



Addendum #1

Date: March 18, 2026
 Owner: City of Kenora
 Consultant: TBT Engineering Consulting Group
 Tender Number: 781-001-23
 Title: Lake of the Woods Museum Roof & Solar

The following answers, clarifications, and changes to the Invitation to Tender documents form part of the ITT process and shall be included in all considerations relating to the Proponent's submission.

Item #	Reference	Answer/Clarification/Change
1	Appendix A Tender Form	The original Appendix A – Tender Form as included with the Invitation to Tender issued February 23, 2026, shall be revoked and replaced in its entirety by Appendix A – Tender Form (Revised for Addendum #1) as included with this addendum. The form included in this addendum shall supersede the original and is required to be submitted at time of submission. The revised tender form adds a separate unit price for replacement of roof deck sheathing as required upon removal of the existing roofing materials.
2	01 23 00 Alternate, Separate, and Itemized Prices	<p>Revise Section 01 23 00 – Alternate, Separate, and Itemized Prices by adding 1.4.2 as follows:</p> <p>“.2 Separate Price #2 – Roof Deck Replacement Unit Price</p> <p>.1 Base bid:</p> <p>.1 Replacement of the roof deck sheathing is not required under the base scope of work.</p> <p>.2 Alternate:</p> <p>.1 Remove damaged, rotting, or wet roof deck sheathing and dispose.</p> <p>.2 Sheathing shall be removed to extents allowing for support and fastening of replacement sheathing.</p> <p>.3 Supply and install new 1/2” roof sheathing to match existing type, fasten in accordance with the Ontario Building Code and industry best practice.</p> <p>.4 New sheathing shall also be installed in any locations identified as missing sheathing.</p> <p>.5 The cost for this work shall be priced on a unit rate basis per square foot (sqft) of roof deck sheathing replaced.</p> <p>.6 Costs within this separate price item do not include any provisions for testing or abatement of designated substances. If required, this work will be addressed separately.”</p>

3	01 33 00 Submittal Procedures	<p>Revise Section 01 33 00 – Submittal Procedures by adding 1.3 as follows:</p> <p>“1.3 SAMPLES</p> <p> .1 Submit samples for Consultant’s review where specified in the drawings and technical specifications. Label samples as to origin, Project name, and intended use.</p> <p> .2 Deliver samples prepaid to Consultant’s business address.</p> <p> .3 Notify Consultant in writing of any deviations in samples from requirements of Contract Documents.</p> <p> .4 Where a required colour, pattern, or texture has not been specified, submit full range of available Products meeting other specified requirements.</p> <p> .5 Consultant selection from samples is not intended to change the Contract Price or Contract Time. If a selection would affect the Contract Price or Contract Time, notify Consultant in writing prior to proceeding with the Work.</p> <p> .6 Resubmit samples as required by Consultant to comply with Contract Documents.</p> <p> .7 Reviewed and accepted samples will establish the standard against which installed Work will be reviewed.”</p>
4	Appendix C Drawings & Technical Specifications	<p>The original drawing package included in Appendix C – Drawings & Technical Specifications as included with the Invitation to Tender issued February 23, 2026, shall be revoked and replaced in its entirety by a new drawing package issued as “Revised for Addendum #1” as included with TBT Engineering Consulting Group’s technical addendum enclosed.</p>
5	Question – Metal Roof Type	<p>Question: Are you certain about exposed fastener metal roof? Standing seam concealed fastener metal roof would be a better product.</p> <p>Answer: The choice of metal roofing product has been revised as outlined in the enclosed TBT Engineering Consulting Group addendum and revised drawing package.</p>
6	Question – Access to Side Lane	<p>Question: Can the lane on the south side of the museum be partially or fully blocked by scaffolding and staging for accessing the roof?</p> <p>Answer: The lane between the Lake of the Woods Museum and St. Alban’s Cathedral is the property of the church. Preliminary discussion with St. Alban’s is in support of a closure of the lane to facilitate this work, subject to final approval by the church. Proponents shall consider in their bids for the full use of this lane as required for construction. Upon award of the contract and preparation of a construction schedule, the successful proponent and the City will coordinate with St. Alban’s Cathedral.</p>

7	Question – Wood Fascia	<p>Question: The scope pertaining to replacement of the lower wood fascia is not clear, can it be adjusted?</p> <p>Answer: The scope will be adjusted to include replacement of all existing lower wood fascia as outlined in the TBT Engineering Consulting Group's enclosed addendum.</p>
8	Clarification – Approved Bidders	<p>Based on attendance at the mandatory pre-bid site meeting, the following vendors are eligible to submit bids for this work.</p> <ul style="list-style-type: none"> • M Builds • WC Electric • Sierra Construction • Regenerate Solar • Oakwood Roofing • Lake of the Woods Electric <p>Bids received from Proponents not included on this list shall be returned to the vendor. Attendance to the mandatory site meeting is not required to be a subcontractor on this project.</p>
9	Request for Equal	<p>All request for equal or request for equivalent shall be reviewed by the Consultant and shall be addressed in the TBT Engineering Consulting Group addendum as enclosed.</p>
10	Enclosures	<p>TBT Engineering Consulting Group Technical Addendum #1</p>

Lake of the Woods
KENORA



APPENDIX A
TENDER FORM
(Revised for Addendum #1)

CITY OF KENORA

ITT #781-001-23

TENDER FORM

Tender Number: 781-001-23
Tender Title: Lake of the Woods Museum Roof & Solar

We, _____
(Company)

of _____
(Business Address)

having examined the Tender Documents as issued by the City of Kenora (the "City"), and having visited the site of where the Work is required to be undertaken; hereby offer to enter into a Contract to perform the Work required by the Tender Documents for the Tender Sum as follows:

1. Construction Preparation/Submittals	\$ _____
2. Mobilization/Demobilization	\$ _____
3. Demolition	\$ _____
4. Insulation & Sheathing	\$ _____
5. Metal Roofing (incl. snow guards & parapet)	\$ _____
6. Soffit, Fascia, Eavestrough, Downspouts, & Heat Trace	\$ _____
7. Electrical & Solar (incl. commissioning & testing)	\$ _____
8. General Construction, Patching, Painting	\$ _____
9. Project Closeout	\$ _____
10. Subtotal (excl. HST)	
_____	\$ _____
<i>(subtotal written in words)</i>	<i>(subtotal in figures)</i>
11. HST (13%)	\$ _____
12. Total (incl. HST)	
_____	\$ _____
<i>(total written in words)</i>	<i>(total in figures)</i>

in Canadian funds, which price includes any specified cash and contingency allowances and the applicable taxes in force at this date and except as may be otherwise provided in the Tender Documents.

Separate Prices:

In accordance with Section 01 23 00 *Alternatives and Separate Prices* of the Specifications. A positive price shall represent an increase to the base bid and a negative price shall represent a decrease to the base bid.

1. Separate Price #1

a. Chimney Removal \$ _____

2. Separate Price #2

a. Roof Deck Replacement Unit Price \$ _____ per sqft

Declarations:

We hereby acknowledge and declare that:

- (a) we agree to perform the Work in compliance with the required completion schedule stated in the Contract;
- (b) no person, firm or corporation other than the undersigned has any interest in this Tender or in the proposed Contract for which this Tender is made;
- (c) we have received the following addenda during the ITT process and have considered all information from the addenda in our proposal and costs:

<u>Addendum Number</u>	<u>Date Issued</u>
_____	_____
_____	_____
_____	_____
_____	_____

- (d) the Tender Security is attached to this Tender. We specifically acknowledge and agree that the Tender Security may be forfeited to the City pursuant to the terms set forth in the Instructions to Tenderers;
- (e) we hereby acknowledge and confirm that the City has the right to accept any tender or to reject any or all tenders in accordance with the Instructions to Tenderers;
- (f) this Tender is open to acceptance for a period of sixty (60) days from the date of Tender Closing.

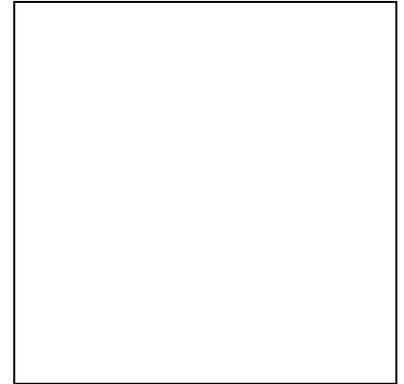
Signatures:

Signed, sealed and submitted for and on behalf of:

Company: _____
(Name)

(Street Address or Postal Box Number)

(City, Province & Postal Code)



*Corporate Seal
(**must** be affixed for all
corporations submitting a bid)*

Project Representative Contact Information

Name: _____

Phone: _____

Email: _____

Signature: _____

Name & Title: _____
(Please Print or Type)

Witness: _____

Dated at _____ this _____ day of _____, 20____

ADDENDUM #1

Project Name: TBTE Project No.: 22-144L Date Issued: March 18, 2026
 City of Kenora LOTW Museum
 Roof Renovation and Solar Array
 Installation

The Request for Tender documents (ITT #781-001-23) is hereby amended as follows:

ITEM	REFERENCE SPECIFICATION SECTION OR DRAWINGS	DESCRIPTION
1	Roof Sheathing Inspection, Replacement and Pricing Revision	Contractor shall provide a separate unit price for replacing any damaged roof sheathing. Unit rates shall be provided on a per square foot basis, in accordance with the front-end documents. Refer to the enclosed drawing 22-144L-A101 for details.
2	Roofing Material Specification Revision	The roofing material specifications are hereby revised from exposed fastner to standing seam metal roofing. Refer to the enclosed drawing 22-144L-A102 for details.
3	Fascia Material Specification and Construction Method Revision	The fascia material specification and construction methods are hereby revised. Refer to detail A201-1 on the enclosed drawing 22-144L-A02 for details.
4	Revisions to the Electric Heat Trace Installation Methods	Contractor shall utilize the existing GFCI located below the roof's eaves for the high wattage electric heat trace. Refer to the enclosed drawing 22-144L-A102 and 22-144L-E101 for details.
5	Request for Equipment Equals	The following solar panel equipment has been approved as equal for this project. All bidders shall provide approved equipment totaling to a capacity of no more than 10kW AC.

6	Solar Array Configuration	The solar array configuration is shown as a basis for design. Other solar array configurations will be acceptable and will be coordinated with the successful bidder during the construction phase. The Contractor must ensure that the setbacks identified on the drawings are maintained.
---	---------------------------	---

Enclosed/Reference Material:

- 1. 22-144L - City of Kenora - LOTW Museum Roof Renovation and Solar Array Installation – IFA 1 – March 18, 2026.
- 2. Equal Solar Equipment

END OF DOCUMENT

CITY OF KENORA

LAKE OF THE WOODS MUSEUM - ROOF RENOVATION AND SOLAR ARRAY INSTALLATION

Project Drawing List:

ARCHITECTURAL:

22-144L-A101 ROOF DEMOLITION PLAN

22-144L-A102 ROOF RENOVATION PLAN

22-144L-A201 DETAILS & SPECIFICATIONS

ELECTRICAL:

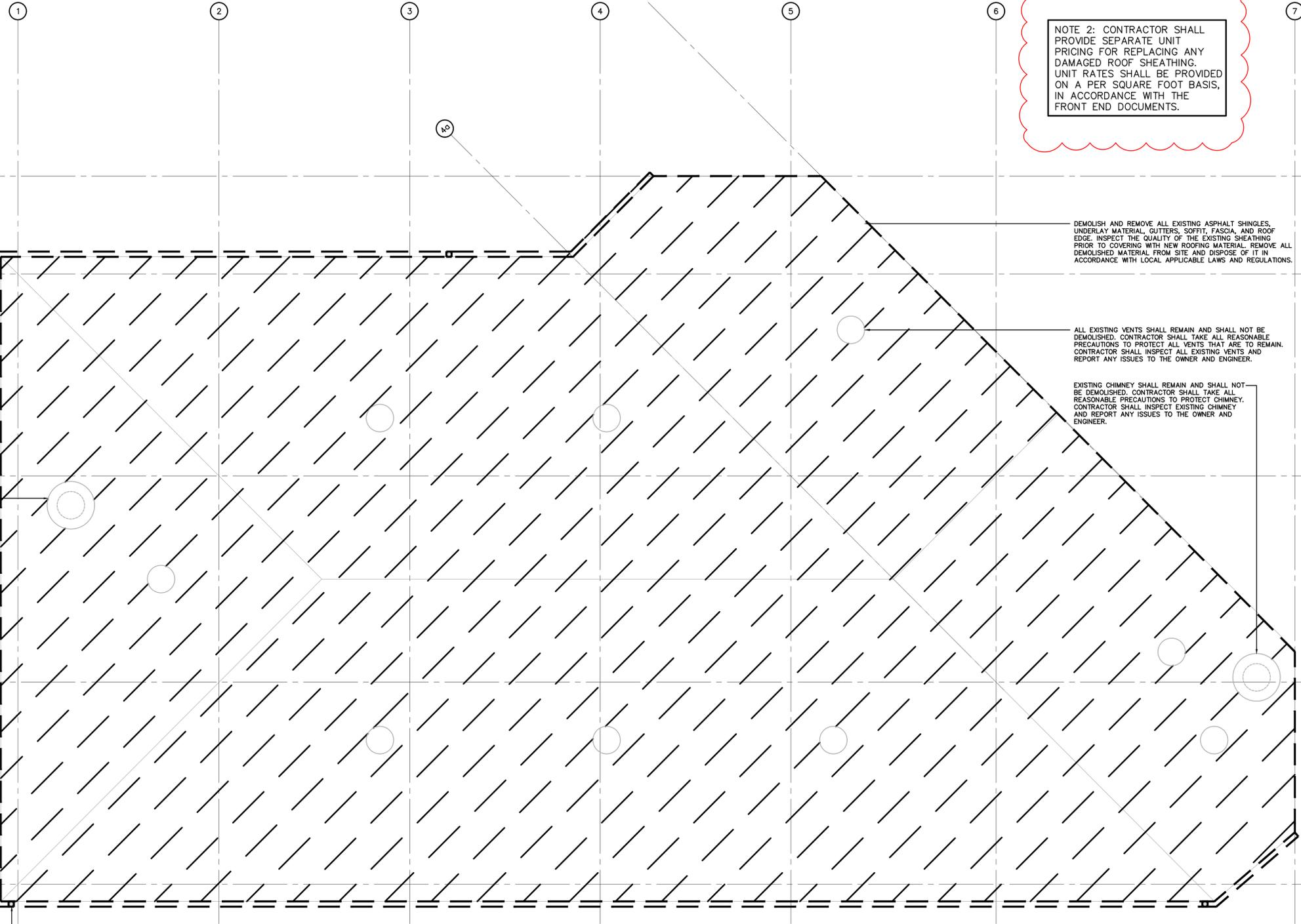
22-144L-E101 PROPOSED SOLAR ARRAY LAYOUT

22-144L-E102 MECHANICAL/ELECTRICAL ROOM LAYOUT, SINGLE LINE DIAGRAM

22-144L-E201 DETAILS & SPECIFICATIONS



Office: (866) 624-8378
E-mail: info@tbte.ca



NOTE 2: CONTRACTOR SHALL PROVIDE SEPARATE UNIT PRICING FOR REPLACING ANY DAMAGED ROOF SHEATHING. UNIT RATES SHALL BE PROVIDED ON A PER SQUARE FOOT BASIS, IN ACCORDANCE WITH THE FRONT END DOCUMENTS.

DEMOLISH AND REMOVE ALL EXISTING ASPHALT SHINGLES, UNDERLAY MATERIAL, GUTTERS, SOFFIT, FASCIA, AND ROOF EDGE. INSPECT THE QUALITY OF THE EXISTING SHEATHING PRIOR TO COVERING WITH NEW ROOFING MATERIAL. REMOVE ALL DEMOLISHED MATERIAL FROM SITE AND DISPOSE OF IT IN ACCORDANCE WITH LOCAL APPLICABLE LAWS AND REGULATIONS.

ALL EXISTING VENTS SHALL REMAIN AND SHALL NOT BE DEMOLISHED. CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO PROTECT ALL VENTS THAT ARE TO REMAIN. CONTRACTOR SHALL INSPECT ALL EXISTING VENTS AND REPORT ANY ISSUES TO THE OWNER AND ENGINEER.

EXISTING CHIMNEY SHALL REMAIN AND SHALL NOT BE DEMOLISHED. CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO PROTECT CHIMNEY. CONTRACTOR SHALL INSPECT EXISTING CHIMNEY AND REPORT ANY ISSUES TO THE OWNER AND ENGINEER.

EXISTING CHIMNEY SHALL REMAIN AND SHALL NOT BE DEMOLISHED. CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO PROTECT CHIMNEY. CONTRACTOR SHALL INSPECT EXISTING CHIMNEY AND REPORT ANY ISSUES TO THE OWNER AND ENGINEER. REFER TO NOTE 1 ON THIS DRAWING.

NOTE 1: CONTRACTOR SHALL PROVIDE A SEPARATE PRICE TO DEMOLISH CHIMNEY, PATCH/SEAL THE ROOF AND PATCH/SEAL THE MECHANICAL ROOM CEILING. REFER TO THE CITY OF KENORA FRONT END DOCUMENTS FOR DETAILS.

DEMOLISH AND REMOVE EXISTING DOWNSPOUTS (TYP. OF 3)

ROOF PLAN - DEMOLITION
SCALE: 3/16"=1'-0"

GENERAL NOTES

1. DRAWINGS ARE DIAGRAMMATIC ONLY. DO NOT SCALE.
2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE PRIOR TO INSTALLATION AND REPORT ANY ERRORS AND/OR OMISSIONS TO THE ENGINEER.
3. CONTRACTOR SHALL MAINTAIN DIGITAL PHOTOGRAPHIC RECORDS OF ALL INSTALLATIONS PRIOR TO CONCEALMENT BY SUPPORTING TRADES.
4. ALL WORK TO BE COMPLETED BY APPROPRIATELY LICENSED PERSONNEL IN ACCORDANCE WITH THE LATEST EDITION OF THE ONTARIO BUILDING CODE AND ALL APPLICABLE RULES AND REGULATIONS.
5. ALL WORK SHALL COMPLY WITH THE MOST CURRENT VERSION OF ALL APPLICABLE CODES AND STANDARDS. IN THE CASE OF CONFLICTING REQUIREMENTS, THE MOST STRINGENT REGULATION SHALL PREVAIL.
6. CONTRACTOR TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS TO ALLOW COMPLETION OF THE WORK.
7. CONTRACTOR TO ARRANGE AND PAY FOR ALL NECESSARY INSPECTIONS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION.
8. DOCUMENT THE COMPLETE INSTALLATION WITH PHOTOGRAPHS. SUBMIT PHOTOGRAPHS TO THE OWNER AND ENGINEER AS THE PROJECT PROGRESSES.
9. ANY CHANGES FROM THE DRAWINGS TO BE APPROVED BY ENGINEER BEFORE COMPLETION.
10. KEEP ONE SET OF DRAWINGS ON SITE TO RECORD ALL CHANGES FROM THE DRAWINGS. MARK THE DRAWINGS "AS BUILT" AND SUBMIT TO OWNER OR ENGINEER UPON COMPLETION OF THE PROJECT.
11. CONTRACTOR IS RESPONSIBLE FOR FINAL LAYOUT AND ROUTING.
12. SUBMIT SHOP DRAWINGS TO ENGINEER FOR APPROVAL PRIOR TO ORDERING EQUIPMENT.
13. THE APPROVAL OF SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF THE FITTING OF EQUIPMENT AND COMPONENTS. ANY DISCREPANCIES IN THE SHOP DRAWINGS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

No.	Revision	Date	Initial
1	REVISED FOR ADDENDUM #1	MAR 18/26	KO
0	ISSUED FOR TENDER	NOV 3/25	KO

- Notes:
1. CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING DIMENSIONS AND EXISTING CONDITIONS AT THE OUTSET OF CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER. DO NOT PROCEED WITHOUT FURTHER WRITTEN DIRECTION FROM THE ENGINEER.
 2. DRAWING SHOWS GENERAL ARRANGEMENT ONLY. DO NOT SCALE.
 3. ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF TBT ENGINEERING CONSULTING GROUP AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR IN WHOLE IS FORBIDDEN WITHOUT THE ENGINEERS WRITTEN PERMISSION.

Approved	Approved
PRELIMINARY	

TBT ENGINEERING CONSULTING GROUP

Office: (866) 624-8378
E-mail: info@tbte.ca

LOTW MUSEUM ROOF RENOVATION & SOLAR
KENORA ON

ARCHITECTURAL
ROOF PLAN
DEMOLITION

ARCHITECTURAL DRAWINGS TO BE READ IN CONJUNCTION WITH ELECTRICAL DRAWINGS

Scale:	Drawn By: LN	Date:
AS NOTED	Ckd. By: KO	MARCH, 2026
	Dwg. No.: 22-144L-A101	Rev. 1



1
SUPPLY AND INSTALL STANDING SEAM CORRUGATED STEEL PANELS WITH A PANEL WIDTH OF 36" OVER THE ENTIRE ROOF SURFACE. STEEL PANELS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS. COFFEE BROWN FINISH (TYP. OF ENTIRE ROOF).

1
CONTRACTOR SHALL UTILIZE THE EXISTING GFCL LOCATED BELOW THE ROOF'S EAVES FOR THE HIGH WATTAGE ELECTRICAL HEAT TRACE LINE.

SUPPLY AND INSTALL AN ELECTRIC HEAT TRACE LINE 12" FROM THE BOTTOM OF THE GUTTER SPACED 12" ALONG THE PATH AS INDICATED ON THE DRAWING.

ALL EXISTING VENTS SHALL REMAIN AND SHALL NOT BE DEMOLISHED. CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO PROTECT ALL VENTS THAT ARE TO REMAIN. CONTRACTOR SHALL INSPECT ALL EXISTING VENTS AND REPORT ANY ISSUES TO THE OWNER AND ENGINEER. EXTEND VENTS TO MATCH NEW INSULATION HEIGHT AS REQUIRED.

SUPPLY AND INSTALL PARAPET WALL AND CAPPING IN ACCORDANCE WITH DETAIL.

2
A201
1
SUPPLY AND INSTALL STEEL RIDGE VENT AS SHOWN. RIDGE VENT TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. COFFEE BROWN FINISH.
SUPPLY AND INSTALL STEEL W VALLEY AS SHOWN. W VALLEY TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. COFFEE BROWN FINISH.

1
EXTEND CHIMNEY TO MATCH NEW INSULATION HEIGHT AS REQUIRED. SUPPLY AND INSTALL STEEL CHIMNEY KIT AS SHOWN. CHIMNEY KIT TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. COFFEE BROWN FINISH. (REFER TO NOTE 1 ON DWG A101).

1
SUPPLY AND INSTALL STEEL HIP/RIDGE AS SHOWN. HIP/RIDGE TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. COFFEE BROWN FINISH (TYP. OF 4 RIDGES)

1
SUPPLY AND INSTALL STEEL SNOW GUARDS AS INDICATED. SNOW GUARDS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. SNOW GUARDS SHALL BE INSTALLED 18" FROM THE EDGE OF ROOF. COFFEE BROWN FINISH. (TYP. OF ALL SLOPED AREAS)
EXTEND CHIMNEY TO MATCH NEW INSULATION HEIGHT AS REQUIRED. SUPPLY AND INSTALL STEEL CHIMNEY KIT AS SHOWN. CHIMNEY KIT TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. COFFEE BROWN FINISH.

1
SUPPLY AND INSTALL 6" HEAVY DUTY ALUMINUM GUTTER IN 10' LENGTHS. ALUMINUM WITH A COFFEE BROWN FINISH. GUTTER SUPPORTS SHALL BE INSTALLED AT 24" O.C. CONTRACTOR SHALL PROVIDE A SLOPE OF 1% IN THE DIRECTIONS INDICATED ON THE DRAWINGS.

SUPPLY AND INSTALL 6"x6" GUTTER DOWNSPOUTS. DOWNSPOUTS TO BE CONSTRUCTED FROM 0.125" ALUMINUM WITH A COFFEE BROWN FINISH (TYP. OF 3)

GENERAL NOTES

- DRAWINGS ARE DIAGRAMMATIC ONLY. DO NOT SCALE.
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE PRIOR TO INSTALLATION AND REPORT ANY ERRORS AND/OR OMISSIONS TO THE ENGINEER.
- CONTRACTOR SHALL MAINTAIN DIGITAL PHOTOGRAPHIC RECORDS OF ALL INSTALLATIONS PRIOR TO CONCEALMENT BY SUPPORTING TRADES.
- ALL WORK TO BE COMPLETED BY APPROPRIATELY LICENSED PERSONNEL IN ACCORDANCE WITH THE LATEST EDITION OF THE ONTARIO BUILDING CODE AND ALL APPLICABLE RULES AND REGULATIONS.
- ALL WORK SHALL COMPLY WITH THE MOST CURRENT VERSION OF ALL APPLICABLE CODES AND STANDARDS. IN THE CASE OF CONFLICTING REQUIREMENTS, THE MOST STRINGENT REGULATION SHALL PREVAIL.
- CONTRACTOR TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS TO ALLOW COMPLETION OF THE WORK.
- CONTRACTOR TO ARRANGE AND PAY FOR ALL NECESSARY INSPECTIONS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION.
- DOCUMENT THE COMPLETE INSTALLATION WITH PHOTOGRAPHS. SUBMIT PHOTOGRAPHS TO THE OWNER AND ENGINEER AS THE PROJECT PROGRESSES.
- ANY CHANGES FROM THE DRAWINGS TO BE APPROVED BY ENGINEER BEFORE COMPLETION.
- KEEP ONE SET OF DRAWINGS ON SITE TO RECORD ALL CHANGES FROM THE DRAWINGS. MARK THE DRAWINGS "AS BUILT" AND SUBMIT TO OWNER OR ENGINEER UPON COMPLETION OF THE PROJECT.
- CONTRACTOR IS RESPONSIBLE FOR FINAL LAYOUT AND ROUTING.
- SUBMIT SHOP DRAWINGS TO ENGINEER FOR APPROVAL PRIOR TO ORDERING EQUIPMENT.
- THE APPROVAL OF SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF THE FITTING OF EQUIPMENT AND COMPONENTS. ANY DISCREPANCIES IN THE SHOP DRAWINGS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

No.	Revision	Date	Initial
1	REVISED FOR ADDENDUM #1	MAR 18/26	KO
0	ISSUED FOR TENDER	NOV 3/25	KO

- Notes:
- CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING DIMENSIONS AND EXISTING CONDITIONS AT THE OUTSET OF CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER. DO NOT PROCEED WITHOUT FURTHER WRITTEN DIRECTION FROM THE ENGINEER.
 - DRAWING SHOWS GENERAL ARRANGEMENT ONLY. DO NOT SCALE.
 - ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF TBT ENGINEERING CONSULTING GROUP AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR IN WHOLE IS FORBIDDEN WITHOUT THE ENGINEERS WRITTEN PERMISSION.

Approved _____ Approved _____
PRELIMINARY

TBT ENGINEERING CONSULTING GROUP
Office: (866) 624-8378
E-mail: info@tbte.ca

LOTW MUSEUM ROOF RENOVATION & SOLAR
KENORA ON

ARCHITECTURAL ROOF PLAN RENOVATION

Scale: AS NOTED	Drawn By: LN Ckd. By: KO Dwg. No.: 22-144L-A102	Date: MARCH, 2026 Rev. 1
--------------------	---	--------------------------------

ROOF PLAN - RENOVATION
SCALE: 3/16"=1'-0"

ARCHITECTURAL DRAWINGS TO BE READ IN CONJUNCTION WITH ELECTRICAL DRAWINGS

ARCHITECTURAL SPECIFICATION

GENERAL INSTRUCTION

- DRAWINGS ARE DIAGRAMMATIC ONLY. DO NOT SCALE.
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE PRIOR TO INSTALLATION AND REPORT ANY ERRORS AND/OR OMISSIONS TO THE ENGINEER.
- CONTRACTOR SHALL MAINTAIN DIGITAL PHOTOGRAPHIC RECORDS OF ALL INSTALLATIONS PRIOR TO CONCEALMENT BY SUPPORTING TRADES.
- ALL WORK TO BE COMPLETED BY APPROPRIATELY LICENSED PERSONNEL IN ACCORDANCE WITH THE LATEST EDITION OF THE ONTARIO BUILDING CODE AND ALL APPLICABLE RULES AND REGULATIONS.
- ALL WORK SHALL COMPLY WITH THE MOST CURRENT VERSION OF ALL APPLICABLE CODES AND STANDARDS. IN THE CASE OF CONFLICTING REQUIREMENTS, THE MOST STRINGENT REGULATION SHALL PREVAIL.
- CONTRACTOR TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS TO ALLOW COMPLETION OF THE WORK.
- CONTRACTOR TO ARRANGE AND PAY FOR ALL NECESSARY INSPECTIONS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION.
- DOCUMENT THE COMPLETE INSTALLATION WITH PHOTOGRAPHS. SUBMIT PHOTOGRAPHS TO THE OWNER AND ENGINEER AS THE PROJECT PROGRESSES.
- ANY CHANGES FROM THE DRAWINGS TO BE APPROVED BY ENGINEER BEFORE COMPLETION.
- KEEP ONE SET OF DRAWINGS ON SITE TO RECORD ALL CHANGES FROM THE DRAWINGS. MARK THE DRAWINGS "AS BUILT" AND SUBMIT TO OWNER OR ENGINEER UPON COMPLETION OF THE PROJECT.
- CONTRACTOR IS RESPONSIBLE FOR FINAL LAYOUT AND ROUTING.
- SUBMIT SHOP DRAWINGS TO ENGINEER FOR APPROVAL PRIOR TO ORDERING EQUIPMENT.
- THE APPROVAL OF SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF THE FITTING OF EQUIPMENT AND COMPONENTS. ANY DISCREPANCIES IN THE SHOP DRAWINGS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

GENERAL CONSTRUCTION NOTES

- ALL MATERIALS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
- ALL PENETRATIONS THROUGH FIRE RATED PARTITIONS SHALL BE SEALED TO PROVIDE MINIMUM 1 HOUR FIRE RATING.
- STUD AND JOIST STRUCTURAL PROPERTIES SHALL BE DESIGNED ACCORDANCE TO CSA STANDARDS, NATIONAL BUILDING CODE OF CANADA 2010 - [NBCC]
- NORTH AMERICAN SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS - [CAN/CSA-S136-07]
- STANDARD SPECIFICATION FOR STEEL SHEET ZINC-COATED (GALVANIZED OR ZINC-IRON ALLOY COATED (GALVANEALDED)) BY THE HOT-DIP PROCESS - [ASTM A653/A653M]
- STANDARD SPECIFICATION FOR INSTALLATION OF LOAD BEARING (TRANSVERSE & AXIAL) STEEL STUDS AND RELATED ACCESSORIES - [ASTM C1007]
- STANDARD SPECIFICATION FOR LOAD BEARING (TRANSVERSE & AXIAL) STEEL STUDS, RUNNERS (TRACKS), & BRACING OR BRIDGING FOR SCREW APPLICATION OF GYPSUM PANEL PRODUCTS AND METAL PLASTER BASES - [ASTM C955]
- STANDARD METHODS OF FIRE ENDURANCE TESTS OF BUILDING CONSTRUCTION AND MATERIALS - [CAN/ULC-S101]

GENERAL DEMOLITION NOTES

- THE OWNER HAS FIRST RIGHT OF ALL MATERIALS TO BE REMOVED AS A RESULT OF THE DEMOLITION OF EXISTING CONDITIONS. ANY/ALL NON-CLAIMED ITEMS BY THE OWNER ARE THE RESPONSIBILITY OF THE CONTRACTOR TO BE REMOVED AND DISCARDED FROM THE SITE.
- ALL DEMOLITION AND MATERIAL REMOVAL OPERATIONS SHALL BE CAREFULLY AND SAFELY CARRIED OUT DAILY TO ACCOMMODATE FUTURE NEW CONSTRUCTION. THE DEMOLITION CONTRACTOR SHALL BE RESPONSIBLE FOR SAFE PROCEDURES, PRACTICES AND OPERATIONS.
- CONTRACTOR SHALL PROPERLY DISPOSE OF ALL DEBRIS IN ACCORDANCE WITH LOCAL LAWS AND REGULATIONS.
- CONTRACTOR SHALL COORDINATE THE LOCATIONS OF DUMP BINS, TRAILERS, SHOOT, SCAFFOLDING, MACHINERY AND ALL OTHER TEMPORARY PROCEDURES REQUIRED TO COMPLETE THE WORK.

WOOD FRAMING

- CONFORM TO CSA 086.
- MATERIALS: LUMBER: GRADE MARKED TO CONFORM TO CSA 0141; KILN DRIED; SPF NO. 2 OR BETTER; MOISTURE CONTENT NOT TO EXCEED 19% AT TIME OF MANUFACTURE AND INSTALLATION; UNLESS NOTED OTHERWISE, PLYWOOD SHEATHING: TO CSA 0151 SOFTWOOD SPRUCE; OR CSA 0121. DOUGLAS FIR OSB SHEATHING: TO CSA 0325, LAMINATED VENEER LUMBER (LVL): MINIMUM GRADE 2.0E, 2500FB (FB=31.9MPA) OR BETTER, PARALLEL STRAND LUMBER (PSL): MINIMUM GRADE 2.0E, 2900FB (FB=37MPA) OR BETTER, LAMINATED STRAND LUMBER (LSL): MINIMUM GRADE 1.3E, 1700FB (FB=29.7MPA) OR BETTER, NAILS: COMMON ROUND STEEL NAILS, BOLTS: ASTM A307 LAG SCREWS: ANSI/ASME B18.12.1, MACHINE THREADED (NOT CAST-THREADED), PREDRILL PRIOR TO LAG SCREW INSTALLATIONS. WOOD CONNECTORS: MANUFACTURED BY SIMPSON STRONG-TIE COMPANY OR APPROVED EQUIVALENT, INSTALL IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS, HOT DIP GALVANIZING: ASTM A123/A12M, MINIMUM ZINC COATING OF 600 G/M² FOR ALL EXTERIOR STEEL TIMBER CONNECTION COMPONENTS, UNLESS OTHERWISE NOTED.
- UNLESS NOTED OTHERWISE, ALL WOOD FRAMING DETAILS TO BE IN ACCORDANCE WITH PART 9 OF THE REFERENCED BUILDING CODE.
- PROTECT ALL WOOD PRODUCTS FROM THE ELEMENTS AS REQUIRED TO MAINTAIN THEIR INTEGRITY.
- PROVIDE ALL ERECTION BRACING REQUIRED TO KEEP THE STRUCTURE STABLE AND IN ALIGNMENT DURING CONSTRUCTION.
- SUBSTITUTION OF COMMON NAILS WITH POWER DRIVEN NAILS OF THE SAME LENGTH AND DIAMETER IS ACCEPTABLE. SUBSTITUTION OF POWER DRIVING NAILS OF SMALL DIAMETER MUST BE APPROVED IN WRITING BY WSE PRIOR TO USE. POWER DRIVEN NAILS NOT TO BE OVER-DRIVEN INTO WOOD OR SHEATHING.
- MEMBER SIZES INDICATED ON DRAWINGS ARE A MINIMUM AND ARE TO BE INCREASED AS REQUIRED TO MEET DESIGN FOLLOWING THE ORIGINAL DESIGN INTENT.
- PROPOSED NOTCHING AND DRILLING OF FRAMING MEMBERS MUST BE SUBMITTED TO THE ENGINEER RESPONSIBLE FOR THOSE FRAMING MEMBERS FOR THEIR REVIEW. SIGNIFICANT NOTCHES CONFORMING TO PART 9 MAY BE REJECTED IF THEY COMPROMISE THE STRUCTURAL INTEGRITY.
- ALL COMPONENTS OF BUILT UP MEMBERS TO BE CONTINUOUS FOR FULL SPAN. DO NOT SPLICE OR USE BUTT JOINTS.
- CARRY ALL POSTS DOWN TO FOUNDATION, PROVIDE SOLID VERTICAL BLOCKING OF MATCHING SIZE OR LARGER AND IN LINE WITH POSTS AT FLOOR LEVELS.
- USE JOISTS HANGERS WHERE JOISTS FRAME INTO SIDES OF SUPPORTS.
- PROVIDE SOLID BLOCKING BETWEEN JOISTS AT INTERIOR SUPPORTS, AND PROVIDE CROSS-BRIDGING BETWEEN JOISTS AT MAX. 2100 (7'-0") ON CENTRE ALONG LENGTH OF SPAN, UNLESS NOTED OTHERWISE.
- UNTREATED WOOD NOT TO BE IN DIRECT CONTACT WITH CONCRETE, PROVIDE FOAM GASKET BETWEEN WOOD AND CONCRETE, OR USE PRESSURE TREATED WOOD. REFER TO PLANS FOR ADDITIONAL REQUIREMENTS.
- WOOD STUD WALLS:
 - ONLY LOAD BEARING WALLS ARE SHOWN ON PLAN. REFER TO ARCHITECTURAL DRAWINGS FOR ALL NON-LOAD BEARING WALLS AND REQUIREMENTS.
 - PROVIDE 2-PLY TOP PLATE. CONNECT BUILT UP TOP PLATES TOGETHER WITH ONE ROW OF 75 (3") NAILS SPACED NOT MORE THAN 300 APART. WHERE TOP PLATES ARE SPLICED, REFER TO TYPICAL DETAILS TW-FAST011 FOR SPLICE REQUIREMENTS.
 - FOR EXTERIOR WALLS THAT ARE NOT SHEAR WALLS, PROVIDE SHEATHING ON EXTERIOR WIDE. FASTEN TO SUPPORT FRAMING AS PER PART 9.

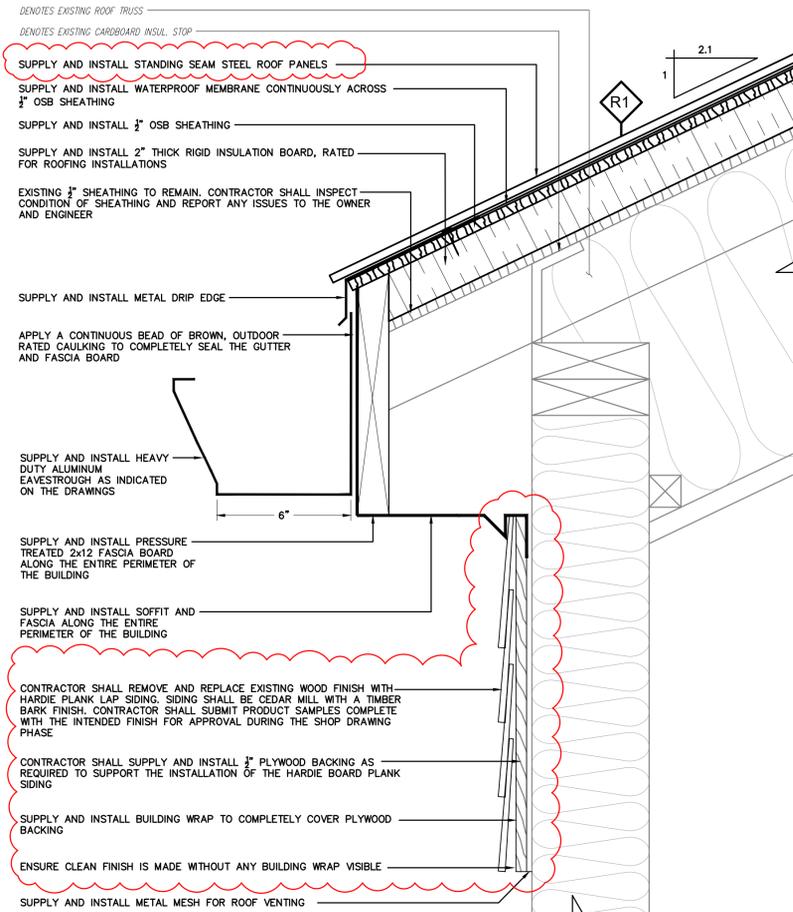
ARCHITECTURAL SPECIFICATION - CONTINUED

NEW ROOF - MATERIALS

- STANDING SEAM STEEL ROOFING PANELS
 - FINISH MATERIAL: METALLIC COATING, CHEMICAL PRE-TREATMENT, FLEXIBLE PRIMER, AND COFFEE BROWN TOPCOAT
 - THICKNESS: HIGH-TENSILE, 29-GAUGE STEEL
 - DIMENSIONS: PANEL WIDTH 36"
- STEEL RIDGE VENT
 - FINISH MATERIAL: METALLIC COATING, CHEMICAL PRE-TREATMENT, FLEXIBLE PRIMER, AND COFFEE BROWN TOPCOAT
 - THICKNESS: HIGH-TENSILE, 29-GAUGE STEEL
- STEEL HIP/RIDGE
 - FINISH MATERIAL: METALLIC COATING, CHEMICAL PRE-TREATMENT, FLEXIBLE PRIMER, AND COFFEE BROWN TOPCOAT
 - THICKNESS: HIGH-TENSILE, 29-GAUGE STEEL
- STEEL W VALLEY
 - FINISH MATERIAL: METALLIC COATING, CHEMICAL PRE-TREATMENT, FLEXIBLE PRIMER, AND COFFEE BROWN TOPCOAT
 - THICKNESS: HIGH-TENSILE, 29-GAUGE STEEL
- STEEL CHIMNEY KIT
 - FINISH MATERIAL: METALLIC COATING, CHEMICAL PRE-TREATMENT, FLEXIBLE PRIMER, AND COFFEE BROWN TOPCOAT
 - THICKNESS: HIGH-TENSILE, 29-GAUGE STEEL
- STEEL SNOW GUARD
 - FINISH MATERIAL: METALLIC COATING, CHEMICAL PRE-TREATMENT, FLEXIBLE PRIMER, AND COFFEE BROWN TOPCOAT
 - THICKNESS: HIGH-TENSILE, 29-GAUGE STEEL
- ALUMINUM GUTTER
 - FINISH MATERIAL: COFFEE BROWN PAINT
 - THICKNESS: 0.125" EXTRUDED ALUMINUM
- ALUMINUM DOWNSPOUT
 - FINISH MATERIAL: COFFEE BROWN PAINT
 - THICKNESS: 0.125" EXTRUDED ALUMINUM

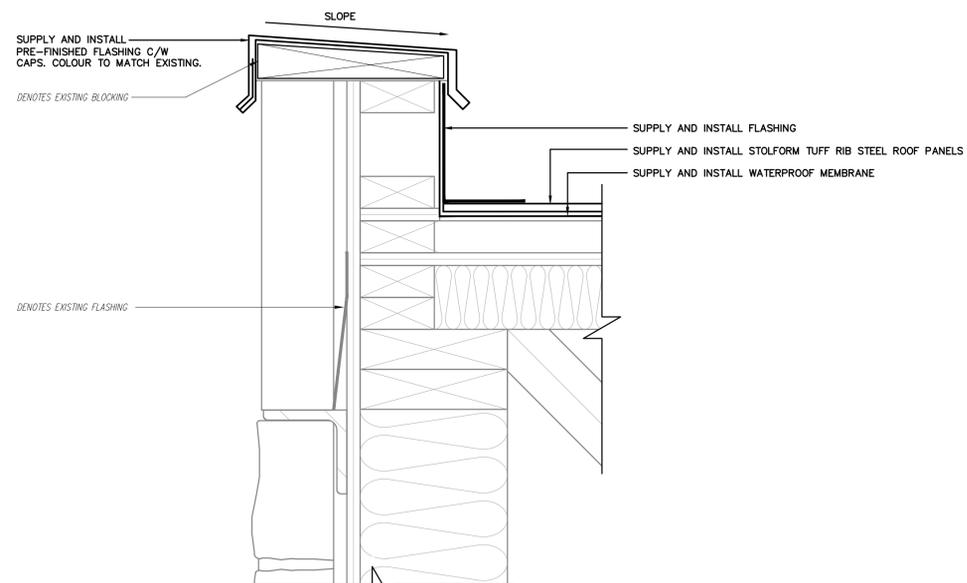
R1 - NEW ROOF CONSTRUCTION

STANDING SEAM STEEL ROOF PANELS
WATERPROOF MEMBRANE
3/4" OSB SHEATHING
2" RIGID INSULATION BOARD
EXISTING 1/2" INCH SHEATHING TO REMAIN



1 RENOVATED ROOF - SECTION

SCALE: NTS



2 RENOVATED PARAPET - SECTION

SCALE: NTS

TYPICAL ROOFING TRIMS

DESCRIPTION		LOCATION
HIP/RIDGE		SUB PEAKS
RIDGE VENT		MAIN PEAK
W VALLEY 34"		1 VALLEY
SNOW GUARD		ALL SIDES
CHIMNEY KIT		2 CHIMNEYS

ROOFING DETAILS ARE FOR ILLUSTRATION PURPOSES ONLY

NOTE: THE PRODUCTS SPECIFIED IN THIS TABLE WERE USED AS THE BASIS FOR DESIGN. THE CONTRACTOR SHALL PROVIDE PRICING BASED ON THE PERFORMANCE OF THE SPECIFIED ROOFING PRODUCTS. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ANY PRODUCTS USED ARE AN APPROVED EQUAL OR SUPERIOR PRODUCT. SUCCESSFUL CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND PRODUCT SAMPLES COMPLETE WITH THE INTENDED FINISH FOR APPROVAL DURING THE SHOP DRAWING PHASE.

No.	Revision	Date	Initial
1	REVISED FOR ADDENDUM #1	MAR 18/26	KO
0	ISSUED FOR TENDER	NOV 3/25	KO

- Notes:
- CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING DIMENSIONS AND EXISTING CONDITIONS AT THE OUTSET OF CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER. DO NOT PROCEED WITHOUT FURTHER WRITTEN DIRECTION FROM THE ENGINEER.
 - DRAWING SHOWS GENERAL ARRANGEMENT ONLY. DO NOT SCALE.
 - ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF TBT ENGINEERING CONSULTING GROUP AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR IN WHOLE IS FORBIDDEN WITHOUT THE ENGINEERS WRITTEN PERMISSION.

Approved	Approved
PRELIMINARY	

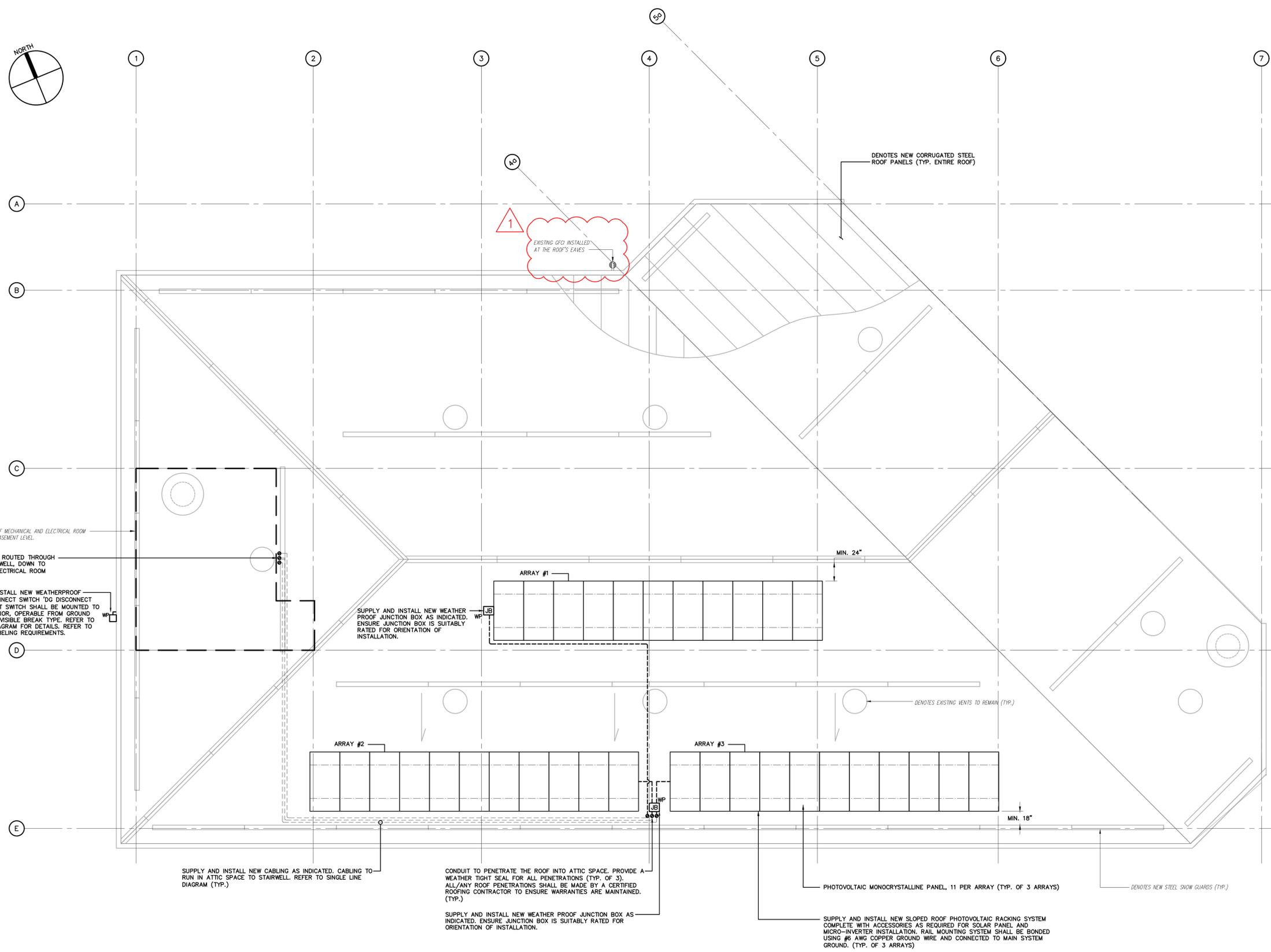
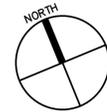
TBT ENGINEERING CONSULTING GROUP

Office: (866) 624-8378
E-mail: info@tbt.ca

LOTW MUSEUM ROOF RENOVATION & SOLAR
KENORA ON

ARCHITECTURAL
DETAILS & SPECIFICATIONS

Scale: AS NOTED	Drawn By: LN Ckd. By: KO Dwg. No.: 22-144L-A201	Date: MARCH, 2026	Rev. 1
--------------------	---	----------------------	-----------



GENERAL NOTES

1. DRAWINGS ARE DIAGRAMMATIC ONLY. DO NOT SCALE.
2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS ON SITE PRIOR TO INSTALLATION AND REPORT ANY ERRORS AND/OR OMISSIONS TO THE ENGINEER.
3. CONTRACTOR SHALL MAINTAIN DIGITAL PHOTOGRAPHIC RECORDS OF ALL INSTALLATIONS PRIOR TO CONCEALMENT BY SUPPORTING TRADES.
4. ALL WORK TO BE COMPLETED BY APPROPRIATELY LICENSED PERSONNEL IN ACCORDANCE WITH THE LATEST EDITION OF THE ONTARIO BUILDING CODE AND ALL APPLICABLE RULES AND REGULATIONS.
5. ALL WORK SHALL COMPLY WITH THE MOST CURRENT VERSION OF ALL APPLICABLE CODES AND STANDARDS. IN THE CASE OF CONFLICTING REQUIREMENTS, THE MOST STRINGENT REGULATION SHALL PREVAIL.
6. CONTRACTOR TO OBTAIN AND PAY FOR ALL NECESSARY PERMITS TO ALLOW COMPLETION OF THE WORK.
7. CONTRACTOR TO ARRANGE AND PAY FOR ALL NECESSARY INSPECTIONS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION.
8. DOCUMENT THE COMPLETE INSTALLATION WITH PHOTOGRAPHS. SUBMIT PHOTOGRAPHS TO THE OWNER AND ENGINEER AS THE PROJECT PROGRESSES.
9. ANY CHANGES FROM THE DRAWINGS TO BE APPROVED BY ENGINEER BEFORE COMPLETION.
10. KEEP ONE SET OF DRAWINGS ON SITE TO RECORD ALL CHANGES FROM THE DRAWINGS. MARK THE DRAWINGS "AS BUILT" AND SUBMIT TO OWNER OR ENGINEER UPON COMPLETION OF THE PROJECT.
11. CONTRACTOR IS RESPONSIBLE FOR FINAL LAYOUT AND ROUTING.
12. SUBMIT SHOP DRAWINGS TO ENGINEER FOR APPROVAL PRIOR TO ORDERING EQUIPMENT.
13. THE APPROVAL OF SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF THE FITTING OF EQUIPMENT AND COMPONENTS. ANY DISCREPANCIES IN THE SHOP DRAWINGS ARE THE RESPONSIBILITY OF THE CONTRACTOR.

DRAWING NOTES

1. PHOTOVOLTAIC RACKING SYSTEM SHALL BE INSTALLED AS PER MANUFACTURER'S RECOMMENDATIONS.
2. CONTRACTOR SHALL SUPPLY AND INSTALL ALL ACCESSORIES REQUIRED FOR A COMPLETE INSTALLATION OF THE PHOTOVOLTAIC SYSTEM.
3. MAINTAIN MINIMUM PHOTOVOLTAIC ARRAY SPACING OF 18" (457MM) FROM ALL SIDES OF ROOF AND MINIMUM 24" (610MM) SPACING FROM ROOF RIDGE.
4. INCLUDE MINIMUM 0.5" (13MM) AIR GAP BETWEEN ARRAY ROWS.
5. ENSURE EACH PHOTOVOLTAIC MODULE IS SECURED IN FOUR PLACES.
6. EMT CONDUIT INSTALLED IN FINISHED SPACES SHALL BE PAINTED TO MATCH.
7. PHOTOVOLTAIC SYSTEM SHALL BE INSTALLED SO AS TO PRODUCE A BALANCED THREE-PHASE OUTPUT.
8. ANY/ALL ROOF PENETRATIONS SHALL BE MADE BY A CERTIFIED ROOFING CONTRACTOR TO ENSURE WARRANTIES ARE MAINTAINED.
9. ANY/ALL CABLING SHALL BE ROUTED THROUGH EMT CONDUIT.

No.	Revision	Date	Initial
1	REVISED FOR ADDENDUM #1	MAR 18/26	KO
0	ISSUED FOR TENDER	NOV 3/25	KO

Notes:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING DIMENSIONS AND EXISTING CONDITIONS AT THE OUTSET OF CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER. DO NOT PROCEED WITHOUT FURTHER WRITTEN DIRECTION FROM THE ENGINEER.
2. DRAWING SHOWS GENERAL ARRANGEMENT ONLY. DO NOT SCALE.
3. ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF TBT ENGINEERING CONSULTING GROUP AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR IN WHOLE IS FORBIDDEN WITHOUT THE ENGINEERS WRITTEN PERMISSION.

Approved _____ Approved _____

PRELIMINARY

TBT ENGINEERING CONSULTING GROUP

Office: (866) 624-8378
E-mail: info@tbe.ca

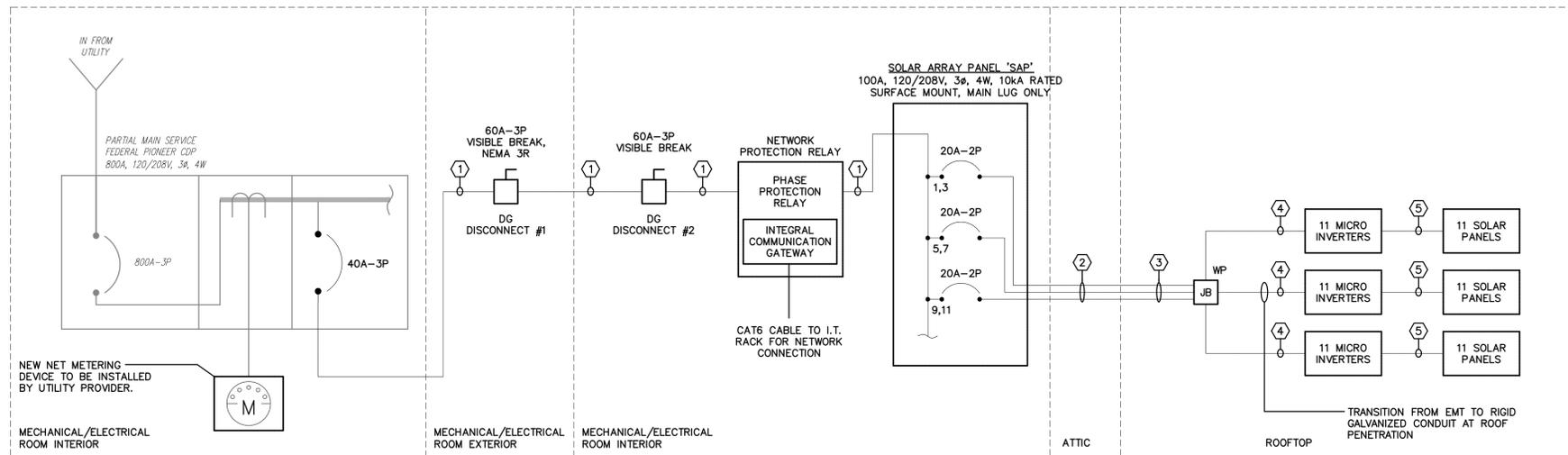
LOTW MUSEUM ROOF RENOVATION & SOLAR
KENORA ON

ELECTRICAL ROOF PLAN
PROPOSED SOLAR ARRAY LAYOUT

Scale: AS NOTED	Drawn By: LN Ckd. By: KO Dwg. No.: 22-144L-E101	Date: MARCH, 2026	Rev. 1
--------------------	---	----------------------	-----------

ROOF PLAN - SOLARY ARRAY LAYOUT
SCALE: 3/16"=1'-0"

ELECTRICAL DRAWINGS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS

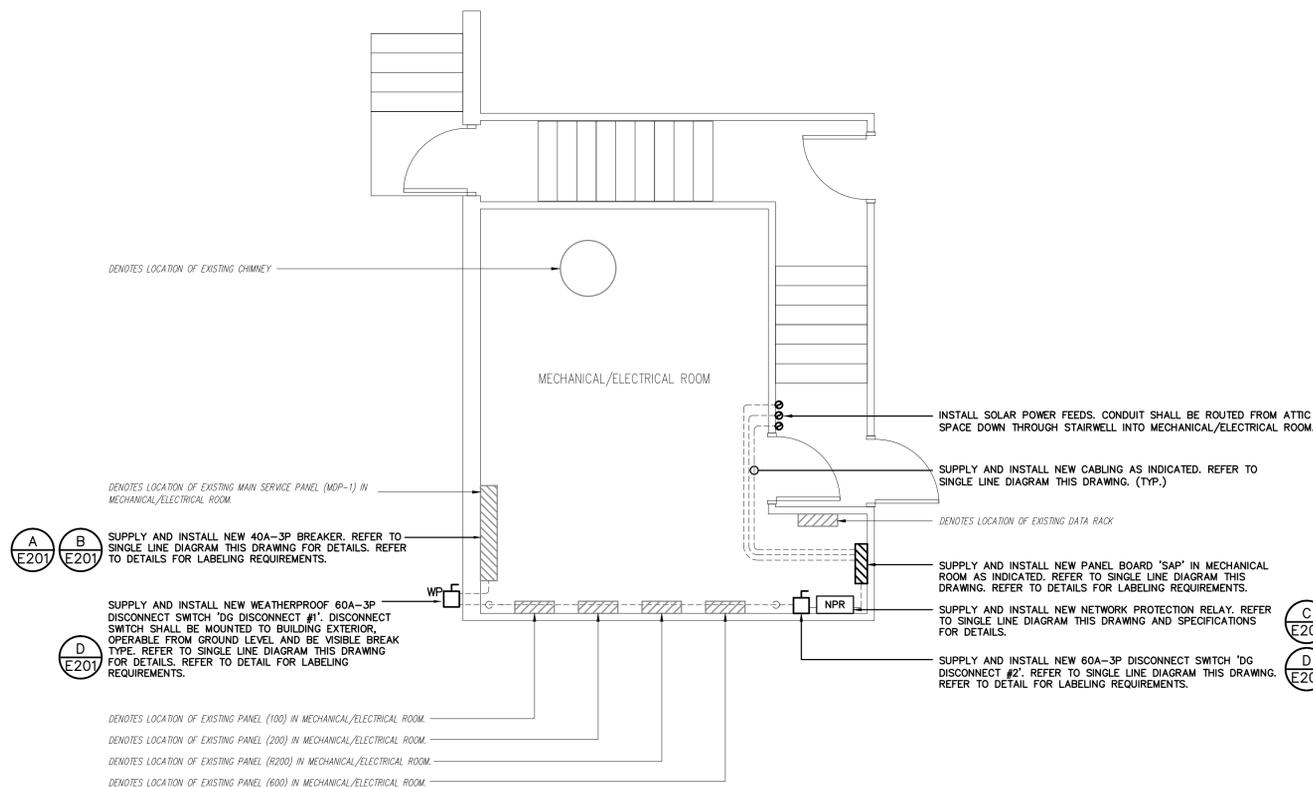


CABLE LEGEND

- ① 4C-#8AWG RW-90 W/GND IN Ø27MM EMT
- ② 6-#12AWG RW90 W/GND IN 27MM EMT
- ③ 6-#12AWG RW90 CU W/ GND IN 27MM RIGID GALVANIZED CONDUIT
- ④ PRE-MANUFACTURED TRUNK CABLE TO BE PROVIDED WITH INVERTERS
- ⑤ PRE-MANUFACTURED CONNECTION CABLE PROVIDED WITH PV PANELS

SINGLE LINE POWER DISTRIBUTION DIAGRAM

SCALE: NTS



1 MECHANICAL/ELECTRICAL ROOM LAYOUT

SCALE: NTS

DISTRIBUTED GENERATION SYSTEM INFORMATION

EQUIPMENT				
TYPE	MAKE	MODEL	MAXIMUM CONTINUOUS POWER OUTPUT	AC FAULT CURRENT CONTRIBUTION
MICRO INVERTER	ENPHASE	IQ7+	290VA	5.8A RMS (3-CYCLE)
SOLAR PANEL	HELIENE	72M	370W	---

SYSTEM POWER OUTPUT				
BRANCH	INVERTER MAXIMUM CONTINUOUS POWER OUTPUT	INVERTER QUANTITY	BRANCH OUTPUT POWER	BRANCH OUTPUT CURRENT
1	290VA	11	3190VA	15.34A (208V, 1φ)
2	290VA	11	3190VA	15.34A (208V, 1φ)
3	290VA	11	3190VA	15.34A (208V, 1φ)
TOTAL			9570VA	26.58A (208V, 3φ)

* THE EQUIPMENT OUTLINED IN THIS TABLE WAS USED AS A BASIS FOR DESIGN. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ANY EQUIPMENT OTHER THAN THAT SPECIFIED CONFORMS TO THE UTILITY PROVIDER'S TECHNICAL INTERCONNECTION REQUIREMENTS FOR MICRO GENERATION (LESS THAN 10KW).

LABELING OF NEW PV SYSTEM SHALL BE IN ACCORDANCE WITH OESC SECTION 64 AND ASSOCIATED BULLETINS

GLOBAL DISTRIBUTED LOAD SHALL NOT EXCEED 5 LBS/FT². REFER TO STRUCTURAL ANALYSIS REPORT ATTACHED.

No.	Revision	Date	Initial
1	REVISED FOR ADDENDUM #1	MAR 18/26	KO
0	ISSUED FOR TENDER	NOV 3/25	KO

- Notes:
- CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING DIMENSIONS AND EXISTING CONDITIONS AT THE OUTSET OF CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER. DO NOT PROCEED WITHOUT FURTHER WRITTEN DIRECTION FROM THE ENGINEER.
 - DRAWING SHOWS GENERAL ARRANGEMENT ONLY. DO NOT SCALE.
 - ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF TBT ENGINEERING CONSULTING GROUP AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR IN WHOLE IS FORBIDDEN WITHOUT THE ENGINEERS WRITTEN PERMISSION.

Approved _____ Approved _____

PRELIMINARY

TBT ENGINEERING CONSULTING GROUP

Office: (866) 624-8378
E-mail: info@tbte.ca

LOTW MUSEUM ROOF RENOVATION & SOLAR KENORA ON

ELECTRICAL MECHANICAL/ELECTRICAL ROOM LAYOUT SINGLE LINE DIAGRAM

ELECTRICAL DRAWINGS TO BE READ IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS

Scale: AS NOTED	Drawn By: LN Ckd. By: KO	Date: MARCH, 2026
	Dwg. No.: 22-144L-E102	Rev. 1

ELECTRICAL SPECIFICATION

GENERAL INSTRUCTION

- THE ELECTRICAL CONTRACTOR SHALL SUPPLY AND INSTALL A COMPLETE ELECTRICAL SYSTEM INCLUDING ALL MATERIALS, EQUIPMENT, SERVICES AND LABOUR NECESSARY AS SHOWN OR IMPLIED FOR A COMPLETE INSTALLATION.
- ALL WORK SHALL COMPLY WITH THE ONTARIO BUILDING CODE, ONTARIO FIRE CODE AND THE ONTARIO ELECTRICAL SAFETY CODE (OESC) 2019 EDITION 2024 AND ALL OTHER APPLICABLE CODES AND REGULATIONS.
- FURNISH INSPECTION CERTIFICATES, PRIOR TO FINAL PAYMENT, TO SHOW INSTALLED WORK CONFORMS TO SPECIFICATION AND REGULATIONS. PAY ALL FEES AND PERMIT COSTS.
- ELECTRICAL CONTRACTOR SHALL VERIFY DIMENSIONS OF EQUIPMENT TO BE INSTALLED.
- EACH ROOM CONTAINING ELECTRICAL EQUIPMENT AND EACH WORKING SPACE AROUND EQUIPMENT SHALL HAVE UNOBSTRUCTED MEANS OF EGRESS PER OESC RULE 2-310.
- MAINTAIN A MINIMUM WORKING SPACE OF 1 METER WITH SECURE FOOTING ABOUT ELECTRICAL EQUIPMENT SUCH AS SWITCHBOARDS, PANELBOARDS, CONTROL PANELS AND MOTOR CONTROL CENTERS WHICH ARE ENCLOSED IN METAL PER OESC RULE 2-308.
- ALL WORK AND MATERIAL SUPPLIED BY THE ELECTRICAL SUBCONTRACTOR SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR AFTER THE COMPLETION OF THE PROJECT.
- ALL MATERIALS SHALL BE NEW AND CSA CERTIFIED.
- PROVIDE SHOP DRAWINGS FOR REVIEW AND APPROVAL BY THE ENGINEER.
- PROVIDE FIRESTOPPING FOR CONDUITS PASSING THROUGH RATED ASSEMBLIES. FIRESTOPPING TO BE UL LISTED AND TO MATCH WALL/FLOOR ASSEMBLY RATING.
- ELECTRICAL CONTRACTOR TO REPAIR ALL SURFACES DAMAGED DUE TO WORK PERFORMED TO THE SATISFACTION OF THE OWNER.
- MOUNTING HEIGHTS FOR DEVICES ARE TO BE PER CODE REQUIREMENTS. ELECTRICAL CONTRACTOR IS TO VERIFY DIMENSIONS SHOWN ON DRAWING.
- PROTECT EXISTING WORK AND EQUIPMENT DURING CONSTRUCTION.
- TEST ALL SYSTEM COMPONENTS FOR PROPER OPERATION AND SAFETY.
- DRAWINGS INDICATE GENERAL LOCATION, QUANTITY AND TYPE OF OUTLETS FOR ELECTRICAL SERVICES ONLY. DO NOT SCALE.
- CO-ORDINATE ELECTRICAL REQUIREMENTS FOR ALL EQUIPMENT SUPPLIED BY OWNER OR OTHER TRADES. NOTIFY ENGINEER OF ANY CONFLICTS PRIOR TO INSTALLATION.
- CARRY OUT DEMOLITION AS SHOWN AND AS REQUIRED TO SUIT RENOVATIONS AND ALL NEW CONSTRUCTION REQUIREMENTS. DETERMINE EXTENT OF DEMOLITION ON SITE. REMOVE ALL CONDUIT AND WIRING BACK TO SOURCE. ALL MATERIALS REMOVED AND MADE REDUNDANT BY THIS WORK (UNLESS INDICATED OTHERWISE) SHALL BECOME PROPERTY OF CONTRACTOR.

PANELBOARDS

- PANELBOARDS: TO CSA C22.2 NO. 29.
- 250 AND 600VOLT PANELBOARDS: BUS AND BREAKERS RATED FOR SYMMETRICAL INTERRUPTING CAPACITY AS INDICATED ON PANEL SCHEDULES (RMS SYMMETRICAL).
- PANELBOARDS: MAINS, NUMBER OF CIRCUITS, AND NUMBER AND SIZE OF BRANCH CIRCUIT BREAKERS AS INDICATED.
- COPPER BUS WITH FULL SIZE NEUTRAL.
- EQUIPMENT GROUND BUS TO MATCH NEUTRAL BUS. BOLTED DIRECTLY TO PANELBOARD ENCLOSURE.
- MAINS SUITABLE FOR BOLT-ON BREAKERS.
- FINISH TRIM AND DOOR BAKED GREY ENAMEL.
- MOUNT PANELBOARDS AT 1980MM TO TOP.
- CONNECT LOADS TO CIRCUITS AS INDICATED.
- CONNECT NEUTRAL CONDUCTORS TO COMMON NEUTRAL BUS WITH RESPECTIVE CIRCUIT(S) IDENTIFIED.
- PROVIDE SPRINKLER PROOF SHIELDS ON SURFACE MOUNTED PANELS WHEN SPRINKLERS LOCATED IN ROOMS.
- POW-R-LINE 1A, 2A AND 3A SERIES PANELBOARDS OR APPROVED EQUAL.
- SIEMENS AND SQUARE D PANELBOARDS ARE APPROVED EQUALS.

CONDUITS

- ELECTRICAL METALLIC TUBING (EMT), COUPLINGS AND CONNECTORS: CSA C22.2 NO. 83.
- RIGID METAL CONDUITS AND FITTINGS: STEEL, GALVANIZED HEAVY WALL, CSA C22.2 NO. 45.
- FLEXIBLE METAL CONDUITS, LIQUID-TIGHT FLEXIBLE METAL CONDUITS: CSA C22.2 NO. 56.
- POLY VINYL CHLORIDE (PVC) DB2 DUCT: CSA C22.2 NO. 211.1
- USE EMT CONDUIT AND FITTINGS FOR ALL INTERIOR WIRING UNLESS OTHERWISE SPECIFIED.
- USE RIGID METAL CONDUITS AND FITTINGS STEEL WHERE EXPOSED INSTALLATION IS SUBJECT TO MECHANICAL INJURY AND FOR EXTERIOR USE.
- USE LIQUID TIGHT FLEXIBLE METAL CONDUIT FOR CONNECTION TO MOTORS OR VIBRATING EQUIPMENT IN DAMP, WET OR CORROSIVE LOCATIONS.
- FOR EXTERIOR MOUNTED CONDUIT PROVIDE EXPANSION FITTINGS AS FOLLOWS:
 - WEATHERPROOF EXPANSION FITTINGS WITH INTERNAL BONDING ASSEMBLY SUITABLE FOR 100MM LINEAR EXPANSION.
 - WATERTIGHT EXPANSION FITTINGS WITH INTEGRAL BONDING JUMPER SUITABLE FOR LINEAR EXPANSION AND 10MM DEFLECTION IN ALL DIRECTIONS.
 - WEATHERPROOF EXPANSION FITTINGS FOR LINEAR EXPANSION AT ENTRY TO PANELS.
- CONDUIT FITTINGS TO BE MANUFACTURED FOR USE WITH CONDUIT SPECIFIED. COATING TO BE THE SAME AS THE CONDUIT. FACTORY 'ELLS' WHERE 90 DEGREE BENDS ARE REQUIRED FOR 25MM AND LARGER CONDUITS. WATERTIGHT CONNECTORS AND COUPLINGS FOR EMT. INSTALL CONDUIT SEALING FITTINGS IN HAZARDOUS AREAS AND FILL WITH COMPOUND. USE EXPLOSION PROOF FLEXIBLE CONNECTIONS TO EXPLOSION PROOF MOTORS.
- INSTALL CONDUITS TO CONSERVE HEADROOM IN EXPOSED LOCATIONS.
- CONCEAL CONDUITS EXCEPT IN MECHANICAL AND ELECTRICAL SERVICE ROOMS AND IN UNFINISHED AREAS.
- INSTALL EXPOSED CONDUITS NEATLY, PARALLEL TO BUILDING LINES WITH CONCENTRIC RIGHT-ANGLE BENDS.
- CLEARLY LABEL ALL EXPOSED CONDUIT, PULL BOXES, JUNCTION BOXES, ETC., TO INDICATE THE NATURE OF THE SERVICE.
- RACEWAY SYSTEMS TO BE COMPLETELY INSTALLED, DRY AND CLEAN BEFORE PULLING CONDUCTORS.
- PROVIDE POLYPROPYLENE FISH WIRE IN ALL EMPTY CONDUITS.
- PROVIDE, IN ALL CONDUITS, AN INSULATED GREEN GROUNDING CONDUCTOR. RUN WITH CIRCUIT CONDUCTORS AND TO ALL ENCLOSURES.

WIRING

- SINGLE OR MULTI-CONDUCTOR TECK 90 CABLES TO CSA STANDARD C22.2 NO. 131. CABLES TO BE 1000 V INSULATION, ALUMINUM SHEATH AND OVERALL PVC JACKET. INSULATION TO BE 1000V CROSS-LINKED POLYETHYLENE SUITABLE FOR INSTALLATION AT A TEMPERATURE DOWN TO MINUS 40 °C. COMPLETE WITH ALUMINUM SHEATH AND OVERALL PVC JACKET. TECK 90 CABLES TO BE COPPER UNLESS OTHERWISE INDICATED.
- 600 VOLT RW90 OR T90 RATING, COPPER CONDUCTORS, MINIMUM #12 AWG, EXCEPT AS OTHERWISE NOTED. 15AMP, 120 VOLT RECEPTACLE BRANCH CIRCUIT HOME RUNS SHALL BE MINIMUM #12 AWG. HOME RUNS OVER 75 FEET SHALL BE MINIMUM #10 AWG. MAXIMUM LENGTH OF BRANCH CIRCUIT FEEDER FROM PANEL TO FURTHEST RECEPTACLE SHALL BE 120 FT.
- ARMoured CABLE (TYPE AC90) ONLY IN CONCEALED CEILING SPACE FOR FINAL CONNECTION FROM JUNCTION OR DISTRIBUTION BOXES TO LUMINAIRES, RECEPTACLES, AND ALL OTHER ELECTRICAL DEVICES, TO MAXIMUM LENGTH OF 5 METERS. AC90 CABLE SHALL NOT BE USED FROM DISTRIBUTION OR JUNCTION BOXES TO A SECOND JUNCTION BOX.
- ENSURE VOLTAGE DROP DOES NOT EXCEED 2 PERCENT.
- WIRE CONNECTORS: TWIST-ON PRESSURE TYPE FOR #10 AND SMALLER. SPLIT-BOLT TYPE FOR #8 AND LARGER.

ELECTRICAL SPECIFICATION - CONTINUED

BOXES

- GALVANIZED SHEET STEEL BOXES WITH CONDUIT K.O.'S TO SUIT INSTALLATION. MASONRY FOR BLOCK WALLS, CONCRETE TIGHT FOR CONCRETE ENCASUREMENT, TYPE FS FOR SURFACE MOUNTING. JUNCTION AND PULL BOXES C/W SCREW-ON FLAT COVERS.
- OPENINGS IN ALL ELECTRICAL METAL BOXES SHALL BE PUNCHED OR CUT. Burring OF HOLES WILL NOT BE PERMITTED.
- ALL CONDUITS AND CABLES MUST BE SECURELY FASTENED WITH APPROVED CLIPS AND SCREWS.

IDENTIFICATION

- IDENTIFY SOURCE, VOLTAGE AND LOAD ON ALL JUNCTION BOXES. USE OF INDELIBLE MARKER FOR THESE LOCATIONS IS ACCEPTABLE.
- ALL CONDUCTORS TO BE COLOUR CODED IN ACCORDANCE WITH CSA 22.1 SECTION 4.036 AND EXISTING BUILDING WIRE COLOUR CODE SYSTEM.
- CONTRACTOR TO PROVIDE A "TYPED" PANEL SCHEDULE FOR ALL ELECTRICAL PANELS INSTALLED IN THIS CONTRACT.
- IDENTIFY PANEL AND CIRCUIT NUMBER ON ALL NEW OR RELOCATED DUPLEX RECEPTACLE FACE PLATES WITH BLACK PRINTED LETTERING ON CLEAR LABELING TABS (P-TABS).
- CONDUIT IDENTIFICATION: CODE WITH PLASTIC TAPE OR PAINT AT POINTS WHERE CONDUITS ENTER WALLS, CEILINGS, OR FLOORS AT 3.0M INTERVALS.
- IDENTIFY ALL ELECTRICAL EQUIPMENT WITH LAMACOID PLATES (BLACK WITH WHITE LETTERING), PANELBOARDS, DISCONNECTS, SPLITTERS, TRANSFORMERS, MOTOR STARTERS ETC.

GROUNDING

- GROUNDING EQUIPMENT TO CSA C22.2 NO. 41.
- COPPER GROUNDING CONDUCTORS TO: CSA 22.1 SECTION 10 LATEST EDITION.
- NON-CORRODING ACCESSORIES NECESSARY FOR GROUNDING SYSTEM.
- INSTALL COMPLETE PERMANENT, CONTINUOUS, SYSTEM AND CIRCUIT, EQUIPMENT, GROUNDING SYSTEMS, INCLUDING ELECTRODES, CONDUCTORS, CONNECTOR, ACCESSORIES, AS INDICATED, TO CONFORM TO REQUIREMENTS OF ENGINEER AND LOCAL AUTHORITY HAVING JURISDICTION OVER INSTALLATION.
- INSTALL SEPARATE "GREEN" GROUND CONDUCTOR IN SAME CONDUIT WITH CIRCUIT (POWER WIRING) CONDUCTORS. BOND SECURELY TO GROUND SCREW IN EACH OUTLET, JUNCTION, PULL BOX, AND EQUIPMENT ENCLOSURE GROUND CONDUCTOR EQUAL IN AMPACITY TO SIZE OF CIRCUIT AMPACITY OR IN ACCORDANCE WITH CODE FOR EQUIPMENT GROUNDING.
- INSTALL GROUNDING CONNECTIONS TO TYPICAL EQUIPMENT INCLUDING, BUT NOT NECESSARILY LIMITED TO: GENERATOR FRAME, PANELBOARDS, TRANSFER SWITCHES AND RECEPTACLES.

DISCONNECT SWITCHES

- ENCLOSED MANUAL AIR BREAK SWITCHES IN NON-HAZARDOUS LOCATIONS: TO CSA C22.2 NO. 4.
- FUSE HOLDER ASSEMBLIES TO CSA C22.2 NO. 39.
- FUSIBLE AND NON-FUSIBLE DISCONNECT SWITCH IN CSA ENCLOSURE EEMAC 1 (EEMAC 3R FOR WEATHERPROOF TYPE).
- PROVISION FOR PADLOCKING IN OFF SWITCH POSITION BY ONE LOCK.
- MECHANICALLY INTERLOCKED DOOR TO PREVENT OPENING WHEN HANDLE IS IN 'ON' POSITION.
- QUICK MAKE, QUICK BREAK ACTION.
- ON-OFF SWITCH POSITION INDICATION ON SWITCH ENCLOSURE COVER.
- INSTALL DISCONNECT SWITCHES COMPLETE WITH FUSES AS INDICATED.
- ALL AC DISCONNECTS ASSOCIATED WITH THE PHOTOVOLTAIC SYSTEM SHALL BE VISUALLY IDENTIFIABLE AS DISCONNECTED WHEN OPEN.

PHOTOVOLTAIC SYSTEM - GENERAL

- ALL SOLAR PANELS SHALL BEAR A CERTIFICATION MARK ACCEPTABLE UNDER THE OESC OR ACCEPTED THROUGH FIELD EVALUATION UNDER THE PROVISIONS OF OESC RULE 2-014.
- THE PHOTOVOLTAIC SYSTEM SHALL BE TERMINATED AT PANEL AS INDICATED AND ACCORDING TO ONTARIO ELECTRICAL SAFETY CODE BULLETIN 64-1-0, DIAGRAM B2. PROVIDE ALL NECESSARY LAMACOID MARKING PLATES IN ACCORDANCE WITH OESC SECTIONS 64 AND 64.

PHOTOVOLTAIC SYSTEM - IDENTIFICATION

- PERMANENT MARKING SHALL BE PROVIDED AT AN ACCESSIBLE LOCATION AT THE DISCONNECTING MEANS FOR THE PHOTOVOLTAIC OUTPUT CIRCUIT. THESE MARKINGS SHALL INCLUDE THE RATED AC OPERATING CURRENT AND THE NOMINAL OPERATING AC VOLTAGE PER OESC RULE 64-200 & OESC BULLETIN 64-4-3.
- A PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN IN ACCORDANCE WITH OESC RULE 64-219 SHALL BE PROVIDED WITH A PERMANENT MARKING IN AN ACCESSIBLE LOCATION AT THE DISCONNECTING MEANS FOR THE PHOTOVOLTAIC OUTPUT CIRCUIT STATING THAT THE PHOTOVOLTAIC SYSTEM IS EQUIPPED WITH RAPID SHUTDOWN.
- A WARNING SIGN FOR A PHOTOVOLTAIC SYSTEM SHALL BE IN CAPITAL LETTERS WITH A MINIMUM HEIGHT OF 9.5MM, IN WHITE ON A RED BACKGROUND. INSTALL WARNING SIGN AT THE SUPPLY AUTHORITY DISCONNECTING MEANS AND AT THE SUPPLY AUTHORITY METER LOCATION.
- EACH PANELBOARD, BUSBAR OR CONDUCTOR SUPPLIED FROM MULTIPLE SOURCES IN THE PHOTOVOLTAIC SYSTEM SHALL BE SUPPLIED WITH SUITABLE WARNING SIGNS ADJACENT TO EACH SOURCE DISCONNECTING MEANS TO INDICATE THAT ALL THE DISCONNECTING MEANS MUST BE OPENED TO ENSURE COMPLETE DE-ENERGIZATION OF THE EQUIPMENT.
- SUPPLY AND INSTALL PV SYSTEM SINGLE LINE DIAGRAM LAMACOID PLATES IN A CONSPICUOUS LOCATION AT THE SUPPLY AUTHORITY DISCONNECTING MEANS AND AT THE SUPPLY AUTHORITY METER LOCATION.
- REFER TO DRAWINGS FOR ADDITIONAL IDENTIFICATION REQUIREMENTS.

PHOTOVOLTAIC SYSTEM - COORDINATION & CONNECTION

- COORDINATE ALL WORK WITH HYDRO ONE, ESA, THE ENGINEER AND OWNER.
- SERVICE INTERRUPTIONS SHALL BE PLANNED TO BE OF MINIMUM DURATION. SUCH INTERRUPTIONS SHALL OCCUR OUTSIDE OF NORMAL WORKING HOURS AT A TIME AS DESIGNATED BY THE OWNER. MAKE ALL ARRANGEMENTS WITH THOSE CONCERNED AND INCLUDE IN CONTRACT PRICE FOR OVERTIME REQUIRED TO ENSURE THAT THE INTERRUPTION IS HELD TO A MINIMUM.
- CONNECTION OF THE NEW PHOTOVOLTAIC SYSTEM TO THE UTILITY GRID TO BE INSPECTED BY ESA. ONCE APPROVED TURN ON POWER TO THE BUILDING BY CLOSING THE PHOTOVOLTAIC BREAKER IN THE MAIN DISTRIBUTION PANELBOARD 'CDP'.
- OBTAIN ALL REGULATORY AND PERMITTING APPROVALS, INCLUDING THOSE REQUIRED TO CONNECT THE PHOTOVOLTAIC SYSTEM TO THE LOCAL DISTRIBUTION COMPANY DISTRIBUTION SYSTEMS. SUBMIT REQUIRED DOCUMENTS AND SHOP DRAWINGS TO AUTHORITIES HAVING JURISDICTION IN ORDER TO OBTAIN APPROVAL FOR THE WORK. PREPARE ANY ADDITIONAL INFORMATION, DETAILS AND DRAWINGS THAT THESE AUTHORITIES MAY REQUIRE.

ELECTRICAL SPECIFICATION - CONTINUED

PHOTOVOLTAIC SYSTEM - EQUIPMENT

- PHOTOVOLTAIC MODULES

PHOTOVOLTAIC MODULES SHALL BE DESIGNED TO CONNECT DIRECTLY TO THE MOUNTING HARDWARE. FOLLOW MANUFACTURER'S DIRECTION FOR DETAILS INSTALLATION OF THE MODULES ON TRACKING UNITS

370W, 72 CELL, MONOCRYSTALLINE PHOTOVOLTAIC PANELS COMPLETE WITH MINIMUM 19.3% EFFICIENCY, 10 YEAR PRODUCT WARRANTY AND 25 YEAR LINEAR PERFORMANCE WARRANTY.

HELIENE 72M SERIES OR APPROVED EQUAL.
- UTILITY GRID-TIED PHOTOVOLTAIC MICRO-INVERTERS

LOCATION OF INVERTERS WILL BE DIRECTLY MOUNTED TO EACH PHOTOVOLTAIC MODULE. INVERTER WIRING IN ACCORDANCE WITH OESC REQUIREMENTS.

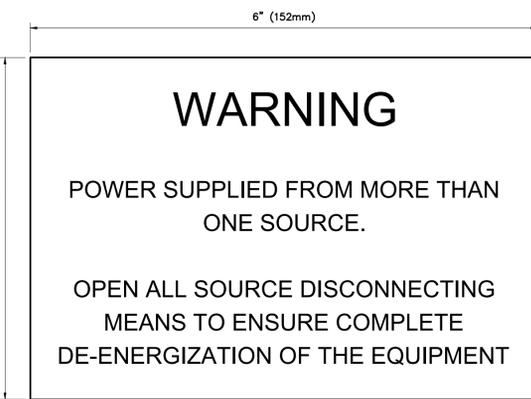
290VA CONTINUOUS OUTPUT, 295VA PEAK OUTPUT, 208V, SINGLE-PHASE MICRO INVERTERS THAT ARE COMPATIBLE WITH 60 AND 72 CELL PHOTOVOLTAIC MODULES. PROVIDE TRUNK CABLES TO FACILITATE THE CONNECTION OF SINGLE-PHASE MODULES TO THREE PHASE ELECTRICAL PANEL/SYSTEM. EVENLY DISTRIBUTE MICRO INVERTERS ACROSS ALL THREE PHASES.

ENPHASE IQ7+ OR APPROVED EQUAL
- NETWORK PROTECTION RELAY

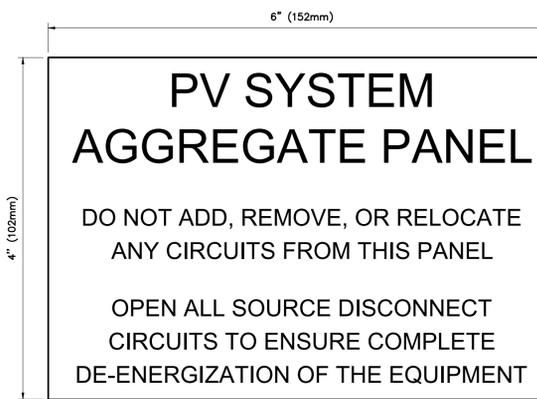
SIMULTANEOUSLY DISCONNECTS ALL UNGROUNDED CONDUCTORS OF THE PHOTOVOLTAIC SYSTEM UPON LOSS OF VOLTAGE IN ONE OR MORE OF ITS PHASES. COMPATIBLE WITH ABOVE MICRO-INVERTERS. RATED FOR 200A CONTINUOUS CURRENT AT 208VAC, THREE-PHASE, UL 1741 COMPLIANT. COMPLETE WITH PHOTOVOLTAIC SYSTEM COMMUNICATION MODULE CAPABLE OF MONITORING AND DISPLAYING PHOTOVOLTAIC SYSTEM ENERGY PRODUCTION, REMOTELY ACCESSIBLE, INTEGRATED Wi-Fi AND ETHERNET CONNECTIONS. PROVIDE ALL COMMUNICATIONS EQUIPMENT AND CABLING AS REQUIRED FOR A COMPLETE INSTALLATION.

ENPHASE NETWORK PROTECTION RELAY (3-PHASE) OR APPROVED EQUAL
- MOUNTING SYSTEM

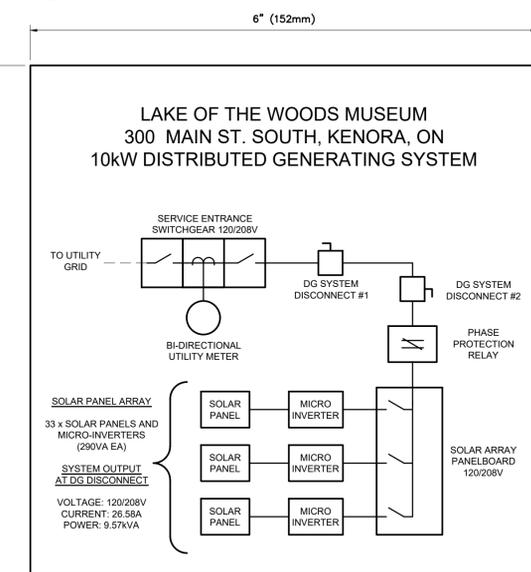
RAIL BASED MOUNTING SYSTEM FOR SLOPED ROOFS. ALUMINIUM CONSTRUCTION COMPLETE WITH RAIL LEVELING, SELF-SEALING ROOF BOLTS, AND INTEGRATED BONDING. MOUNTING SYSTEM TO UL 2703 STANDARD AND CSA CERTIFIED. COMPATIBLE WITH SHINGLE, STANDING SEAM, OR CORRUGATED STEEL ROOFS. COMPLETE WITH ALL ACCESSORIES REQUIRED FOR INSTALLATION, INCLUDING PLATES FOR MOUNTING MICRO INVERTERS.



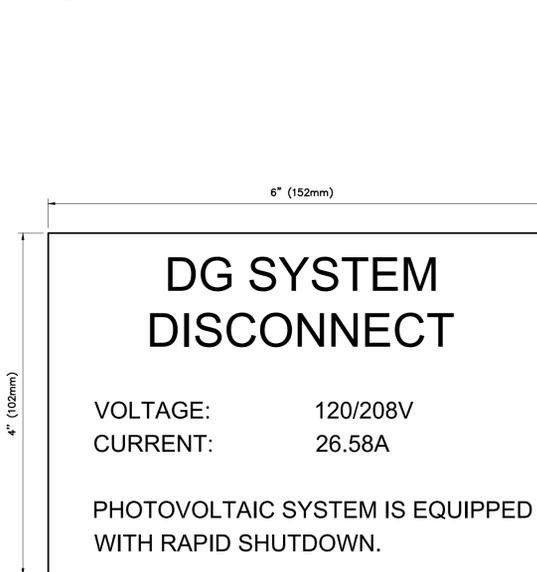
A LABELLING - PANEL 'MDP' - ADJACENT SOURCE DISCONNECT
SCALE: NTS



C LABELLING - PANEL 'SAP'
SCALE: NTS



B LABELLING - PANEL 'MDP' - METER LOCATION
SCALE: NTS



D LABELLING - DG SYSTEM DISCONNECT 1&2
SCALE: NTS

NOTES

- THE LABELING EXAMPLES SHOWN HEREIN ARE FOR REFERENCE ONLY. CONTRACTOR TO ENSURE ANY MISSING LABELS ARE PLACED ON EQUIPMENT DURING CONSTRUCTION.
- ALL LABELING ASSOCIATED WITH THE PV SYSTEM SHALL BE PRINTED IN WHITE TEXT ON A RED BACKGROUND.
 - LARGE TEXT: 10MM
 - SMALL TEXT: 5MM
- ALL LABELING SHALL CONSIST OF UV RESISTANT TWO-COLOUR LAMACOIDS SUITABLE FOR INSTALLATION OUTDOORS.

No.	Revision	Date	Initial
1	REVISED FOR ADDENDUM #1	MAR 18/26	KO
0	ISSUED FOR TENDER	NOV 3/25	KO

- Notes:
- CONTRACTOR SHALL BE RESPONSIBLE FOR CHECKING DIMENSIONS AND EXISTING CONDITIONS AT THE OUTSET OF CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER. DO NOT PROCEED WITHOUT FURTHER WRITTEN DIRECTION FROM THE ENGINEER.
 - DRAWING SHOWS GENERAL ARRANGEMENT ONLY. DO NOT SCALE.
 - ALL DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS ARE THE COPYRIGHT PROPERTY OF TBT ENGINEERING CONSULTING GROUP AND MUST BE RETURNED UPON REQUEST. REPRODUCTION OF DRAWINGS, SPECIFICATIONS AND RELATED DOCUMENTS IN PART OR IN WHOLE IS FORBIDDEN WITHOUT THE ENGINEERS WRITTEN PERMISSION.

Approved Approved

PRELIMINARY

TBT ENGINEERING CONSULTING GROUP

Office: (866) 624-8378
E-mail: info@tbte.ca

LOTW MUSEUM ROOF RENOVATION & SOLAR
KENORA ON

**ELECTRICAL
DETAILS & SPECIFICATIONS**

Scale: AS NOTED	Drawn By: LN Ckd. By: KO Dwg. No.: 22-144L-E201	Date: MARCH, 2026	Rev. 1
--------------------	---	----------------------	-----------

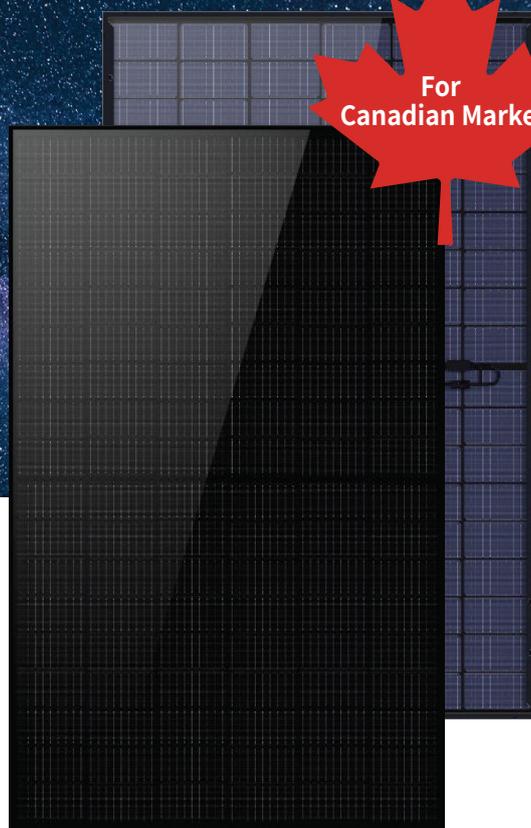
Hi-MO 7

LR8-54HGBB All Black

495~510W

N-type HPDC High Efficiency Bifacial Dual Glass Module

For
Canadian Market



Advanced HPDC cell technology delivers superior module efficiency up to 22.9%



Lower temperature coefficient of Pmax: $-0.28\% / ^\circ\text{C}$, more power production at higher ambient temperatures



Anti-LID, anti-LeTID, and anti-PID with low power degradation



Excellent low irradiance performance



Weather resistant and certified to withstand rain, hail, wind, and snow



LONGi Lifecycle Quality ensures high product quality and long-term performance



Warranty for
Extra Linear Power Output



Warranty for
Materials and Processing

Complete System and Product Certifications

IEC 61215, IEC 61730, UL 61730
ISO9001:2015: ISO Quality Management System
ISO14001: 2015: ISO Environment Management System
ISO45001: 2018: Occupational Health and Safety
IEC62941: Guideline for module design qualification and type approval



LONGi

22.9%
MAX MODULE
EFFICIENCY

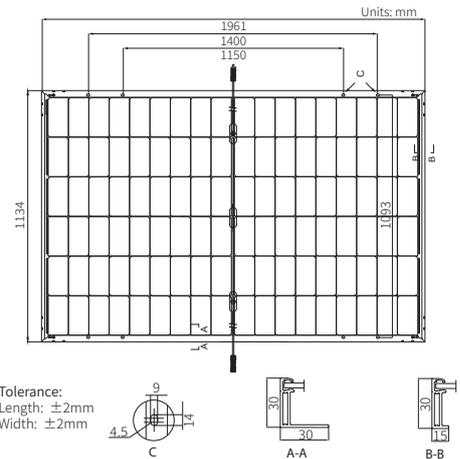
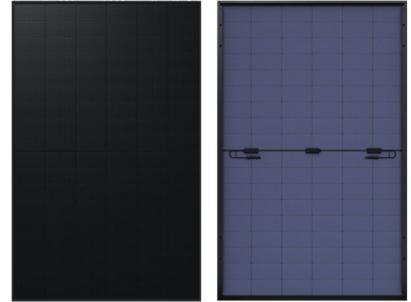
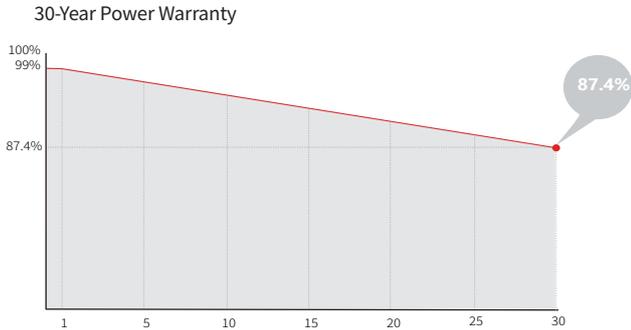
0~3%
POWER
TOLERANCE

<1%
FIRST YEAR
POWER DEGRADATION

0.4%
YEAR 2-30
POWER DEGRADATION

HALF-CELL
Lower operating temperature

Additional Value



Mechanical Parameters

Cell Orientation	108 (6×18)
Junction Box	IP68
Output Cable	4mm ² , +400, -200mm/±1200mm length can be customized
Glass	Dual glass, 2.0+2.0mm heat strengthened glass
Frame	Anodized aluminum alloy frame
Weight	28kg
Dimension	1961×1134×30mm
Packaging	36pcs per pallet / 180pcs per 20' GP / 864pcs per 40' HC

Electrical Characteristics

STC : AM1.5 1000W/m² 25°C

NOCT : AM1.5 800W/m² 20°C 1m/s

Test uncertainty for Pmax: $\pm 3\%$

Modul Type	LR8-54HGGB-495W		LR8-54HGGB-500W		LR8-54HGGB-505W		LR8-54HGGB-510W	
	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Max Power(Pmax/W)	495	377	500	380	505	383	510	386
Open Circuit Voltage(Voc/V)	39.42	37.47	39.58	37.62	39.75	37.78	39.91	37.93
Short Circuit Current (Isc/A)	15.90	12.77	15.95	12.81	16.00	12.85	16.05	12.89
Voltage at Maximum Power (Vmp/V)	32.98	31.34	33.14	31.49	33.31	31.65	33.47	31.80
Current at Maximum Power (Imp/A)	15.01	12.02	15.09	12.06	15.16	12.10	15.24	12.14
Module Efficiency (%)	22.3		22.5		22.7		22.9	

Electrical characteristics with different rear side power gain (reference to 500W front)

Pmax /W	Voc/V	Isc /A	Vmp/V	Imp /A	Pmax gain
525	39.58	16.75	33.14	15.84	5%
550	39.58	17.54	33.14	16.59	10%
575	39.68	18.34	33.24	17.30	15%
600	39.68	19.14	33.24	18.05	20%
625	39.68	19.93	33.24	18.80	25%

Operating Parameters

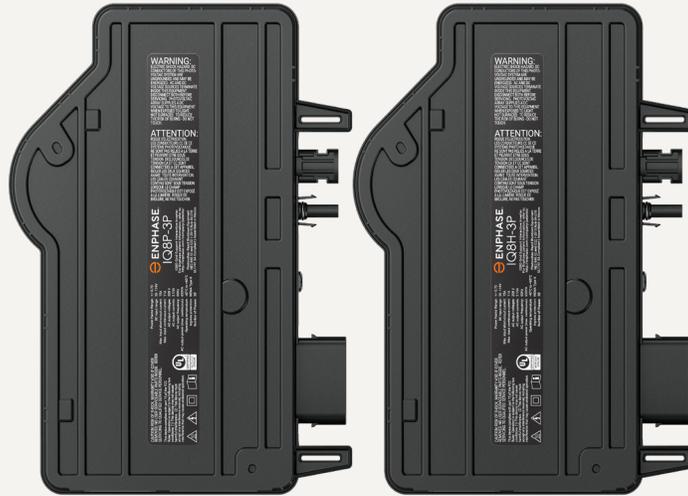
Operational Temperature	-40°C ~ +85°C
Power Output Tolerance	0 ~ 3%
Maximum System Voltage	DC1500V (IEC/UL)
Maximum Series Fuse Rating	30A
Nominal Operating Cell Temperature	45±2°C
Protection Class	Class II
Bifaciality	φPmax: 80±10%
	φVoc: 98±5%
	φIsc: 80±10%
Fire Rating	UL Type 29
	IEC Class C

Mechanical Loading

Front Side Maximum Static Loading (e.g. snow, wind)	5400Pa
Rear Side Maximum Static Loading (e.g. wind)	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

Temperature Ratings (STC)

Temperature Coefficient of Isc	+0.045%/°C
Temperature Coefficient of Voc	-0.230%/°C
Temperature Coefficient of Pmax	-0.280%/°C



IQ8 Commercial Microinverters

The high-powered, smart grid-ready Enphase IQ8P-3P and IQ8H-3P Microinverters are specifically designed for 120/208 VAC (4-wire) three-phase interconnection for small commercial solutions.

Each microinverter integrates with the IQ Gateway Commercial 2 and the Enphase App monitoring and analysis software.

With simplified design, improved energy harvesting, and advanced monitoring, microinverters offer true peace of mind during operation and maintenance.



The IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.*

* 25-year warranty is valid, provided an internet-connected IQ Gateway is installed.

Easy to install

- Lightweight and compact with plug-and-play connectors
- Power line communication (PLC) between components
- Faster installation

High productivity and reliability

- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Smart grid-ready

- Complies with the latest advanced grid support
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets IEEE 1547 (UL 1741-SB) requirements

IQ8 Commercial Microinverters

INPUT DATA (DC)		IQ8P-3P-72-E-US/ IQ8P-3P-72-E-DOM-US ¹		IQ8H-3P-72-E-US ²	
Commonly used modules for pairing ³	W	380–640		320–540	
Module compatibility ³	–	54-cell/108-half-cell, 60-cell/120-half-cell, 66-cell/132-half-cell and 72-cell/144-half-cell			
Maximum input DC voltage	V	63			
Peak power tracking voltage	V	35.5–53		28.5–45	
Operating range	V	16–63			
Min./Max. start voltage	V	21/63			
Max. DC continuous current (module I_{mp})	A	14			
Max. input DC short-circuit current	A	25			
Max. DC short-circuit current (module I_{sc})	A	20			
Overvoltage class DC ports	–	II			
DC port backfeed current	A	0			
PV array configuration	–	1 x 1 ungrounded array; no additional DC side protection required; AC side protection requires max. 20 A per branch circuit			
OUTPUT DATA (AC)		IQ8P-3P-72-E-US/ IQ8P-3P-72-E-DOM-US ¹		IQ8H-3P-72-E-US ²	
Peak output power	VA	480		384	
Maximum continuous output power	VA	475		380	
Nominal (L-L) voltage/range ⁴	V	208/183–229	220/198–242	208/183–229	220/198–242
Maximum continuous output current	A	2.28	2.16	1.83	1.73
Nominal frequency	Hz	60			
Extended frequency range	Hz	47–68			
Maximum microinverters per 20 A three-phase branch circuit ⁵	–	12		15	
Overvoltage class AC port	–	III			
Power factor setting	–	1.0			
Power factor (adjustable)	–	0.85 leading ... 0.85 lagging			
EFFICIENCY		IQ8P-3P-72-E-US/ IQ8P-3P-72-E-DOM-US ¹		IQ8H-3P-72-E-US ²	
Peak efficiency	%	97.8		97.7	
CEC weighted efficiency	%	97.5		96.5	
MECHANICAL DATA		IQ8P-3P-72-E-US/ IQ8P-3P-72-E-DOM-US ¹		IQ8H-3P-72-E-US ²	
Ambient temperature range		–40°F to 149°F (–40°C to 65°C)			
Relative humidity range		4% to 100% (condensing)			
DC connector type ⁶		Enphase EN4 bulkhead; ECA-EN4-S22-12:EN4 (TE PV4-S SOLARLOK) 150 mm/5.9" to Stäubli MC4 adapter cable pair (default supply) ⁷			
Dimensions (H × W × D)		10.4" × 7.9" × 1.4" (265 mm × 200 mm × 35 mm) without bracket			
Weight		3.5 lb (1.6 kg)			
Cooling		Natural convection			
Approved for wet locations		Yes			
Enclosure		Class II double-insulated, corrosion-resistant polymeric enclosure			
Environmental category/UV exposure rating		Outdoor—NEMA Type 6/IP67			

FEATURES	IQ8P-3P-72-E-US/ IQ8P-3P-72-E-DOM-US ¹	IQ8H-3P-72-E-US ²
Communication	Power line communication (PLC)	
Monitoring	Enphase App monitoring and analysis software. Both options require the installation of an IQ Gateway Commercial 2.	
Compliance	CA Rule 21 (UL 1741-SB), UL 62109-1, UL 1741/IEEE 1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01. This product is UL Listed as PV rapid shutdown equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 rapid shutdown of PV systems for AC and DC conductors, when installed according to manufacturer's instructions.	

¹IQ8P-3P-72-E-DOM-US is made in the USA. The PCBA, electrical parts, and enclosure are domestically manufactured to meet the eligibility requirements for the ITC domestic content bonus adder.

²IQ8H-3P-72-E-US is no longer being manufactured.

³Pairing PV modules with wattage above the limit may result in additional clipping losses. See the compatibility calculator at <https://link.enphase.com/module-compatibility>.

⁴Nominal voltage range can be configured if required by the utility. For interconnection to system voltages other than 120/208 VAC (4-wire) three-phase, a transformer is required to connect to the grid.

⁵Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

⁶Enphase IQ8P-3P and IQ8H-3P Microinverter bulkhead and adapter cable male/female DC connectors must only be mated with the identical type and manufacturer brand of male/female connectors.

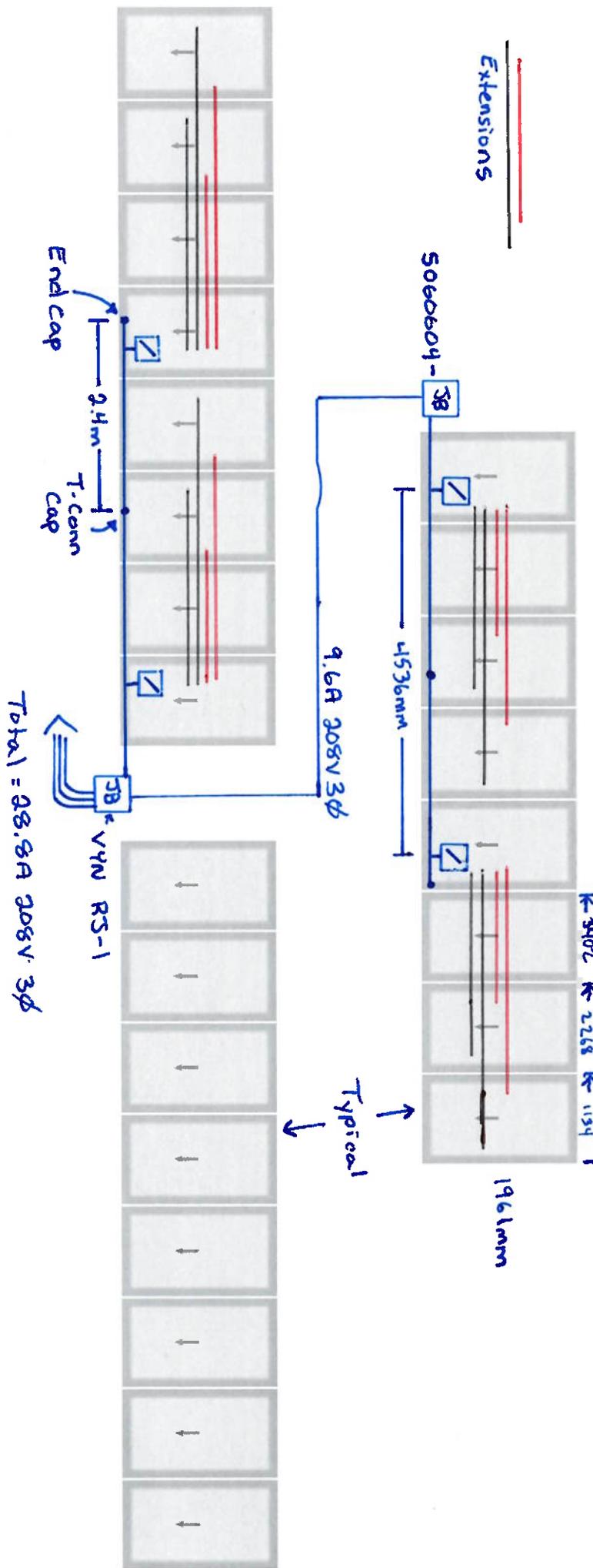
⁷Qualified per UL subject 9703.

Revision history

REVISION	DATE	DESCRIPTION
DSH-00236-6.0	April 2025	Added a new footnote to SKU IQ8H-3P-72-E-US stating that it is no longer being manufactured.
DSH-00236-5.0	October 2024	Removed the reference for preliminary testing for IQ8P-3P-72-E-DOM-US SKU.
DSH-00236-4.0	August 2024	Added information about IQ8P-3P-72-E-DOM-US.
DSH-00236-3.0	February 2024	Modified “208V three-phase” to “208Y VAC three-phase on page 1.
DSH-00236-2.0	November 2023	Updated the specifications.
DSH-00236-1.0	October 2023	Initial release.

Previous releases.

Extensions





485-505 W

High efficiency bifacial single glass module
TS-BBT54-G11



Bifacial technology allows for the harvesting of up to an additional 25% energy from the rear side of the module.



30 years lifespan brings 10-30% additional power generation comparing with conventional P-type module.



N-type solar cell has no LID naturally which can increase power generation.



Excellent low irradiance performance.



Enhanced light trapping and optimized current collection contribute to the improvement of both module power output and reliability.



Industry leading lowest thermal coefficient of power.



Design optimized for lower operating current, resulting in minimized hot spot loss and improved temperature coefficient.

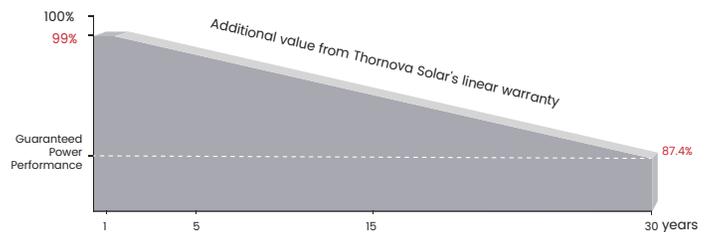


Certified to withstand: wind load (5400 Pa) and snow load (2400 Pa).



100% triple EL test enables remarkable reduction of module hidden crack rate.

LINEAR PERFORMANCE WARRANTY



15 years

Product quality & process guarantee

30 years

Linear power guarantee

0.40%

Annual degradation Over 30 years

COMPREHENSIVE CERTIFICATES



ISO 9001: Quality Management System

ISO 14001: Environmental Management System Standard

ISO 45001: International Occupational Health and Safety Assessment System Standard

* Different markets have different certification requirements. Also, the products are under rapid innovation. Please confirm the certification status with regional sales representatives.

RE INSURANCE



* Optional performance warranty insurance. Please contact our local sales staff for more information.

ELECTRICAL CHARACTERISTICS

Model of modules	TS-BBT54(485)-G11		TS-BBT54(490)-G11		TS-BBT54(495)-G11		TS-BBT54(500)-G11		TS-BBT54(505)-G11	
	STC	NOCT								
Peak power - P_{mp} (W)	485	371	490	375	495	378	500	382	505	386
Open circuit voltage - V_{oc} (V)	39.20	37.10	39.50	37.40	39.80	37.70	40.10	38.00	40.40	38.30
Short circuit current - I_{sc} (A)	15.77	12.72	15.80	12.74	15.83	12.76	15.86	12.78	15.89	12.80
MPP voltage - V_{mp} (V)	32.68	30.86	32.88	31.08	33.10	31.30	33.30	31.52	33.50	31.73
MPP current - I_{mp} (A)	14.85	12.02	14.91	12.05	14.97	12.08	15.03	12.11	15.08	12.15
Module efficiency - η_m (%)	21.8		22.0		22.3		22.5		22.7	

STC (Standard Testing Conditions): Irradiance 1000W/m², Cell Temperature 25 °C, Spectra at AM1.5

NOCT (Nominal Operating Cell Temperature): Irradiance 800W/m², Ambient Temperature 20°C, Spectra at AM1.5, Wind at 1m/s

ELECTRICAL CHARACTERISTICS WITH DIFFERENT POWER BIN (REFERENCE TO 13.5% IRRADIANCE RATIO)

Peak power - P_{mp} (W)	538	543	549	555	560
Open circuit voltage - V_{oc} (V)	39.2	39.5	39.8	40.1	40.4
Short circuit current - I_{sc} (A)	17.47	17.51	17.54	17.57	17.61
MPP voltage - V_{mp} (V)	32.68	32.88	33.1	33.3	33.5
MPP current - I_{mp} (A)	16.45	16.52	16.59	16.65	16.71
Irradiance ratio (rear/front)	13.5 %				

STRUCTURAL CHARACTERISTICS

Module dimension (L*W*H)	1961 x 1134 x 35 mm (77.20 x 44.65 x 1.38 inch)
Weight	24.0 kg (52.91 lbs)
Number of cells	108 cells
Cell	N-type monocrystalline
Glass	Tempered, 3.2 mm AR, High transmittance, Low iron
Backsheet	Transparent black mesh backsheet
Frame	Anodized aluminum alloy
Junction box	IP68, 3 diodes
Output wire	4.0 mm ²
Wire length	300 mm / 1200 mm / Customized length
Connector	MC4 - EVO2
Packing specification	31 pcs/Pallet; 682 pcs/40'HQ

OPERATING PARAMETERS

Power tolerance (W)	(0,+5)
Maximum system voltage (V)	1500
Maximum rated fuse current (A)	30
Current operating temperature (°C)	-40~+85 °C
Bifaciality	80±5%

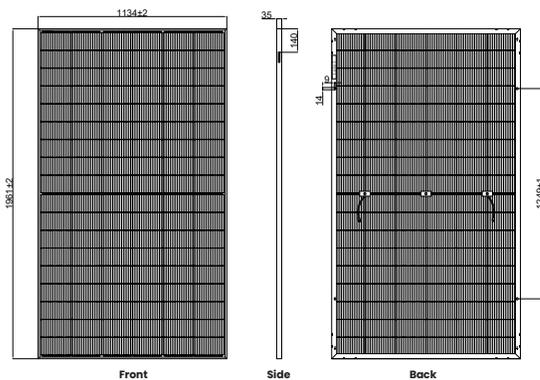
MECHANICAL LOADING

Front side maximum static loading (Pa)	5400
Rear side maximum static loading (Pa)	2400
Hailstone test (mm)	35

TEMPERATURE RATINGS

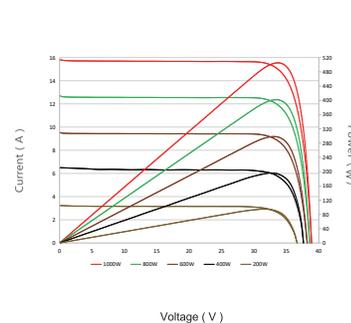
Temperature coefficient (P_{max})	-0.29 %/°C
Temperature coefficient (V_{oc})	-0.28 %/°C
Temperature coefficient (I_{sc})	+0.04 %/°C
Nominal operating cell temperature	45±2 °C

MODULE DIMENSIONS (MM)

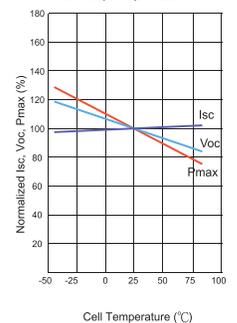


* The unmarked tolerance is ±1 mm
Length shown in mm

Current-Voltage & Power-Voltage Curves (505 W)



Temperature Dependence of I_{sc} , V_{oc} , P_{max}



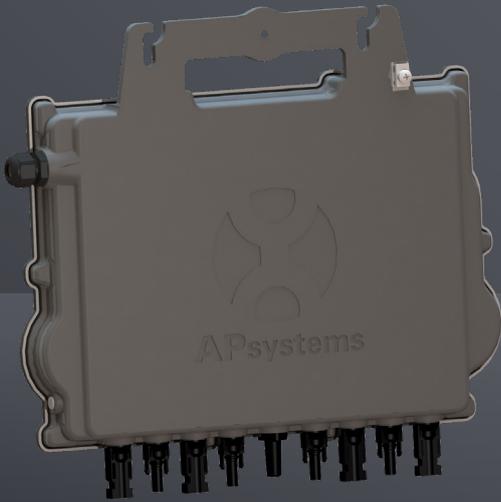
Scan the QR code to get more information

Web: www.thornovasolar.com

E-mail: info@thornovasolar.com

* The parameters delineated within this datasheet, both technical and monetary, may exhibit variations contingent upon the region. Thornova Solar provides no warranty as to their absolute accuracy. Owing to our unceasing commitment to innovation, research, development, and product enhancement, Thornova Solar retains the discretion to amend any information encapsulated in this datasheet without any preceding notification. Clients are urged to procure the most recent iteration of this datasheet and incorporate it as an intrinsic component of the legally binding agreement ratified by both parties. The English rendition of this datasheet serves purely as a point of reference. Should discrepancies arise between the English text and versions rendered in other languages, the stipulations of the English version shall take precedence.





QT2

The most powerful 3-phase Quad microinverter

- Designed for 3-phase grid connection (208V or 480V)
- Single unit connects to 4 modules, 2 MPPTs, module-level DC voltage
- Maximum continuous AC output power 1728VA @ 208V, 1800VA @ 480V
- Engineered to harness today's high-capacity PV modules (Maximum input current 20A)
- Integrated safety protection relay
- Adjustable power factor
- Balancing 3-phase output
- Compatible with both Δ and Y 3-phase grid

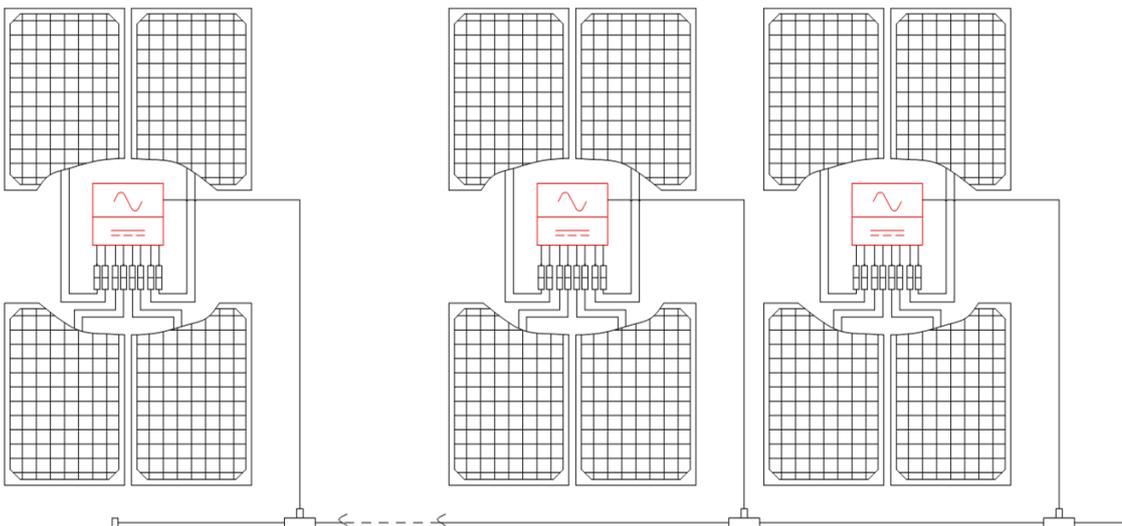
PRODUCT FEATURES

APsystems introduces its 2nd generation of native 3-phase quad microinverters, reaching unprecedented power outputs of 1728VA (for 208V) and 1800VA (for 480V) to harness the power of today's high-output PV modules. The QT2 microinverter gives commercial installers a powerful plug-and-play MLPE inverter that installs faster than competing solutions and is inherently compliant to rapid shutdown requirements.

With balancing 3-phase output, 4 DC inputs and encrypted ZigBee wireless, installers and system owners alike benefit from new QT2 architecture platform. The innovative design facilitates thermal dissipation while maximizing power production. The components are encapsulated with silicone to reduce stress on the electronics, dissipate heat, enhance waterproof properties, and ensure maximum reliability of the system. 24/7 access to performance data through apps or APsystems EMA web-based portal facilitate remote diagnosis and troubleshooting.

The new QT2 is grid interactive through its Reactive Power Control (RPC) feature, designed to better manage photovoltaic power spikes in the grid. At 96.5% peak efficiency and improved reliability, the QT2 is a game changer for commercial solar.

WIRING SCHEMATIC

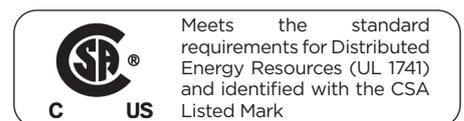


Datasheet | QT2 3-Phase Microinverter

Model	QT2-208	QT2-480
Region	USA/Canada	
Input Data (DC)		
Recommended PV Module Power (STC) Range	315Wp-670Wp+	
Peak Power Tracking Voltage	30V-45V	
Operating Voltage Range	26V-60V	
Maximum Input Voltage	60V	
Maximum Input Current	20A x 4	
Maximum input short circuit current	25A per input	
Output Data (AC)		
Maximum Continuous Output Power	1728VA	1800VA
Nominal Output Voltage/Range ⁽¹⁾	208V/183V-229V	480V/422V-528V
Adjustable Output Voltage Range	166V-240V	385V-552V
Nominal Output Current	4.8Ax3	2.17Ax3
Maximum Output Fault Current (ac) And Duration	L-L:85.4Apk, 13.6ms of duration, 4.967Arms	L-L:35.1Apk, 13.9ms of duration, 2.199Arms
Nominal Output Frequency/Range ⁽¹⁾	60Hz/58.8Hz-61.2Hz(HECO:57Hz-63Hz)	
Adjustable Output Frequency Range	55Hz-65Hz	
Power Factor(Default/Adjustable)	0.99/0.8 leading...0.8 lagging	
Maximum Units per 30A branch ⁽²⁾	5	11
AC Bus Cable	10AWG	
Efficiency		
Peak Efficiency	96.5%	
CEC Efficiency	96%	95.5%
Nominal MPPT Efficiency	99.5%	
Night Power Consumption	80mW	200mW
Mechanical Data		
Operating Ambient Temperature Range ⁽³⁾	-40 °F to +149 °F (-40 °C to +65 °C)	
Storage Temperature Range	-40 °F to +185 °F (-40 °C to +85 °C)	
Dimensions (W x H x D)	14" x 9.5" x 1.8" (359mm X 242mm X 46mm)	
Weight	13 lbs (6kg)	
DC Connector Type	Stäubli MC4 PV-ADBP4-S2&ADSP4-S2	
Cooling	Natural Convection - No Fans	
Enclosure Environmental Rating	Type 6	
Features		
Communication (Inverter To ECU) ⁽⁴⁾	Encrypted ZigBee	
Isolation Design	High Frequency Transformers, Galvanically Isolated	
Energy Management	Energy Management Analysis (EMA) system	
Warranty ⁽⁵⁾	10 Years Standard ; 25 Years Optional	
Compliances		
Safety, EMC & Grid Compliances	UL1741; CSA C22.2 No. 1071-16; CA Rule 21 (UL 1741 SA); UL 1741SB; SRD-V2.0; IEEE1547; FCC Part15; ANSI C63.4; ICES-003; NEC2014&NEC2017 Section 690.11 DC Arc-Fault circuit; Protection NEC2014&NEC2017 Section 690.12 Rapid Shutdown of PV systems on Building; NEC 2020	

(1) Nominal voltage/frequency range can be extended beyond nominal if required by the utility.
 (2) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.
 (3) The inverter may enter to power de-grade mode under poor ventilation and heat dissipation installation environment.
 (4) Recommend no more than 80 inverters register to one ECU for stable communication.
 (5) To be eligible for the warranty, APsystems microinverters need to be monitored via the EMA portal. Please refer to our warranty T&Cs available on usa.APsystems.com.

© All Rights Reserved
 Specifications subject to change without notice please ensure you are using the most recent update found at usa.APsystems.com or canada.APsystems.com



Harvest the Sunshine

JA SOLAR

455W



JAM54D41 LB Black Modules n-type Double Glass Bifacial Modules

Premium Cells

n-
Bycium+
16BB

26%



MBB Half-Cell
Technology

Cell Conversion
Efficiency

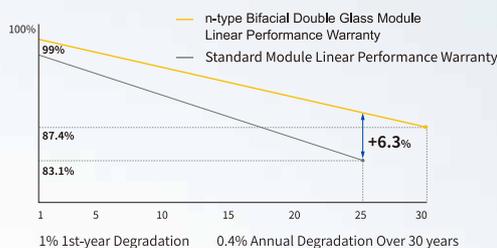
Premium Modules

Higher power
generation better LCOE

n-type with very
Lower LID

Better Temperature
Coefficient

Better low irradiance
response



15-year product
warranty

30-year linear power
output warranty

Comprehensive Certificates

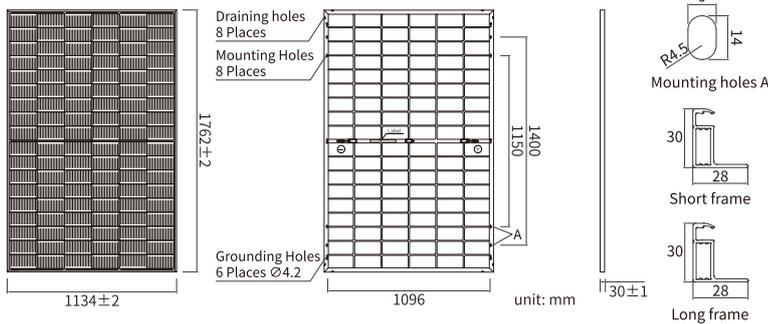
- IEC 61215, IEC 61730, UL 61215, UL 61730
- ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001: 2018 Occupational health and safety management systems
- IEC 62941: 2019 Terrestrial photovoltaic (PV) modules - Quality system for PV module manufacturing



DEEP BLUE 4.0 Pro

JAM54D41 LB

n-type Double Glass Bifacial Modules



MECHANICAL PARAMETERS

Cell	Mono
Weight	22kg
Dimensions	1762±2mm × 1134±2mm × 30±1mm
Cable Cross Section Size	4mm ² (IEC), 12 AWG(UL)
No. of cells	108(6×18)
Junction Box	IP68, 3diodes
Connector	QC 4.10-351/ MC4-EVO2
Cable Length (Including Connector)	Portrait: 300mm(+)/400mm(-) Landscape: 1200mm(+)/1200mm(-)
Front Glass/Back Glass	1.6mm/1.6mm
Packaging Configuration	36pcs/Pallet, 936pcs/40HQ Container

Remark: customized frame color and cable length available upon request

ELECTRICAL PARAMETERS AT STC

TYPE	JAM54D41 430/LB	JAM54D41 435/LB	JAM54D41 440/LB	JAM54D41 445/LB	JAM54D41 450/LB	JAM54D41 455/LB
Rated Maximum Power(Pmax) [W]	430	435	440	445	450	455
Open Circuit Voltage (Voc) [V]	38.50	38.70	38.90	39.10	39.30	39.50
Maximum Power Voltage(Vmp) [V]	32.12	32.29	32.47	32.65	32.82	33.00
Short Circuit Current(Isc) [A]	14.14	14.23	14.31	14.40	14.48	14.56
Maximum Power Current(Imp) [A]	13.39	13.47	13.55	13.63	13.71	13.79
Module Efficiency [%]	21.5	21.8	22.0	22.3	22.5	22.8
Power Tolerance	0~+3%					
Temperature Coefficient of Isc(α _{Isc})	+0.045%/°C					
Temperature Coefficient of Voc(β _{Voc})	-0.250%/°C					
Temperature Coefficient of Pmax(γ _{Pmp})	-0.290%/°C					
STC	Irradiance 1000W/m ² , cell temperature 25°C, AM1.5G					

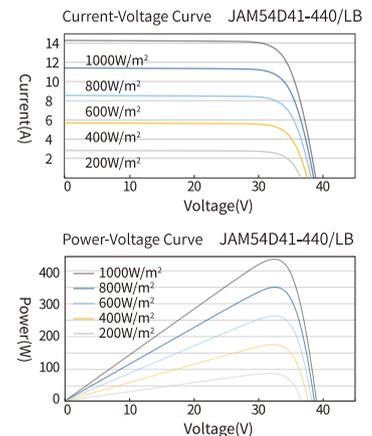
Remark: Electrical data in this catalog do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

ELECTRICAL CHARACTERISTICS WITH 10% SOLAR IRRADIATION RATIO

TYPE	JAM54D41 430/LB	JAM54D41 435/LB	JAM54D41 440/LB	JAM54D41 445/LB	JAM54D41 450/LB	JAM54D41 455/LB
Rated Max Power(Pmax) [W]	464	470	475	481	486	491
Open Circuit Voltage(Voc) [V]	38.50	38.70	38.90	39.10	39.30	39.50
Max Power Voltage(Vmp) [V]	32.11	32.29	32.47	32.65	32.82	32.99
Short Circuit Current(Isc) [A]	15.27	15.36	15.46	15.55	15.64	15.73
Max Power Current(Imp) [A]	14.46	14.55	14.63	14.72	14.81	14.89
Irradiation Ratio (rear/front)	10%					

* Bifaciality=Pmax, rear/Rated Pmax, front

CHARACTERISTICS



OPERATING CONDITIONS

Maximum System Voltage	1500V DC
Operating Temperature	-40°C~+85°C
Maximum Series Fuse Rating	30A
Maximum Static Load, Front	5400Pa(112 lb/ft ²)
Maximum Static Load, Back	2400Pa(50 lb/ft ²)
NOCT	45±2°C
Bifaciality*	80%±10%
Safety Class	Class II
Fire Performance	UL Type 38/Class C