



CAMBRIDGE HISTORICAL COMMISSION

831 Massachusetts Avenue, 2nd Fl., Cambridge, Massachusetts 02139
Telephone: 617 349 4683 TTY: 617 349 6112
E-mail: histcomm@cambridgema.gov URL: www.cambridgema.gov/Historic

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NOV 14 2019

CAMBRIDGE HISTORICAL COMMISSION

APPLICATION FOR CERTIFICATE

- The undersigned hereby applies to the Cambridge Historical Commission for a Certificate of (check one box): Appropriateness, Nonapplicability, or Hardship, in accordance with Chapter 40C of the Massachusetts General Laws and/or Chapter 2.78 of the Municipal Code.
- Address of property: 11 Garden Street, Cambridge, Massachusetts
- Describe the proposed alteration(s), construction or demolition in the space provided below: (An additional page can be attached, if necessary).

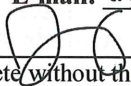
Install a solar array of 78 solar panels on the flat roof of the building using a ballasted racking system. The solar panels are tilted at 10 degrees and extend a maximum height of 13.68 inches above the roof. The panels are setback from the roof edge a minimum of 4 feet. Detailed racking installation drawings (6 pages), Hanwha module data sheet (2 pages) and PanelClaw racking data sheet (2 pages) are provided to support the application.

I certify that the information contained herein is true and accurate to the best of my knowledge and belief.
The undersigned also attests that he/she has read the statements printed on the reverse.

Name of Property Owner of Record: First Church in Cambridge, Congregational

Mailing Address: 11 Garden St. Cambridge, MA 02138

Telephone/Fax: 617-547-2724 / 617-354-4185 E-mail: treasurer@firstchurchcambridge.org

⇒ Signature of Property Owner of Record:  (Jason Whaley, FCC Treasurer)
(Required field; the application will not be considered complete without the property owner's signature)

Name of proponent, if not record owner: 621 Energy, LLC (Bob Clarke)

Mailing Address: 152 Commonwealth Avenue, Suite 21, Concord, MA 01742

Telephone/Fax: 978-849-3060 E-mail: clarker@621energy.com

(for office use only):

Date Application Received: 11/14/19 Case Number: 4234 Hearing Date: 12/5/19

Type of Certificate Issued: _____ Date Issued: _____

Polar Bear® III HD

10 Degree Flat Roof Mounting System

THE ENERGY DENSITY YOU NEED



Flat roof racking that delivers cost savings and peace of mind

The new Polar Bear III HD design draws on seven years of industry experience. It provides more design and energy density flexibility, improved constructability, universal framed module support, enhanced roof protection, better wire management, and a lower cost than Polar Bear III or any other reliable flat roof mounting solution in the market today. Combined with PanelClaw's project support team of flat roof experts, Polar Bear III HD is the obvious choice for your commercial flat roof projects.

With over 9,000 flat roof projects completed around the world including more than 2,000 jurisdictions in 45 states in the US, we are your flat roof partners. Experience the PanelClaw® Advantage on your next flat roof project.



panelclaw.com

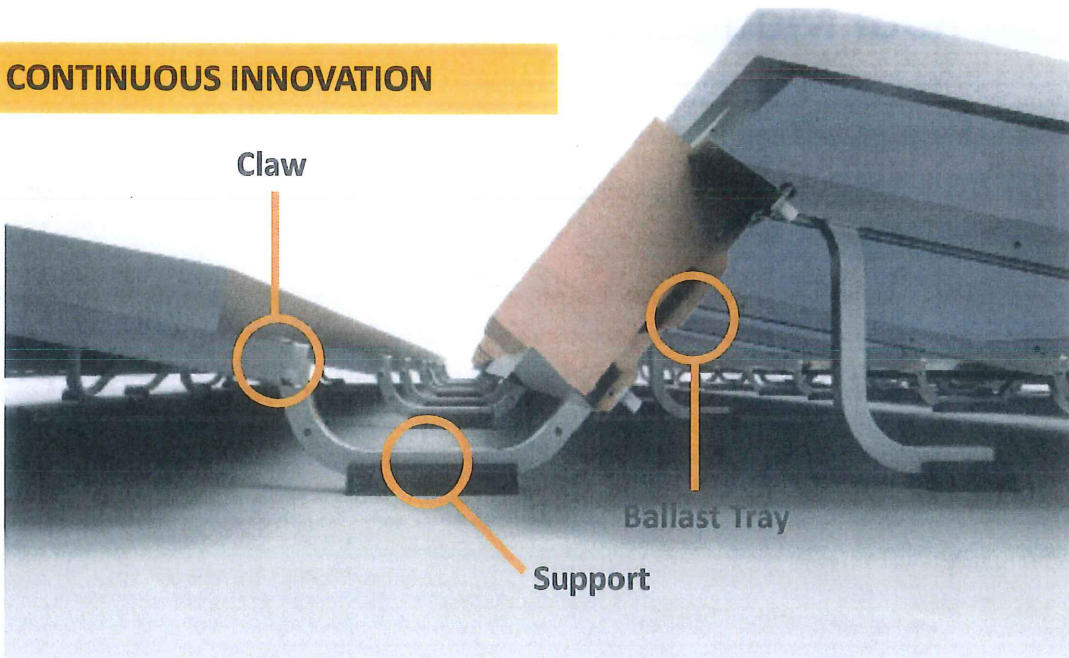


PANELCLAW®

Polar Bear III HD

10 Degree Flat Roof Mounting System

CONTINUOUS INNOVATION



Trusted Roof Integrity

Polar Bear® III HD protects the roof with fully captured ballast, integrated recycled rubber roof protection pads and a system design that allows for free water flow.

Accelerated Construction

The engineered design emphasizes built-in features for construction efficiency:

- Three major components that are light-weight and easy to move
- Pre-installed bolts to quickly mount Ballast Trays
- Single-module tilt-up feature
- Enhanced wire management options

Safety and Reliability

PanelClaw's industry-leading reliability track record in the flat roof space is the result of our investment in an extensive test program that goes beyond existing codes and standards. We maintain long term partnerships with third party test laboratories and codes and standards bodies throughout the industry.

(978) 688.4900 | panelclaw.com

© 2019 PanelClaw, Inc.

Three Components

Support

- Easy-to-handle components that weigh less than 2.5 pounds
- Integrated recycled rubber roof protection pads
- Pre-drilled holes for wire management cabling options

Ballast Tray

- Angled fit with locking end-tab to fully capture ballast blocks
- Hemmed edges and chamfered corners prevent wiring from coming into contact with sharp edges

Claw

- Attachment to module using standard module mounting holes
- UL 2703 certified for electrical bonding and grounding
- Two energy density mounting options
- Pre-drilled for E/W module-to-module wire management

Applications

Flat roof (max slope 5°)
Fully ballasted or mechanically attached

Module Tilt Angle

10° nominal

North/South Module to Module Repeat

52" or 56"

Platform Load

~1.9psf - 8 psf

Module Orientation

Landscape

Module Attachment

Standard module mounting holes

Basic Wind Speed

Up to 150 mph
(>150 mph by approval)

Wind Exposure Category

B and C (D by approval)

Seismic Compatibility

C, D, E and F

Material

G90 steel with stainless steel fastener

Warranty

25 years

Listings and Certifications

ANSI/UL 2703-2015 listed

UL 2703 System Fire Rating: Class A with Type 1 and Type 2 modules



powered by

Q.ANTUM DUO

Q.PEAK DUO L-G5.2 380-395

Q.ANTUM SOLAR MODULE

The new high-performance module Q.PEAK DUO L-G5.2 is the ideal solution for commercial and utility applications thanks to a combination of its innovative cell technology Q.ANTUM and cutting edge cell interconnection. This 1500V IEC/UL solar module with its 6 busbar cell design ensures superior yields with up to 395 Wp while having a very low LCOE. Q.PEAK DUO L-G5.2 is ideal for ground-mounted solar power plants.



LOW ELECTRICITY GENERATION COSTS

Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 19.9%.



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 (2400Pa) regarding IEC.



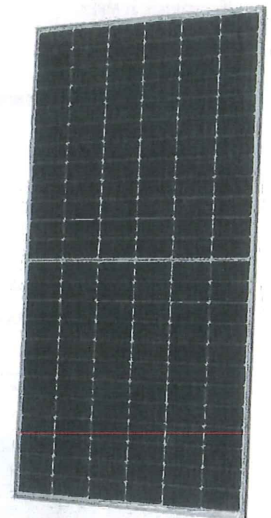
A RELIABLE INVESTMENT

Inclusive 12-year product warranty and 25-year linear performance guarantee².



SIMPLER INSTALLATION

Custom cable lengths connect to cableless junction box after mounting, reducing labour effort and minimizing resistive losses³.



THE IDEAL SOLUTION FOR:



Rooftop arrays on commercial/industrial buildings



Ground-mounted solar power plants

- ¹ APT test conditions according to IEC/TS 62804-1:2015, method B (-1500V, 168h)
- ² See data sheet on rear for further information.
- ³ See data sheet on rear for further information. Cable length depends on the product version.

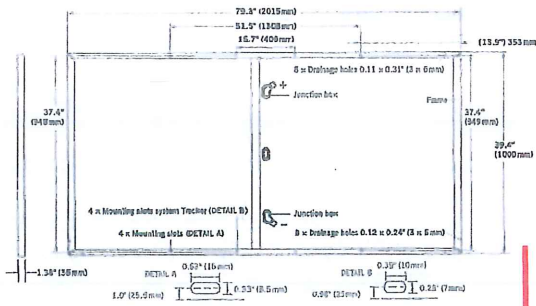
Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	79.3 in × 39.4 in × 1.38 in (including frame) (2015 mm × 1000 mm × 35 mm)
Weight	51.8 lbs (23.5 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Anodized aluminum
Cell	6 × 24 monocrystalline Q.ANTUM solar half-cells
Junction box	2.40-2.80 in × 1.61-1.97 in × 0.51-0.83 in (61-71 mm × 41-50 mm × 13-21 mm), decentralized, IP67
Cable	4 mm ² Solar cable; one ≥ 15.7 in (400 mm) or two ≥ 11.8 in (300 mm) cables*
Connector	IP67 or IP68

* depending on product version



ELECTRICAL CHARACTERISTICS

POWER CLASS		380	385	390	395	
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC¹ (POWER TOLERANCE ±5W / -0W)						
Minimum	Power at MPP ²	P _{MPP} [W]	380	385	390	395
	Short Circuit Current ⁴	I _{SC} [A]	10.05	10.10	10.14	10.19
	Open Circuit Voltage ⁴	V _{OC} [V]	47.95	48.21	48.48	48.74
	Current at MPP ³	I _{MPP} [A]	9.57	9.61	9.66	9.70
	Voltage at MPP ³	V _{MPP} [V]	39.71	40.05	40.38	40.71
	Efficiency ²	η [%]	≥ 18.9	≥ 19.1	≥ 19.4	19.6
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NOC³						
Minimum	Power at MPP ²	P _{MPP} [W]	281.6	285.3	289.0	292.7
	Short Circuit Current ⁴	I _{SC} [A]	8.11	8.14	8.18	8.22
	Open Circuit Voltage ⁴	V _{OC} [V]	44.85	45.10	45.35	45.60
	Current at MPP ³	I _{MPP} [A]	7.53	7.56	7.60	7.63
	Voltage at MPP ³	V _{MPP} [V]	37.41	37.73	38.04	38.35

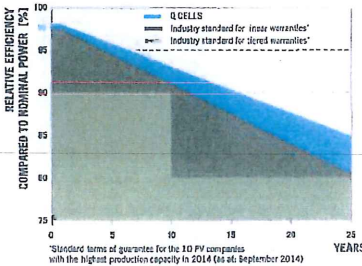
¹1000 W/m², 25°C, spectrum AM 1.5G

²Measurement tolerances STC ±3%; NOC ±5%

³800 W/m², NOCT, spectrum AM 1.5G

⁴typical values, actual values may differ

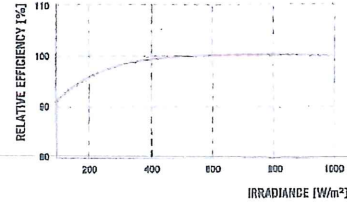
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.54% degradation per year. At least 93.1% of nominal power up to 10 years. At least 85% 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 organization of your respective country.

PERFORMANCE AT LOW IRRADIANCE



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

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I _{SC}	α	[%/K]	+0.04	Temperature Coefficient of V _{OC}	β	[%/K]	-0.28
Temperature Coefficient of P _{MPP}	γ	[%/K]	-0.37	Normal Operating Cell Temperature	NOCT	[°F]	113 ± 5.4 (45 ± 3°C)

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage V _{SYS}	[V]	1500 (IEC) / 1500 (UL)	Safety Class	II
Maximum Series Fuse Rating	[A DC]	20	Fire Rating	C (IEC) / TYPE 1 (UL)
Design load, push (UL) ²	[lbs/ft ²]	75 (3600 Pa)	Permitted module temperature on continuous duty	-40°F up to +185°F (-40°C up to +85°C)
Design load, pull (UL) ²	[lbs/ft ²]	33 (1600 Pa)	² see installation manual	

QUALIFICATIONS AND CERTIFICATES

UL 1703; CE-compliant;
IEC 61215 (Ed.2); IEC 61730 (Ed.1) application class A



PACKAGING INFORMATION

Number of Modules per Pallet	29
Number of Pallets per 53' Trailer	26
Number of Pallets per 40' High Cube Container	22
Pallet Dimensions (L × W × H)	81.9 in × 45.3 in × 46.7 in (2080 mm × 1150 mm × 1185 mm)
Pallet Weight	1635 lbs (742 kg)

Specifications subject to technical changes © Hanwha Q CELLS Q.PEAK DUO L-65.2_350-395_2017-08_Rev01_NA

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.
300 Spectrum Center Drive, Suite 1250, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL inquiry@us.q-cells.com | WEB www.q-cells.us

Site Design Criteria - Flat Roof PV System Basis of Design	
Roof Live Load (psf) ¹	20 (see note 1)
Ground Snow Pg (psf)	40
Flat Roof Snow Pf (psf)	36.96
Snow Importance Factor (Is)	1.1
Wind Design Data	
Ult. Wind Speed (mph)	139
Nom. Wind Speed (mph)	N/A
Risk Category	III
Internal Pressure Coefficient	N/A
Design Life (years)	25 YEARS
MRI Adjustment Factor	0.93
Wind Exposure	B
C and C pressure (psf)	(see note 2)
Earthquake Design Data	
Risk Category	III
Importance Factor (Ie)	1.25
Component Importance Factor (Ip)	1.0
Mapped Acceleration Parameter (Ss)	0.216
Mapped Acceleration Parameter(S1)	0.069
Seismic Site Class	D - ASSUMED
Design Spectral Acceleration Parameter (Sds)	0.23
Design Spectral Acceleration Parameter (Sd1)	0.11
Seismic Design Category (SDC)	B
Basic seismic-force-resisting system(s)	see note 3
Base Design Shear = Fp x W	0.11 W
Seismic Response Coefficient (Cs)	N/A (see note 4)
Response Modification Factor (R)	2.5
Analysis Procedure	see note 3
Design Code (with local amendments)	MA ST B.C. 9th Ed.
	ASCE 7-10
ADDITIONAL CODE PROVISIONS	SEAOC PV1-2012
	SEAOC PV2-2012
1. Roof Live Load only applicable to areas not covered by PV modules. Reference SEAOC Design Guidelines	
2. PV wind design per proprietary wind tunnel testing. Refer to calculations for additional information	
3. Analysis procedure per ASCE 7 "Seismic Design Requirements for NonStructural Components" and SEAOC PV1-2012.	
4. Design utilizes Fp which is calculated per procedure noted in note #3.	



AERIAL PHOTO / SITE DIAGRAM

GENERAL NOTES:

- ALL SITE, PROJECT, AND BUILDING DETAILS ARE PROVIDED BY CUSTOMER OR GENERATED VIA SATELLITE IMAGERY FROM INFORMATION PROVIDED BY CUSTOMER. PANELCLAW IS NOT RESPONSIBLE FOR SITE INACCURACIES THAT COULD LEAD TO CHANGES TO THESE DRAWING DETAILS AND ARRAY LAYOUT CONFIGURATIONS. ALL INFORMATION CONTAINED WITHIN THESE DOCUMENTS ARE TO BE FIELD VERIFIED BY CUSTOMER AND INSTALLER. ANY CHANGES OR MODIFICATIONS TO THESE DOCUMENTS, CONTAINED INFORMATION, OR FINAL ARRAY AND MOUNTING SYSTEM INSTALLATIONS MUST BE SUBMITTED TO PANELCLAW AND OTHER PROJECT AUTHORITIES FOR APPROVAL.
- REFER TO AND FOLLOW THE APPROPRIATE PANELCLAW INSTALLATION MANUALS AND PROCEDURES DURING THE INSTALLATION PROCESS. NOT FOLLOWING SUCH PROCEDURES AND METHODS COULD RESULT IN DAMAGE TO THE COMPONENTS OR MAY VOID THE PRODUCT WARRANTY.
- ARRAY SETBACKS: ALL ARRAYS ARE REQUIRED TO BE SETBACK 4-FEET FROM ALL ROOF EDGES UNLESS OTHERWISE SPECIFIED AND CALLED OUT ON THE ARRAY DIAGRAMS ON THIS PAGE OR ON ADDITIONAL ARRAY BALLAST PAGES.
- REFER TO THE SPECIFIC ARRAY BALLAST SHEETS FOR BALLASTING REQUIREMENTS BASED ON THE PROVIDED SITE INFORMATION.
- SYSTEM PSF INCLUDES ALL PANELCLAW RACKING COMPONENTS, MECHANICAL ATTACHMENTS(IF APPLICABLE), PV MODULE AND BALLAST BLOCKS. FOR MAXIMUM SYSTEM POINT LOAD SUMMARY (PLS), REFER TO CALCULATIONS.
- PANELCLAW AND/OR PANELCLAW CONSULTING ENGINEERS ARE NOT RESPONSIBLE FOR DETERMINING THE ADEQUACY OF THE STRUCTURE TO SUPPORT LOADS IMPOSED BY THE ARRAY AND MOUNTING SYSTEM. SUPPORT STRUCTURE TO BE CHECKED BY OTHERS.
- ALWAYS ALLOW 6" CLEARANCE BETWEEN ARRAYS AND ALL FIXED ROOF OBJECTS OR ROOF EDGES. REFER TO LOCAL FIRE CODES AND ELECTRICAL CODES FOR ADDITIONAL REQUIREMENTS WHICH MAY GOVERN DESIGN.

SHEET INDEX	
NO.	DESCRIPTION
PC-1	COVER SHEET
PC-2	ARRAY SITE MAP
PC-3	TYPICAL ARRAY DIMENSIONS
PC-4	RACKING COMPONENTS
PC-5	BALLAST LEGEND
PC-6	BALLAST LAYOUT - 1

Digitally signed by Trevor G. Wickie
Date: 2019.10.23 11:27:14-05'00'



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Larson Engineering Inc.
1488 Broad Street, Suite 100
Needham Heights, MA 02461
(617) 552-5540 FAX (617) 552-5144
LIC. COMM. NO. 21100013-000

PANELCLAW®

RACKING CONSTRUCTION SET
1600 OSGOOD ST. SUITE 2023
NORTH ANDOVER, MA 01845
TEL: 978.688.4900
www.panelclaw.com

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REV	DESCRIPTION	DATE	CHECK	PREP
0	Initial Ballast Map Layout	2019-10-15	BG	MM

SCALE:
0" 1/2" 1" 2"
ORIGINAL SIZE 36"X24"
SHEET SIZE ARCH "D"

PREPARED FOR:
621 ENERGY

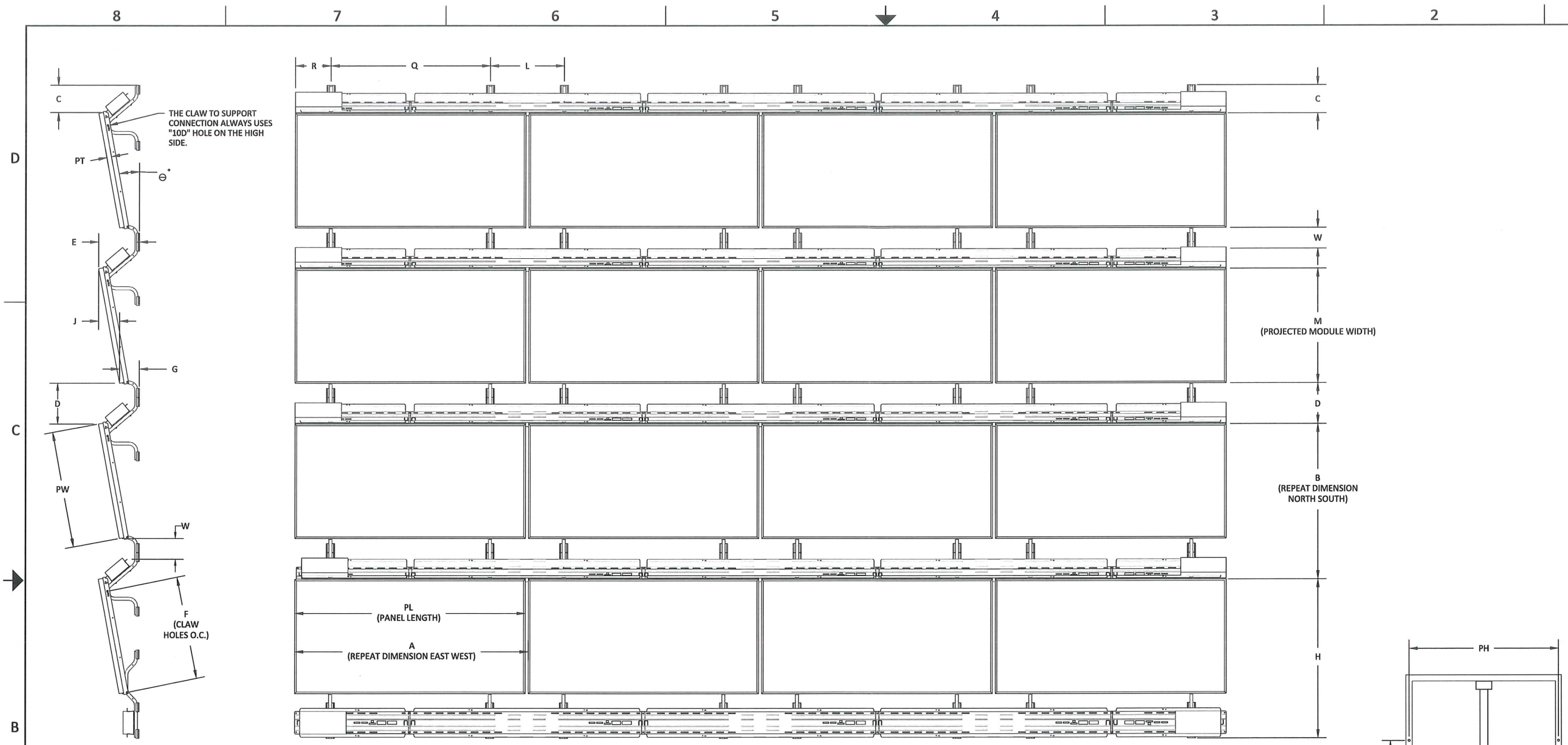
PROJECT:
FIRST CHURCH - CAMBRIDGE

LOCATION:
**11 GARDEN ST
CAMBRIDGE MA 02138**

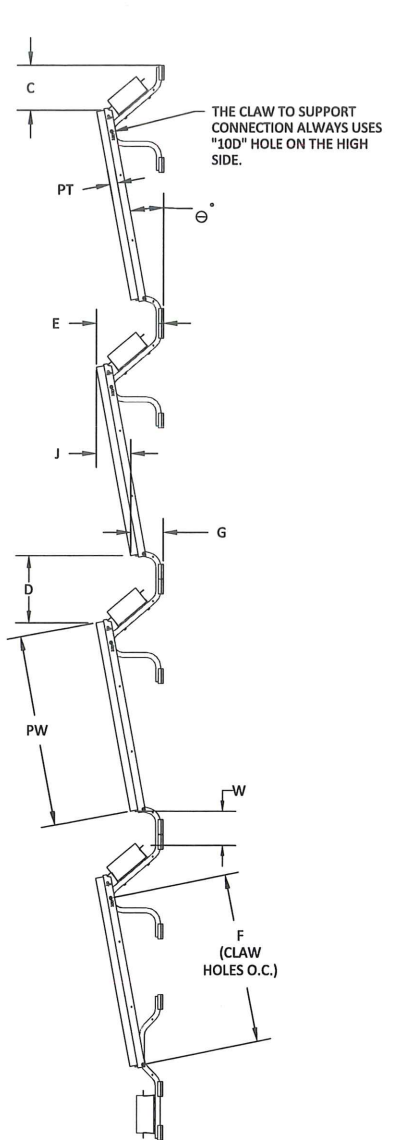
SHEET TITLE:
COVER SHEET

REVISION: 0	SHEET: PC-1
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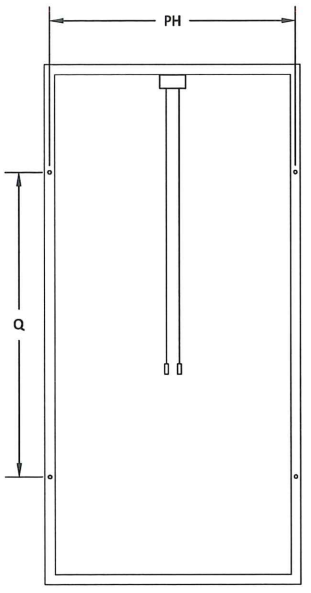
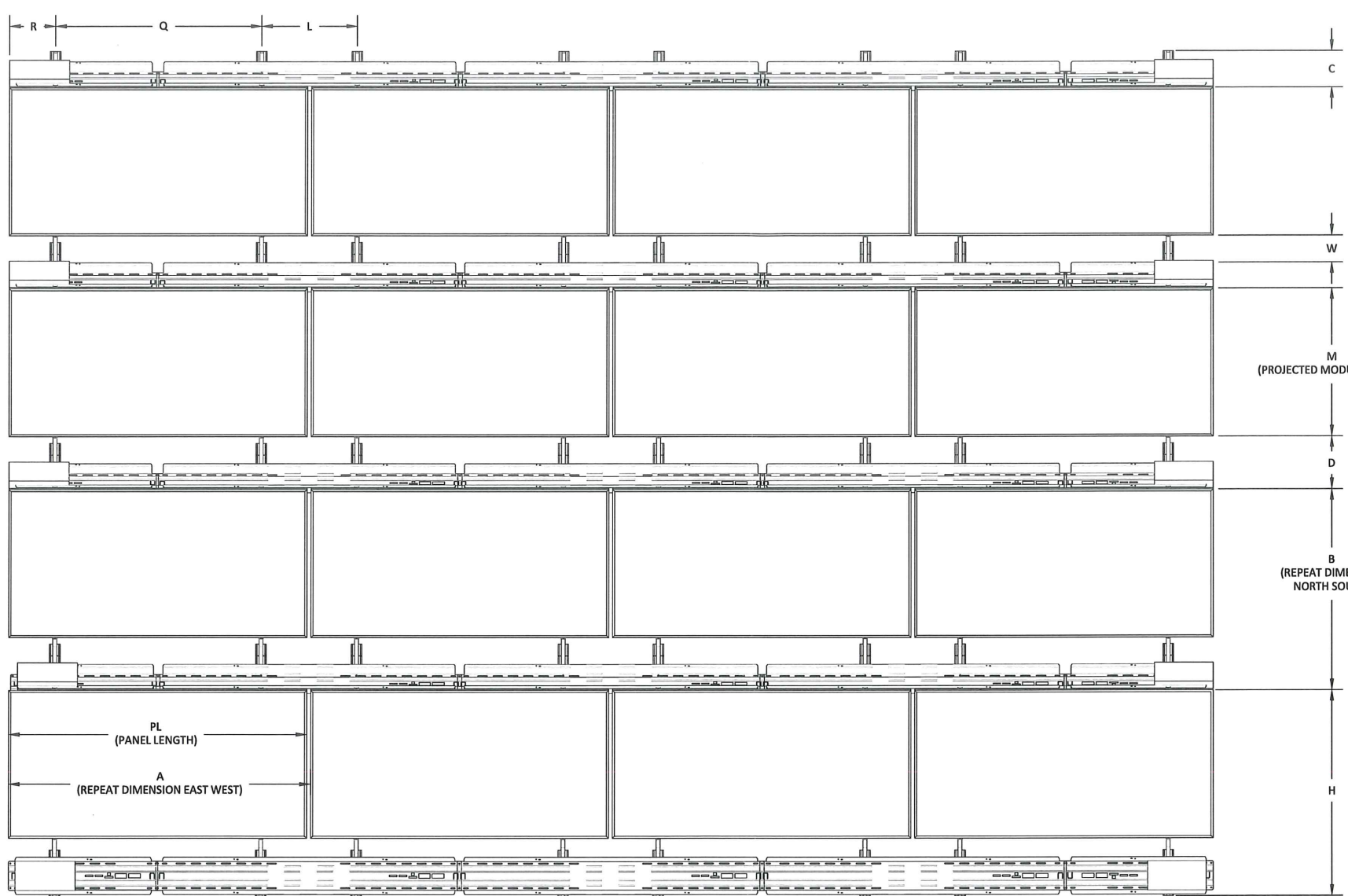
APPROVED FOR CONSTRUCTION



ARRAY CROSS SECTION VIEW
SCALE: NTS



ARRAY TOP VIEW
SCALE: NTS



MODULE BACK VIEW DIMENSIONS
SCALE: NTS

		PL	PW	PT	PH	A	B	C	D	E	F	G	H	J	K	L	M	Q	R	W	Hole Diameter	θ (DEG)	D/I (#:1)	G.C.R.*
UNITS	mm	2015	1000	35	949	2040	1321	239	337	347	878	167	1356	181	103	732	984	1308	354	167.2	8.5	10.4	1.9	0.74
	IN	79.33	39.37	1.38	37.36	80.33	52.00	9.40	13.28	13.68	34.56	6.57	53.40	7.11	4.06	28.83	38.72	51.50	13.92	6.58	0.33	10.4	1.9	0.74

* G.C.R. - Ground coverage ratio calculation = (PL*M) / (A*B)

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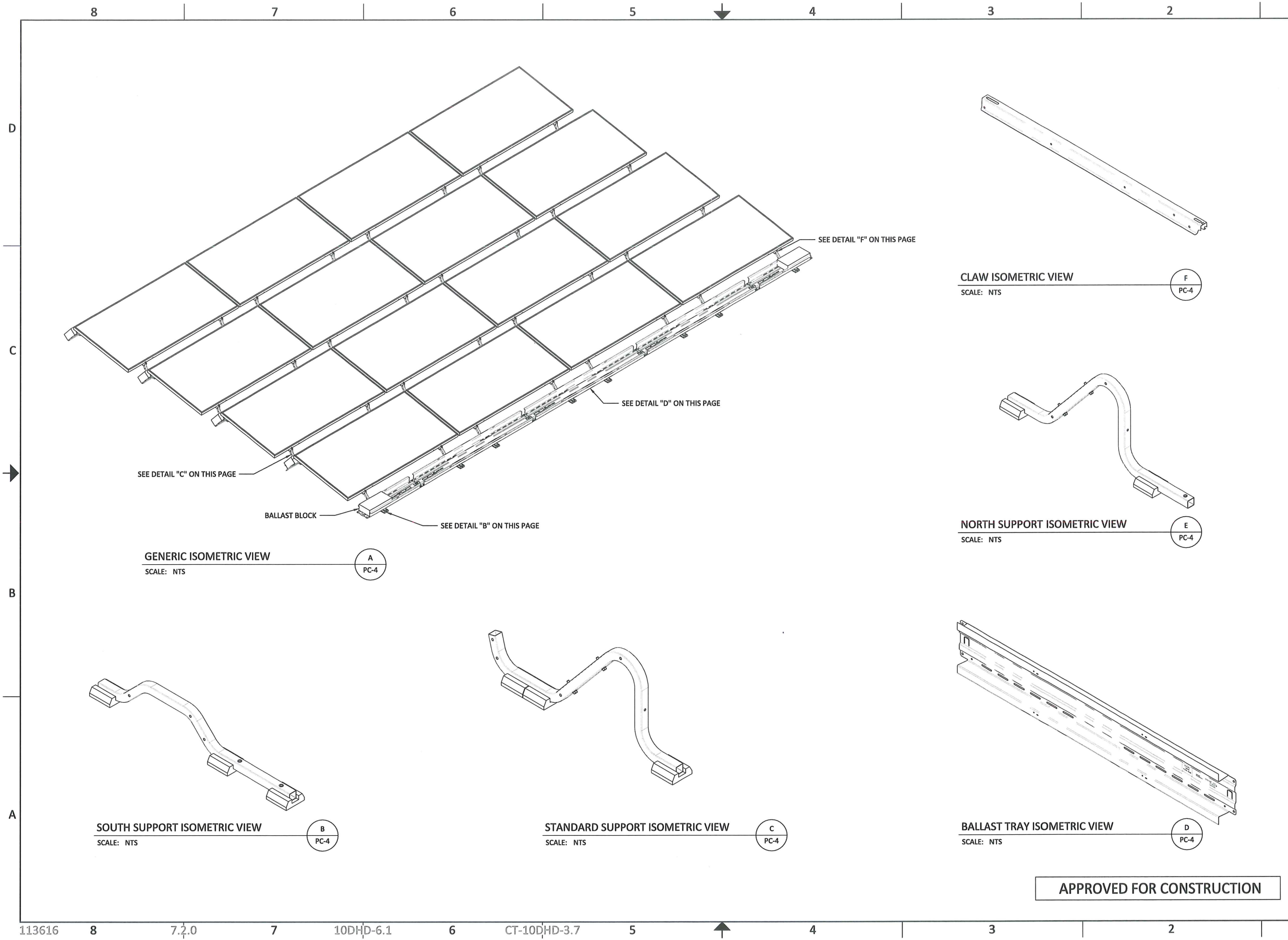
PROJECT:
FIRST CHURCH - CAMBRIDGE

LOCATION:
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SHEET TITLE:
TYPICAL ARRAY DIMENSIONS

REVISION: **0** SHEET: **PC-3**

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LIC. EXPIRES: 06/30/2021

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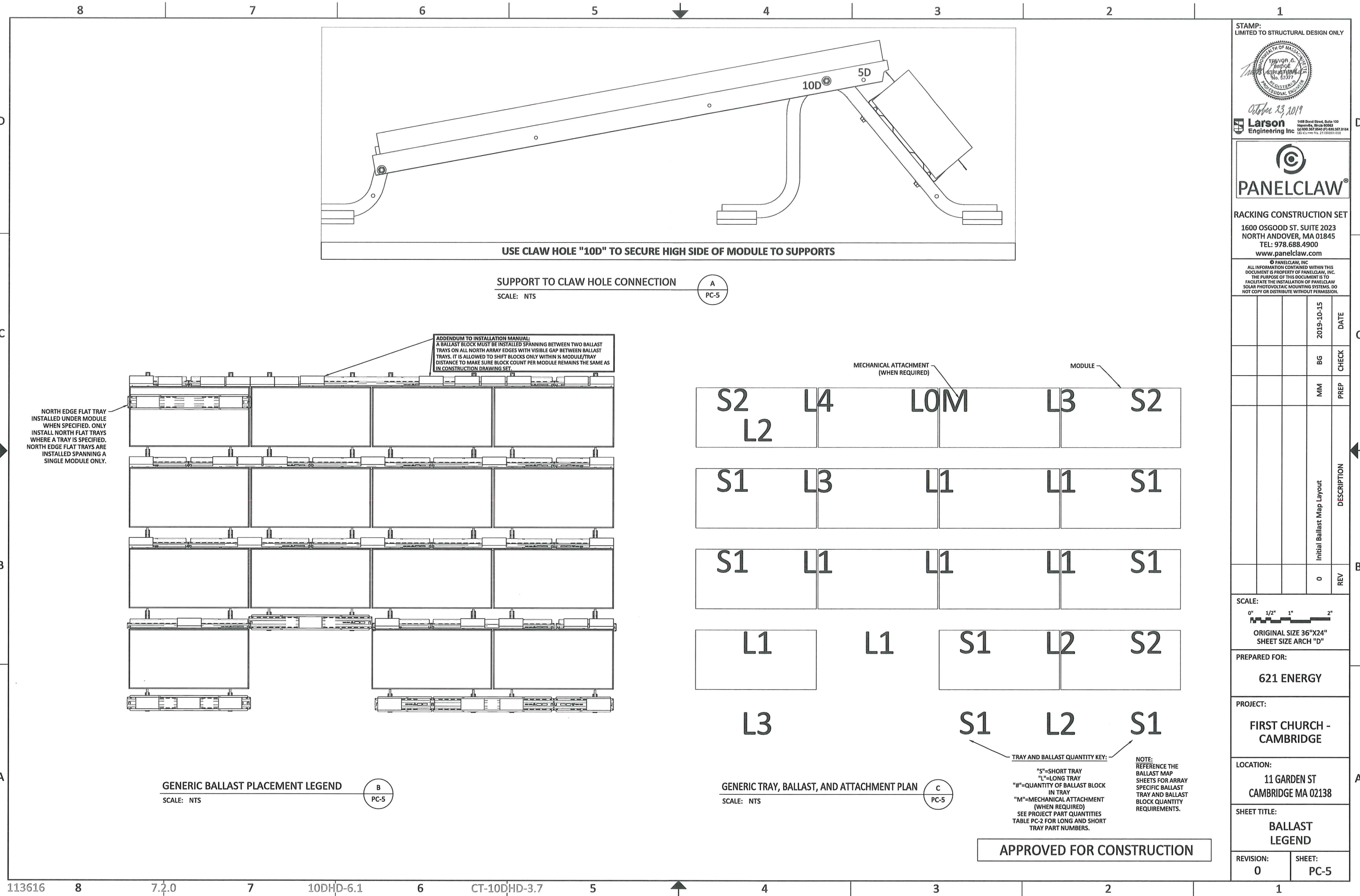
PROJECT:
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LOCATION:
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SHEET TITLE:
RACKING COMPONENTS

REVISION: 0 SHEET: PC-4

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SHEET TITLE:
BALLAST LEGEND

REVISION: **0** SHEET: **PC-5**

