May 16, 2025

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

Re: PETITION NO. 1617- Woodstock Solar One, LLC and VCP, LLC d/b/a Verogy petition for a declaratory ruling, pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed construction, maintenance and operation of a 3.0-megawatt AC solar photovoltaic generating facility located at 11 Castle Roack Road, Woodstock, Connecticut, and associated electrical connection.

Compliance with Conditions of Approval Nos. 1-5 & 9-11

Dear Attorney Bachman:

In accordance with Conditions No. 1-5, & 9-11 of the Siting Council's August 2, 2024, approval of the above-referenced Petition for Declaratory Ruling, enclosed are several materials and an explanation of how the condition is being addressed herewith.

Attached are updated Site Plans that address conditions 1, 4 & 9 as follows:

- Condition No. 1 – The attached updated site plans include "Project changes" that change the racking system from fixed-tilt to single-axis tracker. The Facility will now consist of a total of 7,938 First Solar Series 6 465W modules, of which 2,316 will be mono facial and 5,622 will be bifacial modules. The total DC size of the system is now 3.691-megawatts, and the AC system size remains the same at 3.0-megawatts. To align with the updated system design, the transformer for the eastern array only is now 2000 kVA.

  The layout of the access drive has been adjusted to accommodate the detailed utility connection design that was dictated by Eversource Field Engineering and to address Council's condition No. 9. There will now be a total of five Eversource poles spaced 40 feet apart. The number of customer installed poles remains unchanged at three and those poles will be spaced 25 feet apart.

- Condition No. 4 – The updated plans now clearly indicate the final plan for the electrical intra-connection between the eastern and western array equipment pads. The connection will be accomplished by a 100-foot-long overhead connection between two poles that will be installed outside of the wetland limits. Up to three trees may be cut down to accommodate the overhead crossing, with stumps to remain in place, and there will be no disruption within the wetland limits.

- Condition No. 9 – The location of the eastern inverter bank has been shifted an additional 100 feet toward the center of the array to increase the distance from the nearest residential property line.

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.

Condition No. 5 – An updated copy of the proposed agricultural co-use plan, previously included as part of Appendix M of the original Petion materials, is included herewith and now includes the requested Hold Harmless Agreement.

Condition No. 10 – The installation of pad-mounted equipment on the customer side of the electric distribution level interconnection was considered. However, significant additional lead times for this equipment would have compromised the ability of the project to achieve completion in compliance with the Eversource awarded SCEF contract and would therefore adversely affect the project's viability. For that reason, the existing design that incorporated pole mounted customer equipment was maintained.

Condition No. 11 – This letter shall serve as notice that we intend to commence construction on or around August 4, 2025.

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,

James Cerkanowicz

James Cerkanowicz, PE.
Woodstock Solar One, LLC

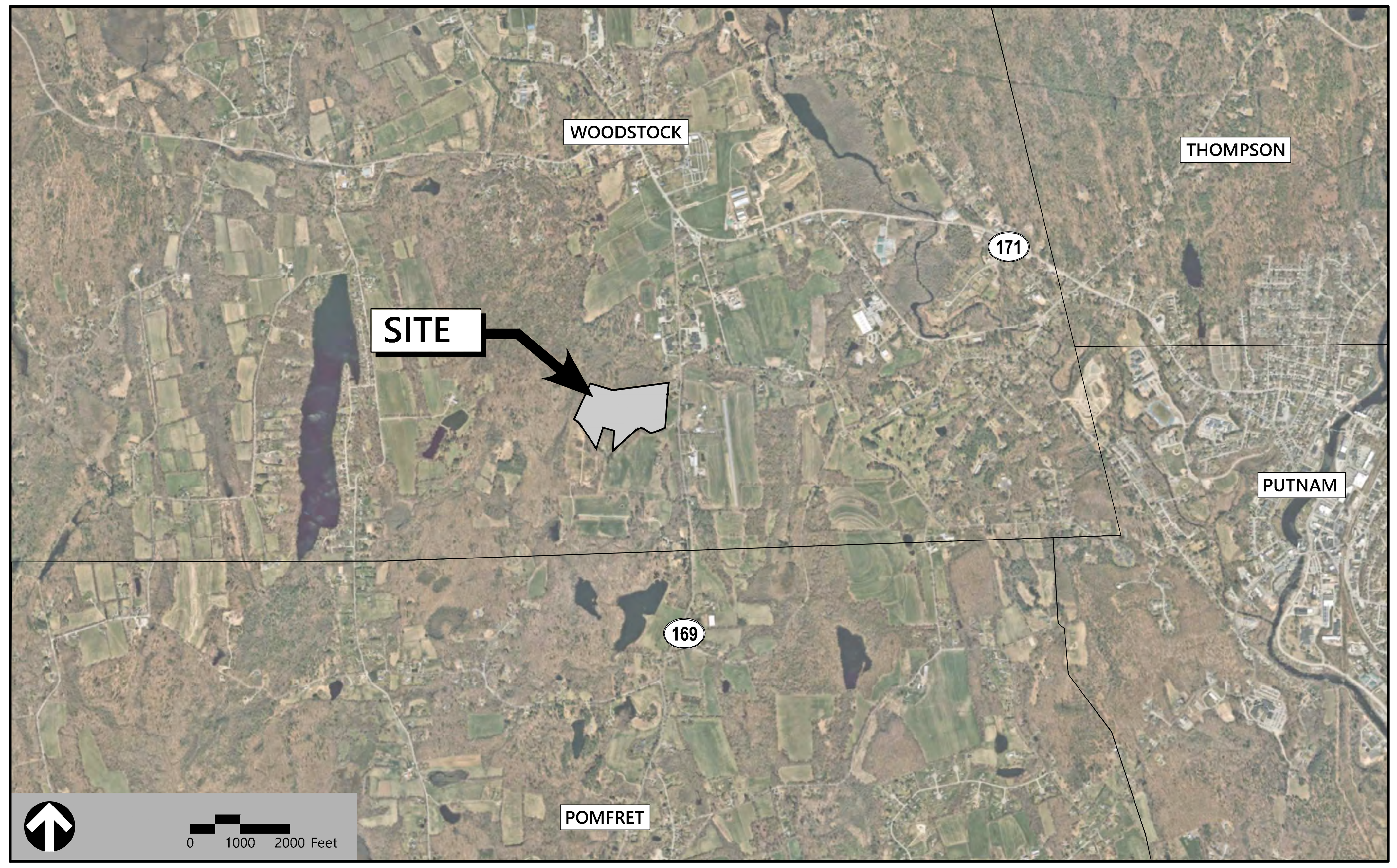
Electronic Cc:
Bryan Fitzgerald, Woodstock Solar One, LLC
Bradley Parsons, PE. PMP. Woodstock Solar One, LLC
Kenneth C. Baldwin, Robinson & Cole
John A. Soltesz III, NJR Clean Energy Ventures III Corp.
Matthew McDavitt, NJR Clean Energy Ventures III Corp.
Lerner Garrett, NJR Clean Energy Ventures III Corp.

Site Plans

Issued for	Construction
Date Issued	February 24, 2024
Latest Issue	April 8, 2025

Woodstock Solar One

11 Castle Rock Road
Woodstock, Connecticut



vhb.com

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

Applicant/Developer

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

Parcel #:
6395-64-08

Map-Block-Lot:
6395-64-08

Property Owner

Chapman John D
149 Butts Rd
Woodstock, CT 06281

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No.	Drawing Title	Latest Issue
C-1.0	Legend and General Notes	April 8, 2025
C-2.0	Layout and Materials Plan	April 8, 2025
C-3.0	Grading and Drainage Plan	April 8, 2025
C-4.0	Erosion and Sediment Control Plan	April 8, 2025
C-5.1-5.2	Site Details	April 8, 2025

Reference Drawings

No.	Drawing Title	Latest Issue
1 of 1	Plan of Land in Woodstock, CT	August 25, 2023

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VHB Project: Woodstock Solar One
Issued for: Construction

Legend

Exist. Prop.

- PROPERTY LINE
- PROJECT LIMIT LINE
- RIGHT-OF-WAY/PROPERTY LINE
- EASEMENT
- BUILDING SETBACK
- PARKING SETBACK
- BASELINE (10+00)
- CONSTRUCTION LAYOUT
- ZONING LINE
- TOWN LINE
- LIMIT OF DISTURBANCE
- WETLAND LINE WITH FLAG
- FLOODPLAIN
- 100-YEAR FLOOD LIMITS
- GRAVEL ROAD
- EDGE OF PAVEMENT (EOP)
- BITUMINOUS BERM (BB)
- BITUMINOUS CURB (BC)
- CONCRETE CURB (CC)
- CURB AND GUTTER (CG)
- EXTRUDED CONCRETE CURB (ECC)
- MONOLITHIC CONCRETE CURB (MCC)
- PRECAST CONC. CURB (PCC)
- SLOPED GRAN. EDGING (SGE)
- VERT. GRAN. CURB (VGC)
- LIMIT OF CURB TYPE
- SAWCUT
- BUILDING
- BUILDING ENTRANCE (EN)
- LOADING DOCK (LD)
- BOLLARD
- DUMPSTER PAD (D)
- 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
- MINOR CONTOUR (4)
- MAJOR CONTOUR (20)
- PARKING COUNT (10)
- COMPACT PARKING STALLS (C10)
- DOUBLE YELLOW LINE (DYL)
- STOP LINE (SL)
- CROSSWALK
- ACCESSIBLE CURB RAMP
- ACCESSIBLE PARKING
- VAN-ACCESSIBLE PARKING (VAN)

Exist. Prop.

- CONCRETE
- HEAVY DUTY PAVEMENT
- BUILDINGS
- RIPRAP
- CONSTRUCTION EXIT
- TOP OF CURB ELEVATION (27.35 TC×)
- BOTTOM OF CURB ELEVATION (26.85 BC×)
- SPOT ELEVATION (132.75 ×)
- TOP & BOTTOM OF WALL ELEVATION (45.0 TW / 38.5 BW)
- BORING LOCATION
- TEST PIT LOCATION
- MONITORING WELL (MW)
- UNDERDRAIN (UD)
- DRAIN (12"D)
- ROOF DRAIN (6"RD)
- SEWER (12"S)
- FORCE MAIN (FM)
- OVERHEAD WIRE (OHW)
- WATER (6"W)
- FIRE PROTECTION (4"FP)
- DOMESTIC WATER (2"DW)
- GAS (G)
- ELECTRIC (E)
- STEAM (STM)
- TELEPHONE (T)
- FIRE ALARM (FA)
- CABLE TV (CATV)
- CATCH BASIN
- DOUBLE CATCH BASIN
- GUTTER INLET
- DRAIN MANHOLE
- TRENCH DRAIN (TD)
- PLUG OR CAP
- CLEANOUT (CO)
- FLARED END SECTION
- HEADWALL
- SEWER MANHOLE
- CURB STOP & BOX (CS)
- WATER VALVE & BOX (WV)
- TAPPING SLEEVE, VALVE & BOX (TSV)
- SIAMESE CONNECTION
- FIRE HYDRANT (HYD)
- WATER METER (WM)
- POST INDICATOR VALVE (PIV)
- WATER WELL
- GAS GATE (GG)
- GAS METER (GM)
- ELECTRIC MANHOLE (EMH)
- ELECTRIC METER (EM)
- LIGHT POLE
- TELEPHONE MANHOLE (TMH)
- TRANSFORMER PAD (T)
- UTILITY POLE
- GUY POLE
- GUY WIRE & ANCHOR
- HAND HOLE (HH)
- PULL BOX (PB)
- 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 AUGUST 25, 2023.
2. ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988.
3. WETLANDS WERE FIELD-DELINEATED BY VHB IN May 2023 AND SUMMARIZED IN A REPORT DATED DECEMBER 19 2023.

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

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860.807.4300

Woodstock Solar One

11 Castle Rock Road
Woodstock, Connecticut

No.	Revision	Date	Appvd.
1	Revised Layout	2/18/25	SJK
2	Revised Layout	4/8/25	SJK

Designed by DRB
Checked by SJK

Issued for Construction
Date February 21, 2024

Legend and General Notes

Drawing Number
C-1.0

Sheet 1 of 6

Project Number
43362.00

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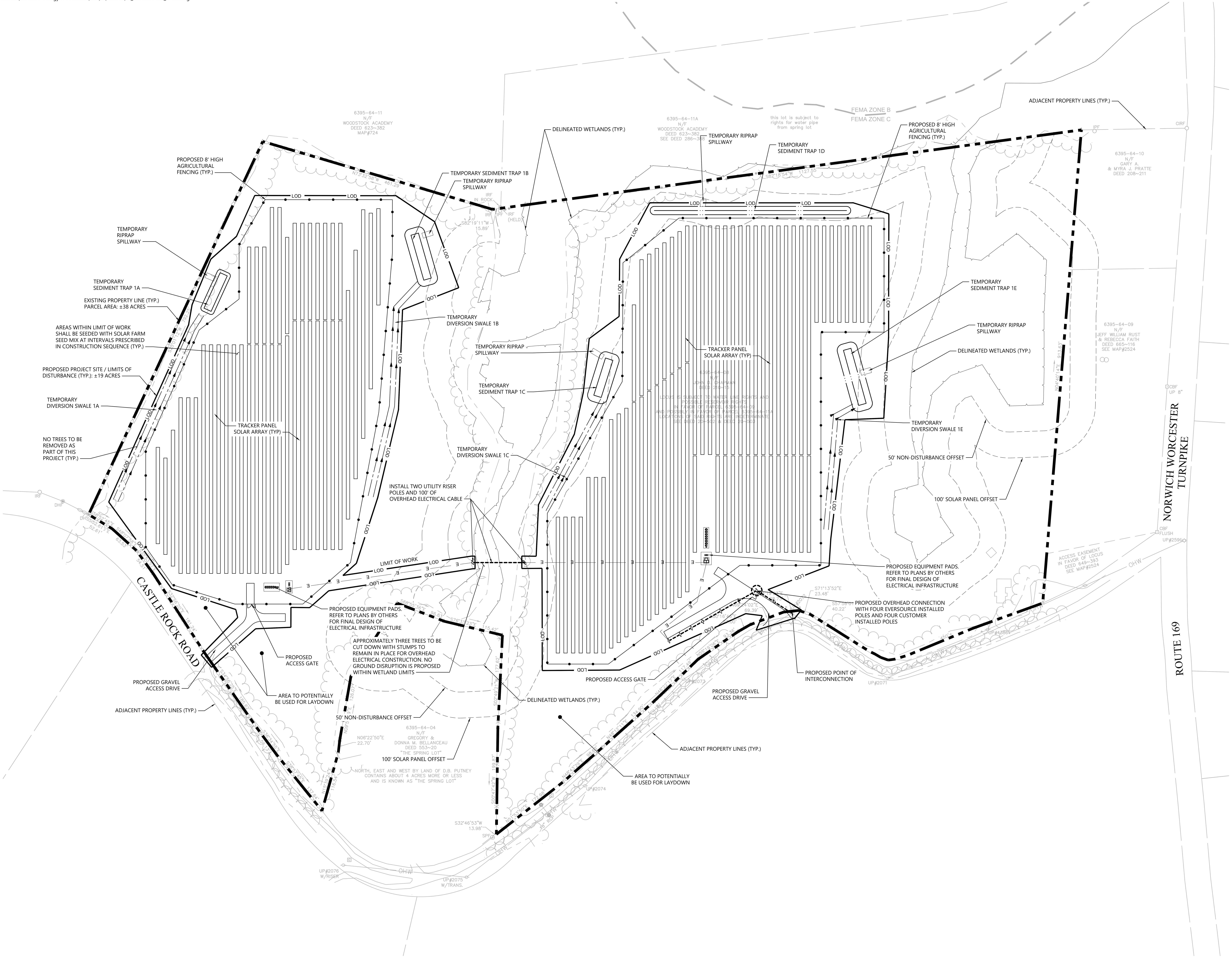

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Wethersfield, CT 06109
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Woodstock Solar One

11 Castle Rock Road
Woodstock, Connecticut

No.	Revision	Date	Appvd.
1	Revised Layout	2/18/25	SJK
2	Revised Layout	4/8/25	SJK

Designed by: DRB
Checked by: SJK

Issued for: Construction
Date: February 21, 2024

Layout and Materials Plan

Drawing Number
C-2.0

Sheet 2 of 6

Project Number
43362.00

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Woodstock Solar One

11 Castle Rock Road
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1	Revised Layout	2/18/25	SJK
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Designed by	Checked by
DRB	SJK
Issued for	Date
Construction	February 21, 2024

Grading and Drainage Plan

Drawing Number

C-3.0

Sheet 3 of 6

Project Number
43362.00

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CONSTRUCTION SEQUENCING

ALL CONSTRUCTION ACTIVITIES ARE EXPECTED TO BEGIN IN THE SUMMER OF 2025 AND BE COMPLETED BY THE END OF 2025. THE GENERAL CONSTRUCTION NOTES ARE AS FOLLOWS:

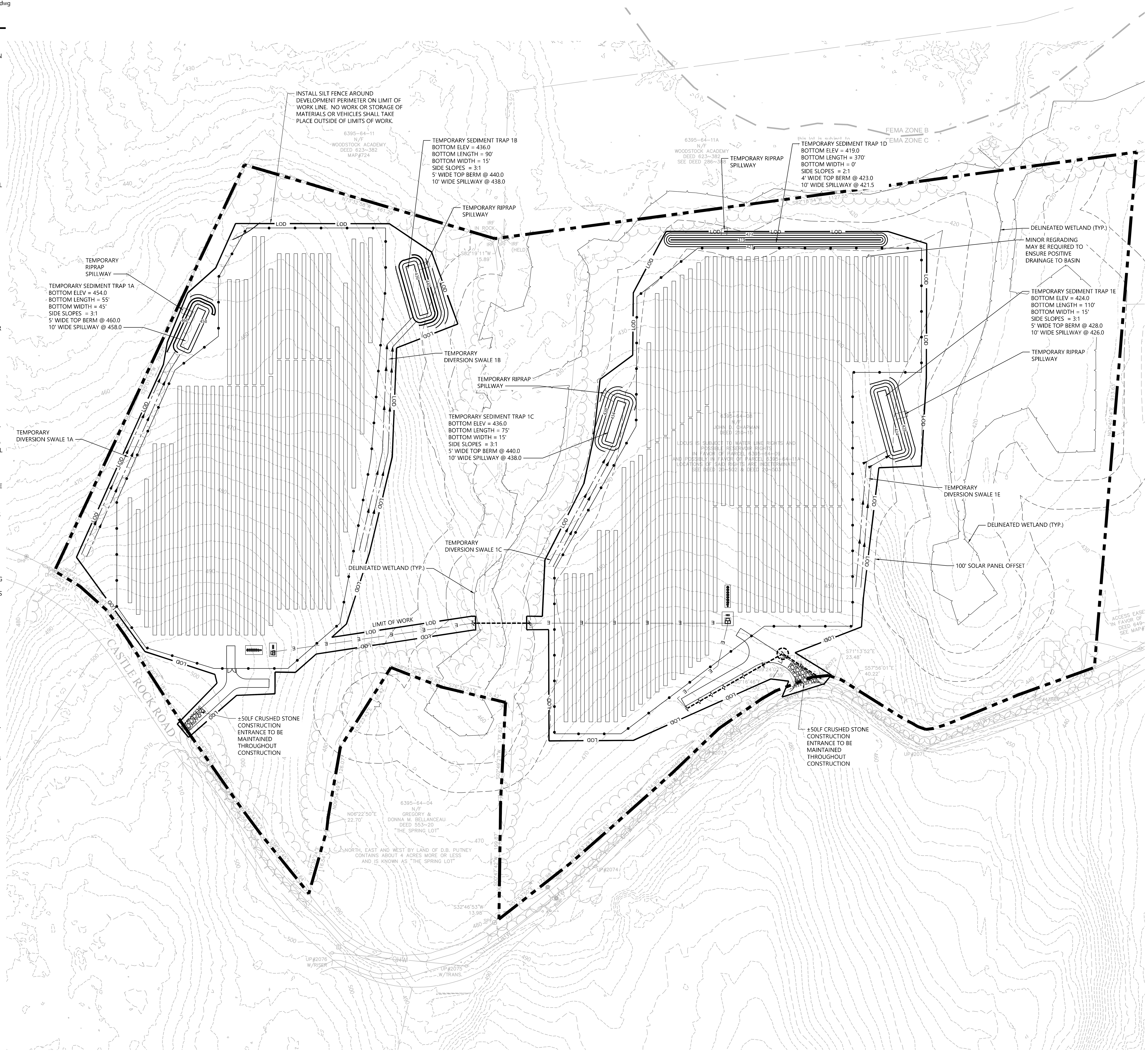
1. THE SITE CONTRACTOR SHALL BE FULLY RESPONSIBLE TO CONTROL CONSTRUCTION SUCH THAT SEDIMENTATION SHALL NOT AFFECT ROADS/HIGHWAYS AND THEIR DRAINAGE SYSTEM, NEIGHBORING PROPERTIES, WETLANDS AND REGULATORY PROTECTED AREAS, WHETHER SUCH SEDIMENTATION IS CAUSED BY WATER, WIND, OR DIRECT DEPOSIT. DESIGNATED 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 WOODSTOCK 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 WOODSTOCK, 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 WOODSTOCK 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.

<u>CONSTRUCTION SEQUENCE</u>

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.



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100 Great Meadow Road
Suite 200
Wethersfield, CT 06109
860.807.4300

Woodstock Solar One
11 Castle Rock Road
Woodstock, Connecticut

No.	Revision	Date	Appvd.
1	Revised Layout	2/18/25	SJK
2	Revised Layout	4/8/25	SJK

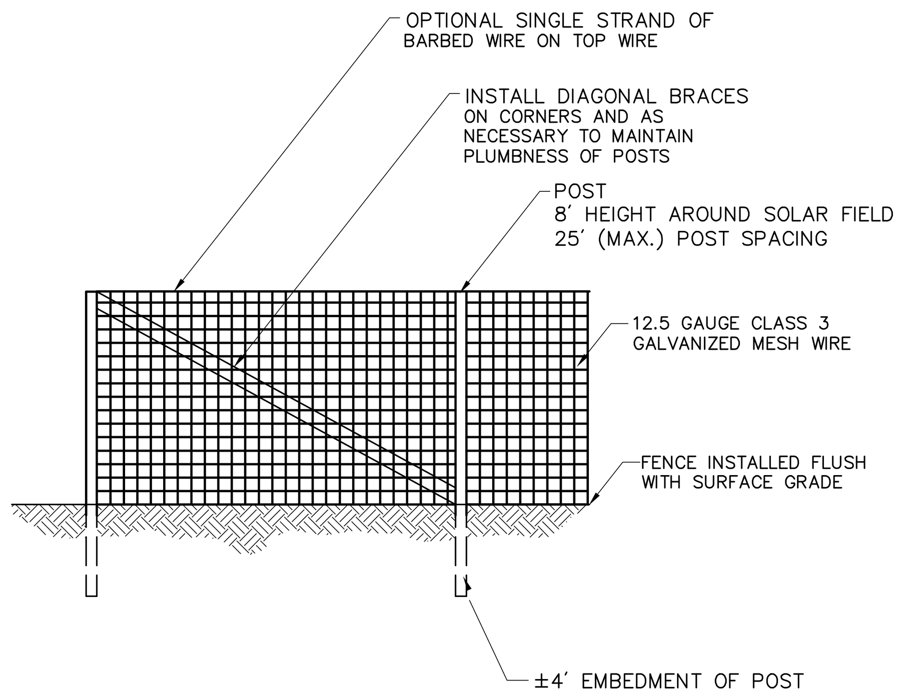
Designed by: DRB
Checked by: SJK
Issued for: Construction
Date: February 21, 2024

Erosion and Sediment Control Plan

Drawing Number: C-4.0

Sheet 4 of 6

Project Number: 43362.00



Notes:

1. FINAL DESIGN OF FENCE TO BE DETERMINED.
2. CONTRACTOR TO PROVIDE SHOP DRAWINGS OF FENCE TO BE APPROVED PRIOR TO INSTALLATION.
3. POST HOLES TO BE AUGURED PRIOR TO POST INSTALLATION.
4. ALL POSTS TO BE PLUMB IN ALL DIRECTIONS.
5. INSTALL STAINLESS STEEL TIE WIRES AT 15" INTERVALS.
6. DIAGONAL BRACING TO BE INSTALLED AS REQUIRED TO KEEP POSTS PLUM WHEN FORCE IS TENSIONED.
7. FORCE FABRIC TO BE TENSIONED TO ELIMINATE SAGS.

Agricultural Fence

6/08

N.T.S. Source: By Others REV LD_480

PHOTOVOLTAIC INSTALLATION
Site Location: 11 Castle Rock Road, Woodstock, CT 06281
Owner: Verogy
Attn: Brad Parsons
124 LaSalle Rd, 2nd Floor
West Hartford, CT 06107
IN CASE OF EMERGENCY CALL 911
WOODSTOCK POLICE DEPARTMENT - (860) 779-4900

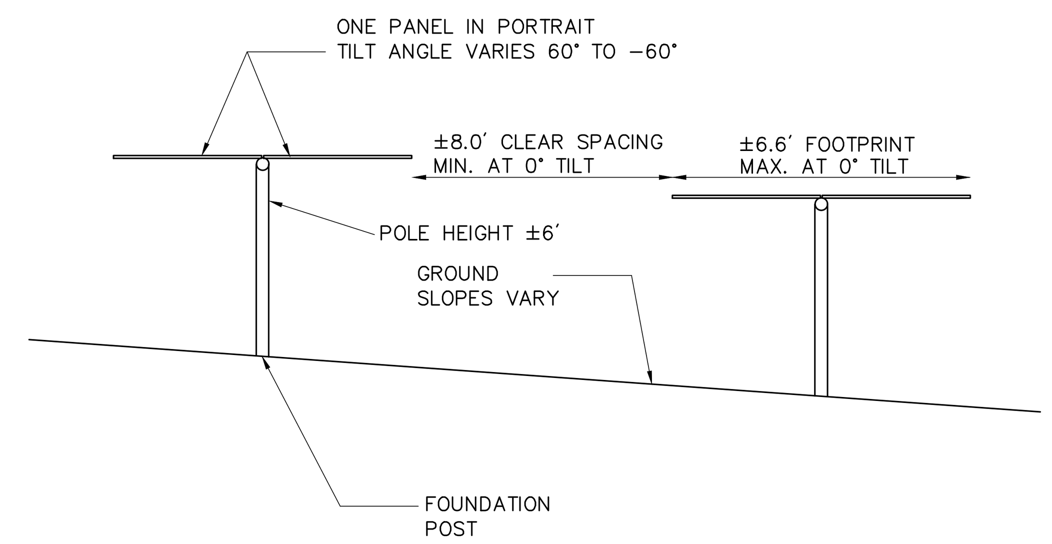
Notes:

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



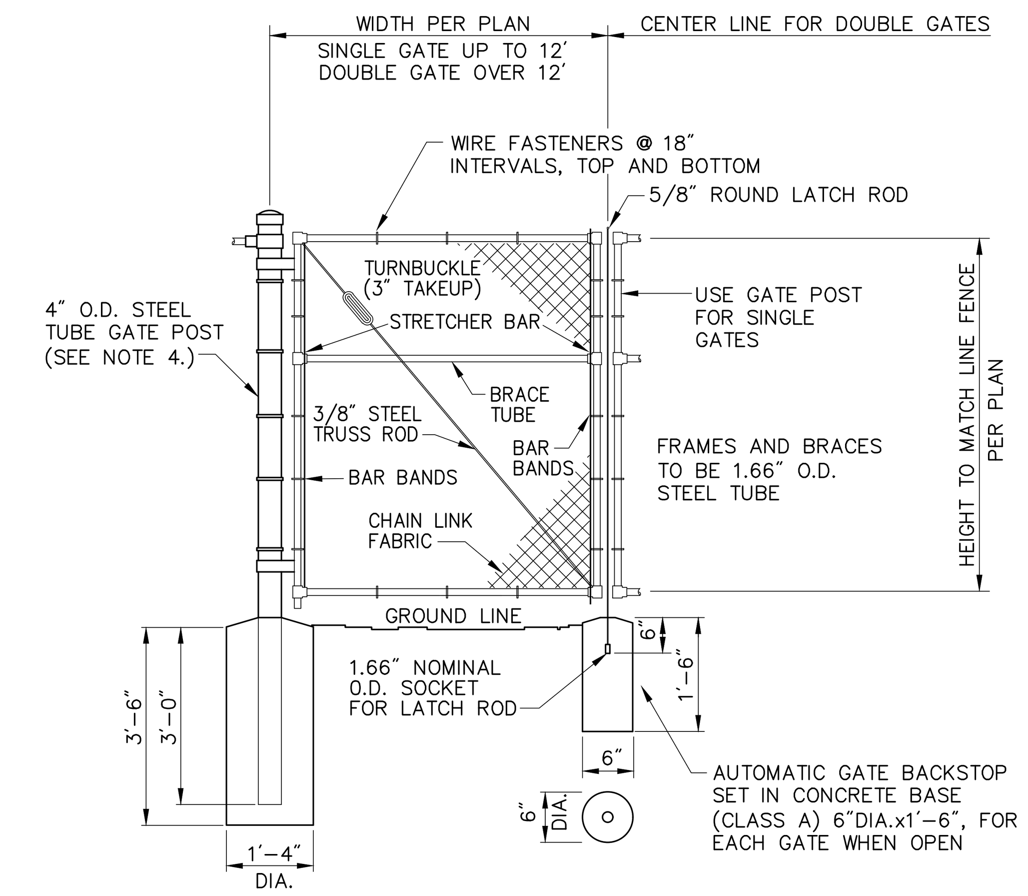
Notes:

1. THIS DETAIL IS SHOWN FOR SCHEMATIC PURPOSES ONLY. REFER TO ELECTRICAL DRAWINGS FOR FINAL RACKING CONFIGURATION.

Cross Section of Tracking 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

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100 Great Meadow Road
Suite 200
Wethersfield, CT 06109
860.807.4300

Woodstock Solar One

11 Castle Rock Road
Woodstock, Connecticut

No.	Revision	Date	Appvd.
1	Revised Layout	2/18/25	SJK
2	Revised Layout	4/8/25	SJK

Designed by DRB Checked by SJK

Issued for: Construction Date: February 21, 2024

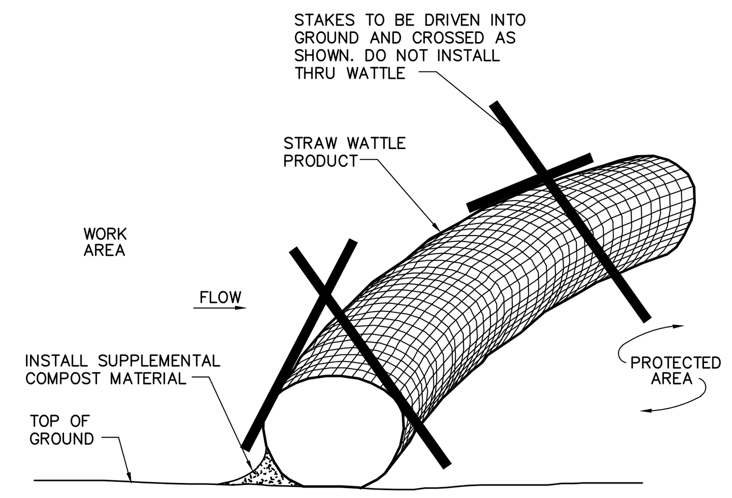
Site Details 1

Drawing Number

C-5.1

Sheet 5 of 6

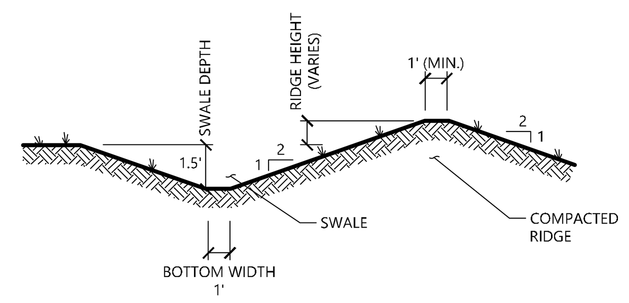
Project Number
43362.00



Straw Wattle Installation

8/12

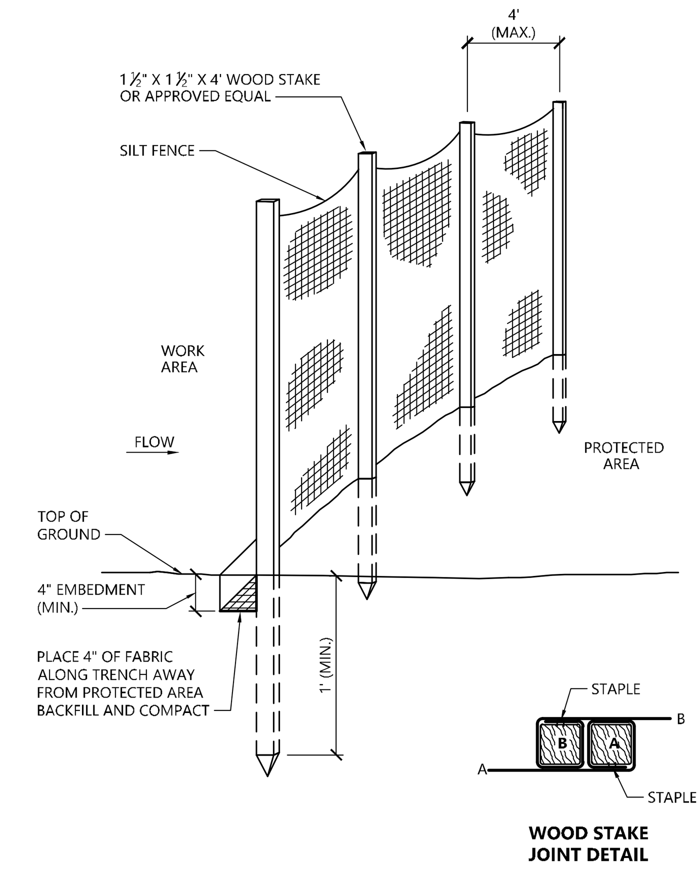
N.T.S. Source: VHB LD_658



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.

Diversion Swale

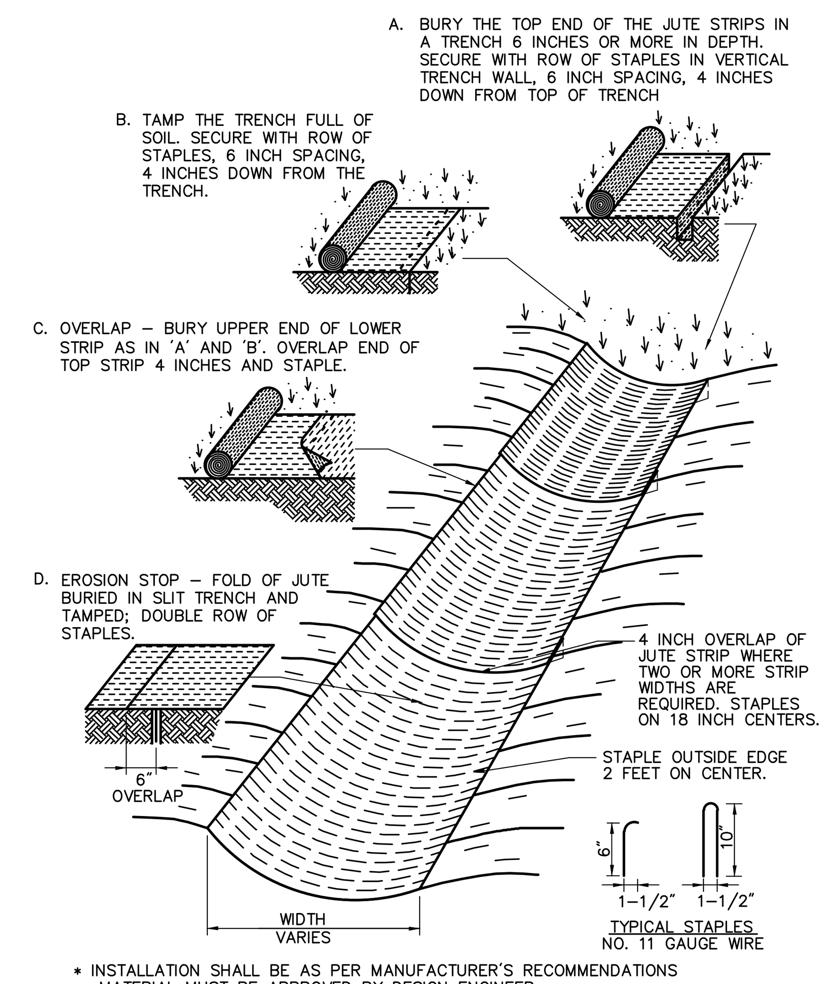
N.T.S. Source: VHB



Silt Fence Barrier

1/16

N.T.S. Source: VHB LD_650

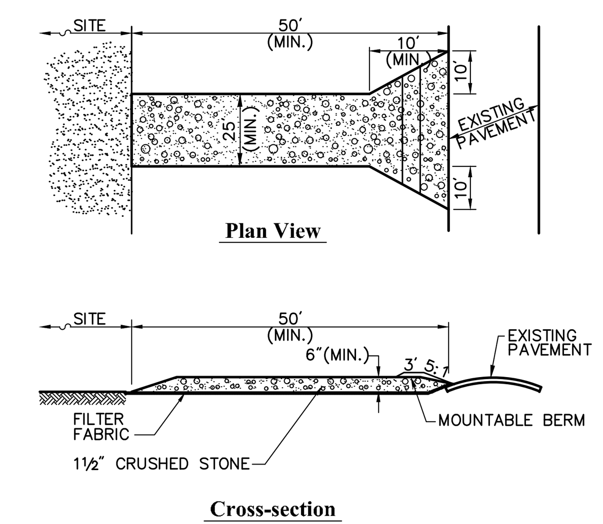


* INSTALLATION SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS
** MATERIAL MUST BE APPROVED BY DESIGN ENGINEER

Erosion Control Blanket (ECB) Swale Installation

6/08

N.T.S. Source: VHB LD_681



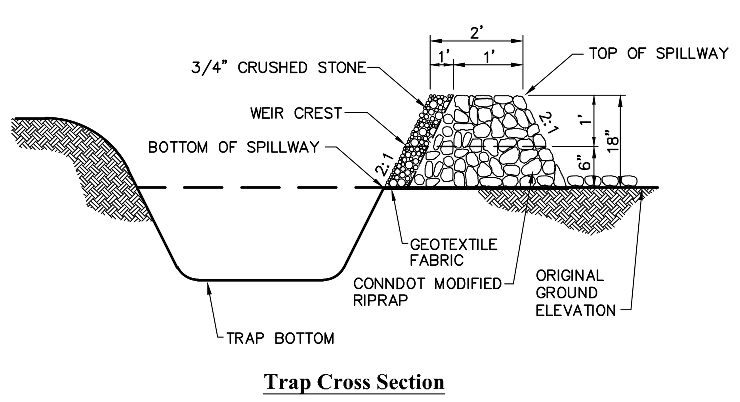
Notes:

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

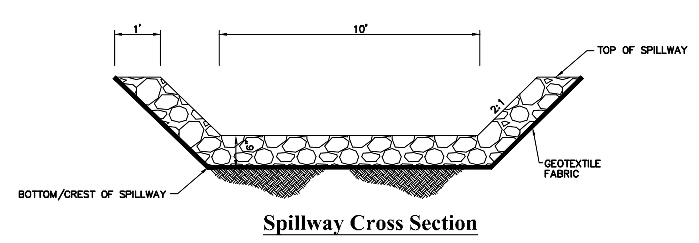


Trap Cross Section

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

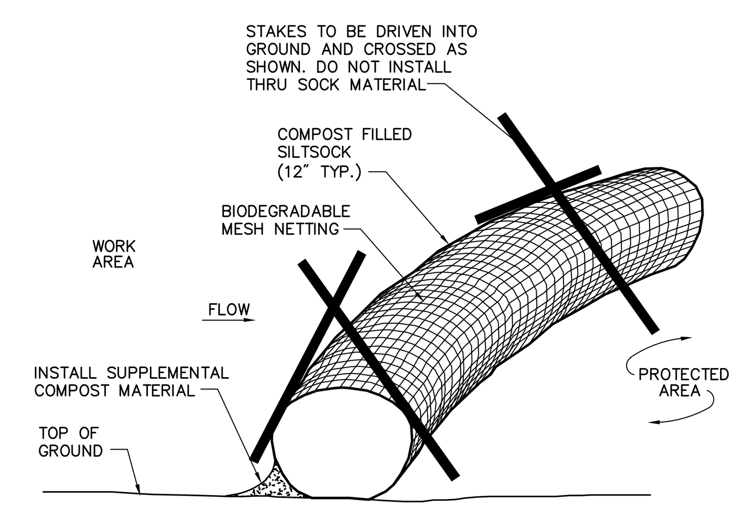


Spillway Cross Section

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



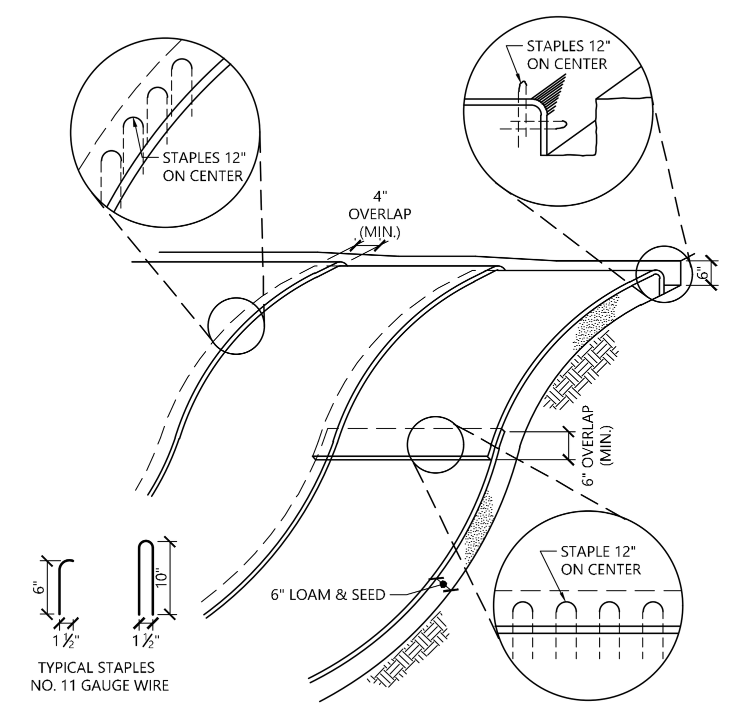
Notes:

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

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100 Great Meadow Road
Suite 200
Wethersfield, CT 06109
860.807.4300

Woodstock Solar One

11 Castle Rock Road
Woodstock, Connecticut

No.	Revision	Date	Appvd.
1	Revised Layout	2/18/25	SJK
2	Revised Layout	4/8/25	SJK

Designed by DRB | Checked by SJK

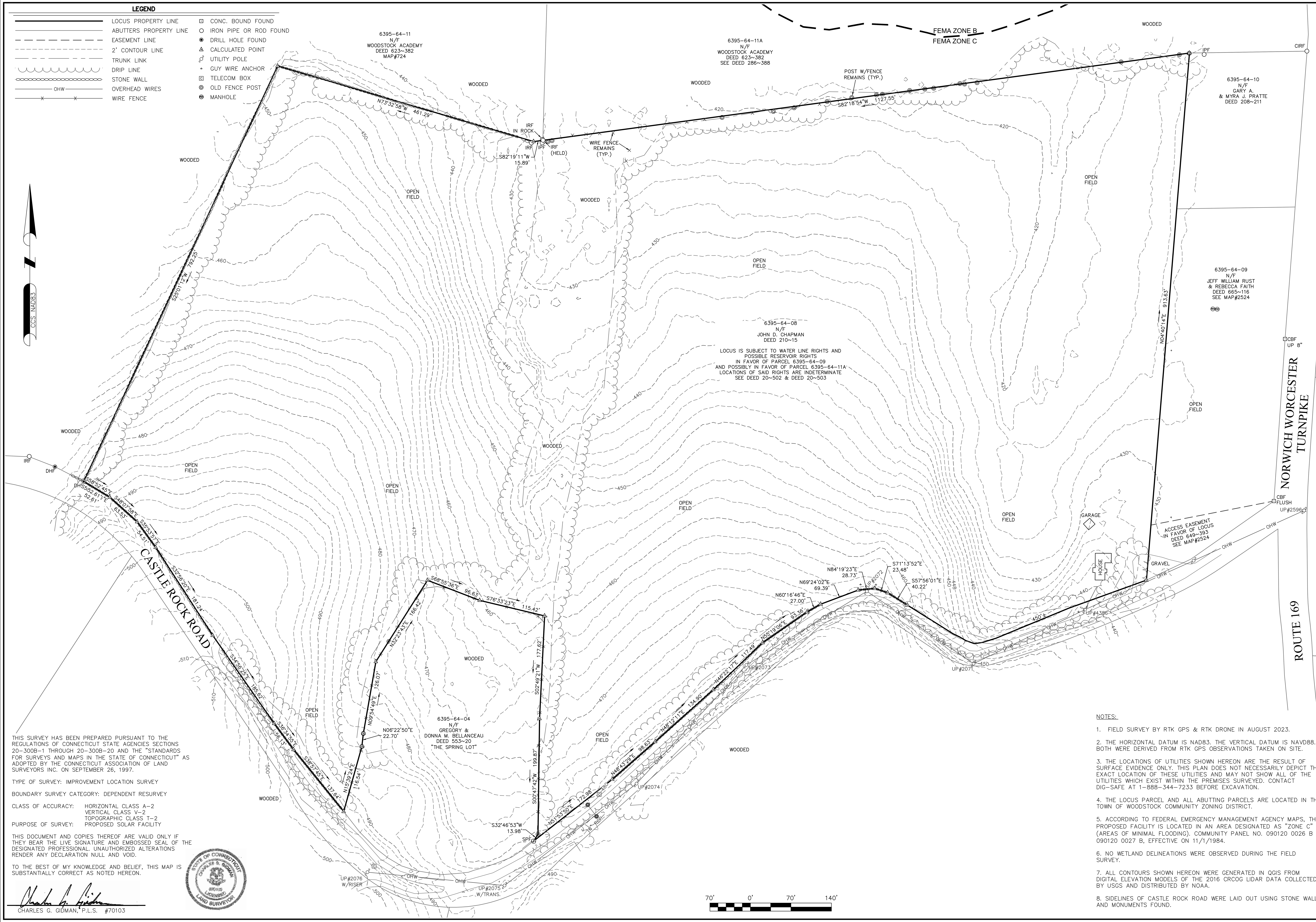
Issued for: Construction | Date: February 21, 2024

Site Details 2

Drawing Number: C-5.2

Sheet 6 of 6

Project Number: 43362.00



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

NOTES:

1. FIELD SURVEY BY RTK GPS & RTK DRONE IN AUGUST 2023.

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 PARCELS ARE LOCATED IN THE TOWN OF WOODSTOCK COMMUNITY ZONING DISTRICT.

5. ACCORDING TO FEDERAL EMERGENCY MANAGEMENT AGENCY MAPS, THE PROPOSED FACILITY IS LOCATED IN AN AREA DESIGNATED AS "ZONE C" (AREAS OF MINIMAL FLOODING). COMMUNITY PANEL NO. 090120 0026 B & 090120 0027 B, EFFECTIVE ON 11/1/1984.

6. NO WETLAND DELINEATIONS WERE OBSERVED DURING THE FIELD 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.

8. SIDELINES OF CASTLE ROCK ROAD WERE LAID OUT USING STONE WALLS AND MONUMENTS FOUND.

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

EXISTING CONDITIONS

SURVEYOR:	CGG	ENGINEER:	–
DRAFTING:	JDG	DESIGN:	–
FIELD WORK:	NAE NMC	HORZ. SCALE:	1" = 70'
PROJECT NUMBER:	23–154	VERT. SCALE:	–
DRAWING NAME:	23–154.DWG	DATE:	8–25–2023

PLAN OF LAND IN WOODSTOCK, CT
11 CASTLE ROCK ROAD

PREPARED FOR
VEROGY

SHEET NO. 1 OF 1

Connecticut Department of
ENERGY &
ENVIRONMENTAL
PROTECTION

79 Elm Street • Hartford, CT 06106-5127 www.ct.gov/deep Affirmative Action/Equal Opportunity Employer

Bureau of Materials Management and Compliance Assurance

Notice of Permit Authorization

April, 21 2025

James Cerkanowicz
Woodstock Solar One, LLC
124 Lasalle Rd
West Hartford, CT 06107-2317

Subject: General Permit Registration for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities
Application NO.: 202405989

James Cerkanowicz:

The Department of Energy and Environmental Protection, Water Permitting and Enforcement Division of the Bureau of Materials Management and Compliance Assurance, has completed the review of the Woodstock Solar One (located at 11 Castle Rock Rd, Woodstock) registration for the **General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities, effective 12/31/2020, modified 11/25/2022 (general permit)** . The project is compliant with the requirements of the general permit and the discharge(s) associated with this project is (are) authorized to commence as of the date of this letter. Permit No. GSN004070 has been assigned to authorize the stormwater discharge(s) from this project.

Questions can be emailed to deep.stormwater@ct.gov.

VEROGY - WOODSTOCK SOLAR ONE
RPCS - NX XTR

SHEET INDEX

SHEET NO.	DESCRIPTION		
S-001	TITLE SHEET		
SITE PLAN			
S-101	SITE PLAN		
S-102	CONSTRUCTION NOTES		
S-103	MODULE DATASHEET		
PIER PLAN	**TORQUE TUBE PLAN**	**STOW PLAN**	**BLOCK #**
S-201	S-301	S-1001	BLOCK - 01
S-202	S-302	S-1002	BLOCK -02
MECHANICAL SET			
S-401	TYPICAL 102 MODULE TRACKER - EXT		
S-402	TYPICAL 102 MODULE TRACKER - EDGE		
S-403	TYPICAL 78 MODULE TRACKER - EXT		
S-404	TYPICAL 78 MODULE TRACKER - EDGE		
S-405	TYPICAL 60 MODULE TRACKER - EXT		
S-406	TYPICAL 60 MODULE TRACKER - EDGE		
S-407	TYPICAL 42 MODULE TRACKER - EXT		
S-408	TYPICAL 42 MODULE TRACKER - EDGE		
S-409	102 MODULE THERMAL EXPANSION BHA DETAILS		
S-410	60 MODULE THERMAL EXPANSION BHA DETAILS		
S-411	42 MODULE THERMAL EXPANSION BHA DETAILS		
S-501	XTR-0.75 PIER TOLERANCES		
S-601	BHA & DAMPER DETAILS (0-<6.1%)		
S-701	WEATHER STATION DETAILS		
NCU PLAN			
S-901	NCU PLAN		

AMPACITY
QUANTA

SEAL

STATE OF CONNECTICUT
MADHAN KUMAR KANTHA SAMY
No.30623
LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER:
N/A

SITE ID:
N/A

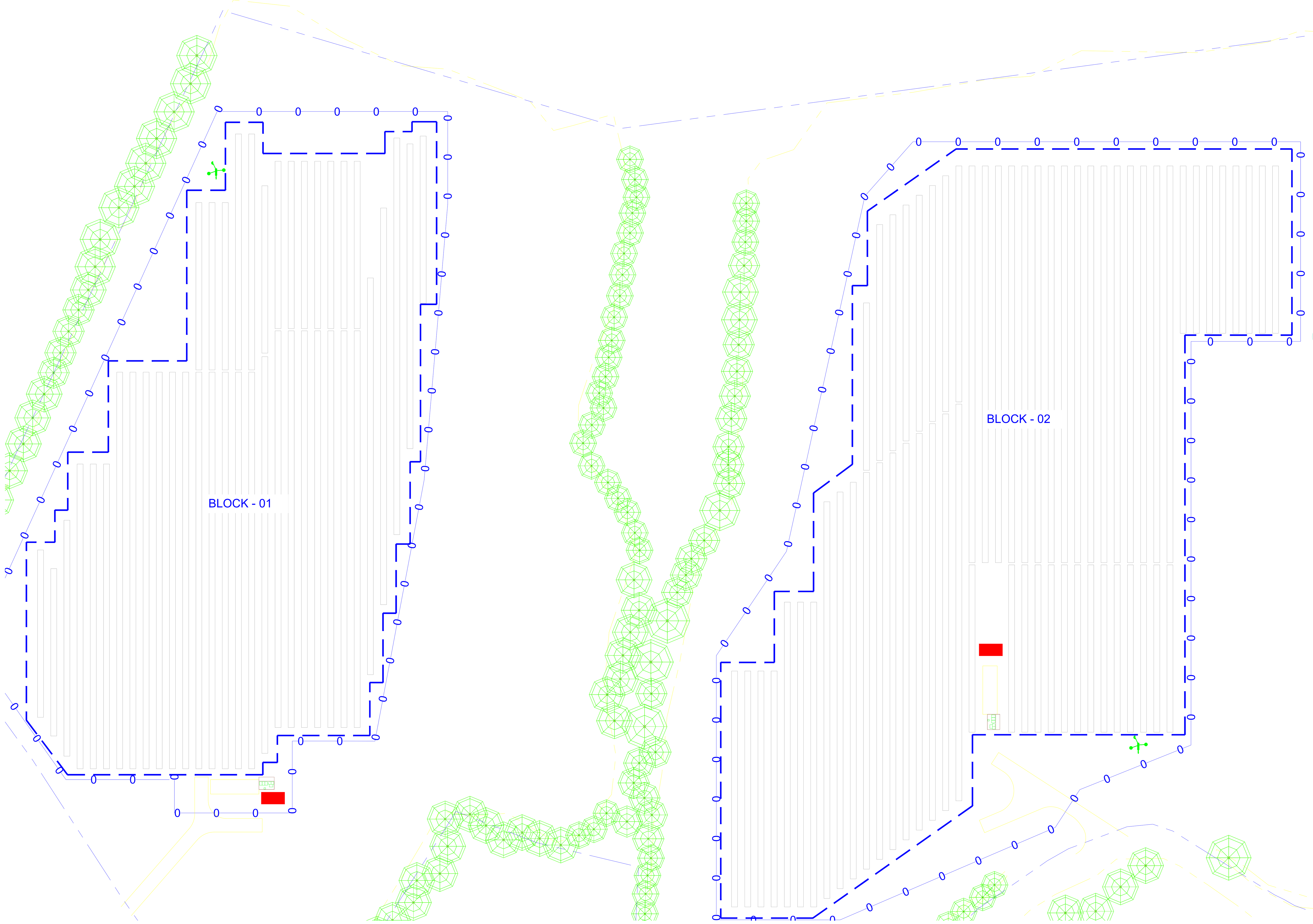
SHEET TITLE:
TITLE SHEET

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

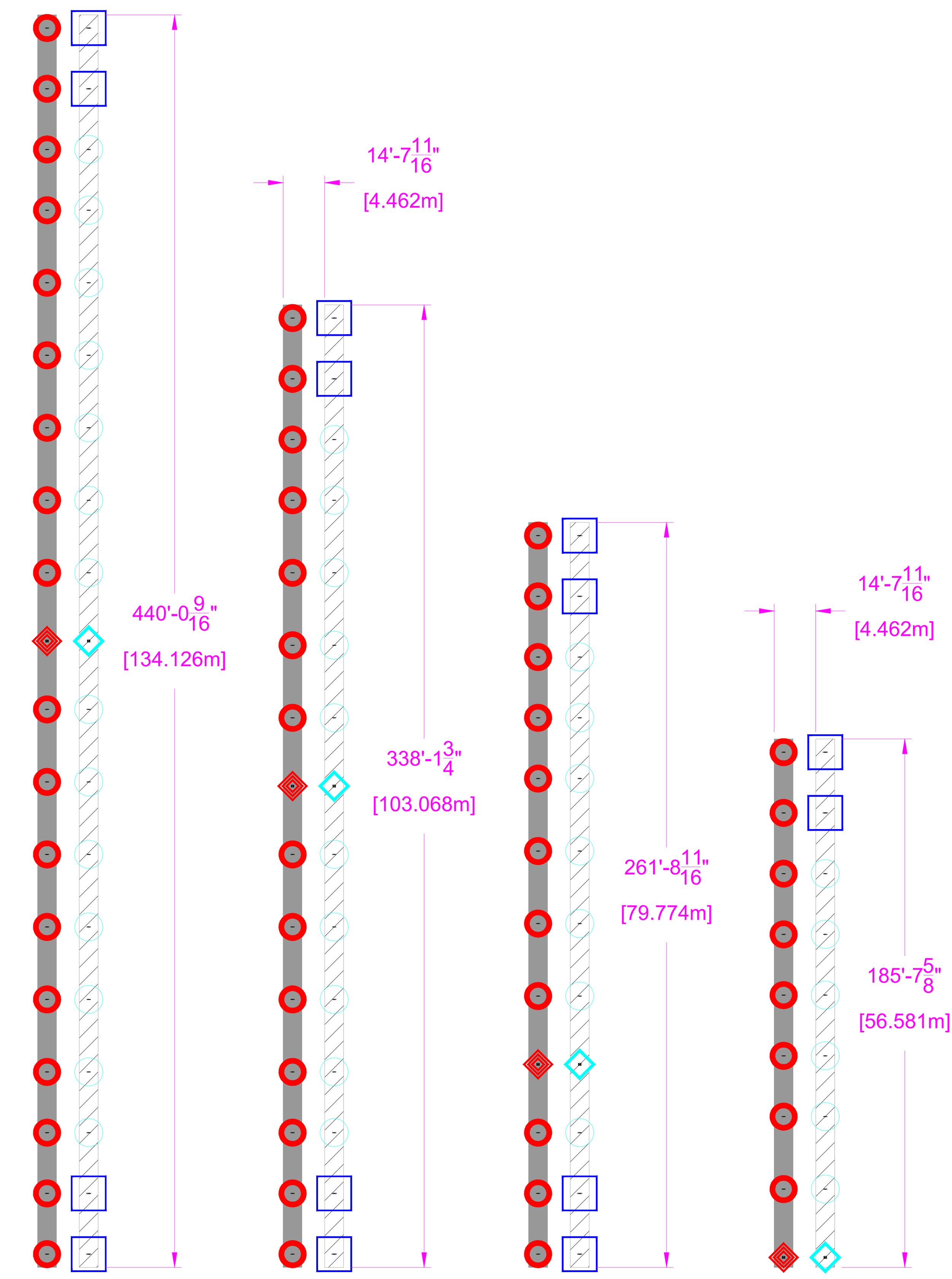
SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-001

0 ½ 1
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



1 SITE PLAN
SCALE: 1" = 75'-0"



3 TRACKER LENGTH(S)
SCALE: 1" = 40'-0"

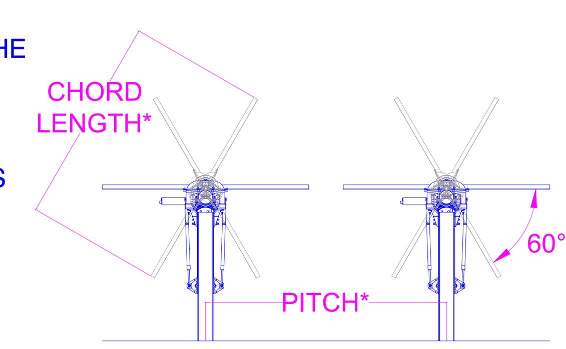
Bill of Materials

QTY	NAME	PART NO:
16	NX Horizon 102 module, 19 pier, Exterior Row - [XTR 0.75]	NXH - 2.3.13.P
33	NX Horizon 102 module, 19 pier, Edge Row - [XTR 0.75]	NXH - 2.3.13.P
5	NX Horizon 78 module, 15 pier, Exterior Row - [XTR 0.75]	NXH - 2.3.13.P
2	NX Horizon 78 module, 15 pier, Edge Row - [XTR 0.75]	NXH - 2.3.13.P
7	NX Horizon 60 module, 12 pier, Exterior Row - [XTR 0.75]	NXH - 2.3.13.P
7	NX Horizon 60 module, 12 pier, Edge Row - [XTR 0.75]	NXH - 2.3.13.P
17	NX Horizon 42 module, 9 pier, Exterior Row - [XTR 0.75]	NXH - 2.3.13.P
20	NX Horizon 42 module, 9 pier, Edge Row - [XTR 0.75]	NXH - 2.3.13.P
2	SPT Network Control Unit, 120VAC, 1 Phase	
2	SPT Weather Station, Ultrasonic Wind Sensor (Mounting Kit Incl.)	
1	NX Datahub	
107	60W SPC Panel	
107	Cold Climate SPC	
571	Heavy Array Pier (HAP)	
45	Heavy Motor Pier (HMP)	
684	Standard Array Pier (SAP)	
33	Standard Array Pier, End (SAPEnd)	
142	Standard Array Pier, Edge (SAPE)	
64	Standard Motor Pier (SMP)	
	62 SMP (Trackers)	
	2 SMP (Weather Stations - W6)	

NEXTRACKER DETAILS

TYPES	102	78	60	42
EXTERIOR	16	5	7	17
EPNS	14	2	2	0
EPN	9	0	5	11
EPS	10	0	0	9
TOTAL	49	7	14	37
GRAND TOTAL	107			

1. W BEAM PIERS MUST BE W6 SHAPE. CONSULT RPCS PROJECT ENGINEERING FOR W8 AND ALTERNATIVE PIER SHAPES.
2. GALVANIZATION COATING OF G90 (OR EQUIVALENT) PER ASTM A653
3. DEFAULT DESIGNS FOR N-S & E-W SLOPES IS 6%, ALLOWED UP TO A MAXIMUM OF 15% WITH CONSIDERATIONS. N-S SLOPES ABOVE 6% ARE ALLOWED, WITH ADDITIONAL HARDWARE REQUIREMENTS. E-W SLOPES ARE ASSUMED TO HAVE FACTORS SUCH AS KZT, OROGRAPHY, OR ANY OTHER TOPOGRAPHIC-RELATED FACTORS, ALL EQUAL TO 1.0.
4. CIVIL ENGINEERING IS NOT IN RPCS SCOPE OF WORK. THE CUSTOMER SHALL HIRE A CIVIL ENGINEER TO ANALYZE GROUND CONDITIONS, SITE GRADING, POST-CONSTRUCTION DRAINAGE, AND OTHER CIVIL-RELATED WORKS PER RPCS SITE SLOPE GUIDELINES.
5. FOR MAXIMUM GROUND UNDULATIONS TOLERANCE PLEASE REFER PDM-000031REV G.
6. FLOOD DEPTHS ARE ASSUMED TO BE SIX INCHES OR LESS THROUGHOUT THE SITE.
7. SCOUR DEPTHS ARE ASSUMED TO BE SIX INCHES OR LESS THROUGHOUT THE SITE. HIGHER SCOUR DEPTHS SHOULD BE REFLECTED IN FOUNDATION DESIGN.
8. ALL DITCHES, WASHES, ETC. SHALL BE GRADED AND COMPACTED TO ENGINEER'S STANDARDS.
9. TRACKER TO HAVE A MAXIMUM 6' (1.9828m) PIER HEIGHT, UNLESS WRITTEN APPROVAL FROM RPCS PROJECT ENGINEERING IS GIVEN.
10. TRACKER NOMENCLATURE ARE AS FOLLOWS:
EXT, INT, EPNS, EPN, EPS ARE EXTERIOR, INTERIOR, EDGE PIER NORTH (AND) SOUTH, EDGE PIER NORTH, AND EDGE PIER SOUTH TRACKERS RESPECTIVELY.
11. PLEASE REFER TO PJE-000004 FOR FOUNDATION DESIGN GUIDELINES DOC FOR PIER DESIGNATION.
12. RPCS DESIGNS TO THE APPLICABLE BUILDING AND ENGINEERING/DESIGN CODES. SHOULD ANY ADDITIONAL CRITERIA BE REQUIRED IN SUPPLEMENT TO THE CODE, THAT SHALL BE THE RESPONSIBILITY OF THE OWNER TO INFORM THE EPC AND RPCS PRIOR TO THE CONTRACT. IN THE EVENT OF ANY FURTHER REQUIREMENTS REQUIRED BY THE OWNER, INDEPENDENT ENGINEER, OR ANY OTHER THIRD PARTY, PLEASE CONTACT RPCS PROJECT ENGINEERING.
13. WHEN RUNNING XTR ANALYSIS, RPCS IS NOT CIVIL ENGINEER OF RECORD AND AS SUCH NOT RESPONSIBLE FOR HYDROLOGIC, SOIL MANAGEMENT, GRADING ACCURACY, MEANS OF CONSTRUCTION AND ACCURACY OF EXISTING GROUND SURFACE. CIVIL ENGINEER OF RECORD IS RESPONSIBLE FOR ADJUSTING PILE COORDINATES BASED ON TRACKER SLOPE, VERIFYING COORDINATES INCLUDING TOP OF PILE ELEVATION, DRAINAGE AND ALL CIVIL RELATED TASKS.



*SEE SYSTEM SPECIFICATIONS

2 ELEVATION VIEW
SCALE: N.T.S.

TRACKER CONFIGURATIONS - FIRST SOLAR SERIES 6+

102 - 2.3.13.P - XTR	1-5-5-5-6-6-6-6-6-5-M-5-6-6-6-6-6-5-5-5-1
78 - 2.3.13.P - XTR	1-5-5-5-6-6-6-5-M-5-6-6-6-5-5-5-1
60 - 2.3.13.P - XTR	1-5-5-5-6-6-6-5-M-5-5-5-1
42 - 2.3.13.P - XTR	1-5-5-5-5-5-5-6-5-M

SYSTEM SPECIFICATIONS

MODULE MODEL	First Solar Series 6+			
MODULE CAPACITY [W]	465			
MODULES PER STRING	6			
NUMBER OF STRINGS	1323			
TOTAL MODULES	7938			
TOTAL CAPACITY [MW]	3.691			
LENGTH	2.0240	m	6.640	ft
WIDTH	1.2450	m	4.085	ft
PITCH	4.462	m	14.6400	ft
GCR [%]	45.358			

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SEAL

STATE OF CONNECTICUT
No.30623
LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE

Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

SHEET TITLE: SITE PLAN

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

SITE DETAILS

LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-101

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

GENERAL NOTES:

1. CONSTRUCTION SET SHALL BE USED TOGETHER WITH PROJECT STRUCTURAL, CIVIL AND ELECTRICAL DRAWINGS.

STRUCTURAL STEEL NOTES:

1. DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL AND MISCELLANEOUS STEEL CONFORM TO THE BUILDING CODE AND LOCAL JURISDICTIONS.
2. GALVANIZATION COATING FOR TRACKER STRUCTURE COMPONENTS SHALL CONFORM TO FOLLOWING UNLESS SPECIFIED OTHERWISE:
   a. ALL POSTS- ASTM A123
   b. TORQUE TUBE, MODULE RAILS - ASTM A653 G90
   c. BHA, BRACKETS, AND MOUNTS - ASTM A123
3. AREA DAMAGED DURING HANDLING OR INSTALLATION SHALL BE REMEDIATED BY APPLYING TOUCH-UP GALVANIZING PAINT OR SPRAY PER ASTM A780.
4. ALL WELDING SHALL CONFORM TO BUILDING CODE AND LOCAL JURISDICTIONS OR AMERICAN WELDING SOCIETY (AWS) D1.1 "STRUCTURAL WELDING CODE - STEEL," WHICHEVER IS MORE STRINGENT. ALL WELDING ELECTRODES SHALL BE E70 SERIES.

POST INSTALLATION NOTES:

1. SURVEYING IS NOT IN NEXTRACKER'S SCOPE OF WORK. ALL POSTS SHALL BE TIED TO PROJECT SURVEY CONTROL. TOP OF POST ELEVATION DETERMINATION IS NOT IN NEXTRACKER'S SCOPE OF WORK.
2. ALL POSTS SHALL BE STAKED AND LOCATED BY SURVEYOR PRIOR TO POST DRIVING OPERATION.
3. ALL POST SHALL BE INSTALLED WITHIN VERTICAL UNDULATION TOLERANCE, SEE NEXTRACKER INSTALLATION MANUAL FOR VERTICAL AND HORIZONTAL ALIGNMENT TOLERANCE.
4. ALL TRACKER POSTS SHALL BE DRIVEN AT THE SPECIFIED LOCATIONS IN ONE SINGLE SLOPE PLANE, FOLLOWING GRADE N-S SLOPE MAXIMUM 6.1% FOR STANDARD TRACKER OR 15% FOR HIGH SLOPE TRACKER. TRACKERS INSTALLED OVER A MAXIMUM OF 6.1% MUST HAVE APPROVAL FROM NEXTRACKER PROJECT ENGINEERING.
5. ADJUSTMENT FOR POST SPACINGS MUST BE MADE TO ACCOUNT FOR HIGH SLOPE AREAS. TRACKER DIMENSIONS PROVIDED IN CONSTRUCTION SET ARE ACTUAL TRACKER DIMENSIONS. PROJECTED HORIZONTAL DIMENSIONS OF TRACKER NEED TO BE CALCULATED FOR ACCURATE POST SPACING. IT IS THE RESPONSIBILITY OF CONTRACTOR TO CALCULATE EXACT POST SPACING THAT ACCOUNTS FOR TORQUE TUBE SLOPE. **SEE NEXTRACKER QMS-000434 FOR PILE SPACING ON SLOPES**.
6. TRACKER MOTOR POST RESIST FORCES IN N-S DIRECTION. FOR PROJECTS IN HIGH SEISMIC OR IN HIGH SLOPE AREA, BUSHING MAY NEED TO BE INSTALLED TO DISTRIBUTE LATERAL FORCES TO ADJACENT POSTS.

NX-XTR TRACKER NOTES:

1. TRACKERS MAY DEFLECT OVER GRADE WHEN INSTALLED PROVIDED THE FOLLOWING CONDITIONS ARE MET:
   a. POST MINIMUM EMBEDMENT IS FOLLOWERED PER THE FOUNDATION DESIGN.
   b. REFER TO PDM-000251 FOR XTR SITE SLOPE GUIDELINES FOR HORIZON XTR.

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STATE OF CONNECTICUT · KUMAR KANTH... · No.30623 · LICENSED · PROFESSIONAL ENGINEER

04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE

Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER:
N/A

SITE ID:
N/A

SHEET TITLE:
CONSTRUCTION NOTES

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
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9			

SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-102

0 ½ 1
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

Series 6 *Plus* Bifacial.

455-480 Watt Thin Film Solar Module

First Solar

First Solar is once again setting the industry benchmark for reliable energy production, optimized design and environmental performance with Series 6 *Plus* Bifacial - the world's first bifacial thin film CdTe module. The advanced design signficantly reduces balance of system, shipping, and operating costs while delivering more energy per nameplate watt.

More Lifetime Energy per Nameplate Watt

- Industry's best (0.3%) warranted degradation rate
- Superior temperature coefficient, spectral response and shading behavior
- Unlike crystalline silicon modules, First Solar's thin film technology does not experience losses from LID or LeTID
- Anti-reflective coated glass enhances energy production
- Added bifacial energy yield

Innovative Module Design

- Under-mount frame provides the cleaning and snowshedding benefits of a frameless module while protecting edges against breakage
- Innovative SpeedSlots combine the robustness of bottom mounting with the speed of top clamping while utilizing fewer fasteners to achieve the industry's fastest installation times and lowest mounting hardware costs
- Dual junction box design reduces wire management complexity and cost

Best In-Class Reliability & Durability

- Manufactured under one roof with 100% traceable QA/QC
- Independently tested and certified for reliable performance that exceeds IEC standards in high temperature, high humidity, extreme desert and coastal applications
- Inherently immune to and warranted against power loss from cell cracking
- Durable glass/glass construction

Best Environmental Profile

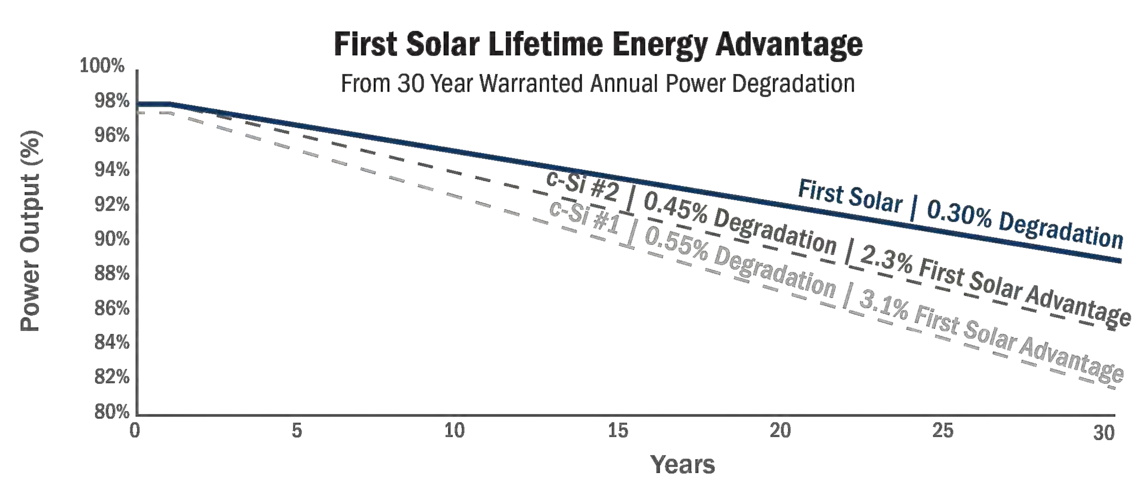
- Fastest energy payback time in the industry
- Carbon footprint that is 2.5X lower and a water footprint that is 3X lower than mono crystalline silicon panels on a life cycle basis
- Global PV module recycling services available through First Solar or customer-selected third-party

19.0% HIGH BIN EFFICIENCY

30YR LINEAR PERFORMANCE WARRANTY

98% WARRANTY START POINT

0.3% WARRANTED ANNUAL DEGRADATION RATE[1]



Learn more about First Solar and Series 6 *Plus* Bifacial at firstsolar.com/S6

Series 6 *Plus* Bifacial.

First Solar

Electrical Specifications

RATINGS AT STANDARD TEST CONDITIONS (1000W/m², AM 1.5, 25°C)[2]

SERIES 6 PLUS BIFACIAL SL MODEL TYPES: FS-6XXX-P-B-I / FS-6XXXA-P-B-I

SERIES 6 PLUS BIFACIAL HL MODEL TYPES: FS-6XXX-P-B / FS-6XXXA-P-B (XXX = NOMINAL POWER)

Nominal Power[3] (-0/+5%)	P_{MAX} (W)	455		460		465		470		475		480	
		STC[4]	BNPI[5]	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI
Nominal Power	P_{MAX} (W)	455	468	460	473	465	478	470	483	475	488	480	493
Voltage at P_{MAX}	V_{MAX} (V)	187.8	187.8	188.8	188.8	189.8	189.8	191.1	191.1	191.5	191.5	192.8	192.8
Current at P_{MAX}	I_{MAX} (A)	2.42	2.49	2.44	2.51	2.45	2.52	2.46	2.53	2.48	2.55	2.49	2.56
Open Circuit Voltage	V_{OC} (V)	222.0	222.0	222.9	222.9	223.8	223.8	224.3	224.3	224.8	224.8	225.4	225.4
Short Circuit Current	I_{SC} (A)	2.58	2.65	2.59	2.66	2.60	2.68	2.61	2.69	2.61	2.69	2.62	2.69
Efficiency (%)	%	18.1		18.3		18.5		18.7		18.9		19.0	
Maximum System Voltage	V_{SYS} (V)	1500[6]											
Limiting Reverse Current	I_R (A)	5.0											
Maximum Series Fuse	I_{CF} (A)	5.0											

TEMPERATURE CHARACTERISTICS

Module Operating Temperature Range	°C	-40 to +85
Temperature Coefficient of P_{MAX}	$T_K (P_{MAX})$	-0.32%/°C [Temperature Range: 25°C to 75°C]
Temperature Coefficient of V_{OC}	$T_K (V_{OC})$	-0.28%/°C
Temperature Coefficient of I_{SC}	$T_K (I_{SC})$	+0.04%/°C
Nominal Operating Cell Temperature	°C	43
Bifaciality Factor	%	20±5

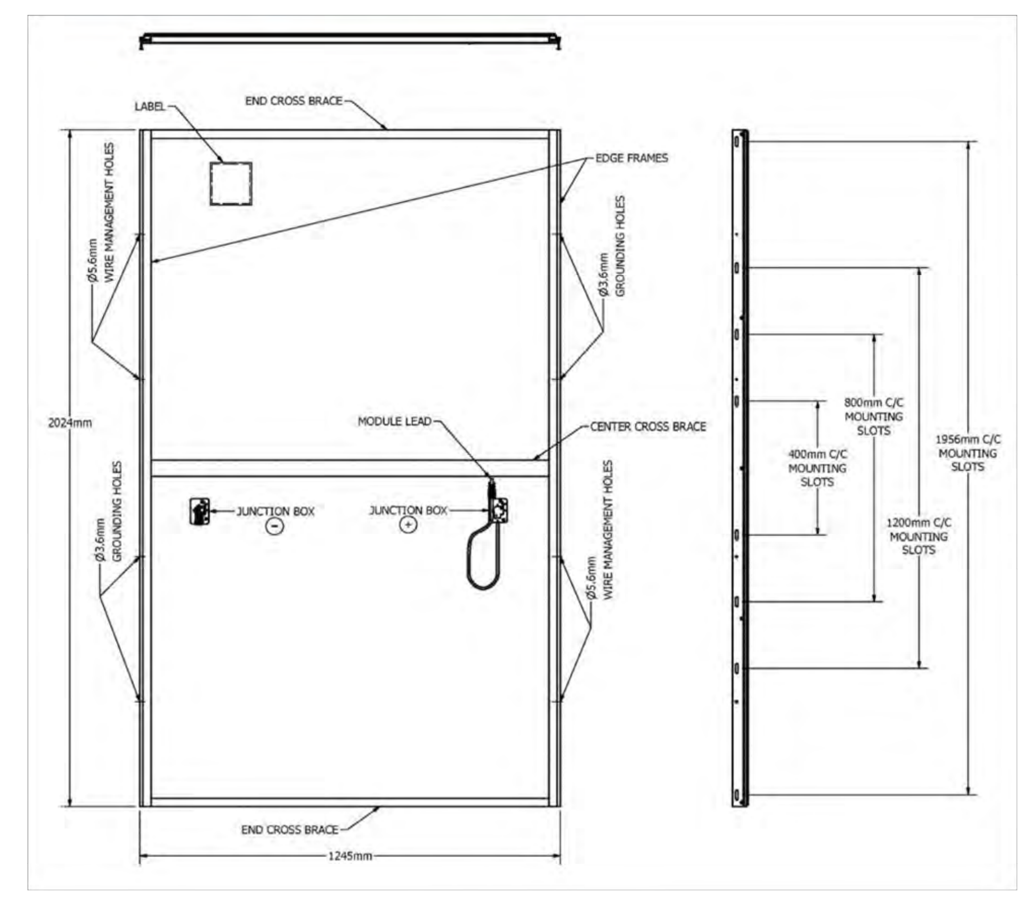
MECHANICAL DESCRIPTION

Length	2024mm
Width	1245mm
Area	2.52m²
Module Weight	SL: 33.3kg HL: 34.0kg
Leadwire[7]	2.5mm², 733mm (+) & Bulkhead (-)
Connectors	TE Connectivity PV4-S, MC4-EVO 2, or alternate
Junction Box	IP68 Rated
Bypass Diode	N/A
Cell Type	Thin film CdTe semiconductor, up to 268 cells
Frame Material	Anodized Aluminum
Front Glass	Heat strengthened
Back Glass	Heat strengthened
Encapsulation	Laminate material with edge seal
Frame to Glass Adhesive	Silicone
Load Rating[8]	SL: +1950/-1350Pa HL: +/-2400Pa

PACKAGING INFORMATION

Model Type	Modules Per Pack	Packs per 40' Container
FS-6XXX-P-B / FS-6XXXA-P-B	27	18
FS-6XXX-P-B-I / FS-6XXXA-P-B-I	30	18

Mechanical Specifications



Install in portrait only

1. Limited power output and product warranties subject to warranty terms and conditions
2. All ratings ±10%, unless specified otherwise. Specifications are subject to change
3. Measurement uncertainty applies
4. Frontside electrical ratings
5. Bifacial Name Plate Irradiance, as per IEC 61215:2021
6. IEC 61730-1: 2016 Class II
7. Leadwire length from junction box exit to connector mating surface
8. 1500Pa tentative load rating for 1956mm mounting slots. Higher loads may be acceptable,subject to testing
9. Testing Certifications/Listings pending

Certifications & Tests[9]

CERTIFICATIONS AND LISTINGS	EXTENDED DURABILITY TESTS	QUALITY & EHS
IEC 61215:2021 & 61730-1:2016[6], CE IEC 61701 Salt Mist Corrosion IEC 60068-2-68 Dust and Sand Resistance UL 61730	IEC TS 63209-1 Extended Stress Test Long-Term Sequential Thresher Test PID Resistant	ISO 9001:2015 ISO 14001:2015 ISO 45001:2018 ISO 14064-3:2006 EPEAT Silver Registered

Disclaimer

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CONSULTING STRUCTURAL ENGINEERS

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VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

SHEET TITLE: MODULE DATASHEET

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
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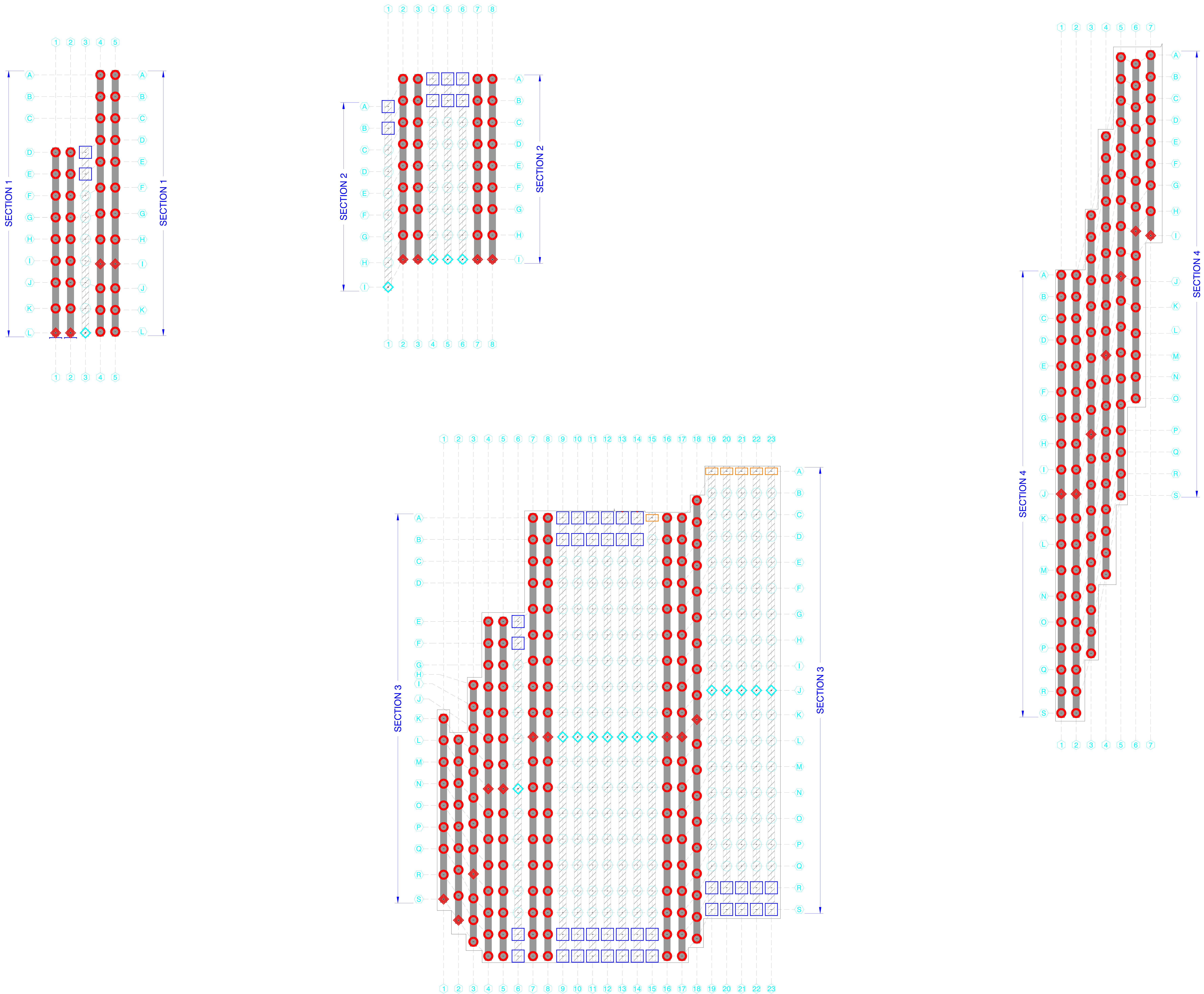
SITE DETAILS

LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-103

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

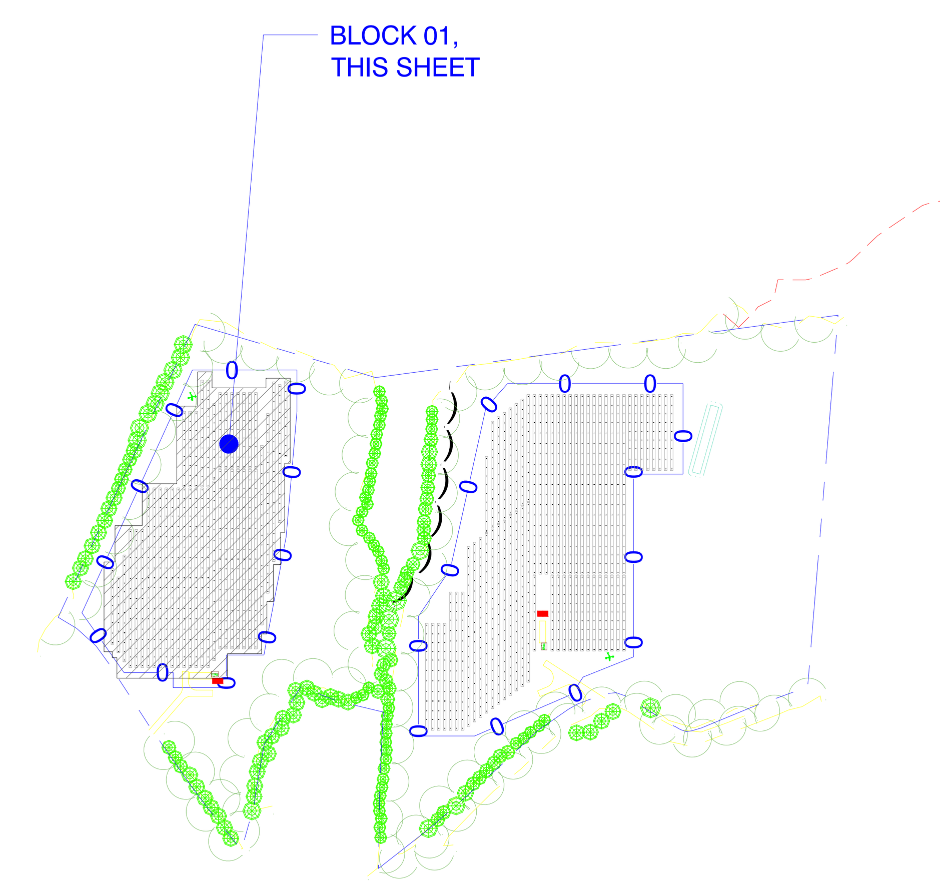


PIER PLAN
SCALE: 1" = 50'-0"

TRACKER LEGEND

TRACKER SYMBOL	TRACKER TYPE
(solid grey)	EXTERIOR
(hatched)	EDGE

PIER LEGEND	
SYMBOL	PIER TYPE
(red circle)	HEAVY ARRAY PIER
(cyan circle)	STANDARD ARRAY PIER
(blue square, filled)	HEAVY ARRAY PIER, EDGE
(blue square)	STANDARD ARRAY PIER, EDGE
(red diamond)	HEAVY MOTOR PIER
(cyan diamond)	STANDARD MOTOR PIER
LABEL	LABEL TYPE
# #	PIER LABEL
# #	TRACKER ROW



SITE KEY
SCALE: N.T.S.

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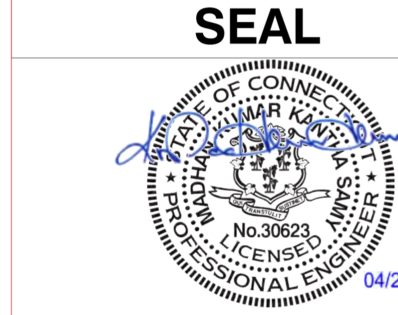

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

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VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER:
N/A

SITE ID:
N/A

SHEET TITLE:
PIER PLAN
BLOCK - 01

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
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SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-201

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

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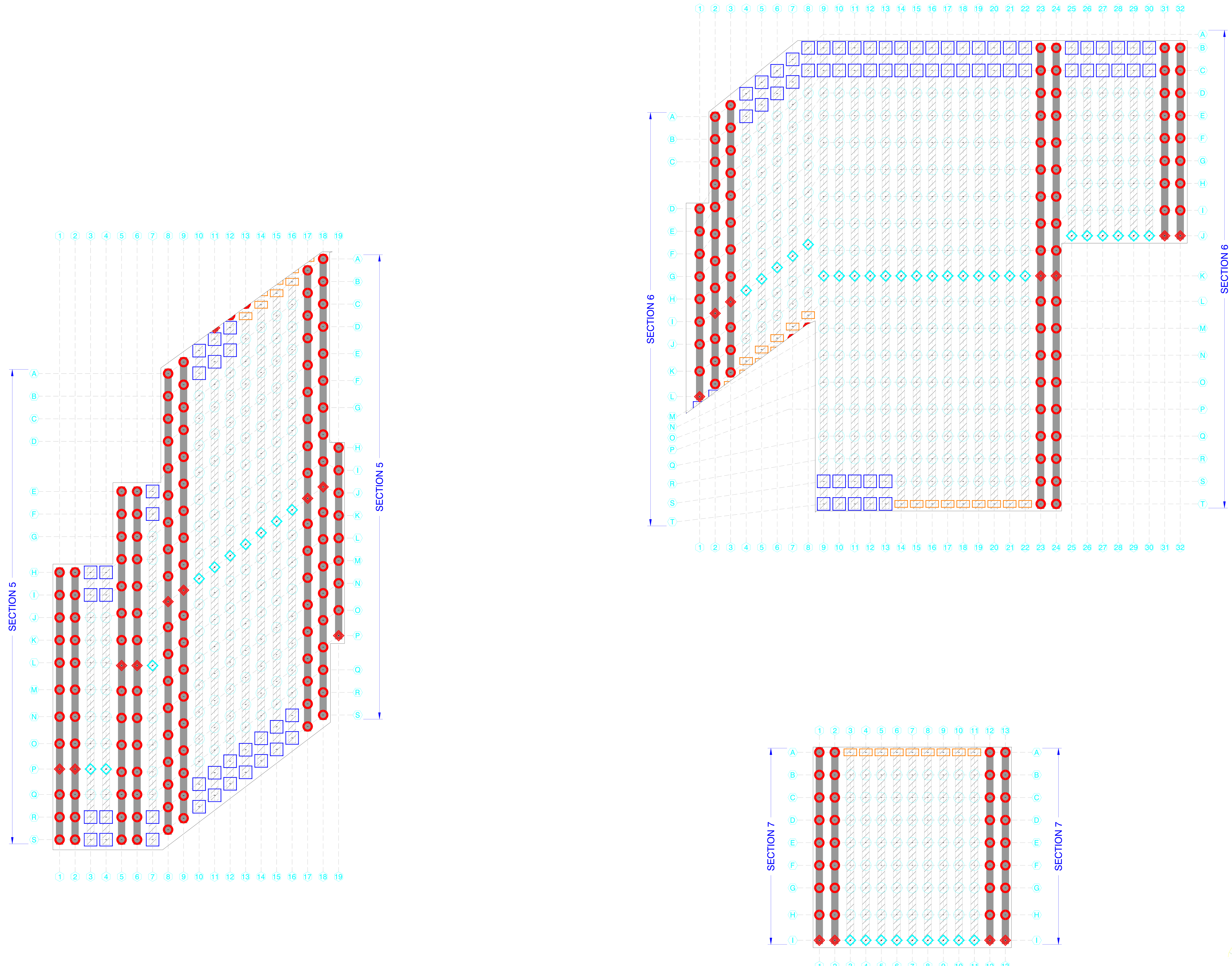
VEROGY_WOODSTOCKSO_PIER PLAN.DWG



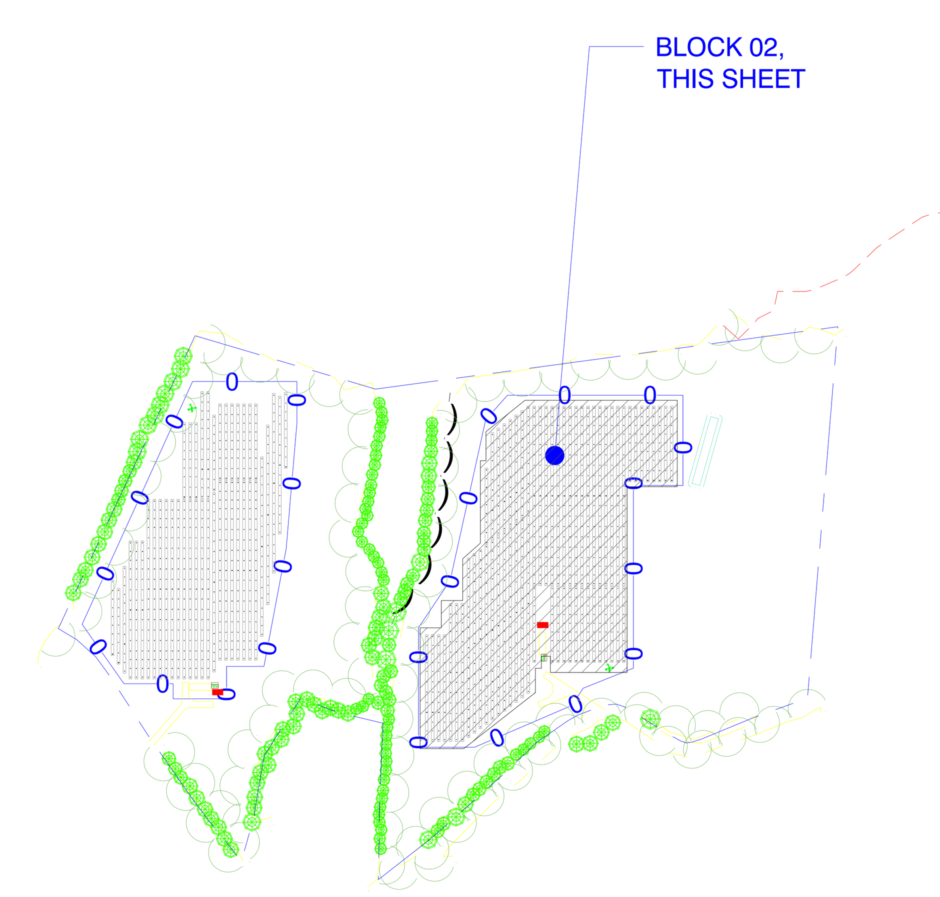
1 PIER PLAN
SCALE: 1" = 50'-0"

TRACKER LEGEND

TRACKER SYMBOL	TRACKER TYPE
(solid grey bar)	EXTERIOR
(hatched bar)	EDGE

PIER LEGEND

SYMBOL	PIER TYPE
(red circle)	HEAVY ARRAY PIER
(small circle)	STANDARD ARRAY PIER
(filled square)	HEAVY ARRAY PIER, EDGE
(open square)	STANDARD ARRAY PIER, EDGE
(red diamond)	HEAVY MOTOR PIER
(cyan diamond)	STANDARD MOTOR PIER
LABEL	**LABEL TYPE**
# #	PIER LABEL
# #	TRACKER ROW



A SITE KEY
SCALE: N.T.S.

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STATE OF CONNECTICUT
MADHAN KUMAR KANTHA SAMY
No.30623
LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE

Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER:
N/A

SITE ID:
N/A

SHEET TITLE:
PIER PLAN
BLOCK - 02

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
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SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-202

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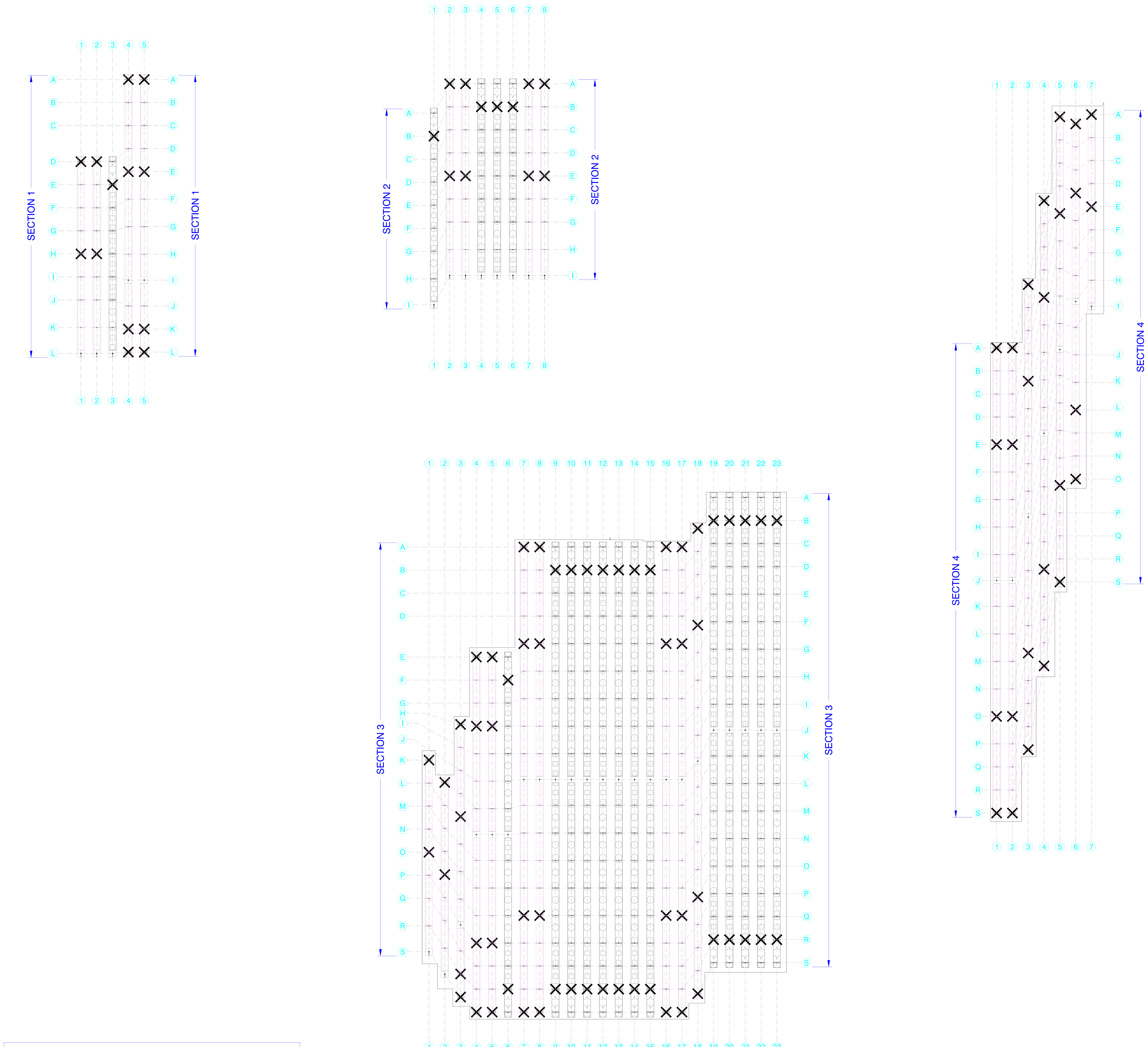
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

TORQUE TUBE LEGEND

HATCH	PART #	COLOR	TORQUE TUBE TYPE	MOD QTY	KSI
	404560	LIGHT PINK	8.22m 3.5mm 60ksi	5+1	BLUE
	404548		8.27m 3.5mm 60ksi	6	BLUE
	404544		7.01m 3.5mm 60ksi	5	BLUE
	405185	BLACK	8.22m 2.5mm 60ksi	5+1	BLUE
	47013		8.27m 2.5mm 60ksi	6	BLUE
	47004		7.01m 2.5mm 60ksi	5	BLUE

DAMPER LEGEND

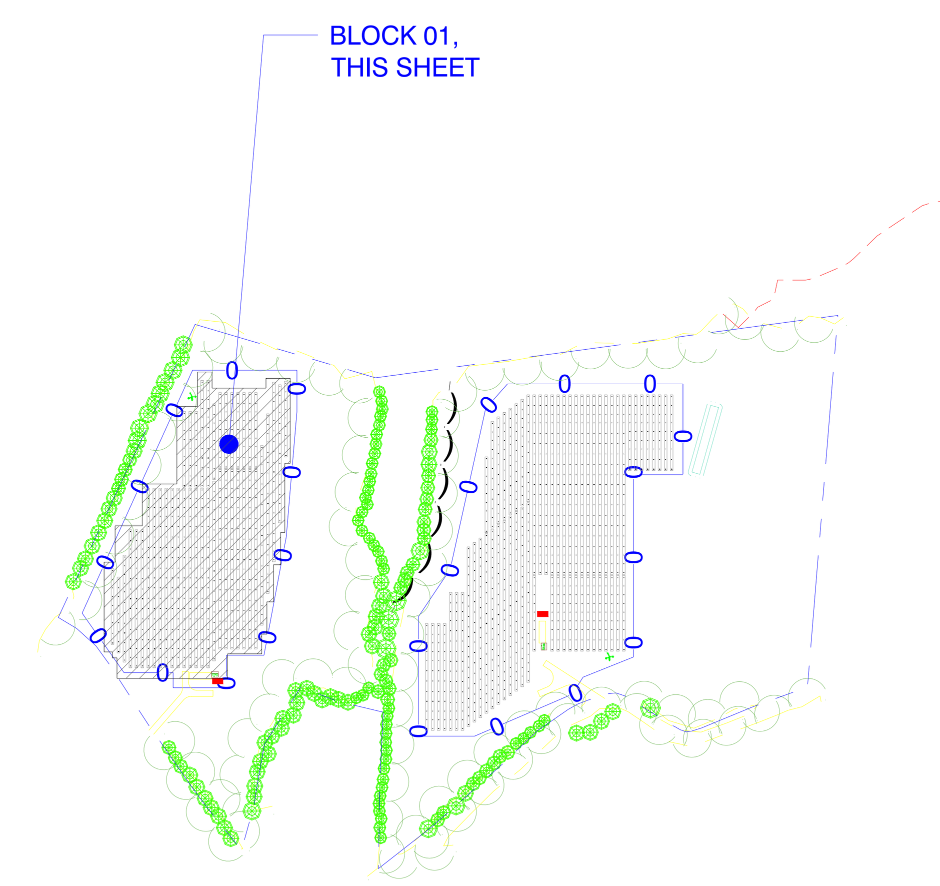
SYMBOL	DAMPER TYPE	SEE SHEET S-601
×	DOUBLE DAMPER	DETAIL 5
LABEL	LABEL TYPE	
# - - - #	PIER LABEL	
# ⋮ #	TRACKER ROW	



TRACKER CONFIGURATIONS - FIRST SOLAR SERIES 6+

102 - 2.3.13.P - XTR	1-5-5-5-6-6-6-6-6-5-M-5-6-6-6-6-6-5-5-5-1
78 - 2.3.13.P - XTR	1-5-5-5-6-6-6-5-M-5-6-6-6-5-5-5-1
60 - 2.3.13.P - XTR	1-5-5-5-6-6-6-5-M-5-5-5-1
42 - 2.3.13.P - XTR	1-5-5-5-5-5-6-5-M

N 1 TORQUE TUBE PLAN
SCALE: 1" = 50'-0"



A SITE KEY N
SCALE: N.T.S.

AMPACITY

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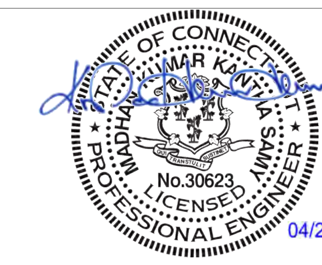
SEAL



STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE

Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

SHEET TITLE: TORQUE TUBE PLAN BLOCK - 01

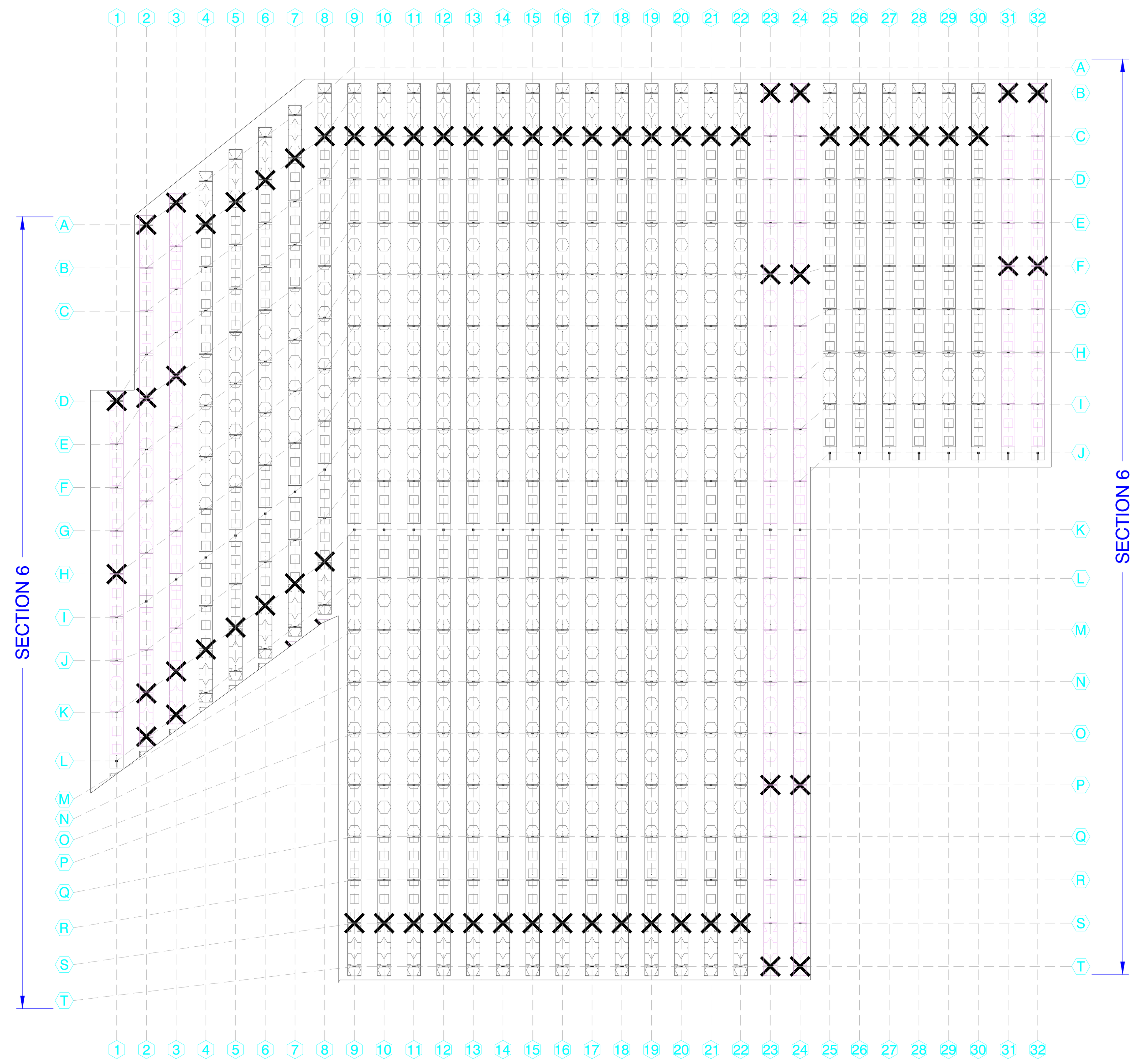
NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

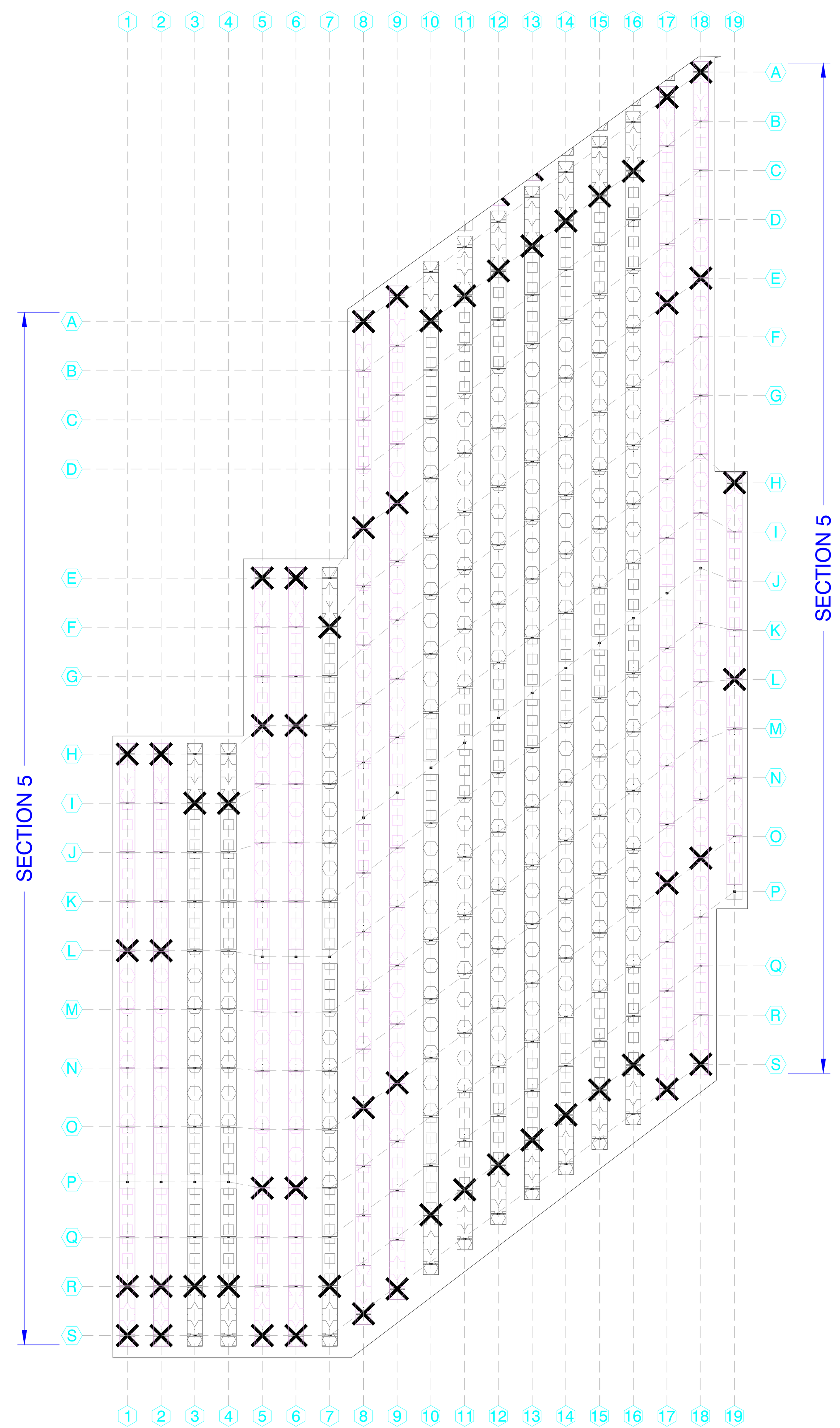
SITE DETAILS

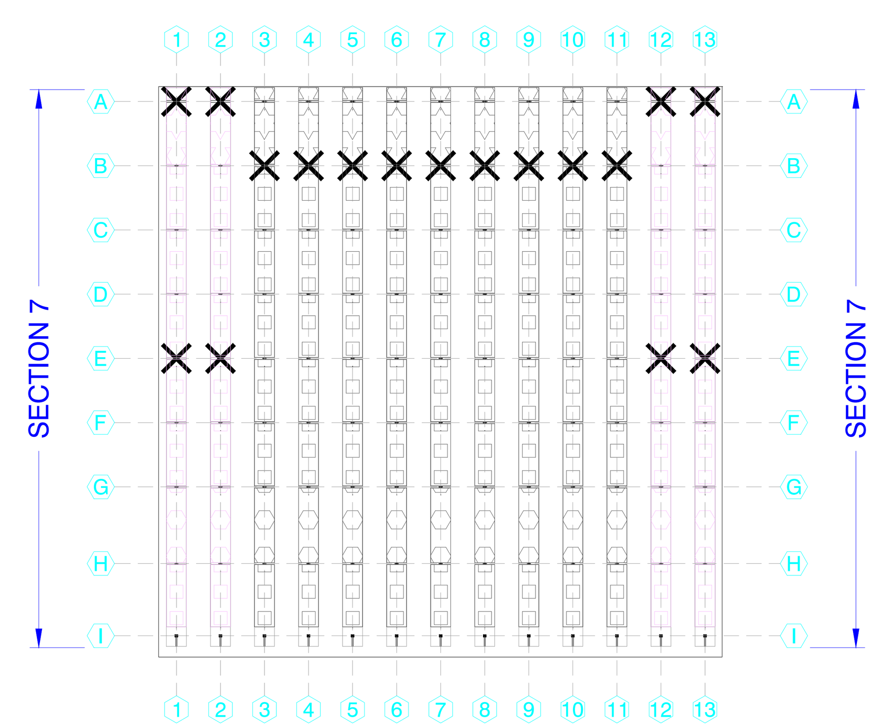
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-301

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE







TORQUE TUBE LEGEND

HATCH	PART #	COLOR	TORQUE TUBE TYPE	MOD QTY	KSI
	404560	LIGHT PINK	8.22m 3.5mm 60ksi	5+1	BLUE
	404548		8.27m 3.5mm 60ksi	6	BLUE
	404544		7.01m 3.5mm 60ksi	5	BLUE
	405185	BLACK	8.22m 2.5mm 60ksi	5+1	BLUE
	47013		8.27m 2.5mm 60ksi	6	BLUE
	47004		7.01m 2.5mm 60ksi	5	BLUE

DAMPER LEGEND

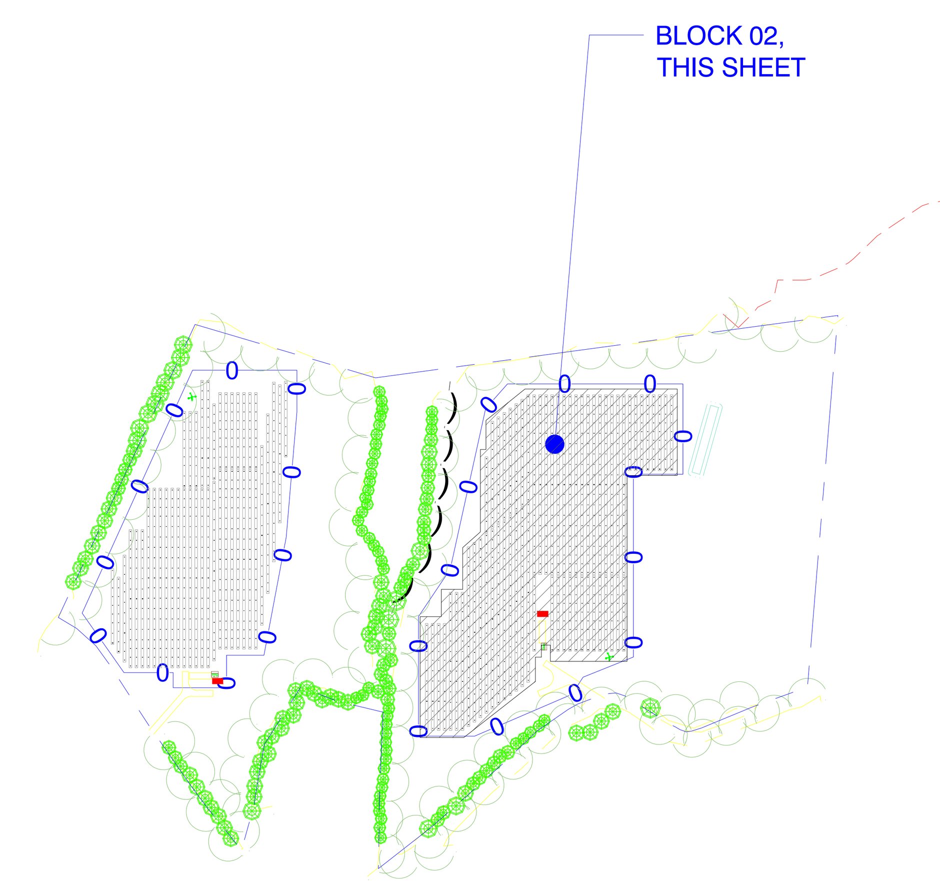
SYMBOL	DAMPER TYPE	SEE SHEET S-601
×	DOUBLE DAMPER	DETAIL 5

LABEL	LABEL TYPE
# — #	PIER LABEL
# / #	TRACKER ROW

TRACKER CONFIGURATIONS - FIRST SOLAR SERIES 6+

102 - 2.3.13.P - XTR	1-5-5-5-6-6-6-6-6-5-M-5-6-6-6-6-6-5-5-5-1
78 - 2.3.13.P - XTR	1-5-5-5-6-6-6-6-5-M-5-6-6-6-6-5-5-5-1
60 - 2.3.13.P - XTR	1-5-5-5-5-6-6-6-5-M-5-5-5-1
42 - 2.3.13.P - XTR	1-5-5-5-5-5-5-6-5-M

N 1 - TORQUE TUBE PLAN
SCALE: 1" = 50'-0"



A - SITE KEY
SCALE: N.T.S.
N

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SEAL

STATE OF CONNECTICUT — MADHAN KUMAR KANTHASAMY — No.30623 — LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE

Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER:
N/A

SITE ID:
N/A

SHEET TITLE:
TORQUE TUBE PLAN BLOCK - 02

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-302

0 ½ 1
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

PIER LEGEND

SYMBOL	PIER TYPE
⊙	HEAVY ARRAY PIER
⊙	STANDARD ARRAY PIER
▣	HEAVY ARRAY PIER, EDGE
▢	STANDARD ARRAY PIER, EDGE
◈	HEAVY MOTOR PIER
◇	STANDARD MOTOR PIER

TRACKER LEGEND

TRACKER SYMBOL	TRACKER TYPE
(solid grey)	EXTERIOR
(hatched)	EDGE

TORQUE TUBE LEGEND

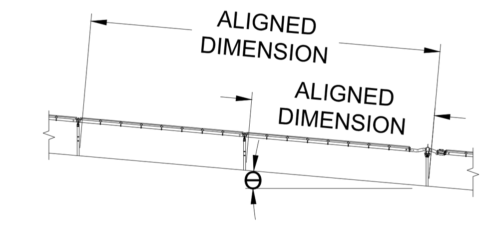
HATCH	PART #	COLOR	TORQUE TUBE TYPE	MOD QTY	KSI
	404560	LIGHT PINK	8.22m 3.5mm 60ksi	5+1	BLUE
	404548		8.27m 3.5mm 60ksi	6	BLUE
	404544		7.01m 3.5mm 60ksi	5	BLUE
	405185	BLACK	8.22m 2.5mm 60ksi	5+1	BLUE
	47013		8.27m 2.5mm 60ksi	6	BLUE
	47004		7.01m 2.5mm 60ksi	5	BLUE

DAMPER LEGEND

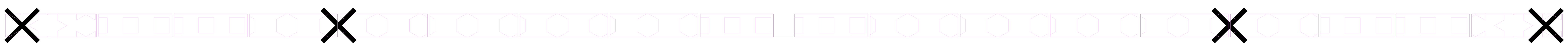
SYMBOL	DAMPER TYPE	SEE SHEET S-601
✕	DOUBLE DAMPER	DETAIL 5

NOTE :

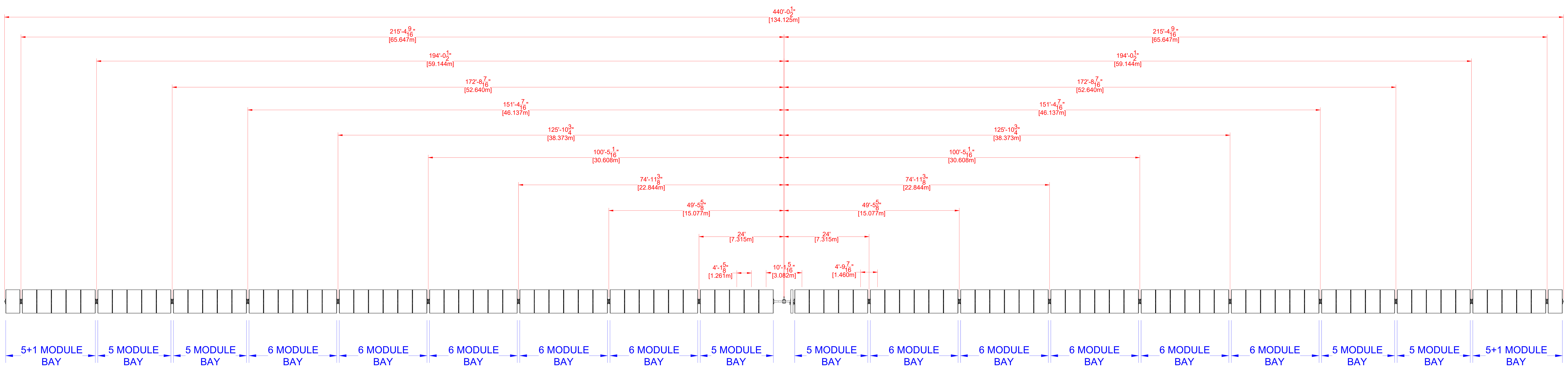
1) DETAILS ON THIS SHEET APPLY TO TRACKERS INDICATED ON THE SHEET TITLE ONLY. PIER PLAN INDICATES TRACKER LOCATIONS.
2) DETAILS 5-9 ARE TYPICAL AND APPLY TO ALL APPLICABLE LOCATIONS ON TRACKER.
3) PIER DISTANCES APPLY TO CENTER OF WEB, SEE DETAIL 10 FOR CENTER OF WEB LOCATION.
4) NEXTRACKER RECOMMENDS TO RUN A STRING LINE ON SLOPES>3% IN EFFORTS TO ENSURE PROPER PIER PLACEMENT. **SEE NEXTRACKER QMS-000434 FOR PILE SPACING ON SLOPES.**



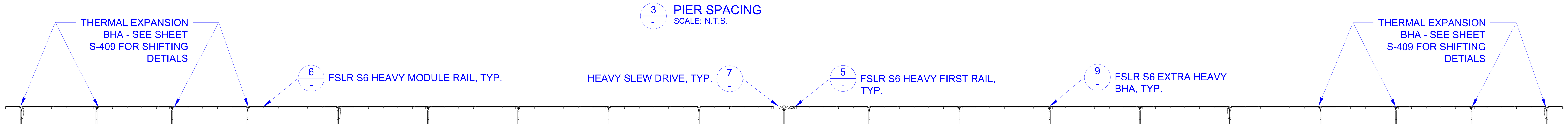
1 - PIER PLAN
SCALE: N.T.S.



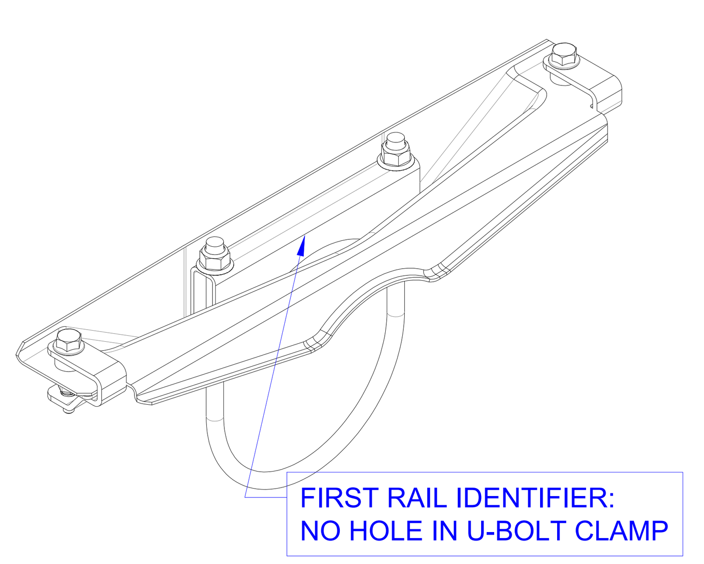
2 - TORQUE TUBE AND DAMPER PLAN
SCALE: N.T.S.



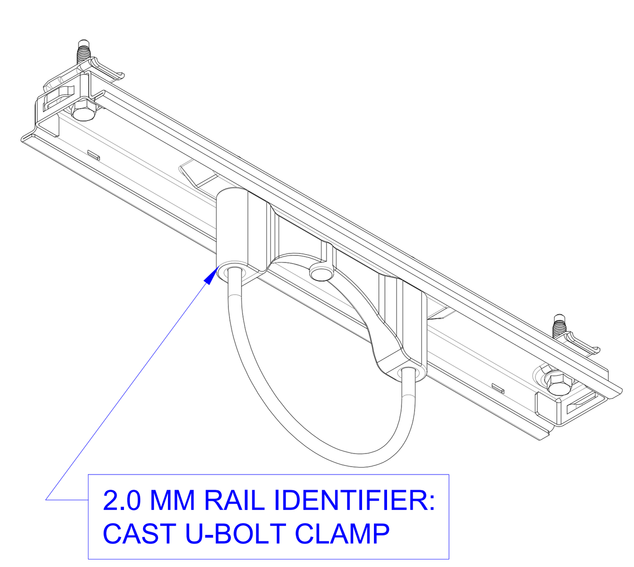
3 - PIER SPACING
SCALE: N.T.S.



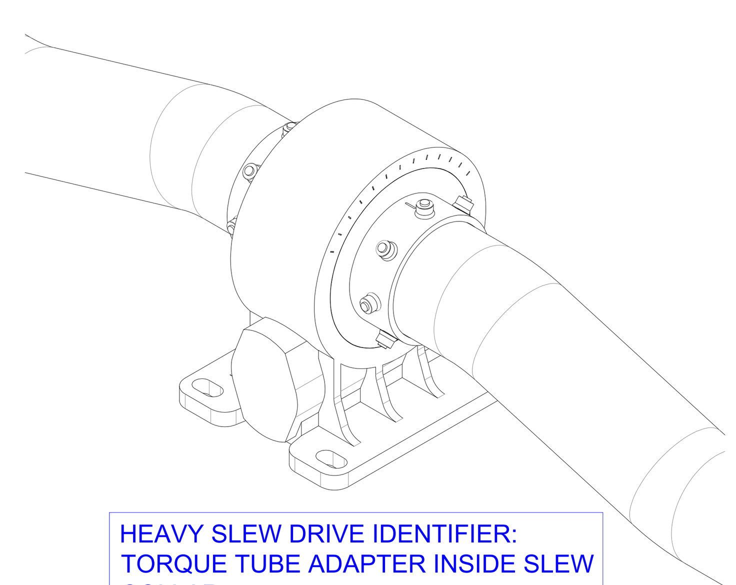
4 - TRACKER ELEVATION
SCALE: N.T.S.



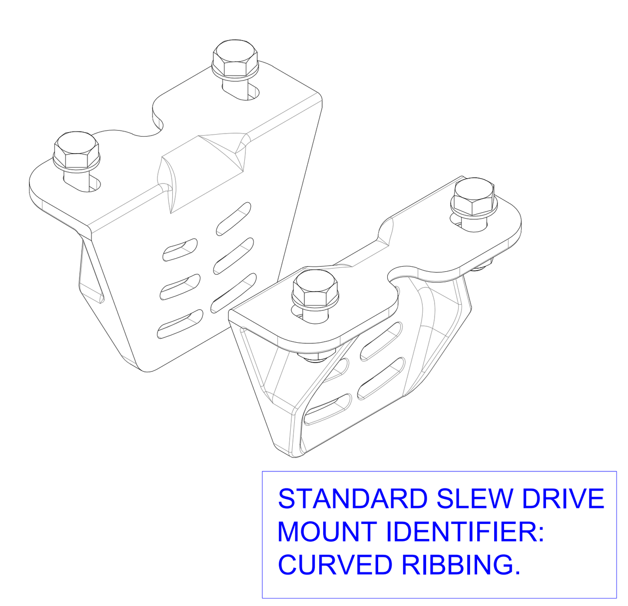
5 - FSLR S6 HEAVY FIRST MODULE RAIL, TYP.
SCALE: N.T.S.



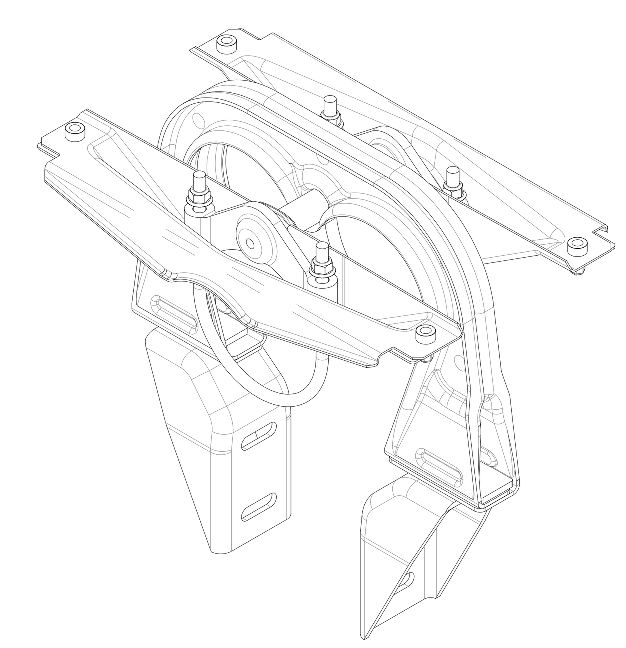
6 - FSLR S6 HEAVY MODULE RAIL, TYP.
SCALE: N.T.S.



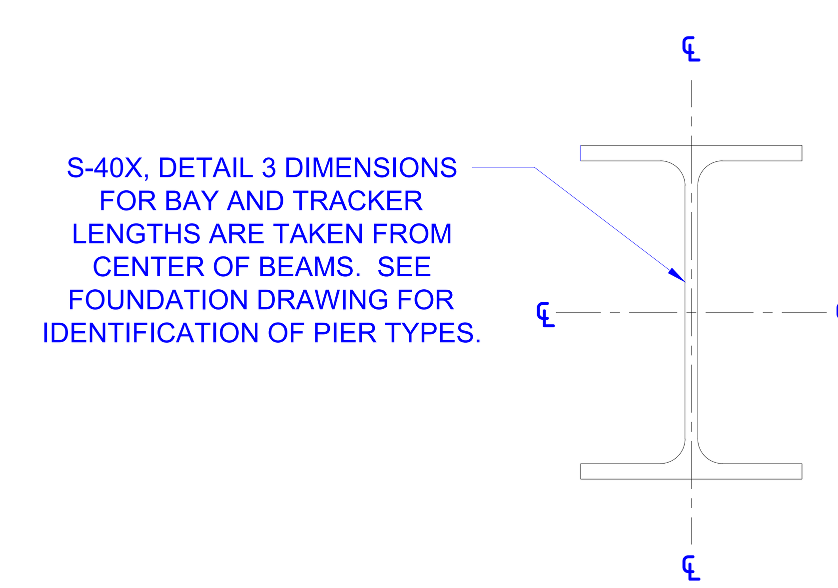
7 - HEAVY SLEW DRIVE, TYP.
SCALE: N.T.S.



8 - HEAVY SLEW MOUNT, TYP.
SCALE: N.T.S.



9 - FSLR S6 EXTRA HEAVY BHA, TYP.
SCALE: N.T.S.



10 - CENTER OF WEB
SCALE: N.T.S.

AMPACITY

QUANTA

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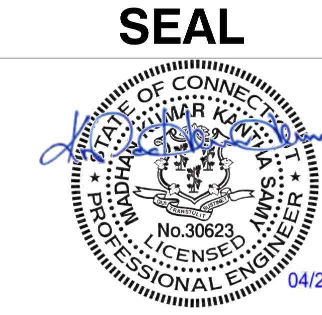

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

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VEROGY: WOODSTOCK SOLAR ONE

Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

SHEET TITLE:

102 MODULE EXT TRACKER

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-401

0 ½ 1
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

PIER LEGEND

SYMBOL	PIER TYPE
(red circle)	HEAVY ARRAY PIER
(small cyan circle)	STANDARD ARRAY PIER
(filled blue square)	HEAVY ARRAY PIER, EDGE
(open blue square)	STANDARD ARRAY PIER, EDGE
(red diamond)	HEAVY MOTOR PIER
(cyan diamond)	STANDARD MOTOR PIER

TRACKER LEGEND

TRACKER SYMBOL	TRACKER TYPE
(solid grey)	EXTERIOR
(hatched)	EDGE

TORQUE TUBE LEGEND

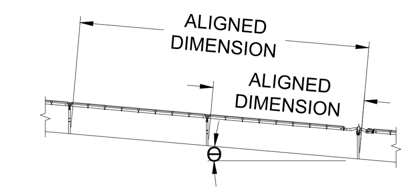
HATCH	PART #	COLOR	TORQUE TUBE TYPE	MOD QTY	KSI
	404560	LIGHT PINK	8.22m 3.5mm 60ksi	5+1	BLUE
	404548		8.27m 3.5mm 60ksi	6	BLUE
	404544		7.01m 3.5mm 60ksi	5	BLUE
	405185	BLACK	8.22m 2.5mm 60ksi	5+1	BLUE
	47013		8.27m 2.5mm 60ksi	6	BLUE
	47004		7.01m 2.5mm 60ksi	5	BLUE

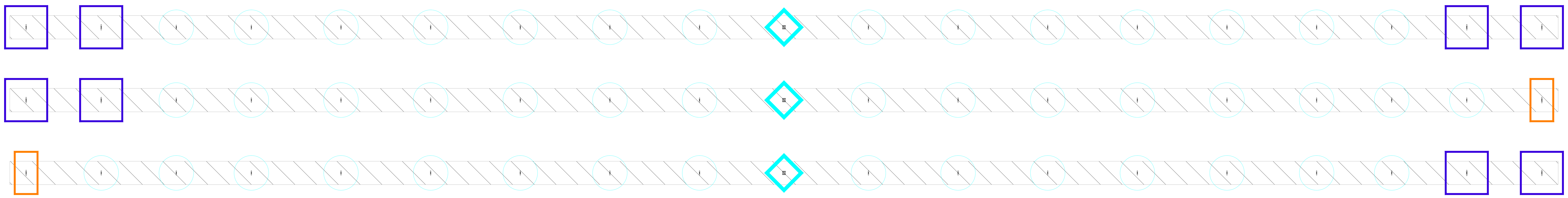
DAMPER LEGEND

SYMBOL	DAMPER TYPE	SEE SHEET S-601
X	DOUBLE DAMPER	DETAIL 5

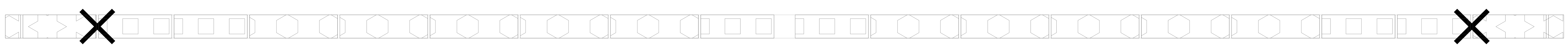
NOTE :

1) DETAILS ON THIS SHEET APPLY TO TRACKERS INDICATED ON THE SHEET TITLE ONLY. PIER PLAN INDICATES TRACKER LOCATIONS.
2) DETAILS 5-9 ARE TYPICAL AND APPLY TO ALL APPLICABLE LOCATIONS ON TRACKER.
3) PIER DISTANCES APPLY TO CENTER OF WEB, SEE DETAIL 10 FOR CENTER OF WEB LOCATION.
4) NEXTRACKER RECOMMENDS TO RUN A STRING LINE ON SLOPES>3% IN EFFORTS TO ENSURE PROPER PIER PLACEMENT. **SEE NEXTRACKER QMS-000434 FOR PILE SPACING ON SLOPES.**

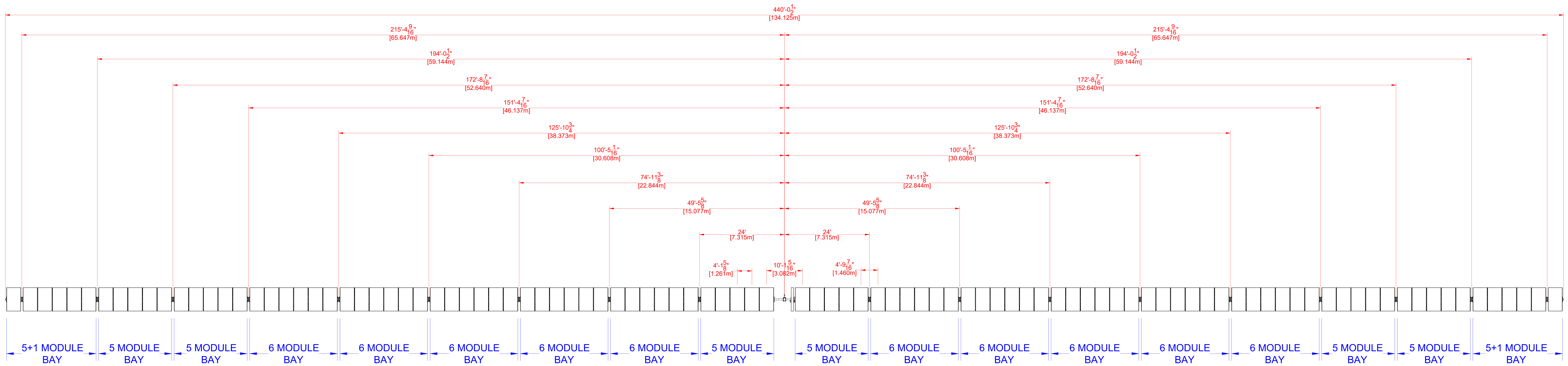




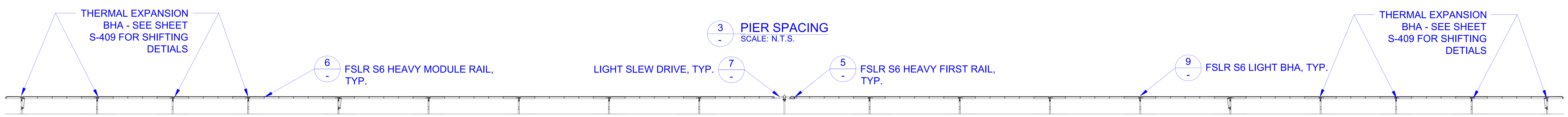
1 PIER PLAN
SCALE: N.T.S.



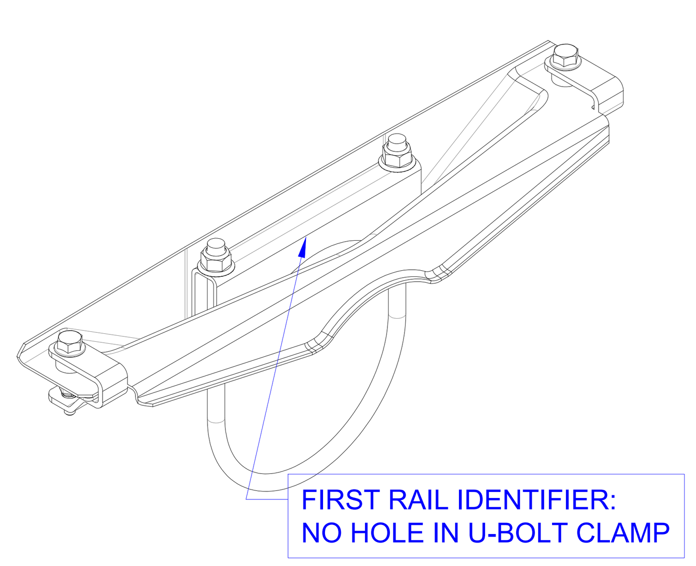
2 TORQUE TUBE AND DAMPER PLAN
SCALE: N.T.S.



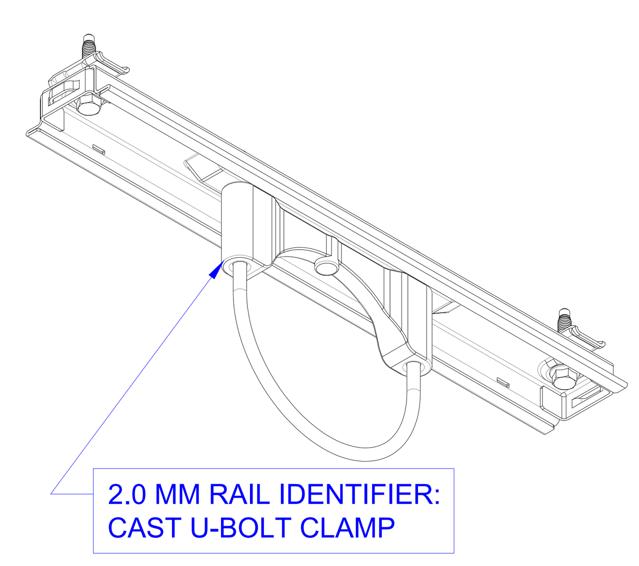
3 PIER SPACING
SCALE: N.T.S.



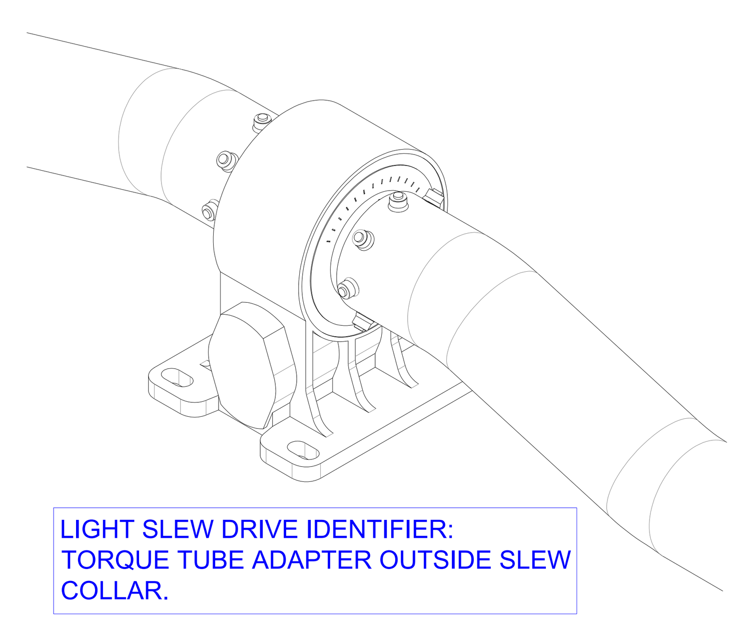
4 TRACKER ELEVATION
SCALE: N.T.S.



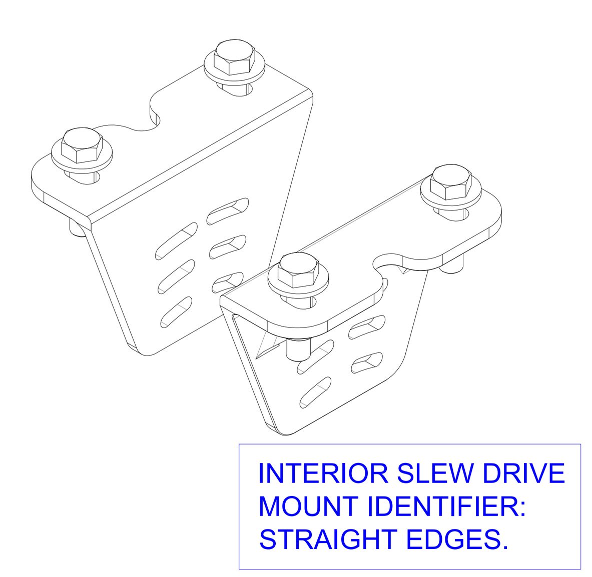
5 FSLR S6 HEAVY FIRST MODULE RAIL, TYP.
SCALE: N.T.S.



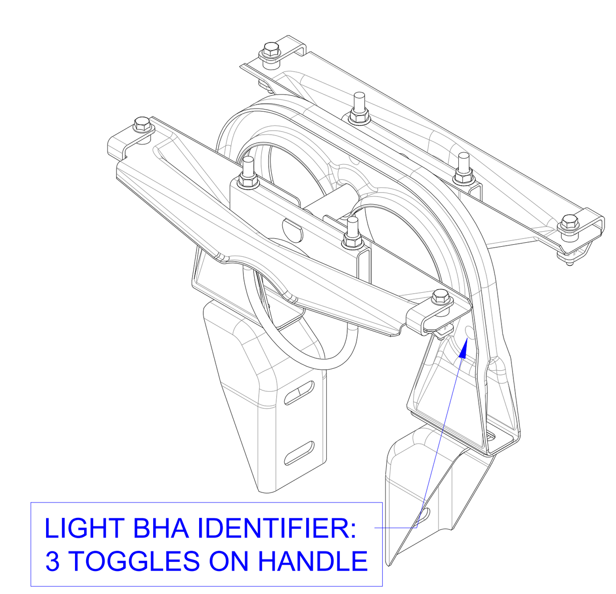
6 FSLR S6 HEAVY MODULE RAIL, TYP.
SCALE: N.T.S.



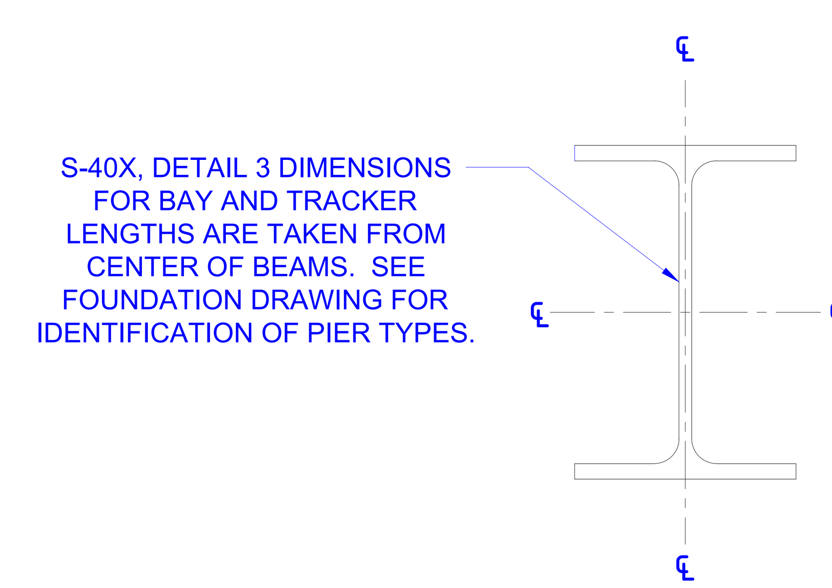
7 LIGHT SLEW DRIVE, TYP.
SCALE: N.T.S.



8 LIGHT SLEW MOUNT, TYP.
SCALE: N.T.S.



9 FSLR S6 LIGHT BHA, TYP.
SCALE: N.T.S.



10 CENTER OF WEB
SCALE: N.T.S.

AMPACITY

QUANTA

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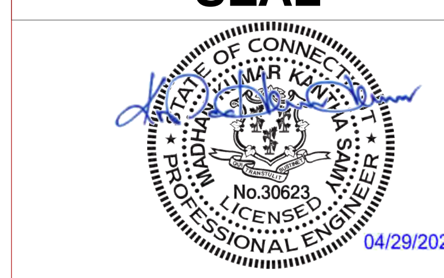
SEAL



STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

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VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER:
N/A

SITE ID:
N/A

SHEET TITLE:
102 MODULE EDGE TRACKER

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

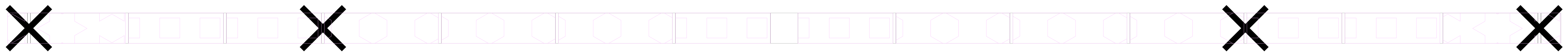
SITE DETAILS

LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

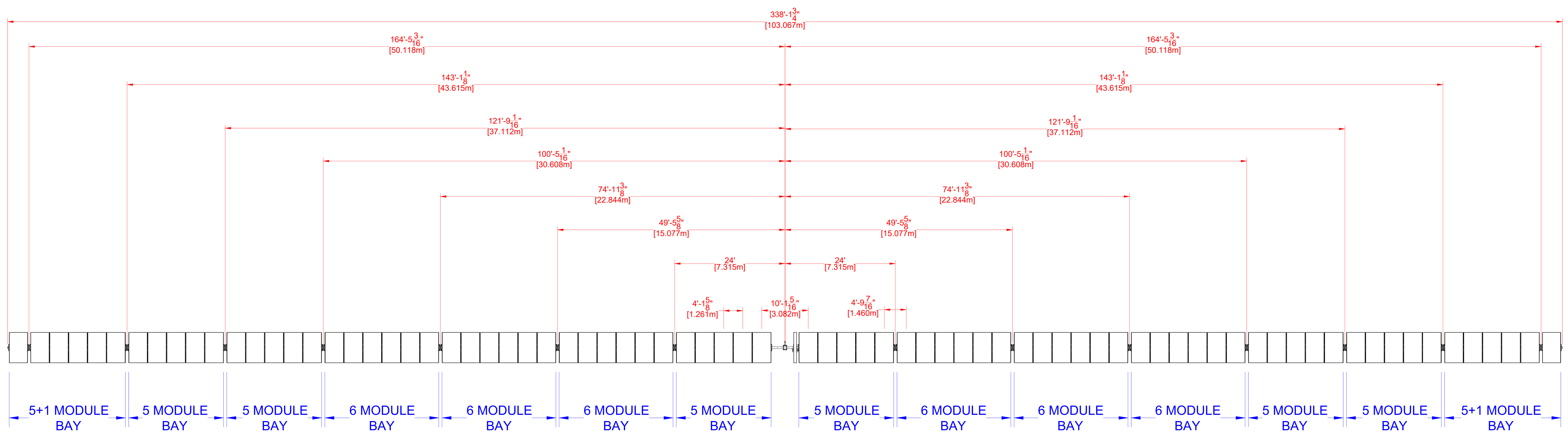
SHEET NO.: S-402

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

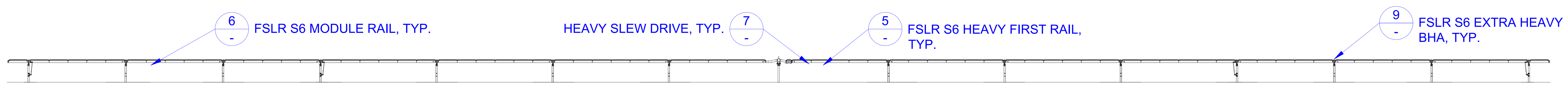
1 PIER PLAN
SCALE: N.T.S.



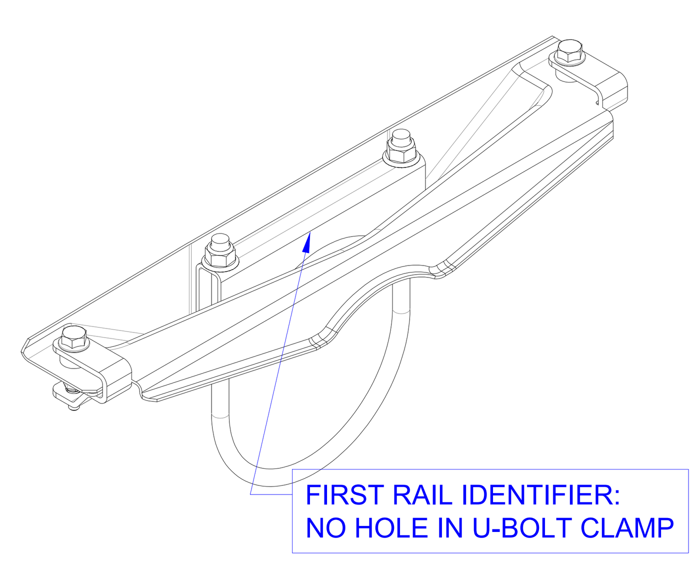
2 TORQUE TUBE AND DAMPER PLAN
SCALE: N.T.S.



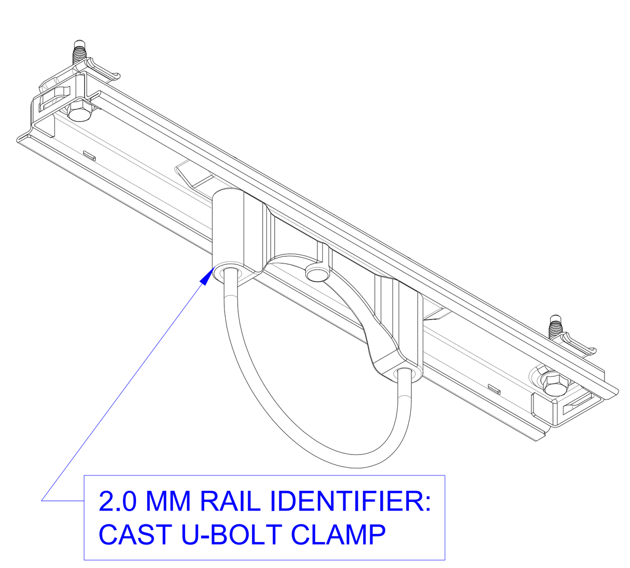
3 PIER SPACING
SCALE: N.T.S.



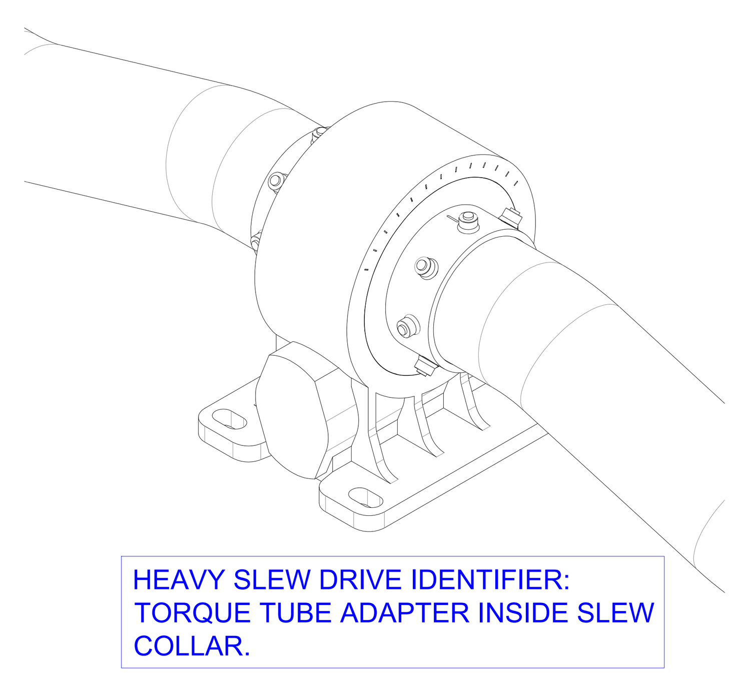
4 TRACKER ELEVATION
SCALE: N.T.S.



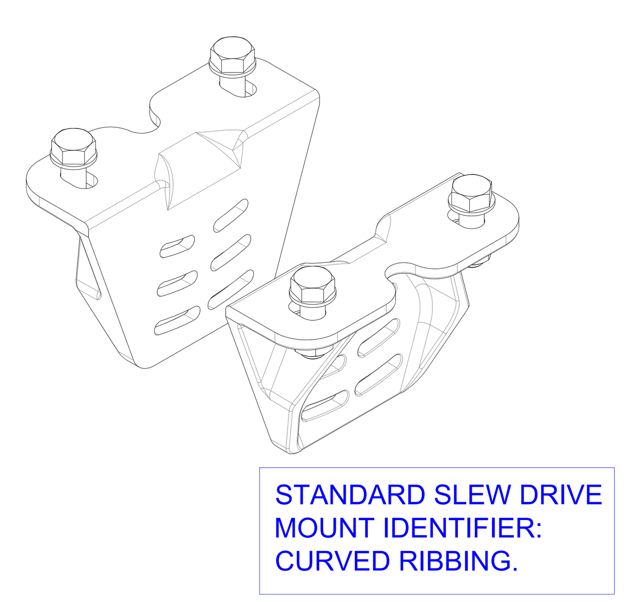
5 FSLR S6 HEAVY FIRST MODULE RAIL, TYP.
SCALE: N.T.S.



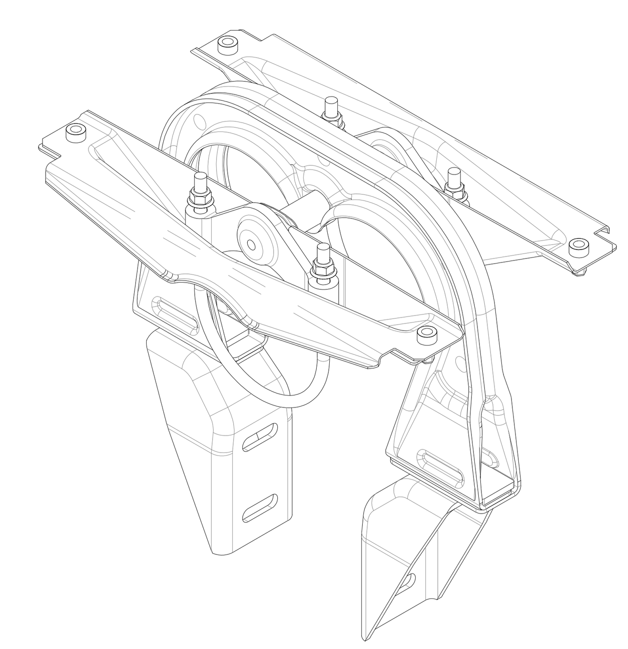
6 FSLR S6 HEAVY MODULE RAIL, TYP.
SCALE: N.T.S.



7 HEAVY SLEW DRIVE, TYP.
SCALE: N.T.S.



8 HEAVY SLEW MOUNT, TYP.
SCALE: N.T.S.



9 FSLR S6 EXTRA HEAVY BHA, TYP.
SCALE: N.T.S.

TRACKER LEGEND

TRACKER SYMBOL	TRACKER TYPE
(solid grey)	EXTERIOR
(hatched)	EDGE

PIER LEGEND

SYMBOL	PIER TYPE
(red circle)	HEAVY ARRAY PIER
(small circle)	STANDARD ARRAY PIER
(filled square)	HEAVY ARRAY PIER, EDGE
(open square)	STANDARD ARRAY PIER, EDGE
(red diamond)	HEAVY MOTOR PIER
(cyan diamond)	STANDARD MOTOR PIER

TORQUE TUBE LEGEND

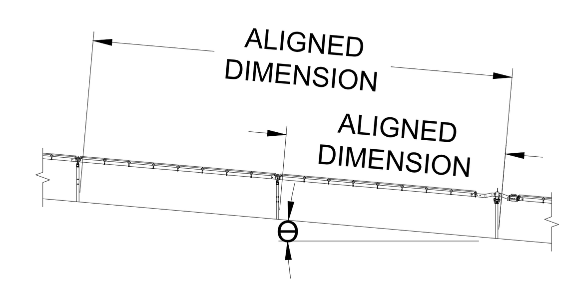
HATCH	PART #	COLOR	TORQUE TUBE TYPE	MOD QTY	KSI
	404560	LIGHT PINK	8.22m 3.5mm 60ksi	5+1	BLUE
	404548		8.27m 3.5mm 60ksi	6	BLUE
	404544		7.01m 3.5mm 60ksi	5	BLUE
	405185	BLACK	8.22m 2.5mm 60ksi	5+1	BLUE
	47013		8.27m 2.5mm 60ksi	6	BLUE
	47004		7.01m 2.5mm 60ksi	5	BLUE

DAMPER LEGEND

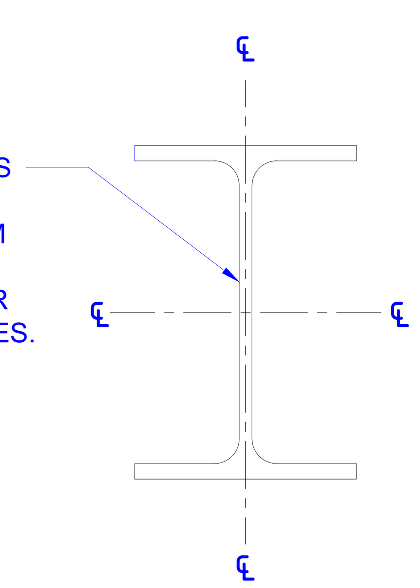
SYMBOL	DAMPER TYPE	SEE SHEET S-601
X	DOUBLE DAMPER	DETAIL 5

NOTE :

1) DETAILS ON THIS SHEET APPLY TO TRACKERS INDICATED ON THE SHEET TITLE ONLY. PIER PLAN INDICATES TRACKER LOCATIONS.
2) DETAILS 5-9 ARE TYPICAL AND APPLY TO ALL APPLICABLE LOCATIONS ON TRACKER.
3) PIER DISTANCES APPLY TO CENTER OF WEB, SEE DETAIL 10 FOR CENTER OF WEB LOCATION.
4) NEXTRACKER RECOMMENDS TO RUN A STRING LINE ON SLOPES >3% IN EFFORTS TO ENSURE PROPER PIER PLACEMENT. **SEE NEXTRACKER QMS-000434 FOR PILE SPACING ON SLOPES.**



S-40X, DETAIL 3 DIMENSIONS FOR BAY AND TRACKER LENGTHS ARE TAKEN FROM CENTER OF BEAMS. SEE FOUNDATION DRAWING FOR IDENTIFICATION OF PIER TYPES.

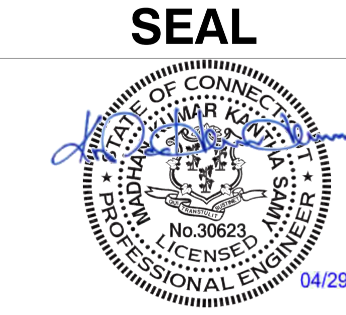


10 CENTER OF WEB
SCALE: N.T.S.

AMPACITY

QUANTA

SEAL



STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

SHEET TITLE: 78 MODULE EXT TRACKER

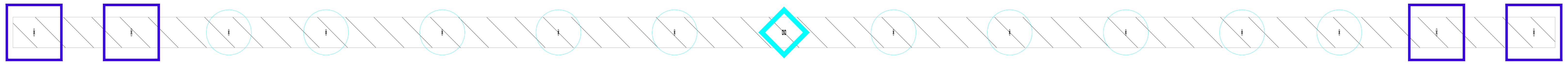
NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

SITE DETAILS

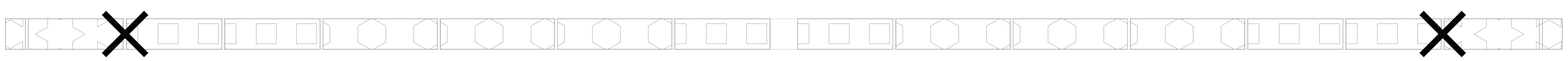
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-403

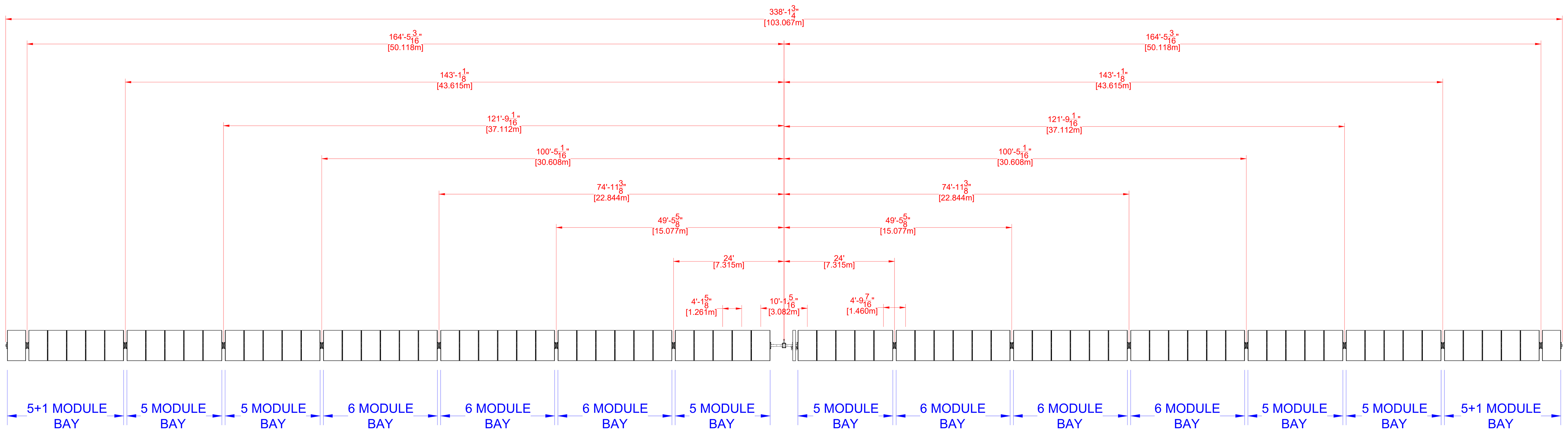
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



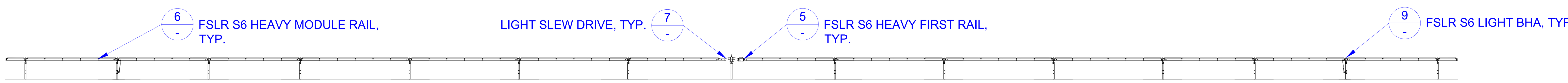
1 PIER PLAN
SCALE: N.T.S.



2 TORQUE TUBE AND DAMPER PLAN
SCALE: N.T.S.



3 PIER SPACING
SCALE: N.T.S.



4 TRACKER ELEVATION
SCALE: N.T.S.

TRACKER LEGEND

TRACKER SYMBOL	TRACKER TYPE
(solid grey)	EXTERIOR
(hatched)	EDGE

PIER LEGEND

SYMBOL	PIER TYPE
(red circle)	HEAVY ARRAY PIER
(cyan circle)	STANDARD ARRAY PIER
(filled square)	HEAVY ARRAY PIER, EDGE
(open square)	STANDARD ARRAY PIER, EDGE
(red diamond)	HEAVY MOTOR PIER
(cyan diamond)	STANDARD MOTOR PIER

TORQUE TUBE LEGEND

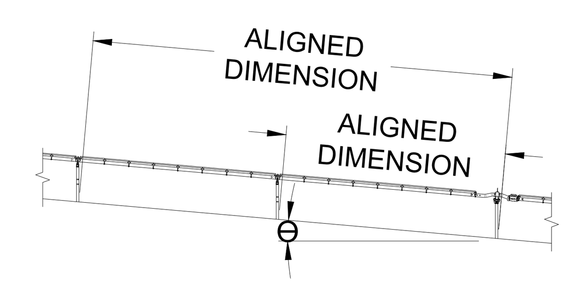
HATCH	PART #	COLOR	TORQUE TUBE TYPE	MOD QTY	KSI
	404560	LIGHT PINK	8.22m 3.5mm 60ksi	5+1	BLUE
	404548		8.27m 3.5mm 60ksi	6	BLUE
	404544		7.01m 3.5mm 60ksi	5	BLUE
	405185	BLACK	8.22m 2.5mm 60ksi	5+1	BLUE
	47013		8.27m 2.5mm 60ksi	6	BLUE
	47004		7.01m 2.5mm 60ksi	5	BLUE

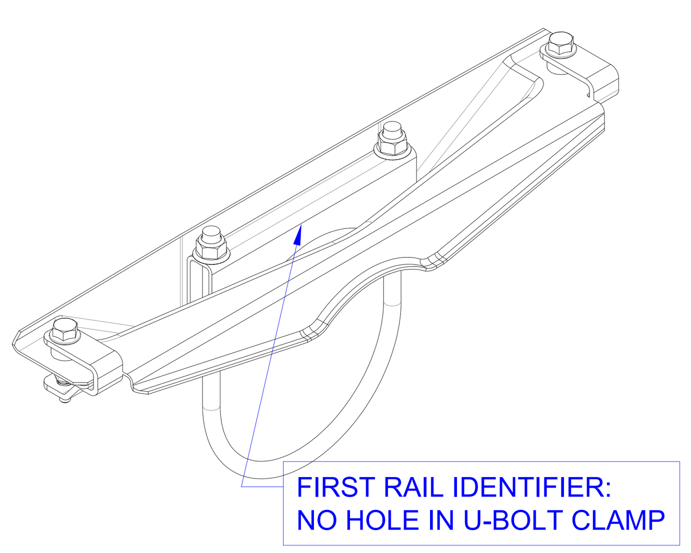
DAMPER LEGEND

SYMBOL	DAMPER TYPE	SEE SHEET S-601
X	DOUBLE DAMPER	DETAIL 5

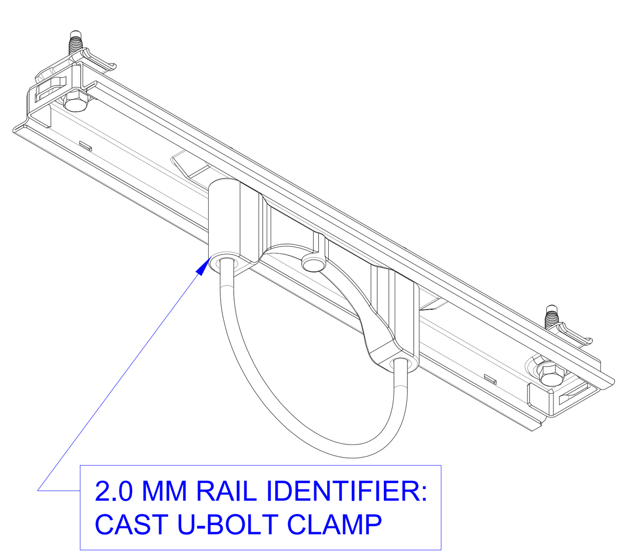
NOTE :

1) DETAILS ON THIS SHEET APPLY TO TRACKERS INDICATED ON THE SHEET TITLE ONLY. PIER PLAN INDICATES TRACKER LOCATIONS.
2) DETAILS 5-9 ARE TYPICAL AND APPLY TO ALL APPLICABLE LOCATIONS ON TRACKER.
3) PIER DISTANCES APPLY TO CENTER OF WEB, SEE DETAIL 10 FOR CENTER OF WEB LOCATION.
4) NEXTRACKER RECOMMENDS TO RUN A STRING LINE ON SLOPES >3% IN EFFORTS TO ENSURE PROPER PIER PLACEMENT. **SEE NEXTRACKER QMS-000434 FOR PILE SPACING ON SLOPES.**

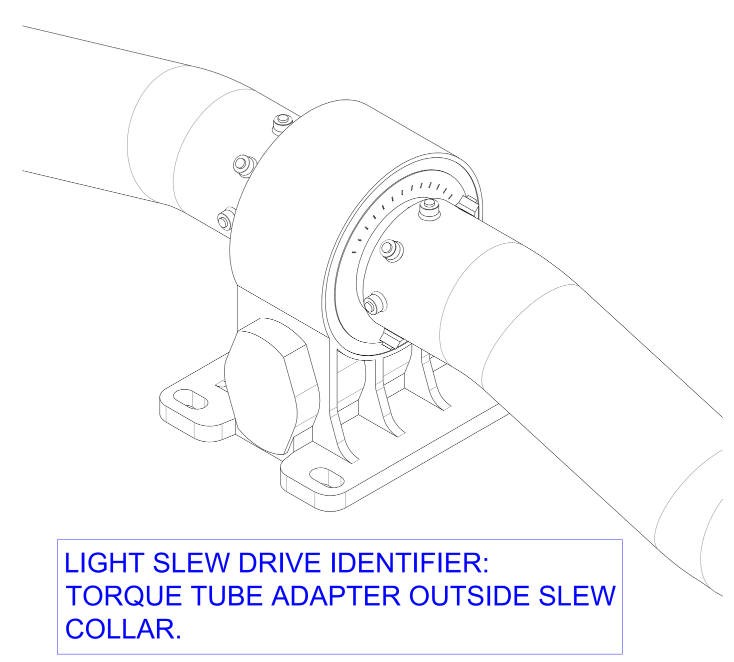




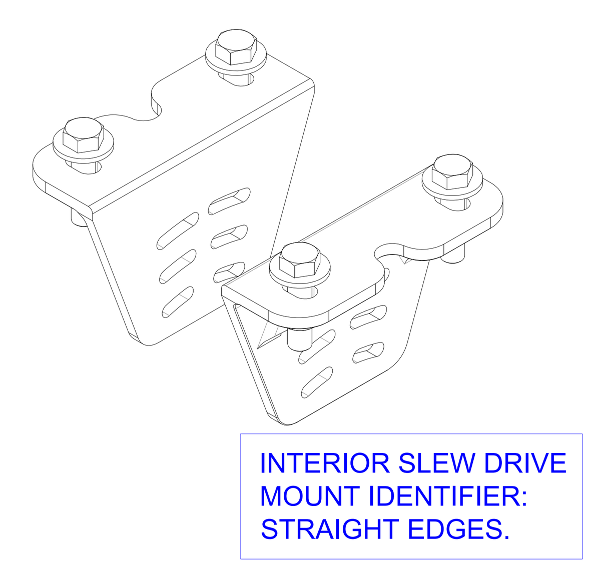
5 FSLR S6 HEAVY FIRST MODULE RAIL, TYP.
SCALE: N.T.S.



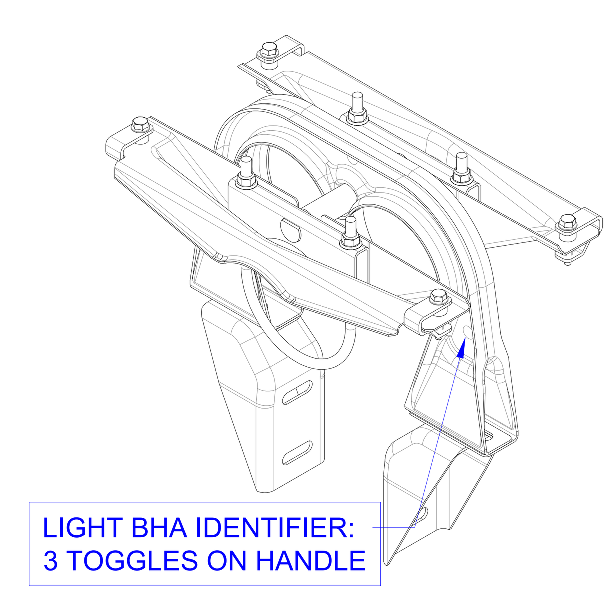
6 FSLR S6 HEAVY MODULE RAIL, TYP.
SCALE: N.T.S.



7 LIGHT SLEW DRIVE, TYP.
SCALE: N.T.S.

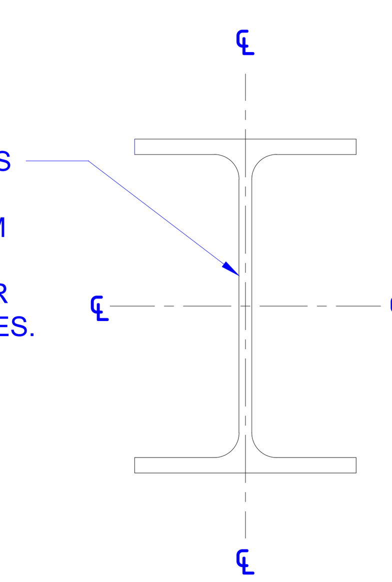


8 LIGHT SLEW MOUNT, TYP.
SCALE: N.T.S.



9 FSLR S6 LIGHT BHA, TYP.
SCALE: N.T.S.

S-40X, DETAIL 3 DIMENSIONS FOR BAY AND TRACKER LENGTHS ARE TAKEN FROM CENTER OF BEAMS. SEE FOUNDATION DRAWING FOR IDENTIFICATION OF PIER TYPES.



10 CENTER OF WEB
SCALE: N.T.S.

AMPACITY
QUANTA

SEAL

STATE OF CONNECTICUT
No.30623
LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

SHEET TITLE:
78 MODULE EDGE TRACKER

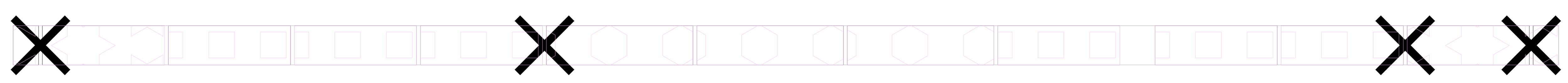
NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

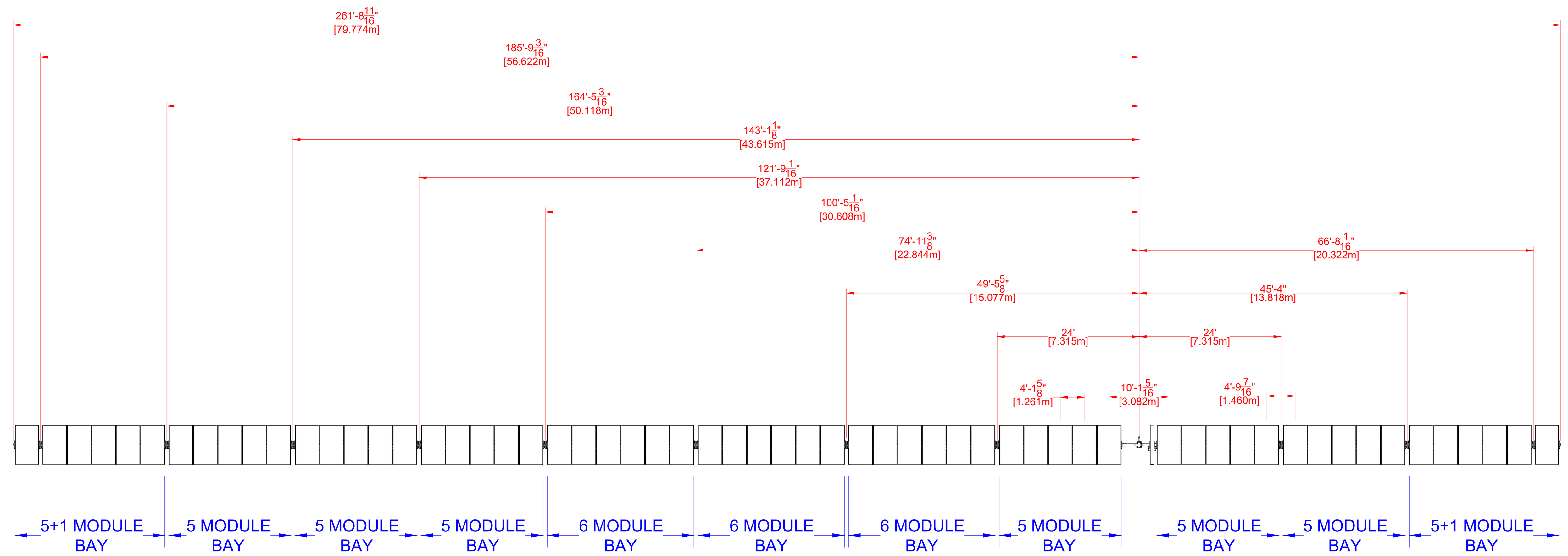
SHEET NO.: S-404

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

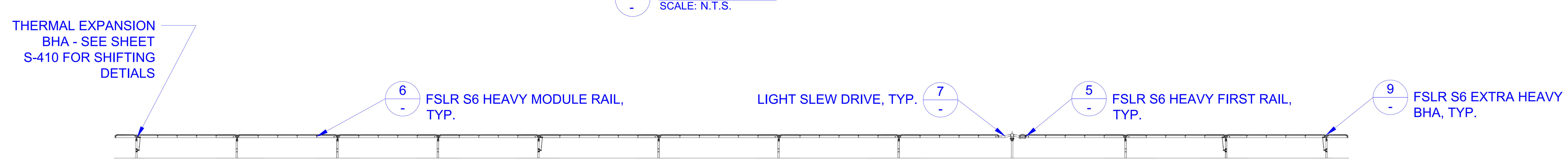
1 - PIER PLAN
SCALE: N.T.S.



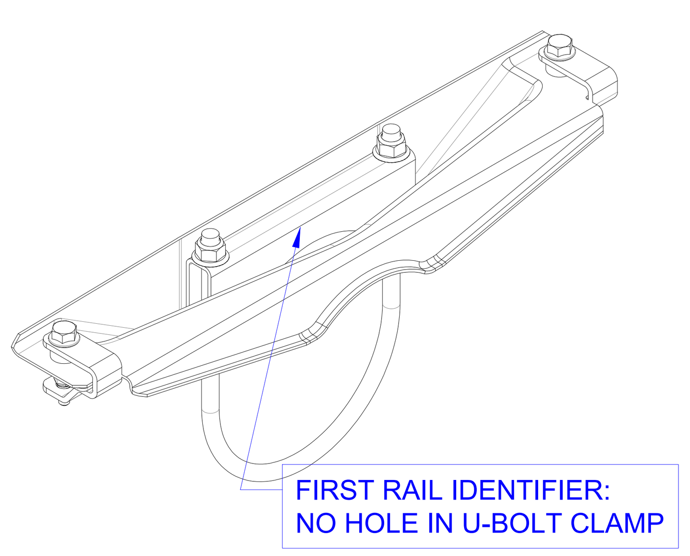
2 - TORQUE TUBE AND DAMPER PLAN
SCALE: N.T.S.



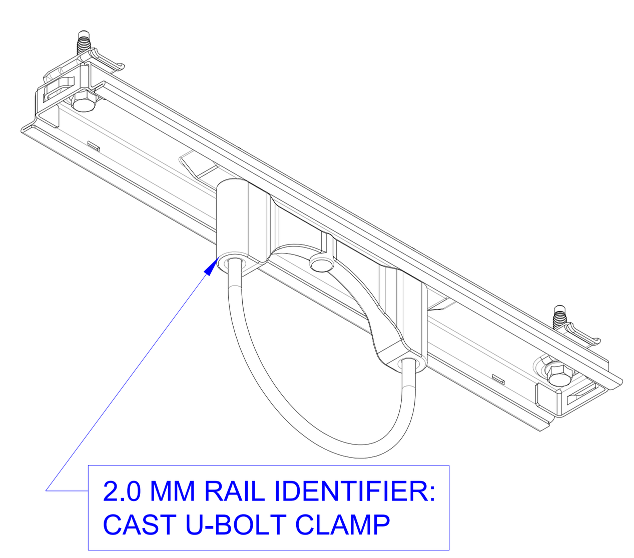
3 - PIER SPACING
SCALE: N.T.S.



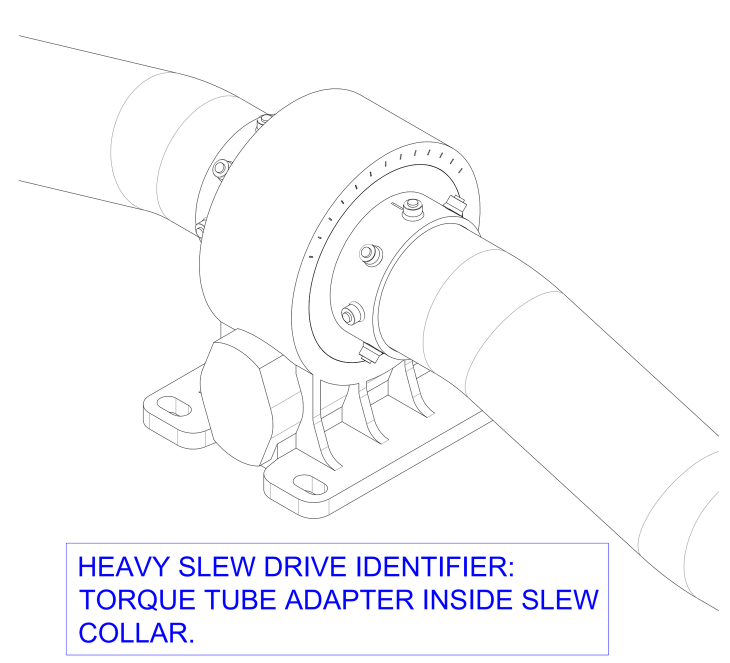
4 - TRACKER ELEVATION
SCALE: N.T.S.



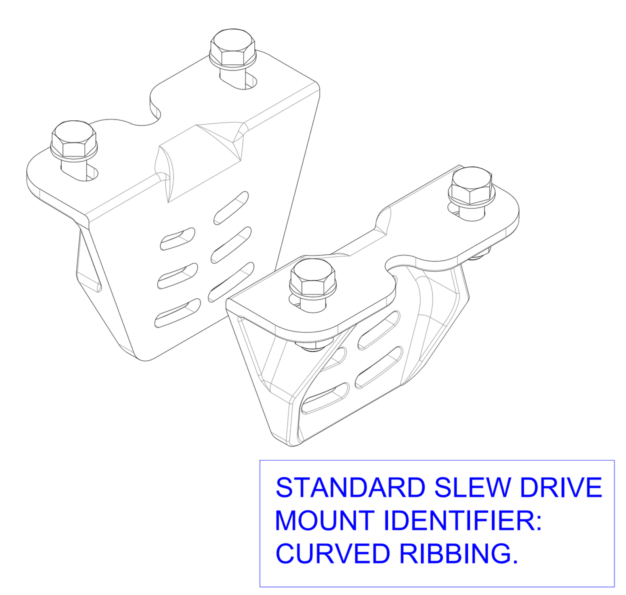
5 - FSLR S6 HEAVY FIRST MODULE RAIL, TYP.
SCALE: N.T.S.



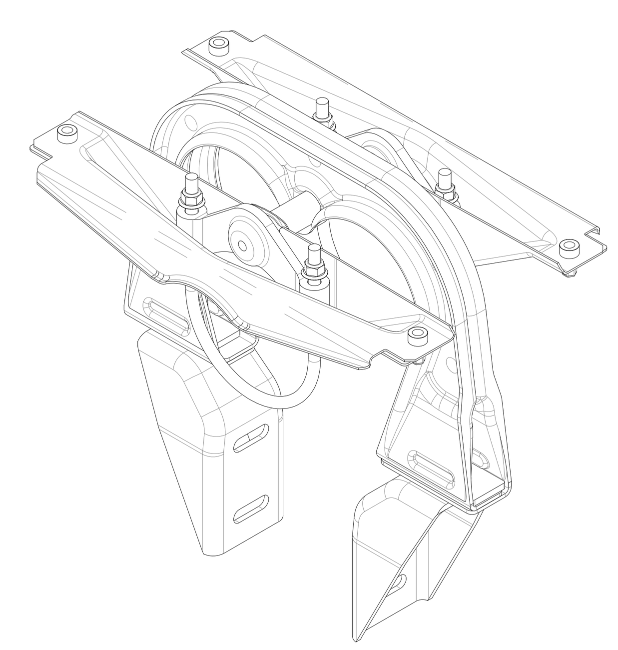
6 - FSLR S6 HEAVY MODULE RAIL, TYP.
SCALE: N.T.S.



7 - HEAVY SLEW DRIVE, TYP.
SCALE: N.T.S.



8 - HEAVY SLEW MOUNT, TYP.
SCALE: N.T.S.



9 - FSLR S6 EXTRA HEAVY BHA, TYP.
SCALE: N.T.S.

TRACKER LEGEND

TRACKER SYMBOL	TRACKER TYPE
(solid grey)	EXTERIOR
(hatched)	EDGE

PIER LEGEND

SYMBOL	PIER TYPE
	HEAVY ARRAY PIER
	STANDARD ARRAY PIER
	HEAVY ARRAY PIER, EDGE
	STANDARD ARRAY PIER, EDGE
	HEAVY MOTOR PIER
	STANDARD MOTOR PIER

TORQUE TUBE LEGEND

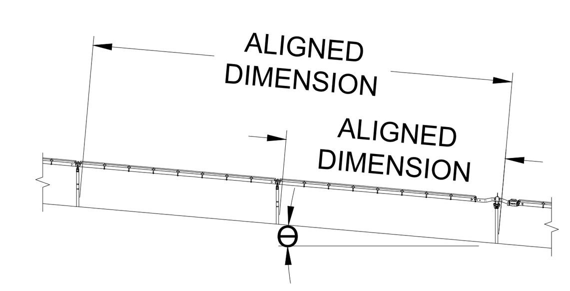
HATCH	PART #	COLOR	TORQUE TUBE TYPE	MOD QTY	KSI
	404560	LIGHT PINK	8.22m 3.5mm 60ksi	5+1	BLUE
	404548		8.27m 3.5mm 60ksi	6	BLUE
	404544		7.01m 3.5mm 60ksi	5	BLUE
	405185	BLACK	8.22m 2.5mm 60ksi	5+1	BLUE
	47013		8.27m 2.5mm 60ksi	6	BLUE
	47004		7.01m 2.5mm 60ksi	5	BLUE

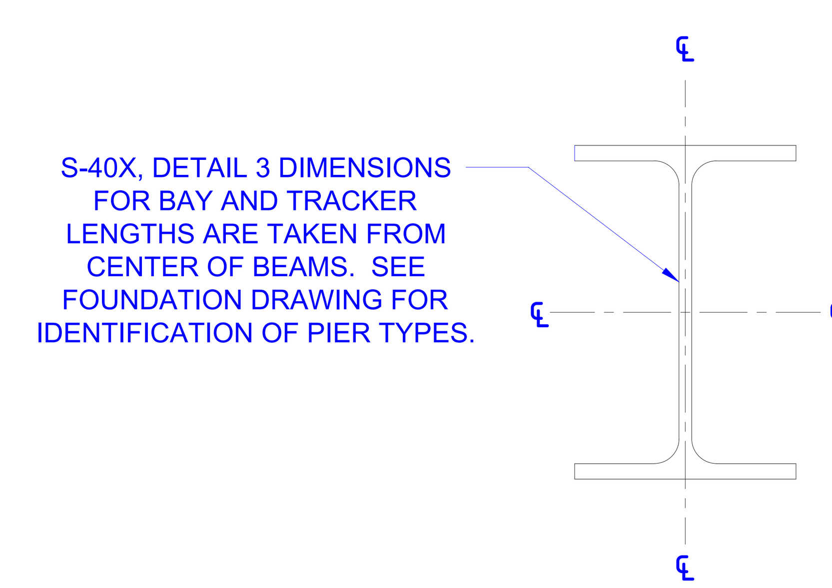
DAMPER LEGEND

SYMBOL	DAMPER TYPE	SEE SHEET S-601
X	DOUBLE DAMPER	DETAIL 5

NOTE :

1) DETAILS ON THIS SHEET APPLY TO TRACKERS INDICATED ON THE SHEET TITLE ONLY. PIER PLAN INDICATES TRACKER LOCATIONS.
2) DETAILS 5-9 ARE TYPICAL AND APPLY TO ALL APPLICABLE LOCATIONS ON TRACKER.
3) PIER DISTANCES APPLY TO CENTER OF WEB, SEE DETAIL 10 FOR CENTER OF WEB LOCATION.
4) NEXTRACKER RECOMMENDS TO RUN A STRING LINE ON SLOPES >3% IN EFFORTS TO ENSURE PROPER PIER PLACEMENT. **SEE NEXTRACKER QMS-000434 FOR PILE SPACING ON SLOPES.**





10 - CENTER OF WEB
SCALE: N.T.S.

AMPACITY
QUANTA

SEAL

STATE OF CONNECTICUT, MADHAN KUMAR KANTHA SAMY, No.30623, LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

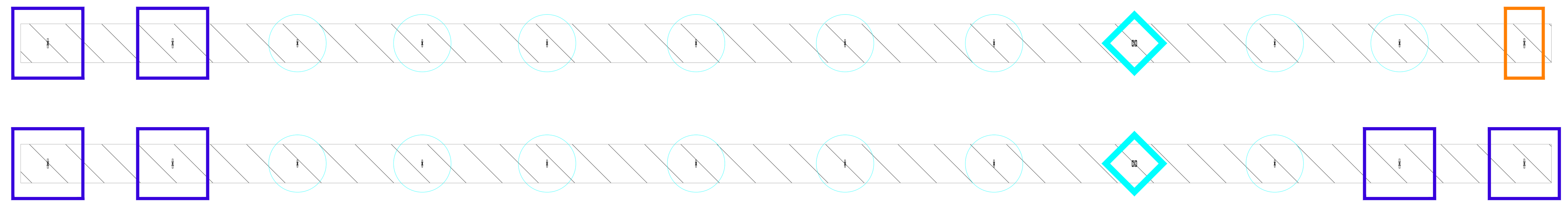
SHEET TITLE: 60 MODULE EXT TRACKER

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

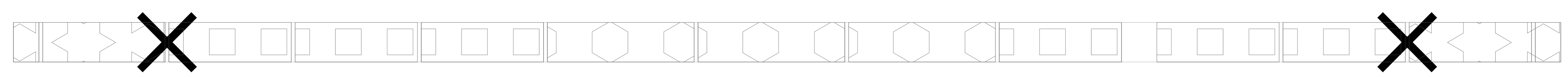
SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-405

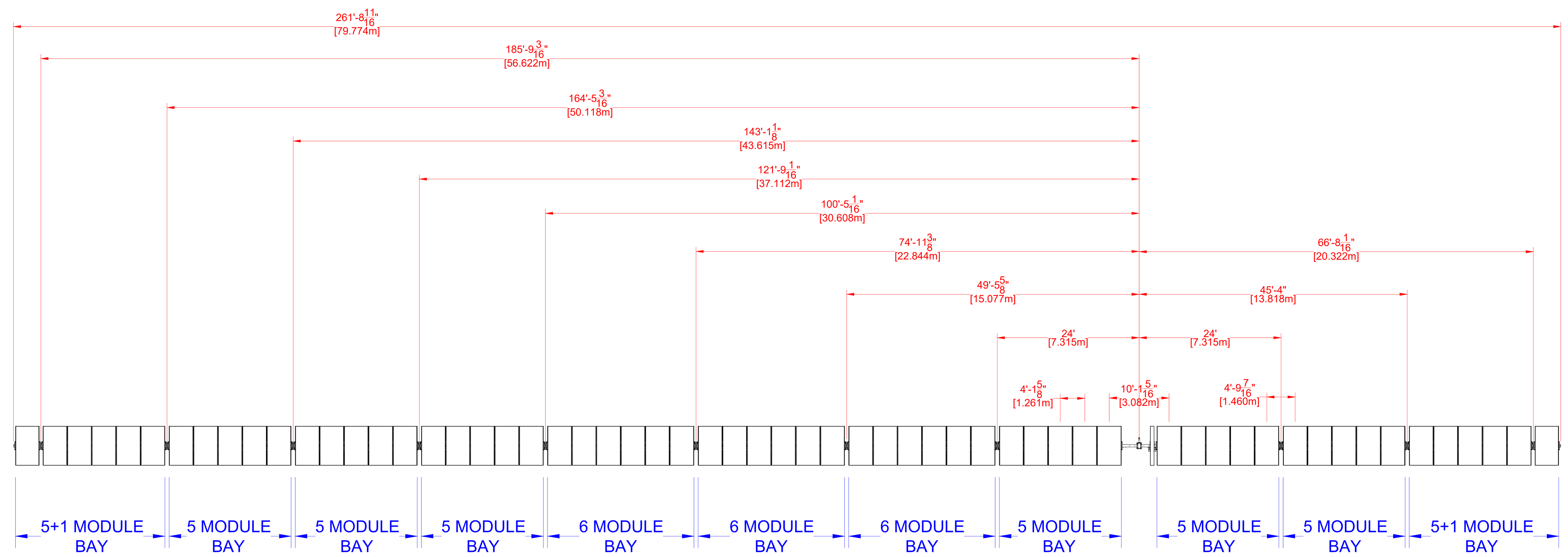
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



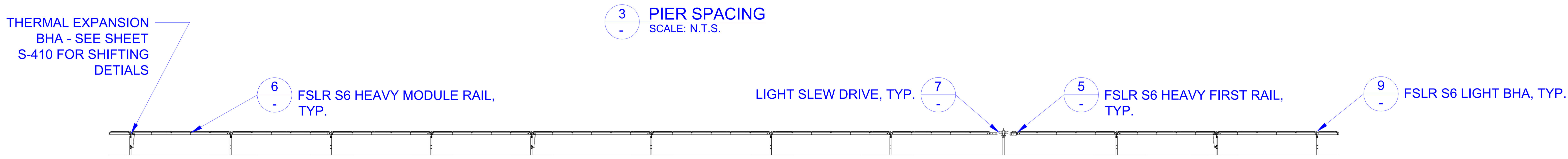
1 PIER PLAN
SCALE: N.T.S.



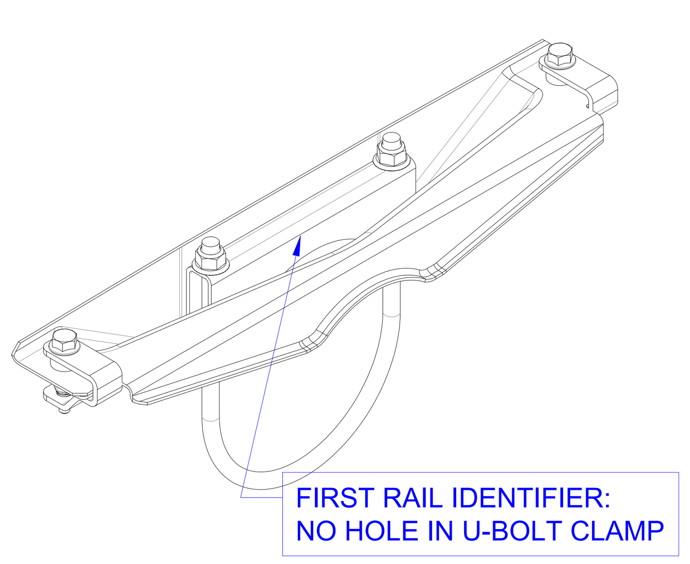
2 TORQUE TUBE AND DAMPER PLAN
SCALE: N.T.S.



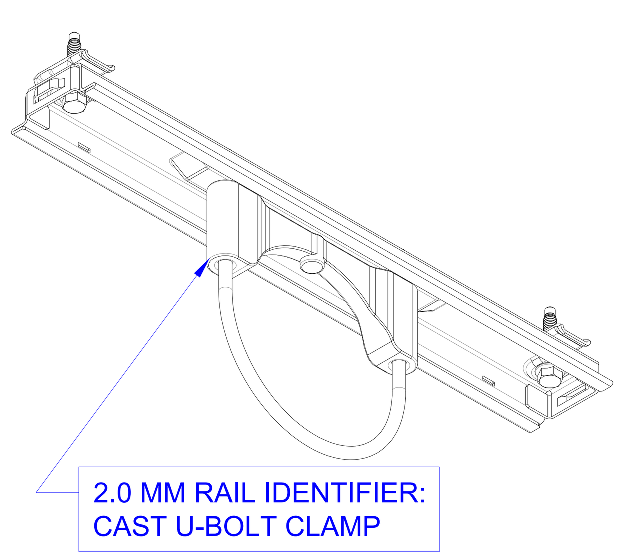
3 PIER SPACING
SCALE: N.T.S.



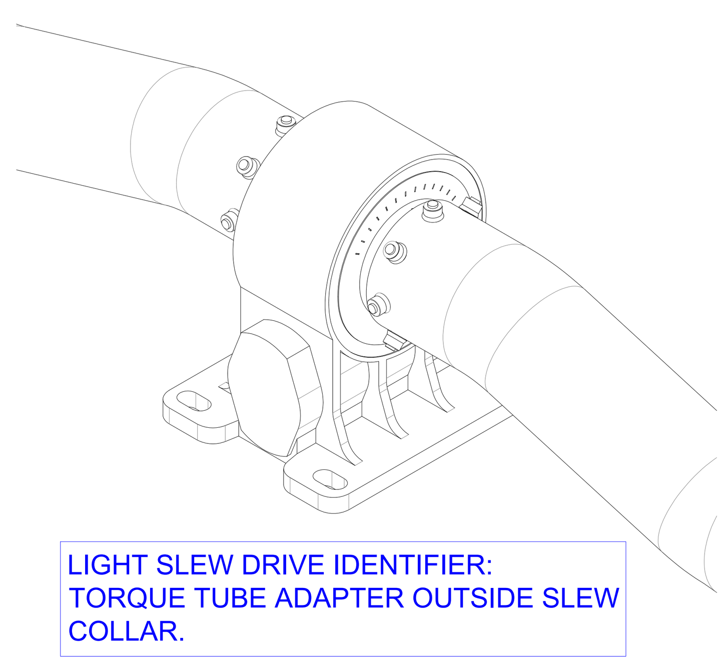
4 TRACKER ELEVATION
SCALE: N.T.S.



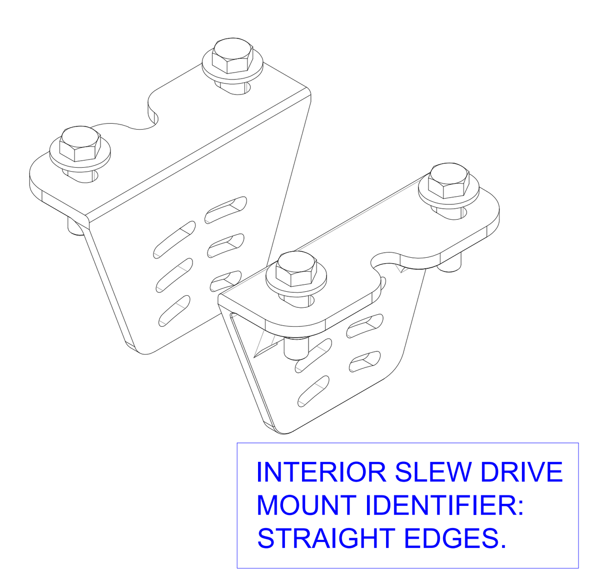
5 FSLR S6 HEAVY FIRST MODULE RAIL, TYP.
SCALE: N.T.S.



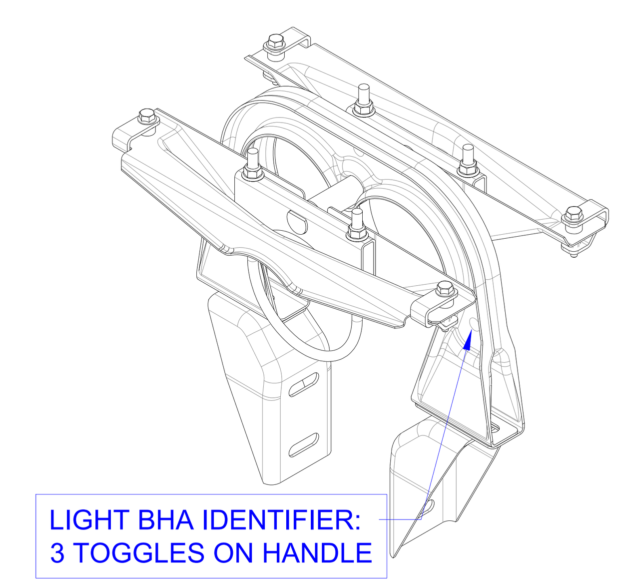
6 FSLR S6 HEAVY MODULE RAIL, TYP.
SCALE: N.T.S.



7 LIGHT SLEW DRIVE, TYP.
SCALE: N.T.S.



8 LIGHT SLEW MOUNT, TYP.
SCALE: N.T.S.



9 FSLR S6 LIGHT BHA, TYP.
SCALE: N.T.S.

TRACKER LEGEND

TRACKER SYMBOL	TRACKER TYPE
(solid grey)	EXTERIOR
(hatched)	EDGE

PIER LEGEND

SYMBOL	PIER TYPE
	HEAVY ARRAY PIER
	STANDARD ARRAY PIER
	HEAVY ARRAY PIER, EDGE
	STANDARD ARRAY PIER, EDGE
	HEAVY MOTOR PIER
	STANDARD MOTOR PIER

TORQUE TUBE LEGEND

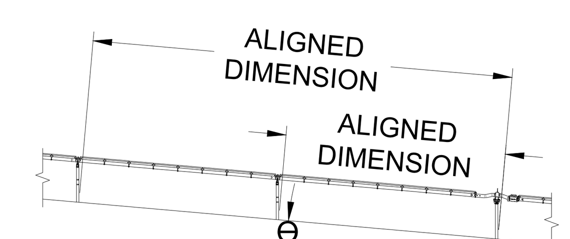
HATCH	PART #	COLOR	TORQUE TUBE TYPE	MOD QTY	KSI
	404560	LIGHT PINK	8.22m 3.5mm 60ksi	5+1	BLUE
	404548		8.27m 3.5mm 60ksi	6	BLUE
	404544		7.01m 3.5mm 60ksi	5	BLUE
	405185	BLACK	8.22m 2.5mm 60ksi	5+1	BLUE
	47013		8.27m 2.5mm 60ksi	6	BLUE
	47004		7.01m 2.5mm 60ksi	5	BLUE

DAMPER LEGEND

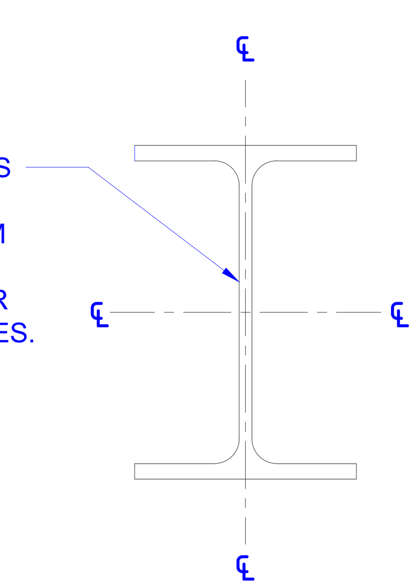
SYMBOL	DAMPER TYPE	SEE SHEET S-601
X	DOUBLE DAMPER	DETAIL 5

NOTE :

1) DETAILS ON THIS SHEET APPLY TO TRACKERS INDICATED ON THE SHEET TITLE ONLY. PIER PLAN INDICATES TRACKER LOCATIONS.
2) DETAILS 5-9 ARE TYPICAL AND APPLY TO ALL APPLICABLE LOCATIONS ON TRACKER.
3) PIER DISTANCES APPLY TO CENTER OF WEB, SEE DETAIL 10 FOR CENTER OF WEB LOCATION.
4) NEXTRACKER RECOMMENDS TO RUN A STRING LINE ON SLOPES >3% IN EFFORTS TO ENSURE PROPER PIER PLACEMENT. **SEE NEXTRACKER QMS-000434 FOR PILE SPACING ON SLOPES.**



S-40X, DETAIL 3 DIMENSIONS FOR BAY AND TRACKER LENGTHS ARE TAKEN FROM CENTER OF BEAMS. SEE FOUNDATION DRAWING FOR IDENTIFICATION OF PIER TYPES.



10 CENTER OF WEB
SCALE: N.T.S.

AMPACITY

QUANTA

THE DOCUMENT CONTAINS PROPRIETARY INFORMATION. REPRODUCTION OR DISCLOSURE OF ANY PART WITHOUT SPECIFIC WRITTEN AUTHORIZATION ON NEXTRACKER INC. IS STRICTLY FORBIDDEN.

SEAL

STATE OF CONNECTICUT — No.30623 — LICENSED PROFESSIONAL ENGINEER — 04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

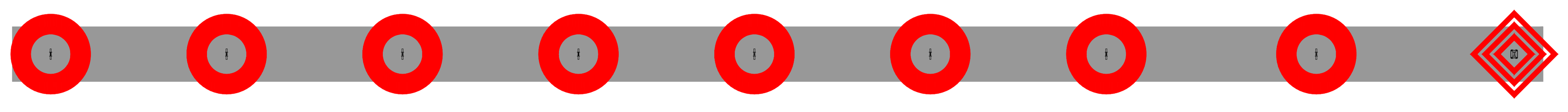
SHEET TITLE:
60 MODULE EDGE TRACKER

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

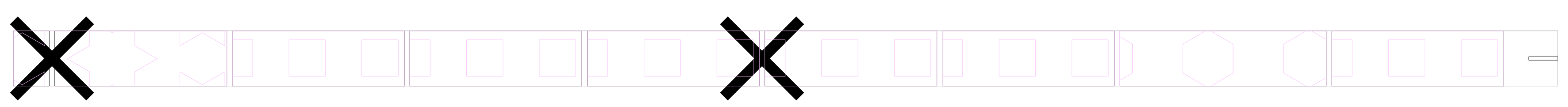
SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-406

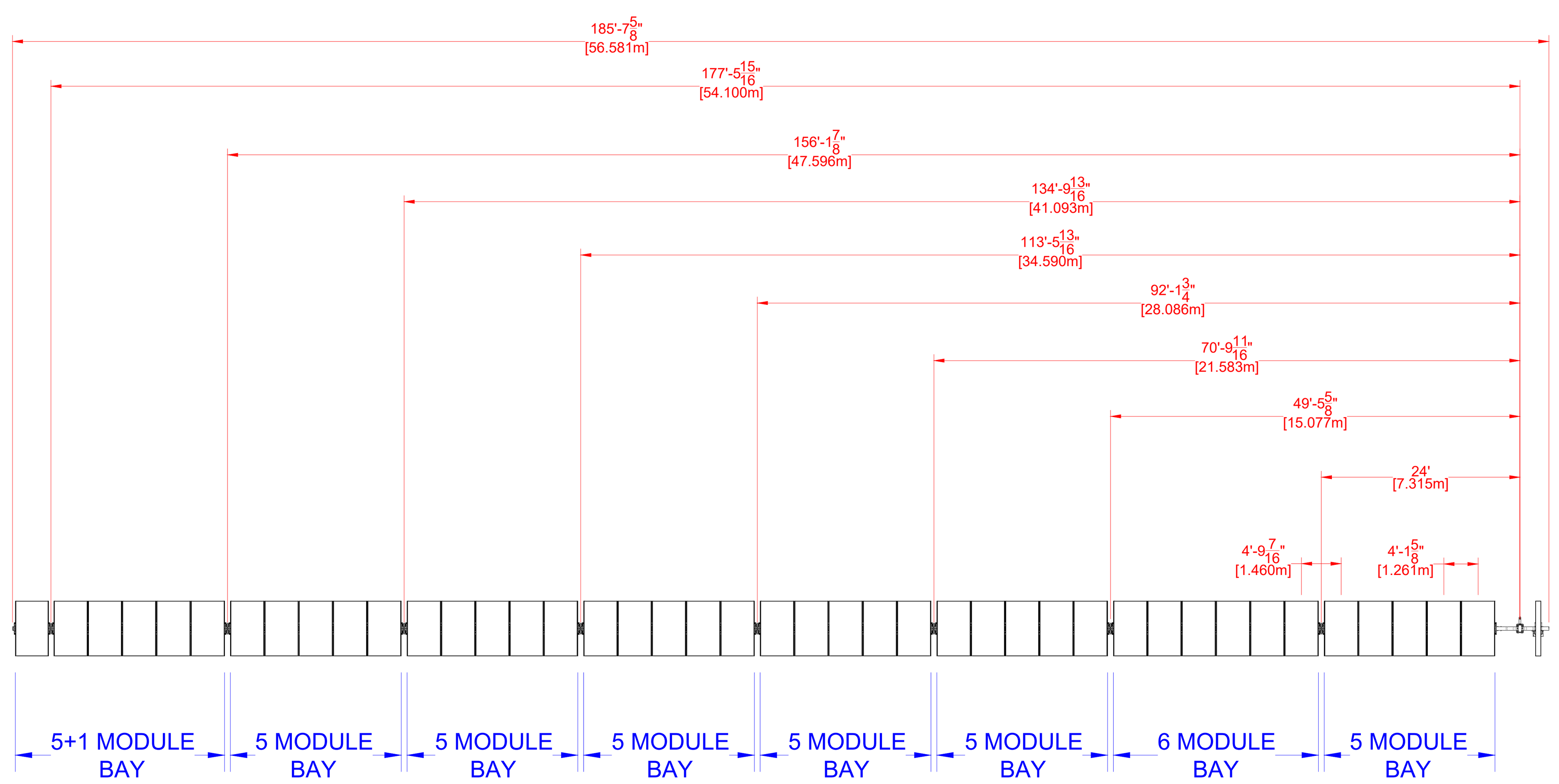
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



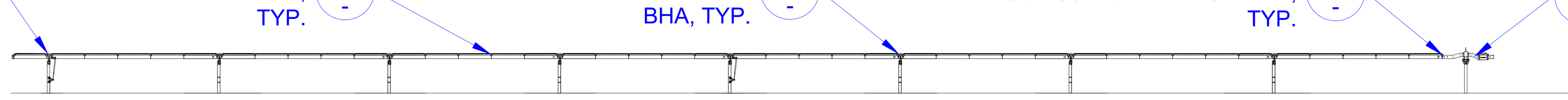
1 - PIER PLAN
SCALE: N.T.S.



2 - TORQUE TUBE AND DAMPER PLAN
SCALE: N.T.S.



3 - PIER SPACING
SCALE: N.T.S.



4 - TRACKER ELEVATION
SCALE: N.T.S.

TRACKER LEGEND

TRACKER SYMBOL	TRACKER TYPE
(solid grey)	EXTERIOR
(hatched)	EDGE

PIER LEGEND

SYMBOL	PIER TYPE
(red circle)	HEAVY ARRAY PIER
(cyan circle)	STANDARD ARRAY PIER
(filled square)	HEAVY ARRAY PIER, EDGE
(open square)	STANDARD ARRAY PIER, EDGE
(red diamond)	HEAVY MOTOR PIER
(cyan diamond)	STANDARD MOTOR PIER

TORQUE TUBE LEGEND

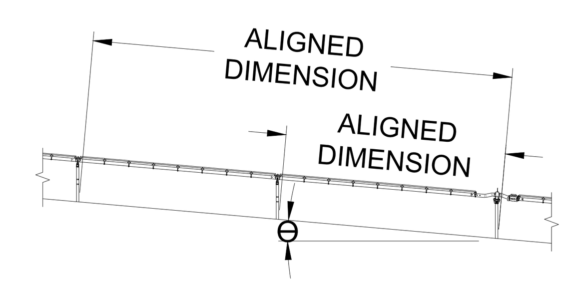
HATCH	PART #	COLOR	TORQUE TUBE TYPE	MOD QTY	KSI
	404560	LIGHT PINK	8.22m 3.5mm 60ksi	5+1	BLUE
	404548		8.27m 3.5mm 60ksi	6	BLUE
	404544		7.01m 3.5mm 60ksi	5	BLUE
	405185	BLACK	8.22m 2.5mm 60ksi	5+1	BLUE
	47013		8.27m 2.5mm 60ksi	6	BLUE
	47004		7.01m 2.5mm 60ksi	5	BLUE

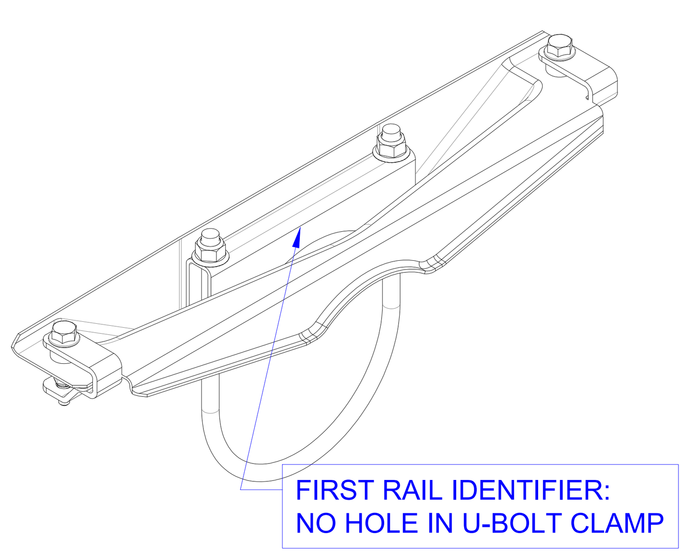
DAMPER LEGEND

SYMBOL	DAMPER TYPE	SEE SHEET S-601
X	DOUBLE DAMPER	DETAIL 5

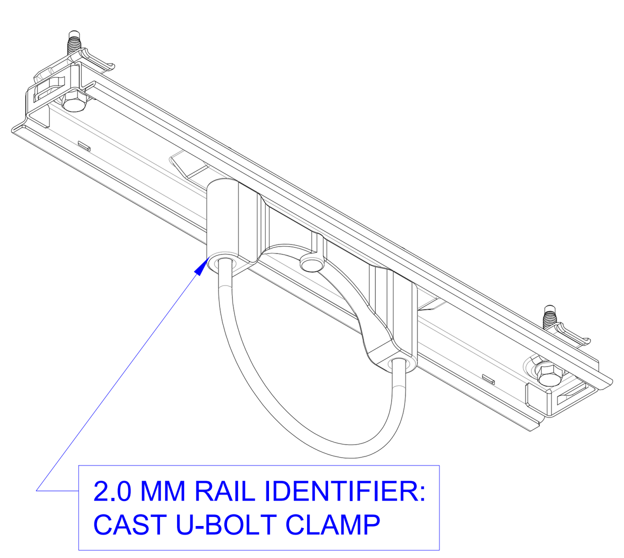
NOTE :

1) DETAILS ON THIS SHEET APPLY TO TRACKERS INDICATED ON THE SHEET TITLE ONLY. PIER PLAN INDICATES TRACKER LOCATIONS.
2) DETAILS 5-9 ARE TYPICAL AND APPLY TO ALL APPLICABLE LOCATIONS ON TRACKER.
3) PIER DISTANCES APPLY TO CENTER OF WEB, SEE DETAIL 10 FOR CENTER OF WEB LOCATION.
4) NEXTRACKER RECOMMENDS TO RUN A STRING LINE ON SLOPES >3% IN EFFORTS TO ENSURE PROPER PIER PLACEMENT. **SEE NEXTRACKER QMS-000434 FOR PILE SPACING ON SLOPES.**

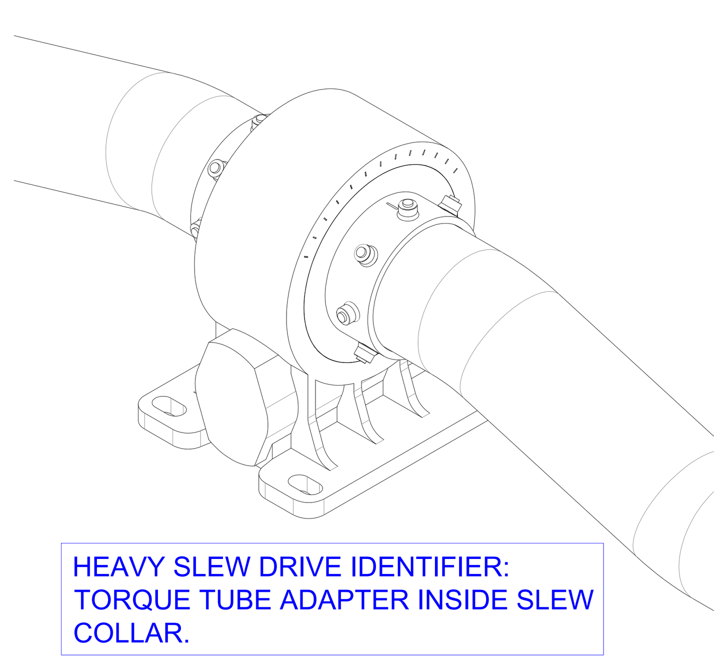




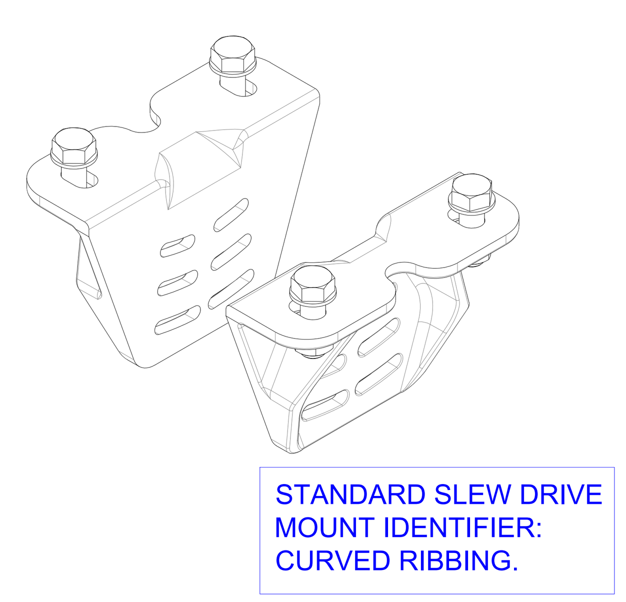
5 - FSLR S6 HEAVY FIRST MODULE RAIL, TYP.
SCALE: N.T.S.



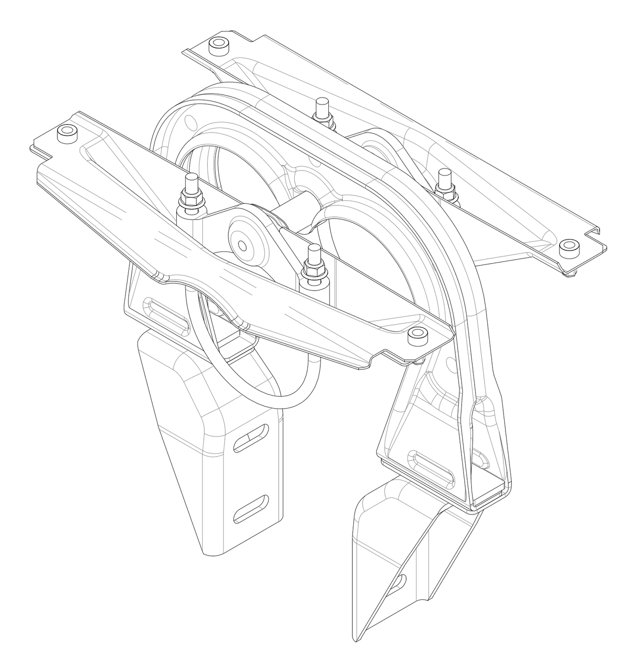
6 - FSLR S6 HEAVY MODULE RAIL, TYP.
SCALE: N.T.S.



7 - HEAVY SLEW DRIVE, TYP.
SCALE: N.T.S.

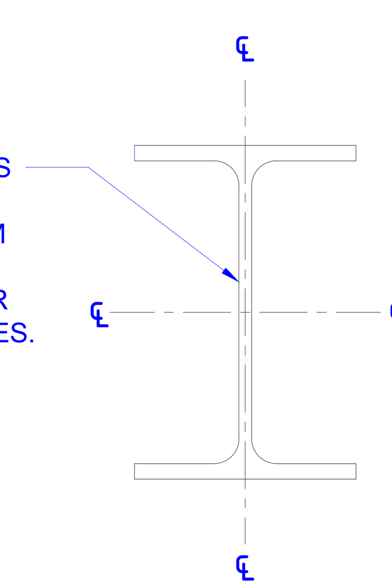


8 - HEAVY SLEW MOUNT, TYP.
SCALE: N.T.S.



9 - FSLR S6 EXTRA HEAVY BHA, TYP.
SCALE: N.T.S.

S-40X, DETAIL 3 DIMENSIONS FOR BAY AND TRACKER LENGTHS ARE TAKEN FROM CENTER OF BEAMS. SEE FOUNDATION DRAWING FOR IDENTIFICATION OF PIER TYPES.



10 - CENTER OF WEB
SCALE: N.T.S.

AMPACITY
QUANTA

SEAL

STATE OF CONNECTICUT · No.30623 · LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

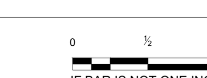
SHEET TITLE: 42 MODULE EXT TRACKER

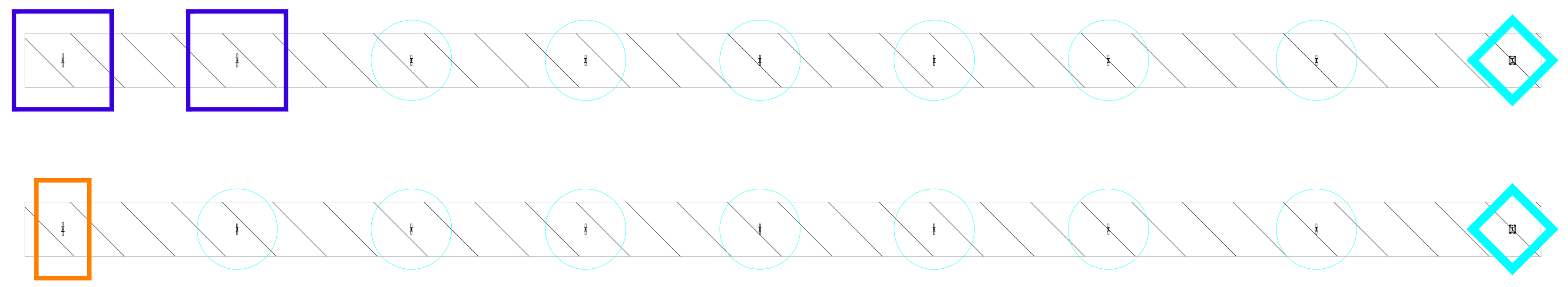
NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

SITE DETAILS

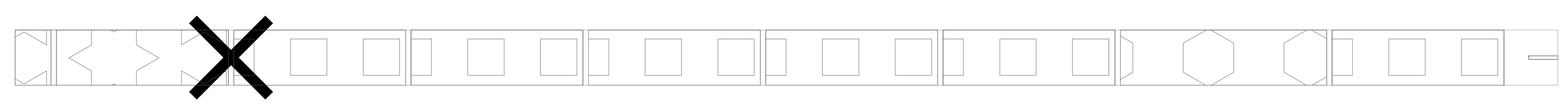
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-407

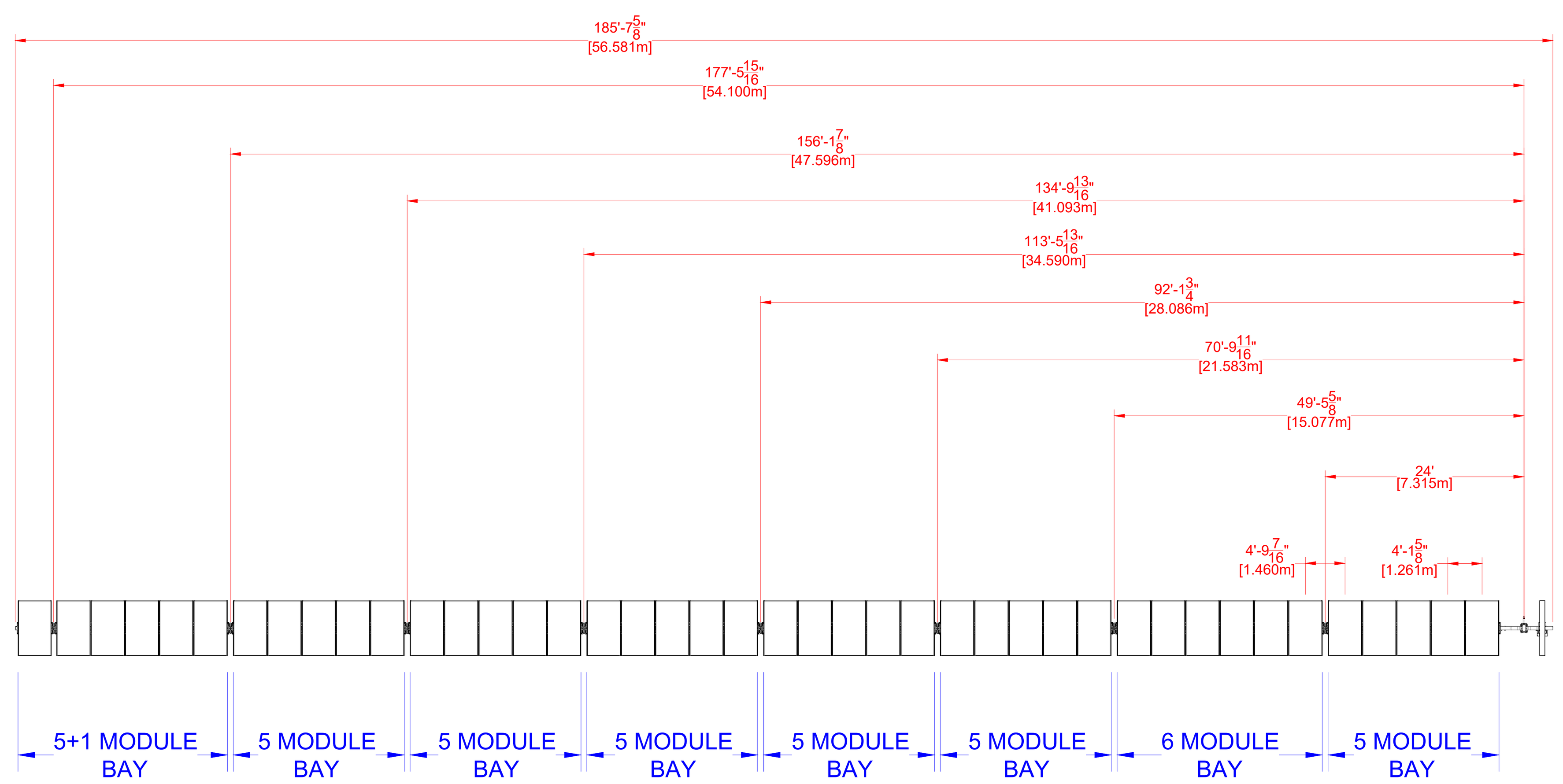




1 - PIER PLAN
SCALE: N.T.S.



2 - TORQUE TUBE AND DAMPER PLAN
SCALE: N.T.S.



3 - PIER SPACING
SCALE: N.T.S.

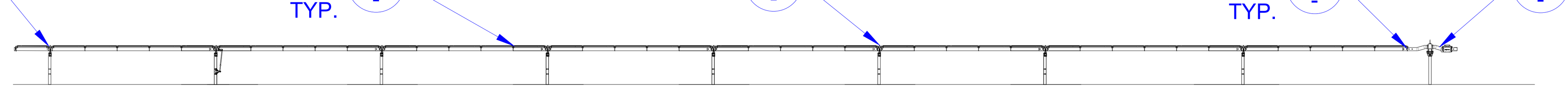
THERMAL EXPANSION BHA - SEE SHEET S-411 FOR SHIFTING DETIALS

FSLR S6 HEAVY MODULE RAIL, TYP. (6)

FSLR S6 LIGHT BHA, TYP. (9)

FSLR S6 HEAVY FIRST RAIL, TYP. (5)

LIGHT SLEW DRIVE, TYP. (7)



4 - TRACKER ELEVATION
SCALE: N.T.S.

TRACKER LEGEND

TRACKER SYMBOL	TRACKER TYPE
(solid grey)	EXTERIOR
(hatched)	EDGE

PIER LEGEND

SYMBOL	PIER TYPE
(red circle)	HEAVY ARRAY PIER
(cyan circle)	STANDARD ARRAY PIER
(filled square)	HEAVY ARRAY PIER, EDGE
(open square)	STANDARD ARRAY PIER, EDGE
(red diamond)	HEAVY MOTOR PIER
(cyan diamond)	STANDARD MOTOR PIER

TORQUE TUBE LEGEND

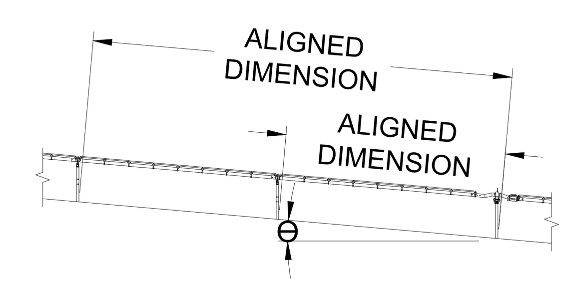
HATCH	PART #	COLOR	TORQUE TUBE TYPE	MOD QTY	KSI
	404560	LIGHT PINK	8.22m 3.5mm 60ksi	5+1	BLUE
	404548		8.27m 3.5mm 60ksi	6	BLUE
	404544		7.01m 3.5mm 60ksi	5	BLUE
	405185	BLACK	8.22m 2.5mm 60ksi	5+1	BLUE
	47013		8.27m 2.5mm 60ksi	6	BLUE
	47004		7.01m 2.5mm 60ksi	5	BLUE

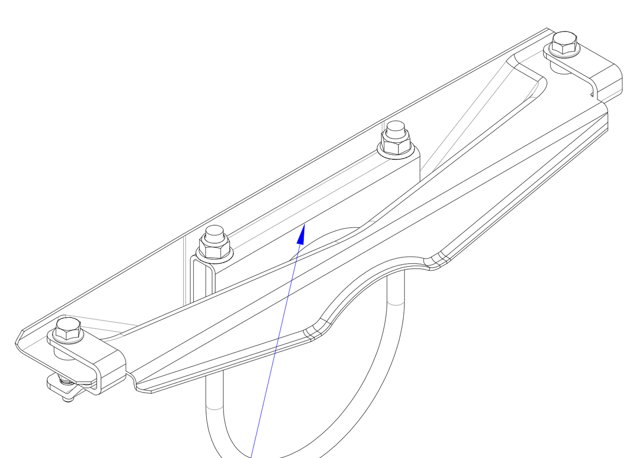
DAMPER LEGEND

SYMBOL	DAMPER TYPE	SEE SHEET S-601
X	DOUBLE DAMPER	DETAIL 5

NOTE :

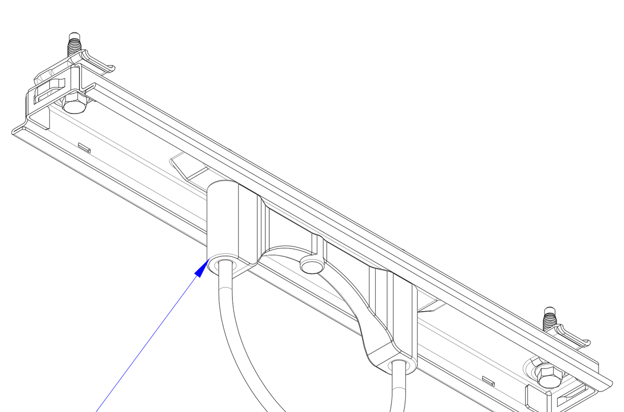
1) DETAILS ON THIS SHEET APPLY TO TRACKERS INDICATED ON THE SHEET TITLE ONLY. PIER PLAN INDICATES TRACKER LOCATIONS.
2) DETAILS 5-9 ARE TYPICAL AND APPLY TO ALL APPLICABLE LOCATIONS ON TRACKER.
3) PIER DISTANCES APPLY TO CENTER OF WEB, SEE DETAIL 10 FOR CENTER OF WEB LOCATION.
4) NEXTRACKER RECOMMENDS TO RUN A STRING LINE ON SLOPES >3% IN EFFORTS TO ENSURE PROPER PIER PLACEMENT. **SEE NEXTRACKER QMS-000434 FOR PILE SPACING ON SLOPES.**





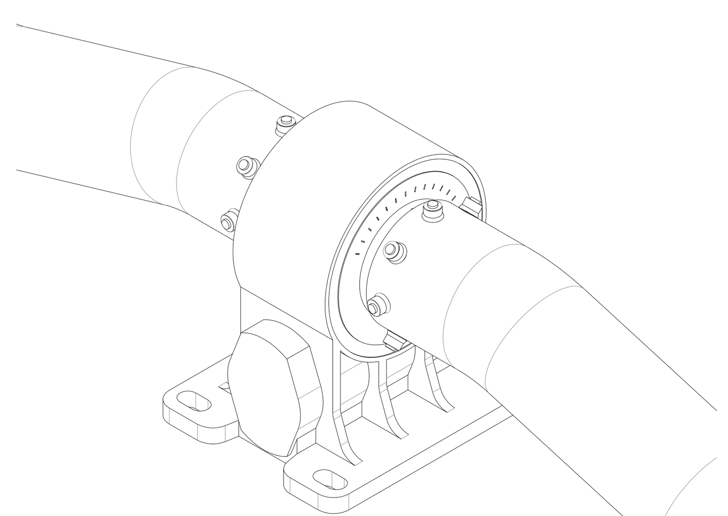
FIRST RAIL IDENTIFIER: NO HOLE IN U-BOLT CLAMP

5 - FSLR S6 HEAVY FIRST MODULE RAIL, TYP.
SCALE: N.T.S.



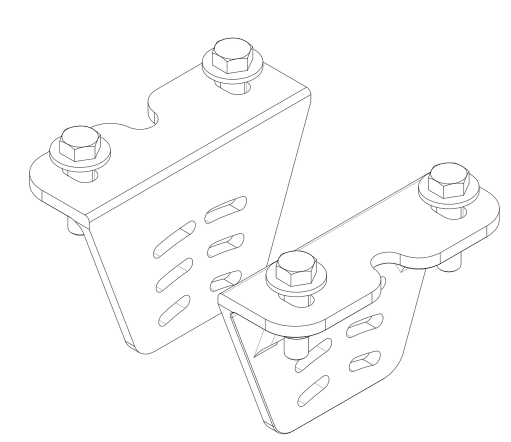
2.0 MM RAIL IDENTIFIER: CAST U-BOLT CLAMP

6 - FSLR S6 HEAVY MODULE RAIL, TYP.
SCALE: N.T.S.



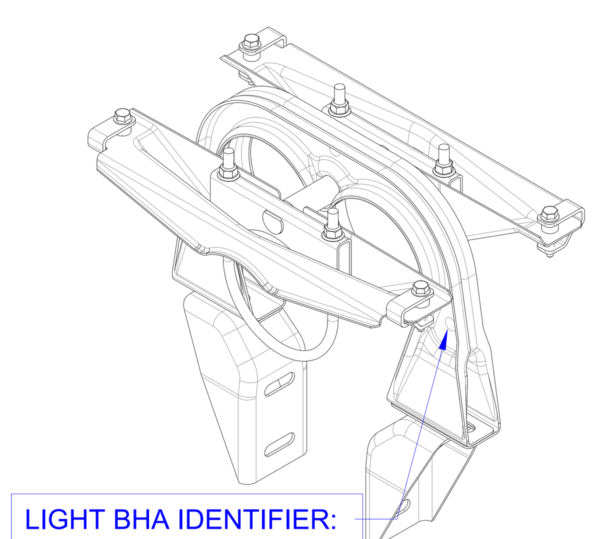
LIGHT SLEW DRIVE IDENTIFIER: TORQUE TUBE ADAPTER OUTSIDE SLEW COLLAR.

7 - LIGHT SLEW DRIVE, TYP.
SCALE: N.T.S.



INTERIOR SLEW DRIVE MOUNT IDENTIFIER: STRAIGHT EDGES.

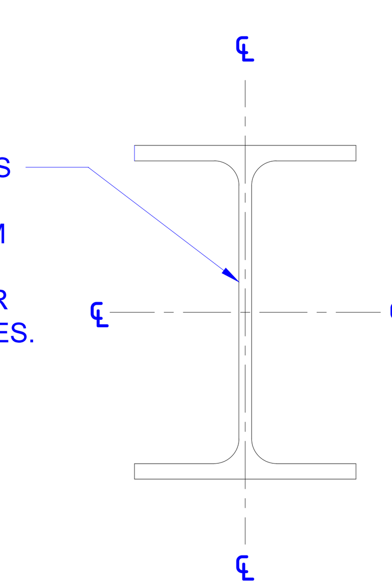
8 - LIGHT SLEW MOUNT, TYP.
SCALE: N.T.S.



LIGHT BHA IDENTIFIER: 3 TOGGLES ON HANDLE

9 - FSLR S6 LIGHT BHA, TYP.
SCALE: N.T.S.

S-40X, DETAIL 3 DIMENSIONS FOR BAY AND TRACKER LENGTHS ARE TAKEN FROM CENTER OF BEAMS. SEE FOUNDATION DRAWING FOR IDENTIFICATION OF PIER TYPES.



10 - CENTER OF WEB
SCALE: N.T.S.

AMPACITY

QUANTA

SEAL

STATE OF CONNECTICUT · MADHAN KUMAR KANTHA SAMY · No.30623 · LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

SHEET TITLE:
42 MODULE EDGE TRACKER

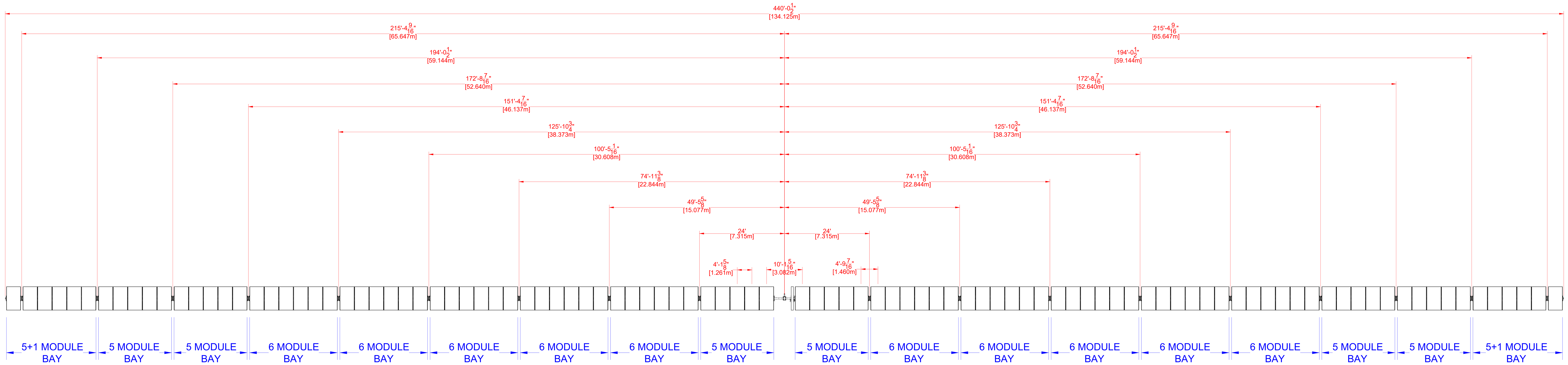
NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

SITE DETAILS

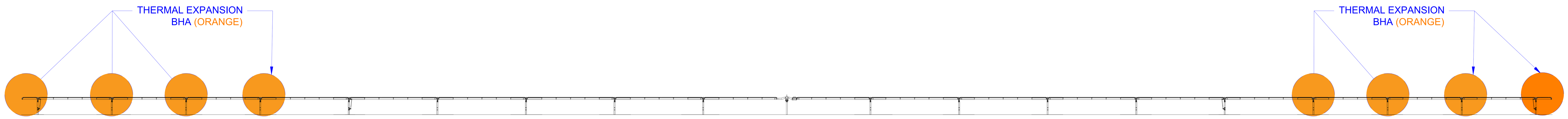
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-408

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



1 PIER SPACING
SCALE: N.T.S.



2 THERMAL EXPANSION ELEVATION GAP
SCALE: N.T.S.

NOTE: TEMPERATURES CALCULATED BASED ON HISTORICAL AMBIENT TEMPERATURES

THERMAL EXPANSION BHA LOCATION

AMBIENT TEMP (°F)	TYPE	BHA LOCATION TYPE	DETAILS
HIGHER THAN 76 (T2)	A	MOVE BHA HOOP TOWARD SLEW GEAR. GAP BETWEEN BHA HOOP AND BHA RAIL CLOSER TO SLEW DRIVE SHOULD BE 0.75" (19MM).	DETAIL 2
CALCULATED TEMPERATURES BETWEEN 76 (T2) AND 10 (T3)	B	LEAVE BHA HOOP CENTERED	-
LOWER THAN 76 (T3)	C	MOVE BHA HOOP AWAY FROM SLEW GEAR. GAP BETWEEN BHA HOOP AND BHA RAIL FURTHER FROM THE SLEW DRIVE SHOULD BE 0.75" (19MM).	DETAIL 2

NOTES:
1. FOR INSTALLATION TEMP GREATER THAN T2, MOVE BHA HOOP IN FROM SLEW GEAR AS SHOWN IN DETAIL 3A.

2. FOR INSTALLATION TEMP BETWEEN T2 AND T3, LEAVE THE BHA CENTERED AS SHOW IN DETAIL 3B.

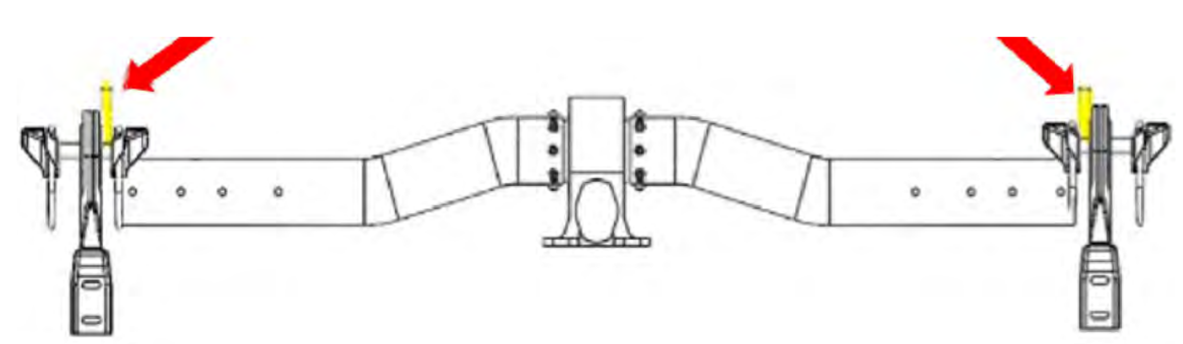
3. FOR INSTALLATION TEMP LOWER THAN T3, MOVE BHA HOOP AWAY FROM SLEW GEAR AS SHOWN IN DETAIL 3C.

4. ALIGN THE HOOPS OF THERMAL EXPANSION BHA BASED ON INSTALLATION TEMPERATURE DURING WHICH THEY INSTALLED.

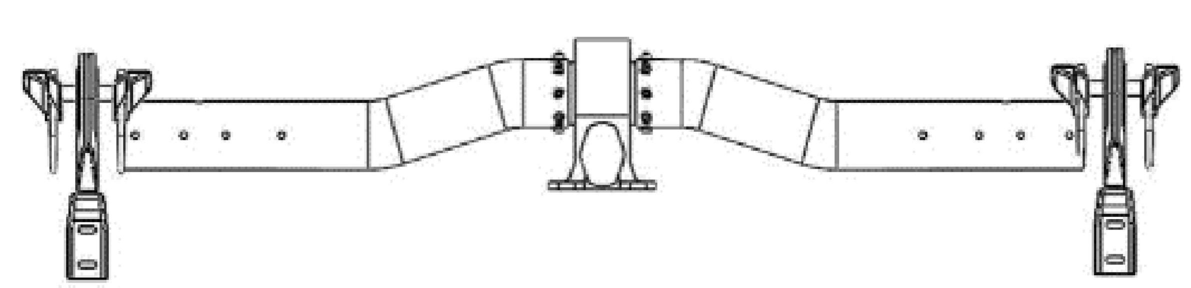
5. INSTALLATION TEMP (AMBIENT TEMPERATURE) SHALL BE CHECK BEFORE INSTALLING BHA's AT LEAST TWICE A DAY.

6. BEST PRACTICES: PAINT PEN BOTH SIDES OF THE HANDLE "HOOP" AT FINISHED RACKING AFTER M-12 PINS & COLLARS ARE SWAGED.

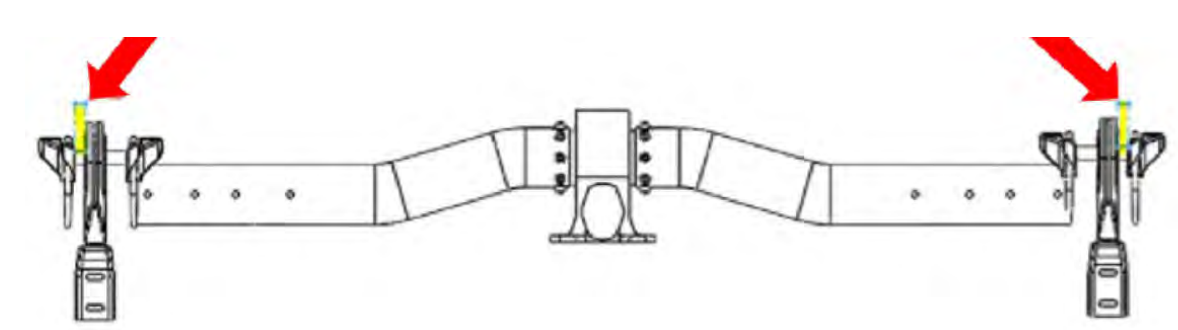
7. BEST PRACTICES: BHA'S, PAINT PEN NEXT TO THE BHA ON THE TORQUE TUBE: DATE, TIME, & AIR TEMPERATURE AT TIME OF INSTALLATION.



3A BHA INSTALLATION TYPE "A" TOWARD SLEW
SCALE: N.T.S.



3B BHA INSTALLATION LEAVE CENTERED TYPE "B"
SCALE: N.T.S.

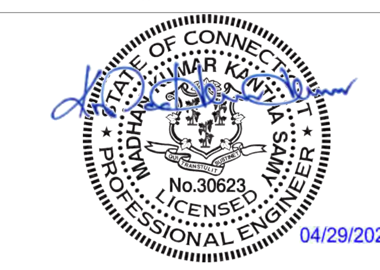


3C BHA INSTALLATION TYPE "C" AWAY FROM SLEW
SCALE: N.T.S.

AMPACITY

QUANTA

SEAL



STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

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VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

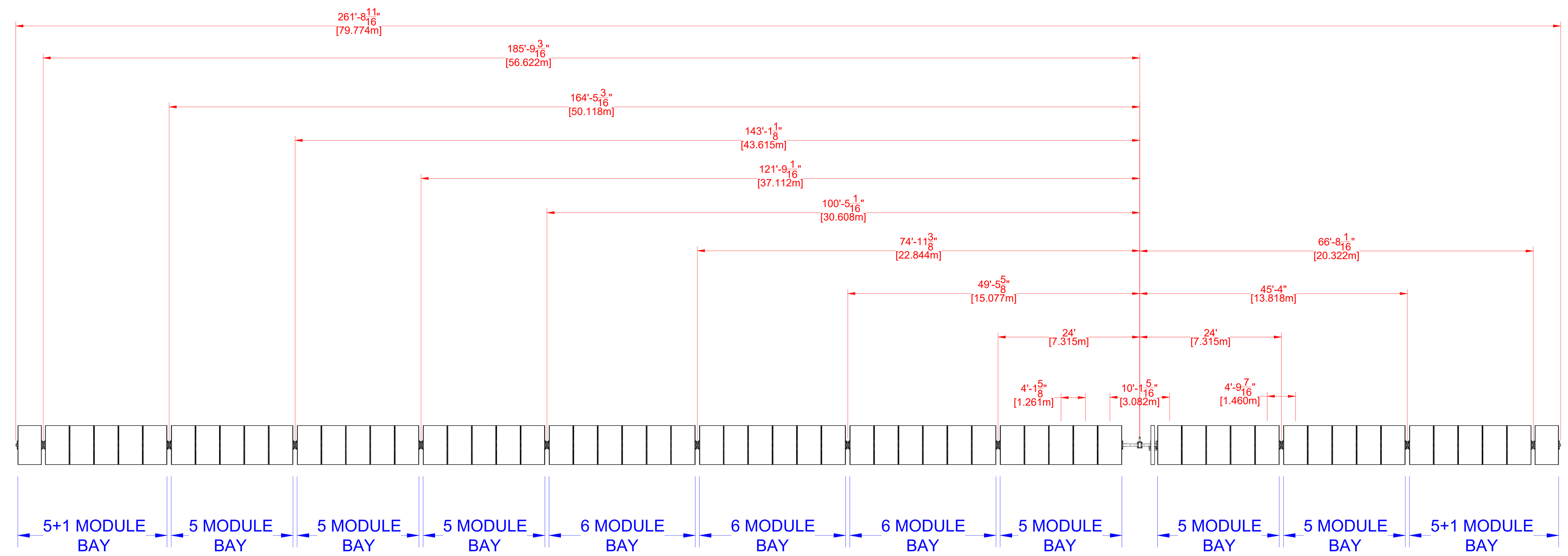
SHEET TITLE:
102 MODULE THERMAL EXPANSION BHA DETAILS

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

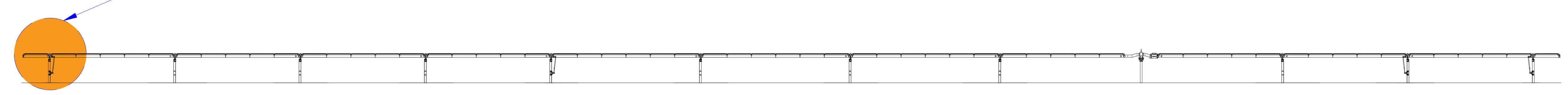
SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-409

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



1 - PIER SPACING
SCALE: N.T.S.



2 - THERMAL EXPANSION ELEVATION GAP
SCALE: N.T.S.

THERMAL EXPANSION BHA LOCATION			
AMBIENT TEMP (°F)	**TYPE**	**BHA LOCATION TYPE**	**DETAILS**
HIGHER THAN 94 (T2)	A	MOVE BHA HOOP TOWARD SLEW GEAR. GAP BETWEEN BHA HOOP AND BHA RAIL CLOSER TO SLEW DRIVE SHOULD BE 0.75" (19MM).	DETAIL 2
CALCULATED TEMPERATURES BETWEEN 94 (T2) AND -8 (T3)	B	LEAVE BHA HOOP CENTERED	-
LOWER THAN -8 (T3)	C	MOVE BHA HOOP AWAY FROM SLEW GEAR. GAP BETWEEN BHA HOOP AND BHA RAIL FURTHER FROM THE SLEW DRIVE SHOULD BE 0.75" (19MM).	DETAIL 2

NOTE: TEMPERATURES CALCULATED BASED ON HISTORICAL AMBIENT TEMPERATURES

NOTES:
1. FOR INSTALLATION TEMP GREATER THAN T2, MOVE BHA HOOP IN FROM SLEW GEAR AS SHOWN IN DETAIL 3A.

2. FOR INSTALLATION TEMP BETWEEN T2 AND T3, LEAVE THE BHA CENTERED AS SHOW IN DETAIL 3B.

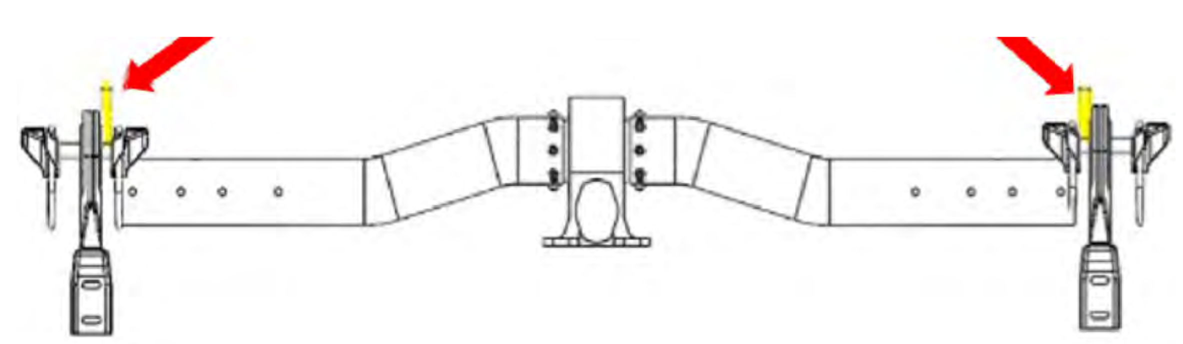
3. FOR INSTALLATION TEMP LOWER THAN T3, MOVE BHA HOOP AWAY FROM SLEW GEAR AS SHOWN IN DETAIL 3C.

4. ALIGN THE HOOPS OF THERMAL EXPANSION BHA BASED ON INSTALLATION TEMPERATURE DURING WHICH THEY INSTALLED.

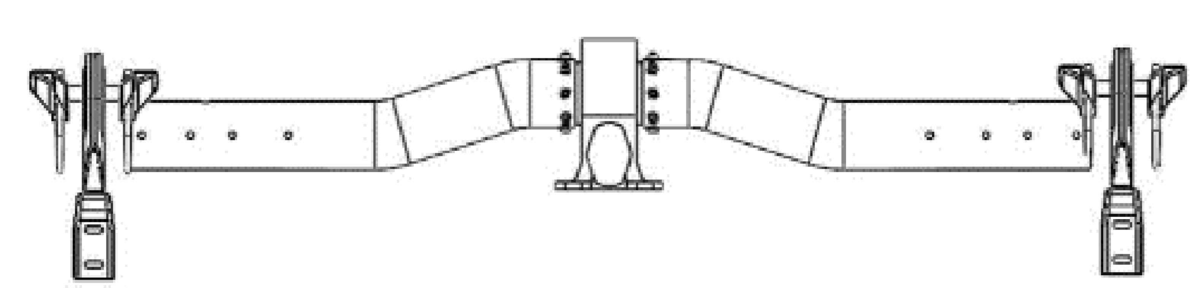
5. INSTALLATION TEMP (AMBIENT TEMPERATURE) SHALL BE CHECK BEFORE INSTALLING BHA's AT LEAST TWICE A DAY.

6. BEST PRACTICES: PAINT PEN BOTH SIDES OF THE HANDLE "HOOP" AT FINISHED RACKING AFTER M-12 PINS & COLLARS ARE SWAGED.

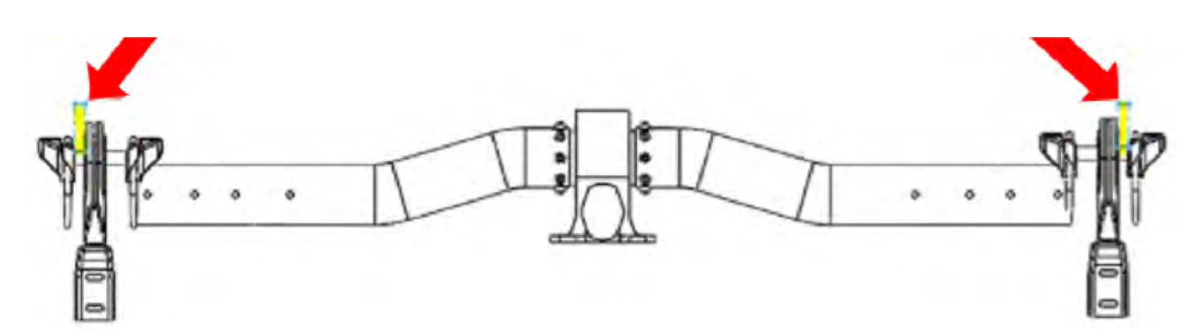
7. BEST PRACTICES: BHA'S, PAINT PEN NEXT TO THE BHA ON THE TORQUE TUBE: DATE, TIME, & AIR TEMPERATURE AT TIME OF INSTALLATION.



3A - BHA INSTALLATION TYPE "A" TOWARD SLEW
SCALE: N.T.S.



3B - BHA INSTALLATION LEAVE CENTERED TYPE "B"
SCALE: N.T.S.



3C - BHA INSTALLATION TYPE "C" AWAY FROM SLEW
SCALE: N.T.S.

AMPACITY

QUANTA

SEAL

STATE OF CONNECTICUT
No.30623
LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE

Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER:
N/A

SITE ID:
N/A

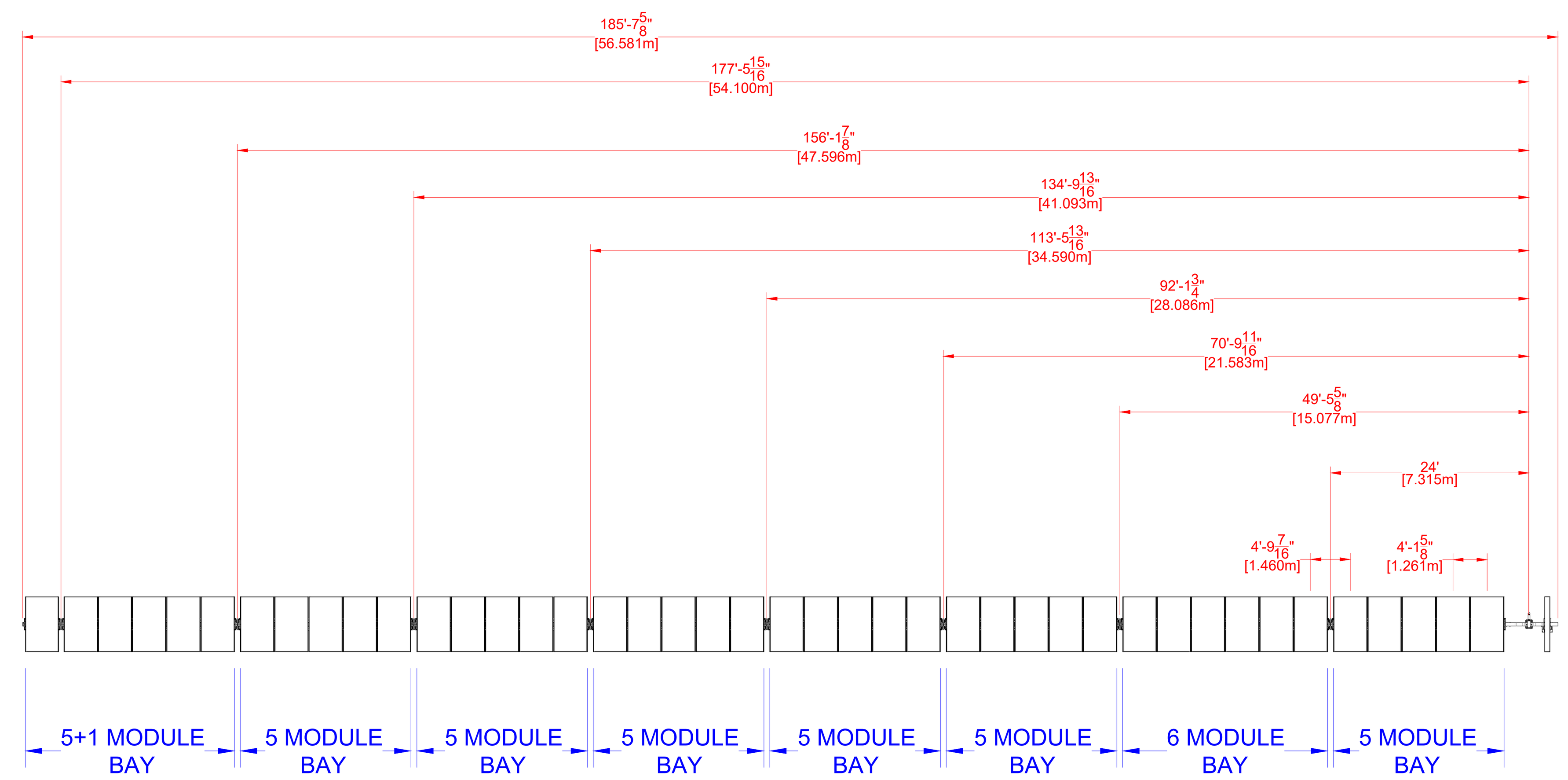
SHEET TITLE:
60 MODULE THERMAL EXPANSION BHA DETAILS

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

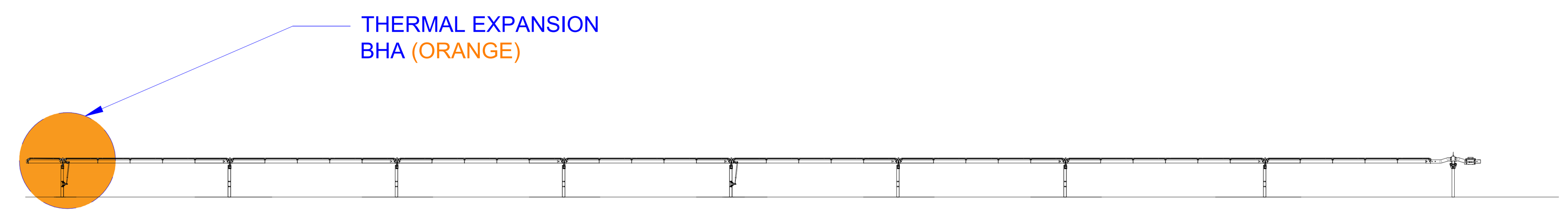
SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-410

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



1 / - PIER SPACING
SCALE: N.T.S.



2 / - THERMAL EXPANSION ELEVATION GAP
SCALE: N.T.S.

THERMAL EXPANSION BHA LOCATION

AMBIENT TEMP (°F)	TYPE	BHA LOCATION TYPE	DETAILS
HIGHER THAN 100 (T2)	A	MOVE BHA HOOP TOWARD SLEW GEAR. GAP BETWEEN BHA HOOP AND BHA RAIL CLOSER TO SLEW DRIVE SHOULD BE 0.75" (19MM).	DETAIL 2
CALCULATED TEMPERATURES BETWEEN 100 (T2) AND -14 (T3)	B	LEAVE BHA HOOP CENTERED	-
LOWER THAN -14 (T3)	C	MOVE BHA HOOP AWAY FROM SLEW GEAR. GAP BETWEEN BHA HOOP AND BHA RAIL FURTHER FROM THE SLEW DRIVE SHOULD BE 0.75" (19MM).	DETAIL 2

NOTE: TEMPERATURES CALCULATED BASED ON HISTORICAL AMBIENT TEMPERATURES

NOTES:

1. FOR INSTALLATION TEMP GREATER THAN T2, MOVE BHA HOOP IN FROM SLEW GEAR AS SHOWN IN DETAIL 3A.

2. FOR INSTALLATION TEMP BETWEEN T2 AND T3, LEAVE THE BHA CENTERED AS SHOW IN DETAIL 3B.

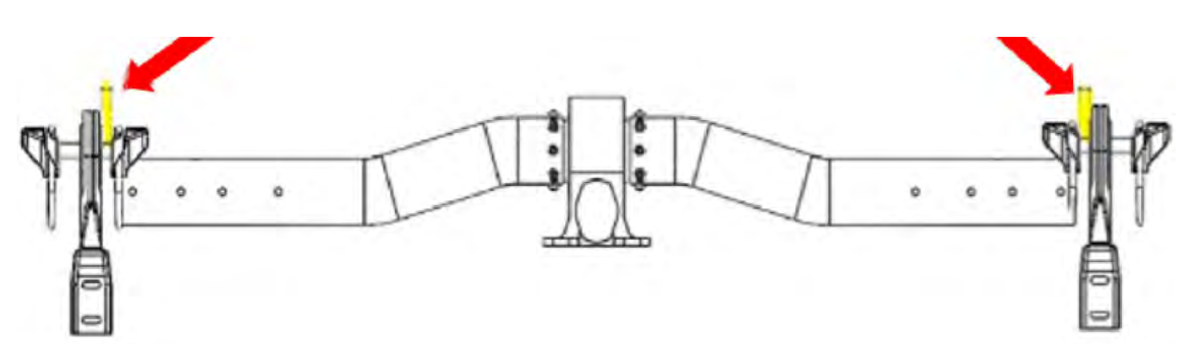
3. FOR INSTALLATION TEMP LOWER THAN T3, MOVE BHA HOOP AWAY FROM SLEW GEAR AS SHOWN IN DETAIL 3C.

4. ALIGN THE HOOPS OF THERMAL EXPANSION BHA BASED ON INSTALLATION TEMPERATURE DURING WHICH THEY INSTALLED.

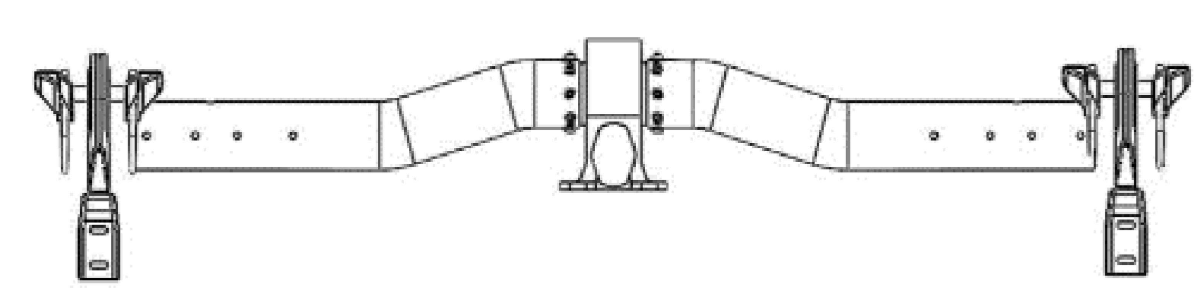
5. INSTALLATION TEMP (AMBIENT TEMPERATURE) SHALL BE CHECK BEFORE INSTALLING BHA's AT LEAST TWICE A DAY.

6. BEST PRACTICES: PAINT PEN BOTH SIDES OF THE HANDLE "HOOP" AT FINISHED RACKING AFTER M-12 PINS & COLLARS ARE SWAGED.

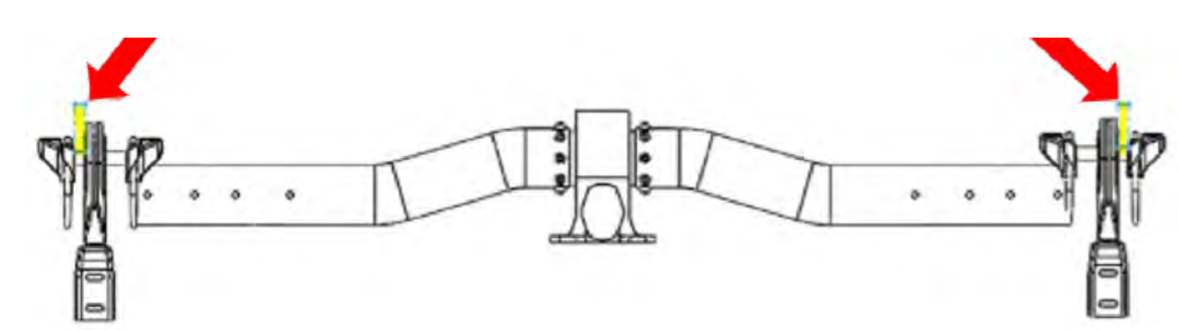
7. BEST PRACTICES: BHA'S, PAINT PEN NEXT TO THE BHA ON THE TORQUE TUBE: DATE, TIME, & AIR TEMPERATURE AT TIME OF INSTALLATION.



3A / - BHA INSTALLATION TYPE "A" TOWARD SLEW
SCALE: N.T.S.



3B / - BHA INSTALLATION LEAVE CENTERED TYPE "B"
SCALE: N.T.S.

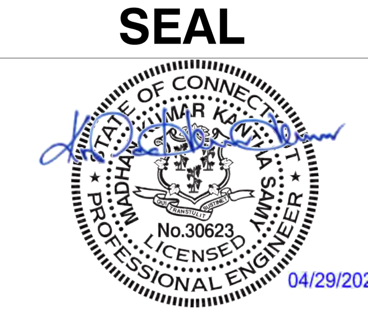


3C / - BHA INSTALLATION TYPE "C" AWAY FROM SLEW
SCALE: N.T.S.

AMPACITY

QUANTA

SEAL



STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE

Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

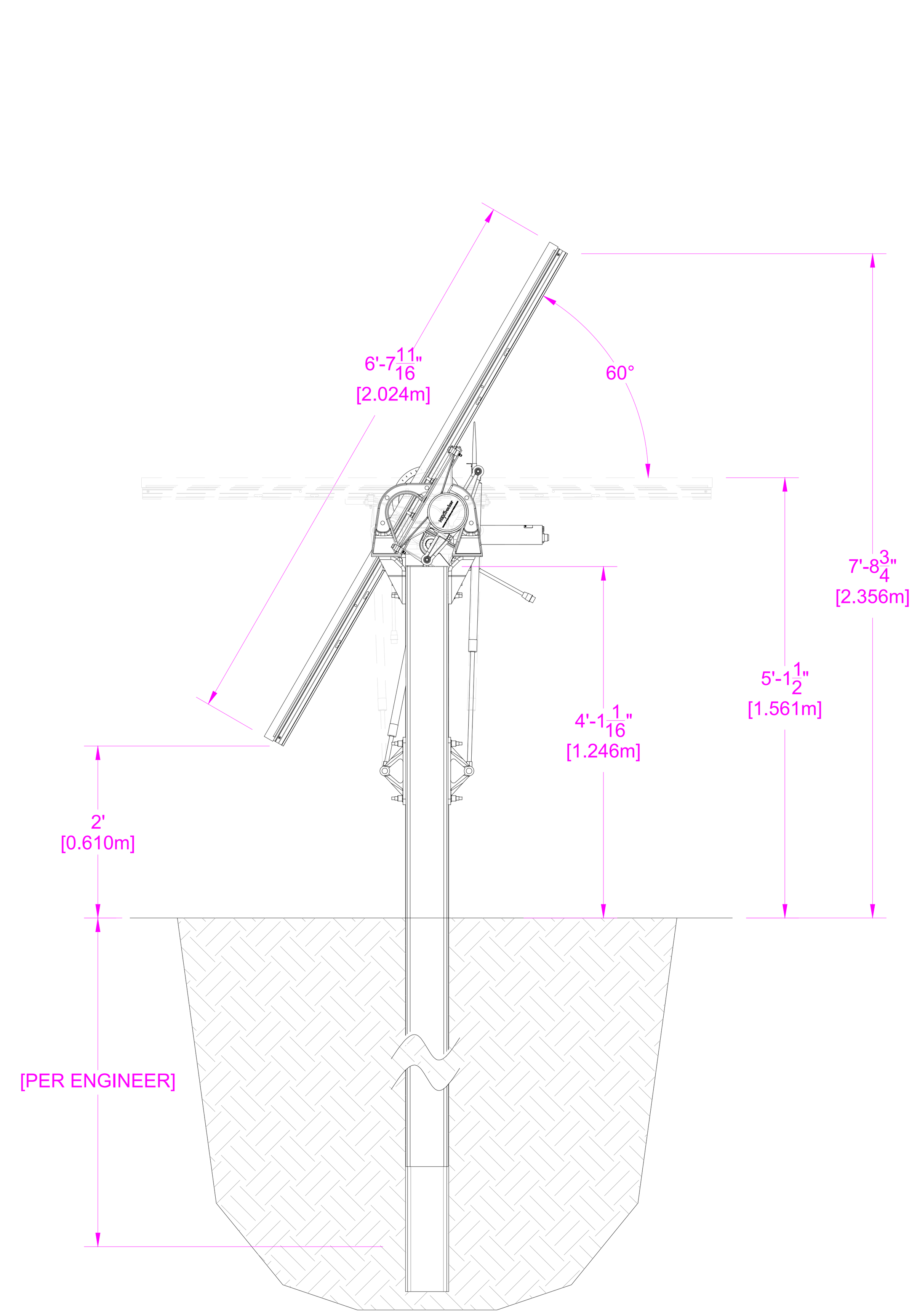
SHEET TITLE: 42 MODULE THERMAL EXPANSION BHA DETAILS

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
3			
4			
5			
6			
7			
8			
9			

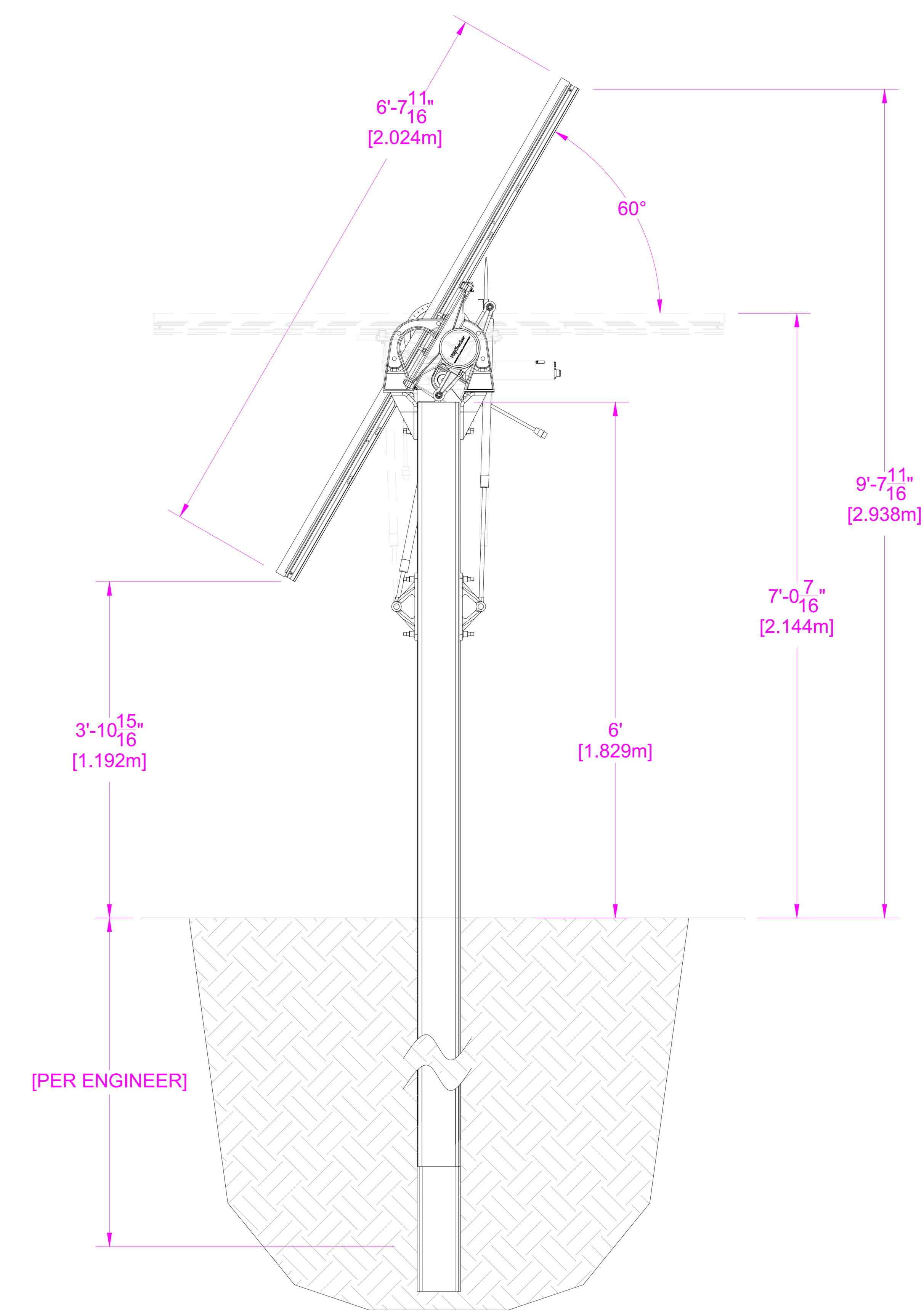
SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-411

0 ½ 1
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



1A TYPICAL MINIMUM PIER HEIGHT DETAIL
SCALE: N.T.S.

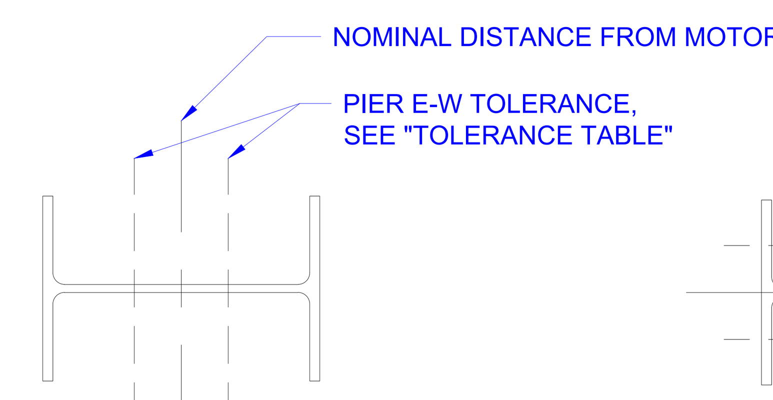


1B TYPICAL MAXIMUM PIER HEIGHT DETAIL
SCALE: N.T.S.

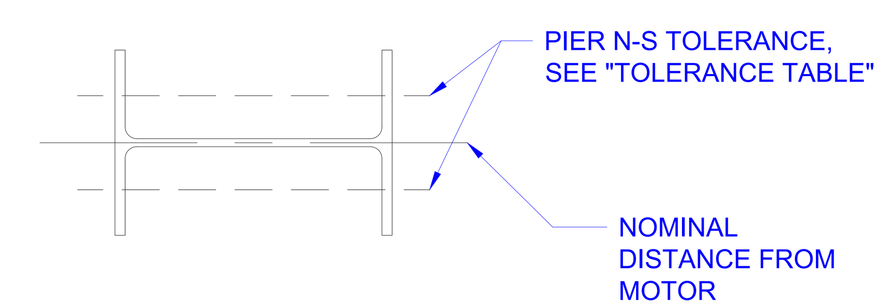
2.4 TOLERANCE TABLE			
MEASUREMENT TYPE		0-6.1% (STANDARD SLOPE)	>6.1-15% (HIGH SLOPE)
TOP OF PIER E-W POSITION		+/- 1 1/4" (31.75 mm)	
TOP OF PIER N-S POSITION		+/- 1 3/4" (45.5 mm)	+/- 1 3/8" (34.9 mm)
PIER VERTICAL		DETERMINED BY XTR 0.75 TORQUE TUBE TOLERANCES	
PIER TWIST		+/- 5°	
0 - 3% TRACKER SLOPE	PIER PLUMB E-W	+/- 1.5°	-
	PIER PLUMB N-S	+/- 3°	-
>3 - 15% TRACKER SLOPE	PIER PLUMB E-W	+/- 1.5°	
	PIER PLUMB N-S	+/- 1.5°	

NX-XTR 0.75 TRACKER TORQUE TUBE TOLERANCES:

1. TRACKERS MAY DEFLECT OVER GRADE WHEN INSTALLED PROVIDED THE FOLLOWING CONDITIONS ARE MET:
   a. POST MINIMUM EMBEDMENT IS FOLLOWED PER THE FOUNDATION DESIGN.
   b. THE MAXIMUM ALLOWABLE TUBE TO TUBE ANGLE DEVIATION FROM THE ADJACENT TUBE IS +- 0.75 DEGS FOR HORIZON XTR-.75 (MEASURED AT CENTER OF THE SPAN OF THE TORQUE TUBE).
   c. MAXIMUM CUMULATIVE DEVIATION OF ANGLES OVER EACH WING (FROM SLEW GEAR TO END OF ROW) IS 6.5 DEGREES.



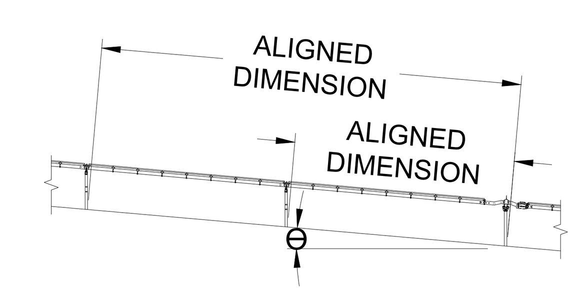
2A EAST WEST PIER LOCATION TOLERANCE
SCALE: N.T.S.

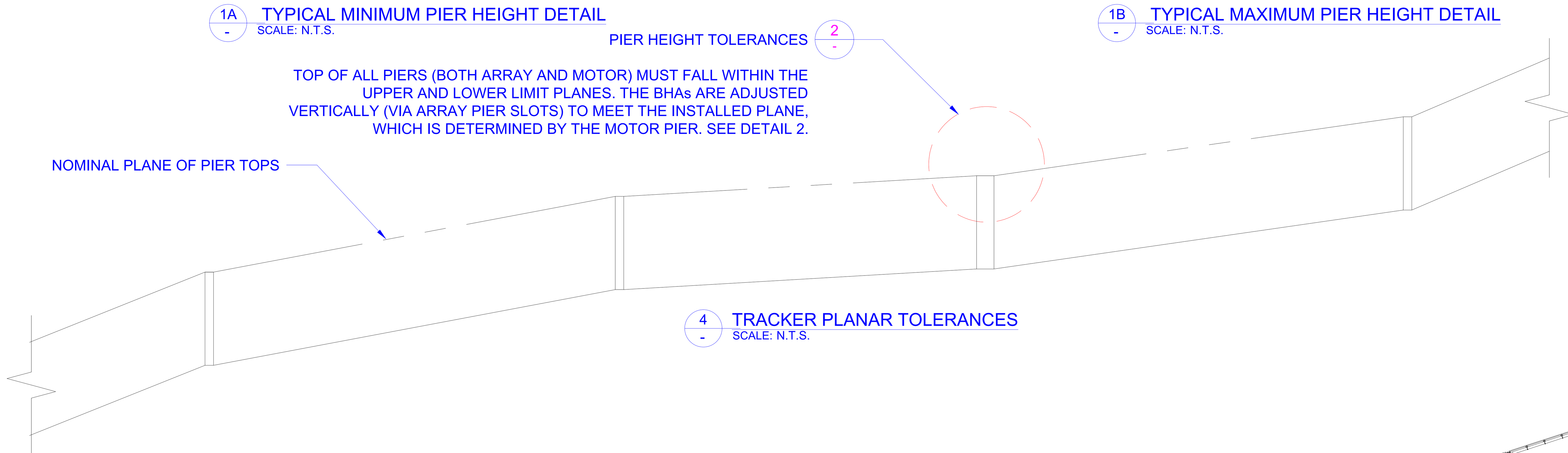


2B NORTH SOUTH PIER LOCATION TOLERANCE
SCALE: N.T.S.

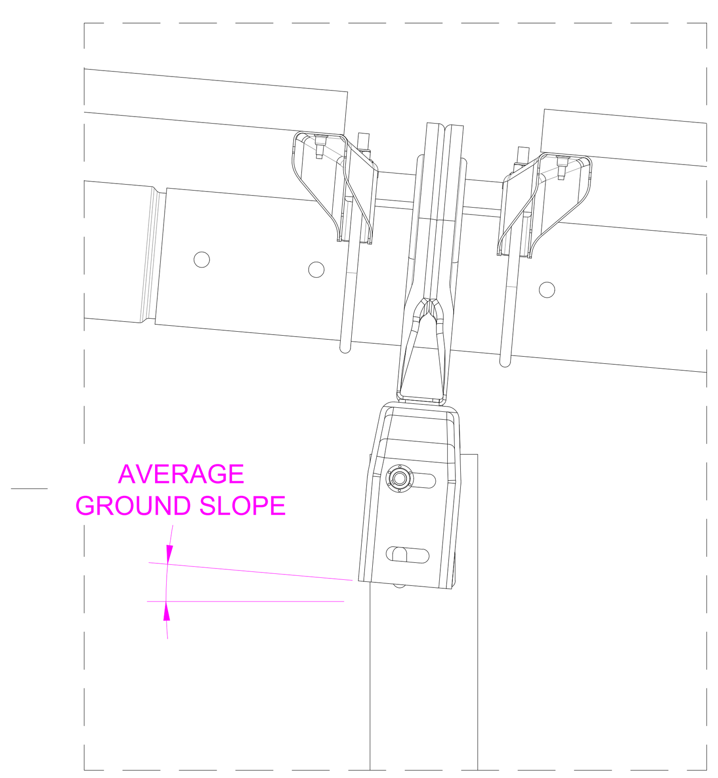
NOTE :

1. DETAILS ON THIS SHEET APPLY TO TRACKERS INDICATED ON THE SHEET TITLE ONLY. PIER PLAN INDICATES TRACKER LOCATIONS.
2. DETAILS 2-4 ARE TYPICAL AND APPLY TO ALL APPLICABLE LOCATIONS ON TRACKER.
3. PIER DISTANCES APPLY TO CENTER OF WEB, SEE DETAILS 6 FOR CENTER OF WEB LOCATION.
4. PIER TO PIER DISTANCES PROVIDED IN DETAIL 5 ARE ALIGNED WITH SLOPE OF TRACKER, PROJECTED DIMENSIONS ARE NOT PROVIDED.

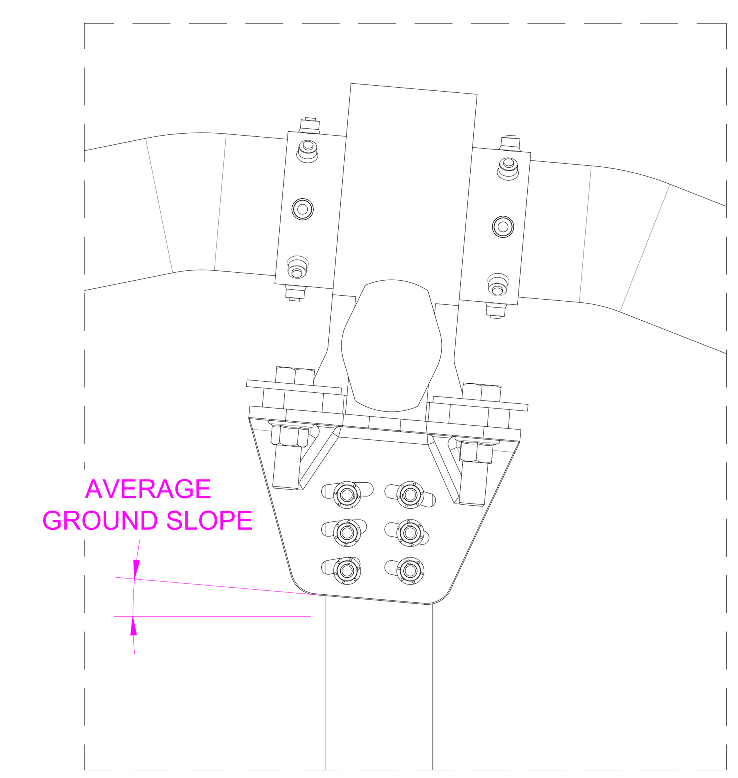




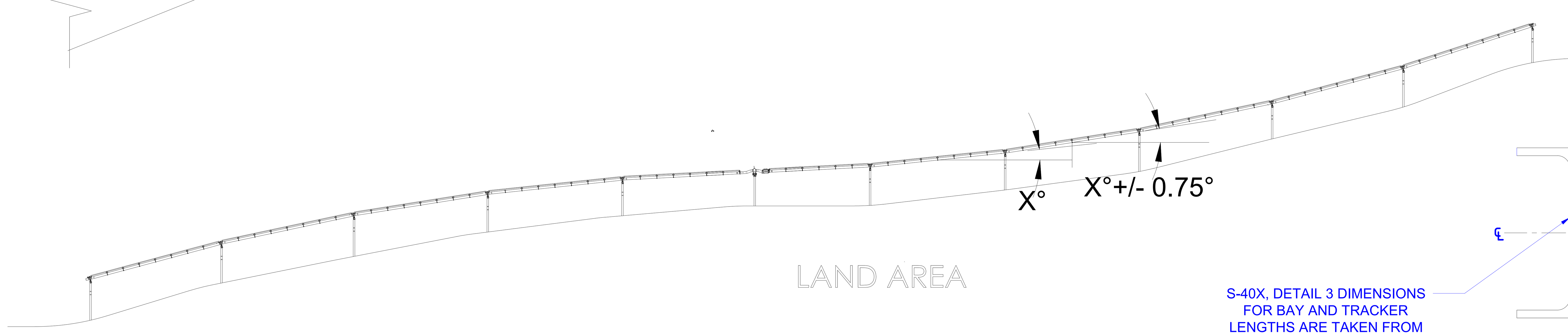
4 TRACKER PLANAR TOLERANCES
SCALE: N.T.S.



3 BHA BRACKET ANGLE
SCALE: N.T.S.

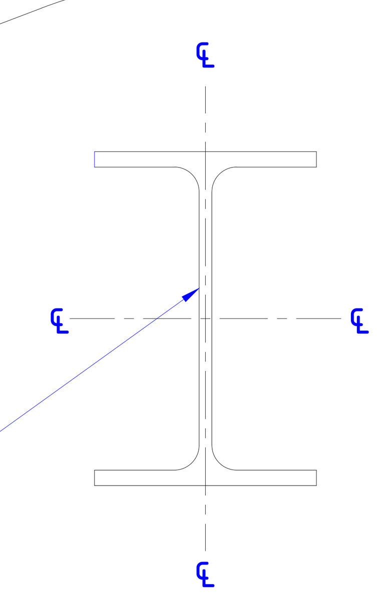


4 MOTOR BRACKET ANGLE
SCALE: N.T.S.



5 PLANE PARALLEL W/ AVERAGE GROUND SLOPE
SCALE: N.T.S.

S-40X, DETAIL 3 DIMENSIONS FOR BAY AND TRACKER LENGTHS ARE TAKEN FROM CENTER OF BEAMS. SEE FOUNDATION DRAWING FOR IDENTIFICATION OF PIER TYPES.



6 CENTER OF WEB
SCALE: N.T.S.

SEAL

STATE OF CONNECTICUT
MADHAN KUMAR KANTHA SAMY
No.30623
LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

SHEET TITLE: XTR-0.75 PIER TOLERANCES

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
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4			
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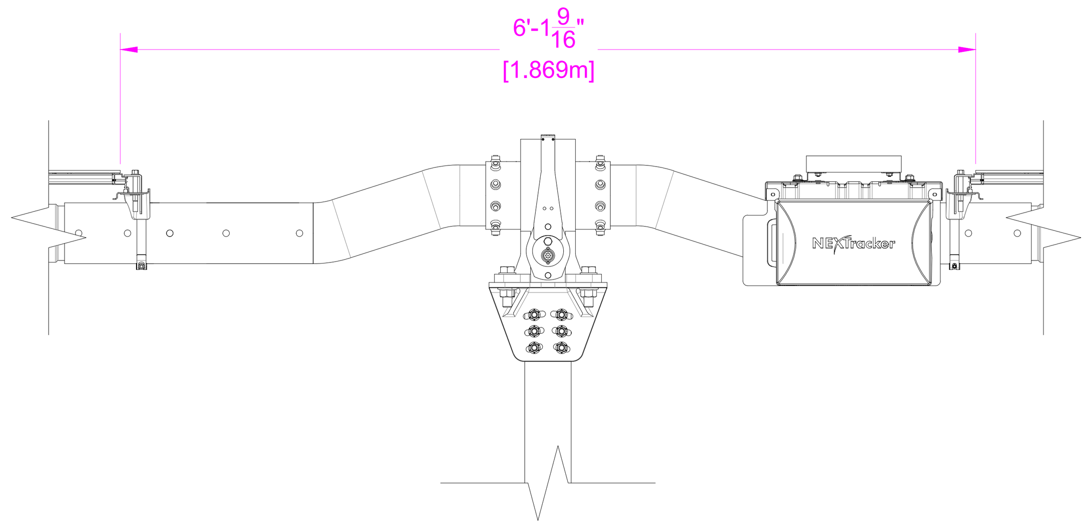
9			

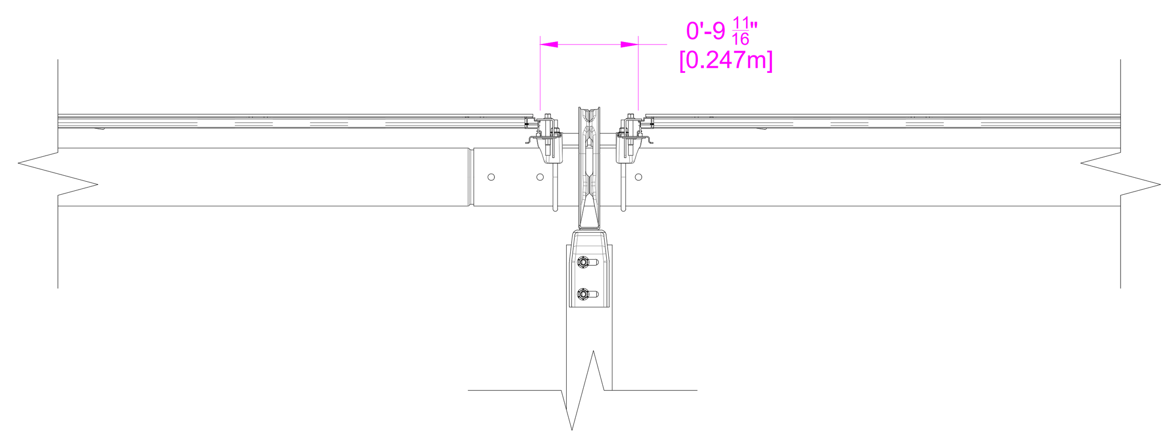
SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-501

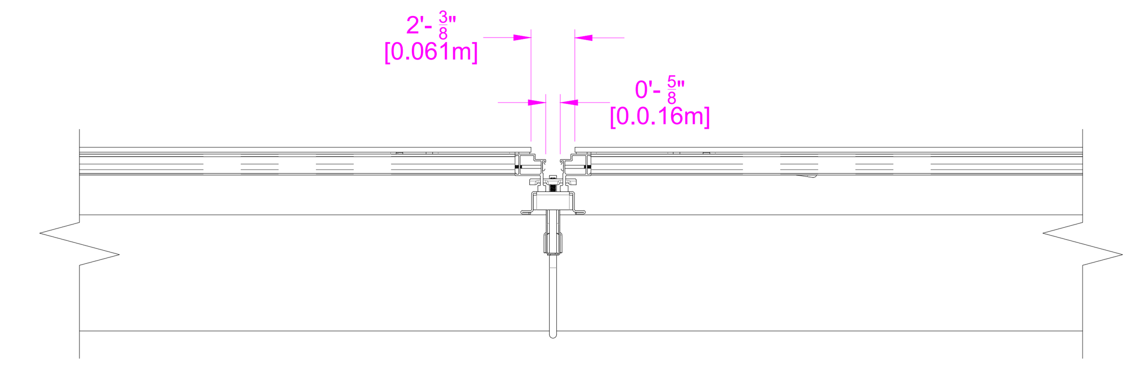
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



1 TYPICAL MODULE SPACING ACROSS MOTOR
SCALE: N.T.S.

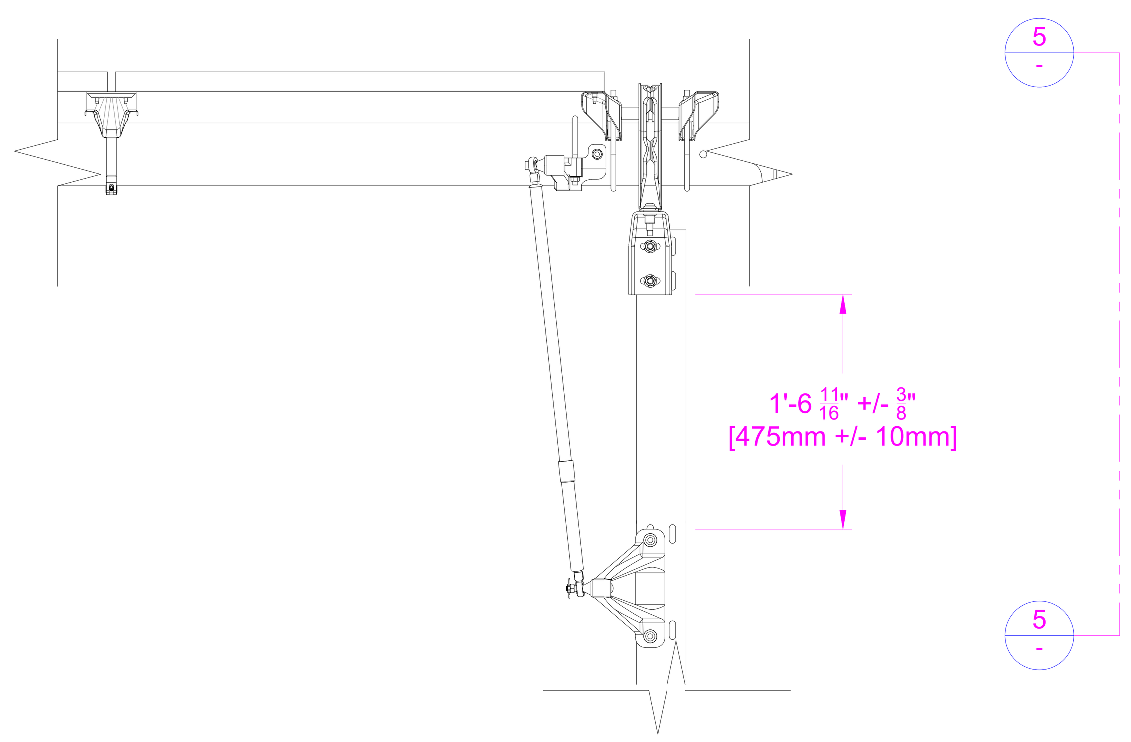


2 TYPICAL MODULE SPACING ACROSS BHA
SCALE: N.T.S.



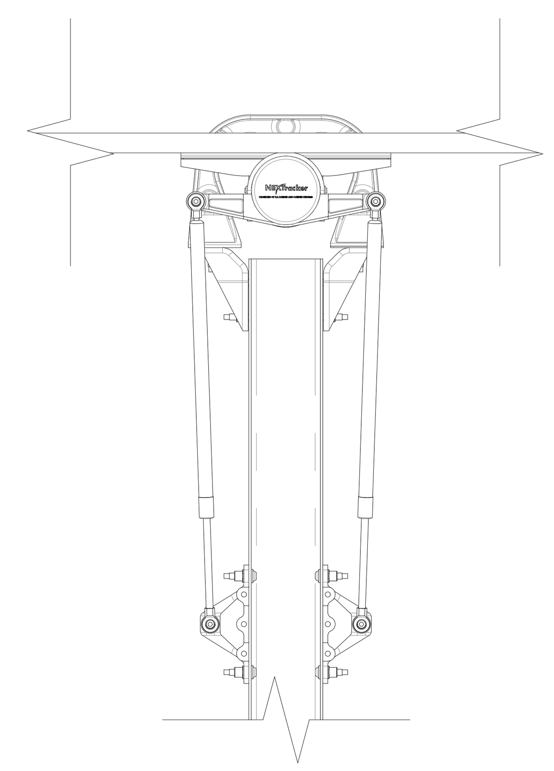
3 TYPICAL MODULE SPACING
SCALE: N.T.S.

NOTE:
1. SEE DETAIL 7 FOR PLACEMENT OF SPC/MODULE MOUNTING ASSEMBLY



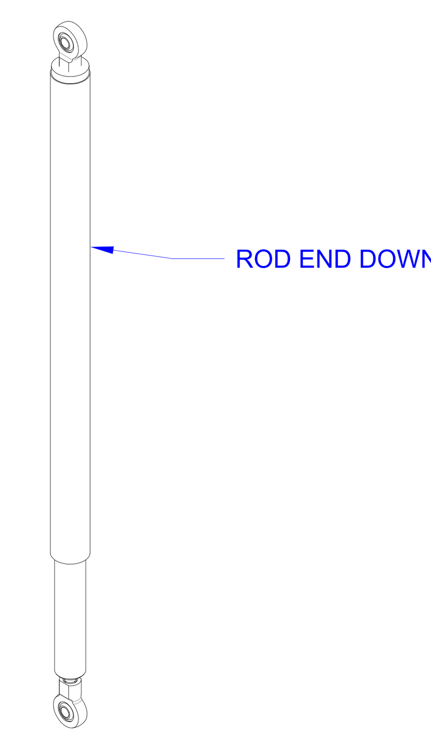
4 INNER DOUBLE DAMPER
SCALE: N.T.S.

NOTE:
1. DAMPERS MARKED WITH ARROW SHOWING CORRECT ROD ORIENTATION.
2. INSTALL DAMPERS ON SIDE OF PIER CLOSEST TO MOTOR.



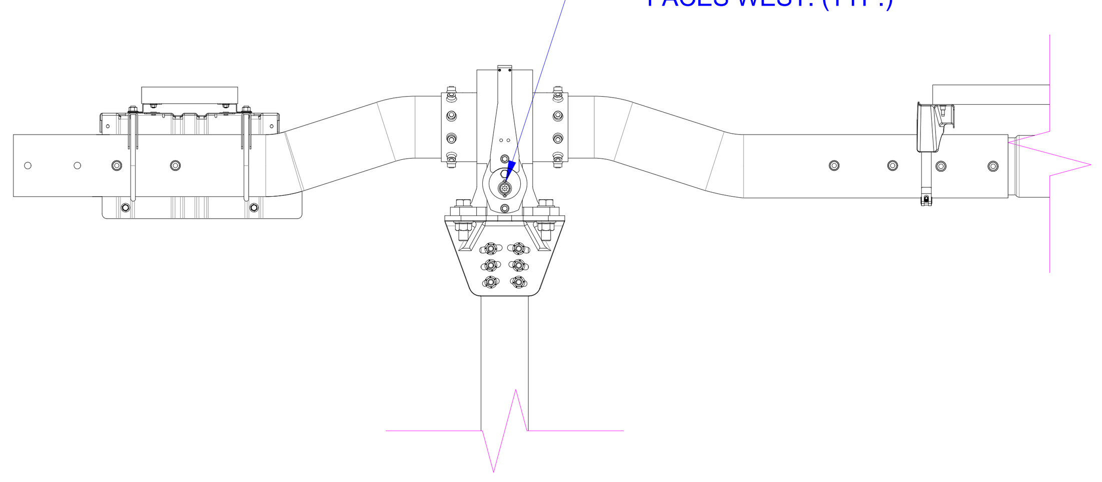
5 DOUBLE DAMPER
SCALE: N.T.S.

NOTE:
1. SEE SHEET S-4XX, DETAIL 2 FOR DAMPER LOCATIONS

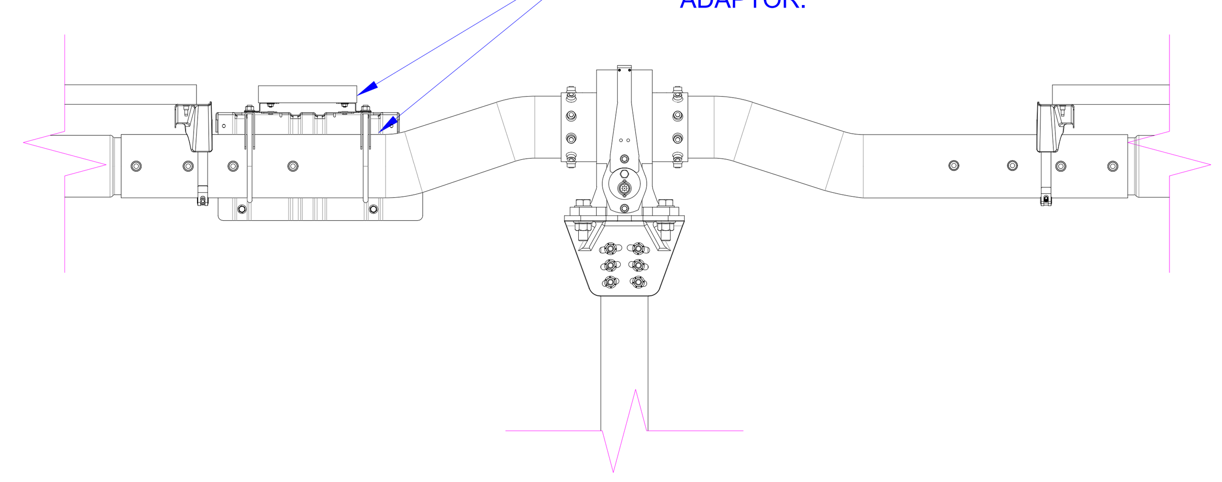


5 21664 DAMPER ORIENTATION
SCALE: N.T.S.

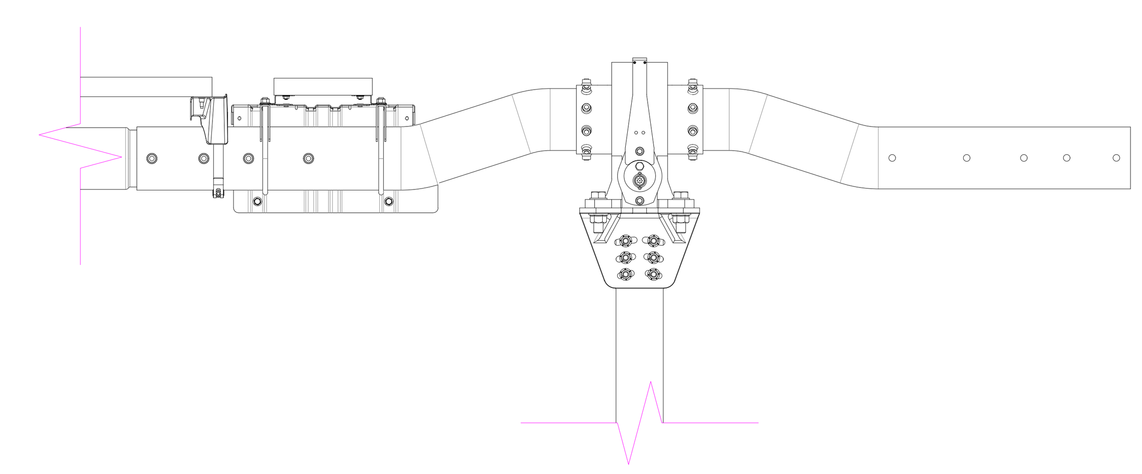
NOTE:
1. DAMPER MARKED WITH ARROW SHOWING CORRECT ROD ORIENTATION



7A NORTH WING (ONLY) TRACKER
SCALE: N.T.S.



7B 2-WING TRACKER
SCALE: N.T.S.



7C SOUTH WING (ONLY) TRACKER
SCALE: N.T.S.

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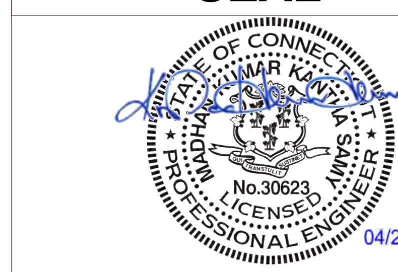

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER:
N/A

SITE ID:
N/A

SHEET TITLE:
BHA & DAMPER DETAILS (0-<6.1%)

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
2			
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4			
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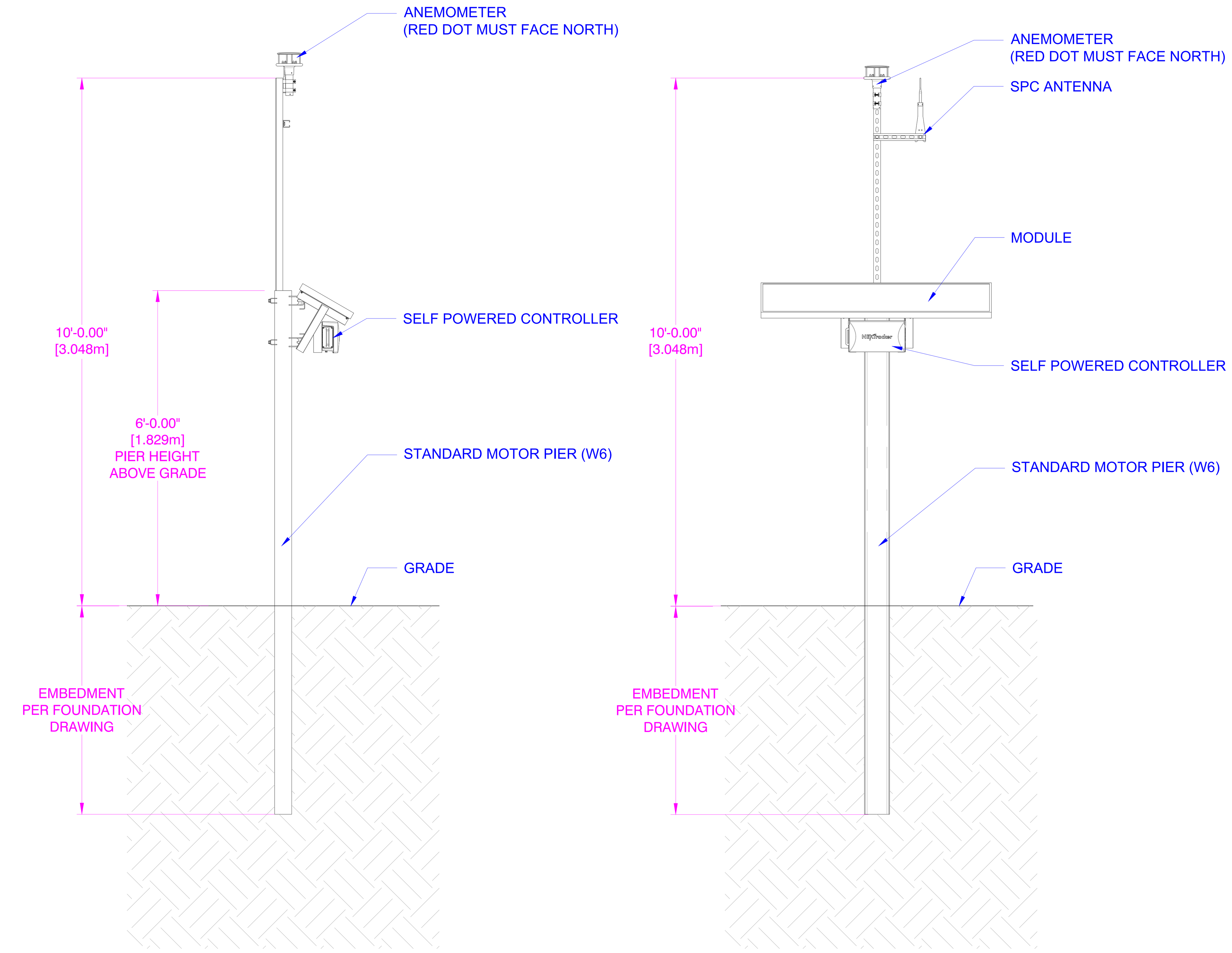
9			

SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-601

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



1 / - SPT WEATHER STATION, ULTRASONIC WIND SENSOR
SCALE: N.T.S.

AMPACITY

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SEAL

04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

SHEET TITLE:

WEATHER STATION DETAILS

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
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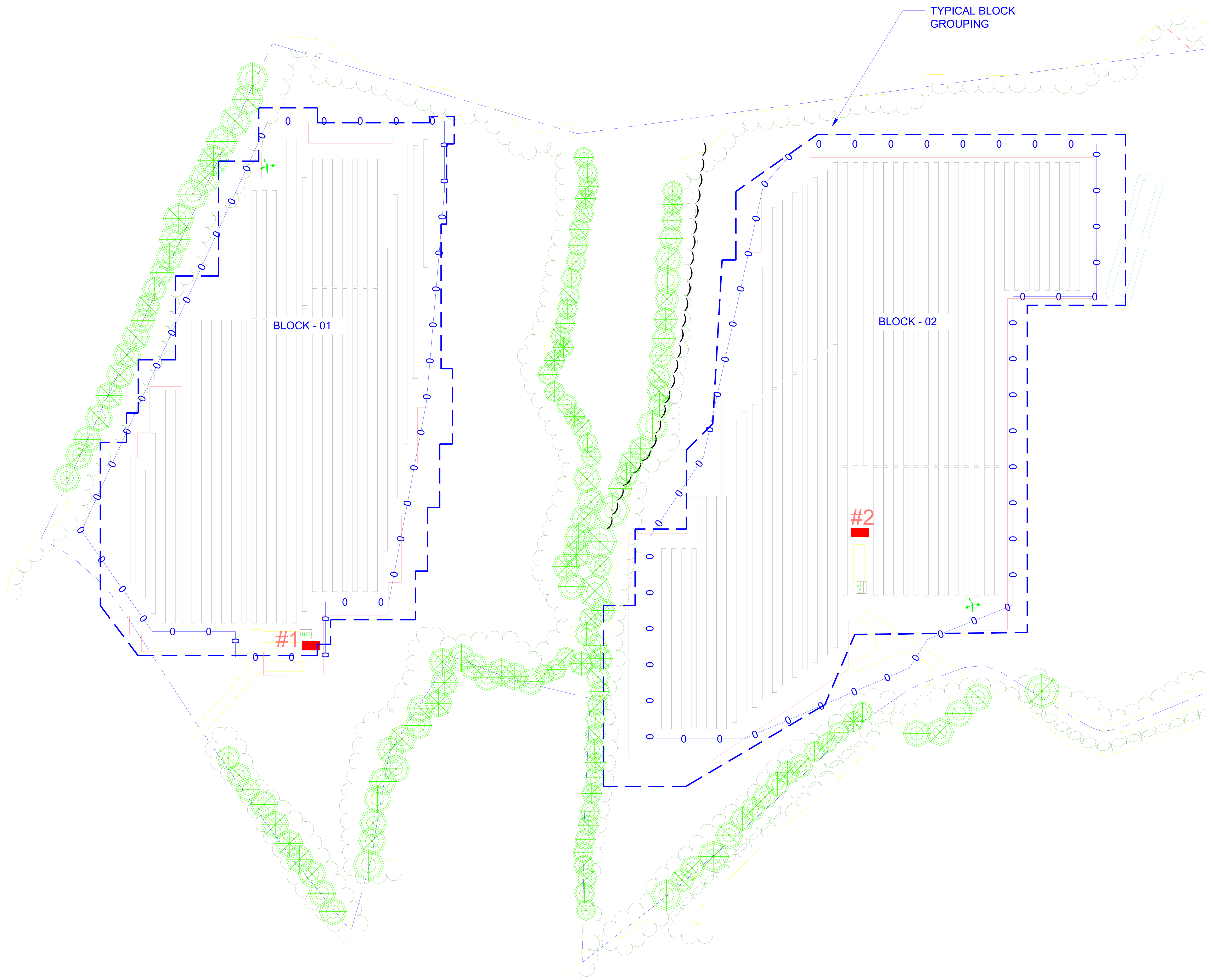
9			

SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-701

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

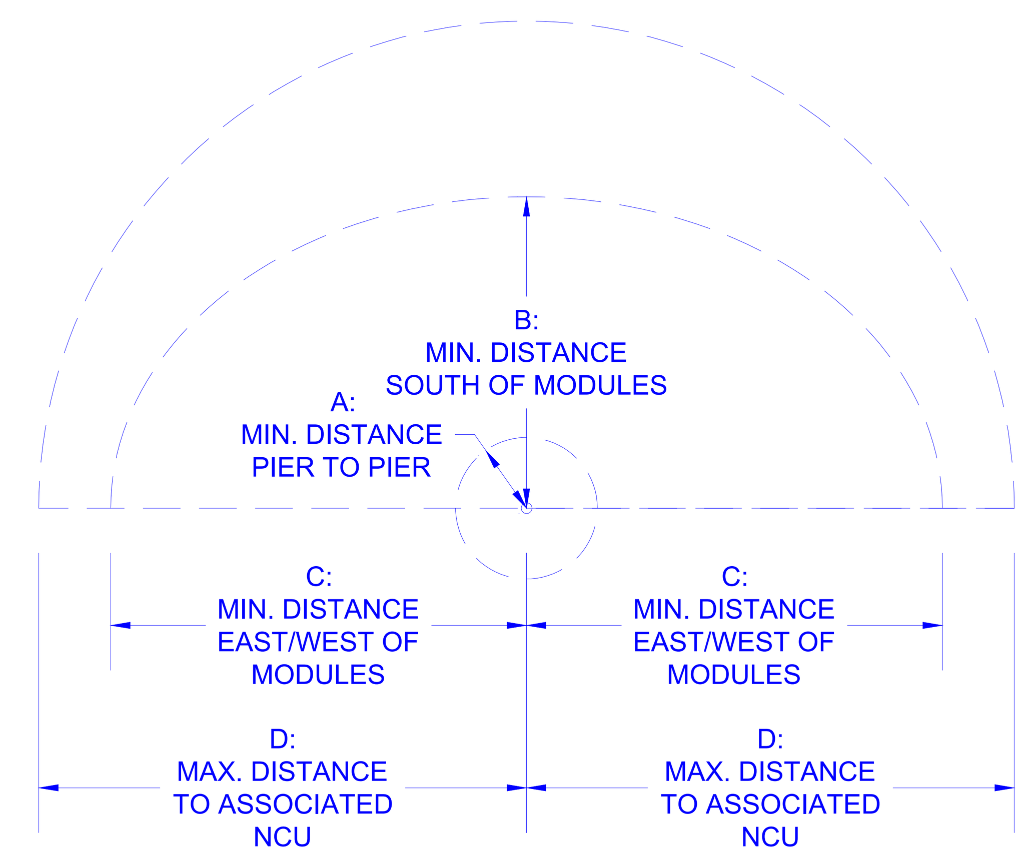
NCU PLAN KEY	
SYMBOL	DESCRIPTION
(red rectangle)	NCU
(green symbol)	WIND SENSOR, WEATHER STATION



1 NCU PLAN
SCALE: 1" = 300'-0"

NOTES:

1. NCUs ARE LOCATED AT THE EQUIPMENT PAD.
2. THE SUPPORT STRUCTURE FOR THE NCU, OR THE M8 FASTENERS ARE NOT PROVIDED BY NEXTRACKER.
3. SPC RANGE LABELS ARE WEST TO EAST, NORTH TO SOUTH. SEE PIER PLAN (S-2XX) FOR TRACKER COLUMN LABELS & SECTION LABELS WHICH CORRESPOND TO SPC RANGES SHOWN IN THE TABLE BELOW.
4. WEATHER STATION SYMBOLS ARE SCHEMATIC. WEATHER STATION PIERS MUST BE W6 SHAPE. ASSOCIATED PIERS MAY BE INSTALLED +/- 50 FEET FROM LOCATION INDICATED ON PLANS IF THEY ALSO MEET THE FOLLOWING CRITERIA:
A. PIER TO PIER: MIN. 3 FEET
B. SOUTH OF MODULES: MIN. 13.5 FEET
C. EAST/WEST OF MODULES: MIN. 18 FEET
D. PIER TO ASSOCIATED NCU UNIT: MAX. 1476 FEET
5. WHEN DETERMINING THE WEATHER STATION PILE LOCATION, SHADING PATTERNS FROM ADJACENT TREES, EQUIPMENT, STRUCTURES, ETC. THIS SHOULD BE AVOIDED TO ENSURE THE WEATHER STATION PV PANEL PROVIDES A SUFFICIENT CHARGE TO THE WEATHER STATION SPC, AS WELL AS ENSURE GHI SENSOR FUNCTIONALITY (IF APPLICABLE).
6. CONSTRUCTION STOW LOCATION IS [50/60/75] DEGREES IN THE [EAST/WEST] DIRECTION.



NCU #	BLK #	SPC START	SPC STOP	# TKRS	# WS	CHANNEL	PAN ID
1	1	101	105	5	1	11	0001
		201	208	8			
		301	323	23			
		401	407	7			
2	2	501	519	19	1	13	0002
		601	632	32			
		701	713	13			
				107	2	109	

NOTE: DESIGN IS BUILT CONSIDERING ALL NCU'S ARE CONFIGURED IN THE SAME NETWORK.

AMPACITY
QUANTA

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SEAL

STATE OF CONNECTICUT · LICENSED PROFESSIONAL ENGINEER · No.30623
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER: N/A

SITE ID: N/A

SHEET TITLE: NCU PLAN

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
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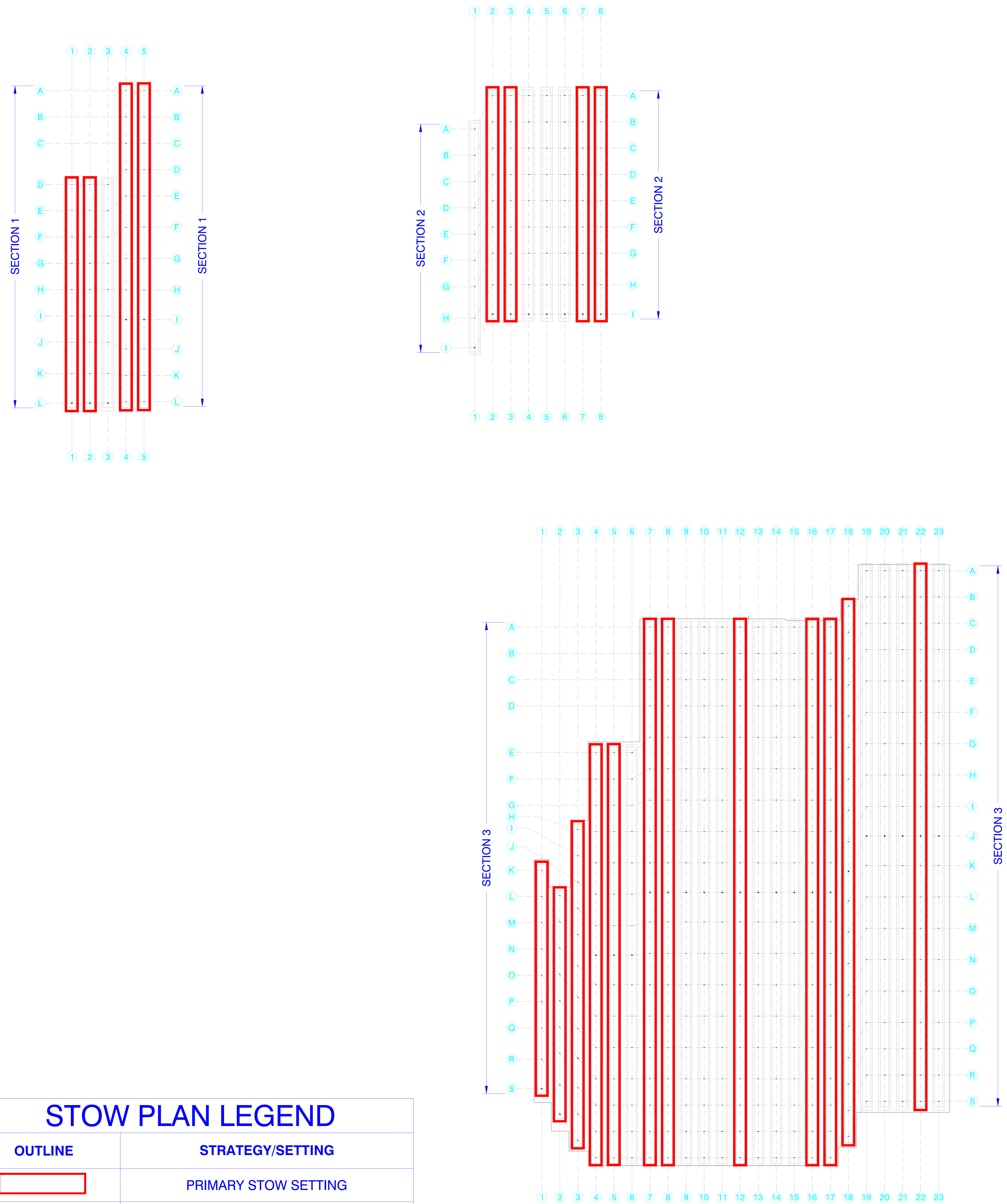
8			
9			

SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-901

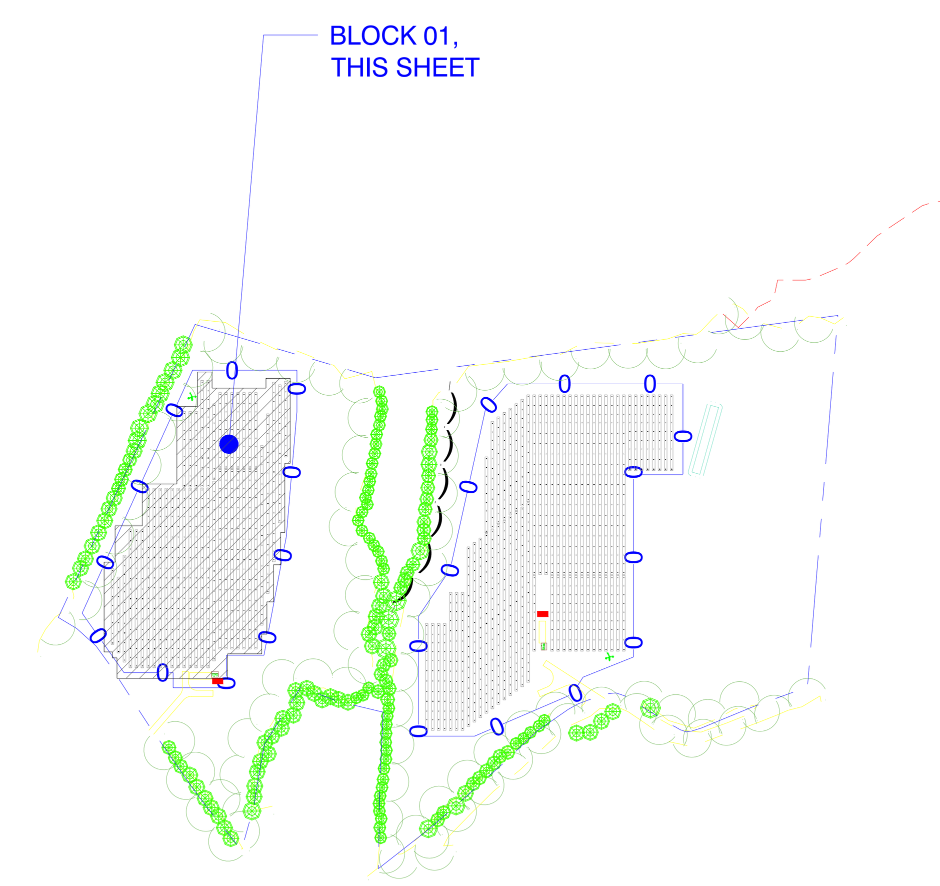
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



STOW PLAN LEGEND

OUTLINE	STRATEGY/SETTING
(red outline)	PRIMARY STOW SETTING
(light outline)	SECONDARY STOW SETTING

N 1 STOW PLAN
SCALE: 1" = 50'-0"



A SITE KEY N
SCALE: N.T.S.

SEAL

STATE OF CONNECTICUT
No.30623
LICENSED
PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE

Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER:
N/A

SITE ID:
N/A

SHEET TITLE:
STOW PLAN
BLOCK - 01

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
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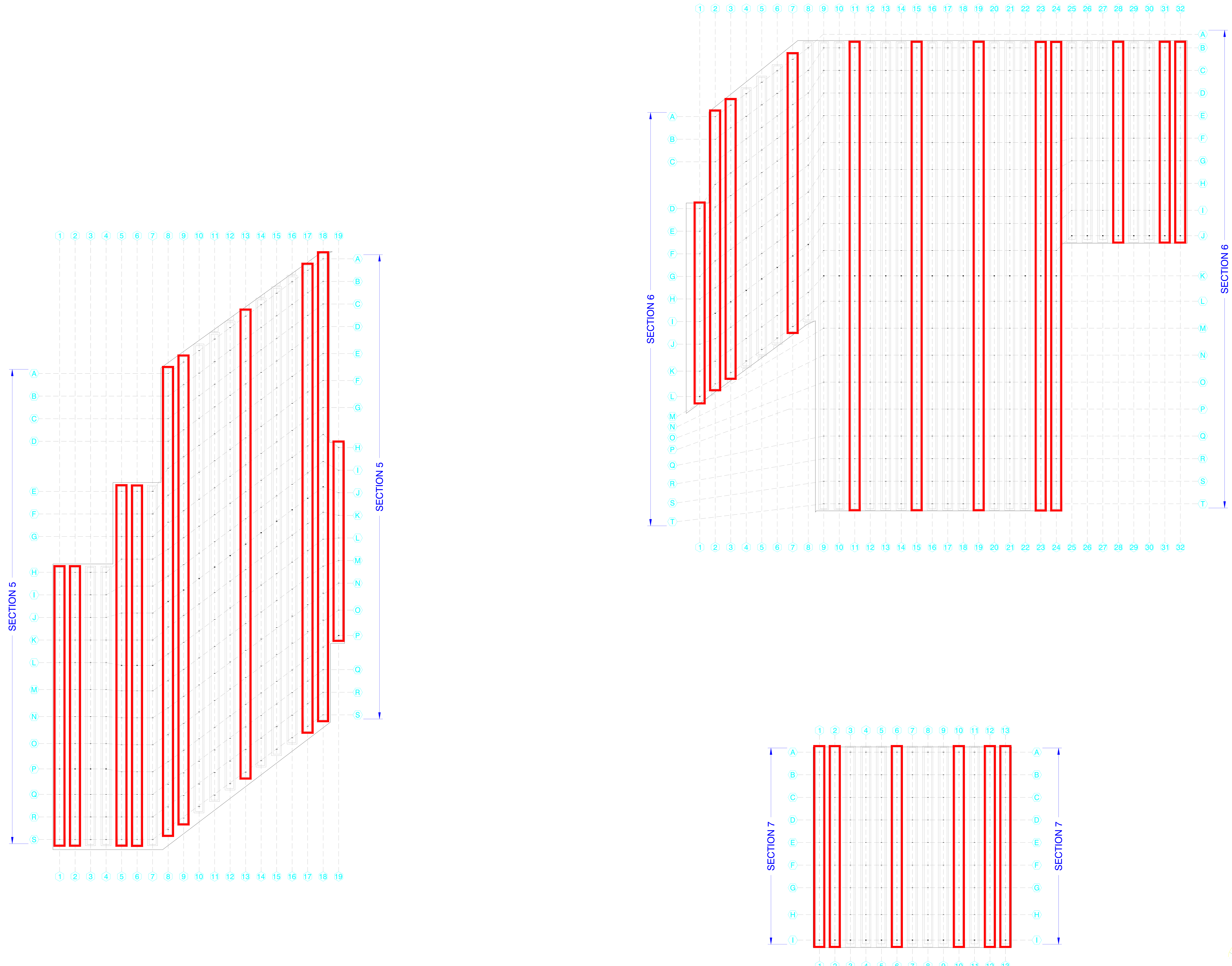
8			
9			

SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-1001

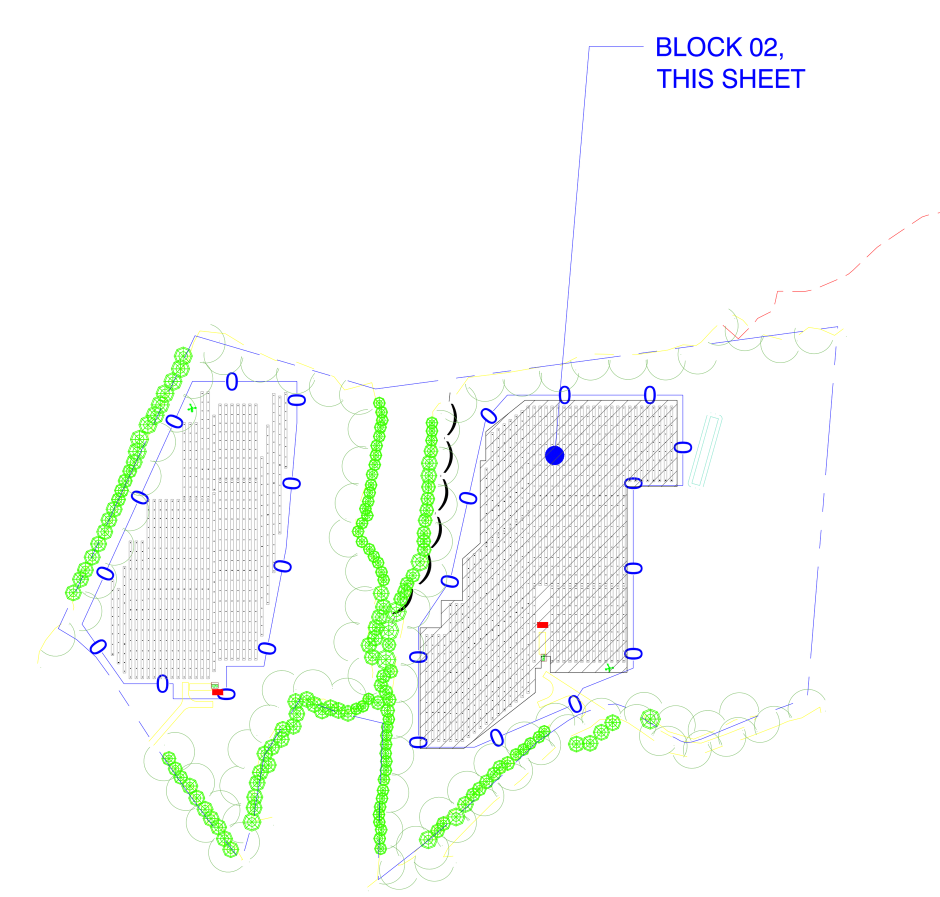
IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE



OUTLINE	STRATEGY/SETTING
(red outline)	PRIMARY STOW SETTING
(grey outline)	SECONDARY STOW SETTING

STOW PLAN LEGEND

N 1 STOW PLAN
SCALE: 1" = 50'-0"



A SITE KEY N
SCALE: N.T.S.

AMPACITY
QUANTA

SEAL

STATE OF CONNECTICUT
MADHAN KUMAR KANTHA SAMY
No.30623
LICENSED PROFESSIONAL ENGINEER
04/29/2025

STRUCTUROLOGY
CONSULTING STRUCTURAL ENGINEERS

THESE PLANS HAVE BEEN PREPARED BY OTHERS AND SEALED BY STRUCTUROLOGY INC FOR CONFORMANCE OF STRUCTURAL ITEMS ONLY.

VEROGY: WOODSTOCK SOLAR ONE
Castle Rock Road
Woodstock, CT 06281

PROJECT NUMBER:
N/A

SITE ID:
N/A

SHEET TITLE:
STOW PLAN
BLOCK - 02

NO.	REVISION	DATE	INIT.
0	L3 LAYOUT REV 0	04/17/2025	KJD
1			
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SITE DETAILS	
LAT/LONG	41.9223, -71.9595
SNOW LOAD	40 PSF
WIND LOAD	110 MPH ASCE 7-16
NEXTRACKER	NX-XTR 2.3.13.P
DATE	04/17/2025
REVIEW BY	-

SHEET NO.: S-1002

IF BAR IS NOT ONE INCH, PRINT IS NOT TO SCALE

PJE-000066_REV A_IMPERIAL

VEROGY_WOODSTOCK_STOW.DWG

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

Structural Calculations For

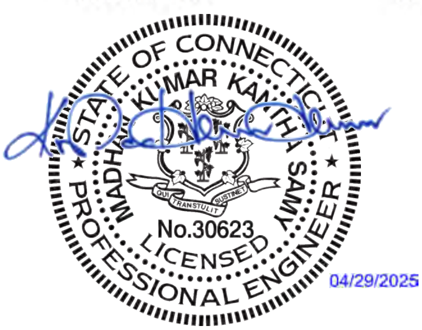
Verogy: Woodstock Solar One

NEXTracker Horizon NX Tracking System

NEXTracker

Design Summary

RISK CATEGORY:	I	ROW TYPE:	Exterior
DESIGN WIND SPEED (MPH):	110	SPACING:	14.64 ft / 45.36%
OPERATIONAL DESIGN SPEED (MPH):	49	TRACKER VERSION:	2.3.13.P
DESIGN METHOD:	ASCE 7-16	GROUND SNOW LOAD (PSF):	40
STOW STRATEGY:	60	PILE REVEAL HEIGHT (FT):	7
		TERRAIN TYPE:	XTR-0.75



Project Location

Latitude: 41.9223, Longitude: -71.9595

Address: Castle Rock Road, Woodstock, CT 06281

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REVISION HISTORY

S.NO	DATE	DESCRIPTION
1	29-Apr	Wi/Di Factors removed, Ksi ratings adjusted on TCP

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BASIS FOR DESIGN

DESCRIPTION: THE NEXTracker HORIZON NX SINGLE AXIS TRACKER IS A STEEL STRUCTURE THAT TRACKS THE SUN FROM EAST TO WEST THROUGHOUT THE DAY TO MAXIMIZE SOLAR ENERGY PRODUCTION. THE TRACKER IS COMPOSED OF COLD FORMED AND HOT ROLLED STEEL

WIND LOADS: WIND LOADS ON THE TRACKER ARE CALCULATED BY MULTIPLYING THE REFERENCE PRESSURE BY AN AERODYNAMIC SHAPE FACTOR, TAKING THE FORM: P=qh*GC. THE AERODYNAMIC COEFFICIENTS ARE TAKEN FROM THE WIND TUNNEL STUDY PERFORMED BY CPP WIND OF FORT COLLINS COLORADO. A THIRD PARTY PEER REVIEW OF THIS STUDY IS AVAILABLE UPON REQUEST. THE REFERENCE PRESSURE IS CALCULATED IN ACCORDANCE WITH THE GOVERNING WIND CODE.

Table 1: Wind speeds analyzed at each tilt

TILT (DEG)	DESIGN WIND SPEED (MPH)	
	(MPH)	(M/S)
0	49	22
15	49	22
30	49	22
45	49	22
60	110	49

K_z IS EVALUATED AT A HEIGHT OF 10 METERS IN ACCORDANCE WITH WIND TUNNEL STUDY REQUIREMENTS.

Table 2: Summary of wind directionality

WIND APPROACH ANGLE (DEG)	K_d FACTOR
0 DEG NORTH	0.85
45 DEG NORTH-EAST	0.85
90 DEG EAST	0.85
135 DEG SOUTH-EAST	0.85
180 DEG SOUTH	0.85
225 DEG SOUTH WEST	0.85
270 DEG NORTH WEST	0.85

PROJECT DEAD LOAD:

THE DL IS CALCULATED AS THE WEIGHT OF STRUCTURE + THE WEIGHT OF THE SOLAR PANELS = 4.16 lbf/ft^2 199.01 Pa
= 27.60 lbf/ft 402.80 N/m

THERMAL ACTIONS: IN OUR TRACKER, TORQUE TUBE IS NOT CONSTRAINED. THE TUBE CAN FREELY EXPAND OR CONTRACT WITHOUT CREATING ADDITIONAL STRESSES. THE JOINTS ARE DESIGNED TO FREELY ACCOMMODATE THE EXPANSION DUE TO TEMPERATURE.

SEISMIC, SNOW AND ICE LOADS: SEE SUBSEQUENT PAGES FOR DETAILED CALCULATIONS OF THESE LOADS

DESIGN REFERENCED STANDARDS: THE TRACKER IS DESIGNED TO COMPLY WITH THE FOLLOWING REFERENCE STANDARDS

1. WIND LOADING IN ACCORDANCE WITH ASCE 7-16 CHAPTER 31
2. SEISMIC LOADING IN ACCORDANCE WITH ASCE 7-16
3. HOT ROLLED STEEL DESIGN IN ACCORDANCE WITH AISC 360
4. COLD FORMED STEEL DESIGN IN ACCORDANCE WITH AISI 100-16.

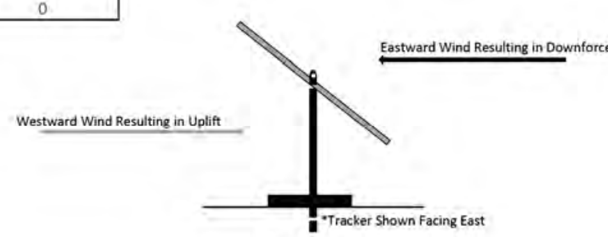
LOAD COMBINATIONS: THE TRACKER IS DESIGNED TO RESIST THE FOLLOWING LOAD COMBINATIONS FOR THE LRFD METHOD PER ASCE 7-16

Table 3: Summary of load combinations for which the tracker is checked.

COMBO #	DL FACTOR	WL FACTOR	SL FACTOR	EQ FACTOR
3b	1.2	0.5	1.6	0
4	1.2	1	0.5	0
5	0.9	1	0	0
5ASD	1	0.6	0	0
6ASD	1	0.45	0.75	0
7ASD	0.6	0.6	0	0

TRACKER APPROACH ANGLE REFERENCE:

THE TRACKERS WILL BE TILTED INTO THE DIRECTION OF THE PREVAILING WIND ONCE STOW STRATEGY IS TRIGGERED. SO, AT 60DEG DESIGN WIND SPEED, RESULTS IN DOWNWARD PRESSURES ON THE TRACKER, WHILE LOADS FROM THE OPPOSITE SIDE RESULT IN UPLIFT LOADS ON THE TRACKER.



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DEAD LOAD

Table 4: Summary of tracker dead load

PART NAME:	PART WEIGHT (lbf/ft^2)	PART WEIGHT (Pa)
SOLAR PANEL	2.62	125.42
PANEL RAIL	0.38	18.03
TORQUE TUBE	1.16	55.56
PROJECT DEAD LOAD	4.16	199.01

NOTE: THE NEXTracker HORIZON TRACKER ROTATES ABOUT A PIN THAT IS SITUATED ABOVE THE TORQUE TUBE, THIS RESULTS IN A BALANCED SYSTEM THAT IS EASIER TO DRIVE, AND REDUCES OVERALL TORQUE TO THE SYSTEM.

SOLAR PANEL SPECIFICATIONS

Solar Panel Type: **Series 6 Plus**

Solar Panel Width	=	4.08	ft	1.25	m	Surface Area of Panel	=	27.12	ft^2	2.52	m^2
Solar Panel Length	=	6.64	ft	2.02	m	Solar Panel Thickness	=	1.93	in	49.00	mm
						Solar Panel Weight	=	74.96	lbf	333.41	N

COMPONENTS

Hot Rolled	Cold Formed
Torque tube	Panel rail
Pivot pin	BHA (handle)
Slew gear mounting	BHA rail
Torque tube adapter	Fastening
Splice	
Bracket	

TRACKER LAYOUT

Stow Speed	18mph 1 min 3m
	35mph 3s 10m

102 MODULE

C	Bay 9	Bay 8	Bay 7	Bay 6	Bay 5	Bay 4	Bay 3	Bay 2	Bay 1	Motor	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
1	5	5	5	6	6	6	6	6	5	M	5	6	6	6	6	6	5	5	5	1

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WIND REFERENCE PRESSURES

THE TRACKER UTILIZES A WIND STOW STRATEGY. EACH TRACKER HAS A BATTERY BACKUP AND WIND SPEEDS ON SITE ARE MONITORED CONTINOUSLY.

Reference Table 1: Wind speeds analyzed at each tilt

TILT (DEG)	DESIGN WIND SPEED (MPH)	
	(mi/hr)	(M/S)
0	49	21.9
15	49	21.9
30	49	21.9
45	49	21.9
60	110	49.2

Reference Table 2: Summary of wind directionality

WIND APPROACH ANGLE (DEG)	K_d FACTOR
0 DEG NORTH	0.85
45 DEG NORTH-EAST	0.85
90 DEG EAST	0.85
135 DEG SOUTH-EAST	0.85
180 DEG SOUTH	0.85
225 DEG SOUTH WEST	0.85
270 DEG NORTH WEST	0.85

WIND EXPOSURE = C

K_z IS EVALUATED AT A HEIGHT OF 10 METERS IN ACCORDANCE WITH WIND TUNNEL STUDY REQUIREMENTS = 1.00

Zg = 466.6 ft

Altitude factor Ke = 0.98

Kzt = 1.00

Selected Stow Inputs

S.no	Stow (Deg)	Wind speed (mph)	AppAngle	LC	Kz	Kzt	Kd	Ke	Q_h (psf)
1	60	110	A	3b	1.00	1	0.85	0.98	25.89
2	60	110	A	4	1.00	1	0.85	0.98	25.89
3	60	93.5	X	5	1.00	1	0.85	0.98	18.70

Stow Speed	18mph 1 min 3m
	35mph 3s 10m

Reference Pressure is Calculated in Accordance with ASCE 7-16 Eq 26.10-1

$qz = 0.00256K_zK_{zt}K_dK_eV^2$ (psf, V in mph), or $qz = 0.613K_zK_{zt}K_dK_eV^2$ (Pa, V in m/s)

Table 6: Reference pressure for approach angle and tilt

WIND APPROACH ANGLE (DEG)	K_d FACTOR	0 & 15 DEG TILT		30 DEG TILT		45 DEG TILT		60 DEG TILT	
		lbf/ft^2	Pa	lbf/ft^2	Pa	lbf/ft^2	Pa	lbf/ft^2	Pa
0 DEG NORTH	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
45 DEG NORTH-EAST	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
90 DEG EAST	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
135 DEG SOUTH-EAST	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
180 DEG SOUTH	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
225 DEG SOUTH WEST	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
270 DEG NORTH WEST	0.85	5.1	246	5.1	246	5.1	246	25.9	1239

*NOTE: STRUCTURAL CALCULATIONS FOR THE 0 DEG AND 15 DEG TILT ARE OMITTED AS THE WIND SPEEDS INDICATE THESE TILT ANGLES WILL NOT GOVERN THE DESIGN OF THE TRACKER

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SNOW LOADS

THE TRACKER IS DESIGNED TO UTILIZE A SNOW STOW OPERATION WHEN DESIGN GROUND SNOW LOADS ARE GREATER THAN 20 PSF. THE TRACKER IS DESIGNED TO ACCOMMODATE 6 INCHES (150 mm) OF SNOW ON THE TRACKER, PRIOR TO MOVING TO STOW.

Table 7: Design ground snow loads, and depth of snow on tracker

TILT (DEG)	DESIGN GROUND SNOW LOAD	
	(lbf/ft^2)	(Pa)
0	10	479
15	10	479
30	20	958
45	32	1532
60	40	1915

SNOW LOADS ARE CALCULATED IN ACCORDANCE WITH ASCE 7-16 CHAPTER 7.

$p_f = 0.7 * C_e * C_t * I_s * p_g$ *Flat surface snow load per ASCE 7-16 Eq 7.3-1*

C_e = 0.9 Exposure Category = C Exposure Type = Fully Exposed *ASCE 7-16 Table 7.3-1*

C_t = 1.2 *ASCE 7-16 Table 7.3-2*

I_s = 0.8 Risk Category = I *ASCE 7-16 Table 1.5-2*

Table 8: Summary of design snow loads

TILT (DEG)	Flat Surface Snow Load, p_f		C_s Slope Factor	Roof Snow Load $p_s = p_f * C_s$		DEPTH OF SNOW ON TRACKER	
	(lbf/ft^2)	(Pa)		(lbf/ft^2)	(Pa)	(INCHES)	(mm)
0	6.0	290	1	6.0	290	3.78	96
15	6.0	290	1	6.0	290	3.78	96
30	12.1	579	0.727	8.8	421	5.50	140
45	19.4	927	0.455	8.8	422	5.50	140
60	24.2	1158	0.182	4.4	211	2.75	70

Snow Density = 19.2 lbf/ft^3 308 kg/m^3

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SEISMIC LOADS

Structure Type: Cantilever Column
Table 15.4-2 From ASCE 7-16

R (Resitance Factor)	2.00
Ω_o (Overstrength Factor)	2.00
C_d (Deflection Amplification)	2.00
I_e (Seismic Importance Factor)	1.00
ρ (Redunancy Factor)	1.30

S_s	0.182	
S_1	0.055	
F_a	1.300	
F_v	1.500	
S_{DS}	0.158	= 2/3 * Ss * Fa
S_{D1}	0.055	= 2/3 * S1 * Fv

Soil Site Class	C	
T_L	6	sec
T	0.16	sec

TRACKER DEAD LOAD

Dead Load = 27.60 plf

WORSE CASE TRACKER SNOW LOAD

58.47 plf

SEISMIC WEIGHT

W =	39.30	plf
V = CsW =	3.10	plf
Tracker Length =	439.53	ft

Vtotal =	1364.4	pounds
Seismic Load to Motor Pier =	1364.4	pounds

SEISMIC RESPONSE COEFFICIENT

$C_{s\,min} = 0.044 S_{DS} I_e$

$C_{s\,min} = 0.03$

$C_{s\,min} = 0.8 S_1/(R/I_e)$ if $S_1 > 0.6$

T = 0.16 seconds < T_L

$C_{s\,max} = S_{D1} * T_L/[T(R/I_e)]$ if $S_1 > 0.6$

$C_s = S_{DS}/(R/I_e)$

C_s = 0.08

$C_{s\,min}$	0.03	$C_{s\,max}$	2.96	$C_{s\,final}$	0.08

SEISMIC LOAD CHECK

E-W Direction

Total Pier Count	=	19	
Seismic Load on each pier	=	72	pounds
Max Wind load on each pier	=	4050	pounds

Max Wind load on each pier > seismic load on each pier, Hence Wind governs design for E-W direction

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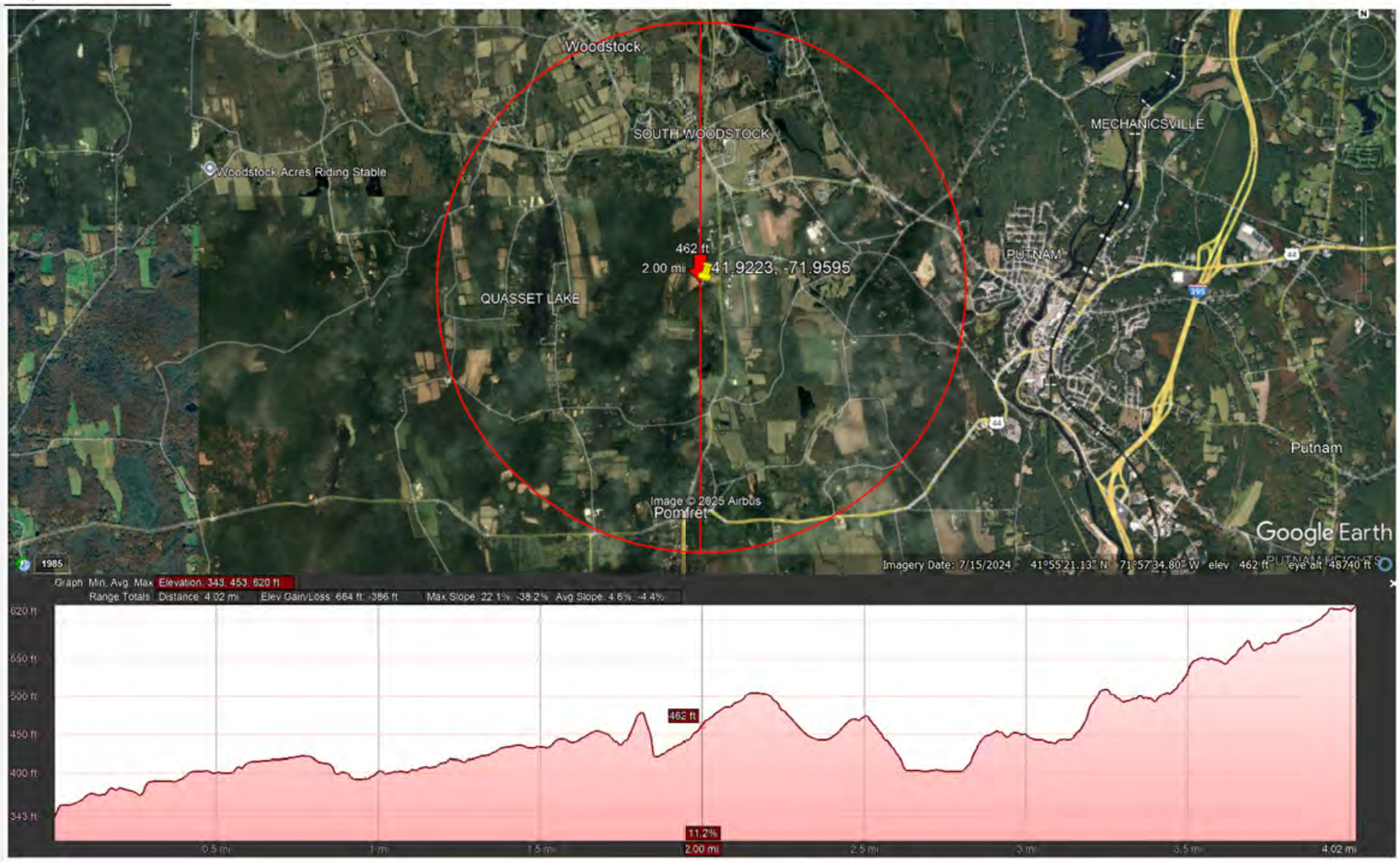
K_{zt} Calculation



Kzt IS CALCULATED IN ACCORDANCE WITH ASCE 7-16 SECTION 26.8

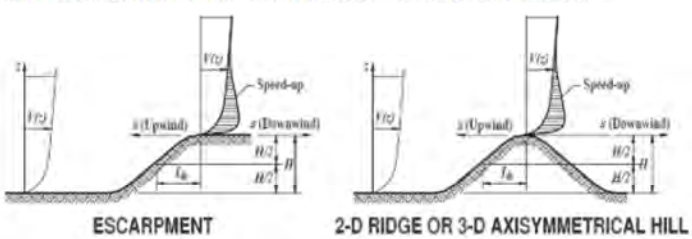


Figure 1: Image for variables in Kzt calculations, taken from ASCE 7-16 Figure 26.8-1

Table 5: K1,K2,K3 values from ASCE 7-16 Figure 26.8-1

K1 Multiplier		K2 Multiplier		K3 Multiplier	
H/L_h	2D Escarp	x/L_h	2D Escarp	z/L_h	2D Escarp
0.20	0.17	0.00	1.00	0.00	1.00
0.25	0.21	0.50	0.88	0.10	0.78
0.30	0.26	1.00	0.75	0.20	0.61
0.35	0.30	1.50	0.63	0.30	0.47
0.40	0.34	2.00	0.50	0.40	0.37
0.45	0.38	2.50	0.38	0.50	0.29
0.50	0.43	3.00	0.25	0.60	0.22
		3.50	0.13	0.70	0.17
		4.00	0.00	0.80	0.14
				0.90	0.11
				1.00	0.08
				1.50	0.02
				2.00	0.00

Equations from ASCE 7-16 Figure 26.8-1

$K_{zt} = (1 + K_1K_2K_3)^2$	=	1.00	H	=	273	ft	83.2	m			
K_1 = SEE TABLE 5	=	0.00	L_h	=	10402	ft	3170.4	m	H/L_h	=	0.03
K_2 = SEE TABLE 5	=	0.75	x	=	10560	ft	3218.7	m	x/L_h	=	1.02
K_3 = SEE TABLE 5	=	0.94	z	=	280	ft	85.3	m	z/L_h	=	0.03

N-S DIRECTION

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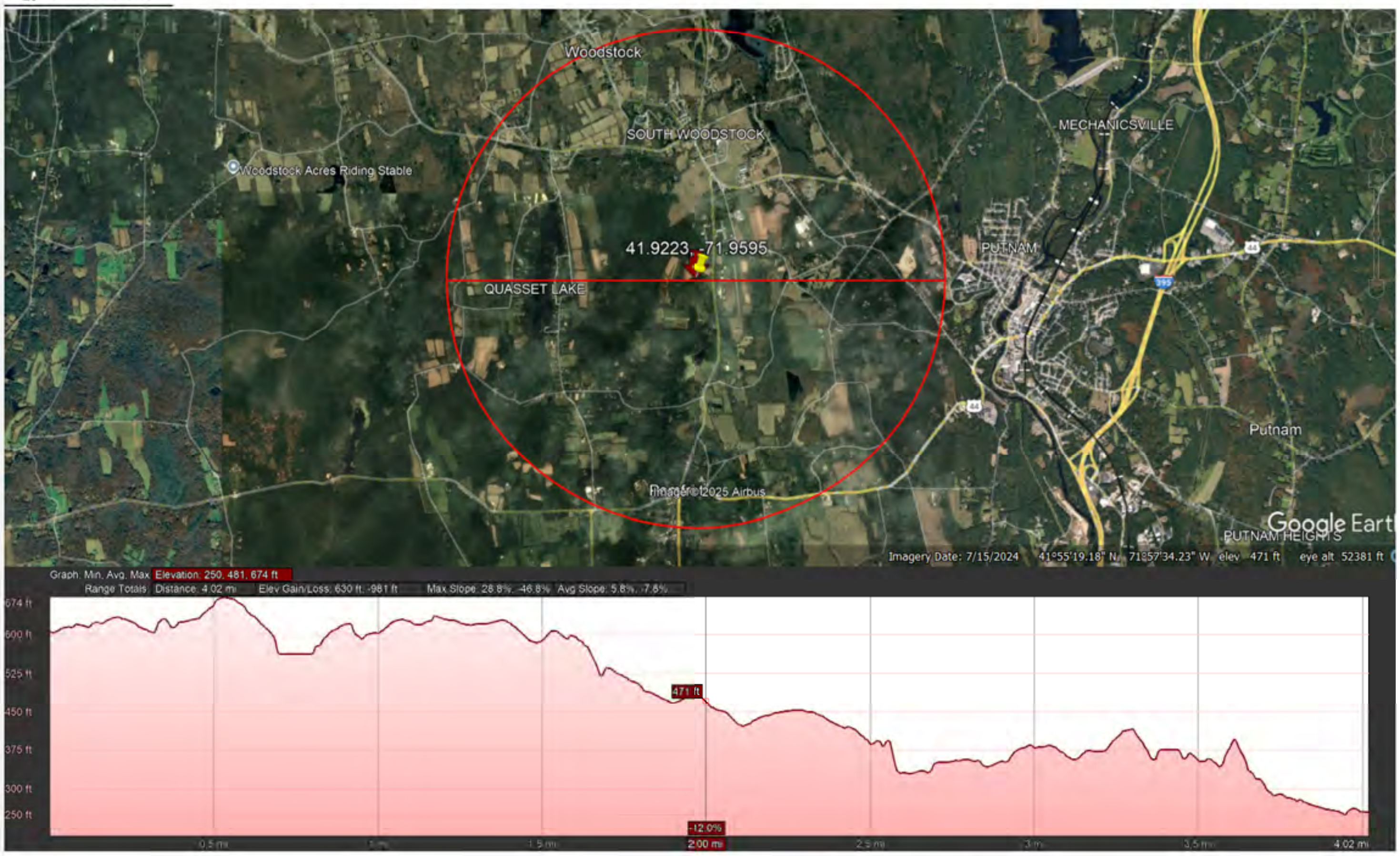
Date:	15-Apr-25

K_{zt} Calculation



Kzt IS CALCULATED IN ACCORDANCE WITH ASCE 7-16 SECTION 26.8

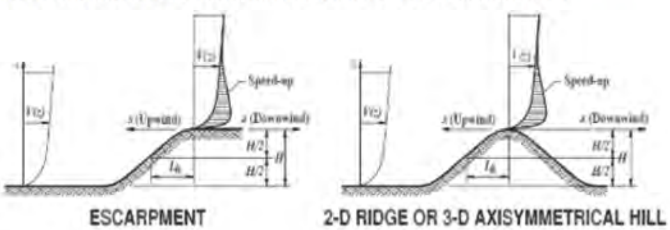


Figure 1: Image for variables in Kzt calculations, taken from ASCE 7-16 Figure 26.8-1

Table 5: K1,K2,K3 values from ASCE 7-16 Figure 26.8-1

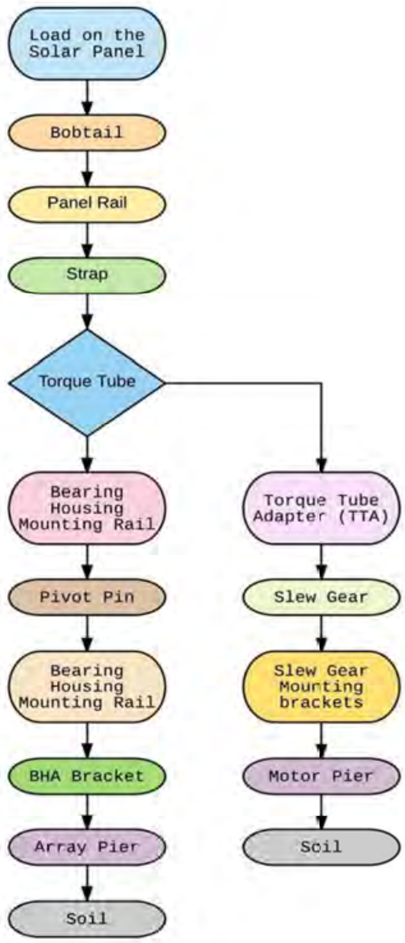
K1 Multiplier		K2 Multiplier		K3 Multiplier	
H/L_h	2D Escarp	x/L_h	2D Escarp	z/L_h	2D Escarp
0.20	0.17	0.00	1.00	0.00	1.00
0.25	0.21	0.50	0.88	0.10	0.78
0.30	0.26	1.00	0.75	0.20	0.61
0.35	0.30	1.50	0.63	0.30	0.47
0.40	0.34	2.00	0.50	0.40	0.37
0.45	0.38	2.50	0.38	0.50	0.29
0.50	0.43	3.00	0.25	0.60	0.22
		3.50	0.13	0.70	0.17
		4.00	0.00	0.80	0.14
				0.90	0.11
				1.00	0.08
				1.50	0.02
				2.00	0.00

Equations from ASCE 7-16 Figure 26.8-1

$K_{zt} = (1 + K_1K_2K_3)^2$	=	1.00	H	=	424	ft	129.2	m			
K_1 = SEE TABLE 5	=	0.00	L_h	=	9029	ft	2752.0	m	H/L_h	=	0.05
K_2 = SEE TABLE 5	=	0.72	x	=	10296	ft	3138.2	m	x/L_h	=	1.14
K_3 = SEE TABLE 5	=	0.89	z	=	431	ft	131.4	m	z/L_h	=	0.05

E-W DIRECTION

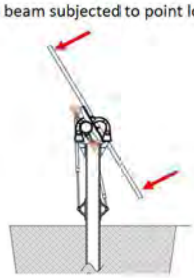
LOAD PATH DESCRIPTION



ANALYSIS HYPOTHESIS

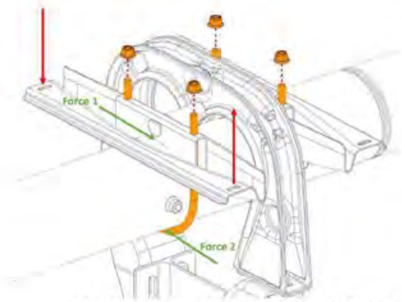
The Wind loads on the solar panel are calculated using the Aerodynamic pressure coefficients from the Wind tunnel study report provided by CPP.

The Wind load thus acting on the solar panel is shared between four bob tail fasteners which are used to attach the solar panel to the panel rail. The load on these fasteners acts as a point load on the panel rail, and the panel rail is analyzed as a simply supported double cantilevered beam subjected to point loads at the end.



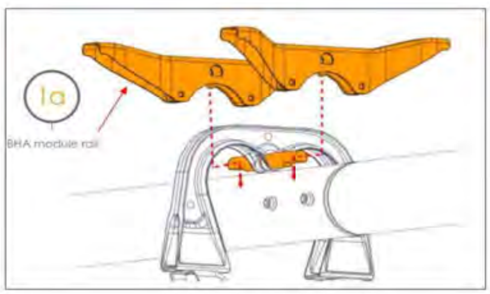
(Double cantilevered beam)

The load from the panel rails is transferred to the torque tubes via strap and metal stub / dimple.
BHA rail also transfer load to torque tube in similar fashion. The moment applied to the U-Bolt is resisted by a force couple formed between Force 1 and Force 2. Force 1 is a shear force in a metal tab that sits in a hole in the torque tube. Force 2 is a frictional force between the U-bolt and the torque tube generated by torqueing the U-bolts.



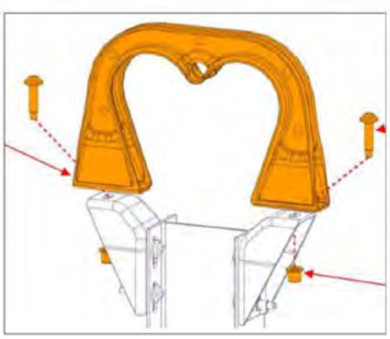
(Moment applied to the U-Bolt at BHA rail)

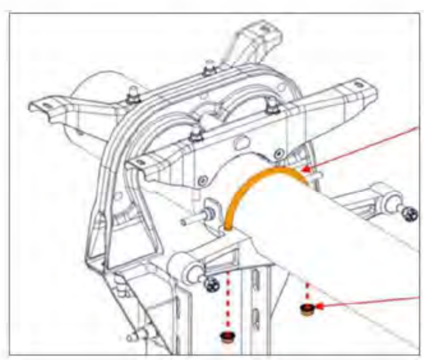
Load goes from torque tube to the bearing housing assembly (BHA) rail. The BHA rail attaches the torque tube to the Pivot Pin. The BHA rail is analyzed for half the load of the panel rail. The load goes to the torque tube from U-bolt. The torque tubes are checked at the LRFD Levels. The BHA rails bearing condition at the either end of the Pivot pin make the rotation of the pin restricted. Hence the pivot pin is analyzed as a fixed-fixed beam with a point load from the BHA handle at the center.



(Pivot pin to handle)

The Shear Load from the Pivot pin is transferred to the BHA handle through bearing. In house testing is performed to determine the allowable load. The Load then travels from the BHA handle to the BHA brackets . These brackets are fixed to the array pier through high strength fasteners that are directly tensioned using a hydraulic tool. The array piers then transfer the loads to the ground





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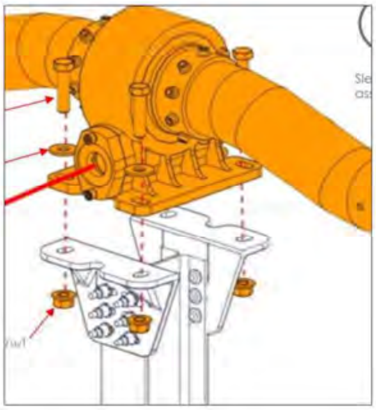
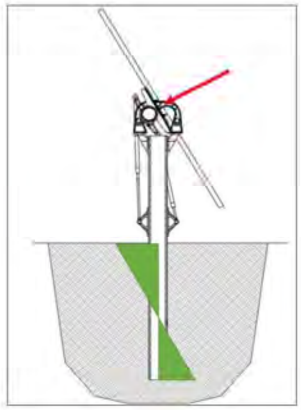
Load to the motor piers are transferred from the slew gear. Loads are transferred from the torque tube to the torque tube adapter with bob tail fasteners. The loads are then transferred from the torque tube adaptor into the slew gear through blind rivets that are factory installed. The slew drive is attached to the motor pier via slew drive mounting brackets. The motor pier then transfers the loads to the ground.



(Slew drive to motor pier via slew drive mounting brackets)



(Transferring lateral load to the ground)

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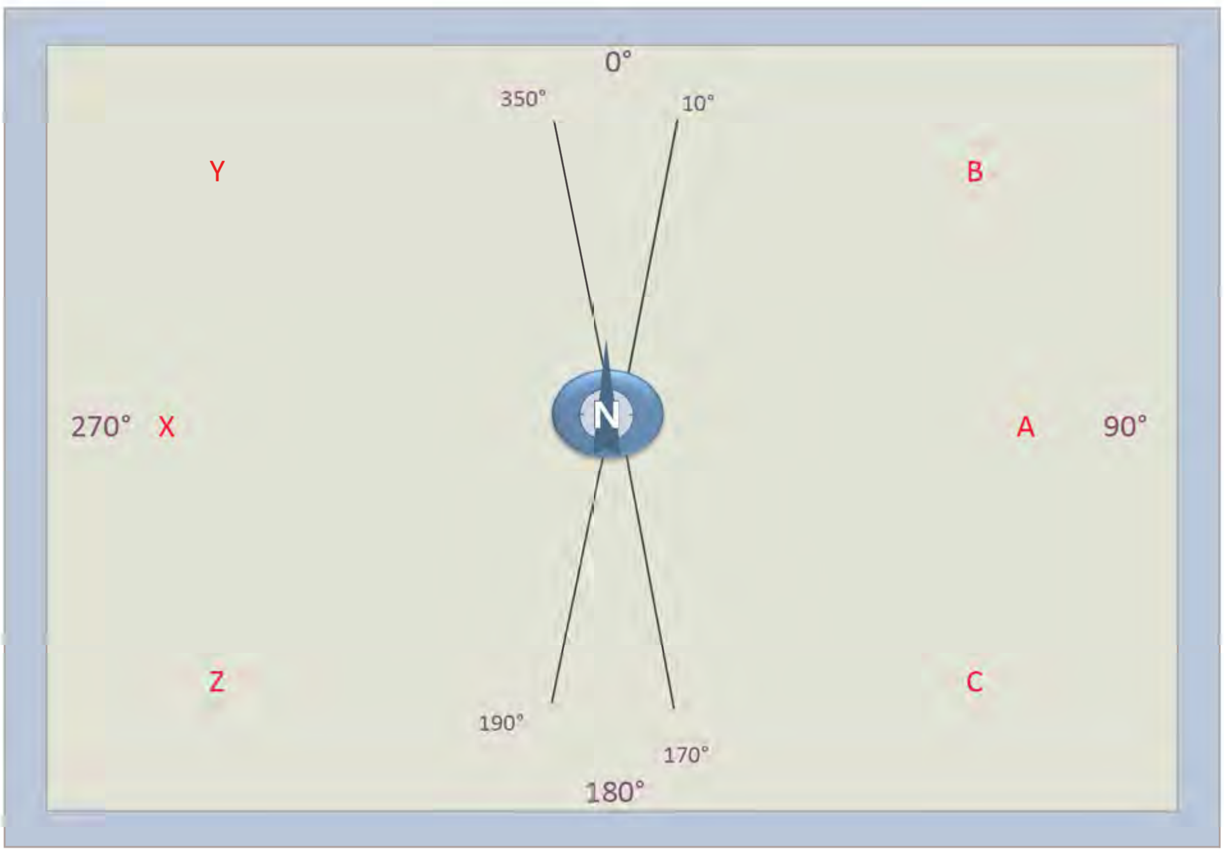
WIND APPROACH ANGLES

Selected Angles	A	X

App Angle	A	B	C	X	Y	Z	N	S
Zone	E	NE	SE	W	NW	SW	N	S
Start Angle	10	10	90	190	340	210	340	160
Stop Angle	170	90	170	350	0	240	20	200



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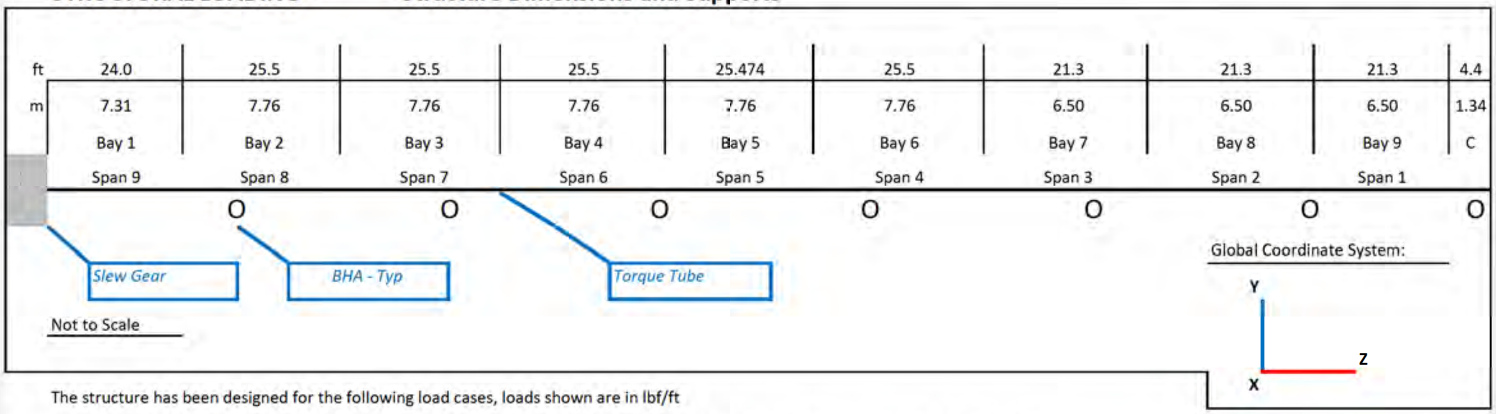
STRUCTURAL LOADING - Structure Dimensions and Supports



The structure has been designed for the following load cases, loads shown are in lbf/ft

Table X: Vertical (Y) loads applied to tracker with units in lbf/ft. Load cases are combined per the load combinations specified in Table 3

Load Combination	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
LC 3b, 0 deg position, 10-170 deg wind approach angle	121.75	123.46	125.16	126.00	126.84	127.67	127.66	129.29	126.52	126.52
LC 4, 0 deg position, 10-170 deg wind approach angle	68.66	75.46	80.45	83.66	86.82	89.94	91.43	92.26	83.80	83.80
LC 5, 0 deg position, 10-170 deg wind approach angle	33.82	40.62	45.61	48.82	51.98	55.10	56.59	58.22	49.75	49.75
LC 3b, 0 deg position, 190-350 deg wind approach angle	111.37	110.56	109.75	109.35	108.96	108.57	108.58	108.07	107.68	107.68
LC 4, 0 deg position, 190-350 deg wind approach angle	45.21	42.15	39.81	38.34	36.91	35.48	34.82	32.56	31.86	31.86
LC 5, 0 deg position, 190-350 deg wind approach angle	10.37	7.30	4.97	3.50	2.07	0.64	-0.03	-1.49	-2.19	-2.19
LC 3b, 15 deg position, 10-170 deg wind approach angle	133.98	128.71	126.01	120.76	118.09	115.44	115.38	116.07	109.85	109.85
LC 4, 15 deg position, 10-170 deg wind approach angle	90.44	87.36	84.26	81.19	79.02	76.93	75.79	76.66	70.72	70.72
LC 5, 15 deg position, 190-350 deg wind approach angle	-2.95	-2.14	-3.59	-4.99	-5.74	-6.54	-6.82	-5.57	-5.92	-5.92
LC 3b, 30 deg position, 10-170 deg wind approach angle	140.53	135.86	133.43	131.02	128.64	126.28	126.19	124.27	122.33	122.33
LC 4, 30 deg position, 10-170 deg wind approach angle	89.48	87.03	84.58	82.69	80.90	79.75	78.79	78.40	76.31	76.31
LC 5, 30 deg position, 190-350 deg wind approach angle	-9.40	-5.85	-5.23	-4.55	-3.99	-3.45	-3.10	-3.29	-6.16	-6.16
LC 3b, 45 deg position, 10-170 deg wind approach angle	139.36	131.53	127.49	123.48	119.52	119.36	115.49	115.40	115.04	115.04
LC 4, 45 deg position, 10-170 deg wind approach angle	86.33	81.44	77.85	74.41	71.13	69.23	67.55	65.65	65.80	65.80
LC 5, 45 deg position, 190-350 deg wind approach angle	-4.57	-0.54	0.84	2.05	3.07	3.87	4.42	4.36	-0.95	-0.95
LC 3b, 60 deg position, 10-170 deg wind approach angle	125.06	125.06	125.06	125.06	125.06	125.06	125.06	123.84	125.18	125.18
LC 4, 60 deg position, 10-170 deg wind approach angle	138.13	138.13	138.13	138.13	138.13	138.13	138.13	135.70	138.38	138.38
LC 5, 60 deg position, 190-350 deg wind approach angle	-50.76	-44.33	-44.33	-44.33	-44.33	-44.33	-44.33	-45.84	-66.69	-66.69

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The structure has been designed for the following load cases, loads shown are in N/m

Table X: Vertical (Y) loads applied to tracker with units in N/m. Load cases are combined per the load combinations specified in Table 3

Load Combination	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
LC 3b, 0 deg position, 10-170 deg wind approach angle	1776.84	1801.79	1826.62	1838.88	1851.09	1863.27	1863.09	1886.82	1846.37	1846.37
LC 4, 0 deg position, 10-170 deg wind approach angle	1002.04	1101.24	1174.09	1220.97	1267.02	1312.62	1334.33	1346.47	1222.90	1222.90
LC 5, 0 deg position, 10-170 deg wind approach angle	493.57	592.76	665.62	712.49	758.54	804.14	825.85	849.63	726.06	726.06
LC 3b, 0 deg position, 190-350 deg wind approach angle	1625.34	1613.43	1601.63	1595.88	1590.16	1584.45	1584.63	1577.12	1571.43	1571.43
LC 4, 0 deg position, 190-350 deg wind approach angle	659.81	615.07	581.01	559.60	538.62	517.75	508.09	475.11	464.90	464.90
LC 5, 0 deg position, 190-350 deg wind approach angle	151.33	106.59	72.53	51.12	30.14	9.27	-0.39	-21.73	-31.94	-31.94
LC 3b, 15 deg position, 10-170 deg wind approach angle	1955.32	1878.41	1839.02	1762.34	1723.36	1684.65	1683.79	1693.93	1603.18	1603.18
LC 4, 15 deg position, 10-170 deg wind approach angle	1319.87	1274.91	1229.66	1184.89	1153.14	1122.65	1106.10	1118.83	1032.08	1032.08
LC 5, 15 deg position, 190-350 deg wind approach angle	-43.11	-31.21	-52.36	-72.78	-83.73	-95.37	-99.50	-81.25	-86.36	-86.4
LC 3b, 30 deg position, 10-170 deg wind approach angle	2050.81	1982.77	1947.27	1912.10	1877.31	1842.94	1841.64	1813.63	1785.20	1785.20
LC 4, 30 deg position, 10-170 deg wind approach angle	1305.81	1270.15	1234.31	1206.76	1180.60	1163.91	1149.85	1144.19	1113.65	1113.65
LC 5, 30 deg position, 190-350 deg wind approach angle	-137.12	-85.38	-76.28	-66.42	-58.23	-50.30	-45.26	-48.08	-89.87	-89.9
LC 3b, 45 deg position, 10-170 deg wind approach angle	2033.74	1919.54	1860.54	1802.11	1744.29	1741.87	1685.45	1684.14	1678.89	1678.89
LC 4, 45 deg position, 10-170 deg wind approach angle	1259.92	1188.59	1136.13	1085.89	1038.10	1010.36	985.85	958.16	960.31	960.31
LC 5, 45 deg position, 190-350 deg wind approach angle	-66.66	-7.84	12.21	29.85	44.84	56.41	64.54	63.62	-13.92	-13.9
LC 3b, 60 deg position, 10-170 deg wind approach angle	1825.08	1825.08	1825.08	1825.08	1825.08	1825.08	1825.08	1807.35	1826.85	1826.85
LC 4, 60 deg position, 10-170 deg wind approach angle	2015.91	2015.91	2015.91	2015.91	2015.91	2015.91	2015.91	1980.43	2019.43	2019.43
LC 5, 60 deg position, 190-350 deg wind approach angle	-740.77	-646.90	-646.90	-646.90	-646.90	-646.90	-646.90	-668.98	-973.34	-973.3

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The structure has been designed for the following load cases, loads shown are in lbf/ft

Table X: Horizontal (X) loads applied to tracker with units in plf. Load cases are combined per the load combinations specified in Table 3

Load Combination	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
LC 3b, 0 deg position, 10-170 deg wind approach angle	0.06	0.24	0.51	0.75	0.99	1.22	1.32	1.61	1.24	1.24
LC 4, 0 deg position, 10-170 deg wind approach angle	0.28	1.43	3.00	4.57	6.23	7.88	8.94	9.85	7.53	68.66
LC 5, 0 deg position, 10-170 deg wind approach angle	0.28	1.43	3.00	4.57	6.23	7.88	8.94	9.85	7.53	33.82
LC 3b, 0 deg position, 190-350 deg wind approach angle	-0.11	-0.34	-0.60	-0.83	-1.04	-1.22	-1.32	-1.45	-1.54	111.37
LC 4, 0 deg position, 190-350 deg wind approach angle	-0.45	-1.59	-2.87	-4.07	-5.23	-6.30	-7.01	-7.77	-8.17	45.21
LC 5, 0 deg position, 190-350 deg wind approach angle	-0.45	-1.59	-2.87	-4.07	-5.23	-6.30	-7.01	-7.77	-8.17	10.37
LC 3b, 15 deg position, 10-170 deg wind approach angle	4.51	4.95	5.34	5.66	5.93	6.14	6.28	6.68	5.18	133.98
LC 4, 15 deg position, 10-170 deg wind approach angle	9.48	11.22	12.74	13.99	15.00	15.77	16.29	17.25	14.13	90.44
LC 5, 15 deg position, 190-350 deg wind approach angle	-8.35	-9.81	-12.01	-14.15	-15.87	-17.42	-18.37	-18.13	-18.61	-2.95
LC 3b, 30 deg position, 10-170 deg wind approach angle	8.31	8.81	9.22	9.57	9.87	10.13	10.25	10.69	9.26	140.53
LC 4, 30 deg position, 10-170 deg wind approach angle	17.14	19.04	20.82	22.24	23.48	24.34	24.99	25.88	24.10	89.48
LC 5, 30 deg position, 190-350 deg wind approach angle	-21.05	-21.16	-22.88	-24.27	-25.45	-26.30	-26.91	-27.69	-30.87	-9.40
LC 3b, 45 deg position, 10-170 deg wind approach angle	13.10	13.36	13.61	13.81	13.97	14.10	14.18	14.21	13.83	139.36
LC 4, 45 deg position, 10-170 deg wind approach angle	26.48	27.54	28.46	29.19	29.74	30.18	30.45	29.95	30.56	86.33
LC 5, 45 deg position, 190-350 deg wind approach angle	-30.94	-29.38	-30.32	-31.05	-31.60	-32.04	-32.31	-33.13	-42.23	-4.57
LC 3b, 60 deg position, 10-170 deg wind approach angle	78.30	78.30	78.30	78.30	78.30	78.30	78.30	76.19	78.51	125.06
LC 4, 60 deg position, 10-170 deg wind approach angle	156.59	156.59	156.59	156.59	156.59	156.59	156.59	152.38	157.01	138.13
LC 5, 60 deg position, 190-350 deg wind approach angle	-130.94	-119.80	-119.80	-119.80	-119.80	-119.80	-119.80	-122.42	-158.54	-50.76

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The structure has been designed for the following load cases, loads shown are in lbf/ft

Table X: Horizontal (X) loads applied to tracker with units in N/m. Load cases are combined per the load combinations specified in Table 3

Load Combination	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
LC 3b, 0 deg position, 10-170 deg wind approach angle	0.83	3.53	7.38	10.87	14.42	17.86	19.25	23.54	18.12	18.12
LC 4, 0 deg position, 10-170 deg wind approach angle	4.11	20.86	43.75	66.73	90.87	115.00	130.53	143.70	109.90	1002.04
LC 5, 0 deg position, 10-170 deg wind approach angle	4.11	20.86	43.75	66.73	90.87	115.00	130.53	143.70	109.90	493.57
LC 3b, 0 deg position, 190-350 deg wind approach angle	-1.54	-4.99	-8.77	-12.09	-15.13	-17.85	-19.23	-21.18	-22.53	1625.34
LC 4, 0 deg position, 190-350 deg wind approach angle	-6.62	-23.19	-41.86	-59.37	-76.26	-91.99	-102.24	-113.36	-119.25	659.81
LC 5, 0 deg position, 190-350 deg wind approach angle	-6.62	-23.19	-41.86	-59.37	-76.26	-91.99	-102.24	-113.36	-119.25	151.33
LC 3b, 15 deg position, 10-170 deg wind approach angle	65.79	72.18	77.90	82.62	86.53	89.55	91.66	97.47	75.54	1955.32
LC 4, 15 deg position, 10-170 deg wind approach angle	138.39	163.76	185.88	204.10	218.85	230.11	237.72	251.80	206.25	1319.87
LC 5, 15 deg position, 190-350 deg wind approach angle	-121.90	-143.14	-175.23	-206.51	-231.57	-254.18	-268.13	-264.58	-271.57	-43.11
LC 3b, 30 deg position, 10-170 deg wind approach angle	121.23	128.65	134.49	139.64	144.10	147.87	149.62	155.95	135.15	2050.81
LC 4, 30 deg position, 10-170 deg wind approach angle	250.18	277.91	303.79	324.58	342.63	355.28	364.72	377.64	351.74	1305.81
LC 5, 30 deg position, 190-350 deg wind approach angle	-307.24	-308.76	-333.86	-354.21	-371.36	-383.77	-392.67	-404.05	-450.49	-137.12
LC 3b, 45 deg position, 10-170 deg wind approach angle	191.12	195.01	198.58	201.51	203.82	205.81	206.88	207.34	201.83	2033.74
LC 4, 45 deg position, 10-170 deg wind approach angle	386.42	401.95	415.36	425.95	434.02	440.38	444.37	437.06	445.92	1259.92
LC 5, 45 deg position, 190-350 deg wind approach angle	-451.47	-428.80	-442.52	-453.19	-461.15	-467.59	-471.50	-483.49	-616.36	-66.66
LC 3b, 60 deg position, 10-170 deg wind approach angle	1142.65	1142.65	1142.65	1142.65	1142.65	1142.65	1142.65	1111.92	1145.70	1825.08
LC 4, 60 deg position, 10-170 deg wind approach angle	2285.30	2285.30	2285.30	2285.30	2285.30	2285.30	2285.30	2223.85	2291.41	2015.91
LC 5, 60 deg position, 190-350 deg wind approach angle	-1910.95	-1748.36	-1748.36	-1748.36	-1748.36	-1748.36	-1748.36	-1786.61	-2313.77	-740.8

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PANEL TO RAIL ATTACHMENT CHECK - 1/4" LARGE HEAD BOBTAIL BOLT

Bolt Diameter =	0.25	in
Bolt Quantity =	4	Nos
Rail Thickness=	0.071	in
Rail Fy=	50	ksi
Rail Fu=	68	ksi
Overhang, Lo =	0.47	ft

ULTIMATE CAPACITIES (#'S)			
DIAMETER	CLAMP	TENSILE	SHEAR
0.3	620	1348	1375

Bolt Tension	
ϕ=	0.65
Pn=	1348
ϕPn=	876.2

Bolt Quantity per side = 2 Nos

Stow	LC	Load Factors	Angle	Combo Load Tension	Check
0	5	0.9D+1W	0	63.2	7%
0	5	0.9D+1W	1	63.3	7%
0	5	0.9D+1W	1	63.3	7%
0	5	0.9D+1W	0	85.6	10%
0	5	0.9D+1W	1	85.8	10%
0	5	0.9D+1W	1	85.8	10%
15	5	0.9D+1W	15	29.2	3%
15	5	0.9D+1W	16	29.6	3%
15	5	0.9D+1W	16	96.6	11%
30	5	0.9D+1W	30	55.3	6%
30	5	0.9D+1W	31	54.7	6%
30	5	0.9D+1W	31	122.5	14%
45	5	0.9D+1W	45	63.6	7%
45	5	0.9D+1W	46	62.9	7%
45	5	0.9D+1W	46	119.7	14%
60	5	0.9D+1W	60	312.4	36%
60	5	0.9D+1W	60	312.4	36%
60	5	0.9D+1W	60	380.3	43%

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PANEL TO RAIL ATTACHMENT CHECK

Torsion Check

Stow	LC	Load Factors	Angle	SL-Torsional Moment	WL-Torsional MOMENT	DL per Bolt	Combination Load	ϕTn	Check
0	5	0.9D+1W	0	216.5	53.5	18.7	70.4	876.2	8%
0	5	0.9D+1W	1	214.9	53.5	18.6	70.2	876.2	8%
0	5	0.9D+1W	1	214.9	53.5	18.6	70.2	876.2	8%
0	5	0.9D+1W	0	216.5	92.1	18.7	108.9	876.2	12%
0	5	0.9D+1W	1	214.9	92.1	18.6	108.8	876.2	12%
0	5	0.9D+1W	1	214.9	92.1	18.6	108.8	876.2	12%
15	5	0.9D+1W	15	210.7	42.7	17.8	58.8	876.2	7%
15	5	0.9D+1W	16	210.5	42.7	17.4	58.3	876.2	7%
15	5	0.9D+1W	16	210.5	134.1	17.4	149.8	876.2	17%
30	5	0.9D+1W	30	200.1	57.0	15.7	71.2	876.2	8%
30	5	0.9D+1W	31	190.6	57.0	15.0	70.5	876.2	8%
30	5	0.9D+1W	31	190.6	140.5	15.0	154.0	876.2	18%
45	5	0.9D+1W	45	143.7	55.1	12.5	66.4	876.2	8%
45	5	0.9D+1W	46	120.1	55.1	11.8	65.7	876.2	8%
45	5	0.9D+1W	46	120.1	167.2	11.8	177.8	876.2	20%
60	5	0.9D+1W	60	59.7	167.7	9.4	176.1	876.2	20%
60	5	0.9D+1W	60	59.7	167.7	9.4	176.1	876.2	20%
60	5	0.9D+1W	60	59.7	570.2	9.4	578.7	876.2	66%

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PANEL TO RAIL ATTACHMENT CHECK

Shear Check

Bolt Shear	
ϕ=	0.65
Pn=	1375
ϕPn=	893.8

Stow	LC	Load Factors	Angle	DL Shear	SL Shear	Combination Load Shear	Load Per Bolt	Bolt Shear	Check
0	5	0.9D+1W	0	9.1	26.4	8.2	2.1	894	0%
0	5	0.9D+1W	1	19.4	56.2	17.5	4.4	894	0%
0	5	0.9D+1W	1	19.4	56.2	17.5	4.4	894	0%
0	5	0.9D+1W	0	9.1	26.4	8.2	2.1	894	0%
0	5	0.9D+1W	1	19.4	56.2	17.5	4.4	894	0%
0	5	0.9D+1W	1	19.4	56.2	17.5	4.4	894	0%
15	5	0.9D+1W	15	28.1	85.1	25.3	6.3	894	1%
15	5	0.9D+1W	16	37.5	119.3	33.7	8.4	894	1%
15	5	0.9D+1W	16	37.5	119.3	33.7	8.4	894	1%
30	5	0.9D+1W	30	44.1	140.3	39.7	9.9	894	1%
30	5	0.9D+1W	31	51.1	162.7	46.0	11.5	894	1%
30	5	0.9D+1W	31	51.1	162.7	46.0	11.5	894	1%
45	5	0.9D+1W	45	58.3	168.7	52.4	13.1	894	1%
45	5	0.9D+1W	46	62.9	165.9	56.6	14.1	894	2%
45	5	0.9D+1W	46	62.9	165.9	56.6	14.1	894	2%
60	5	0.9D+1W	60	64.9	103.3	58.4	14.6	894	2%
60	5	0.9D+1W	60	64.9	103.3	58.4	14.6	894	2%
60	5	0.9D+1W	60	64.9	103.3	58.4	14.6	894	2%

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Engineer:	MDR/DCD
Date:	29-Apr-25

PANEL RAIL - FSLRS6-EXT-21171-02-A

Total Length, L = 1.43 ft

Overhang, Lo = 0.47 ft

Bolt Spacing, s = 0.48 ft

Trib Area = 27.12 ft²

Panel Weight = 2.76 psf

Part No :	21171-02

Analysis / Code Checks

Section	Allow.Load (plf) Tension	Torsion	Torsion Up
FSLRS6-EXT-21171-02-A	2608	19938	14368

Analysis of the maximum loads for each panel rail section was performed in FEA or by Testing. These calculations and/or test reports are available upon request.

Stow	LC	Load Factors	Angle	Design Tension Load (lbs)	Design Check for Tension	Design Torsion Load (lbs-in)	Design Check for Torsion	
							Down	Up
0	3b	1.2D+0.5W+1.6S	0	470.4	18%	1640	8%	
0	4	1.2D+1W+0.5S	1	409.0	16%	3020	15%	
0	5	0.9D+1W	1	279.3	11%	3020		21%
0	3b	1.2D+0.5W+1.6S	0	499.9	19%	1725	9%	
0	4	1.2D+1W+0.5S	1	372.7	14%	3283	16%	
0	5	0.9D+1W	1	243.0	9%	3283		23%
15	3b	1.2D+0.5W+1.6S	15	549.6	21%	1556	8%	
15	4	1.2D+1W+0.5S	16	485.8	19%	3143	16%	
15	5	0.9D+1W	16	331.9	13%	3515		24%
30	3b	1.2D+0.5W+1.6S	30	549.5	21%	1705	9%	
30	4	1.2D+1W+0.5S	31	487.2	19%	3151	16%	
30	5	0.9D+1W	31	430.6	17%	4042		28%
45	3b	1.2D+0.5W+1.6S	45	448.0	17%	1692	8%	
45	4	1.2D+1W+0.5S	46	426.5	16%	3074	15%	
45	5	0.9D+1W	46	438.7	17%	3828		27%
60	3b	1.2D+0.5W+1.6S	60	875.5	34%	6653	33%	
60	4	1.2D+1W+0.5S	60	1544.9	59%	13046	65%	
60	5	0.9D+1W	60	1482.9	57%	13086		91%

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

PANEL RAIL TEST - FSLRS6-EXT-21171-02-A

Analysis Method

Testing on the panel rails was conducted under Structurology's supervision, and the testing provisions of AISI 100-16, Chapter F were used to determine the capacity of the panel rail.

Analysis Code Checks

Determine Resistance factor, f, per AISI 100-16 Chapter F, Section F1.1

	Tension	Torsion	Torsion
$\phi = C_\phi(M_mF_mP_m)e^\gamma$ =	0.890	0.889	0.918
$\gamma = -\beta_o(v_M^2+v_F^2+c_pv_P^2+v_Q^2)^{(1/2)}$ =	-0.625	-0.627	-0.595

C_ϕ = Calibration Coefficient =	1.52
M_m = mean value of material factor =	1.10
F_m = mean value of fabrication factor =	1.00
P_m = mean value of professional factor =	1.00
e = natural logarithmic base =	2.74
β_o = target reliability index =	2.50
v_M = variation of material factor =	0.10
v_F = variation of fabrication factor =	0.05

c_P = correction factor = (1+1/n)m/(m-2) for n>3 and 5.7 for n = 3

Tension cP =	1.41
Torsion cP =	1.48
Torsion cP =	0.00
v_P = coefficient of variation =	0.07
v_Q = variation of load effect =	0.21

Test No.	Tension (lbs)	Torsion (lbs-in)	Torsion (lbs-in)
1	2931	22228	15650
2	2960	22193	
3	3008	21123	
4	2868	22314	
5	2932	22133	
6	2865	23258	
7	2993	22100	
8	2967	23347	
9	2887	23167	
10	2881		
11			
12			
13			
14			
15			

- Refer ENG-000549 for above Test Data

	Tension	Torsion	Torsion
n =	10	9	1
m =	9	8	0

Determine the nominal resistance of the connection

R_n = Average Tension Capacity from all tests = 2929.2 lbs

Rn = Average Torsion Capacity from all tests = 22429.2 lbs-in

Rn = Average Torsion Capacity from all tests = 15650.0 lbs-in

Therefore the Tension load resistance of this rail is:

ϕR_n = 2607.5 lbs

Therefore the Torsion load resistance of this rail is:

fRn = 19937.5 lbs

Therefore the Torsion load resistance of this rail is:

fRn = 14367.8 lbs

Part No :	21171-02

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

TORQUE TUBE CHECK - 3.5MM THICK,GEN 2 FS6

Torque Tube properties		
Panel Width=	4.08	ft
Panel Weight=	2.76	psf
Rail Weight=	0.00	plf
Trib. Width=	6.64	ft
Tube Weight=	7.16	plf

Tube Section Properties				
Shape	A (in2)	S (in3)	Z (in3)	C (in3)
5" O.D. x 0.138"	2.10	2.49	3.26	5.12

E= 29000 ksi

No of Bays= 9

Torque Tube

Layout of Torque Tubes

TT%	65%	82%	82%	81%	84%	83%	72%	70%	69%	10%
TT Size	5" O.D. x 0.138	5" O.D. x 0.138"	5" O.D. x 0.138"	5" O.D. x 0.138"	5" O.D. x 0.138"	5" O.D. x 0.138	5" O.D. x 0.138"	5" O.D. x 0.138"	5" O.D. x 0.138"	5" O.D. x 0.138"
	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
	23.998	25.474	25.474	25.474	25.474	25.474	21.337	21.337	21.337	4.385

(Extra Tolerance Factor =1.2 used for (XTR-0.75 - Extreme Terrain))

Capacity of Torque Tubes

Torsional Capacity of Members is calculated in accordance with AISC H3.1A

$\phi = 0.9$

$T_n = F_{cr}C$

$F_{cr} =$ Max $\{1.23E/((L/D)^{1/2}(D/t)^{5/4});\ 0.60E/((D/t)^{3/2})\}$, but not more than 0.6Fy

Shear Capacity of Members is calculated in accordance with AISC G6

$\phi = 0.9$

$V_n = F_{cr}A_g/2$

$F_{cr} =$ Max $\{1.60E/((L/D)^{1/2}(D/t)^{5/4});\ 0.78E/((D/t)^{3/2})\}$, but not more than 0.6Fy

Bending Capacity of Members is calculated in accordance with AISC F8

$\phi = 0.9$

Yielding: $M_n = M_p = F_y Z$

Local Buckling Non-Compact: $M_n = (0.021E/(D/t) + Fy)S$

Local Buckling Slender: $M_n = F_{cr}S$

$F_{cr} = 0.33E/(D/t)$

Combined Loads were checked per AISC Eq H3-6 : $(P_r/P_c + M_r/M_c)^2 + (V_r/V_c + T_r/T_c)^2 < 1.0$

Allowable Values

Bay	TT Size	ΦTn k-in	ΦVn k	ΦMn k-in	For (V) ksi	Fy ksi
1	5" O.D. x 0.138"	166	34	172	36	60
2	5" O.D. x 0.138"	166	34	172	36	60
3	5" O.D. x 0.138"	166	34	172	36	60
4	5" O.D. x 0.138"	166	34	172	36	60
5	5" O.D. x 0.138"	166	34	172	36	60
6	5" O.D. x 0.138"	166	34	172	36	60
7	5" O.D. x 0.138"	166	34	172	36	60
8	5" O.D. x 0.138"	166	34	172	36	60
9	5" O.D. x 0.138"	166	34	172	36	60
10c	5" O.D. x 0.138"	166	34	172	36	60

Summary for all tilt angles and load combinations

Bay	MAX	%T	%Combined	%M	%V
1	65%	64%	65%	65%	8%
2	82%	57%	82%	82%	9%
3	82%	49%	82%	82%	9%
4	81%	42%	81%	81%	9%
5	84%	34%	84%	84%	9%
6	83%	27%	83%	83%	9%
7	72%	19%	72%	72%	8%
8	70%	13%	70%	70%	8%
9	69%	9%	69%	69%	8%
10c	10%	3%	10%	10%	3%

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TT BOLTS - BLIND OM RIVET, 1/2" DIAMETER, GRIP 4

Bolt = BOM 1/2
d_{bolt} = 0.50 in
d_{hole} = 0.57 in
Nominal Shear = 20.15 kips
Nominal Tension = 13.00 kips

Torque Tube = 5" O.D. x 0.138"
d_{tube} = 5.00
$d_{i,tube}$ = 4.72
E = 29000 ksi

Material Data for Connection Locations										
Location	Motor	2	3	4	5	6	7	8	9	10c
# Bolts	4	3	3	3	3	3	3	3	3	3
t_{tube}	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138
$F_{u\text{-}tube}$	75	75	75	75	75	75	75	75	75	75

tta

Analysis Code Cheks

Bolt Shear Check

CHECK:	BOLT SHEAR	
CODE REF:	[AISC J3-1]	
Vu =	5.28	k
ϕ =	0.75	
ΦRn =	15.1	k
D/C:	0.35	
F_{nveqv} =	103	ksi
A_b =	0.196	in^2
Check	OK	

$\Phi R_n = \phi$ * Nominal Shear
F_{nveqv} = Nominal Shear / Ab
$A_b = \pi r^2$

Bolt Bearing Check

Support	Tube Size	t (in)	F_u (ksi)	ϕR_n (k)
Motor	5" O.D. x 0.138"	0.138	75	9.30
2	5" O.D. x 0.138"	0.138	75	9.30
3	5" O.D. x 0.138"	0.138	75	9.30
4	5" O.D. x 0.138"	0.138	75	9.30
5	5" O.D. x 0.138"	0.138	75	9.30
6	5" O.D. x 0.138"	0.138	75	9.30
7	5" O.D. x 0.138"	0.138	75	9.30
8	5" O.D. x 0.138"	0.138	75	9.30
9	5" O.D. x 0.138"	0.138	75	9.30
10c	5" O.D. x 0.138"	0.138	75	9.30

CHECK:	BEARING STRENGTH AT BOLT HOLES
CODE REF:	[AISC J3-10]

ϕ = 0.75

$R_n = 3.0*d*t*F_u$

R_n = 3.0*0.5*0.137795*75 = 15.50
ΦR_n = 0.75*15.5 = 11.63

Vu = Torsion Max / Dia of Torque Tube / No of Bolts
Bolt D/C = Vu / ΦRn (Shear)
Bearing D/C = Vu / ΦRn (Bearing)

Support	Torsion Max	Vu	ΦRn	Bolt D/C	ΦRn	Bearing D/C
Motor	89.24	4.46	15.11	30%	9.30	48%
2	79.19	5.28	15.11	35%	9.30	57%
3	68.58	4.57	15.11	30%	9.30	49%
4	58.00	3.87	15.11	26%	9.30	42%
5	47.44	3.16	15.11	21%	9.30	34%
6	36.91	2.46	15.11	16%	9.30	26%
7	26.40	1.76	15.11	12%	9.30	19%
8	18.56	1.24	15.11	8%	9.30	13%
9	13.63	0.91	15.11	6%	9.30	10%
10c	5.60	0.37	15.11	2%	9.30	4%

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Torsion at each support for all Load Combinations

* Torque's in Kip-in

Tilt Angle	Load Combo	Pier No									
		Motor	2	3	4	5	6	7	8	9	10c
0	3b	45.69	40.66	35.33	30.02	24.71	19.41	14.12	9.68	5.14	0.88
0	4	89.24	79.19	68.58	58.00	47.44	36.91	26.40	17.61	9.33	1.59
0	5	89.24	79.19	68.58	58.00	47.44	36.91	26.40	17.61	9.33	1.59
0	3b	34.21	30.75	27.01	23.21	19.38	15.52	11.63	8.37	4.68	0.80
0	4	72.23	65.24	57.58	49.74	41.77	33.69	25.48	18.56	10.90	1.86
0	5	72.23	65.24	57.58	49.74	41.77	33.69	25.48	18.56	10.90	1.86
15	3b	41.14	36.20	31.11	26.11	21.27	16.52	11.84	7.93	4.20	0.72
15	4	75.11	65.37	55.53	46.19	37.33	28.81	20.61	13.89	7.51	1.28
15	5	67.05	59.35	51.47	43.88	36.59	29.49	22.59	16.89	10.28	1.75
30	3b	34.35	30.57	26.55	22.53	18.50	14.47	10.44	7.07	3.90	0.67
30	4	69.15	61.58	53.53	45.46	37.39	29.31	21.22	14.44	8.14	1.39
30	5	57.67	51.32	44.80	38.48	32.31	26.28	20.32	15.38	9.98	1.70
45	3b	32.47	28.65	24.74	20.91	17.15	13.46	9.78	6.75	3.76	0.64
45	4	60.00	52.51	44.99	37.76	30.82	24.18	17.68	12.36	6.74	1.15
45	5	65.10	59.49	52.89	45.87	38.42	30.56	22.48	15.53	8.10	1.38
60	3b	7.02	7.45	7.45	7.45	7.45	7.45	6.24	6.94	6.82	2.80
60	4	14.04	14.90	14.90	14.90	14.90	14.90	12.48	13.89	13.63	5.60
60	5	15.31	16.25	16.25	16.25	16.25	16.25	13.61	14.12	11.80	4.85

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Date:	29-Apr-25

PIVOT PIN

Part No : 41014

Pin Type =	Solid		Yield Strength =	75.00	ksi
Diameter =	1.00	in	Ultimate Strength =	82	ksi
Span =	4.90	in	Z =	0.167	in^3
Material =	A666		Sx =	0.098	in^3

Capacity of Pin per AISC

Moment Capacity of the Pin		
Φ_b =	0.9	
$M_n = M_p$ =	11.78	ksi
$\Phi_b M_n$ =	10.6029	ksi

Shear Capacity of the Pin		
Φ_a =	1.00	
Φ_b =	0.75	
V_{na}=	70.69	kip
V_{nb}=	77.28	kip
ΦV_n=	57.96	kip

Verify Length of Pin for Linear Expansion of the tracker AISC TABLE 17-11		
Total Wing Length =	219.8	ft
Δt =	70	°F
ε_{steel} =	0.00065	
ΔL =	0.10	ft
ΔL =	1.20	in

Change of Length = εtl

Flexure and Shear Check

Loads taken from Aeroelastic Torque Tube Analysis, these loads account for twist in torque tube.

LOAD CASE	Joint	X (lb)	Y (lb)	Combined (lb)	Angle (lb)	Moment in Pin Kip-in	$M/\Phi_b M_n$ D/C	$V/\Phi V_n$ D/C	Flexure Check	Shear Check
0 degrees A LC 3b	M	1	3382	3382	0	2.071	0.195	0.058	OK	OK
	2	4	3588	3588	0	2.198	0.207	0.062	OK	OK
	3	11	3762	3762	0	2.304	0.217	0.065	OK	OK
	4	19	3774	3774	0	2.312	0.218	0.065	OK	OK
	5	26	3784	3784	0	2.317	0.219	0.065	OK	OK
	6	34	3892	3892	1	2.384	0.225	0.067	OK	OK
	7	35	3568	3569	1	2.186	0.206	0.062	OK	OK
	8	36	3055	3055	1	1.871	0.176	0.053	OK	OK
	9	40	3565	3565	1	2.184	0.206	0.062	OK	OK
	10	19	1989	1989	1	1.218	0.115	0.034	OK	OK
0 degrees A LC 4	M	4	1885	1886	0	1.155	0.109	0.033	OK	OK
	2	24	2108	2108	1	1.291	0.122	0.036	OK	OK
	3	66	2364	2365	2	1.448	0.137	0.041	OK	OK
	4	114	2468	2471	3	1.513	0.143	0.043	OK	OK
	5	161	2550	2555	4	1.565	0.148	0.044	OK	OK
	6	218	2707	2716	5	1.663	0.157	0.047	OK	OK
	7	234	2533	2544	5	1.558	0.147	0.044	OK	OK
	8	231	2203	2215	6	1.356	0.128	0.038	OK	OK
	9	239	2442	2454	6	1.503	0.142	0.042	OK	OK
	10	116	1311	1316	5	0.806	0.076	0.023	OK	OK
0 degrees A LC 5	M	4	916	916	0	0.561	0.053	0.016	OK	OK
	2	24	1088	1088	1	0.667	0.063	0.019	OK	OK
	3	66	1310	1311	3	0.803	0.076	0.023	OK	OK
	4	114	1421	1426	5	0.873	0.082	0.025	OK	OK
	5	161	1506	1515	6	0.928	0.088	0.026	OK	OK
	6	218	1642	1656	8	1.015	0.096	0.029	OK	OK
	7	234	1557	1575	9	0.965	0.091	0.027	OK	OK
	8	231	1385	1404	9	0.860	0.081	0.024	OK	OK
	9	239	1494	1513	9	0.927	0.087	0.026	OK	OK
	10	116	774	783	9	0.480	0.045	0.014	OK	OK
0 degrees X LC 3b	M	-2	3101	3101	360	1.900	0.179	0.054	OK	OK
	2	-6	3249	3249	360	1.990	0.188	0.056	OK	OK
	3	-14	3332	3332	360	2.041	0.192	0.057	OK	OK
	4	-22	3290	3290	360	2.015	0.190	0.057	OK	OK
	5	-28	3268	3268	360	2.002	0.189	0.056	OK	OK
	6	-35	3324	3324	359	2.036	0.192	0.057	OK	OK
	7	-36	3037	3037	359	1.860	0.175	0.052	OK	OK
	8	-33	2572	2572	359	1.575	0.149	0.044	OK	OK
	9	-42	3007	3007	359	1.842	0.174	0.052	OK	OK
	10	-24	1695	1695	359	1.038	0.098	0.029	OK	OK
0 degrees X LC 4	M	-9	1269	1269	360	0.777	0.073	0.022	OK	OK
	2	-29	1280	1280	359	0.784	0.074	0.022	OK	OK
	3	-67	1237	1239	357	0.759	0.072	0.021	OK	OK
	4	-105	1172	1177	355	0.721	0.068	0.020	OK	OK
	5	-139	1128	1136	353	0.696	0.066	0.020	OK	OK
	6	-178	1104	1118	351	0.685	0.065	0.019	OK	OK
	7	-186	984	1002	349	0.614	0.058	0.017	OK	OK
	8	-176	800	819	348	0.502	0.047	0.014	OK	OK
	9	-224	894	922	346	0.565	0.053	0.016	OK	OK
	10	-129	501	518	346	0.317	0.030	0.009	OK	OK

LOAD CASE	Joint	X (lb)	Y (lb)	Combined (lb)	Angle (lb)	Moment in Pin Kip-in	$M/\Phi_b M_n$ D/C	$V/\Phi V_n$ D/C	Flexure Check	Shear Check
0 degrees X LC 5	M	-9	300	300	358	0.184	0.017	0.005	OK	OK
	2	-29	260	261	354	0.160	0.015	0.005	OK	OK
	3	-67	183	195	340	0.120	0.011	0.003	OK	OK
	4	-105	126	164	320	0.100	0.009	0.003	OK	OK
	5	-139	84	162	301	0.099	0.009	0.003	OK	OK
	6	-178	39	182	282	0.111	0.011	0.003	OK	OK
	7	-186	9	186	273	0.114	0.011	0.003	OK	OK
	8	-176	-17	176	264	0.108	0.010	0.003	OK	OK
	9	-224	-54	230	256	0.141	0.013	0.004	OK	OK
	10	-129	-35	134	255	0.082	0.008	0.002	OK	OK
15 degrees A LC 3b	M	124	3749	3751	2	2.298	0.217	0.065	OK	OK
	2	138	3843	3845	2	2.355	0.222	0.066	OK	OK
	3	156	3854	3858	2	2.363	0.223	0.067	OK	OK
	4	165	3707	3711	3	2.273	0.214	0.064	OK	OK
	5	173	3571	3575	3	2.190	0.207	0.062	OK	OK
	6	185	3567	3572	3	2.188	0.206	0.062	OK	OK
	7	172	3218	3223	3	1.974	0.186	0.056	OK	OK
	8	158	2763	2767	3	1.695	0.160	0.048	OK	OK
	9	163	3141	3145	3	1.926	0.182	0.054	OK	OK
	10	80	1723	1725	3	1.057	0.100	0.030	OK	OK
15 degrees A LC 4	M	258	2527	2540	6	1.556	0.147	0.044	OK	OK
	2	302	2605	2622	7	1.606	0.151	0.045	OK	OK
	3	363	2597	2622	8	1.606	0.151	0.045	OK	OK
	4	402	2483	2516	9	1.541	0.145	0.043	OK	OK
	5	434	2397	2436	10	1.492	0.141	0.042	OK	OK
	6	472	2382	2429	11	1.488	0.140	0.042	OK	OK
	7	445	2129	2175	12	1.332	0.126	0.038	OK	OK
	8	407	1822	1867	13	1.143	0.108	0.032	OK	OK
	9	434	2047	2093	12	1.282	0.121	0.036	OK	OK
	10	219	1107	1129	11	0.691	0.065	0.019	OK	OK
15 degrees X LC 5	M	-228	-87	244	249	0.149	0.014	0.004	OK	OK
	2	-264	-71	273	255	0.167	0.016	0.005	OK	OK
	3	-329	-83	339	256	0.208	0.020	0.006	OK	OK
	4	-394	-131	416	252	0.255	0.024	0.007	OK	OK
	5	-449	-161	477	250	0.292	0.028	0.008	OK	OK
	6	-510	-188	544	250	0.333	0.031	0.009	OK	OK
	7	-502	-190	537	249	0.329	0.031	0.009	OK	OK
	8	-434	-146	458	251	0.280	0.026	0.008	OK	OK
	9	-512	-159	536	253	0.329	0.031	0.009	OK	OK
	10	-294	-94	308	252	0.189	0.018	0.005	OK	OK
30 degrees A LC 3b	M	229	3928	3935	3	2.410	0.227	0.068	OK	OK
	2	251	4045	4053	4	2.482	0.234	0.070	OK	OK
	3	273	4070	4079	4	2.499	0.236	0.070	OK	OK
	4	282	3972	3983	4	2.439	0.230	0.069	OK	OK
	5	291	3888	3899	4	2.388	0.225	0.067	OK	OK
	6	306	3892	3904	5	2.391	0.225	0.067	OK	OK
	7	284	3529	3540	5	2.168	0.204	0.061	OK	OK
	8	252	2978	2988	5	1.830	0.173	0.052	OK	OK
	9	276	3433	3444	5	2.109	0.199	0.059	OK	OK
	10	144	1924	1930	4	1.182	0.111	0.033	OK	OK
30 degrees A LC 4	M	470	2498	2542	11	1.557	0.147	0.044	OK	OK
	2	529	2586	2639	12	1.616	0.152	0.046	OK	OK
	3	604	2595	2664	13	1.632	0.154	0.046	OK	OK
	4	648	2511	2594	14	1.589	0.150	0.045	OK	OK
	5	685	2448	2542	16	1.557	0.147	0.044	OK	OK
	6	733	2454	2561	17	1.568	0.148	0.044	OK	OK
	7	688	2216	2321	17	1.421	0.134	0.040	OK	OK
	8	609	1868	1965	18	1.204	0.114	0.034	OK	OK
	9	695	2154	2263	18	1.386	0.131	0.039	OK	OK
	10	378	1199	1257	17	0.770	0.073	0.022	OK	OK
30 degrees X LC 5	M	-587	-276	649	245	0.397	0.037	0.011	OK	OK
	2	-615	-220	653	250	0.400	0.038	0.011	OK	OK
	3	-664	-163	684	256	0.419	0.039	0.012	OK	OK
	4	-710	-148	725	258	0.444	0.042	0.013	OK	OK
	5	-744	-128	755	260	0.463	0.044	0.013	OK	OK
	6	-792	-113	800	262	0.490	0.046	0.014	OK	OK
	7	-745	-93	751	263	0.460	0.043	0.013	OK	OK
	8	-641	-68	645	264	0.395	0.037	0.011	OK	OK
	9	-822	-137	834	261	0.511	0.048	0.014	OK	OK
	10	-489	-100	499	258	0.306	0.029	0.009	OK	OK
45 degrees A LC 3b	M	363	3908	3925	5	2.404	0.227	0.068	OK	OK
	2	387	3964	3982	6	2.439	0.230	0.069	OK	OK
	3	408	3912	3933	6	2.409	0.227	0.068	OK	OK
	4	412	3773	3795	6	2.325	0.219	0.065	OK	OK
	5	416	3630	3654	7	2.238	0.211	0.063	OK	OK
	6	429	3650	3675	7	2.251	0.212	0.063	OK	OK
	7	395	3292	3316	7	2.031	0.192	0.057	OK	OK
	8	338	2730	2751	7	1.685	0.159	0.047	OK	OK
	9	390	3215	3239	7	1.984	0.187	0.056	OK	OK
	10	217	1810	1823	7	1.117	0.105	0.031	OK	OK
45 degrees A LC 4	M	733	2420	2529	17	1.549	0.146	0.044	OK	OK
	2	790	2457	2581	18	1.581	0.149	0.045	OK	OK
	3	848	2407	2552	19	1.563	0.147	0.044	OK	OK
	4	867	2287	2446	21	1.498	0.141	0.042	OK	OK
	5	882	2177	2349	22	1.439	0.136	0.041	OK	OK
	6	916	2141	2329	23	1.426	0.135	0.040	OK	OK
	7	849	1916	2096	24	1.284	0.121	0.036	OK	OK
	8	716	1577	1731	24	1.060	0.100	0.030	OK	OK
	9	844	1832	2017	25	1.235	0.116	0.035	OK	OK
	10	482	1036	1143	25	0.700	0.066	0.020	OK	OK

LOAD CASE	Joint	X (lb)	Y (lb)	Combined (lb)	Angle (lb)	Moment in Pin Kip-in	$M/\Phi_b M_n$ D/C	$V/\Phi V_n$ D/C	Flexure Check	Shear Check
45 degrees X LC 5	M	-868	-143	880	261	0.539	0.051	0.015	OK	OK
	2	-879	-72	882	265	0.540	0.051	0.015	OK	OK
	3	-899	9	899	271	0.551	0.052	0.016	OK	OK
	4	-924	43	925	273	0.566	0.053	0.016	OK	OK
	5	-938	77	941	275	0.576	0.054	0.016	OK	OK
	6	-972	108	978	276	0.599	0.057	0.017	OK	OK
	7	-905	113	912	277	0.558	0.053	0.016	OK	OK
	8	-754	118	764	279	0.468	0.044	0.013	OK	OK
	9	-1067	39	1067	272	0.654	0.062	0.018	OK	OK
	10	-674	-20	674	268	0.413	0.039	0.012	OK	OK
60 degrees A LC 3b	M	2178	3479	4105	32	2.514	0.237	0.071	OK	OK
	2	2292	3661	4320	32	2.646	0.250	0.075	OK	OK
	3	2369	3783	4464	32	2.734	0.258	0.077	OK	OK
	4	2352	3757	4432	32	2.715	0.256	0.076	OK	OK
	5	2344	3744	4417	32	2.706	0.255	0.076	OK	OK
	6	2392	3822	4509	32	2.762	0.260	0.078	OK	OK
	7	2194	3501	4131	32	2.531	0.239	0.071	OK	OK
	8	1827	2950	3470	32	2.125	0.200	0.060	OK	OK
	9	2158	3473	4089	32	2.504	0.236	0.071	OK	OK
	10	1239	1973	2329	32	1.427	0.135	0.040	OK	OK
60 degrees A LC 4	M	4357	3843	5810	49	3.558	0.336	0.100	OK	OK
	2	4585	4044	6114	49	3.745	0.353	0.105	OK	OK
	3	4737	4179	6317	49	3.869	0.365	0.109	OK	OK
	4	4704	4150	6273	49	3.842	0.362	0.108	OK	OK
	5	4688	4136	6252	49	3.829	0.361	0.108	OK	OK
	6	4785	4221	6380	49	3.908	0.369	0.110	OK	OK
	7	4389	3869	5851	49	3.583	0.338	0.101	OK	OK
	8	3654	3242	4885	48	2.992	0.282	0.084	OK	OK
	9	4316	3823	5766	48	3.531	0.333	0.099	OK	OK
	10	2478	2182	3301	49	2.022	0.191	0.057	OK	OK
60 degrees X LC 5	M	-3692	-1440	3963	249	2.427	0.229	0.068	OK	OK
	2	-3658	-1384	3911	249	2.395	0.226	0.067	OK	OK
	3	-3607	-1331	3844	250	2.355	0.222	0.066	OK	OK
	4	-3603	-1334	3843	250	2.354	0.222	0.066	OK	OK
	5	-3586	-1327	3824	250	2.342	0.221	0.066	OK	OK
	6	-3658	-1353	3900	250	2.389	0.225	0.067	OK	OK
	7	-3370	-1251	3594	250	2.201	0.208	0.062	OK	OK
	8	-2785	-1018	2965	250	1.816	0.171	0.051	OK	OK
	9	-3980	-1605	4291	248	2.628	0.248	0.074	OK	OK
	10	-2532	-1071	2749	247	1.684	0.159	0.047	OK	OK

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

HANDLE - BEARING HOUSING ASSEMBLY, 2.3, FSLR S6, EXTRA HEAVY

Analysis Method

The handle was analyzed using finite element analysis by ATA Engineering, a firm specializing in FEA for various industries, including the Aerospace industry. Safety factors consistent with the IBC/CBC were used in the design. Loads were provided by Structurology to ATA, and the final stress plots were reviewed by Structurology. Shown below are the applied loads and the calculated allowable loads.

Part No : 22311

Combined = $(H^2 + V^2)^{½}$

Design Checks -Extra Tolerance Factor =1.18 used for (XTR-0.75 - Extreme Terrain)

Capacity of BHA	LOAD CASE	Joint	X	Y	Combined	Angle	BHA	Check	Moment	BHA	Check
Tension			(lb)	(lb)	(lb)		D/C			D/C	
10480 lbs		1	0	0	0	0	0%	OK	0	0%	OK
Moment		2	4	3588	3588	0	34%	OK	0	0%	OK
63905 lbs-in		3	11	3762	3762	0	36%	OK	0	0%	OK
	0 degrees	4	19	3774	3774	0	36%	OK	0	0%	OK
	A	5	26	3784	3784	0	36%	OK	0	0%	OK
	LC 3b	6	34	3892	3892	1	37%	OK	0	0%	OK
		7	35	3568	3569	1	34%	OK	0	0%	OK
		8	36	3055	3055	1	29%	OK	0	0%	OK
		9	40	3565	3565	1	34%	OK	0	0%	OK
		10	19	1989	1989	1	19%	OK	0	0%	OK
		1	0	0	0	0	0%	OK	0	0%	OK
		2	24	2108	2108	1	20%	OK	0	0%	OK
		3	66	2364	2365	2	23%	OK	0	0%	OK
	0 degrees	4	114	2468	2471	3	24%	OK	0	0%	OK
	A	5	161	2550	2555	4	24%	OK	0	0%	OK
	LC 4	6	218	2707	2716	5	26%	OK	0	0%	OK
		7	234	2533	2544	5	24%	OK	0	0%	OK
		8	231	2203	2215	6	21%	OK	0	0%	OK
		9	239	2442	2454	6	23%	OK	0	0%	OK
		10	116	1311	1316	5	13%	OK	0	0%	OK
		1	0	0	0	0	0%	OK	0	0%	OK
		2	24	1088	1088	1	10%	OK	0	0%	OK
		3	66	1310	1311	3	13%	OK	0	0%	OK
	0 degrees	4	114	1421	1426	5	14%	OK	0	0%	OK
	A	5	161	1506	1515	6	14%	OK	0	0%	OK
	LC 5	6	218	1642	1656	8	16%	OK	0	0%	OK
		7	234	1557	1575	9	15%	OK	0	0%	OK
		8	231	1385	1404	9	13%	OK	0	0%	OK
		9	239	1494	1513	9	14%	OK	0	0%	OK
		10	116	774	783	9	7%	OK	0	0%	OK
		1	0	0	0	0	0%	OK	0	0%	OK
		2	-6	3249	3249	0	31%	OK	0	0%	OK
		3	-14	3332	3332	0	32%	OK	0	0%	OK
	0 degrees	4	-22	3290	3290	0	31%	OK	0	0%	OK
	X	5	-28	3268	3268	0	31%	OK	0	0%	OK
	LC 3b	6	-35	3324	3324	1	32%	OK	0	0%	OK
		7	-36	3037	3037	1	29%	OK	0	0%	OK
		8	-33	2572	2572	1	25%	OK	0	0%	OK
		9	-42	3007	3007	1	29%	OK	0	0%	OK
		10	-24	1695	1695	1	16%	OK	0	0%	OK
		1	0	0	0	0	0%	OK	0	0%	OK
		2	-29	1280	1280	1	12%	OK	0	0%	OK
		3	-67	1237	1239	3	12%	OK	0	0%	OK
	0 degrees	4	-105	1172	1177	5	11%	OK	0	0%	OK
	X	5	-139	1128	1136	7	11%	OK	0	0%	OK
	LC 4	6	-178	1104	1118	9	11%	OK	0	0%	OK
		7	-186	984	1002	11	10%	OK	0	0%	OK
		8	-176	800	819	12	8%	OK	0	0%	OK
		9	-224	894	922	14	9%	OK	0	0%	OK
		10	-129	501	518	14	5%	OK	0	0%	OK
		1	0	0	0	2	0%	OK	0	0%	OK
		2	-29	260	261	6	2%	OK	0	0%	OK
		3	-67	183	195	20	2%	OK	0	0%	OK
	0 degrees	4	-105	126	164	40	2%	OK	0	0%	OK
	X	5	-139	84	162	59	2%	OK	0	0%	OK
	LC 5	6	-178	39	182	78	2%	OK	0	0%	OK
		7	-186	9	186	87	2%	OK	0	0%	OK
		8	-176	-17	176	84	2%	OK	0	0%	OK
		9	-224	-54	230	76	2%	OK	0	0%	OK
		10	-129	-35	134	75	1%	OK	0	0%	OK

LOAD CASE	Joint	X (lb)	Y (lb)	Combined (lb)	Angle	BHA D/C	Check	Moment	BHA D/C	Check
15 degrees A LC 3b	1	0	0	0	2	0%	OK	0	0%	OK
	2	138	3843	3845	2	37%	OK	0	0%	OK
	3	156	3854	3858	2	37%	OK	0	0%	OK
	4	165	3707	3711	3	35%	OK	0	0%	OK
	5	173	3571	3575	3	34%	OK	0	0%	OK
	6	185	3567	3572	3	34%	OK	0	0%	OK
	7	172	3218	3223	3	31%	OK	0	0%	OK
	8	158	2763	2767	3	26%	OK	0	0%	OK
	9	163	3141	3145	3	30%	OK	0	0%	OK
	10	80	1723	1725	3	16%	OK	0	0%	OK
15 degrees A LC 4	1	0	0	0	6	0%	OK	0	0%	OK
	2	302	2605	2622	7	25%	OK	0	0%	OK
	3	363	2597	2622	8	25%	OK	0	0%	OK
	4	402	2483	2516	9	24%	OK	0	0%	OK
	5	434	2397	2436	10	23%	OK	0	0%	OK
	6	472	2382	2429	11	23%	OK	0	0%	OK
	7	445	2129	2175	12	21%	OK	0	0%	OK
	8	407	1822	1867	13	18%	OK	0	0%	OK
	9	434	2047	2093	12	20%	OK	0	0%	OK
	10	219	1107	1129	11	11%	OK	0	0%	OK
15 degrees X LC 5	1	0	0	0	69	0%	OK	0	0%	OK
	2	-264	-71	273	75	3%	OK	0	0%	OK
	3	-329	-83	339	76	3%	OK	0	0%	OK
	4	-394	-131	416	72	4%	OK	0	0%	OK
	5	-449	-161	477	70	5%	OK	0	0%	OK
	6	-510	-188	544	70	5%	OK	0	0%	OK
	7	-502	-190	537	69	5%	OK	0	0%	OK
	8	-434	-146	458	71	4%	OK	0	0%	OK
	9	-512	-159	536	73	5%	OK	0	0%	OK
	10	-294	-94	308	72	3%	OK	0	0%	OK
30 degrees A LC 3b	1	0	0	0	3	0%	OK	0	0%	OK
	2	251	4045	4053	4	39%	OK	0	0%	OK
	3	273	4070	4079	4	39%	OK	0	0%	OK
	4	282	3972	3983	4	38%	OK	0	0%	OK
	5	291	3888	3899	4	37%	OK	0	0%	OK
	6	306	3892	3904	5	37%	OK	0	0%	OK
	7	284	3529	3540	5	34%	OK	0	0%	OK
	8	252	2978	2988	5	29%	OK	0	0%	OK
	9	276	3433	3444	5	33%	OK	0	0%	OK
	10	144	1924	1930	4	18%	OK	0	0%	OK
30 degrees A LC 4	1	0	0	0	11	0%	OK	0	0%	OK
	2	529	2586	2639	12	25%	OK	0	0%	OK
	3	604	2595	2664	13	25%	OK	0	0%	OK
	4	648	2511	2594	14	25%	OK	0	0%	OK
	5	685	2448	2542	16	24%	OK	0	0%	OK
	6	733	2454	2561	17	24%	OK	0	0%	OK
	7	688	2216	2321	17	22%	OK	0	0%	OK
	8	609	1868	1965	18	19%	OK	0	0%	OK
	9	695	2154	2263	18	22%	OK	0	0%	OK
	10	378	1199	1257	17	12%	OK	0	0%	OK
30 degrees X LC 5	1	0	0	0	65	0%	OK	0	0%	OK
	2	-615	-220	653	70	6%	OK	0	0%	OK
	3	-664	-163	684	76	7%	OK	0	0%	OK
	4	-710	-148	725	78	7%	OK	0	0%	OK
	5	-744	-128	755	80	7%	OK	0	0%	OK
	6	-792	-113	800	82	8%	OK	0	0%	OK
	7	-745	-93	751	83	7%	OK	0	0%	OK
	8	-641	-68	645	84	6%	OK	0	0%	OK
	9	-822	-137	834	81	8%	OK	0	0%	OK
	10	-489	-100	499	78	5%	OK	0	0%	OK
45 degrees A LC 3b	1	0	0	0	5	0%	OK	0	0%	OK
	2	387	3964	3982	6	38%	OK	0	0%	OK
	3	408	3912	3933	6	38%	OK	0	0%	OK
	4	412	3773	3795	6	36%	OK	0	0%	OK
	5	416	3630	3654	7	35%	OK	0	0%	OK
	6	429	3650	3675	7	35%	OK	0	0%	OK
	7	395	3292	3316	7	32%	OK	0	0%	OK
	8	338	2730	2751	7	26%	OK	0	0%	OK
	9	390	3215	3239	7	31%	OK	0	0%	OK
	10	217	1810	1823	7	17%	OK	0	0%	OK
45 degrees A LC 4	1	733	2420	2529	17	24%	OK	0	0%	OK
	2	790	2457	2581	18	25%	OK	0	0%	OK
	3	848	2407	2552	19	24%	OK	0	0%	OK
	4	867	2287	2446	21	23%	OK	0	0%	OK
	5	882	2177	2349	22	22%	OK	0	0%	OK
	6	916	2141	2329	23	22%	OK	0	0%	OK
	7	849	1916	2096	24	20%	OK	0	0%	OK
	8	716	1577	1731	24	17%	OK	0	0%	OK
	9	844	1832	2017	25	19%	OK	0	0%	OK
	10	482	1036	1143	25	11%	OK	0	0%	OK
45 degrees X LC 5	1	-868	-143	880	81	8%	OK	0	0%	OK
	2	-879	-72	882	85	8%	OK	0	0%	OK
	3	-899	9	899	89	9%	OK	0	0%	OK
	4	-924	43	925	87	9%	OK	0	0%	OK
	5	-938	77	941	85	9%	OK	0	0%	OK
	6	-972	108	978	84	9%	OK	0	0%	OK
	7	-905	113	912	83	9%	OK	0	0%	OK
	8	-754	118	764	81	7%	OK	0	0%	OK
	9	-1067	39	1067	88	10%	OK	0	0%	OK
	10	-674	-20	674	88	6%	OK	0	0%	OK

LOAD CASE	Joint	X (lb)	Y (lb)	Combined (lb)	Angle	BHA D/C	Check	Moment	BHA D/C	Check
60 degrees A LC 3b	1	2178	3479	4105	32	39%	OK	0	0%	OK
	2	2292	3661	4320	32	41%	OK	17078	27%	OK
	3	2369	3783	4464	32	43%	OK	17588	28%	OK
	4	2352	3757	4432	32	42%	OK	17588	28%	OK
	5	2344	3744	4417	32	42%	OK	17588	28%	OK
	6	2392	3822	4509	32	43%	OK	17588	28%	OK
	7	2194	3501	4131	32	39%	OK	16159	25%	OK
	8	1827	2950	3470	32	33%	OK	15560	24%	OK
	9	2158	3473	4089	32	39%	OK	16237	25%	OK
	10	1239	1973	2329	32	22%	OK	11348	18%	OK
60 degrees A LC 4	1	4357	3843	5810	49	55%	OK	0	0%	OK
	2	4585	4044	6114	49	58%	OK	34156	53%	OK
	3	4737	4179	6317	49	60%	OK	35175	55%	OK
	4	4704	4150	6273	49	60%	OK	35175	55%	OK
	5	4688	4136	6252	49	60%	OK	35175	55%	OK
	6	4785	4221	6380	49	61%	OK	35175	55%	OK
	7	4389	3869	5851	49	56%	OK	32319	51%	OK
	8	3654	3242	4885	48	47%	OK	31120	49%	OK
	9	4316	3823	5766	48	55%	OK	32473	51%	OK
	10	2478	2182	3301	49	32%	OK	22696	36%	OK
60 degrees X LC 5	1	-3692	-1440	3963	69	38%	OK	0	0%	OK
	2	-3658	-1384	3911	69	37%	OK	37240	58%	OK
	3	-3607	-1331	3844	70	37%	OK	38350	60%	OK
	4	-3603	-1334	3843	70	37%	OK	38350	60%	OK
	5	-3586	-1327	3824	70	36%	OK	38350	60%	OK
	6	-3658	-1353	3900	70	37%	OK	38350	60%	OK
	7	-3370	-1251	3594	70	34%	OK	35236	55%	OK
	8	-2785	-1018	2965	70	28%	OK	32727	51%	OK
	9	-3980	-1605	4291	68	41%	OK	30590	48%	OK
	10	-2532	-1071	2749	67	26%	OK	19647	31%	OK

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

HANDLE TEST - BEARING HOUSING ASSEMBLY, 2.3, FSLR S6, EXTRA HEAVY

Part No : 22311

Analysis Method

The ultimate capacity of the handle of the bearing housing assembly was tested. Testing was conducted, and the testing provisions of AISI 100-16, Chapter F were used to determine the capacity of the connection.

Test Data

Failure Forces in Pounds Force For Various Applied Load Angles

Test #	60 Deg	60 Deg
1	12019	69709
2	11276	71991
3	12085	73175
4	11767	71956
5	11682	72047
6	12004	72023
7	11539	70591
8	11308	71665
9	11578	70606
10	11879	
11		
12		
13		
14		
15		
Average	11714	71529.22222
StdDev	274.16	982.07
f	0.89	0.89
ϕR_n	10480	63905

- Refer ENG-001181,ENG-000939 for above Test Data

Analysis Code Checks - Example Calculation performed for 22311 applied load

Determine Resistance factor, f, per AISI 100-16 Chapter F, Section F1.1

Cf = Calibration Coefficient =	1.52
Mm = mean value of material factor =	1.10
Fm = mean value of fabrication factor =	1.00
Pm = mean value of professional factor =	1.00
e = natural logarithmic base =	2.72
bo = target reliability index =	2.50
vM = variation of material factor =	0.10
vF = variation of fabrication factor =	0.05

Tension

$\phi = C_\phi(M_m F_m P_m)e^\gamma$ = 0.8947

$\gamma = -\beta_o(v_M^2+v_F^2+c_P v_P^2+v_Q^2)^{(1/2)}$ = -0.6254

Torsion

$\phi = C_\phi(M_m F_m P_m)e^\gamma$ = 0.89

$\gamma = -\beta_o(v_M^2+v_F^2+c_P v_P^2+v_Q^2)^{(1/2)}$ = -0.63

Tension

cP = correction factor = (1+1/n)m/(m-2) for n>3 and 5.7 for n = 3

n = 10 cP = 1.41

m = 9

vP = coefficient of variation = 0.065

vQ = variation of load effect = 0.21

Determine the nominal resistance of the connection

R_n = Average Capacity from all tests = 11714 pounds

Therefore the torsional resistance of this connection is:

ϕR_n = 10480 pounds

Torsion

cP = correction factor = (1+1/n)m/(m-2) for n>3 and 5.7 for n = 3

n = 9 cP = 1.48

m = 8

vP = coefficient of variation = 0.065

vQ = variation of load effect = 0.21

Determine the nominal resistance of the connection

R_n = Average Capacity from all tests = 71529 lbs-in

Therefore the torsional resistance of this connection is:

ϕR_n = 63905 lbs-in

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

BRACKET, BEARING HOUSING, W6 HEAVY BRACKET

Vertical Distance From Pin to Bracket = 7.72 in

Horizontal Distance between Brackets = 11.6 in

Analysis Method:
The handle was analyzed extensively in a test lab. Test results were compiled by NEXTracker, and loads were provided by Structurology, with the final test results reviewed by Structurology. Shown below are the applied loads and the calculated allowable loads.

Part No :	41454

Design Checks -Extra Tolerance Factor =1.18 used for (XTR-0.75 - Extreme Terrain]

Loads taken from Aeroelastic Torque Tube Analysis, these loads account for twist in torque tube

LOAD CASE	Joint	X	Y	Uplift Bracket			Downforce Bracket			Check
				Uplift	Capacity	D/C	Dwn Force	Capacity	D/C	
		(lb)	(lb)	(lb)	(lb)		(lb)	(lb)		
	M	1	3382	0	5799	0%	1692	5999	28%	OK
	2	4	3588	0	5799	0%	1797	5999	30%	OK
	3	11	3762	0	5799	0%	1888	5999	31%	OK
0 degrees	4	19	3774	0	5799	0%	1900	5999	32%	OK
A	5	26	3784	0	5799	0%	1909	5999	32%	OK
LC 3b	6	34	3892	0	5799	0%	1969	5999	33%	OK
	7	35	3568	0	5799	0%	1808	5999	30%	OK
	8	36	3055	0	5799	0%	1551	5999	26%	OK
	9	40	3565	0	5799	0%	1809	5999	30%	OK
	10	19	1989	0	5799	0%	1007	5999	17%	OK
	M	4	1885	0	5799	0%	946	5999	16%	OK
	2	24	2108	0	5799	0%	1070	5999	18%	OK
	3	66	2364	0	5799	0%	1226	5999	20%	OK
0 degrees	4	114	2468	0	5799	0%	1310	5999	22%	OK
A	5	161	2550	0	5799	0%	1382	5999	23%	OK
LC 4	6	218	2707	0	5799	0%	1498	5999	25%	OK
	7	234	2533	0	5799	0%	1422	5999	24%	OK
	8	231	2203	0	5799	0%	1255	5999	21%	OK
	9	239	2442	0	5799	0%	1380	5999	23%	OK
	10	116	1311	0	5799	0%	733	5999	12%	OK
	M	4	916	0	5799	0%	461	5999	8%	OK
	2	24	1088	0	5799	0%	560	5999	9%	OK
	3	66	1310	0	5799	0%	699	5999	12%	OK
0 degrees	4	114	1421	0	5799	0%	787	5999	13%	OK
A	5	161	1506	0	5799	0%	860	5999	14%	OK
LC 5	6	218	1642	0	5799	0%	966	5999	16%	OK
	7	234	1557	0	5799	0%	934	5999	16%	OK
	8	231	1385	0	5799	0%	846	5999	14%	OK
	9	239	1494	0	5799	0%	906	5999	15%	OK
	10	116	774	0	5799	0%	465	5999	8%	OK
	M	-2	3101	0	5799	0%	1552	5999	26%	OK
	2	-6	3249	0	5799	0%	1629	5999	27%	OK
	3	-14	3332	0	5799	0%	1675	5999	28%	OK
0 degrees	4	-22	3290	0	5799	0%	1660	5999	28%	OK
X	5	-28	3268	0	5799	0%	1653	5999	28%	OK
LC 3b	6	-35	3324	0	5799	0%	1685	5999	28%	OK
	7	-36	3037	0	5799	0%	1542	5999	26%	OK
	8	-33	2572	0	5799	0%	1308	5999	22%	OK
	9	-42	3007	0	5799	0%	1532	5999	26%	OK
	10	-24	1695	0	5799	0%	864	5999	14%	OK
	M	-9	1269	0	5799	0%	640	5999	11%	OK
	2	-29	1280	0	5799	0%	659	5999	11%	OK
	3	-67	1237	0	5799	0%	663	5999	11%	OK
0 degrees	4	-105	1172	0	5799	0%	656	5999	11%	OK
X	5	-139	1128	0	5799	0%	656	5999	11%	OK
LC 4	6	-178	1104	0	5799	0%	670	5999	11%	OK
	7	-186	984	0	5799	0%	616	5999	10%	OK
	8	-176	800	0	5799	0%	517	5999	9%	OK
	9	-224	894	0	5799	0%	596	5999	10%	OK
	10	-129	501	0	5799	0%	336	5999	6%	OK
	M	-9	300	0	5799	0%	156	5999	3%	OK
	2	-29	260	0	5799	0%	149	5999	2%	OK
	3	-67	183	0	5799	0%	136	5999	2%	OK
0 degrees	4	-105	126	7	5799	0%	133	5999	2%	OK
X	5	-139	84	50	5799	1%	135	5999	2%	OK
LC 5	6	-178	39	99	5799	2%	138	5999	2%	OK
	7	-186	9	119	5799	2%	128	5999	2%	OK
	8	-176	-17	125	5799	2%	108	5999	2%	OK
	9	-224	-54	176	5799	3%	122	5999	2%	OK
	10	-129	-35	103	5799	2%	68	5999	1%	OK

LOAD CASE	Joint	X	Y	Uplift Bracket			Downforce Bracket			Check
				Uplift	Capacity	D/C	Dwn Force	Capacity	D/C	
		(lb)	(lb)	(lb)	(lb)		(lb)	(lb)		
15 degrees A LC 3b	M	124	3749	0	5799	0%	1957	5999	33%	OK
	2	138	3843	0	5799	0%	2013	5999	34%	OK
	3	156	3854	0	5799	0%	2031	5999	34%	OK
	4	165	3707	0	5799	0%	1964	5999	33%	OK
	5	173	3571	0	5799	0%	1901	5999	32%	OK
	6	185	3567	0	5799	0%	1906	5999	32%	OK
	7	172	3218	0	5799	0%	1724	5999	29%	OK
	8	158	2763	0	5799	0%	1486	5999	25%	OK
	9	163	3141	0	5799	0%	1679	5999	28%	OK
	10	80	1723	0	5799	0%	915	5999	15%	OK
15 degrees A LC 4	M	258	2527	0	5799	0%	1435	5999	24%	OK
	2	302	2605	0	5799	0%	1503	5999	25%	OK
	3	363	2597	0	5799	0%	1540	5999	26%	OK
	4	402	2483	0	5799	0%	1509	5999	25%	OK
	5	434	2397	0	5799	0%	1487	5999	25%	OK
	6	472	2382	0	5799	0%	1505	5999	25%	OK
	7	445	2129	0	5799	0%	1361	5999	23%	OK
	8	407	1822	0	5799	0%	1182	5999	20%	OK
	9	434	2047	0	5799	0%	1312	5999	22%	OK
	10	219	1107	0	5799	0%	699	5999	12%	OK
15 degrees X LC 5	M	-228	-87	195	5799	3%	108	5999	2%	OK
	2	-264	-71	211	5799	4%	140	5999	2%	OK
	3	-329	-83	260	5799	4%	177	5999	3%	OK
	4	-394	-131	328	5799	6%	197	5999	3%	OK
	5	-449	-161	380	5799	7%	219	5999	4%	OK
	6	-510	-188	434	5799	7%	246	5999	4%	OK
	7	-502	-190	429	5799	7%	239	5999	4%	OK
	8	-434	-146	362	5799	6%	215	5999	4%	OK
	9	-512	-159	420	5799	7%	261	5999	4%	OK
	10	-294	-94	242	5799	4%	148	5999	2%	OK
30 degrees A LC 3b	M	229	3928	0	5799	0%	2117	5999	35%	OK
	2	251	4045	0	5799	0%	2189	5999	36%	OK
	3	273	4070	0	5799	0%	2217	5999	37%	OK
	4	282	3972	0	5799	0%	2174	5999	36%	OK
	5	291	3888	0	5799	0%	2138	5999	36%	OK
	6	306	3892	0	5799	0%	2150	5999	36%	OK
	7	284	3529	0	5799	0%	1953	5999	33%	OK
	8	252	2978	0	5799	0%	1657	5999	28%	OK
	9	276	3433	0	5799	0%	1900	5999	32%	OK
	10	144	1924	0	5799	0%	1058	5999	18%	OK
30 degrees A LC 4	M	470	2498	0	5799	0%	1562	5999	26%	OK
	2	529	2586	0	5799	0%	1645	5999	27%	OK
	3	604	2595	0	5799	0%	1699	5999	28%	OK
	4	648	2511	0	5799	0%	1687	5999	28%	OK
	5	685	2448	0	5799	0%	1680	5999	28%	OK
	6	733	2454	0	5799	0%	1714	5999	29%	OK
	7	688	2216	0	5799	0%	1566	5999	26%	OK
	8	609	1868	0	5799	0%	1340	5999	22%	OK
	9	695	2154	0	5799	0%	1540	5999	26%	OK
	10	378	1199	0	5799	0%	851	5999	14%	OK
30 degrees X LC 5	M	-587	-276	529	5799	9%	252	5999	4%	OK
	2	-615	-220	519	5799	9%	299	5999	5%	OK
	3	-664	-163	523	5799	9%	360	5999	6%	OK
	4	-710	-148	546	5799	9%	398	5999	7%	OK
	5	-744	-128	559	5799	10%	432	5999	7%	OK
	6	-792	-113	583	5799	10%	471	5999	8%	OK
	7	-745	-93	542	5799	9%	450	5999	7%	OK
	8	-641	-68	461	5799	8%	393	5999	7%	OK
	9	-822	-137	616	5799	11%	479	5999	8%	OK
	10	-489	-100	375	5799	6%	276	5999	5%	OK

LOAD CASE	Joint	X	Y	Uplift Bracket			Downforce Bracket			Check
				Uplift	Capacity	D/C	Dwn Force	Capacity	D/C	
		(lb)	(lb)	(lb)	(lb)		(lb)	(lb)		
45 degrees A LC 3b	M	363	3908	0	5799	0%	2196	5999	37%	OK
	2	387	3964	0	5799	0%	2239	5999	37%	OK
	3	408	3912	0	5799	0%	2227	5999	37%	OK
	4	412	3773	0	5799	0%	2161	5999	36%	OK
	5	416	3630	0	5799	0%	2092	5999	35%	OK
	6	429	3650	0	5799	0%	2111	5999	35%	OK
	7	395	3292	0	5799	0%	1909	5999	32%	OK
	8	338	2730	0	5799	0%	1590	5999	27%	OK
	9	390	3215	0	5799	0%	1867	5999	31%	OK
	10	217	1810	0	5799	0%	1050	5999	18%	OK
45 degrees A LC 4	M	733	2420	0	5799	0%	1698	5999	28%	OK
	2	790	2457	0	5799	0%	1754	5999	29%	OK
	3	848	2407	0	5799	0%	1768	5999	29%	OK
	4	867	2287	0	5799	0%	1720	5999	29%	OK
	5	882	2177	0	5799	0%	1676	5999	28%	OK
	6	916	2141	0	5799	0%	1680	5999	28%	OK
	7	849	1916	0	5799	0%	1523	5999	25%	OK
	8	716	1577	0	5799	0%	1264	5999	21%	OK
	9	844	1832	0	5799	0%	1477	5999	25%	OK
	10	482	1036	0	5799	0%	839	5999	14%	OK
45 degrees X LC 5	M	-868	-143	650	5799	11%	506	5999	8%	OK
	2	-879	-72	622	5799	11%	549	5999	9%	OK
	3	-899	9	594	5799	10%	603	5999	10%	OK
	4	-924	43	593	5799	10%	636	5999	11%	OK
	5	-938	77	586	5799	10%	663	5999	11%	OK
	6	-972	108	593	5799	10%	701	5999	12%	OK
	7	-905	113	546	5799	9%	659	5999	11%	OK
	8	-754	118	443	5799	8%	561	5999	9%	OK
	9	-1067	39	691	5799	12%	729	5999	12%	OK
	10	-674	-20	459	5799	8%	438	5999	7%	OK
60 degrees A LC 3b	M	2178	3479	0	5799	0%	3189	5999	53%	OK
	2	2292	3661	0	5799	0%	3356	5999	56%	OK
	3	2369	3783	0	5799	0%	3468	5999	58%	OK
	4	2352	3757	0	5799	0%	3444	5999	57%	OK
	5	2344	3744	0	5799	0%	3432	5999	57%	OK
	6	2392	3822	0	5799	0%	3503	5999	58%	OK
	7	2194	3501	0	5799	0%	3211	5999	54%	OK
	8	1827	2950	0	5799	0%	2691	5999	45%	OK
	9	2158	3473	0	5799	0%	3173	5999	53%	OK
	10	1239	1973	0	5799	0%	1811	5999	30%	OK
60 degrees A LC 4	M	4357	3843	978	5799	17%	4821	5999	80%	OK
	2	4585	4044	1029	5799	18%	5073	5999	85%	OK
	3	4737	4179	1063	5799	18%	5242	5999	87%	OK
	4	4704	4150	1056	5799	18%	5206	5999	87%	OK
	5	4688	4136	1052	5799	18%	5188	5999	86%	OK
	6	4785	4221	1074	5799	19%	5295	5999	88%	OK
	7	4389	3869	986	5799	17%	4855	5999	81%	OK
	8	3654	3242	811	5799	14%	4053	5999	68%	OK
	9	4316	3823	961	5799	17%	4784	5999	80%	OK
	10	2478	2182	558	5799	10%	2740	5999	46%	OK
60 degrees X LC 5	M	-3692	-1440	3177	5799	55%	1737	5999	29%	OK
	2	-3658	-1384	3126	5799	54%	1742	5999	29%	OK
	3	-3607	-1331	3066	5799	53%	1735	5999	29%	OK
	4	-3603	-1334	3065	5799	53%	1731	5999	29%	OK
	5	-3586	-1327	3050	5799	53%	1723	5999	29%	OK
	6	-3658	-1353	3111	5799	54%	1758	5999	29%	OK
	7	-3370	-1251	2868	5799	49%	1617	5999	27%	OK
	8	-2785	-1018	2363	5799	41%	1344	5999	22%	OK
	9	-3980	-1605	3451	5799	60%	1846	5999	31%	OK
	10	-2532	-1071	2220	5799	38%	1150	5999	19%	OK

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

BHA BRACKET TESTING SUMMARY

Analysis Method

The ultimate capacity of the handle of the bearing housing assembly was tested. Testing was conducted, and the testing provisions of AISI 100-16, Chapter F were used to determine the capacity of the connection.

Test Data

Failure Forces in Pounds Force For Tension and Compression

Test #	Uplift Applied Load	Downforce Applied Load
1	7055	7298
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Average	7055	7298
StdDev	0	0.00
ϕ	0.82	0.82
ϕR_n	5799	5999

- Refer ENG-000XXX for above Test Data

Part No :	41454

Analysis Code Checks - Example Calculation performed for uplift load

Determine Resistance factor, f, per AISI 100-16 Chapter F, Section F1.1

$\phi = C_\phi(M_m F_m P_m)e^\gamma$ = 0.82 (Uplift)

= 0.82 (Downforce)

$\gamma = -\beta_o(v_M^2+v_F^2+c_P v_P^2+v_Q^2)^{(1/2)}$ = -0.71 (Uplift)

= -0.71 (Downforce)

Cf = Calibration Coefficient =	1.52
Mm = mean value of material factor =	1.10
Fm = mean value of fabrication factor =	1.00
Pm = mean value of professional factor =	1.00
e = natural logarithmic base =	2.72
bo = target reliability index =	2.50
vM = variation of material factor =	0.10
vF = variation of fabrication factor =	0.05

cP = correction factor = (1+1/n)m/(m-2) for n>3 and 5.7 for n = 3

n = 1 cP = 5.70 (Uplift)

m = 0

n = 1 cP = 5.70 (Downforce)

m = 0

vP = coefficient of variation = 0.065 (Uplift)

vQ = variation of load effect = 0.21

vP = coefficient of variation = 0.065 (Downforce)

vQ = variation of load effect = 0.21

Determine the nominal resistance of the connection

R_n = Average Capacity from all tests = 7055.00 lbs

Determine the nominal resistance of the connection

R_n = Average Capacity from all tests = 7298.00 lbs

Therefore the torsional resistance of this connection is:

ϕR_n = 5799.17 pounds (Uplift)

Therefore the torsional resistance of this connection is:

ϕR_n = 5998.91 pounds (Downforce)

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

BHA STAMPED RAIL ASSEMBLEY

Part No :	21184-05

Analysis Method

The BHA Rail Stamped Assembly was analyzed by testing per AISI 100-16 Chapter F

Design Checks

ALLOWABLE LOAD FROM TESTING =	2490	lbs
ALLOWABLE TORSION FROM TESTING =	9995	lbs-in
ALLOWABLE TORSION UPLIFT FROM TESTING =	7192	lbs-in

Loads taken from Aeroelastic Torque Tube Analysis, these loads account for twist in torque tube.

Stow	LC	Load Factors	Angle (Deg)	Design Tension Load (lbs)	Design Check for Tension	Design Torsion Load (lbs-in)	Design Check for Torsion	Design Check for Torsion Up
0	3b	1.2D+0.5W+1.6S	0	235	9%	820	8%	
0	4	1.2D+1W+0.5S	1	205	8%	1510	15%	
0	5	0.9D+1W	1	140	6%	1510		21%
0	3b	1.2D+0.5W+1.6S	0	250	10%	863	9%	
0	4	1.2D+1W+0.5S	1	186	7%	1642	16%	
0	5	0.9D+1W	1	122	5%	1642		23%
15	3b	1.2D+0.5W+1.6S	15	275	11%	778	8%	
15	4	1.2D+1W+0.5S	16	243	10%	1572	16%	
15	5	0.9D+1W	16	166	7%	1757		24%
30	3b	1.2D+0.5W+1.6S	30	275	11%	852	9%	
30	4	1.2D+1W+0.5S	31	244	10%	1576	16%	
30	5	0.9D+1W	31	215	9%	2021		28%
45	3b	1.2D+0.5W+1.6S	45	224	9%	846	8%	
45	4	1.2D+1W+0.5S	46	213	9%	1537	15%	
45	5	0.9D+1W	46	219	9%	1914		27%
60	3b	1.2D+0.5W+1.6S	60	438	18%	3327	33%	
60	4	1.2D+1W+0.5S	60	772	31%	6523	65%	
60	5	0.9D+1W	60	741	30%	6543		91%

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BHA RAIL TESTING SUMMARY - Stamped TTA First Rail, FSLR S6

Analysis Method

The connection of the torque tube to the BHA relies on an assembly of a BHA rail, a U-Bolt and a Stamped Saddle. Therefore, testing was conducted, and the testing provisions of AISI 100-16, Chapter F were used to determine the capacity of the connection.

Analysis Code Checks

Determine Resistance factor, f, per AISI 100-16 Chapter F, Section F1.1

		Tension	Torsion	Torsion Up
$\phi = C_\phi(M_m F_m P_m)e^\gamma$	=	0.92	0.92	0.92
$\gamma = -\beta_o(v_M^2+v_F^2+c_p v_P^2+v_Q^2)^{(1/2)}$	=	-0.59	-0.59	-0.59

C_ϕ = Calibration Coefficient =	1.52
M_m = mean value of material factor =	1.10
F_m = mean value of fabrication factor =	1.00
P_m = mean value of professional factor =	1.00
e = natural logarithmic base =	2.72
β_o = target reliability index =	2.50
v_M = variation of material factor =	0.10
v_F = variation of fabrication factor =	0.05

c_p = correction factor = (1+1/n)m/(m-2) for n>3 and 5.7 for n = 3

	Tension	Torsion	Torsion Up
c_p =	0.00	0.00	0.00
v_P = coefficient of variation =	0.065	0.065	0.065
v_Q = variation of load effect =	0.21	0.21	0.21

Determine the nominal resistance of the connection

R_n = Average Capacity from all tests = 2.700 kip

R_n = Average Torsional Capacity from all tests = 10.840 kip-in

R_n = Average Torsional Capacity from all tests = 7.800 kip-in

Therefore the load resistance of this rail is:

ϕR_n = 2.490 kip

Therefore the Torsional resistance of this rail is:

ϕR_n = 9.995 kip-in

Therefore the Uplift Torsional resistance of this rail is:

ϕR_n = 7.192 kip-in

Test Data for BHA Rail

Test No.	Force (k)	Torsion (k-in)	Torsion (k-in)
1	2.700	10.840	7.800
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
Mean	2.700	10.840	7.800
Std Dev	0.000	0.000	0.000

- Refer ENG-000558 for above Test Data

n =	1	1	1
m =	0	0	0

Part No:	21184-05

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SLEW GEAR MOUNTING AND BOLT CHECK

Part No :	2054

Plate Data:		
Plate Fy =	45	ksi
Plate Fu =	55	
Top Plate Thickness =	0.47	in
Vertical Plate Thickness =	0.47	in
Gusset Thickness =	0.39	in

Top Bolt Data:		
Bolt Grade:	Class 10.9	
Bolt Dia =	0.75	in
F_nv =	75	ksi
F_nt =	113	ksi

Side Bolt Data:		
Bolt Type: Twistlok 12mm (10.9)		
Bolt Dia =	0.47	in
Rated Ultimate Shear =	14.7	kips
No of Bolts per Flange =	6	

Analysis Checks

Top bolt Checks		
Bolt Spacing =	*9.44*	in (East to West)
	6.99	in (North to South)
	$R_n = F_{nt}A_b$	
ϕ =	0.75	
A_b =	0.44	in^2
ϕR_n =	37.29	kips

Side Plate Bearing , Shear Rupture

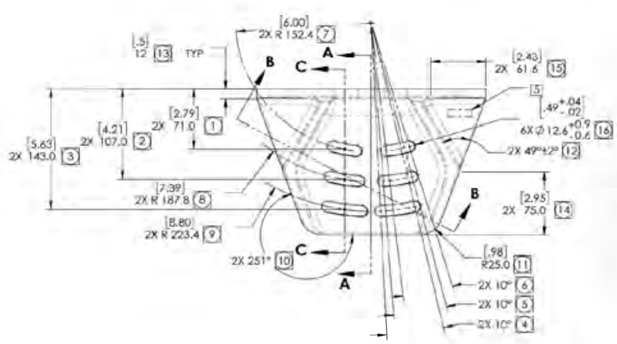
Bearing Check			
	$R_n = 1.0L_ctF_u < 2.0dtF_u$		LRFD J3-2c
	ϕ =	0.75	
	L_c =	0.8	in
Plate	ϕR_n =	15.51	kips

Shear Rupture Check			
	$R_n = 0.6F_yA_g$		J4-3
	$R_n = 0.6F_uA_{nv}$		J4-4
ϕ =	1	0.75	
A_g =	3.76		in^2
A_{nv} =	5.076		in^2
ϕR_n =	101.52		kips

Top Plate Shear Check		
Check a square plate supported on 2 sides, plate is 3" sq, with force at 2" from corner		
Plate Width =	3	in
A_{plate} =	1.41	in^2
	$R_n = 0.6F_yA_g$	J4-3
ϕ =	1	
ϕR_n =	38.07	kips

Tension Rupture Check				
		$R_n = F_yA_g$		
		$R_n = F_uA_e$	Ae = AnU D2-2	
	U =	1	Table D3.1	
	ϕ =	0.9	0.75	
	A_g =	3.995		in^2
	A_n =	2.1996		in^3
	A_e =	2.1996		in^2
Plate	ϕR_n =	90.73		kips

Side Bolt Check			
	Flange Spacing =	6	in
	Bolt Shear =	6.45	kips/bolt
	ϕ =	0.75	
Plate	ϕR_n =	11.025	kips



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SLEW GEAR MOUNTING AND BOLT CHECK

Check of Motor Mount for All Load Conditions

Tilt Angle	LC	Vu (k)	Tu (k-in)	Top Bolt Tension (k)	1). Top Bolt D/C	Top Plate Shear (k)	2). Plate Shear D/C	Side Plate Load (k)	3b,c.)Side Plate D/C	Side Bolt Shear (k)	3a.) Bolt Bearing D/C	4.) Side Bolt Shear D/C
0	3b	2.87	87.02	4.61	12%	9.22	24%	3.07	3%	1.54	10%	14%
0	4	2.98	174.03	9.22	25%	18.44	48%	6.15	7%	3.07	20%	28%
0	5	0.78	174.03	9.22	25%	18.44	48%	6.15	7%	3.07	20%	28%
0	3b	2.63	87.02	4.61	12%	9.22	24%	3.07	3%	1.54	10%	14%
0	4	1.08	174.03	9.22	25%	18.44	48%	6.15	7%	3.07	20%	28%
0	5	1.08	174.03	9.22	25%	18.44	48%	6.15	7%	3.07	20%	28%
15	3b	3.18	56.48	2.99	8%	5.98	16%	1.99	2%	1.00	6%	9%
15	4	2.15	112.95	5.98	16%	11.97	31%	3.99	4%	1.99	13%	18%
15	5	0.21	98.69	5.23	14%	10.45	27%	3.48	4%	1.74	11%	16%
30	3b	3.33	45.31	2.40	6%	4.80	13%	1.60	2%	0.80	5%	7%
30	4	2.15	90.63	4.80	13%	9.60	25%	3.20	4%	1.60	10%	15%
30	5	0.55	80.56	4.27	11%	8.53	22%	2.84	3%	1.42	9%	13%
45	3b	3.33	50.68	2.68	7%	5.37	14%	1.79	2%	0.89	6%	8%
45	4	2.14	101.36	5.37	14%	10.74	28%	3.58	4%	1.79	12%	16%
45	5	0.75	71.73	3.80	10%	7.60	20%	2.53	3%	1.27	8%	11%
60	3b	3.48	14.04	0.74	2%	1.49	4%	0.50	1%	0.25	2%	2%
60	4	4.92	28.08	1.49	4%	2.97	8%	0.99	1%	0.50	3%	4%
60	5	3.36	30.62	1.62	4%	3.24	9%	1.08	1%	0.54	3%	5%

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Check Motor Pier for minimum flange thickness required

Bearing Check:

$R_n = 1.0L_c tF_u < 2.0dtF_u$

ϕ =	0.75	
L_c =	1.97	in
R_u/ϕ =	3.07	kips
Post F_u =	65	ksi
Post F_y =	50.00	ksi
$t_{f\text{-}min}$ =	0.05	in

Tension Check*

$R_n = F_y Wt$ | $R_n = F_u W_e t$

(calculation based on 4" or 6" wide flange)

ϕ =	0.9	0.75	
W =	2	3	in/bolt
W_e =	1.53	2.53	in
R_u/ϕ =	5.37	6.45	kips/bolt
$t_{f\text{-}min\ 4"}$ =	0.065		in
$t_{f\text{-}min\ 6"}$ =	0.039		in

*In order for tensile rupture to occur, the web of the steel member would have to shear as well, this is considered unlikely.

Shear Check

$R_n = 0.6F_y L_g t$ | $R_n = 0.6F_u L_{nv} t$

ϕ =	1	0.75	$t_{f\text{-}min}$ =	0.041 in
L_g =	10.08		in/ 2 bolts	
L_e =	8.804		in/ 2 bolts	
R_u/ϕ =	12.29	0.18	kips/ 2 bolts	

Block Shear Check

$R_n = 0.6F_u L_{nv} t + U_{bs} F_u L_{nt} t \leq 0.6F_y L_{gv} t + U_{bs} F_u L_{nt} t$

ϕ =	0.75			4"	6"	
L_{nv}	8.804	in/ 2 bolts	L_{nt}	1.53	2.53	in
U_{bs}	1					

Minimum Flange Thickness Required (4" Flange) =	0.065	inches
Minimum Flange Thickness Required (6" Flange) =	0.050	inches

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TTA TO SLEW GEAR ATTACHMENT - D= Heavy Slew 50ksi, 4.5mm thick, no collar 1/2" BOM, Terrain

PART DATA:

TTA - Steel

E = 29000 ksi

Fy = 50 ksi

Fu = 68 ksi

Wall thickness = 0.177 in

TTA Dia = 5.12 in

Edge Distance = 1.37 in

BOLT DATA:

Bolts = 8

Bolt = BOM 1/2"

d_{hole} = 0.5 in

Rated Bolt Shear = 20.15 kips

SLEW GEAR COLLAR

E = 29000 ksi

Fy = 100 ksi

Fu = 140 ksi

Wall thickness = 0.275 in

Edge Distance = 0.57 in

Analysis / Code Checks

Bolt Shear Check

CHECK:	BOLT SHEAR	
CODE REF:	[AISC J3-1]	
Vu =	11.25	k
ϕ =	0.75	
ΦRn =	15.1	k
D/C:	0.74	
Check	OK	

TTA Bearing Check

CHECK:	BEARING STRENGTH AT BOLT HOLES				
CODE REF:	[AISC J3-10]				
Vu =	11.25	k	t =	0.177165354	in
ϕ =	0.75		F_u =	68	ksi
ΦRn =	13.6	k	d =	0.5	in
D/C:	0.83		L_c =	1.37	in
$Rn= 1.5L_ctF_u <= 3.0*d*t*F_u$					
R_n =	18.071	kips	Check	OK	

Slew Gear Bearing Check

CHECK:	BEARING STRENGTH AT BOLT HOLES				
CODE REF:	[AISC J3-10]				
Vu =	11.25	k	t =	0.275	in
ϕ =	0.75		F_u =	140	ksi
ΦRn =	24.7	k	d =	0.5	in
D/C:	0.46		L_c =	0.57	in
$Rn= 1.5L_ctF_u <= 3.0*d*t*F_u$					
R_n =	32.918	kips	Check	OK	

Summary of Design Checks for All Load Cases

-Extra Tolerance Factor =1.38 used for (XTR-0.75 - Extreme Terrain)

TTA FEA reduction factor 0.87 used

Tilt Angle	LC	M_u (k-in)	V_u (k)	T_u (k-in)	V_{bolt} (k)	Bolt D/C	TTA Brg	Slew Brg	D/C Max
0	3b	67.43	1.43	44	7.00	0.46	0.52	0.28	52%
0	4	37.15	1.49	87	6.22	0.41	0.46	0.25	46%
0	5	17.79	0.39	87	5.36	0.35	0.40	0.22	40%
0	3b	62.01	1.31	44	6.51	0.43	0.48	0.26	48%
0	4	25.58	0.54	87	5.65	0.37	0.42	0.23	42%
0	5	6.22	0.54	87	5.12	0.34	0.38	0.21	38%
15	3b	75.37	1.59	28	7.47	0.49	0.55	0.30	55%
15	4	50.95	1.08	56	5.93	0.39	0.44	0.24	44%
15	5	4.83	0.10	49	2.92	0.19	0.22	0.12	22%
30	3b	78.97	1.67	23	7.75	0.51	0.57	0.31	57%
30	4	50.91	1.08	45	5.59	0.37	0.41	0.23	41%
30	5	67.43	0.27	40	6.93	0.46	0.51	0.28	51%
45	3b	79.02	1.66	25	7.78	0.52	0.57	0.32	57%
45	4	50.85	1.07	51	5.74	0.38	0.42	0.23	42%
45	5	17.80	0.37	36	2.71	0.18	0.20	0.11	20%
60	3b	82.00	1.74	7	7.94	0.53	0.59	0.32	59%
60	4	116.05	2.46	14	11.25	0.74	0.83	0.46	83%
60	5	80.32	1.68	15	7.82	0.52	0.58	0.32	58%

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TORQUE TUBE ADAPTOR CALCULATION

Part No :	40543

Design Summary:

Capacity of the TTA is taken by analyzing a round shape per AISC 14th Edition.

(Extra Tolerance Factor =1.25 used for (XTR-0.75 - Extreme Terrain))

Design Checks

					Moment Check		Shear		Torsion		Combined Loads	
Tilt Angle	LC	Mu(K-in)	Vu (k)	Tu (k-in)	D/C	Ok ?	D/C	Ok ?	D/C	Ok ?	D/C	Ok ?
0	3b	84.29	1.79	54.38	43%	OK	5%	OK	30%	OK	31%	OK
0	4	46.44	1.86	108.77	24%	OK	5%	OK	59%	OK	47%	OK
0	5	22.23	0.49	108.77	11%	OK	1%	OK	59%	OK	38%	OK
0	3b	77.51	1.64	54.38	40%	OK	4%	OK	30%	OK	27%	OK
0	4	31.97	0.67	108.77	16%	OK	2%	OK	59%	OK	40%	OK
0	5	7.77	0.67	108.77	4%	OK	2%	OK	59%	OK	38%	OK
15	3b	94.22	1.99	35.30	48%	OK	5%	OK	19%	OK	29%	OK
15	4	63.68	1.35	70.60	33%	OK	4%	OK	38%	OK	28%	OK
15	5	6.04	0.13	61.68	3%	OK	0%	OK	34%	OK	12%	OK
30	3b	98.71	2.08	28.32	51%	OK	6%	OK	15%	OK	30%	OK
30	4	63.64	1.35	56.64	33%	OK	4%	OK	31%	OK	23%	OK
30	5	84.29	0.34	50.35	43%	OK	1%	OK	27%	OK	27%	OK
45	3b	98.78	2.08	31.67	51%	OK	6%	OK	17%	OK	31%	OK
45	4	63.56	1.34	63.35	33%	OK	4%	OK	35%	OK	25%	OK
45	5	22.25	0.47	44.83	11%	OK	1%	OK	24%	OK	8%	OK
60	3b	102.50	2.17	8.78	53%	OK	6%	OK	5%	OK	29%	OK
60	4	145.06	3.08	17.55	75%	OK	8%	OK	10%	OK	59%	OK
60	5	100.40	2.10	19.14	52%	OK	6%	OK	10%	OK	29%	OK

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TORQUE TUBE ADAPTOR CALCULATION

CAPACITY CHECK OF TTA PER AISC

Torsional Capacity of Members is calculated in accordance with AISC H3.1A

ϕ = 0.9

$T_n = F_{cr}C$

F_{cr} = Max $\{1.23E/((L/D)^{1/2}(D/t)^{5/4}); 0.60E/((D/t)^{3/2})\}$, but not more than 0.6Fy

ϕT_n =	183.44	k-in
C =	6.79	in^3
F_{cr} =	30	ksi

Shear Capacity of Members is calculated in accordance with AISC G6

ϕ = 0.9

$V_n = F_{cr}A_g/2$

F_{cr} = Max $\{1.60E/((L/D)^{1/2}(D/t)^{5/4}); 0.78E/((D/t)^{3/2})\}$, but not more than 0.6Fy

ϕV_n =	37.10	k
A_g =	2.75	in^2
F_{cr} =	30	ksi

Bending Capacity of Members is calculated in accordance with AISC F8

ϕ = 0.9

Yielding : $M_n = M_p = F_y Z$

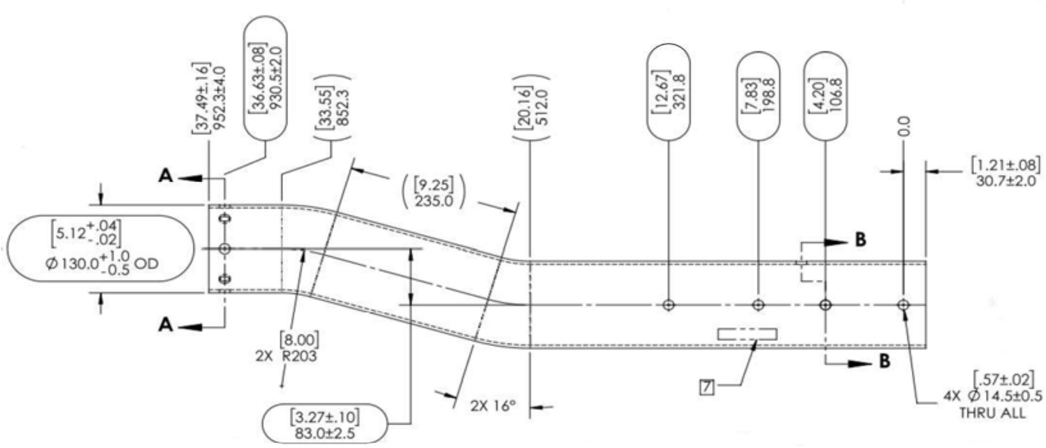
Local Buckling Non-Compact: $M_n = (0.021E/(D/t) + F_y)S$

Local Buckling Slender: $M_n =$ F $M_n = F_{cr}S$

$F_{cr} = 0.33E/(D/t)$

ϕM_n =	194.60	k
Z=	4.32	in^3
F_y=	50	ksi

Combined Loads were checked per AISC Eq H3-6 : $(Pr/Pc + Mr/Mc)^2 + (Vr/Vc + Tr/Tc)2 < 1.0$



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DYNAMICS - FREQUENCY CALCULATION

Panel Data:

Module Type	=	**Series 6 Plus**	
Wing Length	=	66.98	m
mass of each module	=	34.00	kg
Module width	=	1.25	m
Module length	=	2.02	m
Module Iy	=	11.61	kgm^2
Tracker Iy	=	777.48	kgm^2
Tracker Effective Length	=	40	m
Tracker J	=	5.18E-06	m^4
Tracker G	=	79.30	Gpa
Tracker G	=	79300000000	Pa
	=	79300000000	$kg/(ms^2)$

Design Wind Speed

U	=	110	mph

TT geometry:

Outside D	=	127	mm
wall thickness	=	4	mm
inside diameter	=	120	mm
J, Polar Moment of Inertia	=	5182120.0	mm^4

System stiffness:

Tracker L/JG	=	9.78E-05	$s^2/(kgm^2)$
k = L/JG^-1	=	10224.85	kgm^2/s^2
	=		

Dynamic response:

f_n	=	0.577	Hz
f_nD	=	1.168	
$\frac{f_n D}{U}$	=	0.024	

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Structural Calculations For

Verogy: Woodstock Solar One

NEXTracker Horizon NX Tracking System

NEXTracker

Design Summary

RISK CATEGORY:	I	ROW TYPE:	Edge
DESIGN WIND SPEED (MPH):	110	SPACING:	14.64 ft / 45.36%
OPERATIONAL DESIGN SPEED (MPH):	49	TRACKER VERSION:	2.3.13.P
DESIGN METHOD:	ASCE 7-16	GROUND SNOW LOAD (PSF):	40
STOW STRATEGY:	60	PILE REVEAL HEIGHT (FT):	7
		TERRAIN TYPE:	XTR-0.75

Project Location

Latitude: 41.9223, Longitude: -71.9595

Address: Castle Rock Road, Woodstock, CT 06281

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Engineer:	MDR/DCD
Date:	29-Apr-25

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REVISION HISTORY

S.NO	DATE	DESCRIPTION
1	29-Apr	Wi/Di Factors removed, Ksi ratings adjusted on TCP

BASIS FOR DESIGN

DESCRIPTION: THE NEXTracker HORIZON NX SINGLE AXIS TRACKER IS A STEEL STRUCTURE THAT TRACKS THE SUN FROM EAST TO WEST THROUGHOUT THE DAY TO MAXIMIZE SOLAR ENERGY PRODUCTION. THE TRACKER IS COMPOSED OF COLD FORMED AND HOT ROLLED STEEL

WIND LOADS: WIND LOADS ON THE TRACKER ARE CALCULATED BY MULTIPLYING THE REFERENCE PRESSURE BY AN AERODYNAMIC SHAPE FACTOR, TAKING THE FORM: P=qh*GC. THE AERODYNAMIC COEFFICIENTS ARE TAKEN FROM THE WIND TUNNEL STUDY PERFORMED BY CPP WIND OF FORT COLLINS COLORADO. A THIRD PARTY PEER REVIEW OF THIS STUDY IS AVAILABLE UPON REQUEST. THE REFERENCE PRESSURE IS CALCULATED IN ACCORDANCE WITH THE GOVERNING WIND CODE.

Table 1: Wind speeds analyzed at each tilt

TILT (DEG)	DESIGN WIND SPEED (MPH)	
	(MPH)	(M/S)
0	49	22
15	49	22
30	49	22
45	49	22
60	110	49

K_z IS EVALUATED AT A HEIGHT OF 10 METERS IN ACCORDANCE WITH WIND TUNNEL STUDY REQUIREMENTS.

Table 2: Summary of wind directionality

WIND APPROACH ANGLE (DEG)	K_d FACTOR
0 DEG NORTH	0.85
45 DEG NORTH-EAST	0.85
90 DEG EAST	0.85
135 DEG SOUTH-EAST	0.85
180 DEG SOUTH	0.85
225 DEG SOUTH WEST	0.85
270 DEG NORTH WEST	0.85

PROJECT DEAD LOAD:

THE DL IS CALCULATED AS THE WEIGHT OF STRUCTURE + THE WEIGHT OF THE SOLAR PANELS =	3.83	lbf/ft^2	183.46	Pa
=	25.44	lbf/ft	371.32	N/m

THERMAL ACTIONS: IN OUR TRACKER, TORQUE TUBE IS NOT CONSTRAINED. THE TUBE CAN FREELY EXPAND OR CONTRACT WITHOUT CREATING ADDITIONAL STRESSES. THE JOINTS ARE DESIGNED TO FREELY ACCOMMODATE THE EXPANSION DUE TO TEMPERATURE.

SEISMIC, SNOW AND ICE LOADS: SEE SUBSEQUENT PAGES FOR DETAILED CALCULATIONS OF THESE LOADS

DESIGN REFERENCED STANDARDS: THE TRACKER IS DESIGNED TO COMPLY WITH THE FOLLOWING REFERENCE STANDARDS

1. WIND LOADING IN ACCORDANCE WITH ASCE 7-16 CHAPTER 31
2. SEISMIC LOADING IN ACCORDANCE WITH ASCE 7-16
3. HOT ROLLED STEEL DESIGN IN ACCORDANCE WITH AISC 360
4. COLD FORMED STEEL DESIGN IN ACCORDANCE WITH AISI 100-16.

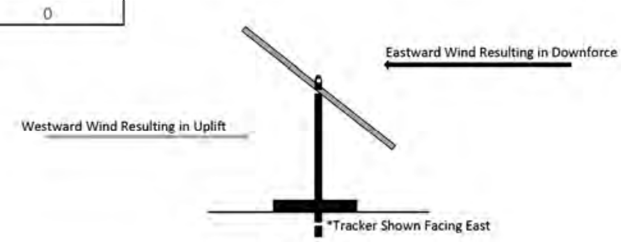
LOAD COMBINATIONS: THE TRACKER IS DESIGNED TO RESIST THE FOLLOWING LOAD COMBINATIONS FOR THE LRFD METHOD PER ASCE 7-16

Table 3: Summary of load combinations for which the tracker is checked.

COMBO #	DL FACTOR	WL FACTOR	SL FACTOR	EQ FACTOR
3b	1.2	0.5	1.6	0
4	1.2	1	0.5	0
5	0.9	1	0	0
5ASD	1	0.6	0	0
6ASD	1	0.45	0.75	0
7ASD	0.6	0.6	0	0

TRACKER APPROACH ANGLE REFERENCE:

THE TRACKERS WILL BE TILTED INTO THE DIRECTION OF THE PREVAILING WIND ONCE STOW STRATEGY IS TRIGGERED. SO, AT 60DEG DESIGN WIND SPEED, RESULTS IN DOWNWARD PRESSURES ON THE TRACKER, WHILE LOADS FROM THE OPPOSITE SIDE RESULT IN UPLIFT LOADS ON THE TRACKER.



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DEAD LOAD

Table 4: Summary of tracker dead load

PART NAME:	PART WEIGHT (lbf/ft^2)	PART WEIGHT (Pa)
SOLAR PANEL	2.62	125.42
PANEL RAIL	0.38	18.03
TORQUE TUBE	0.84	40.00
PROJECT DEAD LOAD	3.83	183.46

NOTE: THE NEXTracker HORIZON TRACKER ROTATES ABOUT A PIN THAT IS SITUATED ABOVE THE TORQUE TUBE, THIS RESULTS IN A BALANCED SYSTEM THAT IS EASIER TO DRIVE, AND REDUCES OVERALL TORQUE TO THE SYSTEM.

SOLAR PANEL SPECIFICATIONS

Solar Panel Type: **Series 6 Plus**

Solar Panel Width	=	4.08	ft	1.25	m	Surface Area of Panel	=	27.12	ft^2	2.52	m^2
Solar Panel Length	=	6.64	ft	2.02	m	Solar Panel Thickness	=	1.93	in	49.00	mm
						Solar Panel Weight	=	74.96	lbf	333.41	N

COMPONENTS

Hot Rolled	Cold Formed
Torque tube	Panel rail
Pivot pin	BHA (handle)
Slew gear mounting	BHA rail
Torque tube adapter	Fastening
Splice	
Bracket	

TRACKER LAYOUT

Stow Speed	18mph 1 min 3m
	35mph 3s 10m

102 MODULE

C	Bay 9	Bay 8	Bay 7	Bay 6	Bay 5	Bay 4	Bay 3	Bay 2	Bay 1	Motor	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
1	5	5	5	6	6	6	6	6	5	M	5	6	6	6	6	6	5	5	5	1

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WIND REFERENCE PRESSURES

THE TRACKER UTILIZES A WIND STOW STRATEGY. EACH TRACKER HAS A BATTERY BACKUP AND WIND SPEEDS ON SITE ARE MONITORED CONTINOUSLY.

Reference Table 1: Wind speeds analyzed at each tilt

TILT (DEG)	DESIGN WIND SPEED (MPH)	
	(mi/hr)	(M/S)
0	49	21.9
15	49	21.9
30	49	21.9
45	49	21.9
60	110	49.2

Reference Table 2: Summary of wind directionality

WIND APPROACH ANGLE (DEG)	K_d FACTOR
0 DEG NORTH	0.85
45 DEG NORTH-EAST	0.85
90 DEG EAST	0.85
135 DEG SOUTH-EAST	0.85
180 DEG SOUTH	0.85
225 DEG SOUTH WEST	0.85
270 DEG NORTH WEST	0.85

WIND EXPOSURE = C

K_z IS EVALUATED AT A HEIGHT OF 10 METERS IN ACCORDANCE WITH WIND TUNNEL STUDY REQUIREMENTS = 1.00

Zg = 466.6 ft

Altitude factor Ke = 0.98

Kzt = 1.00

Selected Stow Inputs

S.no	Stow (Deg)	Wind speed (mph)	AppAngle	LC	Kz	Kzt	Kd	Ke	Q_h (psf)
1	60	110	A	3b	1.00	1	0.85	0.98	25.89
2	60	110	A	4	1.00	1	0.85	0.98	25.89
3	60	93.5	X	5	1.00	1	0.85	0.98	18.70

Stow Speed	18mph 1 min 3m
	35mph 3s 10m

Reference Pressure is Calculated in Accordance with ASCE 7-16 Eq 26.10-1

$qz = 0.00256K_zK_{zt}K_dK_eV^2$ (psf, V in mph), or $qz = 0.613K_zK_{zt}K_dK_eV^2$ (Pa, V in m/s)

Table 6: Reference pressure for approach angle and tilt

WIND APPROACH ANGLE (DEG)	K_d FACTOR	0 & 15 DEG TILT		30 DEG TILT		45 DEG TILT		60 DEG TILT	
		lbf/ft^2	Pa	lbf/ft^2	Pa	lbf/ft^2	Pa	lbf/ft^2	Pa
0 DEG NORTH	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
45 DEG NORTH-EAST	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
90 DEG EAST	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
135 DEG SOUTH-EAST	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
180 DEG SOUTH	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
225 DEG SOUTH WEST	0.85	5.1	246	5.1	246	5.1	246	25.9	1239
270 DEG NORTH WEST	0.85	5.1	246	5.1	246	5.1	246	25.9	1239

*NOTE: STRUCTURAL CALCULATIONS FOR THE 0 DEG AND 15 DEG TILT ARE OMITTED AS THE WIND SPEEDS INDICATE THESE TILT ANGLES WILL NOT GOVERN THE DESIGN OF THE TRACKER

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SNOW LOADS

THE TRACKER IS DESIGNED TO UTILIZE A SNOW STOW OPERATION WHEN DESIGN GROUND SNOW LOADS ARE GREATER THAN 20 PSF. THE TRACKER IS DESIGNED TO ACCOMMODATE 6 INCHES (150 mm) OF SNOW ON THE TRACKER, PRIOR TO MOVING TO STOW.

Table 7: Design ground snow loads, and depth of snow on tracker

TILT (DEG)	DESIGN GROUND SNOW LOAD	
	(lbf/ft^2)	(Pa)
0	10	479
15	10	479
30	20	958
45	32	1532
60	40	1915

SNOW LOADS ARE CALCULATED IN ACCORDANCE WITH ASCE 7-16 CHAPTER 7.

$p_f = 0.7 * C_e * C_t * I_s * p_g$ — *Flat surface snow load per ASCE 7-16 Eq 7.3-1*

C_e = 0.9 — Exposure Category = C — Exposure Type = Fully Exposed — *ASCE 7-16 Table 7.3-1*

C_t = 1.2 — *ASCE 7-16 Table 7.3-2*

I_s = 0.8 — Risk Category = I — *ASCE 7-16 Table 1.5-2*

Table 8: Summary of design snow loads

TILT (DEG)	Flat Surface Snow Load, p_f		C_s Slope Factor	Roof Snow Load $p_s = p_f * C_s$		DEPTH OF SNOW ON TRACKER	
	(lbf/ft^2)	(Pa)		(lbf/ft^2)	(Pa)	(INCHES)	(mm)
0	6.0	290	1	6.0	290	3.78	96
15	6.0	290	1	6.0	290	3.78	96
30	12.1	579	0.727	8.8	421	5.50	140
45	19.4	927	0.455	8.8	422	5.50	140
60	24.2	1158	0.182	4.4	211	2.75	70

Snow Density = 19.2 lbf/ft^3 308 kg/m^3

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SEISMIC LOADS

Structure Type: Cantilever Column

Table 15.4-2 From ASCE 7-16

R (Resitance Factor)	2.00
Ω_o (Overstrength Factor)	2.00
C_d (Deflection Amplification)	2.00
I_e (Seismic Importance Factor)	1.00
ρ (Redunancy Factor)	1.30

S_s	0.182	
S_1	0.055	
F_a	1.300	
F_v	1.500	
S_{DS}	0.158	= 2/3 * Ss * Fa
S_{D1}	0.055	= 2/3 * S1 * Fv

Soil Site Class	C	
T_L	6	sec
T	0.16	sec

TRACKER DEAD LOAD

Dead Load = 25.44 plf

WORSE CASE TRACKER SNOW LOAD

58.47 plf

SEISMIC WEIGHT

W =	37.14	plf
V = CsW =	2.93	plf
Tracker Length =	439.53	ft
Vtotal =	1289.5	pounds
Seismic Load to Motor Pier =	1289.5	pounds

SEISMIC RESPONSE COEFFICIENT

$C_{s\,min} = 0.044 S_{DS} I_e$

T = 0.16 seconds < T_L

$C_s = S_{DS}/(R/I_e)$

$C_{s\,min} = 0.03$

$C_{s\,min} = 0.8S_1/(R/I_e)$ if $S_1 > 0.6$

$C_{s\,max} = S_{D1} * T_L/[T(R/I_e)]$ if $S_1 > 0.6$

C_s 0.08

$C_{s\,min}$	0.03	$C_{s\,max}$	2.96	$C_{s\,final}$	0.08

SEISMIC LOAD CHECK

E-W Direction

Total Pier Count	=	19	
Seismic Load on each pier	=	68	pounds
Max Wind load on each pier	=	2250	pounds

Max Wind load on each pier > seismic load on each pier, Hence Wind governs design for E-W direction

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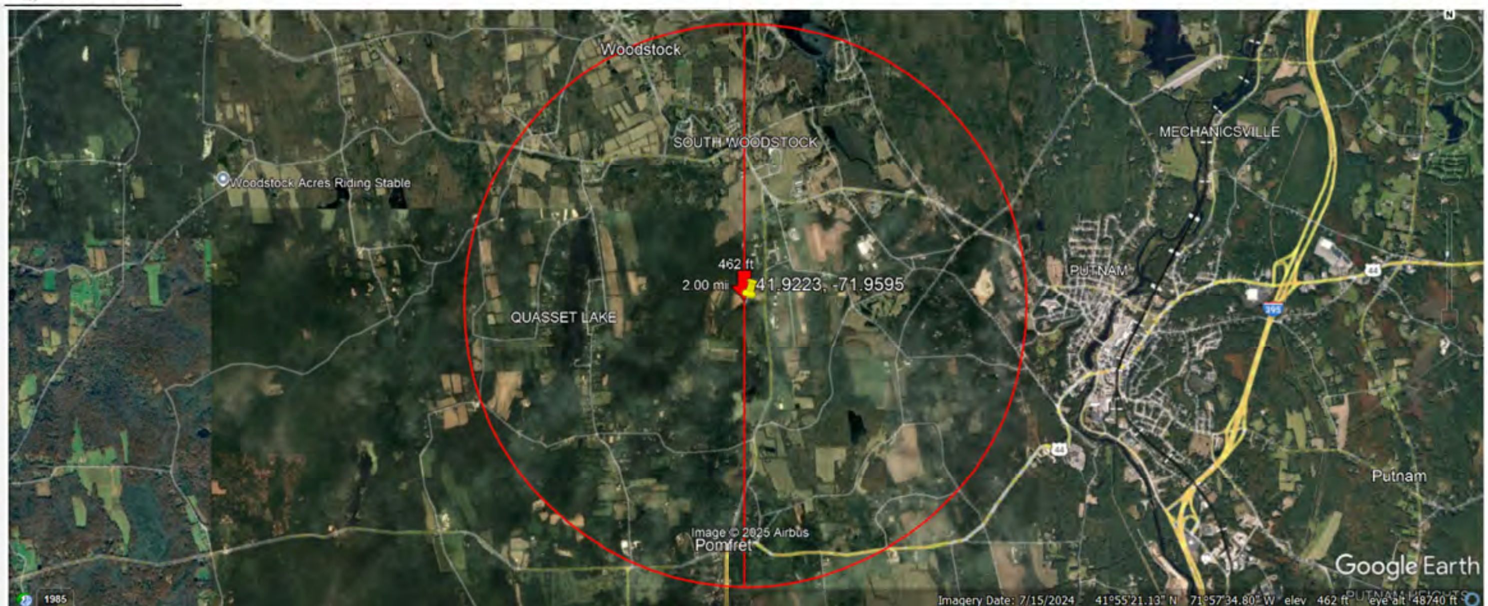
K_{zt} Calculation



Kzt IS CALCULATED IN ACCORDANCE WITH ASCE 7-16 SECTION 26.8

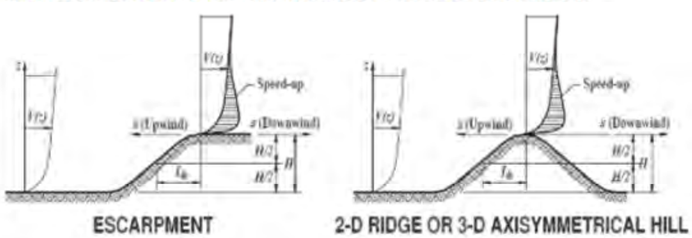


Figure 1: Image for variables in Kzt calculations, taken from ASCE 7-16 Figure 26.8-1

Table 5: K1,K2,K3 values from ASCE 7-16 Figure 26.8-1

K1 Multiplier		K2 Multiplier		K3 Multiplier	
H/L_h	2D Escarp	x/L_h	2D Escarp	z/L_h	2D Escarp
0.20	0.17	0.00	1.00	0.00	1.00
0.25	0.21	0.50	0.88	0.10	0.78
0.30	0.26	1.00	0.75	0.20	0.61
0.35	0.30	1.50	0.63	0.30	0.47
0.40	0.34	2.00	0.50	0.40	0.37
0.45	0.38	2.50	0.38	0.50	0.29
0.50	0.43	3.00	0.25	0.60	0.22
		3.50	0.13	0.70	0.17
		4.00	0.00	0.80	0.14
				0.90	0.11
				1.00	0.08
				1.50	0.02
				2.00	0.00

Equations from ASCE 7-16 Figure 26.8-1

$K_{zt} = (1 + K_1K_2K_3)^2$	=	1.00	H	=	273	ft	83.2	m			
K_1 = SEE TABLE 5	=	0.00	L_h	=	10402	ft	3170.4	m	H/L_h	=	0.03
K_2 = SEE TABLE 5	=	0.75	x	=	10560	ft	3218.7	m	x/L_h	=	1.02
K_3 = SEE TABLE 5	=	0.94	z	=	280	ft	85.3	m	z/L_h	=	0.03

N-S DIRECTION

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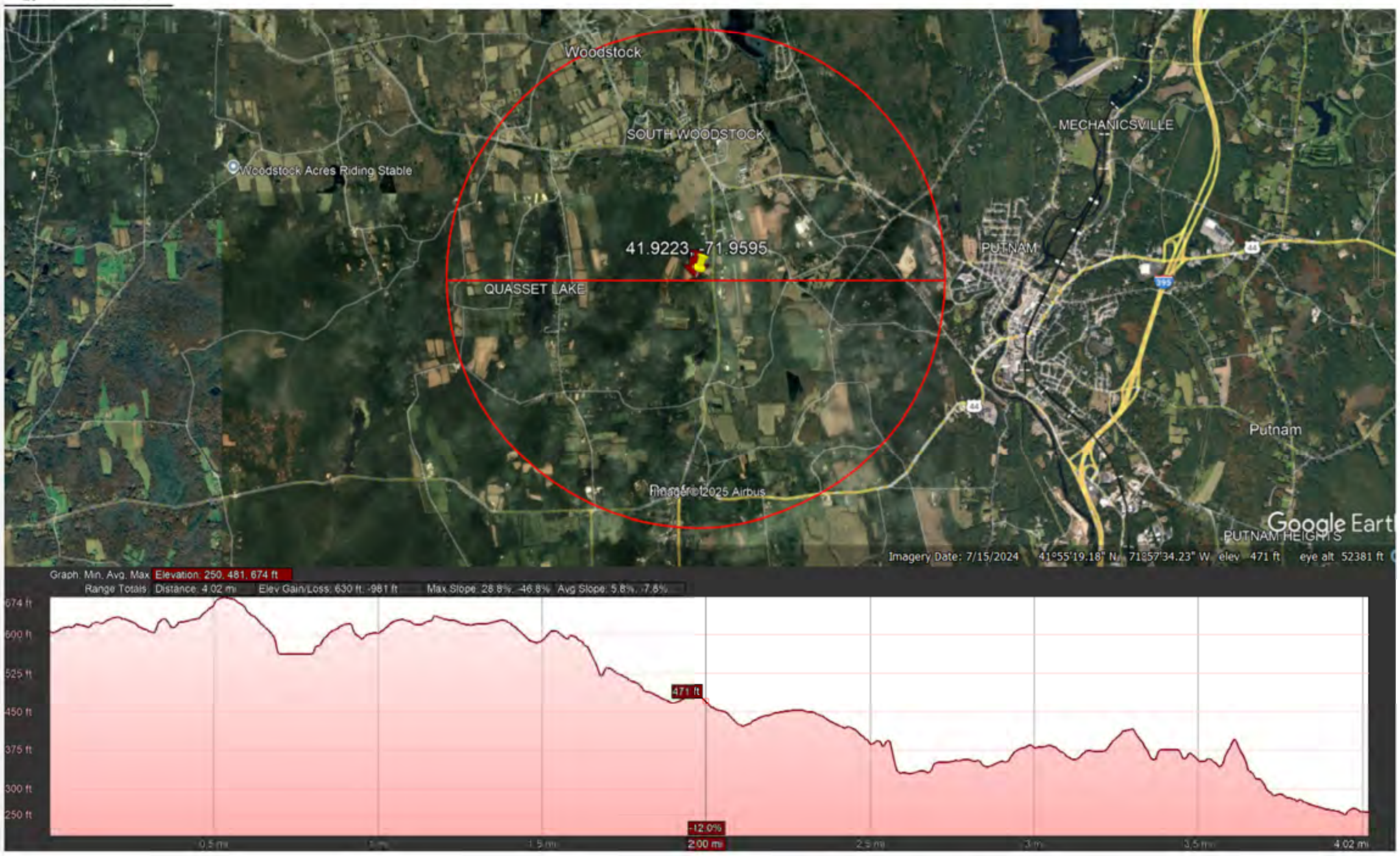
K_{zt} Calculation



Kzt IS CALCULATED IN ACCORDANCE WITH ASCE 7-16 SECTION 26.8

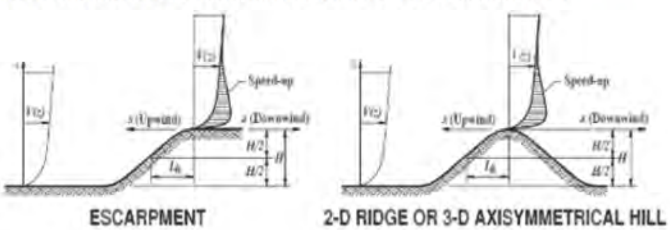


Figure 1: Image for variables in Kzt calculations, taken from ASCE 7-16 Figure 26.8-1

Table 5: K1,K2,K3 values from ASCE 7-16 Figure 26.8-1

K1 Multiplier		K2 Multiplier		K3 Multiplier	
H/L_h	2D Escarp	x/L_h	2D Escarp	z/L_h	2D Escarp
0.20	0.17	0.00	1.00	0.00	1.00
0.25	0.21	0.50	0.88	0.10	0.78
0.30	0.26	1.00	0.75	0.20	0.61
0.35	0.30	1.50	0.63	0.30	0.47
0.40	0.34	2.00	0.50	0.40	0.37
0.45	0.38	2.50	0.38	0.50	0.29
0.50	0.43	3.00	0.25	0.60	0.22
		3.50	0.13	0.70	0.17
		4.00	0.00	0.80	0.14
				0.90	0.11
				1.00	0.08
				1.50	0.02
				2.00	0.00

Equations from ASCE 7-16 Figure 26.8-1

$K_{zt} = (1 + K_1K_2K_3)^2$	=	1.00	H	=	424	ft	129.2	m			
K_1 = SEE TABLE 5	=	0.00	L_h	=	9029	ft	2752.0	m	H/L_h	=	0.05
K_2 = SEE TABLE 5	=	0.72	x	=	10296	ft	3138.2	m	x/L_h	=	1.14
K_3 = SEE TABLE 5	=	0.89	z	=	431	ft	131.4	m	z/L_h	=	0.05

E-W DIRECTION

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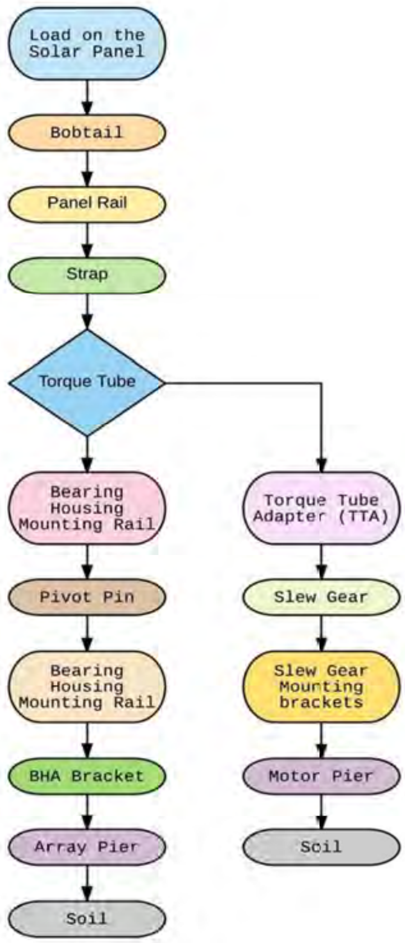
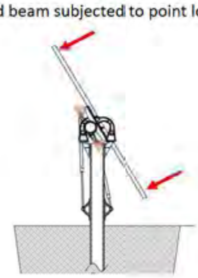
LOAD PATH DESCRIPTION



ANALYSIS HYPOTHESIS

The Wind loads on the solar panel are calculated using the Aerodynamic pressure coefficients from the Wind tunnel study report provided by CPP.

The Wind load thus acting on the solar panel is shared between four bob tail fasteners which are used to attach the solar panel to the panel rail. The load on these fasteners acts as a point load on the panel rail, and the panel rail is analyzed as a simply supported double cantilevered beam subjected to point loads at the end.



(Double cantilevered beam)

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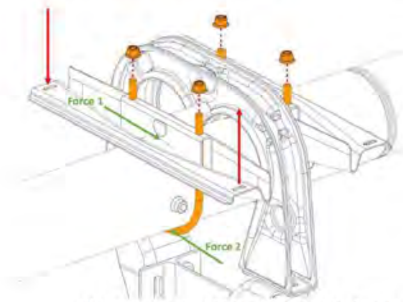
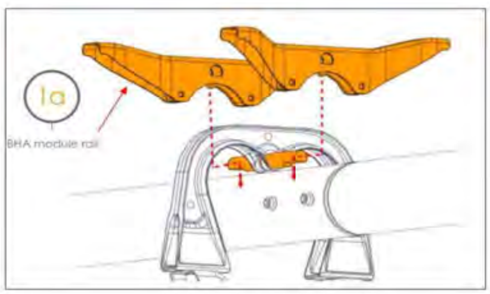
The load from the panel rails is transferred to the torque tubes via strap and metal stub / dimple.
BHA rail also transfer load to torque tube in similar fashion. The moment applied to the U-Bolt is resisted by a force couple formed between Force 1 and Force 2. Force 1 is a shear force in a metal tab that sits in a hole in the torque tube. Force 2 is a frictional force between the U-bolt and the torque tube generated by torqueing the U-bolts.



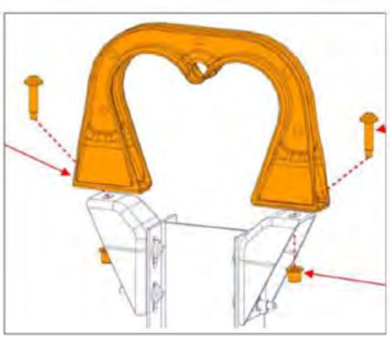
(Moment applied to the U-Bolt at BHA rail)

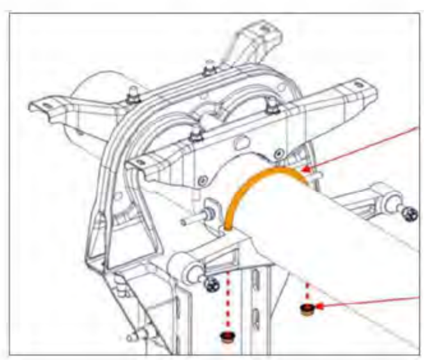
Load goes from torque tube to the bearing housing assembly (BHA) rail. The BHA rail attaches the torque tube to the Pivot Pin. The BHA rail is analyzed for half the load of the panel rail. The load goes to the torque tube from U-bolt. The torque tubes are checked at the LRFD Levels. The BHA rails bearing condition at the either end of the Pivot pin make the rotation of the pin restricted. Hence the pivot pin is analyzed as a fixed-fixed beam with a point load from the BHA handle at the center.



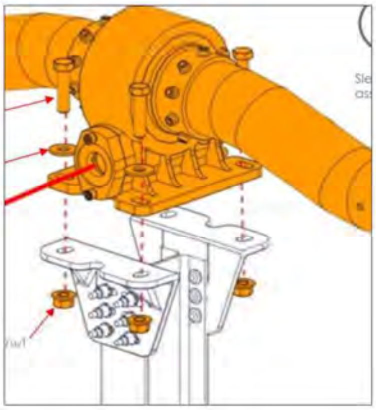
(Pivot pin to handle)

The Shear Load from the Pivot pin is transferred to the BHA handle through bearing. In house testing is performed to determine the allowable load. The Load then travels from the BHA handle to the BHA brackets . These brackets are fixed to the array pier through high strength fasteners that are directly tensioned using a hydraulic tool. The array piers then transfer the loads to the ground

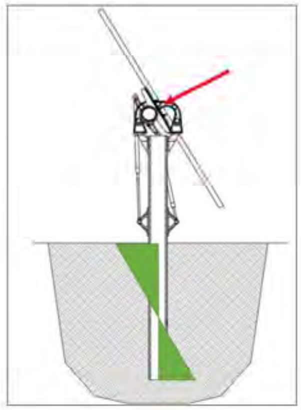




Load to the motor piers are transferred from the slew gear. Loads are transferred from the torque tube to the torque tube adapter with bob tail fasteners. The loads are then transferred from the torque tube adaptor into the slew gear through blind rivets that are factory installed. The slew drive is attached to the motor pier via slew drive mounting brackets. The motor pier then transfers the loads to the ground.



(Slew drive to motor pier via slew drive mounting brackets)



(Transferring lateral load to the ground)

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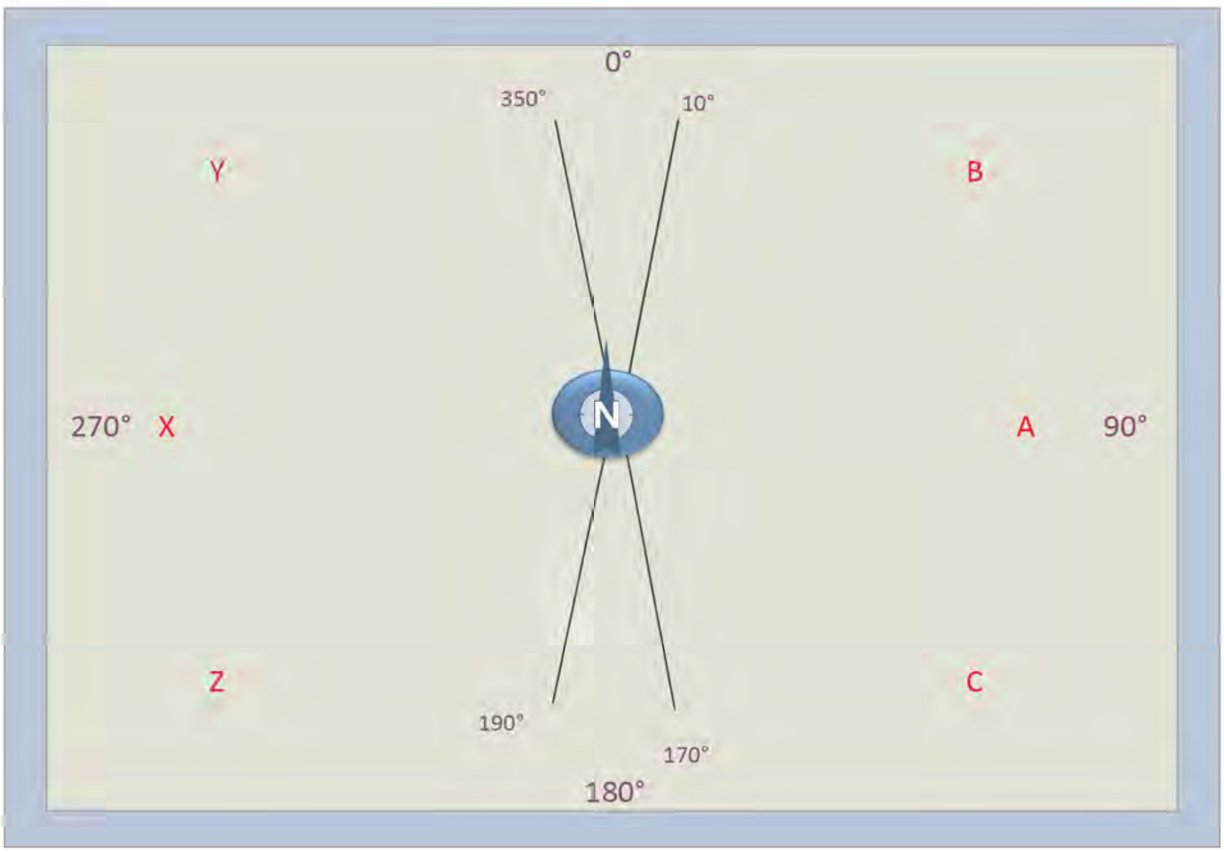
WIND APPROACH ANGLES

Selected Angles	A	X

App Angle	A	B	C	X	Y	Z	N	S
Zone	E	NE	SE	W	NW	SW	N	S
Start Angle	10	10	90	190	340	210	340	160
Stop Angle	170	90	170	350	0	240	20	200



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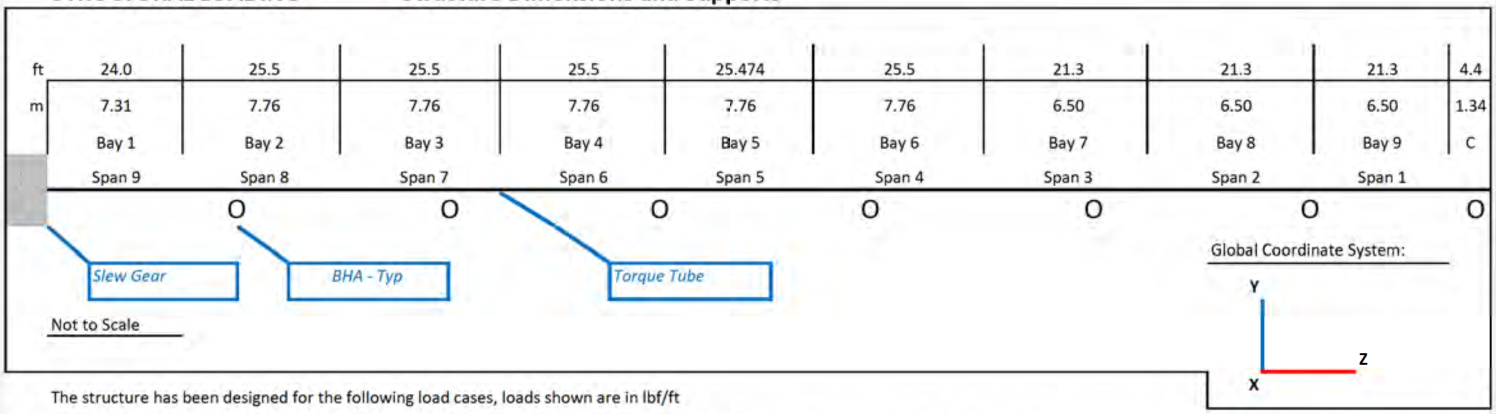
Job Number: EST: 15401
Engineer: MDR/DCD
Date: 29-Apr-25

STRUCTURAL LOADING - Structure Dimensions and Supports



The structure has been designed for the following load cases, loads shown are in lbf/ft

Table X: Vertical (Y) loads applied to tracker with units in lbf/ft. Load cases are combined per the load combinations specified in Table 3

Load Combination	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
LC 3b, 0 deg position, 10-170 deg wind approach angle	118.76	119.21	119.64	120.07	120.28	120.49	120.69	120.43	122.17	122.17
LC 4, 0 deg position, 10-170 deg wind approach angle	64.01	66.19	67.85	69.00	67.07	64.73	62.44	62.46	70.51	70.51
LC 5, 0 deg position, 10-170 deg wind approach angle	29.81	32.00	33.65	34.81	34.47	33.72	33.03	33.84	41.89	41.89
LC 3b, 0 deg position, 190-350 deg wind approach angle	111.25	110.55	109.86	109.18	108.85	108.52	108.19	107.39	105.14	105.14
LC 4, 0 deg position, 190-350 deg wind approach angle	47.83	44.38	41.75	39.92	37.56	35.87	34.12	33.35	26.00	26.00
LC 5, 0 deg position, 190-350 deg wind approach angle	13.64	10.19	7.56	5.72	4.96	4.86	4.71	4.74	-2.62	-2.62
LC 3b, 15 deg position, 10-170 deg wind approach angle	118.96	113.49	108.02	102.57	99.83	97.10	94.38	95.39	97.75	97.75
LC 4, 15 deg position, 10-170 deg wind approach angle	67.09	62.42	57.80	53.26	51.75	50.86	50.49	52.88	64.37	64.37
LC 5, 15 deg position, 190-350 deg wind approach angle	4.85	4.75	4.65	4.57	5.45	7.38	8.15	7.96	-3.23	-3.23
LC 3b, 30 deg position, 10-170 deg wind approach angle	127.47	122.87	120.55	118.23	115.92	113.61	113.59	114.93	118.54	118.54
LC 4, 30 deg position, 10-170 deg wind approach angle	66.03	63.99	62.55	60.50	59.69	58.30	57.57	59.41	70.69	70.69
LC 5, 30 deg position, 190-350 deg wind approach angle	4.85	7.41	8.86	10.67	11.44	12.58	13.18	10.17	-1.49	-1.49
LC 3b, 45 deg position, 10-170 deg wind approach angle	127.61	123.79	116.25	112.45	112.39	108.61	104.85	105.28	110.98	110.98
LC 4, 45 deg position, 10-170 deg wind approach angle	65.72	63.06	59.26	56.65	55.25	52.73	51.44	51.61	61.98	61.98
LC 5, 45 deg position, 190-350 deg wind approach angle	14.54	15.67	16.72	17.43	17.86	18.44	18.75	15.59	6.35	6.35
LC 3b, 60 deg position, 10-170 deg wind approach angle	90.58	90.58	90.58	90.58	90.58	90.58	90.58	90.55	116.08	116.08
LC 4, 60 deg position, 10-170 deg wind approach angle	71.77	71.77	71.77	71.77	71.77	71.77	71.77	71.70	122.77	122.77
LC 5, 60 deg position, 190-350 deg wind approach angle	10.34	11.03	11.03	11.03	11.03	11.03	11.03	-0.28	-32.44	-32.44

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Date:	29-Apr-25

The structure has been designed for the following load cases, loads shown are in N/m

Table X: Vertical (Y) loads applied to tracker with units in N/m. Load cases are combined per the load combinations specified in Table 3

Load Combination	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
LC 3b, 0 deg position, 10-170 deg wind approach angle	1733.22	1739.69	1746.07	1752.36	1755.36	1758.37	1761.41	1757.51	1783.00	1783.00
LC 4, 0 deg position, 10-170 deg wind approach angle	934.11	965.99	990.18	1007.00	978.75	944.64	911.29	911.52	1029.00	1029.00
LC 5, 0 deg position, 10-170 deg wind approach angle	435.08	466.95	491.15	507.97	502.99	492.15	482.06	493.93	611.41	611.41
LC 3b, 0 deg position, 190-350 deg wind approach angle	1623.55	1613.35	1603.28	1593.33	1588.56	1583.80	1578.98	1567.23	1534.43	1534.43
LC 4, 0 deg position, 190-350 deg wind approach angle	698.04	647.71	609.35	582.55	548.11	523.44	497.97	486.72	379.37	379.37
LC 5, 0 deg position, 190-350 deg wind approach angle	199.01	148.68	110.32	83.52	72.35	70.94	68.74	69.13	-38.23	-38.23
LC 3b, 15 deg position, 10-170 deg wind approach angle	1736.05	1656.23	1576.50	1496.95	1456.90	1417.02	1377.33	1392.18	1426.56	1426.56
LC 4, 15 deg position, 10-170 deg wind approach angle	979.04	910.98	843.58	777.29	755.29	742.27	736.84	771.77	939.44	939.44
LC 5, 15 deg position, 190-350 deg wind approach angle	70.75	69.29	67.84	66.76	79.59	107.68	118.91	116.22	-47.10	-47.1
LC 3b, 30 deg position, 10-170 deg wind approach angle	1860.30	1793.20	1759.28	1725.43	1691.66	1657.99	1657.66	1677.24	1730.00	1730.00
LC 4, 30 deg position, 10-170 deg wind approach angle	963.62	933.88	912.80	882.91	871.16	850.83	840.14	867.09	1031.64	1031.64
LC 5, 30 deg position, 190-350 deg wind approach angle	70.81	108.14	129.30	155.74	167.00	183.61	192.31	148.45	-21.72	-21.7
LC 3b, 45 deg position, 10-170 deg wind approach angle	1862.38	1806.65	1696.53	1641.05	1640.23	1585.08	1530.14	1536.51	1619.62	1619.62
LC 4, 45 deg position, 10-170 deg wind approach angle	959.15	920.26	864.77	826.75	806.29	769.59	750.70	753.15	904.51	904.51
LC 5, 45 deg position, 190-350 deg wind approach angle	212.15	228.67	243.95	254.44	260.67	269.12	273.58	227.47	92.73	92.7
LC 3b, 60 deg position, 10-170 deg wind approach angle	1321.94	1321.94	1321.94	1321.94	1321.94	1321.94	1321.94	1321.45	1694.11	1694.11
LC 4, 60 deg position, 10-170 deg wind approach angle	1047.39	1047.39	1047.39	1047.39	1047.39	1047.39	1047.39	1046.42	1791.73	1791.73
LC 5, 60 deg position, 190-350 deg wind approach angle	150.91	161.01	161.01	161.01	161.01	161.01	161.01	-4.02	-473.48	-473.5

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The structure has been designed for the following load cases, loads shown are in lbf/ft

Table X: Horizontal (X) loads applied to tracker with units in plf. Load cases are combined per the load combinations specified in Table 3

Load Combination	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
LC 3b, 0 deg position, 10-170 deg wind approach angle	0.07	0.23	0.40	0.59	0.74	0.87	0.98	0.97	1.35	1.35
LC 4, 0 deg position, 10-170 deg wind approach angle	0.30	1.13	2.14	3.14	3.68	3.93	3.99	4.53	8.06	64.01
LC 5, 0 deg position, 10-170 deg wind approach angle	0.30	1.13	2.14	3.14	3.68	3.93	3.99	4.53	8.06	29.81
LC 3b, 0 deg position, 190-350 deg wind approach angle	-0.09	-0.31	-0.56	-0.82	-1.04	-1.23	-1.39	-1.62	-2.11	111.25
LC 4, 0 deg position, 190-350 deg wind approach angle	-0.40	-1.58	-3.05	-4.52	-5.71	-6.55	-7.17	-7.51	-10.83	47.83
LC 5, 0 deg position, 190-350 deg wind approach angle	-0.40	-1.58	-3.05	-4.52	-5.71	-6.55	-7.17	-7.51	-10.83	13.64
LC 3b, 15 deg position, 10-170 deg wind approach angle	1.73	1.87	1.95	1.99	2.05	2.07	2.06	2.60	5.03	118.96
LC 4, 15 deg position, 10-170 deg wind approach angle	3.62	4.05	4.20	4.09	4.36	4.88	5.16	7.38	16.49	67.09
LC 5, 15 deg position, 190-350 deg wind approach angle	-5.64	-7.26	-8.82	-10.24	-10.90	-10.54	-10.59	-11.09	-19.77	4.85
LC 3b, 30 deg position, 10-170 deg wind approach angle	2.07	2.23	2.35	2.46	2.56	2.65	2.68	3.72	8.24	127.47
LC 4, 30 deg position, 10-170 deg wind approach angle	4.30	4.90	5.40	5.95	6.28	6.66	6.88	8.80	20.55	66.03
LC 5, 30 deg position, 190-350 deg wind approach angle	-11.06	-10.59	-10.54	-9.93	-9.91	-9.38	-9.14	-12.22	-23.68	4.85
LC 3b, 45 deg position, 10-170 deg wind approach angle	3.70	3.79	3.87	3.94	3.98	4.03	4.06	4.64	11.82	127.61
LC 4, 45 deg position, 10-170 deg wind approach angle	7.50	7.84	8.15	8.39	8.58	8.74	8.84	9.29	25.94	65.72
LC 5, 45 deg position, 190-350 deg wind approach angle	-8.77	-8.31	-7.72	-7.33	-7.17	-6.66	-6.42	-11.53	-26.40	14.54
LC 3b, 60 deg position, 10-170 deg wind approach angle	23.06	23.06	23.06	23.06	23.06	23.06	23.06	23.01	67.24	90.58
LC 4, 60 deg position, 10-170 deg wind approach angle	46.13	46.13	46.13	46.13	46.13	46.13	46.13	46.01	134.47	71.77
LC 5, 60 deg position, 190-350 deg wind approach angle	-21.75	-20.55	-20.55	-20.55	-20.55	-20.55	-20.55	-40.14	-95.86	10.34

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The structure has been designed for the following load cases, loads shown are in lbf/ft

Table X: Horizontal (X) loads applied to tracker with units in N/m. Load cases are combined per the load combinations specified in Table 3

Load Combination	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
LC 3b, 0 deg position, 10-170 deg wind approach angle	1.01	3.32	5.90	8.59	10.78	12.73	14.32	14.20	19.73	19.73
LC 4, 0 deg position, 10-170 deg wind approach angle	4.32	16.49	31.16	45.78	53.77	57.35	58.28	66.07	117.65	934.11
LC 5, 0 deg position, 10-170 deg wind approach angle	4.32	16.49	31.16	45.78	53.77	57.35	58.28	66.07	117.65	435.08
LC 3b, 0 deg position, 190-350 deg wind approach angle	-1.34	-4.49	-8.13	-12.00	-15.15	-17.98	-20.33	-23.60	-30.84	1623.55
LC 4, 0 deg position, 190-350 deg wind approach angle	-5.79	-23.04	-44.45	-66.04	-83.40	-95.58	-104.61	-109.63	-158.05	698.04
LC 5, 0 deg position, 190-350 deg wind approach angle	-5.79	-23.04	-44.45	-66.04	-83.40	-95.58	-104.61	-109.63	-158.05	199.01
LC 3b, 15 deg position, 10-170 deg wind approach angle	25.32	27.25	28.49	29.04	29.87	30.23	30.12	37.93	73.37	1736.05
LC 4, 15 deg position, 10-170 deg wind approach angle	52.86	59.04	61.24	59.75	63.65	71.24	75.24	107.74	240.62	979.04
LC 5, 15 deg position, 190-350 deg wind approach angle	-82.35	-105.98	-128.74	-149.41	-159.01	-153.86	-154.59	-161.91	-288.48	70.75
LC 3b, 30 deg position, 10-170 deg wind approach angle	30.16	32.58	34.34	35.94	37.39	38.69	39.13	54.26	120.21	1860.30
LC 4, 30 deg position, 10-170 deg wind approach angle	62.80	71.55	78.79	86.89	91.63	97.17	100.46	128.42	299.97	963.62
LC 5, 30 deg position, 190-350 deg wind approach angle	-161.46	-154.52	-153.89	-144.93	-144.68	-136.92	-133.40	-178.29	-345.52	70.81
LC 3b, 45 deg position, 10-170 deg wind approach angle	54.05	55.31	56.50	57.45	58.15	58.78	59.23	67.77	172.46	1862.38
LC 4, 45 deg position, 10-170 deg wind approach angle	109.51	114.45	118.90	122.47	125.20	127.49	128.96	135.52	378.55	959.15
LC 5, 45 deg position, 190-350 deg wind approach angle	-128.05	-121.28	-112.67	-106.95	-104.71	-97.24	-93.63	-168.33	-385.22	212.15
LC 3b, 60 deg position, 10-170 deg wind approach angle	336.60	336.60	336.60	336.60	336.60	336.60	336.60	335.77	981.23	1321.94
LC 4, 60 deg position, 10-170 deg wind approach angle	673.21	673.21	673.21	673.21	673.21	673.21	673.21	671.53	1962.45	1047.39
LC 5, 60 deg position, 190-350 deg wind approach angle	-317.44	-299.95	-299.95	-299.95	-299.95	-299.95	-299.95	-585.79	-1398.92	150.9

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

PANEL TO RAIL ATTACHMENT CHECK - 1/4" LARGE HEAD BOBTAIL BOLT

Bolt Diameter =	0.25	in
Bolt Quantity =	4	Nos
Rail Thickness=	0.071	in
Rail Fy=	50	ksi
Rail Fu=	68	ksi
Overhang, Lo =	0.47	ft

ULTIMATE CAPACITIES (#'S)			
DIAMETER	CLAMP	TENSILE	SHEAR
0.3	620	1348	1375

Bolt Tension	
ϕ=	0.65
Pn=	1348
ϕPn=	876.2

Bolt Quantity per side = 2 Nos

Stow	LC	Load Factors	Angle	Combo Load Tension	Check
0	5	0.9D+1W	1	28.3	3%
0	5	0.9D+1W	2	28.1	3%
0	5	0.9D+1W	2	28.1	3%
0	5	0.9D+1W	1	73.6	8%
0	5	0.9D+1W	2	73.9	8%
0	5	0.9D+1W	2	73.9	8%
15	5	0.9D+1W	16	20.1	2%
15	5	0.9D+1W	17	19.5	2%
15	5	0.9D+1W	17	94.8	11%
30	5	0.9D+1W	30	49.3	6%
30	5	0.9D+1W	31	48.8	6%
30	5	0.9D+1W	31	120.8	14%
45	5	0.9D+1W	45	51.2	6%
45	5	0.9D+1W	46	50.5	6%
45	5	0.9D+1W	46	91.5	10%
60	5	0.9D+1W	60	242.5	28%
60	5	0.9D+1W	60	242.5	28%
60	5	0.9D+1W	60	264.2	30%

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PANEL TO RAIL ATTACHMENT CHECK

Torsion Check

Stow	LC	Load Factors	Angle	SL-Torsional Moment	WL-Torsional MOMENT	DL per Bolt	Combination Load	ϕTn	Check
0	5	0.9D+1W	1	216.2	46.3	18.7	63.1	876.2	7%
0	5	0.9D+1W	2	213.0	46.3	18.4	62.9	876.2	7%
0	5	0.9D+1W	2	213.0	46.3	18.4	62.9	876.2	7%
0	5	0.9D+1W	1	216.2	73.3	18.7	90.1	876.2	10%
0	5	0.9D+1W	2	213.0	73.3	18.4	89.8	876.2	10%
0	5	0.9D+1W	2	213.0	73.3	18.4	89.8	876.2	10%
15	5	0.9D+1W	16	210.7	38.8	17.6	54.6	876.2	6%
15	5	0.9D+1W	17	209.7	38.8	17.0	54.1	876.2	6%
15	5	0.9D+1W	17	209.7	121.4	17.0	136.7	876.2	16%
30	5	0.9D+1W	30	200.1	20.5	15.7	34.6	876.2	4%
30	5	0.9D+1W	31	193.0	20.5	15.2	34.1	876.2	4%
30	5	0.9D+1W	31	193.0	138.2	15.2	151.8	876.2	17%
45	5	0.9D+1W	45	143.7	62.8	12.5	74.0	876.2	8%
45	5	0.9D+1W	46	120.1	62.8	11.8	73.4	876.2	8%
45	5	0.9D+1W	46	120.1	153.6	11.8	164.3	876.2	19%
60	5	0.9D+1W	60	59.7	307.9	9.4	316.4	876.2	36%
60	5	0.9D+1W	60	59.7	307.9	9.4	316.4	876.2	36%
60	5	0.9D+1W	60	59.7	562.2	9.4	570.6	876.2	65%

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PANEL TO RAIL ATTACHMENT CHECK

Shear Check

Bolt Shear	
ϕ=	0.65
Pn=	1375
ϕPn=	893.8

Stow	LC	Load Factors	Angle	DL Shear	SL Shear	Combination Load Shear	Load Per Bolt	Bolt Shear	Check
0	5	0.9D+1W	1	13.0	37.7	11.7	2.9	894	0%
0	5	0.9D+1W	2	26.9	80.9	24.2	6.0	894	1%
0	5	0.9D+1W	2	26.9	80.9	24.2	6.0	894	1%
0	5	0.9D+1W	1	13.0	37.7	11.7	2.9	894	0%
0	5	0.9D+1W	2	26.9	80.9	24.2	6.0	894	1%
0	5	0.9D+1W	2	26.9	80.9	24.2	6.0	894	1%
15	5	0.9D+1W	16	31.7	97.8	28.5	7.1	894	1%
15	5	0.9D+1W	17	43.0	136.9	38.7	9.7	894	1%
15	5	0.9D+1W	17	43.0	136.9	38.7	9.7	894	1%
30	5	0.9D+1W	30	44.1	140.3	39.7	9.9	894	1%
30	5	0.9D+1W	31	51.1	162.7	46.0	11.5	894	1%
30	5	0.9D+1W	31	51.1	162.7	46.0	11.5	894	1%
45	5	0.9D+1W	45	58.3	168.7	52.4	13.1	894	1%
45	5	0.9D+1W	46	62.9	165.9	56.6	14.1	894	2%
45	5	0.9D+1W	46	62.9	165.9	56.6	14.1	894	2%
60	5	0.9D+1W	60	64.9	103.3	58.4	14.6	894	2%
60	5	0.9D+1W	60	64.9	103.3	58.4	14.6	894	2%
60	5	0.9D+1W	60	64.9	103.3	58.4	14.6	894	2%

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Date:	29-Apr-25

PANEL RAIL - FSLRS6-EXT-21171-02-A

Total Length, L =	1.43	ft
Overhang, Lo =	0.47	ft
Bolt Spacing, s =	0.48	ft

Trib Area =	27.12	ft^2
Panel Weight =	2.76	psf

Part No :	21171-02

Analysis / Code Checks

Section	Allow.Load (plf) Tension	Torsion	Torsion Up
FSLRS6-EXT-21171-02-A	2608	19938	14368

Analysis of the maximum loads for each panel rail section was performed in FEA or by Testing. These calculations and/or test reports are available upon request.

Stow	LC	Load Factors	Angle	Design Tension Load (lbs)	Design Check for Tension	Design Torsion Load (lbs-in)	Design Check for Torsion	
							Down	Up
0	3b	1.2D+0.5W+1.6S	1	501.4	19%	1594	8%	
0	4	1.2D+1W+0.5S	2	437.7	17%	2897	15%	
0	5	0.9D+1W	2	309.1	12%	2897		20%
0	3b	1.2D+0.5W+1.6S	1	511.3	20%	1682	8%	
0	4	1.2D+1W+0.5S	2	433.6	17%	3344	17%	
0	5	0.9D+1W	2	305.1	12%	3344		23%
15	3b	1.2D+0.5W+1.6S	16	549.2	21%	1408	7%	
15	4	1.2D+1W+0.5S	17	460.1	18%	2469	12%	
15	5	0.9D+1W	17	370.4	14%	3613		25%
30	3b	1.2D+0.5W+1.6S	30	532.5	20%	1267	6%	
30	4	1.2D+1W+0.5S	31	445.4	17%	2211	11%	
30	5	0.9D+1W	31	378.9	15%	3785		26%
45	3b	1.2D+0.5W+1.6S	45	429.8	16%	1139	6%	
45	4	1.2D+1W+0.5S	46	399.0	15%	2014	10%	
45	5	0.9D+1W	46	365.2	14%	3743		26%
60	3b	1.2D+0.5W+1.6S	60	855.7	33%	4547	23%	
60	4	1.2D+1W+0.5S	60	1505.3	58%	8834	44%	
60	5	0.9D+1W	60	1188.2	46%	11793		82%

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

PANEL RAIL TEST - FSLRS6-EXT-21171-02-A

Analysis Method

Testing on the panel rails was conducted under Structurology's supervision, and the testing provisions of AISI 100-16, Chapter F were used to determine the capacity of the panel rail.

Analysis Code Checks

Determine Resistance factor, f, per AISI 100-16 Chapter F, Section F1.1

		Tension	Torsion	Torsion
$\phi = C_\phi(M_m F_m P_m)e^\gamma$	=	0.890	0.889	0.918
$\gamma = -\beta_o(v_M{}^2+v_F{}^2+c_P v_P{}^2+v_Q{}^2)^{(1/2)}$	=	-0.625	-0.627	-0.595

C_ϕ = Calibration Coefficient =	1.52
M_m = mean value of material factor =	1.10
F_m = mean value of fabrication factor =	1.00
P_m = mean value of professional factor =	1.00
e = natural logarithmic base =	2.74
β_o = target reliability index =	2.50
v_M = variation of material factor =	0.10
v_F = variation of fabrication factor =	0.05

c_P = correction factor = (1+1/n)m/(m-2) for n>3 and 5.7 for n = 3

Tension cP =	1.41
Torsion cP =	1.48
Torsion cP =	0.00
v_P = coefficient of variation =	0.07
v_Q = variation of load effect =	0.21

Test No.	Tension (lbs)	Torsion (lbs-in)	Torsion (lbs-in)
1	2931	22228	15650
2	2960	22193	
3	3008	21123	
4	2868	22314	
5	2932	22133	
6	2865	23258	
7	2993	22100	
8	2967	23347	
9	2887	23167	
10	2881		
11			
12			
13			
14			
15			

- Refer ENG-000549 for above Test Data

	Tension	Torsion	Torsion
n =	10	9	1
m =	9	8	0

Part No :	21171-02

Determine the nominal resistance of the connection

R_n = Average Tension Capacity from all tests = 2929.2 lbs

Rn = Average Torsion Capacity from all tests = 22429.2 lbs-in

Rn = Average Torsion Capacity from all tests = 15650.0 lbs-in

Therefore the Tension load resistance of this rail is:

ϕR_n = 2607.5 lbs

Therefore the Torsion load resistance of this rail is:

fRn = 19937.5 lbs

Therefore the Torsion load resistance of this rail is:

fRn = 14367.8 lbs

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Date:	29-Apr-25

TORQUE TUBE CHECK - 2.5MM THICK,GEN 2 FS6

Torque Tube properties		
Panel Width=	4.08	ft
Panel Weight=	2.76	psf
Rail Weight=	0.00	plf
Trib. Width=	6.64	ft
Tube Weight=	5.16	plf

Tube Section Properties				
Shape	A (in2)	S (in3)	Z (in3)	C (in3)
5" O.D. x 0.098"	1.52	1.82	2.36	3.71

E= 29000 ksi

No of Bays= 9

Torque Tube

Layout of Torque Tubes

TT%	58%	69%	70%	67%	70%	70%	61%	73%	77%	13%
TT Size	5" O.D. x 0.098	5" O.D. x 0.098"	5" O.D. x 0.098"	5" O.D. x 0.098"	5" O.D. x 0.098"	5" O.D. x 0.098	5" O.D. x 0.098"	5" O.D. x 0.098"	5" O.D. x 0.098"	5" O.D. x 0.098"
	Bay 1	Bay 2	Bay 3	Bay 4	Bay 5	Bay 6	Bay 7	Bay 8	Bay 9	C
	23.998	25.474	25.474	25.474	25.474	25.474	21.337	21.337	21.337	4.385

(Extra Tolerance Factor =1.2 used for (XTR-0.75 - Extreme Terrain))

Capacity of Torque Tubes

Torsional Capacity of Members is calculated in accordance with AISC H3.1A

$\phi = 0.9$

$T_n = F_{cr}C$

$F_{cr} =$ Max $\{1.23E/((L/D)^{1/2}(D/t)^{5/4}); 0.60E/((D/t)^{3/2})\}$, but not more than 0.6Fy

Shear Capacity of Members is calculated in accordance with AISC G6

$\phi = 0.9$

$V_n = F_{cr}A_g/2$

$F_{cr} =$ Max $\{1.60E/((L/D)^{1/2}(D/t)^{5/4}); 0.78E/((D/t)^{3/2})\}$, but not more than 0.6Fy

Bending Capacity of Members is calculated in accordance with AISC F8

$\phi = 0.9$

Yielding: $M_n = M_p = F_y Z$

Local Buckling Non-Compact: $M_n = (0.021E/(D/t) + Fy)S$

Local Buckling Slender: $M_n = F_{cr}S$

$F_{cr} = 0.33E/(D/t)$

Combined Loads were checked per AISC Eq H3-6 : $(P_r/P_c + M_r/M_c)^2 + (V_r/V_c + T_r/T_c)^2 < 1.0$

Allowable Values

Bay	TT Size	ΦTn k-in	ΦVn k	ΦMn k-in	For (V) ksi	Fy ksi
1	5" O.D. x 0.098"	120	25	118	36	60
2	5" O.D. x 0.098"	120	25	118	36	60
3	5" O.D. x 0.098"	120	25	118	36	60
4	5" O.D. x 0.098"	120	25	118	36	60
5	5" O.D. x 0.098"	120	25	118	36	60
6	5" O.D. x 0.098"	120	25	118	36	60
7	5" O.D. x 0.098"	120	25	118	36	60
8	5" O.D. x 0.098"	120	25	118	36	60
9	5" O.D. x 0.098"	120	25	118	36	60
10c	5" O.D. x 0.098"	120	25	118	36	60

Summary for all tilt angles and load combinations

Bay	MAX	%T	%Combined	%M	%V
1	58%	55%	58%	58%	7%
2	69%	51%	69%	69%	7%
3	70%	46%	70%	70%	7%
4	67%	39%	67%	67%	7%
5	70%	32%	70%	70%	7%
6	70%	25%	70%	70%	7%
7	61%	19%	61%	61%	6%
8	73%	13%	73%	73%	6%
9	77%	8%	77%	77%	6%
10c	13%	2%	13%	13%	3%

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Date:	29-Apr-25

TT BOLTS - BLIND OM RIVET, 1/2" DIAMETER, GRIP 4

Bolt = BOM 1/2

d_{bolt} = 0.50 in

d_{hole} = 0.57 in

Nominal Shear = 20.15 kips

Nominal Tension = 13.00 kips

Torque Tube = 5" O.D. x 0.098"

d_{tube} = 5.00

$d_{i,tube}$ = 4.80

E = 29000 ksi

Material Data for Connection Locations										
Location	Motor	2	3	4	5	6	7	8	9	10c
# Bolts	4	3	3	3	3	3	3	3	3	3
t_{tube}	0.098	0.098	0.098	0.098	0.098	0.098	0.098	0.098	0.098	0.098
F_{u-tube}	75	75	75	75	75	75	75	75	75	75

tta

Analysis Code Cheks

Bolt Shear Check

CHECK:	BOLT SHEAR	
CODE REF:	[AISC J3-1]	
Vu =	3.42	k
ϕ =	0.75	
ΦRn =	15.1	k
D/C:	0.23	
F_{nveqv} =	103	ksi
A_b =	0.196	in^2
Check	OK	

$\Phi R_n = \phi$ * Nominal Shear

F_{nveqv} = Nominal Shear / Ab

$A_b = \pi r^2$

Bolt Bearing Check

Support	Tube Size	t (in)	F_u (ksi)	ϕR_n (k)
Motor	5" O.D. x 0.098"	0.098	75	6.64
2	5" O.D. x 0.098"	0.098	75	6.64
3	5" O.D. x 0.098"	0.098	75	6.64
4	5" O.D. x 0.098"	0.098	75	6.64
5	5" O.D. x 0.098"	0.098	75	6.64
6	5" O.D. x 0.098"	0.098	75	6.64
7	5" O.D. x 0.098"	0.098	75	6.64
8	5" O.D. x 0.098"	0.098	75	6.64
9	5" O.D. x 0.098"	0.098	75	6.64
10c	5" O.D. x 0.098"	0.098	75	6.64

CHECK:	BEARING STRENGTH AT BOLT HOLES
CODE REF:	[AISC J3-10]

ϕ = 0.75

R_n = 3.0*d*t*F_u

R_n = 3.0*0.5*0.09842*75 = 11.07

ΦR_n = 0.75*11.07 = 8.30

Vu = Torsion Max / Dia of Torque Tube / No of Bolts

Bolt D/C = Vu / ΦRn (Shear)

Bearing D/C = Vu / ΦRn (Bearing)

Support	Torsion Max	Vu	ΦRn	Bolt D/C	ΦRn	Bearing D/C
Motor	55.08	2.75	15.11	18%	6.64	41%
2	51.29	3.42	15.11	23%	6.64	51%
3	46.00	3.07	15.11	20%	6.64	46%
4	39.68	2.65	15.11	18%	6.64	40%
5	32.60	2.17	15.11	14%	6.64	33%
6	25.59	1.71	15.11	11%	6.64	26%
7	18.91	1.26	15.11	8%	6.64	19%
8	13.58	0.91	15.11	6%	6.64	14%
9	7.80	0.52	15.11	3%	6.64	8%
10c	3.05	0.20	15.11	1%	6.64	3%

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Torsion at each support for all Load Combinations

* Torque's in Kip-in

Tilt Angle	Load Combo	Pier No									
		Motor	2	3	4	5	6	7	8	9	10c
0	3b	21.29	18.89	16.35	13.83	11.33	8.83	6.34	4.26	2.33	0.40
0	4	40.66	35.87	30.86	25.91	21.00	16.24	11.64	7.90	4.82	0.82
0	5	40.66	35.87	30.86	25.91	21.00	16.24	11.64	7.90	4.82	0.82
0	3b	23.46	21.69	19.55	17.16	14.51	11.73	8.83	6.29	3.43	0.58
0	4	55.08	51.29	46.00	39.68	32.60	25.59	18.91	13.58	7.78	1.33
0	5	55.08	51.29	46.00	39.68	32.60	25.59	18.91	13.58	7.78	1.33
15	3b	19.02	16.74	14.40	12.14	9.94	7.78	5.65	3.90	2.47	0.42
15	4	35.27	30.79	26.33	22.15	18.26	14.47	10.77	7.69	5.21	0.89
15	5	49.11	42.51	36.15	30.44	25.38	20.54	15.91	12.08	7.80	1.33
30	3b	16.42	14.63	12.75	10.88	9.03	7.19	5.37	3.85	2.60	0.44
30	4	32.14	28.57	24.87	21.23	17.67	14.14	10.67	7.79	5.36	0.91
30	5	41.00	36.44	31.81	27.30	23.00	18.76	14.65	11.27	7.62	1.30
45	3b	15.52	13.93	12.23	10.51	8.78	7.06	5.32	3.86	2.31	0.39
45	4	31.44	28.23	24.79	21.30	17.77	14.23	10.64	7.63	3.86	0.66
45	5	35.05	31.36	27.41	23.43	19.43	15.41	11.37	7.97	5.46	0.93
60	3b	4.34	4.61	4.61	4.61	4.61	4.61	3.86	5.17	3.64	1.50
60	4	8.68	9.21	9.21	9.21	9.21	9.21	7.72	10.34	7.28	2.99
60	5	7.01	7.44	7.44	7.44	7.44	7.44	6.24	4.15	7.43	3.05

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Engineer:	MDR/DCD
Date:	29-Apr-25

PIVOT PIN

Part No :	41014

Pin Type = Solid

Diameter = 1.00 in

Span = 4.90 in

Material = A666

Yield Strength = 75.00 ksi

Ultimate Strength = 82 ksi

Z = 0.167 in^3

Sx = 0.098 in^3

Capacity of Pin per AISC

Moment Capacity of the Pin		
Φ_b =	0.9	
$M_n = M_p$ =	11.78	ksi
$\Phi_b M_n$ =	10.6029	ksi

Shear Capacity of the Pin		
Φ_a =	1.00	
Φ_b =	0.75	
V_{na}=	70.69	kip
V_{nb}=	77.28	kip
ΦV_n=	57.96	kip

Verify Length of Pin for Linear Expansion of the tracker AISC TABLE 17-11			
Total Wing Length =	219.8	ft	Change of Length = εtl
Δt =	70	°F	
ε_{steel} =	0.00065		
ΔL =	0.10	ft	
ΔL =	1.20	in	

Flexure and Shear Check

Loads taken from Aeroelastic Torque Tube Analysis, these loads account for twist in torque tube.

LOAD CASE	Joint	X (lb)	Y (lb)	Combined (lb)	Angle (lb)	Moment in Pin Kip-in	$M/\Phi_b M_n$ D/C	$V/\Phi V_n$ D/C	Flexure Check	Shear Check
0 degrees A LC 3b	M	1	3303	3303	0	2.023	0.191	0.057	OK	OK
	2	4	3483	3483	0	2.134	0.201	0.060	OK	OK
	3	9	3613	3613	0	2.213	0.209	0.062	OK	OK
	4	15	3601	3601	0	2.206	0.208	0.062	OK	OK
	5	20	3598	3598	0	2.204	0.208	0.062	OK	OK
	6	25	3679	3679	0	2.254	0.213	0.063	OK	OK
	7	26	3375	3375	0	2.067	0.195	0.058	OK	OK
	8	22	2857	2857	0	1.750	0.165	0.049	OK	OK
	9	33	3385	3385	1	2.074	0.196	0.058	OK	OK
	10	22	1925	1926	1	1.179	0.111	0.033	OK	OK
0 degrees A LC 4	M	5	1773	1773	0	1.086	0.102	0.031	OK	OK
	2	20	1906	1906	1	1.167	0.110	0.033	OK	OK
	3	49	2028	2029	1	1.242	0.117	0.035	OK	OK
	4	80	2061	2062	2	1.263	0.119	0.036	OK	OK
	5	103	2043	2046	3	1.253	0.118	0.035	OK	OK
	6	117	2011	2015	3	1.234	0.116	0.035	OK	OK
	7	112	1783	1787	4	1.095	0.103	0.031	OK	OK
	8	92	1457	1460	4	0.894	0.084	0.025	OK	OK
	9	182	1868	1877	6	1.150	0.108	0.032	OK	OK
	10	130	1118	1126	7	0.689	0.065	0.019	OK	OK
0 degrees A LC 5	M	5	821	821	0	0.503	0.047	0.014	OK	OK
	2	20	904	905	1	0.554	0.052	0.016	OK	OK
	3	49	994	995	3	0.610	0.057	0.017	OK	OK
	4	80	1031	1034	4	0.633	0.060	0.018	OK	OK
	5	103	1040	1045	6	0.640	0.060	0.018	OK	OK
	6	117	1041	1047	6	0.642	0.061	0.018	OK	OK
	7	112	937	944	7	0.578	0.055	0.016	OK	OK
	8	92	772	778	7	0.476	0.045	0.013	OK	OK
	9	182	1071	1086	10	0.665	0.063	0.019	OK	OK
	10	130	667	680	11	0.417	0.039	0.012	OK	OK
0 degrees X LC 3b	M	-2	3098	3098	360	1.897	0.179	0.053	OK	OK
	2	-6	3247	3247	360	1.989	0.188	0.056	OK	OK
	3	-13	3334	3334	360	2.042	0.193	0.058	OK	OK
	4	-21	3289	3290	360	2.015	0.190	0.057	OK	OK
	5	-28	3263	3263	360	1.999	0.189	0.056	OK	OK
	6	-35	3322	3322	359	2.035	0.192	0.057	OK	OK
	7	-37	3031	3031	359	1.856	0.175	0.052	OK	OK
	8	-35	2563	2563	359	1.570	0.148	0.044	OK	OK
	9	-53	2959	2960	359	1.813	0.171	0.051	OK	OK
	10	-34	1653	1654	359	1.013	0.096	0.029	OK	OK
0 degrees X LC 4	M	-7	1343	1343	360	0.823	0.078	0.023	OK	OK
	2	-28	1351	1351	359	0.828	0.078	0.023	OK	OK
	3	-69	1300	1302	357	0.798	0.075	0.022	OK	OK
	4	-114	1227	1232	355	0.755	0.071	0.021	OK	OK
	5	-154	1160	1170	352	0.717	0.068	0.020	OK	OK
	6	-188	1121	1137	350	0.696	0.066	0.020	OK	OK
	7	-194	976	995	349	0.609	0.057	0.017	OK	OK
	8	-167	815	832	348	0.510	0.048	0.014	OK	OK
	9	-261	816	856	342	0.525	0.049	0.015	OK	OK
	10	-174	402	438	337	0.268	0.025	0.008	OK	OK

LOAD CASE	Joint	X (lb)	Y (lb)	Combined (lb)	Angle (lb)	Moment in Pin Kip-in	$M/\Phi_b M_n$ D/C	$V/\Phi V_n$ D/C	Flexure Check	Shear Check
0 degrees X LC 5	M	-7	392	392	359	0.240	0.023	0.007	OK	OK
	2	-28	350	351	355	0.215	0.020	0.006	OK	OK
	3	-69	266	275	345	0.169	0.016	0.005	OK	OK
	4	-114	197	228	330	0.140	0.013	0.004	OK	OK
	5	-154	157	220	316	0.135	0.013	0.004	OK	OK
	6	-188	150	241	309	0.148	0.014	0.004	OK	OK
	7	-194	130	233	304	0.143	0.013	0.004	OK	OK
	8	-167	130	212	308	0.130	0.012	0.004	OK	OK
	9	-261	18	262	274	0.160	0.015	0.005	OK	OK
	10	-174	-49	181	254	0.111	0.010	0.003	OK	OK
15 degrees A LC 3b	M	48	3329	3329	1	2.039	0.192	0.057	OK	OK
	2	53	3406	3406	1	2.086	0.197	0.059	OK	OK
	3	58	3352	3353	1	2.054	0.194	0.058	OK	OK
	4	59	3158	3159	1	1.935	0.182	0.054	OK	OK
	5	60	3026	3027	1	1.854	0.175	0.052	OK	OK
	6	63	3009	3010	1	1.844	0.174	0.052	OK	OK
	7	59	2677	2678	1	1.640	0.155	0.046	OK	OK
	8	49	2240	2241	1	1.373	0.129	0.039	OK	OK
	9	111	2700	2702	2	1.655	0.156	0.047	OK	OK
	10	81	1541	1543	3	0.945	0.089	0.027	OK	OK
15 degrees A LC 4	M	99	1883	1885	3	1.155	0.109	0.033	OK	OK
	2	112	1898	1901	3	1.165	0.110	0.033	OK	OK
	3	126	1820	1824	4	1.117	0.105	0.031	OK	OK
	4	124	1663	1668	4	1.021	0.096	0.029	OK	OK
	5	125	1567	1572	5	0.963	0.091	0.027	OK	OK
	6	141	1567	1573	5	0.963	0.091	0.027	OK	OK
	7	143	1420	1427	6	0.874	0.082	0.025	OK	OK
	8	127	1198	1205	6	0.738	0.070	0.021	OK	OK
	9	351	1657	1694	12	1.037	0.098	0.029	OK	OK
	10	268	1025	1059	15	0.649	0.061	0.018	OK	OK
15 degrees X LC 5	M	-151	135	203	312	0.124	0.012	0.004	OK	OK
	2	-188	140	235	307	0.144	0.014	0.004	OK	OK
	3	-243	142	282	300	0.173	0.016	0.005	OK	OK
	4	-287	138	319	296	0.195	0.018	0.005	OK	OK
	5	-319	146	351	295	0.215	0.020	0.006	OK	OK
	6	-327	199	383	301	0.235	0.022	0.007	OK	OK
	7	-299	213	367	305	0.225	0.021	0.006	OK	OK
	8	-236	220	323	313	0.198	0.019	0.006	OK	OK
	9	-445	48	447	276	0.274	0.026	0.008	OK	OK
	10	-320	-62	326	259	0.200	0.019	0.006	OK	OK
30 degrees A LC 3b	M	57	3565	3565	1	2.184	0.206	0.062	OK	OK
	2	63	3663	3664	1	2.244	0.212	0.063	OK	OK
	3	69	3679	3679	1	2.254	0.213	0.063	OK	OK
	4	72	3587	3588	1	2.197	0.207	0.062	OK	OK
	5	75	3506	3507	1	2.148	0.203	0.061	OK	OK
	6	80	3504	3505	1	2.147	0.202	0.060	OK	OK
	7	76	3174	3175	1	1.945	0.183	0.055	OK	OK
	8	65	2704	2704	1	1.656	0.156	0.047	OK	OK
	9	175	3263	3268	3	2.001	0.189	0.056	OK	OK
	10	134	1870	1875	4	1.148	0.108	0.032	OK	OK
30 degrees A LC 4	M	118	1845	1849	4	1.132	0.107	0.032	OK	OK
	2	135	1903	1908	4	1.169	0.110	0.033	OK	OK
	3	156	1915	1921	5	1.177	0.111	0.033	OK	OK
	4	171	1847	1855	5	1.136	0.107	0.032	OK	OK
	5	184	1799	1808	6	1.107	0.104	0.031	OK	OK
	6	197	1802	1813	6	1.111	0.105	0.031	OK	OK
	7	194	1623	1635	7	1.001	0.094	0.028	OK	OK
	8	158	1359	1368	7	0.838	0.079	0.024	OK	OK
	9	431	1835	1885	13	1.155	0.109	0.033	OK	OK
	10	335	1124	1173	17	0.718	0.068	0.020	OK	OK
30 degrees X LC 5	M	-310	125	334	292	0.205	0.019	0.006	OK	OK
	2	-316	180	364	300	0.223	0.021	0.006	OK	OK
	3	-320	247	404	308	0.248	0.023	0.007	OK	OK
	4	-307	294	426	314	0.261	0.025	0.007	OK	OK
	5	-297	332	445	318	0.273	0.026	0.008	OK	OK
	6	-295	368	472	321	0.289	0.027	0.008	OK	OK
	7	-261	359	443	324	0.272	0.026	0.008	OK	OK
	8	-225	306	380	324	0.233	0.022	0.007	OK	OK
	9	-523	98	532	281	0.326	0.031	0.009	OK	OK
	10	-384	-34	385	265	0.236	0.022	0.007	OK	OK
45 degrees A LC 3b	M	103	3560	3561	2	2.181	0.206	0.061	OK	OK
	2	110	3690	3692	2	2.261	0.213	0.064	OK	OK
	3	116	3634	3635	2	2.227	0.210	0.063	OK	OK
	4	117	3419	3421	2	2.096	0.198	0.059	OK	OK
	5	119	3369	3371	2	2.065	0.195	0.058	OK	OK
	6	122	3382	3384	2	2.073	0.196	0.058	OK	OK
	7	117	2986	2988	2	1.830	0.173	0.052	OK	OK
	8	86	2472	2474	2	1.515	0.143	0.043	OK	OK
	9	242	3027	3037	5	1.860	0.175	0.052	OK	OK
	10	193	1753	1763	6	1.080	0.102	0.030	OK	OK
45 degrees A LC 4	M	208	1837	1848	6	1.132	0.107	0.032	OK	OK
	2	224	1889	1902	7	1.165	0.110	0.033	OK	OK
	3	242	1851	1867	7	1.143	0.108	0.032	OK	OK
	4	248	1736	1753	8	1.074	0.101	0.030	OK	OK
	5	255	1677	1696	9	1.039	0.098	0.029	OK	OK
	6	263	1648	1669	9	1.022	0.096	0.029	OK	OK
	7	256	1460	1483	10	0.908	0.086	0.026	OK	OK
	8	174	1195	1208	8	0.740	0.070	0.021	OK	OK
	9	519	1601	1683	18	1.031	0.097	0.029	OK	OK
	10	425	986	1074	23	0.658	0.062	0.019	OK	OK

LOAD CASE	Joint	X (lb)	Y (lb)	Combined (lb)	Angle (lb)	Moment in Pin Kip-in	$M/\Phi_b M_n$ D/C	$V/\Phi V_n$ D/C	Flexure Check	Shear Check
45 degrees X LC 5	M	-246	401	470	328	0.288	0.027	0.008	OK	OK
	2	-251	442	508	330	0.311	0.029	0.009	OK	OK
	3	-243	490	547	334	0.335	0.032	0.009	OK	OK
	4	-225	514	561	336	0.344	0.032	0.010	OK	OK
	5	-218	528	571	338	0.350	0.033	0.010	OK	OK
	6	-211	555	594	339	0.364	0.034	0.010	OK	OK
	7	-184	519	551	340	0.338	0.032	0.010	OK	OK
	8	-176	430	465	338	0.285	0.027	0.008	OK	OK
	9	-560	287	629	297	0.385	0.036	0.011	OK	OK
	10	-429	91	439	282	0.269	0.025	0.008	OK	OK
60 degrees A LC 3b	M	642	2520	2601	14	1.593	0.150	0.045	OK	OK
	2	675	2652	2737	14	1.676	0.158	0.047	OK	OK
	3	698	2740	2828	14	1.732	0.163	0.049	OK	OK
	4	692	2721	2808	14	1.720	0.162	0.048	OK	OK
	5	692	2713	2800	14	1.715	0.162	0.048	OK	OK
	6	699	2765	2852	14	1.747	0.165	0.049	OK	OK
	7	673	2550	2637	15	1.615	0.152	0.045	OK	OK
	8	438	2086	2131	12	1.306	0.123	0.037	OK	OK
	9	1330	2922	3211	24	1.967	0.185	0.055	OK	OK
	10	1103	1853	2157	31	1.321	0.125	0.037	OK	OK
60 degrees A LC 4	M	1283	1997	2374	33	1.454	0.137	0.041	OK	OK
	2	1351	2101	2498	33	1.530	0.144	0.043	OK	OK
	3	1396	2171	2581	33	1.581	0.149	0.045	OK	OK
	4	1385	2156	2562	33	1.569	0.148	0.044	OK	OK
	5	1384	2150	2557	33	1.566	0.148	0.044	OK	OK
	6	1398	2187	2595	33	1.590	0.150	0.045	OK	OK
	7	1345	2039	2443	33	1.496	0.141	0.042	OK	OK
	8	875	1576	1803	29	1.104	0.104	0.031	OK	OK
	9	2659	2794	3857	44	2.362	0.223	0.067	OK	OK
	10	2206	1984	2967	48	1.818	0.171	0.051	OK	OK
60 degrees X LC 5	M	-610	285	674	295	0.413	0.039	0.012	OK	OK
	2	-618	314	693	297	0.424	0.040	0.012	OK	OK
	3	-620	335	705	298	0.432	0.041	0.012	OK	OK
	4	-618	331	701	298	0.429	0.040	0.012	OK	OK
	5	-616	330	698	298	0.428	0.040	0.012	OK	OK
	6	-627	338	712	298	0.436	0.041	0.012	OK	OK
	7	-582	305	657	298	0.402	0.038	0.011	OK	OK
	8	-584	206	619	289	0.379	0.036	0.011	OK	OK
	9	-2013	-524	2080	255	1.274	0.120	0.036	OK	OK
	10	-1561	-541	1652	251	1.012	0.095	0.028	OK	OK

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

HANDLE - BEARING HOUSING ASSEMBLY, 2.3, FSLR S6, LIGHT, SC

Analysis Method

The handle was analyzed using finite element analysis by ATA Engineering, a firm specializing in FEA for various industries, including the Aerospace industry. Safety factors consistent with the IBC/CBC were used in the design. Loads were provided by Structurology to ATA, and the final stress plots were reviewed by Structurology. Shown below are the applied loads and the calculated allowable loads.

Part No : 30793

Combined = $(H^2 + V^2)^{½}$

Design Checks -Extra Tolerance Factor =1.18 used for (XTR-0.75 - Extreme Terrain)

Capacity of BHA	LOAD CASE	Joint	X	Y	Combined	Angle	BHA	Check	Moment	BHA	Check
Tension			(lb)	(lb)	(lb)		D/C			D/C	
4512 lbs	0 degrees A LC 3b	1	0	0	0	0	0%	OK	0	0%	OK
Moment		2	4	3483	3483	0	77%	OK	0	0%	OK
27990 lbs-in		3	9	3613	3613	0	80%	OK	0	0%	OK
		4	15	3601	3601	0	80%	OK	0	0%	OK
		5	20	3598	3598	0	80%	OK	0	0%	OK
		6	25	3679	3679	0	82%	OK	0	0%	OK
		7	26	3375	3375	0	75%	OK	0	0%	OK
		8	22	2857	2857	0	63%	OK	0	0%	OK
		9	33	3385	3385	1	75%	OK	0	0%	OK
		10	22	1925	1926	1	43%	OK	0	0%	OK
	0 degrees A LC 4	1	0	0	0	0	0%	OK	0	0%	OK
		2	20	1906	1906	1	42%	OK	0	0%	OK
		3	49	2028	2029	1	45%	OK	0	0%	OK
		4	80	2061	2062	2	46%	OK	0	0%	OK
		5	103	2043	2046	3	45%	OK	0	0%	OK
		6	117	2011	2015	3	45%	OK	0	0%	OK
		7	112	1783	1787	4	40%	OK	0	0%	OK
		8	92	1457	1460	4	32%	OK	0	0%	OK
		9	182	1868	1877	6	42%	OK	0	0%	OK
		10	130	1118	1126	7	25%	OK	0	0%	OK
	0 degrees A LC 5	1	0	0	0	0	0%	OK	0	0%	OK
		2	20	904	905	1	20%	OK	0	0%	OK
		3	49	994	995	3	22%	OK	0	0%	OK
		4	80	1031	1034	4	23%	OK	0	0%	OK
		5	103	1040	1045	6	23%	OK	0	0%	OK
		6	117	1041	1047	6	23%	OK	0	0%	OK
		7	112	937	944	7	21%	OK	0	0%	OK
		8	92	772	778	7	17%	OK	0	0%	OK
		9	182	1071	1086	10	24%	OK	0	0%	OK
		10	130	667	680	11	15%	OK	0	0%	OK
	0 degrees X LC 3b	1	0	0	0	0	0%	OK	0	0%	OK
		2	-6	3247	3247	0	72%	OK	0	0%	OK
		3	-13	3334	3334	0	74%	OK	0	0%	OK
		4	-21	3289	3290	0	73%	OK	0	0%	OK
		5	-28	3263	3263	0	72%	OK	0	0%	OK
		6	-35	3322	3322	1	74%	OK	0	0%	OK
		7	-37	3031	3031	1	67%	OK	0	0%	OK
		8	-35	2563	2563	1	57%	OK	0	0%	OK
		9	-53	2959	2960	1	66%	OK	0	0%	OK
		10	-34	1653	1654	1	37%	OK	0	0%	OK
	0 degrees X LC 4	1	0	0	0	0	0%	OK	0	0%	OK
		2	-28	1351	1351	1	30%	OK	0	0%	OK
		3	-69	1300	1302	3	29%	OK	0	0%	OK
		4	-114	1227	1232	5	27%	OK	0	0%	OK
		5	-154	1160	1170	8	26%	OK	0	0%	OK
		6	-188	1121	1137	10	25%	OK	0	0%	OK
		7	-194	976	995	11	22%	OK	0	0%	OK
		8	-167	815	832	12	18%	OK	0	0%	OK
		9	-261	816	856	18	19%	OK	0	0%	OK
		10	-174	402	438	23	10%	OK	0	0%	OK
	0 degrees X LC 5	1	0	0	0	1	0%	OK	0	0%	OK
		2	-28	350	351	5	8%	OK	0	0%	OK
		3	-69	266	275	15	6%	OK	0	0%	OK
		4	-114	197	228	30	5%	OK	0	0%	OK
		5	-154	157	220	44	5%	OK	0	0%	OK
		6	-188	150	241	51	5%	OK	0	0%	OK
		7	-194	130	233	56	5%	OK	0	0%	OK
		8	-167	130	212	52	5%	OK	0	0%	OK
		9	-261	18	262	86	6%	OK	0	0%	OK
		10	-174	-49	181	74	4%	OK	0	0%	OK

LOAD CASE	Joint	X (lb)	Y (lb)	Combined (lb)	Angle	BHA D/C	Check	Moment	BHA D/C	Check
	1	0	0	0	1	0%	OK	0	0%	OK
	2	53	3406	3406	1	75%	OK	0	0%	OK
	3	58	3352	3353	1	74%	OK	0	0%	OK
15 degrees	4	59	3158	3159	1	70%	OK	0	0%	OK
A	5	60	3026	3027	1	67%	OK	0	0%	OK
LC 3b	6	63	3009	3010	1	67%	OK	0	0%	OK
	7	59	2677	2678	1	59%	OK	0	0%	OK
	8	49	2240	2241	1	50%	OK	0	0%	OK
	9	111	2700	2702	2	60%	OK	0	0%	OK
	10	81	1541	1543	3	34%	OK	0	0%	OK
	1	0	0	0	3	0%	OK	0	0%	OK
	2	112	1898	1901	3	42%	OK	0	0%	OK
	3	126	1820	1824	4	40%	OK	0	0%	OK
15 degrees	4	124	1663	1668	4	37%	OK	0	0%	OK
A	5	125	1567	1572	5	35%	OK	0	0%	OK
LC 4	6	141	1567	1573	5	35%	OK	0	0%	OK
	7	143	1420	1427	6	32%	OK	0	0%	OK
	8	127	1198	1205	6	27%	OK	0	0%	OK
	9	351	1657	1694	12	38%	OK	0	0%	OK
	10	268	1025	1059	15	23%	OK	0	0%	OK
	1	0	0	0	48	0%	OK	0	0%	OK
	2	-188	140	235	53	5%	OK	0	0%	OK
	3	-243	142	282	60	6%	OK	0	0%	OK
15 degrees	4	-287	138	319	64	7%	OK	0	0%	OK
X	5	-319	146	351	65	8%	OK	0	0%	OK
LC 5	6	-327	199	383	59	8%	OK	0	0%	OK
	7	-299	213	367	55	8%	OK	0	0%	OK
	8	-236	220	323	47	7%	OK	0	0%	OK
	9	-445	48	447	84	10%	OK	0	0%	OK
	10	-320	-62	326	79	7%	OK	0	0%	OK
	1	0	0	0	1	0%	OK	0	0%	OK
	2	63	3663	3664	1	81%	OK	0	0%	OK
	3	69	3679	3679	1	82%	OK	0	0%	OK
30 degrees	4	72	3587	3588	1	80%	OK	0	0%	OK
A	5	75	3506	3507	1	78%	OK	0	0%	OK
LC 3b	6	80	3504	3505	1	78%	OK	0	0%	OK
	7	76	3174	3175	1	70%	OK	0	0%	OK
	8	65	2704	2704	1	60%	OK	0	0%	OK
	9	175	3263	3268	3	72%	OK	0	0%	OK
	10	134	1870	1875	4	42%	OK	0	0%	OK
	1	0	0	0	4	0%	OK	0	0%	OK
	2	135	1903	1908	4	42%	OK	0	0%	OK
	3	156	1915	1921	5	43%	OK	0	0%	OK
30 degrees	4	171	1847	1855	5	41%	OK	0	0%	OK
A	5	184	1799	1808	6	40%	OK	0	0%	OK
LC 4	6	197	1802	1813	6	40%	OK	0	0%	OK
	7	194	1623	1635	7	36%	OK	0	0%	OK
	8	158	1359	1368	7	30%	OK	0	0%	OK
	9	431	1835	1885	13	42%	OK	0	0%	OK
	10	335	1124	1173	17	26%	OK	0	0%	OK
	1	0	0	0	68	0%	OK	0	0%	OK
	2	-316	180	364	60	8%	OK	0	0%	OK
	3	-320	247	404	52	9%	OK	0	0%	OK
30 degrees	4	-307	294	426	46	9%	OK	0	0%	OK
X	5	-297	332	445	42	10%	OK	0	0%	OK
LC 5	6	-295	368	472	39	10%	OK	0	0%	OK
	7	-261	359	443	36	10%	OK	0	0%	OK
	8	-225	306	380	36	8%	OK	0	0%	OK
	9	-523	98	532	79	12%	OK	0	0%	OK
	10	-384	-34	385	85	9%	OK	0	0%	OK
	1	0	0	0	2	0%	OK	0	0%	OK
	2	110	3690	3692	2	82%	OK	0	0%	OK
	3	116	3634	3635	2	81%	OK	0	0%	OK
45 degrees	4	117	3419	3421	2	76%	OK	0	0%	OK
A	5	119	3369	3371	2	75%	OK	0	0%	OK
LC 3b	6	122	3382	3384	2	75%	OK	0	0%	OK
	7	117	2986	2988	2	66%	OK	0	0%	OK
	8	86	2472	2474	2	55%	OK	0	0%	OK
	9	242	3027	3037	5	67%	OK	0	0%	OK
	10	193	1753	1763	6	39%	OK	0	0%	OK
	1	208	1837	1848	6	41%	OK	0	0%	OK
	2	224	1889	1902	7	42%	OK	0	0%	OK
	3	242	1851	1867	7	41%	OK	0	0%	OK
45 degrees	4	248	1736	1753	8	39%	OK	0	0%	OK
A	5	255	1677	1696	9	38%	OK	0	0%	OK
LC 4	6	263	1648	1669	9	37%	OK	0	0%	OK
	7	256	1460	1483	10	33%	OK	0	0%	OK
	8	174	1195	1208	8	27%	OK	0	0%	OK
	9	519	1601	1683	18	37%	OK	0	0%	OK
	10	425	986	1074	23	24%	OK	0	0%	OK
	1	-246	401	470	32	10%	OK	0	0%	OK
	2	-251	442	508	30	11%	OK	0	0%	OK
	3	-243	490	547	26	12%	OK	0	0%	OK
45 degrees	4	-225	514	561	24	12%	OK	0	0%	OK
X	5	-218	528	571	22	13%	OK	0	0%	OK
LC 5	6	-211	555	594	21	13%	OK	0	0%	OK
	7	-184	519	551	20	12%	OK	0	0%	OK
	8	-176	430	465	22	10%	OK	0	0%	OK
	9	-560	287	629	63	14%	OK	0	0%	OK
	10	-429	91	439	78	10%	OK	0	0%	OK

LOAD CASE	Joint	X (lb)	Y (lb)	Combined (lb)	Angle	BHA D/C	Check	Moment	BHA D/C	Check
60 degrees A LC 3b	1	642	2520	2601	14	58%	OK	0	0%	OK
	2	675	2652	2737	14	61%	OK	10555	38%	OK
	3	698	2740	2828	14	63%	OK	10870	39%	OK
	4	692	2721	2808	14	62%	OK	10870	39%	OK
	5	692	2713	2800	14	62%	OK	10870	39%	OK
	6	699	2765	2852	14	63%	OK	10870	39%	OK
	7	673	2550	2637	15	58%	OK	9987	36%	OK
	8	438	2086	2131	12	47%	OK	10651	38%	OK
	9	1330	2922	3211	24	71%	OK	10394	37%	OK
	10	1103	1853	2157	31	48%	OK	6061	22%	OK
60 degrees A LC 4	1	1283	1997	2374	33	53%	OK	0	0%	OK
	2	1351	2101	2498	33	55%	OK	21110	75%	OK
	3	1396	2171	2581	33	57%	OK	21740	78%	OK
	4	1385	2156	2562	33	57%	OK	21740	78%	OK
	5	1384	2150	2557	33	57%	OK	21740	78%	OK
	6	1398	2187	2595	33	58%	OK	21740	78%	OK
	7	1345	2039	2443	33	54%	OK	19975	71%	OK
	8	875	1576	1803	29	40%	OK	21302	76%	OK
	9	2659	2794	3857	44	85%	OK	20788	74%	OK
	10	2206	1984	2967	48	66%	OK	12121	43%	OK
60 degrees X LC 5	1	-610	285	674	65	15%	OK	0	0%	OK
	2	-618	314	693	63	15%	OK	17060	61%	OK
	3	-620	335	705	62	16%	OK	17569	63%	OK
	4	-618	331	701	62	16%	OK	17569	63%	OK
	5	-616	330	698	62	15%	OK	17569	63%	OK
	6	-627	338	712	62	16%	OK	17569	63%	OK
	7	-582	305	657	62	15%	OK	16142	58%	OK
	8	-584	206	619	71	14%	OK	12255	44%	OK
	9	-2013	-524	2080	75	46%	OK	13668	49%	OK
	10	-1561	-541	1652	71	37%	OK	12375	44%	OK

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

HANDLE TEST - BEARING HOUSING ASSEMBLY, 2.3, FSLR S6, LIGHT, SC

Part No : 30793

Analysis Method

The ultimate capacity of the handle of the bearing housing assembly was tested. Testing was conducted, and the testing provisions of AISI 100-16, Chapter F were used to determine the capacity of the connection.

Test Data

Failure Forces in Pounds Force For Various Applied Load Angles

Test #	60 Deg	60 Deg
1	4767	33828
2	5045	30780
3	4777	30564
4	4991	29429
5	5344	31407
6	5185	32650
7	5327	31242
8	4955	30651
9	5104	30774
10	4931	31523
11		
12		
13		
14		
15		
Average	5043	31284.8
StdDev	191.07	1152.65
f	0.89	0.89
ϕR_n	4512	27990

- Refer ENG-000469 & ENG-000536 for above Test Data

Analysis Code Checks - Example Calculation performed for 30793 applied load

Determine Resistance factor, f, per AISI 100-16 Chapter F, Section F1.1

Cf = Calibration Coefficient =	1.52
Mm = mean value of material factor =	1.10
Fm = mean value of fabrication factor =	1.00
Pm = mean value of professional factor =	1.00
e = natural logarithmic base =	2.72
bo = target reliability index =	2.50
vM = variation of material factor =	0.10
vF = variation of fabrication factor =	0.05

Tension

$\phi = C_\phi(M_m F_m P_m)e^\gamma$ = 0.8947

$\gamma = -\beta_o(v_M^2+v_F^2+c_P v_P^2+v_Q^2)^{(1/2)}$ = -0.6254

Torsion

$\phi = C_\phi(M_m F_m P_m)e^\gamma$ = 0.89

$\gamma = -\beta_o(v_M^2+v_F^2+c_P v_P^2+v_Q^2)^{(1/2)}$ = -0.63

Tension

cP = correction factor = (1+1/n)m/(m-2) for n>3 and 5.7 for n = 3

n = 10 cP = 1.41

m = 9

vP = coefficient of variation = 0.065

vQ = variation of load effect = 0.21

Determine the nominal resistance of the connection

R_n = Average Capacity from all tests = 5043 pounds

Therefore the torsional resistance of this connection is:

ϕR_n = 4512 pounds

Torsion

cP = correction factor = (1+1/n)m/(m-2) for n>3 and 5.7 for n = 3

n = 10 cP = 1.41

m = 9

vP = coefficient of variation = 0.065

vQ = variation of load effect = 0.21

Determine the nominal resistance of the connection

R_n = Average Capacity from all tests = 31285 lbs-in

Therefore the torsional resistance of this connection is:

ϕR_n = 27990 lbs-in

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

BRACKET, BEARING HOUSING, W6 LIGHT BRACKET

Part No : 42154

Vertical Distance From Pin to Bracket = 7.72 in

Horizontal Distance between Brackets = 11.6 in

Analysis Method:
The handle was analyzed extensively in a test lab. Test results were compiled by NEXTracker, and loads were provided by Structurology, with the final test results reviewed by Structurology. Shown below are the applied loads and the calculated allowable loads.

Design Checks -Extra Tolerance Factor =1.18 used for (XTR-0.75 - Extreme Terrain)

Loads taken from Aeroelastic Torque Tube Analysis, these loads account for twist in torque tube

LOAD CASE	Joint	X	Y	Uplift Bracket			Downforce Bracket			Check
				Uplift	Capacity	D/C	Dwn Force	Capacity	D/C	
		(lb)	(lb)	(lb)	(lb)		(lb)	(lb)		
0 degrees A LC 3b	M	1	3303	0	3999	0%	1652	4100	40%	OK
	2	4	3483	0	3999	0%	1745	4100	43%	OK
	3	9	3613	0	3999	0%	1813	4100	44%	OK
	4	15	3601	0	3999	0%	1811	4100	44%	OK
	5	20	3598	0	3999	0%	1812	4100	44%	OK
	6	25	3679	0	3999	0%	1856	4100	45%	OK
	7	26	3375	0	3999	0%	1705	4100	42%	OK
	8	22	2857	0	3999	0%	1443	4100	35%	OK
	9	33	3385	0	3999	0%	1715	4100	42%	OK
	10	22	1925	0	3999	0%	977	4100	24%	OK
0 degrees A LC 4	M	5	1773	0	3999	0%	890	4100	22%	OK
	2	20	1906	0	3999	0%	966	4100	24%	OK
	3	49	2028	0	3999	0%	1047	4100	26%	OK
	4	80	2061	0	3999	0%	1084	4100	26%	OK
	5	103	2043	0	3999	0%	1090	4100	27%	OK
	6	117	2011	0	3999	0%	1083	4100	26%	OK
	7	112	1783	0	3999	0%	967	4100	24%	OK
	8	92	1457	0	3999	0%	790	4100	19%	OK
	9	182	1868	0	3999	0%	1055	4100	26%	OK
	10	130	1118	0	3999	0%	646	4100	16%	OK
0 degrees A LC 5	M	5	821	0	3999	0%	414	4100	10%	OK
	2	20	904	0	3999	0%	466	4100	11%	OK
	3	49	994	0	3999	0%	530	4100	13%	OK
	4	80	1031	0	3999	0%	569	4100	14%	OK
	5	103	1040	0	3999	0%	589	4100	14%	OK
	6	117	1041	0	3999	0%	598	4100	15%	OK
	7	112	937	0	3999	0%	543	4100	13%	OK
	8	92	772	0	3999	0%	448	4100	11%	OK
	9	182	1071	0	3999	0%	656	4100	16%	OK
	10	130	667	0	3999	0%	420	4100	10%	OK
0 degrees X LC 3b	M	-2	3098	0	3999	0%	1550	4100	38%	OK
	2	-6	3247	0	3999	0%	1627	4100	40%	OK
	3	-13	3334	0	3999	0%	1676	4100	41%	OK
	4	-21	3289	0	3999	0%	1659	4100	40%	OK
	5	-28	3263	0	3999	0%	1650	4100	40%	OK
	6	-35	3322	0	3999	0%	1684	4100	41%	OK
	7	-37	3031	0	3999	0%	1540	4100	38%	OK
	8	-35	2563	0	3999	0%	1305	4100	32%	OK
	9	-53	2959	0	3999	0%	1515	4100	37%	OK
	10	-34	1653	0	3999	0%	849	4100	21%	OK
0 degrees X LC 4	M	-7	1343	0	3999	0%	676	4100	16%	OK
	2	-28	1351	0	3999	0%	694	4100	17%	OK
	3	-69	1300	0	3999	0%	696	4100	17%	OK
	4	-114	1227	0	3999	0%	689	4100	17%	OK
	5	-154	1160	0	3999	0%	683	4100	17%	OK
	6	-188	1121	0	3999	0%	686	4100	17%	OK
	7	-194	976	0	3999	0%	617	4100	15%	OK
	8	-167	815	0	3999	0%	519	4100	13%	OK
	9	-261	816	0	3999	0%	582	4100	14%	OK
	10	-174	402	0	3999	0%	317	4100	8%	OK
0 degrees X LC 5	M	-7	392	0	3999	0%	201	4100	5%	OK
	2	-28	350	0	3999	0%	193	4100	5%	OK
	3	-69	266	0	3999	0%	179	4100	4%	OK
	4	-114	197	0	3999	0%	175	4100	4%	OK
	5	-154	157	24	3999	1%	181	4100	4%	OK
	6	-188	150	50	3999	1%	200	4100	5%	OK
	7	-194	130	64	3999	2%	194	4100	5%	OK
	8	-167	130	46	3999	1%	176	4100	4%	OK
	9	-261	18	165	3999	4%	183	4100	4%	OK
	10	-174	-49	140	3999	4%	91	4100	2%	OK

LOAD CASE	Joint	X	Y	Uplift Bracket			Downforce Bracket			Check
				Uplift	Capacity	D/C	Dwn Force	Capacity	D/C	
		(lb)	(lb)	(lb)	(lb)		(lb)	(lb)		
15 degrees A LC 3b	M	48	3329	0	3999	0%	1696	4100	41%	OK
	2	53	3406	0	3999	0%	1738	4100	42%	OK
	3	58	3352	0	3999	0%	1715	4100	42%	OK
	4	59	3158	0	3999	0%	1619	4100	39%	OK
	5	60	3026	0	3999	0%	1553	4100	38%	OK
	6	63	3009	0	3999	0%	1547	4100	38%	OK
	7	59	2677	0	3999	0%	1378	4100	34%	OK
	8	49	2240	0	3999	0%	1153	4100	28%	OK
	9	111	2700	0	3999	0%	1424	4100	35%	OK
	10	81	1541	0	3999	0%	825	4100	20%	OK
15 degrees A LC 4	M	99	1883	0	3999	0%	1007	4100	25%	OK
	2	112	1898	0	3999	0%	1024	4100	25%	OK
	3	126	1820	0	3999	0%	994	4100	24%	OK
	4	124	1663	0	3999	0%	914	4100	22%	OK
	5	125	1567	0	3999	0%	867	4100	21%	OK
	6	141	1567	0	3999	0%	877	4100	21%	OK
	7	143	1420	0	3999	0%	806	4100	20%	OK
	8	127	1198	0	3999	0%	683	4100	17%	OK
	9	351	1657	0	3999	0%	1062	4100	26%	OK
	10	268	1025	0	3999	0%	691	4100	17%	OK
15 degrees X LC 5	M	-151	135	33	3999	1%	168	4100	4%	OK
	2	-188	140	55	3999	1%	195	4100	5%	OK
	3	-243	142	91	3999	2%	233	4100	6%	OK
	4	-287	138	122	3999	3%	260	4100	6%	OK
	5	-319	146	140	3999	3%	285	4100	7%	OK
	6	-327	199	118	3999	3%	317	4100	8%	OK
	7	-299	213	93	3999	2%	306	4100	7%	OK
	8	-236	220	48	3999	1%	267	4100	7%	OK
	9	-445	48	272	3999	7%	320	4100	8%	OK
	10	-320	-62	244	3999	6%	182	4100	4%	OK
30 degrees A LC 3b	M	57	3565	0	3999	0%	1820	4100	44%	OK
	2	63	3663	0	3999	0%	1874	4100	46%	OK
	3	69	3679	0	3999	0%	1886	4100	46%	OK
	4	72	3587	0	3999	0%	1842	4100	45%	OK
	5	75	3506	0	3999	0%	1803	4100	44%	OK
	6	80	3504	0	3999	0%	1805	4100	44%	OK
	7	76	3174	0	3999	0%	1637	4100	40%	OK
	8	65	2704	0	3999	0%	1395	4100	34%	OK
	9	175	3263	0	3999	0%	1748	4100	43%	OK
	10	134	1870	0	3999	0%	1024	4100	25%	OK
30 degrees A LC 4	M	118	1845	0	3999	0%	1001	4100	24%	OK
	2	135	1903	0	3999	0%	1041	4100	25%	OK
	3	156	1915	0	3999	0%	1061	4100	26%	OK
	4	171	1847	0	3999	0%	1037	4100	25%	OK
	5	184	1799	0	3999	0%	1021	4100	25%	OK
	6	197	1802	0	3999	0%	1032	4100	25%	OK
	7	194	1623	0	3999	0%	941	4100	23%	OK
	8	158	1359	0	3999	0%	784	4100	19%	OK
	9	431	1835	0	3999	0%	1204	4100	29%	OK
	10	335	1124	0	3999	0%	785	4100	19%	OK
30 degrees X LC 5	M	-310	125	144	3999	4%	269	4100	7%	OK
	2	-316	180	120	3999	3%	301	4100	7%	OK
	3	-320	247	90	3999	2%	336	4100	8%	OK
	4	-307	294	57	3999	1%	352	4100	9%	OK
	5	-297	332	32	3999	1%	363	4100	9%	OK
	6	-295	368	12	3999	0%	380	4100	9%	OK
	7	-261	359	0	3999	0%	353	4100	9%	OK
	8	-225	306	0	3999	0%	303	4100	7%	OK
	9	-523	98	299	3999	7%	397	4100	10%	OK
	10	-384	-34	272	3999	7%	238	4100	6%	OK

LOAD CASE	Joint	X	Y	Uplift Bracket			Downforce Bracket			Check
				Uplift	Capacity	D/C	Dwn Force	Capacity	D/C	
		(lb)	(lb)	(lb)	(lb)		(lb)	(lb)		
45 degrees A LC 3b	M	103	3560	0	3999	0%	1848	4100	45%	OK
	2	110	3690	0	3999	0%	1918	4100	47%	OK
	3	116	3634	0	3999	0%	1894	4100	46%	OK
	4	117	3419	0	3999	0%	1788	4100	44%	OK
	5	119	3369	0	3999	0%	1763	4100	43%	OK
	6	122	3382	0	3999	0%	1772	4100	43%	OK
	7	117	2986	0	3999	0%	1571	4100	38%	OK
	8	86	2472	0	3999	0%	1293	4100	32%	OK
	9	242	3027	0	3999	0%	1675	4100	41%	OK
	10	193	1753	0	3999	0%	1005	4100	25%	OK
45 degrees A LC 4	M	208	1837	0	3999	0%	1056	4100	26%	OK
	2	224	1889	0	3999	0%	1094	4100	27%	OK
	3	242	1851	0	3999	0%	1087	4100	27%	OK
	4	248	1736	0	3999	0%	1033	4100	25%	OK
	5	255	1677	0	3999	0%	1008	4100	25%	OK
	6	263	1648	0	3999	0%	999	4100	24%	OK
	7	256	1460	0	3999	0%	900	4100	22%	OK
	8	174	1195	0	3999	0%	714	4100	17%	OK
	9	519	1601	0	3999	0%	1146	4100	28%	OK
	10	425	986	0	3999	0%	776	4100	19%	OK
45 degrees X LC 5	M	-246	401	0	3999	0%	364	4100	9%	OK
	2	-251	442	0	3999	0%	388	4100	9%	OK
	3	-243	490	0	3999	0%	407	4100	10%	OK
	4	-225	514	0	3999	0%	407	4100	10%	OK
	5	-218	528	0	3999	0%	409	4100	10%	OK
	6	-211	555	0	3999	0%	418	4100	10%	OK
	7	-184	519	0	3999	0%	382	4100	9%	OK
	8	-176	430	0	3999	0%	333	4100	8%	OK
	9	-560	287	229	3999	6%	516	4100	13%	OK
	10	-429	91	240	3999	6%	331	4100	8%	OK
60 degrees A LC 3b	M	642	2520	0	3999	0%	1687	4100	41%	OK
	2	675	2652	0	3999	0%	1775	4100	43%	OK
	3	698	2740	0	3999	0%	1835	4100	45%	OK
	4	692	2721	0	3999	0%	1821	4100	44%	OK
	5	692	2713	0	3999	0%	1817	4100	44%	OK
	6	699	2765	0	3999	0%	1848	4100	45%	OK
	7	673	2550	0	3999	0%	1722	4100	42%	OK
	8	438	2086	0	3999	0%	1334	4100	33%	OK
	9	1330	2922	0	3999	0%	2346	4100	57%	OK
	10	1103	1853	0	3999	0%	1661	4100	41%	OK
60 degrees A LC 4	M	1283	1997	0	3999	0%	1853	4100	45%	OK
	2	1351	2101	0	3999	0%	1949	4100	48%	OK
	3	1396	2171	0	3999	0%	2015	4100	49%	OK
	4	1385	2156	0	3999	0%	1999	4100	49%	OK
	5	1384	2150	0	3999	0%	1996	4100	49%	OK
	6	1398	2187	0	3999	0%	2024	4100	49%	OK
	7	1345	2039	0	3999	0%	1915	4100	47%	OK
	8	875	1576	0	3999	0%	1371	4100	33%	OK
	9	2659	2794	373	3999	9%	3167	4100	77%	OK
	10	2206	1984	476	3999	12%	2460	4100	60%	OK
60 degrees X LC 5	M	-610	285	264	3999	7%	549	4100	13%	OK
	2	-618	314	254	3999	6%	568	4100	14%	OK
	3	-620	335	245	3999	6%	580	4100	14%	OK
	4	-618	331	246	3999	6%	577	4100	14%	OK
	5	-616	330	245	3999	6%	575	4100	14%	OK
	6	-627	338	248	3999	6%	586	4100	14%	OK
	7	-582	305	235	3999	6%	539	4100	13%	OK
	8	-584	206	285	3999	7%	492	4100	12%	OK
	9	-2013	-524	1602	3999	40%	1078	4100	26%	OK
	10	-1561	-541	1309	3999	33%	768	4100	19%	OK

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

BHA BRACKET TESTING SUMMARY

Analysis Method
The ultimate capacity of the handle of the bearing housing assembly was tested. Testing was conducted, and the testing provisions of AISI 100-16, Chapter F were used to determine the capacity of the connection.

Test Data

Failure Forces in Pounds Force For Tension and Compression

Test #	Uplift Applied Load	Downforce Applied Load
1	4865	4988
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
Average	4865	4988
StdDev	0	0.00
ϕ	0.82	0.82
ϕR_n	3999	4100

- Refer ENG-000XXX for above Test Data

Part No :	42154

Analysis Code Checks - Example Calculation performed for uplift load

Determine Resistance factor, f, per AISI 100-16 Chapter F, Section F1.1

$\phi = C_\phi(M_m F_m P_m)e^\gamma$ = 0.82 (Uplift)
= 0.82 (Downforce)

$\gamma = -\beta_o(v_M^2+v_F^2+c_P v_P^2+v_Q^2)^{(1/2)}$ = -0.71 (Uplift)
= -0.71 (Downforce)

Cf = Calibration Coefficient = 1.52
Mm = mean value of material factor = 1.10
Fm = mean value of fabrication factor = 1.00
Pm = mean value of professional factor = 1.00
e = natural logarithmic base = 2.72
bo = target reliability index = 2.50
vM = variation of material factor = 0.10
vF = variation of fabrication factor = 0.05

cP = correction factor = (1+1/n)m/(m-2) for n>3 and 5.7 for n = 3

n = 1 cP = 5.70 (Uplift)
m = 0

n = 1 cP = 5.70 (Downforce)
m = 0

vP = coefficient of variation = 0.065 (Uplift)
vQ = variation of load effect = 0.21

vP = coefficient of variation = 0.065 (Downforce)
vQ = variation of load effect = 0.21

Determine the nominal resistance of the connection
R_n = Average Capacity from all tests = 4865.00 lbs

Determine the nominal resistance of the connection
R_n = Average Capacity from all tests = 4988.00 lbs

Therefore the torsional resistance of this connection is:
ϕR_n = 3999.00 pounds (Uplift)

Therefore the torsional resistance of this connection is:
ϕR_n = 4100.10 pounds (Downforce)

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

BHA STAMPED RAIL ASSEMBLEY

Part No : 21184-05

Analysis Method

The BHA Rail Stamped Assembly was analyzed by testing per AISI 100-16 Chapter F

Design Checks

ALLOWABLE LOAD FROM TESTING =	2490	lbs
ALLOWABLE TORSION FROM TESTING =	9995	lbs-in
ALLOWABLE TORSION UPLIFT FROM TESTING =	7192	lbs-in

Loads taken from Aeroelastic Torque Tube Analysis, these loads account for twist in torque tube.

Stow	LC	Load Factors	Angle (Deg)	Design Tension Load (lbs)	Design Check for Tension	Design Torsion Load (lbs-in)	Design Check for Torsion	Design Check for Torsion Up
0	3b	1.2D+0.5W+1.6S	1	251	10%	797	8%	
0	4	1.2D+1W+0.5S	2	219	9%	1449	14%	
0	5	0.9D+1W	2	155	6%	1449		20%
0	3b	1.2D+0.5W+1.6S	1	256	10%	841	8%	
0	4	1.2D+1W+0.5S	2	217	9%	1672	17%	
0	5	0.9D+1W	2	153	6%	1672		23%
15	3b	1.2D+0.5W+1.6S	16	275	11%	704	7%	
15	4	1.2D+1W+0.5S	17	230	9%	1234	12%	
15	5	0.9D+1W	17	185	7%	1807		25%
30	3b	1.2D+0.5W+1.6S	30	266	11%	634	6%	
30	4	1.2D+1W+0.5S	31	223	9%	1106	11%	
30	5	0.9D+1W	31	189	8%	1892		26%
45	3b	1.2D+0.5W+1.6S	45	215	9%	569	6%	
45	4	1.2D+1W+0.5S	46	200	8%	1007	10%	
45	5	0.9D+1W	46	183	7%	1871		26%
60	3b	1.2D+0.5W+1.6S	60	428	17%	2273	23%	
60	4	1.2D+1W+0.5S	60	753	30%	4417	44%	
60	5	0.9D+1W	60	594	24%	5897		82%

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480.269.7675 contact@structurology.com

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Job Number:	EST: 15401
Engineer:	MDR/DCD
Date:	29-Apr-25

BHA RAIL TESTING SUMMARY - Stamped TTA First Rail, FSLR S6

Analysis Method

The connection of the torque tube to the BHA relies on an assembly of a BHA rail, a U-Bolt and a Stamped Saddle. Therefore, testing was conducted, and the testing provisions of AISI 100-16, Chapter F were used to determine the capacity of the connection.

Analysis Code Checks

Determine Resistance factor, f, per AISI 100-16 Chapter F, Section F1.1

		Tension	Torsion	Torsion Up
$\phi = C_\phi(M_m F_m P_m)e^\gamma$	=	0.92	0.92	0.92
$\gamma = -\beta_o(v_M^2+v_F^2+c_P v_P^2+v_Q^2)^{(1/2)}$	=	-0.59	-0.59	-0.59

C_ϕ = Calibration Coefficient =	1.52
M_m = mean value of material factor =	1.10
F_m = mean value of fabrication factor =	1.00
P_m = mean value of professional factor =	1.00
e = natural logarithmic base =	2.72
β_o = target reliability index =	2.50
V_M = variation of material factor =	0.10
V_F = variation of fabrication factor =	0.05

c_P = correction factor = (1+1/n)m/(m-2) for n>3 and 5.7 for n = 3

	Tension	Torsion	Torsion Up
c_P =	0.00	0.00	0.00
V_P = coefficient of variation =	0.065	0.065	0.065
V_Q = variation of load effect =	0.21	0.21	0.21

Test Data for BHA Rail

Test No.	Force (k)	Torsion (k-in)	Torsion (k-in)
1	2.700	10.840	7.800
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
Mean	2.700	10.840	7.800
Std Dev	0.000	0.000	0.000

- Refer ENG-000558 for above Test Data

n =	1	1	1
m =	0	0	0

Determine the nominal resistance of the connection

R_n = Average Capacity from all tests = 2.700 kip

R_n = Average Torsional Capacity from all tests = 10.840 kip-in

R_n = Average Torsional Capacity from all tests = 7.800 kip-in

Part No:	21184-05

Therefore the load resistance of this rail is:

ϕR_n = 2.490 kip

Therefore the Torsional resistance of this rail is:

ϕR_n = 9.995 kip-in

Therefore the Uplift Torsional resistance of this rail is:

ϕR_n = 7.192 kip-in

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SLEW GEAR MOUNTING AND BOLT CHECK

Part No :	2054

Plate Data:		
Plate Fy =	45	ksi
Plate Fu =	55	
Top Plate Thickness =	0.47	in
Vertical Plate Thickness =	0.47	in
Gusset Thickness =	0.39	in

Top Bolt Data:		
Bolt Grade:	Class 10.9	
Bolt Dia =	0.75	in
$F_n v$ =	75	ksi
$F_n t$ =	113	ksi

Side Bolt Data:		
Bolt Type:	Twistlok 12mm (10.9)	
Bolt Dia =	0.47	in
Rated Ultimate Shear =	14.7	kips
No of Bolts per Flange =	6	

Analysis Checks

Top bolt Checks		
Bolt Spacing =	9.44	in (East to West)
	6.99	in (North to South)
	$R_n = F_{nt}A_b$	
ϕ =	0.75	
A_b =	0.44	in^2
ϕR_n =	37.29	kips

Side Plate Bearing , Shear Rupture

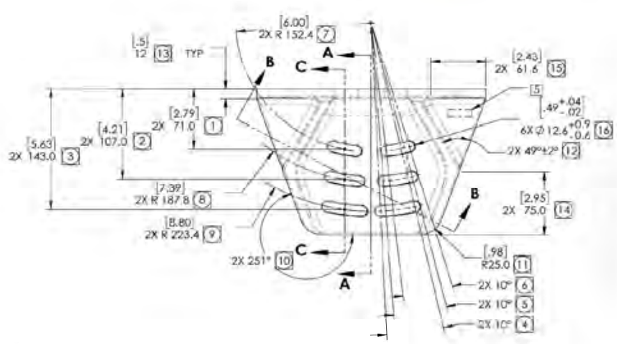
Bearing Check			
	$R_n = 1.0L_c tF_u < 2.0dtF_u$		LRFD J3-2c
	ϕ =	0.75	
	L_c =	0.8	in
Plate	ϕR_n =	15.51	kips

Shear Rupture Check			
	$R_n = 0.6F_yA_g$		J4-3
	$R_n = 0.6F_uA_{nv}$		J4-4
ϕ =	1	0.75	
A_g =	3.76		in^2
A_{nv} =	5.076		in^2
ϕR_n =	101.52		kips

Top Plate Shear Check		
Check a square plate supported on 2 sides, plate is 3" sq, with force at 2" from corner		
Plate Width =	3	in
A_{plate} =	1.41	in^2
	$R_n = 0.6F_yA_g$	J4-3
ϕ =	1	
ϕR_n =	38.07	kips

Tension Rupture Check				
		$R_n = F_yA_g$		
		$R_n = F_uA_e$	Ae = AnU D2-2	
	U =	1	Table D3.1	
	ϕ =	0.9	0.75	
	A_g =	3.995		in^2
	A_n =	2.1996		in^3
	A_e =	2.1996		in^2
Plate	ϕR_n =	90.73		kips

Side Bolt Check			
	Flange Spacing =	6	in
	Bolt Shear =	3.98	kips/bolt
	ϕ =	0.75	
Plate	ϕR_n =	11.025	kips



SLEW GEAR MOUNTING AND BOLT CHECK

Check of Motor Mount for All Load Conditions

Tilt Angle	LC	Vu (k)	Tu (k-in)	Top Bolt Tension (k)	1). Top Bolt D/C	Top Plate Shear (k)	2). Plate Shear D/C	Side Plate Load (k)	3b,c.)Side Plate D/C	Side Bolt Shear (k)	3a.) Bolt Bearing D/C	4.) Side Bolt Shear D/C
0	3b	2.80	39.13	2.07	6%	4.15	11%	1.38	2%	0.69	4%	6%
0	4	2.90	78.26	4.15	11%	8.29	22%	2.76	3%	1.38	9%	13%
0	5	0.70	78.26	4.15	11%	8.29	22%	2.76	3%	1.38	9%	13%
0	3b	2.63	39.13	2.07	6%	4.15	11%	1.38	2%	0.69	4%	6%
0	4	1.14	78.26	4.15	11%	8.29	22%	2.76	3%	1.38	9%	13%
0	5	1.14	78.26	4.15	11%	8.29	22%	2.76	3%	1.38	9%	13%
15	3b	2.82	29.51	1.56	4%	3.13	8%	1.04	1%	0.52	3%	5%
15	4	1.60	59.01	3.13	8%	6.25	16%	2.08	2%	1.04	7%	9%
15	5	0.17	85.63	4.54	12%	9.07	24%	3.02	3%	1.51	10%	14%
30	3b	3.02	15.89	0.84	2%	1.68	4%	0.56	1%	0.28	2%	3%
30	4	1.57	31.77	1.68	5%	3.37	9%	1.12	1%	0.56	4%	5%
30	5	0.28	57.66	3.05	8%	6.11	16%	2.04	2%	1.02	7%	9%
45	3b	3.02	13.05	0.69	2%	1.38	4%	0.46	1%	0.23	1%	2%
45	4	1.57	26.10	1.38	4%	2.76	7%	0.92	1%	0.46	3%	4%
45	5	0.40	40.46	2.14	6%	4.29	11%	1.43	2%	0.71	5%	6%
60	3b	2.20	8.68	0.46	1%	0.92	2%	0.31	0%	0.15	1%	1%
60	4	2.01	17.36	0.92	2%	1.84	5%	0.61	1%	0.31	2%	3%
60	5	0.57	14.03	0.74	2%	1.49	4%	0.50	1%	0.25	2%	2%

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Check Motor Pier for minimum flange thickness required

Bearing Check:

$R_n = 1.0L_ctF_u < 2.0dtF_u$

ϕ =	0.75	
L_c =	1.97	in
R_u/ϕ =	1.51	kips
Post F_u =	65	ksi
Post F_y =	50.00	ksi
$t_{f\text{-}min}$ =	0.025	in

Tension Check*

$R_n = F_yWt$ $R_n = F_uW_et$

(calculation based on 4" or 6" wide flange)

ϕ =	0.9	0.75	
W =	2	3	in/bolt
W_e =	1.53	2.53	in
R_u/ϕ =	2.64	3.17	kips/bolt
$t_{f\text{-}min\ 4"}$ =	0.032		in
$t_{f\text{-}min\ 6"}$ =	0.019		in

*In order for tensile rupture to occur, the web of the steel member would have to shear as well, this is considered unlikely.

Shear Check

$R_n = 0.6F_yL_gt$ $R_n = 0.6F_uL_{nv}t$

ϕ =	1	0.75	$t_{f\text{-}min}$ =	0.02	in
L_g =	10.08		in/ 2 bolts		
L_e =	8.804		in/ 2 bolts		
R_u/ϕ =	6.05	0.09	kips/ 2 bolts		

Block Shear Check

$R_n = 0.6F_uL_{nv}t + U_{bs}F_uL_{nt}t \leq 0.6F_yL_{gv}t + U_{bs}F_uL_{nt}t$

ϕ =	0.75			4"	6"	
L_{nv}	8.804	in/ 2 bolts	L_{nt}	1.53	2.53	in
U_{bs}	1					

Minimum Flange Thickness Required (4" Flange) = 0.032 inches

Minimum Flange Thickness Required (6" Flange) = 0.025 inches

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Date:	29-Apr-25

TTA TO SLEW GEAR ATTACHMENT - I= Light Slew 50ksi, 4.5mm thick, no collar 1/2" BOM, Terrain

PART DATA:

TTA - Steel

E = 29000 ksi
Fy = 50 ksi
Fu = 68 ksi
Wall thickness = 0.177 in
TTA Dia = 5.12 in
Edge Distance = 1.37 in

BOLT DATA:

# Bolts = 8
Bolt = BOM 1/2"
d_{hole} = 0.5 in
Rated Bolt Shear = 20.15 kips

SLEW GEAR COLLAR

E = 29000 ksi
Fy = 100 ksi
Fu = 140 ksi
Wall thickness = 0.275 in
Edge Distance = 0.57 in

Analysis / Code Checks

Bolt Shear Check

CHECK:	BOLT SHEAR	
CODE REF:	[AISC J3-1]	
Vu =	6.94	k
ϕ =	0.75	
ΦRn =	15.1	k
D/C:	0.46	
Check	OK	

TTA Bearing Check

CHECK:	BEARING STRENGTH AT BOLT HOLES				
CODE REF:	[AISC J3-10]				
Vu =	6.94	k	t =	0.177165354	in
ϕ =	0.75		F_u =	68	ksi
ΦRn =	13.6	k	d =	0.5	in
D/C:	0.51		L_c =	1.37	in
	R_n= 1.5L_ctF_u <= 3.0*d*t*F_u				
R_n =	18.071	kips	Check	OK	

Slew Gear Bearing Check

CHECK:	BEARING STRENGTH AT BOLT HOLES				
CODE REF:	[AISC J3-10]				
Vu =	6.94	k	t =	0.275	in
ϕ =	0.75		F_u =	140	ksi
ΦRn =	24.7	k	d =	0.5	in
D/C:	0.28		L_c =	0.57	in
	R_n= 1.5L_ctF_u <= 3.0*d*t*F_u				
R_n =	32.918	kips	Check	OK	

Summary of Design Checks for All Load Cases

-Extra Tolerance Factor =1.38 used for (XTR-0.75 - Extreme Terrain)

Tilt Angle	LC	M_u (k-in)	V_u (k)	T_u (k-in)	V_{bolt} (k)	Bolt D/C	TTA Brg	Slew Brg	D/C Max
0	3b	65.94	1.40	20	6.48	0.43	0.48	0.26	48%
0	4	35.24	1.45	39	4.10	0.27	0.30	0.17	30%
0	5	16.24	0.35	39	2.77	0.18	0.20	0.11	20%
0	3b	61.93	1.31	20	6.10	0.40	0.45	0.25	45%
0	4	27.09	0.57	39	3.48	0.23	0.26	0.14	26%
0	5	8.09	0.57	39	2.41	0.16	0.18	0.10	18%
15	3b	66.90	1.41	15	6.53	0.43	0.48	0.26	48%
15	4	38.00	0.80	30	4.06	0.27	0.30	0.16	30%
15	5	3.97	0.09	43	2.53	0.17	0.19	0.10	19%
30	3b	71.59	1.51	8	6.94	0.46	0.51	0.28	51%
30	4	37.09	0.78	16	3.70	0.25	0.27	0.15	27%
30	5	65.94	0.14	29	6.60	0.44	0.49	0.27	49%
45	3b	71.33	1.51	7	6.91	0.46	0.51	0.28	51%
45	4	37.08	0.78	13	3.67	0.24	0.27	0.15	27%
45	5	9.33	0.20	20	1.49	0.10	0.11	0.06	11%
60	3b	51.95	1.10	4	5.03	0.33	0.37	0.20	37%
60	4	47.42	1.01	9	4.61	0.31	0.34	0.19	34%
60	5	13.53	0.29	7	1.37	0.09	0.10	0.06	10%

TTA FEA reduction factor 0.87 used

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TORQUE TUBE ADAPTOR CALCULATION

Part No :	40543

Design Summary:

Capacity of the TTA is taken by analyzing a round shape per AISC 14th Edition.

(Extra Tolerance Factor =1.25 used for (XTR-0.75 - Extreme Terrain))

Design Checks

					Moment Check		Shear		Torsion		Combined Loads	
Tilt Angle	LC	Mu(K-in)	Vu (k)	Tu (k-in)	D/C	Ok ?	D/C	Ok ?	D/C	Ok ?	D/C	Ok ?
0	3b	82.43	1.75	24.46	42%	OK	5%	OK	13%	OK	21%	OK
0	4	44.05	1.81	48.91	23%	OK	5%	OK	27%	OK	15%	OK
0	5	20.30	0.44	48.91	10%	OK	1%	OK	27%	OK	9%	OK
0	3b	77.41	1.64	24.46	40%	OK	4%	OK	13%	OK	19%	OK
0	4	33.86	0.71	48.91	17%	OK	2%	OK	27%	OK	11%	OK
0	5	10.11	0.71	48.91	5%	OK	2%	OK	27%	OK	8%	OK
15	3b	83.62	1.76	18.44	43%	OK	5%	OK	10%	OK	21%	OK
15	4	47.50	1.00	36.88	24%	OK	3%	OK	20%	OK	11%	OK
15	5	4.97	0.11	53.52	3%	OK	0%	OK	29%	OK	9%	OK
30	3b	89.48	1.89	9.93	46%	OK	5%	OK	5%	OK	22%	OK
30	4	46.36	0.98	19.86	24%	OK	3%	OK	11%	OK	7%	OK
30	5	82.43	0.18	36.04	42%	OK	0%	OK	20%	OK	22%	OK
45	3b	89.16	1.89	8.16	46%	OK	5%	OK	4%	OK	22%	OK
45	4	46.35	0.98	16.31	24%	OK	3%	OK	9%	OK	7%	OK
45	5	11.66	0.25	25.28	6%	OK	1%	OK	14%	OK	2%	OK
60	3b	64.94	1.38	5.42	33%	OK	4%	OK	3%	OK	12%	OK
60	4	59.27	1.26	10.85	30%	OK	3%	OK	6%	OK	10%	OK
60	5	16.91	0.36	8.77	9%	OK	1%	OK	5%	OK	1%	OK

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TORQUE TUBE ADAPTOR CALCULATION

CAPACITY CHECK OF TTA PER AISC

Torsional Capacity of Members is calculated in accordance with AISC H3.1A

ϕ = 0.9

$T_n = F_{cr}C$

F_{cr} = Max $\{1.23E/((L/D)^{1/2}(D/t)^{5/4}); 0.60E/((D/t)^{3/2})\}$, but not more than 0.6Fy

ϕT_n =	183.44	k-in
C =	6.79	in^3
F_{cr} =	30	ksi

Shear Capacity of Members is calculated in accordance with AISC G6

ϕ = 0.9

$V_n = F_{cr}A_g/2$

F_{cr} = Max $\{1.60E/((L/D)^{1/2}(D/t)^{5/4}); 0.78E/((D/t)^{3/2})\}$, but not more than 0.6Fy

ϕV_n =	37.10	k
A_g =	2.75	in^2
F_{cr} =	30	ksi

Bending Capacity of Members is calculated in accordance with AISC F8

ϕ = 0.9

Yielding : $M_n = M_p = F_y Z$

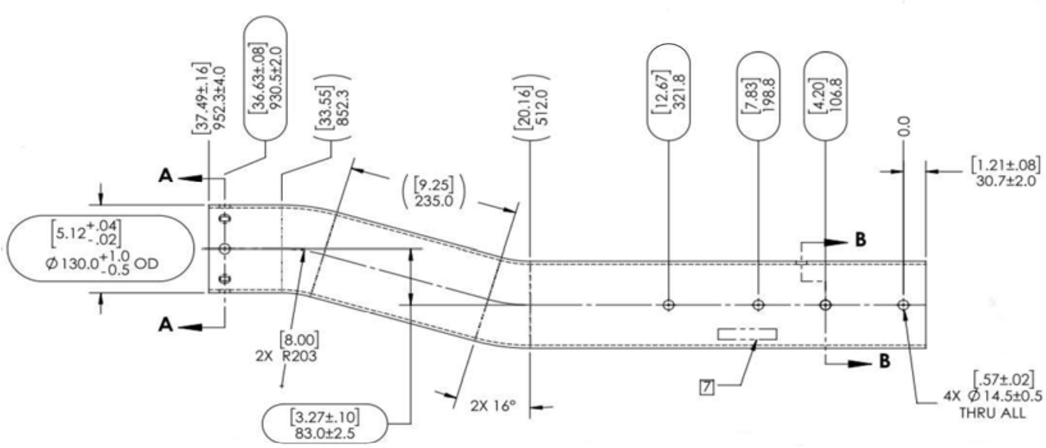
Local Buckling Non-Compact: $M_n = (0.021E/(D/t) + F_y)S$

Local Buckling Slender: $M_n =$ F $M_n = F_{cr}S$

$F_{cr} = 0.33E/(D/t)$

ϕM_n =	194.60	k
Z=	4.32	in^3
F_y=	50	ksi

Combined Loads were checked per AISC Eq H3-6 : $(Pr/Pc + Mr/Mc)^2 + (Vr/Vc + Tr/Tc)2 < 1.0$



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DYNAMICS - FREQUENCY CALCULATION

Panel Data:

Module Type	=	**Series 6 Plus**	
Wing Length	=	66.98	m
mass of each module	=	34.00	kg
Module width	=	1.25	m
Module length	=	2.02	m
Module Iy	=	11.61	kgm^2
Tracker Iy	=	777.48	kgm^2
Tracker Effective Length	=	40	m
Tracker J	=	3.79E-06	m^4
Tracker G	=	79.30	Gpa
Tracker G	=	79300000000	Pa
	=	79300000000	$kg/(ms^2)$

Design Wind Speed

U	=	110	mph

TT geometry:

Outside D	=	127	mm
wall thickness	=	3	mm
inside diameter	=	122	mm
J, Polar Moment of Inertia	=	3790644.2	mm^4

System stiffness:

Tracker L/JG	=	1.34E-04	$s^2/(kgm^2)$
k = L/JG^-1	=	7479.33	kgm^2/s^2
	=		

Dynamic response:

f_n	=	0.494	Hz
f_nD	=	0.999	
$\frac{f_n D}{U}$	=	0.020	

APPENDIX

Please find the row configuration details given below: [illegible]
Voyage: Worthstock Solar Gen 4000
EST:

Date Reviewed: 7-Mar-2019
[illegible]

DM_102 Module

Mod/String	Pier	Row	Tube	BHA	Rail	TTA/Slew	Motor
6	19	Ext	3.5mm	FSLR S6 Extra Heavy	FSLR S6 Heavy	D= Heavy Slew 50ksi, 4.5mm thick, no collar 1/2" BOM, Terrain	STD 24V
6	19	Edge	2.5mm	FSLR S6 Light	FSLR S6 Heavy	I= Light Slew 50ksi, 4.5mm thick, no collar 1/2" BOM, Terrain	STD 24V

Ext row:

	Governing Wing										Other Wing										Tracker Size
M	5	8	8	8	6	6	5	5	5	3	5	8	6	6	6	6	5	5	5	3	257 Sq.m
ksi	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
Damper					D				D						D				D		

Engr. Ref
Product rules

Edge row:

	Governing Wing										Other Wing										Tracker Size
M	5	8	8	8	6	6	5	5	5	3	5	8	6	6	6	6	5	5	5	3	257 Sq.m
ksi	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
Damper								D										D			

Engr. Ref
Product rules

DM_78 Module

Mod/String	Pier	Row	Tube	BHA	Rail	TTA/Slew	Motor
6	15	Ext	3.5mm	FSLR S6 Extra Heavy	FSLR S6 Heavy	D= Heavy Slew 50ksi, 4.5mm thick, no collar 1/2" BOM, Terrain	STD 24V
6	15	Edge	2.5mm	FSLR S6 Light	FSLR S6 Heavy	I= Light Slew 50ksi, 4.5mm thick, no collar 1/2" BOM, Terrain	STD 24V

Ext row:

	Governing Wing										Other Wing										Tracker Size
M	5	8	6	6	5	5	5	3			5	8	6	6	5	5	5	3			197 Sq.m
ksi	60	60	60	60	60	60	60	60			60	60	60	60	60	60	60	60			
Damper				D			D								D			D			

Engr. Ref
Product rules

Edge row:

	Governing Wing										Other Wing										Tracker Size
M	5	8	8	6	5	5	5	3			5	8	6	6	5	5	5	3			197 Sq.m
ksi	60	60	60	60	60	60	60	60			60	60	60	60	60	60	60	60			
Damper							D										D				

Engr. Ref
Product rules

DM_60 Module

Mod/String	Pier	Row	Tube	BHA	Rail	TTA/Slew	Motor
6	12	Ext	3.5mm	FSLR S6 Extra Heavy	FSLR S6 Heavy	D= Heavy Slew 50ksi, 4.5mm thick, no collar 1/2" BOM, Terrain	STD 24V
6	12	Edge	3.5mm	FSLR S6 Light	FSLR S6 Heavy	I= Light Slew 50ksi, 4.5mm thick, no collar 1/2" BOM, Terrain	STD 24V

Ext row:

	Governing Wing										Other Wing										Tracker Size
M	5	8	8	6	5	5	5	5	3		5	8	5	3							151 Sq.m
ksi	60	60	60	60	60	60	60	60	60		60	60	60	60							
Damper				D				D				D	D								

Engr. Ref
Product rules

Edge row:

	Governing Wing										Other Wing										Tracker Size
M	5	8	8	6	5	5	5	5	3		5	8	5	3							151 Sq.m
ksi	60	60	60	60	60	60	60	60	60		60	60	60	60							
Damper							D					D									

Engr. Ref
Product rules

DM_42 Module

Mod/String	Pier	Row	Tube	BHA	Rail	TTA/Slew	Motor
6	5	Ext	3.5mm	FSLR S6 Extra Heavy	FSLR S6 Heavy	D= Heavy Slew 50ksi, 4.5mm thick, no collar 1/2" BOM, Terrain	STD 24V
6	5	Edge	2.5mm	FSLR S6 Light	FSLR S6 Heavy	I= Light Slew 50ksi, 4.5mm thick, no collar 1/2" BOM, Terrain	STD 24V

Ext row:

	Governing Wing										Other Wing	Tracker Size
M	5	8	5	5	5	5	5	5	3			106 Sq.m
ksi	60	60	60	60	60	60	60	60	60			
Damper				D				D				

Engr. Ref
Product rules

Edge row:

	Governing Wing										Other Wing	Tracker Size
M	5	8	5	5	5	5	5	5	3			106 Sq.m
ksi	60	60	60	60	60	60	60	60	60			
Damper							D					

Engr. Ref
Product rules

Specifications

PRODUCT	MODULE NAME / TRACKER VERSION	MODULE SIZE (mm) Length	Width	Thickness	MODULE WEIGHT (kg)	PIER HEIGHT (ft)	PITCH (ft)	GCR	STOW ANGLE (deg)	CODE	RISK CATEGORY	*HURRICANE ZONE	Front Design Wind (mph)	Back Design Wind (mph)	SNOW LOAD (psf)	Ke	Kd	STOW SPEED	STAGED STOW SPEED	OPERATIONAL WIND SPEED	Extra TT
NXH 878-0.75	Series 6 Plus	2024	1245	49	34.0	7.00	19.640	45.36 %	60	ASCE 7-16	I	Yes	110	93.5	40	0.981	0.85	35mph 3s 10m	40mph 3s 10m	49	Not Considered
NXN128	2.3.15.P																	18mph 1min 3m	21mph 1min 3m		

*Manual Input *Manual Input

Notes: D - denotes a Damper Pier (an Array Pier with a set of two dampers)

[illegible]

a) TT minimum thickness = 3.0mm minimum for exterior tracker

nextracker

6200 Paseo Padre Pkwy. Fremont, CA 94555
+1 (510) 793-9388
www.NEXTracker.com

Module Compatibility Declaration Request

Project Name	Verogy: Woodstock Solar One
Request Date	3/7/2025
Request To	Sales

Module Information

Module Type	Series 6 Plus	
Module Dimension (Wx L)	1245 mm	2024 mm
Module Mounting	NXH120 60 degree stow	

Wind Pressure Zone Designations

Site Conditions

Location		CT	
System Size		4 MW	
Stow Angle		60	
Structural Code		ASCE 7-16	
Avg. Tracker Pier height	Max Pier Height*	7.00 ft	7.00 ft
Row to Row Spacing		14.64 ft	
BHA Gap		Standard	
Ke		0.983	
Wind Speed, 3-sec gust (Down)		110.00 mph	
Wind Speed, 3-sec gust (Uplift)		93.50 mph	
GCR		45.35%	
Design load		Service Level	

*Reference construction set for min and max pier heights. Allowable max non-exposing pier height less than 25% of piers in tracker row, and less than 1 ft than average pier height for loads to be applicable

Governing Module Pressures

		Down pressure [Pa]	Uplift Pressure [Pa]
EXTERIOR TRACKER	1	1556	-1534
	2	1556	-1534
	3	1227	-1031
EDGE TRACKER	1	1514	-1222
	2	1514	-1222
	3	965	-571
INTERIOR TRACKER	2	1514	-1222
	3	965	-571

Wind Pressure Methodology

The values defined in the governing module pressures table are the maximum applied wind loads for specified design load based on the site specific 3-sec gust wind speed.

NEXTracker analyzes wind pressures using a structural analysis model which follows ASCE load calculation methodology. Wind pressure coefficients have been validated through product specific wind tunnel analysis performed in accordance with ASCE 4912, by wind engineering consultants CPP.

Wind pressures are calculated for the worst case __ degree tilt angle and worst case wind approach angle. For each location and zone, the highest wind pressure is selected as the governing module pressure. Both uplift and downlift are considered separately.

Global Customer Support Services
350 W. Washington St.
Suite 600
Tempe, AZ 85003

NEXTracker 400mm Mid Clamp

December 3, 2021

Tim Dewhurst
NEXTracker
6200 Paseo Padre Pkwy
Fremont, CA 94555

Dear Mr. Dewhurst,

This letter confirms the successful static load testing of the NEXTracker provided 400mm Mid Clamp based on the mounting configuration, installation instructions and torque values provided by NEXTracker with First Solar Series 6 and Series 6 *Plus* modules. The tests were administered as follows:

Clip Tested	Module	Uplift Design Load (Pa)	Downforce Design Load (Pa)	Uplift Test Load (Pa)	Downforce Test Load (Pa)
400mm Mid Clamp (P/N 21171)	Series 6 (FS-6XXX); Series 6 *Plus* (FS-6XXX-P)	1600	1600	2400	2400
	Series 6 *Plus* Interior (FS-6XXX-P-I)	900	1300	1350	1950

The proposed mounting configuration successfully passed static load tests as shown above and are appropriate for use in conjunction with First Solar Series 6 and Series 6 *Plus* modules, provided the specific design loads for each module type based upon the submitted and referenced above configuration specifications are not exceeded. First Solar warrants its modules according to the First Solar Module Warranty Terms & Conditions, provided the modules and mounting system are installed, operated and serviced in accordance with the First Solar User Guide.

All structural aspects of the system are the responsibility of NEXTracker. In any case where the racking system is found to be the cause of module damage, the racking manufacturer will be responsible.

This review is based upon the submitted and referenced above configuration specifications. Changes in the mounting configuration specifications may nullify these test results.

Briana Burckhardt

Briana Burckhardt
Manager – Post Sales Operations

First Solar

Series 6 *Plus* Bifacial.

455-480 Watt Thin Film Solar Module

First Solar is once again setting the industry benchmark for reliable energy production, optimized design and environmental performance with Series 6 *Plus* Bifacial - the world's first bifacial thin film CdTe module. The advanced design signficantly reduces balance of system, shipping, and operating costs while delivering more energy per nameplate watt.

More Lifetime Energy per Nameplate Watt

- Industry's best (0.3%) warranted degradation rate
- Superior temperature coefficient, spectral response and shading behavior
- Unlike crystalline silicon modules, First Solar's thin film technology does not experience losses from LID or LeTID
- Anti-reflective coated glass enhances energy production
- Added bifacial energy yield

Innovative Module Design

- Under-mount frame provides the cleaning and snowshedding benefits of a frameless module while protecting edges against breakage
- Innovative SpeedSlots combine the robustness of bottom mounting with the speed of top clamping while utilizing fewer fasteners to achieve the industry's fastest installation times and lowest mounting hardware costs
- Dual junction box design reduces wire management complexity and cost

Best In-Class Reliability & Durability

- Manufactured under one roof with 100% traceable QA/QC
- Independently tested and certified for reliable performance that exceeds IEC standards in high temperature, high humidity, extreme desert and coastal applications
- Inherently immune to and warranted against power loss from cell cracking
- Durable glass/glass construction

Best Environmental Profile

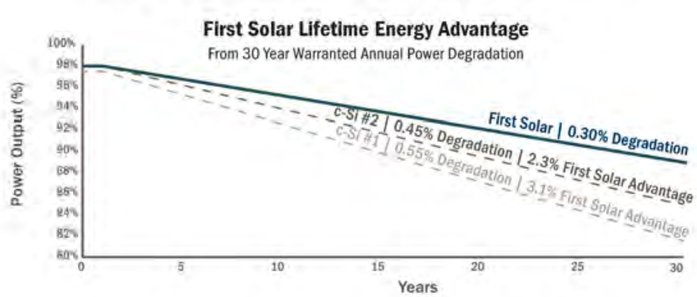
- Fastest energy payback time in the industry
- Carbon footprint that is 2.5X lower and a water footprint that is 3X lower than mono crystalline silicon panels on a life cycle basis
- Global PV module recycling services available through First Solar or customer-selected third-party

19.0%
HIGH BIN EFFICIENCY

30YR
LINEAR PERFORMANCE WARRANTY

98%
WARRANTY START POINT

0.3%
WARRANTED ANNUAL DEGRADATION RATE[1]



Learn more about First Solar and Series 6 *Plus* Bifacial at firstsolar.com/S6

Series 6 *Plus* Bifacial.

First Solar

Electrical Specifications

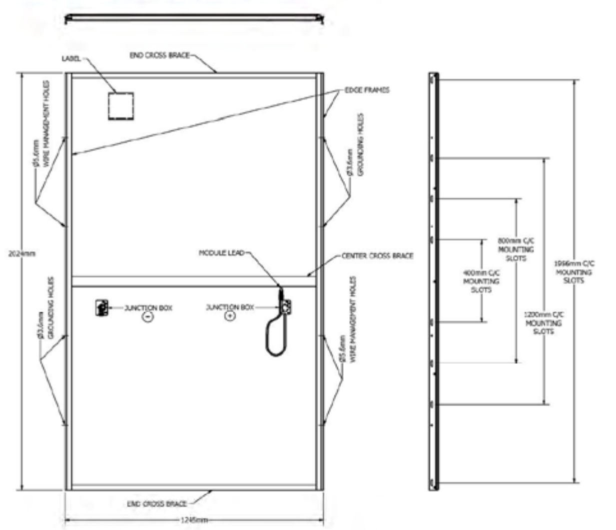
RATINGS AT STANDARD TEST CONDITIONS (1000W/m², AM 1.5, 25°C)[2]													
SERIES 6 PLUS BIFACIAL SL MODEL TYPES: FS-6XXX-P-B-I / FS-6XXXA-P-B-I													
SERIES 6 PLUS BIFACIAL HL MODEL TYPES: FS-6XXX-P-B / FS-6XXXA-P-B (XXX = NOMINAL POWER)													
Nominal Power[3] (-0/+5%)	P_{MAX} (W)	455		460		465		470		475		480	
		STC[4]	BNPI[5]	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI	STC	BNPI
Nominal Power	P_{MAX} (W)	455	468	460	473	465	478	470	483	475	488	480	493
Voltage at P_{MAX}	V_{MAX} (V)	187.8	187.8	188.8	188.8	189.8	189.8	191.1	191.1	191.5	191.5	192.8	192.8
Current at P_{MAX}	I_{MAX} (A)	2.42	2.49	2.44	2.51	2.45	2.52	2.46	2.53	2.48	2.55	2.49	2.56
Open Circuit Voltage	V_{OC} (V)	222.0	222.0	222.9	222.9	223.8	223.8	224.3	224.3	224.8	224.8	225.4	225.4
Short Circuit Current	I_{SC} (A)	2.58	2.65	2.59	2.66	2.60	2.68	2.61	2.69	2.61	2.69	2.62	2.69
Efficiency (%)	%	18.1		18.3		18.5		18.7		18.9		19.0	
Maximum System Voltage	V_{SYS} (V)	1500[6]											
Limiting Reverse Current	I_R (A)	5.0											
Maximum Series Fuse	I_{CF} (A)	5.0											

TEMPERATURE CHARACTERISTICS		
Module Operating Temperature Range	°C	-40 to +85
Temperature Coefficient of P_{MAX}	$T_K (P_{MAX})$	-0.32%/°C [Temperature Range: 25°C to 75°C]
Temperature Coefficient of V_{OC}	$T_K (V_{OC})$	-0.28%/°C
Temperature Coefficient of I_{SC}	$T_K (I_{SC})$	+0.04%/°C
Nominal Operating Cell Temperature	°C	43
Bifaciality Factor	%	20±5

MECHANICAL DESCRIPTION	
Length	2024mm
Width	1245mm
Area	2.52m²
Module Weight	SL: 33.3kg HL: 34.0kg
Leadwire[7]	2.5mm², 733mm (+) & Bulkhead (-)
Connectors	TE Connectivity PV4-S, MC4-EVO 2, or alternate
Junction Box	IP68 Rated
Bypass Diode	N/A
Cell Type	Thin film CdTe semiconductor, up to 268 cells
Frame Material	Anodized Aluminum
Front Glass	Heat strengthened
Back Glass	Heat strengthened
Encapsulation	Laminate material with edge seal
Frame to Glass Adhesive	Silicone
Load Rating[8]	SL: +1950/-1350Pa HL: +/-2400Pa

PACKAGING INFORMATION		
Model Type	Modules Per Pack	Packs per 40' Container
FS-6XXX-P-B / FS-6XXXA-P-B	27	18
FS-6XXX-P-B-I / FS-6XXXA-P-B-I	30	18

Mechanical Specifications



Install in portrait only

1 Limited power output and product warranties subject to warranty terms and conditions
2 All ratings ±10%, unless specified otherwise. Specifications are subject to change
3 Measurement uncertainty applies
4 Frontside electrical ratings
5 Bifacial Name Plate Irradiance, as per IEC 61215:2021
6 IEC 61730-1: 2016 Class II
7 Leadwire length from junction box exit to connector mating surface
8 1500Pa tentative load rating for 1956mm mounting slots. Higher loads may be acceptable,subject to testing
9 Testing Certifications/Listings pending

Certifications & Tests[9]

CERTIFICATIONS AND LISTINGS	EXTENDED DURABILITY TESTS	QUALITY & EHS
IEC 61215:2021 & 61730-1:2016[6], CE IEC 61701 Salt Mist Corrosion IEC 60068-2-68 Dust and Sand Resistance UL 61730	IEC TS 63209-1 Extended Stress Test Long-Term Sequential Thresher Test PID Resistant	ISO 9001:2015 ISO 14001:2015 ISO 45001:2018 ISO 14064-3:2006 EPEAT Silver Registered

IEC · VDE · UL LISTED · epeat SILVER · CE

Disclaimer

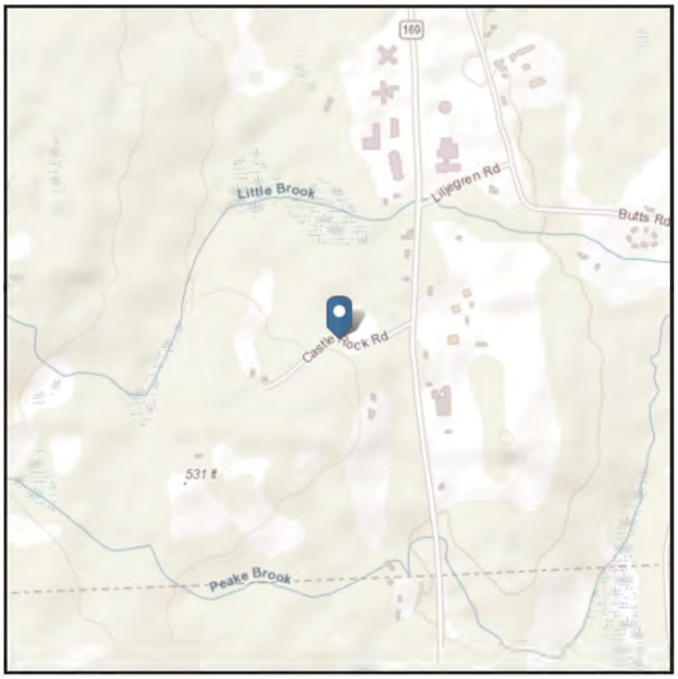
All images shown are provided for illustrative purposes only and may not be an exact representation of the product. First Solar, Inc. reserves the right to change product images at any time without notice.

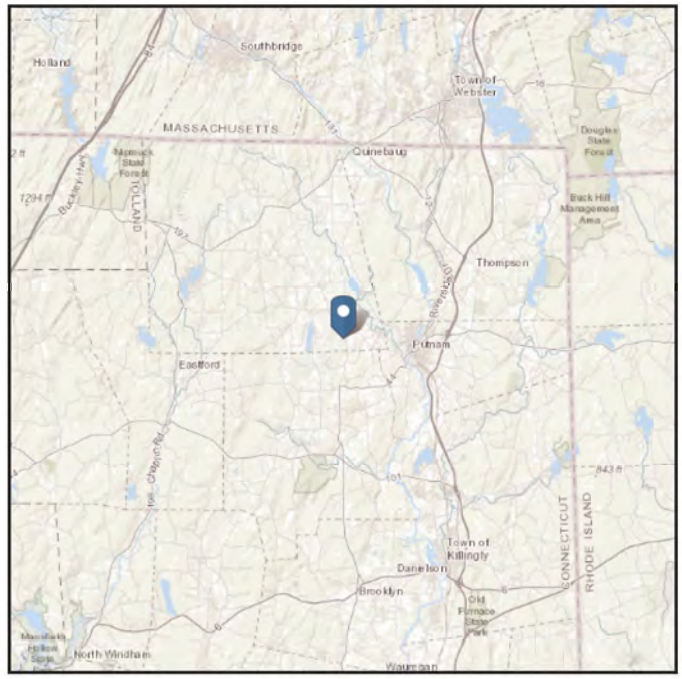
The information included in this Module Datasheet is subject to change without notice and is provided for informational purposes only. No contractual rights are established or should be inferred because of user's reliance on the information contained in this Module Datasheet. Please refer to the appropriate Module User Guide and Module Product Specification document for more detailed technical information regarding module performance, installation and use.

ASCE Hazards Report

Address:
Castle Rock Rd
Woodstock, Connecticut
06281

Standard:	ASCE/SEI 7-16	**Latitude:**	41.922294
Risk Category:	I	**Longitude:**	-71.959514
Soil Class:	C - Very Dense Soil and Soft Rock	**Elevation:**	466.5579657270985 ft (NAVD 88)





Wind

Results:

Wind Speed	110 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	92 Vmph
100-year MRI	99 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1A and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Tue Jul 23 2024

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 15% probability of exceedance in 50 years (annual exceedance probability = 0.00333, MRI = 300 years).

Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

ASCE AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

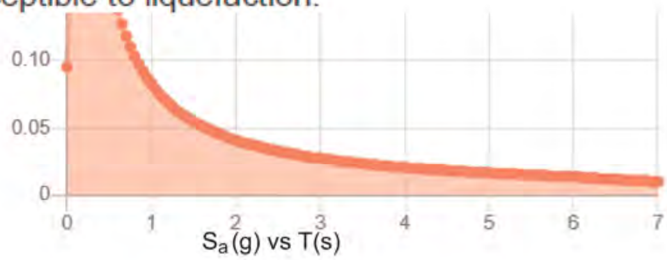
Site Soil Class: C - Very Dense Soil and Soft Rock

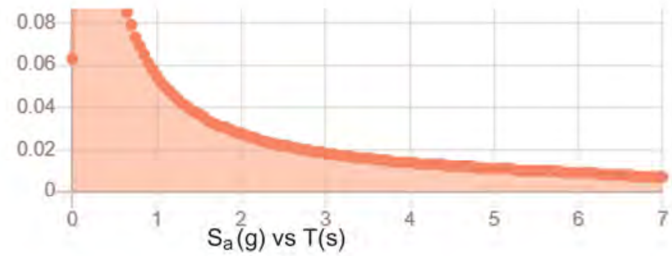
Results:

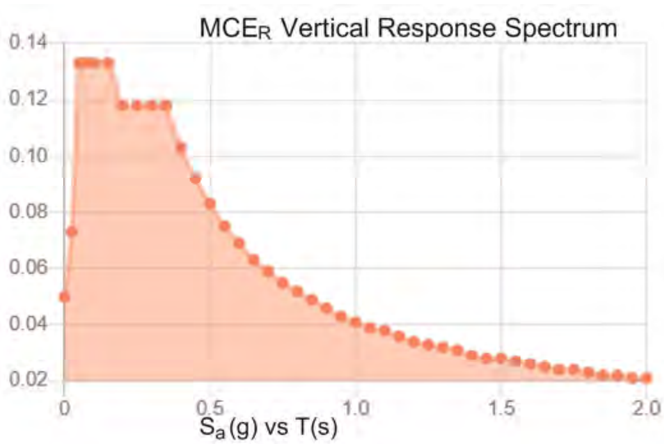
S_S :	0.182	S_{D1} :	0.055
S_1 :	0.055	T_L :	6
F_a :	1.3	PGA :	0.098
F_v :	1.5	PGA_M :	0.127
S_{MS} :	0.237	F_{PGA} :	1.3
S_{M1} :	0.083	I_e :	1
S_{DS} :	0.158	C_v :	0.7

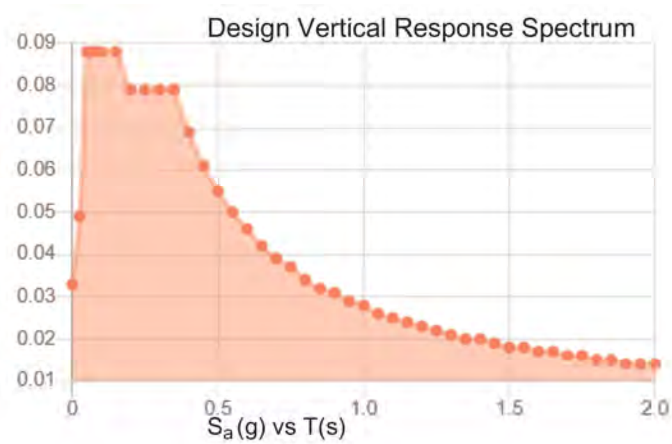
7.1 SEISMIC DESIGN

The site class is “C” per the Building Code. Based on the standard penetration test results, visual soil classification, and design peak ground acceleration at this locale, the site soils are not susceptible to liquefaction.









Data Accessed: **Tue Jul 23 2024**

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Snow

Results:

Ground Snow Load, p_g :	40 lb/ft^2
Mapped Elevation:	466.6 ft
Data Source:	ASCE/SEI 7-16, Table 7.2-8
Date Accessed:	Tue Jul 23 2024

Values provided are ground snow loads. In areas designated "case study required," extreme local variations in ground snow loads preclude mapping at this scale. Site-specific case studies are required to establish ground snow loads at elevations not covered.

Snow load values are mapped to a 0.5 mile resolution. This resolution can create a mismatch between the mapped elevation and the site-specific elevation in topographically complex areas. Engineers should consult the local authority having jurisdiction in locations where the reported 'elevation' and 'mapped elevation' differ significantly from each other.

STRUCTUROLOGY

CONSULTING STRUCTURAL ENGINEERS

40000 Fremont Blvd, Suite F Fremont, CA 94538
480.269.7675 contact@structurology.com
www.structurology.com

Job Number:	EST:
Engineer:	MDR/DCD
Date:	14-Mar-2025

LC : REV.U4
PC : REV.U4

Project : Verogy: Woodstock Solar One_Exterior

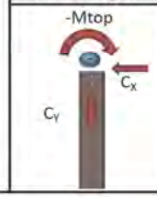
Rev History: **Rev. 6**

Wind Information	
Tilt Angle	Design Wind
±0	49 mph
±15	49 mph
±30	49 mph
±45	49 mph
+60	110 mph
-60	93.5 mph

ASCE Version:	7-16		TT Thick:	3.5	mm
Risk Category:	I		Top of Pier:	7	ft
Design Wind Speed:	110	mph	Load application:	7.75	ft
Ground Snow Load:	40	psf	Pier Count:	19	Nos
Terrain:	XTR-0.75		Mod/String:	6	
Stow Angle:	60	deg	No of module:	102	
Module:	Series 6 Plus / 2.3.13.P				
Module Width:	1245	mm	Module Thick:	49	mm
Module Length:	2024	mm	Module Weight:	34.0	kg

Load Application at center line of pivot pin, 9" above the top of post

Load Diagram



*Loads are combined loads per ASCE 7-16 section 2.4.1 (BASIC ASD)

Wind Factors			
K_z:	1.00	K_d:	0.85
K_{zt}:	1.00	K_e:	0.98
		Zg (ft):	466.6

Stow Wind Speed
35mph 3s 10m

	Lateral (lbs)	Axial (lbs)	Moment (lbs-in)	Abs Down (lbs)	Abs Up (lbs)
M	2215	2180	-16850	2377	-943
M	2	1015	-104418	0	0
P2	2331	2281	-17368	2488	-913
P2	-1860	-913	-18935	0	0
P3	2409	2348	-17886	2562	-884
P3	-1834	-884	-19500	0	0
P4	2392	2334	-17886	2546	-886
P4	-1832	-886	-19500	0	0
P5	2384	2327	-17886	2538	-883
P5	-1824	-883	-19500	0	0
P6	2433	2370	-17886	2586	-895
P6	-1860	-895	-19500	0	0
P7	2232	2193	-16433	2390	-847
P7	-1713	-847	-17917	0	0
P8	1858	1878	-15824	2050	-735
P8	-1416	-735	-16641	0	0
P9	2195	2169	-16512	2370	-1027
P10	1260	1346	-11540	1456	-772

Seismic Load To Motor

S_S:	0.182	S_{DS}:	0.158
S_1:	0.055	S_{D1}:	0.055
R:	2.000	C_S:	0.079
Site Class:	C	V:	1364 lbs

Pier Layout										
Number of Modules per Bay										
M	5	6	6	6	6	6	5	5	5	+1c
Fy	50	50	50	50	50	50	50	50	50	
P.No	P2	P3	P4	P5	P6	P7	P8	P9	P10	
SPACING / GCR : 14.64 ft / 45.36%										

Weak Axis DL to Pier Distribution						
	Slope	Grade	V_D	W [lb/ft]	Weak DLz (Motor)	Weak DLz (Array)
Standard	3.44°	6%	727 lbs	28	256 lbs	26 lbs
High	8.56°	15%	1806 lbs	28	636 lbs	65 lbs

3.6% of the total weak axis load applies to each array pier and the remaining load to motor pier (assuming both wings have the same configuration).

Note

1) Above governing loads do not act simultaneously and EOR should confirm with the detailed loadings provided below.

2) See documents PJE-000004 & PJE-000006 for design guidelines and standard nomenclature. Should the foundation engineer deviate from these recommendations they must inform Nextracker prior to construction.

3) Loads provided, assume both wings on either side of the motor pier have the same length and post spacings. For a tracker with the unsymmetrical wings, it is acceptable to combine ½ of the motor load from each wing.

4) Designer should consider positive and negative signs of $Combo_X$ and Moment factored loads. If both are negative, they are additive, otherwise they are subtractive.

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
0 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	4	191	651	1253	2	1015	-104418	MP-M Max
		2	20	306	685	1318	12	1118	0	
		3	56	473	708	1362	34	1241	0	
		4	97	572	703	1352	58	1296	0	
		5	136	646	700	1348	82	1338	0	
		6	185	748	715	1376	111	1414	0	
		7	198	731	654	1261	119	1343	0	
		8	195	674	555	1052	117	1210	0	
		9	203	679	652	1216	122	1310	0	
		10c	98	325	368	688	59	813	0	
0 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	3	203	651	1253	2	1932	-78314	
		2	12	260	685	1318	5	2041	0	
		3	34	382	708	1362	15	2151	0	
		4	62	492	703	1352	28	2189	0	
		5	86	548	700	1348	39	2208	0	
		6	110	602	715	1376	50	2268	0	
		7	117	579	654	1259	52	2109	0	
		8	122	566	555	1068	55	1861	0	
		9	131	590	652	1256	59	2110	0	
		10c	63	281	368	709	28	1276	0	
0 deg - 49 mph Frontwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	4	191	651	1253	2	755	-104418	
		2	20	306	685	1318	12	844	0	
		3	56	473	708	1362	34	958	0	
		4	97	572	703	1352	58	1015	0	
		5	136	646	700	1348	82	1058	0	
		6	185	748	715	1376	111	1128	0	
		7	198	731	654	1261	119	1081	0	
		8	195	674	555	1052	117	988	0	
		9	203	679	652	1216	122	1049	0	
		10c	98	325	368	688	59	666	0	
0 deg - 49 mph Backwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	-7	-332	651	1253	-4	702	-104418	
		2	-25	-396	685	1318	-15	697	0	
		3	-57	-482	708	1362	-34	669	0	
		4	-89	-526	703	1352	-53	637	0	
		5	-118	-559	700	1348	-71	615	0	
		6	-150	-610	715	1376	-90	599	0	
		7	-158	-581	654	1261	-95	555	0	
		8	-149	-514	555	1052	-89	497	0	
		9	-190	-633	652	1216	-114	523	0	
		10c	-109	-361	368	688	-66	402	0	
0 deg - 49 mph Backwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	-6	-338	651	1253	-3	1688	-78314	
		2	-17	-375	685	1318	-8	1755	0	
		3	-39	-439	708	1362	-18	1782	0	
		4	-62	-489	703	1352	-28	1747	0	
		5	-81	-514	700	1348	-36	1730	0	
		6	-100	-543	715	1376	-45	1752	0	
		7	-103	-513	654	1259	-46	1618	0	
		8	-98	-458	555	1068	-44	1400	0	
		9	-126	-567	652	1256	-57	1589	0	
		10c	-73	-325	368	709	-33	1004	0	
0 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-7	-332	651	1253	-4	441	-104418	
		2	-25	-396	685	1318	-15	423	0	
		3	-57	-482	708	1362	-34	386	0	
		4	-89	-526	703	1352	-53	356	0	
		5	-118	-559	700	1348	-71	335	0	
		6	-150	-610	715	1376	-90	313	0	
		7	-158	-581	654	1261	-95	294	0	
		8	-149	-514	555	1052	-89	275	0	
		9	-190	-633	652	1216	-114	262	0	
		10c	-109	-361	368	688	-66	254	0	
15 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	218	746	651	1229	131	1348	-67772	
		2	256	775	685	1221	154	1400	0	
		3	308	782	708	1138	185	1427	0	
		4	341	759	703	1005	205	1408	0	
		5	368	740	700	902	221	1394	0	
		6	400	743	715	837	240	1410	0	
		7	377	665	654	708	226	1303	0	
		8	345	584	555	587	207	1156	0	
		9	368	612	652	681	221	1269	0	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
		10c	186	307	368	379	111	802	0

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
		M	214	747	651	1224	96	2155	-50829
		2	245	779	685	1241	110	2216	0
		3	286	792	708	1199	129	2213	0
15 deg - 49 mph	DL - 1	4	311	774	703	1109	140	2133	0
Frontwinded	WL - 0.45	5	332	760	700	1023	149	2059	0
LC 6ASD	SL - 0.75	6	358	768	715	981	161	2046	0
		7	336	690	654	862	151	1861	0
		8	307	612	555	716	138	1618	0
		9	321	631	652	821	145	1802	0
		10c	159	310	368	452	72	1097	0
		M	-193	-659	651	1229	-116	-255	-59211
		2	-224	-677	685	1221	-134	255	0
		3	-278	-707	708	1138	-167	250	0
15 deg - 49 mph	DL - 0.6	4	-334	-744	703	1005	-201	-275	0
Backwinded	WL - 0.6	5	-381	-767	700	902	-229	-290	0
LC 7ASD	SL - 0	6	-432	-803	715	837	-259	-303	0
		7	-426	-750	654	708	-255	-307	0
		8	-367	-624	555	587	-220	-291	0
		9	-434	-722	652	681	-261	-292	0
		10c	-249	-411	368	379	-149	-276	0
		M	399	658	651	1355	239	1296	-54377
		2	448	689	685	1362	269	1348	0
		3	511	705	708	1290	307	1381	0
30 deg - 49 mph	DL - 1	4	549	691	703	1188	329	1367	0
Frontwinded	WL - 0.6	5	580	679	700	1111	348	1358	0
LC 5ASD	SL - 0	6	621	684	715	1075	373	1375	0
		7	583	616	654	954	350	1274	0
		8	516	529	555	775	310	1123	0
		9	589	594	652	896	353	1259	0
		10c	320	321	368	507	192	811	0
		M	395	661	651	1352	178	2212	-40782
		2	437	692	685	1378	197	2280	0
		3	487	709	708	1349	219	2288	0
30 deg - 49 mph	DL - 1	4	515	700	703	1262	232	2214	0
Frontwinded	WL - 0.45	5	538	691	700	1203	242	2163	0
LC 6ASD	SL - 0.75	6	570	699	715	1192	256	2173	0
		7	533	634	654	1055	240	1981	0
		8	472	548	555	882	212	1713	0
		9	530	608	652	1017	238	1939	0
		10c	284	325	368	564	128	1187	0
		M	-497	-820	651	1355	-298	-352	-48335
		2	-521	-803	685	1362	-313	-321	0
		3	-563	-775	708	1290	-338	-290	0
30 deg - 49 mph	DL - 0.6	4	-602	-758	703	1188	-361	-283	0
Backwinded	WL - 0.6	5	-631	-738	700	1111	-379	-273	0
LC 7ASD	SL - 0	6	-671	-739	715	1075	-403	-264	0
		7	-632	-667	654	954	-379	-258	0
		8	-543	-557	555	775	-326	-251	0
		9	-697	-703	652	896	-418	-280	0
		10c	-414	-416	368	507	-249	-279	0
		M	621	598	651	1345	373	1259	-60814
		2	670	608	685	1305	402	1300	0
		3	718	594	708	1195	431	1314	0
45 deg - 49 mph	DL - 1	4	734	559	703	1072	441	1288	0
Frontwinded	WL - 0.6	5	748	532	700	946	449	1269	0
LC 5ASD	SL - 0	6	776	520	715	873	466	1277	0
		7	720	463	654	751	432	1182	0
		8	606	378	555	583	364	1032	0
		9	715	439	652	661	429	1166	0
		10c	408	249	368	374	245	768	0
		M	618	601	651	1338	278	2175	-45610
		2	663	616	685	1331	298	2211	0
		3	705	612	708	1289	317	2200	0
45 deg - 49 mph	DL - 1	4	717	585	703	1190	323	2109	0
Frontwinded	WL - 0.45	5	727	564	700	1093	327	2024	0
LC 6ASD	SL - 0.75	6	753	560	715	1060	339	2012	0
		7	696	502	654	912	313	1814	0
		8	591	418	555	753	266	1558	0
		9	691	482	652	854	311	1760	0
		10c	389	271	368	466	175	1089	0

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
				(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
	45 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-736	-707	651	1345	-442	-284	-43037	
			2	-745	-678	685	1305	-447	254	0	
			3	-762	-629	708	1195	-457	297	0	
			4	-783	-596	703	1072	-470	314	0	
			5	-795	-565	700	946	-477	331	0	
			6	-824	-552	715	873	-494	348	0	
			7	-767	-493	654	751	-460	347	0	
			8	-639	-399	555	583	-384	343	0	
			9	-904	-554	652	661	-542	309	0	
			10c	-571	-349	368	374	-343	262	0	
▶	60 deg - 110 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	3692	2132	651	689	2215	2180	-16850	MP Max
▶			2	3885	2243	685	725	2331	2281	-17368	P2 Max
▶			3	4015	2318	708	749	2409	2348	-17886	P3 Max
▶			4	3987	2302	703	744	2392	2334	-17886	P4 Max
▶			5	3973	2294	700	741	2384	2327	-17886	P5 Max
▶			6	4055	2341	715	757	2433	2370	-17886	P6 Max
▶			7	3719	2147	654	692	2232	2193	-16433	
▶			8	3097	1788	555	587	1858	1878	-15824	
			9	3658	2112	652	690	2195	2169	-16512	
			10c	2100	1212	368	390	1260	1346	-11540	
	60 deg - 110 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	3692	2132	651	689	1661	2377	-12637	
			2	3885	2243	685	725	1748	2488	-13026	
			3	4015	2318	708	749	1807	2562	-13414	
			4	3987	2302	703	744	1794	2546	-13414	
			5	3973	2294	700	741	1788	2538	-13414	
			6	4055	2341	715	757	1825	2586	-13414	
			7	3719	2147	654	692	1674	2390	-12325	
			8	3097	1788	555	587	1394	2050	-11868	
			9	3658	2112	652	690	1646	2370	-12384	
			10c	2100	1212	368	390	945	1456	-8655	
	60 deg - 93.5 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-3129	-1806	651	689	-1877	-943	-18371	
▶			2	-3100	-1790	685	725	-1860	-913	-18935	P2-M Max
▶			3	-3056	-1765	708	749	-1834	-884	-19500	P3-M Max
▶			4	-3054	-1763	703	744	-1832	-886	-19500	P4-M Max
▶			5	-3039	-1755	700	741	-1824	-883	-19500	P5-M Max
▶			6	-3100	-1790	715	757	-1860	-895	-19500	
▶			7	-2856	-1649	654	692	-1713	-847	-17917	
▶			8	-2360	-1363	555	587	-1416	-735	-16641	
			9	-3373	-1947	652	690	-2024	-1027	-15554	
			10c	-2146	-1239	368	390	-1287	-772	-9990	

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Job Number:	EST:
Engineer:	MDR/DCD
Date:	14-Mar-2025

LC : REV.U4
PC : REV.U4

Project : Verogy: Woodstock Solar One_Edge

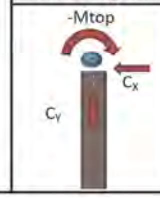
Rev History: **Rev. 6**

Wind Information	
Tilt Angle	**Design Wind**
±0	49 mph
±15	49 mph
±30	49 mph
±45	49 mph
+60	110 mph
-60	93.5 mph

ASCE Version:	7-16		TT Thick:	2.5	mm
Risk Category:	I		Top of Pier:	7	ft
Design Wind Speed:	110	mph	Load application:	7.75	ft
Ground Snow Load:	40	psf	Pier Count:	19	Nos
Terrain:	XTR-0.75		Mod/String:	6	
Stow Angle:	60	deg	No of module:	102	
Module:	Series 6 Plus / 2.3.13.P				
Module Width:	1245	mm	Module Thick:	49	mm
Module Length:	2024	mm	Module Weight:	34.0	kg

Load Application at center line of pivot pin, 9" above the top of post

Load Diagram



*Loads are combined loads per ASCE 7-16 section 2.4.1 (BASIC ASD)

Wind Factors			
K_z:	1.00	K_d:	0.85
K_{zt}:	1.00	K_e:	0.98
		Zg (ft):	466.6

Stow Wind Speed
35mph 3s 10m

	Lateral (lbs)	Axial (lbs)	Moment (lbs-in)	Abs Down (lbs)	Abs Up (lbs)
M	653	1227	-10414	1938	0
M	-77	355	-51375	0	0
P2	687	1278	-10734	1995	-250
P3	710	1312	-11054	2026	-250
P4	704	1304	-11054	2029	-250
P5	704	1302	-11054	2034	-250
P6	711	1319	-11054	2079	-250
P7	684	1248	-10157	1914	-250
P8	445	1019	-10832	1638	-250
P9	1352	1632	-10570	1955	-480
P10	1122	1237	-6163	1368	-505
P10	-794	-505	-6293	0	0

Seismic Load To Motor

S_S:	0.182	S_{DS}:	0.158
S_1:	0.055	S_{D1}:	0.055
R:	2.000	C_S:	0.079
Site Class:	C	V:	1290 lbs

Pier Layout										
Number of Modules per Bay										
M	5	6	6	6	6	6	5	5	5	+1c
Fy	50	50	50	50	50	50	50	50	50	
P.No	P2	P3	P4	P5	P6	P7	P8	P9	P10	
SPACING / GCR : 14.64 ft / 45.36%										

Weak Axis DL to Pier Distribution						
	Slope	Grade	V_D	W [lb/ft]	Weak DLz (Motor)	Weak DLz (Array)
Standard	3.44°	6%	670 lbs	25	236 lbs	24 lbs
High	8.56°	15%	1665 lbs	25	586 lbs	60 lbs

3.6% of the total weak axis load applies to each array pier and the remaining load to motor pier (assuming both wings have the same configuration).

Note

1) Above governing loads do not act simultaneously and EOR should confirm with the detailed loadings provided below.

2) See documents PJE-000004 & PJE-000006 for design guidelines and standard nomenclature. Should the foundation engineer deviate from these recommendations they must inform Nextracker prior to construction.

3) Loads provided, assume both wings on either side of the motor pier have the same length and post spacings. For a tracker with the unsymmetrical wings, it is acceptable to combine ½ of the motor load from each wing.

4) Designer should consider positive and negative signs of Combo$_X$ and Moment factored loads. If both are negative, they are additive, otherwise they are subtractive.

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
0 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	5	156	600	1252	3	944	-46956
		2	17	198	631	1318	10	1000	0
		3	41	255	652	1361	25	1056	0
		4	68	291	648	1356	41	1072	0
		5	87	301	646	1312	52	1076	0
		6	99	289	659	1249	59	1082	0
		7	95	252	603	1072	57	1004	0
		8	78	193	512	858	47	877	0
		9	157	373	601	970	94	1075	0
		10c	114	267	339	537	68	750	0
0 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	3	147	600	1253	1	1855	-35217
		2	12	182	631	1318	5	1952	0
		3	28	228	652	1362	12	2026	0
		4	45	259	648	1353	20	2029	0
		5	61	284	646	1347	28	2034	0
		6	77	304	659	1378	35	2079	0
		7	80	287	603	1242	36	1914	0
		8	65	220	512	1036	29	1638	0
		9	105	340	601	1198	47	1903	0
		10c	72	232	339	665	32	1193	0
0 deg - 49 mph Frontwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	5	156	600	1252	3	704	-46956
		2	17	198	631	1318	10	748	0
		3	41	255	652	1361	25	795	0
		4	68	291	648	1356	41	813	0
		5	87	301	646	1312	52	818	0
		6	99	289	659	1249	59	819	0
		7	95	252	603	1072	57	763	0
		8	78	193	512	858	47	673	0
		9	157	373	601	970	94	835	0
		10c	114	267	339	537	68	614	0
0 deg - 49 mph Backwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	-6	-208	600	1252	-4	725	-46956
		2	-24	-272	631	1318	-14	718	0
		3	-59	-361	652	1361	-35	686	0
		4	-97	-416	648	1356	-58	648	0
		5	-131	-448	646	1312	-78	627	0
		6	-160	-466	659	1249	-96	630	0
		7	-164	-433	603	1072	-99	593	0
		8	-141	-350	512	858	-85	552	0
		9	-224	-532	601	970	-134	532	0
		10c	-150	-353	339	537	-90	378	0
0 deg - 49 mph Backwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	-4	-193	600	1253	-2	1702	-35217
		2	-16	-247	631	1318	-7	1759	0
		3	-38	-318	652	1362	-17	1781	0
		4	-64	-366	648	1353	-29	1747	0
		5	-88	-407	646	1347	-40	1723	0
		6	-111	-438	659	1378	-50	1746	0
		7	-116	-417	603	1242	-52	1597	0
		8	-107	-361	512	1036	-48	1376	0
		9	-160	-518	601	1198	-72	1516	0
		10c	-102	-327	339	665	-46	941	0
0 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-6	-208	600	1252	-4	485	-46956
		2	-24	-272	631	1318	-14	466	0
		3	-59	-361	652	1361	-35	425	0
		4	-97	-416	648	1356	-58	389	0
		5	-131	-448	646	1312	-78	369	0
		6	-160	-466	659	1249	-96	366	0
		7	-164	-433	603	1072	-99	352	0
		8	-141	-350	512	858	-85	347	0
		9	-224	-532	601	970	-134	292	0
		10c	-150	-353	339	537	-90	-258	0
15 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	84	278	600	1196	50	1016	-35407
		2	95	270	631	1163	57	1043	0
		3	106	241	652	1037	64	1047	0
		4	105	202	648	859	63	1019	0
		5	106	180	646	747	64	1003	0
		6	120	183	659	708	72	1019	0
		7	122	174	603	612	73	957	0
		8	107	147	512	508	64	850	0
		9	297	394	601	576	178	1088	0

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
		10c	227	300	339	321	136	770	0

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
		M	84	285	600	1235	38	1904	-26555	
		2	92	279	631	1201	42	1907	0	
		3	101	255	652	1092	46	1836	0	
15 deg - 49 mph	DL - 1	4	105	230	648	985	47	1740	0	
Frontwinded	WL - 0.45	5	107	212	646	905	48	1669	0	
LC 6ASD	SL - 0.75	6	107	197	659	836	48	1625	0	
		7	98	171	603	710	44	1462	0	
		8	90	151	512	578	40	1263	0	
		9	244	399	601	673	110	1535	0	
		10c	183	298	339	380	83	1009	0	
►		M	-128	-425	600	1196	-77	355	-51375	MP-M Max
		2	-159	-449	631	1163	-96	359	0	
		3	-206	-466	652	1037	-124	361	0	
15 deg - 49 mph	DL - 0.6	4	-243	-466	648	859	-146	359	0	
Backwinded	WL - 0.6	5	-271	-457	646	747	-162	363	0	
LC 7ASD	SL - 0	6	-277	-425	659	708	-166	391	0	
		7	-254	-362	603	612	-152	394	0	
		8	-200	-274	512	508	-120	392	0	
		9	-377	-501	601	576	-226	310	0	
		10c	-271	-358	339	321	-163	-261	0	
		M	100	165	600	1357	60	949	-19062	
		2	114	176	631	1358	68	987	0	
		3	132	184	652	1312	79	1013	0	
30 deg - 49 mph	DL - 1	4	145	185	648	1206	87	1009	0	
Frontwinded	WL - 0.6	5	156	185	646	1128	93	1007	0	
LC 5ASD	SL - 0	6	167	188	659	1098	100	1022	0	
		7	165	178	603	948	99	960	0	
		8	134	141	512	794	80	846	0	
		9	365	377	601	913	219	1078	0	
		10c	284	292	339	505	170	765	0	
		M	99	166	600	1351	45	1938	-14297	
		2	111	176	631	1379	50	1995	0	
		3	126	184	652	1345	56	1994	0	
30 deg - 49 mph	DL - 1	4	133	183	648	1283	60	1942	0	
Frontwinded	WL - 0.45	5	141	184	646	1224	64	1897	0	
LC 6ASD	SL - 0.75	6	151	189	659	1186	68	1884	0	
		7	146	176	603	1074	66	1737	0	
		8	122	144	512	896	55	1499	0	
		9	330	386	601	1034	149	1800	0	
		10c	254	296	339	585	114	1161	0	
		M	-263	-434	600	1357	-158	350	-34595	
		2	-268	-415	631	1358	-161	380	0	
		3	-271	-378	652	1312	-163	415	0	
30 deg - 49 mph	DL - 0.6	4	-260	-333	648	1206	-156	439	0	
Backwinded	WL - 0.6	5	-252	-300	646	1128	-151	457	0	
LC 7ASD	SL - 0	6	-250	-281	659	1098	-150	477	0	
		7	-221	-239	603	948	-133	469	0	
		8	-191	-201	512	794	-114	437	0	
		9	-443	-458	601	913	-266	336	0	
		10c	-325	-335	339	505	-195	253	0	
		M	176	170	600	1334	106	952	-15660	
		2	190	173	631	1340	114	985	0	
		3	205	171	652	1230	123	1005	0	
45 deg - 49 mph	DL - 1	4	211	163	648	1062	126	995	0	
Frontwinded	WL - 0.6	5	216	156	646	981	129	989	0	
LC 5ASD	SL - 0	6	223	152	659	907	134	1000	0	
		7	217	142	603	743	130	938	0	
		8	148	95	512	608	89	819	0	
		9	439	276	601	719	264	1017	0	
		10c	360	226	339	405	216	725	0	
		M	175	170	600	1327	79	1922	-11745	
		2	188	176	631	1367	85	1985	0	
		3	201	175	652	1322	90	1973	0	
45 deg - 49 mph	DL - 1	4	205	169	648	1185	92	1863	0	
Frontwinded	WL - 0.45	5	209	164	646	1094	94	1790	0	
LC 6ASD	SL - 0.75	6	215	162	659	1059	97	1776	0	
		7	207	152	603	914	93	1607	0	
		8	147	106	512	748	66	1370	0	
		9	425	302	601	885	191	1651	0	
		10c	344	244	339	499	155	1073	0	

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
				(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
	45 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-208	-201	600	1334	-125	490	-24273	
			2	-212	-194	631	1340	-127	512	0	
			3	-206	-172	652	1230	-123	538	0	
			4	-191	-147	648	1062	-114	550	0	
			5	-185	-133	646	981	-111	557	0	
			6	-179	-122	659	907	-107	572	0	
			7	-156	-103	603	743	-94	550	0	
			8	-149	-96	512	608	-90	500	0	
			9	-475	-298	601	719	-285	432	0	
			10c	-364	-228	339	405	-218	317	0	
►	60 deg - 110 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	1088	628	600	689	653	1227	-10414	MP Max
►			2	1145	661	631	725	687	1278	-10734	P2 Max
►			3	1183	683	652	749	710	1312	-11054	P3 Max
►			4	1174	678	648	744	704	1304	-11054	P4 Max
►			5	1173	677	646	741	704	1302	-11054	P5 Max
►			6	1185	684	659	757	711	1319	-11054	P6 Max
►			7	1140	658	603	692	684	1248	-10157	P7 Max
►			8	742	428	512	587	445	1019	-10832	P8 Max
►			9	2253	1301	601	690	1352	1632	-10570	P9 Max
►			10c	1870	1079	339	390	1122	1237	-6163	P10 Max
	60 deg - 110 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	1088	628	600	689	489	1649	-7810	
			2	1145	661	631	725	515	1722	-8051	
			3	1183	683	652	749	532	1771	-8291	
			4	1174	678	648	744	528	1760	-8291	
			5	1173	677	646	741	528	1756	-8291	
			6	1185	684	659	757	533	1784	-8291	
			7	1140	658	603	692	513	1669	-7617	
			8	742	428	512	587	334	1395	-8124	
			9	2253	1301	601	690	1014	1955	-7928	
			10c	1870	1079	339	390	841	1368	-4622	
	60 deg - 93.5 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-517	-299	600	689	-310	431	-8416	
			2	-524	-302	631	725	-314	447	-8675	
			3	-525	-303	652	749	-315	459	-8933	
			4	-524	-302	648	744	-314	457	-8933	
			5	-522	-301	646	741	-313	457	-8933	
			6	-531	-307	659	757	-319	461	-8933	
			7	-493	-285	603	692	-296	441	-8208	
			8	-495	-286	512	587	-297	386	-6231	
			9	-1706	-985	601	690	-1024	-480	-6950	
►			10c	-1323	-764	339	390	-794	-505	-6293	

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Job Number:	EST:
Engineer:	MDR/DCD
Date:	14-Mar-2025

LC : REV.U4
PC : REV.U4

Project : Verogy: Woodstock Solar One_Exterior

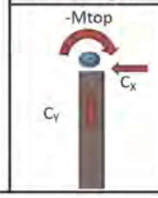
Rev History: **Rev. 6**

Wind Information	
Tilt Angle	Design Wind
±0	49 mph
±15	49 mph
±30	49 mph
±45	49 mph
+60	110 mph
-60	93.5 mph

ASCE Version:	7-16		TT Thick:	3.5	mm
Risk Category:	I		Top of Pier:	7	ft
Design Wind Speed:	110	mph	Load application:	7.75	ft
Ground Snow Load:	40	psf	Pier Count:	15	Nos
Terrain:	XTR-0.75		Mod/String:	6	
Stow Angle:	60	deg	No of module:	78	
Module:	Series 6 Plus / 2.3.13.P				
Module Width:	1245	mm	Module Thick:	49	mm
Module Length:	2024	mm	Module Weight:	34.0	kg

Load Application at center line of pivot pin, 9" above the top of post

Load Diagram



*Loads are combined loads per ASCE 7-16 section 2.4.1 (BASIC ASD)

Wind Factors			
K_z:	1.00	K_d:	0.85
K_{zt}:	1.00	K_e:	0.98
		Zg (ft):	466.6

Stow Wind Speed
35mph 3s 10m

	Lateral (lbs)	Axial (lbs)	Moment (lbs-in)	Abs Down (lbs)	Abs Up (lbs)
M	2214	2177	-16850	2374	-944
M	2	1020	-80211	0	0
P2	2334	2282	-17368	2489	-914
P2	-1862	-914	-18935	0	0
P3	2399	2338	-17886	2551	-883
P3	-1827	-883	-19500	0	0
P4	2429	2365	-17886	2581	-896
P4	-1859	-896	-19500	0	0
P5	2233	2192	-16433	2390	-847
P5	-1714	-847	-17917	0	0
P6	1858	1876	-15824	2049	-735
P6	-1416	-735	-16641	0	0
P7	2195	2168	-16512	2369	-1028
P8	1260	1345	-11540	1455	-773

Seismic Load To Motor

S_S:	0.182	S_{DS}:	0.158
S_1:	0.055	S_{D1}:	0.055
R:	2.000	C_S:	0.079
Site Class:	C	V:	1047 lbs

Pier Layout										
Number of Modules per Bay										
M	5	6	6	6	5	5	5	+1c		
Fy	50	50	50	50	50	50	50			
P.No	P2	P3	P4	P5	P6	P7	P8			
SPACING / GCR : 14.64 ft / 45.36%										

Weak Axis DL to Pier Distribution						
	Slope	Grade	V_D	W [lb/ft]	Weak DLz (Motor)	Weak DLz (Array)
Standard	3.44°	6%	557 lbs	28	276 lbs	20 lbs
High	8.56°	15%	1384 lbs	28	687 lbs	50 lbs

3.6% of the total weak axis load applies to each array pier and the remaining load to motor pier (assuming both wings have the same configuration).

Note

1) Above governing loads do not act simultaneously and EOR should confirm with the detailed loadings provided below.

2) See documents PJE-000004 & PJE-000006 for design guidelines and standard nomenclature. Should the foundation engineer deviate from these recommendations they must inform Nextracker prior to construction.

3) Loads provided, assume both wings on either side of the motor pier have the same length and post spacings. For a tracker with the unsymmetrical wings, it is acceptable to combine ½ of the motor load from each wing.

4) Designer should consider positive and negative signs of $Combo_X$ and Moment factored loads. If both are negative, they are additive, otherwise they are subtractive.

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X (lb)	WL_Y (lb)	DL (lb)	SL (lb)	$Combo_X$ (lb)	$Combo_Y$ (lb)	Moment (lb-in)	
▶	0 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	3	201	649	1252	2	1020	-80211	MP-M Max
			2	13	264	684	1320	8	1093	0	
			3	31	357	703	1356	19	1168	0	
			4	56	456	712	1374	33	1236	0	
			5	68	468	653	1260	41	1184	0	
			6	76	464	554	1068	45	1082	0	
			7	84	491	651	1256	50	1196	0	
			8c	41	234	368	709	25	758	0	
	0 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	3	208	649	1252	1	1931	-60158	
			2	8	241	684	1320	4	2032	0	
			3	21	315	703	1356	9	2112	0	
			4	36	391	712	1374	16	2169	0	
			5	42	386	653	1260	19	2022	0	
			6	48	397	554	1068	22	1784	0	
			7	54	424	651	1256	24	2034	0	
			8c	26	203	368	709	12	1240	0	
▶	0 deg - 49 mph Frontwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	3	201	649	1252	2	760	-80211	
			2	13	264	684	1320	8	819	0	
			3	31	357	703	1356	19	886	0	
			4	56	456	712	1374	33	951	0	
			5	68	468	653	1260	41	923	0	
			6	76	464	554	1068	45	861	0	
			7	84	491	651	1256	50	935	0	
			8c	41	234	368	709	25	611	0	
	0 deg - 49 mph Backwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	-6	-337	649	1252	-4	697	-80211	
			2	-17	-377	684	1320	-10	708	0	
			3	-37	-426	703	1356	-22	698	0	
			4	-58	-475	712	1374	-35	677	0	
			5	-67	-462	653	1260	-40	626	0	
			6	-66	-410	554	1068	-40	558	0	
			7	-87	-507	651	1256	-52	597	0	
			8c	-51	-290	368	709	-30	443	0	
	0 deg - 49 mph Backwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	-5	-340	649	1252	-2	1685	-60158	
			2	-12	-366	684	1320	-6	1760	0	
			3	-26	-406	703	1356	-12	1788	0	
			4	-40	-445	712	1374	-18	1792	0	
			5	-46	-424	653	1260	-21	1657	0	
			6	-46	-377	554	1068	-21	1435	0	
			7	-60	-465	651	1256	-27	1633	0	
			8c	-35	-267	368	709	-16	1029	0	
	0 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-6	-337	649	1252	-4	437	-80211	
			2	-17	-377	684	1320	-10	434	0	
			3	-37	-426	703	1356	-22	416	0	
			4	-58	-475	712	1374	-35	392	0	
			5	-67	-462	653	1260	-40	365	0	
			6	-66	-410	554	1068	-40	337	0	
			7	-87	-507	651	1256	-52	337	0	
			8c	-51	-290	368	709	-30	296	0	
	15 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	214	746	649	1224	128	1347	-52060	
			2	246	780	684	1242	147	1402	0	
			3	283	789	703	1195	170	1426	0	
			4	313	789	712	1123	188	1436	0	
			5	300	709	653	976	180	1329	0	
			6	279	629	554	793	167	1181	0	
			7	292	645	651	915	175	1288	0	
			8c	144	315	368	518	86	806	0	
	15 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	211	748	649	1261	95	2181	-39045	
			2	238	783	684	1282	107	2248	0	
			3	267	795	703	1232	120	2235	0	
			4	291	799	712	1186	131	2211	0	
			5	276	721	653	1052	124	2016	0	
			6	255	643	554	876	115	1750	0	
			7	266	657	651	1009	120	1954	0	
			8c	130	319	368	558	58	1180	0	
	15 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-190	-662	649	1224	-114	-258	-45484	
			2	-212	-673	684	1242	-127	257	0	
			3	-247	-686	703	1195	-148	260	0	
			4	-288	-727	712	1123	-173	-259	0	
			5	-289	-682	653	976	-173	-267	0	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
		6	-259	-585	554	793	-155	-269	0
		7	-314	-693	651	915	-188	-275	0
		8c	-179	-392	368	518	-107	-265	0

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
				(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
			M	395	660	649	1350	237	1295	-41770	
			2	438	693	684	1381	263	1350	0	
	30 deg - 49 mph	DL - 1	3	484	707	703	1341	290	1377	0	
	Frontwinded	WL - 0.6	4	519	711	712	1300	311	1389	0	
	LC 5ASD	SL - 0	5	490	643	653	1163	294	1289	0	
			6	440	560	554	951	264	1140	0	
			7	487	610	651	1104	292	1267	0	
			8c	256	319	368	624	154	809	0	
			M	389	656	649	1387	175	2234	-31328	
			2	428	692	684	1413	192	2306	0	
	30 deg - 49 mph	DL - 1	3	464	707	703	1400	209	2321	0	
	Frontwinded	WL - 0.45	4	493	715	712	1357	222	2302	0	
	LC 6ASD	SL - 0.75	5	464	651	653	1209	209	2103	0	
			6	414	568	554	1015	186	1820	0	
			7	453	613	651	1172	204	2056	0	
			8c	235	317	368	663	106	1257	0	
			M	-493	-822	649	1350	-296	-354	-37129	
			2	-510	-809	684	1381	-306	-325	0	
	30 deg - 49 mph	DL - 0.6	3	-535	-782	703	1341	-321	-297	0	
	Backwinded	WL - 0.6	4	-573	-785	712	1300	-344	-294	0	
	LC 7ASD	SL - 0	5	-542	-712	653	1163	-325	-285	0	
			6	-466	-593	554	951	-280	-274	0	
			7	-576	-721	651	1104	-346	-292	0	
			8c	-337	-419	368	624	-202	-281	0	
			M	618	600	649	1338	371	1259	-46715	
			2	664	617	684	1333	398	1305	0	
	45 deg - 49 mph	DL - 1	3	702	610	703	1284	421	1319	0	
	Frontwinded	WL - 0.6	4	726	597	712	1208	436	1320	0	
	LC 5ASD	SL - 0	5	675	534	653	1021	405	1223	0	
			6	578	444	554	843	347	1070	0	
			7	671	508	651	996	403	1206	0	
			8c	376	283	368	549	225	787	0	
			M	616	603	649	1392	277	2214	-35036	
			2	659	624	684	1392	297	2259	0	
	45 deg - 49 mph	DL - 1	3	692	623	703	1340	311	2238	0	
	Frontwinded	WL - 0.45	4	713	616	712	1299	321	2214	0	
	LC 6ASD	SL - 0.75	5	660	554	653	1136	297	2004	0	
			6	567	466	554	935	255	1715	0	
			7	654	532	651	1107	295	1970	0	
			8c	363	294	368	612	163	1217	0	
			M	-732	-710	649	1338	-439	-287	-33060	
			2	-739	-688	684	1333	-443	-252	0	
	45 deg - 49 mph	DL - 0.6	3	-745	-648	703	1284	-447	283	0	
	Backwinded	WL - 0.6	4	-774	-637	712	1208	-465	295	0	
	LC 7ASD	SL - 0	5	-721	-570	653	1021	-432	300	0	
			6	-608	-468	554	843	-365	302	0	
			7	-824	-623	651	996	-494	267	0	
			8c	-507	-382	368	549	-304	-259	0	
▶			M	3690	2130	649	688	2214	2177	-16850	MP Max
▶			2	3890	2246	684	726	2334	2282	-17368	P2 Max
▶	60 deg - 110 mph	DL - 1	3	3998	2308	703	746	2399	2338	-17886	P3 Max
▶	Frontwinded	WL - 0.6	4	4048	2337	712	755	2429	2365	-17886	P4 Max
▶	LC 5ASD	SL - 0	5	3721	2148	653	693	2233	2192	-16433	P5 Max
▶			6	3096	1788	554	587	1858	1876	-15824	P6 Max
▶			7	3658	2112	651	690	2195	2168	-16512	
▶			8c	2100	1212	368	390	1260	1345	-11540	
			M	3690	2130	649	688	1660	2374	-12637	
			2	3890	2246	684	726	1751	2489	-13026	
	60 deg - 110 mph	DL - 1	3	3998	2308	703	746	1799	2551	-13414	
	Frontwinded	WL - 0.45	4	4048	2337	712	755	1822	2581	-13414	
	LC 6ASD	SL - 0.75	5	3721	2148	653	693	1675	2390	-12325	
			6	3096	1788	554	587	1393	2049	-11868	
			7	3658	2112	651	690	1646	2369	-12384	
			8c	2100	1212	368	390	945	1455	-8655	
			M	-3127	-1805	649	688	-1876	-944	-18371	
▶			2	-3103	-1792	684	726	-1862	-914	-18935	P2-M Max
▶	60 deg - 93.5 mph	DL - 0.6	3	-3044	-1758	703	746	-1827	-883	-19500	P3-M Max
▶	Backwinded	WL - 0.6	4	-3099	-1789	712	755	-1859	-896	-19500	P4-M Max
▶	LC 7ASD	SL - 0	5	-2856	-1649	653	693	-1714	-847	-17917	P5-M Max
▶			6	-2360	-1363	554	587	-1416	-735	-16641	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
		7	-3373	-1947	651	690	-2024	-1028	-15554
		8c	-2146	-1239	368	390	-1287	-773	-9990

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Job Number:	EST:
Engineer:	MDR/DCD
Date:	14-Mar-2025

LC : REV.U4
PC : REV.U4

Project : Verogy: Woodstock Solar One_Edge

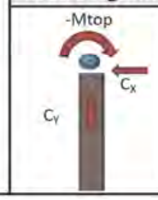
Rev History: **Rev. 6**

Wind Information	
Tilt Angle	**Design Wind**
±0	49 mph
±15	49 mph
±30	49 mph
±45	49 mph
+60	110 mph
-60	93.5 mph

ASCE Version:	7-16		TT Thick:	2.5	mm
Risk Category:	I		Top of Pier:	7	ft
Design Wind Speed:	110	mph	Load application:	7.75	ft
Ground Snow Load:	40	psf	Pier Count:	15	Nos
Terrain:	XTR-0.75		Mod/String:	6	
Stow Angle:	60	deg	No of module:	78	
Module:	Series 6 Plus / 2.3.13.P				
Module Width:	1245	mm	Module Thick:	49	mm
Module Length:	2024	mm	Module Weight:	34.0	kg

Load Application at center line of pivot pin, 9" above the top of post

Load Diagram



*Loads are combined loads per ASCE 7-16 section 2.4.1 (BASIC ASD)

Wind Factors			
K_z:	1.00	K_d:	0.85
K_{zt}:	1.00	K_e:	0.98
		Zg (ft):	466.6

Stow Wind Speed
35mph 3s 10m

	Lateral (lbs)	Axial (lbs)	Moment (lbs-in)	Abs Down (lbs)	Abs Up (lbs)
M	652	1225	-10414	1969	0
M	-74	357	-39465	0	0
P2	687	1277	-10734	2019	-250
P3	708	1307	-11054	2027	-250
P4	710	1316	-11054	2040	-250
P5	684	1247	-10157	1899	-250
P6	445	1017	-10832	1645	-250
P7	1352	1631	-10570	1953	-481
P8	1122	1236	-6163	1367	-505
P8	-794	-505	-6293	0	0

Seismic Load To Motor

S_S:	0.182	S_{DS}:	0.158
S_1:	0.055	S_{D1}:	0.055
R:	2.000	C_S:	0.079
Site Class:	C	V:	989 lbs

Pier Layout										
Number of Modules per Bay										
M	5	6	6	6	5	5	5	+1c		
Fy	50	50	50	50	50	50	50			
P.No	P2	P3	P4	P5	P6	P7	P8			
SPACING / GCR : 14.64 ft / 45.36%										

Weak Axis DL to Pier Distribution						
	Slope	Grade	V_D	W [lb/ft]	Weak DLz (Motor)	Weak DLz (Array)
Standard	3.44°	6%	513 lbs	25	255 lbs	18 lbs
High	8.56°	15%	1276 lbs	25	633 lbs	46 lbs

3.6% of the total weak axis load applies to each array pier and the remaining load to motor pier (assuming both wings have the same configuration).

Note

1) Above governing loads do not act simultaneously and EOR should confirm with the detailed loadings provided below.

2) See documents PJE-000004 & PJE-000006 for design guidelines and standard nomenclature. Should the foundation engineer deviate from these recommendations they must inform Nextracker prior to construction.

3) Loads provided, assume both wings on either side of the motor pier have the same length and post spacings. For a tracker with the unsymmetrical wings, it is acceptable to combine ½ of the motor load from each wing.

4) Designer should consider positive and negative signs of $Combo_x$ and Moment factored loads. If both are negative, they are additive, otherwise they are subtractive.

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
0 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	3	147	598	1252	2	936	-36070	
		2	12	182	631	1320	7	990	0	
		3	27	228	648	1356	16	1035	0	
		4	43	257	656	1374	26	1061	0	
		5	52	258	602	1260	31	1007	0	
		6	47	211	510	1068	28	887	0	
		7	72	303	600	1256	43	1032	0	
		8c	48	200	339	709	29	709	0	
0 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	3	150	598	1252	1	1854	-27053	
		2	8	170	631	1320	4	1947	0	
		3	18	205	648	1356	8	2007	0	
		4	29	230	656	1374	13	2040	0	
		5	34	227	602	1260	15	1899	0	
		6	31	185	510	1068	14	1645	0	
		7	46	259	600	1256	21	1908	0	
		8c	31	171	339	709	14	1197	0	
0 deg - 49 mph Frontwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	3	147	598	1252	2	697	-36070	
		2	12	182	631	1320	7	738	0	
		3	27	228	648	1356	16	775	0	
		4	43	257	656	1374	26	798	0	
		5	52	258	602	1260	31	766	0	
		6	47	211	510	1068	28	683	0	
		7	72	303	600	1256	43	792	0	
		8c	48	200	339	709	29	573	0	
0 deg - 49 mph Backwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	-4	-193	598	1252	-3	732	-36070	
		2	-16	-247	631	1320	-10	732	0	
		3	-38	-317	648	1356	-23	708	0	
		4	-61	-364	656	1374	-36	688	0	
		5	-73	-364	602	1260	-44	634	0	
		6	-74	-332	510	1068	-44	561	0	
		7	-114	-479	600	1256	-68	562	0	
		8c	-72	-299	339	709	-43	409	0	
0 deg - 49 mph Backwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	-4	-198	598	1252	-2	1697	-27053	
		2	-11	-228	631	1320	-5	1768	0	
		3	-25	-282	648	1356	-11	1788	0	
		4	-40	-321	656	1374	-18	1792	0	
		5	-47	-317	602	1260	-21	1654	0	
		6	-47	-281	510	1068	-21	1435	0	
		7	-74	-419	600	1256	-33	1603	0	
		8c	-49	-273	339	709	-22	998	0	
0 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-4	-193	598	1252	-3	493	-36070	
		2	-16	-247	631	1320	-10	480	0	
		3	-38	-317	648	1356	-23	448	0	
		4	-61	-364	656	1374	-36	425	0	
		5	-73	-364	602	1260	-44	393	0	
		6	-74	-332	510	1068	-44	357	0	
		7	-114	-479	600	1256	-68	322	0	
		8c	-72	-299	339	709	-43	274	0	
15 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	84	286	598	1236	50	1019	-27199	
		2	92	278	631	1198	55	1048	0	
		3	102	259	648	1112	61	1053	0	
		4	106	238	656	1021	64	1049	0	
		5	99	204	602	858	59	974	0	
		6	86	169	510	702	52	861	0	
		7	208	394	600	781	125	1086	0	
		8c	155	291	339	431	93	764	0	
15 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	82	284	598	1224	37	1894	-20399	
		2	91	288	631	1242	41	1941	0	
		3	100	277	648	1195	45	1919	0	
		4	104	260	656	1123	47	1866	0	
		5	98	230	602	976	44	1687	0	
		6	82	184	510	793	37	1438	0	
		7	172	376	600	915	78	1705	0	
		8c	125	271	339	518	56	1099	0	
► 15 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-123	-420	598	1236	-74	357	-39465	MP-M Max
		2	-149	-449	631	1198	-90	359	0	
		3	-183	-465	648	1112	-110	360	0	
		4	-211	-471	656	1021	-126	361	0	
		5	-214	-441	602	858	-128	346	0	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
		6	-172	-337	510	702	-103	354	0
		7	-283	-536	600	781	-170	288	0
		8c	-196	-369	339	431	-118	-268	0

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X (lb)	WL_Y (lb)	DL (lb)	SL (lb)	$Combo_X$ (lb)	$Combo_Y$ (lb)	Moment (lb-in)	
			M	99	166	598	1350	59	947	-14643	
			2	111	176	631	1381	66	986	0	
	30 deg - 49 mph	DL - 1	3	125	184	648	1341	75	1008	0	
	Frontwinded	WL - 0.6	4	135	186	656	1300	81	1018	0	
	LC 5ASD	SL - 0	5	132	175	602	1163	79	957	0	
			6	114	147	510	951	68	849	0	
			7	309	392	600	1104	185	1085	0	
			8c	236	299	339	624	142	768	0	
			M	97	163	598	1386	43	1961	-10982	
			2	107	174	631	1414	48	2019	0	
	30 deg - 49 mph	DL - 1	3	118	181	648	1397	53	2027	0	
	Frontwinded	WL - 0.45	4	125	183	656	1378	56	2022	0	
	LC 6ASD	SL - 0.75	5	122	173	602	1231	55	1853	0	
			6	107	149	510	1010	48	1585	0	
			7	289	395	600	1173	130	1907	0	
			8c	220	300	339	663	99	1221	0	
			M	-259	-433	598	1350	-155	349	-26575	
			2	-268	-426	631	1381	-161	373	0	
	30 deg - 49 mph	DL - 0.6	3	-268	-395	648	1341	-161	402	0	
	Backwinded	WL - 0.6	4	-269	-373	656	1300	-161	420	0	
	LC 7ASD	SL - 0	5	-250	-332	602	1163	-150	412	0	
			6	-198	-256	510	951	-119	403	0	
			7	-388	-493	600	1104	-233	314	0	
			8c	-280	-354	339	624	-168	-259	0	
			M	175	170	598	1326	105	950	-12030	
			2	188	176	631	1369	113	986	0	
	45 deg - 49 mph	DL - 1	3	200	175	648	1313	120	1003	0	
	Frontwinded	WL - 0.6	4	206	171	656	1233	124	1009	0	
	LC 5ASD	SL - 0	5	200	160	602	1085	120	948	0	
			6	145	114	510	865	87	828	0	
			7	416	318	600	993	249	1041	0	
			8c	333	255	339	561	200	742	0	
			M	174	171	598	1392	78	1969	-9022	
			2	187	177	631	1392	84	2004	0	
	45 deg - 49 mph	DL - 1	3	197	178	648	1340	89	1983	0	
	Frontwinded	WL - 0.45	4	202	175	656	1299	91	1960	0	
	LC 6ASD	SL - 0.75	5	194	164	602	1136	87	1778	0	
			6	145	120	510	936	65	1516	0	
			7	406	333	600	1106	183	1829	0	
			8c	323	264	339	623	145	1175	0	
			M	-206	-201	598	1326	-124	488	-18646	
			2	-214	-200	631	1369	-128	509	0	
	45 deg - 49 mph	DL - 0.6	3	-211	-185	648	1313	-127	528	0	
	Backwinded	WL - 0.6	4	-207	-172	656	1233	-124	541	0	
	LC 7ASD	SL - 0	5	-189	-151	602	1085	-113	521	0	
			6	-170	-133	510	865	-102	477	0	
			7	-470	-361	600	993	-282	394	0	
			8c	-354	-271	339	561	-213	291	0	
►			M	1087	628	598	688	652	1225	-10414	MP Max
►			2	1145	661	631	726	687	1277	-10734	P2 Max
►	60 deg - 110 mph	DL - 1	3	1180	682	648	746	708	1307	-11054	P3 Max
►	Frontwinded	WL - 0.6	4	1183	683	656	755	710	1316	-11054	P4 Max
►	LC 5ASD	SL - 0	5	1141	659	602	693	684	1247	-10157	P5 Max
►			6	741	428	510	587	445	1017	-10832	P6 Max
►			7	2254	1301	600	690	1352	1631	-10570	P7 Max
►			8c	1870	1079	339	390	1122	1236	-6163	P8 Max
			M	1087	628	598	688	489	1647	-7810	
			2	1145	661	631	726	515	1722	-8051	
	60 deg - 110 mph	DL - 1	3	1180	682	648	746	531	1764	-8291	
	Frontwinded	WL - 0.45	4	1183	683	656	755	532	1780	-8291	
	LC 6ASD	SL - 0.75	5	1141	659	602	693	513	1668	-7617	
			6	741	428	510	587	334	1393	-8124	
			7	2254	1301	600	690	1014	1953	-7928	
			8c	1870	1079	339	390	841	1367	-4622	
			M	-517	-299	598	688	-310	430	-8416	
			2	-524	-303	631	726	-315	447	-8675	
	60 deg - 93.5 mph	DL - 0.6	3	-523	-302	648	746	-314	457	-8933	
	Backwinded	WL - 0.6	4	-531	-306	656	755	-318	460	-8933	
	LC 7ASD	SL - 0	5	-493	-285	602	693	-296	440	-8208	
			6	-495	-286	510	587	-297	385	-6231	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
		7	-1706	-985	600	690	-1024	-481	-6950	
►		8c	-1323	-764	339	390	-794	-505	-6293	P8-M Max

P8-M Max
P8-M Max
P8-M Max
P8-M Max

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Job Number:	EST:
Engineer:	MDR/DCD
Date:	14-Mar-2025

LC : REV.U4
PC : REV.U4

Project : Verogy: Woodstock Solar One_Exterior

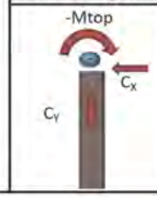
Rev History: **Rev. 6**

Wind Information	
Tilt Angle	**Design Wind**
±0	49 mph
±15	49 mph
±30	49 mph
±45	49 mph
+60	110 mph
-60	93.5 mph

ASCE Version:	**7-16**		TT Thick:	**3.5**	mm
Risk Category:	**I**		Top of Pier:	**7**	ft
Design Wind Speed:	**110**	mph	Load application:	**7.75**	ft
Ground Snow Load:	**40**	psf	Pier Count:	**12**	Nos
Terrain:	**XTR-0.75**		Mod/String:	**6**	
Stow Angle:	**60**	deg	No of module:	**60**	
Module:	**Series 6 Plus / 2.3.13.P**				
Module Width:	**1245**	mm	Module Thick:	**49**	mm
Module Length:	**2024**	mm	Module Weight:	**34.0**	kg

Load Application at center line of pivot pin, 9" above the top of post

Load Diagram



*Loads are combined loads per ASCE 7-16 section 2.4.1 (BASIC ASD)

Wind Factors			
K_z:	**1.00**	K_d:	**0.85**
K_{zt}:	**1.00**	K_e:	**0.98**
		Zg (ft):	466.6

Stow Wind Speed
35mph 3s 10m

	Lateral (lbs)	Axial (lbs)	Moment (lbs-in)	Abs Down (lbs)	Abs Up (lbs)
M	2214	2178	-16850	2374	-943
M	2	1017	-90349	0	0
P2	2335	2283	-17368	2490	-914
P2	-1862	-914	-18935	0	0
P3	2398	2338	-17886	2551	-882
P3	-1825	-882	-19500	0	0
P4	2434	2369	-17886	2585	-898
P4	-1865	-898	-19500	0	0
P5	2210	2175	-16433	2372	-836
P5	-1689	-836	-17917	0	0
P6	1961	1956	-14981	2130	-776
P6	-1507	-776	-16333	0	0
P7	1936	1945	-15824	2125	-756
P7	-1476	-756	-16641	0	0
P8	2175	2152	-16512	2351	-1022
P9	1263	1348	-11540	1459	-773

Seismic Load To Motor

S_S:	**0.182**	S_{DS}:	**0.158**
S_1:	**0.055**	S_{D1}:	**0.055**
R:	**2.000**	C_S:	**0.079**
Site Class:	**C**	V:	**1180 lbs**

Pier Layout									
Number of Modules per Bay									
M	5	6	6	6	5	5	5	5	+1c
Fy	50	50	50	50	50	50	50	50	
P.No	P2	P3	P4	P5	P6	P7	P8	P9	
SPACING / GCR : 14.64 ft / 45.36%									

Weak Axis DL to Pier Distribution						
	Slope	**Grade**	V_D	**W [lb/ft]**	**Weak DLz (Motor)**	**Weak DLz (Array)**
Standard	**3.44°**	**6%**	**628 lbs**	**28**	**379 lbs**	**23 lbs**
High	**8.56°**	**15%**	**1561 lbs**	**28**	**943 lbs**	**56 lbs**

3.6% of the total weak axis load applies to each array pier and the remaining load to motor pier (assuming both wings have the same configuration).

Note

1) Above governing loads do not act simultaneously and EOR should confirm with the detailed loadings provided below.

2) See documents PJE-000004 & PJE-000006 for design guidelines and standard nomenclature. Should the foundation engineer deviate from these recommendations they must inform Nextracker prior to construction.

3) Loads provided, assume both wings on either side of the motor pier have the same length and post spacings. For a tracker with the unsymmetrical wings, it is acceptable to combine ½ of the motor load from each wing.

4) Designer should consider positive and negative signs of $Combo_x$ and Moment factored loads. If both are negative, they are additive, otherwise they are subtractive.

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
▶ 0 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	3	195	650	1252	2	1017	-90349	MP-M Max
		2	16	287	685	1320	10	1107	0	
		3	40	404	704	1356	24	1196	0	
		4	70	495	714	1376	42	1261	0	
		5	90	526	649	1250	54	1215	0	
		6	101	514	574	1106	60	1133	0	
		7	123	586	577	1113	74	1179	0	
		8	129	585	646	1245	77	1247	0	
		9c	63	282	369	711	38	788	0	
0 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	3	202	650	1252	1	1929	-67762	
		2	11	263	685	1320	5	2044	0	
		3	27	361	704	1356	12	2133	0	
		4	46	433	714	1376	21	2191	0	
		5	55	429	649	1250	25	2030	0	
		6	60	411	574	1106	27	1839	0	
		7	75	482	577	1113	34	1879	0	
		8	80	488	646	1245	36	2049	0	
		9c	39	235	369	711	18	1258	0	
▶ 0 deg - 49 mph Frontwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	3	195	650	1252	2	757	-90349	
		2	16	287	685	1320	10	833	0	
		3	40	404	704	1356	24	914	0	
		4	70	495	714	1376	42	976	0	
		5	90	526	649	1250	54	955	0	
		6	101	514	574	1106	60	903	0	
		7	123	586	577	1113	74	948	0	
		8	129	585	646	1245	77	989	0	
		9c	63	282	369	711	38	641	0	
0 deg - 49 mph Backwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	-7	-334	650	1252	-4	699	-90349	
		2	-21	-388	685	1320	-12	702	0	
		3	-45	-448	704	1356	-27	685	0	
		4	-70	-494	714	1376	-42	667	0	
		5	-83	-484	649	1250	-50	609	0	
		6	-89	-454	574	1106	-53	552	0	
		7	-100	-476	577	1113	-60	542	0	
		8	-124	-563	646	1245	-75	558	0	
		9c	-73	-325	369	711	-44	424	0	
0 deg - 49 mph Backwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	-5	-337	650	1252	-2	1687	-67762	
		2	-15	-377	685	1320	-7	1756	0	
		3	-32	-428	704	1356	-14	1778	0	
		4	-49	-466	714	1376	-22	1786	0	
		5	-56	-439	649	1250	-25	1639	0	
		6	-59	-406	574	1106	-27	1471	0	
		7	-66	-426	577	1113	-30	1470	0	
		8	-83	-503	646	1245	-37	1603	0	
		9c	-48	-291	369	711	-22	1021	0	
0 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-7	-334	650	1252	-4	440	-90349	
		2	-21	-388	685	1320	-12	428	0	
		3	-45	-448	704	1356	-27	404	0	
		4	-70	-494	714	1376	-42	382	0	
		5	-83	-484	649	1250	-50	349	0	
		6	-89	-454	574	1106	-53	322	0	
		7	-100	-476	577	1113	-60	311	0	
		8	-124	-563	646	1245	-75	300	0	
		9c	-73	-325	369	711	-44	276	0	
15 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	216	746	650	1230	129	1347	-58640	
		2	250	778	685	1221	150	1402	0	
		3	293	784	704	1151	176	1424	0	
		4	328	782	714	1085	197	1433	0	
		5	317	702	649	915	190	1320	0	
		6	291	607	574	751	175	1188	0	
		7	317	638	577	748	190	1210	0	
		8	318	625	646	813	191	1271	0	
		9c	159	311	369	453	96	806	0	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
15 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	212	747	650	1225	95	2155	-43980
		2	241	781	685	1239	108	2216	0
		3	274	793	704	1215	123	2221	0
		4	302	794	714	1168	136	2198	0
		5	289	716	649	1006	130	1976	0
		6	263	621	574	854	119	1744	0
		7	286	657	577	847	129	1759	0
		8	285	641	646	925	128	1878	0
		9c	142	317	369	517	64	1149	0
15 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-191	-659	650	1230	-114	-256	-51233
		2	-219	-680	685	1221	-131	253	0
		3	-262	-701	704	1151	-157	252	0
		4	-310	-739	714	1085	-186	-265	0
		5	-313	-691	649	915	-188	-275	0
		6	-303	-630	574	751	-182	-284	0
		7	-310	-626	577	748	-186	-279	0
		8	-356	-699	646	813	-213	-282	0
		9c	-206	-403	369	453	-124	-271	0
30 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	397	660	650	1349	238	1295	-47050
		2	441	690	685	1383	265	1349	0
		3	494	704	704	1321	296	1376	0
		4	536	708	714	1263	321	1389	0
		5	508	637	649	1106	305	1281	0
		6	466	560	574	920	280	1160	0
		7	488	572	577	920	293	1171	0
		8	524	603	646	1007	315	1258	0
		9c	285	326	369	565	171	814	0
30 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	394	662	650	1345	177	2206	-35287
		2	432	692	685	1400	194	2297	0
		3	472	706	704	1380	212	2306	0
		4	505	712	714	1339	227	2289	0
		5	475	644	649	1188	214	2080	0
		6	430	564	574	1017	194	1841	0
		7	455	585	577	993	205	1836	0
		8	479	608	646	1093	216	1989	0
		9c	255	322	369	625	115	1233	0
30 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-495	-821	650	1349	-297	-353	-41822
		2	-515	-806	685	1383	-309	-322	0
		3	-545	-777	704	1321	-327	-294	0
		4	-590	-780	714	1263	-354	-290	0
		5	-556	-697	649	1106	-334	-279	0
		6	-511	-613	574	920	-307	-274	0
		7	-515	-605	577	920	-309	-266	0
		8	-620	-713	646	1007	-372	-291	0
		9c	-371	-425	369	565	-223	-284	0
45 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	619	599	650	1335	371	1259	-52620
		2	667	614	685	1337	400	1303	0
		3	707	602	704	1254	424	1315	0
		4	736	585	714	1144	441	1315	0
		5	679	515	649	963	408	1208	0
		6	609	444	574	798	366	1090	0
		7	614	437	577	786	369	1090	0
		8	684	478	646	846	411	1183	0
		9c	390	272	369	467	234	782	0
45 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	617	602	650	1390	278	2213	-39465
		2	662	622	685	1396	298	2262	0
		3	696	617	704	1310	313	2213	0
		4	720	607	714	1236	324	2165	0
		5	663	540	649	1073	298	1946	0
		6	593	468	574	923	267	1727	0
		7	600	466	577	907	270	1718	0
		8	662	508	646	982	298	1861	0
		9c	375	286	369	563	169	1170	0
45 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-733	-709	650	1335	-440	-285	-37239
		2	-743	-684	685	1337	-446	250	0
		3	-751	-639	704	1254	-450	289	0
		4	-785	-624	714	1144	-471	304	0
		5	-722	-547	649	963	-433	311	0
		6	-651	-474	574	798	-391	310	0
		7	-646	-460	577	786	-388	320	0

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
		8	-852	-595	646	846	-511	280	0
		9c	-536	-373	369	467	-322	-253	0

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
				(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
►			M	3689	2130	650	688	2214	2178	-16850	MP Max
►			2	3891	2246	685	726	2335	2283	-17368	P2 Max
►			3	3996	2307	704	745	2398	2338	-17886	P3 Max
►	60 deg - 110 mph	DL - 1	4	4056	2342	714	757	2434	2369	-17886	P4 Max
►	Frontwinded	WL - 0.6	5	3684	2127	649	687	2210	2175	-16433	P5 Max
►	LC 5ASD	SL - 0	6	3269	1887	574	608	1961	1956	-14981	P6 Max
►			7	3227	1863	577	612	1936	1945	-15824	
►			8	3625	2093	646	684	2175	2152	-16512	
►			9c	2105	1215	369	391	1263	1348	-11540	
			M	3689	2130	650	688	1660	2374	-12637	
			2	3891	2246	685	726	1751	2490	-13026	
			3	3996	2307	704	745	1798	2551	-13414	
	60 deg - 110 mph	DL - 1	4	4056	2342	714	757	1825	2585	-13414	
	Frontwinded	WL - 0.45	5	3684	2127	649	687	1658	2372	-12325	
	LC 6ASD	SL - 0.75	6	3269	1887	574	608	1471	2130	-11236	
			7	3227	1863	577	612	1452	2125	-11868	
			8	3625	2093	646	684	1631	2351	-12384	
			9c	2105	1215	369	391	947	1459	-8655	
			M	-3127	-1805	650	688	-1876	-943	-18371	
►			2	-3104	-1792	685	726	-1862	-914	-18935	P2-M Max
►			3	-3042	-1756	704	745	-1825	-882	-19500	P3-M Max
►	60 deg - 93.5 mph	DL - 0.6	4	-3108	-1794	714	757	-1865	-898	-19500	P4-M Max
►	Backwinded	WL - 0.6	5	-2814	-1625	649	687	-1689	-836	-17917	P5-M Max
►	LC 7ASD	SL - 0	6	-2512	-1450	574	608	-1507	-776	-16333	
►			7	-2459	-1420	577	612	-1476	-756	-16641	
			8	-3348	-1933	646	684	-2009	-1022	-15554	
			9c	-2150	-1241	369	391	-1290	-773	-9990	

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Job Number:	EST:
Engineer:	MDR/DCD
Date:	14-Mar-2025

LC : REV.U4
PC : REV.U4

Project : Verogy: Woodstock Solar One_Exterior

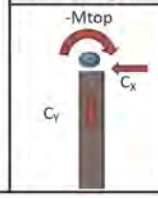
Rev History: **Rev. 6**

Wind Information	
Tilt Angle	**Design Wind**
±0	49 mph
±15	49 mph
±30	49 mph
±45	49 mph
+60	110 mph
-60	93.5 mph

ASCE Version:	7-16		TT Thick:	3.5	mm
Risk Category:	I		Top of Pier:	7	ft
Design Wind Speed:	110	mph	Load application:	7.75	ft
Ground Snow Load:	40	psf	Pier Count:	12	Nos
Terrain:	XTR-0.75		Mod/String:	6	
Stow Angle:	60	deg	No of module:	60	
Module:	Series 6 Plus / 2.3.13.P				
Module Width:	1245	mm	Module Thick:	49	mm
Module Length:	2024	mm	Module Weight:	34.0	kg

Load Application at center line of pivot pin, 9" above the top of post

Load Diagram



*Loads are combined loads per ASCE 7-16 section 2.4.1 (BASIC ASD)

Wind Factors			
K_z:	1.00	K_d:	0.85
K_{zt}:	1.00	K_e:	0.98
		Zg (ft):	466.6

Stow Wind Speed
35mph 3s 10m

	Lateral	Axial	Moment	Abs Down	Abs Up
	(lbs)	(lbs)	(lbs-in)	(lbs)	(lbs)
M	2339	2278	-16850	2486	-994
M	1	1034	-34100	0	0
P2	2072	2046	-15915	2230	-822
P2	-1615	-822	-17352	0	0
P3	2176	2136	-15669	2328	-1003
P4	1265	1346	-11540	1457	-780

Seismic Load To Motor

S_S:	0.182	S_{DS}:	0.158
S_1:	0.055	S_{D1}:	0.055
R:	2.000	C_S:	0.079
Site Class:	C	V:	437 lbs

Pier Layout											
Number of Modules per Bay											
M	5	5	5	+1c							
Fy	50	50	50								
P.No	P2	P3	P4								
SPACING / GCR : 14.64 ft / 45.36%											

Weak Axis DL to Pier Distribution						
	Slope	Grade	V_D	W [lb/ft]	Weak DLz (Motor)	Weak DLz (Array)
Standard	3.44°	6%	232 lbs	27	140 lbs	8 lbs
High	8.56°	15%	576 lbs	27	348 lbs	21 lbs

3.6% of the total weak axis load applies to each array pier and the remaining load to motor pier (assuming both wings have the same configuration).

Note

1) Above governing loads do not act simultaneously and EOR should confirm with the detailed loadings provided below.

2) See documents PJE-000004 & PJE-000006 for design guidelines and standard nomenclature. Should the foundation engineer deviate from these recommendations they must inform Nextracker prior to construction.

3) Loads provided, assume both wings on either side of the motor pier have the same length and post spacings. For a tracker with the unsymmetrical wings, it is acceptable to combine ½ of the motor load from each wing.

4) Designer should consider positive and negative signs of $Combo_x$ and Moment factored loads. If both are negative, they are additive, otherwise they are subtractive.

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
				(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
▶	Frontwinded LC 5ASD	WL - 0.6 SL - 0	M	1	178	677	1323	1	1034	-34100	MP-M Max
			2	3	182	600	1172	2	959	0	
			3	5	199	629	1229	3	999	0	
			4c	3	107	365	713	2	680	0	
	Frontwinded LC 6ASD	WL - 0.45 SL - 0.75	M	1	183	677	1323	1	2002	-25575	
			2	2	160	600	1172	1	1801	0	
			3	4	179	629	1229	2	1881	0	
			4c	2	109	365	713	1	1199	0	
▶	Frontwinded LC 7ASD	WL - 0.6 SL - 0	M	1	178	677	1323	1	763	-34100	
			2	3	182	600	1172	2	719	0	
			3	5	199	629	1229	3	747	0	
			4c	3	107	365	713	2	533	0	
	Backwinded LC 5ASD	WL - 0.6 SL - 0	M	-3	-338	677	1323	-2	725	-34100	
			2	-5	-309	600	1172	-3	665	0	
			3	-9	-338	629	1229	-6	677	0	
			4c	-6	-196	365	713	-4	498	0	
	Backwinded LC 6ASD	WL - 0.45 SL - 0.75	M	-2	-340	677	1323	-1	1766	-25575	
			2	-3	-298	600	1172	-2	1595	0	
			3	-7	-328	629	1229	-3	1653	0	
			4c	-4	-197	365	713	-2	1062	0	
	Backwinded LC 7ASD	WL - 0.6 SL - 0	M	-3	-338	677	1323	-2	454	-34100	
			2	-5	-309	600	1172	-3	425	0	
			3	-9	-338	629	1229	-6	425	0	
			4c	-6	-196	365	713	-4	351	0	
	Frontwinded LC 5ASD	WL - 0.6 SL - 0	M	220	793	677	1326	132	1403	-22132	
			2	205	721	600	1155	123	1283	0	
			3	193	649	629	1189	116	1269	0	
			4c	100	333	365	692	60	815	0	
	Frontwinded LC 6ASD	WL - 0.45 SL - 0.75	M	218	793	677	1321	98	2275	-16599	
			2	202	722	600	1175	91	2056	0	
			3	188	651	629	1208	85	2078	0	
			4c	97	334	365	691	44	1284	0	
	Backwinded LC 7ASD	WL - 0.6 SL - 0	M	-191	-689	677	1326	-115	-257	-19336	
			2	-166	-585	600	1155	-99	259	0	
			3	-182	-613	629	1189	-109	260	0	
			4c	-110	-369	365	692	-66	-252	0	
	Frontwinded LC 5ASD	WL - 0.6 SL - 0	M	411	698	677	1457	247	1346	-17758	
			2	379	633	600	1273	227	1230	0	
			3	364	589	629	1315	218	1233	0	
			4c	193	311	365	765	116	802	0	
	Frontwinded LC 6ASD	WL - 0.45 SL - 0.75	M	410	699	677	1457	184	2335	-13318	
			2	376	634	600	1273	169	2091	0	
			3	359	592	629	1315	162	2132	0	
			4c	190	313	365	765	86	1330	0	
	Backwinded LC 7ASD	WL - 0.45 SL - 0	M	-514	-872	677	1457	-309	-367	-15785	
			2	-442	-738	600	1273	-265	-332	0	
			3	-443	-717	629	1315	-266	-303	0	
			4c	-257	-415	365	765	-154	-279	0	
	Frontwinded LC 5ASD	WL - 0.6 SL - 0	M	654	644	677	1459	392	1314	-19860	
			2	586	571	600	1265	352	1193	0	
			3	601	572	629	1293	360	1223	0	
			4c	341	324	365	754	205	810	0	
	Frontwinded LC 6ASD	WL - 0.45 SL - 0.75	M	653	646	677	1452	294	2307	-14895	
			2	585	573	600	1293	263	2078	0	
			3	598	576	629	1320	269	2129	0	
			4c	339	326	365	751	152	1325	0	
	Backwinded LC 7ASD	WL - 0.6 SL - 0	M	-776	-764	677	1459	-466	-302	-14055	
			2	-646	-630	600	1265	-388	-268	0	
			3	-711	-677	629	1293	-427	-279	0	
			4c	-444	-422	365	754	-266	-284	0	
▶	Frontwinded LC 5ASD	WL - 0.6 SL - 0	M	3899	2251	677	727	2339	2278	-16850	MP Max
▶			2	3453	1993	600	644	2072	2046	-15915	P2 Max
▶			3	3627	2094	629	675	2176	2136	-15669	P3 Max
▶			4c	2109	1217	365	392	1265	1346	-11540	P4 Max
	Frontwinded LC 6ASD	WL - 0.45 SL - 0.75	M	3899	2251	677	727	1755	2486	-12637	
			2	3453	1993	600	644	1554	2230	-11936	
			3	3627	2094	629	675	1632	2328	-11752	
			4c	2109	1217	365	392	949	1457	-8655	
			M	-3321	-1917	677	727	-1992	-994	-18371	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
► Backwinded	WL - 0.6	2	-2691	-1554	600	644	-1615	-822	-17352	P2-M Max
LC 7ASD	SL - 0	3	-3263	-1884	629	675	-1958	-1003	-15247	
		4c	-2162	-1248	365	392	-1297	-780	-9990	

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Job Number:	EST:
Engineer:	MDR/DCD
Date:	14-Mar-2025

LC : REV.U4
PC : REV.U4

Project : Verogy: Woodstock Solar One_Edge

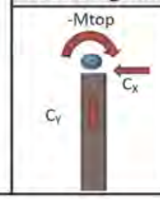
Rev History: **Rev. 6**

Wind Information	
Tilt Angle	**Design Wind**
±0	49 mph
±15	49 mph
±30	49 mph
±45	49 mph
+60	110 mph
-60	93.5 mph

ASCE Version:	**7-16**		TT Thick:	**2.5**	mm
Risk Category:	**I**		Top of Pier:	**7**	ft
Design Wind Speed:	**110**	mph	Load application:	**7.75**	ft
Ground Snow Load:	**40**	psf	Pier Count:	**12**	Nos
Terrain:	**XTR-0.75**		Mod/String:	**6**	
Stow Angle:	**60**	deg	No of module:	**60**	
Module:	**Series 6 Plus / 2.3.13.P**				
Module Width:	**1245**	mm	Module Thick:	**49**	mm
Module Length:	**2024**	mm	Module Weight:	**34.0**	kg

Load Application at center line of pivot pin, 9" above the top of post

Load Diagram



*Loads are combined loads per ASCE 7-16 section 2.4.1 (BASIC ASD)

Wind Factors			
K_z:	1.00	K_d:	0.85
K_{zt}:	1.00	K_e:	0.98
		Zg (ft):	466.6

Stow Wind Speed
35mph 3s 10m

	Lateral	Axial	Moment	Abs Down	Abs Up
	(lbs)	**(lbs)**	**(lbs-in)**	**(lbs)**	**(lbs)**
M	652	1225	-10414	1970	0
M	-76	353	-44453	0	0
P2	688	1278	-10734	2022	-250
P3	706	1306	-11054	2013	-250
P4	719	1323	-11054	2052	-250
P5	644	1220	-10157	1893	-250
P6	606	1129	-9259	1709	-250
P7	467	1052	-10832	1712	-250
P8	1346	1623	-10570	1941	-482
P9	1123	1238	-6163	1369	-505
P9	-794	-505	-6293	0	0

Seismic Load To Motor

S_S:	**0.182**	S_{DS}:	**0.158**
S_1:	**0.055**	S_{D1}:	**0.055**
R:	**2.000**	C_S:	**0.079**
Site Class:	**C**	V:	**1115 lbs**

Pier Layout									
Number of Modules per Bay									
M	5	6	6	6	5	5	5	5	+1c
Fy	50	50	50	50	50	50	50	50	
P.No	P2	P3	P4	P5	P6	P7	P8	P9	
SPACING / GCR : 14.64 ft / 45.36%									

Weak Axis DL to Pier Distribution						
	Slope	**Grade**	V_D	**W [lb/ft]**	**Weak DLz (Motor)**	**Weak DLz (Array)**
Standard	**3.44°**	**6%**	**579 lbs**	**25**	**350 lbs**	**21 lbs**
High	**8.56°**	**15%**	**1438 lbs**	**25**	**869 lbs**	**52 lbs**

3.6% of the total weak axis load applies to each array pier and the remaining load to motor pier (assuming both wings have the same configuration).

Note

1) Above governing loads do not act simultaneously and EOR should confirm with the detailed loadings provided below.

2) See documents PJE-000004 & PJE-000006 for design guidelines and standard nomenclature. Should the foundation engineer deviate from these recommendations they must inform Nextracker prior to construction.

3) Loads provided, assume both wings on either side of the motor pier have the same length and post spacings. For a tracker with the unsymmetrical wings, it is acceptable to combine ½ of the motor load from each wing.

4) Designer should consider positive and negative signs of $Combo_x$ and Moment factored loads. If both are negative, they are additive, otherwise they are subtractive.

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
0 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	4	157	599	1252	2	943	-40629
		2	14	194	631	1320	9	998	0
		3	32	237	648	1356	19	1041	0
		4	54	274	658	1376	32	1073	0
		5	64	271	598	1250	38	1010	0
		6	70	258	529	1107	42	934	0
		7	67	234	532	1100	40	922	0
		8	103	337	595	1184	62	1048	0
		9c	72	233	340	667	43	730	0
0 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	3	148	599	1252	1	1854	-30472
		2	10	177	631	1320	4	1951	0
		3	22	216	648	1356	10	2012	0
		4	36	248	658	1376	16	2052	0
		5	42	238	598	1250	19	1893	0
		6	45	223	529	1106	20	1709	0
		7	45	211	532	1113	20	1712	0
		8	65	287	595	1245	29	1908	0
		9c	44	190	340	711	20	1209	0
0 deg - 49 mph Frontwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	4	157	599	1252	2	704	-40629
		2	14	194	631	1320	9	745	0
		3	32	237	648	1356	19	782	0
		4	54	274	658	1376	32	809	0
		5	64	271	598	1250	38	771	0
		6	70	258	529	1107	42	722	0
		7	67	234	532	1100	40	710	0
		8	103	337	595	1184	62	809	0
		9c	72	233	340	667	43	594	0
0 deg - 49 mph Backwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	-5	-209	599	1252	-3	723	-40629
		2	-20	-265	631	1320	-12	723	0
		3	-45	-333	648	1356	-27	699	0
		4	-76	-390	658	1376	-46	674	0
		5	-92	-390	598	1250	-55	614	0
		6	-100	-368	529	1107	-60	558	0
		7	-108	-374	532	1100	-65	558	0
		8	-158	-515	595	1184	-95	536	0
		9c	-102	-328	340	667	-61	393	0
0 deg - 49 mph Backwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	-4	-195	599	1252	-2	1699	-30472
		2	-13	-238	631	1320	-6	1764	0
		3	-31	-298	648	1356	-14	1781	0
		4	-51	-349	658	1376	-23	1783	0
		5	-59	-338	598	1250	-27	1634	0
		6	-63	-314	529	1106	-28	1468	0
		7	-71	-329	532	1113	-32	1469	0
		8	-104	-459	595	1245	-47	1572	0
		9c	-66	-290	340	711	-30	992	0
0 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-5	-209	599	1252	-3	484	-40629
		2	-20	-265	631	1320	-12	470	0
		3	-45	-333	648	1356	-27	439	0
		4	-76	-390	658	1376	-46	411	0
		5	-92	-390	598	1250	-55	375	0
		6	-100	-368	529	1107	-60	347	0
		7	-108	-374	532	1100	-65	345	0
		8	-158	-515	595	1184	-95	298	0
		9c	-102	-328	340	667	-61	257	0
15 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	82	277	599	1189	49	1015	-30636
		2	94	275	631	1187	56	1047	0
		3	103	249	648	1070	62	1048	0
		4	107	224	658	955	64	1042	0
		5	99	188	598	806	59	961	0
		6	87	153	529	635	52	871	0
		7	92	157	532	602	55	876	0
		8	243	397	595	667	146	1084	0
		9c	183	299	340	381	110	769	0

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
15 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	83	285	599	1230	37	1899	-22977	
		2	91	283	631	1221	41	1924	0	
		3	100	267	648	1151	45	1882	0	
		4	107	252	658	1085	48	1836	0	
		5	97	213	598	914	44	1630	0	
		6	87	179	529	753	39	1425	0	
		7	89	177	532	729	40	1408	0	
		8	200	387	595	794	90	1615	0	
		9c	148	286	340	455	67	1060	0	
15 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-127	-426	599	1189	-76	353	-44453	MP-M Max
		2	-154	-449	631	1187	-92	359	0	
		3	-192	-465	648	1070	-115	360	0	
		4	-227	-475	658	955	-136	360	0	
		5	-225	-427	598	806	-135	353	0	
		6	-221	-389	529	635	-133	334	0	
		7	-202	-344	532	602	-121	363	0	
		8	-319	-523	595	667	-192	293	0	
		9c	-227	-371	340	381	-136	-268	0	
30 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	99	166	599	1351	60	948	-16494	
		2	112	176	631	1380	67	987	0	
		3	126	182	648	1343	76	1008	0	
		4	140	187	658	1283	84	1020	0	
		5	133	170	598	1117	80	950	0	
		6	127	155	529	957	76	872	0	
		7	126	151	532	932	76	873	0	
		8	328	384	595	1025	197	1076	0	
		9c	254	296	340	586	152	768	0	
30 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	97	163	599	1385	44	1960	-12370	
		2	108	174	631	1417	49	2022	0	
		3	121	182	648	1378	54	2013	0	
		4	131	186	658	1340	59	1997	0	
		5	123	168	598	1189	55	1815	0	
		6	116	154	529	1015	52	1610	0	
		7	118	154	532	1008	53	1607	0	
		8	302	388	595	1129	136	1867	0	
		9c	232	297	340	645	104	1207	0	
30 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-260	-433	599	1351	-156	350	-29933	
		2	-270	-425	631	1380	-162	374	0	
		3	-273	-393	648	1343	-164	403	0	
		4	-272	-364	658	1283	-163	427	0	
		5	-241	-307	598	1117	-145	425	0	
		6	-215	-262	529	957	-129	410	0	
		7	-206	-246	532	932	-123	422	0	
		8	-407	-477	595	1025	-244	321	0	
		9c	-297	-347	340	586	-178	-254	0	
45 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	175	170	599	1335	105	951	-13550	
		2	189	175	631	1338	114	986	0	
		3	201	173	648	1249	121	1002	0	
		4	211	170	658	1178	127	1010	0	
		5	193	149	598	994	116	937	0	
		6	183	135	529	821	110	860	0	
		7	153	111	532	811	92	849	0	
		8	424	301	595	872	254	1026	0	
		9c	344	244	340	501	207	736	0	
45 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	174	170	599	1393	78	1970	-10163	
		2	187	177	631	1391	84	2004	0	
		3	198	176	648	1343	89	1985	0	
		4	206	175	658	1270	93	1939	0	
		5	188	155	598	1067	85	1718	0	
		6	177	141	529	925	80	1536	0	
		7	151	119	532	907	68	1516	0	
		8	412	320	595	982	185	1725	0	
		9c	332	257	340	563	149	1128	0	
45 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-208	-201	599	1335	-125	489	-21003	
		2	-211	-195	631	1338	-127	512	0	
		3	-205	-176	648	1249	-123	533	0	
		4	-203	-164	658	1178	-122	547	0	
		5	-178	-137	598	994	-107	527	0	
		6	-154	-114	529	821	-92	499	0	
		7	-170	-124	532	811	-102	495	0	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
		8	-471	-335	595	872	-282	406	0
		9c	-359	-254	340	501	-215	301	0

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
		M	1087	627	599	688	652	1225	-10414	MP Max
		2	1146	662	631	726	688	1278	-10734	P2 Max
		3	1176	679	648	745	706	1306	-11054	P3 Max
60 deg - 110 mph	DL - 1	4	1198	691	658	757	719	1323	-11054	P4 Max
Frontwinded	WL - 0.6	5	1073	620	598	687	644	1220	-10157	P5 Max
LC 5ASD	SL - 0	6	1010	583	529	608	606	1129	-9259	P6 Max
		7	779	450	532	612	467	1052	-10832	P7 Max
		8	2244	1296	595	684	1346	1623	-10570	P8 Max
		9c	1871	1080	340	391	1123	1238	-6163	P9 Max
		M	1087	627	599	688	489	1647	-7810	
		2	1146	662	631	726	516	1723	-8051	
		3	1176	679	648	745	529	1763	-8291	
60 deg - 110 mph	DL - 1	4	1198	691	658	757	539	1787	-8291	
Frontwinded	WL - 0.45	5	1073	620	598	687	483	1642	-7617	
LC 6ASD	SL - 0.75	6	1010	583	529	608	455	1498	-6944	
		7	779	450	532	612	351	1443	-8124	
		8	2244	1296	595	684	1010	1941	-7928	
		9c	1871	1080	340	391	842	1369	-4622	
		M	-517	-298	599	688	-310	430	-8416	
		2	-524	-303	631	726	-315	447	-8675	
		3	-523	-302	648	745	-314	458	-8933	
60 deg - 93.5 mph	DL - 0.6	4	-533	-308	658	757	-320	460	-8933	
Backwinded	WL - 0.6	5	-482	-278	598	687	-289	442	-8208	
LC 7ASD	SL - 0	6	-434	-251	529	608	-261	417	-7483	
		7	-512	-295	532	612	-307	392	-6231	
		8	-1702	-983	595	684	-1021	-482	-6950	
		9c	-1323	-764	340	391	-794	-505	-6293	P9-M Max

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Job Number:	EST:
Engineer:	MDR/DCD
Date:	14-Mar-2025

LC : REV.U4
PC : REV.U4

Project : Verogy: Woodstock Solar One_Edge

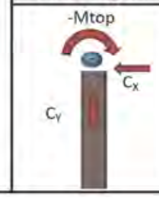
Rev History: **Rev. 6**

Wind Information	
Tilt Angle	**Design Wind**
±0	49 mph
±15	49 mph
±30	49 mph
±45	49 mph
+60	110 mph
-60	93.5 mph

ASCE Version:	7-16		TT Thick:	2.5	mm
Risk Category:	I		Top of Pier:	7	ft
Design Wind Speed:	110	mph	Load application:	7.75	ft
Ground Snow Load:	40	psf	Pier Count:	12	Nos
Terrain:	XTR-0.75		Mod/String:	6	
Stow Angle:	60	deg	No of module:	60	
Module:	Series 6 Plus / 2.3.13.P				
Module Width:	1245	mm	Module Thick:	49	mm
Module Length:	2024	mm	Module Weight:	34.0	kg

Load Application at center line of pivot pin, 9" above the top of post

Load Diagram



*Loads are combined loads per ASCE 7-16 section 2.4.1 (BASIC ASD)

Wind Factors			
K_z:	1.00	K_d:	0.85
K_{zt}:	1.00	K_e:	0.98
		Zg (ft):	466.6

Stow Wind Speed
35mph 3s 10m

	Lateral (lbs)	Axial (lbs)	Moment (lbs-in)	Abs Down (lbs)	Abs Up (lbs)
M	739	1300	-10414	2051	0
M	-76	352	-16777	0	0
P2	497	1089	-9836	1831	-250
P3	1339	1602	-8997	1977	-411
P4	1124	1235	-6163	1367	-514
P4	-807	-514	-6293	0	0

Seismic Load To Motor

S_S:	0.182	S_{DS}:	0.158
S_1:	0.055	S_{D1}:	0.055
R:	2.000	C_S:	0.079
Site Class:	C	V:	412 lbs

Pier Layout											
Number of Modules per Bay											
M	5	5	5	+1c							
Fy	50	50	50								
P.No	P2	P3	P4								
	SPACING / GCR : 14.64 ft / 45.36%										

Weak Axis DL to Pier Distribution						
	Slope	Grade	V_D	W [lb/ft]	Weak DLz (Motor)	Weak DLz (Array)
Standard	3.44°	6%	213 lbs	25	129 lbs	8 lbs
High	8.56°	15%	529 lbs	25	320 lbs	19 lbs

3.6% of the total weak axis load applies to each array pier and the remaining load to motor pier (assuming both wings have the same configuration).

Note

1) Above governing loads do not act simultaneously and EOR should confirm with the detailed loadings provided below.

2) See documents PJE-000004 & PJE-000006 for design guidelines and standard nomenclature. Should the foundation engineer deviate from these recommendations they must inform Nextracker prior to construction.

3) Loads provided, assume both wings on either side of the motor pier have the same length and post spacings. For a tracker with the unsymmetrical wings, it is acceptable to combine ½ of the motor load from each wing.

4) Designer should consider positive and negative signs of $Combo_x$ and Moment factored loads. If both are negative, they are additive, otherwise they are subtractive.

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
				(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
	Frontwinded LC 5ASD	WL - 0.6 SL - 0	M	2	150	623	1323	1	963	-15334	
			2	3	139	552	1172	2	885	0	
			3	6	153	579	1229	3	920	0	
			4c	4	88	336	713	2	639	0	
	Frontwinded LC 6ASD	WL - 0.45 SL - 0.75	M	1	150	623	1323	1	1932	-11501	
			2	2	140	552	1172	1	1744	0	
			3	4	142	579	1229	2	1814	0	
			4c	2	77	336	713	1	1156	0	
	Frontwinded LC 7ASD	WL - 0.6 SL - 0	M	2	150	623	1323	1	714	-15334	
			2	3	139	552	1172	2	664	0	
			3	6	153	579	1229	3	689	0	
			4c	4	88	336	713	2	505	0	
	Backwinded LC 5ASD	WL - 0.6 SL - 0	M	-3	-201	623	1323	-2	752	-15334	
			2	-3	-170	552	1172	-2	700	0	
			3	-11	-274	579	1229	-6	664	0	
			4c	-8	-194	336	713	-5	469	0	
	Backwinded LC 6ASD	WL - 0.45 SL - 0.75	M	-2	-200	623	1323	-1	1775	-11501	
			2	-3	-172	552	1172	-1	1603	0	
			3	-8	-263	579	1229	-3	1631	0	
			4c	-6	-183	336	713	-3	1039	0	
	Backwinded LC 7ASD	WL - 0.6 SL - 0	M	-3	-201	623	1323	-2	503	-15334	
			2	-3	-170	552	1172	-2	479	0	
			3	-11	-274	579	1229	-6	433	0	
			4c	-8	-194	336	713	-5	335	0	
	Frontwinded LC 5ASD	WL - 0.6 SL - 0	M	88	315	623	1324	53	1062	-11563	
			2	75	259	552	1159	45	957	0	
			3	107	346	579	1168	64	1036	0	
			4c	73	235	336	670	44	727	0	
	Frontwinded LC 6ASD	WL - 0.45 SL - 0.75	M	87	314	623	1326	39	2009	-8672	
			2	74	260	552	1155	33	1786	0	
			3	101	340	579	1189	46	1873	0	
			4c	68	228	336	692	31	1208	0	
▶	Backwinded LC 7ASD	WL - 0.6 SL - 0	M	-127	-453	623	1324	-76	352	-16777	MP-M Max
			2	-111	-383	552	1159	-66	351	0	
			3	-155	-502	579	1168	-93	296	0	
			4c	-103	-333	336	670	-62	252	0	
	Frontwinded LC 5ASD	WL - 0.6 SL - 0	M	112	189	623	1458	67	986	-6225	
			2	74	124	552	1273	44	876	0	
			3	223	358	579	1316	134	1044	0	
			4c	190	304	336	758	114	768	0	
	Frontwinded LC 6ASD	WL - 0.45 SL - 0.75	M	111	189	623	1457	50	2051	-4669	
			2	73	124	552	1273	33	1813	0	
			3	220	360	579	1315	99	1977	0	
			4c	187	306	336	765	84	1297	0	
	Backwinded LC 7ASD	WL - 0.45 SL - 0	M	-286	-483	623	1458	-171	334	-11297	
			2	-231	-385	552	1273	-138	350	0	
			3	-331	-532	579	1316	-199	278	0	
			4c	-232	-372	336	758	-139	-272	0	
	Frontwinded LC 5ASD	WL - 0.6 SL - 0	M	199	195	623	1459	119	990	-5114	
			2	135	132	552	1265	81	881	0	
			3	365	345	579	1293	219	1036	0	
			4c	305	289	336	754	183	759	0	
	Frontwinded LC 6ASD	WL - 0.45 SL - 0.75	M	199	196	623	1452	89	2050	-3836	
			2	134	132	552	1293	60	1831	0	
			3	362	348	579	1320	163	1975	0	
			4c	303	291	336	751	137	1280	0	
	Backwinded LC 7ASD	WL - 0.6 SL - 0	M	-240	-236	623	1459	-144	482	-7927	
			2	-159	-156	552	1265	-96	488	0	
			3	-413	-391	579	1293	-248	362	0	
			4c	-347	-328	336	754	-208	255	0	
▶	Frontwinded LC 5ASD	WL - 0.6 SL - 0	M	1232	711	623	727	739	1300	-10414	MP Max
▶			2	828	478	552	644	497	1089	-9836	P2 Max
▶			3	2232	1289	579	675	1339	1602	-8997	P3 Max
▶			4c	1873	1082	336	392	1124	1235	-6163	P4 Max
	Frontwinded LC 6ASD	WL - 0.45 SL - 0.75	M	1232	711	623	727	554	1738	-7810	
			2	828	478	552	644	373	1500	-7377	
			3	2232	1289	579	675	1005	1915	-6748	
			4c	1873	1082	336	392	843	1367	-4622	
			M	-615	-355	623	727	-369	411	-8416	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
Backwinded	WL - 0.6	2	-306	-177	552	644	-184	475	-7949	
LC 7ASD	SL - 0	3	-1467	-847	579	675	-880	-411	-8201	P4-M Max
		4c	-1345	-777	336	392	-807	-514	-6293	

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Job Number:	EST:
Engineer:	MDR/DCD
Date:	14-Mar-2025

LC : REV.U4
PC : REV.U4

Project : Verogy: Woodstock Solar One_Exterior

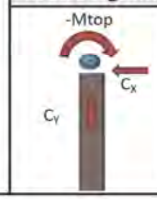
Rev History: **Rev. 6**

Wind Information	
Tilt Angle	**Design Wind**
±0	49 mph
±15	49 mph
±30	49 mph
±45	49 mph
+60	110 mph
-60	93.5 mph

ASCE Version:	7-16		TT Thick:	3.5	mm
Risk Category:	I		Top of Pier:	7	ft
Design Wind Speed:	110	mph	Load application:	7.75	ft
Ground Snow Load:	40	psf	Pier Count:	9	Nos
Terrain:	XTR-0.75		Mod/String:	6	
Stow Angle:	60	deg	No of module:	42	
Module:	Series 6 Plus / 2.3.13.P				
Module Width:	1245	mm	Module Thick:	49	mm
Module Length:	2024	mm	Module Weight:	34.0	kg

Load Application at center line of pivot pin, 9" above the top of post

Load Diagram



*Loads are combined loads per ASCE 7-16 section 2.4.1 (BASIC ASD)

Wind Factors			
K_z:	1.00	K_d:	0.85
K_{zt}:	1.00	K_e:	0.98
		Zg (ft):	466.6

Stow Wind Speed
35mph 3s 10m

	Lateral (lbs)	Axial (lbs)	Moment (lbs-in)	Abs Down (lbs)	Abs Up (lbs)
M	2190	2157	-16850	2351	-937
M	2	1007	-86418	0	0
P2	2379	2321	-17368	2532	-926
P2	-1896	-926	-18935	0	0
P3	2230	2191	-16433	2389	-837
P3	-1696	-837	-17917	0	0
P4	1939	1938	-14981	2110	-767
P4	-1487	-767	-16333	0	0
P5	2018	2007	-14981	2187	-784
P5	-1541	-784	-16333	0	0
P6	2019	2007	-14981	2185	-791
P6	-1551	-791	-16333	0	0
P7	1921	1932	-15824	2110	-752
P7	-1464	-752	-16641	0	0
P8	2179	2155	-16512	2354	-1023
P9	1262	1347	-11540	1458	-773

Seismic Load To Motor

S_S:	0.182	S_{DS}:	0.158
S_1:	0.055	S_{D1}:	0.055
R:	2.000	C_S:	0.079
Site Class:	C	V:	1128 lbs

Pier Layout										
Number of Modules per Bay										
M	5	6	5	5	5	5	5	5	+1c	
Fy	50	50	50	50	50	50	50	50		
P.No	P2	P3	P4	P5	P6	P7	P8	P9		
	SPACING / GCR : 14.64 ft / 45.36%									

Weak Axis DL to Pier Distribution						
	Slope	Grade	V_D	W [lb/ft]	Weak DLz (Motor)	Weak DLz (Array)
Standard	3.44°	6%	601 lbs	28	428 lbs	22 lbs
High	8.56°	15%	1492 lbs	28	1063 lbs	54 lbs

3.6% of the total weak axis load applies to each array pier and the remaining load to motor pier (assuming both wings have the same configuration).

Note

1) Above governing loads do not act simultaneously and EOR should confirm with the detailed loadings provided below.

2) See documents PJE-000004 & PJE-000006 for design guidelines and standard nomenclature. Should the foundation engineer deviate from these recommendations they must inform Nextracker prior to construction.

3) Loads provided, assume both wings on either side of the motor pier have the same length and post spacings. For a tracker with the unsymmetrical wings, it is acceptable to combine ½ of the motor load from each wing.

4) Designer should consider positive and negative signs of $Combo_X$ and Moment factored loads. If both are negative, they are additive, otherwise they are subtractive.

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
				(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
►	0 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	3	191	642	1238	2	1007	-86418	MP-M Max
			2	16	295	698	1345	10	1125	0	
			3	34	373	654	1261	21	1128	0	
			4	52	398	569	1096	31	1058	0	
			5	72	466	592	1142	43	1122	0	
			6	86	491	591	1139	52	1136	0	
			7	105	549	573	1104	63	1152	0	
			8	111	554	647	1247	67	1229	0	
			9c	54	267	369	710	33	778	0	
	0 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	2	196	642	1238	1	1910	-64813	
			2	11	274	698	1345	5	2080	0	
			3	21	313	654	1261	10	1990	0	
			4	32	326	569	1096	14	1787	0	
			5	46	398	592	1142	21	1878	0	
			6	53	404	591	1139	24	1877	0	
			7	63	441	573	1104	28	1849	0	
			8	68	455	647	1247	31	2037	0	
			9c	33	219	369	710	15	1250	0	
►	0 deg - 49 mph Frontwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	3	191	642	1238	2	750	-86418	
			2	16	295	698	1345	10	846	0	
			3	34	373	654	1261	21	866	0	
			4	52	398	569	1096	31	830	0	
			5	72	466	592	1142	43	885	0	
			6	86	491	591	1139	52	899	0	
			7	105	549	573	1104	63	923	0	
			8	111	554	647	1247	67	971	0	
			9c	54	267	369	710	33	631	0	
	0 deg - 49 mph Backwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	-6	-329	642	1238	-3	695	-86418	
			2	-21	-396	698	1345	-12	710	0	
			3	-38	-415	654	1261	-23	655	0	
			4	-51	-396	569	1096	-31	581	0	
			5	-67	-436	592	1142	-40	581	0	
			6	-79	-450	591	1139	-47	571	0	
			7	-87	-457	573	1104	-52	549	0	
			8	-109	-544	647	1247	-66	570	0	
			9c	-64	-314	369	710	-38	430	0	
	0 deg - 49 mph Backwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	-4	-332	642	1238	-2	1672	-64813	
			2	-15	-386	698	1345	-7	1783	0	
			3	-27	-387	654	1261	-12	1676	0	
			4	-35	-362	569	1096	-16	1478	0	
			5	-46	-404	592	1142	-21	1517	0	
			6	-54	-409	591	1139	-24	1511	0	
			7	-57	-405	573	1104	-26	1468	0	
			8	-72	-483	647	1247	-33	1614	0	
			9c	-42	-279	369	710	-19	1025	0	
	0 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-6	-329	642	1238	-3	438	-86418	
			2	-21	-396	698	1345	-12	431	0	
			3	-38	-415	654	1261	-23	393	0	
			4	-51	-396	569	1096	-31	353	0	
			5	-67	-436	592	1142	-40	344	0	
			6	-79	-450	591	1139	-47	335	0	
			7	-87	-457	573	1104	-52	320	0	
			8	-109	-544	647	1247	-66	312	0	
			9c	-64	-314	369	710	-38	283	0	
	15 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	212	739	642	1218	127	1336	-56088	
			2	254	793	698	1242	152	1424	0	
			3	267	731	654	1071	160	1343	0	
			4	254	626	569	880	152	1194	0	
			5	279	647	592	870	168	1230	0	
			6	288	631	591	809	173	1219	0	
			7	304	640	573	775	182	1207	0	
			8	307	632	647	852	184	1276	0	
			9c	153	313	369	474	92	806	0	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
15 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	209	739	642	1213	94	2135	-42066
		2	245	796	698	1262	110	2253	0
		3	251	738	654	1128	113	2082	0
		4	235	635	569	947	106	1815	0
		5	256	658	592	954	115	1854	0
		6	263	644	591	917	118	1818	0
		7	276	656	573	854	124	1759	0
		8	276	646	647	946	124	1897	0
		9c	137	318	369	540	62	1167	0
15 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-187	-652	642	1218	-112	-256	-49004
		2	-222	-694	698	1242	-133	252	0
		3	-238	-653	654	1071	-143	251	0
		4	-237	-585	569	880	-142	-260	0
		5	-269	-621	592	870	-161	-268	0
		6	-292	-640	591	809	-175	-279	0
		7	-291	-615	573	775	-175	-275	0
		8	-338	-696	647	852	-203	-279	0
		9c	-196	-401	369	474	-118	-269	0
30 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	391	653	642	1338	235	1284	-45003
		2	450	704	698	1404	270	1370	0
		3	452	655	654	1251	271	1297	0
		4	419	566	569	1020	251	1158	0
		5	454	587	592	1020	272	1195	0
		6	466	579	591	984	279	1188	0
		7	472	572	573	942	283	1166	0
		8	509	606	647	1044	305	1260	0
		9c	274	325	369	585	165	813	0
30 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	385	649	642	1372	173	2213	-33752
		2	438	703	698	1442	197	2346	0
		3	436	658	654	1284	196	2163	0
		4	398	571	569	1066	179	1875	0
		5	427	593	592	1082	192	1921	0
		6	434	584	591	1064	195	1902	0
		7	441	582	573	1018	199	1848	0
		8	467	608	647	1129	210	2017	0
		9c	246	319	369	645	111	1246	0
30 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-489	-814	642	1338	-293	-353	-40002
		2	-524	-822	698	1404	-314	-324	0
		3	-500	-723	654	1251	-300	-291	0
		4	-463	-626	569	1020	-278	-284	0
		5	-497	-643	592	1020	-298	-280	0
		6	-512	-637	591	984	-307	-278	0
		7	-499	-605	573	942	-299	-269	0
		8	-602	-716	647	1044	-361	-292	0
		9c	-359	-424	369	585	-215	-284	0
45 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	611	593	642	1323	367	1248	-50330
		2	679	626	698	1360	407	1323	0
		3	654	564	654	1167	393	1242	0
		4	582	472	569	933	349	1102	0
		5	615	480	592	932	369	1130	0
		6	621	467	591	872	372	1121	0
		7	605	444	573	828	363	1089	0
		8	678	490	647	902	407	1191	0
		9c	385	276	369	498	231	784	0
45 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	610	596	642	1379	274	2195	-37747
		2	674	634	698	1416	303	2295	0
		3	645	577	654	1247	290	2099	0
		4	571	488	569	1035	257	1815	0
		5	601	500	592	1031	271	1840	0
		6	605	489	591	974	272	1791	0
		7	592	470	573	920	266	1724	0
		8	658	516	647	1044	296	1911	0
		9c	370	289	369	582	167	1194	0
45 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-725	-703	642	1323	-435	-286	-35618
		2	-755	-698	698	1360	-453	250	0
		3	-694	-598	654	1167	-416	284	0
		4	-621	-504	569	933	-373	288	0
		5	-653	-510	592	932	-392	299	0
		6	-664	-499	591	872	-398	305	0
		7	-636	-468	573	828	-382	313	0

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
		8	-840	-606	647	902	-504	274	0
		9c	-526	-378	369	498	-315	-256	0

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
				(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
▶			M	3650	2107	642	681	2190	2157	-16850	MP Max
▶			2	3965	2289	698	739	2379	2321	-17368	P2 Max
▶			3	3716	2145	654	693	2230	2191	-16433	P3 Max
▶	60 deg - 110 mph	DL - 1	4	3231	1866	569	603	1939	1938	-14981	P4 Max
▶	Frontwinded	WL - 0.6	5	3363	1941	592	628	2018	2007	-14981	P5 Max
▶	LC 5ASD	SL - 0	6	3365	1943	591	626	2019	2007	-14981	P6 Max
▶			7	3201	1848	573	607	1921	1932	-15824	
▶			8	3632	2097	647	685	2179	2155	-16512	
▶			9c	2104	1215	369	391	1262	1347	-11540	
			M	3650	2107	642	681	1643	2351	-12637	
			2	3965	2289	698	739	1784	2532	-13026	
			3	3716	2145	654	693	1672	2389	-12325	
	60 deg - 110 mph	DL - 1	4	3231	1866	569	603	1454	2110	-11236	
	Frontwinded	WL - 0.45	5	3363	1941	592	628	1513	2187	-11236	
	LC 6ASD	SL - 0.75	6	3365	1943	591	626	1514	2185	-11236	
			7	3201	1848	573	607	1441	2110	-11868	
			8	3632	2097	647	685	1634	2354	-12384	
			9c	2104	1215	369	391	947	1458	-8655	
			M	-3096	-1788	642	681	-1858	-937	-18371	
▶			2	-3161	-1825	698	739	-1896	-926	-18935	P2-M Max
▶			3	-2826	-1632	654	693	-1696	-837	-17917	P3-M Max
▶	60 deg - 93.5 mph	DL - 0.6	4	-2478	-1431	569	603	-1487	-767	-16333	P4-M Max
▶	Backwinded	WL - 0.6	5	-2568	-1483	592	628	-1541	-784	-16333	P5-M Max
▶	LC 7ASD	SL - 0	6	-2586	-1493	591	626	-1551	-791	-16333	
▶			7	-2440	-1409	573	607	-1464	-752	-16641	
			8	-3353	-1936	647	685	-2012	-1023	-15554	
			9c	-2149	-1241	369	391	-1289	-773	-9990	

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Job Number:	EST:
Engineer:	MDR/DCD
Date:	14-Mar-2025

LC : REV.U4
PC : REV.U4

Project : Verogy: Woodstock Solar One_Edge

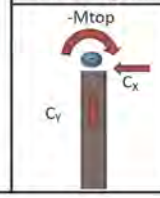
Rev History: **Rev. 6**

Wind Information	
Tilt Angle	**Design Wind**
±0	49 mph
±15	49 mph
±30	49 mph
±45	49 mph
+60	110 mph
-60	93.5 mph

ASCE Version:	**7-16**		TT Thick:	**2.5**	mm
Risk Category:	**I**		Top of Pier:	**7**	ft
Design Wind Speed:	**110**	mph	Load application:	**7.75**	ft
Ground Snow Load:	**40**	psf	Pier Count:	**9**	Nos
Terrain:	**XTR-0.75**		Mod/String:	**6**	
Stow Angle:	**60**	deg	No of module:	**42**	
Module:	**Series 6 Plus / 2.3.13.P**				
Module Width:	**1245**	mm	Module Thick:	**49**	mm
Module Length:	**2024**	mm	Module Weight:	**34.0**	kg

Load Application at center line of pivot pin, 9" above the top of post

Load Diagram



*Loads are combined loads per ASCE 7-16 section 2.4.1 (BASIC ASD)

Wind Factors			
K_z:	**1.00**	K_d:	**0.85**
K_{zt}:	**1.00**	K_e:	**0.98**
		Zg (ft):	466.6

Stow Wind Speed
35mph 3s 10m

	Lateral (lbs)	Axial (lbs)	Moment (lbs-in)	Abs Down (lbs)	Abs Up (lbs)
M	645	1214	-10414	1952	0
M	-73	356	-42518	0	0
P2	701	1298	-10734	2054	-250
P3	656	1231	-10157	1892	-250
P4	573	1105	-9259	1681	-250
P5	587	1134	-9259	1745	-250
P6	623	1154	-9259	1748	-250
P7	463	1045	-10832	1697	-250
P8	1348	1624	-10570	1944	-482
P9	1123	1238	-6163	1368	-505
P9	-794	-505	-6293	0	0

Seismic Load To Motor

S_S:	**0.182**	S_{DS}:	**0.158**
S_1:	**0.055**	S_{D1}:	**0.055**
R:	**2.000**	C_S:	**0.079**
Site Class:	**C**	V:	**1066 lbs**

Pier Layout									
Number of Modules per Bay									
M	5	6	5	5	5	5	5	5	+1c
Fy	50	50	50	50	50	50	50	50	
P.No	P2	P3	P4	P5	P6	P7	P8	P9	
SPACING / GCR : 14.64 ft / 45.36%									

	Weak Axis DL to Pier Distribution					
	Slope	Grade	V_D	W [lb/ft]	Weak DLz (Motor)	Weak DLz (Array)
Standard	**3.44°**	**6%**	**553 lbs**	**25**	**394 lbs**	**20 lbs**
High	**8.56°**	**15%**	**1375 lbs**	**25**	**979 lbs**	**49 lbs**

3.6% of the total weak axis load applies to each array pier and the remaining load to motor pier (assuming both wings have the same configuration).

Note

1) Above governing loads do not act simultaneously and EOR should confirm with the detailed loadings provided below.

2) See documents PJE-000004 & PJE-000006 for design guidelines and standard nomenclature. Should the foundation engineer deviate from these recommendations they must inform Nextracker prior to construction.

3) Loads provided, assume both wings on either side of the motor pier have the same length and post spacings. For a tracker with the unsymmetrical wings, it is acceptable to combine ½ of the motor load from each wing.

4) Designer should consider positive and negative signs of $Combo_X$ and Moment factored loads. If both are negative, they are additive, otherwise they are subtractive.

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
0 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	4	157	592	1238	2	936	-38862
		2	14	192	643	1345	8	1008	0
		3	26	209	603	1261	16	978	0
		4	38	212	524	1096	23	901	0
		5	49	234	546	1142	30	936	0
		6	61	251	544	1139	37	945	0
		7	61	232	528	1104	36	917	0
		8	91	326	596	1247	55	1041	0
		9c	62	219	340	710	37	721	0
0 deg - 49 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	3	146	592	1238	1	1836	-29146
		2	10	181	643	1345	4	1983	0
		3	18	195	603	1261	8	1886	0
		4	25	189	524	1096	11	1681	0
		5	33	208	546	1142	15	1745	0
		6	40	220	544	1139	18	1748	0
		7	39	202	528	1104	18	1697	0
		8	57	275	596	1247	26	1905	0
		9c	38	181	340	710	17	1203	0
0 deg - 49 mph Frontwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	4	157	592	1238	2	699	-38862
		2	14	192	643	1345	8	751	0
		3	26	209	603	1261	16	737	0
		4	38	212	524	1096	23	691	0
		5	49	234	546	1142	30	718	0
		6	61	251	544	1139	37	727	0
		7	61	232	528	1104	36	706	0
		8	91	326	596	1247	55	803	0
		9c	62	219	340	710	37	585	0
0 deg - 49 mph Backwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	-5	-209	592	1238	-3	717	-38862
		2	-19	-261	643	1345	-11	736	0
		3	-37	-290	603	1261	-22	678	0
		4	-53	-300	524	1096	-32	594	0
		5	-71	-336	546	1142	-42	594	0
		6	-86	-356	544	1139	-52	581	0
		7	-97	-370	528	1104	-58	556	0
		8	-142	-509	596	1247	-85	541	0
		9c	-89	-317	340	710	-54	399	0
0 deg - 49 mph Backwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	-3	-192	592	1238	-1	1684	-29146
		2	-13	-245	643	1345	-6	1792	0
		3	-25	-268	603	1261	-11	1677	0
		4	-35	-264	524	1096	-16	1477	0
		5	-46	-294	546	1142	-21	1519	0
		6	-56	-309	544	1139	-25	1510	0
		7	-61	-312	528	1104	-27	1465	0
		8	-91	-443	596	1247	-41	1582	0
		9c	-59	-281	340	710	-26	996	0
0 deg - 49 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-5	-209	592	1238	-3	480	-38862
		2	-19	-261	643	1345	-11	479	0
		3	-37	-290	603	1261	-22	437	0
		4	-53	-300	524	1096	-32	384	0
		5	-71	-336	546	1142	-42	376	0
		6	-86	-356	544	1139	-52	363	0
		7	-97	-370	528	1104	-58	345	0
		8	-142	-509	596	1247	-85	302	0
		9c	-89	-317	340	710	-54	263	0
15 deg - 49 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	83	283	592	1224	50	1011	-29303
		2	96	283	643	1221	58	1063	0
		3	95	237	603	1016	57	995	0
		4	85	186	524	795	51	885	0
		5	89	179	546	765	53	903	0
		6	91	169	544	708	54	896	0
		7	91	164	528	659	55	876	0
		8	230	399	596	700	138	1085	0
		9c	174	299	340	390	104	769	0

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
		M	81	282	592	1218	37	1883	-21977	
		2	93	288	643	1242	42	1954	0	
		3	92	249	603	1071	41	1768	0	
15 deg - 49 mph	DL - 1	4	84	205	524	880	38	1526	0	
Frontwinded	WL - 0.45	5	88	202	546	870	40	1539	0	
LC 6ASD	SL - 0.75	6	89	193	544	809	40	1488	0	
		7	86	181	528	775	39	1440	0	
		8	189	384	596	852	85	1657	0	
		9c	140	282	340	474	63	1072	0	
		M	-122	-416	592	1224	-73	356	-42518	MP-M Max
		2	-155	-456	643	1221	-93	362	0	
		3	-174	-432	603	1016	-104	352	0	
15 deg - 49 mph	DL - 0.6	4	-173	-378	524	795	-104	338	0	
Backwinded	WL - 0.6	5	-194	-391	546	765	-117	343	0	
LC 7ASD	SL - 0	6	-214	-400	544	708	-128	337	0	
		7	-191	-344	528	659	-115	360	0	
		8	-307	-532	596	700	-184	288	0	
		9c	-217	-374	340	390	-130	-270	0	
		M	98	164	592	1338	59	940	-15776	
		2	114	179	643	1405	68	1000	0	
		3	116	170	603	1249	70	954	0	
30 deg - 49 mph	DL - 1	4	109	149	524	1035	65	863	0	
Frontwinded	WL - 0.6	5	117	154	546	1053	70	888	0	
LC 5ASD	SL - 0	6	126	159	544	1017	75	890	0	
		7	122	150	528	955	73	868	0	
		8	320	386	596	1061	192	1078	0	
		9c	246	297	340	606	148	768	0	
		M	96	161	592	1372	43	1943	-11832	
		2	110	177	643	1442	49	2054	0	
		3	111	169	603	1285	50	1892	0	
30 deg - 49 mph	DL - 1	4	103	149	524	1063	46	1639	0	
Frontwinded	WL - 0.45	5	110	154	546	1100	49	1689	0	
LC 6ASD	SL - 0.75	6	116	157	544	1082	52	1677	0	
		7	114	153	528	1015	51	1607	0	
		8	298	392	596	1130	134	1870	0	
		9c	228	300	340	645	103	1208	0	
		M	-257	-429	592	1338	-154	348	-28631	
		2	-274	-433	643	1405	-165	376	0	
		3	-251	-367	603	1249	-151	391	0	
30 deg - 49 mph	DL - 0.6	4	-217	-297	524	1035	-130	386	0	
Backwinded	WL - 0.6	5	-224	-294	546	1053	-135	401	0	
LC 7ASD	SL - 0	6	-225	-284	544	1017	-135	406	0	
		7	-205	-254	528	955	-123	414	0	
		8	-399	-483	596	1061	-239	318	0	
		9c	-290	-350	340	606	-174	-256	0	
		M	173	168	592	1325	104	943	-12961	
		2	193	179	643	1357	116	1000	0	
		3	186	162	603	1194	112	950	0	
45 deg - 49 mph	DL - 1	4	167	137	524	963	100	856	0	
Frontwinded	WL - 0.6	5	174	138	546	923	104	878	0	
LC 5ASD	SL - 0	6	185	141	544	903	111	879	0	
		7	152	114	528	851	91	846	0	
		8	420	308	596	929	252	1031	0	
		9c	340	248	340	532	204	739	0	
		M	172	169	592	1379	78	1952	-9720	
		2	191	180	643	1416	86	2036	0	
		3	183	165	603	1247	82	1862	0	
45 deg - 49 mph	DL - 1	4	163	141	524	1036	73	1614	0	
Frontwinded	WL - 0.45	5	170	142	546	1027	76	1630	0	
LC 6ASD	SL - 0.75	6	180	147	544	1002	81	1612	0	
		7	150	121	528	948	68	1543	0	
		8	410	325	596	1039	184	1771	0	
		9c	328	260	340	594	148	1152	0	
		M	-206	-200	592	1325	-123	485	-20089	
		2	-214	-198	643	1357	-128	517	0	
		3	-194	-168	603	1194	-116	511	0	
45 deg - 49 mph	DL - 0.6	4	-164	-134	524	963	-98	484	0	
Backwinded	WL - 0.6	5	-162	-128	546	923	-97	500	0	
LC 7ASD	SL - 0	6	-164	-125	544	903	-99	501	0	
		7	-173	-129	528	851	-104	489	0	

LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads		
			WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment
			(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)
		8	-471	-345	596	929	-283	400	0
		9c	-358	-261	340	532	-215	297	0

	LOAD CASE	FACTORS	Joint	Unfactored Loads				Factored Loads			
				WL_X	WL_Y	DL	SL	$Combo_X$	$Combo_Y$	Moment	
				(lb)	(lb)	(lb)	(lb)	(lb)	(lb)	(lb-in)	
►	60 deg - 110 mph Frontwinded LC 5ASD	DL - 1 WL - 0.6 SL - 0	M	1075	621	592	681	645	1214	-10414	MP Max
►			2	1168	674	643	739	701	1298	-10734	P2 Max
►			3	1094	632	603	693	656	1231	-10157	P3 Max
►			4	955	552	524	603	573	1105	-9259	P4 Max
►			5	978	565	546	628	587	1134	-9259	P5 Max
►			6	1039	600	544	626	623	1154	-9259	P6 Max
►			7	771	445	528	607	463	1045	-10832	P7 Max
►			8	2246	1297	596	685	1348	1624	-10570	P8 Max
►			9c	1871	1080	340	391	1123	1238	-6163	P9 Max
	60 deg - 110 mph Frontwinded LC 6ASD	DL - 1 WL - 0.45 SL - 0.75	M	1075	621	592	681	484	1632	-7810	
			2	1168	674	643	739	526	1751	-8051	
			3	1094	632	603	693	492	1657	-7617	
			4	955	552	524	603	430	1474	-6944	
			5	978	565	546	628	440	1520	-6944	
			6	1039	600	544	626	468	1534	-6944	
			7	771	445	528	607	347	1433	-8124	
			8	2246	1297	596	685	1011	1944	-7928	
			9c	1871	1080	340	391	842	1368	-4622	
	60 deg - 93.5 mph Backwinded LC 7ASD	DL - 0.6 WL - 0.6 SL - 0	M	-512	-295	592	681	-307	428	-8416	
			2	-534	-308	643	739	-320	451	-8675	
			3	-486	-281	603	693	-292	443	-8208	
			4	-425	-245	524	603	-255	417	-7483	
			5	-440	-254	546	628	-264	425	-7483	
			6	-447	-258	544	626	-268	422	-7483	
			7	-508	-293	528	607	-305	391	-6231	
			8	-1703	-983	596	685	-1022	-482	-6950	
►			9c	-1323	-764	340	391	-794	-505	-6293	P9-M Max

DRAFT

Woodstock Solar One

Sheep Grazing Plan
Ground Mount PV Array

Date:
November 2023, Revised May 2025

Prepared By:
Woodstock Solar One, LLC
in conjunction with Natalie Cohen of Hillview Farm

Introduction

Ground-mounted solar sites, by nature of their design, have ample fenced areas. The fencing at solar sites is uniquely suited to serve as grazing areas or be subdivided into grazing paddocks in a pasture rotation with sheep. The perimeter fencing also serves as predator deterrent, the solar panels provide shading and shelter for inhabitants, and the solar arrays provide palatable pasture species for ruminant nutrition. In turn, rotationally grazed sheep provide adequate and comparatively cheap vegetation management, optimal ground coverage and thus reduced erosion and run-off, as well as agricultural usage of lands that can add to the viability of farming communities.

Woodstock Solar One, located at 11 Castle Rock Road in Woodstock, CT, is planned for approximately *14.6* acres of fenced in solar array ("Facility"). Sheep grazing will be used to control vegetation within the fenced facility to:

- Prevent panel shading from vegetation,
- Control and remove invasive and unpalatable plant species,
- Avoid the growth of brush and woody species under the solar panels,
- Maintain a diverse forage population to support optimal sheep nutrition,
- Encourage flowering forb and plant species to maximize pollinator habitat,
- Optimize sequestered soil carbon through increasing top-soil amount and root matter,
- Control erosion.

To achieve these goals a rotational grazing system will be implemented. Rotational grazing is a technique where animals are moved as one group, from one pastured area ("paddock") to the next (Hodgson, 1979). Only one paddock is grazed at any given time throughout the rotation, while the other paddocks are given a rest period to achieve pasture regrowth. Compared to continuous or extensive grazing, rotational grazing inhibits weed growth, improves the health of pasture, sustains healthy vegetation, and improves sheep health.

Site Requirements

The perimeter fencing can be chain link or "ag type" woven wire and should be installed to the ground. It can be buried slightly below grade or have a maximum gap of 1-2". Gaps caused by uneven ground should be cleaned up with a with a small machine. If chain link fencing is used it should be installed with a bottom tensioning wire.

The perimeter gates should be installed to meet evenly and have an even spacing to the ground. The maximum gap between the gates and the ground should be 1-2". Care should be taken to add some gravel or grade the area to avoid large gaps.

The site should be building on an existing sod or hay-ground or planting an existing tilled field. The solar facility should be seeded with Ernst Conservation Seeds, Inc. Fuzz & Buzz mix or equivalent. The Fuzz & Buzz mix is the best way to blend grazing with solar and introducing pollinator friendly species. This seed mix was developed by Ernst and the Cornell Sheep Program in conjunction with the American Solar Grazing Association. For additional seedings, clover or legume mixes are a good option for vigor and grazing friendliness. For grass species fescue species should be avoided unless they are endophyte-free varieties.

Rotation planning

Woodstock Solar One was assessed for a planned grazing rotation based on the preliminary panel layout, and *14.6* acres fenced area under panels. The grazing plan requires division of the solar array into smaller grazing units, known as *paddocks*. The site layout can be subdivided into *4* different grazing paddocks with Electronet® fencing (Figure 1). The Electronet® is a portable fence that is a product familiar to farmers in in the grazing community. It is a white, lightweight fence that is energized using a portable battery, battery/solar, or 110V power supply. This fencing is simple to power on/off and will only be located inside the fenced areas. Its use is to facilitate grazing inside the permanently fenced areas only. The Electronet® will be installed by the grazing manager according to the grazing plan.

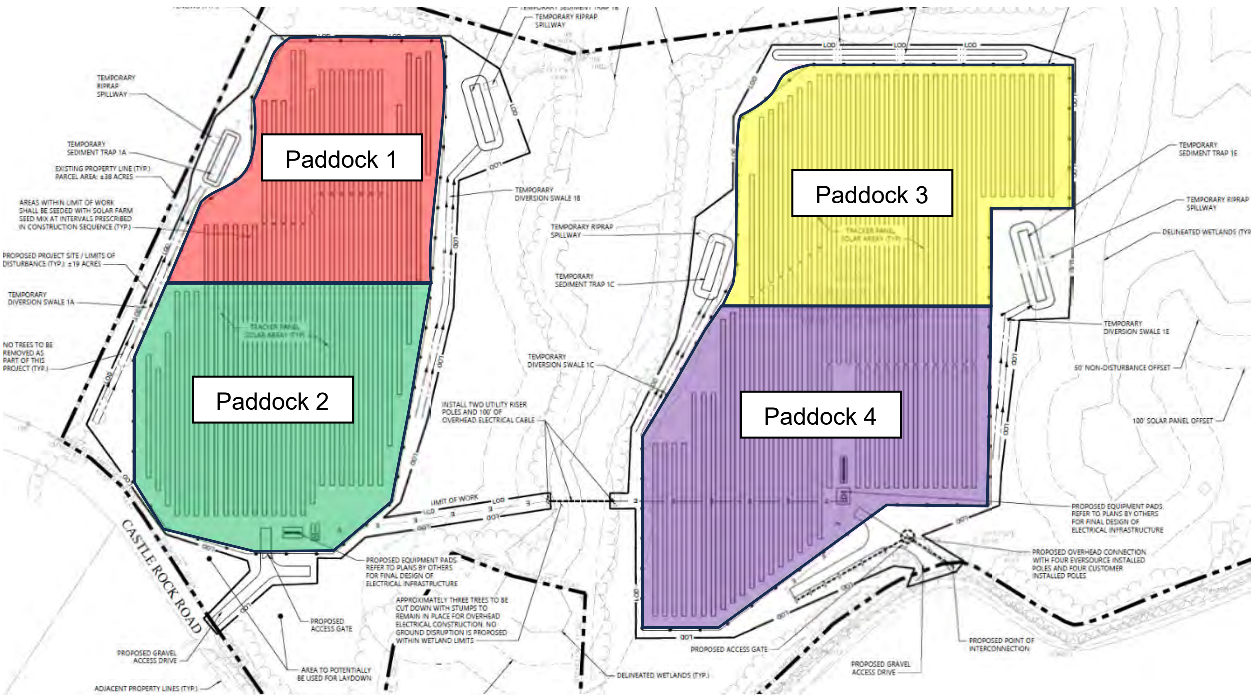


Figure 1. Woodstock Solar One Layout with distinctly colored sections. Please note that this is an approximation and subject to change.

- Paddock 1 (3.2 acres)
- Paddock 2 (3.2 acres)
- Paddock 3 (4.1 acres)
- Paddock 4 (4.1 acres)

The number of grazing paddocks in each array is dependent on a unique set of factors. The number depends on size and layout of the permanently fenced array, panel orientation, and space used for access roads, inverter pads, and other non-forage producing areas.

Manure management is a subset of the flock management and sheep management planned for the solar site. The primary purpose of the placement of sheep on the solar site is to achieve vegetation management goals. The planned movement of the sheep around the solar site has the underlying benefit of moving and distributing sheep manure at the same time. Sheep manure is typically small and pelletized. For the layperson, sheep manure may resemble the manure of rabbits or deer. Similarly, the manure is typically invisible within a short period of time and begins nutrient cycling in the soils.

The correct sheep stocking rate and density (sheep per acre per unit of time) will be calculated before the grazing season based on site size, and quantity and type of vegetation present. This metric also ensures that no over-grazing occurs, and that the amount of manure deposition does not outpace the rate of manure decomposition throughout the grazing rotation.

The flock will not overwinter within the fenced area of the solar array.

Acreage

The sheep flock is sized to cover the four grazing paddocks in a full rotation, i.e. the amount of sheep needed to graze Paddock 1, 2, 3 and 4 with 3.2, 3.2, 4.1 and 4.1 acres, respectively, in a +/- 45-day rotation. The precise number of days per paddock may be adjusted over the season by the flock manager, depending on weather and forage growth conditions. The number of sheep determined by the grazing plan can be found in Table 1 below:

Woodstock Solar One - Grazing Plan						
	Items	Paddock 1	Paddock 2	Paddock 3	Paddock 4	Site Totals
Paddock Info.	Total Paddock Area (ac)					14.0
	Number of Paddocks					4
	Paddock Rest Period (days)					45
	Paddock Use (days)					15
	Paddock Size (ac)	3.2	3.2	4.1	4.1	
Feed Anlysis	Vegetation Cover of Paddock (%),(ac)	80% 2.56	80% 2.56	80% 3.28	80% 3.28	80% 11.20
	Biomass (lbs/sy)	1.5	1.5	1.5	1.5	1.5
	Dry Matter (%), (lbs/sy)	20% 0.3	20% 0.3	20% 0.3	20% 0.3	20% 0.3
	Dry Matter per Acre (lbs)	1452	1452	1452	1452	1452
	Dry Matter per Paddock (lbs)	3717	3717	4763	4763	16262
	Refusals per Paddock (%), (lbs)	30% 1115	30% 1115	30% 1429	30% 1429	30% 4879
	Adjusted Dry Matter per Paddock (lbs)	2602	2602	3334	3334	11384
Feed Intake	Average sheep weight (lbs)					160.0
	Dry Matter Intake per Sheep (%),(lbs)					3.5% 5.6
Sheep Anlysis	Total Paddock Area (ac)					14.0
	Total Adjusted Dry Matter (lbs)					11384
	Number of Sheep for Site					34
	Sheep Stocking Rate					2.4

Table 1. Grazing Plan Woodstock Solar One Project

The rest time for a given grazed area is largely guided by management for the sheep flock's health. The rest time can be considered the window during which the sheep are not present in a given area and the space is given a rest. The pasture rest period (time between grazing periods) in the US Northeast should not be less than 40-days to minimize internal parasite pressure for sheep. Internal parasites are a health risk to the sheep but not to humans. Internal parasites of sheep are not zoonotic, but a threat only to the health of sheep. This health risk to sheep is minimized by following the following prescriptive grazing plan.

A common internal parasite specific to ruminates is the stomach nematode *H. contortus* or barber pole worm. It has a life cycle of 40 days; thus, a clean pasture can only be achieved with rest periods of 40+ days to avoid reinfection through ingestion of larvae. However, in effective grazing regimens with parasite-resistant sheep flocks, exceptions can be made by the flock manager if the vegetation pressure is too high to adhere to a 40-day rest period before re-grazing.

Sampling and analysis

In newly commissioned solar sites, full vegetation coverage cannot be expected in the first 1-2 years. Additionally, access roads, inverter pads and other site infrastructure will reduce the overall vegetation cover. The estimate for NY State solar sites lies between 65 and 85% vegetation coverage for new sites. This number should be estimated and considered separately for each individual paddock. This number will be adjusted over subsequent years and grazing seasons.

As previous management regimes for solar sites might consist of hay fields, crop fields, marginal pastures or brush areas, the vegetation coverage is expected to be heterogeneous. Therefore, vegetation sampling must be performed to determine sheep stocking rate and density, which is a requirement prior to establishing a grazing rotation. Tabular dry matter and nutrient values as they are published for uniform stands of established crops, hay field or other, are not adequate for evaluating solar array site vegetation for grazing. A detailed organic matter (OM) vegetation sampling protocol is published on the American Solar Grazing Association (ASGA) website. The grazing rotation will largely depend on the amount of forage dry matter (DM) growing within the individual areas. Manager may perform vegetation sampling at intervals to analyze the nutritional value of the forage.

Forage analysis laboratories such as Dairy One provide detailed analyses that can be used to calculate the available DM per grazing paddock from submitted OM samples. Dry matter is a percent of total percent plant weight minus water content. These DM values are necessary to establish the amount of available feed for sheep, and eventually the sheep stocking rate and density. Typically, pasture DM values in the Northeastern US for well-maintained pastures are between 18-25%, depending on the season.

Typically, well managed Northeast pastures can achieve yields above 2,500 lbs DM per acre. The yield in the grazing plan draft above is substantially lower; it is expected that the solar array pastures will take time after establishment to reach their potential. It is necessary to plan a grazing rotation prior to the grazing season, which would be used to guide a flock manager's rotation plan. The flock manager would then use his/her own experience and observation to decide daily if the rotation plan is reasonable and responsible, and to make necessary adjustments in rotation days and stocking rates.

Pasture utilization should be between 70 and 85% to ensure optimal regrowth and animal nutrition. Thus, pasture refusals (uneaten vegetation remaining after grazing) should be part of the calculation and should be between 15% and 35%.

Two examples of common adjustments to rotation plans include: First, in late spring after rain events and with the warming weather, stocking rates may have to be increased to be able to clear the vegetation growth. Secondly, in the summer, sheep may have to be moved from paddock to paddock faster than they were in spring or fall due to the slowed growth of dormant cool-season vegetation.

Feed Intake

It is recommended to graze uniform animal groups that are either dry (non-lactating) ewes, open (non-pregnant) ewes, ewes in their early stages of pregnancy, yearling ewes or growing lambs of at least 60 lb. (or alternatively, 50% of their mature body weight in case of small breeds). In the case of groups of growing lambs, the lambs should be of the same sex or the males should be castrated.

Table 2. Body weight and feed intake				
Breed	*Stage of production*	*Body weight, lbs*	*Feed intake, DM %BW*	*Feed intake, lbs DM*
Katahdin hair sheep	Growing lamb, 50% mature BW	65	2.5	1.6
	Yearling	110	3.0	3.3
	Open, dry ewe	130	3.5	4.6
Polypay composite	Growing lamb, 50% mature BW	80	2.5	2.0
	Yearling	130	3.0	3.9
	Open, dry ewe	160	3.5	5.6
Texel	Growing lamb, 50% mature BW	90	2.5	2.3
	Yearling	150	3.0	4.5
	Open, dry ewe	180	3.5	6.3

Depending on the breed and uniformity of the group of sheep, an average weight for the individual animals in the flock can be determined. Table 2. Body weight and feed intake, gives an overview of BW (body weight) and feed intake across popular Northeastern sheep breeds. According to NRC nutritional requirements for small ruminants (NRC, 2007), daily DM consumption per animal can be estimated as a percentage of bodyweight.

Totals

These calculations can be used to determine the optimal number of sheep per paddock according to body weight and stage of production. By using this with the chosen grazing rotation days (or rest period), the stocking rate (the necessary sheep number for the calculated grazing time within each paddock) can be calculated, and the optimal grazing flock size calculated.

On the 14.6 acre Woodstock Solar One project, the grazing plan allows for 34 mature ewes managed in four grazing paddocks, a stocking rate of 2.4 sheep per acre, and 15 grazing days per paddock with a 45-day rest period.

Animal welfare recommendations

Regardless of season, ad libitum clean and fresh water access is crucial for animal welfare (NRC, 2007). Site-specific amenities like well water or connection to municipal water lines are ideal, but transported water is typical of solar grazing operations. For sheep of the recommended production stages (non-lactating and > 60 lbs growing lambs), water requirements are very low in spring and fall. Typically, dry, non-gestating ewes will consume between 5 and 10 % of their BW water daily.

Granulated mineral feed must be available ad libitum and contain adequate concentrations. Mineral feed should be offered in troughs that can be moved with the flock according to the rotation and rotation days. Mineral feed is specially blended and commercially available for sheep producers (Cargill, 2019).

Sheep will be visually inspected on every rotation day by the flock manager. A closer inspection of each member of the flock is recommended at regular intervals (every 6 weeks on site), including parasite monitoring or treatment with a FAMACHA (FAffa MAlan CHArt) protocol (Wyk and Bath, 2002), and 5-point checks (Bath and van Wyk, 2009). Each spring, before the flocks begin the grazing season, certain protocols are recommended to ensure they are in optimal health before their work at the solar site begins:

- Feet must be checked and trimmed,
- Ear tags replaced or added, in compliance with USDA regulations,
- Wool sheep must be shorn,
- Wool sheep should be tail-banded,
- Body-condition scores should be recorded to monitor nutritional and health status across the grazing season,
- *Sheep should be kept in a dry lot on hay 24 hours prior to moving on site in Spring and de-wormed with a commercially available de-wormer to prevent parasite infections on site.*

Emergency Protocols

In the event of a site emergency, the following protocol is to be on hand to ensure safe site access for emergency personnel:

- Clear signage will be displayed at the main gate with emergency contact information of the sheep manager. The manager should be contacted immediately in the event emergency personnel have to enter the site in order to ascertain if there are animals present, and to provide notification to the sheep manager that the animals may need to be removed.
- If portable electric fence is installed crossing site roadways, the fence charger will be placed clearly by the side of the roadway. In the event of emergency, the charger will only need to be switched off and the fence pulled up by hand to allow passage.
- If possible, animals should remain inside the site during an emergency, until the sheep manager can safely remove them. They will likely move as a flock away from any commotion and pose little risk of being in the way. If they do escape during the site emergency, they should be monitored and pushed towards fields and away from roads if possible.

Literature

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HOLD HARMLESS AGREEMENT

Woodstock Solar One, LLC ("Woodstock S1") hereby agrees that it will indemnify and hold harmless the Connecticut Siting Council (the "Siting Council") and its respective employees, officers, agents, and representatives (collectively, the "Indemnified Parties") from and against any and all losses, claims, actions, costs and expenses, judgments, subrogations, or other damages (collectively, "Claims") brought against or incurred by the Siting Council or the Indemnified Parties due to injury to a person or damage to property at the solar photovoltaic facility site located at 11 Castle Rock Road in Woodstock, Connecticut (the "Premises") to the extent such injury or damage arises out of the agricultural co-use plan and the corresponding presence of third parties within the fenced solar facility site in the performance of the agricultural co-use plan, unless such Claims are the result of the negligence, recklessness or willful misconduct of the Siting Council or the Indemnified Parties.

This Hold Harmless Agreement shall remain in full force and effect for so long as Woodstock S1 is developing and operating the solar facility on the Premises and performing the agricultural co-use plan, and shall terminate upon the earlier of the decommissioning of the solar facility or the termination of the agricultural co-use plan.

IN WITNESS WHEREOF, this Hold Harmless Agreement has been executed as of the 15th day of May, 2025.

Woodstock Solar One, LLC

By: _________________________
Name: _______________________
Title: ________________________