

PLANNING DEPARTMENT

Town of Durham

8 Newmarket Road
Durham, NH 03824-2898
Phone (603) 868-8064
www.ci.durham.nh.us

HISTORIC DISTRICT COMMISSION
Application for Certificate of Approval

Date: 2/20/24

Property information

Property address/location: 1 Park Ct (back of property) / 15 Park Ct (side lawn)

Tax map and lot #: 108 - 31; (Old tax map and lot # _____)

Date of building, if known: 1952

Name of project (if applicable): St. George's Solar Array

Property owner

Name (include name of individual): St. George's Episcopal Church (Rector – Nathan Bourne)

Mailing address: 1 Park Ct, Durham, NH 03824

Telephone #: 603-868-2785 Email address: nathan@stgeorgesdurham.org

Applicant (if different from property owner)

Name (include name of individual): Scott Righini – Facilities Manager

Mailing address: 149 Mill Rd, Durham, NH 03824

Telephone #: 603-502-2357 Email address: srighini@comcast.net

Architect/Designer (if applicable)

Name (include name of individual): _____

Professional Designation: _____

Mailing address: _____

Telephone #: _____ Email address: _____

Contractor (if applicable)

Name (include name of individual): _____

Mailing address: _____

Telephone #: _____ Email address: _____

(over)

Proposed activity (check all that apply)

New building/structure: _____ Addition onto existing building/structure: _____

Alterations to existing building: _____ Demolition: _____ Signage: _____

Site development (other structures, parking, utilities, etc.): X Change of use: _____

Wall or fence: _____ Removal of tree(s): _____

Describe project: 16.8 kW free standing/ground mount solar array to be installed in the back corner of the property behind the building and parking lot (on the side lawn of the rectory @ 15 Park Ct)

Proposed starting date: Late Spring / early Summer of 2024

Submission of materials

The following materials must be submitted with this application. Please check off each item:

Elevation drawings. Submit for the building and any pertinent details: _____ X _____

Site plans. Submit if any changes are proposed to the site: _____ X _____

Details. Provide drawings/cut sheets of any pertinent elements: _____ X _____

Samples. Provide samples or swatches of proposed colors and materials: _____

Other items. Provide information or drawings of any other pertinent elements: _____ X _____

Submission of application

This application must be signed by the property owner.

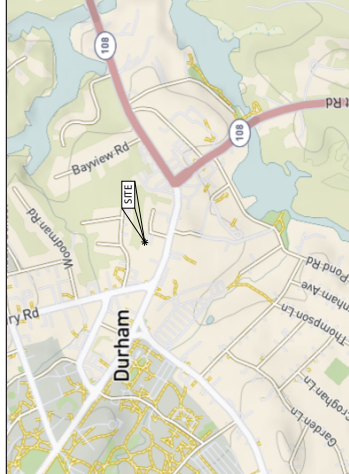
I hereby submit this application to the Town of Durham Historic District Commission pursuant to the Historic District Ordinance and attest to the best of my knowledge that all of the information on this application and in the accompanying materials is true and accurate.

Name of Property Owner: _____

Signature: _____ Date: _____

I authorize and designate _____, attorney or developer or architect/designer or contractor or agent (circle all that apply), to represent me in all matters related to this application.

The applicant or a representative must attend the HDC meeting to present the application and answer any questions. If nobody attends the meeting then the HDC may not take action on the application.



LOCATION MAP
SCALE: 1" = 2,000' ±

ABUTTERS LIST

- 108-6 Durham Community Church
17 Main Street
Durham, NH 03824
- 108-12 Toomerfs, LLC
19 Main Street
Durham, NH 03824
- 108-13 Toomerfs, LLC
21 main Street
Durham, NH 03824
- 108-24 David Richman
16 Cowell Drive
Durham, NH 03824
- 108-25 Refresh Homes and Designs, LLC
14 Cowell Drive
Durham, NH 03824
- 108-26 Toomerfs, LLC
12 Cowell Drive
Durham, NH 03824
- 108-30 Toomerfs, LLC
18 Main Street
Durham, NH 03824
- 108-32 Torrington Mast LLC
21 Park Court
Durham, NH 03824
- 108-35 Torrington Malden One LLC
10 Main Street
Durham, NH 03824

FINAL APPROVAL BY DURHAM PLANNING BOARD.
CERTIFIED BY MICHAEL BEHRENDT, TOWN PLANNER
CERTIFIED _____
DATE _____

108-30

Tax Map 108
Lot 31
1.295 Ac
56,410 Sq. Ft.

ST GEORGE'S
EPISCOPAL CHURCH

PARK

COURT

MAIN
STREET

108-12

108-6

108-26

108-25

108-24

108-32

108-35

159.82'

116.96'

137.27'

228'

45.93'

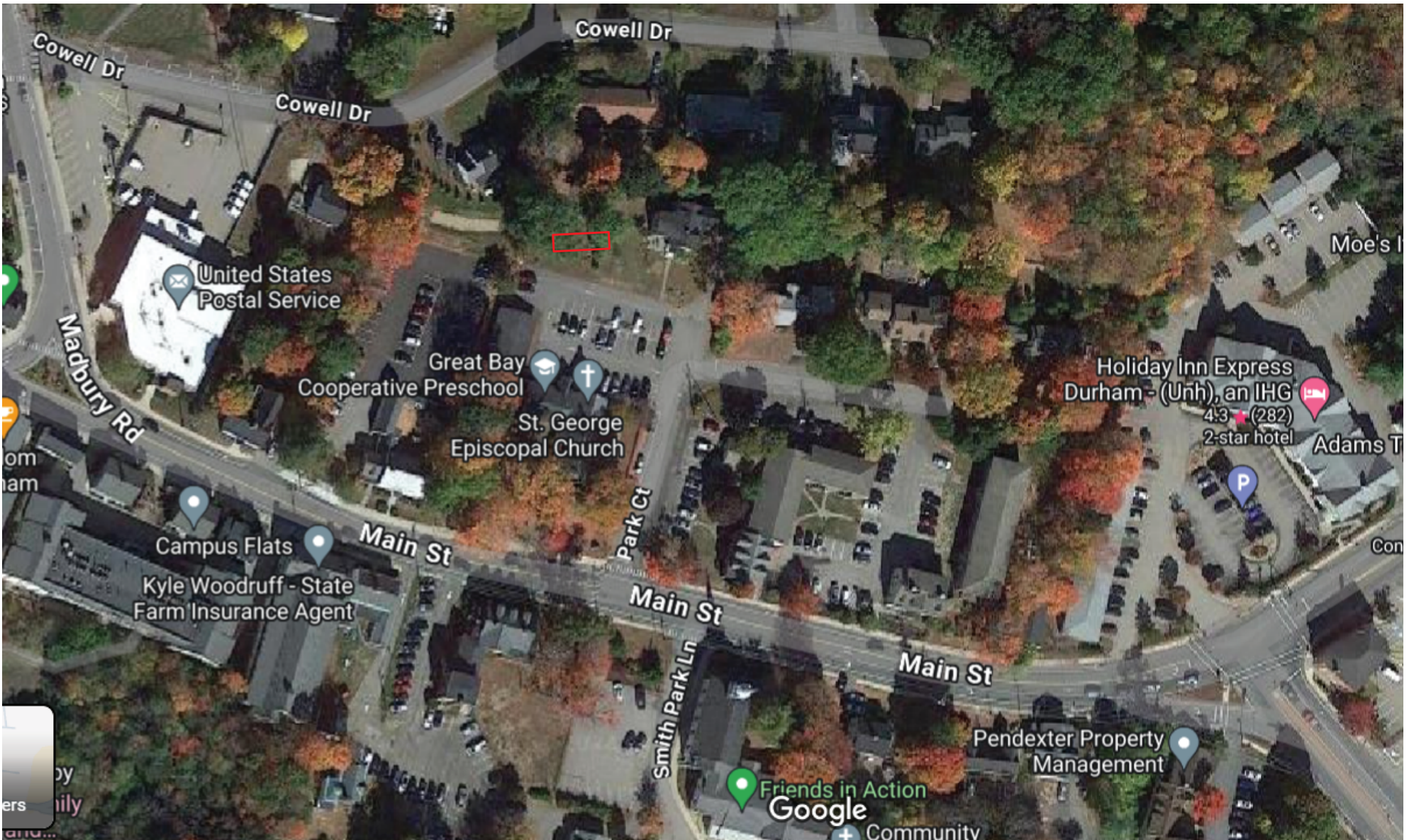
45.68'

44.66'

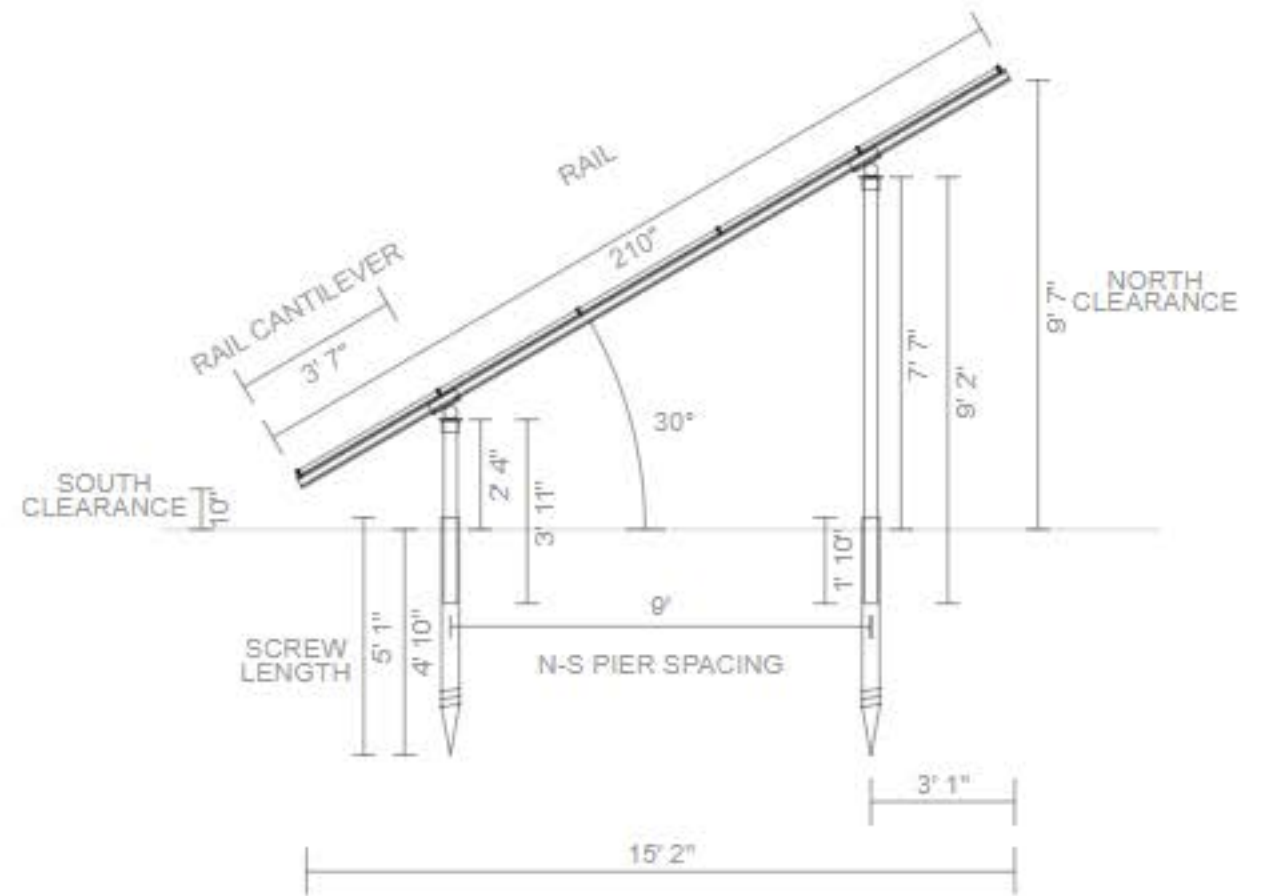
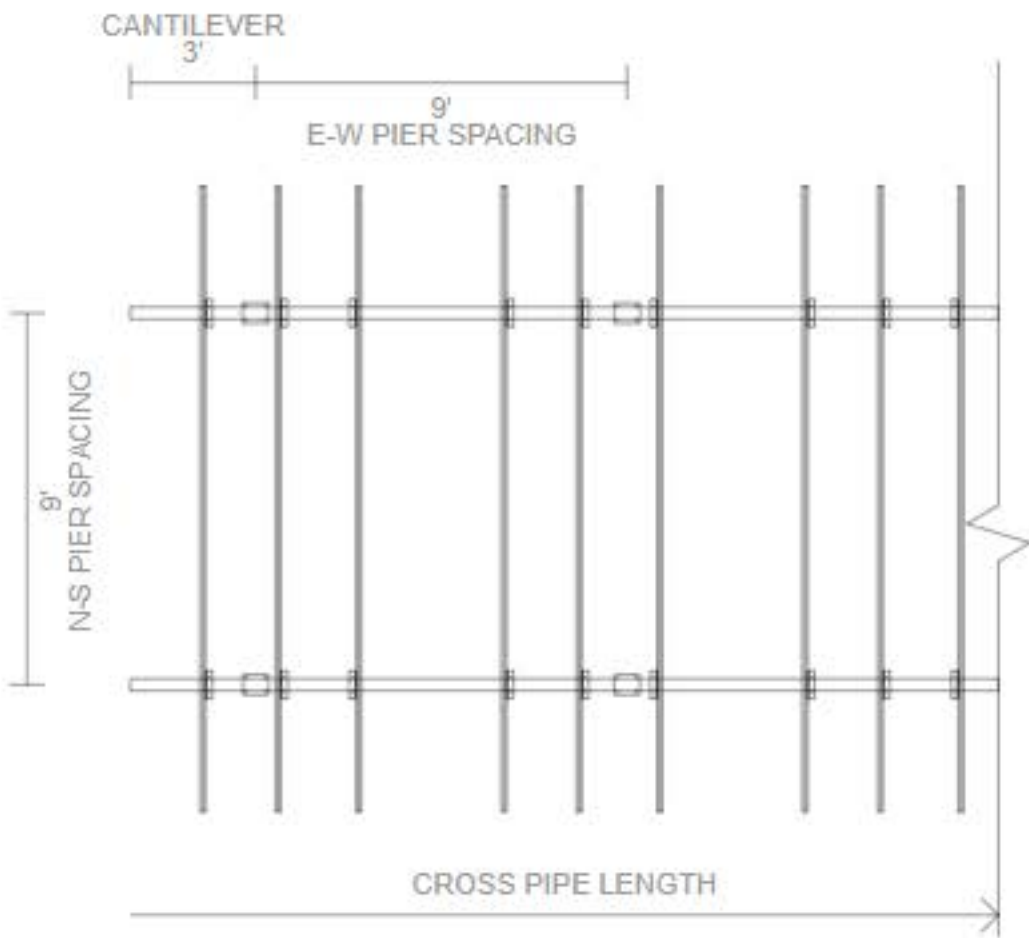
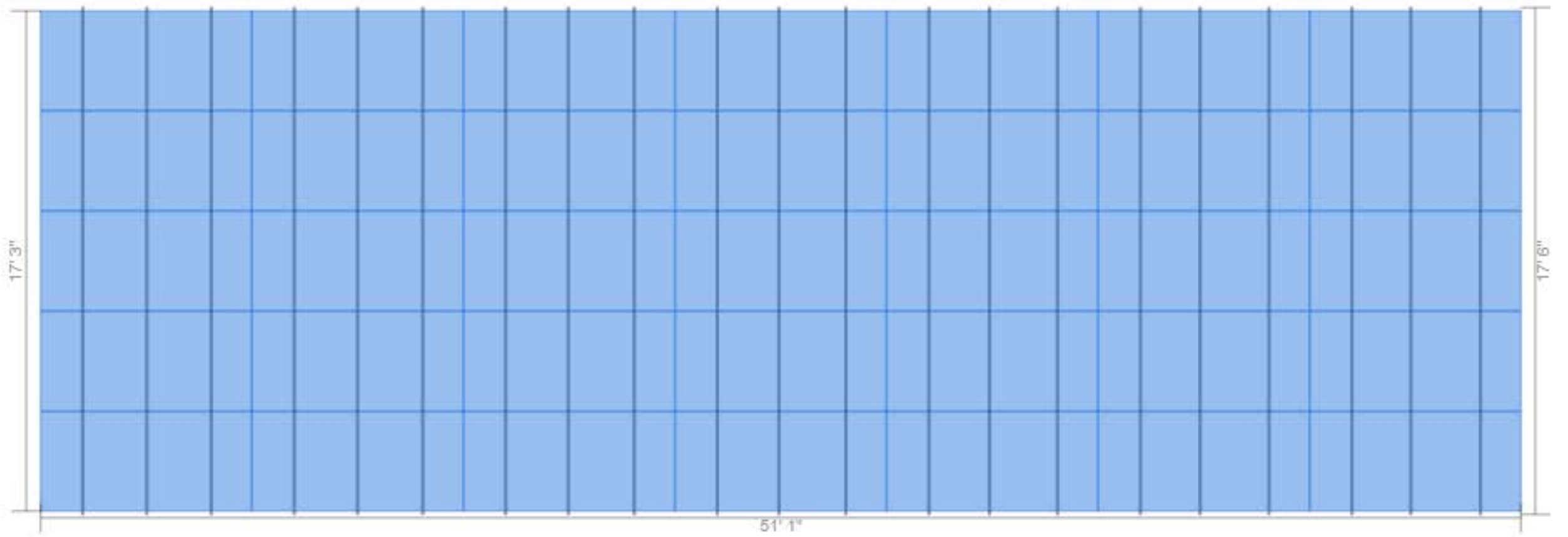
9.44'



<p>St. George's Solar Array</p>	<p>St. George's Episcopal Church 1 Park Ct. Durham, NH 03824</p>	<p>Prepared by: Scott Righini</p>	<p>Date: 2/2/2024</p>	<p>Revision: 1</p>
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St. George's Solar Array
Aerial Photo





Anticipated Summer view from Main Street



Anticipated Summer view from Park Ct



Anticipated Winter view from Main St.



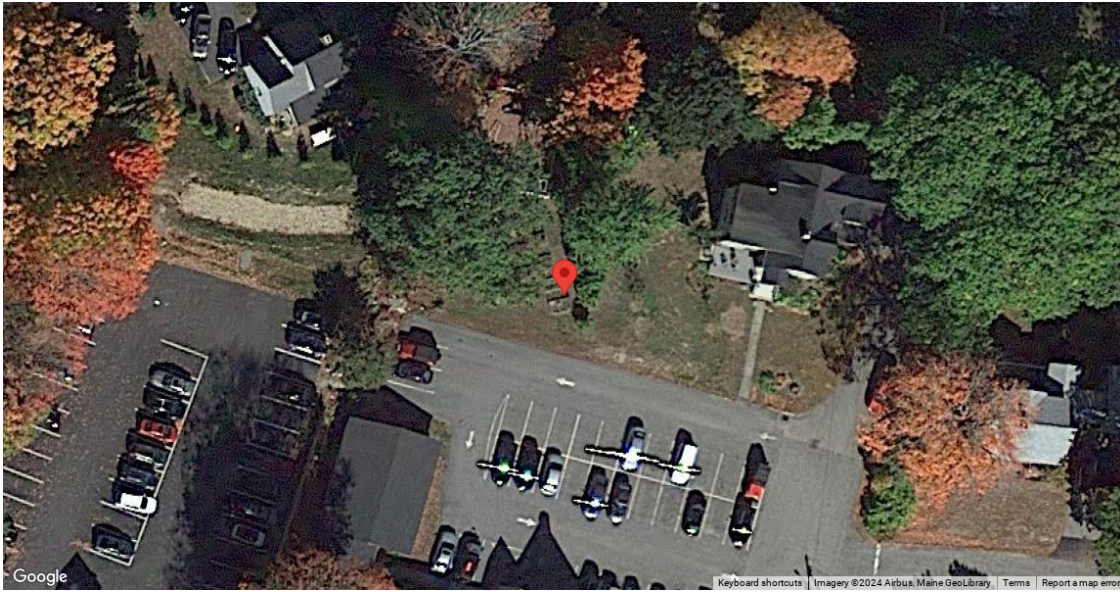
Anticipated Winter view from Park Ct.

Project Details

Name	1 Park Court	Date	01/11/2024
Location	1 Park Court, Durham, NH 03824	ASCE code	7.10
Total modules	35	Wind speed	110 mph
Module	Hanwha Q.Cells: Q.PEAK DUO XL-G10.3 BFG 485 (35mm)	Snow load	60 psf
Dimensions	Dimensions: 87.24" x 41.14" x 1.38" (2216.0mm x 1045.0mm x 35.0mm)	Wind exposure	B
Total watts	16,975 kW	Piers	12
		Concrete	4.85 yd ³

Inter sub-array spacing

336.0"
Calculated using solar azimuth of -37.77° and solar elevation of 13.76° at 9AM (America/New_York) on the winter solstice.



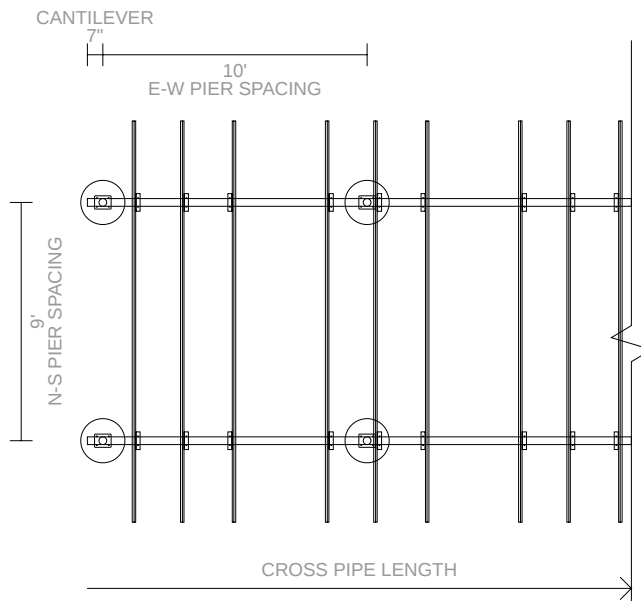
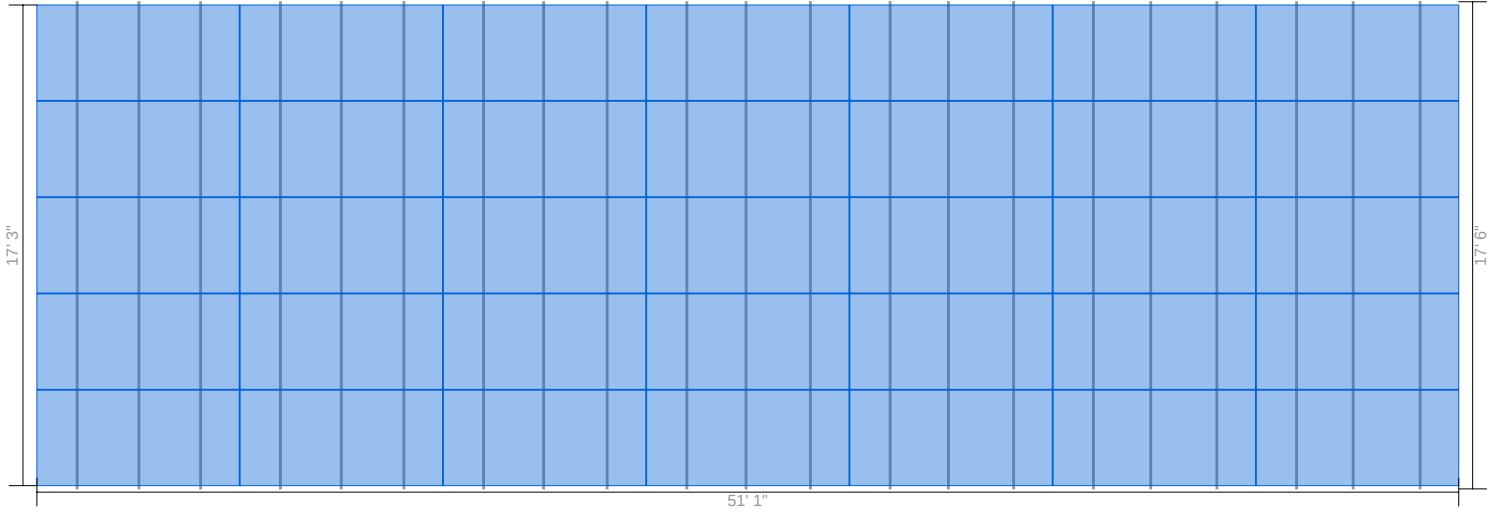
Substructure & Foundation

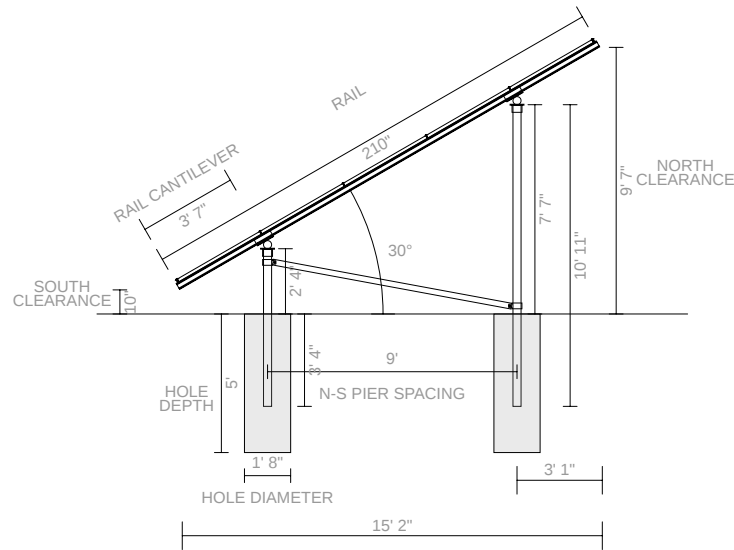
Tilt	30°	South facing grade	0°
Pipe/tubing diameter	3"	Soil class	4
Foundation type	Concrete	Hole diameter	20"

Sub array #1

* IronRidge engineering requires a 3rd rail for each column in this array due to the project parameters and site conditions.

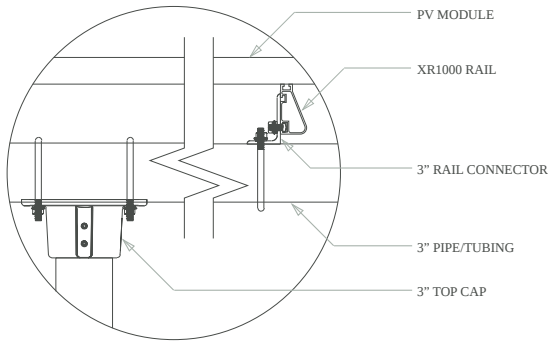
Rows	5	Columns	7	# Arrays	1
Area	51' 1" (EW) × 17' 5" (NS)	Rail type	XR1000	Diagonal bracing	yes
E/W spacing	10'	Rail cantilever	3' 7"	Pipe cantilever	7"
Piers/array	12	Total south piers	6 (5' 8")	Total north piers	6 (10' 11")
Total cross pipes	2 (51' 1")	Total pipe length	201' 7"		
Shear	1,369 lbs	Moment	0 ft-lbs	Uplift	-1,598 lbs



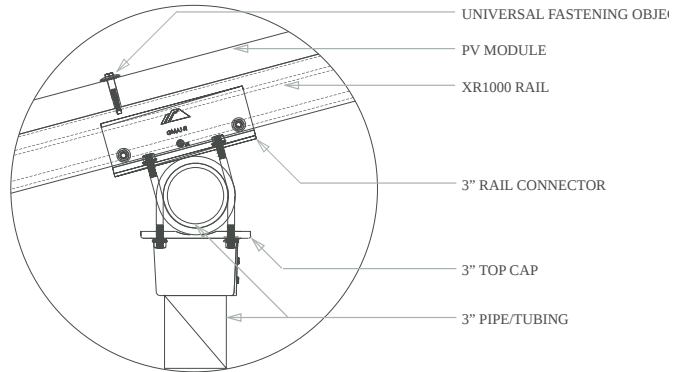


Pipe Fitting Detail

XR1000 Rail

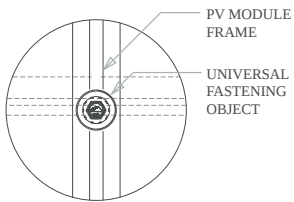


Front View

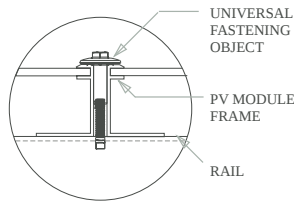


Side View

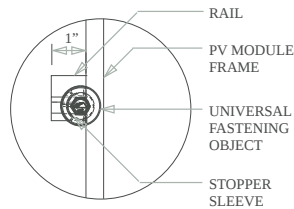
Clamp Detail



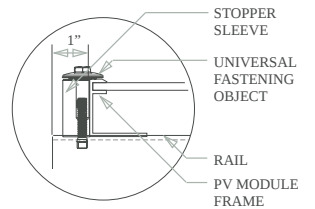
Mid Clamp, Plan



Mid Clamp, Front

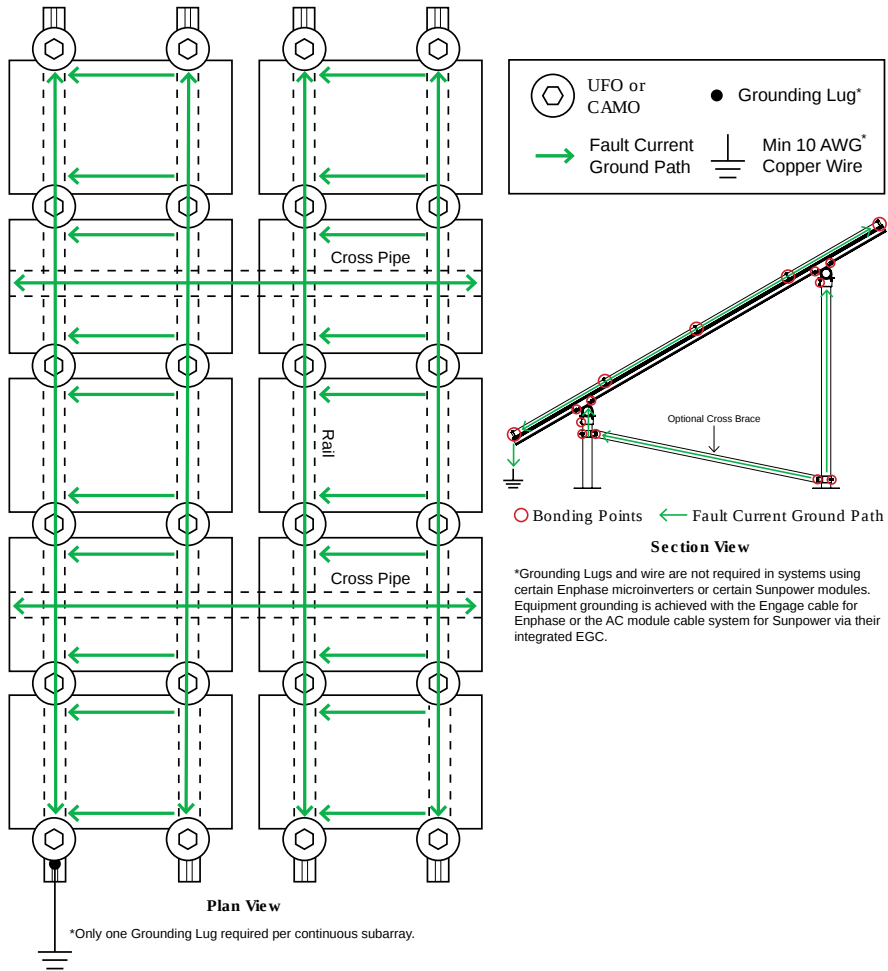


End Clamp, Plan



End Clamp, Front

Grounding Diagram



Bill of Materials

Part	Spares	Total Qty
Rails		
XR-1000-210A XR1000, Rail 210" Clear * [Custom Length] Please check with your distributor for availability.	0	21
Clamps & Grounding		
UFO-CL-01-A1 Universal Module Clamp, Clear	0	126
UFO-STP-35MM-M1 Stopper Sleeve, 35MM, Mill	0	42
XR-LUG-03-A1 Grounding Lug, Low Profile	0	1
Substructure		
70-0300-SGA SGA Top Cap at 3"	0	12
GM-BRC3-01-M1 Ground Mount Bonded Rail Connector - 3"	0	42
GM-DB3-TB02-M1 GM Diagonal Brace, 2.5" Square Tube, 105.0" LG (For 3" Pipe)	0	6
GM-DB3-SLV01-M1 GM 3" Sleeve, Diagonal Brace	0	12
GM-DB-HW01-M1 GM Diagonal Brace Hardware (For 2" & 3" Pipe)	0	6
Accessories		
29-4000-077 Wire Clips, Molded PVC Black, Polybag 20	0	4
XR-1000-CAP Kit, End Cap XR1000 (10 sets per bag)	0	3
BHW-MI-01-A1 Microinverter/MLPE Bonding Hardware, T-Bolt	0	35

CHECKLIST

PRE-INSTALLATION

- Verify module compatibility. See [Page 14](#) for info.
- Purchase 2" or 3" Pipe or Mechanical Tubing

Pipe: 2" or 3" (NPS) ASTM A53 Grade B SCH 40 Pipe, galvanized to a min of ASTM A653 G90 or ASTM A123 G35.

Mechanical Tubing: 2.375" x 12 ga (O.D) or 3.500" x 8 ga (O.D.) Mechanical Tubing with one of the following Galvinizations (ASTM A1057).

- Allied Gatorshield
- Allied Flo-Coat Coating
- Wheatland ThunderCoat

TOOLS REQUIRED

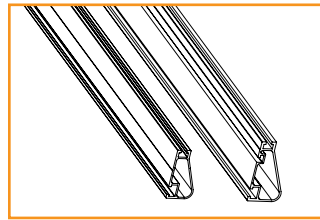
- Post Hole Digger or Powered Auger
- Socket Drive (7/16", 9/16", 15/16" and 1/2" Sockets)
- Torque Wrenches (0-240 in-lbs and 10-40 ft-lbs)
- Transit, String Line, or Laser Level
- 3/16" Allen Head

TORQUE VALUES

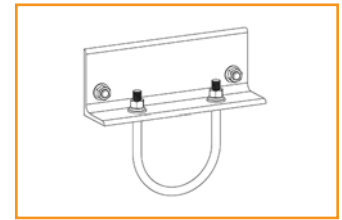
Top Cap Set Screws (3/16" Allen Head)

- 2" or 3" NPS Schedule 40 Grade B Pipe: 20 ft-lbs
- 2.375" x 12 ga OD Mechanical Tubing: 11 ft-lbs
- 3.500" x 8 ga OD Mechanical Tubing: 16 ft-lbs
- For Ground Screw to Pipe Connection Hardware see [Page 5](#).
- Top Cap U-Bolt Nuts (9/16" Socket): 15 ft-lbs
- Rail Connector Bracket Nuts (9/16" Socket): 21 ft-lbs
- Rail Connector U-Bolt Nuts (9/16" Socket): 60 in-lbs
- Rail Grounding Lug Nut (7/16" Socket): 80 in-lbs
 - Rail Grounding Lug Terminal Screws (7/16" Socket): 20 in-lbs
- Module Grounding Lug Nut (3/8" Socket): 60 in-lbs
 - Module Grounding Lug Terminal Screws (1/2" Socket): 20 in-lbs
- Universal Fastening Objects (7/16" Socket): 80 in-lbs
- Diagonal Brace Set Screws (1/2" Socket): 15 ft-lbs
- Diagonal Brace Bolts (1/2" Socket): 40 ft-lbs
- Microinverter Kit Nuts (7/16" Socket): 80 in-lbs
- Frameless Module Kit Nuts (7/16" Socket): 80 in-lbs
- If using previous version of: Integrated Grounding Mid Clamps, Grounding Lug and End Clamps please refer to Alternate Components Addendum (Version 1.90).
- If installing on a low slope roof please refer to Ground Mount for Flat Roof Applications Addendum (Version 3.30).
- Unless otherwise noted, all components have been evaluated for multiple use. They can be uninstalled and reinstalled in the same or new location.

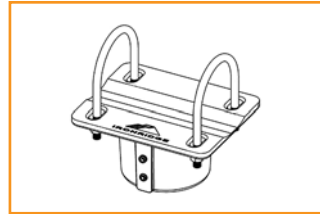
IRONRIDGE COMPONENTS



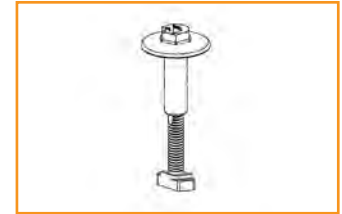
XR100 & XR1000 Rail



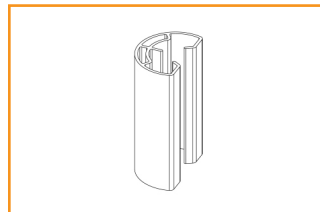
Rail Connector



Top Cap



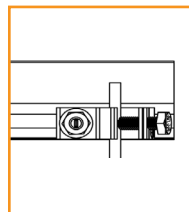
UFO (30-46mm)



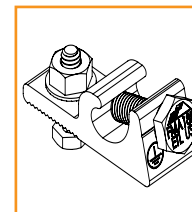
Stopper Sleeve



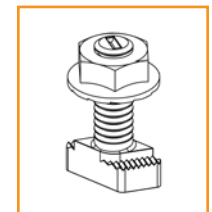
CAMO



Rail Grounding Lug



Module Grounding Lug



Microinverter Kit



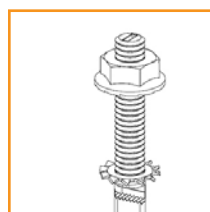
Diagonal Brace



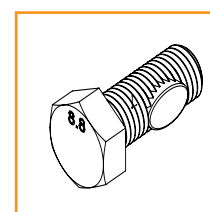
End Cap



Wire Clip



Frameless Module Kit



Hex Head Set Screw



Frameless End/Mid Clamp

Q.PEAK DUO BLK ML-G10+ 385-405

ENDURING HIGH
PERFORMANCE



BREAKING THE 20% EFFICIENCY BARRIER

Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 20.9%.



THE MOST THOROUGH TESTING PROGRAMME IN THE INDUSTRY

Q CELLS is the first solar module manufacturer to pass the most comprehensive quality programme in the industry: The new "Quality Controlled PV" of the independent certification institute TÜV Rheinland.



INNOVATIVE ALL-WEATHER TECHNOLOGY

Optimal yields, whatever the weather with excellent low-light and temperature behavior.



ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID Technology, Anti PID Technology¹, Hot-Spot Protect and Traceable Quality Tra.Q™.



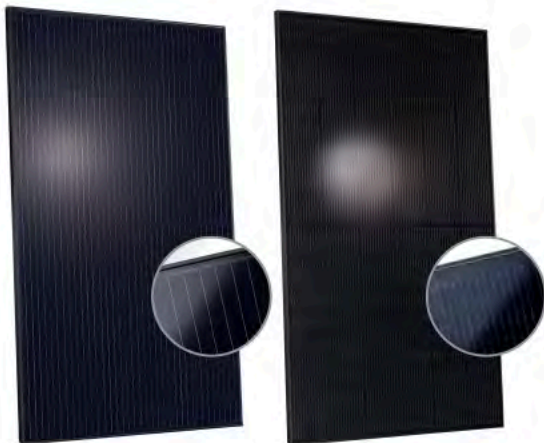
EXTREME WEATHER RATING

High-tech aluminum alloy frame, certified for high snow (5400Pa) and wind loads (4000Pa).



A RELIABLE INVESTMENT

Inclusive 25-year product warranty and 25-year linear performance warranty².



6 BUSBAR
CELL TECHNOLOGY

12 BUSBAR
CELL TECHNOLOGY

¹ APT test conditions according to IEC/TS 62804-1:2015, method A (-1500V, 96h)

² See data sheet on rear for further information.

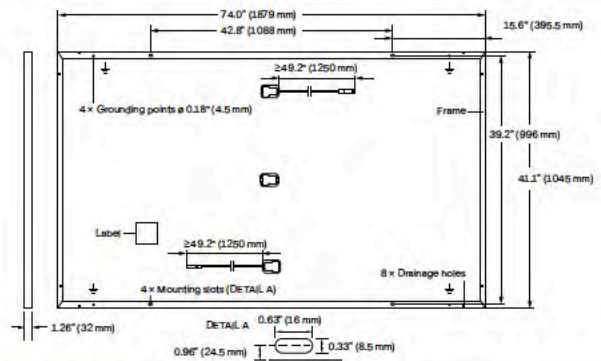
THE IDEAL SOLUTION FOR:



Rooftop arrays on
residential buildings

MECHANICAL SPECIFICATION

Format	74.0in x 41.1in x 1.26in (including frame) (1879mm x 1045mm x 32mm)
Weight	48.5lbs (22.0kg)
Front Cover	0.13in (3.2mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodized aluminum
Cell	6 x 22 monocrystalline Q.ANTUM solar half cells
Junction Box	2.09-3.98in x 1.26-2.36in x 0.59-0.71in (53-101mm x 32-60mm x 15-18mm), IP67, with bypass diodes
Cable	4 mm ² Solar cable; (+) ≥49.2in (1250mm), (-) ≥49.2in (1250mm)
Connector	Stäubli MC4; IP68

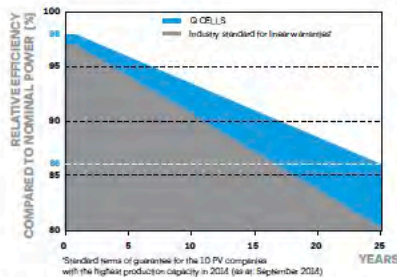


ELECTRICAL CHARACTERISTICS

POWER CLASS		385	390	395	400	405	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC ¹ (POWER TOLERANCE +5W / -0W)							
Minimum	Power at MPP ¹	P _{MPP} [W]	385	390	395	400	405
	Short Circuit Current ¹	I _{SC} [A]	11.04	11.07	11.10	11.14	11.17
	Open Circuit Voltage ¹	V _{OC} [V]	45.19	45.23	45.27	45.30	45.34
	Current at MPP	I _{MPP} [A]	10.59	10.65	10.71	10.77	10.83
	Voltage at MPP	V _{MPP} [V]	36.36	36.62	36.88	37.13	37.39
	Efficiency ¹	η [%]	≥19.6	≥19.9	≥20.1	≥20.4	≥20.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT ²							
Minimum	Power at MPP	P _{MPP} [W]	288.8	292.6	296.3	300.1	303.8
	Short Circuit Current	I _{SC} [A]	8.90	8.92	8.95	8.97	9.00
	Open Circuit Voltage	V _{OC} [V]	42.62	42.65	42.69	42.72	42.76
	Current at MPP	I _{MPP} [A]	8.35	8.41	8.46	8.51	8.57
	Voltage at MPP	V _{MPP} [V]	34.59	34.81	35.03	35.25	35.46

¹Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000W/m², 25±2°C, AM1.5 according to IEC 60904-3 • ²800W/m², NMOT, spectrum AM 1.5

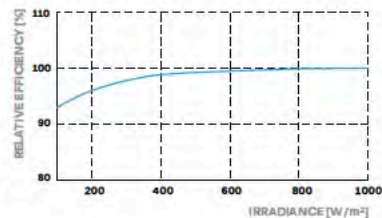
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25°C, 1000W/m²)

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I _{SC}	α [%/K]	+0.04	Temperature Coefficient of V _{OC}	β [%/K]	-0.27
Temperature Coefficient of P _{MPP}	γ [%/K]	-0.34	Nominal Module Operating Temperature	NMOT [°F]	109±5.4 (43±3°C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V _{sys} [V]	1000 (IEC)/1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating [A DC]	20	Fire Rating based on ANSI / UL 61730	TYPE 2
Max. Design Load, Push / Pull ³ [lbs/ft ²]	75 (3600Pa) / 55 (2660Pa)	Permitted Module Temperature on Continuous Duty	-40°F up to +185°F (-40°C up to +85°C)
Max. Test Load, Push / Pull ³ [lbs/ft ²]	113 (5400Pa) / 84 (4000Pa)		

³See Installation Manual

QUALIFICATIONS AND CERTIFICATES

UL 61730, CE-compliant,
Quality Controlled PV - TÜV Rheinland,
IEC 61215:2016, IEC 61730:2016,
U.S. Patent No. 9,893,215 (solar cells),



PACKAGING INFORMATION

Horizontal packaging	76.4in 1940mm	43.3in 1100mm	48.0in 1220mm	1656lbs 751kg	24 pallets	24 pallets
						32 modules

Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS America Inc.

400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us