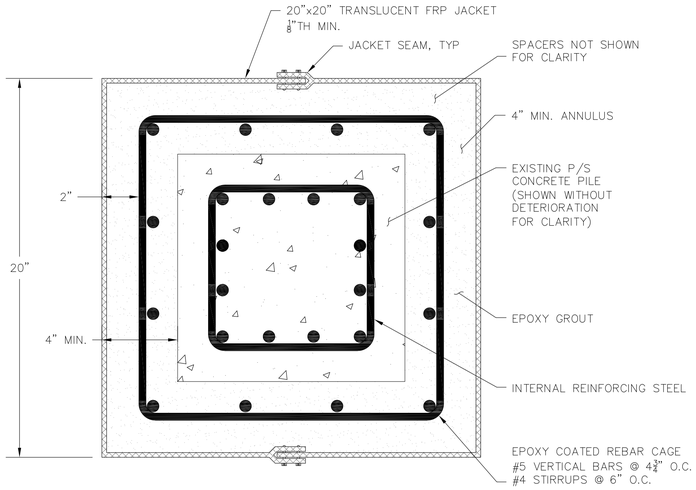
CITY OF BEAUFORT, SOUTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL No. 25047 WILLIAM D. BARRA 4/22/19

| | |
|---|---|
| DESIGNED BY: | WDB |
| DRAWN BY: | JTP |
| CHECKED BY: | DBM |
| DATE: | 4/22/19 |
| REV: | DATE: |

**S1**

PILE REPAIR 1



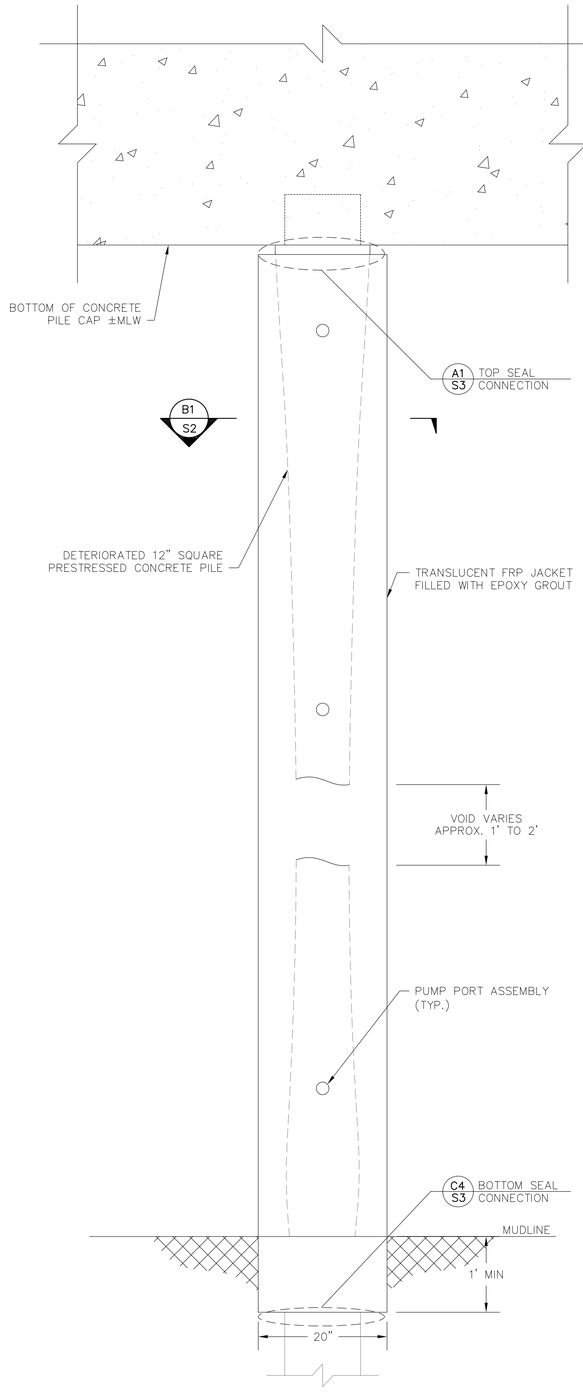

B1 S2

## 20" PILE JACKET CROSS SECTION W/ SUPPLEMENTAL REINFORCEMENT

**SCALE: 1:4**

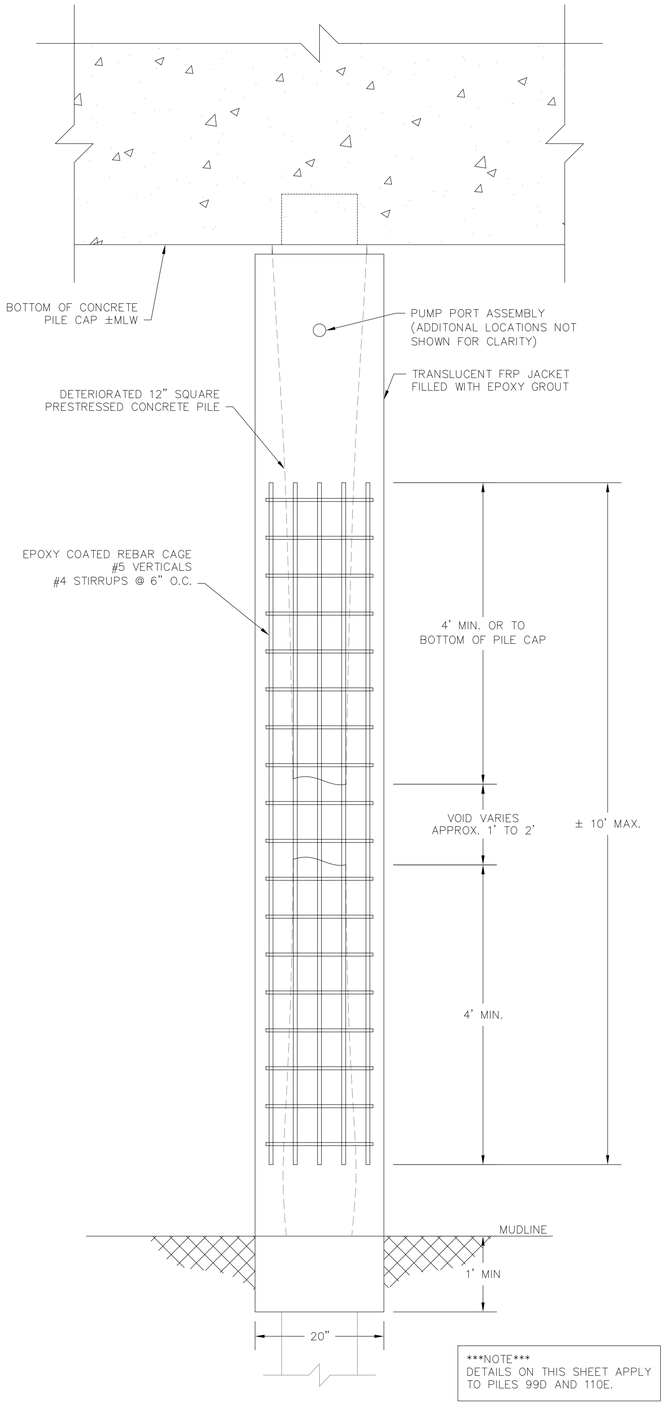
## REINFORCEMENT NOTES:

1. REINFORCING STEEL SHALL BE #5 BARS AND #4 STIRRUPS, PLACED IN THE LOCATIONS SHOWN ON THESE PLANS.
2. REINFORCING BARS ARE TO BE PLACED AT A MIN. DEPTH OF 2" COVER FROM THE NEAREST FACE OF THE FRP PILE JACKET.
3. REINFORCING STEEL SHALL BE DEFORMED BILLET STEEL CONFORMING TO ASTM DESIGNATION A934, GRADE 60, AND SHALL BE EPOXY-COATED.
4. ALL REINFORCING STEEL INTERSECTIONS AND LAPS (IF NECESSARY) SHALL BE WIRED TOGETHER AND INSTALLED IN ACCORDANCE WITH THE GUIDELINES ESTABLISHED IN THE MANUAL OF STANDARD PRACTICE – CONCRETE REINFORCING STEEL INSTITUTE, LATEST EDITION.




## TYPICAL PILE JACKET ELEVATION

**SCALE: 1:1**




***NOTE***
DETAILS ON THIS SHEET APPLY TO PILES 99D AND 110E.

## TYPICAL PILE JACKET W/ REBAR CAGE ELEVATION

**SCALE: 1:1**

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CITY OF BEAUFORT, SOUTH CAROLINA

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 25047 4/22/19 WILLIAM D. BARRA

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|---|---|
| DESIGNED BY: | WDB |
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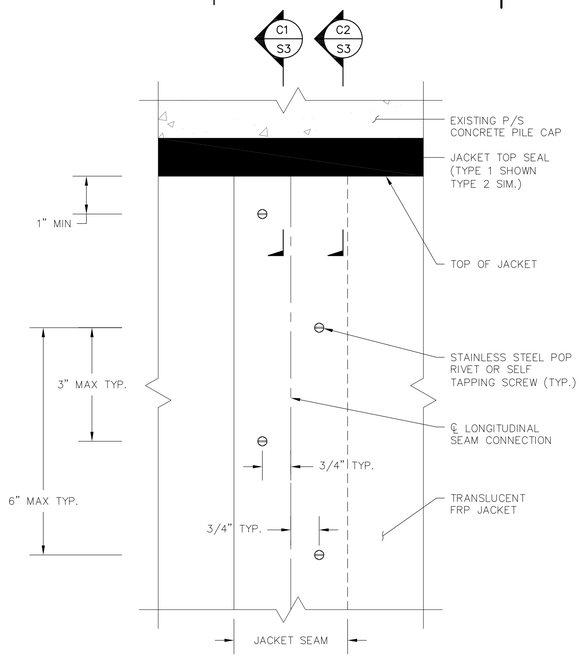
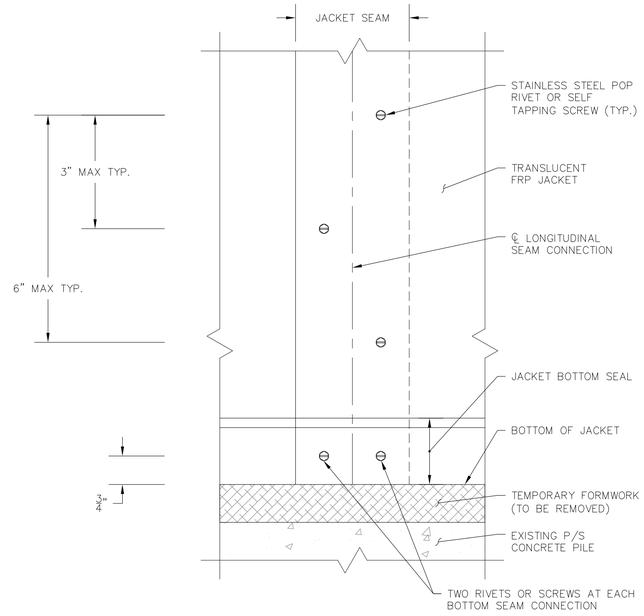
**S2**

PILE REPAIR 2



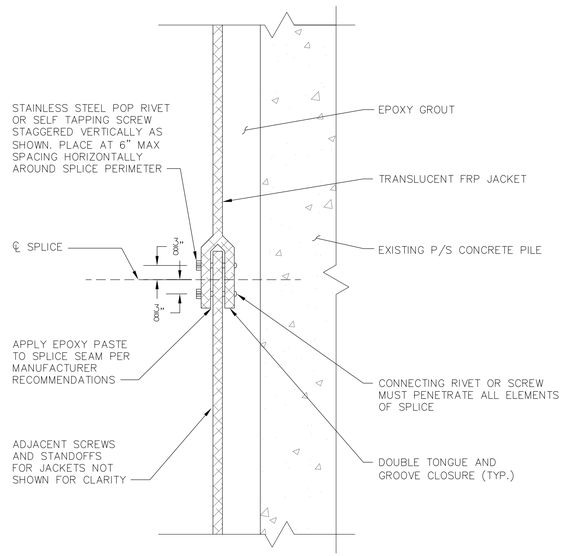

A1 S3 **DETAIL - JACKET TOP SEAL CONNECTION**

**SCALE: NTS**



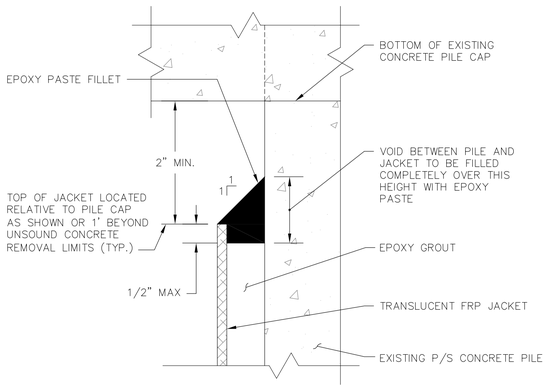

A2 S3 **DETAIL - JACKET BOTTOM SEAM CONNECTION**

**SCALE: NTS**




A4 S3 **DETAIL - JACKET MID SEAM CONNECTION (WHERE REQUIRED)**

**SCALE: NTS**

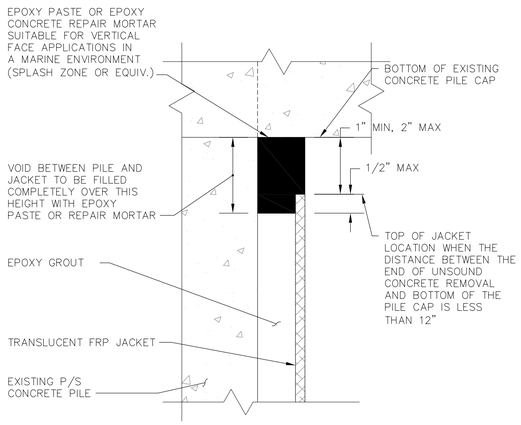



C1 S3 **DETAIL - JACKET TOP SEAL TYPE 1**

**SCALE: NTS**

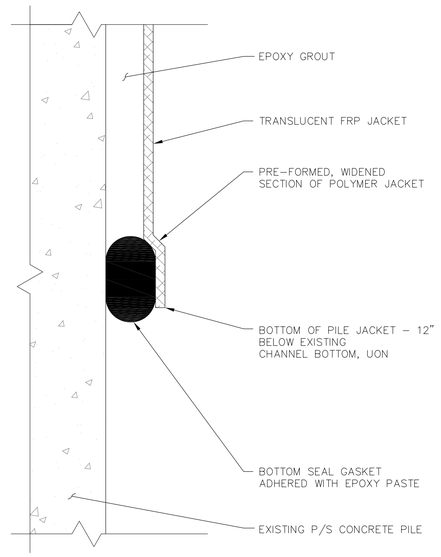
NOTE:
AS AN ALTERNATE, THE PILE JACKET MAY BE INSTALLED FLUSH WITH THE BOTTOM OF THE PILE CAP IF A SYSTEM OF STAND PIPES ARE USED TO ENSURE THE VOID IS COMPLETELY FILLED. SUBMIT ALTERNATE DETAILS TO THE OWNER & ENGINEER FOR APPROVAL.

NOTE:
EITHER PILE JACKET TOP SEAL OPTION IS ACCEPTABLE




C2 S3 **DETAIL - JACKET TOP SEAL TYPE 2**

**SCALE: NTS**




C4 S3 **DETAIL - JACKET BOTTOM SEAL**

**SCALE: NTS**

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CITY OF BEAUFORT, SOUTH CAROLINA

NORTH CAROLINA PROFESSIONAL ENGINEER
No. 25067
4/22/19
WILLIAM D. BARRA

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**S3**
SEAL DETAILS