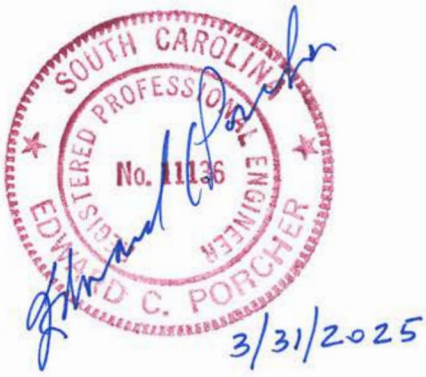
Stantec

WATER TOWER ROAD

SCREEN WALL INVESTIGATIONS

Water Tower Road
Longs, South Carolina

Stantec Project No. 171015900



March 31, 2025

Stantec Consulting Services, Inc.
Attention: Edward C. Porcher, P.E.
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SECTION 1
AUTHORIZATION AND SCOPE

Per the request of Mr. Robert E. Lee and the Barefoot Resort Residential Owners Association, Stantec visited the existing screen wall on Water Tower Road in Longs, South Carolina, in order to review the full length of the existing precast concrete wall, document observed structural deficiencies, structurally analyze existing conditions, and provide a Deficiency Report in order to advise the Owner of observed structural deficiencies, explain the cause of observed structural deficiencies, and provide schematic repair recommendations for budget pricing. As authorized in the attached email from the Board President on January 21, 2025, Stantec visited the existing residence at 3512 Club Course Drive in order to review a severely displaced wall panel and provide stabilization repair recommendations, as documented in previous Stantec Field Reports dated January 30, 2025 and March 11, 2025.

The following documents have been made available to Stantec for review:

1) A fully executed AIA A101-2017 Agreement between the Barefoot Resort Residential Owners Association and Permacast, LLC in the amount of $1,337,032.50 plus a $17,370.33 bond, for a total amount of $1,354,402.83, including but not limited to:
    A) Five (5) pages of an unsigned AIA Additions and Deletions Report,
    B) One (1) unsigned page of an AIA Certification of Document's Authenticity,
    C) Thirty-nine (39) pages of AIA A201-2017 General Conditions for the Contract,
    D) Eleven (11) pages of Supplementary Conditions for the Contract,
    E) Seven (7) pages of a Permacast Quote Number 00000605 in the amount of $1,337,032.50, with an expiration date of April 4, 2021, and
    F) Twenty-one (21) sheets of sealed drawings entitled Site Improvements of Water Tower Road Perimeter Wall, by Earthworks Planning and Design Consultants with revisions No. 7 dated February 24, 2021.
2) Three (3) sheets of sealed Construction Plans & Specifications for Permacast Precast Concrete Fence by Elias Runar Johannsson, P.E. of Tulsa, Oklahoma dated January 21, 2021.
3) Eleven (11) sheets of a sealed Water Tower Road Wall As-Built Survey by Palmetto Corp Land Surveying Division dated February 9, 2022.
4) A Full One Year Warranty by Permacast, LLC referencing a Substantial Completion Date of September 15, 2021.
5) One (1) sheet of "Added Brackets for Columns" by JBM&R Engineering, Inc. for Permacast Precast Concrete Fence, Amazon MGE9 Project dated October 19, 2021.
6) A quote by Mr. Mike Stempien of Permacast in the amount of $9,300.00, with no date and no signatures, to "Identify and repair structural damages along the barefoot resort wall."
7) A Preliminary Consultation Services Summary Report by SKA Consulting Engineers dated September 12, 2024.
8) Miscellaneous additional correspondence relative to the subject screen wall.

Complete structural analysis of each wall component, including but not limited to panel reinforcing steel, column reinforcing steel, and lateral stability of column foundations is beyond the scope of this report, but may be provided as additional services if authorized by the Owner. Due to the length of the existing wall, the magnitude of the existing wall, and limited access to existing conditions; not all deficiencies will be identified in this report. The Residential Owners Association, Individual Homeowners, Property Manager, and On-Site Maintenance Staff shall continually monitor the wall for structural deficiencies. Any newly discovered significant cracks, significantly displaced members, or other significant structural deficiencies shall be brought to the attention of Stantec for review and analysis.

To date, Stantec's scope of work has been limited to review of open and obvious structural deficiencies, as observed along the length of the wall. No other portions of the existing wall have been investigated or analyzed by Stantec. Stantec accepts no liability for the existing wall in its current condition and is only responsible for specific repairs which have been designed and sealed by Stantec. Schematic repair recommendations will be presented in this report. However, specific repair designs and sealed repair documents are beyond the scope of this report, but may be provided as additional services if authorized by the Owner.

SECTION II
INVESTIGATIONS AND ANALYSES

Although the Building Permit and Building Permit Application for the subject wall have not been made available to Stantec for review, the attached Code Adoption History for the State of South Carolina and the following dates on the Contract Documents reveal that the screen wall was permitted under the 2018 International Building Code, which references ASCE/SEI 7-16 for "Minimum Design Loads and Associated Criteria for Buildings and Other Structures:"

1) January 21, 2021 – Construction Plans and Specifications for Permacast Precast Concrete Fence by Elias Runar Johannsson, P.E.

2) February 24, 2021 – Drawings for Site Improvements of Water Tower Road Perimeter Wall by Earthworks Planning and Design Consultants.

3) April 9, 2021 – AIA A101-2017 Agreement between Barefoot Resort Residential Owners Association and Permacast, LLC.

4) September 15, 2021 – Date of Substantial Completion, per the Permacast Full One Year Warranty.

5) February 9, 2022 – Water Tower Road Wall As-Built Survey by Palmetto Corp Land Surveying Division.

The current Building Code for the State of South Carolina is the 2021 International Building Code, which references ASCE/SEI 7-16 with Supplement 1 for "Minimum Design Loads and Associated Criteria for Buildings and Other Structures." Therefore, all repairs must be designed and constructed in accordance with the 2021 International Building Code and ASCE/SEI 7-16, with Supplement 1.

Stantec investigations included the following site visits, with various representatives of the Owner and two (2) separate Repair Contractors:

1A) January 16, 2025 – Ms. Dara Baltuskonis (briefly) and Ms. Marie Chaisson (briefly) representing the Owner.
Mr. Mike Rheam of Kennedy Richter Construction.
Mr. Edward C. Porcher, P.E. of Stantec.

2A) February 6, 2025 – Ms. Riverlee Weaver and Mr. Ron Weaver of Glasstec, Inc.
Mr. Edward C. Porcher, P.E. of Stantec.

3A) February 25, 2025 – Mr. John Karpovich (briefly) representing the Owner.
Mr. Edward C. Porcher, P.E. of Stantec.

4A) March 27, 2025 – Mr. John Karpovich representing the Owner.
Mr. Ian N. Cundiff, P.E. of Stantec.

The existing screen wall long Water Tower Road is divided into six (6) separate structures. During Stantec's site visits on January 16th through February 25, 2025, Edward C. Porcher, P.E. numbered each column along each screen wall, observed each wall panel to column connection, and documented each observed deficiency with a photograph. Mr. Porcher's site observations were limited to outboard faces of each wall along Water Tower Road, and did not include inboard faces of each wall along individual residences. Raw data of each observed deficiency is available upon request. The column numbering schedule is shown on attached Column Designation Plans SP1 through SP11 dated March 31, 2025 and listed as follows:

1B) Extreme South Wall ..... Columns 1SS through 80SS on Sheets SP1 through SP3

2B) South Wall ..... Column 1S through 82S on Sheets SP4 through SP6

3B) South Middle Wall ..... Columns 1SM through 27SM on Sheet SP7

4B) North Middle Wall ..... Columns 1NM through 16NM on Sheet SP8

5B) North Wall ..... Columns 1N through 58N on Sheets SP9 and SP10

6B) Northeast Wall ..... Columns 1NE through 18NE on Sheets SP10 and SP11

Results of Stantec site observations are listed as follows:

1C) The existing screen wall is constructed with precast wall panels anchored in "H" shaped precast concrete columns spaced at approximately 20'-0" on center, as shown in example photograph No. 1 and Sheet 2 of the attached Construction Plans and Specifications by Elias Runar Johannsson, P.E. dated January 21, 2021.

2C) In response to the attached email dated January 21, 2025, Stantec investigated one severely displaced wall panel at 3512 Club Course Drive, as shown in example photographs No. 1 through No. 11, and provided emergency repair recommendations as documented in previous Stantec Field Reports dated January 30, 2025 and March 11, 2025.

3C) Precast "H" shaped columns are supported in 24" diameter x 6'-4" deep, cast-in-place concrete foundations, as shown in example photographs No. 12 through No. 14 and Sheet S3 of the attached Construction Plans and Specifications by Elias Runar Johannsson, P.E. dated January 21, 2021.

4C) Although no wall panel bearing conditions are specified on the Construction Plans and Specifications by Mr. Johannsson, some wall panels are supported on grout pedestals, while other panels are supported on grout pedestals with 2" x 2" neoprene bearing pads, as shown in example photographs No. 15 through No. 17.

5C) Wall panel thicknesses vary from a minimum of approximately 4" to a maximum of approximately 5," due to textured wall finishes.

6C) Each end of each wall panel is formed with a "tongue," for seating into its supporting "H" column. Column dimensions and wall panel "tongue" dimensions were field measured at Columns 17N, 22N, and stored excess wall panels on site, as shown in example photographs No. 18 through No. 31. Field measured column dimensions and "tongue" dimensions are detailed on attached Sheet AB1 dated March 31, 2025.

7C) Design column dimensions and "tongue" dimensions, as detailed on Mr. Johannsson's Construction Plans and Specifications, are shown on attached Sheet AB2 dated March 31, 2025. Field measured column and "tongue" dimensions on attached sheet AB1 are slightly different from design column and "tongue" dimensions on Sheet AB2. Field measured wall panel to column connections contain at least 1/2" of "play" if fully seated, and significantly more "play" if not adequately seated, as shown on attached Sheet AB3.

8C) Each wall panel is equipped with lifting eyes, as shown in example photographs No. 32 through No. 34.

9C) At excess panels stored on site, "tongue" reinforcing steel extends to the end of each panel with no concrete cover, as shown in example photographs No. 35 through No. 41. Similarly, tongue end widths of 1," as shown in example photograph No. 26, provide less than 3/4" of concrete cover on each side of "tongue" reinforcing steel.

10C) One wall panel stored on site is saw cut, as shown in attached photographs No. 42 through No. 47, and revealed #4 horizontal bars spaced at approximately 10 1/2" on center, which is heavier reinforcement than the #4 horizontal bars at 15" on center, as specified on Sheet 3 of the Construction Plans and Specifications by Mr. Johannsson.

11C) One excess "H" column is stored on site, as shown in example photographs No. 48 through No. 50.

12C) At the displaced wall panel on the south side of Column 13NM, as shown in attached photographs No. 51 through No. 56, one "tongue" dowel was exposed and removed for review. As shown in attached photographs No. 57 through No. 62, the exposed dowel had less than 3/4" of clear cover on three sides and was held in place during concrete placement with plastic zip ties.

13C) Numerous precast wall panels are inadequately supported on 2" x 2" neoprene bearing pads, as shown in example photographs No. 63 through No. 105.

14C) Numerous precast wall panels supported on grout pedestals have failed, with cracked and spalled pedestals and/or cracked and spalled panels, as shown in example photographs No. 106 through No. 182.

15C) Numerous precast wall panels are insufficiently seated in precast "H" columns, as shown in example photographs No. 183 through No. 261 and compared to attached Sheet AB1 of field measured dimensions and Sheet AB3 of varying "play" at wall panel to column connections.

16C) Numerous wall panel to column connections are inadequately stabilized with loose shims, as shown in example photographs No. 262 through No. 286.

17C) Numerous wall panel "tongues" are cracked and spalled at "H" column connections, as shown in example photographs No. 287 through No. 400.

18C) Several deficient wall panel to column connections have been inadequately repaired with aesthetically displeasing and non-code-compliant clip angles, as shown in example photographs No. 401 through No. 458.

19C) Several isolated precast members are cracked and spalled, as shown in example photographs No. 459 through No. 493.

20C) Numerous precast members have been cast, or field modified, with exposed reinforcing steel, as shown in example photographs No. 494 through No. 507.

As shown in attached excerpts from the 2018 International Building Code and ACI 318-14, Table 20.6.1.3.3 in ACI 318-14 requires at least 3/4" of concrete cover for all No. 11 and smaller reinforcing bars in precast concrete, when exposed to weather. Therefore, any reinforcing steel in the subject screen wall which is exposed to the elements or has less than 3/4" of concrete cover is in violation of the 2018 International Building Code.

As shown in attached Sheet AB1, precast column flange thicknesses are 3." As specified in the attached "Added Brackets For Columns" details by JBM&R Engineering dated October 19, 2021, 1/2" diameter Red Head Concrete Wedge Type Bolts are specified at each clip angle. According to the attached ICC-ES Evaluation Report ESR-2251, the minimum required edge distance for a 1/2" diameter ITW Red Head Trubolt Wedge Anchor is 3 3/4." Therefore, each wedge anchor in each added clip angle is in violation of the Manufacturer's International Code Council Evaluation Report.

SECTION III
CONCLUSIONS AND RECOMMENDATIONS

Construction Plans and Specifications for the Permacast Precast Concrete Fence, by Elias Runar Johannsson, P.E. dated January 21, 2021, are flawed, in that:

1) Wall panel "tongues" as detailed on Sheet 2 are too narrow to receive the specified reinforcing steel and provide 3/4" of concrete cover on each face, as required by the 2018 International Building Code and ACI 318-14.

2) Wall panel tapered "tongue" designs, combined with tapered column pockets, results in 1/2" of "play" at wall panel to column connections if columns are installed exactly at 20'-0" on center, and excessive "play," as shown on attached Sheet AB3, if columns are installed greater than 20'-0" on center.

3) No tolerances are specified for wall panel to column connections.

4) Column reinforcement specified in the Column Reinforcement Table on Sheet 3 references 8 feet high columns at 10 feet on center, in lieu of 8 feet high columns at 20 feet on center as specified on Sheet 2 and as constructed in the field.

5) No provisions are specified for the gravity support of each wall panel.

The existing screen wall along Water Tower Road is flawed and failing, in that:

1A) One wall panel at 3512 Club Course Drive has dropped and is severely displaced, as documented in the previous Stantec Field Report dated January 30, 2025.

2A) Reinforcing steel in wall panel "tongues" is installed with less than 3/4" of concrete cover, in violation of the 2018 International Building Code and ACI 318-14.

3A) Numerous precast wall panels and/or their supporting grout pedestals have failed at bearing.

4A) Numerous precast wall panels are insufficiently seated in precast "H" columns, with excessive "play" at wall panel to column connections.

5A) Numerous precast wall panel to column connections are inadequately stabilized with loose shims.

6A) Numerous wall panel "tongues" are cracked and spalled at wall panel to column connections.

7A) Several deficient wall panel to column connections have been inadequately repaired with clip angles and non-code-compliant wedge anchors, in violation of minimum edge distance requirements of the Wedge Anchor Manufacturer's International Code Council Evaluation Report.

8A) Several isolated precast members are cracked and spalled.

9A) Numerous precast members have been cast or field modified with exposed reinforcing steel, in violation of 3/4" minimum concrete cover requirements of the 2018 International Building Code and ACI 318-14.

The existing screen wall along Water Tower Road is unstable in its current condition, due to:

1B) Inadequate bearing at each end of each wall panel for resistance to gravity loads,

2B) Insufficient seating of wall panel "tongues" at numerous wall panel to column connections,

3B) Numerous cracked and spalled wall panel "tongues" at wall panel to column connections, and

4B) Inadequate, non-code-compliant clip angle connections at deficient wall panel to column connections with inadequate seating.

The existing screen wall should be completely removed and replaced with a new code-compliant screen wall, or stabilized in accordance with attached Preliminary Sheet S1A, but only after budget pricing and final designs of attached Sheet S1A. Stantec's Sheet S1A is preliminary, for budget pricing only, and must be developed further prior to construction. The Owner is advised that repair designs on Stantec Sheet S1A will stabilize each wall panel to existing precast concrete columns, and stabilize each wall panel on new footing foundations. However, Sheet S1A repair designs will not repair existing cracked "tongues," spalled "tongues," or reinforcing steel with inadequate concrete cover. Each existing "tongue" at each end of each existing panel will deteriorate over time, due to corrosion and expansion of existing reinforcing steel with inadequate concrete cover. Any future cracks or spalls which extend to within 3" of new stainless steel through-bolts shall be brought to the attention of Stantec for review and analysis. Ultimately, each individual wall panel will have to be removed and replaced with a new wall panel, with code-compliant reinforcing steel. Stabilization of the existing wall in accordance with attached preliminary Sheet S1A shall include, but not be limited to:

1C) Providing temporary shoring and lateral stability for each wall panel until completion of all work,

2C) Raising each existing displaced wall panel until it is level and plumb,

3C) Supporting each end of each existing wall panel on new footings, concrete pedestals, and bearing pads in accordance with Details 1/S1A and 3/S1A,

4C) Securing each existing wall panel with four (4) new pairs of stainless steel and painted stabilizer brackets, in accordance with Details 1/S1A through 4/S1A,

5C) Coating all rigid insulation with one (1) coat of primer plus two (2) finish coats to match the color of adjacent wall panels as close as practical, and

6C) Repairing all cracked and spalled concrete on top of precast panels, at bottom of precast panels, and on faces of columns by saw cutting, chipping, and application of Sika "Armatec 100 Epocem" bonding agent/corrosion inhibitors, Sika "SikaTop 123 Plus" Repair Mortars, Sika "Sikagard 552W Primer," plus two (2) coats of Sika "Sikagard 670W" finish coatings, in strict accordance with Sika recommendations, as required to match adjacent finishes as close as practical.

Complete structural analysis of each wall component, including but not limited to panel reinforcing steel, column reinforcing steel, and lateral stability of column foundations is beyond the scope of this report, but may be provided as additional services if authorized by the Owner. Due to the length of the existing wall, the magnitude of the existing wall, and limited access to existing conditions; not all deficiencies have been identified in this report. The Residential Owners Association, Individual Homeowners, Property Manager, and On-Site Maintenance Staff shall continually monitor the wall for structural deficiencies. Any newly discovered significant cracks, significantly displaced members, or other significant structural deficiencies shall be brought to the attention of Stantec for review and analysis.

To date, Stantec's scope of work has been limited to review of open and obvious structural deficiencies, as observed along the length of the wall. No other portions of the existing wall have been investigated or analyzed by Stantec. Stantec accepts no liability for the existing wall in its current condition and is only responsible for specific repairs which have been designed and sealed by Stantec. Schematic repair recommendations have been presented in this report, but are preliminary and must be developed further prior to construction. Specific repair designs and sealed repair documents are beyond the scope of this report, but may be provided as additional services if authorized by the Owner.

Porcher, Eddie

From: Dara Baltuskonis <darabaltuskonis@gmail.com>
Sent: Tuesday, January 21, 2025 10:05 AM
To: Porcher, Eddie
Cc: Marie Chaisson; Kelly White; Robert E. Lee (rel@rellawfirm.com); Cundiff, Ian; Mike@kennedyrichter.com; Paul Kennedy (paul@kennedyrichter.com)
Subject: Re: Watertower Road Sound Wall, Dropped Panel at 3512 Club Course Drive

I approve this emergency repair, please proceed.
Dara Baltuskonis
BRRA President
609-780-7764

On Tue, Jan 21, 2025 at 8:37 AM Porcher, Eddie <eddie.porcher@stantec.com> wrote:

Dara,

I enjoyed meeting you and Marie last week at the subject sound wall. Please confirm that Stantec is authorized to provide emergency repair details for the attached dropped wall panel at 3512 Club Course Drive, and Stantec will promptly provide repair details for pricing by Kennedy Richter Construction. Thanks.

Edward C. Porcher, P.E.

Senior Associate, Structural

Direct: (843)740-7706
Mobile: (843)822-2749
eddie.porcher@stantec.com

Stantec
4969 Centre Pointe Drive Suite 200
North Charleston SC 29418-6952

NO. 29 - ECP SITE VISIT ON 1/16/25

NO. 30 - ECP SITE VISIT ON 1/16/25

NO. 31 - ECP SITE VISIT ON 1/16/25

NO. 32 - ECP SITE VISIT ON 1/16/25

NO. 33 - ECP SITE VISIT ON 1/16/25

NO. 34 - ECP SITE VISIT ON 1/16/25

NO. 35 - ECP SITE VISIT ON 1/16/25

SOUTH CAROLINA
CODE ADOPTION HISTORY

Building Codes in Effect for South Carolina

Code Adoption Process:

The mandatory codes referenced in S.C, Ann. §6-9-50(1976, as amended), modified and adopted by the South Carolina Building Codes Council (Council), must be enforced by every South Carolina municipality and county. Appendices to the mandatory codes may not be used by municipalities and counties unless the appendices are specifically adopted as a local modification by the Building Codes Council.

The latest edition of the permissive codes referenced in S.C. Code Ann. §6-9-60 (1976, as amended), may be adopted by municipalities and counties via ordinance, and this local adoption by ordinance must take place before enforcement can begin. The permissive codes are the latest editions of the International Property Maintenance Code, International Existing Building Code, International Performance Code, and International Swimming Pool and Spa Code.

Adoption of the mandatory codes and permissive codes does not include the chapters, sections or provisions addressing administrative policies or procedures. Administrative policies and procedures are the sole responsibility of each local jurisdiction. If the governing body of a local jurisdiction desires to use the administrative provisions in one or more of the adopted codes, it must first adopt the chapters or sections by ordinance. In lieu of adopting the administrative provisions contained in the adopted codes, the governing body of a local jurisdiction may develop specific administrative policies and procedures for the operation of its Building Inspection Department. If administrative policies and procedures are developed at the local level, they must be adopted by ordinance before they can take effect.

Latest Code Adoption:

On October 6, 2021, the South Carolina Building Codes Council adopted the latest editions of the mandatory codes and appendices with modifications, as referenced in S.C. Code Ann. §6-9-50 (1976, as amended), to be enforced by all municipalities and counties in South Carolina. The Council established the implementation date for local jurisdictions as January 1, 2023.

The adopted modifications and the mandatory codes are as follows:

2021 South Carolina Building Code or the 2021 International Building Code with SC modifications
2021 South Carolina Residential Code or the 2021 International Residential Code with SC modifications
2021 South Carolina Fire Code or the 2021 International Fire Code with SC modifications
2021 South Carolina Plumbing Code or the 2021 International Plumbing Code with SC modifications
2021 South Carolina Mechanical Code or the 2021 International Mechanical Code with SC modifications
2021 South Carolina Fuel Gas Code or the 2021 International Fuel Gas Code with SC modifications
2020 National Electrical Code (NFPA 70) with SC modifications
2009 International Energy Conservation Code

The latest edition of ICC/ANSI A117.1, Accessible and Useable Buildings and Facilities, is adopted by the Accessibility Act, S.C. Code Ann. §10-5-210 et seq., and is mandatory for use in all municipalities and counties within the State. Although other standards for building accessibility exist, the latest published

edition of the ICC/ANSI A117.1 is the only accessibility document required by state law to be enforced by the local building officials. All plan reviews and inspections conducted by local building inspection departments, therefore, will be based on ICC/ANSI A117.1. It is important to note, however, that other accessibility documents are also law and cannot be ignored. Legal action can be taken against a building owner, manager or any person involved in the design or construction/renovation of a building or structure requiring accessibility under any of the accessibility laws. Therefore, before construction or renovation of a building or structure that requires accessibility is started, all applicable accessibility laws should be considered.

Additional accessibility laws that must be considered, and their enforcement entities, include the Americans with Disabilities Act (ADA), published and enforced by the US Department of Justice (DOJ); Fair Housing Act Amendments of 1988, published and enforced by the US Department of Housing and Urban Development (HUD); and, the South Carolina Fair Housing Law, published and enforced by the South Carolina Human Affairs Commission.

The Building Energy Efficiency Standards Act is adopted by statute and is mandatory for use in all jurisdictions within the state.

Code Adoption History:

The following information is provided for research purposes and may be used to verify the official dates for which local jurisdictions were or are required to enforce certain editions of the mandatory building codes.

The International Code Series was developed as a joint project by the Southern Building Code Congress, International, the International Conference of Building Officials and the Building Officials and Code Administrators, International (referred to as model code organizations) and replaced the Standard, National and Uniform Building Code Series. The 1997 Editions of the Standard, National and Uniform Codes (which were regional), and the 1995 Edition of the CABO One and Two Family Dwelling Code (which was national), were the last to be published. The International Building Code Series replaced those documents and provided a single set of National Codes. Simultaneously, the three model code organizations merged and created the International Code Council. All codes, training, and Code Enforcement Officer Certification examinations for the State of South Carolina are now based on the International Code series.

Prior to June 13, 1997, local jurisdictions that desired to adopt building codes were permitted to do so by local ordinance. If a jurisdiction did adopt building codes, it was required to adopt only the codes authorized by the Building Codes Act. Once adopted, the jurisdiction was obligated to continue the adoption of each new edition within one year after it was made available by the publisher. The implementation date for enforcement was established by the local jurisdiction.

Starting July 13, 1997, all local jurisdictions that did not legally "opt-out" of the mandatory building code program were required to adopt building codes by local ordinance, after they were authorized by the Council. The Council was also required to establish the date of implementation for each of the adopted codes.

Beginning July 2, 2003, the Council was charged with the responsibility for adopting all mandatory building codes and establishing the date of implementation for the local jurisdictions.

Starting with the 2006 code adoption cycle, the Council, instead of the local jurisdictions, began adopting the appendices as needed.

Building codes authorized or adopted by the Building Codes Council, and their corresponding implementation dates starting with the current codes and going back to the 2000 International Code Series, include the following:

Adopted Codes	Adoption Date	Implementation Date
2021 International Residential Code*	October 6, 2021	January 1, 2023
2021 International Building Code*	October 6, 2021	January 1, 2023
2021 International Fire Code*	October 6, 2021	January 1, 2023
2021 International Plumbing Code*	October 6, 2021	January 1, 2023
2021 International Mechanical Code*	October 6, 2021	January 1, 2023
2021 International Fuel Gas Code*	October 6, 2021	January 1, 2023
2020 National Electrical Code*	October 6, 2021	January 1, 2023
2009 International Energy Conservation Code[1]	April 2, 2012	January 1, 2013
2018 International Residential Code*	August 22, 2018	January 1, 2020
2018 International Building Code*	August 22, 2018	January 1, 2020
2018 International Fire Code*	August 22, 2018	January 1, 2020
2018 International Plumbing Code	August 22, 2018	January 1, 2020
2018 International Mechanical Code*	August 22, 2018	January 1, 2020
2018 International Fuel Gas Code*	August 22, 2018	January 1, 2020
2017 National Electrical Code*	August 22, 2018	January 1, 2020
2009 International Energy Conservation Code[1]	April 2, 2012	January 1, 2013
2015 International Residential Code*	August 29, 2012	July 1, 2016
2015 International Building Code*	August 29, 2012	July 1, 2016
2015 International Fire Code*	August 29, 2012	July 1, 2016
2015 International Plumbing Code	August 29, 2012	July 1, 2016
2015 International Mechanical Code	August 29, 2012	July 1, 2016
2015 International Fuel Gas Code*	August 29, 2012	July 1, 2016
2014 National Electrical Code*	August 29, 2012	July 1, 2016
2009 International Energy Conservation Code[1]	April 2, 2012	January 1, 2013
2012 International Residential Code*	August 29, 2012	July 1, 2013
2012 International Building Code*	August 29, 2012	July 1, 2013
2012 International Fire Code*	August 29, 2012	July 1, 2013
2012 International Plumbing Code	August 29, 2012	July 1, 2013
2012 International Mechanical Code	August 29, 2012	July 1, 2013
2012 International Fuel Gas Code*	August 29, 2012	July 1, 2013
2011 National Electrical Code[2]*	August 29, 2012	July 1, 2013
2009 International Energy Conservation Code[1]	April 2, 2012	January 1, 2013

Adopted Codes	Adoption Date	Implementation Date
2009 International Building Code	March 22, 2010	Not implemented[3]
2009 International Fire Code	March 22, 2010	Not implemented[3]
2009 International Plumbing Code	March 22, 2010	Not implemented[3]
2009 International Mechanical Code	March 22, 2010	Not implemented[3]
2009 International Fuel Gas Code	March 22, 2010	Not implemented[3]
2006 International Energy Conservation Code[1]	June 2, 2009	July 1, 2009
2008 National Electrical Code*	March 30, 2009	July 1, 2009
2006 International Residential Code[4]**	November 28, 2007	July 1, 2008
2006 International Building Code*	November 28, 2007	July 1, 2008
2006 International Fire Code*	November 28, 2007	July 1, 2008
2006 International Plumbing Code	November 28, 2007	July 1, 2008
2006 International Mechanical Code	November 28, 2007	July 1, 2008
2006 International Fuel Gas Code*	November 28, 2007	July 1, 2008
2006 International Energy Conservation Code[1]	June 2, 2009	July 1, 2009
2005 National Electrical Code*	February 22, 2006	July 1, 2007
2003 International Residential Code*	May 26, 2004	July 1, 2005
2003 International Building Code*	May 26, 2004	July 1, 2005
2003 International Fire Code*	May 26, 2004	January 1, 2005
2003 International Plumbing Code	May 26, 2004	January 1, 2005
2003 International Mechanical Code	May 26, 2004	January 1, 2005
2003 International Fuel Gas Code*	May 26, 2004	January 1, 2005
2003 International Energy Conservation Code	May 26, 2004	January 1, 2005
2002 National Electrical Code	May 22, 2002	July 1, 2002
2000 International Residential Code*	May 24, 2000	July 1, 2002
2000 International Building Code*	May 24, 2000	July 1, 2001
2000 International Fire Code*	May 24, 2000	July 1, 2001
2000 International Plumbing Code*	May 24, 2000	July 1, 2001
2000 International Mechanical Code	May 24, 2000	July 1, 2001
2000 International Fuel Gas Code	May 24, 2000	July 1, 2001
2000 International Energy Conservation Code	May 24, 2000	July 1, 2001

*with South Carolina modifications

Footnotes:

1. The 2006 International Energy Conservation Code (IECC) was adopted by the South Carolina Legislature as the minimum standard for compliance with the State Energy Standard, thus removing it from the normal adoption process. The legislature updated the IECC to the 2009 Edition during the 2012 legislative session (Act 143) with an effective date of January 1, 2013. Future updated versions must also be adopted by statutory amendment.

2. The Building Codes Council included the adoption of the National Electrical Code with the International Code Series, starting with the 2012 Code Adoption Cycle.

3. The 2009 International Code Series was formally adopted by the Building Codes Council May 10, 2010. Implementation did not occur, however, due to a request to remove the regulations from the administrative procedures process by the South Carolina House Labor, Commerce and Industry Committee.

4. The implementation date for the International Residential Code was delayed until July 1, 2009 by 2008/2009 budget proviso 182 (65.10).

History of the SC Energy Standards:

The South Carolina Energy Standards started as House Bill 2863 (Act 156) and became effective on July 6, 1979. The standards were adopted as state law and were applicable and mandatory in every municipality and county in South Carolina.

In 1979, the State Standard referenced "the current addition of Appendix J Energy Conservation" of the 1979 edition of the Standard Building Code, which in turn referenced the "Code for Energy Conservation in New Buildings" (published jointly by the Southern Building Code Congress, International Conference of Building Officials, and Building Officials, Code Administrators International and National Conference of States for Building Codes and Standards) and "ASHRAE Standard 90" as methods of compliance with state law

In 1982, the State Standard was automatically updated to reference Appendix J of the 1982 edition of the Standard Building Code, which referenced the "Code for Energy Conservation in New Buildings", and "ASHRAE Standards 90A and 90B" as methods of compliance.

In 1985, the State Standard automatically updated to reference Appendix J of the 1985 edition of the Standard Building Code, which referenced the "CABO Model Energy Code" (published by the Council of American Building Officials) and "ASHRAE Standards 90A and 90B" as methods of compliance.

In 1988, the State Standard automatically updated to reference Appendix J of the 1988 edition of the Standard Building Code, which referenced the "CABO Model Energy Code" and "ASHRAE Standards 90A and 90B" as methods of compliance.

In the 1991 edition of the Standard Building Code, the Energy Conservation provisions were moved from Appendix J to Appendix E. The State Standard, however, continued to reference Appendix J of the Standard Building Code. Appendix E referenced the "CABO Model Energy Code" and "ASHRAE Standards 90.1" as methods of compliance.

In the 1994 and 1997 editions of the Standard Building Code, the Energy Conservation provisions remained in Appendix E. The State Standard continued to reference Appendix J of the Standard Building Code. Appendix E referenced the "CABO Model Energy Code" and "ASHRAE Standards 90.1" as methods of compliance.

On July 1, 2001, the State implemented the 2000 edition of the International Building Code and on July 1, 2002, the State implemented the 2000 edition of the International Residential Code. The State Standard, however, continued to reference Appendix J of the Standard Building Code.

In 2005, the State implemented the 2003 editions of the International Building and Residential Codes. The State Standard continued to reference Appendix J of the Standard Building Code.

In 2008, the State implemented the 2006 edition of the International Building Code; and in 2009, the State implemented the 2006 edition of the International Residential Code. The State Standard, however, continued to reference Appendix J of the Standard Building Code.

On July 1, 2009, by Act 46 (H3550), the SC Energy Standard was updated to the 2006 International Energy Conservation Code for all commercial and residential buildings.

On April 2, 2012, by Act 143 (H4639), the SC Energy Standard was updated to the 2009 International Energy Conservation Code for all commercial and residential buildings.

IBC 2018
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ACI 318-14

2018

INTERNATIONAL CODES®

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CHAPTER 19

CONCRETE

Italics are used for text within Sections 1903 through 1905 of this code to indicate provisions that differ from ACI 318.

User notes:

About this chapter: *Chapter 19 provides minimum accepted practices for the design and construction of buildings and structural components using concrete—both plain and reinforced. Chapter 19 relies primarily on the reference to American Concrete Institute (ACI) 318, Building Code Requirements for Structural Concrete. Structural concrete must be designed and constructed to comply with this code and all listed standards. There are also specific provisions addressing concrete slabs and shotcrete.*

Code development reminder: *Code change proposals to this chapter will be considered by the IBC—Structural Code Development Committee during the 2019 (Group B) Code Development Cycle. See explanation on page iv.*

SECTION 1901
GENERAL

1901.1 Scope. The provisions of this chapter shall govern the materials, quality control, design and construction of concrete used in structures.

1901.2 Plain and reinforced concrete. Structural concrete shall be designed and constructed in accordance with the requirements of this chapter and ACI 318 as amended in Section 1905 of this code. Except for the provisions of Sections 1904 and 1907, the design and construction of slabs on grade shall not be governed by this chapter unless they transmit vertical loads or lateral forces from other parts of the structure to the soil. Precast concrete diaphragms in buildings assigned to *Seismic Design Category* C, D, E or F shall be designed in accordance with the requirements of ASCE 7, Section 14.2.4.

1901.3 Anchoring to concrete. Anchoring to concrete shall be in accordance with ACI 318 as amended in Section 1905, and applies to cast-in (headed bolts, headed studs and hooked J- or L-bolts), post-installed expansion (torque-controlled and displacement-controlled), undercut and adhesive anchors.

1901.4 Composite structural steel and concrete structures. Systems of structural steel acting compositely with reinforced concrete shall be designed in accordance with Section 2206 of this code.

1901.5 Construction documents. The *construction documents* for structural concrete construction shall include:

1. The specified compressive strength of concrete at the stated ages or stages of construction for which each concrete element is designed.
2. The specified strength or grade of reinforcement.
3. The size and location of structural elements, reinforcement and anchors.
4. Provision for dimensional changes resulting from creep, shrinkage and temperature.
5. The magnitude and location of prestressing forces.
6. Anchorage length of reinforcement and location and length of lap splices.
7. Type and location of mechanical and welded splices of reinforcement.
8. Details and location of contraction or isolation joints specified for plain concrete.
9. Minimum concrete compressive strength at time of posttensioning.
10. Stressing sequence for posttensioning tendons.
11. For structures assigned to *Seismic Design Category* D, E or F, a statement if slab on grade is designed as a structural diaphragm.

1901.6 Special inspections and tests. *Special inspections* and tests of concrete elements of buildings and structures and concreting operations shall be as required by Chapter 17.

SECTION 1902
DEFINITIONS

1902.1 General. The words and terms defined in ACI 318 shall, for the purposes of this chapter and as used elsewhere in this code for concrete construction, have the meanings shown in ACI 318 as modified by Section 1905.1.1.

SECTION 1903
SPECIFICATIONS FOR TESTS AND MATERIALS

1903.1 General. Materials used to produce concrete, concrete itself and testing thereof shall comply with the applicable standards listed in ACI 318.

Exception: *The following standards as referenced in Chapter 35 shall be permitted to be used.*

1. *ASTM C150*
2. *ASTM C595*
3. *ASTM C1157*

1903.2 Special inspections. *Where required, special inspections and tests shall be in accordance with Chapter 17.*

1903.3 Glass fiber-reinforced concrete. *Glass fiber-reinforced concrete (GFRC) and the materials used in such concrete shall be in accordance with the PCI MNL 128 standard.*

1903.4 Flat wall insulating concrete form (ICF) systems. *Insulating concrete form material used for forming flat concrete walls shall conform to ASTM E2634.*

CHAPTER 35
REFERENCED STANDARDS

User note:

About this chapter: *The* International Building Code® *contains numerous references to standards promulgated by other organizations that are used to provide requirements for materials and methods of construction. This chapter contains a comprehensive list of all standards that are referenced in this code. These standards, in essence, are part of this code to the extent of the reference to the standard.*

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in Section 102.4.

AA

Aluminum Association
1400 Crystal Drive, Suite 430
Arlington, VA 22202

ADM—2015: Aluminum Design Manual: Part 1—A Specification for Aluminum Structures
1604.3.5, 2002.1

ASM 35—00: Aluminum Sheet Metal Work in Building Construction (Fourth Edition)
2002.1

AAMA

American Architectural Manufacturers Association
1827 Waldon Office Square, Suite 550
Schaumburg, IL 60173

711—13: Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products
1404.4

714—15: Voluntary Specification for Liquid Applied Flashing Used to Create a Water-resistive Seal around Exterior Wall Openings in Buildings
1404.4

1402—09: Standard Specifications for Aluminum Siding, Soffit and Fascia
1403.5.1

AAMA/WDMA/CSA 101/I.S.2/A440—17: North American Fenestration Standard/Specifications for Windows, Doors and Skylights
1709.5.1, 2405.5

ACI

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331

216.1—14: Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies
Table 721.1(2), 722.1

318—14: Building Code Requirements for Structural Concrete
722.2.4.3, 1604.3.2, 1616.2.1, 1616.3.1, 1704.5, Table 1705.3, 1705.3.2, 1808.8.2, Table 1808.8.2, 1808.8.5, 1808.8.6, 1810.1.3, 1810.2.4.1, 1810.3.2.1.1, 1810.3.2.1.2, 1810.3.8.3.1, 1810.3.8.3.3, 1810.3.9.4.2.1, 1810.3.9.4.2.2, 1810.3.10.1, 1810.3.11.1, 1810.3.12, 1901.2, 1901.3, 1902.1, 1903.1, 1904.1, 1904.2, 1905.1, 1905.1.1, 1905.1.2, 1905.1.3, 1905.1.4, 1905.1.5, 1905.1.6, 1905.1.7, 1905.1.8, 1906.1, 2108.3, 2206.1

AISC

American Institute of Steel
130 East Randolph Street, Suite 2000
Chicago, IL 60601-6219

ANSI/AISC 341—16: Seismic Provisions for Structural Steel Buildings
1705.12.1.1, 1705.12.1.2, 1705.13.1.1, 1705.13.1.2, 2205.2.1.1, 2205.2.1.2, 2205.2.2, 2206.2.1

APA—continued

APA S475—16: Glued Laminated Beam Design Tables
2306.1

APA S560—14: Field Notching and Drilling of Glued Laminated Timber Beams
2306.1

APA T300—16: Glulam Connection Details
2306.1

APA X440—17: Product Guide: Glulam
2306.1

APA X450—01: Glulam in Residential Construction—Western Edition
2306.1

ASABE

American Society of Agricultural and Biological Engineers
2950 Niles Road
St. Joseph, MI 49085

EP 484.3 MON2016: Diaphragm Design of Metal-clad, Wood-frame Rectangular Buildings
2306.1

EP 486.2 OCT 2012ED: Shallow-post and Pier Foundation Design
2306.1

EP 559.1 w/Corr.1 Aug. 2010(R2014): Design Requirements and Bending Properties for Mechanically Laminated Wood Assemblies
2306.1

ASCE/SEI

American Society of Civil Engineers
Structural Engineering Institute
1801 Alexander Bell Drive
Reston, VA 20191-4400

7—16: Minimum Design Loads and Associated Criteria for Buildings and Other Structures
202, Table 1504.1.1, Table 1504.8, 1602.1, 1604.3, Table 1604.3, 1604.5, Table 1604.5, 1604.8.2, 1604.9, 1605.1, 1605.2.1, 1605.3.1, 1605.3.1.2, 1605.3.2, 1605.3.2.1, 1607.8.1, 1607.8.1.1, 1607.8.1.2, 1607.9, 1607.13.1, 1607.13.3.1, 1608.1, 1608.2, 1608.3, 1609.1.1, 1609.2, 1609.3, 1609.5.1, 1609.5.3, 1611.2, 1612.2, 1613.1, 1613.2.2, 1613.2.3, 1613.2.5, Table 1613.2.3(1), Table 1613.2.3(2), 1613.2.5.1, 1613.2.5.2, 1613.3, 1614.1, 1615.1, 1705.12, 1705.12.1.1, 1705.12.1.2, 1705.12.4, 1705.13.1.1, 1705.13.1.2, 1705.13.2, 1705.13.3, 1705.13.4, 1709.5, 1803.5.12, 1808.3.1, 1809.13, 1810.3.6.1, 1810.3.8.3.2, 1810.3.8.3.3, 1810.3.9.4, 1810.3.11.2, 1810.3.12, 1901.2, 1905.1.1, 1905.1.2, 1905.1.7, 1905.1.8, 2205.2.1.1, 2205.2.1.2, 2205.2.2, 2206.2.1, 2209.1, 2209.2, 2210.2, 2211.1.1.1, Table 2304.6.1, Table 2306.3(3), Table 2308.7.5, 2404.1, 2505.1, 2505.2, 2506.2.1

8—02: Standard Specification for the Design of Cold-formed Stainless Steel Structural Members
1604.3.3, 2210.1, 2210.2

19—16: Structural Applications of Steel Cables for Buildings
2208.1

24—14: Flood Resistant Design and Construction
1202.4.2, 1202.4.4, 1612.4, 1612.5, 2702.1.8, 3001.3

29—05: Standard Calculation Methods for Structural Fire Protection
722.1

32—01: Design and Construction of Frost Protected Shallow Foundations
1809.5

49—12: Wind Tunnel Testing for Buildings and Other Structures
1609.1.1

55—16: Tensile Membrane Structures
3102.2

An ACI Standard

Building Code Requirements for Structural Concrete (ACI 318-14)

Commentary on Building Code Requirements for Structural Concrete (ACI 318R-14)

Reported by ACI Committee 318

ACI 318-14

American Concrete Institute
Always advancing

CODE

20.5—Headed shear stud reinforcement

20.5.1 Headed shear stud reinforcement and stud assemblies shall conform to ASTM A1044.

20.6—Provisions for durability of steel reinforcement

20.6.1 *Specified concrete cover*

20.6.1.1 Unless the general building code requires a greater concrete cover for fire protection, the minimum specified concrete cover shall be in accordance with 20.6.1.2 through 20.6.1.4.

COMMENTARY

strength of 0.0018 × 29,000,000, or 52,000 psi, represents an upper limit of the useful maximum steel stress.

R20.5—Headed shear stud reinforcement

R20.5.1 The configuration of the studs for headed shear stud reinforcement differs from the configuration of the headed-type shear studs prescribed in Section 7 of AWS D1.1 (2010) and referenced for use in Chapter 17 of this Code (Fig. R20.5.1). Ratios of the head to shank cross-sectional areas of the AWS D1.1 studs range from approximately 2.5 to 4. In contrast, ASTM A1044 requires the area of the head of headed shear stud reinforcement to be at least 10 times the area of the shank. Thus, the AWS D1.1 headed studs are not suitable for use as headed shear stud reinforcement. The base rail, where provided, anchors one end of the studs; ASTM A1044 specifies material width and thickness of the base rail that are sufficient to provide the required anchorage without yielding for stud shank diameters of 0.375, 0.500, 0.625, and 0.750 in. In ASTM A1044, the minimum specified yield strength of headed shear studs is 51,000 psi.

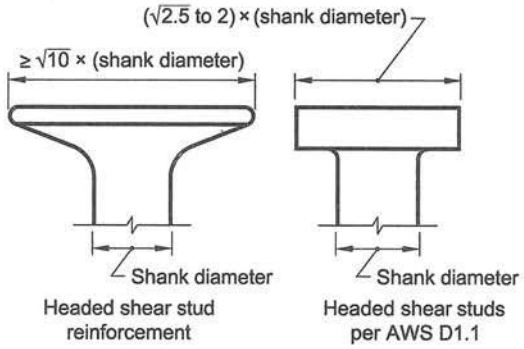


Fig. R20.5.1—Configurations of stud heads.

R20.6—Provisions for durability of steel reinforcement

R20.6.1 *Specified concrete cover*—This section addresses concrete cover over reinforcement and does not include requirements for concrete cover over embedments such as pipes, conduits, and fittings, which are addressed in 20.7.5.

R20.6.1.1 Concrete cover as protection of reinforcement from weather and other effects is measured from the concrete surface to the outermost surface of the reinforcement to which the cover requirement applies. Where concrete cover is prescribed for a class of structural members, it is measured to the outer edge of stirrups, ties, or spirals if transverse reinforcement encloses main bars; to the outermost layer of bars if more than one layer is used without stirrups or ties; to the metal end fitting or duct of post-tensioning tendons; or to the outermost part of the head on headed bars.

The condition "exposed to weather or in contact with ground" refers to direct exposure to moisture changes and not just to temperature changes. Slab soffits are not usually considered directly exposed unless subject to alternate

CODE

COMMENTARY

wetting and drying, including that due to condensation conditions or direct leakage from exposed top surface, run off, or similar effects.

Alternative methods of protecting the reinforcement from weather may be provided if they are equivalent to the additional concrete cover required by the Code. When approved by the building official under the provisions of 1.10, reinforcement with alternative protection from weather may not have concrete cover less than the cover required for reinforcement not exposed to weather.

Development length provisions given in Chapter 25 are a function of cover over the reinforcement. To meet requirements for development length, it may be necessary to use cover greater than the minimums specified in 20.6.1.

20.6.1.2 It shall be permitted to consider concrete floor finishes as part of required cover for nonstructural purposes.

R20.6.1.2 Concrete floor finishes may be considered for nonstructural purposes such as cover for reinforcement and fire protection. Provisions should be made, however, to ensure that the concrete finish will not spall off, thus resulting in decreased cover. Furthermore, considerations for development of reinforcement require minimum monolithic concrete cover in accordance with 20.6.1.3.

20.6.1.3 *Specified concrete cover requirements*

R20.6.1.3 *Specified concrete cover requirements*

20.6.1.3.1 Nonprestressed cast-in-place concrete members shall have specified concrete cover for reinforcement at least that given in Table 20.6.1.3.1.

Table 20.6.1.3.1—Specified concrete cover for cast-in-place nonprestressed concrete members

Concrete exposure	Member	Reinforcement	Specified cover, in.
Cast against and permanently in contact with ground	All	All	3
Exposed to weather or in contact with ground	All	No. 6 through No. 18 bars	2
		No. 5 bar, W31 or D31 wire, and smaller	1-1/2
Not exposed to weather or in contact with ground	Slabs, joists, and walls	No. 14 and No. 18 bars	1-1/2
		No. 11 bar and smaller	3/4
	Beams, columns, pedestals, and tension ties	Primary reinforcement, stirrups, ties, spirals, and hoops	1-1/2

20.6.1.3.2 Cast-in-place prestressed concrete members shall have specified concrete cover for reinforcement, ducts, and end fittings at least that given in Table 20.6.1.3.2.

CODE

Table 20.6.1.3.2—Specified concrete cover for cast-in-place prestressed concrete members

Concrete exposure	Member	Reinforcement	Specified cover, in.
Cast against and permanently in contact with ground	All	All	3
Exposed to weather or in contact with ground	Slabs, joists, and walls	All	1
	All other	All	1-1/2
Not exposed to weather or in contact with ground	Slabs, joists, and walls	All	3/4
	Beams, columns, and tension ties	Primary reinforcement	1-1/2
		Stirrups, ties, spirals, and hoops	1

20.6.1.3.3 Precast nonprestressed or prestressed concrete members manufactured under plant conditions shall have specified concrete cover for reinforcement, ducts, and end fittings at least that given in Table 20.6.1.3.3.

Table 20.6.1.3.3—Specified concrete cover for precast nonprestressed or prestressed concrete members manufactured under plant conditions

Concrete exposure	Member	Reinforcement	Specified cover, in.
Exposed to weather or in contact with ground	Walls	No. 14 and No. 18 bars; tendons larger than 1-1/2 in. diameter	1-1/2
		No. 11 bars and smaller; W31 and D31 wire and smaller; tendons and strands 1-1/2 in. diameter and smaller	3/4
	All other	No. 14 and No. 18 bars; tendons larger than 1-1/2 in. diameter	2
		No. 6 through No. 11 bars; tendons and strands larger than 5/8 in. diameter through 1-1/2 in. diameter	1-1/2
		No. 5 bar, W31 or D31 wire, and smaller; tendons and strands 5/8 in. diameter and smaller	1-1/4
Not exposed to weather or in contact with ground	Slabs, joists, and walls	No. 14 and No. 18 bars; tendons larger than 1-1/2 in. diameter	1-1/4
		Tendons and strands 1-1/2 in. diameter and smaller	3/4
		No. 11 bar, W31 or D31 wire, and smaller	5/8
	Beams, columns, pedestals, and tension ties	Primary reinforcement	Greater of d_b and 5/8 and need not exceed 1-1/2
		Stirrups, ties, spirals, and hoops	3/8

20.6.1.3.4 For bundled bars, specified concrete cover shall be at least the smaller of (a) and (b):

COMMENTARY

R20.6.1.3.3 The lesser cover thicknesses for precast construction reflect the greater control for proportioning, placing, and curing inherent in precasting. Manufactured under plant conditions does not imply that precast members should be manufactured in a plant. Structural elements precast at the job site will also qualify under this section if the control of form dimensions, placing of reinforcement, quality control of concrete, and curing procedures are equal to that normally expected in a plant.

Concrete cover to pretensioned strand as described in this section is intended to provide minimum protection from weather and other effects. Such cover may not be sufficient to transfer or develop the stress in the strand, and it may be necessary to increase the cover accordingly.

PERMACAST WARRANTY REPAIR PROPOSAL AND REPAIR DETAIL

PERMACAST
The fastest delivery & installation of America's Best Walls

PERMACAST, LLC
FULL ONE YEAR WARRANTY

What Is Covered

Permacast, LLC warrants its work against all defects in materials and/or workmanship for a period of one (1) year excluding paint. Any paint products that Permacast, LLC uses can be warranted directly by the manufacturer.

How Long Coverage Lasts

This warranty runs for one year from the date your Permacast Wall contract is completed.

What Is Not Covered

This warranty does not cover damage due to settlement, cracks that do not effect structural integrity of the product, cracks or damage done by outside sources, acts of God such as tornadoes and hurricane winds above engineering maximum wind loads, flying debris, changes in finish due to pressure washing or painting by others, labor required to prepare and repaint because the paint product fails having nothing to do with Permacast application techniques.

What Permacast, LLC Will Do

Permacast, LLC will repair the product in the area that is proven to be defective in materials or workmanship.

How To Get Service

Contact Permacast, LLC. A service representative will come to your wall location and take any necessary action to correct problems covered by this warranty.

How State Law Applies

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Signature: DocuSigned by: Shannon Rhew 2B68BDC011C6469... Date of Substantial Completion: Sept. 15, 2021

Project: Barefoot Resort Golf Club II LLC
4980 Barefoot Resort Bridge Road
North Myrtle Beach, NC 29582

PERMACAST
The fastest delivery & installation of America's Best Walls.

State License #: CBC 1256823

Company Address: 6015 21st Street East
Bradenton, FL 34203

Created Date: Mike Stempien
Job #: 1181

Permacast Walls Contact Information

Prepared By:Mike Stempien
Email:Mike@permacastwalls.com
Phone:
Mobile:727-267-5818

Job Site Address & Main Contact

Job Site Street: Water Tower Rd
Job Site City: North Myrtle Beach
Job Site State:South Carolina
Job Site Zip Code:29582

Bill to Name:Barefoot Resort
Bill to Address:1021 2nd Ave N STE 6,

Quote Line Items

Product Name	Line Item Description	Quantity	Sales Price	Total Price
Repair	Identify and repair structural damages along the barefoot resort wall. This quote does not include paint touchup or excessive cosmetic repairs. Based on up to 5 days of labor. *Customer is responsible for any state or local taxes.	1	9,300	9,300

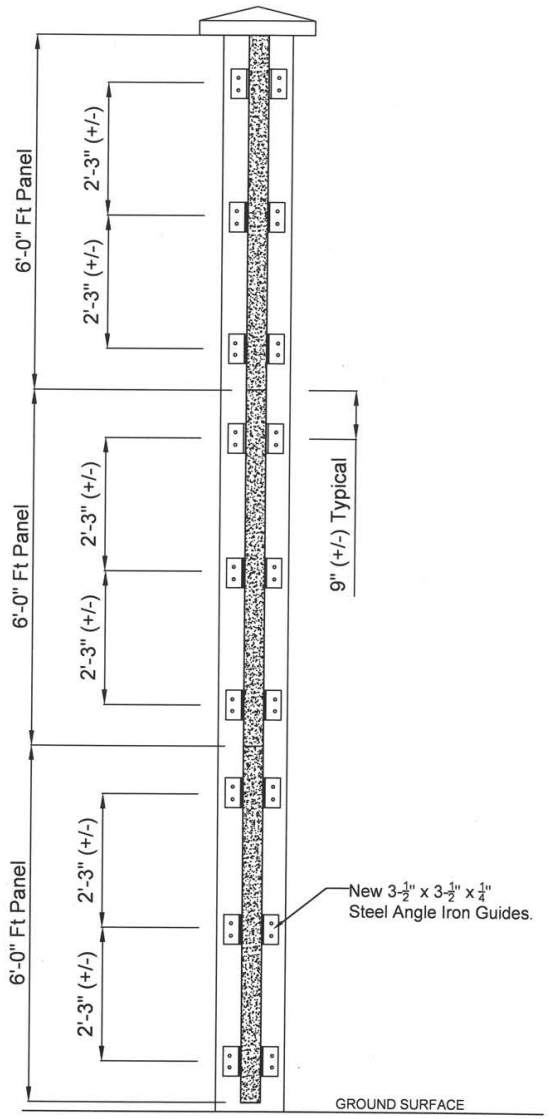
Totals

Grand Total: $ 9,300.00

I hereby agree to all specifications, terms, and conditions of this proposal for contract. Change Order pricing is valid for two (2) weeks from the Created Date listed above.

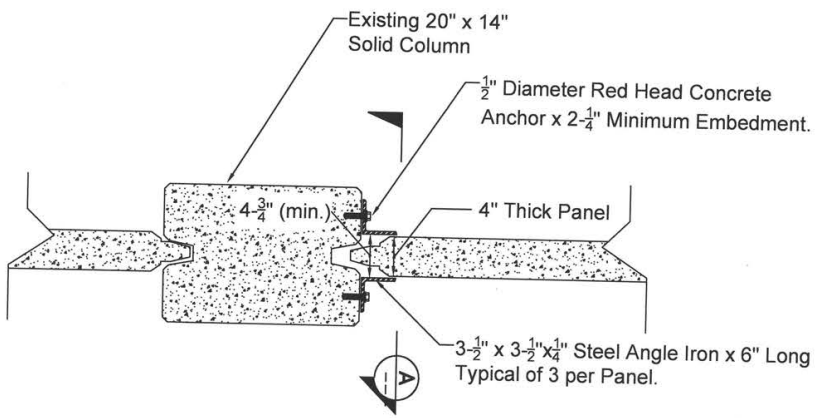
Sold by: Permacast LLC _____ _____
Signature **Date**

Authorized by: _____ _____
Signature **Date**



SECTION A-A

SCALE: ½" = 1'-0"



FOUNDATION SECTION

SCALE: 1" = 1'-0"

GENERAL NOTES:

- STRUCTURAL DESIGN BASED ON THE 2018 INTERNATIONAL BUILDING CODE DESIGN.

FENCE PANELS

- CONTRACTOR TO VERIFY EXISTING WALL AND COLUMN DIMENSIONS AS SHOWN.
- FENCE PANELS SHALL BE INSTALLED PRIOR TO INSTALLING ANGLE IRON GUIDES .

MATERIALS:

- 3-½" x 3-½" x ⅜" STEEL ANGLE IRON SHALL HAVE A MINIMUM Fy OF 36 KSI
- CONCRETE BOLTS SHALL BE WEDGE TYPE BOLTS WITH AN MIN. EFFECTIVE EMBEDMENT OF 2-¼".

PAINTING

- CONTRACTOR SHALL APPLY A MIN. EPOXY HIGH PRIMER FINISH TO STEEL PLATE OF 3-4 MILS AND THEN PAINT AS REQUIRED.

NO.	DATE	REVISION	BY	CK	APP
1	10-19-21	ADDED BRACKETS FOR COLUMNS	RR		RR

REFERENCE DRAWINGS

PERMACAST PRECAST CONCRETE FENCE
Amazon MGE9 Project
3600 Flat Shoals Rd.
Union City, GA 30291
BRACKET DETAILS

JBM & R ENGINEERING, INC.
PO Box 1566 Valrico, FL 33595 Tel: 813.598.4643 (C) 813.741.2109 (O) 813.655.0061 (Fax)
Ralph E. Remmert, P.E.
GA. P.E. #27713

PLOT SCALE: AS NOTED | DWG FILE: amazon | DRAWN BY: RR | DATE: 09-29-21
ACTUAL SCALE: ACTUAL SCALE | CHKD BY: | DATE: 09-29-21 | APP BY: | DATE: 09-29-21
DISCIPLINE: CIVIL | PROJECT: 20214 | SHEET NO: 0 | SHEET 5 | REV: 0

RED HEAD
WEDGE ANCHOR
TECHNICAL DATA

TRUBOLT WEDGE ANCHOR

For projects that need a heavy-duty hold, Red Head Trubolt wedge anchors deliver:

- ICC-ES approvals for use in uncracked concrete (ICC-ES ESR-2251)
- Stainless steel clip provides additional corrosion protection
- A reputation for quality, strength and ease of installation from industry professionals

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ICC-ES Evaluation Report
ESR-2251

Reissued September 2021
Revised June 2022
This report is subject to renewal September 2023.

DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 19—Post-installed Concrete Anchors

REPORT HOLDER:

ITW RED HEAD

ADDITIONAL LISTEE:

ITW BRANDS

EVALUATION SUBJECT:

ITW RED HEAD TRUBOLT CARBON STEEL WEDGE ANCHORS IN CONCRETE

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018 and 2015 *International Building Code®* (IBC)
- 2021, 2018 and 2015 *International Residential Code®* (IRC)

Property evaluated:

Structural

2.0 USES

The RED HEAD Trubolt Wedge Anchors are used to resist static, wind, and earthquake (Seismic Design Categories A and B only) tension and shear loads in uncracked normal-weight concrete and lightweight concrete having a specified compressive strength, f'_c, ranging from 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa). The anchoring system complies with anchors as described in Section 1901.3 of the 2021, 2018 and 2015 IBC. The anchors may also be used where an engineered design is submitted in accordance with Section R301.1.3 of the IRC.

3.0 DESCRIPTION

3.1 RED HEAD Carbon Steel Trubolt Wedge Anchor:

The RED HEAD Trubolt wedge anchor is a zinc plated, torque-controlled expansion anchor, available in $^1/_4$-inch, $^3/_8$-inch and $^1/_2$-inch diameters (6.4, 9.5 and 12.7 mm). The Trubolt wedge anchor consists of a fully threaded stud, expansion clip, nut and washer. The anchor stud is cold-formed from carbon steel materials. The zinc plating on the anchor body complies with ASTM B633 SC1, Type III, with a minimum 0.0002-inch (5 µm) thickness. The expansion clip is fabricated from Type 302 or Type 430 stainless steels. The standard hexagonal nut conforms to ANSI B18.2.2-65, and the washer conforms to ANSI/ASME B18.22.1 1965 (R1981). The anchor stud is threaded throughout the majority of its length and has a wedge section at the far end, around which the expansion clip is formed. The expansion clip, consisting of a split-ring element with a "coined" groove at each end, is shown in Figure 1. During installation of the anchor, the expansion clip engages the walls of the concrete as the wedge portion of the stud is forced upward against the interior of the clip.

3.2 Concrete:

Normal-weight and lightweight concrete must comply with Sections 1903 and 1905 of the IBC.

4.0 DESIGN AND INSTALLATION

4.1 Strength Design:

4.1.1 General: Design strength of anchors in accordance with the 2021 IBC, as well as Section R301.1.3 of the 2021 IRC, must be determined in accordance with ACI 318-19 Chapter 17 and this report.

Design strength of anchors in accordance with the 2018 and 2015 IBC, as well as Section R301.1.3 of the 2018 and 2015 IRC, must be determined in accordance with ACI 318-14 Chapter 17 and this report.

Design parameters and references to ACI 318 are based on the 2021 IBC (ACI 318-19) and on the 2018 and 2015 IBC (ACI 318-14) unless noted otherwise in Sections 4.1.1 through 4.1.11 of this report. The strength design of anchors must comply with ACI 318-19 17.5.1.2 or ACI 318-14 17.3.1, as applicable, except as required in ACI 318-19 17.10 or ACI 318-14 17.2.3, as applicable. A design example in accordance with the 2021, 2018 and 2015 IBC is provided in Figure 4 of this report.

Strength reduction factors, ϕ, as given in ACI 318-19 17.5.3 or ACI 318-14 17.3.3 must be used for load combinations calculated in accordance with Section 1605.1

of the 2021 IBC or Section 1605.2 of the 2018 and 2015 IBC and Section 5.3 of ACI 318 (-19 and -14), as applicable. The value of f'_c used in calculations must be limited to 8,000 psi (55.2 MPa), maximum, in accordance with ACI 318-19 17.3.1 or ACI 318-14 17.2.7 as applicable. Strength reduction factors, ϕ, corresponding to ductile steel elements may be used.

4.1.2 Requirements for Static Steel Strength in Tension, N_{sa}: The nominal static steel strength of a single anchor in tension, N_{sa}, calculated in accordance with ACI 318-19 17.6.1.2 or ACI 318-14 17.4.1.2, as applicable, is given in Table 3 of this report.

4.1.3 Requirements for Static Concrete Breakout Strength in Tension, N_{cb}, N_{cbg}: The nominal concrete breakout strength of a single anchor or group of anchors in tension, N_{cb} or N_{cbg}, respectively, must be calculated in accordance with ACI 318-19 17.6.2 or ACI 318-14 17.4.2, as applicable, with modifications as described in this section. The values of f'_c used for calculation purposes must not exceed 8,000 psi (55.2 MPa). The basic concrete breakout strength of a single anchor in tension, N_b, must be calculated in accordance with ACI 318-19 17.6.2.2 or ACI 318-14 17.4.2.2, using the values of h_{ef} and k_{uncr} as given in Table 3 of this report. The nominal concrete breakout strength in tension in regions where analysis indicates no cracking in accordance with ACI 318-19 17.6.2.5 or ACI 318-14 17.4.2.6 must be calculated with $\psi_{c,N} = 1.0$.

4.1.4 Requirements for Static Pullout Strength in Tension, N_{pn}: The pullout nominal strength in tension for a single anchor in accordance with ACI 318-19 17.6.3.1 and 17.6.3.2.1 or ACI 318-14 17.4.3.1 and 17.4.3.2, respectively, as applicable, in uncracked concrete, $N_{p,uncr}$, is given in Table 4 of this report. For all design cases $\Psi_{c,P} = 1.0$.

4.1.5 Requirements for Static Steel Strength in Shear, V_{sa}: The values of V_{sa} for a single anchor given in Table 3 of this report must be used in lieu of the values of V_{sa} as derived by calculation according to ACI 318-19 17.7.1.2 or ACI 318-14 17.5.1.2, as applicable. The strength reduction factor, ϕ, corresponding to a ductile steel element must be used for the Trubolt anchors as described in Table 3 of this report.

4.1.6 Requirements for Static Concrete Breakout Strength in Shear, V_{cb} or V_{cbg}: The nominal static concrete breakout strength in shear of a single anchor or a group of anchors, V_{cb} or V_{cbg}, respectively, must be calculated in accordance with ACI 318-19 17.7.2 or ACI 318-14 17.5.2, as applicable, with modifications as described in this section. The basic concrete breakout strength in shear of a single anchor in cracked concrete, V_b, must be calculated in accordance with ACI 318-19 17.7.2.2.1 or ACI 318-14 17.5.2.2, as applicable, using the value of d_a, given in Table 2 of this report, and the value h_{ef}, given in Table 3. l_e must be taken as no greater than h_{ef} and in no case must l_e exceed $8d_a$.

4.1.7 Requirements for Static Concrete Pryout Strength of Anchor in Shear, V_{cp} or V_{cpg}: The nominal static concrete pryout strength in shear of a single anchor or groups of anchors, V_{cp} or V_{cpg}, must be calculated in accordance with ACI 318-19 17.7.3 or ACI 318-14 17.5.3, as applicable, modified by using the value of k_{cp} provided in Table 3 of this report and the value of N_{cb} or N_{cbg} as calculated in Section 4.1.3 of this report

4.1.8 Requirements for Minimum Member Thickness, Minimum Anchor Spacing and Minimum Edge Distance: Values of s_{min} and c_{min} as given in Table 2 of this report must be used in lieu of ACI 318-19 17.9.2 or ACI 318-14 17.7.1 and 17.7.3, as applicable. Minimum member thicknesses, h_{min}, as given in Table 2 of this report, must be used in lieu of ACI 318-19 17.9.4 or ACI 318-14 17.7.5, as applicable

4.1.9 Requirements for Critical Edge Distance: In applications where $c < c_{cr}$ and supplemental reinforcement to control splitting of the concrete is not present, the concrete breakout strength in tension for uncracked concrete, calculated according to ACI 318-19 17.6.2 or ACI 318-14 17.4.2, as applicable, must be further multiplied by the factor $\psi_{cp,N}$, as given by the following equation:

$$\Psi_{cp,N} = c / c_{ac} \qquad \text{(Eq-1)}$$

where $c \geq c_{min}$ from Table 2, and whereby the factor $\psi_{cp,N}$ need not be taken as less than $1.5h_{ef} / c_{ac}$. For all other cases, $\psi_{cp,N} = 1.0$. In lieu of ACI 318-19 17.9.5 or ACI 318-14 17.7.6, as applicable, values for c_{ac} must be taken from Table 3 of this report.

4.1.10 Interaction of Tensile and Shear forces: For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318-19 17.8 or ACI 318-14 17.6, as applicable.

4.1.11 Lightweight Concrete: For the use of anchors in lightweight concrete, the modification factor λ_a equal to 0.8λ is applied to all values of $\sqrt{f'_c}$ affecting N_n and V_n.

For ACI 318-19 (2021 IBC) and ACI 318-14 (2018 and 2015 IBC), λ shall be determined in accordance with the corresponding version of ACI 318.

4.2 Allowable Stress Design (ASD):

4.2.1 General: For anchors designed using the allowable stress design load combinations in accordance with 2021 IBC Section 1605.1 or 2018 and 2015 IBC Section 1605.3, allowable loads must be established using Eq-2 and Eq-3:

$$T_{allowable,ASD} = \phi N_n / \alpha \qquad \text{(Eq-2)}$$

and

$$V_{allowable,ASD} = \phi V_n / \alpha \qquad \text{(Eq-3)}$$

where

$T_{allowable,ASD}$ = Allowable tension load (lbf or kN).

$V_{allowable,ASD}$ = Allowable shear load (lbf or kN).

ϕN_n = Lowest design strength of an anchor or anchor group in tension as determined in accordance with ACI 318 (-19 and -14) Chapter 17 and 2021, 2018 and 2015 IBC Section 1905.1.8, with amendments in Section 4.1 of this report, as applicable (lb or kN).

ϕV_n = Lowest design strength of an anchor or anchor group in shear as determined in accordance with ACI 318 (-19 and -14) Chapter 17 and 2021, 2018 and 2015 IBC Section 1905.1.8, and Section 4.1 of this report as applicable. (lb or kN).

α = Conversion factor calculated as a weighted average of the load factors for the controlling load combination. In addition, α must include all applicable factors to account for nonductile failure modes and required over-strength.

The requirements for member thickness, edge distance and spacing, as described in this report, must apply. An example of allowable stress design values for illustrative purposes is shown in Table 5 of this report.

4.2.2 Interaction of Tensile and Shear Forces: In lieu of ACI 318-19 17.8 or ACI 318-14 17.6, interaction must be calculated as follows:

For shear loads $V \leq 0.2\ V_{allowable,\ ASD}$, the full allowable load in tension $T_{allowable,\ ASD}$ may be taken.

For tension loads $T \leq 0.2\ T_{allowable,\ ASD}$, the full allowable load in shear $V_{allowable,\ ASD}$ may be taken.

For all other cases, Eq-4 applies:

$$T/T_{allowable,\ ASD} + V/V_{allowable,\ ASD} \leq 1.2 \qquad \text{(Eq-4)}$$

4.3 Installation:

The anchors must be installed in accordance with the manufacturer's printed installation instructions (MPII) as depicted in Figure 3, and this report. Anchor locations must comply with this report and the plans and specifications approved by the code official. Embedment, spacing, edge distance, and concrete thickness are shown in Figure 2, and Tables 2 and 3. Holes must be predrilled in concrete with a compressive strength from 2,500 to 8,500 psi (17.2 to 58.6 MPa), using carbide-tipped masonry drill bits complying with ANSI B212.15-1994. The nominal drill bit diameter must be equal to the anchor diameter. The drilled hole depth, h_o, must exceed the required embedment in concrete as noted in Table 2. The hole must be cleaned with pressurized air or vacuum prior to installation of the anchor. The anchors must be hammered into the predrilled hole to the required embedment depth in concrete. A standard hexagonal nut and washer must be used over the material being fastened and the nut tightened (three to five turns) until the minimum installation torque, as specified in Table 2, is reached.

4.4 Special Inspection:

Periodic special inspection is required, in accordance with Section 1705.1.1 and Table 1705.3 of the 2021, 2018 and 2015 IBC. The special inspector must make periodic inspections during anchor installation to verify anchor type, anchor dimensions, concrete type, concrete compressive strength, hole dimensions, hole cleaning procedures, anchor spacing, edge distance, concrete member thickness, anchor embedment, tightening torque. And adherence to the manufacturer's printed installation instructions. The special inspector must be present as often as required in accordance with the "statement of special inspection". Under the IBC, additional requirements as set forth in Sections 1705, 1706, and 1707 must be observed, where applicable.

5.0 CONDITIONS OF USE

The Trubolt Wedge Anchors described in this report comply with, or are suitable alternatives to what is specified in, the codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Anchor sizes, dimensions, and installation are as set forth in this report.

5.2 The anchors must be installed in accordance with the manufacturer's printed installation instructions and this report in uncracked normal-weight or lightweight concrete having a specified compressive strength, f'_c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa). In case of conflict, this report governs.

5.3 The values of f'_c used for calculation purposes must not exceed 8,000 psi (55.1 MPa).

5.4 Strength design values must be established in accordance with Section 4.1 of this report.

5.5 Allowable design values are established in accordance with Section 4.2 of this report.

5.6 Anchor spacing and edge distance, as well as minimum member thickness, must comply with Table 2 and Table 3 of this report.

5.7 Prior to installation, calculations and details justifying that the applied loads comply with this report must be submitted to the building official for approval. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed

5.8 Since an ICC-ES acceptance criteria for evaluating data to determine the performance of expansion anchors subjected to fatigue or shock loading is unavailable at this time, the use of these anchors under such conditions is beyond the scope of this report.

5.9 The use of Trubolt anchors is limited to installation in uncracked normal-weight and lightweight concrete. Anchors may not be installed in regions of a concrete member where cracking has occurred or where analysis indicates cracking may occur at service load levels, subject to the conditions of this report.

5.10 Anchors used to resist seismic loads are limited to locations designated as Seismic Design Categories A and B.

5.11 Anchors may be used to resist short-term loading due to wind forces, subject to the conditions of this report.

5.12 Where not otherwise prohibited in the code, Trubolt wedge anchors are permitted for use with fire-resistance-rated construction provided that at least one of the following conditions is fulfilled:

- Anchors are used to resist wind or seismic forces only.
- Anchors that support a fire-resistance-rated envelope or a fire-resistance-rated membrane are protected by approved fire-resistance-rated materials, or have been evaluated for resistance to fire exposure in accordance with recognized standards.
- Anchors are used to support nonstructural elements.

5.13 Use of zinc-coated carbon steel anchors is limited to dry, interior locations.

5.14 Special inspections are provided in accordance with Section 4.4 of this report.

5.15 Anchors are manufactured under an approved quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Mechanical Anchors in Concrete Elements (AC193), dated October 2017 (Editorially revised in December 2020) for use in uncracked concrete; and quality control documentation.

7.0 IDENTIFICATION

7.1 The concrete anchors are identified by their dimensional characteristics, the anchor size, and by the length code stamped on the anchor, as indicated in Table 1. Packages are identified with the anchor type and size, the manufacturer's name and address, and the evaluation report number (ESR-2251).

7.2 The report holder's contact information is the following:

ITW RED HEAD
155 HARLEM AVENUE, N4E
GLENVIEW, ILLINOIS 60025
(800) 848-5611
www.itw-redhead.com
techsupport@itwccna.com

7.3 The additional listee's contact information is the following:

ITW BRANDS
155 HARLEM AVENUE, N3E
GLENVIEW, ILLINOIS 60025
(877) 489-2726
www.itwbrands.com

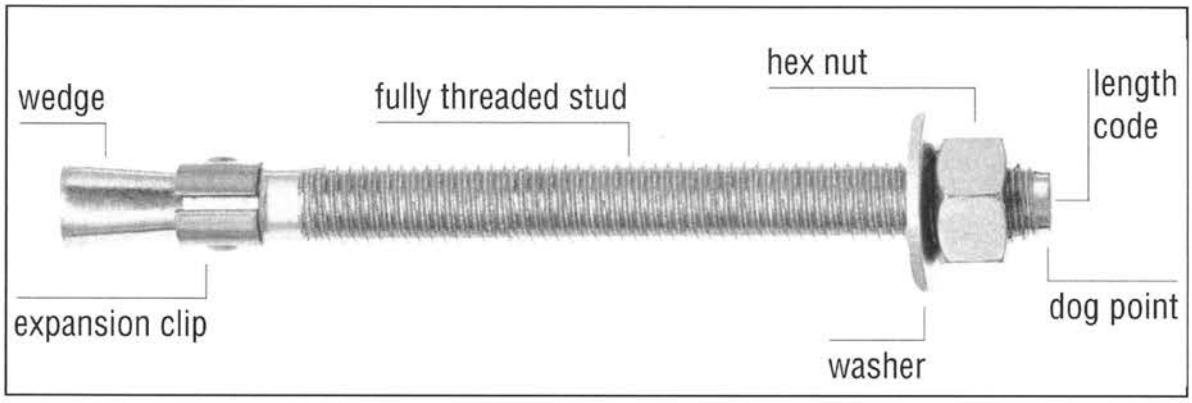


FIGURE 1—ITW RED HEAD TRUBOLT WEDGE ANCHOR

TABLE 1—LENGTH IDENTIFICATION SYSTEM

LENGTH ID MARKING ON ANCHOR HEAD		UNITS	A	B	C	D	E	F	G	H	I	J
Length of anchor, ℓ_{anch}	From	in. (mm)	1 1/2 (38.1)	2 (50.8)	2 1/2 (63.5)	3 (76.2)	3 1/2 (88.9)	4 (101.6)	4 1/2 (114.3)	5 (127.0)	5 1/2 (139.7)	6 (152.4)
	Up to, but not including	in. (mm)	2 (50.8)	2 1/2 (63.5)	3 (76.2)	3 1/2 (88.9)	4 (101.6)	4 1/2 (114.3)	5 (127.0)	5 1/2 (139.7)	6 (152.4)	6 1/2 (165.1)

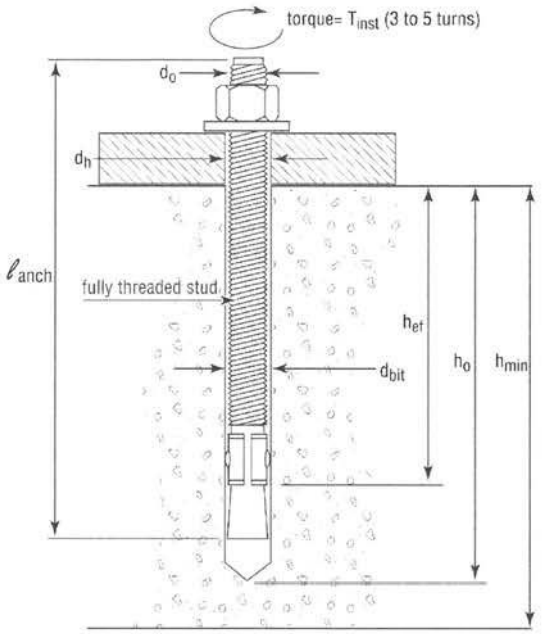
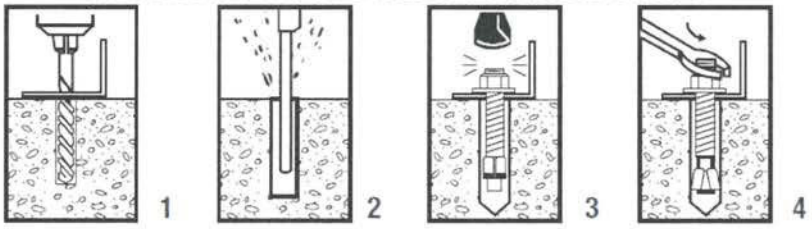


FIGURE 2—ITW RED HEAD TRUBOLT WEDGE ANCHOR (INSTALLED)

MANUFACTURER'S INSTALLATION STEPS



1. Select a carbide drill bit with a diameter equal to the anchor diameter. Drill hole at least 1/4" deeper than nominal anchor embedment.
2. Clean hole with pressurized air or vacuum to remove any excess dust/debris.
3. Using the washer and nut provided, assemble the anchor, leaving nut one half turn from the end of anchor to protect threads. Drive anchor through fixture to be fastened until washer is flush to surface of fixture.
4. Expand anchor by tightening nut to the specified setting torque - see Table (approx 3 to 5 full revolutions).

FIGURE 3—INSTALLATION INSTRUCTIONS

TABLE 2—ITW TRUBOLT WEDGE ANCHOR INSTALLATION INFORMATION

	SYMBOL	UNITS	NOMINAL ANCHOR DIAMETER (in.)					
			1/4		3/8		1/2	
Anchor outer diameter	d_a	in. (mm)	0.25 (6.4)		0.375 (9.5)		0.5 (12.7)	
Nominal carbide bit diameter	d_{bit}	in. (mm)	1/4		3/8		1/2	
Effective embedment depth	h_{ef}	in. (mm)	1 1/2 (38)	2 (51)	1 3/4 (44)	2 5/8 (67)	1 7/8 (48)	3 3/8 (86)
Nominal Embedment depth	h_{nom}	in. (mm)	1 3/4 (44)	2 1/4 (57)	2 1/4 (57)	3 1/8 (79)	2 1/2 (64)	4 (102)
Minimum hole depth	h_o	in. (mm)	2 (51)	2 1/2 (64)	2 1/2 (64)	3 3/8 (86)	2 3/4 (70)	4 1/4 (108)
Minimum concrete member thickness	h_{min}	in. (mm)	4 (102)		4 (102)	5 (127)	5 (127)	6 (152)
Critcial edge distance	c_{ac}	in. (mm)	2 5/8 (67)	3 (76)	2 5/8 (67)	5 1/4 (133)	3 3/4 (95)	6 3/4 (171)
Minimum edge distance	c_{min}	in. (mm)	1 3/4 (44)	1 1/2 (38)	2 1/4 (57)	2 (51)	3 3/4 (95)	3 3/4 (95)
Minimum anchor spacing	s_{min}	in. (mm)	1 3/4 (44)	1 1/2 (38)	2 1/4 (57)	2 (51)	3 3/4 (95)	3 3/4 (95)
Installation torque	T_{inst}	ft-lb (N-m)	4 (5)		25 (34)		55 (75)	
Reference (attachment) hole diameter	d_h	in. (mm)	5/16 (7.9)		7/16 (11.1)		9/16 (14.3)	

TABLE 3—ITW TRUBOLT WEDGE ANCHOR DESIGN INFORMATION[1,2,3]

DESIGN INFORMATION	SYMBOL	UNITS	NOMINAL ANCHOR DIAMETER					
			1/4		3/8		1/2	
Anchor O.D.	d_o	in	0.250		0.375		0.500	
		mm	6.4		9.5		12.7	
Effective min. embedment	h_{ef}	in	1 1/2	2	1 3/4	2 5/8	1 7/8	3 3/8
		mm	38	51	44	67	48	86
Minimum member thickness	h_{min}	in	4	4	4	5	5	6
		mm	102	102	102	127	127	152
Installation Torque	T_{inst}	ft-lb	4		25		55	
		N-m	5		34		75	
Critcial edge distance	c_{ac}	in	2 5/8	3	2 5/8	5 1/4	3 3/4	6 3/4
		mm	67	76	67	133	95	171
Minimum edge distance	c_{min}	in	1 3/4	1 1/2	2 1/4	2	3 3/4	3 3/4
		mm	44	38	57	51	95	95
Minimum anchor spacing	s_{min}	in	1 3/4	1 1/2	2 1/4	2	3 3/4	3 3/4
		mm	44	38	57	51	95	95
Min. hole depth in concrete	h_o	in	2	2 1/2	2 1/2	3 3/8	2 3/4	4 1/4
		mm	51	64	64	86	70	108
Min. Specified Yield Strength	f_{ya}	lb/in²	55,000					
		N/mm²	379					
Min. Specified Ultimate Strength	f_{uta}	lb/in²	75,000					
		N/mm²	517					
Effective tensile stress area	$A_{se,N}$	in²	0.032		0.078		0.142	
		mm²	20.5		50.0		91.5	
Effective shear stress area	$A_{se,V}$	in²	0.032		0.078		0.142	
		mm²	20.5		50.0		91.5	
Steel strength in tension	N_{sa}	lb	2385		5815		10645	
		kN	10.6		25.9		47.3	
Steel strength in shear	V_{sa}	lb	1430		2975	3490	4450	6385
		kN	6.4		13.2	15.5	19.8	28.4
Pullout strength, uncracked concrete	$N_{p,uncr}$	lb	See Table 4					
		kN						
Anchor Category			1					
Effectiveness factor k_{uncr} uncracked concrete[5]			24					
Coefficient for pryout strength	k_{cp}	-	1.0	1.0	1.0	2.0	1.0	2.0
Axial stiffness in service load range	β	lb/in	14,651	9,385	17,515	26,424	32,483	26,136
		kN/mm	2.6	1.6	3.1	4.6	5.7	4.6
Coefficient of variation for axial stiffness in service load range			34	47	28	45	17	33
Strength reduction factor for tension, steel failure modes	ϕ	—	0.75					
Strength reduction factor for shear, steel failure modes	ϕ	—	0.65					
Strength reduction factor for tension, concrete failure modes[4]	ϕ	—	0.65					
Strength reduction factor for shear, concrete failure modes[4]	ϕ	—	0.70					

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 Mpa. For pound-inch units: 1 mm = 0.03937 inch.

[1]The data in this table is intended to be used with the design provisions of ACI 318 (-19 and -14) Chapter 17, as applicable.
[2]Installation must comply with the manufacturers printed installation instructions and details, and this report.
[3]The Trubolt Wedge Anchors are ductile steel elements as defined by ACI 318 (-19 and -14) 2.3, as applicable.
[4]The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3 or ACI 318-14 17.3.3, as applicable, are met.
[5]For all design cases $\Psi_{c,N}$ = 1.0. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) must be used.

TABLE 4—ITW TRUBOLT WEDGE ANCHOR PULLOUT STRENGTH, $N_{p,uncr}$ [1,2]

NOMINAL ANCHOR DIAMETER (in.)	EFFECTIVE EMBEDMENT DEPTH (in.)	CONCRETE COMPRESSIVE STRENGTH			
		f'c = 2,500 psi	f'c = 3,000 psi	f'c = 4,000 psi	f'c = 6,500 psi
1/4	1 1/2	1,392	1,525	1,610	1,822
	2	1,706	1,869	1,947	2,151
3/8	1 3/4	2,198	2,408	2,621	3,153
	2 5/8	3,469	3,800	3,936	4,275
1/2	1 7/8	2,400	2,629	3,172	4,520
	3 3/8	4,168	4,520	4,520	4,520

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa.

[1] Values are for single anchors with no edge distance or spacing reduction.
[2] The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3 or ACI 318-14 17.3.3, as applicable, are met.

TABLE 5—EXAMPLE RED HEAD TRUBOLT WEDGE ANCHOR ALLOWABLE STRESS DESIGN (ASD) VALUES FOR ILLUSTRATIVE PURPOSES[1,2,3,4,5,6,7,8,9]

NOMINAL ANCHOR DIAMETER (in.)	EFFECTIVE EMBEDMENT DEPTH (in.)	CONCRETE COMPRESSIVE STRENGTH			
		f'c = 2,500 psi	f'c = 3,000 psi	f'c = 4,000 psi	f'c = 6,500 psi
1/4	1 1/2	610	670	705	800
	2	750	820	855	945
3/8	1 3/4	965	1,060	1,150	1,385
	2 5/8	1,525	1,670	1,730	1,880
1/2	1 7/8	1,055	1,155	1,395	1,985
	3 3/8	1,830	1,985	1,985	1,985

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa.

Design assumptions:

[1] Single anchor with static tension load only.
[2] Concrete determined to remain uncracked for the life of the anchorage.
[3] Load combinations are in accordance with ACI 318 (-19 and -14) Section 5.3, as applicable, and no seismic loading.
[4] 30 percent dead load and 70 percent live load, controlling load combination $1.2D + 1.6L$.
[5] Calculation of weighted average for α: $1.2D + 1.6L = 1.2(0.3) + 1.6(0.7) = 1.48$.
[6] f'_c = 2,500 psi (normal-weight concrete).
[7] $c_{a1} = c_{a2} >= c_{ac}$.
[8] $h \geq h_{min}$.
[9] Values are for Condition B where supplementary reinforcement in accordance with ACI 318-19 17.5.3 or ACI 318-14 17.3.3(c), as applicable, is not provided.

Illustrative Procedure to Calculate Allowable Stress Design Tension Value:

RED HEAD Trubolt Wedge Anchor $^1/_2$ inch diameter using an effective embedment of $3^3/_8$ inches, assuming the given conditions in Table 5 for f'_c =2,500 psi normal-weight concrete, in accordance with ACI 318-19 Chapter 17, ACI 318-14 Chapter 17 and this report.

	PROCEDURE		CALCULATION
Step 1	Calculate steel strength of a single anchor in tension per ACI 318-19 17.6.1.2, ACI 318-14 Section 17.4.1.2, Table 3 of this report	ϕN_{sa}	$= \phi N_{sa}$ =0.75*10,645 **=7,984 lb (steel strength)**
Step 2	Calculate concrete breakout strength of a single anchor in tension per ACI 318-19 17.6.2.1, ACI 318-14 Section 17.4.2.1, Table 3 of this report	N_b	= 7,440 lbs
		ϕN_{cb}	$=\phi A_{Nc}/A_{Nc0}\,\psi_{ed,N}\,\psi_{c,N}\,\psi_{cp,N}\,N_b$ = 0.65*(103/103)*1.0*1.0*1.0*7,440 = 0.65*7,440 **= 4,836 lb (concrete breakout strength)**
Step 3	Calculate pullout strength in tension per ACI 318-19 17.6.3.2.1 ACI 318-14 Section 17.4.3.2 and Table 5 of this report	ϕN_{pn}	$= \phi N_{p,uncr}$ = 0.65*4,168 **= 2,709 lb (pullout strength)**
Step 4	Determine controlling resistance strength in tension per ACI 318-19 17.5.2, ACI 318-14 Section 17.3.1.1		**= 2,709 lb (controlling resistance)**
Step 5	Calculate allowable stress design conversion factor for loading condition per ACI 318-19 and ACI 318-14 Section 5.3:	α	=1.2D + 1.6L =1.2(0.3) + 1.6(0.7) **=1.48**
Step 6	Calculate allowable stress design value per Section 4.2 of this report	$T_{allowable,ASD}$	$= \phi N_n / \alpha$ = 2,709 / 1.48 **= 1,830 lb (allowable stress design)**

FIGURE 4—DESIGN EXAMPLE

ICC EVALUATION SERVICE®

ICC-ES Evaluation Report

ESR-2251 FBC Supplement

Reissued September 2021
Revised June 2022
This report is subject to renewal September 2023.

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DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 19—Post-Installed Concrete Anchors

REPORT HOLDER:

ITW RED HEAD

EVALUATION SUBJECT:

ITW RED HEAD TRUBOLT CARBON STEEL WEDGE ANCHORS IN CONCRETE

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the RED HEAD Trubolt Wedge Anchors, described in ICC-ES evaluation report ESR-2251, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2020 *Florida Building Code—Building*
- 2020 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The RED HEAD Trubolt Wedge Anchors, described in Sections 2.0 through 7.0 of the evaluation report ESR-2251, comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*. The design requirements shall be determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-2251 for the 2018 *International Building Code®* meet the requirements of the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable.

Use of the RED HEAD Trubolt Wedge Anchors for compliance with the High-Velocity Hurricane Zone Provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential* has not been evaluated and is outside the scope of this supplement.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official, when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, reissued September 2021 and revised June 2022.

STANTEC PHOTOGRAPHS

NO. 1 - DROPPED PRECAST WALL PANEL AT 3512 CLUB COURSE DRIVE, BETWEEN COLUMNS 13NM AND 14NM, AS VIEWED FROM WATER TOWER ROAD

NO. 2 - COLUMN 13NM - DROPPED PRECAST PANEL WITH A CRACKED AND SPALLED TOP

NO. 3 - COLUMN 13NM - DROPPED PRECAST PANEL WITH A CRACKED AND SPALLED TOP

NO. 4 - COLUMN 13NM - DROPPED PRECAST PANEL WITH A SEVERELY CRACKED AND SPALLED TONGUE

NO. 5 - COLUMN 13NM - DROPPED PRECAST SOUTH PANEL AND ELEVATED PRECAST NORTH PANEL

NO. 6 - COLUMN 13NM - DROPPED PRECAST PANEL WITH A 1" GAP AT THE TOP AND A 2 7/8" GAP AT THE BOTTOM

NO. 7 - COLUMN 13NM - DROPPED PRECAST PANEL WITH A 1" GAP AT THE TOP AND A 2 7/8" GAP AT THE BOTTOM

NO. 8 - COLUMN 14NM, AS VIEWED FROM WATER TOWER ROAD

NO. 9 - COLUMN 14NM - BASE OF ADJACENT PRECAST WALL PANELS

NO. 10 - COLUMN 14NM - DROPPED PRECAST PANEL WITH A 2 7/8" GAP AT THE TOP AND A 1" GAP AT THE BOTTOM

NO. 11 - COLUMN 14NM - DROPPED PRECAST PANEL WITH A 2 7/8" GAP AT THE TOP AND A 1" GAP AT THE BOTTOM

NO. 12 - COLUMN 3N - TYPICAL PRECAST COLUMN FOUNDATION

NO. 13 - COLUMN 3N - TYPICAL PRECAST COLUMN FOUNDATION

NO. 14 - COLUMN 3N - TYPICAL PRECAST COLUMN FOUNDATION

NO. 15 - COLUMN 3N - TYPICAL WALL PANEL BEARING CONDITIONS AT A GROUT PEDESTAL, AND AT A GROUT PEDESTAL WITH 2" x 2" NEOPRENE BEARING PADS

NO. 16 - COLUMN 3N - TYPICAL WALL PANEL BEARING CONDITION AT A GROUT PEDESTAL WITH 2" x 2" NEOPRENE BEARING PADS

NO. 17 - COLUMN 3N - TYPICAL WALL PANEL BEARING CONDITION AT A GROUT PEDESTAL WITH 2" x 2" NEOPRENE BEARING PADS

NO. 18 - COLUMN 17N - FIELD MEASURED COLUMN AND WALL PANEL TONGUE

NO. 19 - COLUMN 17N - FIELD MEASURED COLUMN AND WALL PANEL TONGUE

NO. 20 - COLUMN 22N - FIELD MEASURED COLUMN AND WALL PANEL TONGUE

NO. 21 - COLUMN 22N - FIELD MEASURED COLUMN AND WALL PANEL TONGUE

NO. 22 - COLUMN 22N - FIELD MEASURED COLUMN AND WALL PANEL TONGUE

NO. 23 - STORED EXCESS WALL PANELS

NO. 24 - STORED EXCESS WALL PANELS

NO. 25 - STORED EXCESS WALL PANELS

NO. 26 - STORED EXCESS WALL PANELS - TYPICAL TONGUE DIMENSIONS

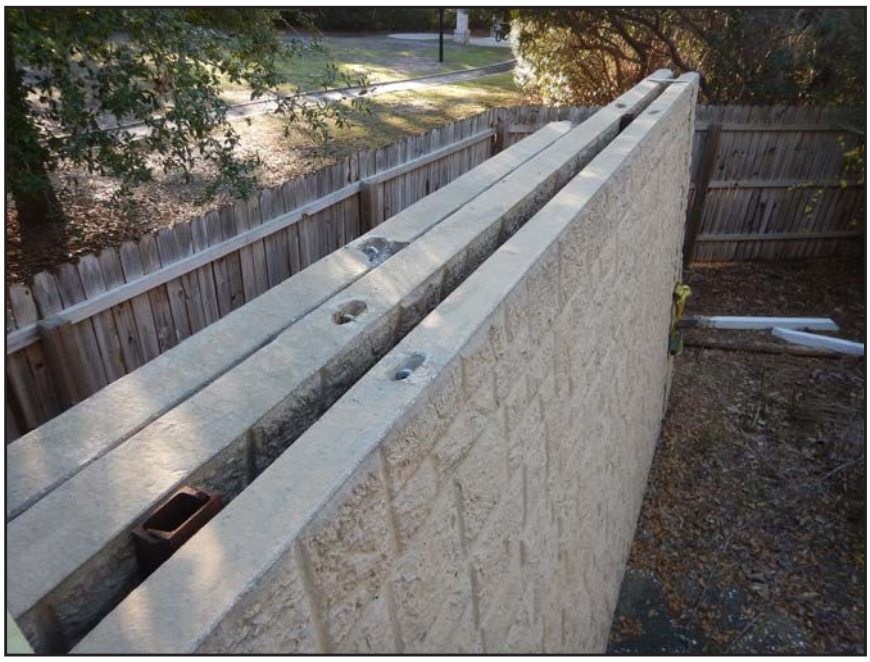
NO. 27 - STORED EXCESS WALL PANELS - TYPICAL TONGUE DIMENSIONS

NO. 28 - STORED EXCESS WALL PANELS - TYPICAL TONGUE DIMENSIONS

NO. 29 - STORED EXCESS WALL PANELS - TYPICAL TONGUE DIMENSIONS

NO. 30 - STORED EXCESS WALL PANELS - TYPICAL TONGUE DIMENSIONS

NO. 31 - STORED EXCESS WALL PANELS - TYPICAL TONGUE DIMENSIONS



NO. 32 - STORED EXCESS WALL PANELS - TYPICAL LIFTING EYES

NO. 33 - STORED EXCESS WALL PANELS - TYPICAL LIFTING EYES

NO. 34 - STORED EXCESS WALL PANELS - TYPICAL LIFTING EYE

NO. 35 - STORED EXCESS WALL PANELS - TONGUE REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 36 - STORED EXCESS WALL PANEL - TONGUE REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 37 - STORED EXCESS WALL PANEL - TONGUE REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 38 - STORED EXCESS WALL PANEL - TONGUE REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 39 - STORED EXCESS WALL PANELS

NO. 40 - STORED EXCESS WALL PANEL - TONGUE REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 41 - STORED EXCESS WALL PANEL - TONGUE REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 42 - SAW CUT STORED EXCESS WALL PANEL - TYPICAL HORIZONTAL REINFORCING BARS

NO. 43 - SAW CUT STORED EXCESS WALL PANEL - TYPICAL HORIZONTAL REINFORCING BARS

NO. 44 - SAW CUT STORED EXCESS WALL PANEL - TYPICAL HORIZONTAL REINFORCING BARS

NO. 45 - SAW CUT STORED EXCESS WALL PANEL - TYPICAL HORIZONTAL REINFORCING BARS

NO. 46 - SAW CUT STORED EXCESS WALL PANEL - TYPICAL HORIZONTAL REINFORCING BARS

NO. 47 - SAW CUT STORED EXCESS WALL PANEL - TYPICAL HORIZONTAL REINFORCING BARS

NO. 48 - STORED EXCESS PRECAST COLUMN

NO. 49 - STORED EXCESS PRECAST COLUMN

NO. 50 - STORED EXCESS PRECAST COLUMN

NO. 51 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM

NO. 52 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM

NO. 53 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM - TONGUE REINFORCING DOWEL WITH INADEQUATE CONCRETE COVER

NO. 54 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM - TONGUE REINFORCING DOWEL WITH INADEQUATE CONCRETE COVER

NO. 55 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM - TONGUE REINFORCING DOWEL WITH INADEQUATE CONCRETE COVER

NO. 56 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM - TONGUE REINFORCING DOWEL WITH INADEQUATE CONCRETE COVER

NO. 57 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM - TONGUE REINFORCING DOWEL WITH INADEQUATE CONCRETE COVER

NO. 58 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM - TONGUE REINFORCING DOWEL WITH INADEQUATE CONCRETE COVER

NO. 59 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM - TONGUE REINFORCING DOWEL WITH INADEQUATE CONCRETE COVER

NO. 60 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM - TONGUE REINFORCING DOWEL WITH INADEQUATE CONCRETE COVER

NO. 61 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM - EMBEDDED ZIP TIES

NO. 62 - SPALLED WALL PANEL ON THE SOUTH SIDE OF COLUMN 13NM - EMBEDDED ZIP TIES

NO. 63 - COLUMN 2N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 64 - COLUMN 2N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 65 - COLUMN 2N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 66 - COLUMN 11N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 67 - COLUMN 11N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 68 - COLUMN 11N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 69 - COLUMN 52N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 70 - COLUMN 52N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 71 - COLUMN 10NM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 72 - COLUMN 10NM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 73 - COLUMN 10NM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 74 - COLUMN 14NM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 75 - COLUMN 14NM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 76 - COLUMN 2SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 77 - COLUMN 2SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 78 - COLUMN 2SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 79 - COLUMN 3SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 80 - COLUMN 3SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 81 - COLUMN 3SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 82 - COLUMN 15SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 83 - COLUMN 15SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 84 - COLUMN 15SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 85 - COLUMN 22SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 86 - COLUMN 22SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 87 - COLUMN 22SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 88 - COLUMN 8S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 89 - COLUMN 8S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 90 - COLUMN 33S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 91 - COLUMN 33S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 92 - COLUMN 33S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 93 - COLUMN 33S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 94 - COLUMN 46S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 95 - COLUMN 46S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 96 - COLUMN 51SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 97 - COLUMN 64SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 98 - COLUMN 64SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 99 - COLUMN 66S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 100 - COLUMN 67SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 101 - COLUMN 67SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 102 - COLUMN 67SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 103 - COLUMN 78SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 104 - COLUMN 78SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 105 - COLUMN 78SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A 2" x 2" NEOPRENE BEARING PAD

NO. 106 - COLUMN 8N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 107 - COLUMN 10N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 108 - COLUMN 25N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 109 - COLUMN 41N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 110 - COLUMN 43N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 111 - COLUMN 43N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 112 - COLUMN 45N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 113 - COLUMN 45N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 114 - COLUMN 53N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 115 - COLUMN 55N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 116 - COLUMN 55N - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 117 - COLUMN 5NM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 118 - COLUMN 11NM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 119 - COLUMN 12NM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 120 - COLUMN 25SM - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 121 - COLUMN 2S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 122 - COLUMN 2S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 123 - COLUMN 4S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 124 - COLUMN 4S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 125 - COLUMN 12S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 126 - COLUMN 12S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 127 - COLUMN 20S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 128 - COLUMN 28S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 129 - COLUMN 37S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 130 - COLUMN 40S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 131 - COLUMN 42S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 132 - COLUMN 42S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 133 - COLUMN 53S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 134 - COLUMN 55S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 135 - COLUMN 58S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 136 - COLUMN 61S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 137 - COLUMN 61S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 138 - COLUMN 62S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 139 - COLUMN 67S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 140 - COLUMN 67S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 141 - COLUMN 69S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 142 - COLUMN 73S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 143 - COLUMN 73S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 144 - COLUMN 73S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 145 - COLUMN 75S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 146 - COLUMN 75S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 147 - COLUMN 75S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 148 - COLUMN 76S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 149 - COLUMN 76S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 150 - COLUMN 76S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 151 - COLUMN 78S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 152 - COLUMN 78S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 153 - COLUMN 79S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 154 - COLUMN 80S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 155 - COLUMN 82S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 156 - COLUMN 82S - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 157 - COLUMN 6SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 158 - COLUMN 9SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 159 - COLUMN 13SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 160 - COLUMN 13SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 161 - COLUMN 16SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 162 - COLUMN 16SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 163 - COLUMN 21SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 164 - COLUMN 24SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 165 - COLUMN 26SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 166 - COLUMN 27SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 167 - COLUMN 29SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 168 - COLUMN 32SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 169 - COLUMN 32SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 170 - COLUMN 33SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 171 - COLUMN 35SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 172 - COLUMN 43SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 173 - COLUMN 45SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 174 - COLUMN 50SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 175 - COLUMN 56SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 176 - COLUMN 64SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 177 - COLUMN 64SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 178 - COLUMN 65SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 179 - COLUMN 66SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 180 - COLUMN 69SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 181 - COLUMN 71SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 182 - COLUMN 71SS - INADEQUATE BEARING OF A PRECAST WALL PANEL ON A FAILED GROUT PEDESTAL OR A FAILED PRECAST TONGUE

NO. 183 - COLUMN 3N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 184 - COLUMN 12N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 185 - COLUMN 12N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 186 - COLUMN 14N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 187 - COLUMN 18N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 188 - COLUMN 20N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 189 - COLUMN 20N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 190 - COLUMN 28N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 191 - COLUMN 30N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 192 - COLUMN 35N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 193 - COLUMN 36N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 194 - COLUMN 36N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 195 - COLUMN 54N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 196 - COLUMN 57N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 197 - COLUMN 57N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 198 - COLUMN 57N - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 199 - COLUMN 2NM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 200 - COLUMN 2NM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 201 - COLUMN 2NM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 202 - COLUMN 7NM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 203 - COLUMN 9NM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 204 - COLUMN 9NM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 205 - COLUMN 11NM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 206 - COLUMN 14NM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 207 - COLUMN 6SM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 208 - COLUMN 6SM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 209 - COLUMN 8SM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 210 - COLUMN 11SM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 211 - COLUMN 19SM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 212 - COLUMN 21SM - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 213 - COLUMN 4S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 214 - COLUMN 4S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 215 - COLUMN 10S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 216 - COLUMN 12S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 217 - COLUMN 13S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 218 - COLUMN 24S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 219 - COLUMN 28S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 220 - COLUMN 29S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 221 - COLUMN 29S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 222 - COLUMN 34S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 223 - COLUMN 35S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 224 - COLUMN 37S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 225 - COLUMN 41S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 226 - COLUMN 41S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 227 - COLUMN 42S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 228 - COLUMN 42S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 229 - COLUMN 47S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 230 - COLUMN 47S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 231 - COLUMN 53S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 232 - COLUMN 58S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 233 - COLUMN 63S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 234 - COLUMN 68S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 235 - COLUMN 69S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 236 - COLUMN 70S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 237 - COLUMN 72S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 238 - COLUMN 75S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 239 - COLUMN 76S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 240 - COLUMN 79S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 241 - COLUMN 79S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 242 - COLUMN 79S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 243 - COLUMN 80S - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 244 - COLUMN 6SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 245 - COLUMN 6SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 246 - COLUMN 6SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 247 - COLUMN 13SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 248 - COLUMN 18SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 249 - COLUMN 24SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 250 - COLUMN 27SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 251 - COLUMN 28SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 252 - COLUMN 28SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 253 - COLUMN 32SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 254 - COLUMN 46SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 255 - COLUMN 47SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 256 - COLUMN 51SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 257 - COLUMN 51SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 258 - COLUMN 55SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 259 - COLUMN 55SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 260 - COLUMN 71SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 261 - COLUMN 80SS - INSUFFICIENT SEATING OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 262 - COLUMN 22N - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 263 - COLUMN 22N - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 264 - COLUMN 22N - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 265 - COLUMN 7NM - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 266 - COLUMN 11NM - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 267 - COLUMN 17SM - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 268 - COLUMN 17SM - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 269 - COLUMN 24SM - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 270 - COLUMN 25SM - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 271 - COLUMN 26SM - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 272 - COLUMN 4S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 273 - COLUMN 10S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 274 - COLUMN 10S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 275 - COLUMN 23S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 276 - COLUMN 28S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 277 - COLUMN 31S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 278 - COLUMN 34S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 279 - COLUMN 41S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 280 - COLUMN 42S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 281 - COLUMN 45S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 282 - COLUMN 45S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 283 - COLUMN 53S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 284 - COLUMN 59S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 285 - COLUMN 66S - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 286 - COLUMN 50SS - INADEQUATE SHIMS STABILIZING A WALL PANEL TO COLUMN CONNECTION AT EXCESSIVE PLAY BETWEEN ADJACENT MEMBERS

NO. 287 - COLUMN 9N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 288 - COLUMN 10N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 289 - COLUMN 28N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 290 - COLUMN 28N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 291 - COLUMN 33N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 292 - COLUMN 33N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 293 - COLUMN 44N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 294 - COLUMN 44N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 295 - COLUMN 47N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 296 - COLUMN 49N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 297 - COLUMN 49N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 298 - COLUMN 49N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 299 - COLUMN 50N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 300 - COLUMN 50N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 301 - COLUMN 50N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 302 - COLUMN 50N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 303 - COLUMN 51N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 304 - COLUMN 51N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 305 - COLUMN 56N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 306 - COLUMN 56N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 307 - COLUMN 56N - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 308 - COLUMN 5NM - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 309 - COLUMN 7NM - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 310 - COLUMN 7NM - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 311 - COLUMN 8NM - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 312 - COLUMN 13NM - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 313 - COLUMN 13NM - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 314 - COLUMN 16SM - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 315 - COLUMN 16SM - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 316 - COLUMN 3S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 317 - COLUMN 13S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 318 - COLUMN 13S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 319 - COLUMN 15S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 320 - COLUMN 15S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 321 - COLUMN 19S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 322 - COLUMN 19S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 323 - COLUMN 19S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 324 - COLUMN 25S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 325 - COLUMN 50S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 326- COLUMN 50S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 327 - COLUMN 54S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 328 - COLUMN 54S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 329 - COLUMN 56S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 330 - COLUMN 56S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 331 - COLUMN 61S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 332 - COLUMN 62S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 333 - COLUMN 62S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 334 - COLUMN 67S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 335 - COLUMN 67S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 336 - COLUMN 67S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 337 - COLUMN 70S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 338 - COLUMN 70S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 339 - COLUMN 70S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 340 - COLUMN 77S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

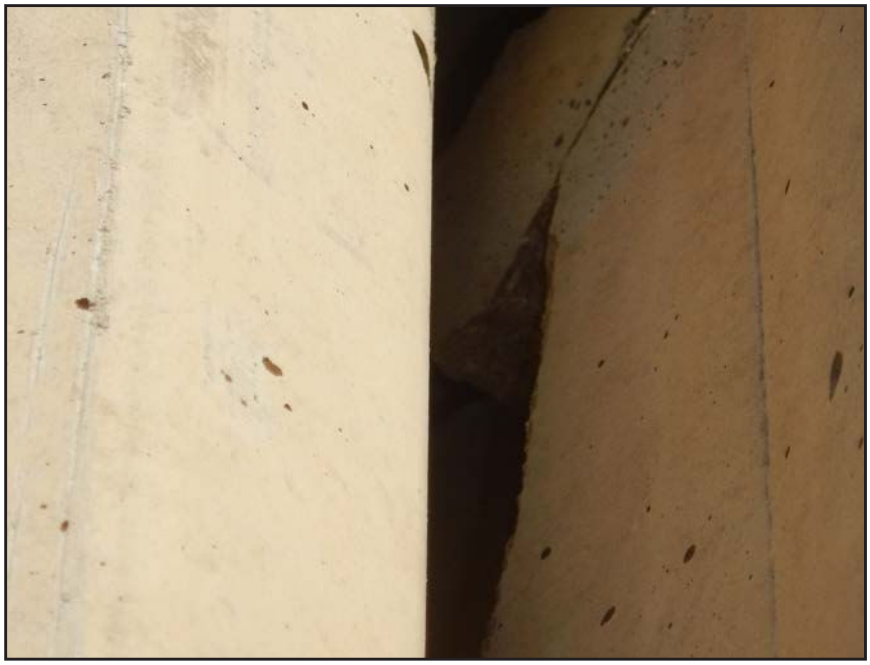
NO. 341 - COLUMN 77S - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 342 - COLUMN 6SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 343 - COLUMN 6SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 344 - COLUMN 8SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 345 - COLUMN 8SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN



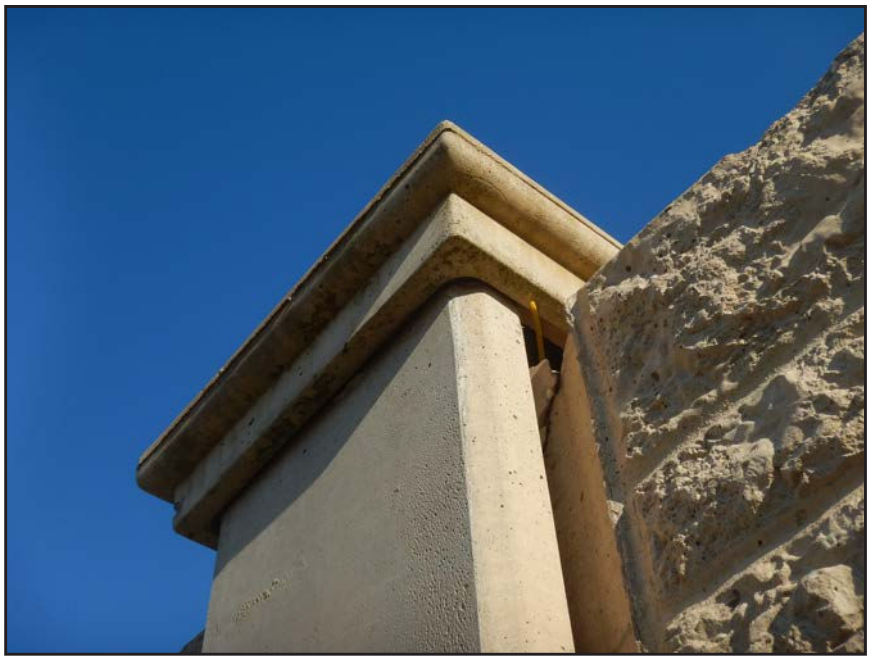
NO. 346 - COLUMN 8SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 347 - COLUMN 8SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 348 - COLUMN 16SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 349 - COLUMN 16SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 350 - COLUMN 18SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN



NO. 351 - COLUMN 20SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 352 - COLUMN 20SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 353 - COLUMN 21SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 354 - COLUMN 22SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 355 - COLUMN 22SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 356 - COLUMN 25SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 357 - COLUMN 25SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 358- COLUMN 25SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 359 - COLUMN 25SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 360 - COLUMN 25SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 361 - COLUMN 28SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 362 - COLUMN 28SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 363 - COLUMN 37SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 364 - COLUMN 37SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 365 - COLUMN 39SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 366 - COLUMN 39SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 367 - COLUMN 39SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 368 - COLUMN 46SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 369 - COLUMN 46SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 370 - COLUMN 46SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 371 - COLUMN 46SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 372 - COLUMN 46SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 373 - COLUMN 47SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 374 - COLUMN 47SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 375 - COLUMN 47SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 376 - COLUMN 47SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 377 - COLUMN 47SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 378 - COLUMN 59SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 379 - COLUMN 59SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 380 - COLUMN 59SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 381 - COLUMN 59SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 382 - COLUMN 59SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 383 - COLUMN 59SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 384 - COLUMN 60SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 385 - COLUMN 60SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 386 - COLUMN 62SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 387 - COLUMN 62SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 388 - COLUMN 63SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 389 - COLUMN 65SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 390 - COLUMN 65SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 391 - COLUMN 69SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 392 - COLUMN 69SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 393 - COLUMN 70SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 394 - COLUMN 70SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 395 - COLUMN 70SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 396 - COLUMN 76SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 397 - COLUMN 76SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 398 - COLUMN 76SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 399 - COLUMN 78SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 400 - COLUMN 78SS - CRACKED AND FAILED TONGUE OF A PRECAST WALL PANEL IN A PRECAST COLUMN

NO. 401 - COLUMN 1NE - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 402 - COLUMN 1NE - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 403 - COLUMN 1NE - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 404 - COLUMN 1NE - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 405 - COLUMN 1NE - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 406 - COLUMN 1NE - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

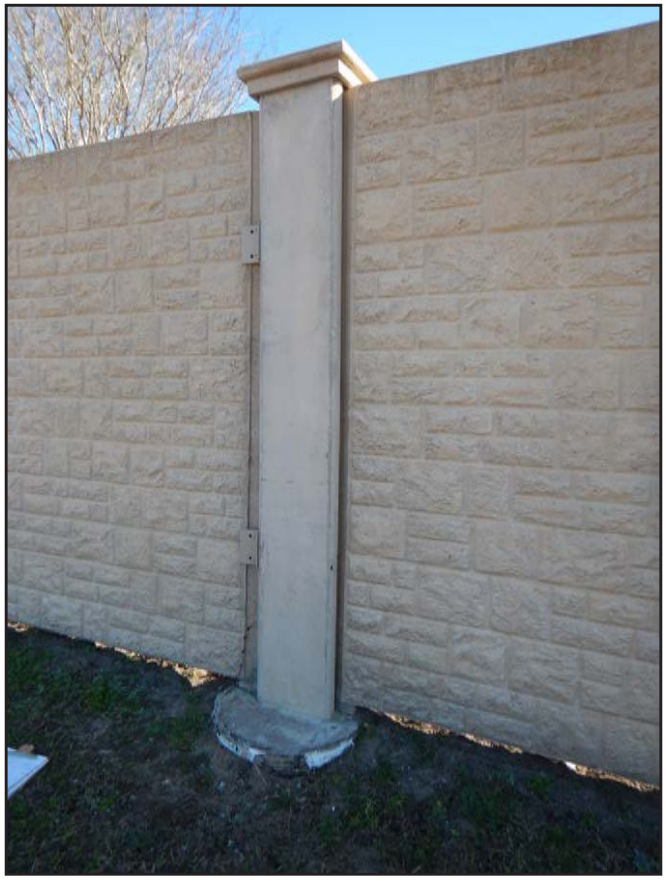
NO. 407 - COLUMN 1NE - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 408 - COLUMN 1NE - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 409 - COLUMN 6N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 410 - COLUMN 6N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 411 - COLUMN 6N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION



NO. 412 - COLUMN 9N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 413 - COLUMN 9N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 414 - COLUMN 9N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 415 - COLUMN 9N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 416 - COLUMN 9N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 417 - COLUMN 10N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 418 - COLUMN 10N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 419 - COLUMN 10N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 420 - COLUMN 14N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 421 - COLUMN 14N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 422 - COLUMN 14N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 423 - COLUMN 14N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 424 - COLUMN 14N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 425 - COLUMN 19N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 426 - COLUMN 19N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 427 - COLUMN 19N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 428 - COLUMN 19N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 429 - COLUMN 20N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 430 - COLUMN 20N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 431 - COLUMN 20N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 432 - COLUMN 20N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 433 - COLUMN 20N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 434 - COLUMN 49N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 435 - COLUMN 49N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 436 - COLUMN 50N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 437 - COLUMN 50N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 438 - COLUMN 50N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 439 - COLUMN 50N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 440 - COLUMN 50N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 441 - COLUMN 50N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

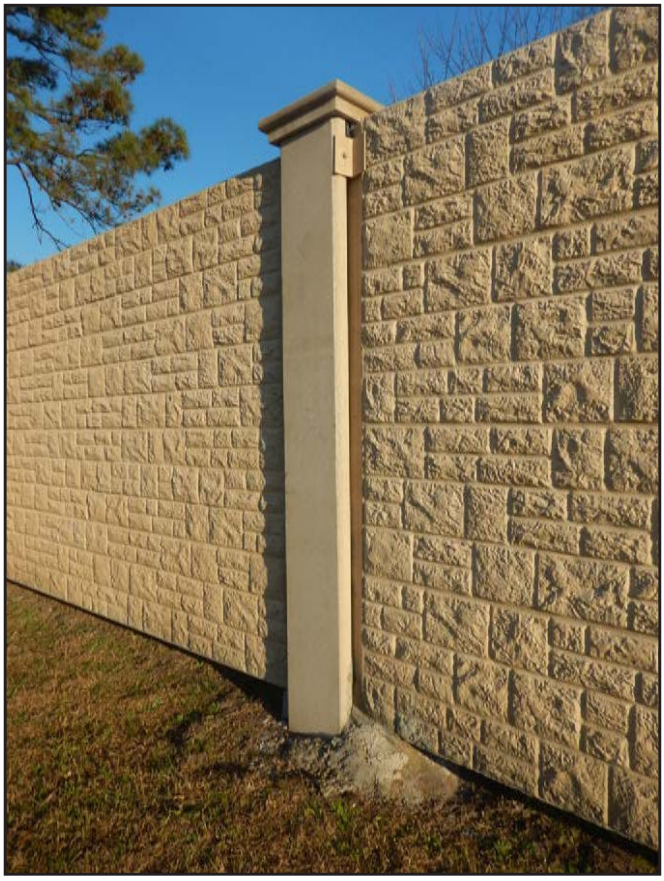
NO. 442 - COLUMN 50N - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 443 - COLUMN 55S - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 444 - COLUMN 55S - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 445 - COLUMN 55S - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 446 - COLUMN 55S - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION



NO. 447 - COLUMN 40SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 448 - COLUMN 40SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 449 - COLUMN 41SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 450 - COLUMN 41SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 451 - COLUMN 41SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

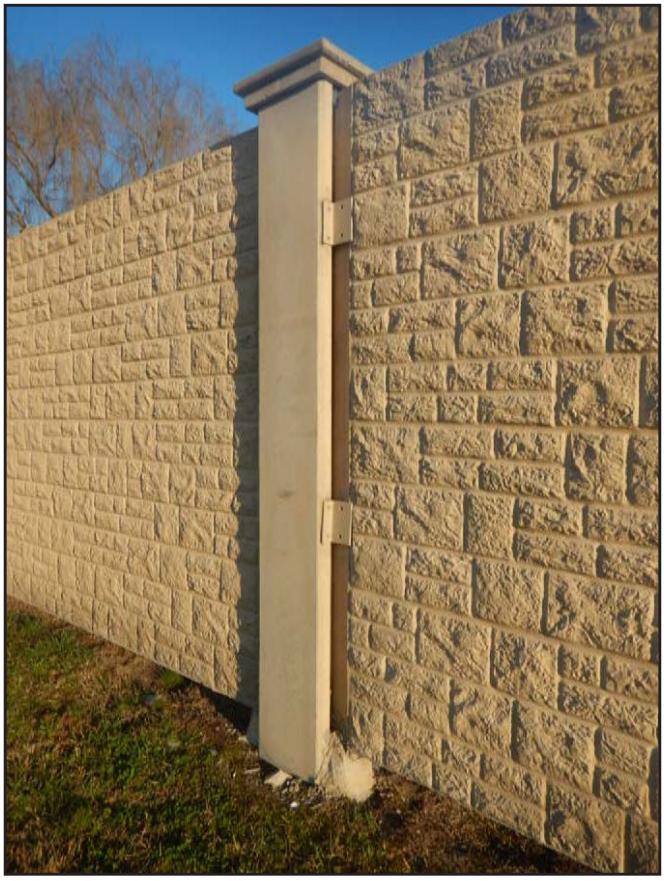
NO. 452 - COLUMN 41SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 453 - COLUMN 41SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 454 - COLUMN 41SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 455 - COLUMN 41SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 456 - COLUMN 41SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION



NO. 457 - COLUMN 45SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 458 - COLUMN 45SS - INADEQUATE ADDED CLIP ANGLE CONNECTION AT A DEFICIENT WALL PANEL TO COLUMN CONNECTION

NO. 459 - COLUMN 1N - CRACKED AND SPALLED PRECAST CONCRETE

NO. 460 - COLUMN 30N - CRACKED AND SPALLED PRECAST CONCRETE

NO. 461 - COLUMN 30N - CRACKED AND SPALLED PRECAST CONCRETE

NO. 462 - COLUMN 42N - CRACKED AND SPALLED PRECAST CONCRETE

NO. 463 - COLUMN 42N - CRACKED AND SPALLED PRECAST CONCRETE

NO. 464 - COLUMN 13S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 465 - COLUMN 17S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 466 - COLUMN 17S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 467 - COLUMN 17S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 468 - COLUMN 52S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 469 - COLUMN 52S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 470 - COLUMN 75S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 471 - COLUMN 75S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 472 - COLUMN 75S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 473 - COLUMN 77S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 474 - COLUMN 77S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 475 - COLUMN 78S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 476 - COLUMN 78S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 477 - COLUMN 78S - CRACKED AND SPALLED PRECAST CONCRETE

NO. 478 - COLUMN 3SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 479 - COLUMN 3SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 480 - COLUMN 54SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 481 - COLUMN 54SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 482 - COLUMN 55SS-
CRACKED AND SPALLED
PRECAST CONCRETE

NO. 483 - COLUMN 55SS -
CRACKED AND SPALLED
PRECAST CONCRETE

NO. 484 - COLUMN 63SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 485 - COLUMN 63SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 486 - COLUMN 64SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 487 - COLUMN 64SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 488 - COLUMN 68SS (BACK) - CRACKED AND SPALLED PRECAST CONCRETE

NO. 489 - COLUMN 68SS (BACK) - CRACKED AND SPALLED PRECAST CONCRETE

NO. 490 - COLUMN 68SS (BACK) - CRACKED AND SPALLED PRECAST CONCRETE

NO. 491 - COLUMN 70SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 492 - COLUMN 70SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 493 - COLUMN 79SS - CRACKED AND SPALLED PRECAST CONCRETE

NO. 494 - COLUMN 14N - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 495 - COLUMN 56N - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 496 - COLUMN 56N - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 497 - COLUMN 11NM - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 498 - COLUMN 16SM - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 499 - COLUMN 6S - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 500 - COLUMN 12S - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 501 - COLUMN 48S - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 502 - COLUMN 55S - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 503 - COLUMN 25SS - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 504 - COLUMN 25SS - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 505 - COLUMN 79SS - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 506 - COLUMN 79SS - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

NO. 507 - COLUMN 79SS - EXPOSED REINFORCING STEEL WITH INADEQUATE CONCRETE COVER

CONSTRUCTION PLANS AND SPECIFICATIONS FOR PERMACAST PRECAST CONCRETE FENCE

CONSTRUCTION PLANS & SPECIFICATIONS FOR PERMACAST PRECAST CONCRETE FENCE

GENERAL NOTES:

CODES AND STANDARDS

- STRUCTURAL DESIGN BASED ON THE 2018 INTERNATIONAL BUILDING CODE DESIGN.

DESIGN
- WIND SPEED = 135 MPH (3 SEC GUST)
  104.6 MPH (NOMINAL)
- EXPOSURE - C
- Kd = 0.85
- CONSTRUCTION TYPE - I OR II (NONCOMBUSTIBLE MATERIALS)

CONCRETE STRENGTH

- MINIMUM 28 DAY COMPRESSIVE STRENGTH OF PRECAST ELEMENTS F'c=5000 PSI
- MINIMUM 28 DAY COMPRESSIVE STRENGTH OF CAST IN PLACE CONCRETE F'c=3000 PSI

MATERIALS:
- CEMENT PER ASTM C-150 TYPE 1

AGGREGATES FOR CONCRETE:
- NORMAL WEIGHT AGGREGATE: FINE AND COARSE AGGREGATE PROVISIONS AND TEST METHODS SHALL MEET ASTM C33. MAXIMUM AGGREGATE SIZE OF 3/4".

ADMIXTURES:
- NO ADMIXTURES SHALL CAUSE AN INCREASE IN SHRINKAGE WHEN TESTED IN ACCORDANCE WITH ASTM C494 AND C157

DELIVERY OF CONCRETE:
- DISCHARGE OF THE CONCRETE SHALL BE COMPLETED WITHIN 1-1/2 HOURS AFTER THE INTRODUCTION OF THE MIXING WATER TO THE CEMENT AND AGGREGATES OR THE INTRODUCTION OF THE CEMENT TO THE AGGREGATES.
- WATER SHALL NOT BE ADDED IN THE FIELD UNLESS APPROVED BY THE ENGINEER.

UTILITIES

- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL OVERHEAD AND UNDERGROUND UTILITIES PRIOR TO CONSTRUCTING THE FENCE AND/OR FOUNDATIONS. CONTRACTOR SHALL NOTIFY LOCATION OF ALL UTILITIES TO BOTH THE OWNER AND SITE ENGINEER PRIOR TO CONSTRUCTING FENCE AND / OR FOUNDATIONS.

JANUARY 21, 2021

Elias Runar Johannsson, P.E
South Carolina License No: 34124
Exp Date: June 30, 2022

1201 East 3rd Street
Tulsa, OK 74120
(Office) 918-518-1124

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 34124 ELIAS JOHANNSSON
01/21/2021

PROJECT
BARFOOT RESORT & GOLF
4001 WATER TOWER RD
NORTH MYRTLE BEACH, SC.

WALL TYPE:
8 FT. PERMAWALL 2.0 (SAND FINISH)

WIND DESIGN: 135 MPH (3 SEC. GUST)
104.6 MPH (NOMINAL)

EXPOSURE: C

RISK CATEGORY 1

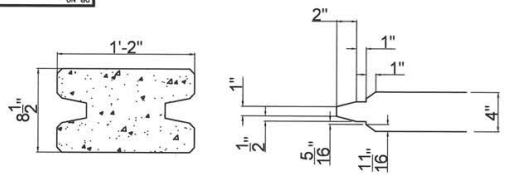
SOIL TYPE AND PROPERTIES (ASSUMED)
SOIL TYPE - SAND
SOIL MODULUS - 129 PCI
EFFECTIVE UNIT WEIGHT - 120 PCF
INTERNAL FRICTION ANGLE - 32 DEGREES
ALLOWABLE BEARING CAPACITY = 2,000 PSF
ALLOWABLE LATERAL SOIL CAPACITY = 150 PSF

NOTES:

1) CONTRACTOR TO REFER TO CIVIL DRAWINGS FOR WALL LAYOUT.

DRAWING INDEX

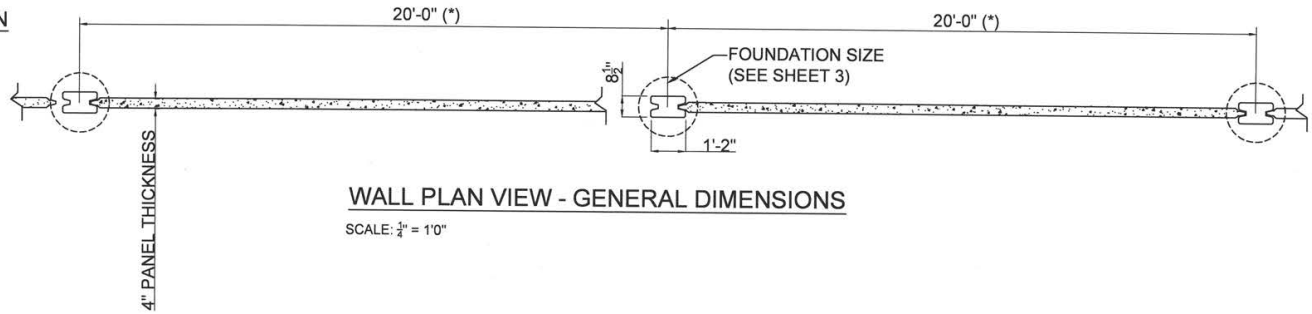
SHEET 2 | REV 0



TYPICAL PANEL / POST CONNECTION

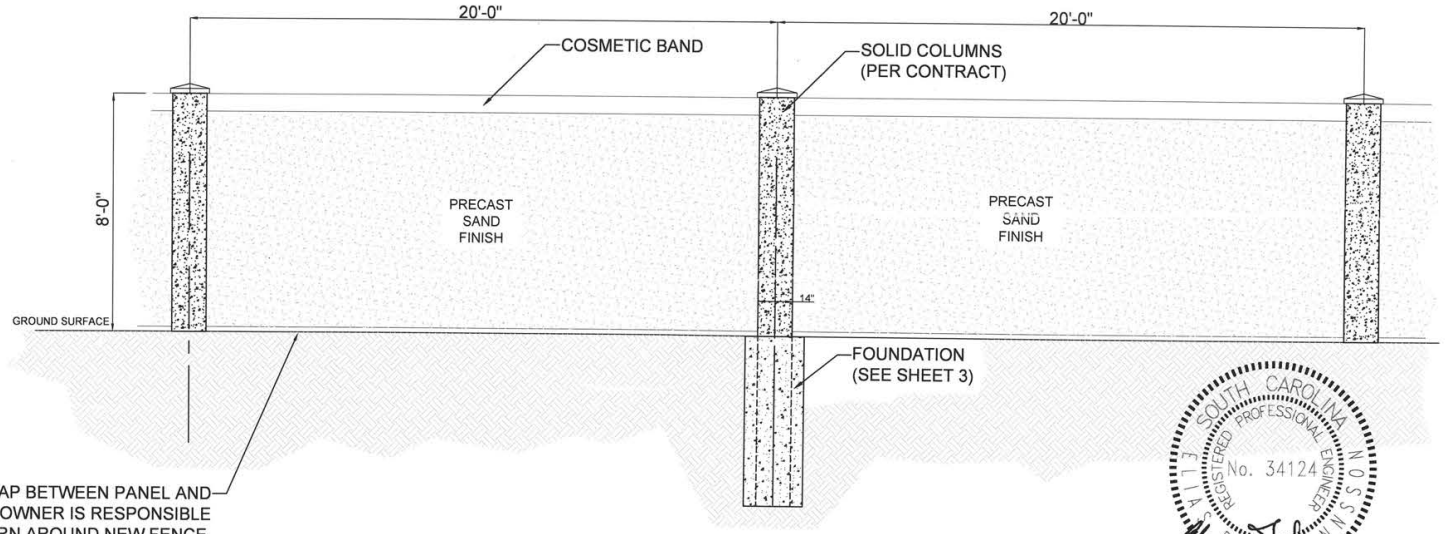
SCALE: NTS

(*): 20'-0" - Contact Manufacturer for Exact Center to Center Distance



WALL PLAN VIEW - GENERAL DIMENSIONS

SCALE: ¼" = 1'0"



MAINTAIN MIN. 2" GAP BETWEEN PANEL AND GRADE FOR DRAINAGE. OWNER IS RESPONSIBLE FOR DRAINAGE PATTERN AROUND NEW FENCE. 360 ENGINEERING GROUP, PLLC. IS NOT RESPONSIBLE FOR SITE DRAINAGE REQUIREMENTS.

01/21/2021

TYPICAL 8 FT. X 20 FT. WALL ELEVATION - GENERAL DIMENSIONS

SCALE: ¾" = 1'0"

REFERENCE DRAWINGS	NO.	DATE	REVISION	BY	CK	APP
	XXX		ISSUED FOR CONSTRUCTION	RR		RR

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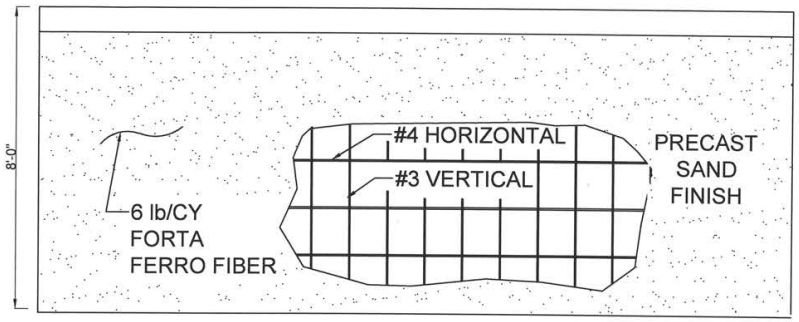
PLOT SCALE: AS NOTED | CAD FILE: BARFOOT | DRAWN BY: RR DATE: 1-20-20
ACTUAL SCALE: ACTUAL SCALE | ORDER #: | CHK BY: DATE: 1-20-20 | APP BY: DATE: 1-20-20

PERMACAST PRECAST CONCRETE FENCE
BARFOOT RESORT& GOLF
4001 WATER TOWER RD.
NORTH MYRTLE BEACH, SC 29568
6 FT GENERAL WALL DIMENSIONS

DISCIPLINE: CIVIL | ADD ID: 0 | DWG NO: SHEET 2 | REV: 0
PROJECT:

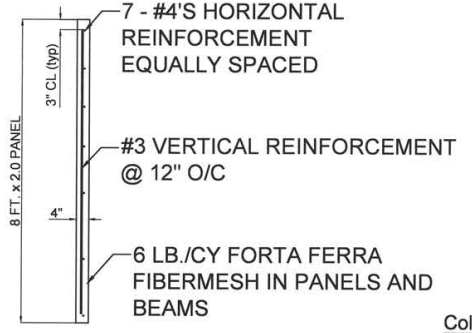
Elias Runar Johannsson, P.E
1201 East 3rd Street
Tulsa, OK 74120
(Office) 918-518-1124

SHEET 3 | DR NO | REV 0



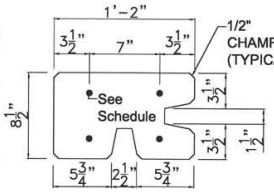
TYPICAL 8 ft. X 20 FT. (2.0) PERMASAND PANEL

SCALE: $\frac{1}{4}$" = 1'0"

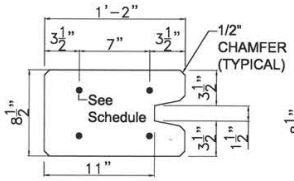


Column Reinforcement

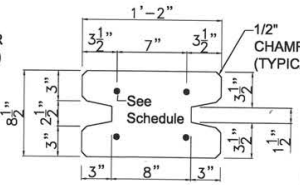
Wall Height	Vertical Reinforcement
8 ft. High Columns on 10 ft. Centers	#6's Ea. Corner



CORNER SOLID POST DETAIL
8-1/2" X 14"
SCALE: 1" = 1'-0"



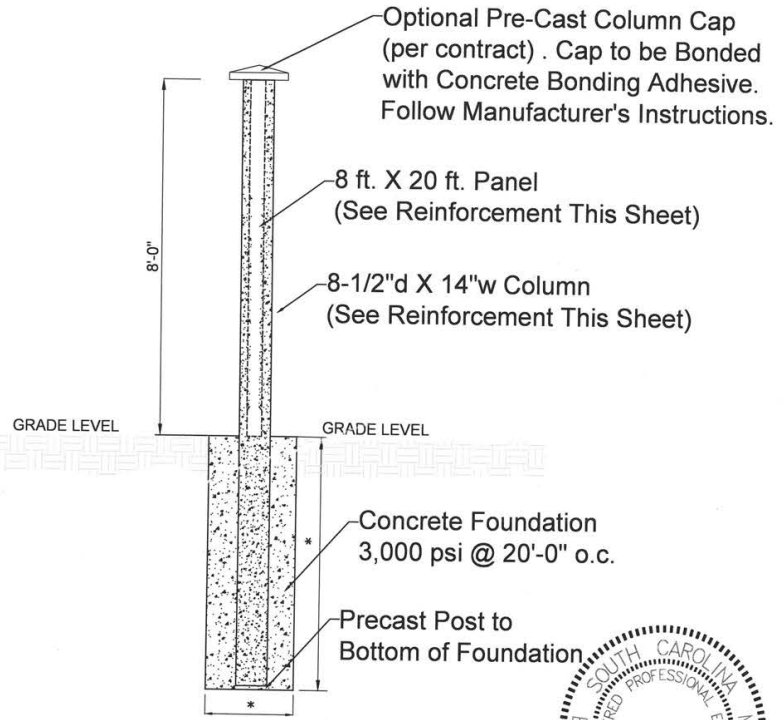
END SOLID POST DETAIL
8-1/2" X 14"
SCALE: 1" = 1'-0"



LINE SOLID POST DETAIL
8-1/2" X 14"
SCALE: 1" = 1'-0"

* Foundation Schedule

Wall Height	Diameter (Inches)	Depth (Inches)
8 ft. Wall Height on 20 ft. Centers	24" Diameter	76" Depth



TYPICAL FOUNDATION for 8 FT. COLUMNS
FOR PERMACAST 2.0 PANELS (20 FT. O/C)

SCALE: $\frac{3}{8}$" = 1'-0"

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 34124 ELIAS NOSSMAN JOHANNSSON

01/21/2021

REFERENCE DRAWINGS	NO.	DATE	REVISION	BY	CK	APP
	xxx		ISSUED FOR CONSTRUCTION	RR		RR

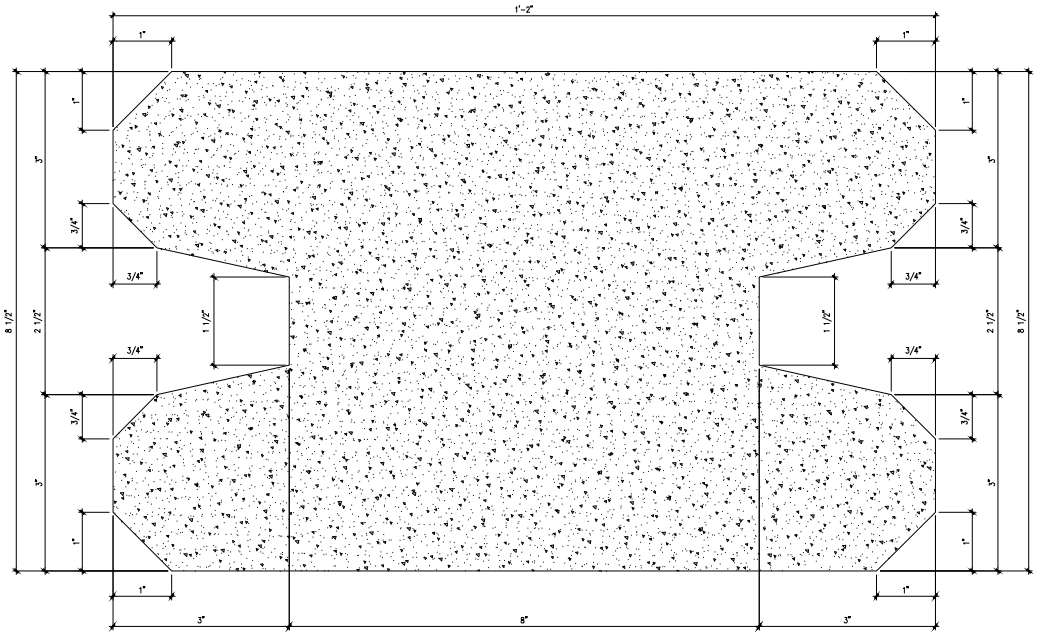
PLOT SCALE: AS NOTED | CAD FILE: BARFOOT | DRAWN BY: RR 1-20-21 | DISCIPLINE: CIVIL | DWG NO: 0 | SHEET 3 | REV: 0

ACTUAL SCALE: ACTUAL SCALE | CHECK BY: JT 1-20-21 | APP BY: RR 1-20-21 | PROJECT:

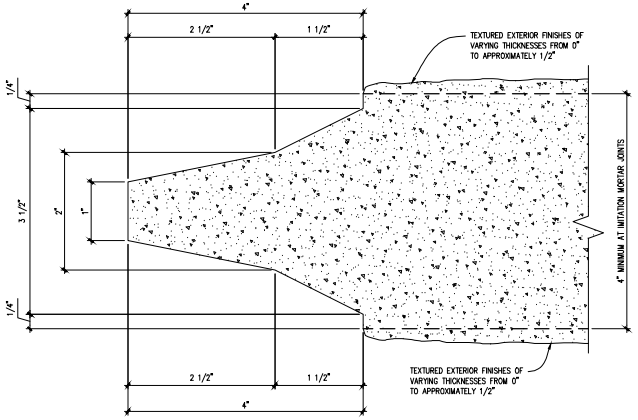
PERMACAST PRECAST CONCRETE FENCE
BARFOOT RESORT& GOLF
4001 WATER TOWER RD.
NORTH MYRTLE BEACH, SC 29568
FOUNDATION DETAILS

Elias Runar Johannsson, P.E
1201 East 3rd Street
Tulsa, OK 74120
(Office) 918-518-1124

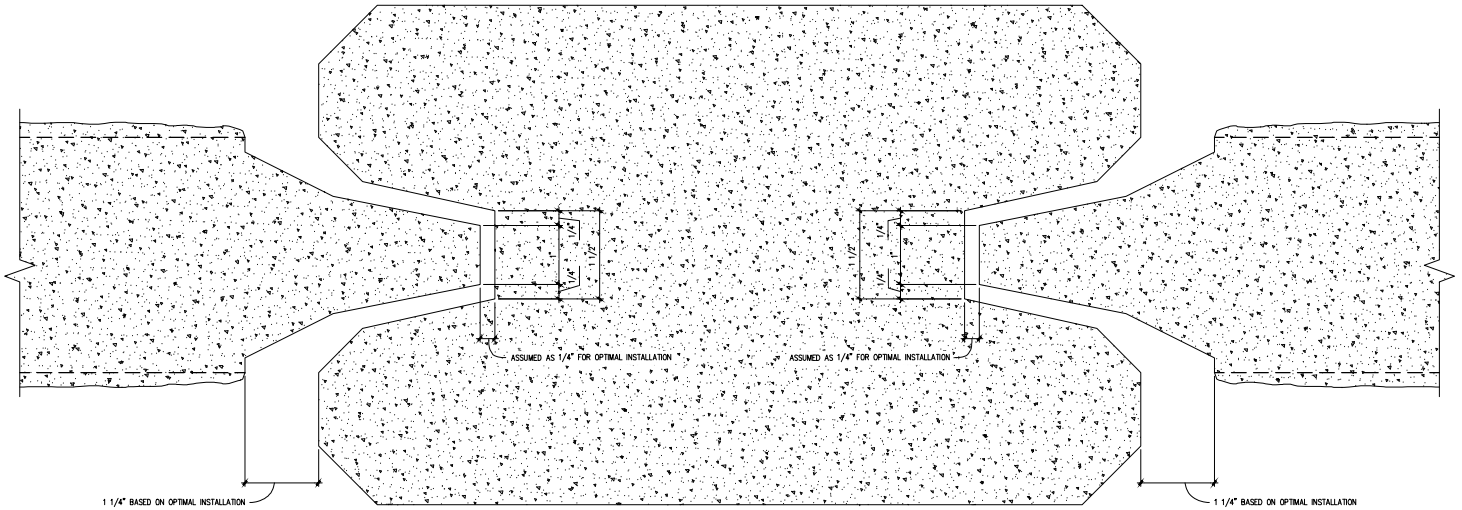
STANTEC
SHEETS AB1 THROUGH AB3
STABILIZATION SHEET S1A
SHEETS SP1 THROUGH SP11



1 AB1 EXISTING COLUMN, AS OBSERVED ON SITE AT COLUMNS 17N, 22N, AND EXCESS STORED PANELS
SCALE: 1"-0" = 1' - 0"



2 AB1 EXISTING PANEL TONGUE, AS OBSERVED ON SITE AT COLUMNS 17N, 22N, EXCESS STORED PANELS
SCALE: 1"-0" = 1' - 0"



3 AB1 EXISTING COLUMN / PANEL CONNECTIONS, BASED ON DIMENSIONS AT COLUMNS 17N, 22N, AND EXCESS STORED PANELS
SCALE: 1"-0" = 1' - 0"

ALL DIMENSIONS AND DETAILS OF EXISTING CONDITIONS ARE APPROXIMATE, BASED ON LIMITED SITE OBSERVATIONS, AND MUST BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO FABRICATION OF NEW MATERIALS.

Stantec

Stantec Consulting Services Inc.
4969 Centre Pointe Drive, Suite 200
North Charleston, SC 29418
Tel 843.740.7700
www.stantec.com

Legend

Revision	By	Appd.	Date

File Name: 1710-dwg	Dwn.	Chkd.	Dsgn.	Date
	NC	ECP	ECP	3/31/25

Permit-Seal

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION STANTEC CONSULTING SERVICES, INC No. C02310

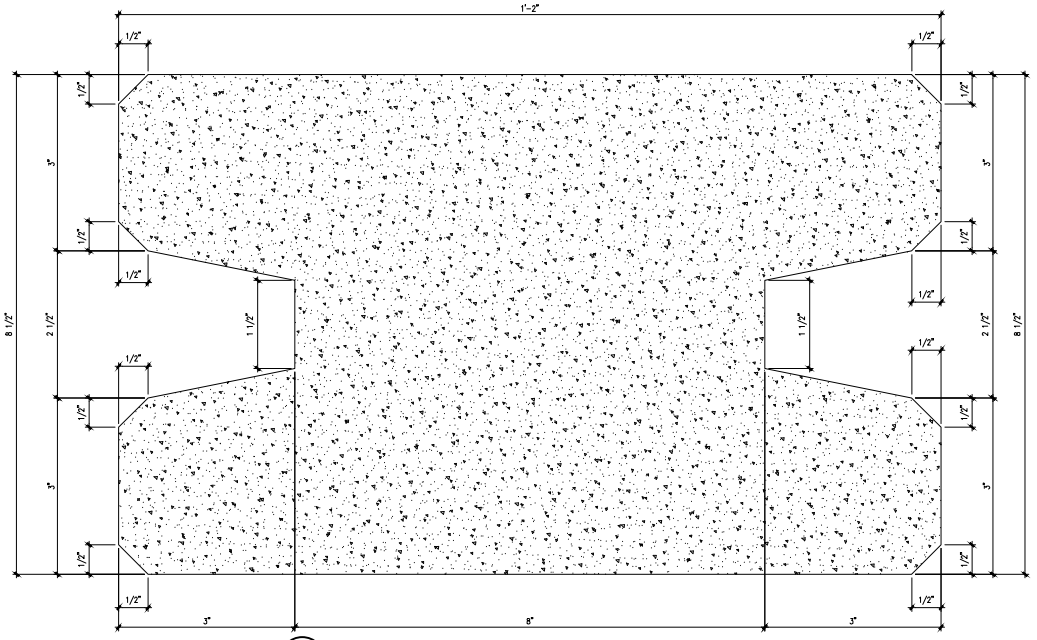
REGISTERED PROFESSIONAL ENGINEER No. 11136 EDWARD C. PONCHER 3/31/25

Client/Project
The Barefoot Resort
Residential Owners Association

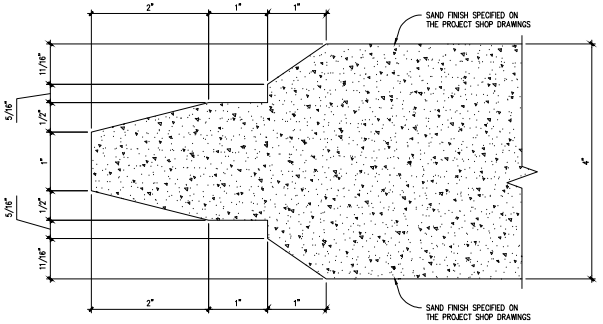
Water Tower Road
Screen Wall Investigations
Longs, South Carolina

Title
Existing Column and Panel Connections, as Measured on Site

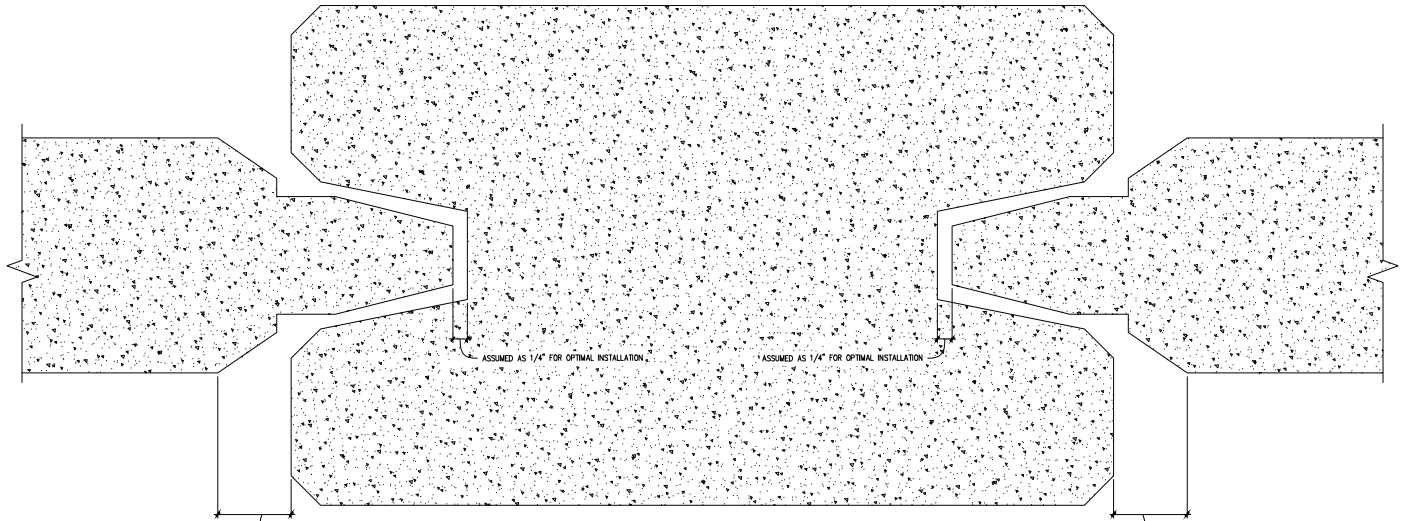
Project No.	Scale	
171015900	As Noted	
Drawing No.	Sheet	Revision
AB1	1 of 3	



1 AB2 DESIGNED COLUMN, AS DETAILED ON SHEET 3 OF THE PROJECT SHOP DRAWINGS
SCALE: 1"-0" = 1" - 0"



2 AB2 DESIGNED PANEL TONGUE, AS DETAILED ON SHEET 2 OF THE PROJECT SHOP DRAWINGS
SCALE: 1"-0" = 1" - 0"



3 AB2 DESIGNED COLUMN / PANEL CONNECTION, BASED ON SHEETS 2 AND 3 OF THE PROJECT SHOP DRAWINGS
SCALE: 1"-0" = 1" - 0"

ALL DIMENSIONS AND DETAILS ARE BASED ON THE "CONSTRUCTION PLANS & SPECIFICATIONS FOR PERMACAST PRECAST CONCRETE FENCE" SHOP DRAWINGS, SIGNED AND SEALED BY ELIAS RUNAR JOHANNSSON, P.E. ON 1/21/2021

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Legend

Revision	By	Appd.	Date
File Name: 1710-dwg	BJC	ECP	ECP	5/31/25
	Dwn.	Chkd.	Dsgn.	Date

Permit-Seal

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION STANTEC CONSULTING SERVICES, INC No. C02310

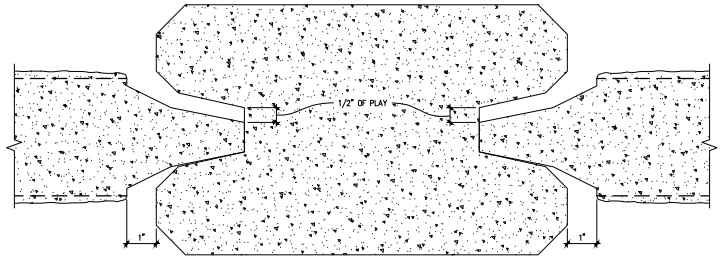
SOUTH CAROLINA PROFESSIONAL ENGINEER No. 11136 EDWARD C. PONCHER 5/31/25

Client/Project
The Barefoot Resort
Residential Owners Association

Water Tower Road
Screen Wall Investigations
Longs, South Carolina

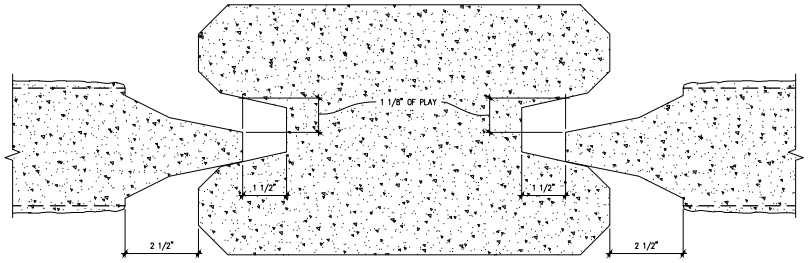
Title
Designed Column and Panel Connections, as Detailed on the Project Shop Drawings

Project No.	Scale	
171015900	As Noted	
Drawing No.	Sheet	Revision
AB2	2 of 3	



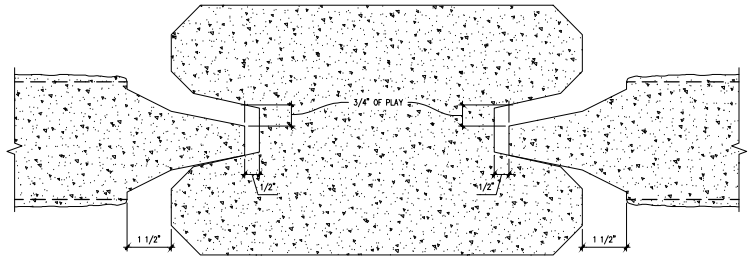
1 AB3 EXISTING PLAY AT COLUMN / PANEL CONNECTIONS WITH 1" BETWEEN THE COLUMN AND PANEL TEXTURED FINISHES

SCALE: 6" = 1' - 0"



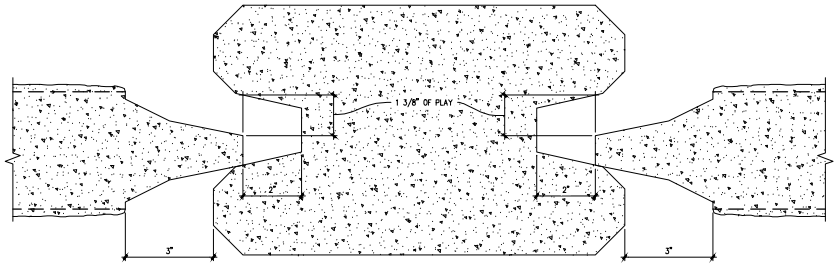
4 AB3 EXISTING PLAY AT COLUMN / PANEL CONNECTIONS WITH 2 1/2" BETWEEN THE COLUMN AND PANEL TEXTURED FINISHES

SCALE: 6" = 1' - 0"



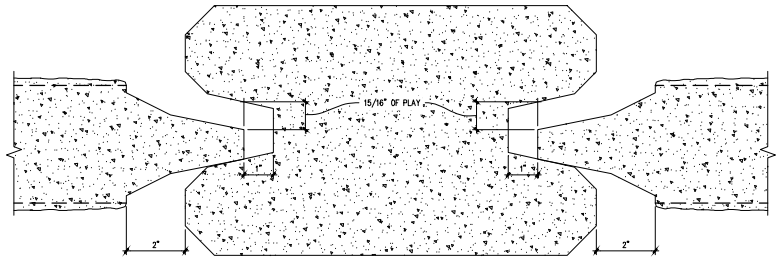
2 AB3 EXISTING PLAY AT COLUMN / PANEL CONNECTIONS WITH 1 1/2" BETWEEN THE COLUMN AND PANEL TEXTURED FINISHES

SCALE: 6" = 1' - 0"



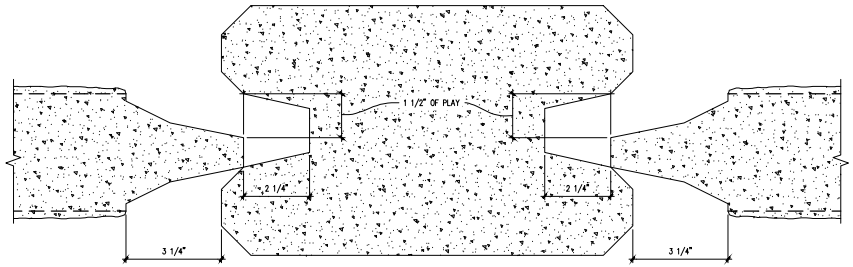
5 AB3 EXISTING PLAY AT COLUMN / PANEL CONNECTIONS WITH 3" BETWEEN THE COLUMN AND PANEL TEXTURED FINISHES

SCALE: 6" = 1' - 0"



3 AB3 EXISTING PLAY AT COLUMN / PANEL CONNECTIONS WITH 2" BETWEEN THE COLUMN AND PANEL TEXTURED FINISHES

SCALE: 6" = 1' - 0"



6 AB3 EXISTING PLAY AT COLUMN / PANEL CONNECTIONS WITH 3 1/4" BETWEEN THE COLUMN AND PANEL TEXTURED FINISHES

SCALE: 6" = 1' - 0"

ALL DIMENSIONS AND DETAILS ARE BASED ON THE "CONSTRUCTION PLANS & SPECIFICATIONS FOR PERMACAST PRECAST CONCRETE FENCE" SHOP DRAWINGS, SIGNED AND SEALED BY ELIAS RUNAR JOHANNSSON, P.E. ON 1/21/2021

Stantec

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Legend

Revision	By	Appd.	Date

File Name: 1710-dwg	Init.	ECP	ECP	3/31/25
	Dwn.	Chkd.	Dsgn.	Date

Permit-Seal

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION STANTEC CONSULTING SERVICES, INC No. C02310

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 11136 EDWARD C. PONCHER 3/31/25

Client/Project

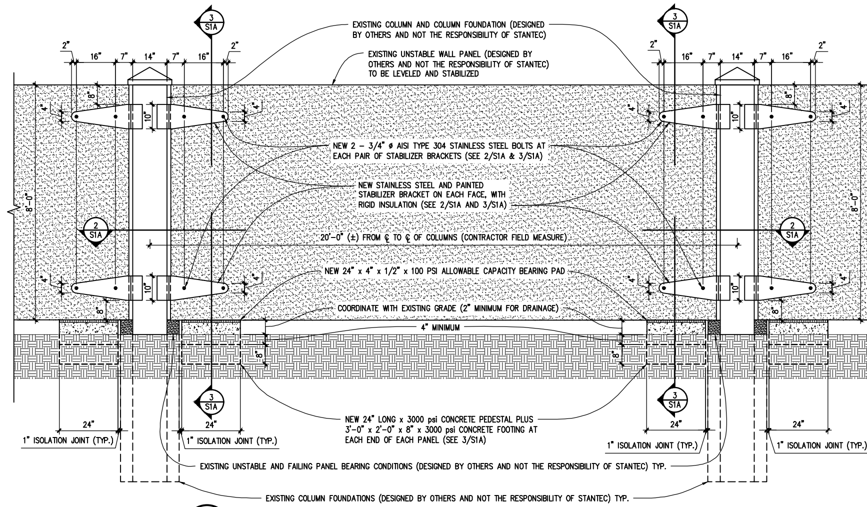
The Barefoot Resort
Residential Owners Association

Water Tower Road
Screen Wall Investigations
Longs, South Carolina

Title

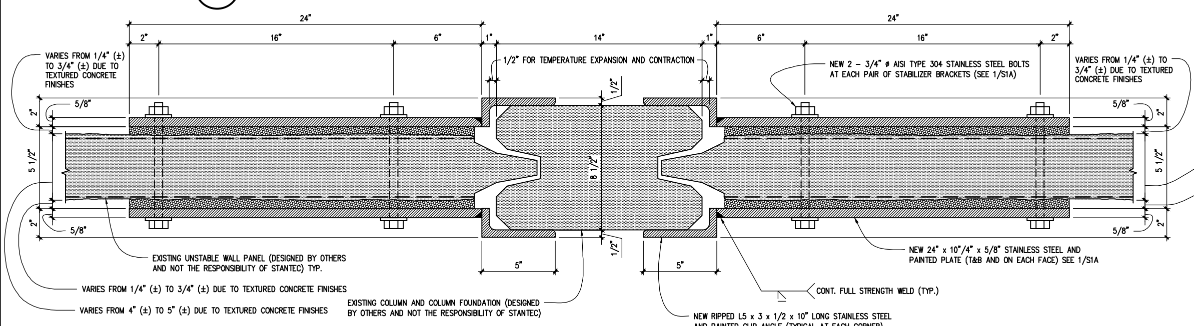
Varying Play between Columns and Panels, as Observed on Site

Project No.	Scale	
171015900	As Noted	
Drawing No.	Sheet	Revision
AB3	3 of 3	



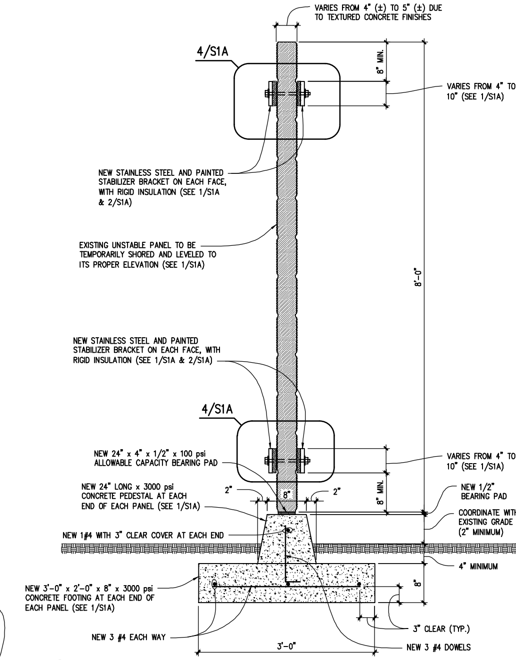
1 S1A ELEVATION AT A TYPICAL PANEL TO COLUMN STABILIZATION DETAIL

SCALE: 1/2" = 1' - 0"



2 S1A PARTIAL PLAN AT A TYPICAL COLUMN TO PANEL STABILIZATION DETAIL

SCALE: 3" = 1' - 0"

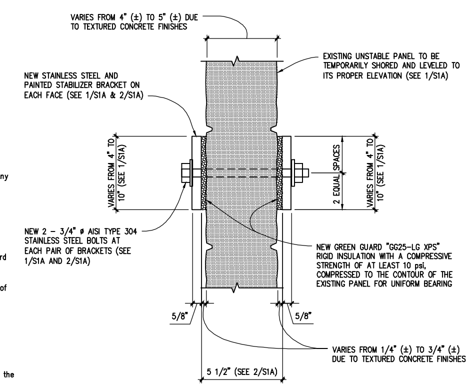


3 S1A SECTION AT A TYPICAL STABILIZED WALL PANEL FOUNDATION

SCALE: 1" = 1' - 0"

VARIES FROM 4" (±) TO 5" (±) DUE TO TEXTURED CONCRETE FINISHES

VARIES FROM 1/4" (±) TO 3/4" (±) DUE TO TEXTURED CONCRETE FINISHES



4 S1A SECTION AT A TYPICAL STABILIZER BRACKET TO PANEL CONNECTION

SCALE: 3" = 1' - 0"

GENERAL STRUCTURAL NOTES

GENERAL

1. Refer to Stantec's report of Water Tower Road, Screen Wall Investigations dated 3/31/25 and Stantec Field Reports dated 1/30/2025 and 3/11/25 for existing conditions at the screen wall along Water Tower Road in Longs, South Carolina.
2. Stantec Sheet S1A is preliminary, for budget pricing only, and must be developed further prior to construction.
3. Stantec accepts no liability for the existing screen wall in its current condition, and is only responsible for specific repairs designed and sealed by Stantec.
4. Each existing wall panel contains inadequately designed "tongues" at each end of each panel, with non-code-compliant reinforcing steel with inadequate concrete cover. The Owner is advised that repair designs on Stantec Sheet S1A will stabilize each wall panel to existing precast concrete columns, and stabilize each wall panel on new footing foundations. However, Sheet S1A repair designs will not repair existing cracked tongues, spalled tongues, or reinforcing steel with inadequate concrete cover in tongues. Each existing tongue at each end of each existing panel will deteriorate over time, due to corrosion and expansion of existing reinforcing steel with inadequate concrete cover. Any future cracks or spalls which extend to within 3" of new stainless steel through-bolts shall be brought to the attention of Stantec for review and analysis. Ultimately, each individual wall panel will have to be removed and replaced with a new wall panel, with code-compliant reinforcing steel.
5. The repair scope of work shall include, but not be limited to:
   - A) Providing temporary shoring and lateral stability for each wall panel until completion of all work,
   - B) Raising each existing displaced wall panel until it is level and plumb,
   - C) Supporting each end of each existing wall panel on new footings, concrete pedestals, and bearing pads in accordance with Details 1/S1A and 3/S1A,
   - D) Securing each existing wall panel with four (4) new pairs of stainless steel and painted stabilizer brackets, in accordance with Details 1/S1A through 4/S1A,
   - E) Coating all rigid insulation with one (1) coat of primer plus two (2) finish coats to match the color of adjacent wall panels as close as practical, and
   - F) Repairing all cracked and spalled concrete on top of precast panels, at bottom of precast panels, and on faces of columns by saw cutting, chipping, and application of Sika "Armatec 110 Epocem" bonding agent/corrosion inhibitors, Sika "SikaTop 123 Plus" Repair Mortars, Sika "Sikagard 552W Primer," plus two (2) coats of Sika "Sikagard 670W" finish coatings, in strict accordance with Sika recommendations, as required to match adjacent finishes as close as practical.
6. All new connections have been designed for 150 mph ultimate wind speeds in accordance with IBC 2021 and ASCE 7-16, with a minimum design wind pressure of (±) 28 psf for allowable stress design (ASD).
7. Existing columns and column foundations have been designed by others, are beyond Stantec's scope of work, and are not the responsibility of Stantec. All new footing designs for support of existing panels are based on an allowable soil bearing capacity of 1000 psf, which must be confirmed by a Registered Geotechnical Engineer in the State of South Carolina, utilizing penetrometer testing, prior to placement of reinforcing steel in footing excavations. Excavations for new footings shall extend to virgin soils, free and clear of all organic materials and standing water.
8. All dimensions and details of existing conditions are approximate, based on original sealed drawings by Elias R. Johannsson, P.E. dated 1/21/2021 and limited site observations, and must be field verified by the Contractor prior to fabrication of new materials.
9. New stabilizer brackets shall be fabricated from AISI Type 304 stainless steel and painted black with one (1) coat of Sherwin Williams "MACROPOXY 646 FAST CURE EPOXY MASTIC" plus two coats of Sherwin Williams "ACROLON 218 HS ACRYLIC POLYURETHANE," prior to installation.
10. All steel to steel connections shall be continuously welded by a certified welder to meet the requirements of the American Welding Society for welding structural steel of type as shown on the drawings, utilizing E-70 series electrodes.
11. All new bolts, nuts, and washers shall be AISI Type 304 or Type 316 stainless steel.
12. All new through-holes in existing precast panels shall be "core-drilled," rather than "hammer-drilled," in order to provide smooth holes and protect existing concrete from blow-outs and spalling.
13. All new materials, including surface preparation for receipt of new materials, shall be handled, stored, prepared, mixed, applied, and cured in strict accordance with the Manufacturer's Recommendations.
14. The Contractor shall provide adequate bracing, shoring, formwork, and protection during construction and he is responsible for any failures and damages due to the lack of such.
15. Extreme diligence and care shall be exercised by the Contractor to protect the adjacent roadway, roadway vehicles, and the existing complex, its appurtenances, and its contents. Any damages to the adjacent roadway, roadway vehicles, or the complex, its contents, or any other property or equipment as a result of construction operations are the sole responsibility of the Contractor, and shall be either repaired or replaced at no cost to the Owner.
16. Workers, Employees, Individual Homeowners, Guests, passing vehicles, and the General Public shall be protected by the Contractor. All OSHA and other applicable safety standards shall be adhered to by the Contractor during all work. Adequate shoring, bracing, formwork, barricades, fencing, overhead protection, flagmen, netting, signage, locks, and other temporary safety devices shall be provided by the Contractor as required to protect all personnel and property. Any damages, accidents, or injuries as a result of construction operations are the sole responsibility of the Contractor.
17. Each existing wall panel must be stabilized at the end of each work day and no unstable conditions shall be left overnight or on weekends.
18. Prior to commencing with any excavations, the Contractor shall notify SC811 at 811 for locations of underground utilities. Any existing underground utilities must be protected during all work.
19. Existing utilities, fixtures, piping, conduits, equipment, finishes, landscaping, and other appurtenances conflicting with proposed work shall be removed and reinstalled, or removed and replaced, by the Contractor as required to complete all work without disrupting normal operations of the Owner. All removal and reinstallation work, or removal and replacement work, shall be in accordance with applicable codes and standards of the 2021 South Carolina Building Code.
20. Unless specifically noted in the drawings or specifications, any items to be removed shall be disposed of by the Contractor.
21. Items to be removed and reinstalled by the Contractor shall be adequately protected, adequately stored, and thoroughly cleaned by the Contractor prior to reinstallation.
22. Upon completion of all work, the Contractor shall clean up and remove from the site all surplus materials, tools, appliances, rubbish, protection devices, accessing devices, excess materials, cleaning debris, and other foreign debris such that the site is left in a neat, orderly condition and ready for use.
23. Water and power shall be provided by the Contractor.
24. If a job site trailer or storage container is required by the Contractor for the project, the job site trailer or container shall be placed at a location acceptable to the Owner.
25. A Sanitary Facility (portable restroom) shall be provided on site by the Contractor for all workmen associated with the project. Workmen shall not use sanitary facilities within the complex. The portable facility shall be placed at a location acceptable to the Owner.
26. Access and lifting equipment shall not leave the site until Stantec has reviewed all temporary repairs and provided written acceptance.
27. After completion of all repairs, structural maintenance shall be the responsibility of the Owner.

ALL DIMENSIONS AND DETAILS OF EXISTING CONDITIONS ARE APPROXIMATE, BASED ON ORIGINAL SEALED DRAWINGS BY ELIAS R. JOHANNSSON, P.E. DATED 1/21/2021 AND LIMITED SITE OBSERVATIONS, AND MUST BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO FABRICATION OF NEW MATERIALS.

U:\171015900\structural\drawings\project_drawings\2025_03_31_s1a_sp1_sp11_ab1_ab2_ab3\171015900_s1a.dwg
2025/04/07 3:05 PM By: Cundiff, Ean

ORIGINAL SHEET - ARCH D

Stantec

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North Charleston, SC 29418
Tel. 843.740.7700
www.stantec.com

Legend

Revision	By	Appd.	Date

File Name: 171015900.dwg	INC	ECP	ECP	3/31/25
	Dwn.	Chkd.	Dsgn.	Date

Permit-Seal

PRELIMINARY
FOR BUDGET PRICING ONLY
NOT FOR CONSTRUCTION

Client/Project
The Barefoot Resort
Residential Owners Association
Water Tower Road
Screen Wall Investigations
Longs, South Carolina

Title
Partial Plan, Elevation, and Sections at Typical Column to Panel Stabilization Details

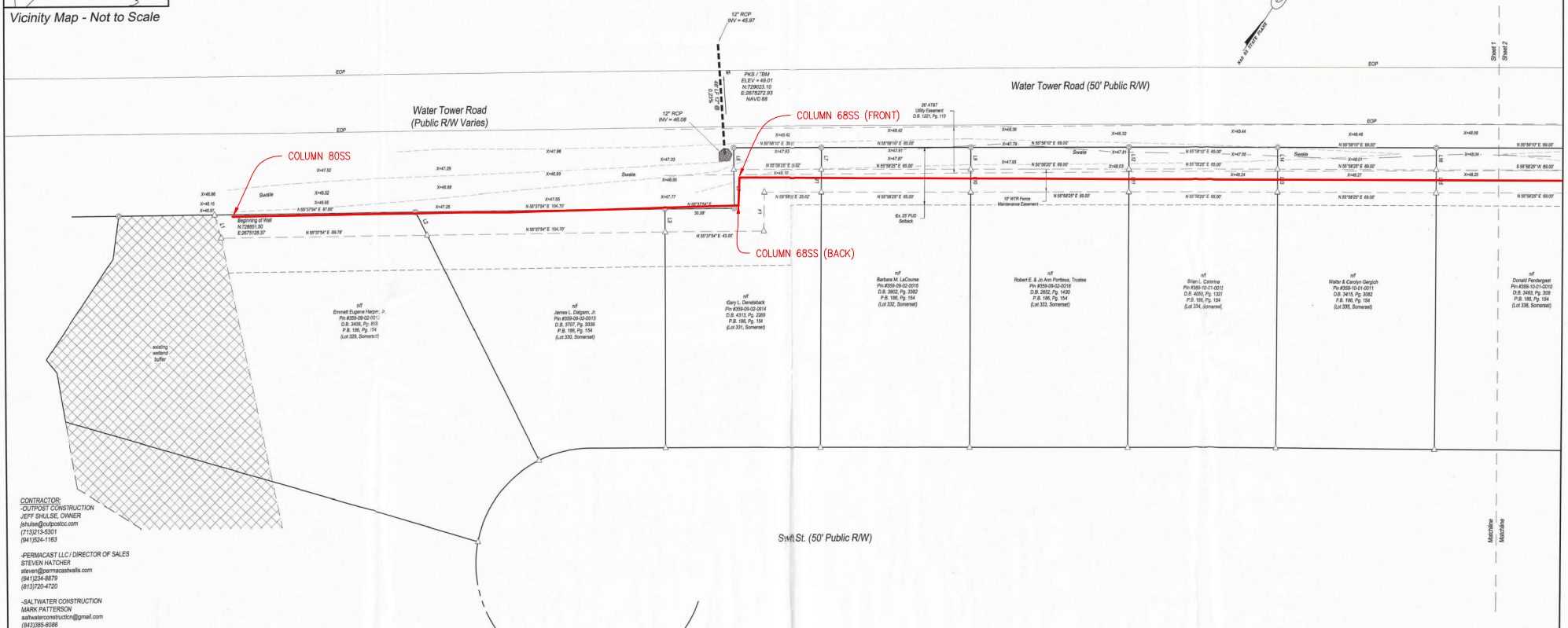
Project No.	Scale	
171015900	As Noted	
Drawing No.	Sheet	Revision
S1A	1 of 1	

Vicinity Map - Not to Scale

State Plane Coordinates:
NAD-83 Horizontal
NAVD-88 Vertical

Legend
- corner found (noted)
- 5/8" iron rebar set (unless noted)
- map / computed point

Line Work Legend
- adjoining R/W property lines
- parent tract property line
- adjoining property lines



CONTRACTOR:
-OUTPOST CONSTRUCTION
JEFF SHULSE, OWNER
jshulse@outpostcc.com
(713)213-5301
(941)524-1163

-PERMACAST LLC / DIRECTOR OF SALES
STEVEN HATCHER
steven@permacastwalls.com
(941)234-8879
(813)720-4720

-SALTWATER CONSTRUCTION
MARK PATTERSON
saltwaterconstruction@gmail.com
(843)385-6086

DEVELOPER:

-BAREFOOT RESORT RESIDENTIAL OWNERS ASSOCIATION
KELLY WHITE
kwhite@pm-llc.com
(843)399-8688
(843)399-1761

DATE OF COMPLETION:

OCTOBER, 2021

Plat BK: 303 PG: 88 Doctype: 061
02/10/2022 at 09:49:45 AM, 1 OF 11

Marion D. Foxworth III
Horry County, SC Registrar of Deeds

1 SP1 EXTREME SOUTH WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

APPROVED FOR RECORDING
NORTH MYRTLE BEACH PUBLIC WORKES
BY:
DATE: 2/9/2022

Extreme South Wall
Stantec Column Designations
Date: 3/31/25
STANTEC NO.: 171015900
SP1

Stantec

PALMETTO CORP
Land Surveying Division
3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

DRAWN BY: JAL	JOB# 52778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

STANTEC COLUMN DESIGNATIONS ARE SHOWN IN RED ON THE AS-BUILT SURVEY BY PALMETTO CORP OF CONWAY, INC., CERTIFIED ON FEBRUARY 9, 2022, AND ARE NOT THE RESPONSIBILITY OF PALMETTO CORP

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Sheet 1 of 11

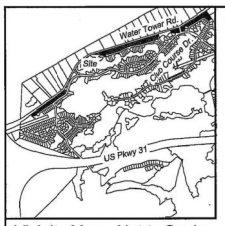
SOUTH CAROLINA PROFESSIONAL ENGINEER No. 22753 RAY R. ESHELMAN

SOUTH CAROLINA PALMETTO CORP OF CONWAY, INC No. C5176 CERTIFICATE OF AUTHORIZATION

Certificate of Accuracy
I hereby state that to the best of my professional knowledge, information, and belief, the survey shown herein was made in accordance with the requirements of the Standards of Practice Manual for Surveying in South Carolina, and meets or exceeds the requirements for a Class A survey as specified therein; also there are no visible encroachments or projections other than shown.

Ray R. Eshelman PLS# 22753

2/9/22 DATE

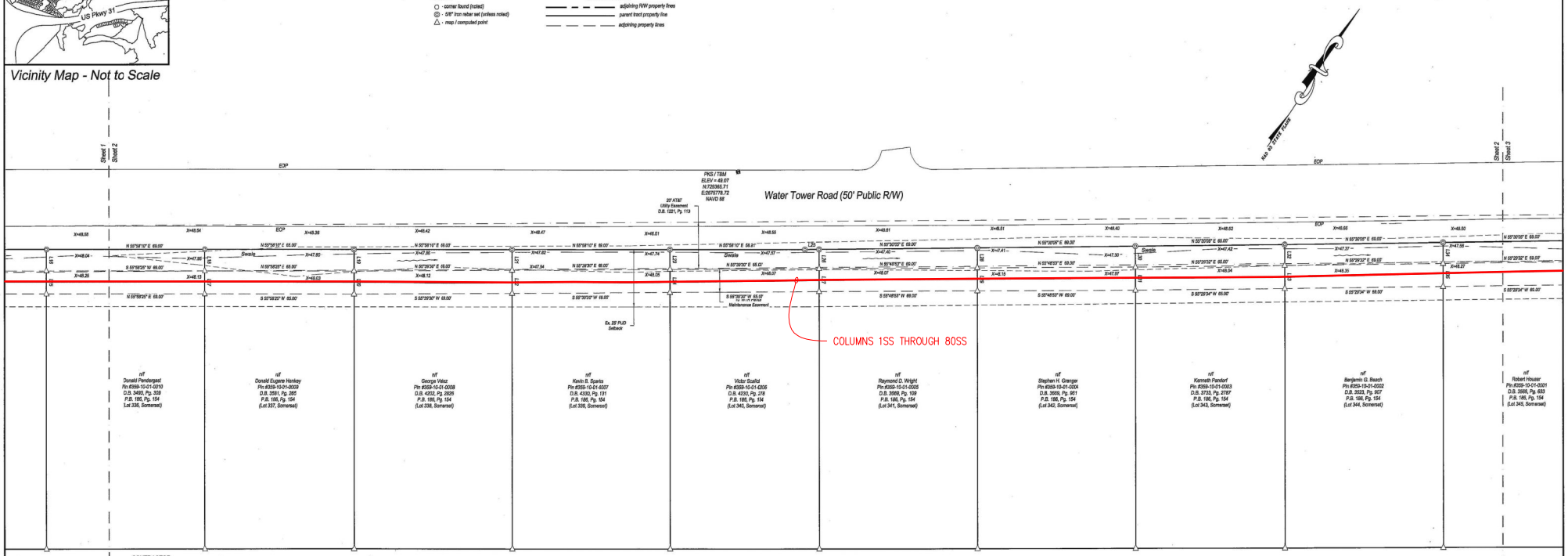


Vicinity Map - Not to Scale

State Plane Coordinates:
NAD-83 Horizontal
NAVD-88 Vertical

Legend
○ - corner found (noted)
◎ - 5/8" iron rebar set (unless noted)
△ - map / computed point

Line Work Legend
adjoining R/W property lines
parent tract property line
adjoining property lines



CONTRACTOR:
-OUTPOST CONSTRUCTION
JEFF SHULSE, OWNER
jshulse@outpostcc.com
(713)213-8301
(941)524-1163

-PERMACAST LLC / DIRECTOR OF SALES
STEVEN HATCHER
steven@permacastwalls.com
(941)234-8879
(813)720-4720

-SALTWATER CONSTRUCTION
MARK PATTERSON
saltwaterconstruction@gmail.com
(843)385-8086

DEVELOPER:

-BAREFOOT RESORT RESIDENTAL OWNERS ASSOCIATION
KELLY WHITE
kwhite@pm-llc.com
(843)399-9888
(843)399-1761

DATE OF COMPLETION:

OCTOBER, 2021

1 / SP2 EXTREME SOUTH WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

Extreme South Wal
Stantec Column Designations
Date: 3/31/22
STANTEC NO.: 171015902
SP2

Stantec

PALMETTO CORP
Land Surveying Division
3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

DRAWN BY: JAL	JOB# 52778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

STANTEC COLUMN DESIGNATIONS ARE SHOWN IN RED ON THE AS-BUILT SURVEY BY PALMETTO CORP OF CONWAY, INC., CERTIFIED ON FEBRUARY 9, 2022, AND ARE NOT THE RESPONSIBILITY OF PALMETTO CORP

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Sheet 2 of 11

SOUTH CAROLINA REGISTERED LAND SURVEYOR No. 22753 RAY R. EISHELMAN

PALMETTO CORP OF CONWAY, INC No. C0176 CERTIFICATE OF AUTHORIZATION

Ray R. Eishelman
Ray R. Eishelman PLS# 22753

2/9/22
DATE

Certificate of Accuracy
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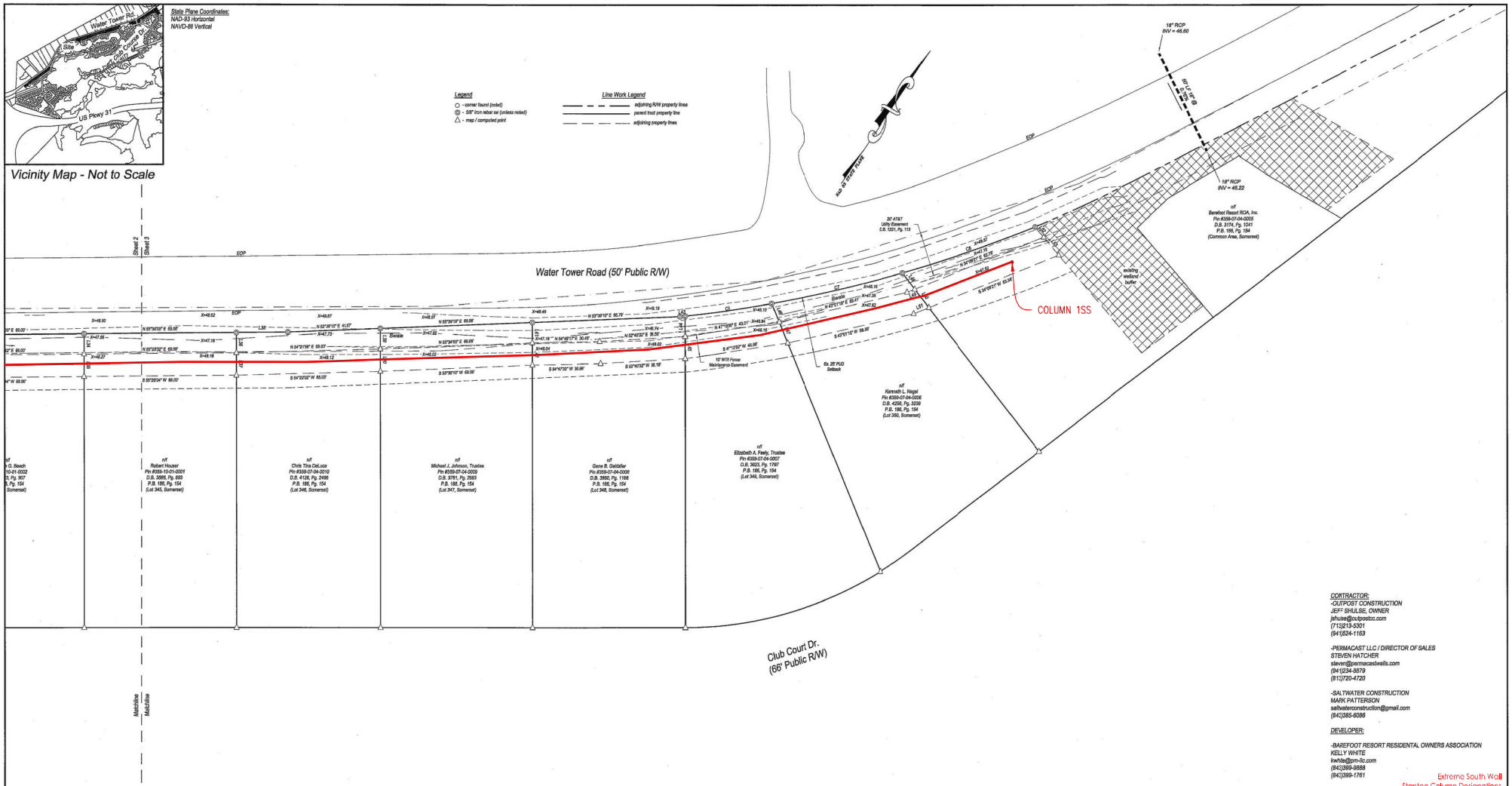

1 SP3 EXTREME SOUTH WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

CONTRACTOR:
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-SALTWATER CONSTRUCTION
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DEVELOPER:

-BAREFOOT RESORT RESIDENTAL OWNERS ASSOCIATION
KELLY WHITE
kwhite@pm-llc.com
(843)399-9888
(843)399-1761

DATE OF COMPLETION:
OCTOBER, 2021

Extreme South Wall
Stantec Column Designations
Date: 3/31/25
STANTEC NO.: 171015900
SP3

Stantec

PALMETTO CORP
Land Surveying Division
3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

DRAWN BY: JAL	JOB# 52778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

STANTEC COLUMN DESIGNATIONS ARE SHOWN IN RED ON THE AS-BUILT SURVEY BY PALMETTO CORP OF CONWAY, INC., CERTIFIED ON FEBRUARY 9, 2022, AND ARE NOT THE RESPONSIBILITY OF PALMETTO CORP

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Sheet 3 of 11

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 22753 RAY R. ESHELMAN

PALMETTO CORP OF CONWAY, INC No. C01176 STATE OF AUTHORIZATION

Ray R. Eshelman PLS# 22753

2/9/22 DATE

Certificate of Accuracy
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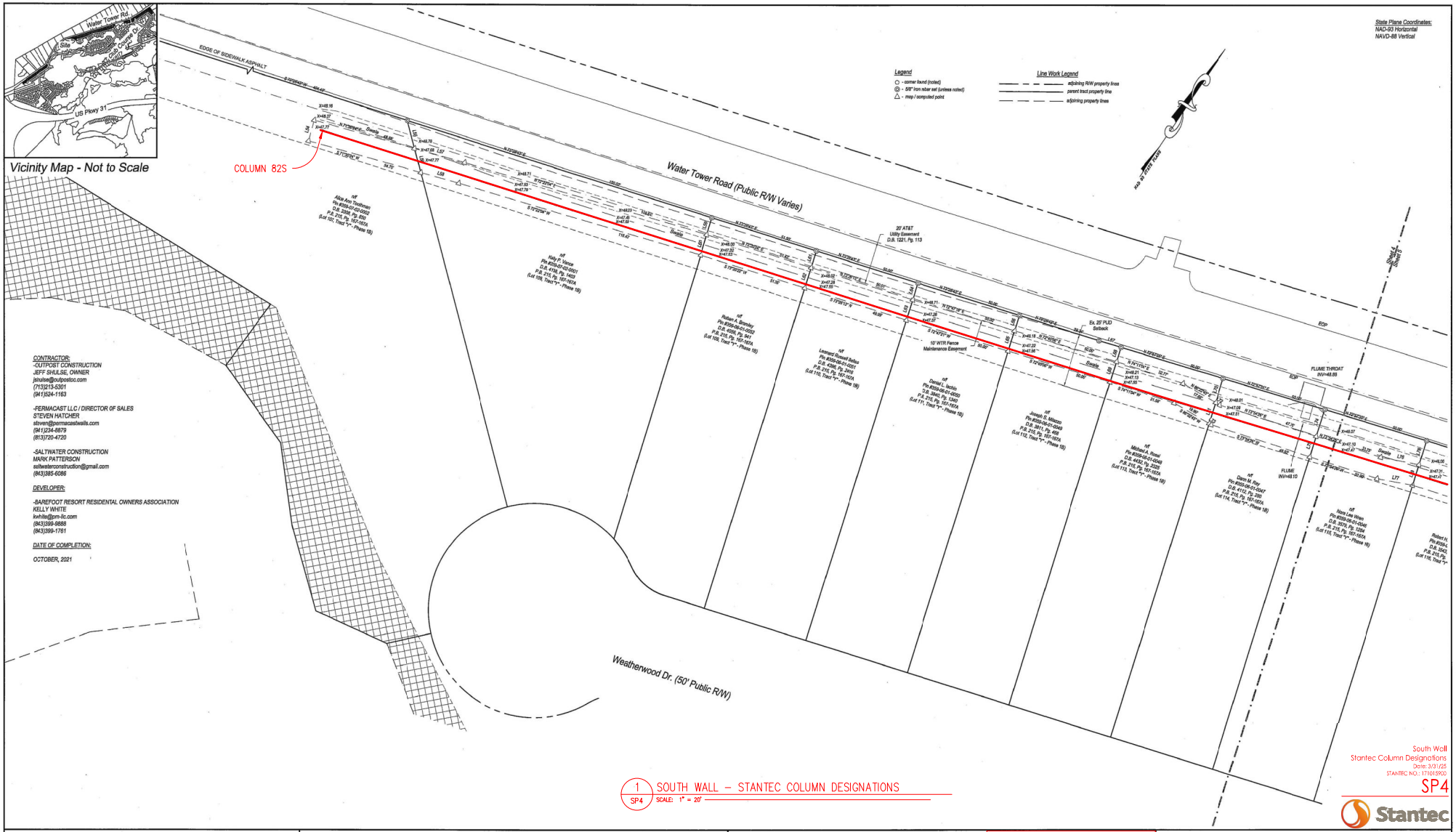

1 SP4 SOUTH WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

South Wall
Stantec Column Designations
Date: 3/31/25
STANTEC NO.: 171015900
SP4
Stantec

PALMETTO CORP
Land Surveying Division
3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

DRAWN BY: JAL	JOB#S2778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

STANTEC COLUMN DESIGNATIONS ARE SHOWN IN RED ON THE AS-BUILT SURVEY BY PALMETTO CORP OF CONWAY, INC., CERTIFIED ON FEBRUARY 9, 2022, AND ARE NOT THE RESPONSIBILITY OF PALMETTO CORP

GRAPHIC SCALE
20 0 10 20 40 60
(IN FEET)
1 inch = 20 ft.

Sheet 4 of 11

SOUTH CAROLINA PROFESSIONAL LAND SURVEYOR No. 22753 RAY R. ESHELMAN
SOUTH CAROLINA PALMETTO CORP OF CONWAY, INC No. C0176 CERTIFICATE OF AUTHORIZATION

Ray R. Eshelman PLS# 22753
2/9/22 DATE

Certificate of Accuracy
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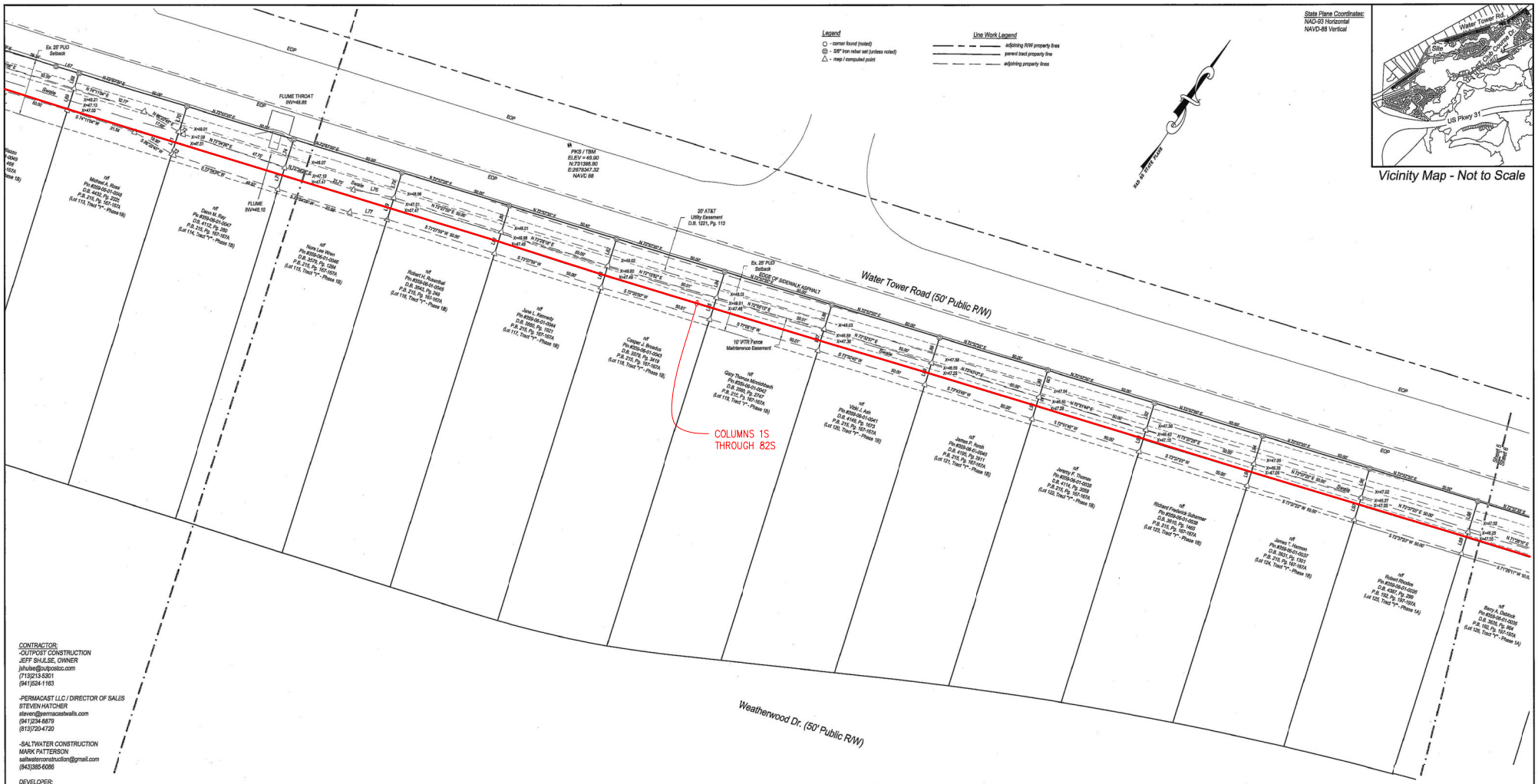

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(941)524-1163

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-SALTWATER CONSTRUCTION
MARK PATTERSON
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DEVELOPER:

-BAREFOOT RESORT RESIDENTAL OWNERS ASSOCIATION
KELLY WHITE
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(843)399-9888
(843)399-1761

DATE OF COMPLETION:

OCTOBER, 2021

1 SP5 SOUTH WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

South Wall
Stantec Column Designations
Date: 3/31/25
STANTEC NO.: 171015900
SP5

Stantec

PALMETTO CORP
Land Surveying Division
3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

DRAWN BY: JAL	JOB#:52778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

STANTEC COLUMN DESIGNATIONS ARE SHOWN IN RED ON THE AS-BUILT SURVEY BY PALMETTO CORP OF CONWAY, INC., CERTIFIED ON FEBRUARY 9, 2022, AND ARE NOT THE RESPONSIBILITY OF PALMETTO CORP

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Sheet 5 of 11

SOUTH CAROLINA PROFESSIONAL LAND SURVEYOR No. 22753 RAY R. ESHELMAN

SOUTH CAROLINA PALMETTO CORP OF CONWAY, INC No. C0178 CERTIFICATE OF AUTHORIZATION

Ray R. Eshelman PLS# 22753

2/9/22 DATE

Certificate of Accuracy
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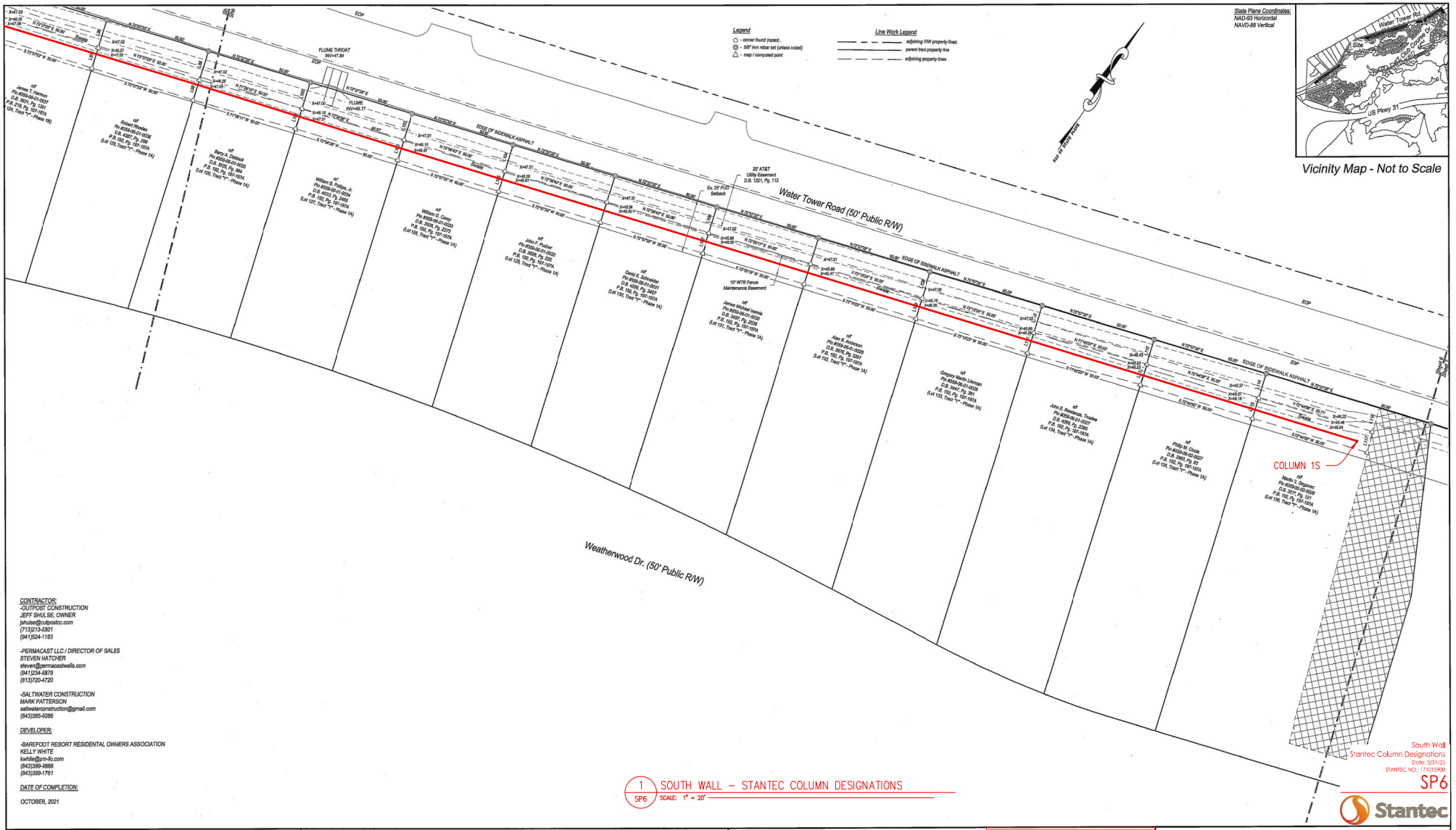

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(843)399-1761

DATE OF COMPLETION:

OCTOBER, 2021

1 SP6 SOUTH WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

South Wall
Stantec Column Designations
Date: 3/31/25
STANTEC NO.: 171015900
SP6

Stantec

PALMETTO CORP
Land Surveying Division
3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

DRAWN BY: JAL	JOB# 52778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

STANTEC COLUMN DESIGNATIONS ARE SHOWN IN RED ON THE AS-BUILT SURVEY BY PALMETTO CORP OF CONWAY, INC., CERTIFIED ON FEBRUARY 9, 2022, AND ARE NOT THE RESPONSIBILITY OF PALMETTO CORP.

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Sheet 6 of 11

SOUTH CAROLINA REGISTERED LAND SURVEYOR No. 22753 RAY R. ESHELMAN

PALMETTO CORP OF CONWAY, INC No. C0176 CERTIFICATE OF AUTHORIZATION

Ray R. Eshelman PLS# 22753

2/9/22 DATE

Certificate of Accuracy
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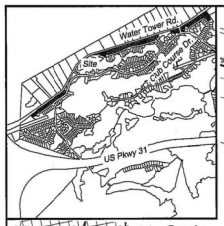

Vicinity Map - Not to Scale

CONTRACTOR:
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(843)399-1781

DATE OF COMPLETION:

OCTOBER, 2021

1 SP7 SOUTH MIDDLE WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

South Middle Wall
Stantec Column Designations
Date: 3/31/25
STANTEC NO.: 171015900
SP7

Stantec

PALMETTO CORP
Land Surveying Division
3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

DRAWN BY: JAL	JOB#52778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

STANTEC COLUMN DESIGNATIONS ARE SHOWN IN RED ON THE AS-BUILT SURVEY BY PALMETTO CORP OF CONWAY, INC., CERTIFIED ON FEBRUARY 9, 2022, AND ARE NOT THE RESPONSIBILITY OF PALMETTO CORP

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Sheet 7 of 11

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 22753 RAY R. EISHELMAN

SOUTH CAROLINA PALMETTO CORP OF CONWAY, INC No. C0178 CERTIFICATE OF AUTHORIZATION

Ray R. Eshelman PLS# 22753

2/9/22 DATE

Certificate of Accuracy
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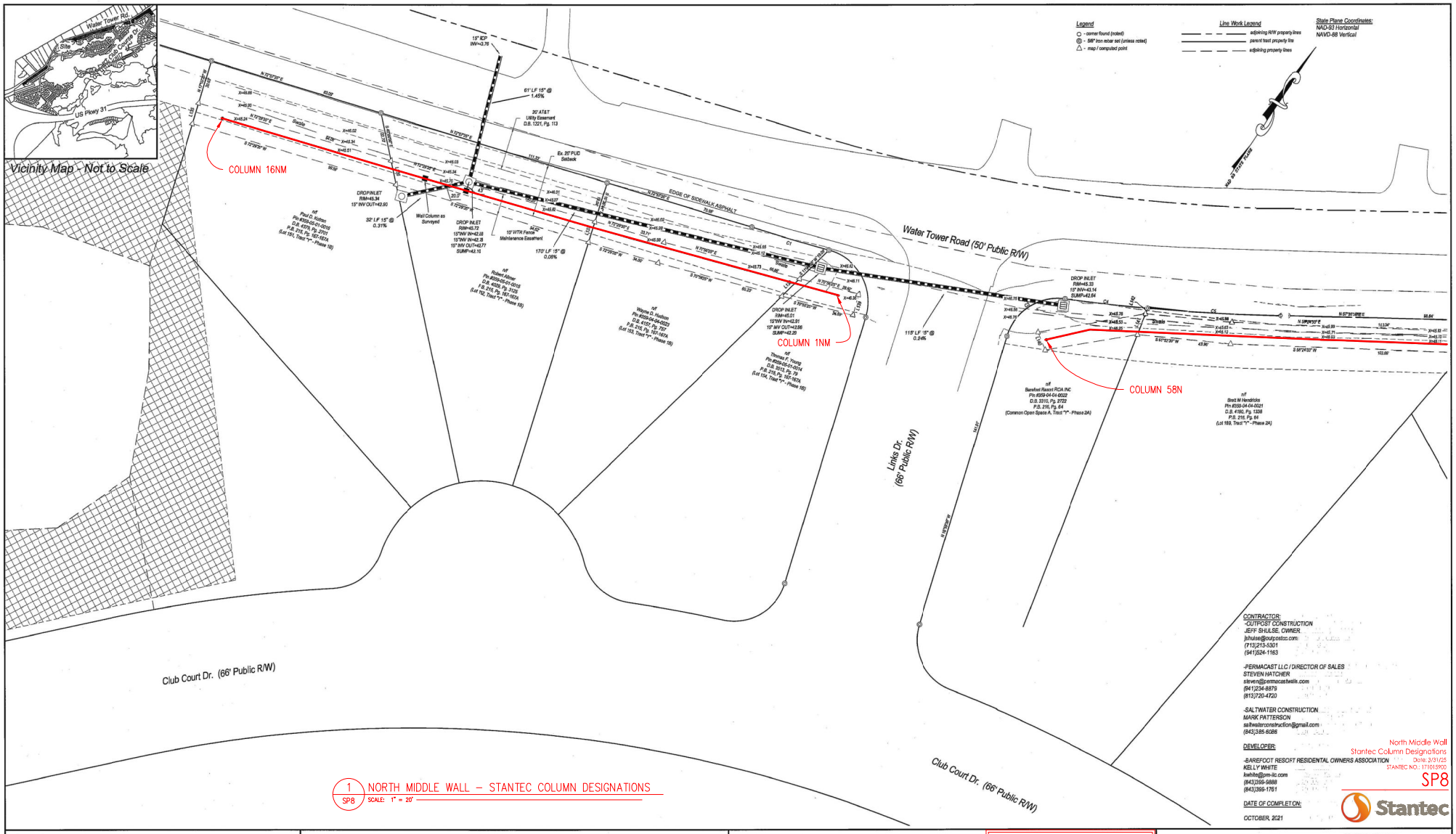

1 SP8 NORTH MIDDLE WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

CONTRACTOR:
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(843)399-1761

DATE OF COMPLETION:
OCTOBER, 2021

North Middle Wall
Stantec Column Designations
Date: 2/31/23
STANTEC NO.: 177015900
SP8

Stantec

PALMETTO CORP
Land Surveying Division
3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

DRAWN BY: JAL	JOB# 52778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

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GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Sheet 8 of 11

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 22753 RAY R. ESHELMAN
SOUTH CAROLINA PALMETTO CORP OF CONWAY, INC No. C0176 CERTIFICATE OF AUTHORIZATION

Ray R. Eshelman PLS# 22753
2/9/22 DATE

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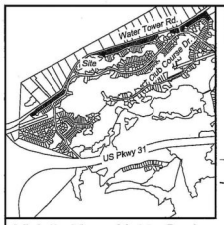

Vicinity Map - Not to Scale

State Plane Coordinates:
NAD-83 Horizontal
NAVD-88 Vertical

CONTRACTOR:
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(843)389-1761

DATE OF COMPLETION:

OCTOBER, 2021

1 SP9 NORTH WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

North Wall
Stantec Column Designations
Date: 3/31/25
STANTEC NO.: 171015900
SP9

Stantec

PALMETTO CORP
Land Surveying Division
3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

DRAWN BY: JAL	JOB#:52778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

STANTEC COLUMN DESIGNATIONS ARE SHOWN IN RED ON THE AS-BUILT SURVEY BY PALMETTO CORP OF CONWAY, INC., CERTIFIED ON FEBRUARY 9, 2022, AND ARE NOT THE RESPONSIBILITY OF PALMETTO CORP

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Sheet 9 of 11

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 22753 RAY R. EISHEIMAN

SOUTH CAROLINA PALMETTO CORP OF CONWAY, INC No. C0176 CERTIFICATE OF AUTHORIZATION

Ray R. Eisheiman PLS# 22753

2/9/22 DATE

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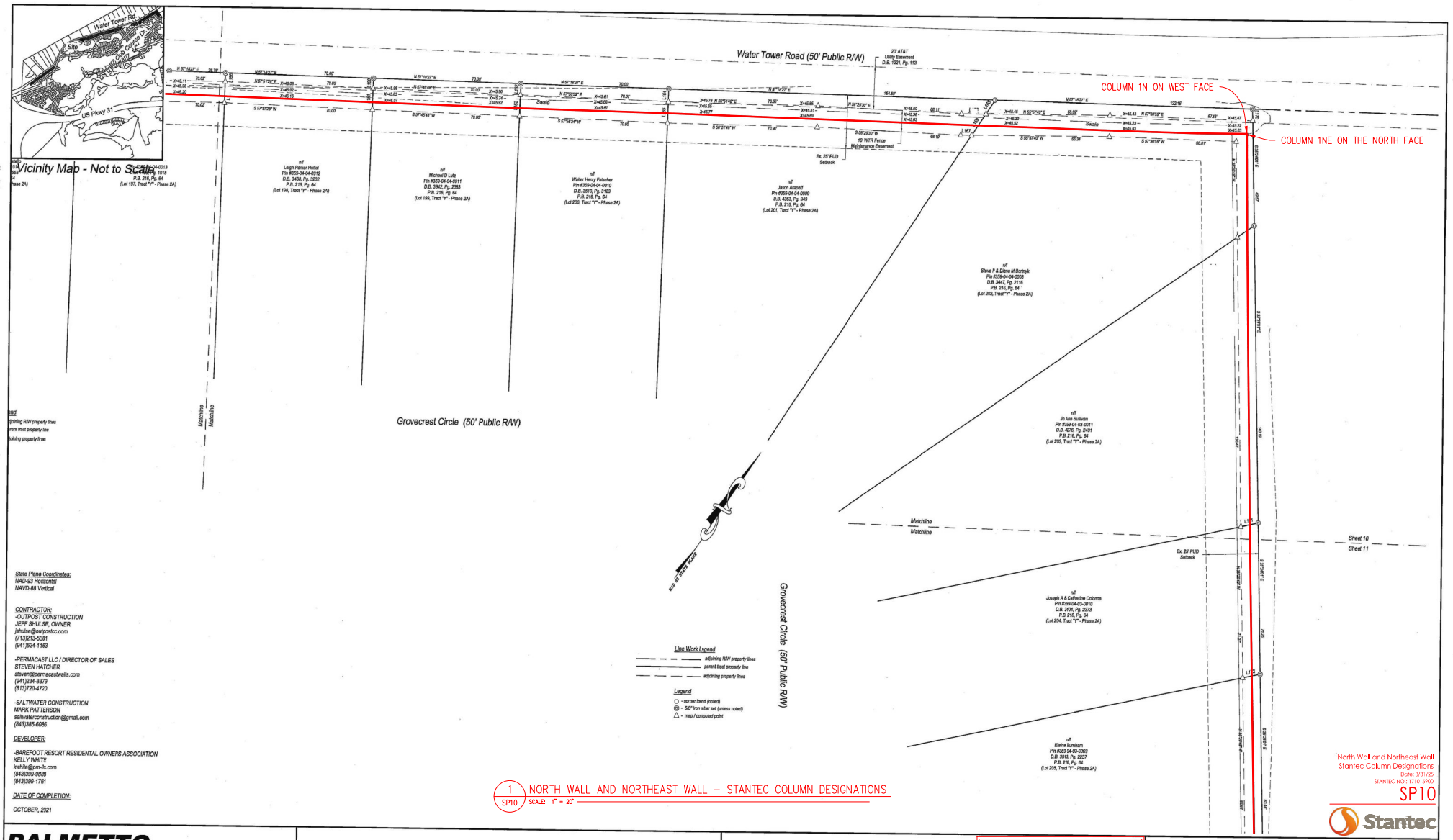

State Plane Coordinates:
NAD-83 Horizontal
NAVD-88 Vertical

CONTRACTOR:
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(843)399-1781

DATE OF COMPLETION:

OCTOBER, 2021

1 SP10 NORTH WALL AND NORTHEAST WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

North Wall and Northeast Wall
Stantec Column Designations
Date: 3/31/25
STANTEC NO.: 1710139XX

SP10

Stantec

PALMETTO CORP
Land Surveying Division

3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

DRAWN BY: JAL	JOB#:53778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

STANTEC COLUMN DESIGNATIONS ARE SHOWN IN RED ON THE AS-BUILT SURVEY BY PALMETTO CORP OF CONWAY, INC., CERTIFIED ON FEBRUARY 9, 2022, AND ARE NOT THE RESPONSIBILITY OF PALMETTO CORP

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

SOUTH CAROLINA PROFESSIONAL LAND SURVEYOR No. 22753 RAY R. ESHELMAN

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION PALMETTO CORP OF CONWAY, INC No. C3076

Certificate of Accuracy
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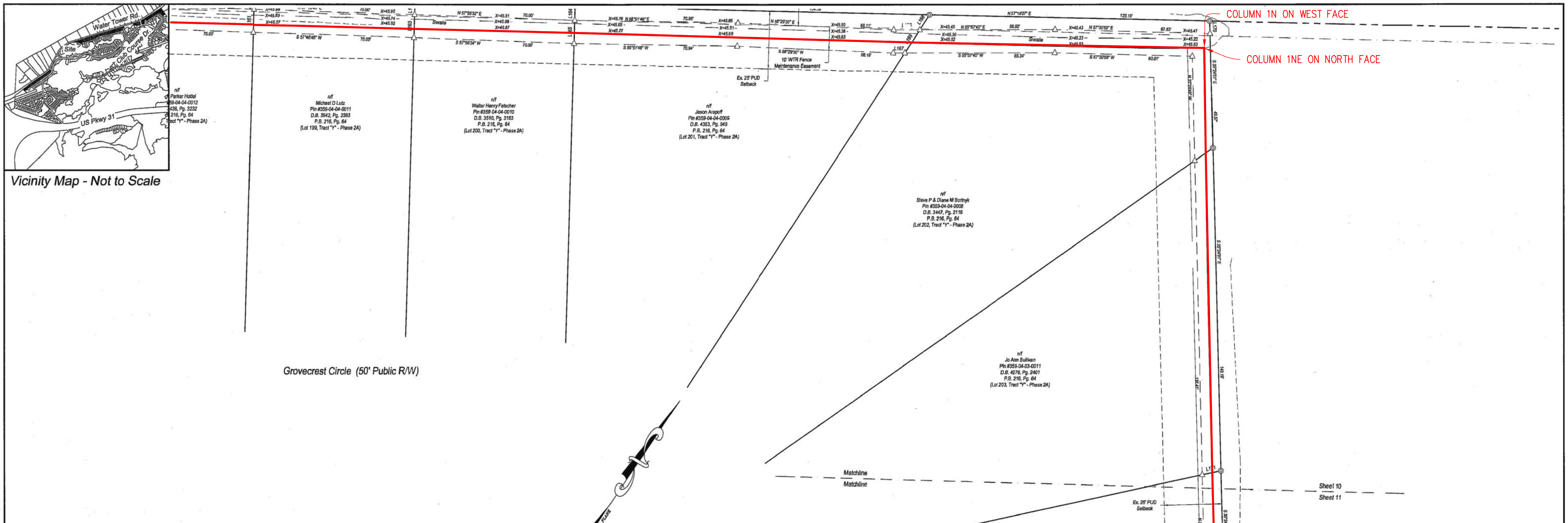
Ray R. Eshelman PLS# 22753

2/9/22 DATE

Sheet 10 of 11


COLUMN 1N ON WEST FACE
COLUMN 1NE ON NORTH FACE
COLUMN 18NE
Water Tower Rd.
Site
US Pkwy 31
Vicinity Map - Not to Scale
n/f Parker Hattel
n/f Michael D Lutz Pin #359-04-04-0011 D.B. 3942, Pg. 2383 P.B. 216, Pg. 64 (Lot 199, Tract "Y" - Phase 2A)
n/f Walter Henry Fetscher Pin #359-04-04-0010 D.B. 3510, Pg. 3183 P.B. 216, Pg. 64 (Lot 200, Tract "Y" - Phase 2A)
n/f Jason Arapoff Pin #359-04-04-0009 D.B. 4353, Pg. 949 P.B. 216, Pg. 64 (Lot 201, Tract "Y" - Phase 2A)
n/f Steve P & Diane M Bortnyk Pin #359-04-04-0008 D.B. 3447, Pg. 2116 P.B. 216, Pg. 64 (Lot 202, Tract "Y" - Phase 2A)
n/f Jo Ann Sullivan Pin #359-04-03-0011 D.B. 4276, Pg. 2401 P.B. 216, Pg. 64 (Lot 203, Tract "Y" - Phase 2A)
n/f Joseph A & Catherine Colonna Pin #359-04-03-0010 D.B. 3404, Pg. 2373 P.B. 216, Pg. 64 (Lot 204, Tract "Y" - Phase 2A)
n/f Elaine Burnham Pin #359-04-03-0009 D.B. 3813, Pg. 2237 P.B. 216, Pg. 64 (Lot 205, Tract "Y" - Phase 2A)
Ex. 25' PUD Setback
10' WTR Fence Maintenance Easement
Swale
Grovecrest Circle (50' Public R/W)
Grovecrest Circle (50' Public R/W)
Matchline
Matchline
Sheet 10
Sheet 11
Ex. 25' PUD Setback
Line Work Legend
adjoining R/W property lines
parent tract property line
adjoining property lines
Legend
○ - corner found (noted)
◎ - 5/8" iron rebar set (unless noted)
△ - map / computed point
1 SP11 NORTH WALL AND NORTHEAST WALL – STANTEC COLUMN DESIGNATIONS
SCALE: 1" = 20'

CURVE	ARC LENGTH	RADIUS	DELTA ANGLE	CHORD BEARING	CHORD LENGTH	TANGENT
C1	37.83'	883.29'	2°27'15"	N 72°31'24" E	37.83'	18.92'
C2	40.02'	25.00'	91°42'36"	S 52°50'55" E	35.88'	25.78'
C3	36.31'	25.00'	80°56'07"	N 23°28'25" E	32.45'	21.33'
C4	38.93'	883.29'	2°31'31"	N 62°40'44" E	38.93'	19.47'
C5	62.82'	883.29'	4°04'30"	N 59°22'44" E	62.81'	31.42'
C6	39.57'	588.18'	3°51'15"	N 47°47'49" E	39.66'	19.79'
C7	60.77'	588.18'	5°55'12"	N 42°54'36" E	60.75'	30.41'
C8	63.38'	588.18'	6°10'27"	N 36°51'46" E	63.35'	31.72'

LINE	BEARING	DISTANCE
L1	N 49°44'45" W	10.37'
L2	N 60°22'49" W	11.13'
L3	N 34°22'06" W	10.00'
L4	N 32°56'59" W	16.90'
L5	N 34°22'06" W	16.97'
L6	N 34°22'06" W	9.40'
L7	N 34°01'50" W	9.40'
L8	S 34°01'35" E	10.00'
L9	S 34°01'50" E	9.41'
L10	S 34°01'50" E	10.00'
L11	S 34°01'50" E	10.00'
L12	S 34°01'50" E	9.41'
L13	S 34°01'50" E	10.00'
L14	S 34°01'50" E	9.42'
L15	S 34°01'50" E	10.00'
L16	S 34°01'50" E	9.42'
L17	S 34°01'50" E	10.00'
L18	S 34°01'50" E	9.43'
L19	S 34°01'50" E	9.43'
L20	S 34°01'50" E	10.00'
L21	S 34°01'50" E	9.06'
L22	S 34°01'50" E	10.00'
L23	S 34°01'50" E	8.88'
L24	S 34°01'50" E	10.00'
L25	N 55°30'05" E	6.19'
L26	S 34°01'50" E	8.38'
L27	S 34°01'50" E	10.00'
L28	S 34°01'50" E	8.76'
L29	S 34°01'50" E	10.00'
L30	S 34°01'50" E	9.13'
L31	S 34°01'50" E	10.00'
L32	S 34°01'50" E	9.12'
L33	S 34°01'50" E	10.00'
L34	S 34°01'50" E	9.11'
L35	S 34°01'50" E	10.00'
L36	S 34°01'50" E	9.10'
L37	S 34°01'50" E	10.00'
L38	N 55°30'06" E	23.47'
L39	S 34°01'50" E	9.15'
L40	S 34°01'50" E	10.00'
L41	S 34°01'50" E	9.07'
L42	S 34°01'50" E	10.01'
L43	N 49°50'06" E	2.28'
L44	S 34°01'50" E	9.17'
L45	S 34°01'50" E	10.02'
L46	S 56°07'24" E	8.94'
L47	S 56°07'24" E	10.13'
L48	S 71°27'36" E	9.19'
L49	S 34°09'21" W	3.77'
L50	S 71°27'36" E	10.38'
L51	S 34°09'21" W	7.34'
L52	S 74°25'31" E	8.18'
L53	S 74°25'31" E	10.55'
L54	N 18°29'36" W	10.00'
L55	S 46°42'44" E	13.46'
L56	S 48°42'44" E	11.57'
L57	N 71°30'24" E	24.34'
L58	N 71°30'24" E	18.44'
L59	S 17°00'31" E	8.26'
L60	S 17°00'31" E	10.00'
L61	S 16°27'57" E	8.13'
L62	S 16°36'42" E	10.00'
L63	S 16°31'17" E	10.00'
L64	S 16°31'17" E	8.10'
L65	S 16°31'17" E	10.00'
L66	S 16°31'17" E	7.49'
L67	N 72°57'35" E	10.66'
L68	S 16°31'17" E	6.95'
L69	S 16°31'17" E	10.00'
L70	S 16°31'17" E	11.76'
L71	S 16°31'17" E	10.26'
L72	N 66°22'45" E	2.31'
L73	N 66°22'45" E	1.11'
L74	S 16°31'17" E	13.06'
L75	S 16°31'17" E	10.00'
L76	N 68°52'45" E	16.37'
L77	N 66°19'40" E	17.04'
L78	S 16°30'58" E	11.66'
L79	S 16°32'01" E	10.00'
L80	S 16°30'58" E	12.11'
L81	S 16°32'01" E	10.00'
L82	S 16°31'34" E	12.55'
L83	S 16°31'17" E	10.00'
L84	S 16°31'35" E	12.00'
L85	S 16°31'17" E	10.00'
L86	S 16°31'36" E	11.24'
L87	S 16°31'17" E	10.00'
L88	S 16°31'35" E	11.75'
L89	S 16°31'17" E	10.00'
L90	S 16°31'34" E	12.42'
L91	S 16°31'17" E	10.00'
L92	S 16°31'34" E	12.34'
L93	S 16°31'17" E	10.00'
L94	S 16°31'34" E	12.92'
L95	S 16°31'17" E	10.00'
L96	S 16°31'33" E	13.50'
L97	S 16°31'17" E	10.00'
L98	S 16°31'32" E	14.06'
L99	S 16°31'17" E	10.00'
L100	S 16°31'17" E	12.75'
L101	S 16°31'17" E	10.00'
L102	S 16°31'17" E	12.75'
L103	S 16°31'17" E	10.00'
L104	S 16°31'08" E	12.73'
L105	S 16°31'30" E	10.01'
L106	S 16°31'17" E	12.75'
L107	S 16°31'17" E	10.00'
L108	S 16°31'17" E	12.92'
L109	S 16°31'17" E	10.00'
L110	S 16°31'17" E	13.21'
L111	S 16°31'17" E	10.00'
L112	S 16°31'17" E	11.97'
L113	S 16°31'17" E	10.00'
L114	S 16°31'17" E	11.75'
L115	S 16°31'17" E	10.00'
L116	S 17°22'53" E	11.54'
L117	S 18°42'51" E	10.00'
L118	S 26°36'12" E	12.49'
L119	S 26°38'12" E	10.14'
L120	S 16°52'26" E	12.32'
L120	S 16°52'26" E	12.32'
L121	S 17°02'25" E	10.00'
L122	S 17°02'26" E	12.32'
L123	S 17°02'25" E	10.00'
L124	S 17°12'29" E	12.32'
L125	S 17°02'27" E	10.00'
L126	S 17°02'25" E	12.32'
L127	S 17°02'25" E	10.00'
L128	S 17°02'25" E	12.32'
L129	S 17°02'25" E	10.00'
L130	S 17°02'25" E	12.32'
L131	S 17°02'25" E	10.00'
L132	S 00°45'52" W	12.94'
L133	S 00°45'52" W	10.50'
L134	S 17°52'47" E	10.00'
L135	S 17°02'25" E	10.00'
L136	S 46°00'00" E	11.38'
L137	S 16°21'02" E	10.16'
L138	N 11°44'55" E	11.64'
L139	N 18°43'35" W	10.28'
L140	N 55°50'03" W	9.11'
L141	N 12°34'03" W	10.36'
L142	N 12°34'03" W	2.77'
L143	N 58°09'21" E	13.96'
L144	S 06°45'07" W	12.60'
L145	S 58°09'21" W	6.00'
L146	N 06°48'07" E	6.81'
L147	S 41°52'31" E	6.12'
L148	N 58°09'21" E	1.64'
L149	S 41°52'31" E	10.16'
L150	S 32°23'22" E	4.65'
L151	S 32°23'22" E	10.00'
L152	S 32°23'22" E	5.30'
L153	S 32°23'22" E	10.00'
L154	S 32°23'22" E	4.06'
L155	S 32°23'22" E	10.00'
L156	S 32°23'22" E	5.43'
L157	S 32°23'22" E	10.00'
L158	S 32°23'22" E	4.02'
L159	S 32°23'22" E	10.00'
L160	S 32°23'22" E	4.69'
L161	S 32°23'22" E	10.00'
L162	S 32°23'22" E	5.27'
L163	S 32°23'22" E	10.00'
L164	S 32°23'22" E	6.04'
L165	S 32°23'22" E	10.00'
L166	N 55°57'40" E	11.45'
L167	N 55°57'40" E	5.12'
L168	S 00°49'06" E	7.81'
L169	S 00°49'06" E	11.95'
L170	N 35°24'01" W	5.50'
L171	N 43°50'20" E	8.30'
L172	N 43°50'20" E	8.36'
L173	N 49°05'13" E	8.33'
L174	N 54°35'59" E	8.30'
L175	S 35°20'49" E	6.45'
L176	N 35°24'01" W	7.25'

State Plane Coordinates:
NAD-83 Horizontal
NAVD-88 Vertical

CONTRACTOR:
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kwhite@pm-llc.com
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DATE OF COMPLETION:
OCTOBER, 2021

North Wall and Northeast Wall
Stantec Column Designations
Date: 3/31/25
STANTEC NO.: 171015900
SP11

Stantec

STANTEC COLUMN DESIGNATIONS ARE SHOWN IN RED ON THE AS-BUILT SURVEY BY PALMETTO CORP OF CONWAY, INC., CERTIFIED ON FEBRUARY 9, 2022, AND ARE NOT THE RESPONSIBILITY OF PALMETTO CORP

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.

Certificate of Accuracy
I hereby state that to the best of my professional knowledge, information, and belief, the survey shown herein was made in accordance with the requirements of the Standards of Practice Manual for Surveying in South Carolina, and meets or exceeds the requirements for a Class A survey as specified therein; also there are no visible encroachments or projections other than shown.

SOUTH CAROLINA PROFESSIONAL LAND SURVEYOR No. 22753 RAY R. ESHELMAN
SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION PALMETTO CORP OF CONWAY, INC No. C0176

Ray R. Eshelman PLS# 22753

2/9/22
DATE

PALMETTO CORP
Land Surveying Division

3873 Highway 701 N
Conway, S.C. 29526
Phone: (843) 716-6021

Water Tower Road Wall As-Built Survey
Dogwood Neck Township, Horry County, South Carolina
for
Earthworks Group

DRAWN BY: JAL	JOB# S2778	REVISIONS:
CLOSURE CHECKED BY:	DATE OF SURVEY: 11/17/2021	
APPROVED BY: RRE		