



PREPARED FOR:

Pfister Energy
56 Goffle Road
Hawthorne, NJ 07506

PROJECT:

Forest Road
127 Forest Road
N. Branford, CT 06472

AP ALTERNATIVES, LLC

20-345 County Road X
Ridgeville Corners, OH 43555
(419) 267-5280
www.apalternatives.com

PREPARED BY:

On-Site Testing: **AP Alternatives**
Report: **Jacob Kahle**
Report Review: **Tawana Molnar**

Project No. **210261**
Anchor Test No. **210261-1**

July 19, 2021

ENGINEERING REVIEW:

JDS Consulting, PLLC
8600-D Jersey, Ct
Raleigh, NC 27617
919-480-1075
www.JDSConsulting.net
Project No.: **21901598**



ANCHOR TEST REPORT

FOR SOLAR PV GROUND MOUNT



REV: A

REVIEWING ENGINEER
FIRM #1349559
PAGE 1 OF 7

SITE EVALUATION REPORT

SITE CONDITIONS

The test site was located just south of Neubig’s Way Road. The site is located at approximately, 41.342628, -72.802396. The proposed site is currently on undeveloped land. Tree lines and other interfering vegetation is not documented in any tested areas meant for solar at this time.

PROPOSED CONSTRUCTION

Intended construction on the site will be a solar photovoltaic ground mounted array, utilizing AP Alternatives racking hardware. The array will consist of panels assembled in a 4 high, landscape orientation or 2 high portrait orientation. The foundation engineers required testing to be conducted at a frequency of approximately 2 load tests per major soil type, with no less than 2 of either, per site. The following totals were completed.

Axial tension load test locations: 5

The engineer of record has calculated the maximum anchor reaction per the structural report (ASD values) to be approximately:

Axial compression load value: 3096 lbs.
Axial tension load value: 3460 lbs.

The engineer of record has required testing to be conducted to a minimum of the following values.

Axial compression load value: 4700 lbs.
Axial tension load value: 7000 lbs.

COLLECTED DATA

Complete data logs with screw pile test results can be found after the foundation recommendation. A site map, with test and bore locations can be additionally found. All video and photographic evidence will be held at AP Alternatives.

WEBSOIL SURVEY

The following major soil type(s) was indicated in the websoil survey, at final screw depth.

303: Pits, Quarries:

Unweathered Bedrock @ screw depth

30A: Branford Silt Loam:

SM, SP, SP-SM

FINDINGS SUMMARY

Site testing was found to be compatible with AP Alternatives screw piles. Below is a summary of maximum displacements and configurations in the tested areas.

| Soil Type | Anchor Tests Displacement | Screw | Screw Length (TOTAL) |
|-----------|---------------------------|-------|----------------------|
| | Tens. @ 7000lbs | | |
| 303 | 0.125 | 3.00" | 73" |

Table 1 – Summary of Findings

All dimensions in inches. Anchor test results above represent largest passing anchor configuration (worst case condition) for each area or soil type in tension.

FOUNDATION RECOMMENDATIONS

Based on the summary of findings, on-site observations, and previous experience, APA recommends the screw setup to be a 3” x 73” long ground screw. An auxiliary method will be available in the case of refusals.

Note: Anchor test reports do not address Soil Corrosivity. All soils are assumed non-corrosive. Therefore, APA provides standard galvanized coatings unless otherwise requested by the customer.

Project Loc. N BRANFORD, CT

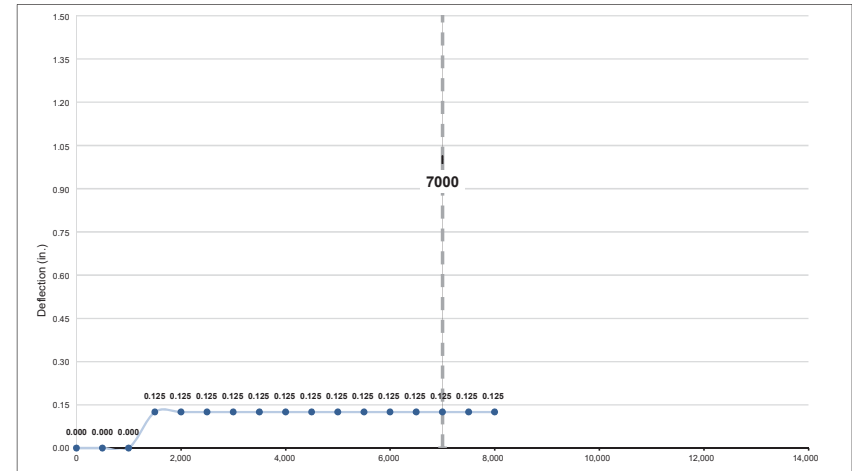
Project No. 210261

Anchor Test No. 210261-1

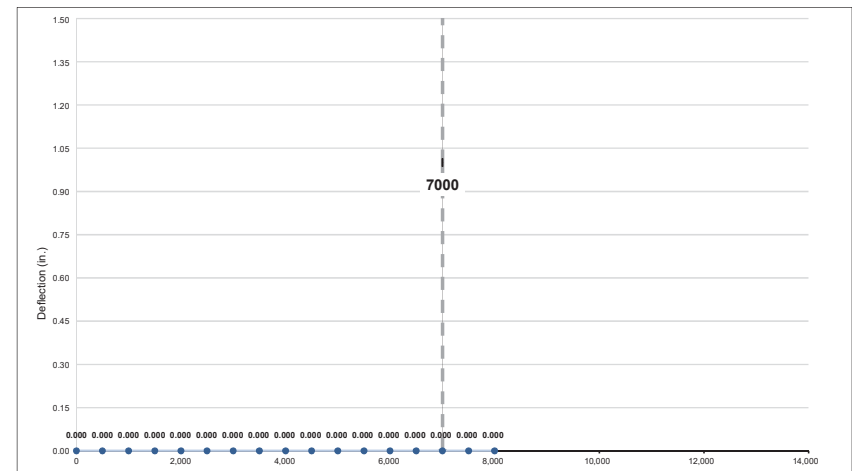
SECTION A: PULL TEST RESULTS

AXIAL TENSION (PULL OUT) TEST(S)

| TEST SETUP CONFIGURATION | | | | | Passing Load | 7000 | Soil ID |
|--------------------------|------------|------------------|-------------|------------|------------------|------|---------|
| Video ID | Test Loc. | Screw Type | Depth (in.) | Date | PASS | 7000 | 303 |
| T-01 | T-01 | 3.00 | 67 | 7/8/2021 | | | |
| Time (mins) | Load (lbs) | Deflection (in.) | Time (mins) | Load (lbs) | Deflection (in.) | | |
| 0:00 | 0 | 0.000 | 13:00 | 6500 | 0.125 | | |
| 1:00 | 500 | 0.000 | 14:00 | 7000 | 0.125 | | |
| 2:00 | 1000 | 0.000 | 15:00 | 7500 | 0.125 | | |
| 3:00 | 1500 | 0.125 | 16:00 | 8000 | 0.125 | | |
| 4:00 | 2000 | 0.125 | 17:00 | 8500 | | | |
| 5:00 | 2500 | 0.125 | 18:00 | 9000 | | | |
| 6:00 | 3000 | 0.125 | 19:00 | 9500 | | | |
| 7:00 | 3500 | 0.125 | 20:00 | 10000 | | | |
| 8:00 | 4000 | 0.125 | 21:00 | 10500 | | | |
| 9:00 | 4500 | 0.125 | 22:00 | 11000 | | | |
| 10:00 | 5000 | 0.125 | 23:00 | 11500 | | | |
| 11:00 | 5500 | 0.125 | 24:00 | 12000 | | | |
| 12:00 | 6000 | 0.125 | 25:00 | 12500 | | | |



| TEST SETUP CONFIGURATION | | | | | Passing Load | 7000 | Soil ID |
|--------------------------|------------|------------------|-------------|------------|------------------|------|---------|
| Video ID | Test Loc. | Screw Type | Depth (in.) | Date | PASS | 7000 | 30A |
| T-02 | T-02 | 3.00 | 67 | 7/8/2021 | | | |
| Time (mins) | Load (lbs) | Deflection (in.) | Time (mins) | Load (lbs) | Deflection (in.) | | |
| 0:00 | 0 | 0.000 | 13:00 | 6500 | 0.000 | | |
| 1:00 | 500 | 0.000 | 14:00 | 7000 | 0.000 | | |
| 2:00 | 1000 | 0.000 | 15:00 | 7500 | 0.000 | | |
| 3:00 | 1500 | 0.000 | 16:00 | 8000 | 0.000 | | |
| 4:00 | 2000 | 0.000 | 17:00 | 8500 | | | |
| 5:00 | 2500 | 0.000 | 18:00 | 9000 | | | |
| 6:00 | 3000 | 0.000 | 19:00 | 9500 | | | |
| 7:00 | 3500 | 0.000 | 20:00 | 10000 | | | |
| 8:00 | 4000 | 0.000 | 21:00 | 10500 | | | |
| 9:00 | 4500 | 0.000 | 22:00 | 11000 | | | |
| 10:00 | 5000 | 0.000 | 23:00 | 11500 | | | |
| 11:00 | 5500 | 0.000 | 24:00 | 12000 | | | |
| 12:00 | 6000 | 0.000 | 25:00 | 12500 | | | |



Project Loc. N BRANFORD, CT

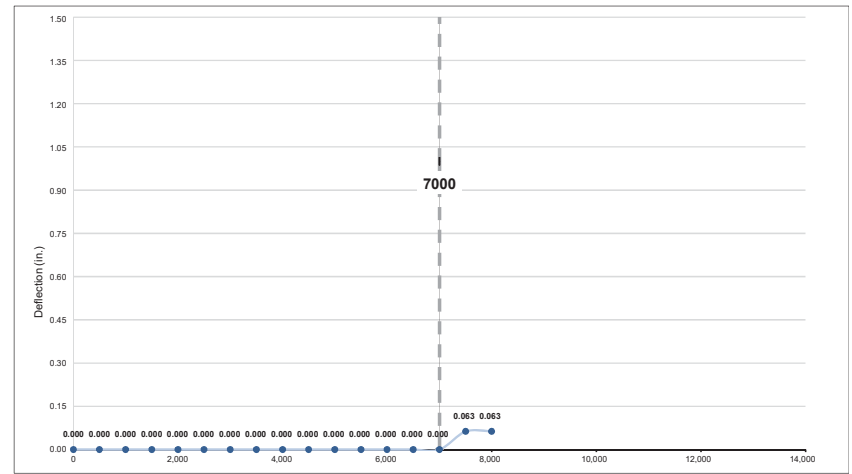
Project No. 210261

Anchor Test No. 210261-1

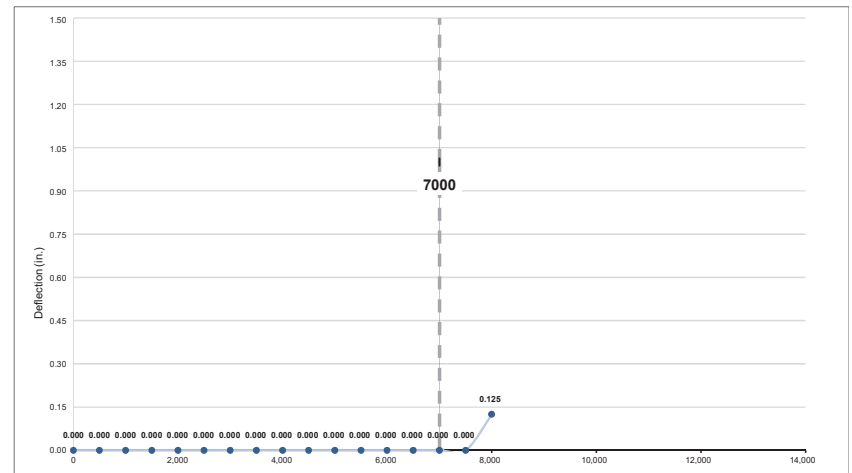
SECTION A: PULL TEST LOG

AXIAL TENSION (PULL OUT) TEST(S)

| TEST SETUP CONFIGURATION | | | | | Passing Load | 7000 | Soil ID |
|--------------------------|------------|------------------|-------------|-------------|--------------|------------------|---------|
| Video ID | Test Loc. | Screw Type | Depth (in.) | Date | PASS | 303 | |
| T-03 | T-03 | 3.00 | 67 | 7/8/2021 | | | |
| Time (mins) | Load (lbs) | Deflection (in.) | | Time (mins) | Load (lbs) | Deflection (in.) | |
| 0:00 | 0 | 0.000 | | 13:00 | 6500 | 0.000 | |
| 1:00 | 500 | 0.000 | | 14:00 | 7000 | 0.000 | |
| 2:00 | 1000 | 0.000 | | 15:00 | 7500 | 0.063 | |
| 3:00 | 1500 | 0.000 | | 16:00 | 8000 | 0.063 | |
| 4:00 | 2000 | 0.000 | | 17:00 | 8500 | | |
| 5:00 | 2500 | 0.000 | | 18:00 | 9000 | | |
| 6:00 | 3000 | 0.000 | | 19:00 | 9500 | | |
| 7:00 | 3500 | 0.000 | | 20:00 | 10000 | | |
| 8:00 | 4000 | 0.000 | | 21:00 | 10500 | | |
| 9:00 | 4500 | 0.000 | | 22:00 | 11000 | | |
| 10:00 | 5000 | 0.000 | | 23:00 | 11500 | | |
| 11:00 | 5500 | 0.000 | | 24:00 | 12000 | | |
| 12:00 | 6000 | 0.000 | | 25:00 | 12500 | | |



| TEST SETUP CONFIGURATION | | | | | Passing Load | 7000 | Soil ID |
|--------------------------|------------|------------------|-------------|-------------|--------------|------------------|---------|
| Video ID | Test Loc. | Screw Type | Depth (in.) | Date | PASS | 30A | |
| T-04 | T-04 | 3.00 | 67 | 7/8/2021 | | | |
| Time (mins) | Load (lbs) | Deflection (in.) | | Time (mins) | Load (lbs) | Deflection (in.) | |
| 0:00 | 0 | 0.000 | | 13:00 | 6500 | 0.000 | |
| 1:00 | 500 | 0.000 | | 14:00 | 7000 | 0.000 | |
| 2:00 | 1000 | 0.000 | | 15:00 | 7500 | 0.000 | |
| 3:00 | 1500 | 0.000 | | 16:00 | 8000 | 0.125 | |
| 4:00 | 2000 | 0.000 | | 17:00 | 8500 | | |
| 5:00 | 2500 | 0.000 | | 18:00 | 9000 | | |
| 6:00 | 3000 | 0.000 | | 19:00 | 9500 | | |
| 7:00 | 3500 | 0.000 | | 20:00 | 10000 | | |
| 8:00 | 4000 | 0.000 | | 21:00 | 10500 | | |
| 9:00 | 4500 | 0.000 | | 22:00 | 11000 | | |
| 10:00 | 5000 | 0.000 | | 23:00 | 11500 | | |
| 11:00 | 5500 | 0.000 | | 24:00 | 12000 | | |
| 12:00 | 6000 | 0.000 | | 25:00 | 12500 | | |



Project Loc. N BRANFORD, CT

Project No. 210261

Anchor Test No. 210261-1

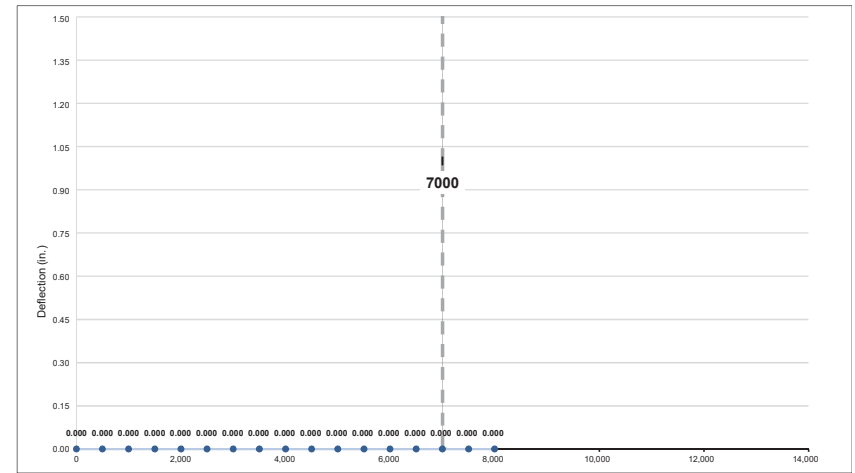
SECTION A: PULL TEST LOG

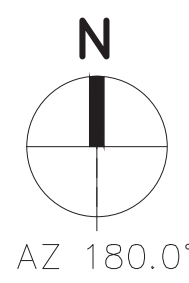
AXIAL TENSION (PULL OUT) TEST(S)

| TEST SETUP CONFIGURATION | | | | |
|--------------------------|-----------|------------|-------------|----------|
| Video ID | Test Loc. | Screw Type | Depth (in.) | Date |
| T-05 | T-05 | 3.00 | 67 | 7/8/2021 |

| Passing Load | 7000 | Soil ID |
|--------------|------|---------|
| PASS | | 30A |

| Time (mins) | Load (lbs) | Deflection (in.) | Time (mins) | Load (lbs) | Deflection (in.) |
|-------------|------------|------------------|-------------|------------|------------------|
| 0:00 | 0 | 0.000 | 13:00 | 6500 | 0.000 |
| 1:00 | 500 | 0.000 | 14:00 | 7000 | 0.000 |
| 2:00 | 1000 | 0.000 | 15:00 | 7500 | 0.000 |
| 3:00 | 1500 | 0.000 | 16:00 | 8000 | 0.000 |
| 4:00 | 2000 | 0.000 | 17:00 | 8500 | |
| 5:00 | 2500 | 0.000 | 18:00 | 9000 | |
| 6:00 | 3000 | 0.000 | 19:00 | 9500 | |
| 7:00 | 3500 | 0.000 | 20:00 | 10000 | |
| 8:00 | 4000 | 0.000 | 21:00 | 10500 | |
| 9:00 | 4500 | 0.000 | 22:00 | 11000 | |
| 10:00 | 5000 | 0.000 | 23:00 | 11500 | |
| 11:00 | 5500 | 0.000 | 24:00 | 12000 | |
| 12:00 | 6000 | 0.000 | 25:00 | 12500 | |





SCALE: 1" = 40'
0 40' 80'

303

30A

T-01

T-02

T-03

T-04

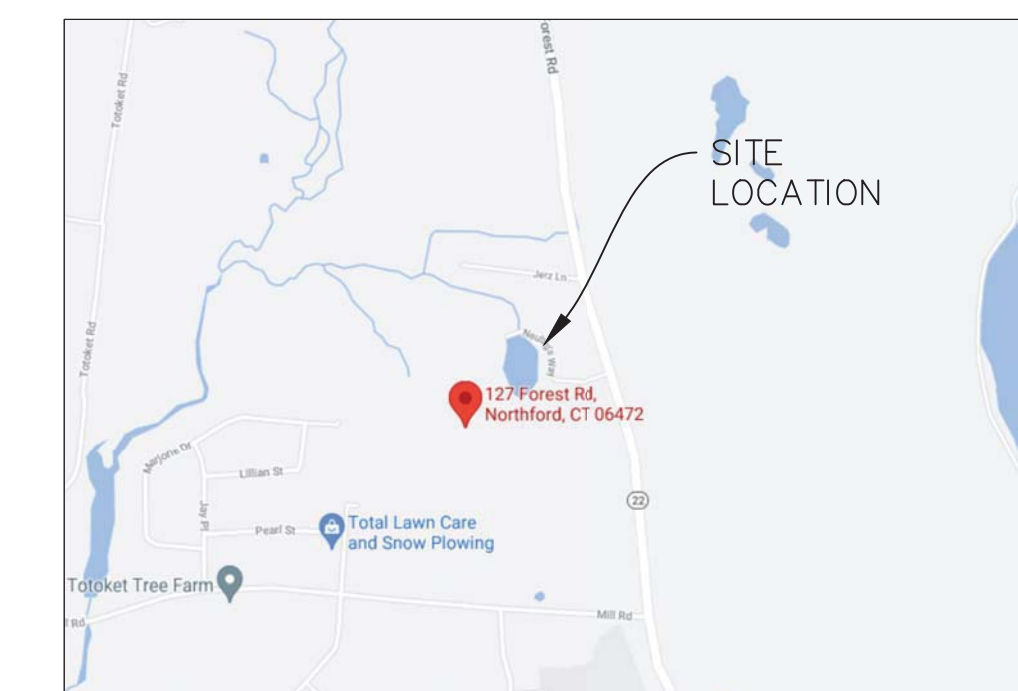
T-05

NOTES:

1. **PULL TESTS:**
 - 1.1. PULL TEST MUST ACHIEVE MIN LOAD INDICATED ON TEST SHEETS
 - 1.2. AFTER INDICATED MIN LOAD IS ACHIEVED, CONTINUE TESTING TO MAX LOAD OR UNTIL 2" TRAVEL IS ACHIEVED
 - 1.3. IF 2" MOVEMENT IS REACHED, RECORD LOAD REQUIRED. IF MAX LOAD IS REACHED, RECORD FINAL TRAVEL.
2. **GENERAL:**
 - 2.1. LOCATIONS ARE APPROXIMATE REFERENCE ONLY AND ARE SUBJECT TO CHANGE.
 - 2.2. PROVIDE ADDITIONAL TESTING AND BORING AS NECESSARY

| LEGEND | |
|--------|------------------------------|
| T-01 | TENSION (PULL) TEST LOCATION |

| SOIL IDENTIFICATION | | | | |
|---------------------|--------------------|--------|---------------------|--------|
| SYMBOL | NAME | SLOPES | UNSC | LEGEND |
| 30A | BRANFORD SILT LOAM | 0-3% | SM, SP, SP-SM | |
| 303 | PITS, QUARRIES | | UNWEATHERED BEDROCK | |



A1 ANCHOR TEST POINTS

A6 LOCATION MAP

CUSTOMER

PFISTER ENERGY
57 COFFLE RD.
HAWTHORNE, NJ 07506
(P) 973-653-9880

RACKING PROVIDER

APA
SOLAR RACKING
20-345 COUNTY ROAD X
RIDGEVILLE CORNERS, OHIO 43555
(P) 419.267.5280
(F) 419.267.5214
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RACKING TYPE

TITAN
RACKING

STRUCTURAL ENGINEER OF RECORD

JDS Consulting
8600-D Jersey, Ct.
Raleigh, NC 27617
919-480-1075
info@JDSConsulting.net
www.JDSConsulting.net
Project No.: 21901598

PROFESSIONAL SEAL/STAMP

SITE NAME:
FOREST ROAD
SITE ADDRESS:
127 FOREST RD.
SITE CITY, STATE:
N. BRANFORD, CT 06472

| SHEET REVISIONS | | |
|-----------------|-----------------|-----------|
| REV. | DESCRIPTION | DATE |
| A | INITIAL RELEASE | 6/22/2021 |

NOT FOR CONSTRUCTION

| | | | |
|-------|----------|----------|------|
| DRAWN | REVIEWED | APPROVED | SIZE |
| JDK | TM | JR | D |

SHEET NAME
ANCHOR TESTING
MAP

PROJECT NUMBER
210261

DRAWING NUMBER
T-100

REV.
A

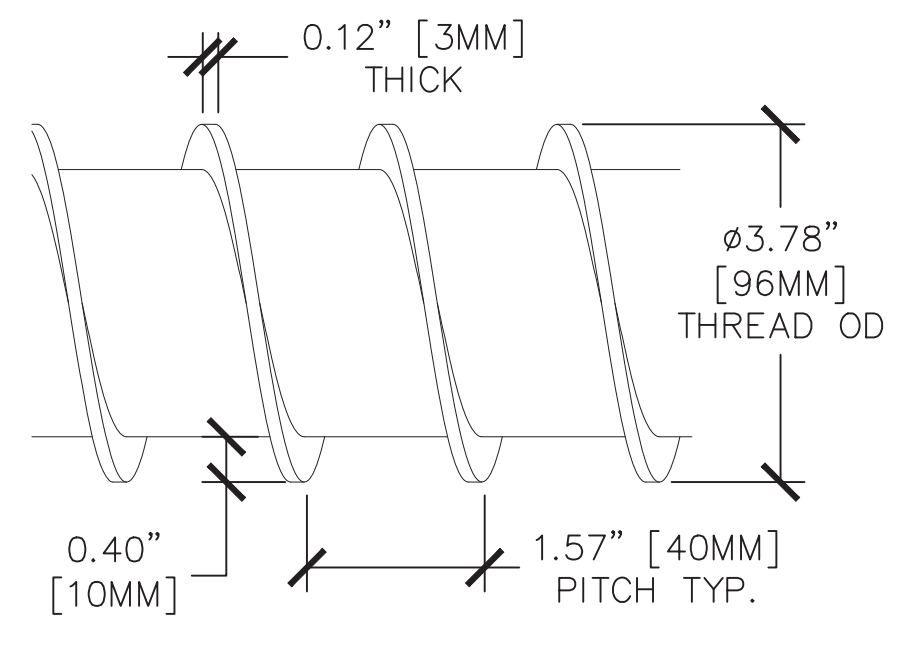
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SCALE IS REDUCED WHEN SHEET SIZE IS 11" x 17"

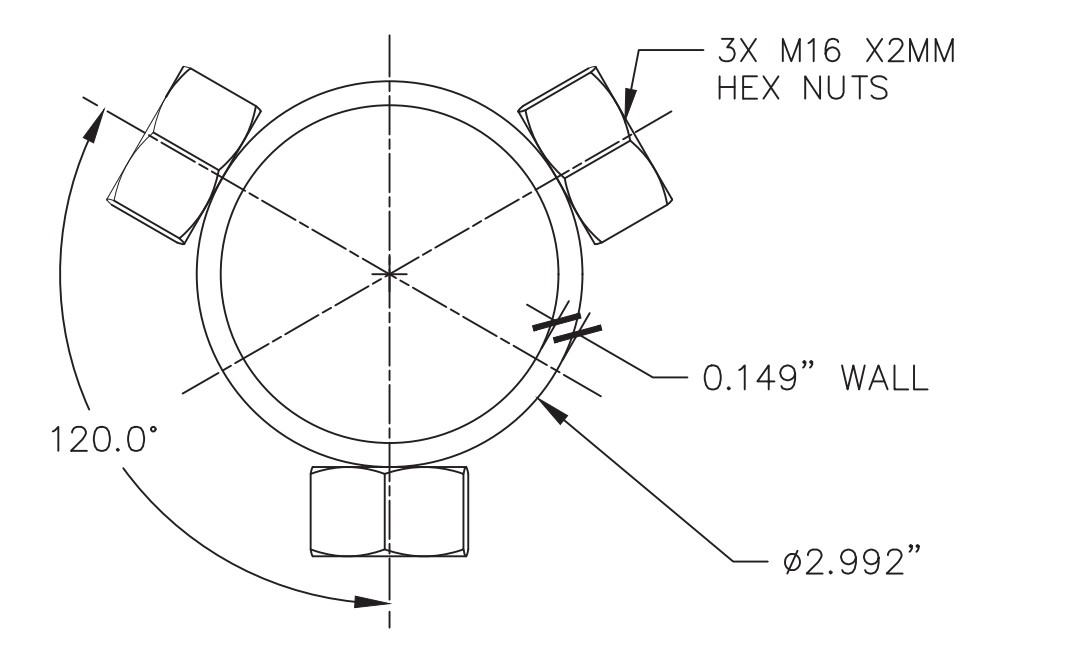


NOTES:
1. VIEW NOT REPRESENTATIVE OF SCREW TIP OR REQUIRED OVERALL OR THREAD LENGTH.

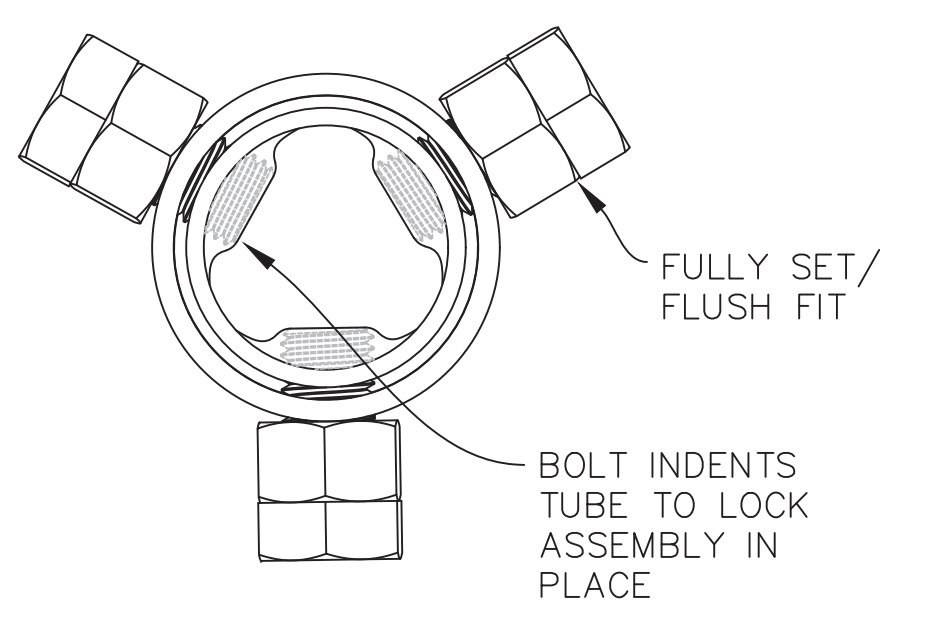
E1 PART: SCREW PILE



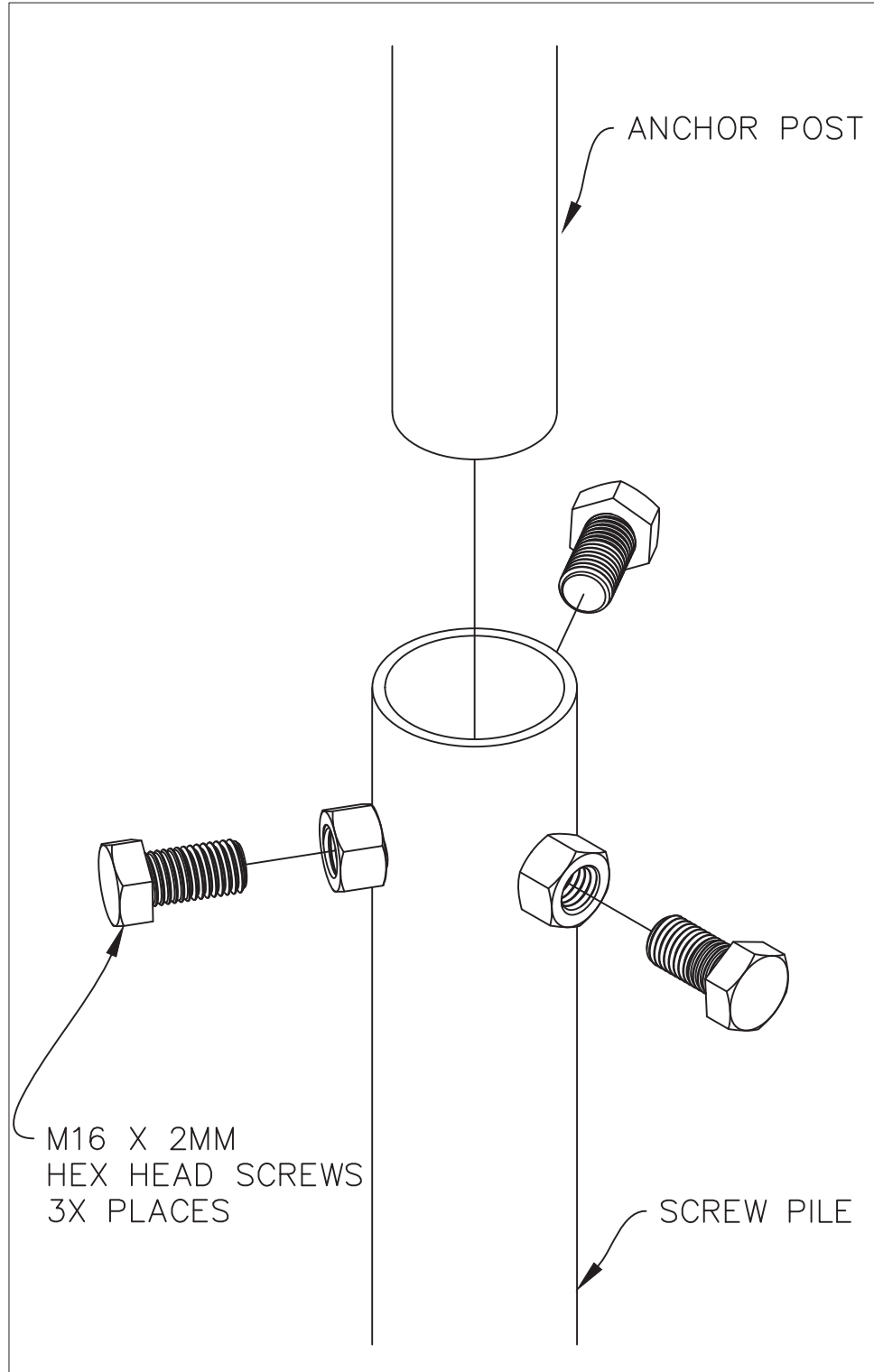
D1 DETAIL: SCREW PILE



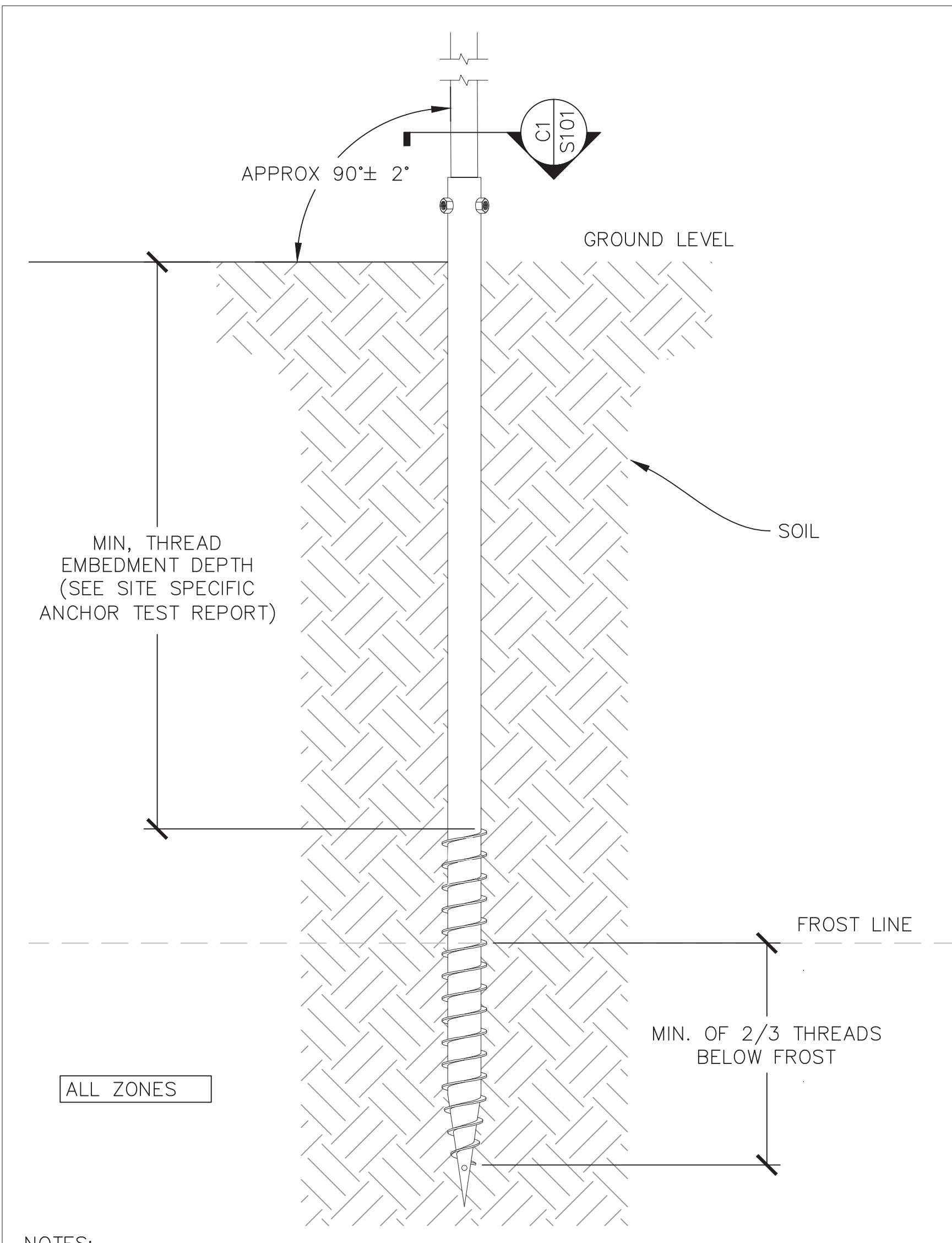
D2 SECTION: SCREW PILE



C1 SECTION: PILE ASSEMBLY

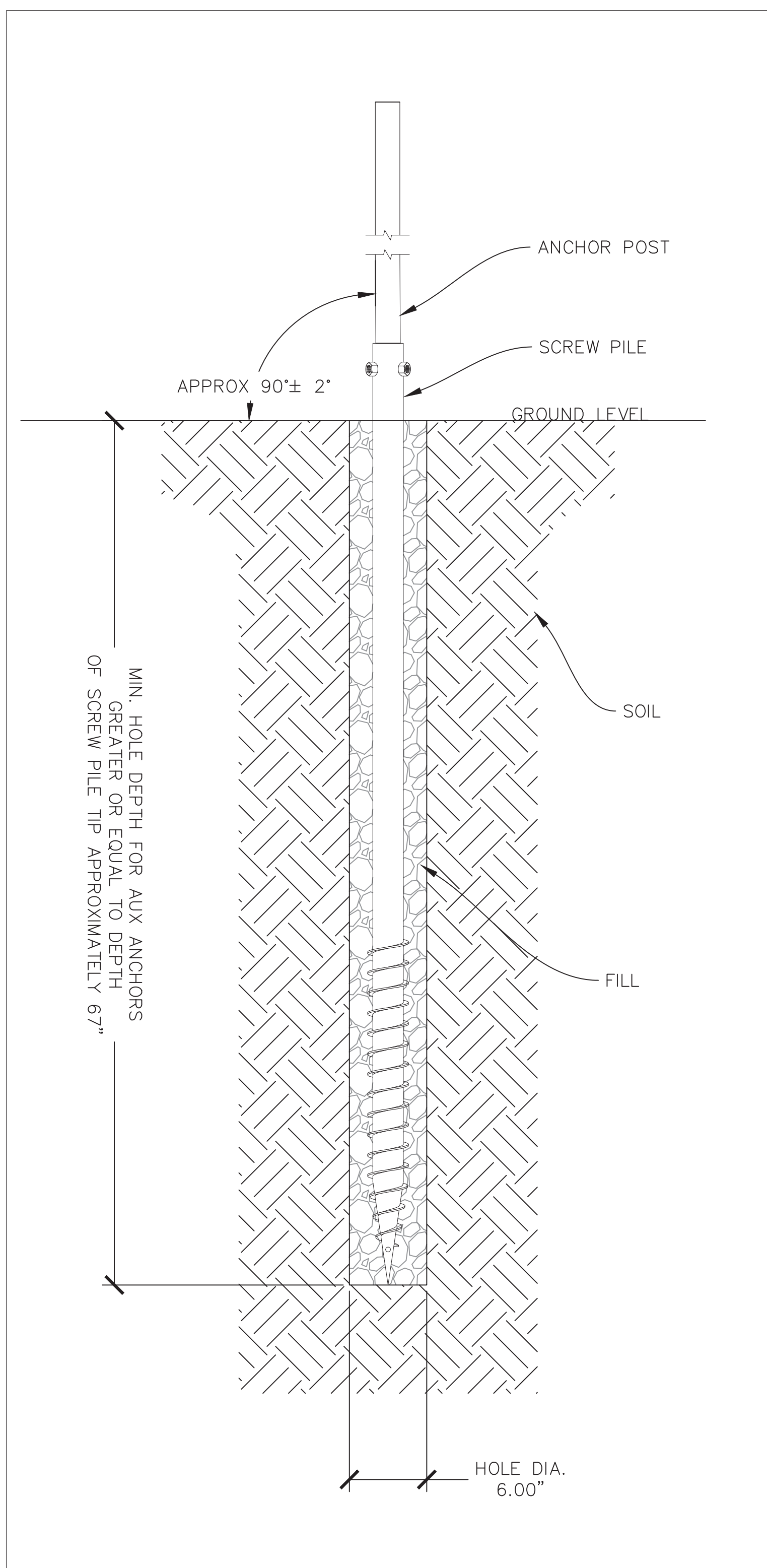


A1 CONNECTION: POST-TO-PILE



NOTES:
1. LENGTH & THREADS MAY VARY, SEE SHEET NOTES
2. EMBEDMENT DEPTH PER GEOTECHNICAL ENGINEER APPROVED ANCHOR TEST REPORT, NOT BY JDI GROUP.

A2 VIEW: POST EMBEDMENT



NOTE: EMBEDMENT DEPTH PER GEOTECHNICAL ENGINEER APPROVED ANCHOR TEST REPORT, NOT BY JDI GROUP.

A3 AUX. FOUNDATION VIEW: PROFILE - SOIL CUTAWAY

NOTES:

- ANCHOR TUBE MATERIAL: 50 KSI MIN YIELD STRENGTH, 1010 STEEL
- ANCHOR TUBE TO BE HOT DIPPED GALVANIZED TO ASTM A123 OR INLINE GALVANIZED TO ASTM A1057.
- SCREW PILE TUBE MATERIAL: 30 KSI MIN YIELD STRENGTH STEEL.
- SCREW PILE THREAD MATERIAL: 28 KSI MIN YIELD STRENGTH STEEL.
- SCREW PILE TO BE HOT DIPPED GALVANIZED TO ASTM A123 OR INLINE GALVANIZED TO ASTM A1057.
- ALL HARDWARE IS 300 SERIES STAINLESS STEEL, A574 ALLOY STEEL, OR MINIMUM 8.8 CLASS METRIC.
- BOLTS MUST BE FULLY SET INTO WELDED NUTS.
- BOLTS SHALL BE 30 MM LONG.
- SCREW PILE SHALL PENETRATE THE SOIL TO A DEPTH PAST THE FROST LINE, SUCH WHICH LESS THAN 1/3 OF THE TOTAL LENGTH OF THREADS ARE ABOVE THE FROST LINE, OR TO THE DEPTH INDICATED AS MINIMUM PER THE STAMPED ANCHOR TEST REPORT, WHICHEVER IS DEEPER.
- ANCHOR POST SHALL EXTEND ABOVE GROUND LEVEL AT MINIMUM OF INDICATED FRONT LIP CLEARANCE, PLUS THE ADDITIONAL LENGTH REQUIRED TO ACHIEVE THE INDICATED TILT ANGLE.
- MINIMUM ENGAGEMENT BETWEEN SCREW PILE AND ANCHOR POST SHALL BE 4".
- INSTALLERS SHALL REFER TO STRUT AND POST SETUP SHEETS FOR LENGTH AND PLACEMENT DETAILS.

AUXILIARY FOUNDATION NOTES:

- EMBEDMENT DEPTH (PER GEOTECHNICAL ENGINEER, NOT JDI-DELEGATED DESIGN PARAMETER) CONTINGENT UPON SITE SPECIFIC DATA, INCLUDING BUT NOT LIMITED TO: FROST DEPTH, SOIL PROPERTIES, AND LOCAL BUILDING CODE REQUIREMENTS.
 - AUGERED HOLE SHOULD EXTEND BELOW THE LOCAL FROST LINE, INTO THE STABLE SOIL ZONE.
 - HOLDING PROPERTIES OF THE SCREW PILE IN AGGREGATE DETERMINED BY TESTING CONDUCTED BY APA, PER ASTM D1143
 - STRUCTURAL PROPERTIES OF SCREW PILE TESTED ONLY. CORROSIVITY, AND OTHER GEOTECHNICAL PROPERTIES NOT TESTED.
- INSTALLATION PROCEDURE**
- AUGER HOLE TO REQUIRED DEPTH. HOLE SHOULD BE APPROXIMATELY PLUMB AND A MINIMUM DIAMETER AS INDICATED IN DRAWING.
 - REMOVE THE SPOILS AS BEST AS POSSIBLE. THERE SHOULD BE NO LARGE CLUMPS OR ROCKS AT THE BOTTOM OF THE HOLE.
 - POUR IN AGGREGATE.
 - AGGREGATE SHOULD BE SIZED BETWEEN 1" - 2 1/2".
 - KNOWN ACCEPTABLE AGGREGATES (NAMING PER ASTM C33-03):
 - 5.5.A. #2 (2 1/2" - 1 1/2")
 - 5.5.B. #3 (2" - 1")
 - 5.5.C. A COMBINATION OF BOTH #2 & #3
 - 5.5.D. EQUIVALENT SIZE OF EITHER #2 OR #3.
 - DEVIATIONS IN AGGREGATE SIZE, FROM THE ABOVE SPECIFICATIONS, MUST BE APPROVED BY AP ALTERNATIVES ENGINEERING BEFORE USING/PURCHASING.
 - DRIVE SCREW PILE AS NORMALLY INTO HOLE. ENSURE IT IS PLUMB. ENSURE THE NORTH-SOUTH DIMENSIONS AND EAST-WEST DIMENSIONS ARE CORRECT. ALSO ENSURE BOLT HOLE IN THE ANCHOR IS FACING THE CORRECT DIRECTION.
- IF NEEDED, RETAMP THE AGGREGATE AT SOIL LEVEL AROUND THE SCREW PILE.

QUALITY CONTROL NOTES

- ANCHOR HEIGHTS SHOULD BE MEASURED FROM THE GROUND LEVEL, NOT THE TOP OF THE AGGREGATE. IF AGGREGATE IS BELOW GROUND LEVEL, ADDITIONAL GRAVEL SHOULD BE ADDED AND TAMPED TO BRING IT UP TO AT LEAST GROUND LEVEL.
- ANCHORS SHOULD NOT BE VERIFIED BY PULLING LATERALLY AT THE TOP OF THE ANCHOR (FIGURE 3). THIS CREATES A LARGE AND ARTIFICIAL MOMENT IN THE ANCHOR. ANCHORS SHOULD ALSO NOT BE ROCKED BACK AND FORTH UNTIL IT "FAILS"; THE ANCHORS ARE INTENDED TO WORK AS A SYSTEM WITH ALL PARTS INTACT (ADJOINING ANCHORS, SMALL AND LARGE ZEES, HARD AND CABLE BRACES, AND ALL ADDITIONAL PARTS AND HARDWARE INSTALLED AND TIGHTENED) AND DO NOT REACH FULL CAPACITY UNTIL THAT POINT.

CUSTOMER

RACKING PROVIDER

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20-345 COUNTY ROAD X
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(F) 419.267.5214
WWW.APALTERNATIVES.COM

RACKING TYPE

TITAN
R15

STRUCTURAL ENGINEER OF RECORD

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8600-D Jersey, Ct.
Raleigh, NC 27617
919-480-1076
Info@JDSConsulting.net
www.JDSConsulting.net
Project No. 21901598

PROFESSIONAL SEAL/STAMP

STATE OF CONNECTICUT
JAMES J. SWANSON
3498B
LICENSED PROFESSIONAL ENGINEER

DOCUMENT NAME: STRUCTURAL PRINT PACKAGE

SITE STREET ADDRESS: 127 FOREST RD

SITE CITY, STATE, ZIP: N BRANFORD, CT 06472

| SHEET REVISIONS | | |
|-----------------|-----------------|-----------|
| REV. | DESCRIPTION | DATE |
| A | INITIAL RELEASE | 7/15/2021 |

APPROVED

| | | | |
|-------|----------|----------|------|
| DRAWN | REVIEWED | APPROVED | SIZE |
| JDK | TM | JDI | D |

SHEET NAME: GROUND SCREW

PROJECT NUMBER: 210261

DRAWING NUMBER: S.101

REV: A