June 10, 2026

Melanie Bachman, Esq.
Executive Director and Staff Attorney
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: **PETITION NO. 1685** — Willington Solar One, LLC petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the construction, maintenance and operation of a 1.975-megawatt AC solar photovoltaic electric generating facility and associated equipment located at Parcel No. 046-004-00, Lohse Road, Willington, Connecticut, and associated electrical interconnection.

Compliance with Conditions of Approval Nos. 2-5, 8, & 10

Dear Attorney Bachman:

In accordance with Conditions No. 2-5, 8, & 10 of the Siting Council's January 23, 2026 approval of the above-referenced Petition for Declaratory Ruling, enclosed are several materials and an explanation of how the condition is being addressed herewith.

Condition No. 2 – A copy of the DEEP Stormwater Permit is attached herewith.

Condition No. 3 – A copy of the final structural design for the racking system stamped by a Professional Engineer duly licensed in the State of Connecticut is being provided herewith.

Attached are updated Site Plans that address conditions 4 and 5 as follows (Please note that these are the same plans that were provided to satisfy Condition 1 sent to the Connecticut Siting Council on May 19, 2026):

- Condition No. 4 – Notes on sheet C-2.0 and a detail on C-5.0 satisfy condition 4. A high voltage sign with a point of contact for the owner/operator will be installed at the fence gate to the site off Lohse Road.

- Condition No. 5 – The Site Plan attached herewith is a final Site Plan.

Condition No. 8 – A final Spill Prevention and Materials Storage Plan for the Project is attached herewith.

Condition No. 10 – This letter shall serve as notice that we intend to commence construction on or around June 29, 2026.

The remaining conditions of approval that must be addressed before facility operations commence or post-construction will be addressed at later dates as appropriate, under separate cover.

If you have any questions concerning this letter or any of the materials provided, please contact me.

Sincerely,

Ian Gottheim, PE.
Willington Solar One, LLC

Electronic Cc:
Bryan Fitzgerald, Willington Solar One, LLC
Bradley Parsons, PE. PMP. Willington Solar One, LLC
William Herchel, Willington Solar One, LLC
Kenneth C. Baldwin, Robinson & Cole

Connecticut
Department of Energy & Environmental Protection
WATER PERMITTING & ENFORCEMENT

April 29, 2026

Willington Solar One, LLC
124 Lasalle Rd
West Hartford, CT 06107-2317

RE: Permit Issuance
NPDES Construction Stormwater General Permit
Application No. 202600305 & Permit No. CTR100005

Dear Permittee:

Pursuant to Section 22a-430 of Chapter 446k, Connecticut General Statutes ("Conn. Gen. Stat."), and Regulations of Connecticut State Agencies ("Regs. Conn. State Agency") adopted thereunder, as amended, and Section 402(b) of the Clean Water Act, as amended, 33 USC 1251, et. Seq., the Department of Energy and Environmental Protection ("DEEP") has issued the attached authorization to discharge under the National Pollutant Discharge Elimination System ("NPDES") *General Permit for the Discharge of Stormwater from Construction Activities*, issued on January 1, 2026 for the above-referenced facility.

Review the entire General Permit, its conditions, and the supporting regulations. This permit expires on December 31, 2030. Please be advised that on and after the effective date of this Notice of Coverage, the Permittee must comply with all terms, conditions, and limitations of the permit, the requirements of the regulations that govern the authorized activity, and any other applicable state, federal, or local laws or regulations. **All activities must conform to that which is specifically authorized**.

This authorization is not transferable to a new entity. To change the name of the existing permit holder, submit the Notice of Change form. **In case of an emergency, please contact DEEP Dispatch at 860-424-3333**.

Report instances of noncompliance on DEEP's website here: Stormwater Management

Retain a copy of this letter and Notice of Coverage in your Stormwater Pollution Control Plan (SPCP) for your records. Should you have any questions about this notice or any other questions concerning the general permit, please visit the Construction Stormwater website at Construction Stormwater Program or contact the program staff at deep.stormwaterconstruction@ct.gov.

Best Regards,

Audra Godfrey, Director
Water Permitting and Enforcement Division
Bureau of Materials Management and Compliance Assurance

Connecticut
Department of Energy & Environmental Protection
WATER PERMITTING & ENFORCEMENT

NOTICE OF COVERAGE

Authorization to Discharge Stormwater under the Construction Stormwater General Permit

Pursuant to Section 22a-430b of the Connecticut General Statutes, as amended, and in accordance with the provisions of the National Pollutant Discharge Elimination System ("NPDES") *General Permit for the Discharge of Stormwater from Construction Activities*, issued on January 1, 2026 (hereinafter referred to as the "Construction Stormwater General Permit" or "General Permit"), the Commissioner of Energy and Environmental Protection (hereinafter, the "Commissioner") hereby grants authorization to the following permittee at the following site:

Permittee Information:	**Site Information:**
Willington Solar One, LLC	Willington Solar One
124 Lasalle Rd	41 Lohse Rd
West Hartford, CT 06107-2317	Willington, CT 06279

This authorization is issued based upon the receipt of application no. 202600305 submitted by the permittee in accordance with the Construction Stormwater General Permit. This Notice of Coverage ("NOC") constitutes written confirmation that the Commissioner has received a complete application from the Permittee and that the Permittee is hereby authorized to discharge stormwater associated with construction activity from the site location listed above, in accordance with the terms and conditions of the General Permit. The following permit has been assigned to this site:

Permit Number: CTR100005
Effective Date of Authorization: April 29, 2026
Permit Expiration Date: December 31, 2030

It is expressly understood that this authorization does not constitute a determination by the Connecticut Department of Energy and Environmental Protection regarding the validity, accuracy, or completeness of any information provided in the application or associated documentation. The electronic certification by the Permittee represents that, to the best of their knowledge and belief, the site is eligible for coverage under the General Permit and that all submitted information is true, accurate, and complete. Authorization to discharge shall be considered void if any information submitted in the registration is found to be false, misleading, or if the site is not eligible for coverage. The Permittee shall at all times ensure compliance with all provisions, limitations, and conditions of the General Permit, including applicable effluent limits, benchmark monitoring requirements, and all sector-specific performance standards. Any modification, addition, or removal of outfalls must be approved in accordance with the general permit. This NOC does not relieve the Permittee of compliance with other federal, state, or local laws.

Authorization is issued on April 29, 2026

Issued by: Audra Godfrey, Director
Water Permitting & Enforcement Division
Bureau of Materials Management and Compliance Assurance

Obligations of Construction Stormwater Permit Holders

Any entity authorized by the Commissioner of Energy and Environmental Protection under the NPDES *General Permit for the Discharge of Stormwater from Construction Activities* ("Construction Stormwater General Permit" or "general permit") assumes specific responsibilities to ensure ongoing compliance with terms and conditions of the permit. This document provides an overview of key permit obligations but does not serve as a comprehensive list of all requirements. Permit holders are responsible for reviewing and complying with all applicable provisions of the general permit.

I. General Conditions

The permittee must at all times continue to meet the eligibility and authorization set forth in Section 2 of the general permit for the duration of coverage. Authorized activities must be conducted in accordance with all applicable general and sector-specific conditions, including but not limited to the following:

- Comply with discharge-specific requirements, if applicable.
- Implement all stormwater control measures required by the general permit, such as:
  - Good housekeeping practices
  - Perimeter controls
  - Inlet Protection
  - Containment of liquids and wastewater
  - Anti-tracking control measures
  - Dewatering control measures
  - Dust control
  - Spill prevention and response procedures
  - Erosion and sediment controls
  - Preventive maintenance
  - Stormwater management structures and practices
  - Infiltration and groundwater quality protection
  - Employee training
  - Posting a Notice of Construction Activity
- Develop and maintain a Stormwater Pollution Control Plan (SPCP) in accordance with the general permit.
- Conduct all required inspections.
- Implement and document corrective actions when deficiencies or permit violations occur.
- Maintain records and documentation as required by the general permit.
- Report any permit violations as required by the general permit.

II. Inspection and Reporting Requirements

The Permittee shall comply with all applicable inspection and reporting provisions set forth in the general permit, including, but not limited to the following categories of inspections:

- Plan Implementation Inspection
- Routine inspections
- Post Construction Inspection
- Final Stabilization Inspection
- Termination Inspection

III. Recordkeeping Requirements

The Permittee shall maintain a current copy of the Stormwater Pollution Control Plan on site from the date construction is initiated until the date construction at the site is complete. All records, communications, inspection reports, logs, data, reports, and other relevant documentation shall be retained in the Stormwater Pollution Control Plan (SPCP) for a minimum of five (5) years from the date that the Notice of Termination is submitted to the Commissioner, unless otherwise specified by the Commissioner. Records shall be made available to the Department upon request.

IV. Compliance Obligations

The permittee shall at all times ensure compliance with all applicable conditions and requirements of the Construction Stormwater General Permit. The permittee is responsible for the development, maintenance, and implementation of a current SPCP and the performance of regular activities, including, but not limited to:

- Conducting inspections of stormwater controls, sediment and erosion controls, and best management practices
- Implementing corrective actions where deficiencies, exceedances, or noncompliance are identified.

Failure to maintain compliance with any of the above requirements may result in enforcement actions, including penalties, modification, or revocation of coverage under the general permit.

360 W. Dussel Drive | Maumee, OH 43537
419.725.7161 | www.thejdigroup.com

4/16/2026

Subject: Verogy-Willington Solar One
41-43 Lohse Road
Willington, CT 06279
Foundation Load Testing & Corrosion Analysis for Design Life

To Whom it May Concern,

This letter is written to certify that APA Solar reportedly tested the foundations for this project at 41-43 Lohse Road Willington, CT 06279 guided by the "Quick Test Method" per ASTM D1143 and D3689. The results of that test are documented in their attached report. The test results provided by APA Solar are within the parameters as set forth by our design.

Additionally, based on The JDI Group Inc.'s review and analysis of the information provided in the Down to Earth Consulting, LLC geotechnical report prepared for Verogy for the Willington Solar One site, our opinion is the solar racking system's structural foundation components will resist the design loading beyond the minimum required design life of 25 years when considering the material loss and a minimum ASTM123 Grade 75 hot dipped galvanizing of the soil screw anchors.
This evaluation is based on the nomograph for estimating the corrosion rate of pile/anchor shafts published in the Chance Technical Design Manual (Edition 5) and the Service Life of Hot-Dip Galvanizing in Soil Applications Charts published by the American Galvanizers Association (2024).

Sincerely,
Anne M. Grasser, P.E.

The JDI Group Inc.

cc: Thomas R. Worline, P.E.
Sarah Penner, PMP, PM Department Manager

20-345 County Road X, PO Box 326
Ridgeville Corners, OH 43555

Office: 419.267.5280
Fax: 419.267.5214

4/7/2026

APA PN: 260106
Verogy-Willington Solar One
41-43 Lohse Road
Willington, CT 06279

Subject: Foundation Design Report

APA submits the following report to document the site foundation testing & results thereof at the project site located at the above stated address. Information discussed in this report is specific & exclusive to the following parameters:

1. Pile Type: APA Ground Screw
2. Site Location: 41-43 Lohse Road Willington, CT 06279
3. Construction: APA Solar Racking

Recommendations found in this report are based on empirical data gathered by APA's extensive experience in testing foundations designed for solar racking. Test procedures used to gather data in this report have been guided by ASTM standards D1143_07 & D3689-07. The methods and calculations in this report are further approved by a state licensed Professional Engineer.

Site Characterization

Geotechnical reports, site images, & topographic documents are useful items for pre site visit characterization when provided by the customer. Information from these items are considered as supplemental information, but APA maintain that site testing data & observations will take precedence in the foundation design considerations.

The test site was located approximately 0.6 miles WNW of FedEx Ground Willington Hub. The site is located at approximately, 41.921320, -72.269285. The proposed site is currently on undeveloped land. Tree lines and other interfering vegetation were documented in some tested areas meant for solar at this time.

A Websoil survey has classified the major soil types at the proposed site to be:

1.) SM
2.) BEDROCK

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2. Onsite Observations

The site had some areas of concerning slopes that should be considered for the final rack design and its tolerances.Many underground obstacles were experienced during installation of the test screws so pre drill is recommended. Test locations were predrilled & backfilled with stone.

3. Site Testing

Four screw piles were installed at select locations throughout the proposed site. The area and quantity of locations were selected to reflect an acceptable sample set given the size and soil variability of the site.

Standard tension tests were performed at each location:

1. **Tension Capacity Test**: Load is applied in the uplift direction in 500 lbs. increments and held for 1 minute each. Pile deflection is recorded simultaneously. Load is increased until ultimate capacity is reached, 1.5X Design Load is reached, or up to the safe working load of the test equipment, whichever occurs first. Ultimate capacity is defined as the highest load achieved at which the pile deflection is less than 1”.

See test data, maps, and foundation specifications in Appendix A.

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4. Design Consideration

Based on the customer provided information, APA finds the values below to be within good reason for foundation design consideration for frost heave. These values shall be confirmed by authorities for this site's location or however necessary it may be for permit approvals.

Frost Depth: 42"

Adfreeze Bond: 6.95 psi

Frost Heave Design: 2.875 X 73

Screw Length Spec'd or Desired:	SL =		73.0	in
Frost Depth:	Df =		42.0	in
Adfreeze Force:	Fa =		6.95	psi

Unthreaded Portion:

Pile Diameter:	Rd1 =		2.875	in
Pile Circumference:	Rc1 =	pi * Rd1	9.03	in
Length Subject to Frost Load:	Lf1 =		40.0	in
Pile Surface Area:	Rsa1 =	Rc1 * Lf1	361.3	in2
Frost Jacking Force:	Fjs1 =	Rsa1 * Fa	2,510.9	lbs

Threaded Portion:

Pile Diameter (to edge of threads):	Rd2 =		3.68	in
Pile Circumference (to edge of threads):	Rc2 =	pi * Rd2	11.55	in
Length Subject to Frost Load:	Lf2 =		2.0	in
Pile Surface Area:	Rsa2 =	Rc2 * Lf2	23.1	in2
Frost Jacking Force:	Fjs2 =	Rsa2 * Fa	160.5	lbs

Factor of Safety:			1.0	
Total Frost Jacking Force:	**Fjstt =**	**Fjs1+Fsj2**	**2,671.4**	**lbs**

Proportion reduction of resistance tested length of threaded portion:	24	in
length of threaded portion within the frost zone that shall be ignored:	2.0	in

Tension test load required to resist frost jacking force when considering threads that remain in	**2914**	**lbs**

The Engineer of Record has calculated the Design loads per the structural report (ASD values) to be:

Axial Compression Load Value:	4001 lbs.
Axial Tension Load Value:	5036 lbs.
Frost Heave Load Value:	2671 lbs.

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The Engineer of Record has required testing to be conducted to a minimum of the following values, 1.5X Design Loads & 1X Frost Loads or .45xTension + .75xFrost:

Axial Tension Load Value: 7600 lbs.

Axial Load is derived from tension or compression, whichever is maximum, but is tested only in tension.

5. Results

Based on the site testing results, on-site observations, and previous experience, APA recommends the foundation setup to be the following:

Zone	Foundation Type	Embedment Depth	Ultimate Axial Capacity	Recommended Install Method	Refusal Option
Entire Site	73" Ground Screw	67"	10000	100% Pre-Drill	N/a

$$Q_{uplift} = q_{friction}$$

$$Q_{bearing} = q_{friction} + q_{end\ bearing}$$

End bearing capacity was not tested at the time of this report, but will only add to the bearing capacity of the foundation.

Q_{uplift} = soil capacity to resist uplift loads

$Q_{bearing}$ = soil capacity to resist bearing loads

$q_{friction}$ = friction component of soil capacity

$q_{end\ bearing}$ = end bearing component of soil capacity

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6. Report Limitations

1. APA provides standard galvanized coatings unless otherwise requested by the customer.

2. Foundation design recommendations found in this report are entirely established on the compatibility of the proposed solar racking designed by APA and the foundation testing data gathered by APA. Therefore if racking design or site location(s) change, information from this report must be re-evaluated by APA to be approved as still valid.

3. In the event that sections of the site are not accurately represented in the data found in this report because of soil variability between tested areas, ground water level, construction disturbance, or other reasons, the installer or APA should consult with APA engineering team to determine the most appropriate foundation design alternative.

4. Due to the quantity of test locations in comparison to the quantity of proposed ground screw installations for the final product, refusal frequency cannot be predetermined on the basis of this report.

5. If grading or cut & fill has taken place after the foundation test program APA would recommend a compaction to at least 95% maxumum dry density of native soils to ensure that the test data collected remains valid. If the site specific geotech recommends a more conservative compaction APA would defer to the geotech recommendation.

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APPENDIX

APA SOLAR RACKING

20-345 County Road X, PO Box 326
Ridgeville Corners, OH 43555

Office: 419.267.5280
Fax: 419.267.5214

Project Loc. Willington, CT 06279
Project No. 260106
Foundation Test No. 260106-1

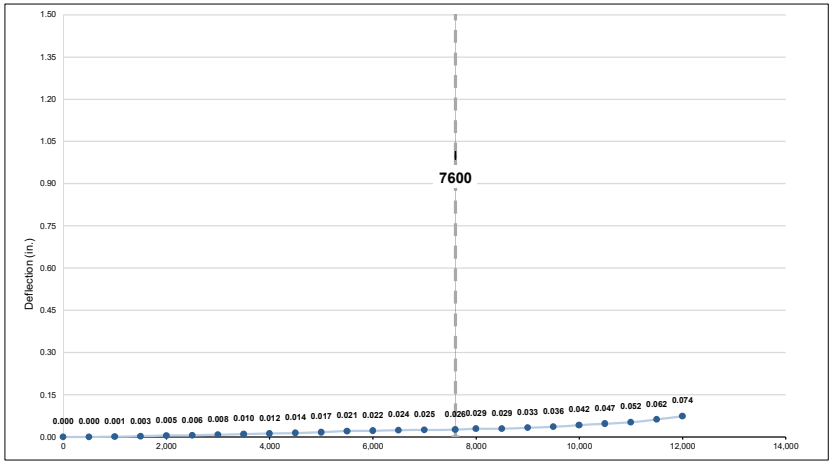
SECTION A: PULL TEST RESULTS

AXIAL **TENSION (PULL OUT)** TEST(S)

TEST SETUP CONFIGURATION				
Video ID	Test Loc.	Screw Type	Depth (in.)	Date
T-01	**T-01**	3" X 73"	67"	3/27/2026

Passing Load	7600	Soil ID
PASS		61C

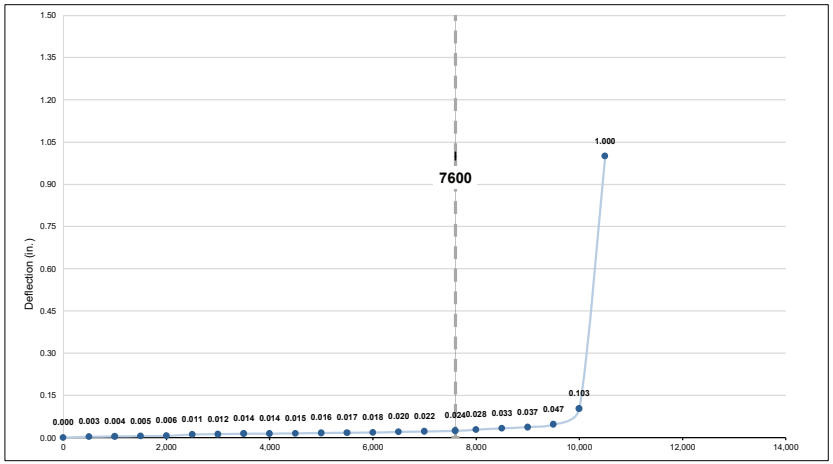
Time (mins)	Load (lbs)	Deflection (in.)	Time (mins)	Load (lbs)	Deflection (in.)
0:00	0	0.000	13:00	6500	0.024
1:00	500	0.000	14:00	7000	0.025
2:00	1000	0.001	15:00	7600	0.026
3:00	1500	0.003	16:00	8000	0.029
4:00	2000	0.005	17:00	8500	0.029
5:00	2500	0.006	18:00	9000	0.033
6:00	3000	0.008	19:00	9500	0.036
7:00	3500	0.010	20:00	10000	0.042
8:00	4000	0.012	21:00	10500	0.047
9:00	4500	0.014	22:00	11000	0.052
10:00	5000	0.017	23:00	11500	0.062
11:00	5500	0.021	24:00	12000	0.074
12:00	6000	0.022	25:00	12500	



TEST SETUP CONFIGURATION				
Video ID	Test Loc.	Screw Type	Depth (in.)	Date
T-02	**T-02**	3" X 73"	67"	3/27/2026

Passing Load	7600	Soil ID
PASS		61C

Time (mins)	Load (lbs)	Deflection (in.)	Time (mins)	Load (lbs)	Deflection (in.)
0:00	0	.	13:00	6500	0.020
1:00	500	0.003	14:00	7000	0.022
2:00	1000	0.004	15:00	7600	0.024
3:00	1500	0.005	16:00	8000	0.028
4:00	2000	0.006	17:00	8500	0.033
5:00	2500	0.011	18:00	9000	0.037
6:00	3000	0.012	19:00	9500	0.047
7:00	3500	0.014	20:00	10000	0.103
8:00	4000	0.014	21:00	10500	1.000
9:00	4500	0.015	22:00	11000	
10:00	5000	0.016	23:00	11500	
11:00	5500	0.017	24:00	12000	
12:00	6000	0.018	25:00	12500	



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Project Loc. Willington, CT 06279
Project No. 260106
Foundation Test No. 260106-1

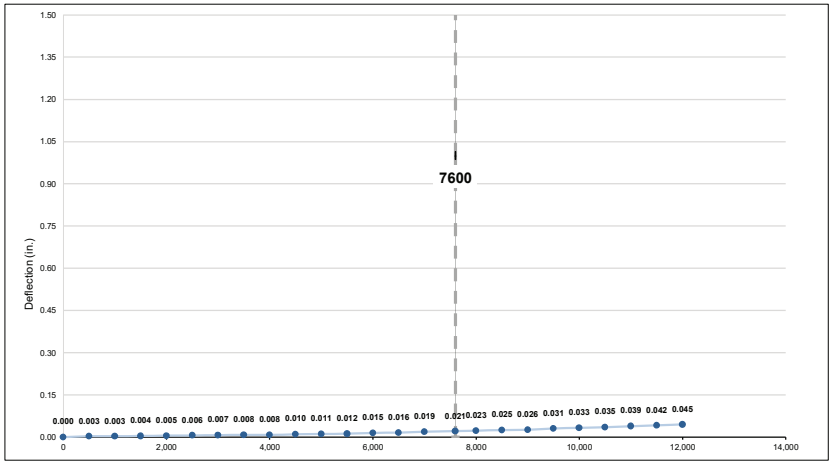
SECTION A: PULL TEST RESULTS

AXIAL **TENSION (PULL OUT)** TEST(S)

TEST SETUP CONFIGURATION				
Video ID	Test Loc.	Screw Type	Depth (in.)	Date
T-03	**T-03**	3" X 73"	67"	3/27/2026

Passing Load	7600	Soil ID
PASS		60C

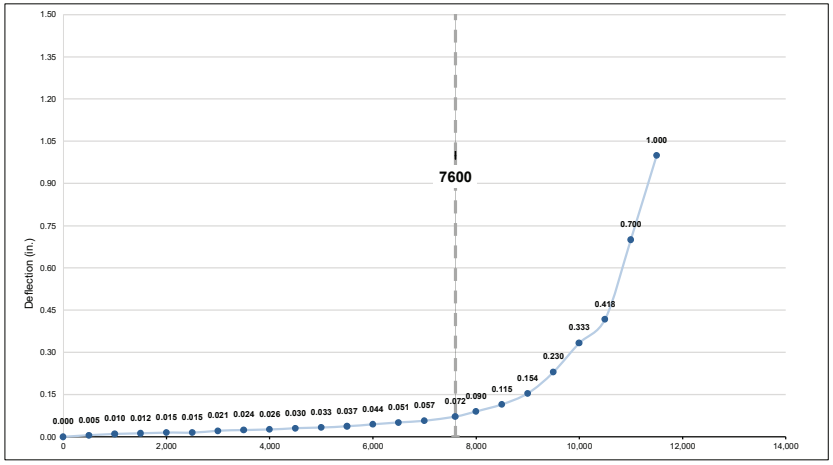
Time (mins)	Load (lbs)	Deflection (in.)	Time (mins)	Load (lbs)	Deflection (in.)
0:00	0	0.000	13:00	6500	0.016
1:00	500	0.003	14:00	7000	0.019
2:00	1000	0.003	15:00	7600	0.021
3:00	1500	0.004	16:00	8000	0.023
4:00	2000	0.005	17:00	8500	0.025
5:00	2500	0.006	18:00	9000	0.026
6:00	3000	0.007	19:00	9500	0.031
7:00	3500	0.008	20:00	10000	0.033
8:00	4000	0.008	21:00	10500	0.035
9:00	4500	0.010	22:00	11000	0.039
10:00	5000	0.011	23:00	11500	0.042
11:00	5500	0.012	24:00	12000	0.045
12:00	6000	0.015	25:00	12500	



TEST SETUP CONFIGURATION				
Video ID	Test Loc.	Screw Type	Depth (in.)	Date
T-04	**T-04**	3" X 73"	67"	3/27/2026

Passing Load	7600	Soil ID
PASS		60C

Time (mins)	Load (lbs)	Deflection (in.)	Time (mins)	Load (lbs)	Deflection (in.)
0:00	0	0.000	13:00	6500	0.051
1:00	500	0.005	14:00	7000	0.057
2:00	1000	0.010	15:00	7600	0.072
3:00	1500	0.012	16:00	8000	0.090
4:00	2000	0.015	17:00	8500	0.115
5:00	2500	0.015	18:00	9000	0.154
6:00	3000	0.021	19:00	9500	0.230
7:00	3500	0.024	20:00	10000	0.333
8:00	4000	0.026	21:00	10500	0.418
9:00	4500	0.030	22:00	11000	0.700
10:00	5000	0.033	23:00	11500	1.000
11:00	5500	0.037	24:00	12000	
12:00	6000	0.044	25:00	12500	



20-345 County Road X, PO Box 326
Ridgeville Corners, OH 43555

Office: 419.267.5280
Fax: 419.267.5214

Date: April 8, 2026

Subject: 41-43 Lohse Road
Willington, CT 06279
Verogy-Willington Solar One
APA PN: 260106

Foundation Corrosion Evaluation

pH	7.6	
Soil Resistivity	108,000	ohm * cm

Bare Steel Lifetime

Allowable Bare Steel Loss	0.002	in
Allowable Bare Steel Loss	1.176530353	oz / ft^2
Corrosion Rate	0.2	oz / ft^2 / year
Usable Lifetime	5.882651765	years

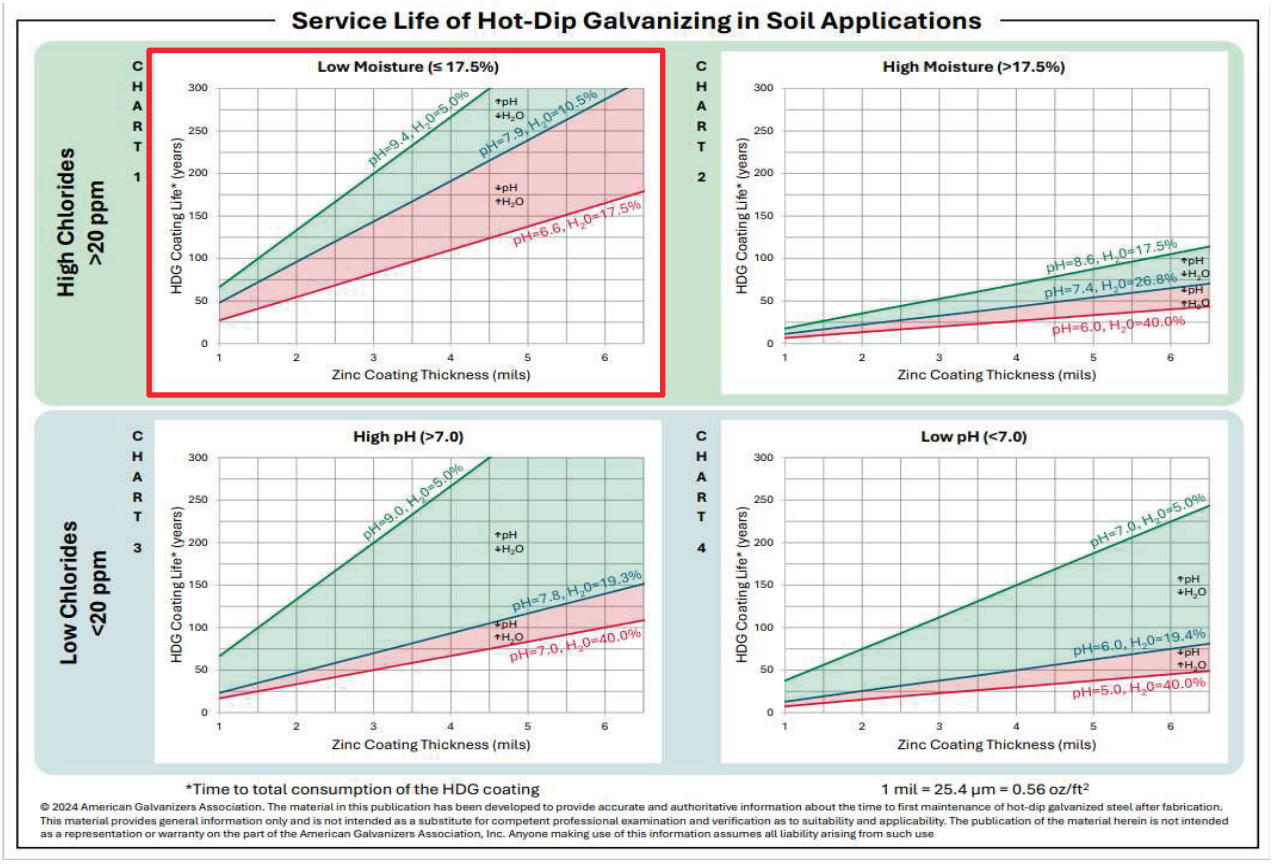
Zinc / Galvanize Coating Lifetime

Zinc Coating Loss	0.025	mils / yr
Zinc Coating Designation	ASTM 123 Gr 75	
Zinc Coating Thickness	3	mils
Usable Lifetime	120	years

Total Coated Foundation Lifetime	**125.88**	**years**

File(s) referenced:
Geotechnical Engineering Report - Willington Solar One, Lohse Road, Willington, CT.pdf

** Based on the information provided to APA and the above evaluation we would expect the lifetime given to be accurate**



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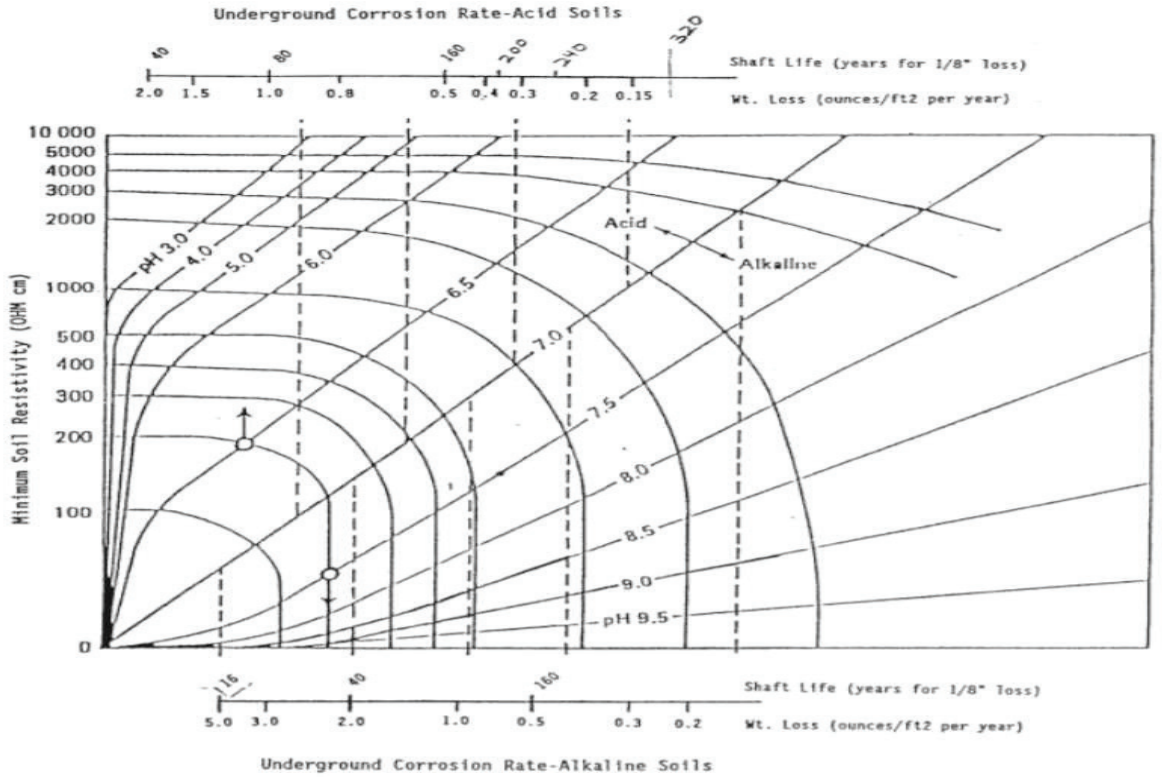
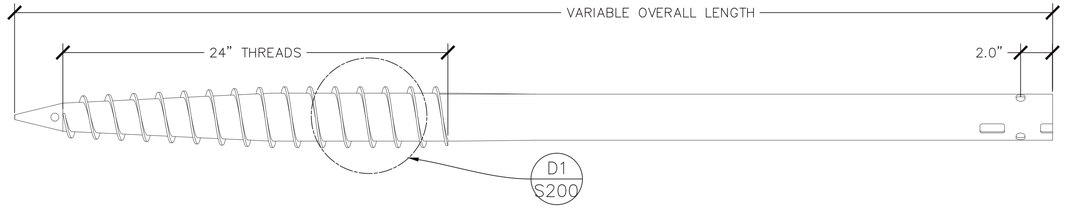
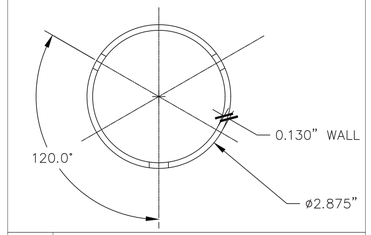


Figure 7.4 - Nomograph for Estimating the Corrosion Rate of Anchor Shafts

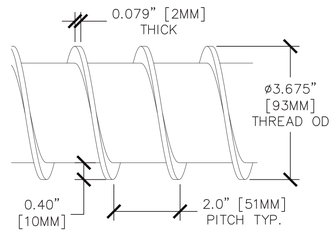


NOTES:
1. VIEW NOT REPRESENTATIVE OF SCREW TIP OR REQUIRED OVERALL OR THREAD LENGTH.

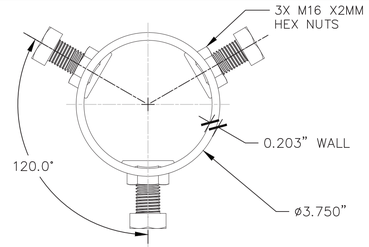
E1 PART: SCREW PILE



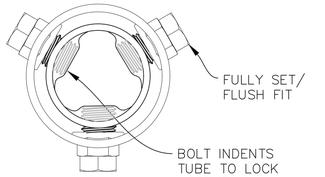
E4 SECTION: SCREW PILE



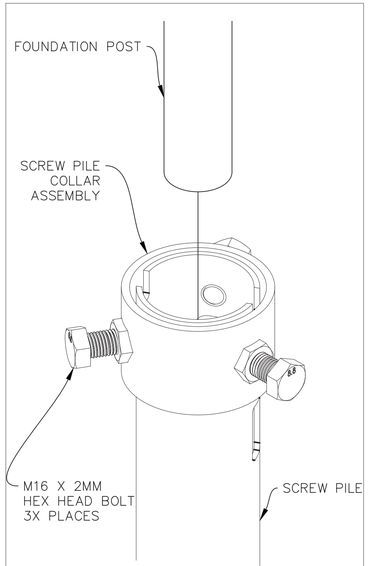
D1 DETAIL: SCREW PILE



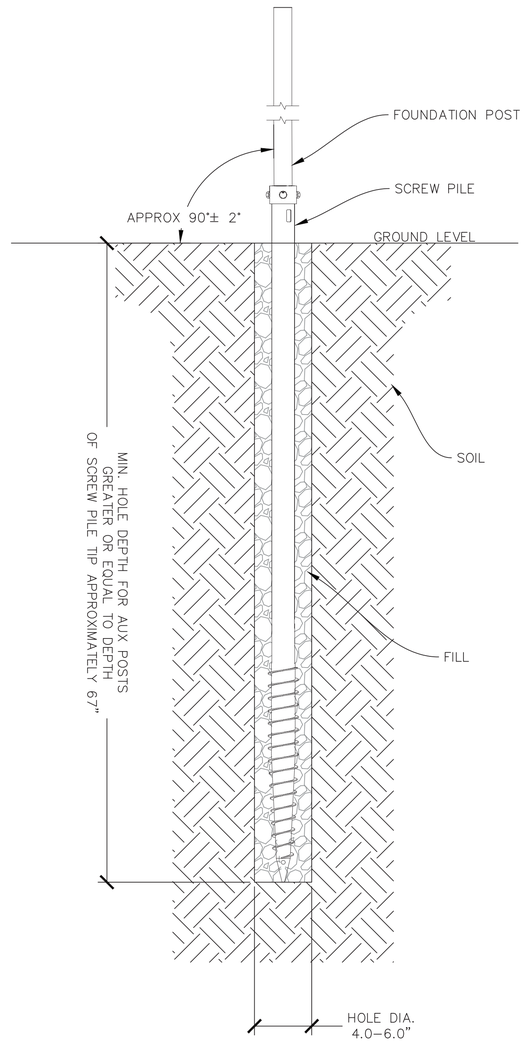
D2 SECTION: SCREW PILE COLLAR ASSEMBLY



C1 SECTION: PILE ASSEMBLY



A1 CONNECTION: POST–TO–PILE



A3 STANDARD INSTALL OPTION 1: PRE–DRILL: PROFILE–SOIL CUTAWAY

NOTES:

1. FOUNDATION POST MATERIAL: 50 KSI MIN YIELD STRENGTH
2. FOUNDATION POST TO BE HOT DIPPED GALVANIZED TO ASTM A123 OR INLINE GALVANIZED TO ASTM A1057.
3. SCREW PILE TUBE MATERIAL: 60 KSI MIN YIELD STRENGTH STEEL.
4. SCREW PILE THREAD MATERIAL: 36 KSI MIN YIELD STRENGTH STEEL.
5. SCREW PILE TO BE HOT DIPPED GALVANIZED TO ASTM A123 OR INLINE GALVANIZED TO ASTM A1057.
6. ALL HARDWARE IS 300 SERIES STAINLESS STEEL, A574 ALLOY STEEL, OR MINIMUM 8.8 CLASS METRIC.
7. GROUND SCREW BOLTS MUST BE FULLY SET INTO NUTS.
8. GROUND SCREW BOLTS SHALL BE 35 MM LONG.
9. SCREW PILE SHALL PENETRATE THE SOIL TO A DEPTH PAST THE FROST LINE, WITH 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 FOUNDATION DESIGN REPORT.
10. FOUNDATION POST SHALL EXTEND ABOVE GROUND LEVEL AT MINIMUM OF INDICATED FRONT LIP CLEARANCE, PLUS THE ADDITIONAL LENGTH REQUIRED TO ACHIEVE THE INDICATED TILT ANGLE.
11. MINIMUM ENGAGEMENT BETWEEN SCREW PILE AND FOUNDATION POST SHALL BE 6".
12. INSTALLERS SHALL REFER TO STRUT AND POST SETUP SHEETS FOR LENGTH AND PLACEMENT DETAILS.

FOUNDATION POST INSTALLATION

13. ACCURATELY LOCATE AND INSTALL SCREW PILES BY SUCH METHODS AND EQUIPMENT SO AS NOT TO IMPAIR THE PILE STRENGTH OR DAMAGE POSTS OR ADJACENT CONSTRUCTION.
14. INSTALLATION CONTRACTOR RESPONSIBLE FOR ALL CONSTRUCTION EQUIPMENT, METHODS, AND SEQUENCES.
15. DISTURBED GALVANIZED SURFACES SHALL BE TOUCHED UP WITH AN APPROVED COLD GALVANIZING COMPOUND.
16. INSTALL SCREW PILES TO MINIMUM DEPTH AS INDICATED THIS SHEET OR AS REQUIRED PER THE STAMPED FOUNDATION DESIGN REPORT, WHICHEVER IS GREATER.

AUXILLIARY FOUNDATION NOTES:

1. EMBEDMENT DEPTH CONTINGENT UPON SITE SPECIFIC DATA, INCLUDING BUT NOT LIMITED TO: FROST DEPTH, SOIL PROPERTIES, AND LOCAL BUILDING CODE REQUIREMENTS.
2. AUGERED HOLE SHOULD EXTEND BELOW THE LOCAL FROST LINE, INTO THE STABLE SOIL ZONE.
3. HOLDING PROPERTIES OF THE SCREW PILE IN AGGREGATE DETERMINED BY TESTING CONDUCTED BY APA, PER ASTM D1143
4. STRUCTURAL PROPERTIES OF SCREW PILE TESTED ONLY. CORROSIVITY, AND OTHER GEOTECHNICAL PROPERTIES NOT TESTED.
5. INSTALLATION PROCEDURE

5.1. AUGER HOLE TO REQUIRED DEPTH. HOLE SHOULD BE APPROXIMATELY PLUMB AND A MINIMUM DIAMETER AS INDICATED IN DRAWING.

5.2. REMOVE THE SPOILS AS BEST AS POSSIBLE. THERE SHOULD BE NO LARGE CLUMPS OR ROCKS AT THE BOTTOM OF THE HOLE.

5.3. POUR IN AGGREGATE.

5.4. AGGREGATE SHOULD BE SIZED BETWEEN 3/8" – 3/4".

5.5. KNOWN ACCEPTABLE AGGREGATES (NAMING PER ASTM C33–03):

5.5.A. #6 (3/8" – 3/4")
5.5.B. EQUIVALENT SIZE OF #6.

5.6. DEVIATIONS IN AGGREGATE SIZE, FROM THE ABOVE SPECIFICATIONS, MUST BE APPROVED BY APA SOLAR ENGINEERING BEFORE USING/PURCHASING.

5.7. 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 POST IS FACING THE CORRECT DIRECTION (FACING EAST–WEST).

IF NEEDED, RETAMP THE AGGREGATE AT SOIL LEVEL AROUND THE SCREW PILE.

6. QUALITY CONTROL NOTES

1.1. POST 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.

1.2. FOUNDATION POSTS SHOULD NOT BE VERIFIED BY PULLING LATERALLY AT THE TOP OF THE POST (FIGURE 3). THIS CREATES A LARGE AND ARTIFICIAL MOMENT IN THE FOUNDATION. FOUNDATION POSTS SHOULD ALSO NOT BE ROCKED BACK AND FORTH UNTIL IT "FAILS"; THE FOUNDATION POSTS ARE INTENDED TO WORK AS A SYSTEM WITH ALL PARTS INTACT (ADJOINING POSTS, 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.

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PROFESSIONAL SEAL/STAMP

STATE OF CONNECTICUT
JOSEPH D. IMPERATO
0036452
LICENSED
PROFESSIONAL ENGINEER
04/23/2026

SITE NAME: WILLINGTON SOLAR ONE
SITE ADDRESS: 41–43 LOHSE ROAD
SITE CITY, STATE: WILLINGTON, CT 06279

SHEET REVISIONS		
REV	DESCRIPTION	DATE
A	INITIAL RELEASE	4/7/2026

APPROVED

DRAWN	REVIEWED	APPROVED	SIZE
HB	CW	JDI	D

SHEET NAME: GROUND SCREW

PROJECT NUMBER: 260106

DRAWING NUMBER: S.200 REV: A

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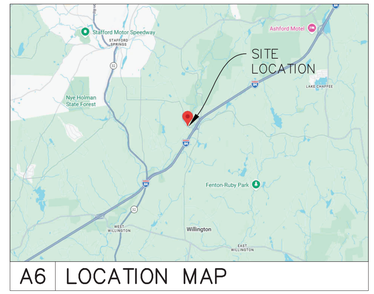
SCALE IS REDUCED WHEN SHEET SIZE IS 11" x 17"

A1 | FOUNDATION TEST POINTS

ZONE LEGEND	
	73" GROUND SCREW

TEST SITE COORDINATES: 41.921925, -72.266113



A6 | LOCATION MAP

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SITE ADDRESS: 41-43 LOHSE ROAD
SITE CITY, STATE: WILLINGTON, CT 06279

SHEET REVISIONS

REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	3/30/26

APPROVED

DRAWN	REVIEWED	APPROVED	SIZE
KCK	SDS	TK	D

SHEET NAME: FOUNDATION TESTING MAP
PROJECT NUMBER: 260106
DRAWING NUMBER: ZONE MAP | REV.: A

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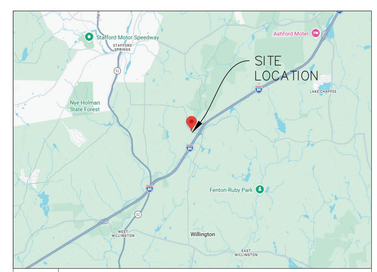
SCALE IS REDUCED WHEN SHEET SIZE IS 11" x 17"

A1 | FOUNDATION TEST POINTS

TEST MAP LEGEND	
	TENSION TEST POINT (PASS)

SOIL IDENTIFICATION			
SYMBOL	NAME	SLOPES	UNSC
60C	CANTON AND CHARLTON FINE SANDY LOAMS	8–15%	SM
61C	CANTON AND CHARLTON FINE SANDY LOAMS	8–15%	SM
72E	NIPMUCK–BROOKFIELD COMPLEX	15–45%	BEDROCK

TEST SITE COORDINATES: 41.921925, –72.266113



A6 | LOCATION MAP

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WILLINGTON SOLAR ONE

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SITE ADDRESS: 41–43 LOHSE ROAD
SITE CITY, STATE: WILLINGTON, CT 06279

SHEET REVISIONS		
REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	3/30/26

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DRAWN	REVIEWED	APPROVED	SIZE
KCK	SDS	TK	D

SHEET NAME
FOUNDATION TESTING MAP

PROJECT NUMBER
260106

DRAWING NUMBER	REV.
RESULTS	A

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SOLAR PV GROUND MOUNT
STRUCTURAL CALCULATIONS

APA SOLAR RACKING
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LOCATION

Connecticut

PRINT PACKAGE NUMBER:

260106.1

REVISION: A

ON:

3/16/2026

DESIGN CRITERIA:

TITAN
25° TILT
35 PSF SNOW
109 MPH WIND, RISK CAT I, EX. C.

ASCE7-16
Allowable Stress Design (ASD)

the jdj group
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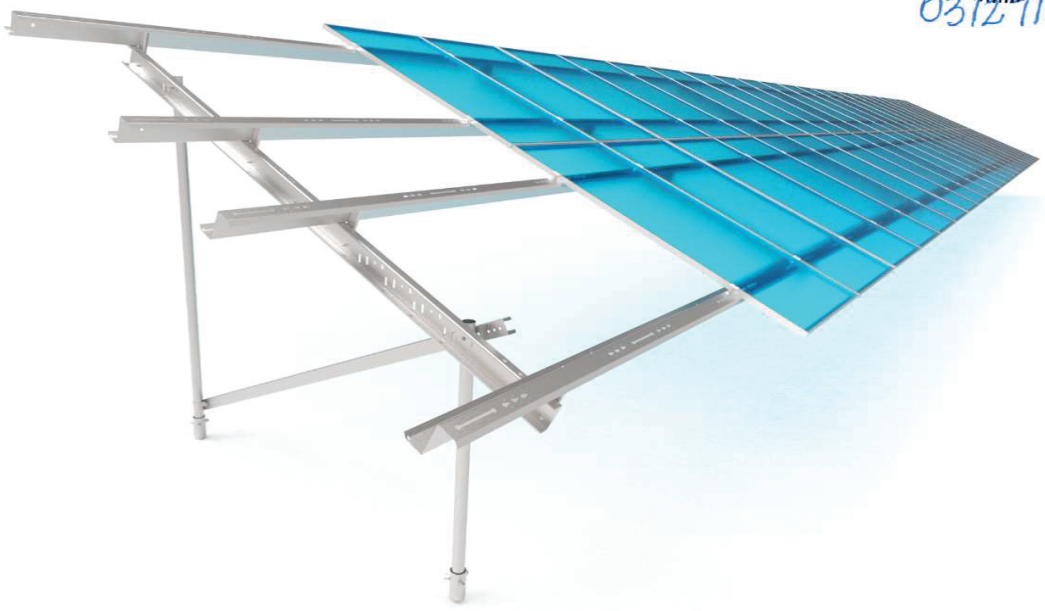

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LOAD CALCULATIONS

APA SOLAR RACKING
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General Calculations

General Dimensions

Quantity of PV Modules, Vertically (Cartridge)	PV_Q =	**1**	
PV Module Tilt	PVT =	**25°**	
PV Module Length	PVL =	**89.69**	**in**
PV Module Width	PVW =	**44.65**	**in**
PV Module Area	PVA = PVL × PVW =	**27.81**	**ft^2**
PV Module Weight	PV_{LB} =	**71**	**lbs**
Force Resisting Members Quantity	M_Q =	**2**	
Vertical Section Flat Length (chord)	$PV_{FL} = PV_L \times PV_Q$ =	**7.47**	**ft**
Vertical Section Profile Length (at tilt)	$PV_{PL} = PV_{FL} \times \cos(PV_T)$ =	**6.77**	**ft**
Horizontal Width (at tilt)	$PV_{PW} = PV_W$ =	**3.72**	**ft**
Profile Height (at tilt)	$PV_{PH} = PV_{FL} \times \sin(PV_T)$ =	**3.16**	**ft**
Area Projected Vertically	$PV_{AV} = PV_{PL} \times PV_{PW}$ =	**25.20**	**ft^2**
Area Projected Horizontally	$PV_{AH} = PV_{PH} \times PV_{PW}$ =	**11.75**	**ft^2**

Dead Loading

Force Resisting Member Weight	M_W =	**2.75**	**lbs/ft**
Cartridge Weight per Member	$PV_{LBT} = PV_{LB} / PV_Q / M_Q$ =	**35.5**	**lbs**
Misc. Hardware Weight per Vertical Section	W_{MH} =	**5.00**	**lbs**
Dead Load per Vertical Section	$DL_T = -(PV_{LB} \times PV_Q + M_W \times PV_W \times M_Q \times PV_Q + W_{MH})$ =	**-96.46**	**lbs**
TD: Distributed Dead Load on Member	$DL_o = DL_T / PV_Q / M_Q / PV_W$ =	**12.96**	**lbs/ft**

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SNOW

Snow loading (ASCE7-16)

Tedds calculation version 1.0.09

Building details

Roof type	Monoslope	
Width of roof	b=	**6.77 ft**
Slope of roof 1	α=	**25 deg**

Ground snow load

Ground snow load	Pg=	**35 lb/ft^2**
Density of snow	ɣ=	**18.55 lb/ft^3**
Terrain type	C (see Section 26.7)	
Exposure condition (Table 7.3-1)	Fully Exposed	
Exposure factor (Table 7.3-1)	Ce=	**0.9**
Thermal condition (Table 7.3-2)	Unheated and open air structures	
Thermal factor (Table 7.3-2)	Ct=	**1.2**
Importance category(Table 1.5-1)	I	
Risk factor (Table 7-4)	Is=	0.8
Flat roof snow load (Sect 7.3)	pf = 0.7*Ce*Ct Is*pg =	**21.17 lb/ft^2**
Minimum (flat roof) snow load	p_m=	**16 lb/ft^2**

Cold roof slope factor (Ct > 1.0)

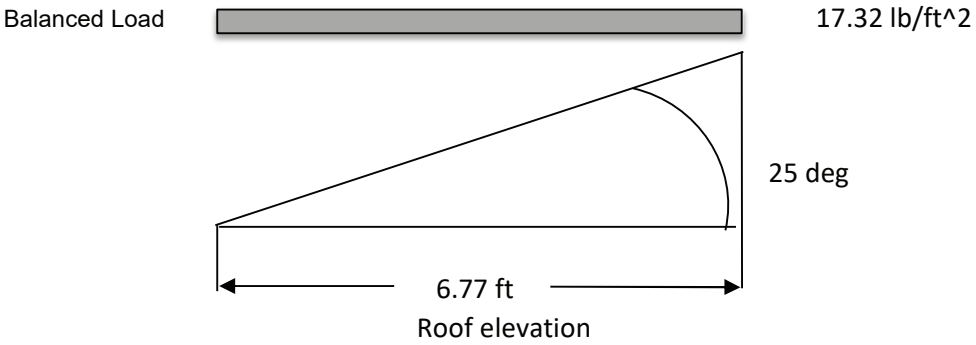
Roof surface type	Slippery	
Ventilation	Ventilated	
Thermal resistance (R-value)	R=	**30**
Roof slope factor Fig 4-1c (dashed line)	Cs=	**0.82**

Monoslope

Sloped roof snow load (Cl.7.4)	ps = Cs x pf =	**17.32 lb/ft^2**

Distributed Snow Loading

Snow Load per Vertical Section	$SL_T = -(p_s \times PV_{AV})$ =	**436.54 lbs**
TD: Distributed Snow Load on Member	$SL = SL_T/PV_Q/M_Q/PV_W$ =	**58.66 lbs/ft/mem.**



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SEISMIC

Seismic Forces (ASCE7-16)

Tedds calculation version 3.1.01

Site parameters

Site class	E	
Mapped acceleration parameters (Section 11.4.2)		
at short period	S_S =	**0.179**
at 1 sec period	S_1 =	**0.055**
Site coefficientshort period (Table 11.4-1)	F_a =	**2.5**
at 1 sec period (Table 11.4-2)	F_v =	**3.5**

Spectral response acceleration parameters

at short period (Eq. 11.4-1)	S_{MS} =	**0.4296**
at 1 sec period (Eq. 11.4-2)	S_{M1} =	**0.231**

Design spectral acceleration parameters (Sect 11.4.4)

at short period (Eq. 11.4-3)	S_{DS} =	**0.286**
at 1 sec period (Eq. 11.4-4)	S_{D1} =	**0.154**

Seismic design category

Occupancy category (Table 1-1)	I	
Seismic design category	B	

Approximate fundamental period

Height above base to highest level of building	h_n =	**11.96 ft.**

From Table 12.8-2:		
Structure type	All other systems	
Building period parameter Ct	C_t =	**0.02**
Building period parameter x	x =	**0.75**
Approximate fundamental period (Eq 12.8-7)	T_a =	**0.129 sec**
Building fundamental period (Sect 12.8.2)	T =	**0.129**
Long-period transition period	T_L =	**6**

Seismic response coefficient

Seismic force-resisting system (Table 12.2-1)	G. CANTILEVERED COLUMN SYSTEMS DETAILED TO CONFORM TO THE REQUIRE 2. Steel ordinary cantilever column systems	
Response modification factor (Table 12.2-1)	R =	**1.25**
Seismic importance factor (Table 1.5-2)	I_e =	**1.00**
Seismic response coefficient (Sect 12.8.1.1)		

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Maximum ((Eq 12.8-3))	Cs_max =	**0.958**	
Maximum Sa value	Sa,max =	**0.19**	
Period T at which Sa is max	$T_{sa,max}$ =	**0.08**	**sec**
Minimum:			
Eq 9.5.5.2.1-3	C_{s_min} =	**0.0126016**	
Calculated (Eq 12.8-3)	C_{s_calc} =	**0.22912**	
Seismic response coefficient	C_s =	**0.22912**	

Seismic base shear (Sect 12.8.1)

Effective seismic weight of the structure	W =	**9.07**	**kips**
Seismic base shear (Eq 12.8-1)	$V = C_s \times W$ =	**2.1**	**kips**

Distributed Seismic Loading

Analyzed Rack Length	AR_L =	**2157.45**	**in**
Analyzed Rack Weight	$AR_{LB} = AR_L / (PW_{PW} \times 0.75) \times 2 \times DL_T$ =		**9068 lbs**
Analyzed Rack Anchor Qty	AR_A =	22	
Load per node (top of post)	$EL = V/AR_A$ =	**94.44 lbs/post**	

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WIND

Wind Loading (ASCE7-16)

General wind load requirements

Basic wind speed	V =	**109 mph**
Risk category	I	
Velocity pressure exponent coeff(Table26.6-1)	K_d =	**0.85**
Exposure category (cl.26.7.3)	C	

Topography

Topography factor not significant	K_{zt} =	**1.00**
Ground Elevation Factor	K_e =	**1.00**

Velocity pressure

Velocity pressure coefficient (T.29.3-1)	K_z =	**1.00**
Velocity pressure	qh=0.00256×Kz×Kzt×Kd×Kd×V2×1psf/mph2 =	**25.85 psf**

Pressures and forces

Net pressure	p = qh × GCN
Net force	$F_w = p \times A_{ref}$
Area (per zone)	$A_{ref} = PV_A$

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CPP Wind Loading Table
Titan

	Load Case	Load Case Desc.	Panel Load Loc.	CPP Pressure Coeff. G_{CN}	Net Pressure, p (psf)	Net Force, F_w (lbs)	Rails	Net Force per Rail (lbs/ft)
Green Zone	1	CPP E-W Rail-Up	1	-1.58	-40.82	-283.80	4	153
			2	-0.68	-17.47	-121.44		65
			3	-0.43	-11.16	-77.58		42
			4	-0.27	-7.04	-48.97		26
	2	CPP Half Chord-Up	1	-1.44	-37.27	-259.09		139
			2	-1.07	-27.76	-193.01		104
			3	-0.54	-14.01	-97.42		52
			4	-0.29	-7.38	-51.33		28
	3	CPP Post Pair-Up	1	-1.35	-35.00	-243.32		131
			2	-1.05	-27.16	-188.85		102
			3	-0.75	-19.43	-135.09		73
			4	-0.39	-10.20	-70.94		38
	4	CPP Post Pair-Down	1	0.29	7.55	52.49		-28
			2	0.40	10.47	72.79		-39
			3	0.52	13.44	93.44		-50
			4	0.69	17.96	124.83		-67
	5	CPP Half Chord-Down	1	0.21	5.33	37.03		-20
			2	0.33	8.55	59.43		-32
			3	0.52	13.32	92.63		-50
			4	0.76	19.76	137.38		-74
	6	CPP E-W Rail-Down	1	0.18	4.59	31.94		-17
			2	0.29	7.47	51.93		-28
			3	0.39	10.01	69.60		-37
			4	0.72	18.54	128.88		-69

	Load Case	Load Case Desc.	Panel Load Loc.	CPP Pressure Coeff. G_{CN}	Net Pressure, p (psf)	Net Force, F_w (lbs)	Rails	Net Force per Rail (lbs/ft)
y Zone	1	CPP E-W Rail-Up	1	-2.04	-52.78	-366.97		197
			2	-0.84	-21.68	-150.73		81
			3	-0.55	-14.20	-98.70		53
			4	-0.33	-8.61	-59.86		32
	2	CPP Half Chord-Up	1	-1.80	-46.66	-324.43		174
			2	-1.42	-36.82	-256.01		138
			3	-0.67	-17.23	-119.76		64
			4	-0.33	-8.47	-58.92		32
	3	CPP Post	1	-1.38	-35.75	-248.56		134
			2	-1.24	-32.05	-222.80		120

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Yellow	3	Pair-Up	3	-1.19	-30.70	-213.42	4	115
			4	-0.70	-18.10	-125.81		68
	4	CPP Post Pair-Down	1	0.46	11.98	83.29		-45
			2	0.79	20.37	141.64		-76
			3	0.99	25.67	178.46		-96
			4	1.17	30.18	209.81		-113
	5	CPP Half Chord-Down	1	0.34	8.85	61.56		-33
			2	0.61	15.75	109.50		-59
			3	1.02	26.36	183.24		-98
			4	1.21	31.31	217.71		-117
	6	CPP E-W Rail-Down	1	0.30	7.68	53.38		-29
			2	0.51	13.10	91.11		-49
			3	0.77	19.95	138.69		-75
			4	1.23	31.77	220.86		-119

	Load Case	Load Case Desc.	Panel Load Loc.	CPP Pressure Coeff. G_{CN}	Net Pressure, p (psf)	Net Force, F_w (lbs)	Rails	Net Force per Rail (lbs/ft)
Orange Zone	1	CPP E-W Rail-Up	1	-2.53	-65.29	-453.94	4	244
			2	-0.89	-22.96	-159.64		86
			3	-0.52	-13.52	-93.99		51
			4	-0.34	-8.67	-60.31		32
	2	CPP Half Chord-Up	1	-2.71	-70.19	-487.99		262
			2	-1.38	-35.62	-247.66		133
			3	-0.96	-24.84	-172.71		93
			4	-0.66	-17.07	-118.70		64
	3	CPP Post Pair-Up	1	-2.56	-66.16	-459.98		247
			2	-1.40	-36.22	-251.82		135
			3	-1.12	-28.89	-200.89		108
			4	-0.83	-21.54	-149.75		80
	4	CPP Post Pair-Down	1	0.72	18.54	128.89		-69
			2	1.07	27.77	193.10		-104
			3	1.64	42.39	294.72		-158
			4	1.92	49.59	344.78		-185
	5	CPP Half Chord-Down	1	0.65	16.79	116.71		-63
			2	1.00	25.81	179.44		-96
			3	1.70	44.05	306.25		-165
			4	1.92	49.52	344.30		-185
	6	CPP E-W Rail-Down	1	0.43	11.22	77.97		-42
			2	0.60	15.50	107.79		-58
			3	0.99	25.53	177.50		-95
			4	1.58	40.97	284.84		-153

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Load data - with ASD Combos (for reactions)

GLOSSARY

Load conditions

Condition	Description	Comb.	Category
DL	Dead Load	No	DL
SL	Snow Load	No	SNOW
WL1	Wind - APA_CPP - EW Rail / Up - 0° (S-N)	No	WIND
WL2	Wind - APA_CPP - Half Chord/ Up - 0° (S-N)	No	WIND
WL3	Wind - APA_CPP - Post Pair / Up - 0° (S-N)	No	WIND
WL4	Wind - APA_CPP - Post Pair / Down - 180° (N-S)	No	WIND
WL5	Wind - APA_CPP - Half Chord / Down - 180° (N-S)	No	WIND
WL6	Wind - APA_CPP - EW Rail / Down - 180° (N-S)	No	WIND
EL1	Seismic Left	No	EQ
EL2	Seismic Right	No	EQ
EL3	Seismic North	No	EQ
EL4	Seismic South	No	EQ
D1	DL	Yes	
D2	DL+SL	Yes	
D3	DL+0.75SL	Yes	
D4	DL+0.6WL1	Yes	
D5	DL+0.6WL2	Yes	
D6	DL+0.7EL1	Yes	
D7	DL+0.7EL2	Yes	
D8	DL+0.7EL3	Yes	
D9	DL+0.7EL4	Yes	
D10	DL+0.75SL+0.45WL1	Yes	
D11	DL+0.75SL+0.45WL2	Yes	
D12	DL+0.75SL+0.525EL1	Yes	
D13	DL+0.75SL+0.525EL2	Yes	
D14	DL+0.75SL+0.525EL3	Yes	
D15	DL+0.75SL+0.525EL4	Yes	
D16	0.6DL+0.6WL1	Yes	
D17	0.6DL+0.6WL2	Yes	
D18	0.6DL+0.7EL1	Yes	
D19	0.6DL+0.7EL2	Yes	
D20	0.6DL+0.7EL3	Yes	
D21	0.6DL+0.7EL4	Yes	
D22	DL+0.6WL3	Yes	
D23	DL+0.6WL4	Yes	
D24	DL+0.6WL5	Yes	
D25	DL+0.6WL6	Yes	
D26	DL+0.525SL+0.45WL3	Yes	
D27	DL+0.525SL+0.45WL4	Yes	

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D28	DL+0.525SL+0.45WL5	Yes
D29	DL+0.525SL+0.45WL6	Yes
D30	0.6DL+0.6WL3	Yes
D31	0.6DL+0.6WL4	Yes
D32	0.6DL+0.6WL5	Yes
D33	0.6DL+0.6WL6	Yes

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Load on nodes

Condition	Node	FX	FY	FZ	MX	MY	MZ
		[Lb]	[Lb]	[Lb]	[Lb*ft]	[Lb*ft]	[Lb*ft]
EL1	153	94.44	0.00	0.00	0.00	0.00	0.00
EL2	153	-94.44	0.00	0.00	0.00	0.00	0.00
EL3	153	0.00	0.00	94.44	0.00	0.00	0.00
EL4	153	0.00	0.00	-94.44	0.00	0.00	0.00

Distributed Forces on Members

Condition	Member	Dir1	Val1	Val2	Dist1	%	Dist2	%
			[Lb/ft]	[Lb/ft]	[in]		[in]	
DL	376	Y	-12.96	-12.96	0.00	Yes	100.00	Yes
SL	376	Y	-58.66	-58.66	0.00	Yes	100.00	Yes
WL1	See Pages 9-10							
WL2	See Pages 9-10							
WL3	See Pages 9-10							
WL4	See Pages 9-10							
WL5	See Pages 9-10							
WL6	See Pages 9-10							

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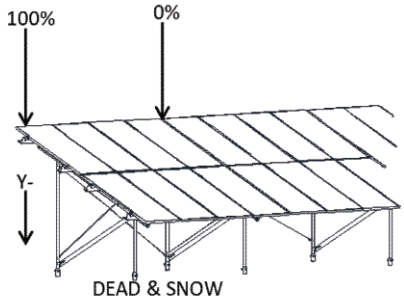

Figure 1: Load Direction Y

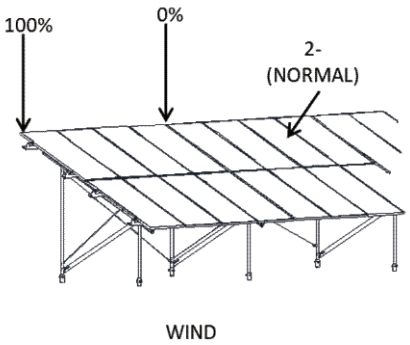

Figure 2: Load Direction 2

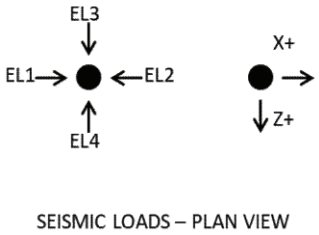

Figure 3: Load Direction X & Z

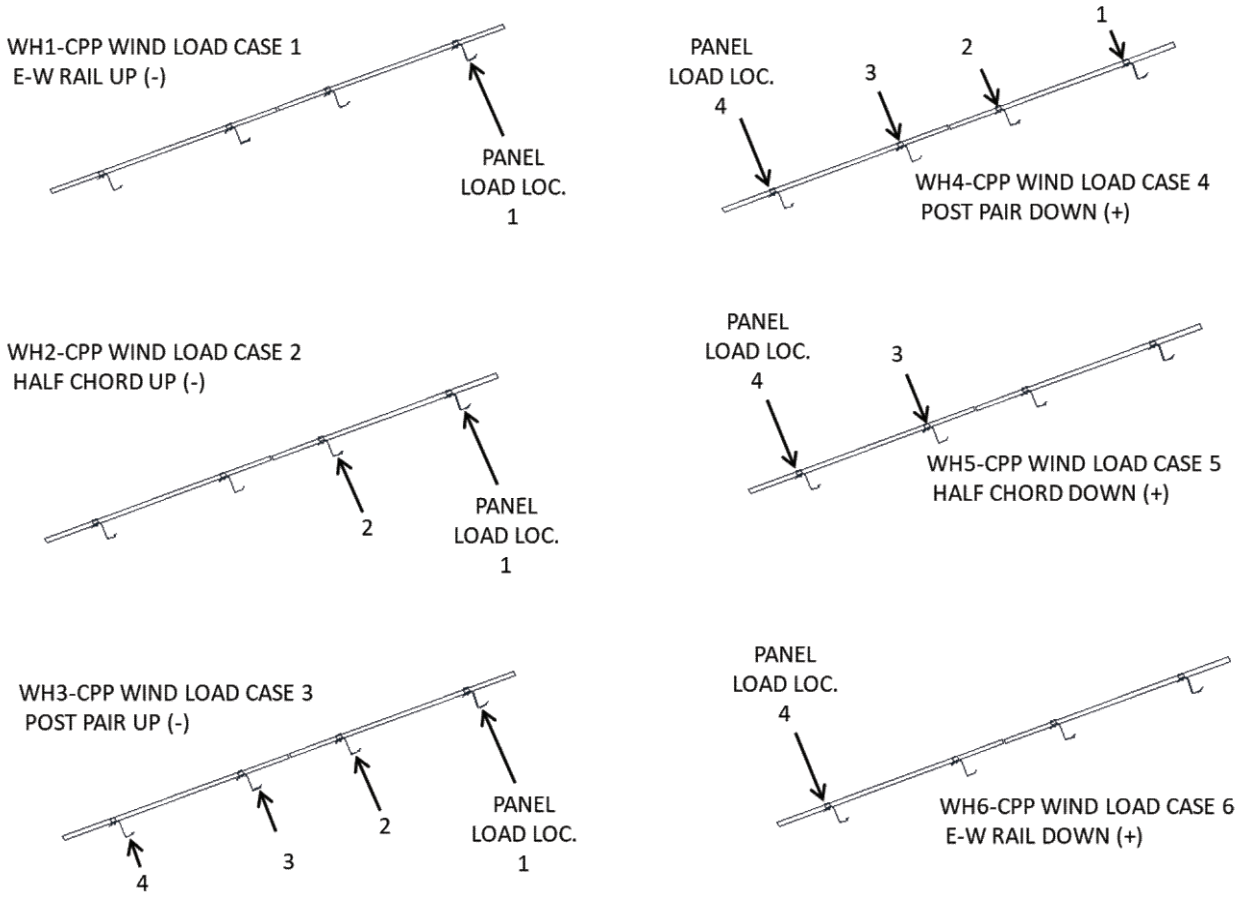

Figure 4: Load CPP Wind Loads

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WIND TUNNEL DATA

CERMAK PETERKA PETERSEN

CPP Project 17649 -
Wind Tunnel Tests and Wind Load Analysis for APA Solar FIXED-TILT GROUND MOUNT

Executive Summary

CPP, Inc. has evaluated wind loads on a generic array of fixed-tilt ground-mounted photovoltaic (PV) solar panels produced by APA Solar. The wind tunnel data used in the analysis is from the CPP proprietary ground mount wind loads database. This database consists of simultaneous surface pressure measurements at a large number of locations on the solar panels. The database contains data for a large number of configurations with varying combinations of tilt, ground clearance, and row spacing. The geometric parameters of the APA Solar system studied are summarized below:

	Range of applicability
Chord length:	140 in to 200 in, with results presented for two chord lengths and interpolation appropriate between the presented chord lengths
Tilt:	5°, 15°, 22.5°, 30° and 45°, allowable with interpolation appropriate between presented results.
Height (low edge of modules):	≤0.5L, with results presented for three low-edge heights (0.2L, 0.35L & 0.5L) and interpolation appropriate between the presented heights.
Row spacing (clear gap):	≤4LSin(tilt), with results presented for 1.5, 2.75 and 4LSin(tilt) and interpolation appropriate between the presented row spacings
Post spacing (along row):	≥0.5L, with results presented for 4 post spacings of 0.5L, 1L, 1.5L and 2.75L and interpolations appropriate between the presented post spacings

The wind loads determined by CPP are based upon measurements obtained in an atmospheric boundary layer wind tunnel study conducted in accordance with the test procedures described in ASCE 7. The primary goal of this study was to determine peak forces on an array of panels for the purpose of calculating design wind loads. The results are presented as load cases, defined in this document. These loads vary with position within the array and, as expected, the worst case- loads were found at the array perimeter. Interior portions of the array were generally found to have substantially lower wind loads than perimeter locations due to sheltering

Wind Tunnel Load Cases

The load cases are listed below. In some cases the load effect is the peak load on a fraction of the chord (e.g. the high rail or half the chord).

$GC_{N\text{-}Post\ \ pair}$ – Peak net pressure on a post-pair tributary area; uplift and downforces; for designs of posts, N-S strut/beam and braces. The tributary area considered includes the full chord and spans halfway to the next post pair; the nominal tributary area for a pair of posts in a dual-post system.

GCN-Post half-chord – Peak net pressure on a single post tributary area; uplift on upper post and downforce on lower post cases; for design of posts, N-S strut, and braces. The tributary area considered includes half of the chord and spans halfway to the next post pair; the nominal tributary area for a single post in a dual-post system.

GCN Rail– Peak net pressure on E-W rails spanning between posts, supporting modules; uplift and downforce cases. The tributary area considered includes one quarter of the chord and spans from one post pair to the next post pair; the nominal tributary area for a rail .

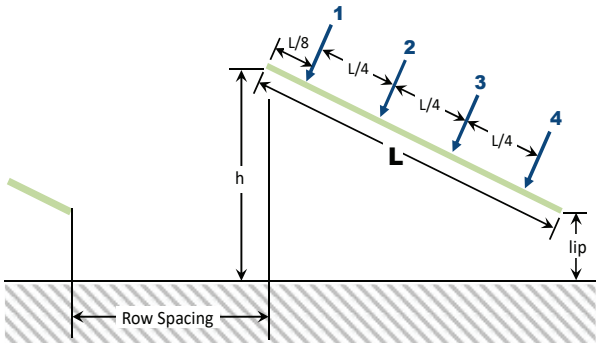

Figure 5: Wind Tunnel Load Distribution Schematic

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Wind Tunnel Zone Map

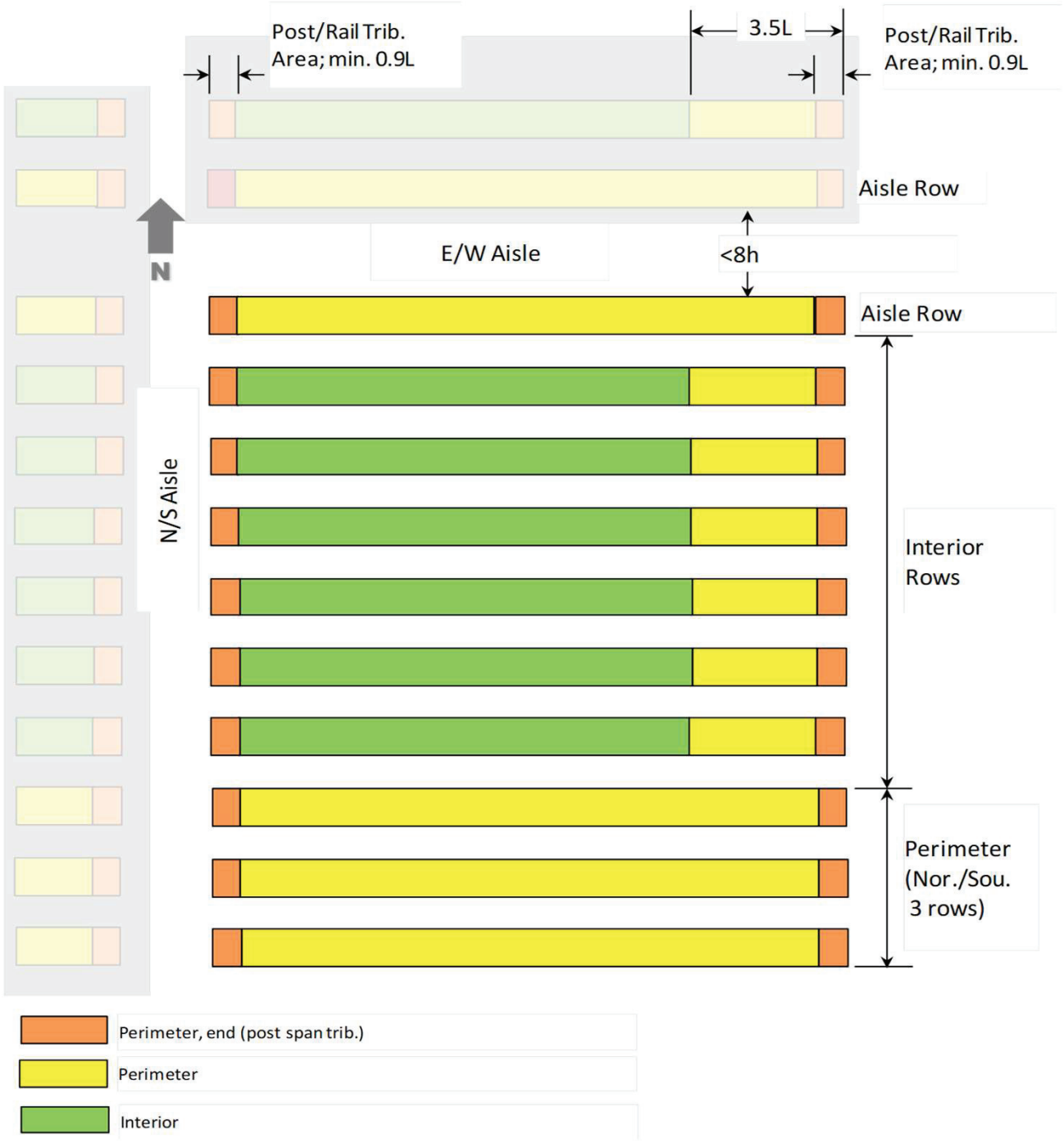

Figure 6: Wind Tunnel Zone Map

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SETUP & ANALYSIS

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Parts list

Note.- Only the graphically selected elements are listed below

Profile	Length [in]	N° of pieces
CABLE BRACE - 1/8	213.96	8
STD. BIG ZEE - 6 X 3 X 0...	152	16
STD. BIG ZEE - 6 X 3 X 0...	168	8
STD. BIG ZEE - 6 X 3 X 0...	197.5	16
STD. BIG ZEE - 6 X 3 X 0.055	67.73	8
STD. BIG ZEE SPLICE - 6 ...	16	72
STD. TITAN DUO POST - ...	111.2	11
STD. TITAN DUO POST - 2...	66.39	11
STD. TITAN KNEE BRAC...	113.49	11
STD. TITAN NS CHORD -...	136.25	11
Total N° of pieces		172

List of materials

Profile	Material	Uweight [Lb/ft]	Length [in]	Weight [Lb]
CABLE BRACE - 1/8	APA - A36 - CABLES	1.61E-01	1711.713	22.954
STD. BIG ZEE - 6 X 3 X 0.055	A653 SS 80-1	2.51E+00	7477.84	1566.464
STD. BIG ZEE SPLICE - 6 X 3 X 0.11	A653 SS 80-1	4.97E+00	1152	477.435
STD. TITAN DUO POST - 2.375 X 0.095	APA - A570 GR50	2.18E+00	1953.49	355.308
STD. TITAN KNEE BRACE - 3 X 2 X 0...	A653 SS 80-1	1.99E+00	1248.403	207.491
STD. TITAN NS CHORD - 6 X 2 X 0.108	A653 SS 80-1	3.72E+00	1498.698	464.788
Total weight [Lb]				3094.441

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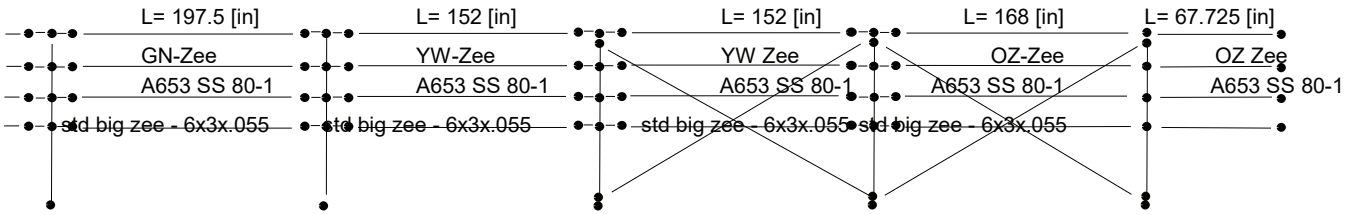

Figure 7: - Member Length, Name, Material, And Section - ORANGE,YELLOW, & GREEN ZONE

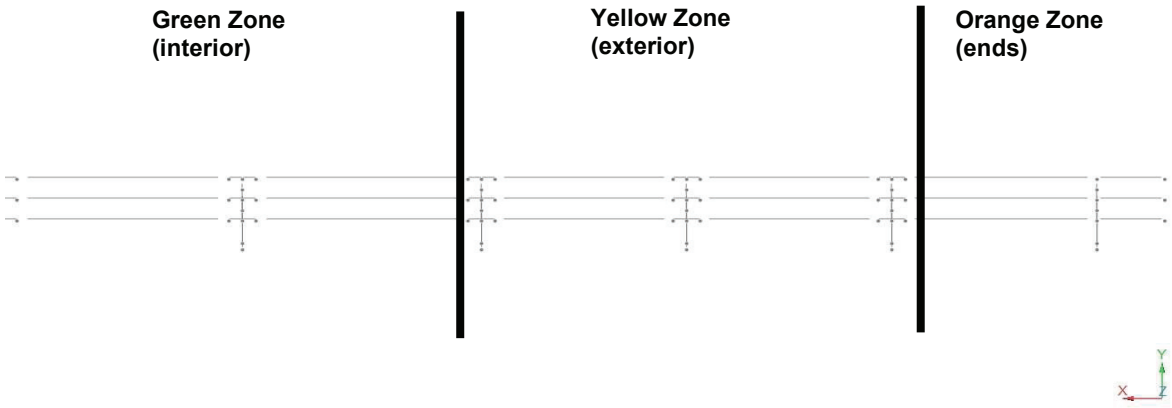

Figure 8: - Racking Zones

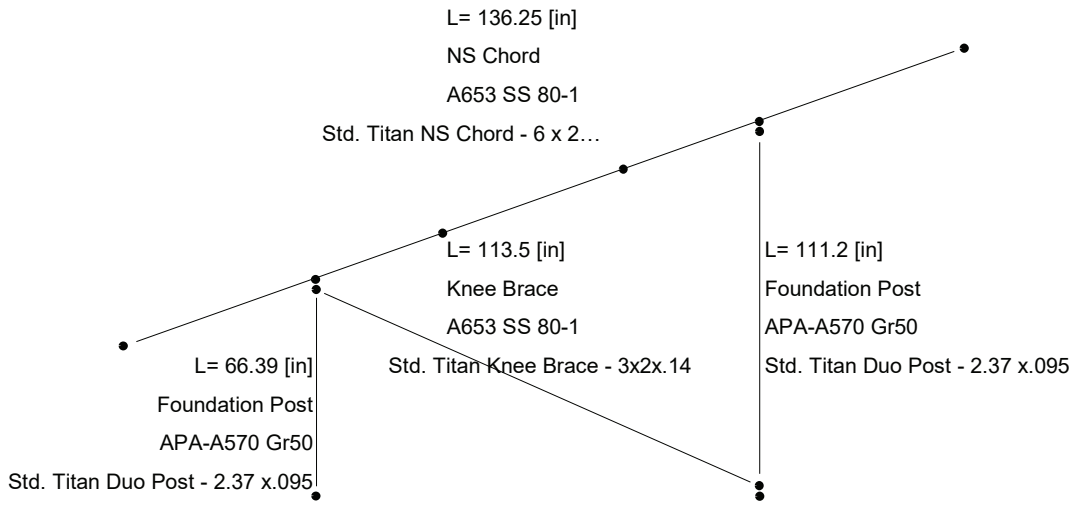

Figure 9: - Member Length, Name, Material, and Section

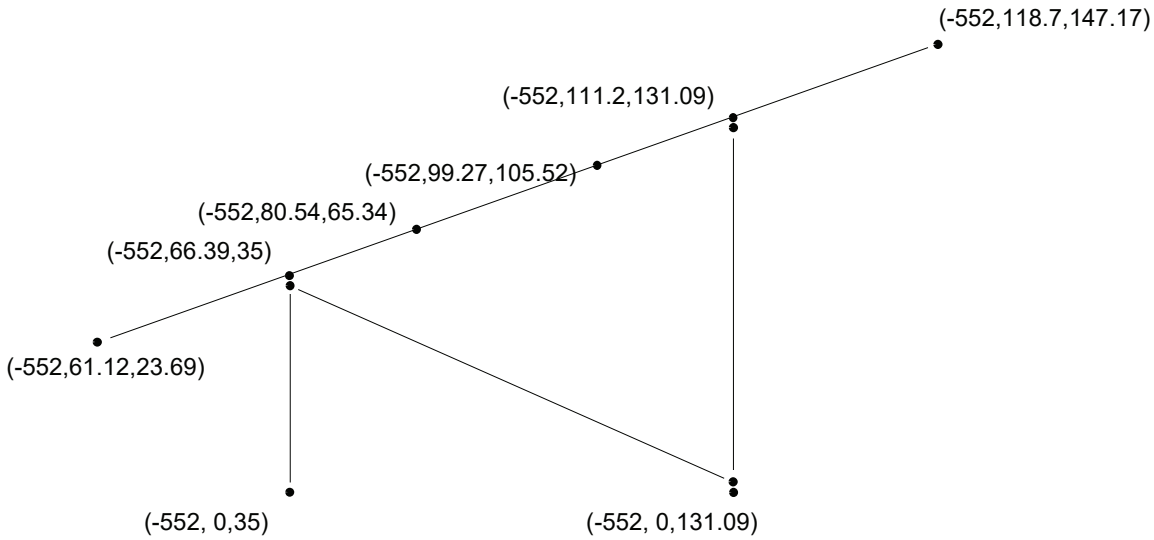

Figure 10: - Node X,Y,Z Coordinate

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Analysis - Reaction Envelope - ASD

Reactions

Direction of positive forces and moments

Max Uplift: -5036 lbs (D17)
Max Down Load: 4001 lbs (D27)
Max Lateral: 2170 lbs (D30)

	Forces					Moments	
Node	Fx [Lb]	lc	Fy [Lb]	lc	Fz [Lb]	lc	My [Lb*ft]	lc
145-max	364.626	D19	3240.21	D27	1733.34	D22	0	D1
145-min	-0.038	D18	-3895.42	D17	-1313.57	D31	0	D1
151-max	0.04	D7	3587.82	D27	2013.635	D22	0	D1
151-min	-366.198	D6	-4752.54	D17	-1831.96	D31	0	D1
173-max	0.04	D7	3237.9	D27	1740.936	D22	0	D1
173-min	-369.037	D6	-3932.58	D17	-1311.08	D31	0	D1
174-max	361.491	D19	3590.21	D27	2015.118	D22	0	D1
174-min	-0.038	D18	-4776.42	D17	-1831.69	D31	0	D1
185-max	364.639	D7	4000.57	D27	2169.527	D30	0	D1
185-min	-365.501	D18	-5036.25	D17	-1826.74	D23	0	D1
195-max	366.658	D7	3996.7	D27	2164.431	D30	0	D1
195-min	-356.406	D18	-4983.38	D17	-1828.4	D23	0	D1
205-max	0.012	D12	3420.62	D27	1809.354	D30	0	D1
205-min	-0.037	D16	-4081.45	D17	-1171.8	D23	0	D1
212-max	0.012	D12	3415.51	D27	1815.076	D30	0	D1
212-min	-0.037	D16	-4092.86	D17	-1170.08	D23	0	D1
213-max	0.013	D12	3400.64	D27	1792.663	D30	0	D1
213-min	-0.036	D16	-4020.14	D30	-945.232	D23	0	D1
214-max	0.012	D12	3319.47	D27	1771.102	D22	0	D1
214-min	-0.036	D16	-3947.1	D17	-952.884	D31	0	D1

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215-max	0.013 D12	3399.19 D27	1794.457 D30	0 D1
215-min	-0.036 D16	-4025.19 D30	-944.648 D23	0 D1
294-max	0.072 D17	2386.43 D10	80.591 D31	0 D1
294-min	-0.011 D2	103.94 D20	-106.345 D22	0 D1
296-max	0.068 D16	2290.06 D10	112.398 D31	0 D1
296-min	-0.067 D7	74.869 D20	-123.545 D22	0 D1
298-max	0.06 D16	2388.59 D10	80.44 D31	0 D1
298-min	-0.067 D7	103.909 D20	-106.814 D22	0 D1
300-max	0.069 D16	2291.72 D10	112.379 D31	0 D1
300-min	-0.009 D2	75.022 D20	-123.633 D22	0 D1
302-max	0.068 D16	2668.23 D10	112.077 D23	0 D1
302-min	-0.067 D7	117.592 D20	-133.108 D30	0 D1
304-max	0.07 D16	2666.07 D10	112.178 D23	0 D1
304-min	-0.067 D7	117.551 D20	-132.795 D30	0 D1
306-max	0.062 D16	2686.49 D10	71.894 D23	0 D1
306-min	-0.02 D12	141.512 D20	-111.01 D30	0 D1
308-max	0.062 D16	2689.18 D10	71.789 D23	0 D1
308-min	-0.019 D12	141.674 D20	-111.361 D30	0 D1
310-max	0.06 D16	2896.36 D10	57.993 D23	0 D1
310-min	-0.022 D12	172.136 D20	-109.986 D30	0 D1
312-max	0.06 D16	2848.43 D10	58.463 D31	0 D1
312-min	-0.021 D12	167.036 D20	-108.663 D22	0 D1
314-max	0.061 D16	2896.87 D10	57.957 D23	0 D1
314-min	-0.021 D12	172.14 D20	-110.096 D30	0 D1

Mx = 0 for all nodes at ground

Mz = 0 for all nodes at ground

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CODE CHECK

(ASCE7-16, ASD)

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Steel Code Check - SUMMARY

Description	Section	Member & Ctrl Eq.	Ratio & Status	Reference
NS Chord	*Std. Titan NS Chord - 6 x 2...*	335 - D28 at 9.16%	0.71 - OK	Sec. G5
Knee Brace	*Std. Titan Knee Brace - 3 ...*	308 - D31 at 0.00%	0.93 - OK	Sec. E2
Cable Brace	*CABLE BRACE - 1/8*	510 - D7 at 50.00%	0.45 - OK	0
Foundation P	*Std. Titan Duo Post - 2.37...*	337 - D27 at 1.80%	0.97 - OK	0
Zee Purlin	*STD BIG ZEE - 6 X 3 X .055*	331 - D28 at 0.00%	0.85 - OK	Eq. H1.2-1

Steel Code Check
Concise Report

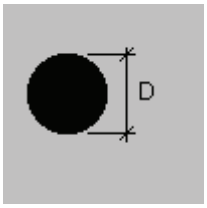
AISC 360-2016 ASD (Hot-rolled)

Member : 510 (Cable Brace) - OK

Section information

Section name: CABLE BRACE - 1/8 **(US)**

Dimensions



D = 0.245 [in] Diameter

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	0.047	
Moment of Inertia (local axes) (I)	[in4]	1.77E-04	1.77E-04
Moment of Inertia (principal axes) (I')	[in4]	1.77E-04	1.77E-04
Bending constant for moments (principal axis) (J')	[in]	0.000	0.000
Radius of gyration (local axes) (r)	[in]	0.061	0.061
Radius of gyration (principal axes) (r')	[in]	0.061	0.061
Saint-Venant torsion constant. (J)	[in4]	3.68E-04	
Section warping constant. (Cw)	[in6]	0.000	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	0.000	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	0.001	0.001
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	0.001	0.001
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	0.001	0.001
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	0.001	0.001
Plastic section modulus (local axis) (Z)	[in3]	0.002	0.002
Plastic section modulus (principal axis) (Z')	[in3]	0.002	0.002
Polar radius of gyration. (ro)	[in]	0.087	
Area for shear (Aw)	[in2]	0.047	0.047
Torsional constant. (C)	[in3]	0.004	

Material : APA - A36 - Cables

Properties	Unit	Value
Yield stress (Fy):	[Lb/in2]	36000.00
Tensile strength (Fu):	[Lb/in2]	58000.00
Elasticity Modulus (E):	[Lb/in2]	2.9E07
Shear modulus for steel (G):	[Lb/in2]	1.150794E07

Design Criteria

Description	Unit	Value

Length for tension slenderness ratio (L)	[in]	213.96

Distance between member lateral bracing points

Length (Lb) [in]	
Top	Bottom
213.96	213.96

Laterally unbraced length

Length [in]			Effective length factor		
Major axis(L33)	Minor axis(L22)	Torsional axis(Lt)	Major axis(K33)	Minor axis(K22)	Torsional axis(Kt)
213.96	213.96	213.96	1.0	1.0	1.0

Additional assumptions

Continuous lateral torsional restraint	No
Tension field action	No
Continuous flexural torsional restraint	No
Effective length factor value type	None
Major axis frame type	Sway
Minor axis frame type	Sway

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	:	0.43			
Capacity	:	1017.88 [Lb]	Reference	:	Cl.D2
Demand	:	434.13 [Lb]	Ctrl Eq.	:	D7 at 50.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity(P_n/Ω):	[Lb]	1017.88	Cl.D2

Axial Compression Design ✔

Compression in the major axis 33

Ratio	:	0.01			
Capacity	:	0.58 [Lb]	Reference	:	Cl.E3
Demand	:	0.01 [Lb]	Ctrl Eq.	:	D18 at 0.00%

Intermediate results	Unit	Value	Reference
Factored flexural buckling strength(P_{n33}/Ω):	[Lb]	0.58	Cl.E3

Compression in the minor axis 22

Ratio	:	0.01			
Capacity	:	0.58 [Lb]	Reference	:	Cl.E3
Demand	:	0.01 [Lb]	Ctrl Eq.	:	D18 at 0.00%

Intermediate results	Unit	Value	Reference
Factored flexural buckling strength(P_{n22}/Ω):	[Lb]	0.58	Cl.E3

Flexural Design ✔

Bending about major axis, M33

Ratio	:	0.01			
Capacity	:	4.07 [Lb*ft]	Reference	:	Cl.F11.1
Demand	:	0.04 [Lb*ft]	Ctrl Eq.	:	D18 at 50.00%

Intermediate results	Unit	Value	Reference
Factored yielding strength(M_n/Ω):	[Lb*ft]	4.07	Cl.F11.1

Bending about minor axis, M22

Ratio	:	0.03			
Capacity	:	4.07 [Lb*ft]	Reference	:	Cl.F11.1
Demand	:	-0.11 [Lb*ft]	Ctrl Eq.	:	D13 at 50.00%

Intermediate results	Unit	Value	Reference
Factored yielding strength about a geometric axis(M_n/Ω):	[Lb*ft]	4.07	Cl.F11.1

Shear Design ✔

Shear in major axis 33

Ratio	:	0.00			
Capacity	:	610.73 [Lb]	Reference	:	Cl.G1
Demand	:	0.01 [Lb]	Ctrl Eq.	:	D13 at 50.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	610.73	Cl.G1

Shear in minor axis 22

Ratio	:	0.00			
Capacity	:	610.73 [Lb]	Reference	:	Cl.G1
Demand	:	0.00 [Lb]	Ctrl Eq.	:	D18 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	610.73	Cl.G1

Combined Actions Design ✔

Combined flexure and axial

Ratio	:	0.45			
Ctrl Eq.	:	D7 at 50.00%	Reference	:	Eq.H1-1a

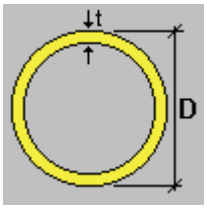
Intermediate results	Unit	Value	Reference
Interaction of flexure and axial force:	--	0.45	Eq.H1-1a

Member : 337 (Foundation Post) - OK

Section information

Section name: Std. Titan Duo Post - 2.375 x 0.095 **(US)**

Dimensions



D	=	2.375	[in]	Diameter
T	=	0.088	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	0.640	
Moment of Inertia (local axes) (I)	[in4]	0.417	0.417
Moment of Inertia (principal axes) (I')	[in4]	0.417	0.417
Bending constant for moments (principal axis) (J')	[in]	0.000	0.000
Radius of gyration (local axes) (r)	[in]	0.807	0.807
Radius of gyration (principal axes) (r')	[in]	0.807	0.807
Saint-Venant torsion constant. (J)	[in4]	0.814	
Section warping constant. (Cw)	[in6]	5.07E-05	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	0.000	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	0.345	0.345
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	0.345	0.345
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	0.345	0.345
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	0.345	0.345
Plastic section modulus (local axis) (Z)	[in3]	0.465	0.465
Plastic section modulus (principal axis) (Z')	[in3]	0.465	0.465
Polar radius of gyration. (ro)	[in]	1.141	
Area for shear (Aw)	[in2]	0.412	0.412
Torsional constant. (C)	[in3]	0.722	

Material : APA - A570 Gr50

Properties	Unit	Value
Yield stress (Fy):	[Lb/in2]	50000.00
Tensile strength (Fu):	[Lb/in2]	65300.00
Elasticity Modulus (E):	[Lb/in2]	2.9E07
Shear modulus for steel (G):	[Lb/in2]	1.150794E07

Design Criteria

Description	Unit	Value

Length for tension slenderness ratio (L)	[in]	111.20

Distance between member lateral bracing points

Length (Lb) [in]	
Top	Bottom
111.20	111.20

Laterally unbraced length

Length [in]			Effective length factor		
Major axis(L33)	Minor axis(L22)	Torsional axis(Lt)	Major axis(K33)	Minor axis(K22)	Torsional axis(Kt)
111.20	111.20	111.20	1.0	1.0	1.0

Additional assumptions

Continuous lateral torsional restraint	No
Tension field action	No
Continuous flexural torsional restraint	No
Effective length factor value type	None
Major axis frame type	Non sway
Minor axis frame type	Non sway

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	: 0.26		
Capacity	: 19174.73 [Lb]	Reference	: Cl.D2
Demand	: 4983.38 [Lb]	Ctrl Eq.	: D17 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity(P_n/Ω):	[Lb]	19174.73	Cl.D2

Axial Compression Design ✔

Compression in the major axis 33

Ratio	: 0.79		
Capacity	: 5066.21 [Lb]	Reference	: Cl.E3
Demand	: 3996.70 [Lb]	Ctrl Eq.	: D27 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Factored flexural buckling strength(P_{n33}/Ω):	[Lb]	5066.21	Cl.E3

Compression in the minor axis 22

Ratio	: 0.79		
Capacity	: 5066.21 [Lb]	Reference	: Cl.E3
Demand	: 3996.70 [Lb]	Ctrl Eq.	: D27 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Factored flexural buckling strength(P_{n22}/Ω):	[Lb]	5066.21	Cl.E3

Flexural Design ✔

Bending about major axis, M33

Ratio	: 0.05		
Capacity	: 1159.85 [Lb*ft]	Reference	: Cl.F8.1
Demand	: -61.11 [Lb*ft]	Ctrl Eq.	: D7 at 1.80%

Intermediate results	Unit	Value	Reference
Section classification			
Factored yielding strength(M_n/Ω):	[Lb*ft]	1159.85	Cl.F8.1

Bending about minor axis, M22

Ratio	: 0.31		
Capacity	: 1159.85 [Lb*ft]	Reference	: Cl.F8.1
Demand	: 360.72 [Lb*ft]	Ctrl Eq.	: D30 at 1.80%

Intermediate results	Unit	Value	Reference
Section classification			
Factored yielding strength about a geometric axis(M_n/Ω):	[Lb*ft]	1159.85	Cl.F8.1

Shear Design ✔

Shear in major axis 33

Ratio	: 0.38		
Capacity	: 5752.42 [Lb]	Reference	: Cl.G1
Demand	: 2164.43 [Lb]	Ctrl Eq.	: D30 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	5752.42	Cl.G1

Shear in minor axis 22

Ratio	: 0.06		
Capacity	: 5752.42 [Lb]	Reference	: Cl.G1
Demand	: 366.66 [Lb]	Ctrl Eq.	: D7 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	5752.42	Cl.G1

Torsion Design ✔

Torsion

Ratio	:	0.00			
Capacity	:	1080.70 [Lb*ft]	Reference	:	Cl.H3.1
Demand	:	0.44 [Lb*ft]	Ctrl Eq.	:	D17 at 1.80%

Intermediate results	Unit	Value	Reference
Factored torsion capacity(T_n/Ω):	[Lb*ft]	1080.70	Cl.H3.1

Combined Actions Design

Combined flexure and axial

Ratio	:	0.97			
Ctrl Eq.	:	D27 at 1.80%	Reference	:	Eq.H1-1a

Intermediate results	Unit	Value	Reference
Interaction of flexure and axial force:	--	0.97	Eq.H1-1a

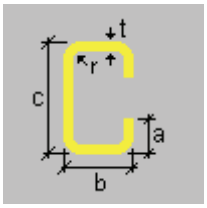
AISI 2016 ASD (Cold-formed)

Member : 335 (NS Chord) - OK

Section information

Section name: Std. Titan NS Chord - 6 x 2 x 0.108 **(US)**

Dimensions



a	=	0.600	[in]	Lip
b	=	2.000	[in]	Flange width
c	=	6.000	[in]	Depth
r	=	0.219	[in]	Inside bend radius
t	=	0.108	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	1.108	
Moment of Inertia (local axes) (I)	[in4]	5.733	0.525
Moment of Inertia (principal axes) (I')	[in4]	5.733	0.525
Bending constant for moments (principal axis) (J')	[in]	0.000	3.324
Radius of gyration (local axes) (r)	[in]	2.275	0.688
Radius of gyration (principal axes) (r')	[in]	2.275	0.688
Saint-Venant torsion constant. (J)	[in4]	0.005	
Section warping constant. (Cw)	[in6]	4.248	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	-1.466	0.000

Top elastic section modulus of the section (local axis) (Ssup)	[in3]	1.911	0.364
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	1.911	0.942
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	1.911	0.364
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	1.911	0.942
Plastic section modulus (local axis) (Z)	[in3]	2.290	0.561
Plastic section modulus (principal axis) (Z')	[in3]	2.290	0.561
Polar radius of gyration. (ro)	[in]	2.793	
Area for shear (Aw)	[in2]	0.409	0.754
Torsional constant. (C)	[in3]	0.042	

Material : A653 SS 80-1

Properties	Unit	Value
Yield stress (Fy):	[Lb/in2]	80000.00
Tensile strength (Fu):	[Lb/in2]	82000.00
Elasticity Modulus (E):	[Lb/in2]	2.95E07
Shear modulus for steel (G):	[Lb/in2]	1.134615E07

Design Criteria

Description	Unit	Major axis	Minor axis
Additional hypotheses			
Full lateral restraints		No	
Continuous flexural torsional restraint		No	
Local axis design		Yes	
Region between inflection points adjacent to support		No	
Span type		Simple	
Fastened to support		Unfastened	
Local shear		No	
Braced for sidesway in major axis		No	
Braced for sidesway in minor axis		No	
Loading condition		EOF	
Flange support condition		Fastened	
Bearing length	[in]	5.18	

Member lateral unbraced lengths

Length (Lb) [in]		Restraint arrangement		Rotation restraint	
Top	Bottom	Top	Bottom	Top	Bottom
12.48	12.48	FF	FF	None	None
33.48	106.03	FF	FF	None	None
44.33	17.74	FF	FF	None	None
28.22		FF		None	
17.74		FF		None	

Compression member unbraced lengths

Length (L) [in]			Effective length factor (ke)		
Major axis	Minor axis		Major axis	Minor axis	
12.48	12.48	12.48	0.00	0.00	1.0
106.03	33.48	33.48	0.00	0.00	1.0
17.74	44.33	44.33	0.00	0.00	1.0
	28.22	28.22		0.00	1.0
	17.74	17.74		0.00	1.0

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	: 0.02		
Capacity	: 45411.63 [Lb]	Reference	: Sec. D3
Demand	: 954.82 [Lb]	Ctrl Eq.	: D27 at 66.27%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity(P_n/Ω):	[Lb]	53058.71	Sec. D2
Factored axial tensile fracture capacity(P_n/Ω):	[Lb]	45411.63	Sec. D3

Shear Design ✔

Shear in major axis 33

Ratio	: 0.02		
Capacity	: 8722.08 [Lb]	Reference	: Sec. G2
Demand	: 158.36 [Lb]	Ctrl Eq.	: D7 at 66.27%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	8722.08	Sec. G2

Shear in minor axis 22

Ratio	: 0.13		
Capacity	: 15527.64 [Lb]	Reference	: Sec. G2
Demand	: -2005.08 [Lb]	Ctrl Eq.	: D16 at 86.98%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	15527.64	Sec. G2

Axial Compression Design ✔

Axial compression

Ratio	: 0.07		
Capacity	: 25482.42 [Lb]	Reference	: Sec. E3
Demand	: 1708.47 [Lb]	Ctrl Eq.	: D17 at 36.98%

Intermediate results	Unit	Value	Reference
Factored axial compression capacity(P_n/Ω):	[Lb]	28988.63	Sec. E2
Factored axial compression distortional buckling capacity(P_n/Ω):	[Lb]	33136.75	Sec. E4
Factored local buckling strength(P_n/Ω):	[Lb]	25482.42	Sec. E3

Flexural Design ✔

Bending about major axis, M33

Ratio	: 0.47		
Capacity	: 7116.35 [Lb*ft]	Reference	: Sec. F4
Demand	: 3377.12 [Lb*ft]	Ctrl Eq.	: D17 at 86.98%

Intermediate results	Unit	Value	Reference
Factored section moment capacity(M_n/Ω):	[Lb*ft]	7629.31	Sec. F2
Factored moment distortional buckling capacity(M_n/Ω):	[Lb*ft]	7116.35	Sec. F4
Factored local buckling strength(M_n/Ω):	[Lb*ft]	7557.94	Sec. F3

Bending about the minor axis 22

Ratio	: 0.14		
Capacity	: 1452.06 [Lb*ft]	Reference	: Sec. F2
Demand	: 196.22 [Lb*ft]	Ctrl Eq.	: D7 at 66.27%

Intermediate results	Unit	Value	Reference
Factored section moment capacity(M_n/Ω):	[Lb*ft]	1452.06	Sec. F2
Factored local buckling strength(M_n/Ω):	[Lb*ft]	1452.06	Sec. F3

Web Crippling Design ✔

Web crippling

Ratio	: 0.71		
Capacity	: 5024.13 [Lb]	Reference	: Sec. G5
Demand	: 3575.80 [Lb]	Ctrl Eq.	: D28 at 9.16%

Intermediate results	Unit	Value	Reference
Factored web crippling capacity(P_n/Ω):	[Lb]	5024.13	Sec. G5

Combined Actions Design ✔

Combined bending and web crippling interaction

Ratio	: 0.33		
Ctrl Eq.	: D17 at 86.98%	Reference	: Sec. H3

Intermediate results	Unit	Value	Reference

Combined bending and shear interaction

Ratio	: 0.46		
Ctrl Eq.	: D17 at 86.98%	Reference	: Sec. H2

Intermediate results	Unit	Value	Reference
Combined bending and shear interaction (x-x):	--	0.46	Sec. H2
Combined bending and shear interaction(y-y):	--	0.03	

Combined bending and tension interaction

Ratio	:	0.51			
Ctrl Eq.	:	D17 at 86.98%	Reference	:	Eq. H1.1-2

Intermediate results	Unit	Value	Reference
Combined tensile axial and bending (flexure with tension yielding):	--	0.45	Eq. H1.1-1
Combined tensile axial and bending (flexure with buckling):	--	0.51	Eq. H1.1-2

Combined bending and compression interaction

Ratio	:	0.56			
Ctrl Eq.	:	D17 at 86.98%	Reference	:	Eq. H1.2-1

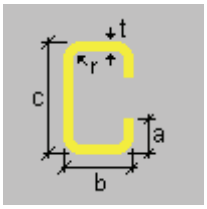
Intermediate results	Unit	Value	Reference
Combined bending and compression interaction:	--	0.56	Eq. H1.2-1

Member : 308 (Knee Brace) - OK

Section information

Section name: Std. Titan Knee Brace - 3 x 2 x 0.078 **(US)**

Dimensions



a	=	0.630	[in]	Lip
b	=	2.000	[in]	Flange width
c	=	3.000	[in]	Depth
r	=	0.141	[in]	Inside bend radius
t	=	0.078	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	0.594	
Moment of Inertia (local axes) (I)	[in4]	0.871	0.333
Moment of Inertia (principal axes) (I')	[in4]	0.871	0.333
Bending constant for moments (principal axis) (J')	[in]	0.000	2.304
Radius of gyration (local axes) (r)	[in]	1.211	0.749
Radius of gyration (principal axes) (r')	[in]	1.211	0.749
Saint-Venant torsion constant. (J)	[in4]	0.001	
Section warping constant. (Cw)	[in6]	0.845	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	-1.909	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	0.581	0.273
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	0.581	0.427
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	0.581	0.273
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	0.581	0.427

Plastic section modulus (local axis) (Z)	[in3]	0.672	0.396
Plastic section modulus (principal axis) (Z')	[in3]	0.672	0.396
Polar radius of gyration. (ro)	[in]	2.381	
Area for shear (Aw)	[in2]	0.300	0.320
Torsional constant. (C)	[in3]	0.016	

Material : A653 SS 80-1

Properties	Unit	Value
Yield stress (Fy):	[Lb/in2]	80000.00
Tensile strength (Fu):	[Lb/in2]	82000.00
Elasticity Modulus (E):	[Lb/in2]	2.95E07
Shear modulus for steel (G):	[Lb/in2]	1.134615E07

Design Criteria

Description	Unit	Major axis	Minor axis
Additional hypotheses			
Full lateral restraints		No	
Continuous flexural torsional restraint		No	
Local axis design		Yes	
Region between inflection points adjacent to support		No	
Span type		Simple	
Fastened to support		Unfastened	
Local shear		No	
Braced for sidesway in major axis		No	
Braced for sidesway in minor axis		No	
Loading condition		EOF	
Flange support condition		Fastened	

Member lateral unbraced lengths

Length (Lb) [in]		Restraint arrangement		Rotation restraint	
Top	Bottom	Top	Bottom	Top	Bottom
113.49	113.49	FF	FF	None	None

Compression member unbraced lengths

Length (L) [in]			Effective length factor (ke)		
Major axis	Minor axis		Major axis	Minor axis	
113.49	113.49	113.49	0.00	0.00	1.0

Design Checks

Axial Tension Design ✔

Axial tension

Ratio : 0.10
Capacity : 24337.19 [Lb]
Demand : 2421.88 [Lb]
Reference : Sec. D3
Ctrl Eq. : D22 at 0.00%

Intermediate results	Unit	Value	Reference

Factored axial tension capacity(P_n/Ω):	[Lb]	28435.45	Sec. D2
Factored axial tensile fracture capacity(P_n/Ω):	[Lb]	24337.19	Sec. D3

Shear Design ✔

Shear in major axis 33

Ratio	: 0.00		
Capacity	: 7310.16 [Lb]	Reference	: Sec. G2
Demand	: 0.00 [Lb]	Ctrl Eq.	: D1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	7310.16	Sec. G2

Shear in minor axis 22

Ratio	: 0.00		
Capacity	: 5995.08 [Lb]	Reference	: Sec. G2
Demand	: 0.00 [Lb]	Ctrl Eq.	: D1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	5995.08	Sec. G2

Axial Compression Design ✔

Axial compression

Ratio	: 0.93		
Capacity	: 2368.55 [Lb]	Reference	: Sec. E2
Demand	: 2203.36 [Lb]	Ctrl Eq.	: D31 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial compression capacity(P_n/Ω):	[Lb]	2368.55	Sec. E2
Factored axial compression distortional buckling capacity(P_n/Ω):	[Lb]	21111.11	Sec. E4
Factored local buckling strength(P_n/Ω):	[Lb]	2368.55	Sec. E3

Flexural Design ✔

Bending about major axis, M33

Ratio	: 0.00		
Capacity	: 791.00 [Lb*ft]	Reference	: Sec. F2
Demand	: 0.00 [Lb*ft]	Ctrl Eq.	: D1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored section moment capacity(M_n/Ω):	[Lb*ft]	2317.74	Sec. F2
Factored lateral-torsional buckling strength(M_n/Ω):	[Lb*ft]	791.00	Sec. F2
Factored moment distortional buckling capacity(M_n/Ω):	[Lb*ft]	2101.38	Sec. F4
Factored local buckling strength(M_n/Ω):	[Lb*ft]	791.00	Sec. F3

Bending about the minor axis 22

Ratio	:	0.00			
Capacity	:	1090.14 [Lb*ft]	Reference	:	Sec. F2
Demand	:	0.00 [Lb*ft]	Ctrl Eq.	:	D1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored section moment capacity(M_n/Ω):	[Lb*ft]	1090.14	Sec. F2
Factored local buckling strength(M_n/Ω):	[Lb*ft]	1090.14	Sec. F3

Web Crippling Design ✔

Web crippling

Ratio	:	0.00			
Capacity	:	799.58 [Lb]	Reference	:	Sec. G5
Demand	:	0.00 [Lb]	Ctrl Eq.	:	D1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored web crippling capacity(P_n/Ω):	[Lb]	799.58	Sec. G5

Combined Actions Design ✔

Combined bending and web crippling interaction

Ratio	:	0.00			
Ctrl Eq.	:	D1 at 0.00%	Reference	:	Sec. H3

Intermediate results	Unit	Value	Reference

Combined bending and shear interaction

Ratio	:	0.00			
Ctrl Eq.	:	D1 at 0.00%	Reference	:	Sec. H2

Intermediate results	Unit	Value	Reference
Combined bending and shear interaction (x-x):	--	0.00	Sec. H2
Combined bending and shear interaction(y-y):	--	0.00	Sec. H2

Combined bending and tension interaction

Ratio	:	0.10			
Ctrl Eq.	:	D22 at 0.00%	Reference	:	Eq. H1.1-1

Intermediate results	Unit	Value	Reference
Combined tensile axial and bending (flexure with tension yielding):	--	0.10	Eq. H1.1-1

Combined tensile axial and bending (flexure with buckling):	--	-0.10

Combined bending and compression interaction

Ratio	:	0.93			
Ctrl Eq.	:	D31 at 0.00%	Reference	:	Eq. H1.2-1

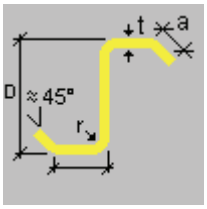
Intermediate results	Unit	Value	Reference
Combined bending and compression interaction:	--	0.93	Eq. H1.2-1

Member : 331 (OG - Zee - Bot) - OK

Section information

Section name: Std. Big Zee - 6 x 3 x 0.055 **(US)**

Dimensions



a	=	1.000	[in]	Lip
b	=	3.000	[in]	Flange width
D	=	6.000	[in]	Depth
r	=	0.187	[in]	Inside bend radius
t	=	0.055	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	0.748	
Moment of Inertia (local axes) (I)	[in4]	4.452	2.135
Moment of Inertia (principal axes) (I')	[in4]	4.452	2.135
Bending constant for moments (principal axis) (J')	[in]	0.000	0.000
Radius of gyration (local axes) (r)	[in]	2.439	1.689
Radius of gyration (principal axes) (r')	[in]	2.439	1.689
Saint-Venant torsion constant. (J)	[in4]	7.70E-04	
Section warping constant. (Cw)	[in6]	12.653	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	0.000	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	1.484	0.577
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	1.484	0.577
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	1.484	0.577
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	1.484	0.577
Plastic section modulus (local axis) (Z)	[in3]	1.696	0.837
Plastic section modulus (principal axis) (Z')	[in3]	1.696	0.837
Polar radius of gyration. (ro)	[in]	2.967	
Area for shear (Aw)	[in2]	0.557	0.475
Torsional constant. (C)	[in3]	0.014	

Material : A653 SS 80-1

Properties	Unit	Value
Yield stress (Fy):	[Lb/in2]	80000.00

Tensile strength (Fu):	[Lb/in2]	82000.00
Elasticity Modulus (E):	[Lb/in2]	2.95E07
Shear modulus for steel (G):	[Lb/in2]	1.134615E07

Design Criteria

Description	Unit	Major axis	Minor axis
Additional hypotheses			
Full lateral restraints		No	
Continuous flexural torsional restraint		No	
Local axis design		Yes	
Region between inflection points adjacent to support		No	
Span type		Simple	
Fastened to support		Unfastened	
Local shear		No	
Braced for sidesway in major axis		Yes	
Braced for sidesway in minor axis		Yes	
Loading condition		IOF	
Flange support condition		Fastened	
Bearing length	[in]	3.00	

Member lateral unbraced lengths

Length (Lb) [in]		Restraint arrangement		Rotation restraint	
Top	Bottom	Top	Bottom	Top	Bottom
168.00	168.00	FF	FF	None	None

Compression member unbraced lengths

Length (L) [in]			Effective length factor (ke)		
Major axis	Minor axis		Major axis	Minor axis	
44.65	168.00	44.65	0.00	0.00	1.0

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	:	0.00			
Capacity	:	30673.98 [Lb]	Reference	:	Sec. D3
Demand	:	27.75 [Lb]	Ctrl Eq.	:	D12 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity(P_n/Ω):	[Lb]	35839.32	Sec. D2
Factored axial tensile fracture capacity(P_n/Ω):	[Lb]	30673.98	Sec. D3

Shear Design ✔

Shear in major axis 33

Ratio	:	0.03

Capacity	: 8054.03 [Lb]	Reference	: Sec. G2
Demand	: -222.16 [Lb]	Ctrl Eq.	: D2 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	8054.03	Sec. G2

Shear in minor axis 22

Ratio	: 0.37		
Capacity	: 2684.57 [Lb]	Reference	: Sec. G2
Demand	: 999.44 [Lb]	Ctrl Eq.	: D27 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	2684.57	Sec. G2

Axial Compression Design ✔

Axial compression

Ratio	: 0.00		
Capacity	: 8254.48 [Lb]	Reference	: Sec. E3
Demand	: 14.93 [Lb]	Ctrl Eq.	: D19 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial compression capacity(P_n/Ω):	[Lb]	10732.77	Sec. E2
Factored axial compression distortional buckling capacity(P_n/Ω):	[Lb]	14180.27	Sec. E4
Factored local buckling strength(P_n/Ω):	[Lb]	8254.48	Sec. E3

Flexural Design ✔

Bending about major axis, M33

Ratio	: 0.64		
Capacity	: 3378.60 [Lb*ft]	Reference	: Sec. F4
Demand	: -2161.83 [Lb*ft]	Ctrl Eq.	: D28 at 0.00%

Intermediate results	Unit	Value	Reference
Factored section moment capacity(M_n/Ω):	[Lb*ft]	5923.85	Sec. F2
Factored lateral-torsional buckling strength(M_n/Ω):	[Lb*ft]	5338.10	
Factored moment distortional buckling capacity(M_n/Ω):	[Lb*ft]	3378.60	Sec. F4
Factored local buckling strength(M_n/Ω):	[Lb*ft]	4102.19	

Bending about the minor axis 22

Ratio	: 0.28		
Capacity	: 1918.79 [Lb*ft]	Reference	: Sec. F3
Demand	: -528.53 [Lb*ft]	Ctrl Eq.	: D2 at 0.00%

Intermediate results	Unit	Value	Reference

Factored section moment capacity(M_n/Ω):	[Lb*ft]	2304.60	Sec. F2
Factored local buckling strength(M_n/Ω):	[Lb*ft]	1918.79	Sec. F3

Web Crippling Design ✔

Web crippling

Ratio	:	0.01			
Capacity	:	2009.74 [Lb]	Reference	:	Sec. G5
Demand	:	29.78 [Lb]	Ctrl Eq.	:	D28 at 26.58%

Intermediate results	Unit	Value	Reference
Factored web crippling capacity(P_n/Ω):	[Lb]	2009.74	Sec. G5

Combined Actions Design ✔

Combined bending and web crippling interaction

Ratio	:	0.22			
Ctrl Eq.	:	D28 at 0.00%	Reference	:	Sec. H3

Intermediate results	Unit	Value	Reference

Combined bending and shear interaction

Ratio	:	0.62			
Ctrl Eq.	:	D27 at 0.00%	Reference	:	Sec. H2

Intermediate results	Unit	Value	Reference
Combined bending and shear interaction (x-x):	--	0.62	Sec. H2
Combined bending and shear interaction(y-y):	--	0.21	

Combined bending and tension interaction

Ratio	:	0.85			
Ctrl Eq.	:	D28 at 0.00%	Reference	:	Eq. H1.1-2

Intermediate results	Unit	Value	Reference
Combined tensile axial and bending (flexure with tension yielding):	--	0.54	Eq. H1.1-1
Combined tensile axial and bending (flexure with buckling):	--	0.85	Eq. H1.1-2

Combined bending and compression interaction

Ratio	:	0.85			
Ctrl Eq.	:	D28 at 0.00%	Reference	:	Eq. H1.2-1

Intermediate results	Unit	Value	Reference

Combined bending and compression interaction:	--	0.85	Eq. H1.2-1

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CONNECTIONS CHECK

(ASCE7-16, ASD)

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Parts Details (in. & lbs.)

Part Details	Depth (Dia.), in.	Width, in.	Material/ Wall Thickness, in.	Ultimate Strength, psi	Edge Distance, in.	Bolt Couple Distance, in.	
NS Chord	6	2	0.108	82000	1.5		
Knee Brace	3	2	0.078	82000	1.25		
Zee Purlin	6	3	0.055	82000	2	4.75	
Post	2.375		0.095	65300	2		
Roll Bar	2.25		0.078	50000	1		

Governing Loads

Knee Brace - Max(Tension, Compression)	2609
Foundation Post Axial	3665
NS Chord - Axial	1788
Zee Purlin - Axial	305
Zee Purlin - Shear	1180
Zee Purlin - Moment	2845
Uplift Module Pressure, Pa	1520

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Knee Brace-Foundation Post

Safety Factor, Ω	2.5

Governing Load, P_u	2609.34	lbs.	2.60934 kips
	Knee Brace - Max(Tension, Compression)		
Bolt Diameter, d	0.5	in.	
Tensile Strength of Bolt, P_t	150000	psi	150 ksi
Shear Strength of Bolt, P_s	6344.05	lbs.	6.34 kips

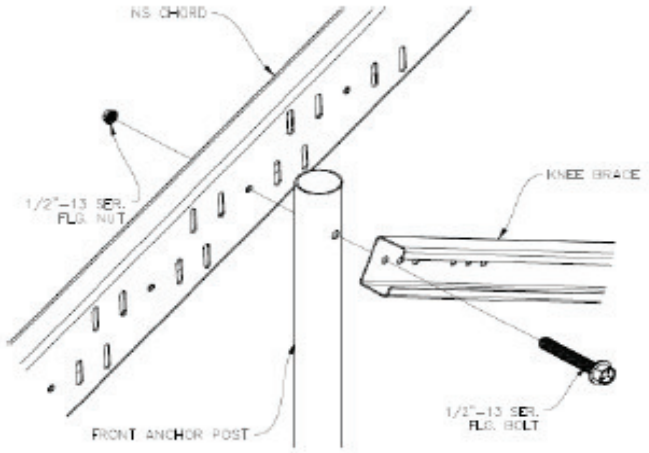
Bearing Capacity	P_n =	$C*m_f*d*t*F_u$	**AISI J3.3.1-1**

C =	3	
m_f =	1	
t_{KB} =	0.078	in.
F_{uKNEE} =	82000	psi

P_n/Ω =	3837.6	lbs	3.838 kips

Minimum Edge Distance Required =	**0.75**	**in.**	**AISC Table J3.4**
Provided Edge Distance =	**1.25**	**in.**	**PASS**

Pn =	**3.838 >**	**P_u =**	**2.60934014**	**PASS**
Ps =	**6.344 >**	**P_u =**	**2.60934014**	**PASS**



***Knee Brace-Brace clamp connection physically tested for no deformation at maximum 3400 lbs.**
****Post-Pile Set screw connection physically tested for no movement at maximum 11,000 lbs.**

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Foundation Post-NS Chord

Safety Factor, Ω	2.5

Governing Load, P_u	3665.09	lbs.	3.665089 kips
	Foundation Post Axial		
Bolt Diameter, d	0.5	in.	
Tensile Strength of Bolt, P_t	150000	psi	150 ksi
Shear Strength of Bolt, P_s	6344.05	lbs.	6.344 kips

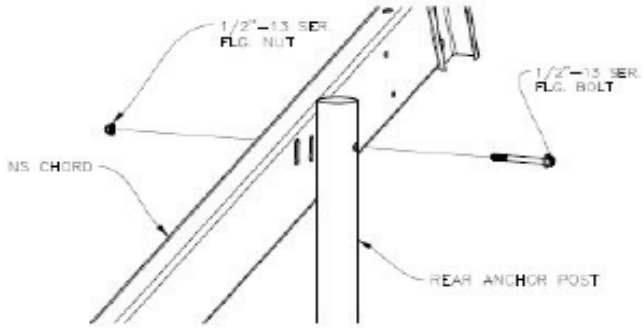
Bearing Capacity	P_n =	$C*m_f*d*t*F_u$	**AISI J3.3.1-1**

C =	3	
m_f =	1	
$t_{nschord}$ =	0.108 in.	
$F_{uNS\ CHORD}$ =	82000 psi	***Two shear walls on post**

P_n/Ω =	5313.6 lbs.	5.3136 kips

Minimum Edge Distance =	**0.75**	**in.**	**AISC Table J3.4**
Provided Edge Distance =	**2**	**in.**	**PASS**

Pn =	**5.314 >**	**P_u =**	**3.6650891**	**PASS**
Ps =	**6.344 >**	**P_u =**	**3.6650891**	**PASS**



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Zee-Zee Splice

Safety Factor, Ω	2.5		
Maximum Moment in Zee	2844.95	ft*lbs	
Distance Between Bolts	4.75	in.	
Overlap Splice force Reduction Factor	0.66		
Number of Bolt couples, X_B	3		
Governing Load, $P_u = M/d/X_b$	1581.19	lbs	1.581 kips
	Zee Purlin - Moment		
Bolt Diameter, d	0.5	in.	
Tensile Strength of Bolt, P_t	150000	psi	150 ksi
Shear Strength of Bolt, P_s	6344.05	lbs	6.344 kips

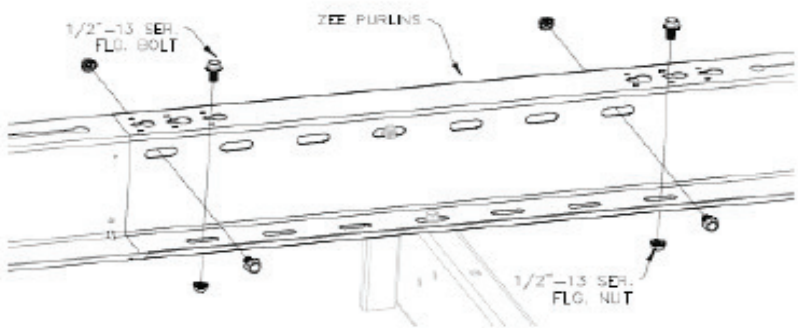
Bearing Capacity	$P_n =$	$C*m_f*d*t*F_u$	**AISI J3.3.1-1**

C =	3
m_f =	1
t_Z =	0.055 in.
F_{uZEE} =	82000 psi

P_n/Ω =	2706 lbs.	2.706 kips	

Minimum Edge Distance =	**0.75 in.**	**AISC Table J3.4**
Provided Edge Distance =	**2 in.**	**PASS**

Pn =	**2.706 >**	**P_u =**	**1.581**	**PASS**
Ps =	**6.344 >**	**P_u =**	**1.581**	**PASS**



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Roll Bar-NS Chord

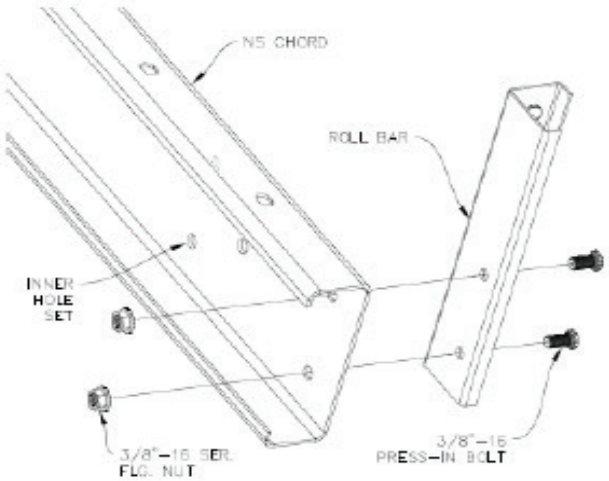
Safety Factor, Ω	2.5		
Governing Load, P_u	2360.68 lbs.	2.36068 kips	
	Zee Purlin - Shear		
Bolt Diameter, d	0.375 in.		
Tensile Strength of Bolt, P_t	75000 psi	75 ksi	
Shear Strength of Bolt, P_s	1744.5 lbs.	1.745 kips	
Number of bolts, n	2		

Bearing Capacity	P_n =	$C*m_f*d*t*F_u*2$	**Two Bolts**	**AISI J3.3.1-1**

C =	3	
m_f =	1	
t_{RB} =	0.078	in.
$F_{uROLL\ BAR}$ =	50000	psi

P_n/Ω =	3510 lbs.	3.510 kips	
Minimum Edge Distance =	**0.5625**	**in.**	
Provided Edge Distance =	**1**	**in.**	**PASS**

Pn =	**3.510 >**	**P_u =**	**2.36068**	**PASS**
Ps =	**3.489 >**	**P_u =**	**2.36068**	**PASS**



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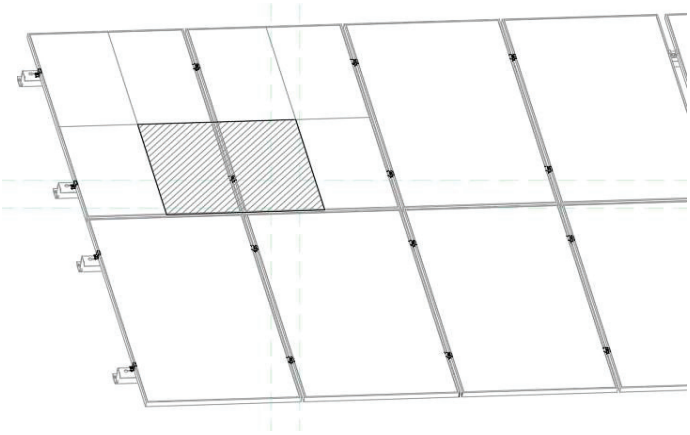
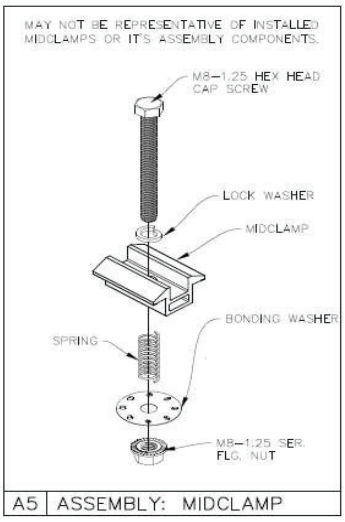
Module Clamp

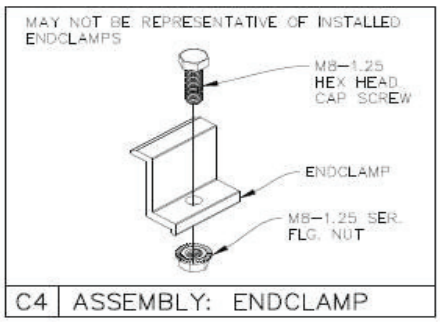
Safety Factor, Ω	2		
Governing Load, P_u	1520	Pa	883 lbs. per panel
Bolt Diameter, d	0.3125	in.	
Torque	15.6	ft. - lbs.	
Coefficient of Friction	0.2		
Bolt Tension, T_u	2995	lbs.	



*Half panel load per Clamp

P_n/Ω =	1497.6 lbs.			
Pn =	**1498 >**	**P_u =**	**441**	**PASS**





SOLAR PV GROUND MOUNT
STRUCTURAL CALCULATIONS

APA SOLAR RACKING
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20-345 County Road X, PO Box 326
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Office: 419.267.5280
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LOCATION

Connecticut

PRINT PACKAGE NUMBER:

260106

REVISION: A

ON:

3/13/2026

DESIGN CRITERIA:

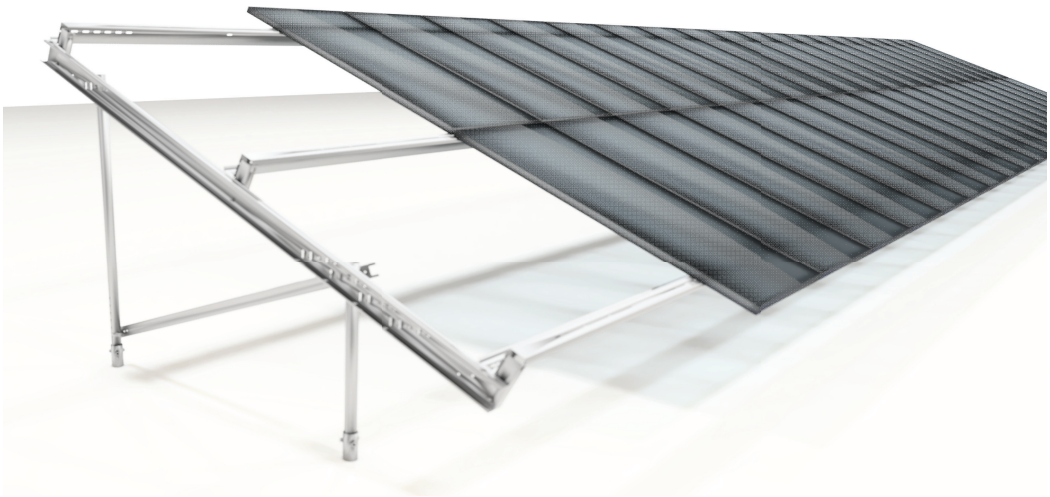
TITAN
25° TILT
35 PSF SNOW
109 MPH WIND, RISK CAT I, EX. C.

ASCE7-16
Allowable Stress Design (ASD)

the jdi group
architects & engineers

360 W. Dussel Drive
Maumee, OH 43537
Office: 419.725.7161
Fax: 419.725.7160

STATE OF CONNECTICUT
ANNE M. GRASSER
0036452
LICENSED
PROFESSIONAL ENGINEER
03/12/2026



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LOAD CALCULATIONS

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General Calculations

General Dimensions

Quantity of PV Modules, Vertically (Cartridge)	PV_Q =	**1**
PV Module Tilt	PVT =	**25°**
PV Module Length	PVL =	**79.69 in**
PV Module Width	PVW =	**49.02 in**
PV Module Area	PVA = PVL × PVW =	**27.13 ft^2**
PV Module Weight	PV_{LB} =	**75 lbs**
Force Resisting Members Quantity	M_Q =	**1.5**
Vertical Section Flat Length (chord)	$PV_{FL} = PV_L \times PV_Q$ =	**6.64 ft**
Vertical Section Profile Length (at tilt)	$PV_{PL} = PV_{FL} \times \cos(PV_T)$ =	**6.02 ft**
Horizontal Width (at tilt)	$PV_{PW} = PV_W$ =	**4.09 ft**
Profile Height (at tilt)	$PV_{PH} = PV_{FL} \times \sin(PV_T)$ =	**2.81 ft**
Area Projected Vertically	$PV_{AV} = PV_{PL} \times PV_{PW}$ =	**24.59 ft^2**
Area Projected Horizontally	$PV_{AH} = PV_{PH} \times PV_{PW}$ =	**11.46 ft^2**

Dead Loading

Force Resisting Member Weight	M_W =	**2.75 lbs/ft**
Cartridge Weight per Member	$PV_{LBT} = PV_{LB} / PV_Q / M_Q$ =	**37.5 lbs**
Misc. Hardware Weight per Vertical Section	W_{MH} =	**5.00 lbs**
Dead Load Pressure	DL_P=	**3.78 lbs**
Outer Zee Tributary Length	TB_o =	**3.96 ft**
Inner Zee Tributary Length	TB_i =	**4.20 ft**
Dead Load per Vertical Section	$DL_T = -(PV_{LB} \times PV_Q + M_W \times PV_W \times M_Q \times PV_Q + W_{MH})$ =	**-102.47 lbs**
TD: Distributed Dead Load on Outer Member	$DL_o = DL_P \times TB_o$ =	**-14.95 lbs/ft**
TD: Distributed Dead Load on Inner Member	$DL_i = DL_P \times TB_i$ =	**-15.87 lbs/ft**

APA SOLAR RACKING
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SNOW

Snow loading (ASCE7-16)

Tedds calculation version 1.0.09

Building details

Roof type	Monoslope	
Width of roof	b=	**6.02 ft**
Slope of roof 1	α=	**25 deg**

Ground snow load

Ground snow load	Pg=	**35 lb/ft^2**
Density of snow	ɣ=	**18.55 lb/ft^3**
Terrain type	C (see Section 26.7)	
Exposure condition (Table 7.3-1)	Fully Exposed	
Exposure factor (Table 7.3-1)	Ce=	**0.9**
Thermal condition (Table 7.3-2)	Unheated and open air structures	
Thermal factor (Table 7.3-2)	Ct=	**1.2**
Risk category (Table 1.5-1)	I	
Risk factor (Table 7-4)	Is=	**0.8**
Flat roof snow load (Sect 7.3)	pf = 0.7*Ce*Ct Is*pg =	**21.17 lb/ft^2**
Minimum (flat roof) snow load	p_m=	**16 lb/ft^2**

Cold roof slope factor (Ct > 1.0)

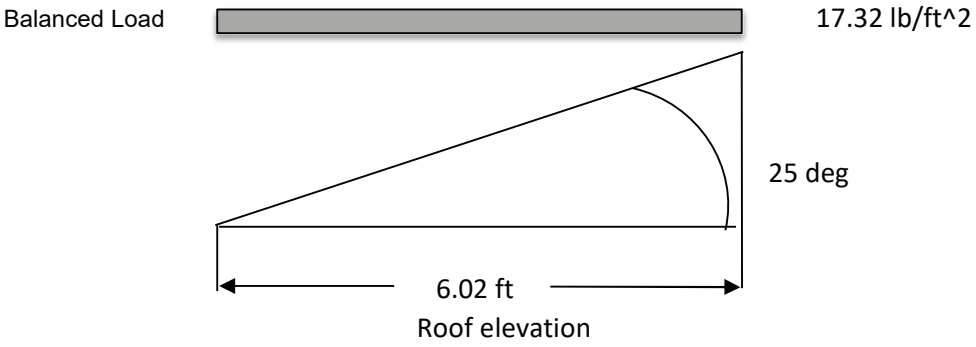
Roof surface type	Slippery	
Ventilation	Ventilated	
Thermal resistance (R-value)	R=	**30**
Roof slope factor Fig 4-1c (dashed line)	Cs=	**0.82**

Monoslope

Sloped roof snow load (Cl.7.4)	ps = Cs x pf =	**17.32 lb/ft^2**

Distributed Snow Loading

Outer Zee Tributary Length	TB_o =	**3.96 ft**
Inner Zee Tributary Length	TB_i =	**4.20 ft**
TD: Distributed Snow Load on Outer Member	$SL_o = p_s \times TB_o$ =	**-68.571 lbs/ft**
TD: Distributed Snow Load on Inner Member	$SL_i = p_s \times TB_i$ =	**-72.77 lbs/ft**



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SEISMIC

Seismic Forces (ASCE7-16)

Tedds calculation version 3.1.01

Site parameters

Site class	E	
Mapped acceleration parameters (Section 11.4.1)		
at short period	S_S =	**0.179**
at 1 sec period	S_1 =	**0.055**
Site coefficientshort period (Table 11.4-1)	F_a =	**2.5**
at 1 sec period (Table 11.4-2)	F_v =	**3.5**

Spectral response acceleration parameters

at short period (Eq. 11.4-1)	S_{MS} =	**0.4296**
at 1 sec period (Eq. 11.4-2)	S_{M1} =	**0.231**

Design spectral acceleration parameters (Sect 11.4.4)

at short period (Eq. 11.4-3)	S_{DS} =	**0.286**
at 1 sec period (Eq. 11.4-4)	S_{D1} =	**0.154**

Seismic design category

Risk category (Table 1.5-1)	I	
Seismic design category	B	

Approximate fundamental period

Height above base to highest level of building	h_n =	**11.26 ft.**

From Table 12.8-2:

Structure type	All other systems	
Building period parameter Ct	C_t =	**0.02**
Building period parameter x	x =	**0.75**
Approximate fundamental period (Eq 12.8-7)	T_a =	**0.123 sec**
Building fundamental period (Sect 12.8.2)	T =	**0.123**
Long-period transition period	T_L =	**6**

Seismic response coefficient

Seismic force-resisting system (Table 12.2-1)	G. CANTILEVERED COLUMN SYSTEMS DETAILED TO CONFORM TO THE REQUIRE 2. Steel ordinary cantilever column systems	
Response modification factor (Table 12.2-1)	R =	**1.25**
Seismic importance factor (Table 1.5-2)	I_e =	**1.00**
Seismic response coefficient (Sect 12.8.1.1)		

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Maximum ((Eq 12.8-3))	Cs_max =	**1.002**	
Maximum Sa value	Sa,max =	**0.19**	
Period T at which Sa is max	$T_{sa,max}$ =	**0.08**	**sec**
Minimum:			
Eq 12.8-5	C_{s_min} =	**0.0126016**	
Calculated (Eq 12.8-3)	C_{s_calc} =	**0.22912**	
Seismic response coefficient	C_s =	**0.22912**	

Seismic base shear (Sect 12.8.1)

Effective seismic weight of the structure	W =	**8.81**	**kips**
Seismic base shear (Eq 12.8-1)	$V = C_s \times W$ =	**2.0**	**kips**

Distributed Seismic Loading

Analyzed Rack Length	AR_L =	**2144 in**
Analyzed Rack Weight	$AR_{LB} = AR_L / (PW_{PW} \times 0.75) \times 2 \times DL_T$ =	**8812 lbs**
Analyzed Rack Anchor Qty	AR_A =	22
Load per node (top of post)	$EL = V/AR_A$ =	**91.78 lbs/post**

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WIND

Wind Loading (ASCE7-16)

General wind load requirements

Basic wind speed	V =	**109 mph**
Risk category	I	
Velocity pressure exponent coeff(Table26.6-1)	K_d =	**0.85**
Exposure category (cl.26.7.3)	C	

Topography

Topography factor not significant	K_{zt} =	**1.00**

Velocity pressure

Velocity pressure coefficient (T.29.3-1)	K_z =	**1.00**
Velocity pressure	qh=0.00256×Kz×Kzt×Kd×Kd×V2×1psf/mph2 =	**25.85 psf**

Pressures and forces

Net pressure	p = qh × GCN
Net force	$F_w = p \times A_{ref}$
Area (per zone)	$A_{ref} = PV_A$

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CPP Wind Loading Table

Titan

	Load Case	Load Case Desc.	Panel Load Loc.	CPP Pressure Coeff. G_{CN}	Net Pressure, p (psf)	Net Force, F_w (lbs)	Rails	Net Force per Rail (lbs/ft)
Green Zone	1	CPP E-W Rail-Up	1	-1.63	-42.19	-286.10	3	159
			2	-0.70	-18.12	-122.91		67
			3	-0.42	-10.82	-73.38		33
			4	-0.25	-6.55	-44.42		
	2	CPP Half Chord-Up	1	-1.48	-38.33	-259.97		155
			2	-1.06	-27.52	-186.65		96
			3	-0.55	-14.27	-96.76		39
			4	-0.28	-7.29	-49.42		
	3	CPP Post Pair-Up	1	-1.38	-35.64	-241.71		146
			2	-1.07	-27.57	-187.01		108
			3	-0.74	-19.11	-129.61		53
			4	-0.39	-9.99	-67.78		
	4	CPP Post Pair-Down	1	0.27	7.07	47.93		-34
			2	0.40	10.28	69.72		-54
			3	0.51	13.26	89.92		-74
			4	0.70	18.17	123.22		
	5	CPP Half Chord-Down	1	0.20	5.09	34.52		-26
			2	0.33	8.55	58.01		-50
			3	0.52	13.34	90.47		-79
			4	0.76	19.67	133.42		
	6	CPP E-W Rail-Down	1	0.17	4.49	30.46		-22
			2	0.28	7.31	49.57		-39
			3	0.37	9.65	65.43		-74
			4	0.74	19.22	130.32		

	Load Case	Load Case Desc.	Panel Load Loc.	CPP Pressure Coeff. G_{CN}	Net Pressure, p (psf)	Net Force, F_w (lbs)	Rails	Net Force per Rail (lbs/ft)
y Zone	1	CPP E-W Rail-Up	1	-1.96	-50.72	-343.97		192
			2	-0.88	-22.78	-154.47		86
			3	-0.57	-14.77	-100.18		40
			4	-0.30	-7.65	-51.91		
	2	CPP Half Chord-Up	1	-1.80	-46.59	-315.98		191
			2	-1.38	-35.75	-242.43		123
			3	-0.69	-17.84	-120.99		46
			4	-0.33	-8.50	-57.64		
	3	CPP Post	1	-1.49	-38.40	-260.43		161
			2	-1.27	-32.72	-221.88		140

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Yellow	3	Pair-Up	3	-1.09	-28.22	-191.40	3	82
			4	-0.62	-16.03	-108.69		
	4	CPP Post Pair-Down	1	0.48	12.43	84.31		-62
			2	0.79	20.34	137.91		-106
			3	1.00	25.79	174.88		-126
			4	1.16	29.95	203.09		
	5	CPP Half Chord-Down	1	0.38	9.73	66.02		-50
			2	0.66	17.05	115.64		-100
			3	1.02	26.33	178.56		-130
			4	1.20	31.08	210.79		
	6	CPP E-W Rail-Down	1	0.36	9.27	62.87		-47
			2	0.60	15.64	106.06		-87
			3	0.86	22.11	149.98		-125
			4	1.20	30.98	210.11		

	Load Case	Load Case Desc.	Panel Load Loc.	CPP Pressure Coeff. G_{CN}	Net Pressure, p (psf)	Net Force, F_w (lbs)	Rails	Net Force per Rail (lbs/ft)
Orange Zone	1	CPP E-W Rail-Up	1	-2.35	-60.77	-412.13	3	226
			2	-0.92	-23.68	-160.62		88
			3	-0.56	-14.37	-97.48		42
			4	-0.32	-8.24	-55.86		
	2	CPP Half Chord-Up	1	-2.58	-66.77	-452.85		257
			2	-1.33	-34.39	-233.21		132
			3	-0.89	-23.01	-156.04		74
			4	-0.59	-15.17	-102.88		
	3	CPP Post Pair-Up	1	-2.42	-62.49	-423.83		244
			2	-1.40	-36.24	-245.76		143
			3	-1.00	-25.80	-174.94		88
			4	-0.72	-18.65	-126.49		
	4	CPP Post Pair-Down	1	0.67	17.33	117.55		-85
			2	1.04	26.94	182.73		-151
			3	1.49	38.64	262.02		-182
			4	1.67	43.10	292.30		
	5	CPP Half Chord-Down	1	0.59	15.13	102.60		-74
			2	0.92	23.68	160.62		-145
			3	1.53	39.45	267.57		-187
			4	1.71	44.31	300.48		
	6	CPP E-W Rail-Down	1	0.42	10.81	73.33		-53
			2	0.65	16.83	114.13		-96
			3	0.96	24.81	168.29		-148
			4	1.43	36.95	250.62		

*E-W Rail Loading adapted from CPP 4-rail report, converted to 3-rail loading

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Load data - with ASD Combos (for reactions)

GLOSSARY

Load conditions

Condition	Description	Comb.	Category
DL	Dead Load	No	DL
SL	Snow Load	No	SNOW
WL1	Wind - APA_CPP - EW Rail / Up - 0° (S-N)	No	WIND
WL2	Wind - APA_CPP - Half Chord/ Up - 0° (S-N)	No	WIND
WL3	Wind - APA_CPP - Post Pair / Up - 0° (S-N)	No	WIND
WL4	Wind - APA_CPP - Post Pair / Down - 180° (N-S)	No	WIND
WL5	Wind - APA_CPP - Half Chord / Down - 180° (N-S)	No	WIND
WL6	Wind - APA_CPP - EW Rail / Down - 180° (N-S)	No	WIND
EL1	Seismic Left	No	EQ
EL2	Seismic Right	No	EQ
EL3	Seismic North	No	EQ
EL4	Seismic South	No	EQ
D1	DL	Yes	
D2	DL+SL	Yes	
D3	DL+0.75SL	Yes	
D4	DL+0.6WL1	Yes	
D5	DL+0.6WL2	Yes	
D6	DL+0.7EL1	Yes	
D7	DL+0.7EL2	Yes	
D8	DL+0.7EL3	Yes	
D9	DL+0.7EL4	Yes	
D10	DL+0.75SL+0.45WL1	Yes	
D11	DL+0.75SL+0.45WL2	Yes	
D12	DL+0.75SL+0.525EL1	Yes	
D13	DL+0.75SL+0.525EL2	Yes	
D14	DL+0.75SL+0.525EL3	Yes	
D15	DL+0.75SL+0.525EL4	Yes	
D16	0.6DL+0.6WL1	Yes	
D17	0.6DL+0.6WL2	Yes	
D18	0.6DL+0.7EL1	Yes	
D19	0.6DL+0.7EL2	Yes	
D20	0.6DL+0.7EL3	Yes	
D21	0.6DL+0.7EL4	Yes	
D22	DL+0.6WL3	Yes	
D23	DL+0.6WL4	Yes	
D24	DL+0.6WL5	Yes	
D25	DL+0.6WL6	Yes	
D26	DL+0.525SL+0.45WL3	Yes	
D27	DL+0.525SL+0.45WL4	Yes	

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D28	DL+0.525SL+0.45WL5	Yes
D29	DL+0.525SL+0.45WL6	Yes
D30	0.6DL+0.6WL3	Yes
D31	0.6DL+0.6WL4	Yes
D32	0.6DL+0.6WL5	Yes
D33	0.6DL+0.6WL6	Yes

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Load on nodes

Condition	Node	FX	FY	FZ	MX	MY	MZ
		[Lb]	[Lb]	[Lb]	[Lb*ft]	[Lb*ft]	[Lb*ft]
EL1	153	91.78	0.00	0.00	0.00	0.00	0.00
EL2	153	-91.78	0.00	0.00	0.00	0.00	0.00
EL3	153	0.00	0.00	91.78	0.00	0.00	0.00
EL4	153	0.00	0.00	-91.78	0.00	0.00	0.00

Distributed Forces on Members

Condition	Member	Dir1	Val1	Val2	Dist1	%	Dist2	%
			[Lb/ft]	[Lb/ft]	[in]		[in]	
DL	351(Outer)	Y	-14.95	-14.95	0.00	Yes	100.00	Yes
SL	351(Outer)	Y	-68.57	-68.57	0.00	Yes	100.00	Yes
DL	351(Inner)	Y	-15.87	-15.87	0.00	Yes	100.00	Yes
SL	351(Inner)	Y	-72.77	-72.77	0.00	Yes	100.00	Yes
WL1	See Pages 9-10							
WL2	See Pages 9-10							
WL3	See Pages 9-10							
WL4	See Pages 9-10							
WL5	See Pages 9-10							
WL6	See Pages 9-10							

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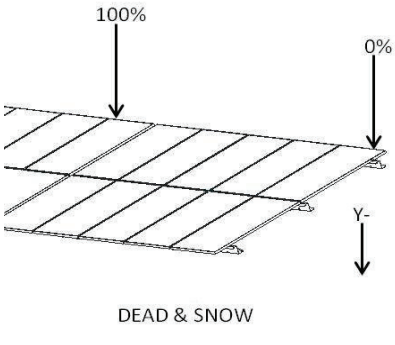

Figure 1: Load Direction Y

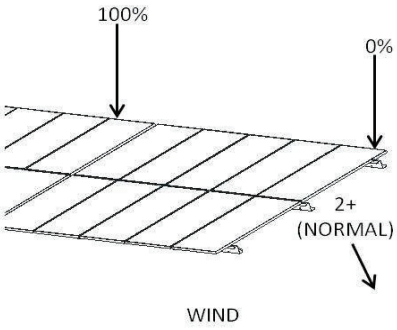

Figure 2: Load Direction 2

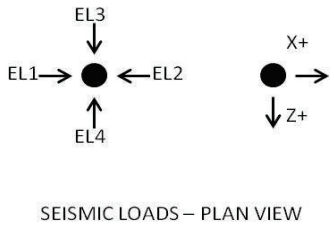

Figure 3: Load Direction X & Z

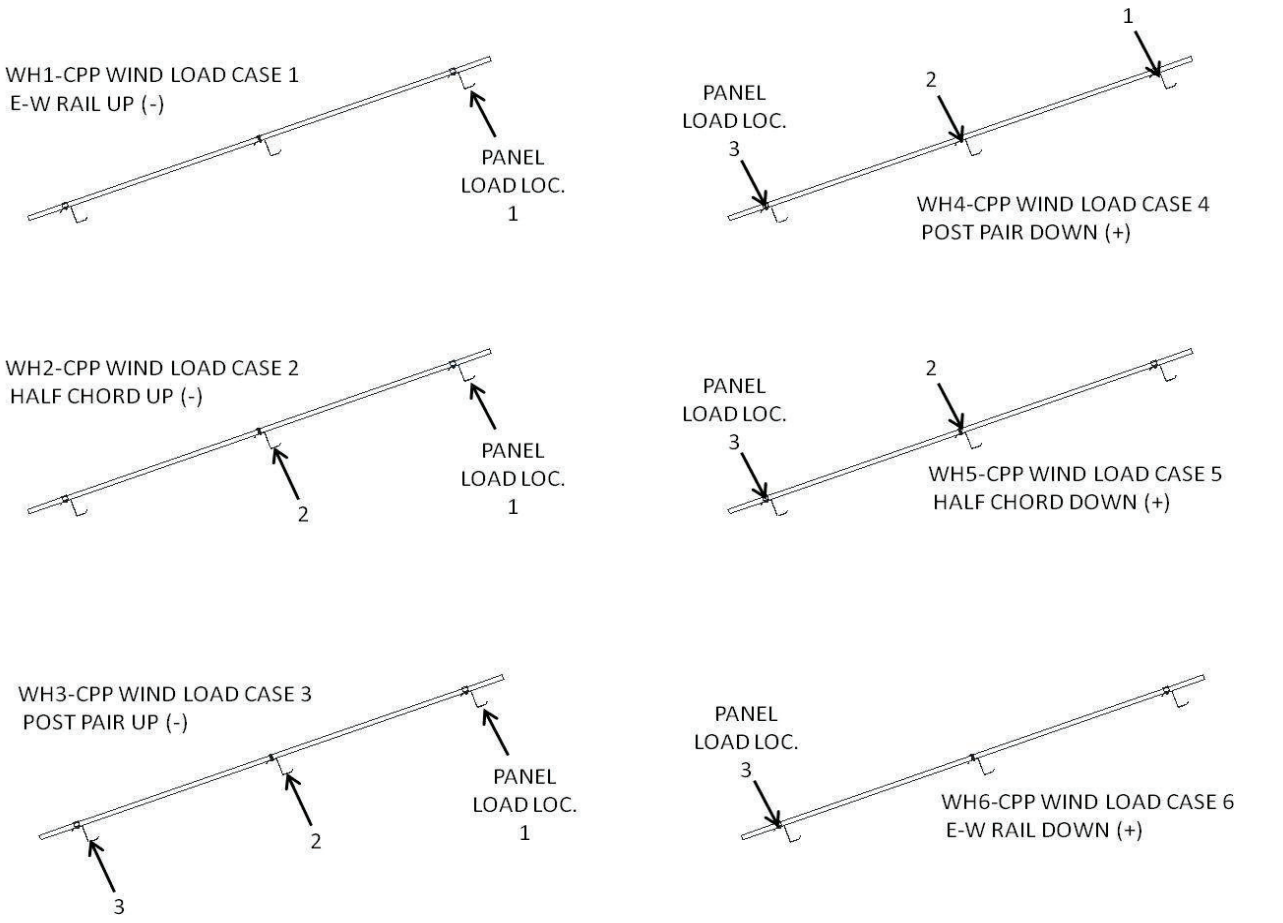

Figure 4: Load CPP Wind Loads

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WIND TUNNEL DATA

CERMAK PETERKA PETERSEN

CPP Project 17649 -
Wind Tunnel Tests and Wind Load Analysis for APA Solar FIXED-TILT GROUND MOUNT

Executive Summary
CPP, Inc. has evaluated wind loads on a generic array of fixed-tilt ground-mounted photovoltaic (PV) solar panels produced by APA Solar. The wind tunnel data used in the analysis is from the CPP proprietary ground mount wind loads database. This database consists of simultaneous surface pressure measurements at a large number of locations on the solar panels. The database contains data for a large number of configurations with varying combinations of tilt, ground clearance, and row spacing. The geometric parameters of the APA Solar system studied are summarized below:

	Range of applicability
Chord length:	140 in to 200 in, with results presented for two chord lengths and interpolation appropriate between the presented chord lengths
Tilt:	5°, 15°, 22.5°, 30° and 45°, allowable with interpolation appropriate between presented results.
Height (low edge of modules):	≤0.5L, with results presented for three low-edge heights (0.2L, 0.35L & 0.5L) and interpolation appropriate between the presented heights.
Row spacing (clear gap):	≤4LSin(tilt), with results presented for 1.5, 2.75 and 4LSin(tilt) and interpolation appropriate between the presented row spacings
Post spacing (along row):	≥0.5L, with results presented for 4 post spacings of 0.5L, 1L, 1.5L and 2.75L and interpolations appropriate between the presented post spacings

The wind loads determined by CPP are based upon measurements obtained in an atmospheric boundary layer wind tunnel study conducted in accordance with the test procedures described in ASCE 7. The primary goal of this study was to determine peak forces on an array of panels for the purpose of calculating design wind loads. The results are presented as load cases, defined in this document. These loads vary with position within the array and, as expected, the worst case- loads were found at the array perimeter. Interior portions of the array were generally found to have substantially lower wind loads than perimeter locations due to sheltering

Wind Tunnel Load Cases

The load cases are listed below. In some cases the load effect is the peak load on a fraction of the chord (e.g. the high rail or half the chord).

$GC_{N\text{-}Post\ \ pair}$ – Peak net pressure on a post-pair tributary area; uplift and downforces; for designs of posts, N-S strut/beam and braces. The tributary area considered includes the full chord and spans halfway to the next post pair; the nominal tributary area for a pair of posts in a dual-post system.

GCN-Post half-chord – Peak net pressure on a single post tributary area; uplift on upper post and downforce on lower post cases; for design of posts, N-S strut, and braces. The tributary area considered includes half of the chord and spans halfway to the next post pair; the nominal tributary area for a single post in a dual-post system.

GCN Rail– Peak net pressure on E-W rails spanning between posts, supporting modules; uplift and downforce cases. The tributary area considered includes one quarter of the chord and spans from one post pair to the next post pair; the nominal tributary area for a rail .

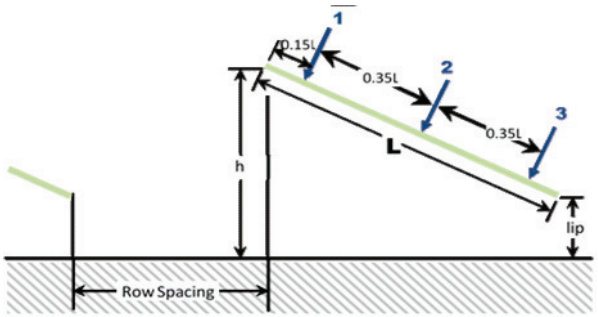

Figure 5: Wind Tunnel Load Distribution Schematic

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Wind Tunnel Zone Map

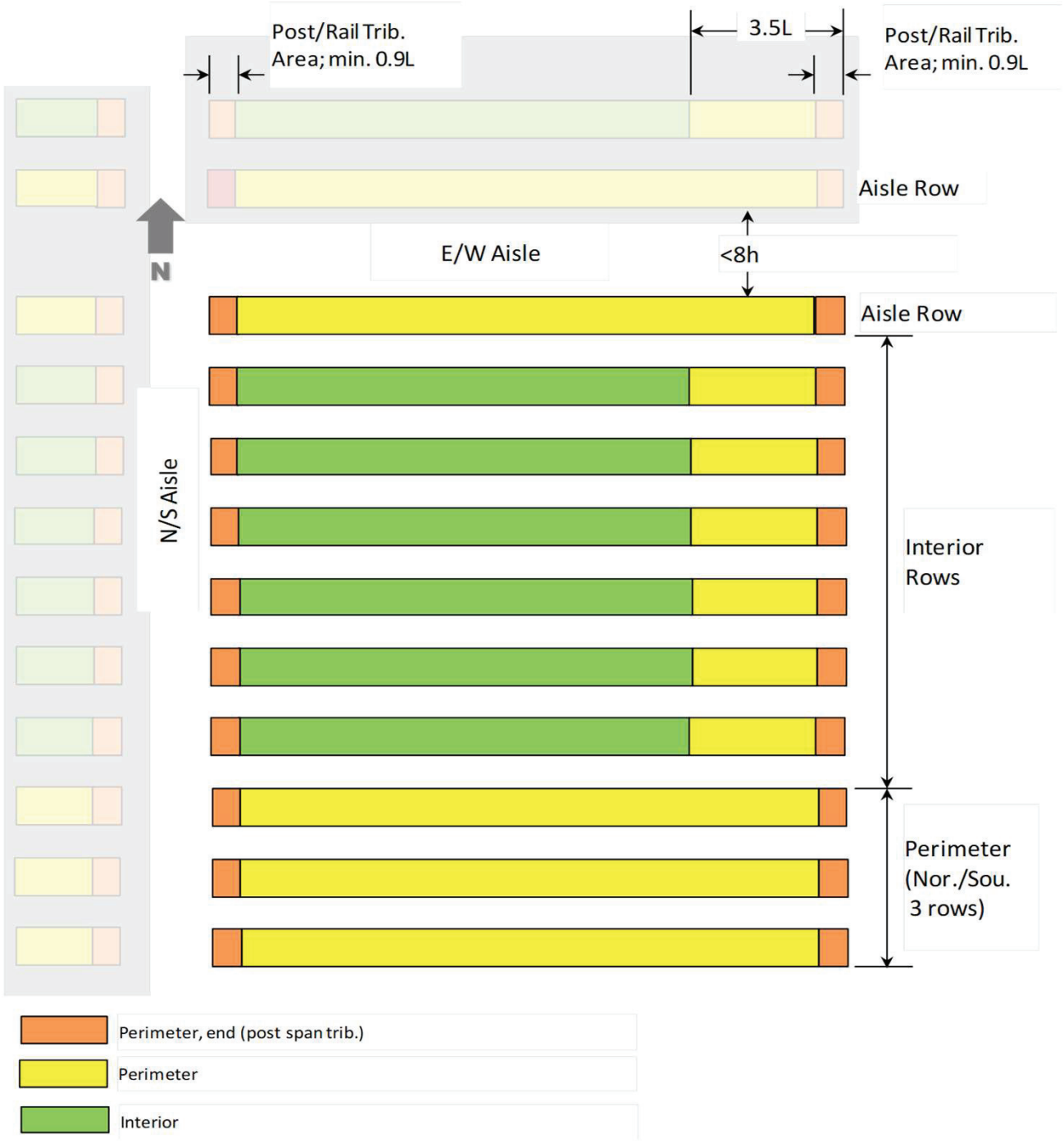

Figure 6: Wind Tunnel Zone Map

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SETUP & ANALYSIS

APA SOLAR RACKING
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Parts list

Note.- Only the graphically selected elements are listed below

Profile	Length [in]	N° of pieces
CABLE BRACE - 1/8	225.9	8
STD. BIG ZEE - 6 X 3 X 0...	169	24
STD. BIG ZEE - 6 X 3 X 0...	185	6
STD. BIG ZEE - 6 X 3 X 0.055	67	6
STD. BIG ZEE SPLICE - 6 ...	16	54
STD. TITAN DUO POST - ...	105.1	11
STD. TITAN DUO POST - 2...	69.01	11
STD. TITAN KNEE BRACE ...	99.81	11
STD. TITAN NS CHORD -...	111.26	11
Total N° of pieces		142

List of materials

Profile	Material	Uweight [Lb/ft]	Length [in]	Weight [Lb]
CABLE BRACE - 1/8	APA - A36 - CABLES	1.61E-01	1807.196	24.234
STD. BIG ZEE - 6 X 3 X 0.055	A653 SS 80-1	2.51E+00	5568	1166.389
STD. BIG ZEE SPLICE - 6 X 3 X 0.11	A653 SS 80-1	4.97E+00	864	358.076
STD. TITAN DUO POST - 2.375 X 0.095	APA - A570 GR50	2.18E+00	1915.21	348.346
STD. TITAN KNEE BRACE - 3 X 2 X 0...	A653 SS 80-1	1.99E+00	1097.912	182.479
STD. TITAN NS CHORD - 6 X 2 X 0.108	A653 SS 80-1	3.72E+00	1223.899	379.566
Total weight [Lb]				2459.09

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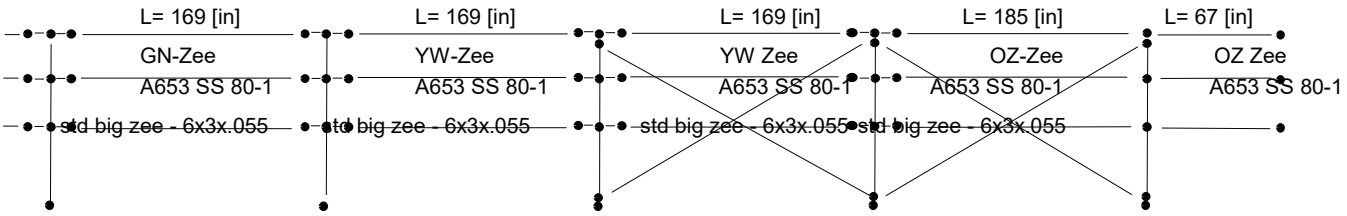

Figure 7: - Member Length, Name, Material, And Section - ORANGE,YELLOW, & GREEN ZONE

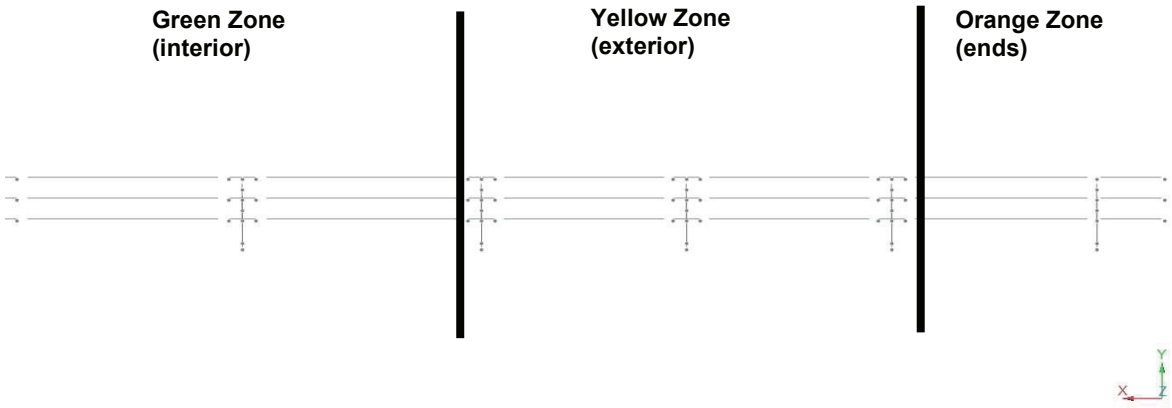

Figure 8: - Racking Zones

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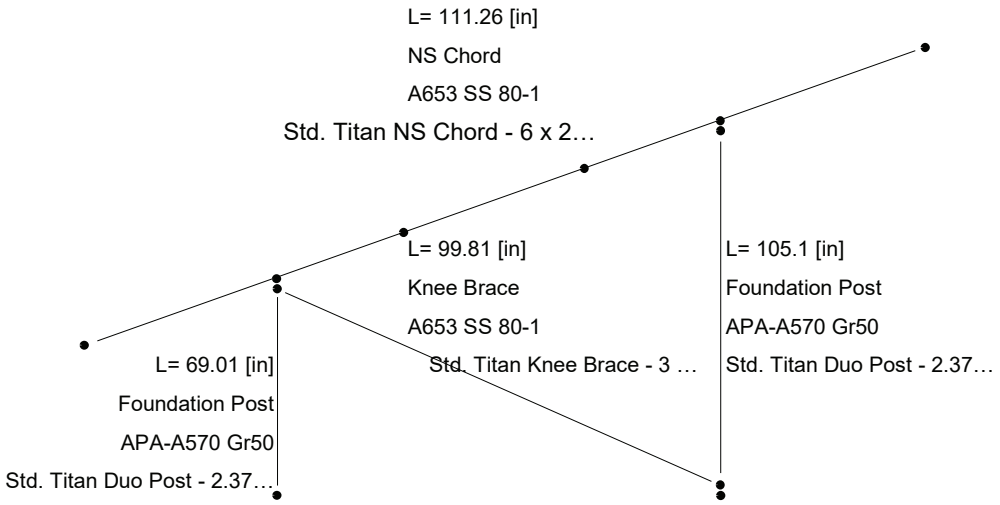

Figure 9: - Member Length, Name, Material, and Section

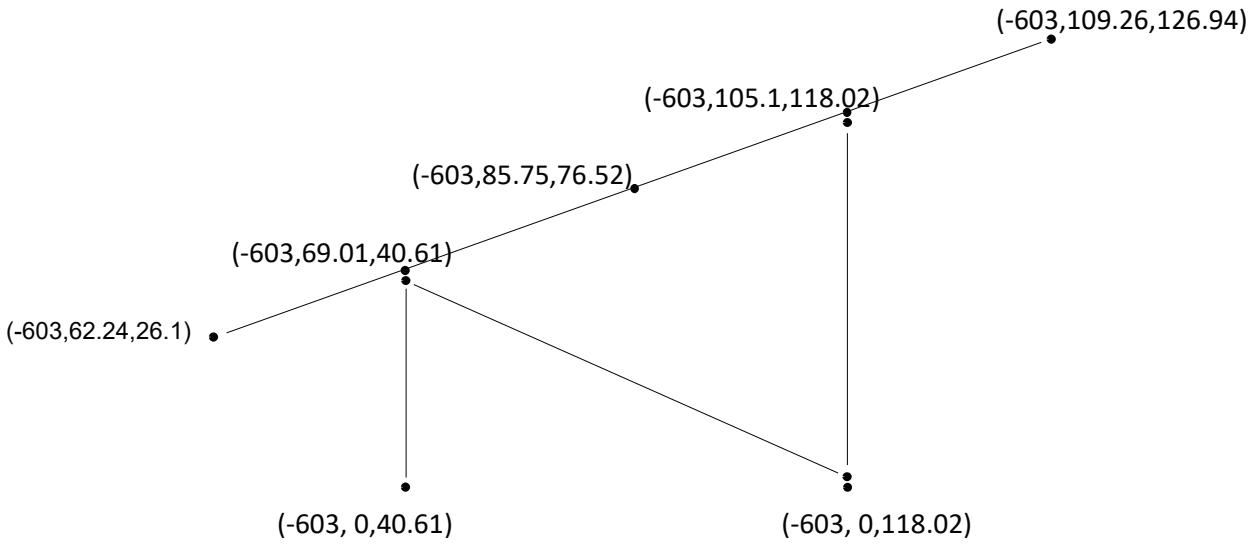

Figure 10: - Node X,Y,Z Coordinate

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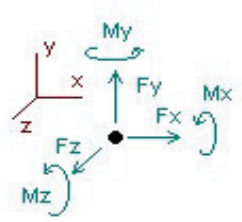
Analysis - Reaction Envelope - ASD

Reactions



Direction of positive forces and moments

Max Uplift: -4926 lbs (D17)
Max Down Load: 3701 lbs (D27)
Max Lateral: 2045 lbs (D30)

	Forces						Moments	
Node	Fx [Lb]	lc	Fy [Lb]	lc	Fz [Lb]	lc	My [Lb*ft]	lc
145-max	352.112	D19	3085.04	D27	1692.681	D22	0	D1
145-min	-0.05	D12	-3950.82	D17	-1302.42	D31	0	D1
151-max	0.042	D19	3024.22	D27	1721.926	D22	0	D1
151-min	-356.622	D6	-4217.81	D17	-1518.65	D31	0	D1
173-max	0.041	D19	3079.54	D27	1696.05	D22	0	D1
173-min	-355.925	D6	-3965.32	D17	-1302.49	D31	0	D1
174-max	352.091	D19	3017.91	D27	1721.707	D22	0	D1
174-min	-0.045	D6	-4227.02	D17	-1518.22	D31	0	D1
185-max	357.79	D7	3689.16	D27	2045.039	D30	0	D1
185-min	-355.588	D6	-4925.76	D17	-1706.28	D23	0	D1
195-max	354.728	D19	3700.81	D27	2043.795	D30	0	D1
195-min	-347.749	D18	-4905.03	D17	-1706.61	D23	0	D1
205-max	-0.001	D18	2798.88	D27	1571.764	D30	0	D1
205-min	-0.04	D28	-3682.93	D17	-1045.54	D23	0	D1
212-max	-0.001	D18	2798.6	D27	1574.256	D30	0	D1
212-min	-0.039	D28	-3687.2	D17	-1045.2	D23	0	D1
213-max	-0.001	D18	2329.7	D27	1358.322	D22	0	D1
213-min	-0.034	D28	-3150.89	D30	-687.649	D31	0	D1
214-max	-0.001	D18	2420.4	D27	1398.068	D30	0	D1
214-min	-0.035	D28	-3257.83	D17	-750.872	D23	0	D1

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215-max	-0.001 D18	2329.61 D27	1359.205 D22	0 D1
215-min	-0.033 D28	-3153.2 D30	-687.607 D31	0 D1
294-max	0.075 D12	2632.38 D10	76.956 D31	0 D1
294-min	0.004 D21	108.205 D20	-100.015 D22	0 D1
296-max	0.067 D24	2273.74 D10	89.733 D31	0 D1
296-min	-0.063 D19	60.178 D20	-101.744 D22	0 D1
298-max	0.065 D29	2633.77 D10	76.961 D31	0 D1
298-min	-0.062 D19	108.126 D20	-100.215 D22	0 D1
300-max	0.068 D6	2274.27 D10	89.707 D31	0 D1
300-min	0.003 D21	60.241 D20	-101.73 D22	0 D1
302-max	0.084 D28	2857.69 D10	100.819 D23	0 D1
302-min	-0.062 D19	117.89 D20	-120.835 D30	0 D1
304-max	0.084 D28	2856.55 D10	100.839 D23	0 D1
304-min	-0.062 D19	117.904 D20	-120.762 D30	0 D1
306-max	0.061 D28	2604.18 D10	61.778 D23	0 D1
306-min	0.002 D18	109.967 D20	-92.871 D30	0 D1
308-max	0.06 D28	2605.03 D10	61.758 D23	0 D1
308-min	0.002 D18	109.957 D20	-93.018 D30	0 D1
310-max	0.051 D28	2516.92 D10	40.631 D31	0 D1
310-min	0.002 D18	109.583 D20	-80.259 D22	0 D1
312-max	0.053 D28	2533.88 D10	44.367 D23	0 D1
312-min	0.002 D18	109.688 D20	-82.608 D30	0 D1
314-max	0.051 D28	2517.32 D10	40.629 D31	0 D1
314-min	0.002 D18	109.583 D20	-80.311 D22	0 D1

Mx = 0 for all nodes at ground

Mz = 0 for all nodes at ground

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CODE CHECK

(ASCE7-16, ASD)

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Steel Code Check - SUMMARY

Description	Section	Member & Ctrl Eq.	Ratio & Status	Reference
NS Chord	*Std. Titan NS Chord - 6 x 2...*	335 - D28 at 14.39%	0.75 - OK	Sec. G5
Knee Brace	*Std. Titan Knee Brace - 3 ...*	339 - D23 at 0.00%	0.8 - OK	Sec. E2
Cable Brace	*CABLE BRACE - 1/8*	456 - D7 at 50.00%	0.41 - OK	0
Foundation P	*Std. Titan Duo Post - 2.37...*	334 - D27 at 1.90%	0.82 - OK	0
Zee Purlin	*STD BIG ZEE - 6 X 3 X .055*	331 - D28 at 0.00%	0.95 - OK	Eq. H1.2-1

Steel Code Check
Concise Report

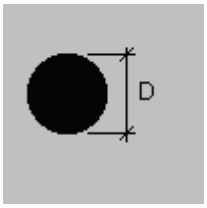
AISC 360-2016 ASD (Hot-rolled)

Member : 456 (Cable Brace) - OK

Section information

Section name: CABLE BRACE - 1/8 **(US)**

Dimensions



D = 0.245 [in] Diameter

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	0.047	
Moment of Inertia (local axes) (I)	[in4]	1.77E-04	1.77E-04
Moment of Inertia (principal axes) (I')	[in4]	1.77E-04	1.77E-04
Bending constant for moments (principal axis) (J')	[in]	0.000	0.000
Radius of gyration (local axes) (r)	[in]	0.061	0.061
Radius of gyration (principal axes) (r')	[in]	0.061	0.061
Saint-Venant torsion constant. (J)	[in4]	3.68E-04	
Section warping constant. (Cw)	[in6]	0.000	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	0.000	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	0.001	0.001
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	0.001	0.001
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	0.001	0.001
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	0.001	0.001
Plastic section modulus (local axis) (Z)	[in3]	0.002	0.002
Plastic section modulus (principal axis) (Z')	[in3]	0.002	0.002
Polar radius of gyration. (ro)	[in]	0.087	
Area for shear (Aw)	[in2]	0.047	0.047
Torsional constant. (C)	[in3]	0.004	

Material : APA - A36 - Cables

Properties	Unit	Value
Yield stress (Fy):	[Lb/in2]	36000.00
Tensile strength (Fu):	[Lb/in2]	58000.00
Elasticity Modulus (E):	[Lb/in2]	2.9E07
Shear modulus for steel (G):	[Lb/in2]	1.150794E07

Design Criteria

Description	Unit	Value

Length for tension slenderness ratio (L)	[in]	225.90

Distance between member lateral bracing points

Length (Lb) [in]	
Top	Bottom
225.90	225.90

Laterally unbraced length

Length [in]			Effective length factor		
Major axis(L33)	Minor axis(L22)	Torsional axis(Lt)	Major axis(K33)	Minor axis(K22)	Torsional axis(Kt)
225.90	225.90	225.90	1.0	1.0	1.0

Additional assumptions

Continuous lateral torsional restraint	No
Tension field action	No
Continuous flexural torsional restraint	No
Effective length factor value type	None
Major axis frame type	Sway
Minor axis frame type	Sway

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	:	0.40			
Capacity	:	1017.88 [Lb]	Reference	:	Cl.D2
Demand	:	409.87 [Lb]	Ctrl Eq.	:	D7 at 50.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity(P_n/Ω):	[Lb]	1017.88	Cl.D2

Axial Compression Design ✔

Compression in the major axis 33

Ratio	:	0.01			
Capacity	:	0.52 [Lb]	Reference	:	Cl.E3
Demand	:	0.01 [Lb]	Ctrl Eq.	:	D18 at 0.00%

Intermediate results	Unit	Value	Reference
Factored flexural buckling strength(P_{n33}/Ω):	[Lb]	0.52	Cl.E3

Compression in the minor axis 22

Ratio	:	0.01			
Capacity	:	0.52 [Lb]	Reference	:	Cl.E3
Demand	:	0.01 [Lb]	Ctrl Eq.	:	D18 at 0.00%

Intermediate results	Unit	Value	Reference
Factored flexural buckling strength(P_{n22}/Ω):	[Lb]	0.52	Cl.E3

Flexural Design ✔

Bending about major axis, M33

Ratio	:	0.01			
Capacity	:	4.07 [Lb*ft]	Reference	:	Cl.F11.1
Demand	:	0.02 [Lb*ft]	Ctrl Eq.	:	D18 at 50.00%

Intermediate results	Unit	Value	Reference
Factored yielding strength(M_n/Ω):	[Lb*ft]	4.07	Cl.F11.1

Bending about minor axis, M22

Ratio	:	0.01			
Capacity	:	4.07 [Lb*ft]	Reference	:	Cl.F11.1
Demand	:	-0.06 [Lb*ft]	Ctrl Eq.	:	D13 at 50.00%

Intermediate results	Unit	Value	Reference
Factored yielding strength about a geometric axis(M_n/Ω):	[Lb*ft]	4.07	Cl.F11.1

Shear Design ✔

Shear in major axis 33

Ratio	:	0.00			
Capacity	:	610.73 [Lb]	Reference	:	Cl.G1
Demand	:	0.01 [Lb]	Ctrl Eq.	:	D13 at 50.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	610.73	Cl.G1

Shear in minor axis 22

Ratio	:	0.00			
Capacity	:	610.73 [Lb]	Reference	:	Cl.G1
Demand	:	0.00 [Lb]	Ctrl Eq.	:	D18 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	610.73	Cl.G1

Combined Actions Design ✔

Combined flexure and axial

Ratio	:	0.41			
Ctrl Eq.	:	D7 at 50.00%	Reference	:	Eq.H1-1a

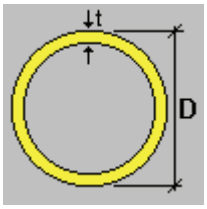
Intermediate results	Unit	Value	Reference
Interaction of flexure and axial force:	--	0.41	Eq.H1-1a

Member : 334 (Foundation Post) - OK

Section information

Section name: Std. Titan Duo Post - 2.375 x 0.095 **(US)**

Dimensions



D	=	2.375	[in]	Diameter
T	=	0.088	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	0.640	
Moment of Inertia (local axes) (I)	[in4]	0.417	0.417
Moment of Inertia (principal axes) (I')	[in4]	0.417	0.417
Bending constant for moments (principal axis) (J')	[in]	0.000	0.000
Radius of gyration (local axes) (r)	[in]	0.807	0.807
Radius of gyration (principal axes) (r')	[in]	0.807	0.807
Saint-Venant torsion constant. (J)	[in4]	0.814	
Section warping constant. (Cw)	[in6]	5.07E-05	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	0.000	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	0.345	0.345
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	0.345	0.345
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	0.345	0.345
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	0.345	0.345
Plastic section modulus (local axis) (Z)	[in3]	0.465	0.465
Plastic section modulus (principal axis) (Z')	[in3]	0.465	0.465
Polar radius of gyration. (ro)	[in]	1.141	
Area for shear (Aw)	[in2]	0.412	0.412
Torsional constant. (C)	[in3]	0.722	

Material : APA - A570 Gr50

Properties	Unit	Value
Yield stress (Fy):	[Lb/in2]	50000.00
Tensile strength (Fu):	[Lb/in2]	65300.00
Elasticity Modulus (E):	[Lb/in2]	2.9E07
Shear modulus for steel (G):	[Lb/in2]	1.150794E07

Design Criteria

Description	Unit	Value

Length for tension slenderness ratio (L)	[in]	105.10

Distance between member lateral bracing points

Length (Lb) [in]	
Top	Bottom
105.10	105.10

Laterally unbraced length

Length [in]			Effective length factor		
Major axis(L33)	Minor axis(L22)	Torsional axis(Lt)	Major axis(K33)	Minor axis(K22)	Torsional axis(Kt)
105.10	105.10	105.10	1.0	1.0	1.0

Additional assumptions

Continuous lateral torsional restraint	No
Tension field action	No
Continuous flexural torsional restraint	No
Effective length factor value type	None
Major axis frame type	Non sway
Minor axis frame type	Non sway

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	: 0.26		
Capacity	: 19174.73 [Lb]	Reference	: Cl.D2
Demand	: 4925.76 [Lb]	Ctrl Eq.	: D17 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity(P_n/Ω):	[Lb]	19174.73	Cl.D2

Axial Compression Design ✔

Compression in the major axis 33

Ratio	: 0.65		
Capacity	: 5671.37 [Lb]	Reference	: Cl.E3
Demand	: 3689.16 [Lb]	Ctrl Eq.	: D27 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Factored flexural buckling strength(P_{n33}/Ω):	[Lb]	5671.37	Cl.E3

Compression in the minor axis 22

Ratio	: 0.65		
Capacity	: 5671.37 [Lb]	Reference	: Cl.E3
Demand	: 3689.16 [Lb]	Ctrl Eq.	: D27 at 0.00%

Intermediate results	Unit	Value	Reference
Section classification			
Factored flexural buckling strength(P_{n22}/Ω):	[Lb]	5671.37	Cl.E3

Flexural Design ✔

Bending about major axis, M33

Ratio	: 0.05		
Capacity	: 1159.85 [Lb*ft]	Reference	: Cl.F8.1
Demand	: -59.63 [Lb*ft]	Ctrl Eq.	: D7 at 1.90%

Intermediate results	Unit	Value	Reference
Section classification			
Factored yielding strength(M_n/Ω):	[Lb*ft]	1159.85	Cl.F8.1

Bending about minor axis, M22

Ratio	: 0.29		
Capacity	: 1159.85 [Lb*ft]	Reference	: Cl.F8.1
Demand	: 340.82 [Lb*ft]	Ctrl Eq.	: D30 at 1.90%

Intermediate results	Unit	Value	Reference
Section classification			
Factored yielding strength about a geometric axis(M_n/Ω):	[Lb*ft]	1159.85	Cl.F8.1

Shear Design ✔

Shear in major axis 33

Ratio	: 0.36		
Capacity	: 5752.42 [Lb]	Reference	: Cl.G1
Demand	: 2045.04 [Lb]	Ctrl Eq.	: D30 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	5752.42	Cl.G1

Shear in minor axis 22

Ratio	: 0.06		
Capacity	: 5752.42 [Lb]	Reference	: Cl.G1
Demand	: 357.79 [Lb]	Ctrl Eq.	: D7 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	5752.42	Cl.G1

Torsion Design ✔

Torsion

Ratio	:	0.00			
Capacity	:	1080.70 [Lb*ft]	Reference	:	Cl.H3.1
Demand	:	0.41 [Lb*ft]	Ctrl Eq.	:	D6 at 1.90%

Intermediate results	Unit	Value	Reference
Factored torsion capacity(T_n/Ω):	[Lb*ft]	1080.70	Cl.H3.1

Combined Actions Design

Combined flexure and axial

Ratio	:	0.82			
Ctrl Eq.	:	D27 at 1.90%	Reference	:	Eq.H1-1a

Intermediate results	Unit	Value	Reference
Interaction of flexure and axial force:	--	0.82	Eq.H1-1a

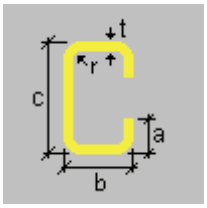
AISI 2016 ASD (Cold-formed)

Member : 335 (NS Chord) - OK

Section information

Section name: Std. Titan NS Chord - 6 x 2 x 0.108 **(US)**

Dimensions



a	=	0.600	[in]	Lip
b	=	2.000	[in]	Flange width
c	=	6.000	[in]	Depth
r	=	0.219	[in]	Inside bend radius
t	=	0.108	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	1.108	
Moment of Inertia (local axes) (I)	[in4]	5.733	0.525
Moment of Inertia (principal axes) (I')	[in4]	5.733	0.525
Bending constant for moments (principal axis) (J')	[in]	0.000	3.324
Radius of gyration (local axes) (r)	[in]	2.275	0.688
Radius of gyration (principal axes) (r')	[in]	2.275	0.688
Saint-Venant torsion constant. (J)	[in4]	0.005	
Section warping constant. (Cw)	[in6]	4.248	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	-1.466	0.000

Top elastic section modulus of the section (local axis) (Ssup)	[in3]	1.911	0.364
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	1.911	0.942
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	1.911	0.364
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	1.911	0.942
Plastic section modulus (local axis) (Z)	[in3]	2.290	0.561
Plastic section modulus (principal axis) (Z')	[in3]	2.290	0.561
Polar radius of gyration. (ro)	[in]	2.793	
Area for shear (Aw)	[in2]	0.409	0.754
Torsional constant. (C)	[in3]	0.042	

Material : A653 SS 80-1

Properties	Unit	Value
Yield stress (Fy):	[Lb/in2]	80000.00
Tensile strength (Fu):	[Lb/in2]	82000.00
Elasticity Modulus (E):	[Lb/in2]	2.95E07
Shear modulus for steel (G):	[Lb/in2]	1.134615E07

Design Criteria

Description	Unit	Major axis	Minor axis
Additional hypotheses			
Full lateral restraints		No	
Continuous flexural torsional restraint		No	
Local axis design		Yes	
Region between inflection points adjacent to support		No	
Span type		Simple	
Fastened to support		Unfastened	
Local shear		No	
Braced for sidesway in major axis		No	
Braced for sidesway in minor axis		No	
Loading condition		EOF	
Flange support condition		Fastened	
Bearing length	[in]	5.18	

Member lateral unbraced lengths

Length (Lb) [in]		Restraint arrangement		Rotation restraint	
Top	Bottom	Top	Bottom	Top	Bottom
111.26	111.26	FF	FF	None	None

Compression member unbraced lengths

Length (L) [in]			Effective length factor (ke)		
Major axis	Minor axis		Major axis	Minor axis	
85.00	53.50	47.00	0.00	0.00	1.0

Design Checks

Axial Tension Design ✔

Axial tension

Ratio : 0.01
Capacity : 45411.63 [Lb]
Reference : Sec. D3

Demand	: 638.90 [Lb]	Ctrl Eq.	: D27 at 50.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity(P_n/Ω):	[Lb]	53058.71	Sec. D2
Factored axial tensile fracture capacity(P_n/Ω):	[Lb]	45411.63	Sec. D3

Shear Design ✔

Shear in major axis 33

Ratio	: 0.02		
Capacity	: 8722.08 [Lb]	Reference	: Sec. G2
Demand	: 196.04 [Lb]	Ctrl Eq.	: D6 at 91.15%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	8722.08	Sec. G2

Shear in minor axis 22

Ratio	: 0.15		
Capacity	: 15527.64 [Lb]	Reference	: Sec. G2
Demand	: -2332.43 [Lb]	Ctrl Eq.	: D28 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	15527.64	Sec. G2

Axial Compression Design ✔

Axial compression

Ratio	: 0.07		
Capacity	: 22194.60 [Lb]	Reference	: Sec. E3
Demand	: 1593.04 [Lb]	Ctrl Eq.	: D5 at 14.39%

Intermediate results	Unit	Value	Reference
Factored axial compression capacity(P_n/Ω):	[Lb]	24574.36	Sec. E2
Factored axial compression distortional buckling capacity(P_n/Ω):	[Lb]	33136.75	Sec. E4
Factored local buckling strength(P_n/Ω):	[Lb]	22194.60	Sec. E3

Flexural Design ✔

Bending about major axis, M33

Ratio	: 0.52		
Capacity	: 6420.94 [Lb*ft]	Reference	: Sec. F2
Demand	: -3356.52 [Lb*ft]	Ctrl Eq.	: D28 at 14.39%

Intermediate results	Unit	Value	Reference

Factored section moment capacity(M_n/Ω):	[Lb*ft]	7629.31	Sec. F2
Factored lateral-torsional buckling strength(M_n/Ω):	[Lb*ft]	6420.94	Sec. F2
Factored moment distortional buckling capacity(M_n/Ω):	[Lb*ft]	7244.51	Sec. F4
Factored local buckling strength(M_n/Ω):	[Lb*ft]	6420.94	Sec. F3

Bending about the minor axis 22

Ratio	: 0.14		
Capacity	: 1452.06 [Lb*ft]	Reference	: Sec. F2
Demand	: -196.79 [Lb*ft]	Ctrl Eq.	: D7 at 91.15%

Intermediate results	Unit	Value	Reference
Factored section moment capacity(M_n/Ω):	[Lb*ft]	1452.06	Sec. F2
Factored local buckling strength(M_n/Ω):	[Lb*ft]	1452.06	Sec. F3

Web Crippling Design ✔

Web crippling

Ratio	: 0.75		
Capacity	: 5024.13 [Lb]	Reference	: Sec. G5
Demand	: 3772.57 [Lb]	Ctrl Eq.	: D28 at 14.39%

Intermediate results	Unit	Value	Reference
Factored web crippling capacity(P_n/Ω):	[Lb]	5024.13	Sec. G5

Combined Actions Design ✔

Combined bending and web crippling interaction

Ratio	: 0.36		
Ctrl Eq.	: D28 at 14.39%	Reference	: Sec. H3

Intermediate results	Unit	Value	Reference

Combined bending and shear interaction

Ratio	: 0.47		
Ctrl Eq.	: D28 at 14.39%	Reference	: Sec. H2

Intermediate results	Unit	Value	Reference
Combined bending and shear interaction (x-x):	--	0.47	Sec. H2
Combined bending and shear interaction(y-y):	--	0.02	

Combined bending and tension interaction

Ratio	: 0.53		
Ctrl Eq.	: D28 at 14.39%	Reference	: Eq. H1.1-2

Intermediate results	Unit	Value	Reference
Combined tensile axial and bending (flexure with tension yielding):	--	0.47	Eq. H1.1-1
Combined tensile axial and bending (flexure with buckling):	--	0.53	Eq. H1.1-2

Combined bending and compression interaction

Ratio : 0.54
Ctrl Eq. : D28 at 14.39% Reference : Eq. H1.2-1

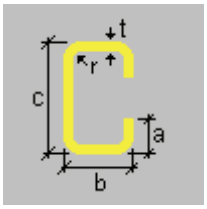
Intermediate results	Unit	Value	Reference
Combined bending and compression interaction:	--	0.54	Eq. H1.2-1

Member : 339 (Knee Brace) - OK

Section information

Section name: Std. Titan Knee Brace - 3 x 2 x 0.078 **(US)**

Dimensions



a	=	0.630	[in]	Lip
b	=	2.000	[in]	Flange width
c	=	3.000	[in]	Depth
r	=	0.141	[in]	Inside bend radius
t	=	0.078	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	0.594	
Moment of Inertia (local axes) (I)	[in4]	0.871	0.333
Moment of Inertia (principal axes) (I')	[in4]	0.871	0.333
Bending constant for moments (principal axis) (J')	[in]	0.000	2.304
Radius of gyration (local axes) (r)	[in]	1.211	0.749
Radius of gyration (principal axes) (r')	[in]	1.211	0.749
Saint-Venant torsion constant. (J)	[in4]	0.001	
Section warping constant. (Cw)	[in6]	0.845	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	-1.909	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	0.581	0.273
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	0.581	0.427
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	0.581	0.273
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	0.581	0.427
Plastic section modulus (local axis) (Z)	[in3]	0.672	0.396
Plastic section modulus (principal axis) (Z')	[in3]	0.672	0.396
Polar radius of gyration. (ro)	[in]	2.381	
Area for shear (Aw)	[in2]	0.300	0.320
Torsional constant. (C)	[in3]	0.016	

Material : A653 SS 80-1

Properties	Unit	Value
Yield stress (Fy):	[Lb/in2]	80000.00
Tensile strength (Fu):	[Lb/in2]	82000.00
Elasticity Modulus (E):	[Lb/in2]	2.95E07
Shear modulus for steel (G):	[Lb/in2]	1.134615E07

Design Criteria

Description	Unit	Major axis	Minor axis
Additional hypotheses			
Full lateral restraints		No	
Continuous flexural torsional restraint		No	
Local axis design		Yes	
Region between inflection points adjacent to support		No	
Span type		Simple	
Fastened to support		Unfastened	
Local shear		No	
Braced for sidesway in major axis		No	
Braced for sidesway in minor axis		No	
Loading condition		EOF	
Flange support condition		Fastened	

Member lateral unbraced lengths

Length (Lb) [in]		Restraint arrangement		Rotation restraint	
Top	Bottom	Top	Bottom	Top	Bottom
99.81	99.81	FF	FF	None	None

Compression member unbraced lengths

Length (L) [in]			Effective length factor (ke)		
Major axis	Minor axis		Major axis	Minor axis	
99.81	99.81	99.81	0.00	0.00	1.0

Design Checks

Axial Tension Design ✔

Axial tension

Ratio	:	0.11			
Capacity	:	24337.19 [Lb]	Reference	:	Sec. D3
Demand	:	2686.44 [Lb]	Ctrl Eq.	:	D30 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity(P_n/Ω):	[Lb]	28435.45	Sec. D2
Factored axial tensile fracture capacity(P_n/Ω):	[Lb]	24337.19	Sec. D3

Shear Design ✔

Shear in major axis 33

Ratio	:	0.00		
Capacity	:	7310.16 [Lb]	Reference	: Sec. G2
Demand	:	0.00 [Lb]	Ctrl Eq.	: D1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	7310.16	Sec. G2

Shear in minor axis 22

Ratio	:	0.00		
Capacity	:	5995.08 [Lb]	Reference	: Sec. G2
Demand	:	0.00 [Lb]	Ctrl Eq.	: D1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	5995.08	Sec. G2

Axial Compression Design ✔

Axial compression

Ratio	:	0.80		
Capacity	:	2816.68 [Lb]	Reference	: Sec. E2
Demand	:	2243.23 [Lb]	Ctrl Eq.	: D23 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial compression capacity(P_n/Ω):	[Lb]	2816.68	Sec. E2
Factored axial compression distortional buckling capacity(P_n/Ω):	[Lb]	21111.11	Sec. E4
Factored local buckling strength(P_n/Ω):	[Lb]	2816.68	Sec. E3

Flexural Design ✔

Bending about major axis, M33

Ratio	:	0.00		
Capacity	:	971.93 [Lb*ft]	Reference	: Sec. F2
Demand	:	0.00 [Lb*ft]	Ctrl Eq.	: D1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored section moment capacity(M_n/Ω):	[Lb*ft]	2317.74	Sec. F2
Factored lateral-torsional buckling strength(M_n/Ω):	[Lb*ft]	971.93	Sec. F2
Factored moment distortional buckling capacity(M_n/Ω):	[Lb*ft]	2101.38	Sec. F4
Factored local buckling strength(M_n/Ω):	[Lb*ft]	971.93	Sec. F3

Bending about the minor axis 22

Ratio	:	0.00

Capacity	: 1090.14 [Lb*ft]	Reference	: Sec. F2
Demand	: 0.00 [Lb*ft]	Ctrl Eq.	: D1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored section moment capacity(M_n/Ω):	[Lb*ft]	1090.14	Sec. F2
Factored local buckling strength(M_n/Ω):	[Lb*ft]	1090.14	Sec. F3

Web Crippling Design ✔

Web crippling

Ratio	: 0.00		
Capacity	: 799.58 [Lb]	Reference	: Sec. G5
Demand	: 0.00 [Lb]	Ctrl Eq.	: D1 at 0.00%

Intermediate results	Unit	Value	Reference
Factored web crippling capacity(P_n/Ω):	[Lb]	799.58	Sec. G5

Combined Actions Design ✔

Combined bending and web crippling interaction

Ratio	: 0.00		
Ctrl Eq.	: D1 at 0.00%	Reference	: Sec. H3

Intermediate results	Unit	Value	Reference

Combined bending and shear interaction

Ratio	: 0.00		
Ctrl Eq.	: D1 at 0.00%	Reference	: Sec. H2

Intermediate results	Unit	Value	Reference
Combined bending and shear interaction (x-x):	--	0.00	Sec. H2
Combined bending and shear interaction(y-y):	--	0.00	Sec. H2

Combined bending and tension interaction

Ratio	: 0.11		
Ctrl Eq.	: D30 at 0.00%	Reference	: Eq. H1.1-1

Intermediate results	Unit	Value	Reference
Combined tensile axial and bending (flexure with tension yielding):	--	0.11	Eq. H1.1-1
Combined tensile axial and bending (flexure with buckling):	--	-0.11	

Combined bending and compression interaction

Ratio	:	0.80			
Ctrl Eq.	:	D23 at 0.00%	Reference	:	Eq. H1.2-1

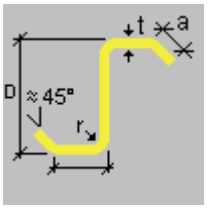
Intermediate results	Unit	Value	Reference
Combined bending and compression interaction:	--	0.80	Eq. H1.2-1

Member : 331 (OG - Zee - Bot) - OK

Section information

Section name: Std. Big Zee - 6 x 3 x 0.055 **(US)**

Dimensions



a	=	1.000	[in]	Lip
b	=	3.000	[in]	Flange width
D	=	6.000	[in]	Depth
r	=	0.187	[in]	Inside bend radius
t	=	0.055	[in]	Thickness

Properties	Unit	Major axis	Minor axis
Gross area of the section. (Ag)	[in2]	0.748	
Moment of Inertia (local axes) (I)	[in4]	4.452	2.135
Moment of Inertia (principal axes) (I')	[in4]	4.452	2.135
Bending constant for moments (principal axis) (J')	[in]	0.000	0.000
Radius of gyration (local axes) (r)	[in]	2.439	1.689
Radius of gyration (principal axes) (r')	[in]	2.439	1.689
Saint-Venant torsion constant. (J)	[in4]	7.70E-04	
Section warping constant. (Cw)	[in6]	12.653	
Distance from centroid to shear center (principal axis) (xo,yo)	[in]	0.000	0.000
Top elastic section modulus of the section (local axis) (Ssup)	[in3]	1.484	0.577
Bottom elastic section modulus of the section (local axis) (Sinf)	[in3]	1.484	0.577
Top elastic section modulus of the section (principal axis) (S'sup)	[in3]	1.484	0.577
Bottom elastic section modulus of the section (principal axis) (S'inf)	[in3]	1.484	0.577
Plastic section modulus (local axis) (Z)	[in3]	1.696	0.837
Plastic section modulus (principal axis) (Z')	[in3]	1.696	0.837
Polar radius of gyration. (ro)	[in]	2.967	
Area for shear (Aw)	[in2]	0.557	0.475
Torsional constant. (C)	[in3]	0.014	

Material : A653 SS 80-1

Properties	Unit	Value
Yield stress (Fy):	[Lb/in2]	80000.00
Tensile strength (Fu):	[Lb/in2]	82000.00
Elasticity Modulus (E):	[Lb/in2]	2.95E07
Shear modulus for steel (G):	[Lb/in2]	1.134615E07

Design Criteria

Description	Unit	Major axis	Minor axis
Additional hypotheses			
Full lateral restraints		No	
Continuous flexural torsional restraint		No	
Local axis design		Yes	
Region between inflection points adjacent to support		No	
Span type		Simple	
Fastened to support		Unfastened	
Local shear		No	
Braced for sidesway in major axis		Yes	
Braced for sidesway in minor axis		Yes	
Loading condition		IOF	
Flange support condition		Fastened	
Bearing length	[in]	3.00	

Member lateral unbraced lengths

Length (Lb) [in]		Restraint arrangement		Rotation restraint	
Top	Bottom	Top	Bottom	Top	Bottom
185.00	185.00	FF	FF	None	None

Compression member unbraced lengths

Length (L) [in]			Effective length factor (ke)		
Major axis	Minor axis		Major axis	Minor axis	
49.02	185.00	49.02	0.00	0.00	1.0

Design Checks

Axial Tension Design ✔

Axial tension

Ratio : 0.00
Capacity : 30673.98 [Lb]
Demand : 52.44 [Lb]
Reference : Sec. D3
Ctrl Eq. : D12 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial tension capacity(P_n/Ω):	[Lb]	35839.32	Sec. D2
Factored axial tensile fracture capacity(P_n/Ω):	[Lb]	30673.98	Sec. D3

Shear Design ✔

Shear in major axis 33

Ratio : 0.03
Capacity : 8054.03 [Lb]
Demand : -279.09 [Lb]
Reference : Sec. G2
Ctrl Eq. : D2 at 0.00%

Intermediate results	Unit	Value	Reference

Factored shear capacity(V_n/Ω):	[Lb]	8054.03	Sec. G2

Shear in minor axis 22

Ratio	: 0.42		
Capacity	: 2684.57 [Lb]	Reference	: Sec. G2
Demand	: 1126.39 [Lb]	Ctrl Eq.	: D28 at 0.00%

Intermediate results	Unit	Value	Reference
Factored shear capacity(V_n/Ω):	[Lb]	2684.57	Sec. G2

Axial Compression Design

Axial compression

Ratio	: 0.00		
Capacity	: 7216.71 [Lb]	Reference	: Sec. E3
Demand	: 7.39 [Lb]	Ctrl Eq.	: D19 at 0.00%

Intermediate results	Unit	Value	Reference
Factored axial compression capacity(P_n/Ω):	[Lb]	8850.89	Sec. E2
Factored axial compression distortional buckling capacity(P_n/Ω):	[Lb]	14180.27	Sec. E4
Factored local buckling strength(P_n/Ω):	[Lb]	7216.71	Sec. E3

Flexural Design

Bending about major axis, M33

Ratio	: 0.67		
Capacity	: 3333.47 [Lb*ft]	Reference	: Sec. F4
Demand	: -2241.15 [Lb*ft]	Ctrl Eq.	: D28 at 0.00%

Intermediate results	Unit	Value	Reference
Factored section moment capacity(M_n/Ω):	[Lb*ft]	5923.85	Sec. F2
Factored lateral-torsional buckling strength(M_n/Ω):	[Lb*ft]	4664.17	Sec. F2
Factored moment distortional buckling capacity(M_n/Ω):	[Lb*ft]	3333.47	Sec. F4
Factored local buckling strength(M_n/Ω):	[Lb*ft]	3761.71	Sec. F3

Bending about the minor axis 22

Ratio	: 0.35		
Capacity	: 1918.79 [Lb*ft]	Reference	: Sec. F3
Demand	: -678.72 [Lb*ft]	Ctrl Eq.	: D2 at 0.00%

Intermediate results	Unit	Value	Reference
Factored section moment capacity(M_n/Ω):	[Lb*ft]	2304.60	Sec. F2
Factored local buckling strength(M_n/Ω):	[Lb*ft]	1918.79	Sec. F3

Web Crippling Design ✔

Web crippling

Ratio	:	0.05			
Capacity	:	2009.74 [Lb]	Reference	:	Sec. G5
Demand	:	105.74 [Lb]	Ctrl Eq.	:	D28 at 26.50%

Intermediate results	Unit	Value	Reference
Factored web crippling capacity(P_n/Ω):	[Lb]	2009.74	Sec. G5

Combined Actions Design ✔

Combined bending and web crippling interaction

Ratio	:	0.23			
Ctrl Eq.	:	D28 at 0.00%	Reference	:	Sec. H3

Intermediate results	Unit	Value	Reference

Combined bending and shear interaction

Ratio	:	0.67			
Ctrl Eq.	:	D28 at 0.00%	Reference	:	Sec. H2

Intermediate results	Unit	Value	Reference
Combined bending and shear interaction (x-x):	--	0.67	Sec. H2
Combined bending and shear interaction(y-y):	--	0.28	

Combined bending and tension interaction

Ratio	:	0.95			
Ctrl Eq.	:	D28 at 0.00%	Reference	:	Eq. H1.1-2

Intermediate results	Unit	Value	Reference
Combined tensile axial and bending (flexure with tension yielding):	--	0.61	Eq. H1.1-1
Combined tensile axial and bending (flexure with buckling):	--	0.95	Eq. H1.1-2

Combined bending and compression interaction

Ratio	:	0.95			
Ctrl Eq.	:	D28 at 0.00%	Reference	:	Eq. H1.2-1

Intermediate results	Unit	Value	Reference
Combined bending and compression interaction:	--	0.95	Eq. H1.2-1

APA SOLAR RACKING
An ARRAY Company

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CONNECTIONS CHECK

(ASCE7-16, ASD)

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Parts Details (in. & lbs.)

Part Details	Depth (Dia.), in.	Width, in.	Material/ Wall Thickness, in.	Ultimate Strength, psi	Edge Distance, in.	Bolt Couple Distance, in.	
NS Chord	6	2	0.108	82000	1.5		
Knee Brace	3	2	0.078	82000	1.25		
Zee Purlin	6	3	0.055	82000	2	4.75	
Post	2.375		0.095	65300	2		
Roll Bar	2.25		0.078	50000	1		

Governing Loads

Knee Brace - Max(Tension, Compression)	2688
Foundation Post Axial	3598
NS Chord - Axial	1593
Zee Purlin - Axial	413
Zee Purlin - Shear	1300
Zee Purlin - Moment	3635
Uplift Module Pressure, Pa	1453

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Knee Brace-Foundation Post

Safety Factor, Ω	2.5

Governing Load, P_u	2688.07 lbs.	2.688074 kips
	Knee Brace - Max(Tension, Compression)	
Bolt Diameter, d	0.5 in.	
Tensile Strength of Bolt, P_t	150000 psi	150 ksi
Shear Strength of Bolt, P_s	6344.05 lbs.	6.34 kips

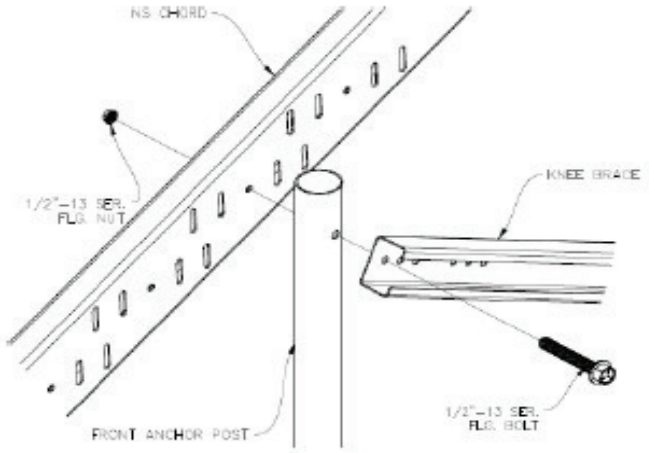
Bearing Capacity	P_n =	$C*m_f*d*t*F_u$	**AISI J3.3.1-1**

C =	3
m_f =	1
t_{KB} =	0.078 in.
F_{uKNEE} =	82000 psi

P_n/Ω =	3837.6 lbs	3.838 kips

Minimum Edge Distance Required =	**0.75 in.**	**AISC Table J3.4**
Provided Edge Distance =	**1.25 in.**	**PASS**

Pn =	**3.838 >**	**P_u =**	**2.68807355**	**PASS**
Ps =	**6.344 >**	**P_u =**	**2.68807355**	**PASS**



***Knee Brace-Brace clamp connection physically tested for no deformation at maximum 3400 lbs.**

****Post-Pile Set screw connection physically tested for no movement at maximum 11,000 lbs.**

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Foundation Post-NS Chord

Safety Factor, Ω	2.5	

Governing Load, P_u	3598.49 lbs.	3.598491 kips
	Foundation Post Axial	
Bolt Diameter, d	0.5 in.	
Tensile Strength of Bolt, P_t	150000 psi	150 ksi
Shear Strength of Bolt, P_s	6344.05 lbs.	6.344 kips

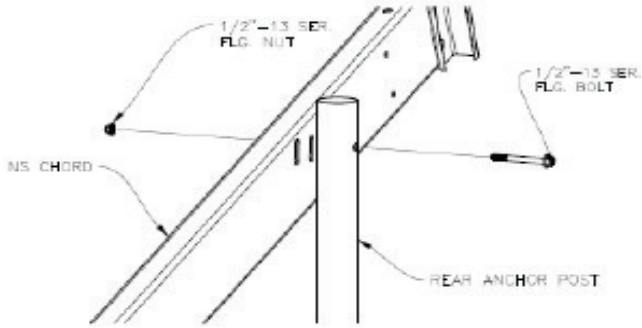
Bearing Capacity	P_n =	$C*m_f*d*t*F_u$	**AISI J3.3.1-1**

C =	3	
m_f =	1	
$t_{nschord}$ =	0.108 in.	
$F_{uNS\ CHORD}$ =	82000 psi	***Two shear walls on post**

P_n/Ω =	5313.6 lbs.	5.3136 kips

Minimum Edge Distance =	**0.75 in.**	**AISC Table J3.4**
Provided Edge Distance =	**2 in.**	**PASS**

Pn =	**5.314 >**	**P_u =**	**3.59849109**	**PASS**
Ps =	**6.344 >**	**P_u =**	**3.59849109**	**PASS**



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Zee-Zee Splice

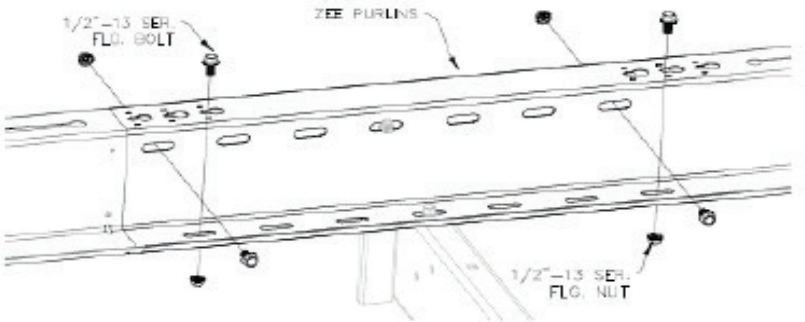
Safety Factor, Ω	2.5		
Maximum Moment in Zee	3635.28	ft*lbs	
Distance Between Bolts	4.75	in.	
Overlap Splice force Reduction	0.66		
Number of Bolt couples, X_B	3		
Governing Load, $P_u = M/d/X_b$	2020.45	lbs	2.020 kips
	Zee Purlin - Moment		
Bolt Diameter, d	0.5	in.	
Tensile Strength of Bolt, P_t	150000	psi	150 ksi
Shear Strength of Bolt, P_s	6344.05	lbs	6.344 kips

Bearing Capacity	$P_n =$	$C*m_f*d*t*F_u$	**AISI J3.3.1-1**

C =	3	
m_f =	1	
t_Z =	0.055	in.
F_{uZEE} =	82000	psi

P_n/Ω =	2706 lbs.	2.706 kips	
Minimum Edge Distance =		**0.75 in.**	**AISC Table J3.4**
Provided Edge Distance =		**2 in.**	**PASS**

Pn =	**2.706 >**	**P_u =**	**2.020**	**PASS**
Ps =	**6.344 >**	**P_u =**	**2.020**	**PASS**



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Roll Bar-NS Chord

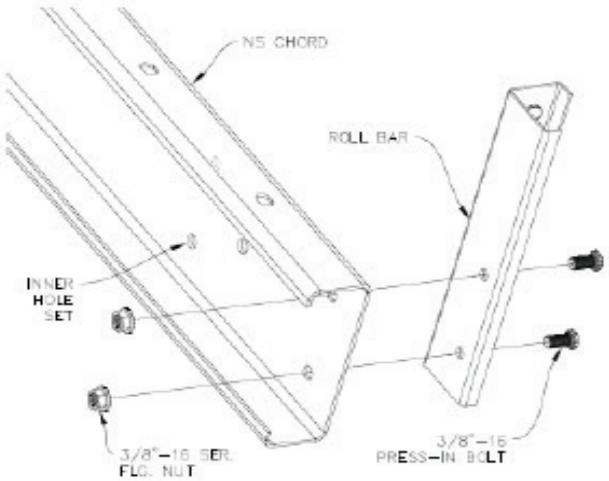
Safety Factor, Ω	2.5	
Governing Load, P_u	2599.58 lbs.	2.59958 kips
	Zee Purlin - Shear	
Bolt Diameter, d	0.375 in.	
Tensile Strength of Bolt, P_t	75000 psi	75 ksi
Shear Strength of Bolt, P_s	1744.5 lbs.	1.745 kips
Number of bolts, n	2	

Bearing Capacity	P_n =	$C*m_f*d*t*F_u*2$	**Two Bolts**	**AISI J3.3.1-1**

C =	3	
m_f =	1	
t_{RB} =	0.078	in.
$F_{uROLL\ BAR}$ =	50000	psi

P_n/Ω =	3510 lbs.	3.510 kips	
Minimum Edge Distance =	**0.5625**	**in.**	
Provided Edge Distance =	**1**	**in.**	**PASS**

Pn =	**3.510 >**	**P_u =**	**2.59958**	**PASS**
Ps =	**3.489 >**	**P_u =**	**2.59958**	**PASS**



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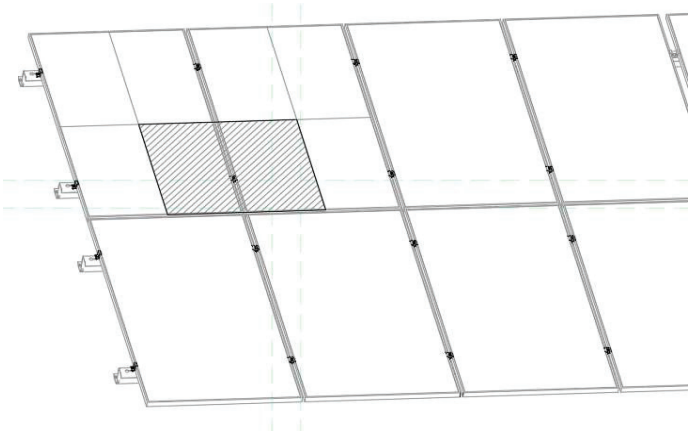
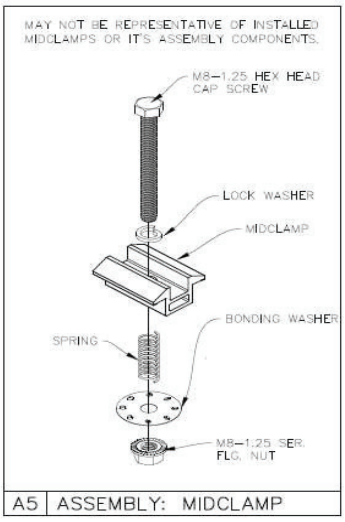
Module Clamp

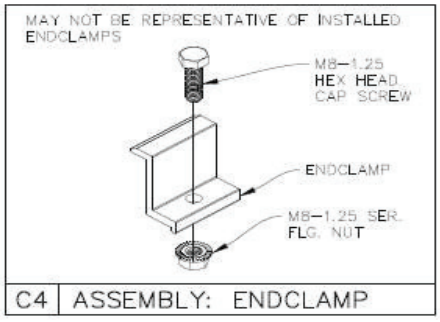
Safety Factor, Ω	2	
Governing Load, P_u	1453 Pa	823 lbs. per panel
Bolt Diameter, d	0.3125 in.	
Torque	15.6 ft. - lbs.	
Coefficient of Friction	0.2	
Bolt Tension, T_u	2995 lbs.	



*Half panel load per Clamp

P_n/Ω =	1497.6 lbs.			
Pn =	**1498 >**	**P_u =**	**412**	**PASS**





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

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RACKING PRODUCT LINE

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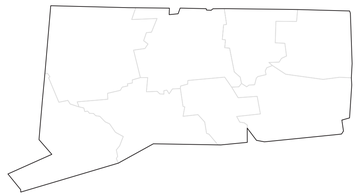
USE WITH THE FOLLOWING PRINTS & PACKAGES. INCLUDE WITH SUBMISSION TO PERMIT/INSPECTION AGENCY:

- ☑ CALCULATION PACKAGE: 260106 CALC SET – STAMPED
- ☑ FOUNDATION DESIGN REPORT (SITE SPECIFIC, & ONLY WHERE REQUIRED BY EOR OR AHJ)



SITE ADDRESS: 41-43 LOHSE ROAD
WILLINGTON, CT 06279

REVISION: A

PERMIT SET/
STRUCTURAL PACKET

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SOLAR PHOTOVOLTAIC GROUND MOUNT

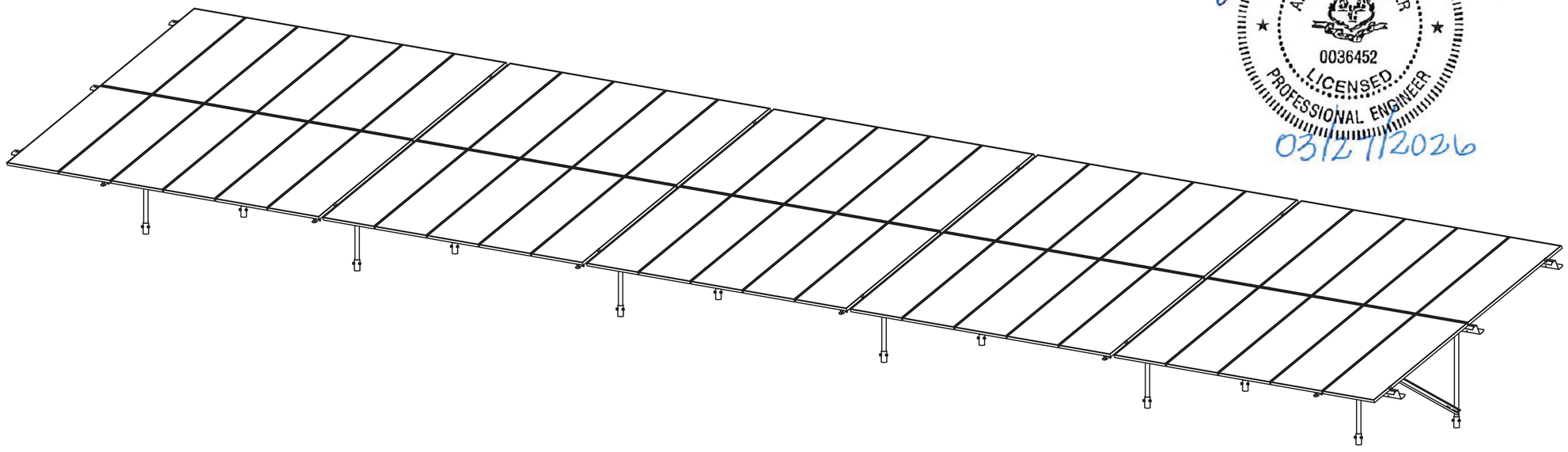

IMAGE FOR REFERENCE ONLY

STATE OF CONNECTICUT
ANNE M. GRASBER
0036452
LICENSED
PROFESSIONAL ENGINEER

03/27/2026

SHEET INDEX		
STRUCTURAL		
S-000	A	STRUCTURAL COVER
S-100	A	RACKING OVERVIEW
S-300	A	STRUCTURAL COMPONENTS
S-400	A	CONNECTIONS
S-500	A	STRUCTURAL PURLINS
S-600	A	CLAMPS & BRACES

GOVERNING STRUCTURAL CODE/S

2021 INTERNATIONAL BUILDING CODE

PACKAGE COVERAGE – LOADING AND SETUP RANGES & CONSTANTS

TILT ANGLES:	25°
MAX GROUND SNOW LOAD (PSF):	35
MAX WIND LOADS (MPH):	109
WIND EXPOSURE CATEGORY:	C
MAX SEISMIC Ss:	0.179 g
MAX SEISMIC S1:	0.055 g

PV MODULE: FIRST SOLAR SERIES 6 PLUS BIFACIAL

MAX. PANEL WIDTH:	49.02"
MAX. PANEL LENGTH:	79.69"
MAX. PANEL HEIGHT:	2.00"
MAX. PANEL WEIGHT:	75.00 LBS
RISK CATEGORY:	I
MAX FRONT LIP CLEARANCE:	66"

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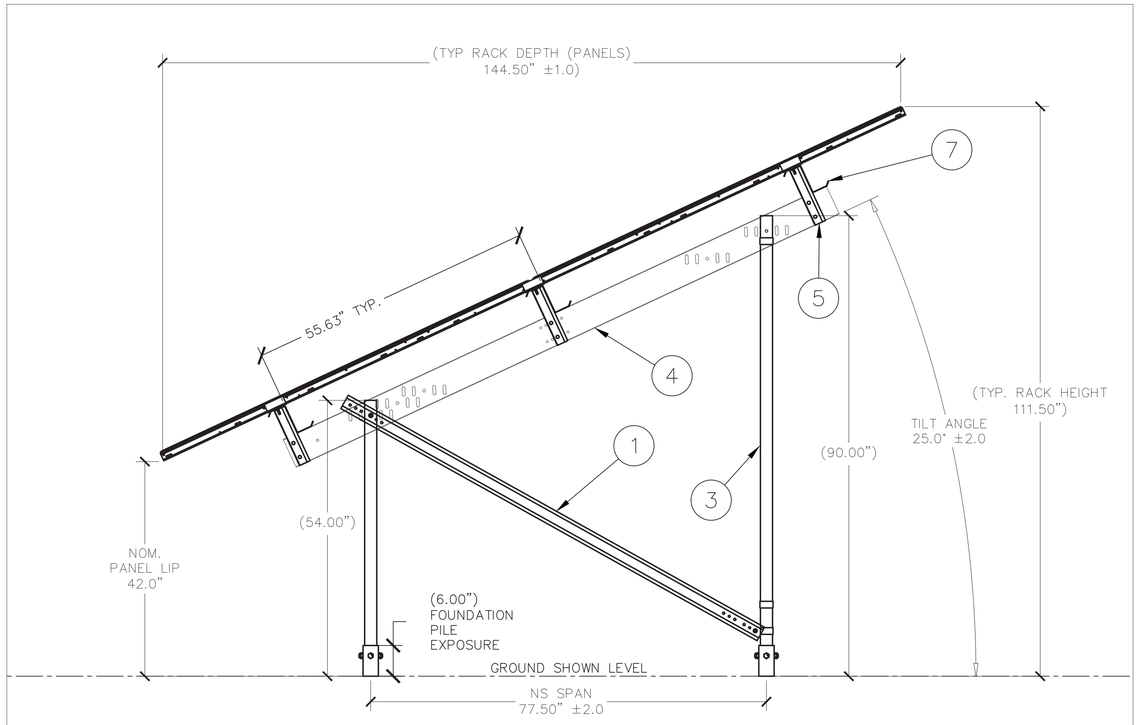


PARTS LIST (BALLOONS THIS SHEET)			
ITEM	DESCRIPTION	SHAPE	DETAIL / SHEET
1	KNEE BRACE	CEE	B2 / S.300
3	FOUNDATION POST	POST	A6 / S.300
4	NS CHORD	CEE	D1 / S.300
5	ROLL BAR	MIXED	A4 / S.300
6	TRANSVERSE BRACE	ZEE	D5 / S.600
7	ZEE PURLIN	HAT	E1 / S.300
8	CABLE BRACE	CABLE	D4/ S.600

SEE VIEW A1 ON S600 FOR VIEW OF TRANSVERSE BRACE

NOTES:

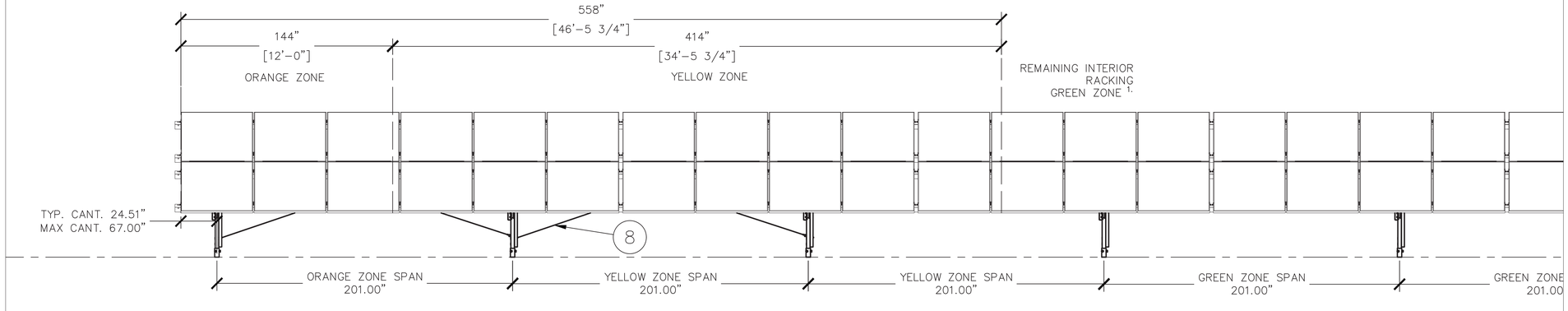
1. STANDARD FRONT LIP HEIGHT AND TILT ANGLES MEASURED FROM LEVEL GROUND
2. FOUNDATION TESTING, WHERE REQUIRED, SHALL BE DONE ACCORDING TO THE "QUICK TEST METHOD" PER ASTM D1143 & D3689.
3. PRINT DIMENSIONS: DIMENSIONS SHOWN REFLECT POST HEIGHTS ON LEVEL GROUND. ON UNEVEN TERRAIN, REAR FOUNDATION POST HEIGHT WILL BE DICTATED BY FRONT LIP HEIGHT, PANEL TILT, AND NORTH/SOUTH POST SPACING.
4. ADDITIONAL TOLERANCES: POST PLUMBNESS SHOULD BE WITHIN ±2°
5. SPECIAL INSPECTIONS (WHERE REQUIRED):

SPECIAL INSPECTIONS ARE NOT REQUIRED BY APA SOLAR OR THE STRUCTURAL ENGINEER OF RECORD, THE JDI GROUP, WHERE REQUIRED BY OWNER, CUSTOMER, AND/OR AUTHORITY HAVING JURISDICTION, MINIMUM INSPECTION SHALL FOLLOW IBC OR LOCAL AHJ SPECIAL INSPECTIONS GUIDELINES.

NOTES: PV MODULE & MODULE RELATED DIMENSIONS THIS DETAIL ARE MAX ALLOWABLE, UNLESS SPECIFIED ELSEWHERE IN THIS PACKET.
DIMENSIONS TO GROUND ARE NOMINAL FROM LEVEL GROUND.

C1 | PROFILE VIEW: RACK OVERVIEW

*IMAGE REFERENCE ONLY.SHOWS STRUCTURAL MAXIMUMS. NOT INDICATIVE OF REQUIRED QUANTITIES.PLEASE REFER TO SITE SPECIFIC BUILD PLANS FOR SITE SPECIFIC REQUIRED SPANS/QUANTITIES.



NOTES: MAX CANTILEVER MEASURED FROM EDGE OF PANEL TO POST CENTER.
MAX SPAN MEASURED FROM PILE CENTER TO PILE CENTER.
POST QUANTITY AS REQUIRED TO SATISFY CANTILEVERS, SPANS, ROW LENGTH, & PANEL QUANTITY
1. WHERE ALLOWABLE PER THE CALCULATIONS PACKAGE. EXTERIOR/CORNER AREAS SHALL REMAIN ZONED YELLOW. SEE EXPLAINATION IN CALC PACKAGE.
SITE SPECIFIC BUILD PLANS SHALL DESIGNATE EXTERIOR/CORNER SPANS.

A1 | ELEVATION VIEW FROM FRONT (NORTH-FACING)

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PROFESSIONAL SEAL/STAMP

STATE OF CONNECTICUT
ANDREW WILLIAMS
0036452
LICENSED
PROFESSIONAL ENGINEER
03/12/2026

DOCUMENT NAME: STRUCTURAL PRINT PACKAGE
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SITE CITY, STATE, ZIP: WILLINGTON, CT 06279

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REV.	DESCRIPTION	DATE
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DRAWN	REVIEWED	APPROVED	SIZE
HB	CW	JDI	D

SHEET NAME: RACKING OVERVIEW
PROJECT NUMBER: 260106
DRAWING NUMBER: S.100
REV.: A

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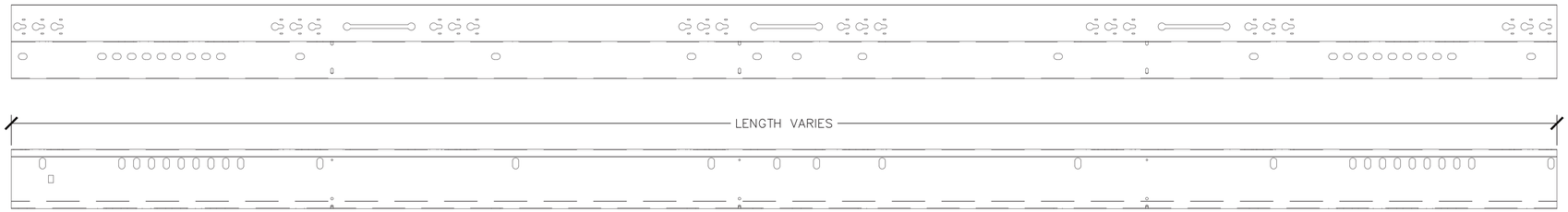
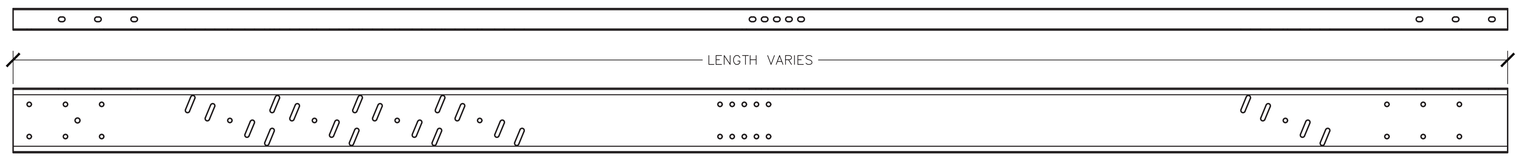
3/13/2026 3:30:27 PM MASTER DRAWING 11.07 c:\users\hvalenzuela\apa solar ltd\apa - projects 2026 - docs\260106_willington_ct - revs - antonopoulos\3.0 design and structural analysis\apa-titan_ct - revs - antonopoulos.dwg

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

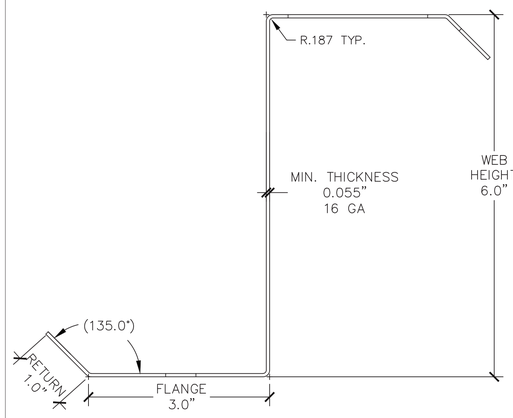


E1 | SIDE/TOP: ZEE PURLIN

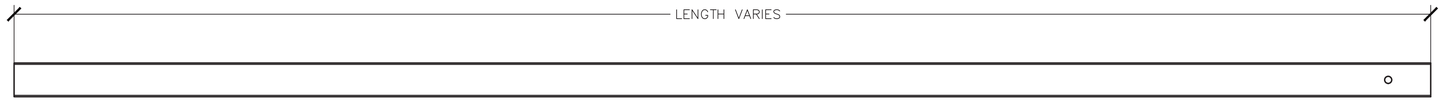


D1 | SIDE/TOP: NS CHORD

MATERIAL: A653 STR. STL.
STRENGTH: MIN. YIELD (Fy): 80 KSI.

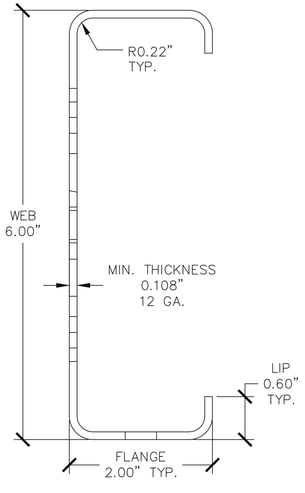


D5 | PART: ZEE PURLIN



C1 | SIDE: FOUNDATION POST

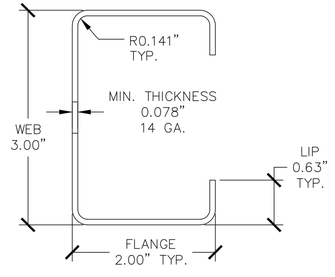
MATERIAL: A653 HSLAS
STRENGTH: MIN. YIELD (Fy): 80 KSI.



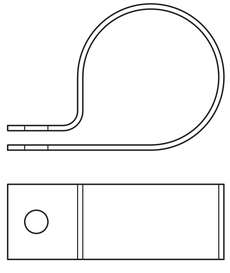
A1 | PROFILE: NS CHORD

B2 | SIDE: KNEE BRACE

MATERIAL: A653 SS GR 80 CL1
STRENGTH: MIN. YIELD (Fy): 80 KSI.

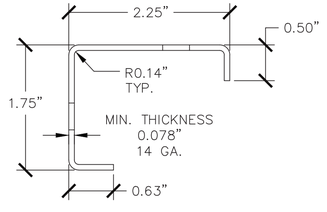


A2 | PROFILE: KNEE BRACE

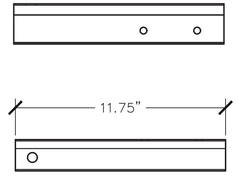


A3 | SIDE: BRACE CLAMP

MATERIAL: A572 CF STR. STL.
STRENGTH: MIN. YIELD (Fy): 30 KSI.

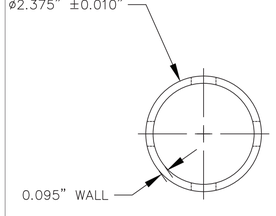


A4 | PROFILE: ROLL BAR



A5 | SIDE/TOP: ROLL BAR

MATERIAL: A570 CF STR. STL.
STRENGTH: MIN. YIELD (Fy): 50 KSI.



A6 | PROFILE: FOUNDATION POST

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HB	CW	JDI	D

SHEET NAME
STRUCTURAL COMPONENTS

PROJECT NUMBER
260106

DRAWING NUMBER
S.300

REV.
A

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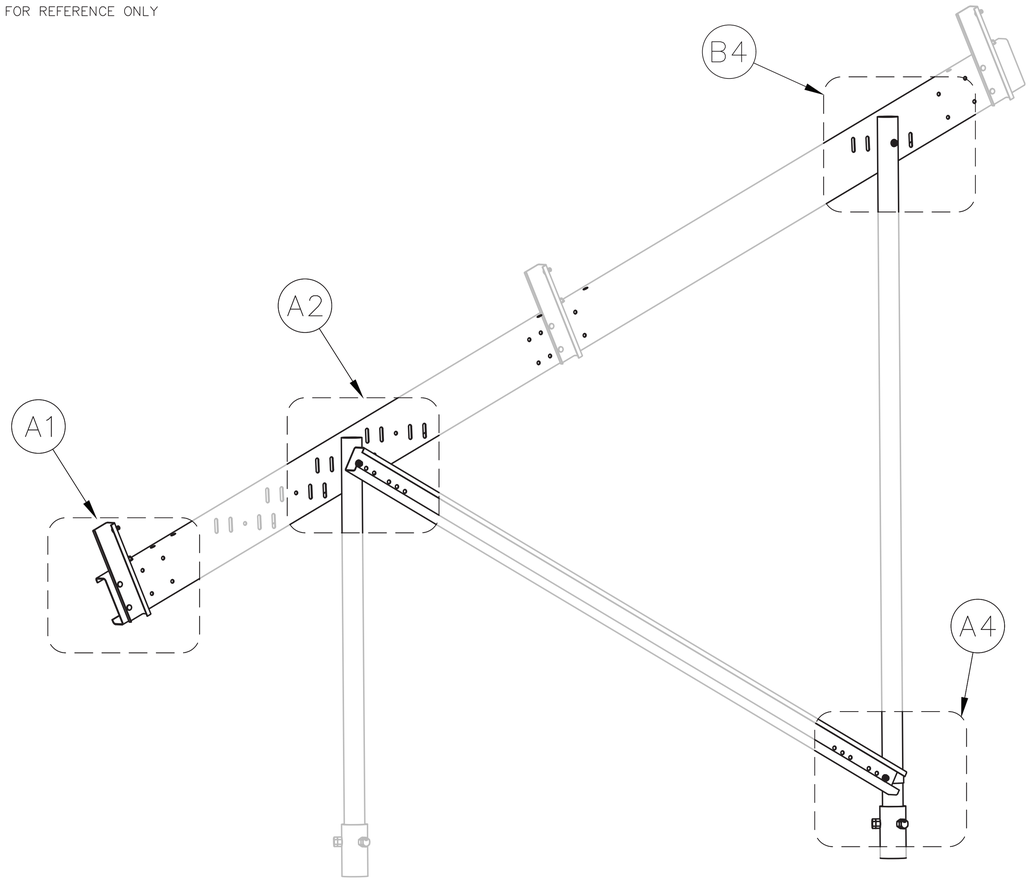
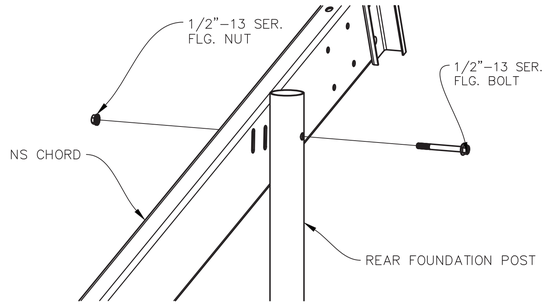


B1 | FOUNDATION SET CONNECTIONS OVERVIEW

IMAGE FOR REFERENCE ONLY



B4 | CONNECTION: REAR POST–TO–NS CHORD

NOTES:

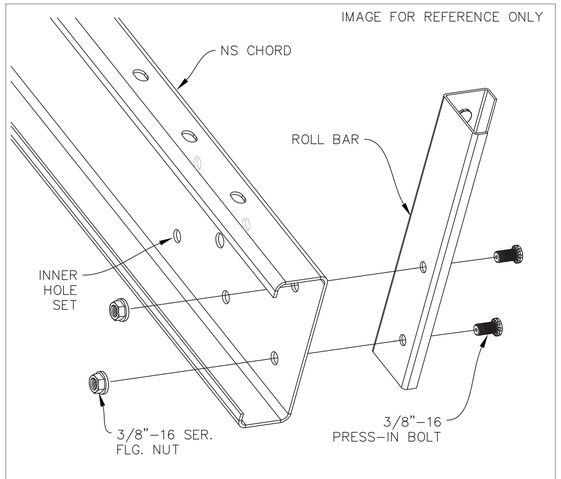
1. HARDWARE TORQUE VALUES:

   3/8"–16 STAINLESS STEEL
   MIN.: 17.5 FT–LBS
   NOM.: 19.6 FT–LBS
   MAX.: 50.0 FT–LBS

   1/2"–13 CARBON STEEL GRADE 5 OR BETTER
   MIN: 40 FT–LBS

2. DEPICTED HARDWARE AND PART PLACEMENT NOT INDICATIVE OF PREFERRED OR REQUIRED POSITIONS.
3. HOLE/SLOT PATTERNS IN PARTS ALLOW FOR DEVIATION FROM NOMINAL DIMENSIONS, MULTIPLE PART POSITIONS, AND MULTIPLE TILT ANGLES.
4. SEE INSTALLATION MANUAL FOR SETUP INSTRUCTIONS.
5. SERRATED FLANGED BOLTS MAY BE REPLACED WITH EQUIVALENT PRESS–IN BOLTS. SEE NOTE 10 FOR MORE OPTIONS.
6. PRESS–IN BOLTS, WHERE PRESENT, TO BE INSTALLED TO MANUFACTURERS RECOMMENDED VALUES.
7. OTHER SPECIFIC CONNECTIONS ELSEWHERE IN PRINT SET.
8. ROLL BAR MUST CONNECT TO THE CORRECT HOLES IN CEE CHANNEL (INNER, OR OUTER TYPICALLY), AS DETERMINED BY PV MODULE MANUFACTURERS ALLOWABLE CLAMPING ZONE.
9. USE CORRECT NOMINAL HOLES IN CEE TO CONNECT TO FOUNDATION POST, AS INDICATED. ADJACENT HOLES AND SLOTS FOR FIELD ADJUSTMENTS.
10. SERRATED HARDWARE MAY BE REPLACED WITH EQUIVALENT HARDWARE WITH WASHERS IF NECESSARY.
11. IN ALL DETAILS, THE PRESENCE OF TWO SETS OF HARDWARE INDICATES THE REQUIREMENT OF TWO SETS OF HARDWARE.
12. STAINLESS STEEL HARDWARE MAY BE REPLACED WITH GALVANIZED STEEL HARDWARE OR CORROSION AND STRENGTH COMPARABLE HARDWARE MATERIALS AND FINISHES.
13. UNLESS NOTED OTHERWISE, ALL HARDWARE MAY BE INSTALLED IN EITHER DIRECTION (NUT/BOLT MAY BE ON EITHER SIDE OF CONNECTION).
14. WHEN NECESSARY, ADDITIONAL HOLES MAY BE DRILLED TO COMPLETE CONNECTION. ENGINEERING SHALL BE CONTRACTED PRIOR TO FIELD MODIFICATIONS OF PARTS.

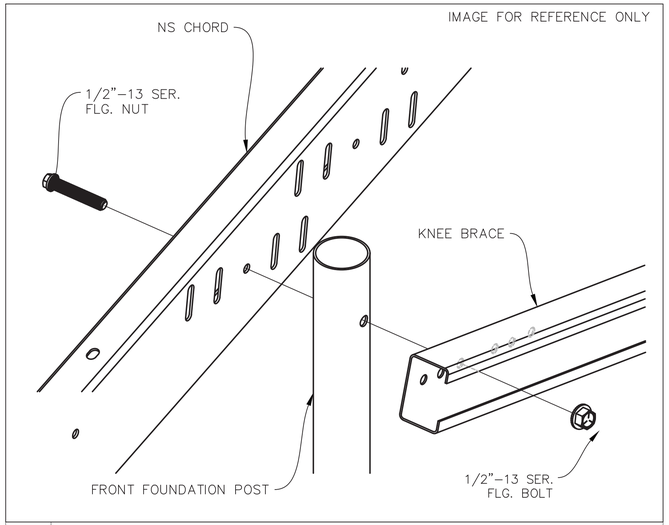
IMAGE FOR REFERENCE ONLY



ATTACHED TO OUTER HOLE SET FOR REFERENCE ONLY. SEE NOTES.

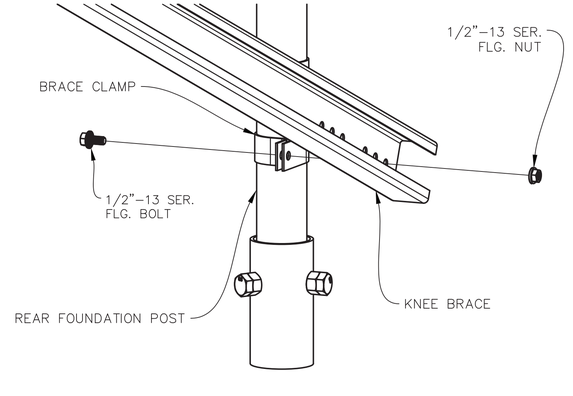
A1 | CONNECTION: ROLL BAR–TO–NS CHORD

IMAGE FOR REFERENCE ONLY



A2 | CONNECTION: KNEE BRACE–TO–FRONT POST

IMAGE FOR REFERENCE ONLY



A4 | KNEE BRACE–TO–REAR POST

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0036452
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03/12/2026

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SITE CITY, STATE, ZIP: WILLINGTON, CT 06279

SHEET REVISIONS

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HB	CW	JDI	D

SHEET NAME: CONNECTIONS

PROJECT NUMBER: 260106

DRAWING NUMBER: S.400

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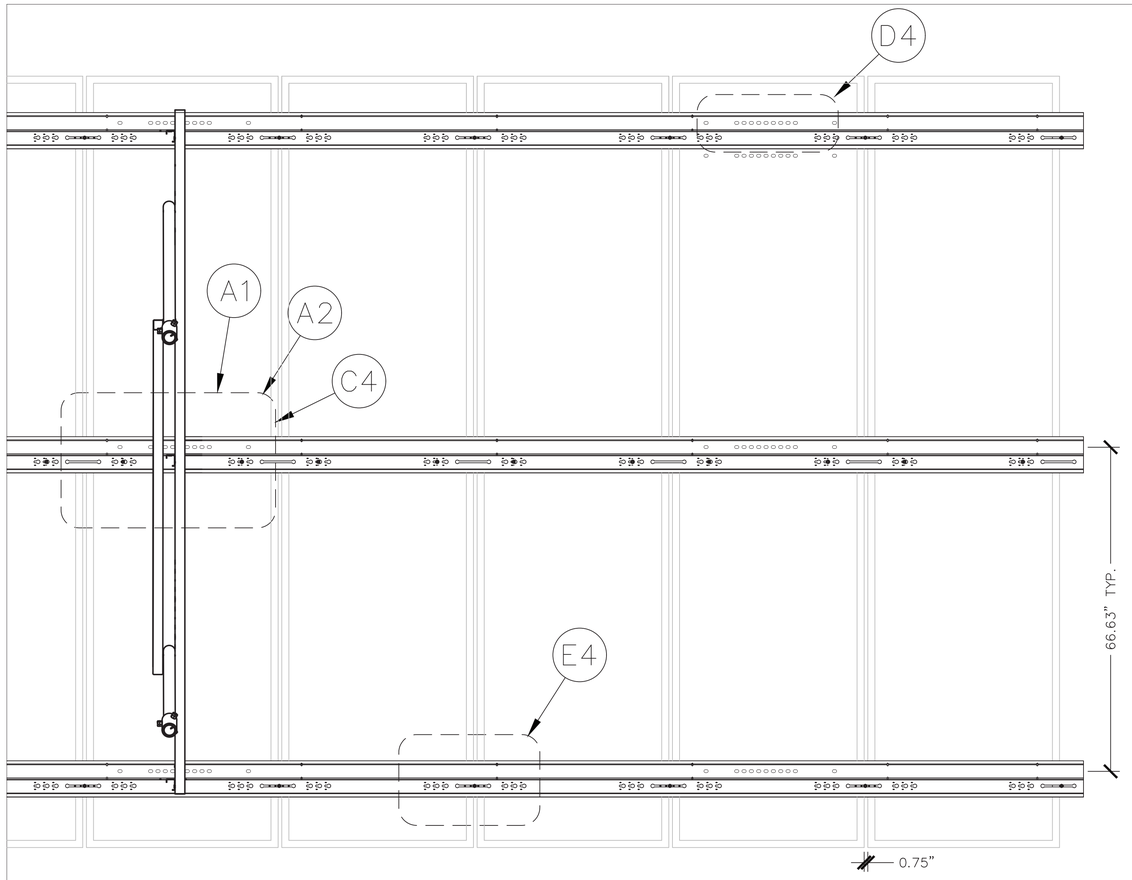
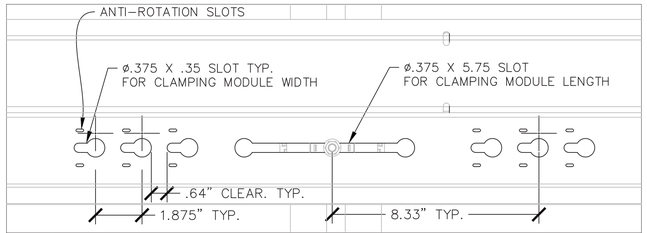
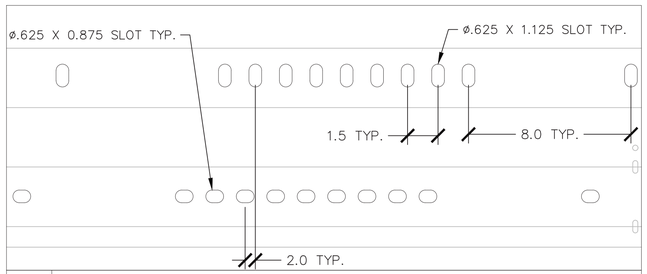


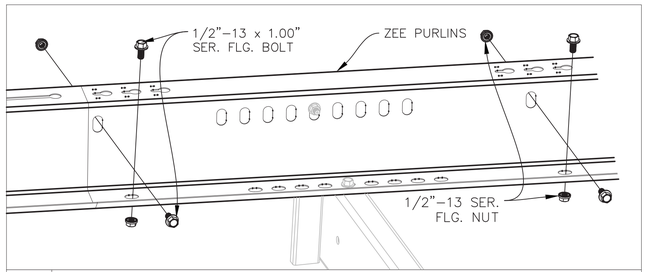
B1 | OVERVIEW: ZEE PURLIN CONNECTIONS (RACK UNDERSIDE)



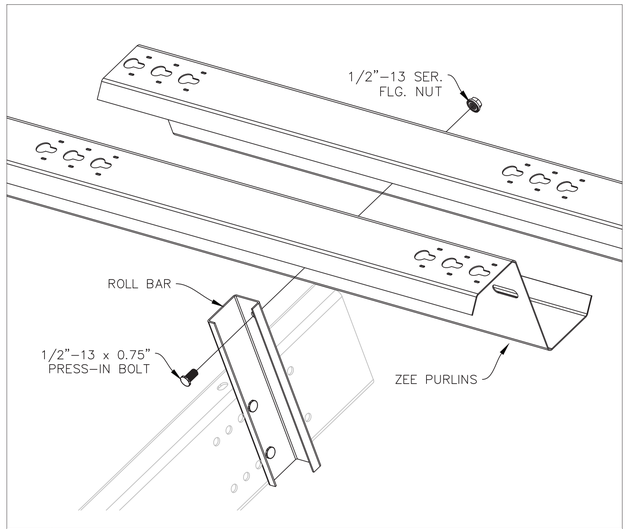
E4 | DETAIL: ZEE PURLIN PANEL SLOTS



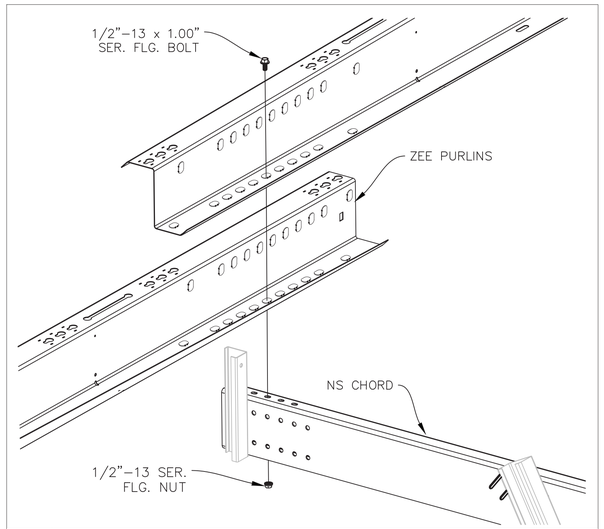
D4 | DETAIL: ZEE PURLIN SPLICE SLOTS



C4 | CONNECTION: ZEE-TO-ZEE PURLINS SPLICE



A1 | CONNECTION: ZEE PURLINS-TO-ROLL BAR



A2 | CONNECTION: ZEE PURLINS-TO-NS CHORD

NOTES:

1. HARDWARE TORQUE VALUES:

   3/8"-16 STAINLESS STEEL
   MIN.: 17.5 FT-LBS
   NOM.: 19.6 FT-LBS
   MAX.: 50.0 FT-LBS

2. DEPICTED HARDWARE AND PART PLACEMENT NOT INDICATIVE OF PREFERRED OR REQUIRED POSITIONS.
3. HOLE/SLOT PATTERNS IN PARTS ALLOW FOR DEVIATION FROM NOMINAL DIMENSIONS, MULTIPLE PART POSITIONS, AND MULTIPLE TILT ANGLES.
4. SEE INSTALLATION MANUAL FOR SETUP INSTRUCTIONS.
5. SERRATED FLANGED BOLTS MAY BE REPLACED WITH EQUIVALENT PRESS-IN BOLTS.
6. PRESS-IN BOLTS, WHERE PRESENT, TO BE INSTALLED TO MANUFACTURERS RECOMMENDED VALUES.
7. OTHER SPECIFIC CONNECTIONS ELSEWHERE IN PRINT SET.
8. SERRATED HARDWARE MAY BE REPLACED WITH EQUIVALENT HARDWARE WITH WASHERS IF NECESSARY.
9. IN ALL DETAILS, THE PRESENCE OF TWO SETS OF HARDWARE INDICATES THE REQUIREMENT OF TWO SETS OF HARDWARE.
10. STAINLESS STEEL HARDWARE MAY BE REPLACED WITH GALVANIZED STEEL HARDWARE OR CORROSION AND STRENGTH COMPARABLE HARDWARE MATERIALS AND FINISHES.
11. UNLESS NOTED OTHERWISE, ALL HARDWARE MAY BE INSTALLED IN EITHER DIRECTION (NUT/BOLT MAY BE ON EITHER SIDE OF CONNECTION).
12. WHEN NECESSARY, ADDITIONAL HOLES MAY BE DRILLED TO COMPLETE CONNECTION. ENGINEERING SHALL BE CONTRACTED PRIOR TO FIELD MODIFICATIONS OF PARTS.
13. CONNECTION IN DETAIL A1 & A2 SHOWN IN NOMINAL POSITION. ACTUAL CONNECTION MAY BE ±1.5".
14. WHEN CONNECTIONS IN DETAIL A1 & A2 ARE AT THEIR MAX/MIN POSITIONS (±2") INTERFERING SPLICE HARDWARE MAY BE RELOCATED TO NEXT NEAREST SLOTS.
15. WHERE PRESENT, TRANSVERSE BRACE MAY UTILIZE LOWER SPLICE BOLTS. SEE CONNECTIONS SHEET FOR MORE INFORMATION.
16. ZEE-TO-ZEE SPLICE SHALL ALWAYS OVERLAP MINIMUM 32", AS INDICATED, EXCEPT AT ENDS OF ROW, WHERE NO SPLICE IS REQUIRED.
17. SPLICE MAY OVERLAP IN EITHER DIRECTION.
18. ZEE PURLIN MATERIAL AND FINISH ARE MANUFACTURED TO SPECIFICATIONS THAT MEET OR EXCEED OUR STANDARD PRODUCT WARRANTY.
19. ZEE PURLINS GALVANIZED TO CONFORM TO A MINIMUM THICKNESS DESIGNATION EQUAL TO G90 OR INLINE GALVANIZED TO COMPARABLE THICKNESS AS PER ASTM A1057.
20. TYPICAL ZEE PURLIN RETURN LIP ANGLE SHOWN. ACTUAL ANGLE MAY VARY.
21. SLOT DIMENSIONS FOR REFERENCE ONLY. FINAL SHAPE, FREQUENCY, AND DIMENSIONS MAY VARY.
22. LENGTH OF PURLIN VARIES BY PROJECT AND LOCATION WITHIN ARRAY.

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STATE OF CONNECTICUT
JOSEPH D. IMMER
0036452
LICENSED PROFESSIONAL ENGINEER
03/17/2026

DOCUMENT NAME:
STRUCTURAL PRINT PACKAGE
SITE STREET ADDRESS:
41-43 LOHSE ROAD
SITE CITY, STATE, ZIP:
WILLINGTON, CT 06279

SHEET REVISIONS

REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	3/13/2026

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DRAWN	REVIEWED	APPROVED	SIZE
HB	CW	JDI	D

SHEET NAME
STRUCTURAL PURLINS

PROJECT NUMBER
260106

DRAWING NUMBER
S.500

REV.
A

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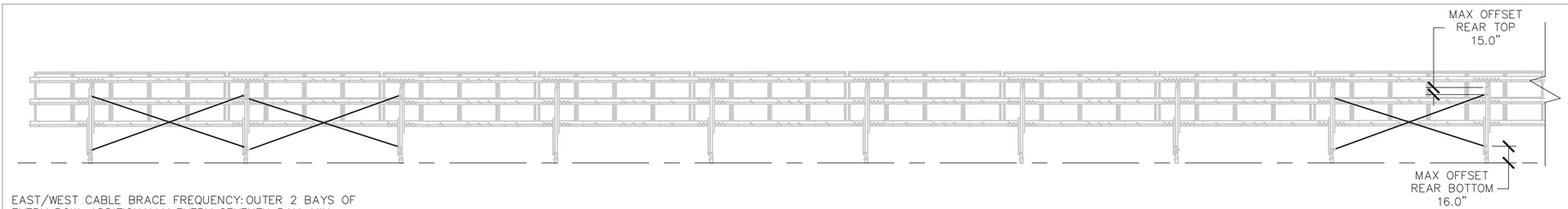
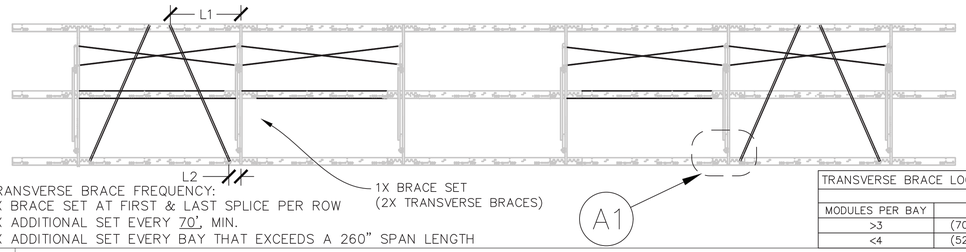


EAST/WEST CABLE BRACE FREQUENCY: OUTER 2 BAYS OF EVERY ROW. ADDITIONALLY EVERY SEVENTH BAY, MIN

E1 | REAR VIEW: CABLE BRACE FREQUENCY

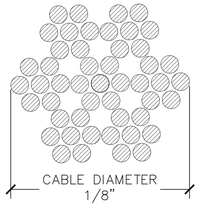


TRANSVERSE BRACE FREQUENCY:
1X BRACE SET AT FIRST & LAST SPLICE PER ROW
1X ADDITIONAL SET EVERY 70', MIN.
1X ADDITIONAL SET EVERY BAY THAT EXCEEDS A 260" SPAN LENGTH

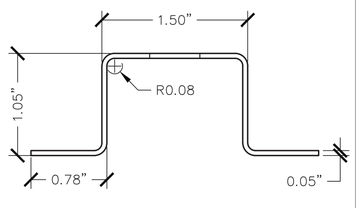
TRANSVERSE BRACE LOCATION FROM CHORD		
MODULES PER BAY	L1	L2
>3	(70.25")	(12.00")
<4	(52.00")	(14.00")

D1 | BOTTOM VIEW: TRANSVERSE BRACE LOCATIONS

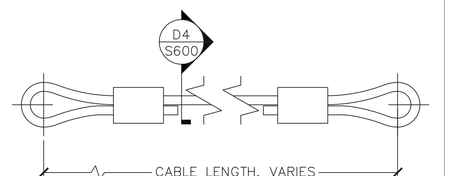
MIN. BREAKING STRENGTH: 1,700 LBS



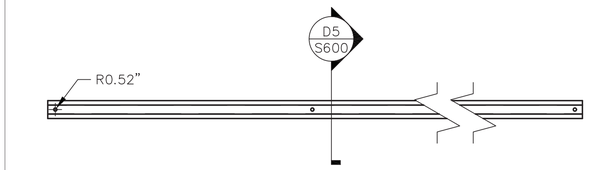
D4 | SEC.: CABLE BRACE



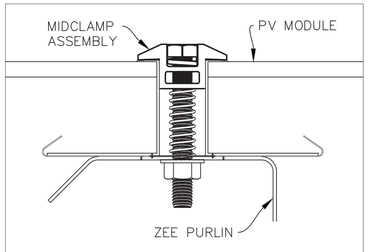
D5 | SECTION: TVS BRACE



C1 | PART: CABLE BRACE

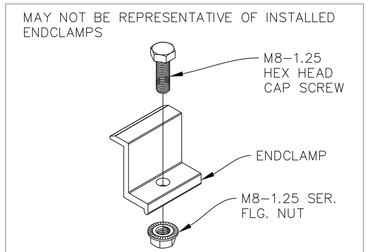


C2 | PART: TRANSVERSE BRACE (TVS BRACE)

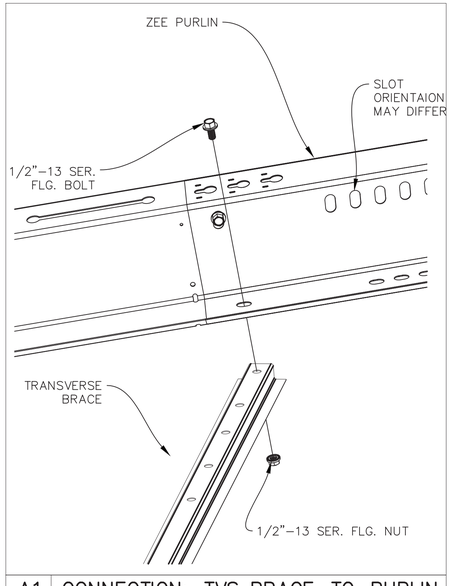


C4 | CONNECTION: PV–TO–PURLIN

MAY NOT BE REPRESENTATIVE OF INSTALLED ENDCLAMPS



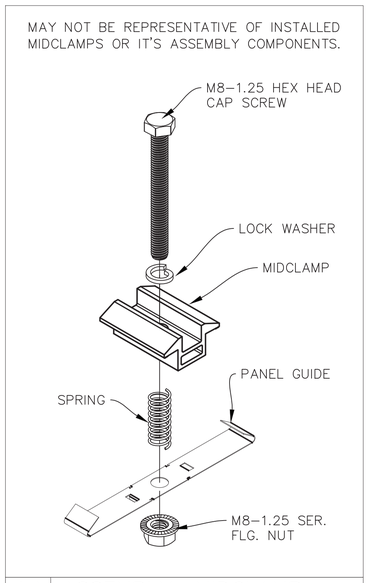
C5 | ASSEMBLY: ENDCLAMP



A1 | CONNECTION: TVS BRACE–TO–PURLIN

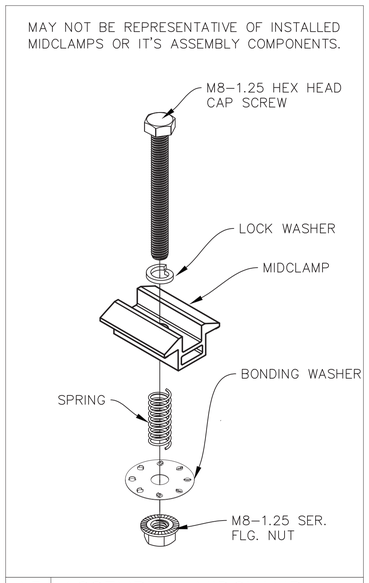
A2 | TOP (ISO) VIEW: PV CLAMP LOCATIONS

MAY NOT BE REPRESENTATIVE OF INSTALLED MIDCLAMPS OR IT'S ASSEMBLY COMPONENTS.



A4 | ASSEMBLY: MIDCLAMP

MAY NOT BE REPRESENTATIVE OF INSTALLED MIDCLAMPS OR IT'S ASSEMBLY COMPONENTS.



A5 | ASSEMBLY: MIDCLAMP

NOTES:

1. HARDWARE TORQUE VALUES:

   1/2"–13 CARBON STEEL GRADE 5 OR BETTER
   MIN.: 40 FT–LBS

   M8–1.25 STAINLESS STEEL
   MIN.: 14.0 FT–LBS
   NOM.: 15.6 FT–LBS
   MAX.: 25 FT–LBS

2. DEPICTED HARDWARE AND PART PLACEMENT NOT INDICATIVE OF PREFERRED OR REQUIRED POSITIONS.
3. HOLE/SLOT PATTERNS IN PARTS ALLOW FOR DEVIATION FROM NOMINAL DIMENSIONS, MULTIPLE PART POSITIONS, AND MULTIPLE TILT ANGLES.
4. SEE INSTALLATION MANUAL FOR SETUP INSTRUCTIONS.
5. SERRATED FLANGED BOLTS MAY BE REPLACED WITH EQUIVALENT PRESS–IN BOLTS. SEE NOTE 8 FOR MORE INFORMATION.
6. PRESS–IN BOLTS, WHERE PRESENT, TO BE INSTALLED TO MANUFACTURERS RECOMMENDED VALUES.
7. OTHER SPECIFIC CONNECTIONS ELSEWHERE IN PRINT SET.
8. SERRATED HARDWARE MAY BE REPLACED WITH EQUIVALENT HARDWARE WITH WASHERS IF NECESSARY.
9. STAINLESS STEEL HARDWARE MAY BE REPLACED WITH GALVANIZED STEEL HARDWARE OR CORROSION AND STRENGTH COMPARABLE HARDWARE MATERIALS AND FINISHES.
10. UNLESS NOTED OTHERWISE, ALL HARDWARE MAY BE INSTALLED IN EITHER DIRECTION (NUT/BOLT MAY BE ON EITHER SIDE OF CONNECTION).
11. WHEN NECESSARY, ADDITIONAL HOLES MAY BE DRILLED TO COMPLETE CONNECTION. ENGINEERING SHALL BE CONTRACTED PRIOR TO FIELD MODIFICATIONS OF PARTS.
12. EASE/WEST CABLE BRACING (C1) TO BE INSTALLED IN THE SPACE BETWEEN POST SETS (BAY).
13. MINIMUM CABLE BREAKING STRENGTH DETERMINED BY PROJECT SPECIFIC STRUCTURAL CALCULATIONS.
14. CABLE TO BE STAINLESS STEEL AIRCRAFT CABLE.
15. CABLE MAY BE OF ANY CONFIGURATION (IE. 7X7 OR 7X19) AS LONG AS IT MEETS THE REQUIREMENTS LISTED ON THIS SHEET.
16. LENGTH OF BRACES WILL VARY DEPENDENT ON PROJECT SPECIFICS.
17. TRANSVERSE BRACE SETS SHALL BE INSTALLED AT FREQUENCY INDICATED.
18. TRANSVERSE BRACE SHALL BE FASTENED IN THREE PLACES (ONCE TO EACH ZEE).
19. TRANSVERSE BRACES ARE NOT A REQUIREMENT OF THE STRUCTURAL MODELS. APA REQUIRES THEIR PRESENCE AS AN ASSEMBLY AID ONLY.
20. DUE TO IT'S NON–STRUCTURAL NATURE, TRANSVERSE BRACE PROFILE, THICKNESS, MATERIAL, STRENGTH, COATING, FREQUENCY, AND INSTALLATION MAY CHANGE AT ANY TIME AT THE DISCRETION OF APA, BY APPROVAL OF APA ENGINEERING.
21. WHERE TRANSVERSE BRACE CANNOT BE INSTALLED DUE TO NS CHORD (OUT OF NOMINAL LOCATION), BRACE SHALL BE RELOCATED TO NEXT NEAREST REASONABLE SPLICE.
22. TRANSVERSE BRACE MAY UTILIZE LOWER SPLICE BOLTS, WHERE PRESENT. SEE PURLIN SHEET FOR MORE INFORMATION.
23. EACH PV MODULE SHALL BE CLAMPED IN 4 PLACES.
24. A MAJORITY OF THE CLAMP BOLT FLANGES MUST TERMINATE OVER THE SLOT, AND NOT OVER THE KEYHOLE.
25. SPRING, & PANEL GUIDE MAY NOT BE PRESENT AT ALL LOCATIONS, OR ANY LOCATIONS.
26. ALL PANELS MUST BE GROUNDED/BONDED TO ZEE PURLINS. THIS MAY BE ACCOMPLISHED WITH THE PANEL GUIDE, BONDING WASHERS, DYNOBOND EQUIPMENT OR OTHER APPROVED GROUNDING DEVICE.

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A	INITIAL RELEASE	3/13/2026

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SHEET NAME: CLAMPS & BRACES

PROJECT NUMBER: 260106

DRAWING NUMBER: S.600 | REV.: A

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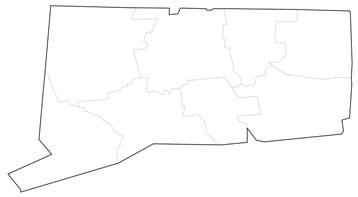
- ☑ FOUNDATION DESIGN REPORT (SITE SPECIFIC, & ONLY WHERE REQUIRED BY EOR OR AHJ)



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ANNE M. GRASSER
0036452
LICENSED PROFESSIONAL ENGINEER
03/27/2026

SOLAR PHOTOVOLTAIC GROUND MOUNT

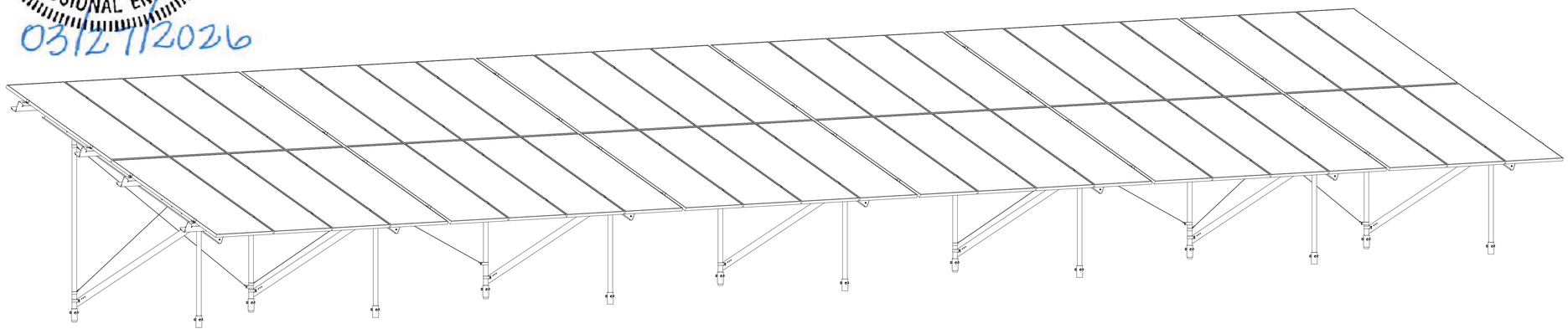

IMAGE FOR REFERENCE ONLY

SHEET INDEX		
STRUCTURAL		
S-000	A	STRUCTURAL COVER
S-100	A	RACKING OVERVIEW
S-300	A	STRUCTURAL COMPONENTS
S-400	A	CONNECTIONS
S-500	A	STRUCTURAL PURLINS
S-600	A	CLAMPS & BRACES

GOVERNING STRUCTURAL CODE/S

2021 INTERNATIONAL BUILDING CODE

PACKAGE COVERAGE – LOADING AND SETUP RANGES & CONSTANTS

TILT ANGLES:	25°
MAX GROUND SNOW LOAD (PSF):	35
MAX WIND LOADS (MPH):	109
WIND EXPOSURE CATEGORY:	C
MAX SEISMIC Ss:	0.179 g
MAX SEISMIC S1:	0.055 g

PV MODULE: PHONO DRACO MODULE SERIES 144-16BB-W-WG

MAX. PANEL WIDTH:	44.65"
MAX. PANEL LENGTH:	89.69"
MAX. PANEL HEIGHT:	2.00"
MAX. PANEL WEIGHT:	71.00 LBS
RISK CATEGORY:	I
MAX FRONT LIP CLEARANCE:	66"

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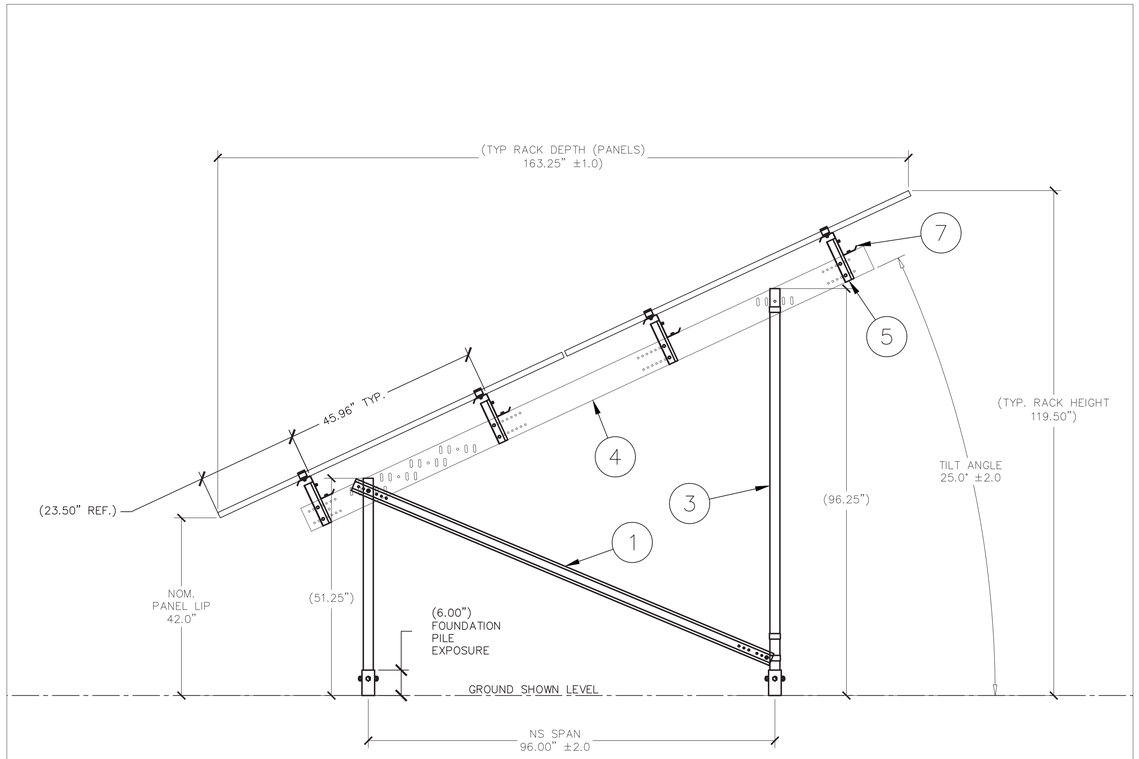


NOTES: PV MODULE & MODULE RELATED DIMENSIONS THIS DETAIL ARE MAX ALLOWABLE, UNLESS SPECIFIED ELSEWHERE IN THIS PACKET.
DIMENSIONS TO GROUND ARE NOMINAL FROM LEVEL GROUND.

C1 | PROFILE VIEW: RACK OVERVIEW

PARTS LIST (BALLOONS THIS SHEET)			
ITEM	DESCRIPTION	SHAPE	DETAIL / SHEET
1	KNEE BRACE	CEE	B2 / S.300
3	FOUNDATION POST	POST	A6 / S.300
4	NS CHORD	CEE	D1 / S.300
5	ROLL BAR	MIXED	A4 / S.300
6	TRANSVERSE BRACE	HAT	D5 / S.600
7	ZEE PURLIN	ZEE	E1 / S.300
8	CABLE BRACE	CABLE	D4/ S.600

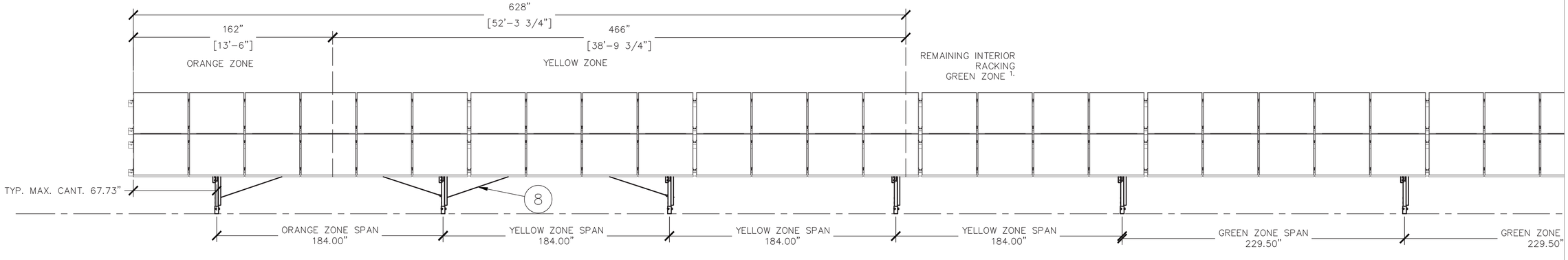
SEE VIEW A1 ON S600 FOR VIEW OF TRANSVERSE BRACE

NOTES:

1. STANDARD FRONT LIP HEIGHT AND TILT ANGLES MEASURED FROM LEVEL GROUND
2. FOUNDATION TESTING, WHERE REQUIRED, SHALL BE DONE ACCORDING TO THE "QUICK TEST METHOD" PER ASTM D1143 & D3689.
3. PRINT DIMENSIONS: DIMENSIONS SHOWN REFLECT POST HEIGHTS ON LEVEL GROUND. ON UNEVEN TERRAIN, REAR FOUNDATION POST HEIGHT WILL BE DICTATED BY FRONT LIP HEIGHT, PANEL TILT, AND NORTH/SOUTH POST SPACING.
4. ADDITIONAL TOLERANCES: POST PLUMBNESS SHOULD BE WITHIN ±2°
5. SPECIAL INSPECTIONS (WHERE REQUIRED):

SPECIAL INSPECTIONS ARE NOT REQUIRED BY APA SOLAR OR THE STRUCTURAL ENGINEER OF RECORD, THE JDI GROUP, WHERE REQUIRED BY OWNER, CUSTOMER, AND/OR AUTHORITY HAVING JURISDICTION, MINIMUM INSPECTION SHALL FOLLOW IBC OR LOCAL AHJ SPECIAL INSPECTIONS GUIDELINES.

*IMAGE REFERENCE ONLY.SHOWS STRUCTURAL MAXIMUMS. NOT INDICATIVE OF REQUIRED QUANTITIES.PLEASE REFER TO SITE SPECIFIC BUILD PLANS FOR SITE SPECIFIC REQUIRED SPANS/QUANTITIES.



NOTES: MAX CANTILEVER MEASURED FROM EDGE OF PANEL TO POST CENTER.
MAX SPAN MEASURED FROM PILE CENTER TO PILE CENTER.
POST QUANTITY AS REQUIRED TO SATISFY CANTILEVERS, SPANS, ROW LENGTH, & PANEL QUANTITY
1. WHERE ALLOWABLE PER THE CALCULATIONS PACKAGE. EXTERIOR/CORNER AREAS SHALL REMAIN ZONED YELLOW. SEE EXPLAINATION IN CALC PACKAGE.
SITE SPECIFIC BUILD PLANS SHALL DESIGNATE EXTERIOR/CORNER SPANS.

A1 | ELEVATION VIEW FROM FRONT (NORTH-FACING)

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SHEET NAME: RACKING OVERVIEW
PROJECT NUMBER: 260106.1
DRAWING NUMBER: S.100
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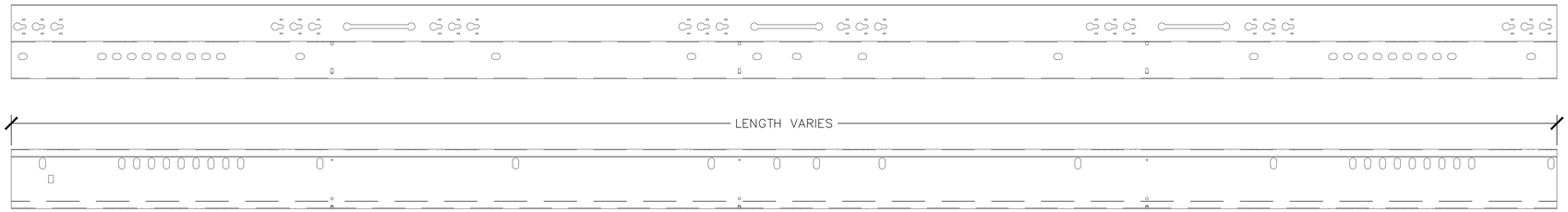
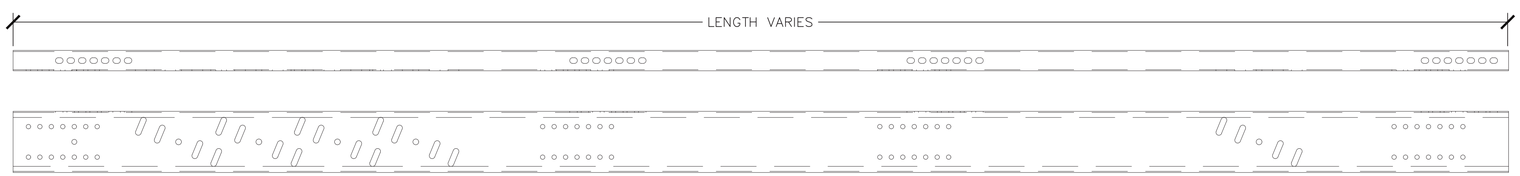
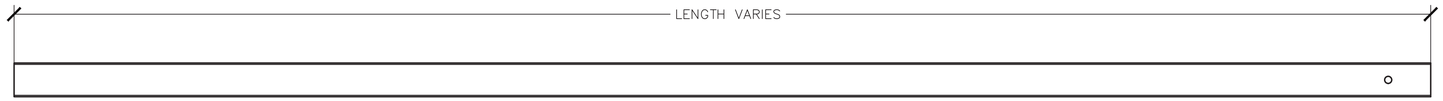


E1 | SIDE/TOP: ZEE PURLIN

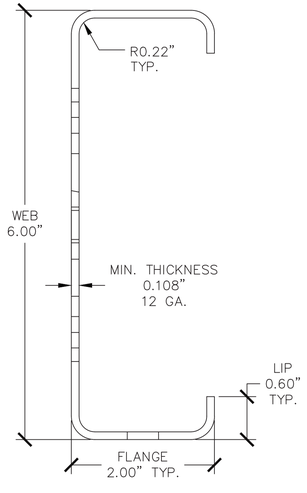


D1 | SIDE/TOP: NS CHORD



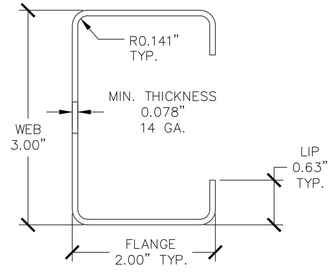
C1 | SIDE: FOUNDATION POST

MATERIAL: A653 HSLAS
STRENGTH: MIN. YIELD (Fy): 80 KSI.

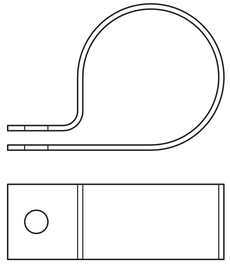


A1 | PROFILE: NS CHORD

MATERIAL: A653 SS GR 80 CL1
STRENGTH: MIN. YIELD (Fy): 80 KSI.

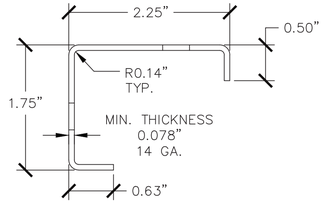


A2 | PROFILE: KNEE BRACE

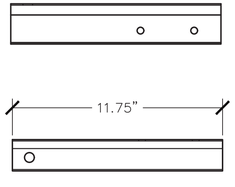


A3 | SIDE: BRACE CLAMP

MATERIAL: A572 CF STR. STL.
STRENGTH: MIN. YIELD (Fy): 30 KSI.

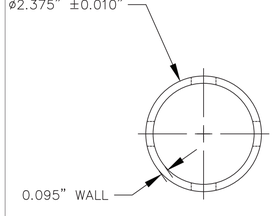


A4 | PROFILE: ROLL BAR



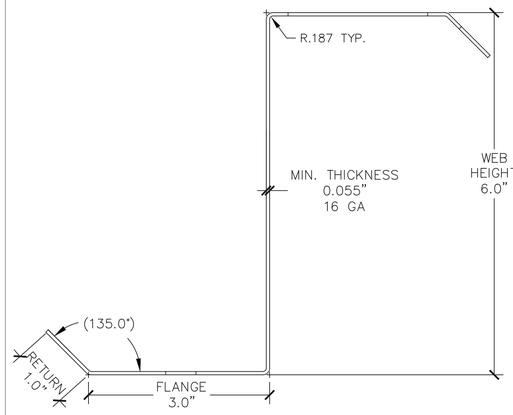
A5 | SIDE/TOP: ROLL BAR

MATERIAL: A570 CF STR. STL.
STRENGTH: MIN. YIELD (Fy): 50 KSI.



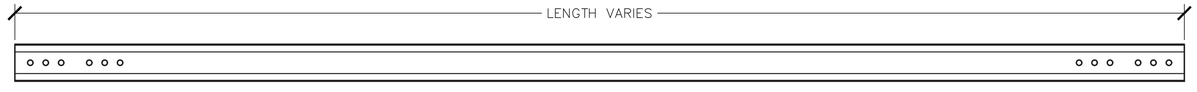
A6 | PROFILE: FOUNDATION POST

MATERIAL: A653 STR. STL.
STRENGTH: MIN. YIELD (Fy): 80 KSI.



D5 | PART: ZEE PURLIN

B2 | SIDE: KNEE BRACE



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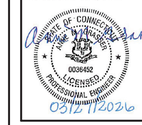

DOCUMENT NAME:
STRUCTURAL PRINT PACKAGE

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SITE CITY, STATE, ZIP:
WILLINGTON, CT 06279

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REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	3/16/2026

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DRAWN	REVIEWED	APPROVED	SIZE
HB	CW	JDI	D

SHEET NAME
STRUCTURAL COMPONENTS

PROJECT NUMBER
260106.1

DRAWING NUMBER
S.300

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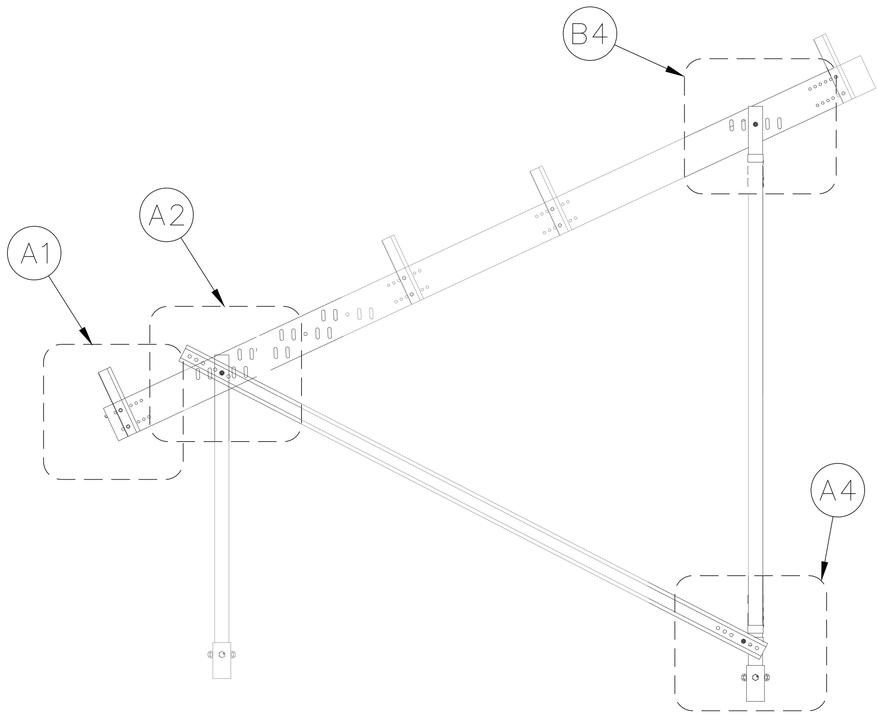
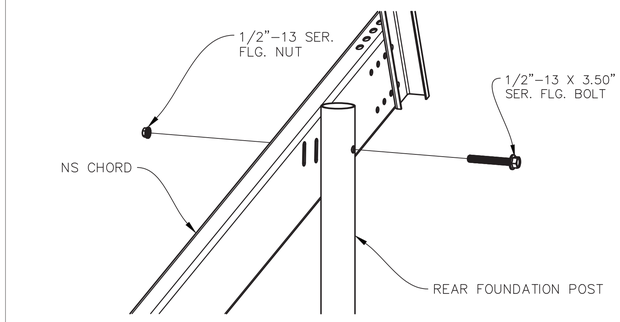
IMAGE FOR REFERENCE ONLY



B1 | FOUNDATION SET CONNECTIONS OVERVIEW

IMAGE FOR REFERENCE ONLY



B4 | CONNECTION: REAR POST–TO–NS CHORD

NOTES:

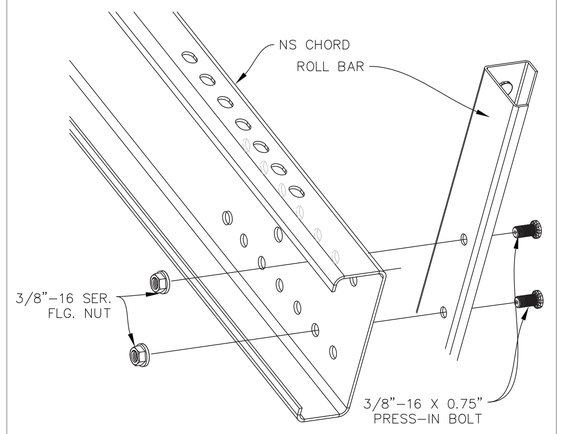
1. HARDWARE TORQUE VALUES:

   3/8"–16 STAINLESS STEEL
   MIN.: 17.5 FT–LBS
   NOM.: 19.6 FT–LBS
   MAX.: 50.0 FT–LBS

   1/2"–13 CARBON STEEL GRADE 5 OR BETTER
   MIN.: 40 FT–LBS

2. DEPICTED HARDWARE AND PART PLACEMENT NOT INDICATIVE OF PREFERRED OR REQUIRED POSITIONS.
3. HOLE/SLOT PATTERNS IN PARTS ALLOW FOR DEVIATION FROM NOMINAL DIMENSIONS, MULTIPLE PART POSITIONS, AND MULTIPLE TILT ANGLES.
4. SEE INSTALLATION MANUAL FOR SETUP INSTRUCTIONS.
5. SERRATED FLANGED BOLTS MAY BE REPLACED WITH EQUIVALENT PRESS–IN BOLTS. SEE NOTE 10 FOR MORE OPTIONS.
6. PRESS–IN BOLTS, WHERE PRESENT, TO BE INSTALLED TO MANUFACTURERS RECOMMENDED VALUES.
7. OTHER SPECIFIC CONNECTIONS ELSEWHERE IN PRINT SET.
8. ROLL BAR MUST CONNECT TO THE CORRECT HOLES IN CEE CHANNEL (INNER, OR OUTER TYPICALLY), AS DETERMINED BY PV MODULE MANUFACTURERS ALLOWABLE CLAMPING ZONE.
9. USE CORRECT NOMINAL HOLES IN CEE TO CONNECT TO FOUNDATION POST, AS INDICATED. ADJACENT HOLES AND SLOTS FOR FIELD ADJUSTMENTS.
10. SERRATED HARDWARE MAY BE REPLACED WITH EQUIVALENT HARDWARE WITH WASHERS IF NECESSARY.
11. IN ALL DETAILS, THE PRESENCE OF TWO SETS OF HARDWARE INDICATES THE REQUIREMENT OF TWO SETS OF HARDWARE.
12. STAINLESS STEEL HARDWARE MAY BE REPLACED WITH GALVANIZED STEEL HARDWARE OR CORROSION AND STRENGTH COMPARABLE HARDWARE MATERIALS AND FINISHES.
13. UNLESS NOTED OTHERWISE, ALL HARDWARE MAY BE INSTALLED IN EITHER DIRECTION (NUT/BOLT MAY BE ON EITHER SIDE OF CONNECTION).
14. WHEN NECESSARY, ADDITIONAL HOLES MAY BE DRILLED TO COMPLETE CONNECTION. ENGINEERING SHALL BE CONTRACTED PRIOR TO FIELD MODIFICATIONS OF PARTS.

IMAGE FOR REFERENCE ONLY



ATTACHED TO OUTER HOLE SET FOR REFERENCE ONLY. SEE NOTES.

A1 | CONNECTION: ROLL BAR–TO–NS CHORD

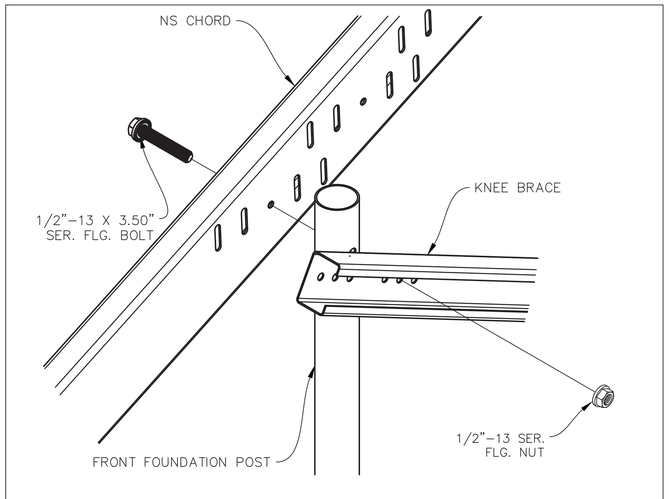
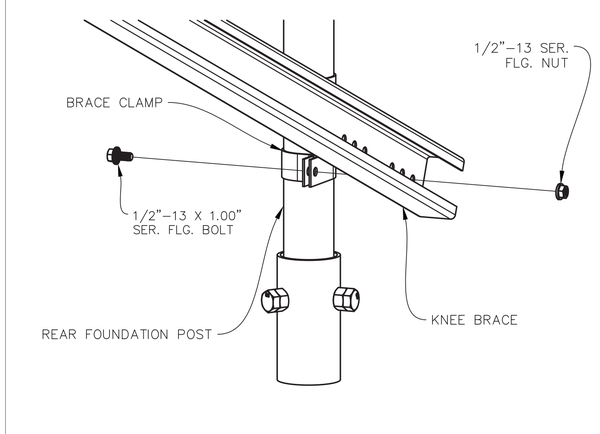


IMAGE FOR REFERENCE ONLY

A2 | CONNECTION: KNEE BRACE–TO–FRONT POST

IMAGE FOR REFERENCE ONLY



A4 | KNEE BRACE–TO–REAR POST

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PROFESSIONAL SEAL/STAMP

STATE OF CONNECTICUT
JOSEPH D. IMPERATO
0038452
LICENSED PROFESSIONAL ENGINEER
03/17/2026

DOCUMENT NAME: STRUCTURAL PRINT PACKAGE
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SITE CITY, STATE, ZIP: WILLINGTON, CT 06279

SHEET REVISIONS		
REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	3/16/2026

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HB	CW	JDI	D

SHEET NAME: CONNECTIONS

PROJECT NUMBER: 260106.1

DRAWING NUMBER: S.400 REV.: A

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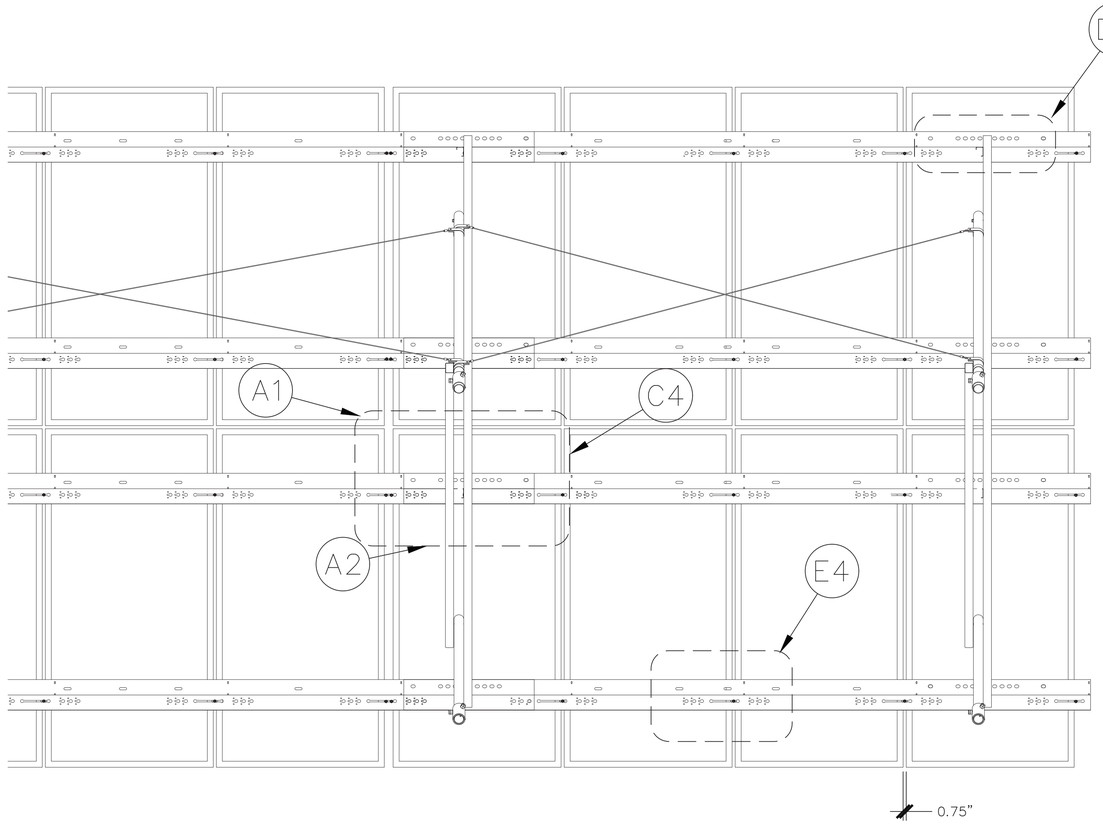
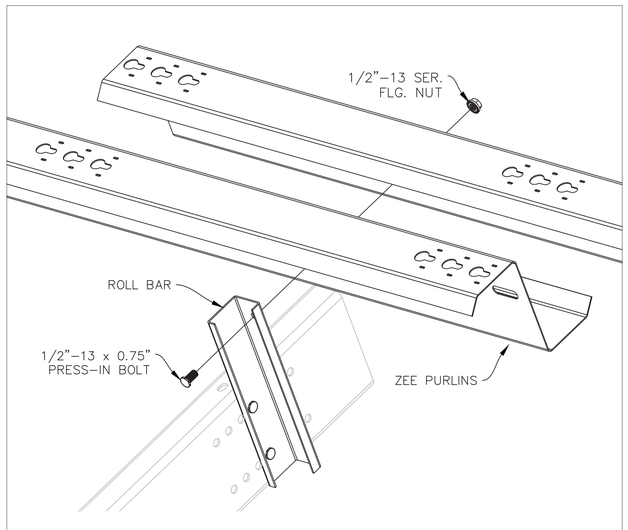
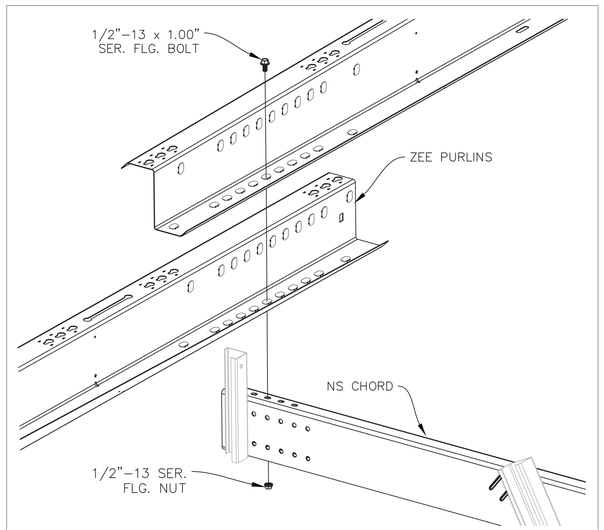


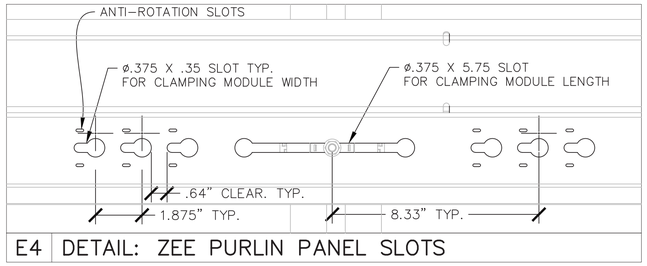
B1 | OVERVIEW: ZEE PURLIN CONNECTIONS (RACK UNDERSIDE)



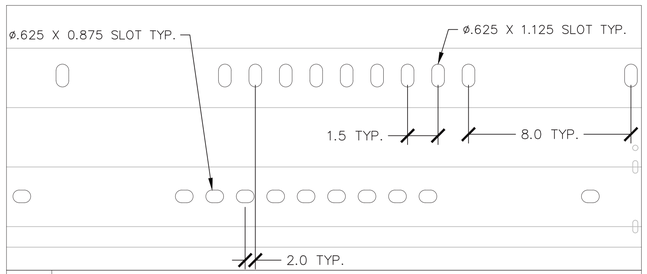
A1 | CONNECTION: ZEE PURLINS–TO–ROLL BAR



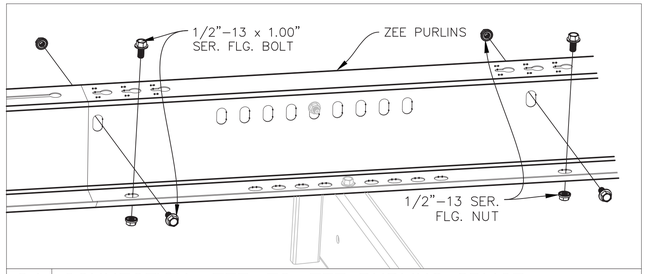
A2 | CONNECTION: ZEE PURLINS–TO–NS CHORD



E4 | DETAIL: ZEE PURLIN PANEL SLOTS



D4 | DETAIL: ZEE PURLIN SPLICE SLOTS



C4 | CONNECTION: ZEE–TO–ZEE PURLINS SPLICE

NOTES:

1. HARDWARE TORQUE VALUES:

   3/8"–16 STAINLESS STEEL
   MIN.: 17.5 FT–LBS
   NOM.: 19.6 FT–LBS
   MAX.: 50.0 FT–LBS

2. DEPICTED HARDWARE AND PART PLACEMENT NOT INDICATIVE OF PREFERRED OR REQUIRED POSITIONS.
3. HOLE/SLOT PATTERNS IN PARTS ALLOW FOR DEVIATION FROM NOMINAL DIMENSIONS, MULTIPLE PART POSITIONS, AND MULTIPLE TILT ANGLES.
4. SEE INSTALLATION MANUAL FOR SETUP INSTRUCTIONS.
5. SERRATED FLANGED BOLTS MAY BE REPLACED WITH EQUIVALENT PRESS–IN BOLTS.
6. PRESS–IN BOLTS, WHERE PRESENT, TO BE INSTALLED TO MANUFACTURERS RECOMMENDED VALUES.
7. OTHER SPECIFIC CONNECTIONS ELSEWHERE IN PRINT SET.
8. SERRATED HARDWARE MAY BE REPLACED WITH EQUIVALENT HARDWARE WITH WASHERS IF NECESSARY.
9. IN ALL DETAILS, THE PRESENCE OF TWO SETS OF HARDWARE INDICATES THE REQUIREMENT OF TWO SETS OF HARDWARE.
10. STAINLESS STEEL HARDWARE MAY BE REPLACED WITH GALVANIZED STEEL HARDWARE OR CORROSION AND STRENGTH COMPARABLE HARDWARE MATERIALS AND FINISHES.
11. UNLESS NOTED OTHERWISE, ALL HARDWARE MAY BE INSTALLED IN EITHER DIRECTION (NUT/BOLT MAY BE ON EITHER SIDE OF CONNECTION).
12. WHEN NECESSARY, ADDITIONAL HOLES MAY BE DRILLED TO COMPLETE CONNECTION. ENGINEERING SHALL BE CONTRACTED PRIOR TO FIELD MODIFICATIONS OF PARTS.
13. CONNECTION IN DETAIL A1 & A2 SHOWN IN NOMINAL POSITION. ACTUAL CONNECTION MAY BE ±1.5".
14. WHEN CONNECTIONS IN DETAIL A1 & A2 ARE AT THEIR MAX/MIN POSITIONS (±2") INTERFERING SPLICE HARDWARE MAY BE RELOCATED TO NEXT NEAREST SLOTS.
15. WHERE PRESENT, TRANSVERSE BRACE MAY UTILIZE LOWER SPLICE BOLTS. SEE CONNECTIONS SHEET FOR MORE INFORMATION.
16. ZEE–TO–ZEE SPLICE SHALL ALWAYS OVERLAP MINIMUM 32", AS INDICATED, EXCEPT AT ENDS OF ROW, WHERE NO SPLICE IS REQUIRED.
17. SPLICE MAY OVERLAP IN EITHER DIRECTION.
18. ZEE PURLIN MATERIAL AND FINISH ARE MANUFACTURED TO SPECIFICATIONS THAT MEET OR EXCEED OUR STANDARD PRODUCT WARRANTY.
19. ZEE PURLINS GALVANIZED TO CONFORM TO A MINIMUM THICKNESS DESIGNATION EQUAL TO G90 OR INLINE GALVANIZED TO COMPARABLE THICKNESS AS PER ASTM A1057.
20. TYPICAL ZEE PURLIN RETURN LIP ANGLE SHOWN. ACTUAL ANGLE MAY VARY.
21. SLOT DIMENSIONS FOR REFERENCE ONLY. FINAL SHAPE, FREQUENCY, AND DIMENSIONS MAY VARY.
22. LENGTH OF PURLIN VARIES BY PROJECT AND LOCATION WITHIN ARRAY.

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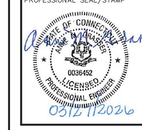

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SHEET NAME
STRUCTURAL PURLINS

PROJECT NUMBER
260106.1

DRAWING NUMBER
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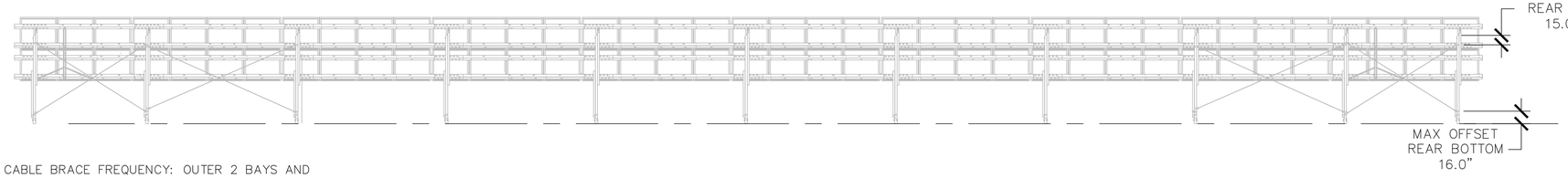
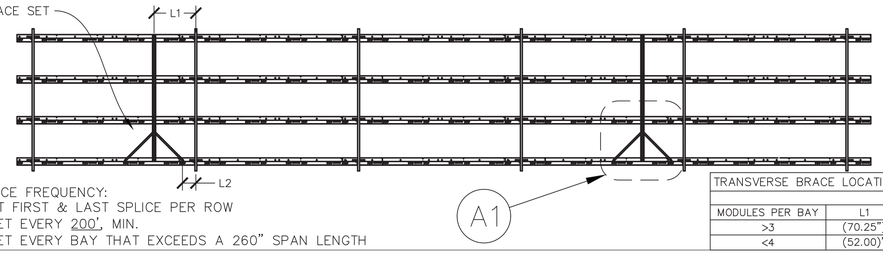


EAST/WEST CABLE BRACE FREQUENCY: OUTER 2 BAYS AND EVERY 7TH BAY.

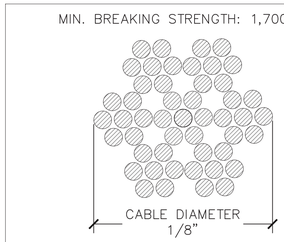
E1 | REAR VIEW: CABLE BRACE FREQUENCY



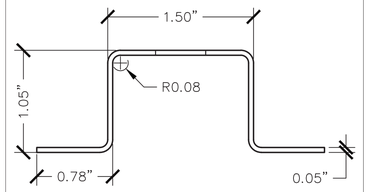
TRANSVERSE BRACE FREQUENCY:
1X BRACE SET AT FIRST & LAST SPLICE PER ROW
1X ADDITIONAL SET EVERY 200', MIN.
1X ADDITIONAL SET EVERY BAY THAT EXCEEDS A 260" SPAN LENGTH

TRANSVERSE BRACE LOCATION FROM CHORD		
MODULES PER BAY	L1	L2
>3	(70.25")	(12.00")
<4	(52.00")	(14.00")

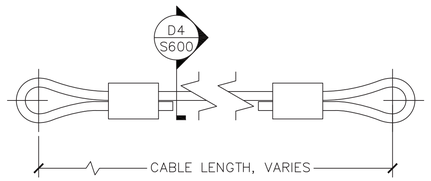
D1 | BOTTOM VIEW: TRANSVERSE BRACE LOCATIONS



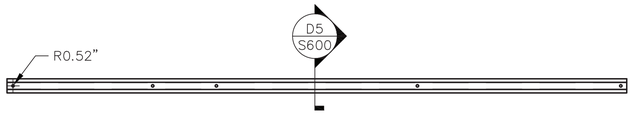
D4 | SEC.: CABLE BRACE



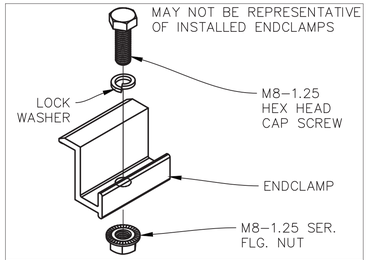
D5 | SECTION: TVS BRACE



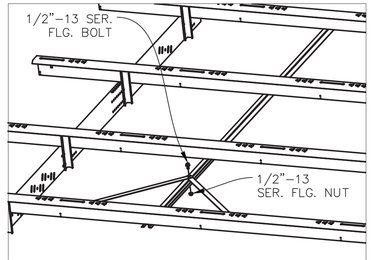
C1 | PART: CABLE BRACE



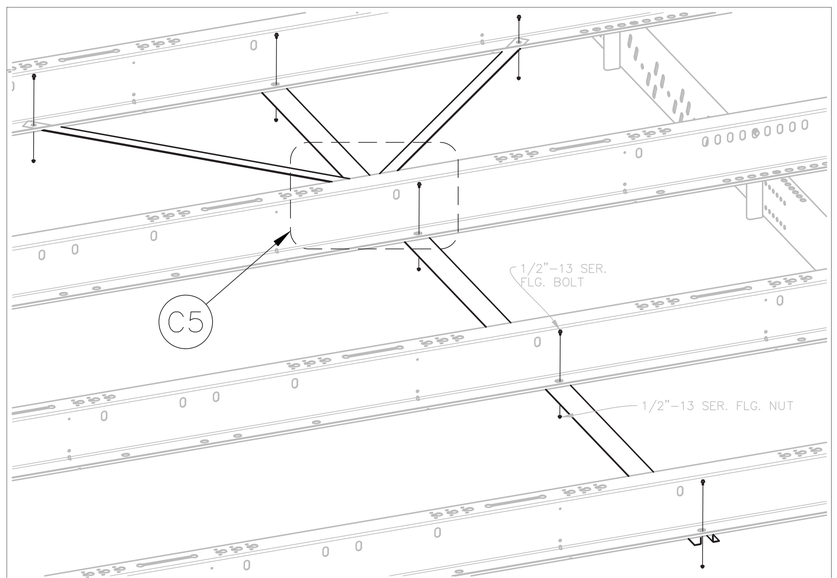
C2 | PART: TRANSVERSE BRACE (TVS BRACE)



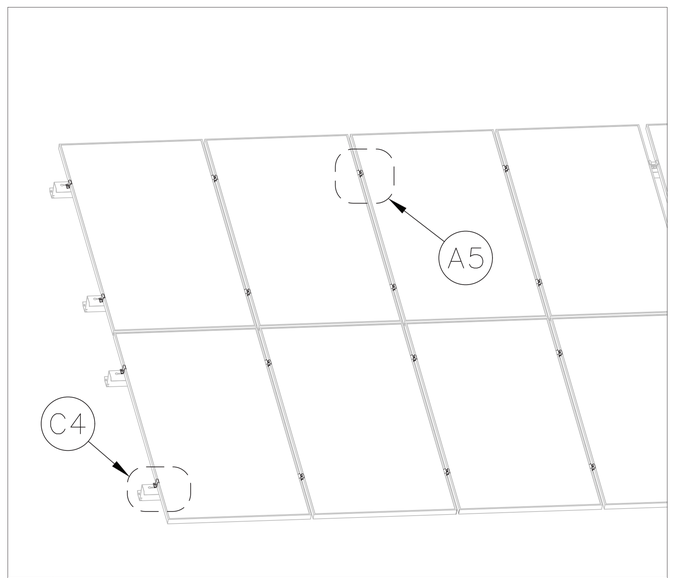
C4 | ASSEMBLY: ENDCLAMP



C5 | TVS BRACE ASSEMBLY

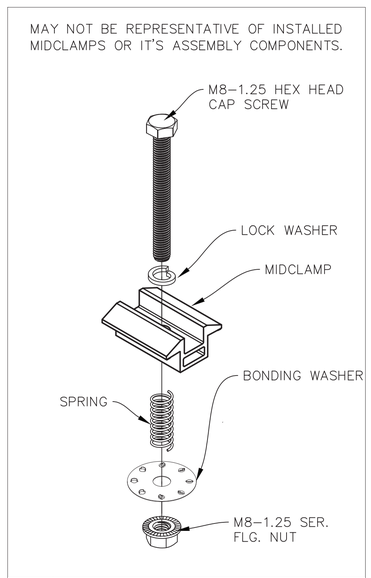


A1 | CONNECTION: TVS BRACE-TO-PURLIN



A3 | TOP (ISO) VIEW: PV CLAMP LOCATIONS

MAY NOT BE REPRESENTATIVE OF INSTALLED MIDCLAMPS OR IT'S ASSEMBLY COMPONENTS.



A5 | ASSEMBLY: MIDCLAMP

NOTES:

1. HARDWARE TORQUE VALUES:

   1/2"-13 CARBON STEEL GRADE 8 OR 5
   MIN.: 40 FT-LBS

   M8-1.25 STAINLESS STEEL
   MIN.: 14.0 FT-LBS
   NOM.: 15.6 FT-LBS
   MAX.: 25 FT-LBS

2. DEPICTED HARDWARE AND PART PLACEMENT NOT INDICATIVE OF PREFERRED OR REQUIRED POSITIONS.
3. HOLE/SLOT PATTERNS IN PARTS ALLOW FOR DEVIATION FROM NOMINAL DIMENSIONS, MULTIPLE PART POSITIONS, AND MULTIPLE TILT ANGLES.
4. SEE INSTALLATION MANUAL FOR SETUP INSTRUCTIONS.
5. SERRATED FLANGED BOLTS MAY BE REPLACED WITH EQUIVALENT PRESS-IN BOLTS. SEE NOTE 8 FOR MORE INFORMATION.
6. PRESS-IN BOLTS, WHERE PRESENT, TO BE INSTALLED TO MANUFACTURERS RECOMMENDED VALUES.
7. OTHER SPECIFIC CONNECTIONS ELSEWHERE IN PRINT SET.
8. SERRATED HARDWARE MAY BE REPLACED WITH EQUIVALENT HARDWARE WITH WASHERS IF NECESSARY.
9. STAINLESS STEEL HARDWARE MAY BE REPLACED WITH GALVANIZED STEEL HARDWARE OR CORROSION AND STRENGTH COMPARABLE HARDWARE MATERIALS AND FINISHES.
10. UNLESS NOTED OTHERWISE, ALL HARDWARE MAY BE INSTALLED IN EITHER DIRECTION (NUT/BOLT MAY BE ON EITHER SIDE OF CONNECTION).
11. WHEN NECESSARY, ADDITIONAL HOLES MAY BE DRILLED TO COMPLETE CONNECTION. ENGINEERING SHALL BE CONTRACTED PRIOR TO FIELD MODIFICATIONS OF PARTS.
12. EASE/WEST CABLE BRACING (C1) TO BE INSTALLED IN THE SPACE BETWEEN ANCHOR SETS (BAY).
13. MINIMUM CABLE BREAKING STRENGTH DETERMINED BY PROJECT SPECIFIC STRUCTURAL CALCULATIONS.
14. CABLE TO BE STAINLESS STEEL AIRCRAFT CABLE.
15. CABLE MAY BE OF ANY CONFIGURATION (IE. 7X7 OR 7X19) AS LONG AS IT MEETS THE REQUIREMENTS LISTED ON THIS SHEET.
16. LENGTH OF BRACES WILL VARY DEPENDENT ON PROJECT SPECIFICS.
17. TRANSVERSE BRACE SETS SHALL BE INSTALLED AT FREQUENCY INDICATED.
18. TRANSVERSE BRACES ARE NOT A REQUIREMENT OF THE STRUCTURAL MODELS. APA REQUIRES THEIR PRESENCE AS AN ASSEMBLY AID ONLY.
19. DUE TO IT'S NON-STRUCTURAL NATURE, TRANSVERSE BRACE PROFILE, THICKNESS, MATERIAL, STRENGTH, COATING, FREQUENCY, AND INSTALLATION MAY CHANGE AT ANY TIME AT THE DISCRETION OF APA, BY APPROVAL OF APA ENGINEERING.
20. WHERE TRANSVERSE BRACE CANNOT BE INSTALLED DUE TO NS CHORD (OUT OF NOMINAL LOCATION), BRACE SHALL BE RELOCATED TO NEXT NEAREST REASONABLE SPLICE.
21. TRANSVERSE BRACE MAY UTILIZE LOWER SPLICE BOLTS, WHERE PRESENT. SEE PURLIN SHEET FOR MORE INFORMATION.
22. EACH PV MODULE SHALL BE CLAMPED IN 4 PLACES.
23. A MAJORITY OF THE CLAMP BOLT FLANGES MUST TERMINATE OVER THE SLOT, AND NOT OVER THE KEYHOLE.
24. SPRING, & PANEL GUIDE MAY NOT BE PRESENT AT ALL LOCATIONS, OR ANY LOCATIONS.
25. ALL PANELS MUST BE GROUNDED/BONDED TO ZEE PURLINS. THIS MAY BE ACCOMPLISHED WITH THE PANEL GUIDE, BONDING WASHERS, DYNOBOND EQUIPMENT OR OTHER APPROVED GROUNDING DEVICE.

CUSTOMER

RACKING PROVIDER

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

RACKING TYPE

TITAN DUO

ENGINEER OF RECORD

the jdi group
architects & engineers
360 W. DUSSEL DR.
MAUMEE, OH 43537
|P| 419.725.7161 |F| 419.725.7160

PROFESSIONAL SEAL/STAMP

STATE OF CONNECTICUT
CHRISTOPHER WARNER
0036452
LICENSED
PROFESSIONAL ENGINEER
03/17/2026

DOCUMENT NAME:
STRUCTURAL PRINT PACKAGE

SITE STREET ADDRESS:
41-43 LOHSE ROAD

SITE CITY, STATE, ZIP:
WILLINGTON, CT 06279

SHEET REVISIONS

REV	DESCRIPTION	DATE
A	INITIAL RELEASE	3/16/2026

APPROVED

DRAWN	REVIEWED	APPROVED	SIZE
HB	CW	JDI	D

SHEET NAME
CLAMPS & BRACES

PROJECT NUMBER
260106.1

DRAWING NUMBER
S.600

REV.
A

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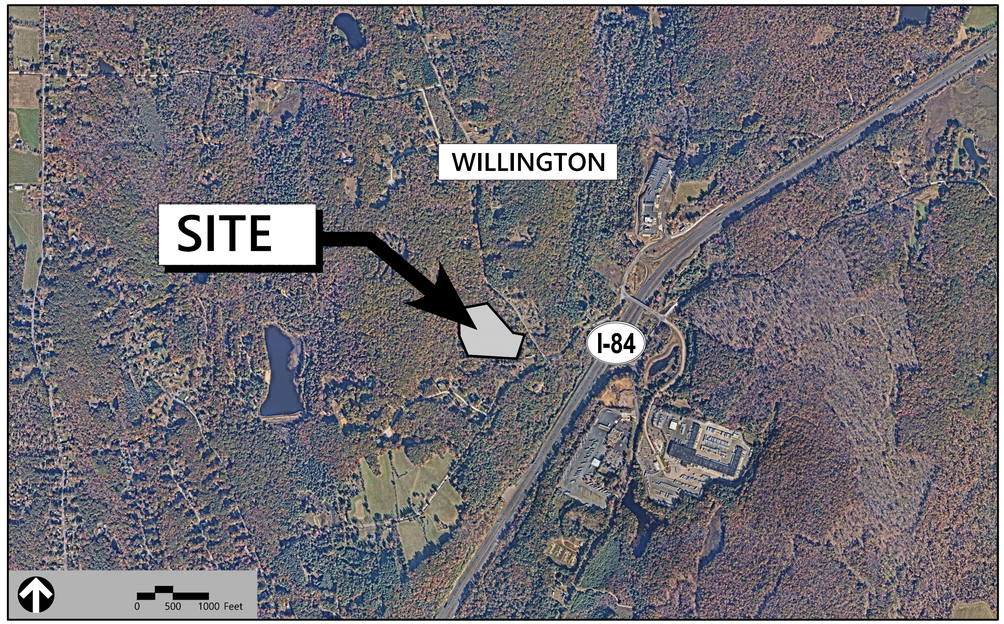
Site Plans

Issued for	**Construction**
Date Issued	**July 3, 2025**
Latest Issue	**March 13, 2026**

Willington Solar One

41-43 Lohse Road
Willington, Connecticut



Applicant/Developer

Verogy
124 LaSalle Road, 2nd Floor
West Hartford, CT 06107

Map-Block-Lot:

0046-004-00

Property Owner

Grimaldi, Grace Trustee
121 Spruce Street
Manchester, CT 06040

Sheet Index

No.	Drawing Title	Latest Issue
C-1.0	Legend and General Notes	March 13, 2026
C-2.0	Layout and Materials Plan	March 13, 2026
C-3.0	Grading and Drainage Plan	March 13, 2026
C-4.0	Erosion and Sediment Control Plan	March 13, 2026
C-5.0	Site Details	March 13, 2026

Reference Drawings

No.	Drawing Title	Latest Issue
1 of 1	Plan of Land in Willington, CT	January 16, 2025

vhb.com

vhb

100 Great Meadow Road
Suite 200
Wethersfield, CT 06109
860.807.4300

Licensed Land Surveyor
Northeast Survey Consultants
3 Ferry Street, Studio 1
Easthampton, MA 01027
413-203-5144

\\VHB.COM\GBL\PROJ\WETHERSFIELD\43590.00\05_WORK\CAD\LD\PLANSET\00_43590.00-CV_C-0.0

VHB Project : Willington Solar One
Issued for : Construction

Legend

Exist.	Prop.	
		PROPERTY LINE
		PROJECT LIMIT LINE
		RIGHT-OF-WAY/PROPERTY LINE
		EASEMENT
		BUILDING SETBACK
		PARKING SETBACK
10+00	10+00	BASELINE
		CONSTRUCTION LAYOUT
		ZONING LINE
		TOWN LINE
		LIMIT OF DISTURBANCE
		WETLAND LINE WITH FLAG
		FLOODPLAIN
		100-YEAR FLOOD LIMITS
		GRAVEL ROAD
EOP	EOP	EDGE OF PAVEMENT
BB	BB	BITUMINOUS BERM
BC	BC	BITUMINOUS CURB
CC	CC	CONCRETE CURB
	CG	CURB AND GUTTER
EC	ECC	EXTRUDED CONCRETE CURB
MC	MCC	MONOLITHIC CONCRETE CURB
PC	PCC	PRECAST CONC. CURB
SGE	SGE	SLOPED GRAN. EDGING
VGC	VGC	VERT. GRAN. CURB
		LIMIT OF CURB TYPE
		SAWCUT
		BUILDING
	EN	BUILDING ENTRANCE
	LD	LOADING DOCK
		BOLLARD
D	D	DUMPSTER PAD
		SIGN
		DOUBLE SIGN
		STEEL GUARDRAIL
		WOOD GUARDRAIL
		PATH
		TREE LINE
		WIRE FENCE
		FENCE
		STOCKADE FENCE
		STONE WALL
		RETAINING WALL
		STREAM / POND / WATER COURSE
		DETENTION BASIN
		HAY BALES
		SILT FENCE
		SILT SOCK / STRAW WATTLE
4	4	MINOR CONTOUR
20	20	MAJOR CONTOUR
(10)	(10)	PARKING COUNT
	C10	COMPACT PARKING STALLS
DYL	DYL	DOUBLE YELLOW LINE
SL	SL	STOP LINE
		CROSSWALK
		ACCESSIBLE CURB RAMP
		ACCESSIBLE PARKING
VAN	VAN	VAN-ACCESSIBLE PARKING

Exist.	Prop.	
		CONCRETE
		HEAVY DUTY PAVEMENT
		BUILDINGS
		RIPRAP
		CONSTRUCTION EXIT
27.35 TC×	27.35 TC×	TOP OF CURB ELEVATION
26.85 BC×	26.85 BC×	BOTTOM OF CURB ELEVATION
132.75×	132.75×	SPOT ELEVATION
45.0 TW× 38.5 BW×	45.0 TW× 38.5 BW×	TOP & BOTTOM OF WALL ELEVATION
		BORING LOCATION
		TEST PIT LOCATION
MW	MW	MONITORING WELL
UD	UD	UNDERDRAIN
12"D	12"D	DRAIN
6"RD	6"RD	ROOF DRAIN
12"S	12"S	SEWER
FM	FM	FORCE MAIN
OHW	OHW	OVERHEAD WIRE
6"W	6"W	WATER
4"FP	4"FP	FIRE PROTECTION
	2"DW	DOMESTIC WATER
3"G	G	GAS
E	E	ELECTRIC
STM	STM	STEAM
T	T	TELEPHONE
FA	FA	FIRE ALARM
CATV	CATV	CABLE TV
		CATCH BASIN
		DOUBLE CATCH BASIN
		GUTTER INLET
		DRAIN MANHOLE
TD		TRENCH DRAIN
E	E	PLUG OR CAP
CO	CO	CLEANOUT
		FLARED END SECTION
		HEADWALL
S		SEWER MANHOLE
CS	CS	CURB STOP & BOX
WV	WV	WATER VALVE & BOX
TSV	TSV	TAPPING SLEEVE, VALVE & BOX
		SIAMESE CONNECTION
HYD	HYD	FIRE HYDRANT
WM	WM	WATER METER
PIV	PIV	POST INDICATOR VALVE
W	W	WATER WELL
GS	GG	GAS GATE
GM	GM	GAS METER
EMH	EMH	ELECTRIC MANHOLE
EM	EM	ELECTRIC METER
		LIGHT POLE
TMH	TMH	TELEPHONE MANHOLE
T	T	TRANSFORMER PAD
		UTILITY POLE
		GUY POLE
		GUY WIRE & ANCHOR
HH	HH	HAND HOLE
PB	PB	PULL BOX
Matchline		MATCHLINE

Abbreviations

General

ABAN	ABANDON
ACR	ACCESSIBLE CURB RAMP
ADJ	ADJUST
APPROX	APPROXIMATE
BIT	BITUMINOUS
BS	BOTTOM OF SLOPE
BWLL	BROKEN WHITE LANE LINE
CONC	CONCRETE
DYCL	DOUBLE YELLOW CENTER LINE
EL	ELEVATION
ELEV	ELEVATION
EX	EXISTING
FDN	FOUNDATION
FFE	FIRST FLOOR ELEVATION
GRAN	GRANITE
GTD	GRADE TO DRAIN
LA	LANDSCAPE AREA
LOD	LIMIT OF DISTURBANCE
MAX	MAXIMUM
MIN	MINIMUM
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
PERF	PERFORATED
PROP	PROPOSED
REM	REMOVE
RET	RETAIN
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
SWEL	SOLID WHITE EDGE LINE
SWLL	SOLID WHITE LANE LINE
TS	TOP OF SLOPE
TYP	TYPICAL

Utility

CB	CATCH BASIN
CMP	CORRUGATED METAL PIPE
CO	CLEANOUT
DCB	DOUBLE CATCH BASIN
DMH	DRAIN MANHOLE
CIP	CAST IRON PIPE
COND	CONDUIT
DIP	DUCTILE IRON PIPE
FES	FLARED END SECTION
FM	FORCE MAIN
F&G	FRAME AND GRATE
F&C	FRAME AND COVER
GI	GUTTER INLET
GT	GREASE TRAP
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HH	HANDHOLE
HW	HEADWALL
HYD	HYDRANT
INV	INVERT ELEVATION
I=	INVERT ELEVATION
LP	LIGHT POLE
MES	METAL END SECTION
PIV	POST INDICATOR VALVE
PWW	PAVED WATER WAY
PVC	POLYVINYLCHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
R=	RIM ELEVATION
SMH	SEWER MANHOLE
TSV	TAPPING SLEEVE, VALVE AND BOX
UG	UNDERGROUND
UP	UTILITY POLE

Notes

General

1. CONTRACTOR SHALL NOTIFY "CALL BEFORE YOU DIG" (811 OR 1-800-922-4455) AT LEAST 72 HOURS BEFORE EXCAVATING.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SECURITY AND JOB SAFETY. CONSTRUCTION ACTIVITIES SHALL BE IN ACCORDANCE WITH OSHA STANDARDS AND LOCAL REQUIREMENTS.
3. WORK WITHIN THE LOCAL RIGHTS-OF-WAY SHALL CONFORM TO LOCAL MUNICIPAL STANDARDS.
4. UPON AWARD OF CONTRACT, CONTRACTOR SHALL MAKE NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN NECESSARY PERMITS, PAY FEES, AND POST BONDS ASSOCIATED WITH THE WORK INDICATED ON THE DRAWINGS, IN THE SPECIFICATIONS, AND IN THE CONTRACT DOCUMENTS. DO NOT CLOSE OR OBSTRUCT ROADWAYS, SIDEWALKS, AND FIRE HYDRANTS, WITHOUT APPROPRIATE PERMITS.
5. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
6. IN THE EVENT THAT SUSPECTED CONTAMINATED SOIL, GROUNDWATER, AND OTHER MEDIA ARE ENCOUNTERED DURING EXCAVATION AND CONSTRUCTION ACTIVITIES BASED ON VISUAL, OLFACTORY, OR OTHER EVIDENCE, THE CONTRACTOR SHALL STOP WORK IN THE VICINITY OF THE SUSPECT MATERIAL TO AVOID FURTHER SPREADING OF THE MATERIAL, AND SHALL NOTIFY THE OWNER IMMEDIATELY SO THAT THE APPROPRIATE TESTING AND SUBSEQUENT ACTION CAN BE TAKEN.
7. CONTRACTOR SHALL PREVENT DUST, SEDIMENT, AND DEBRIS FROM EXITING THE SITE AND SHALL BE RESPONSIBLE FOR CLEANUP, REPAIRS AND CORRECTIVE ACTION IF SUCH OCCURS.
8. DAMAGE RESULTING FROM CONSTRUCTION LOADS SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO OWNER OR DEVELOPER.
9. CONTRACTOR SHALL CONTROL STORMWATER RUNOFF DURING CONSTRUCTION TO PREVENT ADVERSE IMPACTS TO OFF SITE AREAS, AND SHALL BE RESPONSIBLE TO REPAIR RESULTING DAMAGES, IF ANY, AT NO COST TO OWNER OR DEVELOPER.
10. THIS PROJECT IS LOCALLY EXEMPT AND DISTURBS MORE THAN ONE ACRE OF LAND, REQUIRING ADHERENCE TO AND REGISTRATION FOR THE CONNECTICUT DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION GENERAL PERMIT FOR THE DISCHARGE OF STORMWATER AND DEWATERING WASTEWATERS FROM CONSTRUCTION ACTIVITIES, EFFECTIVE NOVEMBER 25, 2022.
11. STAGING AND STOCKPILE AREAS SHALL NOT BE LOCATED WITHIN ANY WETLAND AND ABUTTING RESOURCE AREA AND SHALL BE LOCATED WITHIN THE LIMITS OF DISTURBANCE.

Utilities

1. THE LOCATIONS, SIZES, AND TYPES OF EXISTING UTILITIES ARE SHOWN AS AN APPROXIMATE REPRESENTATION ONLY. THE OWNER OR IT'S REPRESENTATIVE(S) HAVE NOT INDEPENDENTLY VERIFIED THIS INFORMATION AS SHOWN ON THE PLANS. THE UTILITY INFORMATION SHOWN DOES NOT GUARANTEE THE ACTUAL EXISTENCE, SERVICEABILITY, OR OTHER DATA CONCERNING THE UTILITIES, NOR DOES IT GUARANTEE AGAINST THE POSSIBILITY THAT ADDITIONAL UTILITIES MAY BE PRESENT THAT ARE NOT SHOWN ON THE PLANS. PRIOR TO ORDERING MATERIALS AND BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY AND DETERMINE THE EXACT LOCATIONS, SIZES, AND ELEVATIONS OF THE POINTS OF CONNECTIONS TO EXISTING UTILITIES AND, SHALL CONFIRM THAT THERE ARE NO INTERFERENCES WITH EXISTING UTILITIES AND THE PROPOSED UTILITY ROUTES, INCLUDING ROUTES WITHIN THE PUBLIC RIGHTS OF WAY.
2. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, OR EXISTING CONDITIONS DIFFER FROM THOSE SHOWN SUCH THAT THE WORK CANNOT BE COMPLETED AS INTENDED, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED IN WRITING TO THE OWNER'S REPRESENTATIVE FOR THE RESOLUTION OF THE CONFLICT AND CONTRACTOR'S FAILURE TO NOTIFY PRIOR TO PERFORMING ADDITIONAL WORK RELEASES OWNER FROM OBLIGATIONS FOR ADDITIONAL PAYMENTS WHICH OTHERWISE MAY BE WARRANTED TO RESOLVE THE CONFLICT.
3. THE LOCATION, SIZE, DEPTH, AND SPECIFICATIONS FOR CONSTRUCTION OF PROPOSED PRIVATE UTILITY SERVICES SHALL BE INSTALLED ACCORDING TO THE REQUIREMENTS PROVIDED BY, AND APPROVED BY, THE RESPECTIVE UTILITY COMPANY (GAS, TELEPHONE, ELECTRIC, FIRE ALARM, ETC.). FINAL DESIGN LOADS AND LOCATIONS TO BE COORDINATED WITH OWNER AND ARCHITECT.
4. CONTRACTOR SHALL MAKE ARRANGEMENTS FOR AND SHALL BE RESPONSIBLE FOR PAYING FEES FOR POLE RELOCATION AND FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, FIRE ALARM, AND ANY OTHER PRIVATE UTILITIES, WHETHER WORK IS PERFORMED BY CONTRACTOR OR BY THE UTILITIES COMPANY.
5. CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR AND SHALL FURNISH EXCAVATION, INSTALLATION, AND BACKFILL OF ELECTRICAL FURNISHED SITEWORK RELATED ITEMS SUCH AS PULL BOXES, CONDUITS, DUCT BANKS, LIGHT POLE BASES, AND CONCRETE PADS. SITE CONTRACTOR SHALL FURNISH CONCRETE ENCASEMENT OF DUCT BANKS IF REQUIRED BY THE UTILITY COMPANY AND AS INDICATED ON THE DRAWINGS.

Layout and Materials

1. PROPOSED BOUNDS AND ANY EXISTING PROPERTY LINE MONUMENTATION DISTURBED DURING CONSTRUCTION SHALL BE SET OR RESET BY A PROFESSIONAL LICENSED SURVEYOR, AT THE EXPENSE OF THE CONTRACTOR.
2. PRIOR TO START OF CONSTRUCTION, CONTRACTOR SHALL VERIFY EXISTING PAVEMENT ELEVATIONS AT INTERFACE WITH PROPOSED PAVEMENTS, AND EXISTING GROUND ELEVATIONS ADJACENT TO DRAINAGE OUTLETS TO ASSURE PROPER TRANSITIONS BETWEEN EXISTING AND PROPOSED FACILITIES.
3. FINAL LAYOUT SUBJECT TO CONDITIONS ENCOUNTERED IN THE FIELD.

Demolition

1. CONTRACTOR SHALL DISPOSE OF DEMOLITION DEBRIS IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS, ORDINANCES AND STATUTES.
2. THE DEMOLITION LIMITS DEPICTED IN THE PLANS IS INTENDED TO AID THE CONTRACTOR DURING THE BIDDING AND CONSTRUCTION PROCESS AND IS NOT INTENDED TO DEPICT EACH AND EVERY ELEMENT OF DEMOLITION. THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING THE DETAILED SCOPE OF DEMOLITION BEFORE SUBMITTING ITS BID/PROPOSAL TO PERFORM THE WORK AND SHALL MAKE NO CLAIMS AND SEEK NO ADDITIONAL COMPENSATION FOR CHANGED CONDITIONS OR UNFORESEEN OR LATENT SITE CONDITIONS RELATED TO ANY CONDITIONS DISCOVERED DURING EXECUTION OF THE WORK.
3. UNLESS OTHERWISE SPECIFICALLY PROVIDED ON THE PLANS OR IN THE SPECIFICATIONS, THE ENGINEER HAS NOT PREPARED DESIGNS FOR AND SHALL HAVE NO RESPONSIBILITY FOR THE PRESENCE, DISCOVERY, REMOVAL, ABATEMENT OR DISPOSAL OF HAZARDOUS MATERIALS, TOXIC WASTES OR POLLUTANTS AT THE PROJECT SITE. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR ANY CLAIMS OF LOSS, DAMAGE, EXPENSE, DELAY, INJURY OR DEATH ARISING FROM THE PRESENCE OF HAZARDOUS MATERIAL AND CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE ENGINEER FROM ANY CLAIMS MADE IN CONNECTION THEREWITH. MOREOVER, THE ENGINEER SHALL HAVE NO ADMINISTRATIVE OBLIGATIONS OF ANY TYPE WITH REGARD TO ANY CONTRACTOR AMENDMENT INVOLVING THE ISSUES OF PRESENCE, DISCOVERY, REMOVAL, ABATEMENT OR DISPOSAL OF ASBESTOS OR OTHER HAZARDOUS MATERIALS.

Erosion Control

1. PRIOR TO STARTING ANY OTHER WORK ON THE SITE, THE CONTRACTOR SHALL NOTIFY APPROPRIATE AGENCIES AND SHALL INSTALL EROSION CONTROL MEASURES AS SHOWN ON THE PLANS AND AS IDENTIFIED IN FEDERAL, STATE, AND LOCAL APPROVAL DOCUMENTS PERTAINING TO THIS PROJECT.
2. CONTRACTOR OR QUALIFIED INSPECTOR SHALL INSPECT AND MAINTAIN EROSION CONTROL MEASURES ON A WEEKLY BASIS OR MORE FREQUENTLY AS NEEDED, (MINIMUM) OR AS REQUIRED PER THE STORMWATER POLLUTION CONTROL PLAN (SWPCP). THE CONTRACTOR SHALL ADDRESS DEFICIENCIES AND MAINTENANCE ITEMS WITHIN TWENTY-FOUR HOURS OF INSPECTION. CONTRACTOR SHALL PROPERLY DISPOSE OF SEDIMENT SUCH THAT IT DOES NOT ENCUMBER OTHER DRAINAGE STRUCTURES AND PROTECTED AREAS.
3. CONTRACTOR SHALL BE FULLY RESPONSIBLE TO CONTROL CONSTRUCTION SUCH THAT SEDIMENTATION SHALL NOT AFFECT REGULATORY PROTECTED AREAS, WHETHER SUCH SEDIMENTATION IS CAUSED BY WATER, WIND, OR DIRECT DEPOSIT.
4. CONTRACTOR SHALL PERFORM CONSTRUCTION SEQUENCING SUCH THAT EARTH MATERIALS ARE EXPOSED FOR A MINIMUM AMOUNT OF TIME BEFORE THEY ARE COVERED, SEEDED, OR OTHERWISE STABILIZED TO PREVENT EROSION.
5. UPON COMPLETION OF CONSTRUCTION AND ESTABLISHMENT OF PERMANENT GROUND COVER, CONTRACTOR SHALL REMOVE AND DISPOSE OF EROSION CONTROL MEASURES AND CLEAN SEDIMENT AND DEBRIS FROM ENTIRE DRAINAGE AND SEWER SYSTEMS.
6. VEGETATIVE SLOPE STABILIZATION WILL BE IMPLEMENTED WITHIN 14 DAYS AFTER GRADING OR CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED. VEGETATIVE SLOPE STABILIZATION WILL BE USED TO MINIMIZE EROSION ON SLOPES OF 3:1 OR STEEPER. ESTABLISHMENT OF TEMPORARY AND PERMANENT VEGETATIVE COVER MAY BE ESTABLISHED BY HYDRO-SEEDING OR SODDING. A SUITABLE TOPSOIL, GOOD SEEDBED PREPARATION, AND ADEQUATE LIME, FERTILIZER AND WATER WILL BE PROVIDED FOR EFFECTIVE ESTABLISHMENT OF THESE VEGETATIVE STABILIZATION METHODS. MULCH WILL ALSO BE USED AFTER PERMANENT SEEDING TO PROTECT SOIL FROM THE IMPACT OF FALLING RAIN AND TO INCREASE THE CAPACITY OF THE SOIL TO ABSORB WATER.

Existing Conditions Information

1. EXISTING CONDITIONS BASE PLAN WAS PREPARED BY NORTHEAST SURVEY CONSULTANTS DATED JANUARY 16, 2025.
2. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988.
3. WETLANDS WERE FIELD-DELINEATED BY DAVISON ENVIRONMENTAL IN DECEMBER 2024.

Document Use

1. THESE PLANS AND CORRESPONDING CADD DOCUMENTS ARE INSTRUMENTS OF PROFESSIONAL SERVICE, AND SHALL NOT BE USED, IN WHOLE OR IN PART, FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS CREATED WITHOUT THE EXPRESSED, WRITTEN CONSENT OF VHB. ANY UNAUTHORIZED USE, REUSE, MODIFICATION OR ALTERATION, INCLUDING AUTOMATED CONVERSION OF THIS DOCUMENT SHALL BE AT THE USER'S SOLE RISK WITHOUT LIABILITY OR LEGAL EXPOSURE TO VHB.
2. CONTRACTOR SHALL NOT RELY SOLELY ON ELECTRONIC VERSIONS OF PLANS, SPECIFICATIONS, AND DATA FILES THAT ARE OBTAINED FROM THE DESIGNERS, BUT SHALL VERIFY LOCATION OF PROJECT FEATURES IN ACCORDANCE WITH THE PAPER COPIES OF THE PLANS AND SPECIFICATIONS THAT ARE SUPPLIED AS PART OF THE CONTRACT DOCUMENTS.
3. SYMBOLS AND LEGENDS OF PROJECT FEATURES ARE GRAPHIC REPRESENTATIONS AND ARE NOT NECESSARILY SCALED TO THEIR ACTUAL DIMENSIONS OR LOCATIONS ON THE DRAWINGS. THE CONTRACTOR SHALL REFER TO THE DETAIL SHEET DIMENSIONS, MANUFACTURERS' LITERATURE, SHOP DRAWINGS AND FIELD MEASUREMENTS OF SUPPLIED PRODUCTS FOR LAYOUT OF THE PROJECT FEATURES.

vhb.com

100 Great Meadow Road
Suite 200
Wethersfield, CT 06109
860.807.4300

Willington Solar One

41-43 Lohse Road
Willington, Connecticut

No.	Revision	Date	Appvd.
1	Layout Revision	2/25/2026	SJK
2	Fence/Racking Revisions	3/13/2026	SJK

Designed by DRB | Checked by SJK

Issued for: Construction | Date: July 3, 2025

Legend and General Notes

Drawing Number: C-1.0

Sheet 1 of 5

Project Number: 43590.00

PROJECT INFORMATION

ZONE DESIGNATION: R80 - RESIDENTIAL

PARCEL ACREAGE: ±18.4 ACRES

LIMITS OF WORK: ±10 ACRES

AREA OF PROPOSED TREE CLEARING: ±5 ACRES

ROW CLEAR SPACING: ±12.7 FEET

GROUND COVER RATIO: ±48.5%

SYSTEM POWER: ±1.975 MW-AC

0 25 50 100 Feet

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Suite 200
Wethersfield, CT 06109
860.807.4300

Willington Solar One

41-43 Lohse Road
Willington, Connecticut

No.	Revision	Date	Appvd.
1	Layout Revision	2/25/2026	SJK
2	Fence/Racking Revisions	3/13/2026	SJK

Designed by: DRB
Checked by: SJK

Issued for: Construction
Date: July 3, 2025

Layout and Materials Plan

Drawing Number: C-2.0

Sheet 2 of 5

Project Number: 43590.00

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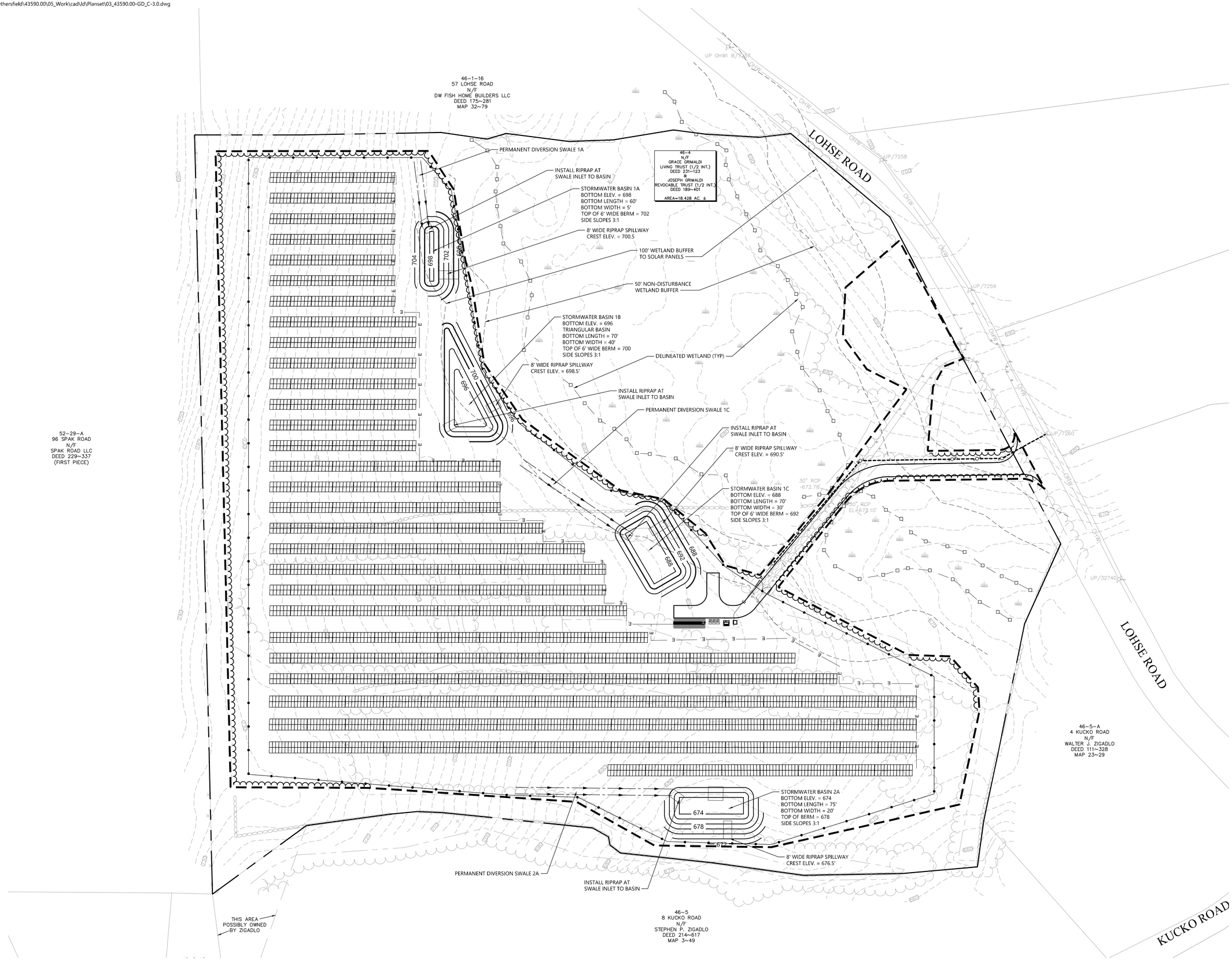

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0 25 50 100 Feet

Willington Solar One

41-43 Lohse Road
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No.	Revision	Date	Appvd.
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Designed by DRB | Checked by SJK

Issued for: Construction | Date: July 3, 2025

Grading and Drainage Plan

Drawing Number
C-3.0

Sheet 3 of 5

Project Number
43590.00

CONSTRUCTION SEQUENCING

ALL CONSTRUCTION ACTIVITIES ARE EXPECTED TO TAKE APPROXIMATELY 6 MONTHS TO COMPLETE. THE GENERAL CONSTRUCTION NOTES ARE AS FOLLOWS:

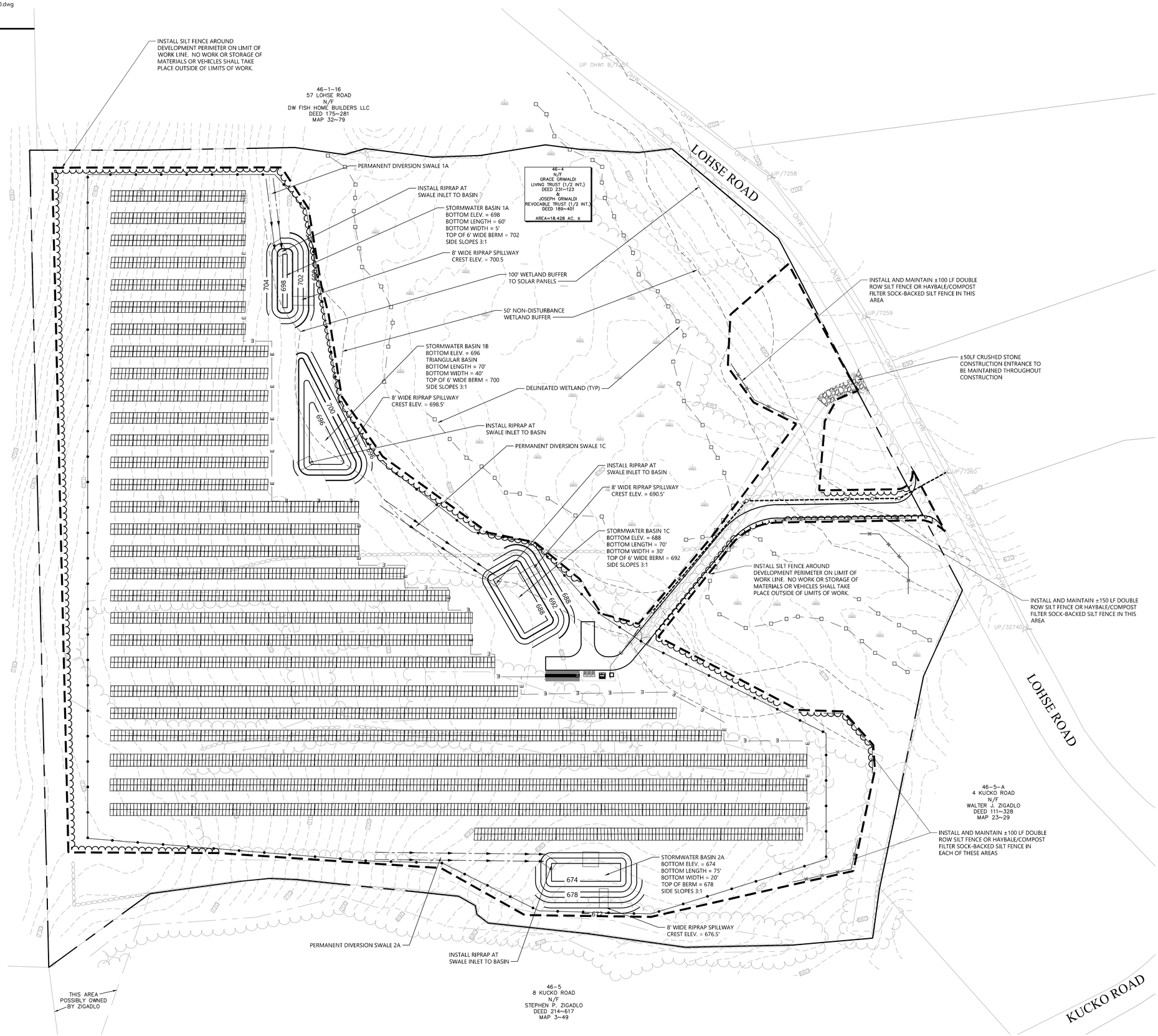
1. THE SITE CONTRACTOR SHALL BE FULLY RESPONSIBLE TO CONTROL CONSTRUCTION SUCH THAT SEDIMENTATION SHALL NOT AFFECT ROADS/HIGHWAYS AND THEIR DRAINAGE SYSTEM, NEIGHBORING PROPERTIES, WETLANDS AND REGULATORY PROTECTED AREAS, WHETHER SUCH SEDIMENTATION IS CAUSED BY WATER, WIND, OR DIRECT DEPOSIT. DESIGNATED ACCESS DRIVES MUST BE USED TO THE MAXIMUM EXTENTS POSSIBLE. IT IS REQUIRED THAT THE SITE CONTRACTOR PERFORM A DAILY INSPECTION OF ALL EROSION AND SEDIMENT CONTROL MEASURES EMPLOYED AT THE SITE.
2. A CTDEEP-APPROVED QUALIFIED INSPECTOR SHALL BE ASSIGNED TO BE RESPONSIBLE FOR PERFORMING INSPECTIONS AND PREPARING REPORTS IN ACCORDANCE WITH SECTION 5(B)(4)(B) OF THE CONSTRUCTION GENERAL PERMIT. THESE INSPECTIONS SHALL TAKE PLACE WEEKLY, AT A MINIMUM, AND SHALL BE REQUIRED WITHIN 24 HOURS OF A RAINFALL EVENT EXCEEDING 0.5 INCHES. THE ENGINEER OF RECORD SHALL BE REQUIRED TO REVIEW AND COUNTER-SIGN THE PREPARED WEEKLY REPORTS. IT IS ALSO ANTICIPATED THAT REPRESENTATIVES FROM CTDEEP AND/OR THE STATE CONSERVATION DISTRICT WILL PERFORM PERIODIC INSPECTIONS.
3. ENGINEER OF RECORD WILL PERFORM MONTHLY PLAN IMPLEMENTATION INSPECTIONS AND PREPARE REPORTS OF THE FINDINGS. THESE INSPECTIONS SHALL LAST A MINIMUM OF THREE (3) MONTHS OR UNTIL THE COMPLETION AND STABILIZATION OF ALL EROSION CONTROL MEASURES AT THE SITE.
4. THROUGHOUT THE COURSE OF THE CONSTRUCTION PROJECT, ADDITIONAL SEDIMENT AND EROSION CONTROL MEASURES MAY BE WARRANTED AT THE DISCRETION OF THE QUALIFIED INSPECTOR AND/OR DESIGN ENGINEER. THESE IMPROVEMENTS MUST BE IMPLEMENTED IN A TIMELY FASHION IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONSTRUCTION GENERAL PERMIT. ADDITIONALLY, AREAS OF PROPOSED COMPACTED NATIVE SOIL ROADS SHALL BE CONVERTED TO STABLE GRAVEL ROADS IF/AS DETERMINED BY THE QUALIFIED INSPECTOR OR ENGINEER OF RECORD.
5. PRIOR TO CONSTRUCTION, THE APPLICANT SHALL PROVIDE THE TOWN OF WILLINGTON WITH THE NAME OF CONTACT AND 24-HOUR CONTACT INFORMATION.
6. CONTRACTOR SHALL ADHERE TO 2024 CONNECTICUT GUIDELINES FOR EROSION AND SEDIMENT CONTROL, AS AMENDED.
7. THE CONTRACTOR SHALL HOLD PRE-CONSTRUCTION MEETING(S). ATTENDEES SHALL INCLUDE, BUT NOT BE LIMITED TO, DEVELOPER, REPRESENTATIVES OF THE GENERAL CONTRACTOR, SITE CONTRACTOR, CTDEEP, TOWN OF WILLINGTON, ENGINEER OF RECORD, AND QUALIFIED SWPPP INSPECTOR.
8. THE CONTRACTOR SHALL CONTACT CALL-BEFORE-YOU-DIG (1-800-922-4455) PRIOR TO ENGAGING IN ANY EXCAVATION ACTIVITIES AT THE SITE.
9. THE CONTRACTOR SHALL NOTIFY THE TOWN OF WILLINGTON AGENT, ZONING ENFORCEMENT OFFICER, AND ENGINEERING DEPARTMENT, 48 HOURS PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY.
10. NO CONSTRUCTION OF SITE IMPROVEMENTS MAY BEGIN UNTIL THE PROPER EROSION CONTROL MEASURES SERVING THE AREA TO BE DISTURBED ARE IN PLACE.
11. ANTICIPATED WORK HOURS WILL BE BETWEEN 7:00 AM AND 5:00 PM.
12. ANY DEWATERING BY PUMP SHALL INCLUDE AN INTAKE AND/OR DISCHARGE FILTRATION SYSTEM (I.E. DIRTBAG SYSTEM) AND BE PUMPED TO STABLE GROUND. CONTRACTOR TO ENSURE DISCHARGED WATER IS RUNNING CLEAN OR ALTERIOR METHODS MUST BE EMPLOYED.

PRE-CONSTRUCTION SITE PROTECTION SEQUENCE

1. ACCESS ROADS SHALL BE DESIGNATED AS EARLY AS FEASIBLE AND USED PRIMARILY FOR CONSTRUCTION TRAFFIC.
2. INSTALL EROSION AND SEDIMENT CONTROLS FOLLOWING THE CT GUIDELINES AND MANUFACTURER'S DIRECTIONS. DURING CONSTRUCTION, THE CONTRACTOR SHALL INSTALL MEASURES AS REQUIRED BY THE ENGINEER OF RECORD OR QUALIFIED INSPECTOR, TO PREVENT SEDIMENT-LADEN RUNOFF FROM REACHING WETLANDS OR DISCHARGING OFFSITE.
3. INSTALL TEMPORARY SEDIMENT TRAPS AND CONVEYANCE SWALES IN ACCORDANCE WITH THE APPROVED SITE-SPECIFIC SWPCP AND CT GUIDELINES. THE ENGINEER OF RECORD SHALL INSPECT FEATURES TO CONFIRM REQUIRED STORAGE CAPACITIES ARE PROVIDED AND THAT OUTLETS AND/OR SPILLWAYS ARE CONSTRUCTED CORRECTLY. DISCHARGE AREAS BELOW OUTFALLS MUST BE INSPECTED TO CONFIRM FLOW WILL BE OVER STABLE GROUND AND SHEET FLOW IS ENCOURAGED. IF DISTURBED SOILS ARE PRESENT, THE ENGINEER OF RECORD TO PROVIDE CORRECT MEASURES TO ADDRESS CONDITION.
4. SEED AND PROTECT DISTURBED SOILS AROUND SEDIMENT TRAPS WITHIN 14 DAYS OF COMPLETION. SECURE SEED WITH BIODEGRADABLE EROSION CONTROL MATTING.

CONSTRUCTION SEQUENCE

1. CLEAR AND GRUB AREAS TO LIMITS PRESCRIBED ON THE PLANS.
2. PERFORM EARTHWORK ON THE SITE. THIS SHALL ONLY INCLUDE MINIMAL SHAPING WITHIN CLEARED/GRUBBED AREAS.
3. TOPSOIL SHALL BE REPLACED OVER REGRADED AREAS UPON COMPLETION OF MASS EARTHWORK ACTIVITIES AND AREAS WHICH WERE DISTURBED BY MASS EARTHWORK OPERATIONS SHALL BE RESEEDED WITHIN 14 DAYS OF COMPLETION.
4. THROUGHOUT CONSTRUCTION, THE CONTRACTOR SHALL ADDRESS ONGOING EROSION PROBLEMS USING TEMPORARY DIVERSIONS AND FILLING AND GRADING GULLIES. TRACK GULLIES UP AND DOWN SLOPE. A STAPLED BIODEGRADABLE EROSION CONTROL BLANKET WITHOUT MONOFILAMENT MESH IS AN ACCEPTABLE ALTERNATIVE FOR HYDROSEED AND BFM.
5. UPON COMPLETION OF THIS CONSTRUCTION PHASE, ALL DISTURBED AREAS SHALL BE SEEDED AND STABILIZED WITH BIODEGRADABLE EROSION CONTROL MATTING PRIOR TO CONTINUING CONSTRUCTION SEQUENCE.
6. INSTALL PILES AND/OR GROUND SCREWS FOR SOLAR PANEL RACKING.
7. INSTALL ELECTRICAL CONDUIT AS REQUIRED BY THE ELECTRICAL DESIGN PLANS.
8. THE INSTALLATION OF RACKING SHALL FOLLOW THE FOUNDATION INSTALLATION BY ROUGHLY ONE WEEK STARTING FROM THE SAME POINT.
9. RESEED AND REGRADE ALL AREAS DISTURBED BY CONSTRUCTION TRAFFIC WITHIN THE ARRAYS WHERE RACKS ARE INSTALLED AS EARLY AS POSSIBLE. RUTS AND RILLS SHALL BE SMOOTHED AND GRADED AS DISCOVERED.
10. INSTALL SOLAR PANEL MODULES IN THE RACKING. MUCH OF THIS WORK IS ANTICIPATED TO BE PERFORMED BY HAND AND LIGHT CONSTRUCTION EQUIPMENT WHICH WILL CAUSE MINIMAL DISTURBANCE COMPARED TO THE USE OF HEAVY EQUIPMENT. DESIGNATED ACCESS ROADS SHALL STILL BE USED TO THE MAXIMUM EXTENTS POSSIBLE.
11. UPON COMPLETION OF CONSTRUCTION, RE-SEED ALL DISTURBED AREAS WITHIN 14 DAYS AND PREVENT VEHICULAR TRAFFICKING OVER THESE AREAS. INSTALL FINAL LANDSCAPING.
12. AFTER SITE IS STABILIZED, AND AFTER INSPECTION BY DESIGN ENGINEER AND/OR CTDEEP REPRESENTATIVE, REMOVE TEMPORARY EROSION AND SEDIMENT CONTROLS INCLUDING SEDIMENT TRAPS AND DIVERSION SWALES. ENTIRE SITE SHALL BE CHECKED FOR AND CLEANED OF SEDIMENT AS NEEDED.



0 25 50 100 Feet

Willington Solar One

41-43 Lohse Road
Willington, Connecticut

No.	Revision	Date	Appvd.
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Designed by DRB | Checked by SJK

Issued for: Construction | Date: July 3, 2025

Erosion and Sediment Control Plan

Drawing Number: C-4.0

Sheet 4 of 5

Project Number: 43590.00

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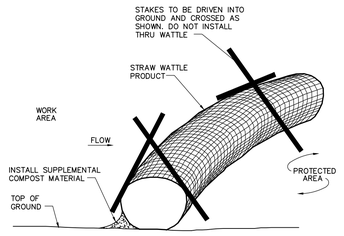
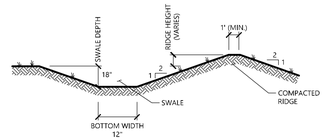


Straw Wattle Installation

8/12

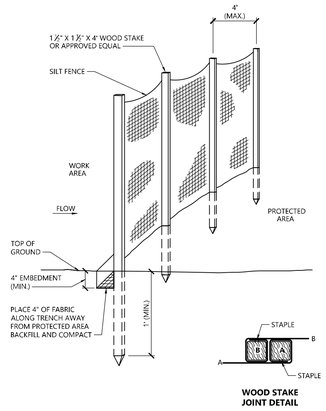
N.T.S. Source: VHB LD_658



NOTE:
1. ALL SIDE SLOPES SHALL NOT EXCEED 2:1
2. SWALE SHALL BE LINED WITH EROSION CONTROL BLANKETS.
3. THE INTENT IS TO USE THE MATERIAL EXCAVATED FROM THE SWALE TO CONSTRUCT THE RIDGE AT THE DOWNHILL SIDE OF THE SWALE.
4. THE CONTRACTOR SHALL INSTALL CHECK DAMS APPROXIMATELY EVERY 50 HORIZONTAL FEET WITHIN THE SWALES. CHECK DAMS CAN BE CONSTRUCTED WITH 8" RIPRAP, COMPOST FILTER SOCK, OR STRAW WATTLE.

Diversion Swale

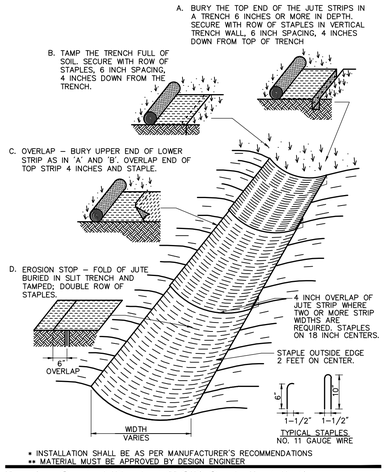
N.T.S. Source: VHB



Silt Fence Barrier

1/16

N.T.S. Source: VHB LD_650

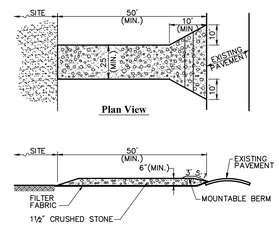


- INSTALLATION SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS
- MATERIAL MUST BE APPROVED BY DESIGN ENGINEER

Erosion Control Blanket (ECB) Swale Installation

6/08

N.T.S. Source: VHB LD_681



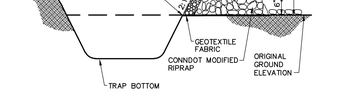
Notes:

1. ENTRANCE WIDTH SHALL BE A TWENTY-FIVE (25) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
2. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY. BERM SHALL BE PERMITTED. PERIODIC INSPECTION AND MAINTENANCE SHALL BE PROVIDED AS NEEDED.
3. STABILIZED CONSTRUCTION EXIT SHALL BE REMOVED PRIOR TO FINAL FINISH MATERIALS BEING INSTALLED.

Stabilized Construction Exit

6/08

N.T.S. Source: VHB LD_682

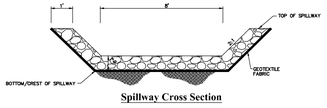


Trap Cross Section

NOTE:
1. ALL SIDE SLOPES SHALL NOT EXCEED 2:1
2. SIDE SLOPES OF EMBANKMENT SHALL BE STABILIZED BY TEMPORARY SEEDING OR EROSION CONTROL BLANKETS AS DIRECTED BY THE ENGINEER.
3. TRAP SHALL BE DRAINED AND CLEANED OF SEDIMENT ONCE SEDIMENT IS > 1' ABOVE TRAP BOTTOM OR IF INFILTRATION INTO THE NATIVE SOIL BECOMES COMPROMISED.

Temporary Sediment Trap (TST)

N.T.S. Source: VHB



Spillway Cross Section

NOTE:
1. ALL SIDE SLOPES SHALL NOT EXCEED 2:1
2. TOP OF EMBANKMENT SHALL BE 2' (MIN.)
3. SIDE SLOPES OF EMBANKMENT SHALL BE STABILIZED BY TEMPORARY SEEDING OR EROSION CONTROL BLANKETS AS DIRECTED BY THE ENGINEER AND/OR QUALIFIED INSPECTOR.
4. PERIMETER SILT FENCE SHALL BE REPLACED BY E-FENCE IMMEDIATELY DOWNSTREAM FROM SPILLWAY.

Riprap Spillway

N.T.S. Source: VHB

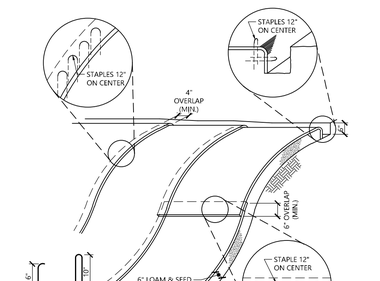
Notes:

1. SILTSOCK SHALL BE 12" DIAMETER FILTREXX SILTSOXX, OR APPROVED EQUAL.
2. SILTSOCKS SHALL OVERLAP A MINIMUM OF 12 INCHES.
3. SILTSOCK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS, AND REPAIR OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.
4. COMPOST MATERIAL SHALL BE DISPERSED ON SITE, AS DETERMINED BY THE ENGINEER.
5. IF NON BIODEGRADABLE NETTING IS USED THE NETTING SHALL BE COLLECTED AND DISPOSED OF OFFSITE.

Compost Filter Sock (CFS)

8/12

N.T.S. Source: VHB LD_658



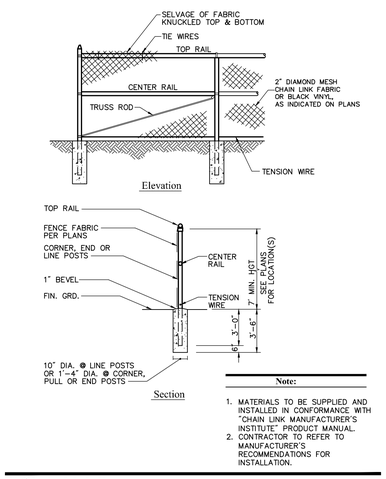
NOTES

1. BEGIN AT THE TOP OF BLANKET INSTALLATION AREA BY ANCHORING BLANKET IN A 6" DEEP TRENCH BACKFILL AND COMPACT TRENCH AFTER STAPLING.
2. ROLL THE BLANKET DOWN THE SWALE IN THE DIRECTION OF THE WATER FLOW.
3. THE EDGES OF BLANKETS MUST BE STAPLED WITH APPROX. 4 INCH OVERLAP WHERE 2 OR MORE STRIP WIDTHS ARE REQUIRED.
4. WHEN BLANKETS MUST BE SPLICED DOWN THE SWALE, PLACE UPPER BLANKET END OVER LOWER END WITH 6 INCH (MIN.) OVERLAP AND STAPLE BOTH TOGETHER.
5. METHOD OF INSTALLATION SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS.
6. EROSION CONTROL BLANKETS SHALL BE USED IN ALL AREAS WHERE SLOPES EXCEED 3:1.

Erosion Control Blanket Slope Installation

1/16

N.T.S. Source: VHB REV LD_680



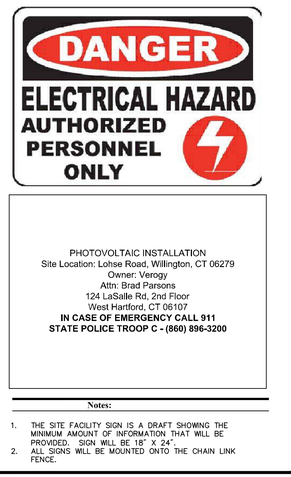
Note:

1. MATERIALS TO BE SUPPLIED AND INSTALLED IN CONFORMANCE WITH "CHAIN LINK MANUFACTURER'S INSTITUTE" PRODUCT MANUAL.
2. CONTRACTOR TO REFER TO MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION.

7' Chain Link Fence

6/08

N.T.S. Source: VHB REV LD_480



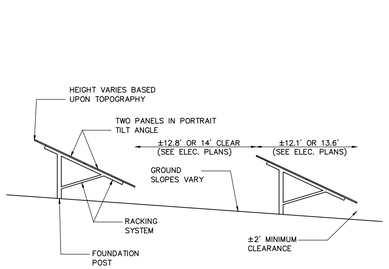
Notes:

1. THE SITE FACILITY SIGN IS A DRAFT SHOWING THE MINIMUM AMOUNT OF INFORMATION THAT WILL BE PROVIDED. SIGN WILL BE 18" X 24".
2. ALL SIGNS WILL BE MOUNTED ONTO THE CHAIN LINK FENCE.

Danger and Site Facility Signs

1/16

N.T.S. Source: VHB



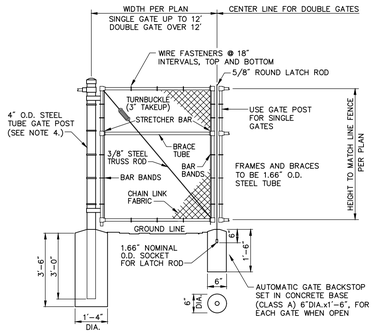
Notes:

1. FINAL DETERMINATION OF PANEL TYPE, RACKING SYSTEM, AND FOUNDATION POSTS TO BE DETERMINED PENDING BEST AVAILABLE TECHNOLOGY AT TIME OF CONSTRUCTION AND STRUCTURAL GROUND TESTING.

Cross Section of Fixed-Tilt Panel Array

7/20

N.T.S. Source: VHB



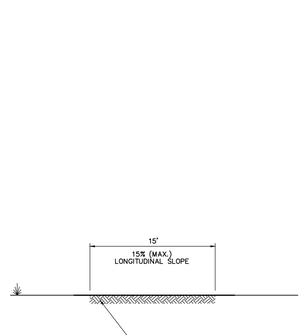
Notes:

1. CHAIN LINK FABRIC FOR GATES TO BE THE SAME AS REQUIRED FOR FENCE.
2. GATE POST BASE-PORTLAND CEMENT CONCRETE (3000 PSI).
3. FENCE FABRIC, POSTS, FRAMEWORKS, AND HARDWARE SHALL BE GALVANIZED STEEL OR BLACK VINYL (AS INDICATED ON PLANS) PER SPECIFICATIONS.
4. GATE POSTS TO BE USED ON EACH SIDE OF SINGLE AND DOUBLE GATE OPENINGS.

Chain Link Fence Gate

6/08

N.T.S. Source: VHB LD_482



Notes:

1. COMPACTED GRAVEL SHALL BE IN ACCORDANCE WITH THE CURRENT VERSION OF THE CONNECTICUT DEPARTMENT OF TRANSPORTATION SPECIFICATIONS FOR ROADS, BRIDGES, AND INCIDENTAL CONSTRUCTION.

Access Road Cross Section

N.T.S. Source: VHB

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Suite 200
Wethersfield, CT 06109
860.807.4300

Willington Solar One

41-43 Lohse Road
Willington, Connecticut

No.	Revision	Date	Appvd.
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Designed by: DRB
Checked by: SJK

Issued for: Construction
Date: July 3, 2025

Site Details

Drawing Number: C-5.0

Sheet 5 of 5

Project Number: 43590.00

LEGEND

LOCUS PROPERTY LINE		IPF IRF ○	IRON PIPE OR ROD FOUND
ABUTTERS PROPERTY LINE		CIRF ○	CAPPED ROD FOUND
EASEMENT LINE		△	CALCULATED POINT
2' CONTOUR LINE			UTILITY POLE
TRUNK LINK		●	PIPE INLET OR OUTLET
DRIP LINE		+	GUY WIRE ANCHOR
OHW	OVERHEAD WIRES	◎	POST
X X	WIRE FENCE	□	WETLAND FLAG
STONE WALL			
WETLAND DELINEATION			

52-29-A
96 SPAK ROAD
N/F
SPAK ROAD LLC
DEED 229~337
(FIRST PIECE)

46-1-16
57 LOHSE ROAD
N/F
DW FISH HOME BUILDERS LLC
DEED 175~281
MAP 32~79

46-4
N/F
GRACE GRIMALDI
LIVING TRUST (1/2 INT.)
DEED 231~123
&
JOSEPH GRIMALDI
REVOCABLE TRUST (1/2 INT.)
DEED 189~401

AREA=18.428 AC. ±

LOHSE ROAD

46-5-A
4 KUCKO ROAD
N/F
WALTER J. ZIGADLO
DEED 111~328
MAP 23~29

46-5
8 KUCKO ROAD
N/F
STEPHEN P. ZIGADLO
DEED 214~617
MAP 3~49

42-8-12
24 WILDERNESS WAY
N/F
MARCOS &
ANA NODARI
DEED 234~105
MAP 32~95

KUCKO ROAD

THIS AREA
POSSIBLY OWNED
BY ZIGADLO

CHRISTMAS TREE FARM

WOODED

GRAVEL

BIT. ROAD

CHAIN GATE

BARN

SHED

30" RCP
EL=672.78'

30" RCP
EL=672.10'

IRF FLUSH

IRF UP 2"

IRF UP 4"

IRF UP 3"

IRF UP 2"

IRF UP 3"

CIRF UP 11"

IRF DOWN 2"

UP/7258

UP/7259

UP/7260

UP/32740

CCS NAD83

50' 0' 50' 100'

NOTES:

1. FIELD SURVEY BY RTK GPS & RTK DRONE IN DECEMBER 2024.

2. THE HORIZONTAL DATUM IS NAD83. THE VERTICAL DATUM IS NAVD88. BOTH WERE DERIVED FROM RTK GPS OBSERVATIONS TAKEN ON SITE.

3. THE LOCATIONS OF UTILITIES SHOWN HEREON ARE THE RESULT OF SURFACE EVIDENCE ONLY. THIS PLAN DOES NOT NECESSARILY DEPICT THE EXACT LOCATION OF THESE UTILITIES AND MAY NOT SHOW ALL OF THE UTILITIES WHICH EXIST WITHIN THE PREMISES SURVEYED. CONTACT DIG-SAFE AT 1-888-344-7233 BEFORE EXCAVATION.

4. THE LOCUS PARCEL AND ALL ABUTTING LAND WITHIN THE VIEW OF THIS PLAN IS LOCATED IN THE TOWN OF WILLINGTON R-80 ZONING DISTRICT.

5. ACCORDING TO FEDERAL EMERGENCY MANAGEMENT AGENCY MAPS, THE ENTIRE LOCUS PARCEL IS LOCATED IN AN AREA DESIGNATED AS "ZONE C" (AREAS OF MINIMAL FLOODING). COMMUNITY PANEL NO. 090159 0010 A, EFFECTIVE ON 6/15/1982.

6. WETLANDS SHOWN HEREON WERE DELINEATED BY DAVISON ENVIRONMENTAL, LLC IN DECEMBER 2024 & WERE LOCATED BY THIS SURVEY.

7. ALL CONTOURS SHOWN HEREON WERE GENERATED IN QGIS FROM DIGITAL ELEVATION MODELS OF THE 2016 CRCOG LIDAR DATA COLLECTED BY USGS AND DISTRIBUTED BY NOAA.

THIS SURVEY HAS BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300B-1 THROUGH 20-300B-20 AND THE "STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" AS ADOPTED BY THE CONNECTICUT ASSOCIATION OF LAND SURVEYORS INC. ON SEPTEMBER 26, 1997.

TYPE OF SURVEY: IMPROVEMENT LOCATION SURVEY

BOUNDARY SURVEY CATEGORY: DEPENDENT RESURVEY

CLASS OF ACCURACY: HORIZONTAL CLASS A-2
VERTICAL CLASS V-2
TOPOGRAPHIC CLASS T-2

PURPOSE OF SURVEY: PROPOSED SOLAR FACILITY

THIS DOCUMENT AND COPIES THEREOF ARE VALID ONLY IF THEY BEAR THE LIVE SIGNATURE AND EMBOSSED SEAL OF THE DESIGNATED PROFESSIONAL. UNAUTHORIZED ALTERATIONS RENDER ANY DECLARATION NULL AND VOID.

TO THE BEST OF MY KNOWLEDGE AND BELIEF, THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

CHARLES G. GIDMAN, P.L.S. #70103

STATE OF CONNECTICUT · CHARLES G. GIDMAN · 70103 · LICENSED LAND SURVEYOR

NORTHEAST SURVEY CONSULTANTS
3 FERRY STREET
STUDIO 1 EAST
EASTHAMPTON, MA 01027
(413) 203-5144

EXISTING CONDITIONS

SURVEYOR:	–
ENGINEER:	–
DRAFTING:	CGG
DESIGN:	JDG
FIELD WORK:	MAK CRC
HORZ. SCALE:	1" = 50'
PROJECT NUMBER:	24-341
VERT. SCALE:	–
DRAWING NAME:	24-341.DWG
DATE:	1-16-2025

PLAN OF LAND IN WILLINGTON, CT

LOHSE ROAD

PREPARED FOR

VEROGY

SHEET NO. 1 OF 1

Spill Prevention and Materials Storage Plan

Willington Solar One
1.975 MW AC Ground Mounted Solar Project
Lohse Road, Willington, Connecticut

Date:

July 2025, Revised December 2025, Revised June 2026

Prepared By:

Willington Solar One, LLC

124 LaSalle Road, 2nd Floor

West Hartford, CT 06107

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1. Introduction

This Spill Prevention and Materials Storage Plan was developed for the construction of a 1.975 MW ground mounted solar array located at Lohse Road, Willington, Connecticut.

2. General Requirements

The project's location is proximate to sensitive environmental features and as such the Contractor is required to take precautions related to the storage of petroleum materials and equipment refueling. The Contractor is responsible for containing and properly cleaning up any inadvertent fuel or petroleum (i.e., oil, hydraulic fluid, biodegradable transformer insulating fluid, etc.) spill.

The Contractor shall not keep any above ground fuel or oil storage onsite greater than 1,320 gallons in cumulative volume.

The Contractor is responsible for keeping and maintaining a spill containment kit on Site for the duration of the construction of the project. The spill containment kit shall consist of a sufficient supply of absorbent pads and absorbent material, as well as contain this Spill Prevention and Materials Storage Plan. In addition, a waste drum will be kept on site to contain any used absorbent pads/material for proper and timely disposal off site in accordance with applicable local, state, and federal laws.

The Contractor shall make all workers and subcontractors on Site aware of this Spill Prevention and Materials Storage Plan and shall include it as part of their job briefings.

3. Specific Spill Response and Material Handling Procedures

The Contractor should adhere to the following spill response and material handling procedures.

<u>Refueling and Material Storage</u>

- All light duty construction support vehicles shall be fueled off site at a service station.
- Refueling of vehicles on site shall take place in a supervised manner to avoid any overfills.
- Refueling of vehicles or machinery shall take place on an impervious pad with secondary containment designed to contain petroleum fuels.
- Any refueling tanks and/or drums or other hazardous materials that must be kept on site shall be stored on an impervious surface utilizing secondary containment and be kept at least 100 feet from any wetlands or water courses located on site.

<u>Initial Spill Response Procedure</u>

- Immediately stop operation and shut off all equipment
- Remove any sources of ignition

- Locate the source of the spill and contain and/or stop the spill from continuing
- Once the spill is stopped or contained, follow any flow paths of the spill and prevent or contain any further release into sensitive environmental areas.
- Ensure that all contractors and subcontractors on site are notified of the spill.

Spill Clean Up

- Obtain the Spill Response Kit from the designated location on Site
- Place the absorbent materials directly on the spill
- Continue to place the absorbent materials around the spill to prevent any further release
- Ensure that the spill is eliminated or isolated at the source
- Determine the type and approximate amount of material that was spilled
- Contact the appropriate Site contacts and local, state, and/or federal agencies as required.
- Contact a disposal company to properly dispose of any contaminated materials
- Fill a report on the incident.

Reporting

- Complete an incident report for each spill
- Submit a completed incident report to local, state and federal agencies, as required.
- The Connecticut Department of Energy & Environmental Protection (DEEP), Emergency Response Unit should be contacted at: (860) 424-3338, in the event of an emergency spill

4. Site and Emergency Contact Information

Project Owner: Willington Solar One, LLC Phone: (860) 288-7215	**Local Fire Department:** Trevor Gantick, Fire Marshal Phone (non-emergency): (959) 929-4181 Phone (emergency): 911
Project Site Contact: Willington Solar One, LLC Name: Dan Sheridan – Project Superintendent Phone: 860.336.7244	**Local Police Department (CT State Police Troop C):** Phone (non-emergency): (860) 896-3200 Phone (emergency): 911
Construction Oversight Contact: Willington Solar One, LLC Name: Steven DeNino, Chief Operating Officer Phone: (860) 288-7215	**State Agency: Connecticut Department of Energy & Environmental Protection (DEEP), Emergency Response Unit** Phone: (860) 424-3338 Alternate Phone: (860) 424-3333
Spill Clean Up Contractor: **Clean Harbors Environmental** 51 Broderick Road, Bristol, CT 06010 Phone: (860) 583-8917	