Docket Item #3
BAR #2025-00391
Parker-Gray District
November 5, 2025

ISSUE: Certificate of Appropriateness for alterations.

APPLICANT: City of Alexandria General Services

LOCATION: Parker-Gray District
1605 Cameron Street

ZONE: POS/Parks and Open Space zone

STAFF RECOMMENDATION

Staff recommends approval of the Certificate of Appropriateness for alterations as submitted.

GENERAL NOTES TO THE APPLICANT

1. APPEAL OF DECISION: In accordance with the Zoning Ordinance, if the Board of Architectural Review denies or approves an application in whole or in part, the applicant or opponent may appeal the Board's decision to City Council on or before 14 days after the decision of the Board.

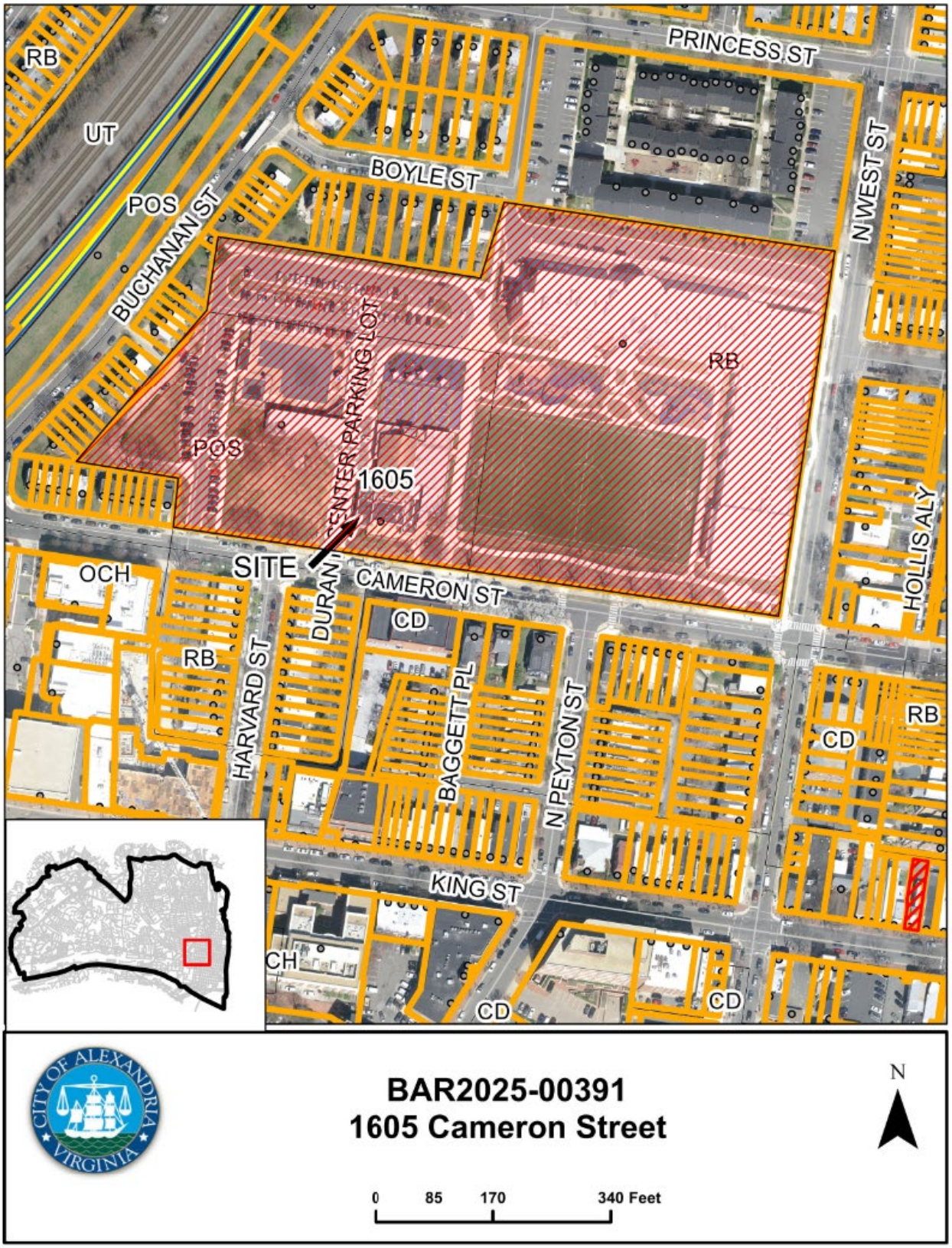
2. COMPLIANCE WITH BAR POLICIES: All materials must comply with the BAR's adopted policies unless otherwise specifically approved.

3. BUILDING PERMITS: Most projects approved by the Board of Architectural Review require the issuance of one or more construction permits by Department of Code Administration (including signs). The applicant is responsible for obtaining all necessary construction permits after receiving Board of Architectural Review approval. Contact Code Administration, Permit Center, 4850 Mark Center Drive, Suite 2015, 703-746-4200 for further information.

4. ISSUANCE OF CERTIFICATES OF APPROPRIATENESS AND PERMITS TO DEMOLISH: Applicants must obtain a copy of the Certificate of Appropriateness or Permit to Demolish PRIOR to applying for a building permit. Contact BAR Staff, Room 2100, City Hall, 703-746-3833, or preservation@alexandriava.gov for further information.

5. EXPIRATION OF APPROVALS NOTE: In accordance with Sections 10-106(B), 10-206(B) and 10-307 of the Zoning Ordinance, any Board of Architectural Review approval will expire 12 months from the date of issuance if the work is not commenced and diligently and substantially pursued by the end of that 12-month period.

6. HISTORIC PROPERTY TAX CREDITS: Applicants performing extensive, certified rehabilitations of historic properties may separately be eligible for state and/or federal tax credits. Consult with the Virginia Department of Historic Resources (VDHR) prior to initiating any work to determine whether the proposed project may qualify for such credits.


RB
UT
POS
BUCHANAN ST
BOYLE ST
PRINCESS ST
N WEST ST
RB
POS
CENTER PARKING LOT
1605
SITE
OCH
CAMERON ST
CD
RB
HARVARD ST
DURAN
BAGGETT PL
N PEYTON ST
HOLLIS ALY
CD
RB
KING ST
CH
CD
CD
BAR2025-00391
1605 Cameron Street
N
0
85
170
340 Feet

I. APPLICANT'S PROPOSAL

The applicant is requesting approval for the installation of photovoltaic solar panels to both the sloped and flat roof portions of the building. The main gable roof does not face the street but is visible from a public right of way. The flat roofs are not visible from any public way (Figures 1 and 2).

Site context

The building sits on the Jefferson Houston Elementary School site, west of the school building.

II. HISTORY

During World War II, the Federal government built two USO buildings in Alexandria to provide recreation space and services to the military stationed in the immediate area. These building were constructed at 1605 Cameron Street and at 1005 Pendleton Street for African American servicemen. The Cameron Street building was constructed by the Army in the spring of **1942** and was one of the earliest USO buildings constructed in the country. Following the war the City leased the buildings from the Federal government and they were used as recreation centers. In 1947 the City negotiated the purchase of the two buildings from the Federal government. Today the former USO center on Cameron Street is incorporated into the Durant Recreation Center. The center on Pendleton Street served for a time as a gymnasium for African Americans and was subsequently demolished in the 1980s and replaced with a townhouse development project.

Previous BAR Approvals
BAR2000-00301/302 - Approval for demolition and new addition on 12/29/2000.
BAR2001-00230 – Approval for fenestration modification on 09/26/2001
BAR2002-00261 – Approval for the demolition of "the wood shop" and new addition on 10/23/2002.
BAR2005-00092 – Approval for exterior lighting on 05/25/2005.

III. ANALYSIS

The *Design Guidelines* state that "Since the mid-1970s, the use of solar energy systems has increased across the country. However, when inappropriately mounted on historic structures, these systems can detract from the building's historic architectural character. The Board supports sustainable design and the use of solar energy within the historic districts, but such features must be carefully balanced with the architectural character of both the individual structure and the district as a whole." Furthermore, "Roof-mounted solar energy systems should be low-profile and mounted at an angle which is as close to the adjacent roof slope as possible."

Staff has no objection to the solar panels installation since the gable roof does not face the street, the panels will be flush on the roofing, and the building is a "Late" building within the Parker-Gray District. The solar panels on the flat roofed buildings are not going to be visible from any public way; therefore, not under the BAR purview. Additionally, the Board routinely approves small changes on the rear and side elevations to accommodate a more modern and functional green technology.
Thus, staff recommends approval of the project, as submitted.

STAFF
Marina Novaes, Historic Preservation Planner, Planning & Zoning
Tony LaColla, AICP, Land Use Services Division Chief, Planning & Zoning

IV. CITY DEPARTMENT COMMENTS
Legend: C- code requirement R- recommendation S- suggestion F- finding

Zoning
C-1 Proposed roof flush mounted solar panels will comply with zoning.

Code Administration
C-1 A building permit is required.

Transportation and Environmental Services
R-1 The building permit must be approved and issued prior to the issuance of any permit for demolition, if a separate demolition permit is required. (T&ES)

R-2 Applicant shall be responsible for repairs to the adjacent city right-of-way if damaged during construction activity. (T&ES)

R-3 No permanent structure may be constructed over any existing private and/or public utility

easements. It is the responsibility of the applicant to identify any and all existing easements on the plan. (T&ES)

F-1 After review of the information provided, an approved grading plan is not required at this time. Please note that if any changes are made to the plan it is suggested that T&ES be included in the review. (T&ES)

C-1 The applicant shall comply with the City of Alexandria's Solid Waste Control, Title 5, Chapter 1, which sets forth the requirements for the recycling of materials (Sec. 5-1-99). (T&ES)

C-2 The applicant shall comply with the City of Alexandria's Noise Control Code, Title 11, Chapter 5, which sets the maximum permissible noise level as measured at the property line. (T&ES)

C-3 Roof, surface and sub-surface drains be connected to the public storm sewer system, if available, by continuous underground pipe. Where storm sewer is not available applicant must provide a design to mitigate impact of stormwater drainage onto adjacent properties and to the satisfaction of the Director of Transportation & Environmental Services. (Sec.5-6-224) (T&ES)

C-4 All secondary utilities serving this site shall be placed underground. (Sec. 5-3-3) (T&ES)

C-5 Any work within the right-of-way requires a separate permit from T&ES. (Sec. 5-2) (T&ES)

C-6 All improvements to the city right-of-way such as curbing, sidewalk, driveway aprons, etc. must be city standard design. (Sec. 5-2-1) (T&ES)

Alexandria Archaeology

F-1 No archaeology comments

V. ATTACHMENTS

- Application Materials
- Completed application
- Plans
- Material specifications
- Scaled survey plat if applicable
- Photographs
- Public comment, if applicable
- Any other supporting documentation

BAR CASE# BAR2025-00391
(OFFICE USE ONLY)

ADDRESS OF PROJECT: Oswald Durant Center 1605 Cameron St, Alexandria VA 22314

DISTRICT: ☐ **Old & Historic Alexandria** ■ **Parker – Gray** ■ **100 Year Old Building**

TAX MAP AND PARCEL: 064.03-01-01 **ZONING:** POS (Parks and Open Space)

APPLICATION FOR: *(Please check all that apply)*

■ CERTIFICATE OF APPROPRIATENESS

☐ PERMIT TO MOVE, REMOVE, ENCAPSULATE OR DEMOLISH
(Required if more than 25 square feet of a structure is to be demolished/impacted)

☐ WAIVER OF VISION CLEARANCE REQUIREMENT and/or YARD REQUIREMENTS IN A VISION CLEARANCE AREA (Section 7-802, Alexandria 1992 Zoning Ordinance)

☐ WAIVER OF ROOFTOP HVAC SCREENING REQUIREMENT
(Section 6-403(B)(3), Alexandria 1992 Zoning Ordinance)

Applicant: ■ Property Owner ☐ Business *(Please provide business name & contact person)*

Name: City of Alexandria General Services

Address: [redacted]

City: [redacted] State: [redacted] Zip: [redacted]

Phone: [redacted] E-mail : [redacted]

Authorized Agent *(if applicable)*: ☐ Attorney ☐ Architect ☒ PM

Name: Frank J. Delimba Phone: [redacted]

E-mail: [redacted]

Legal Property Owner:

Name: City of Alexandria

Address: [redacted]

City: [redacted] State: [redacted] Zip: [redacted]

Phone: [redacted] E-mail: [redacted]

BAR CASE# BAR2025-00391

(OFFICE USE ONLY)

NATURE OF PROPOSED WORK: *Please check all that apply*

- ☐ NEW CONSTRUCTION
- ☒ EXTERIOR ALTERATION: *Please check all that apply.*
  - ☐ awning
  - ☐ doors
  - ☐ lighting
  - ☐ fence, gate or garden wall
  - ☐ windows
  - ☐ pergola/trellis
  - ☐ HVAC equipment
  - ☐ siding
  - ☐ painting unpainted masonry
  - ☐ shutters
  - ☐ shed
  - ☒ other SOLAR PANEL / PV SYSTEM
- ☒ ADDITION
- ☐ DEMOLITION/ENCAPSULATION
- ☐ SIGNAGE

DESCRIPTION OF PROPOSED WORK: *Please describe the proposed work in detail (Additional pages may be attached).*

Replacing the roof and adding solar photovoltaic panels to both the sloped and flat roof portion of the Oswald Durant Center

The sloped roofs are only visible from the east and west directions and all of that property is owned by the city.

Attached is a drawing of the solar panels from the south side / front of the property and the leading edge of the solar panels on the sloped roofs MAY be visible. All other solar panels will be installed on flat roofs below parapets.

SUBMITTAL REQUIREMENTS:

☐ Check this box if there is a homeowner's association for this property. If so, you must attach a copy of the letter approving the project.

Items listed below comprise the **minimum supporting materials** for BAR applications. Staff may request additional information during application review. Please refer to the relevant section of the *Design Guidelines* for further information on appropriate treatments.

Applicants must use the checklist below to ensure the application is complete. Include all information and material that are necessary to thoroughly describe the project. Incomplete applications will delay the docketing of the application for review. Pre-application meetings are required for all proposed additions. All applicants are encouraged to meet with staff prior to submission of a completed application.

Demolition/Encapsulation : *All applicants requesting 25 square feet or more of demolition/encapsulation must complete this section. Check N/A if an item in this section does not apply to your project.*

	N/A	
☐	☒	Survey plat showing the extent of the proposed demolition/encapsulation.
☐	☒	Existing elevation drawings clearly showing all elements proposed for demolition/encapsulation.
☐	☒	Clear and labeled photographs of all elevations of the building if the entire structure is proposed to be demolished.
☐	☒	Description of the reason for demolition/encapsulation.
☐	☒	Description of the alternatives to demolition/encapsulation and why such alternatives are not considered feasible.

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(OFFICE USE ONLY)

Additions & New Construction: *Drawings must be to scale and should not exceed 11" x 17" unless approved by staff. Check N/A if an item in this section does not apply to your project.*

	N/A	
☐	■	Scaled survey plat showing dimensions of lot and location of existing building and other structures on the lot, location of proposed structure or addition, dimensions of existing structure(s), proposed addition or new construction, and all exterior, ground and roof mounted equipment.
☐	■	FAR & Open Space calculation form.
☐	■	Clear and labeled photographs of the site, surrounding properties and existing structures, if applicable.
☐	■	Existing elevations must be scaled and include dimensions.
☐	■	Proposed elevations must be scaled and include dimensions. Include the relationship to adjacent structures in plan and elevations.
☐	■	Materials and colors to be used must be specified and delineated on the drawings. Actual samples may be provided or required.
☒	■	Manufacturer's specifications for materials to include, but not limited to: roofing, siding, windows, doors, lighting, fencing, HVAC equipment and walls.
☐	■	For development site plan projects, a model showing mass relationships to adjacent properties and structures.

Signs & Awnings: *One sign per building under one square foot does not require BAR approval unless illuminated. All other signs including window signs require BAR approval. Check N/A if an item in this section does not apply to your project.*

	N/A	
☐	■	Linear feet of building: Front:_____ Secondary front (if corner lot):_____.
☐	■	Square feet of existing signs to remain:_____.
☐	■	Photograph of building showing existing conditions.
☐	■	Dimensioned drawings of proposed sign identifying materials, color, lettering style and text.
☐	■	Location of sign (show exact location on building including the height above sidewalk).
☐	■	Means of attachment (drawing or manufacturer's cut sheet of bracket if applicable).
☐	■	Description of lighting (if applicable). Include manufacturer's cut sheet for any new lighting fixtures and information detailing how it will be attached to the building's facade.

Alterations: *Check N/A if an item in this section does not apply to your project.*

	N/A	
☐	■	Clear and labeled photographs of the site, especially the area being impacted by the alterations, all sides of the building and any pertinent details.
☐	■	Manufacturer's specifications for materials to include, but not limited to: roofing, siding, windows, doors, lighting, fencing, HVAC equipment and walls.
☒	☐	Drawings accurately representing the changes to the proposed structure, including materials and overall dimensions. Drawings must be to scale.
☐	■	An official survey plat showing the proposed locations of HVAC units, fences, and sheds.
☐	■	Historic elevations or photographs should accompany any request to return a structure to an earlier appearance.

BAR2025-00391

BAR CASE# _____

(OFFICE USE ONLY)

ALL APPLICATIONS: *Please read and check that you have read and understand the following items:*

☒ I understand that after reviewing the proposed alterations, BAR staff will invoice the appropriate filing fee in APEX. The application will not be processed until the fee is paid online.

☒ I understand the notice requirements and will return a copy of the three respective notice forms to BAR staff at least five days prior to the hearing. If I am unsure to whom I should send notice I will contact Planning and Zoning staff for assistance in identifying adjacent parcels.

☐ I, the applicant, or an authorized representative will be present at the public hearing.

☐ I understand that any revisions to this initial application submission (including applications deferred for restudy) must be accompanied by the BAR Supplemental form and revised materials.

The undersigned hereby attests that all of the information herein provided including the site plan, building elevations, prospective drawings of the project, and written descriptive information are true, correct and accurate. The undersigned further understands that, should such information be found incorrect, any action taken by the Board based on such information may be invalidated. The undersigned also hereby grants the City of Alexandria permission to post placard notice as required by Article XI, Division A, Section 11-301(B) of the 1992 Alexandria City Zoning Ordinance, on the property which is the subject of this application. The undersigned also hereby authorizes the City staff and members of the BAR to inspect this site as necessary in the course of research and evaluating the application. The applicant, if other than the property owner, also attests that he/she has obtained permission from the property owner to make this application.

APPLICANT OR AUTHORIZED AGENT:

Signature: Frank J. Delimba

Printed Name: Frank J. Delimba

Date: 09/19/2025

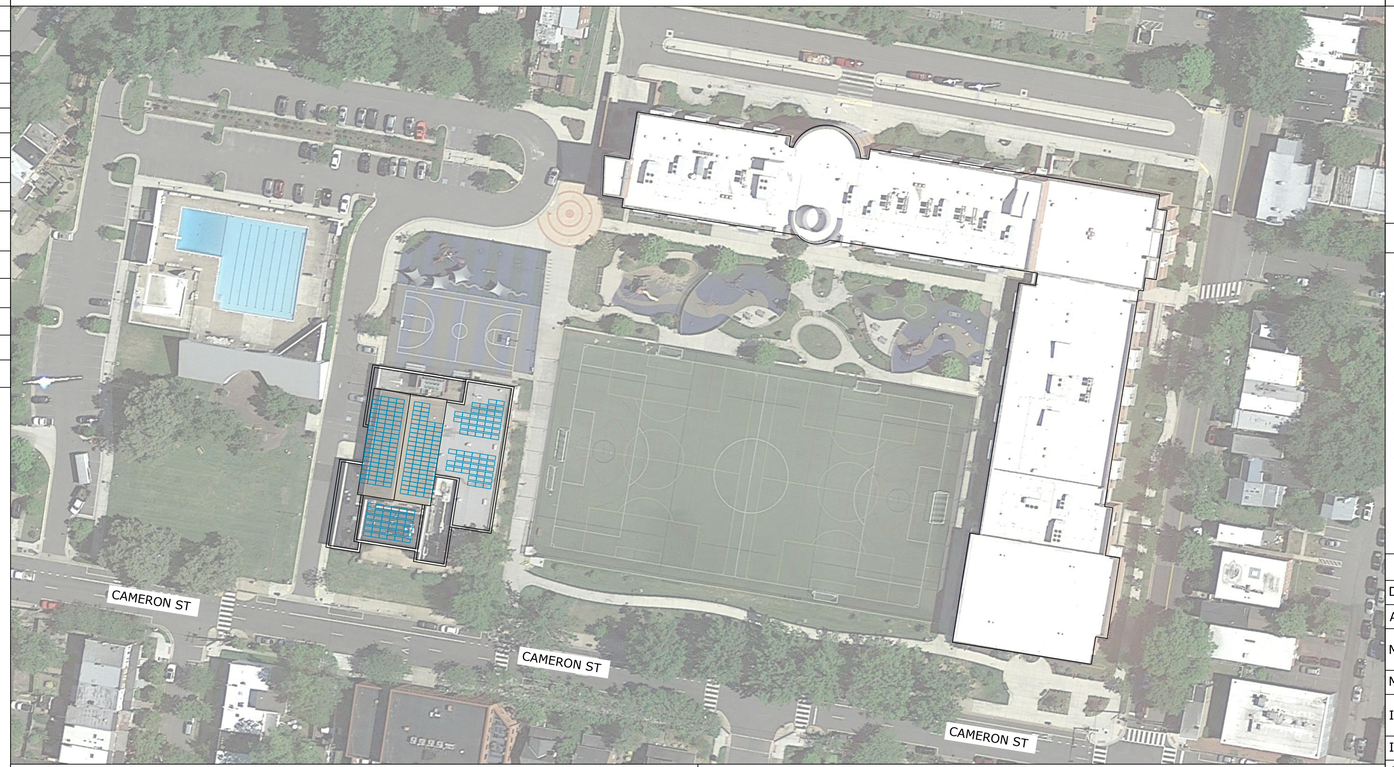
DURANT RECREATION CENTER
101.20 kWp (DC) PHOTOVOLTAIC PV SYSTEM
1605 CAMERON ST, ALEXANDRIA, VA 22314

AMERICAN MICROGRID SOLUTIONS

SHEET CATALOG

SHEET #	DESCRIPTION
G-01	COVER SHEET
G-02	GENERAL NOTES
E-01	SITE PLAN
E-01.1	ENLARGED SITE PLAN
E-02	ELECTRICAL STRING PLAN
E-03	ELECTRICAL MOUNTING DETAILS
E-04	LINE DIAGRAM
E-05	ELECTRICAL CALCULATIONS & VOLTAGE DROP CALCULATIONS
S-01	STRUCTURAL DETAIL & ARRAY PLAN-01
S-02	STRUCTURAL DETAIL & ARRAY PLAN-02
E-06	ELECTRICAL PLACARDS & SPEC SHEETS
E-06.1	SPEC SHEETS
E-06.2	SPEC SHEETS

LOCATION MAP



LOCATION INFORMATION

SITE COORDINATES	:	38.807904, -77.056381
ADDRESS	:	1605 CAMERON ST
CITY / VILLAGE	:	ALEXANDRIA
STATE	:	VA
ZIP	:	22314
COUNTY	:	-
PERMITTING AUTHORITY	:	VA-CITY OF ALEXANDRIA
INTERCONNECTING UTILITY	:	DOMINION ENERGY

APPLICABLE CODES AND COMPLIANCE

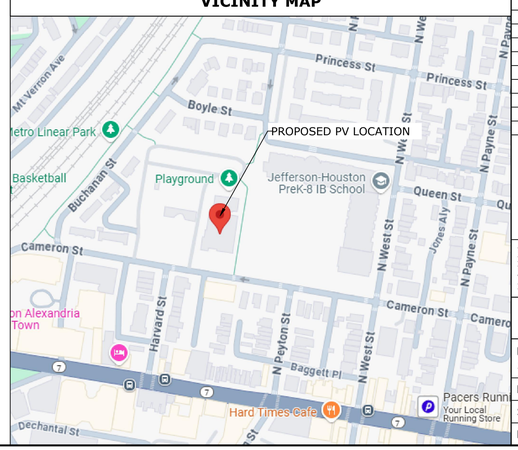
NFPA 70E - STANDARD FOR ELECTRICAL SAFETY IN THE WORKFORCE
UL 61730 - SOLAR MODULES
UL 1741 - INVERTERS
UL 2703 - MOUNTING SYSTEMS AND CLAMPING DEVICES FOR PV MODULES

2020 NATIONAL ELECTRICAL CODE
2021 VIRGINIA CONSTRUCTION CODE
2021 INTERNATIONAL FIRE CODE
2021 VIRGINIA STATEWIDE FIRE PREVENTION CODE
2021 VIRGINIA UNIFORM STATEWIDE BUILDING CODE (USBC)
ADDITIONALLY, CONFORM TO ALL LOCAL ORDINANCES AND REQUIREMENTS

PROJECT SUMMARY INFORMATION

DC kWp	101.20
AC kW	100.00
MODULE MFG. & MODEL	HANWHA Q CELLS Q.PEAK DUO BLK ML-G10.a+ (400Wp)
MODULE QTY	253
INVERTER MFG. & MODEL	SOLAREDGE TECHNOLOGIES SE50KUS (208V, 3PH)
INVERTER QTY	2
OPTIMIZER/RSD	SOLAREDGE P1101 POWER OPTIMIZER
OPTIMIZER/RSD QTY	129
DC:AC RATIO	1.01
STRINGS	12
MODULES PER STRING	22, 21, 20
RACKING MFG. & MODEL	IRONRIDGE FLASHFOOT2 & UNIRAC RM10 EVO
PITCHED ROOF TILT	27°
FLAT ROOF TILT	10°
AZIMUTH	99°, 189°, 279°
INTER-ROW SPACING	13.5"

VICINITY MAP



SYSTEM INFORMATION

SYSTEM SIZE (DC/AC):
101.20 kWp DC / 100.00 kW AC

MODULES:
(253)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10.a+ (400Wp)

INVERTERS:
(2)SOLAREDGE TECHNOLOGIES SE50KUS (208V, 3PH)

OPTIMIZER/MLPE:
(129)SOLAREDGE P1101 POWER OPTIMIZER

WIND SPEED: **130MPH**
SNOW LOAD: **61PSF**
EXPOSURE CAT.: **B**

AHJ:**VA-CITY OF ALEXANDRIA**

UTILITY:**DOMINION ENERGY**

MIN. TEMP.: **-11°C** | MAX. TEMP.: **35.1°C**

GENERAL NOTES

1. THESE NOTES SET MINIMUM STANDARDS FOR CONSTRUCTION. THE DRAWINGS GOVERN OVER THESE NOTES TO THE EXTENT SHOWN.
2. ALL WORK SHALL CONFORM TO THE MINIMUM STANDARDS OF THE FOLLOWING: LOCAL BUILDING CODE, LOCAL ELECTRICAL CODE, ANY OTHER REGULATING AGENCIES THAT HAVE AUTHORITY OVER ANY PORTION OF THE WORK AND THOSE CODES AND STANDARDS LISTED IN THESE DRAWINGS AND IN THE AGREEMENT.
3. ALL MATERIAL AND EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND THE NEC.
4. ALL ELECTRICAL WORK AND INSTALLATION TO BE COMPLETED BY QUALIFIED PERSONNEL, ADJUSTED, ALIGNED AND TESTED BY THE CONTRACTOR AS REQUIRED TO PRODUCE THE INTENDED PERFORMANCE.
5. BEFORE THE COMMENCEMENT OF ANY WORK, EACH TRADE SHALL VERIFY EXISTING CONDITIONS, AND NOTE DISCREPANCIES OR VARIANCES FROM THE INFORMATION CONTAINED IN THESE DRAWINGS, INCLUDING BUT NOT LIMITED TO DIMENSIONS OF THE WORK AREA, STRUCTURE, EXISTING ELECTRICAL SERVICE, CONDUIT PATHS, OBSTRUCTIONS, ACCESSIBILITY ISSUES, AND WORKING CLEARANCES.
6. UNLESS INDICATED AS EXISTING (E), ALL PROPOSED MATERIALS AND EQUIPMENT ARE NEW.
7. ALL EQUIPMENT SHALL BE MOUNTED AS SHOWN. WHERE DETAILS ARE NOT PROVIDED, THE SUBCONTRACTOR SHALL USE DILIGENT EFFORTS TO MOUNT EQUIPMENT SUCH THAT IT WILL BE CLEAN, LEVEL AND SOLID.
8. EXISTING SURFACES SHALL BE PATCHED AND PAINTED AROUND NEW DEVICES AND EQUIPMENT TO MATCH EXISTING FINISHES.
9. UPON COMPLETION OF WORK, THE CONTRACTORS SHALL THOROUGHLY CLEAN ALL EXPOSED EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. REMOVE ALL LABELS AND ANY DEBRIS, CRATING OR CARTONS AND LEAVE THE INSTALLATION FINISHED AND READY FOR OPERATION.
10. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ITEMS WITH THE OWNER OR GENERAL CONTRACTOR FURNISHED EQUIPMENT DELIVERY SCHEDULE TO PREVENT UNNECESSARY DELAYS IN THE TOTAL WORK.

ENGINEERING SCOPE OF WORK

1. ILLUMINE INTERNATIONAL INC. HAS ONLY PROVIDED DRAFTING SERVICES FOR THE PERMIT DRAWINGS. NO ACTUAL ENGINEERING WORK, ENGINEERING REVIEW OR ENGINEERING APPROVAL HAS BEEN CONDUCTED BY ILLUMINE INTERNATIONAL INC UNLESS NOTED OTHERWISE.
2. WHEN A PROFESSIONAL ENGINEER APPROVES AND SEALS THE DESIGN FOR COMPONENTS OF THEIR RESPECTIVE DISCIPLINE (STRUCTURAL/ELECTRICAL) SHOWN ON THESE PERMIT DRAWINGS, HE/SHE:
   a. TAKES FULL DIRECT CONTROL OF THE ENGINEERED DESIGN.
   b. IS GIVEN ACCESS TO PERSONALLY SUPERVISE AND RECTIFY ANY ASPECT OF THE ENGINEERED DESIGN.
   c. HAS FULLY ACCEPTED RESPONSIBILITY FOR THE ENGINEERED DESIGN.

SOLAR PV PROJECT:

DURANT RECREATION CENTER
1605 CAMERON ST,
ALEXANDRIA, VA 22314
38.807904, -77.056381
APN #10294550
PROJECT #AMG-DG-2024-499

REVISION HISTORY

REV	DATE	DESCRIPTION
A	03/24/2025	PERMIT PLAN
B	06/17/2025	SYSTEM SIZE UPDATE

ILLUMINE i
ILLUMINE INTERNATIONAL INC.
1320 ARROW POINT DR, STE 501, #163
CEDAR PARK, TX 78613

COVER SHEET

DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

PAPER SIZE: 24" X 36"

SCALE: AS NOTED | REV:B

DATE: 06/17/2025 | G-01

GENERAL NOTES: NEC 2020

1. EXISTING PLUMBING VENTS, SKYLIGHTS, EXHAUST OUTLETS, VENTILATION INTAKE AIR OPENINGS SHALL NOT BE COVERED BY THE SOLAR PHOTOVOLTAIC SYSTEM.
2. INVERTERS, MOTOR GENERATORS, PV MODULES, AC MODULES AND AC MODULE SYSTEMS, DC COMBINERS, DC-TO-DC CONVERTERS, RAPID SHUTDOWN EQUIPMENT, DC CIRCUIT CONTROLLERS, AND CHARGE CONTROLLERS INTENDED FOR USE IN PV SYSTEMS SHALL BE LISTED OR BE EVALUATED FOR THE APPLICATION AND HAVE A FIELD LABEL APPLIED. [NEC 690.4(B)]
3. ALL OUTDOOR EQUIPMENT SHALL BE NEMA 3R RATED, INCLUDING ALL ROOF MOUNTED TRANSITION BOXES AND SWITCHES.
4. ALL EQUIPMENT SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC ARTICLE 250.
5. PV SYSTEM DC CIRCUIT AND INVERTER OUTPUT CONDUCTORS AND EQUIPMENT SHALL BE PROTECTED AGAINST OVERCURRENT. [NEC 690.9(A)]
6. ALL PHOTOVOLTAIC (PV) MODULES SHALL BE MOUNTED ON THE ROOF, CARPORT, ETC.
7. THE UTILITY INTERACTIVE INVERTERS SHALL TRIP OR SHALL BE PERMITTED TO AUTOMATICALLY DISCONNECTED FROM ALL UNGROUNDED CONDUCTORS OF THE PRIMARY SOURCE WHEN ONE OR MORE OF THE PHASES OF THE PRIMARY SOURCE TO WHICH IT IS CONNECTED OPENS. THE INTERACTIVE ELECTRIC POWER PRODUCTION EQUIPMENT SHALL NOT BE RECONNECTED TO THE PRIMARY SOURCE UNTIL ALL THE PHASES OF THE PRIMARY SOURCE TO WHICH IT IS CONNECTED ARE RESTORED. [NEC 705.40]
8. EQUIPMENT DISCONNECTING MEANS SHALL HAVE RATINGS SUFFICIENT FOR THE MAXIMUM CIRCUIT CURRENT, VOLTAGE, AND AVAILABLE FAULT CURRENT. THE DISCONNECTING MEANS SHALL SIMULTANEOUSLY DISCONNECT ALL CURRENT-CARRYING CONDUCTORS THAT ARE NOT SOLIDLY GROUNDED WHICH IT IS CONNECTED TO AND SHALL BE OPERABLE WITHOUT EXPOSING THE OPERATOR TO ANY ENERGIZED PARTS OF THE DISCONNECT. [NEC 690.15(C)]
9. ALL CONDUCTORS EXPOSED TO WEATHER SHALL BE LISTED AND IDENTIFIED FOR USE IN DIRECT SUNLIGHT. [NEC 310.10(D)]
10. THE MODULE CONDUCTORS MUST BE TYPE USE-2 OR LISTED FOR PHOTOVOLTAIC (PV) WIRE. [NEC 690.31(C)(1)]
11. PV SYSTEM DC CIRCUIT CONDUCTORS SHALL BE IDENTIFIED AT ALL TERMINATIONS, CONNECTIONS, AND SPLICE POINTS BY COLOR CODING, MARKING TAPE, TAGGING, OR OTHER APPROVED MEANS. [NEC 690.31(B)(1)]
12. ALL GROUNDED CONDUCTORS SHALL BE PROPERLY COLOR IDENTIFIED AS WHITE OR GRAY. [NEC 200.6]
13. PV SYSTEM CONNECTED ON THE LOAD SIDE OR SOURCE SIDE OF THE SERVICE DISCONNECTING MEANS OF THE OTHER SOURCE(S) AT ANY DISTRIBUTION EQUIPMENT ON THE PREMISES SHALL BE IN ACCORDANCE WITH NEC 705.11 (SUPPLY SIDE) & 705.12 (LOAD SIDE).
14. EACH SOURCE CONNECTION SHALL BE MADE AT A DEDICATED CIRCUIT BREAKER OR FUSIBLE DISCONNECTING MEANS. [(NEC 705.12(A)]
15. THE SUM OF THE AMPERE RATING OF THE OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO THE BUSBAR OR CONDUCTOR SHALL NOT EXCEED 120% OF THE RATING OF THE BUSBAR OR CONDUCTOR AND THE INTERCONNECTION POINT SHALL BE LOCATED AT THE OPPOSITE END OF THE BUSBAR AS THE PRIMARY POWER SOURCE. [NEC 705.12(B)(3)(2)]
16. THE INTERCONNECTION POINT OF PRODUCTION EQUIPMENT SHALL BE CONNECTED TO THE SUPPLY SIDE OF THE GROUND-FAULT PROTECTION EQUIPMENT INSTALLED IN AC CIRCUITS AS REQUIRED ELSEWHERE IN THIS CODE, BUT SHALL BE PERMITTED TO BE MADE TO THE LOAD SIDE OF THE GROUND-FAULT PROTECTED EQUIPMENT PROVIDED THERE IS GROUND-FAULT PROTECTION FOR EQUIPMENT FROM ALL GROUND-FAULT CURRENT SOURCES. [NEC 705.32]
17. EQUIPMENT CONTAINING OVERCURRENT DEVICES IN CIRCUITS SUPPLYING POWER TO A BUS BAR OR CONDUCTOR SHALL BE MARKED TO INDICATE THE PRESENCE OF ALL SOURCES. [NEC 705.12(C)]
18. FUSED DISCONNECTS, UNLESS OTHERWISE MARKED, SHALL BE CONSIDERED SUITABLE FOR BACKFEED. CIRCUIT BREAKERS NOT MARKED "LINE" AND "LOAD" SHALL BE CONSIDERED SUITABLE FOR BACKFEED. CIRCUIT BREAKERS MARKED "LINE" AND "LOAD" SHALL BE CONSIDERED SUITABLE FOR BACKFEED OR REVERSE CURRENT IF SPECIFICALLY RATED. [NEC 705.12(D)]
19. ALL THE NEC REQUIRED WARNING SIGNS, MARKINGS, AND LABELS SHALL BE POSTED ON EQUIPMENT AND DISCONNECTS PRIOR TO ANY INSPECTIONS TO BE PERFORMED BY THE BUILDING DEPARTMENT INSPECTOR.
20. METAL RACEWAYS, TYPE MC METAL-CLAD CABLE THAT COMPLIES WITH NEC 250.118(10) OR METALLIC ENCLOSURES ARE REQUIRED AS WIRING METHOD FOR INSIDE THE BUILDING FOR PV SYSTEM DC CIRCUITS THAT EXCEED 30 VOLTS OR 8 AMPERES. [NEC 690.31(D)]
21. FLEXIBLE, FINE-STRANDED CABLES SHALL BE TERMINATED ONLY WITH TERMINALS, LUGS, DEVICES OR CONNECTOR IN ACCORDANCE WITH NEC 110.14. [NEC 690.31(C)(5)]
22. CONNECTORS SHALL BE OF LATCHED OR LOCKING TYPE. CONNECTORS THAT ARE READILY ACCESSIBLE AND OPERATING AT OVER 30 VOLTS DC OR 15 VOLTS AC SHALL REQUIRE TOOL TO OPEN AND MARKED "DO NOT DISCONNECT UNDER LOAD" OR "NOT FOR CURRENT INTERRUPTING". [NEC 690.33(C) & (D)(2)]
23. EQUIPMENT GROUNDING CONDUCTOR FOR PV SYSTEMS WITHOUT GROUND FAULT PROTECTION (GFP) AND INSTALLED ON NON-DWELLING UNIT MUST HAVE AMPACITY OF AT LEAST #10 AWG.
24. GROUNDING ELECTRODE CONDUCTOR WILL BE CONTINUOUS. [NEC 250.64(C)]
25. EQUIPMENT PROPOSED TO BE MOUNTED ON EXTERIOR WALLS ARE TO MAINTAIN CLEARANCE TO OPERABLE WINDOWS PER MANUFACTURERS RECOMMENDATION AND CODE.

EQUIPMENT:

1. EQUIPMENT COMPONENTS SHALL BE LISTED AND LABELED BY A NATIONALLY-RECOGNIZED TESTING LABORATORY(NRTL), SUCH AS UL OR ETL, WHERE SUCH LISTING IS AVAILABLE FOR THE APPLICATION.
2. DANGER, WARNING, AND CAUTION LABELS SHALL BE PROVIDED AS REQUIRED BY NESC, OR OSHA STANDARDS ON EQUIPMENT ENCLOSURES, DOORS, ACCESS PLATES, AND BARRIERS. LABEL ALL MEDIUM VOLTAGE EQUIPMENT WITH THE OPERATING VOLTAGE.
3. ALL OPENINGS INTO EQUIPMENT SHALL BE SEALED WITH GALVANIZED STEEL PLATE OR SCREEN TO PREVENT INSECTS AND RODENTS FROM ENTERING.
4. ALL CONDUCTORS SHALL BE ROUTED TO MAINTAIN ACCESS TO INDICATORS, VALVES, SAMPLE PORTS, SWITCHES, TAP CHANGES, FUSE WELLS, AND OTHER COMPONENTS AND ACCESSORIES REQUIRING OPERATOR ACCESS.
5. INSTALL BOLLARDS AS REQUIRED.

ELECTRICAL NOTES FOR NEW PHOTOVOLTAIC SYSTEM:

1. THIS PROPOSED SOLAR ELECTRIC SYSTEM IS INTENDED TO OPERATE IN PARALLEL WITH POWER RECEIVED FROM THE UTILITY SERVICE PROVIDER.
2. THE INVERTER FOR THE PROPOSED SOLAR ELECTRIC SYSTEM SHALL BE IDENTIFIED FOR USE IN SOLAR PHOTOVOLTAIC SYSTEMS. ALL EQUIPMENT SHALL BE UL APPROVED.
3. THIS SYSTEM IS INTENDED TO CONNECT TO THE EXISTING FACILITY POWER SYSTEM AT A SINGLE POINT, POINT OF COMMON COUPLING (POCC). THIS CONNECTION SHALL BE IN COMPLIANCE WITH THE NEC.
4. ALL SOURCE CIRCUITS SHALL HAVE INDIVIDUAL SOURCE CIRCUIT PROTECTION, AS REQUIRED, FOR TESTING AND ISOLATION.
5. ALL DISCONNECTS AND COMBINERS SHALL BE SECURED FROM UNAUTHORIZED OR UNQUALIFIED PERSONNEL BY LOCK OR LOCATION.
6. ALL DISCONNECTS, COMBINERS, PULL/SPLICE BOXES, AND ENCLOSURES SHALL BE LISTED FOR ITS PURPOSE.
7. EQUIPMENT SHALL BE INSTALLED IN A SECURE AREA. INVERTER PERFORMANCE MAY BE AFFECTED IF INSTALLED IN DIRECT SUNLIGHT.

WIRING AND WIRING METHODS:

1. THE EXPOSED PV SOLAR MODULE WIRING AND PV SOURCE CIRCUITS TO BE UV RESISTANT, RATED FOR WET CONDITIONS, AND USE 2,000V PV WIRE WITH A TEMPERATURE RATING OF 90°C.
2. ALL EXPOSED CABLES, SUCH AS MODULE LEADS, SHALL BE SECURED IN A NEAT WORKMANLIKE MANNER TO PREVENT CHAFFING, SWINGING, AND EXCEEDING MINIMUM BEND RADIUS WITH PROPER MECHANICAL SUNLIGHT-RESISTANT MEANS AND ROUTED TO AVOID DIRECT EXPOSURE TO SUNLIGHT AT ALL TIMES.
3. ALL FIELD WIRING THAT IS NOT COLOR-CODED SHALL BE TAGGED AT BOTH ENDS WITH PERMANENT WIRE MARKERS TO IDENTIFY POLARITY AND GROUND.
4. FLEXIBLE METAL CONDUIT IS SUITABLE FOR INSTALLATION IN DRY LOCATIONS; SHOULD IT BE EMPLOYED, SUPPORTS WILL BE NO MORE THAN 12 INCHES FROM BOXES (JUNCTION BOX, CABINETS, OR CONDUIT FITTING) AND NO MORE THAN 48 INCHES APART.
5. LIQUID-TIGHT FLEXIBLE METAL AND NON-METALLIC CONDUIT IS SUITABLE FOR INSTALLATION IN WET AND DRY LOCATIONS. SHOULD IT BE EMPLOYED, SUPPORTS WILL BE NO MORE THAN 12 INCHES FROM BOXES (JUNCTION BOX, CABINETS, OR CONDUIT FITTING) AND NO MORE THAN 36 INCHES APART.
6. PVC CONDUIT AND FITTINGS SHALL NOT BE USED ON ROOFTOP CONDITIONS OR EXPOSED TO DIRECT SUNLIGHT. WHEN USED IN ACCEPTABLE LOCATION CONDUIT SHALL BE SCHEDULE 80 UV RESISTANT UNLESS NOTED OTHERWISE.
7. FUSES AND WIRES SUBJECT TO TEMPERATURE CONDITIONS GREATER THAN 100°F OR TRANSFORMER INRUSH CURRENT SHALL BE SIZED ACCORDINGLY.
8. THE PHOTOVOLTAIC SOURCE CIRCUITS AND PHOTOVOLTAIC OUTPUT CIRCUITS OF THIS PROPOSED SOLAR SYSTEM SHALL NOT BE CONTAINED IN THE SAME RACEWAY CABLE TRAY, CABLE, OUTLET BOX, OR SIMILAR FITTING AS FEEDERS OR BRANCH CIRCUITS OF OTHER SYSTEMS UNLESS THE CONDUCTORS OF THE DIFFERENT SYSTEMS ARE SEPARATED BY A PARTITION OR ARE CONNECTED TOGETHER.
9. ALL TERMINATIONS SHALL HAVE ANTI-OXIDANT COMPOUND AND BE TORQUED PER DEVICE LISTED OR MANUFACTURER'S RECOMMENDATION.
10. SPLIT BOLTS/SPLICED/CONNECTORS ARE PERMITTED ON THE AC CONDUCTORS AND SHALL BE INSULATED WITH APPROVED MEANS. SPLICES ON DC CONDUCTORS ARE PERMITTED WITH THE APPROPRIATE CONDUCTORS PER THE NEC CODE.
11. NO PVC CONDUIT ALLOWED ON ROOF, UNLESS OPEN-ENDED WIRE MANAGEMENT < 10'.

GROUNDING:

1. EQUIPMENT GROUNDING CONDUCTORS MAY BE COPPER OR ALUMINUM.
2. PARTS OF THE ELECTRICAL INSTALLATION TO BE GROUNDED AND BONDED SHALL INCLUDE, BUT NOT BE LIMITED TO, ELECTRICAL EQUIPMENT, RACEWAYS, BOXES, CABINETS, AND OTHER NON-CURRENT CARRYING METAL PARTS OF THE WIRING SYSTEM, METAL CONDUIT, SWITCHGEAR, HOUSING AND NEUTRALS OF TRANSFORMERS, LIGHTING FIXTURES, AND PANEL DEVICES AS APPLICABLE TO EQUIPMENT INSTALLED ON THIS PROJECT.
3. RACKING COMPONENTS AND STRUCTURAL SUPPORTS MUST BE ELECTRICALLY BONDED TOGETHER BY AN ACCEPTABLE MEANS.
4. MODULES SHALL BE GROUNDED PER MODULE AND RACKING MANUFACTURER'S INSTALLATION GUIDELINES. BARE COPPER USED FOR GROUNDING SHALL NOT TOUCH THE ALUMINUM OF THE MODULE FRAMES.
5. AN EQUIPMENT GROUNDING CONDUCTOR BETWEEN A PV ARRAY AND OTHER EQUIPMENT SHALL BE REQUIRED IN ACCORDANCE WITH NEC ARTICLE 250.

DISCONNECTING MEANS:

1. MEANS SHALL BE PROVIDED TO DISCONNECT ALL CURRENT CARRYING CONDUCTORS OF THE PHOTOVOLTAIC POWER SOURCE FROM ALL OTHER CONDUCTORS IN THE BUILDING.
2. THE GROUNDED CONDUCTOR MAY HAVE A BOLTED OR TERMINAL DISCONNECTING MEANS TO ALLOW MAINTENANCE OR TROUBLESHOOTING BY QUALIFIED PERSONNEL.
3. EQUIPMENT SUCH AS PHOTOVOLTAIC SOURCE CIRCUITS, OVERCURRENT DEVICES, AND BLOCKING DIODES SHALL BE PERMITTED ON THE PHOTOVOLTAIC SIDE OF THE PHOTOVOLTAIC DISCONNECTING MEANS.
4. MEANS SHALL BE PROVIDED TO DISCONNECT EQUIPMENT SUCH AS INVERTERS, BATTERIES, CHARGE CONTROLLERS, AND THE LIKE FROM ALL UNGROUNDED CONDUCTORS OF ALL SOURCES. IF THE EQUIPMENT IS ENERGIZED FROM MORE THAN ONE SOURCE, THE DISCONNECTING MEANS SHALL BE GROUPED AND IDENTIFIED.
5. FUSES AND DISCONNECTING MEANS SHALL BE PROVIDED TO DISCONNECT A FUSE FROM ALL SOURCES OF SUPPLY IF THE FUSE IS ENERGIZED FROM BOTH DIRECTIONS AND IS ACCESSIBLE TO OTHER THAN QUALIFIED PERSONS. SUCH A FUSE IN A PHOTOVOLTAIC SOURCE CIRCUIT SHALL BE CAPABLE OF BEING DISCONNECTED INDEPENDENTLY OF FUSES IN OTHER PHOTOVOLTAIC SOURCE CIRCUITS.

CONTRACTOR PROCEDURAL NOTES:

1. THE CONTRACTOR IS RESPONSIBLE FOR THOROUGHLY INSPECTING THE SITE AND BECOMING FAMILIAR WITH ALL ASPECTS OF EXISTING CONDITIONS PRIOR TO COMMENCING CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONFIRM THAT THE DRAWINGS AND SPECIFICATIONS ACCURATELY DEPICT AND ACCOUNT FOR THE EXISTING CONDITIONS. ANY LACK OF DETAIL REGARDING EXISTING CONDITIONS IN THE DRAWINGS OR SPECIFICATIONS DOES NOT RELIEVE THE CONTRACTOR FROM PROVIDING ANY MATERIALS OR PERFORMING ANY WORK REQUIRED BY THE DESIGN DOCUMENTATION.
2. THE CONTRACTOR SHALL PROCURE ALL NECESSARY PERMITS PRIOR TO STARTING CONSTRUCTION.
3. ANY DEFICIENCIES, ERRORS, INCONSISTENCIES, OR CONFLICTS BETWEEN OBSERVED FIELD CONDITIONS AND THOSE DEPICTED IN THE DESIGN DRAWINGS SHOULD BE NOTED. CONTRACTOR SHALL CONFIRM ALL DIMENSIONS WITH FIELD MEASUREMENTS PRIOR TO STARTING WORK AND REPORT ANY DISCREPANCIES TO ENGINEER OF RECORD.
4. THE CONTRACTOR SHALL REVIEW ALL CIVIL, ARCHITECTURAL, AND MECHANICAL DRAWINGS AND COORDINATE THE ELECTRICAL WORK WITH THE OTHER TRADES. IF CONFLICTS, DISCREPANCIES, OR DEFICIENCIES ARE FOUND WHICH REQUIRE REVISIONS TO THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF RECORD. BEFORE PROCEEDING WITH THE INSTALLATION, CONTRACTOR MUST OBTAIN WRITTEN DIRECTION ON ANY REQUIRED MODIFICATIONS TO THE DESIGN.
5. ALL EQUIPMENT SHALL BE INSTALLED AS PER THE MANUFACTURER'S INSTRUCTIONS OR PER THE ENGINEER'S CONSTRUCTION DESIGN DOCUMENTS. THE CONTRACTOR SHALL REVIEW AND UNDERSTAND ALL ENGINEERING DRAWINGS AND COMPONENT MANUALS PRIOR TO THE INSTALLATION OR ENERGIZING OF ANY EQUIPMENT. CONTRACTOR IS RESPONSIBLE FOR UNDERSTANDING AND OPERATING ALL INVERTERS IN ACCORDANCE WITH THE LATEST MANUFACTURER'S INSTALLATION AND OPERATION DOCUMENTATIONS, INCLUDING ALL MANUFACTURER'S TECHNICAL BULLETINS AND UPDATES.
6. THE CONTRACTOR SHALL INSTALL SYSTEM INTERCONNECTION AS REQUIRED BY UTILITY INTERCONNECTION STANDARDS.
7. ANY CHANGES TO OR DEVIATIONS FROM THE DESIGN MADE PRIOR TO THE RECEIPT OF WRITTEN APPROVAL BY THE ENGINEER OF RECORD ARE DONE AT THE CONTRACTOR'S SOLE RISK. THE CONTRACTOR SHALL SUBMIT WRITTEN REQUESTS FOR INFORMATION (RFI) FOR ANY DISCREPANCIES OR PROPOSED CHANGES. RFIS WILL INCLUDE DETAILED SUBMITTALS FOR REVIEW AND APPROVAL BY THE ENGINEER OF RECORD.
8. IT IS THE CONTRACTOR'S RESPONSIBILITY TO RECEIVE, STORE, AND SECURE ALL EQUIPMENT PRIOR TO AND DURING INSTALLATION.

ELECTRICAL ABBREVIATION:

ACP	ACCUMULATION PANEL
A, AMP	AMPERE
AF	AMP FRAME
AIC	AMPERE INTERRUPTING CAPACITY
APPROX	APPROXIMATE(LY)
AL	ALUMINUM
AWG	AMERICAN WIRE GAUGE
BLDG	BUILDING
CB	CIRCUIT BREAKER
CONC	CONCRETE
Cu	COPPER
CT	CURRENT TRANSFORMER
DIA	DIAMETER
DISC	DISCONNECT
(E)	EXISTING
EC	ELECTRICAL CONTRACTOR
EMT	ELECTRICAL METALLIC TUBING
EM	EMERGENCY
ENC	ENCLOSURE, ENCLOSED
EV	ELECTRIC VEHICLE
EVCS	ELECTRIC VEHICLE CHARGING STATION
FMC	FLEXIBLE METAL CONDUIT
G, GND	GROUND OR GROUNDING
GA	GALVANIZED
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
IN	INCHES
J, JB	JUNCTION BOX
KCMIL	THOUSAND CIRCULAR MILS
KV	KILOVOLT
KVA	KILOVOLT - AMPERE
KWp	KILOWATT PEAK
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MDP	MAIN DISTRIBUTION PANEL
MSP	MAIN SERVICE PANEL
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
N, NEUT	NEUTRAL
(N)	NEW
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NTS	NOT TO SCALE
OCPD	OVERCURRENT PROTECTIVE DEVICE
OH	OVERHEAD
P	POLE
PT	POTENTIAL TRANSFORMER
PV	PHOTOVOLTAIC
PVC	POLYVINYL CHLORIDE
RMC	RIGID METAL CONDUIT
SCH	SCHEDULE
SP	SPARE
TX, XFMR	TRANSFORMER
TB	TERMINAL BLOCK
TBD	TO BE DETERMINED
TYP	TYPICAL
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED

LEGEND:

MODULES	DRIVE WAY		WHEEL STOPS
EQUIPMENT	SETBACK		PROPERTY LINE
OBSTRUCTION	AC CONDUIT RUN (ABOVE GROUND)		PEDESTAL
INVERTER	AC CONDUIT RUN (UNDERGROUND)		EV CHARGER
TRANSFORMER	DC CONDUIT RUN (ABOVE GROUND)		FUSED DISCONNECT
METER	DC CONDUIT RUN (UNDERGROUND)		SIGNAGE (LOCATION)
NON-FUSED DISCONNECT	CIRCUIT BREAKER		SAFETY BOLLARD

GENERAL CONDUCTOR INSULATION KEY	
DC CONDUCTORS	
POSITIVE (UNGROUNDED)	RED
NEGATIVE (UNGROUNDED)	BLACK
120/208V OR 240V AC CONDUCTORS	
PHASE A	BLACK
PHASE B	RED (SEE NOTE)
PHASE C	BLUE
NEUTRAL	WHITE OR GREY
GROUND	GREEN OR BARE Cu
277/480V AC CONDUCTORS	
PHASE A	BROWN
PHASE B	ORANGE
PHASE C	YELLOW
NEUTRAL	WHITE OR GREY
GROUND	GREEN OR BARE Cu
347/600V AC CONDUCTORS	
PHASE A	BLACK
PHASE B	RED
PHASE C	PINK
NEUTRAL	WHITE OR GREY
GROUND	GREEN OR BARE Cu
NOTE: ON THREE PHASE HIGH LEG DELTA SYSTEMS, HIGH LEG MUST BE ORANGE, AS PER REQUIRED BY NFPA 70.	

AMERICAN MICROGRID SOLUTIONS

SYSTEM INFORMATION

SYSTEM SIZE (DC/AC):
101.20 kWp DC / 100.00 kW AC

MODULES:
(253)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10.a+ (400Wp)

INVERTERS:
(2)SOLAREDGE TECHNOLOGIES SE50KUS (208V, 3PH)

OPTIMIZER/MLPE:
(129)SOLAREDGE P1101 POWER OPTIMIZER

WIND SPEED: **130MPH**
SNOW LOAD: **61PSF**
EXPOSURE CAT.: **B**

AHJ:**VA-CITY OF ALEXANDRIA**

UTILITY:**DOMINION ENERGY**

MIN. TEMP.: **-11°C**	MAX. TEMP.: **35.1°C**

SOLAR PV PROJECT:

DURANT RECREATION CENTER
1605 CAMERON ST,
ALEXANDRIA, VA 22314
38.807904, -77.056381
APN #10294550
PROJECT #AMG-DG-2024-499

REVISION HISTORY

REV	DATE	DESCRIPTION
A	03/24/2025	PERMIT PLAN
B	06/17/2025	SYSTEM SIZE UPDATE

ILLUMINE i

ILLUMINE INTERNATIONAL INC.
1320 ARROW POINT DR, STE 501, #163
CEDAR PARK, TX 78613

GENERAL NOTES

DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

PAPER SIZE: 24" X 36"

SCALE: AS NOTED	REV:B
DATE: 06/17/2025	G-02

SITE PLAN:

SCALE:1"=40'-0"

AMERICAN MICROGRID SOLUTIONS

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INVERTERS: **(2)SOLAREDGE TECHNOLOGIES SE50KUS (208V, 3PH)**	
OPTIMIZER/MLPE: **(129)SOLAREDGE P1101 POWER OPTIMIZER**	
WIND SPEED: **130MPH** SNOW LOAD: **61PSF** EXPOSURE CAT.: **B**	
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SITE PLAN

DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

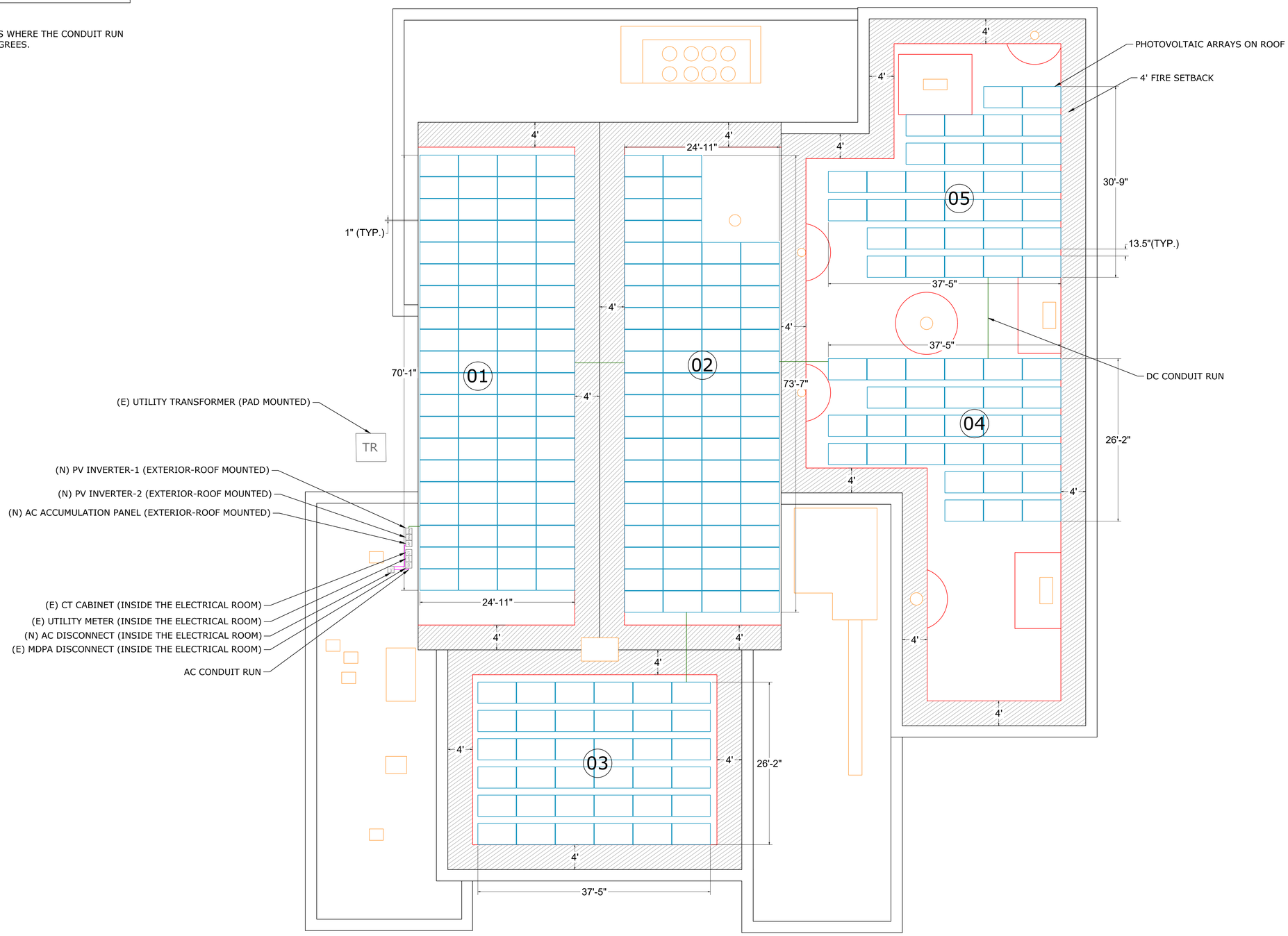
PAPER SIZE: 24" X 36"

SCALE: AS NOTED	REV:B
DATE: 06/17/2025	E-01

ENLARGED SITE PLAN:

ARRAY	QUANTITY	MODULE/ROOF TILT	AZIMUTH
ARRAY-01	80	27°	279°
ARRAY-02	76	27°	99°
ARRAY-03	36	10°	189°
ARRAY-04	29	10°	189°
ARRAY-05	32	10°	189°
TOTAL MODULES	253		

NOTE:
ADD PULL BOXES IN PLACES WHERE THE CONDUIT RUN BENDS MORE THAN 360 DEGREES.



SCALE:1/8" = 1'-0"

AMERICAN MICROGRID SOLUTIONS

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ENLARGED SITE PLAN

DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

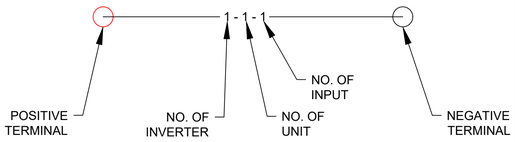
PAPER SIZE: 24" X 36"

SCALE: AS NOTED | REV:B

DATE: 06/17/2025 | E-01.1

ELECTRICAL STRING PLAN:

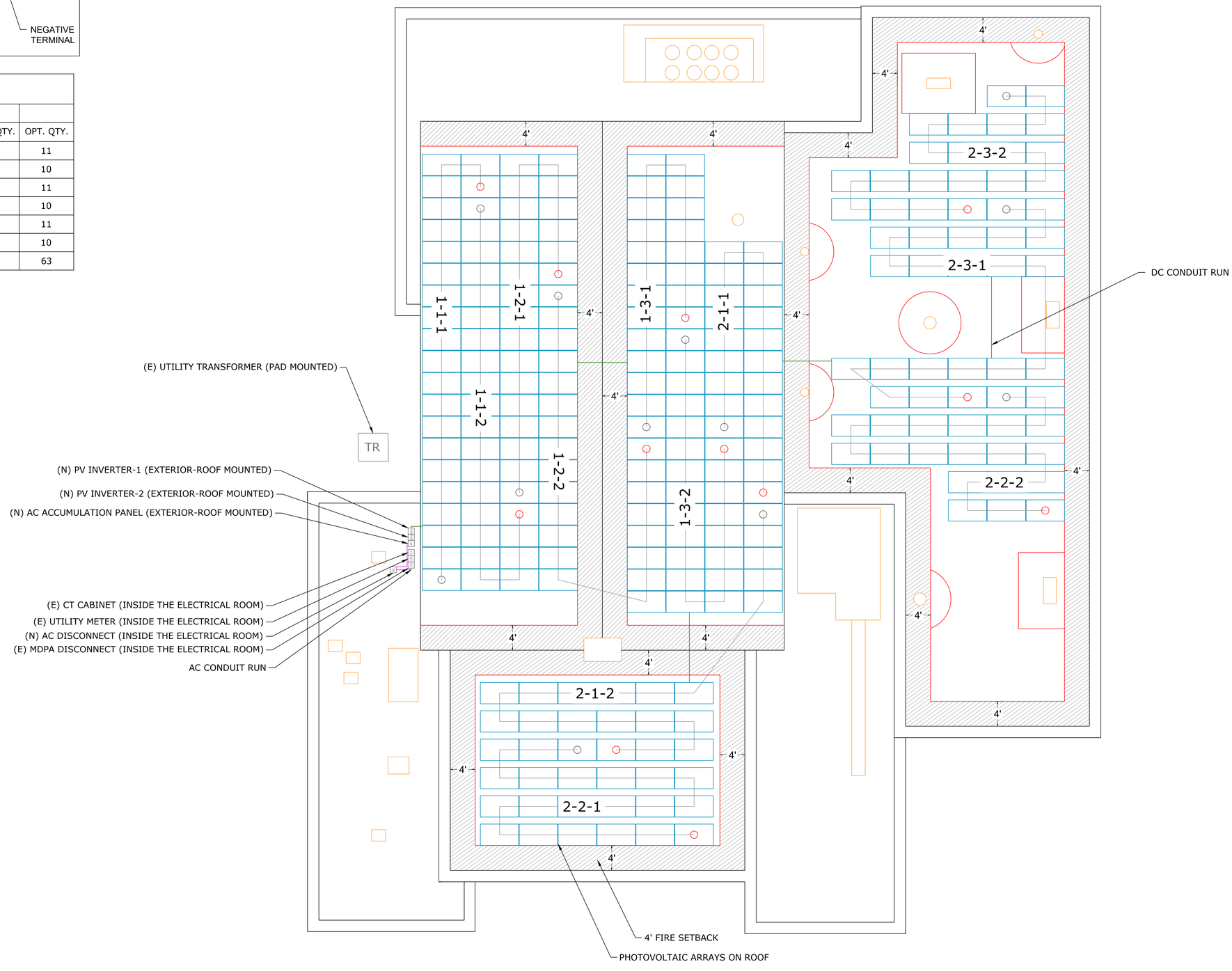
LEGEND:



STRINGING DETAILS

INVERTER-01			INVERTER-02		
STRING	MOD. QTY.	OPT. QTY.	STRING	MOD. QTY.	OPT. QTY.
1-1-1	22	11	2-1-1	21	11
1-1-2	22	11	2-1-2	20	10
1-2-1	22	11	2-2-1	21	11
1-2-2	22	11	2-2-2	20	10
1-3-1	21	11	2-3-1	21	11
1-3-2	21	11	2-3-2	20	10
TOTAL	130	66	TOTAL	123	63

NOTE:
ADD PULL BOXES IN PLACES WHERE THE CONDUIT RUN BENDS MORE THAN 360 DEGREES.



SCALE:1/8" = 1'-0"

AMERICAN MICROGRID SOLUTIONS

SYSTEM INFORMATION

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OPTIMIZER/MLPE:
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WIND SPEED: **130MPH**
SNOW LOAD: **61PSF**
EXPOSURE CAT.: **B**

AHJ:**VA-CITY OF ALEXANDRIA**

UTILITY:**DOMINION ENERGY**

MIN. TEMP.: **-11°C** | MAX. TEMP.: **35.1°C**

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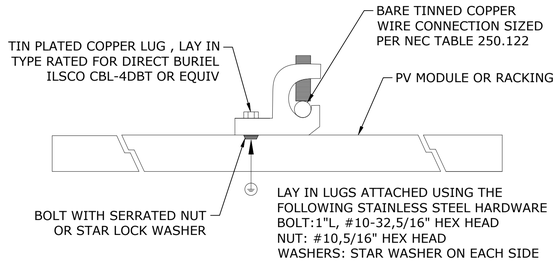
DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

PAPER SIZE: 24" X 36"

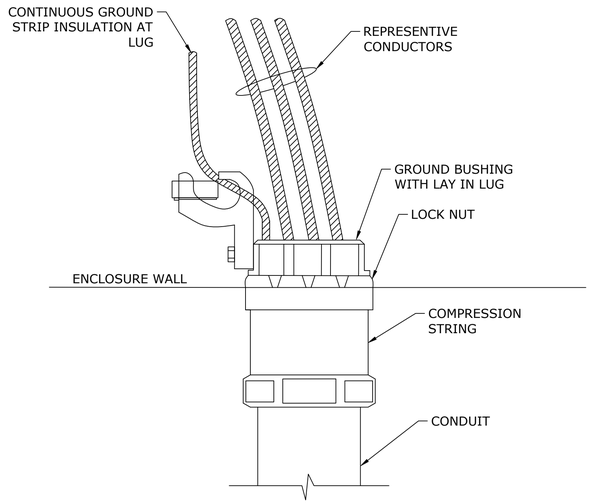
SCALE: AS NOTED | REV:B

DATE: 06/17/2025 | E-02

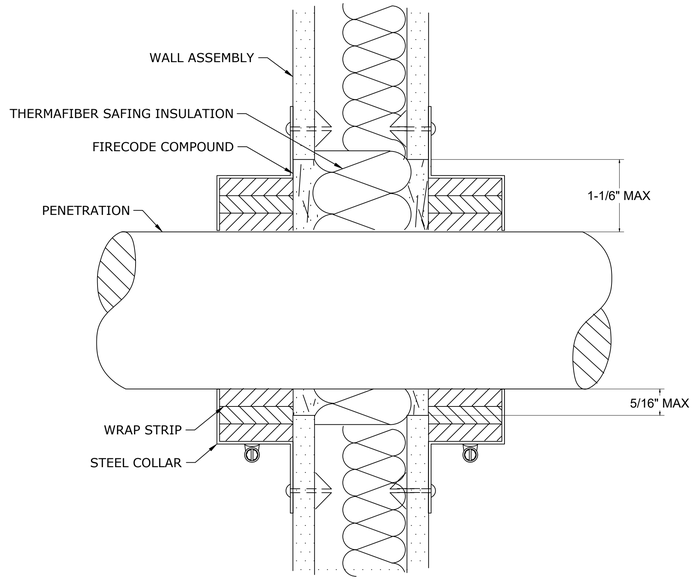
GROUND LUG DETAIL:



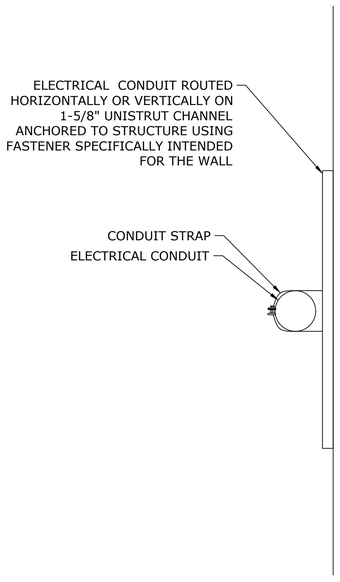
CONDUIT BODY GROUNDING DETAIL:



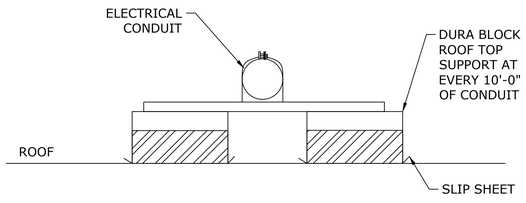
FIRE WALL PENETRATION DETAIL:



CONDUIT WALL ANCHORING:



TYPICAL DURA-BLOCK CONDUIT SUPPORT DETAIL:



NOTE: REQUIRE CONTRACTOR SUBMITTALS FOR ALL ROOF AND WALL PENETRATIONS. PENETRATIONS THROUGH FIRE RATED CONDITIONS SHOULD REFERENCE UL APPROVED, OR OTHER SIMILAR APPROVED TESTING LAB SYSTEMS (E.G., BY INTERTEK, FM, OR OTHERS).

NOTE: DETAIL DRAWINGS ARE FOR REFERENCE ONLY

AMERICAN MICROGRID SOLUTIONS

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1605 CAMERON ST,
ALEXANDRIA, VA 22314
38.807904, -77.056381
APN #10294550
PROJECT #AMG-DG-2024-499

REVISION HISTORY

REV	DATE	DESCRIPTION
A	03/24/2025	PERMIT PLAN
B	06/17/2025	SYSTEM SIZE UPDATE

ILLUMINE i
ILLUMINE INTERNATIONAL INC.
1320 ARROW POINT DR, STE 501, #163
CEDAR PARK, TX 78613

ELECTRICAL MOUNTING DETAILS

DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

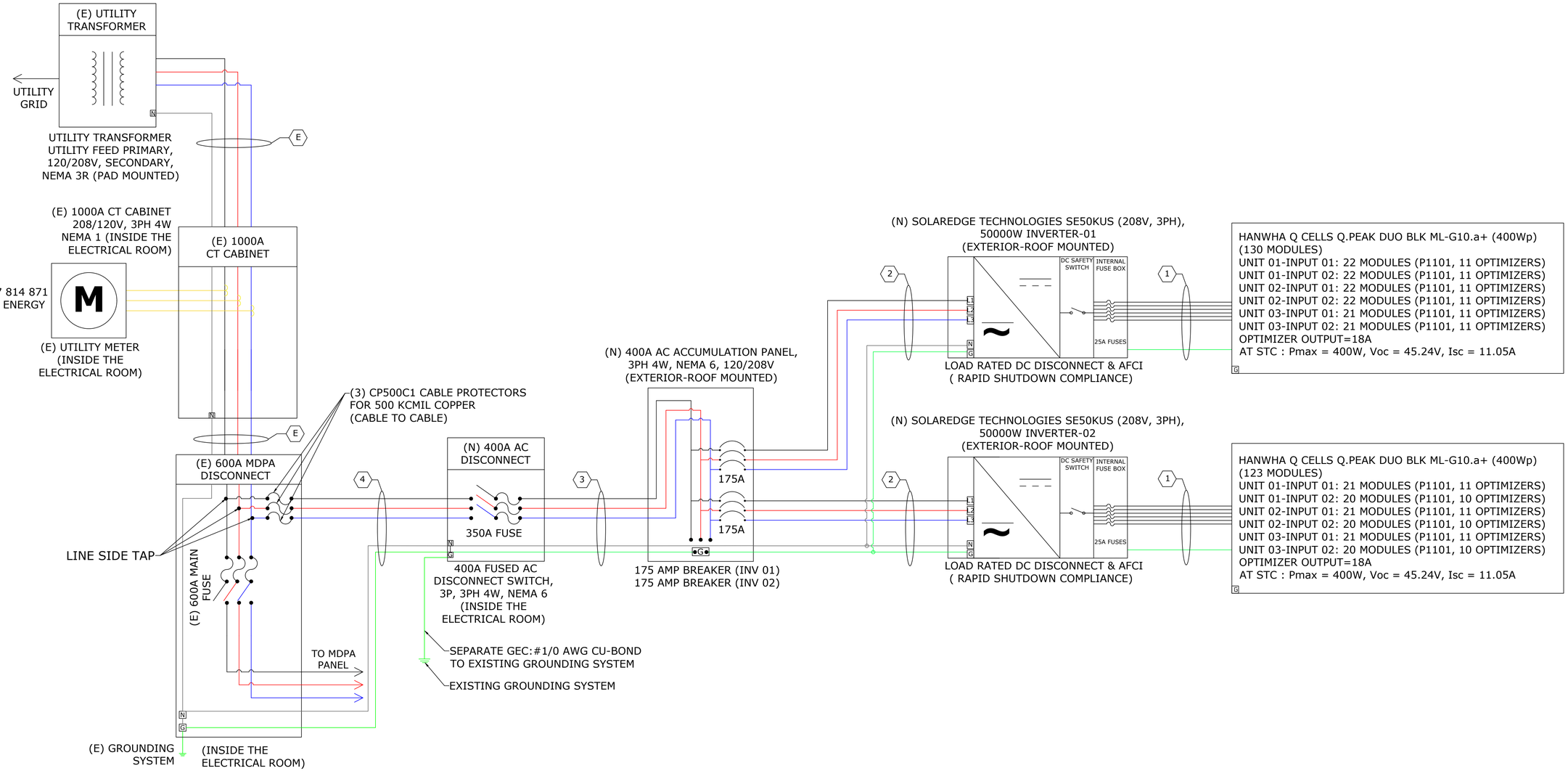
PAPER SIZE: 24" X 36"

SCALE: AS NOTED	REV:B
DATE: 06/17/2025	E-03

LINE DIAGRAM: DC SYSTEM SIZE: **101.20**kWp, AC SYSTEM SIZE: **100.00**kW

NOTE:
1.THIS INSTALLATION IS TO BE CONSIDERED SUPERVISED. ALL NEW ADDITIONS AND ALTERATIONS TO ANY EQUIPMENT IDENTIFIED IN THIS DOCUMENT MUST BE MADE WITH ENGINEERING SUPERVISION AND ALL WORK MUST BE COMPLETED BY QUALIFIED PERSONNEL.
2.ALL EQUIPMENT AND TERMINALS MUST BE MINIMUM 75°C RATED.
3.ALL CONDUCTORS ARE COPPER, UNLESS OTHERWISE SPECIFIED.
4.TAPS ARE MADE USING LISTED DEVICES.

NOTES:
1. EACH SOLAREDGE P1101 POWER OPTIMIZER IS CONNECTED TO TWO MODULES.
2. EACH SOLAREDGE P1101 POWER OPTIMIZER IS RAPID SHUTDOWN COMPLIANT.
3. ALL DC FUSES SHOWN ARE CONNECTED INTERNALLY TO THE INVERTER.
4. ADD PULL BOXES IN PLACES WHERE THE CONDUIT RUN BENDS MORE THAN 360 DEGREES.



CONDUIT SCHEDULE					
TAG ID	**CONDUIT SIZE**	**CONDUCTOR**	**NEUTRAL**	**GROUND**	**CONDUIT FILL%**
1	1" IMC 1" IMC	(6) 10 AWG PV WIRE 1kV (6) 10 AWG PV WIRE 1kV	NONE	(1) 6 AWG BARE COPPER	33.99 33.99
2	1-1/2" IMC	(3) 2/0 AWG THHN/THWN-2	(1) 6 AWG THHN/THWN-2	(1) 6 AWG THHN/THWN-2	32.80
3	3" IMC	(3) 500 KCMIL THHN/THWN-2	(1) 3 AWG THHN/THWN-2	(1) 3 AWG THHN/THWN-2	27.88
4	3" EMT	(3) 500 KCMIL THHN/THWN-2	(1) 1/0 AWG THHN/THWN-2	(1) 1/0 AWG THHN/THWN-2	26.83

OCPD CALCULATIONS
MDPA DISCONNECT RATING: 600A
LINE SIDE TAP INTERCONNECTION ALLOWABLE BACKFEED IS 600A
OCPD CALCULATIONS: INVERTER OVERCURRENT PROTECTION = INVERTER O/P I X # OF INVERTERS X 1.25
=(139.5A X 2) X 1.25 = 348.75A => PV BREAKER/FUSE = 350A
TOTAL REQUIRED PV BREAKER/FUSE SIZE => 350A PV BREAKER/FUSE
THE DESIGNED INTERCONNECTION MEETS THE 705.11 REQUIREMENTS.

AMERICAN MICROGRID SOLUTIONS

SYSTEM INFORMATION

SYSTEM SIZE (DC/AC):
101.20 kWp DC / 100.00 kW AC

MODULES:
(253)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10.a+ (400Wp)

INVERTERS:
(2)SOLAREDGE TECHNOLOGIES SE50KUS (208V, 3PH)

OPTIMIZER/MLPE:
(129)SOLAREDGE P1101 POWER OPTIMIZER

WIND SPEED: **130MPH**
SNOW LOAD: **61PSF**
EXPOSURE CAT.: **B**

AHJ:**VA-CITY OF ALEXANDRIA**

UTILITY:**DOMINION ENERGY**

MIN. TEMP.: **-11°C**	MAX. TEMP.: **35.1°C**

SOLAR PV PROJECT:

DURANT RECREATION CENTER
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38.807904, -77.056381
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LINE DIAGRAM

DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

PAPER SIZE: 24" X 36"

SCALE: AS NOTED	REV:B
DATE: 06/17/2025	E-04

ELECTRICAL CALCULATIONS:

SYSTEM INFO:
101.20 kWp DC SYSTEM SIZE
(253)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10.a+ (400Wp) MODULES,
(2)SOLAREDGE TECHNOLOGIES SE50KUS (208V, 3PH)
(129)SOLAREDGE P1101 POWER OPTIMIZER

SYSTEM CHARACTERISTICS: (INV-01)
VMP - MAXIMUM POWER POINT VOLTAGE = 370V
VOC - MAXIMUM INVERTER SYSTEM VOLTAGE = 600V
IMP - RATED MAXIMUM POWER-POINT CURRENT = 139.5A
ISC - MAXIMUM CIRCUIT CURRENT = 139.5A

SYSTEM CHARACTERISTICS: (INV-02)
VMP - MAXIMUM POWER POINT VOLTAGE = 370V
VOC - MAXIMUM INVERTER SYSTEM VOLTAGE = 600V
IMP - RATED MAXIMUM POWER-POINT CURRENT = 132.97A
ISC - MAXIMUM CIRCUIT CURRENT = 139.5A

DC WIRE SIZING: (TAG-1)
MAX CIRCUIT CURRENT = OPTIMIZER OUTPUT X 1.25 = 18A X 1.25 = 22.50A
ADJUSTED CONDUCTOR AMPACITY = (HIGH TEMP) [PER TABLE 310.15(B)(1)] X (CONDUIT FILL) [PER TABLE 310.15(C)(1)] X (CONDUCTOR AMPACITY) [PER TABLE 310.16] = 0.91 X 0.8 X 40A = 29.12A
TERMINAL RATING, [PER NEC 110.14(C)] - 10 AWG, 60°C RATED = 30A
30A > 22.50A, SO THE ADJUSTED CONDUCTOR AMPACITY GOVERNS THE CONDUCTOR SIZING
ALSO, 29.12A > 18.00A, AND **10 AWG** IS SUFFICIENT.

AC WIRE SIZING: (TAG-2)
MAX AC OUTPUT CURRENT = MAX INVERTER OUTPUT X 1.25 = 139.5A X 1.25 = 174.38A
ADJUSTED CONDUCTOR AMPACITY = (HIGH TEMP) [PER TABLE 310.15(B)(1)] X (CONDUIT FILL) [PER TABLE 310.15(C)(1)] X (CONDUCTOR AMPACITY) [PER TABLE 310.16] = 0.91 X 1 X 195A = 177.45A
TERMINAL RATING, [PER NEC 110.14(C)] - 2/0 AWG , 75°C RATED = 175A
175A >174.38A, SO THE TERMINAL RATING GOVERNS THE CONDUCTOR SIZING
ALSO, 177.45A >139.5A, AND **2/0 AWG** IS SUFFICIENT
INVERTER OVER CURRENT PROTECTION
(INVERTER MAX CURRENT) X 1.25 = 139.5A X 1.25 = 174.38A --> 175A OVERCURRENT PROTECTION

AC ACCUMULATION PANEL TO POINT INTERCONNECTION: (TAG-3 & 4)
MAX AC OUTPUT CURRENT = MAX INVERTER OUTPUT X # OF INVERTERS X 1.25 = (139.5 X 2) X 1.25 = 348.75A
ADJUSTED CONDUCTOR AMPACITY = (HIGH TEMP) [PER TABLE 310.15(B)(1)] X (CONDUIT FILL) [PER TABLE 310.15(C)(1)] X (CONDUCTOR AMPACITY) [PER TABLE 310.16] = 0.91 X 1 X 430A = 391.3A
TERMINAL RATING, [PER NEC 110.14(C)] - 500 KCMIL , 75°C RATED = 380A
380A >348.75A, SO THE TERMINAL RATING GOVERNS THE CONDUCTOR SIZING
ALSO, 391.3A >279.0A, AND **500 KCMIL** IS SUFFICIENT
OVER CURRENT PROTECTION
(MAX OUTPUT CURRENT) X # OF INVERTERS X 1.25 = (139.5 X 2) X 1.25 = 348.75A --> 350A OVERCURRENT PROTECTION

MODULE SPECIFICATION	
MODEL	HANWHA Q CELLS Q.PEAK DUO BLK ML-G10.a+ (400Wp)
MODULE POWER @ STC	400W
OPEN CIRCUIT VOLTAGE:**Voc**	45.24V
MAX POWER VOLTAGE:**Vmp**	37.95V
SHORT CIRCUIT CURRENT:**Isc**	11.05A
MAX POWER CURRENT:**Imp**	10.54A

SPECIFICATIONS	INVERTER-01 & 02
MODEL	SOLAREDGE TECHNOLOGIES SE50KUS (208V, 3PH)
POWER RATING	50000W
MAX OUTPUT CURRENT	139.5A
CEC WEIGHTED EFFICIENCY	97%
MAX INPUT CURRENT	139.5A
MAX DC VOLTAGE	600V

OPTIMIZER CHARACTERISTICS	
MODEL	**SOLAREDGE P1101 POWER OPTIMIZER**
MAX INPUT VOLTAGE	125 VDC
MAX OUTPUT VOLTAGE	80 VDC
MAX INPUT CURRENT	14.1 ADC
MAX OUTPUT CURRENT	18 ADC

DC VOLTAGE DROP CALCULATION

SOURCE	TERMINATION	TAG	CONDUIT TYPE	CURRENT (IMP)	STRING VOLTAGE AT 2%DB (VMP)	#SET OF PARALLEL CONDUCTOR	CONDUCTOR	CONDUCTOR MATERIAL	RESISTANCE AT 75 DEG C	RESISTANCE AT 2%DB	MAX CONDUTOR LENGTH(ft)	%V.DROP
MODULES	INVERTER 01	1	IMC	18	370	1	C AWG 10	Cu	0.00124	0.001080193	120	1.26%
MODULES	INVERTER 02	1	IMC	18	370	1	C AWG 10	Cu	0.00124	0.001080193	180	1.89%
											MAX Vdrop	1.89%
											AVERAGE Vdrop	1.58%

3 PHASE AC VOLTAGE DROP CALCULATION

SOURCE	TERMINATION	TAG	CONDUIT TYPE	CURRENT	VOLTAGE	#SET OF PARALLEL CONDUCTOR	CONDUCTOR	CONDUCTOR MATERIAL	RESISTANCE AT 75 DEG C	RESISTANCE AT 2%DB	MAX CONDUTOR LENGTH(ft)	%V.DROP
INVERTER TO COLLECTION												
INVERTER 01	AC ACCUMULATION PANEL	2	IMC	139.5	208	1	K AWG 2/0	Cu	0.000100	0.000087112	10	0.10%
INVERTER 02	AC ACCUMULATION PANEL	2	IMC	139.5	208	1	K AWG 2/0	Cu	0.000100	0.000087112	10	0.10%
COLLECTION TO POI												
AC ACCUMULATION PANEL	AC DISCONNECT	3	IMC	279	208	1	R 500 KCMIL	Cu	0.000032	0.000027876	15	0.10%
AC DISCONNECT	POI	4	EMT	279	208	1	R 500 KCMIL	Cu	0.000032	0.000027876	10	0.06%
											MAX Vdrop	0.26%
											AVERAGE Vdrop	0.26%
											TOTAL SYSTEM VDROP	2.15%

AMERICAN MICROGRID SOLUTIONS

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OPTIMIZER/MLPE:
(129)SOLAREDGE P1101 POWER OPTIMIZER

WIND SPEED: **130MPH**
SNOW LOAD: **61PSF**
EXPOSURE CAT.: **B**

AHJ:**VA-CITY OF ALEXANDRIA**

UTILITY:**DOMINION ENERGY**

MIN. TEMP.: **-11°C** | MAX. TEMP.: **35.1°C**

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ILLUMINE INTERNATIONAL INC.
1320 ARROW POINT DR, STE 501, #163
CEDAR PARK, TX 78613

ELECTRICAL CALCULATIONS & VOLTAGE DROP CALCULATIONS

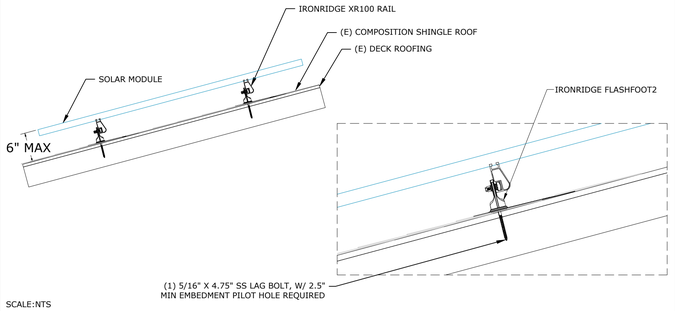
DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

PAPER SIZE: 24" X 36"

SCALE: AS NOTED | REV:B

DATE: 06/17/2025 | E-05

ATTACHMENT DETAIL- IRONRIDGE FLASHFOOT2



SCALE:NTS

SITE INFORMATION - WIND SPEED: 130 MPH AND SNOW LOAD: 61 PSF

SR. NO	AZIMUTH	ROOF TILT	MODULE TILT	NO. OF MODULES	ARRAY AREA (SQ. FT.)	ROOF TYPE	ATTACHMENT	MAX ATTACHMENT SPAN	OVER HANG
MP-01	279°	27°	0°	80	1689.7	COMPOSITION SHINGLE	IRONRIDGE FLASHFOOT2	4'-0"	1'-6"
MP-02	99°	27°	0°	76	1605.2	COMPOSITION SHINGLE	IRONRIDGE FLASHFOOT2	4'-0"	1'-6"

GENERAL STRUCTURAL NOTES

1.ALL EQUIPMENTS SHALL BE INSTALLED PER MANUFACTURER INSTALLATION AND OPERATIONS MANUAL REQUIREMENTS.
2.PRIOR TO COMMENCEMENT OF WORK OR FABRICATION OF COMPONENTS, THE CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS, DIMENSIONS,AND ELEVATIONS OF THE EXISTING CONSTRUCTION.CONTRACTOR SHALL NOTIFY ENGINEER OF ANY DISCREPANCIES BETWEEN THE FIELD -VERIFIED CONDITIONS, DIMENSIONS,AND ELEVATION AND THOSE INDICATED ON THE DRAWINGS.
3.ALL THE CONSTRUCTION SHALL COMPLY WITH REQUIREMENTS OF 2021 EDITION OF THE VIRGINIA CONSTRUCTION CODE.

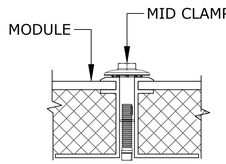
SOLAR RACK COMPONENTS:

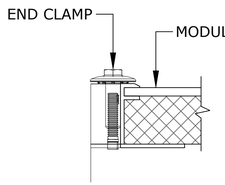
1. FOLLOW MANUFACTURER'S INSTALLATION FOR INSTALLATION OF THE SOLAR COMPONENTS,INCLUDING MODULE CLAMPS, L-FEET, BRACKETS MECHANICAL ATTACHMENTS,AND HARDWARE.

DEAD LOAD CALCULATIONS

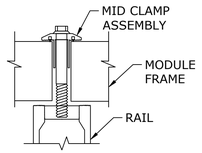
BOM	QUANTITY	LBS/UNIT	TOTAL WEIGHT (LBS)
MODULES	156	48.5	12270.50
MID-CLAMP	124	0.050	6.20
END-CLAMP	16	0.050	0.80
RAIL LENGTH	560	0.680	380.80
SPLICE BAR	32	0.360	11.52
IRONRIDGE FLASHFOOT 2	290	0.88	255.20
TOTAL WEIGHT OF THE SYSTEM (LBS)			12925.02
TOTAL ARRAY AREA ON THE ROOF (SQ. FT.)			1393.98
WEIGHT PER SQ. FT.(LBS)			9.27
WEIGHT PER PENETRATION (LBS)			44.57

MID CLAMP AND END CLAMP ANATOMY



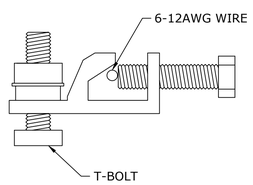


MODULE TO MODULE & MODULE TO RAIL

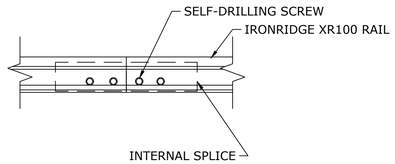


GROUNDING MID-CLAMP

GROUNDING LUG



RAIL TO RAIL



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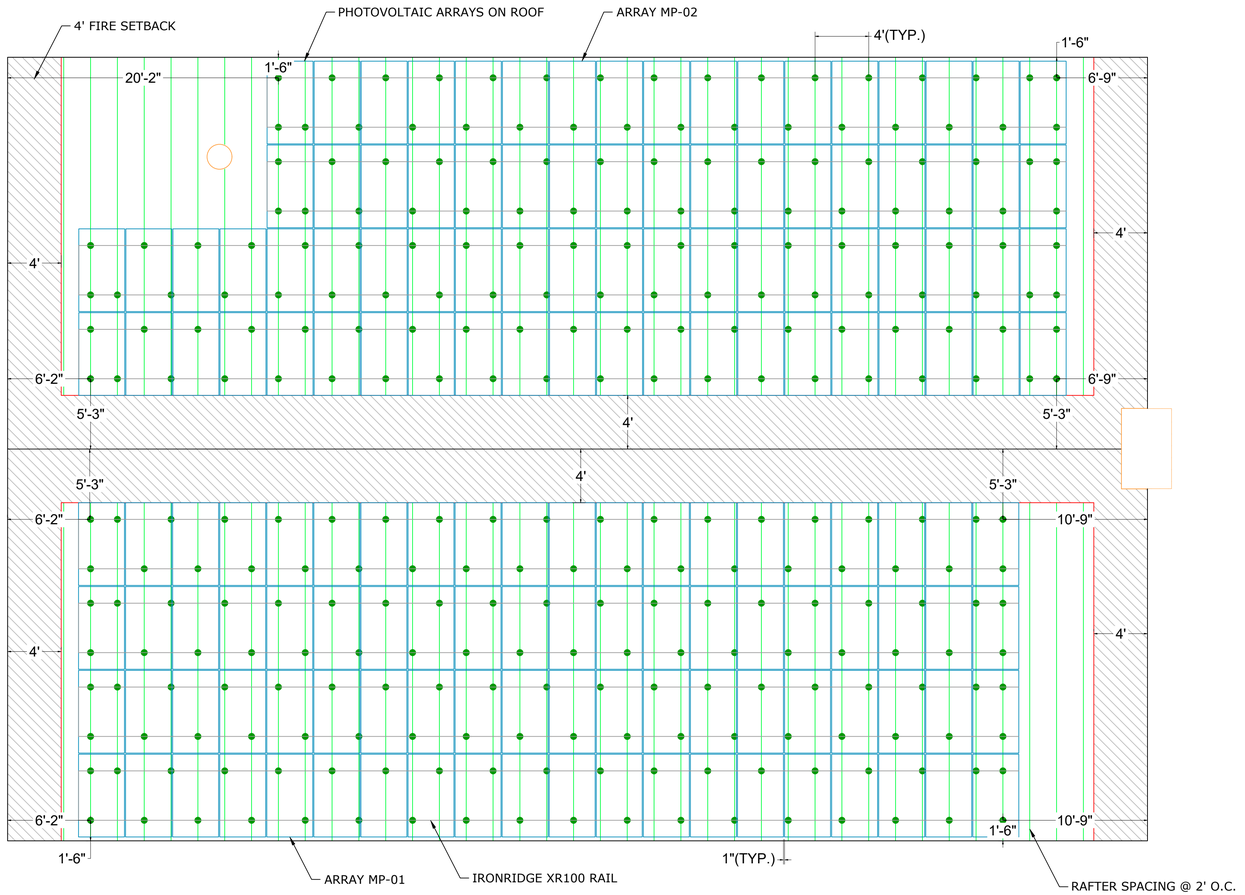

SCALE:3/16" = 1'-0"

AMERICAN MICROGRID SOLUTIONS

SYSTEM INFORMATION

SYSTEM SIZE (DC/AC):
101.20 kWp DC / 100.00 kW AC

MODULES:
(253)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10.a+ (400Wp)

INVERTERS:
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OPTIMIZER/MLPE:
(129)SOLAREDGE P1101 POWER OPTIMIZER

WIND SPEED: **130MPH**
SNOW LOAD: **61PSF**
EXPOSURE CAT.: **B**

AHJ:**VA-CITY OF ALEXANDRIA**

UTILITY:**DOMINION ENERGY**

MIN. TEMP.: **-11°C** | MAX. TEMP.: **35.1°C**

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ILLUMINE i

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1320 ARROW POINT DR, STE 501, #163
CEDAR PARK, TX 78613

STRUCTURAL DETAIL & ARRAY PLAN-01

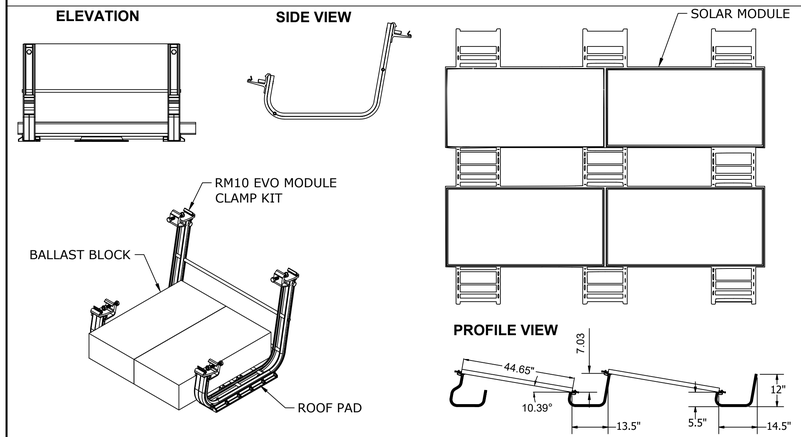
DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

PAPER SIZE: 24" X 36"

SCALE: AS NOTED | REV:B

DATE: 06/17/2025 | S-01

UNIRAC RM10 EVO WITH FLASHLOC RM ATTACHMENT



NOTES
PROVIDE (8) #14 FULLY THREADED STS SCREWS FULLY EMBEDDED TO ROOF DECKING AT EACH ATTACHMENT POINT

SITE INFORMATION - WIND SPEED: 130 MPH, WIND EXPOSURE: B AND SNOW LOAD: 61 PSF

SR. NO	AZIMUTH	ROOF SLOPE	MODULE TILT	NO. OF MODULES	ARRAY AREA (SQ. FT.)	ROOF TYPE	ATTACHMENT
ARRAY MP-03	189°	0°	10°	36	1040	EPDM	UNIRAC RM10 EVO WITH FLASHLOC RM ATTACHMENT
ARRAY MP-04	189°	0°	10°	29	853	EPDM	UNIRAC RM10 EVO WITH FLASHLOC RM ATTACHMENT
ARRAY MP-05	189°	0°	10°	32	929	EPDM	UNIRAC RM10 EVO WITH FLASHLOC RM ATTACHMENT

BILL OF MATERIALS

SL. NO.	PART NUMBER	PART TYPE	DESCRIPTION	QUANTITY
1	USER SUPPLIED	BALLAST BLOCK	BALLAST BLOCK	270
2	370010	BALLAST BAY	RM 10 EVO FIELD BAY	138
3	370023	CLAMP	EVO MOD CLAMP BULK	458
4	310760	RM ROOF PAD	RM ROOF PAD	220
5	370022	RM HEX BOLT	EVO MOD CLAMP SIDE BOLT BULK	458
6	310999	ATTACHMENT	FLASHLOC RM KIT	28
7	310771	ATTACHMENT	RM10 ATTACHMENT KIT	28
8	008115M	WIRE MANAGEMENT	MLPE TIGER CLIP	97

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SOLAR RACK COMPONENTS:

1. FOLLOW MANUFACTURER'S INSTALLATION INSTRUCTIONS OF THE SOLAR COMPONENTS, INCLUDING MODULE CLAMPS, L-FEET,BRACKETS, MECHANICAL ATTACHMENTS, AND HARDWARE.

NOTE:

1. BALLAST BLOCKS TO WEIGHT 32 LBS PER MANUFACTURER'S REQUIREMENT

TOTAL AVERAGE PSF	4.88 PSF
TOTAL NUMBER OF MODULES	97
TOTAL KW	38.80
TOTAL AREA SQ FT	~2822
TOTAL WEIGHT ON ROOF LBS	13782
RACKING WEIGHT LBS	338
MODULE WEIGHT LBS	4705
BALLAST WEIGHT LBS	8640
MAX BAY LOAD(DEAD) LBS	179
TOTAL ATTACHMENT COUNT	28
ATTACHMENT KIT WEIGHT	99.68
TOTAL BALLAST BLOCK COUNT	270

LEGEND:

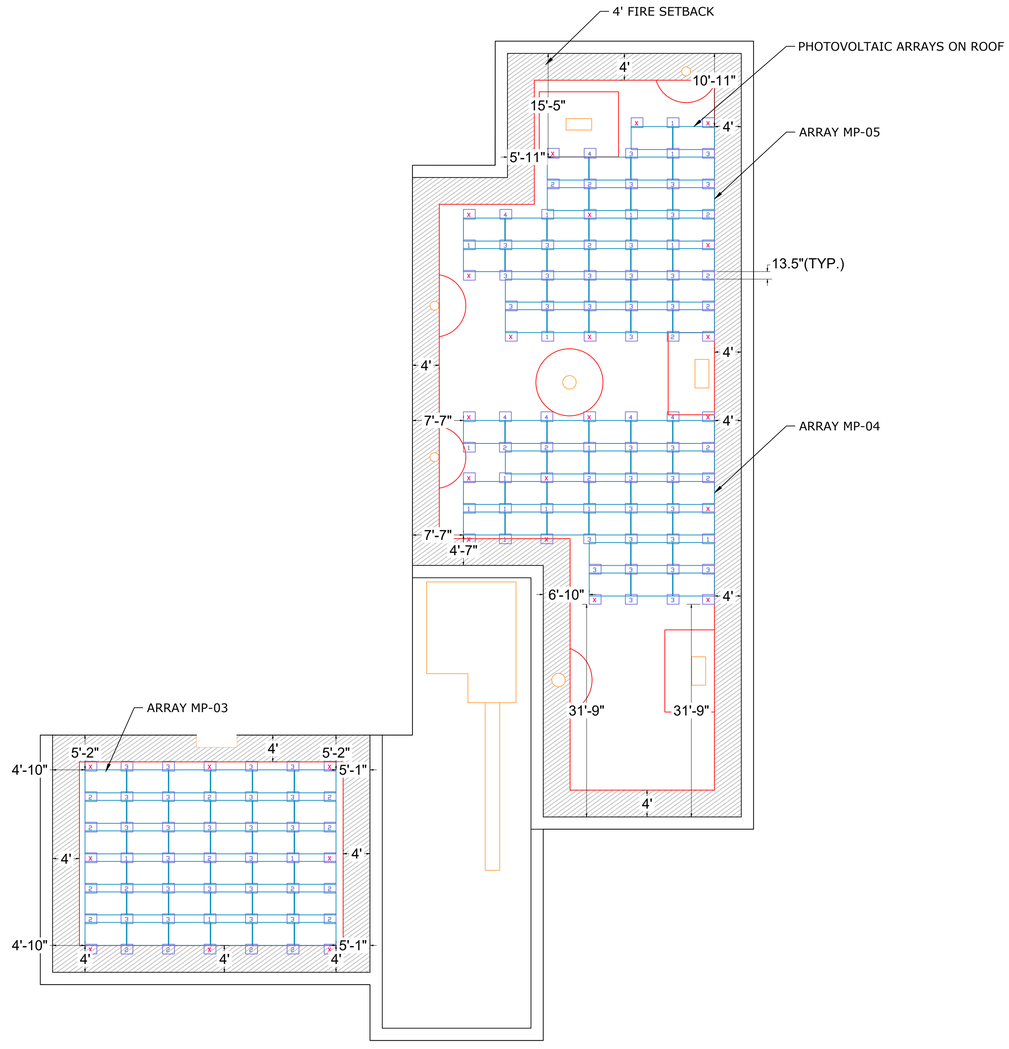
X - STANDARD CORNER BAY WITH CMU BLOCK COUNT

X - BAY WITH ATTACHMENT

(ARRAY-03)AVERAGE PSF	4.93 PSF
TOTAL NUMBER OF MODULES	36
ROOF SLOPE	0°
ROW SPACING	13.5°
TOTAL KW	14.40
TOTAL AREA SQ FT	1040
TOTAL WEIGHT ON ROOF LBS	5127
RACKING WEIGHT LBS	120
MODULE WEIGHT LBS	1746
BALLAST WEIGHT LBS	3232
TOTAL ATTACHMENT COUNT	8
ATTACHMENT KIT WEIGHT LBS	28.48

(ARRAY-04)AVERAGE PSF	4.89 PSF
TOTAL NUMBER OF MODULES	29
ROOF SLOPE	0°
ROW SPACING	13.5°
TOTAL KW	11.60
TOTAL AREA SQ FT	853
TOTAL WEIGHT ON ROOF LBS	4107
RACKING WEIGHT LBS	105
MODULE WEIGHT LBS	1407
BALLAST WEIGHT LBS	2560
TOTAL ATTACHMENT COUNT	10
ATTACHMENT KIT WEIGHT LBS	35.60

(ARRAY-05)AVERAGE PSF	4.89 PSF
TOTAL NUMBER OF MODULES	32
ROOF SLOPE	0°
ROW SPACING	13.5°
TOTAL KW	12.80
TOTAL AREA SQ FT	929
TOTAL WEIGHT ON ROOF LBS	4548
RACKING WEIGHT LBS	113
MODULE WEIGHT LBS	1552
BALLAST WEIGHT LBS	2848
TOTAL ATTACHMENT COUNT	10
ATTACHMENT KIT WEIGHT LBS	35.60



SCALE:3/32" = 1'-0"

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PAPER SIZE: 24" X 36"

SCALE: AS NOTED | REV:B

DATE: 06/17/2025 | S-02

PLACARDS

⚠ WARNING

ELECTRIC SHOCK HAZARD

TERMINALS ON BOTH LINE AND LOAD SIDE MAY BE ENERGIZED IN THE OPEN POSITION

INSTALLED ON: AC DISCONNECT, LOAD CENTERS, COMBINER PANELS, POINT OF INTERCONNECTION
APPLICABLE CODE(S): NEC 690.13(B)

WARNING:PHOTOVOLTAIC POWER SOURCE

INSTALLED ON: CONDUIT, RACEWAYS, AND J-BOXES (LABELED EVERY 10'). REFLECTIVE. MIN 3/8" WHITE TEXT ON BLACK BACKGROUND.
APPLICABLE CODE(S): NEC 690.31(D)(2)

PHOTOVOLTAIC
DC DISCONNECT

INSTALLED ON: DC DISCONNECT(S)
APPLICABLE CODE(S): NEC 690.13(B)

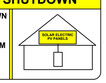
INVERTER 1&2

MAXIMUM DC VOLTAGE
600 V
OF PV SYSTEM

INSTALLED ON: INVERTER
APPLICABLE CODE(S): NEC 690.53

SOLAR PV SYSTEM EQUIPPED WITH RAPID SHUTDOWN

TURN RAPID SHUTDOWN SWITCH TO THE "OFF" POSITION TO SHUT DOWN PV SYSTEM AND REDUCE SHOCK HAZARD IN THE ARRAY



INSTALLED ON: WITHIN 3 FT OF SERVICE DISCONNECTING MEANS. MIN 3/8" BLACK TEXT ON YELLOW BACKGROUND & 3/16" BLACK TEXT ON WHITE BACKGROUND.
APPLICABLE CODE(S): NEC 690.56(C)

RAPID SHUTDOWN SWITCH FOR SOLAR PV SYSTEM

INSTALLED ON:RAPID SHUTDOWN SWITCH
APPLICABLE CODE(S): NEC 690.56(C)(2)

PHOTOVOLTAIC SYSTEM AC DISCONNECT SWITCH

RATED AC OPERATING CURRENT 279 AMPS AC
AC NOMINAL OPERATING VOLTAGE 208 VAC

INSTALLED ON: AC DISCONNECT(S), POINT OF INTERCONNECTION.
APPLICABLE CODE(S): NEC 690.54

⚠ WARNING

DUAL POWER SOURCE SECOND SOURCE IS PHOTOVOLTAIC SYSTEM

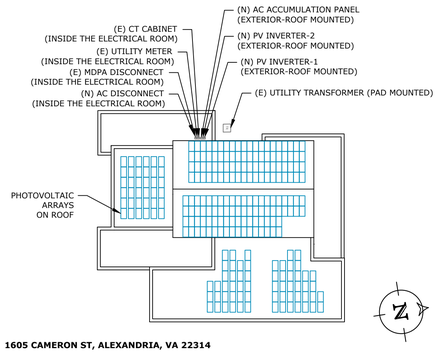
INSTALLED ON: POINT OF INTERCONNECTION
APPLICABLE CODE(S): NEC 705.12(C)

DEDICATED PHOTOVOLTAIC SYSTEM COMBINER PANEL NO LOAD SHALL BE ADDED TO THIS PANEL

INSTALLED ON: COMBINER PANEL

CAUTION:MULTIPLE SOURCES OF POWER

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM THE FOLLOWING SOURCES WITH DISCONNECTS LOCATED AS SHOWN



1605 CAMERON ST, ALEXANDRIA, VA 22314

LABEL LOCATION
SERVICE PANEL
PER CODE: NEC 705.10

NOTES

1.PLACARDS SHALL MEET THE REQUIREMENTS OF ARTICLES 690 AND 705, UNLESS OTHERWISE SPECIFIED PER LOCAL AHJ REQUIREMENTS.
2.PLACARDS SHALL MEET THE REQUIREMENTS OF SECTION 110.21(B) AS REQUIRED AND SHALL COMPLY WITH ANSI Z535.4-2011, PRODUCT SAFETY SIGNS AND LABELS.
3.PLACARDS SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD.
4.PLACARDS SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED AND SHALL BE HANDWRITTEN.
5.PLACARDS SHALL NOT COVER EXISTING MANUFACTURER LABELS.

MODULE SPECIFICATION SHEET

Q.PEAK DUO BLK ML-G10+ SERIES

qcells

395-415 Wp | 132 Cells
21.1% Maximum Module Efficiency

MODEL Q.PEAK DUO BLK ML-G10.a+
Q.PEAK DUO BLK ML-G10+

Breaking the 21% efficiency barrier
Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 21.1%.

A reliable investment
Inclusive 25-year product warranty and 25-year linear performance warranty[1].

Enduring high performance
Long-term yield security with Anti LeTID Technology, Anti PID Technology[2] and Hot-Spot Protect.

Extreme weather rating
High-tech aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

Innovative all-weather technology
Optimal yields, whatever the weather with excellent low-light and temperature behaviour.

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

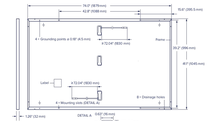
[1] See data sheet on rear for further information.
[2] APT test conditions according to IEC/TS 62804-1:2015, method A (-1500 V, 96 h)

The ideal solution for:
Rooftop arrays on residential buildings

Q.PEAK DUO BLK ML-G10+ SERIES

■ Mechanical Specification

Format	74.0 in × 41.1 in × 1.26 in (including frame) (1879 mm × 1045 mm × 32 mm)
Weight	48.5 lbs (22.0 kg)
Front Cover	0.13 in (3.2 mm) thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
Frame	Black anodised aluminium
Cell	6 × 22 monocrystalline Q.ANTUM solar half cells
Junction box	2.09-3.98 in × 1.26-2.36 in × 0.59-0.71 in (53-101 mm × 32-60 mm + 15-18 mm), IP67, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥ 72.04 in (1830 mm), (-) ≥ 72.04 in (1830 mm)
Connector	Stäubli MC4; IP68

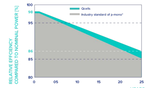


■ Electrical Characteristics

POWER CLASS			395	400	405	410	415
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W/−0 W)							
Minimum	Power at MPP[2]	P_{MPP} [W]	395	400	405	410	415
	Short Circuit Current[2]	I_{SC} [A]	11.02	11.05	11.08	11.11	11.14
	Open Circuit Voltage[2]	V_{OC} [V]	45.20	45.24	45.27	45.31	45.34
	Current at MPP	I_{MPP} [A]	10.48	10.54	10.60	10.65	10.71
	Voltage at MPP	V_{MPP} [V]	37.68	37.95	38.22	38.48	38.74
	Efficiency[2]	η [%]	≥20.1	≥20.4	≥20.6	≥20.9	≥21.1
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[1]							
Minimum	Power at MPP	P_{MPP} [W]	296.4	300.1	303.9	307.6	311.4
	Short Circuit Current	I_{SC} [A]	8.88	8.91	8.93	8.95	8.98
	Open Circuit Voltage	V_{OC} [V]	42.63	42.66	42.69	42.73	42.76
	Current at MPP	I_{MPP} [A]	8.25	8.30	8.35	8.40	8.45
	Voltage at MPP	V_{MPP} [V]	35.93	36.16	36.39	36.61	36.84

[1] Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25 ± 2 °C, AM 1.5 according to IEC 60904-3 • [2] 800 W/m², NMOT, spectrum AM 1.5

Qcells PERFORMANCE WARRANTY

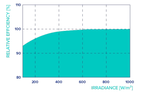


At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 years.

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

*Standard terms of guarantee for the 5 PV companies with the highest production capacity in 2021 (February 2021)

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]	−0.27
Temperature Coefficient of P_{MPP}	γ	[%/K]	−0.34	Nominal Module Operating Temperature	NMOT	[°F]	109 ± 5.4 (43 ± 3 °C)

■ Properties for System Design

Maximum System Voltage	V_{SYS}	[V]	1000 (IEC)/1000 (UL)	PV module classification	Class II
Maximum Series Fuse Rating		[A DC]	20	Fire Rating based on ANSI/UL 61730	TYPE 2
Max. Design Load, Push/Pull[3]		[lbs/ft²]	75 (3600 Pa)/55 (2660 Pa)	Permitted Module Temperature on Continuous Duty	−40 °F up to +185 °F (−40 °C up to +85 °C)
Max. Test Load, Push/Pull[3]		[lbs/ft²]	113 (5400 Pa)/84 (4000 Pa)		

[3] See Installation Manual

■ Qualifications and Certificates

UL61730-1 & UL61730-2, CE-compliant, Quality Controlled PV - TÜV Rheinland, IEC 61215:2016, IEC 61730:2016, U.S. Patent No. 9,893,215 (solar cells),

*Contact your Qcells Sales Representative for details regarding the module's eligibility to be Buy American Act (BAA) compliant.

Qcells pursues minimizing paper output in consideration of the global environment.

Note: Installation instructions must be followed. Contact our technical service for further information on approved installation of this product.
Hanwha Q CELLS America Inc. 400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | TEL +1 949 748 59 96 | EMAIL hqc-inquiry@qcells.com | WEB www.qcells.com

qcells

INVERTER SPECIFICATION SHEET

Three Phase Inverter with Synergy Technology

For the 208V Grid for North America

SE50KUS

INVERTERS

Powered by unique pre-commissioning process for rapid system installation

- Pre-commissioning feature for automated validation of system components and wiring during the site installation process and prior to grid connection
- Easy 2-person installation with lightweight, modular design (each inverter consists of 3 Synergy units and 1 Synergy Manager)
- Independent operation of each Synergy unit enables higher uptime and easy serviceability
- Built-in thermal sensors detect faulty wiring ensuring enhanced protection and safety
- Built-in arc fault protection and rapid shutdown
- Built-in PID mitigation for maximized system performance
- Monitored* and field-replaceable surge protection devices, to better withstand surges caused by lightning or other events
- Built-in module-level monitoring with Ethernet or cellular communication for full system visibility

*Applicable only for DC and AC SPDs

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Three Phase Inverter with Synergy Technology

For the 208V Grid for North America

SE50KUS

MODEL NUMBER	SExxK-USx21xxxxx	
APPLICABLE TO INVERTERS WITH PART NUMBER	SE50KUS	UNITS
OUTPUT		
Rated AC Active Output Power	50000	W
Maximum AC Apparent Output Power	50000	VA
AC Output Line Connections	3W + PE, 4W + PE	
Supported Grids	WYE: TN-C, TN-S, TN-C-S, TT, IT, Delta: IT	
AC Output Voltage Minimum-Nominal-Maximum[1] (L-N)	105 – 120 – 132.5	Vac
AC Output Voltage Minimum-Nominal-Maximum[1] (L-L)	183 – 208 – 229	Vac
AC Frequency Min-Nom-Max[2]	59.5 – 60 – 60.5	Hz
Maximum Continuous Output Current (per Phase, PF=1)	139.5	Aac
GFDI Threshold	1	A
Utility Monitoring, Islanding Protection, Configurable Power Factor, Country Configurable Thresholds	Yes	
Total Harmonic Distortion	≤ 3	%
Power Factor Range	±0.85 to 1	
INPUT		
Maximum DC Power (Module STC) Inverter / Synergy Unit	87500 / 29165	W
Transformer-less, Ungrounded	Yes	
Maximum Input Voltage DC + to DC-	600	Vdc
Operating Voltage Range	370 – 600	Vdc
Maximum Input Current	3 x 46.5	Adc
Reverse-Polarity Protection	Yes	
Ground-Fault Isolation Detection	167kΩ sensitivity per Synergy Unit[3]	
CEC Weighted Efficiency	97	%
Nighttime Power Consumption	< 12	W
ADDITIONAL FEATURES		
Supported Communication Interfaces[3]	2 x RS485, Ethernet, Wi-Fi (optional), Cellular (optional)	
Smart Energy Management	Export Limitation	
Inverter Commissioning	With the SetApp mobile application using built-in Wi-Fi access point for local connection	
Arc Fault Protection	Built-in, User Configurable (According to UL1699B)	
Photovoltaic Rapid Shutdown System	NEC 2014 – 2023, built-in	
PID Rectifier	Nighttime, built-in	
RS485 Surge Protection (ports 1+2)	Type II, field replaceable, integrated	
AC, DC Surge Protection	Type II, field replaceable, integrated	
DC Fuses (Single Pole)	25A, integrated	
Pre-Commissioning	Built-in[4]	
VAR at Night[5]	Yes	
DC SAFETY SWITCH		
DC Disconnect	Built-in	
STANDARD COMPLIANCE		
Safety	UL1699B, UL1741, UL1741 SA, UL1741 SB, UL1998, CSA C22.2#107.1, Canadian AFCI according to T.I.L. M-07	
Grid Connection Standards	IEEE 1547-2018, Rule 21, Rule 14 (HI)	
Emissions	FCC part 15 class A	

(1) For other regional settings please contact Solaredge support.
(2) Where permitted by local regulations.
(3) For specifications of the optional communication options, visit the Communication product page or the Knowledge Center to download the relevant product datasheet.
(4) Not available for P/Ns: SExxK-xxxxIPxx.
(5) For details, see Set Volt Ampere Reactive at Night

Three Phase Inverter with Synergy Technology

For the 208V Grid for North America

SE50KUS

MODEL NUMBER		SExxK-USx21xxxxx	
APPLICABLE TO INVERTERS WITH PART NUMBER		SE50KUS	UNITS
INSTALLATION SPECIFICATIONS			
Number of Synergy Units per Inverter		3	
AC Max Conduit Size		2 ½"	in
Max AWG Line / PE		4/0 / 1/0	
DC Max Conduit Size		1 x 3", 2 x 2"	in
DC Input Inverter / Synergy Unit	Multi-input (SExxK-USxxxxZ4)	12 / 4 pairs; 6 – 12 AWG	
	Combined input (SExxK-USxxxxW4)	3 pairs / 1 pair, Max 2 AWG copper or aluminum	
Dimensions (H x W x D)		Synergy Unit: 22 x 12.9 x 10.75 / 558 x 328 x 273 Synergy Manager: 14.17 x 22.4 x 11.6 / 360 x 560 x 295	in / mm
Weight		Synergy Unit: 70.4 / 32 Synergy Manager: 39.6 / 18	lb / kg
Operating Temperature Range		-40 to +140 / -40 to +60[6]	°F / °C
Cooling		Fan (user replaceable)	
Noise		< 67	dBA
Protection Rating		NEMA 3R	
Mounting		Brackets provided	

(6) For power de-rating information refer to the Temperature Derating Technical Note for North America

AMERICAN MICROGRID SOLUTIONS

SYSTEM INFORMATION

SYSTEM SIZE (DC/AC):
101.20 kWp DC / 100.00 kW AC

MODULES:
(253)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10.a+ (400Wp)

INVERTERS:
(2)SOLAREDGE TECHNOLOGIES SE50KUS (208V, 3PH)

OPTIMIZER/MLPE:
(129)SOLAREDGE P1101 POWER OPTIMIZER

WIND SPEED: **130MPH**
SNOW LOAD: **61PSF**
EXPOSURE CAT.: **B**

AHJ:**VA-CITY OF ALEXANDRIA**

UTILITY:**DOMINION ENERGY**

MIN. TEMP.: **-11°C**	MAX. TEMP.: **35.1°C**

SOLAR PV PROJECT:

DURANT RECREATION CENTER
1605 CAMERON ST, ALEXANDRIA, VA 22314
38.807904, -77.056381
APN #10294550
PROJECT #AMG-DG-2024-499

REVISION HISTORY

REV	DATE	DESCRIPTION
A	03/24/2025	PERMIT PLAN
B	06/17/2025	SYSTEM SIZE UPDATE

ILLUMINE i

ILLUMINE INTERNATIONAL INC.
1320 ARROW POINT DR, STE 501, #163
CEDAR PARK, TX 78613

ELECTRICAL PLACARDS & SPEC SHEETS

DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

PAPER SIZE: 24" X 36"

SCALE: AS NOTED	REV:B
DATE: 06/17/2025	E-06

OPTIMIZER SPECIFICATION SHEET

Power Optimizer

For North America

P1101

POWER OPTIMIZER

PV power optimization at the module level

The most cost-effective solution for commercial and large field installations

- Specifically designed to work with SolarEdge inverters
- High efficiency with module-level MPPT, for maximized system energy production and revenue, and fast project ROI
- Superior efficiency (99.5%)
- Balance of System cost reduction; 50% less cables, fuses, and combiner boxes; over 2x longer string lengths possible
- Fast installation with a single bolt
- Advanced maintenance with module-level monitoring
- Module-level voltage shutdown for installer and firefighter safety
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

solaredge.com

solaredge

/ Power Optimizer

For North America

P1101

Power Optimizer Model (Typical Module Compatibility)		P1101 (for up to 2 x high power or bi-facial modules)	Units
INPUT			
Rated Input DC Power(1)		1100	W
Connection Method		Single input for series connected modules	
Absolute Maximum Input Voltage (Voc at lowest temperature)		125	Vdc
MPPT Operating Range		12.5 – 105	Vdc
Maximum Short Circuit Current (Isc)		14.1	Adc
Maximum Short Circuit Current per Input (Isc)		-	Adc
Maximum Efficiency		99.5	%
Weighted Efficiency		98.6	%
Overvoltage Category		II	
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)			
Maximum Output Current		18	Adc
Maximum Output Voltage		80	Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)			
Safety Output Voltage per Power Optimizer		1 ± 0.1	Vdc
STANDARD COMPLIANCE			
Photovoltaic Rapid Shutdown System		Compliant with NEC 2014, 2017, 2020	
EMC		FCC Part 15 Class A, IEC61000-6-2, IEC61000-6-3	
Safety		IEC62109-1 (class II safety), UL1741, UL3741, CSA C22.2#107.1	
Material		UL94 V-0, UV resistant	
RoHS		Yes	
INSTALLATION SPECIFICATIONS			
Compatible SolarEdge Inverters		All commercial three phase inverters	
Maximum Allowed System Voltage		1000	Vdc
Dimensions (W x L x H)		129 x 162 x 59 / 5.1 x 6.4 x 2.32	mm / in
Weight		1064 / 2.34	gr / lb
Input Connector		MC4(2)	
Input Wire Length Options	1	1.6 / 5.2	m / ft
	2		
	3		
Output Wire Type / Connector		Double insulated; MC4	
Output Wire Length		2.4 / 7.8	m / ft
Operating Temperature Range(3)		-40 to +85 / -40 to +185	°C / °F
Protection Rating		IP68 / NEMA6P	
Relative Humidity		0 – 100	%

(1) Rated power of the module at STC will not exceed the Power Optimizer "Rated Input DC Power". Modules with up to +5% power tolerance are allowed.
(2) For other connector types please refer to the Power Optimizer Input Connector Compatibility Technical Note.
(3) For ambient temperatures above +70°C / +158°F power de-rating is applied. Refer to Power Optimizers De-Rating Application Note for more details.

PV System Design Using a SolarEdge Inverter(4)(5)		208V Grid SE10K	208V Grid SE17.3K*	277/480V Grid SE10K	277/480V Grid SE40K*	
Compatible Power Optimizers		P1101				
Minimum String Length	Power Optimizers	8	10	14	14	
	PV Modules	15	19	27	27	
Maximum String Length	Power Optimizers	30	30	30	30	
	PV Modules	60	60	60	60	
Maximum Continuous Power per String		7200	8820	15300	15300	W
Maximum Allowed Connected Power per String(6)		1 string – 8400 2 strings or more – 9800	1 string – 10020 2 strings or more – 12020	1 string – 17550 2 strings or more – 20300	2 strings or less – 17550 3 strings or more – 20300	W
Parallel Strings of Different Lengths or Orientations		Yes				
Maximum Difference in Number of Power Optimizers Allowed Between the Shortest and Longest String Connected to the Same Inverter Unit		5 Power Optimizers				

* The same rules apply for Synergy units of equivalent power ratings, that are part of the modular Synergy Technology inverter.
(4) For each string, a Power Optimizer may be connected to a single PV module if 1) each Power Optimizer is connected to a single PV module or 2) it is the only Power Optimizer connected to a single PV module in the string.
(5) Design with three phase 208V inverters is limited. Use the SolarEdge Designer for verification.
(6) To connect more STC power per string, design your project using SolarEdge Designer.

RoHS Intertek

CURRENT LIMITER SPECIFICATION SHEET

AMP-TRAP®

Ferraz Shawmut

CP

CABLE PROTECTORS / SPECIAL PURPOSE

CABLE PROTECTORS

Ferraz Shawmut CP Cable Protectors are special purpose limiters which are crimped or bolted to cables or terminals to clear and isolate faults quickly, increasing the reliability of service entrance and distribution runs. They are current limiting with a 200,000A interrupting rating, yet will carry low cable overloads which are handled by standard protective devices. Cable Protectors are rated in terms of cable size and material (Al or Cu). Heavier duty CPH Cable Protectors are available on special order. Heat shrinkable (HS) tubing can be specified for field installation. Refer to the Application Information Section for more information.

Features/Benefits

- **Fiberglass bodies** for dimensional stability in harsh environments
- **Catalog number stamped** into terminal for permanent identification
- **Crimp terminals** for aluminum cable include oxide inhibitor
- **Molded rubber boots** or heat shrinkable tubing available for insulation and protection
- **Current limiting device**
- **Permitted by code**

Ratings

- Sizes #2 to 1000kcmil copper
- 4/0 to 1000kcmil aluminum 600VAC, 200kA I.R.

Approvals

- Ferraz Shawmut Certified
- UL Listed to File E305297

Catalog Numbering System

CP 500 C 3

- Standard Duty CP / Heavy Duty CPH
- Conductor Size
- Cable Material: Copper C / Aluminum A
- Termination Type

*Please consult factory for special terminations.

Description			Catalog # for Cable Type	
Type	Termination	Cable Size	Copper	Aluminum
1	Cable to Cable	2	CP2C1	-
		1/0	CP1/0C1	-
		2/0	CP2/0C1	-
		4/0	CP4/0C1	CP4/0A1
		250kcmil	CP250C1	CP250A1
		350kcmil	CP350C1	CP350A1
		400kcmil	CP400C1	CP400A1
		500kcmil	CP500C1	CP500A1
		600kcmil	CP600C1	CP600A1
		750kcmil	CP750C1	CP750A1
		1000kcmil	CP1000C1	-
3	Cable to Offset to Bus	2	CP2C3	-
		1/0	CP1/0C3	-
		2/0	CP2/0C3	-
		4/0	CP4/0C3	CP4/0A3
		250kcmil	CP250C3	CP250A3
		350kcmil	CP350C3	CP350A3
		400kcmil	CP400C3	-
		500kcmil	CP500C3	CP500A3
		600kcmil	CP600C3	CP600A3
		750kcmil	CP750C3	CP750A3
		1000kcmil	CP1000C3	-
5	Straight Bus to Offset Bus	4/0	CP4/0C5	CP4/0C5
		250kcmil	CP250C5	CP250C5
		350kcmil	CP350C5	CP350C5
		500kcmil	CP500C5	CP500C5
		600kcmil	CP600C5	CP600C5
		750kcmil	CP750C5	CP750C5
6	Mole to Cable	4/0	CP4/0C6	CP4/0A6
		250kcmil	CP250C6	CP250A6
		350kcmil	CP350C6	CP350A6
		500kcmil	CP500C6	CP500A6
		750kcmil	CP750C6	CP750A6
8	Mole to Offset Bus	4/0	CP4/0C8	CP4/0C8
		250kcmil	CP250C8	CP250C8
		350kcmil	CP350C8	CP350C8
		500kcmil	CP500C8	CP500C8
		750kcmil	CP750C8	CP750C8

G

G 11

Gross Automation (877) 268-3700 · www.ferrazshawmutsales.com · sales@grossautomation.com

RAIL SPECIFICATION SHEET

Tech Brief

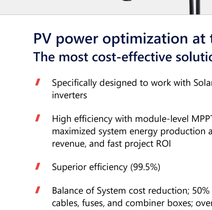
IRONRIDGE

XR Rail® Family

Solar Is Not Always Sunny

Over their lifetime, solar panels experience countless extreme weather events. Not just the worst storms in years, but the worst storms in 40 years. High winds capable of ripping panels from a roof, and snowfalls weighing enough to buckle a panel frame.

XR Rails® are the structural backbone preventing these results. They resist uplift, protect against buckling and safely and efficiently transfer loads into the building structure. Their superior spanning capability requires fewer roof attachments, reducing the number of roof penetrations and the amount of installation time.



Force-Stabilizing Curve

Sloped roofs generate both vertical and lateral forces on mounting rails which can cause them to bend and twist. The curved shape of XR Rails® is specially designed to increase strength in both directions while resisting the twisting. This unique feature ensures greater security during extreme weather and a longer system lifetime.

Compatible with Flat & Pitched Roofs

XR Rails® are compatible with FlashFoot® and other pitched roof attachments.

IronRidge® offers a range of tilt leg options for flat roof mounting applications.

Corrosion-Resistant Materials

All XR Rails® are made of 6000-series aluminum alloy, then protected with an anodized finish. Anodizing prevents surface and structural corrosion, while also providing a more attractive appearance.

Tech Brief

XR Rail® Family

The XR Rail® Family offers the strength of a curved rail in three targeted sizes. Each size supports specific design loads, while minimizing material costs. Depending on your location, there is an XR Rail® to match.

XR10

XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

- 6' spanning capability
- Moderate load capability
- Clear & black anodized finish
- Internal splices available

XR100

XR100 is a residential and commercial mounting rail. It supports a range of wind and snow conditions, while also maximizing spans up to 10 feet.

- 10' spanning capability
- Heavy load capability
- Clear & black anodized finish
- Internal splices available

XR1000

XR1000 is a heavyweight among solar mounting rails. It's built to handle extreme climates and spans up to 12 feet for commercial applications.

- 12' spanning capability
- Extreme load capability
- Clear anodized finish
- Internal splices available

Rail Selection

The table below was prepared in compliance with applicable engineering codes and standards.* Values are based on the following criteria: ASCE 7-16, Gable Roof Flush Mount, Roof Zones 1 & 2e, Exposure B, Roof Slope of 8 to 20 degrees and Mean Building Height of 30 ft. Visit IronRidge.com for detailed certification letters.

Load		Rail Span					
Snow (PSF)	Wind (MPH)	4'	5' 4"	6'	8'	10'	12'
None	90	XR10		XR100		XR1000	
	120						
	140						
	160						
20	90						
	120						
	140						
	160						
30	90						
	160						
40	90						
	160						
80	160						
120	160						

*Table is meant to be a simplified span chart for conveying general rail capabilities. Use approved certification letters for actual design guidance.

ATTACHMENT SPECIFICATION SHEET

Tech Brief

IRONRIDGE

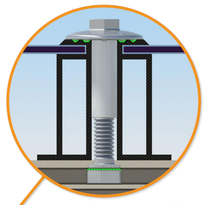
UFO® Family of Components

Simplified Grounding for Every Application

The UFO® family of components eliminates the need for separate grounding hardware by bonding solar modules directly to IronRidge® XR Rails®. All system types that feature the UFO® family—Flush Mount®, Tilt Mount® and Ground Mount®—are fully listed to the UL 2703 standard.

UFO® hardware forms secure electrical bonds with both the module and the rail, resulting in many parallel grounding paths throughout the system. This leads to safer and more reliable installations.

Only for installation and use with IronRidge products in accord with written instructions. See IronRidge.com/UFO

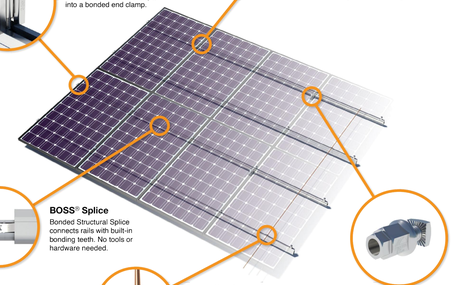


Universal Fastening Object (UFO®)

The UFO® securely bonds solar modules to XR Rails®. It comes assembled and lubricated, and can fit a wide range of module heights.

Stopper Sleeve

The Stopper Sleeve snaps onto the UFO®, converting it into a bonded end clamp.



BOSS® Splice

Bonded Structural Splice connects rails with built-in bonding teeth. No tools or hardware needed.

Grounding Lug

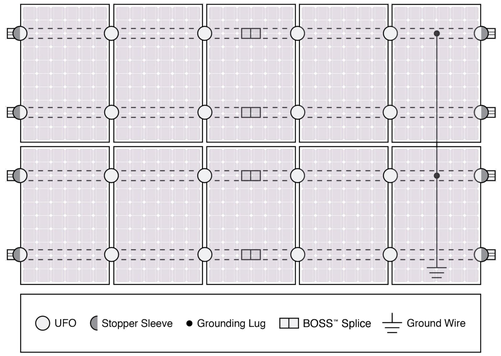
A single Grounding Lug connects an entire row of PV modules to the grounding conductor.

Bonded Attachments

The bonding bolt attaches and bonds the L-foot® to the rail. It is installed with the same socket as the rest of the system.

Tech Brief

System Diagram



Approved Enphase microinverters can provide equipment grounding of IronRidge systems, eliminating the need for grounding lugs and field installed equipment ground conductors (EGC). A minimum of two microinverters mounted to the same rail and connected to the same Engage cable is required. Refer to installation manuals for additional details.

UL Certification

The IronRidge® Flush Mount®, Tilt Mount®, and Ground Mount Systems have been listed to UL 2703 by Intertek Group plc.

UL 2703 is the standard for evaluating solar mounting systems. It ensures these devices will maintain strong electrical and mechanical connections over an extended period of time in extreme outdoor environments.

Go to IronRidge.com/UFO

Cross-System Compatibility			
Feature	Flush Mount	Tilt Mount	Ground Mount
XR Rails®	✔	✔	XR100 & XR1000
UFO®/Stopper	✔	✔	✔
BOSS® Splice	✔	✔	N/A
Grounding Lugs	1 per Row	1 per Row	1 per Array
Microinverters & Power Optimizers	Compatible with most MLPE manufacturers. Refer to system installation manual.		
Fire Rating	Class A	Class A	N/A
Modules	Tested or Evaluated with over 400 Framed Modules Refer to installation manuals for a detailed list.		

AMERICAN MICROGRID SOLUTIONS

SYSTEM INFORMATION

SYSTEM SIZE (DC/AC):
101.20 kWp DC / 100.00 kW AC

MODULES:
(253)HANWHA Q CELLS Q.PEAK DUO BLK ML-G10.a+ (400Wp)

INVERTERS:
(2)SOLAREDGE TECHNOLOGIES SE50KUS (208V, 3PH)

OPTIMIZER/MLPE:
(129)SOLAREDGE P1101 POWER OPTIMIZER

WIND SPEED: **130MPH**
SNOW LOAD: **61PSF**
EXPOSURE CAT.: **B**

AHJ:**VA-CITY OF ALEXANDRIA**

UTILITY:**DOMINION ENERGY**

MIN. TEMP.: **-11°C** | MAX. TEMP.: **35.1°C**

SOLAR PV PROJECT:

DURANT RECREATION CENTER

1605 CAMERON ST, ALEXANDRIA, VA 22314
38.807904, -77.056381
APN #10294550
PROJECT #AMG-DG-2024-499

REVISION HISTORY

REV	DATE	DESCRIPTION
A	03/24/2025	PERMIT PLAN
B	06/17/2025	SYSTEM SIZE UPDATE

ILLUMINE i

ILLUMINE INTERNATIONAL INC.
1320 ARROW POINT DR, STE 501, #163
CEDAR PARK, TX 78613

SPEC SHEETS

DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

PAPER SIZE: 24" X 36"

SCALE: AS NOTED | REV:B

DATE: 06/17/2025 | E-06.1

ATTACHMENT SPECIFICATION SHEET

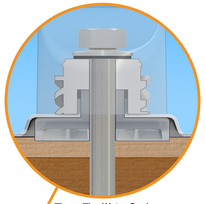
Tech Brief

IRONRIDGE

FlashFoot2®

The Strongest Attachment in Solar

IronRidge® FlashFoot2® raises the bar in solar roof protection. The unique water seal design is both elevated and encapsulated, delivering redundant layers of protection against water intrusion. In addition, the twist-on Cap perfectly aligns the rail attachment with the lag bolt to maximize mechanical strength.

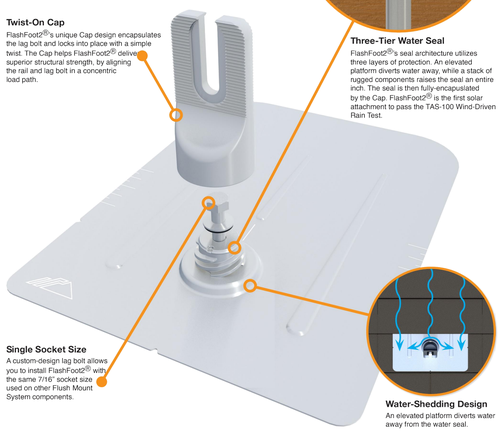


Twist-On Cap

FlashFoot2®'s unique Cap design encapsulates the lag bolt and locks into place with a simple twist. The Cap helps FlashFoot2® deliver superior structural strength, by aligning the rail and lag bolt in a concentric load path.

Three-Tier Water Seal

FlashFoot2®'s seal architecture utilizes three layers of protection. An elevated platform diverts water away, while a stack of rugged components raises the seal an entire inch. The seal is then fully-encapsulated by the Cap. FlashFoot2® is the first solar attachment to pass the TAS-100 Wind-Driven Rain Test.



Single Socket Size

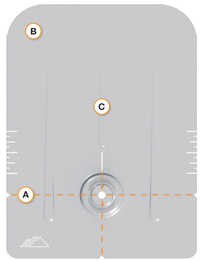
A custom-design lag bolt allows you to install FlashFoot2® with the same 7/16" socket size used on other Flush Mount System components.

Water-Shedding Design

An elevated platform diverts water away from the water seal.

Tech Brief

Installation Features



A Alignment Markers

Quickly align the flashing with chalk lines to find pilot holes.

B Rounded Corners

Makes it easier to handle and insert under the roof shingles.

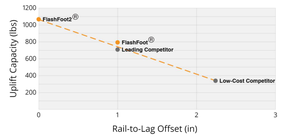
C Reinforcement Ribs

Help to stiffen the flashing and prevent any bending or crinkling during installation.

Benefits of Concentric Loading

Traditional solar attachments have a horizontal offset between the rail and lag bolt, which introduces leverage on the lag bolt and decreases uplift capacity.

FlashFoot2® is the only product to align the rail and lag bolt. This concentric loading design results in a stronger attachment for the system.



Testing & Certification

Structural Certification

Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7.

Water Seal Ratings

Water Sealing Tested to UL 441 Section 27 "Rain Test" and TAS 100-95 "Wind Driven Rain Test" by Intertek. Ratings applicable for composition shingle roofs having slopes between 2:12 and 12:12.

UL 2703

Conforms to UL 2703 Mechanical and Bonding Requirements. See Flush Mount Install Manual for full ratings.

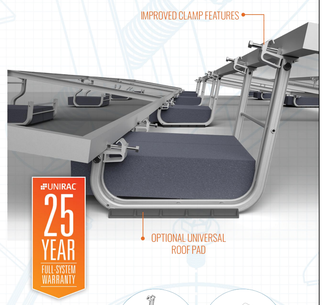
RACKING SPECIFICATION SHEET

ROOFMOUNT | RM10 EVO

UNIRAC
BETTER SOLAR STARTS HERE

THREE MAJOR COMPONENTS. ONE TOOL.

- Supports most framed PV modules (conventional, bi-facial, and large format) at a 10-degree tilt.
- Three SKUs: a fully assembled ballast bay, a tucked north row bay, and a redesigned universal module clamp.
- Improved 13" row spacing yeilds up to 20% more power density on the roof.
- Built on a decade long legacy, RM10 EVO retains the elements that made RM10 reliable, simple and robust.
- Designed to conveniently work with off the shelf wire management products.

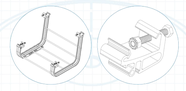


AVAILABILITY

- UNIRAC maintains the largest network of stocking distributors for our racking solutions. Count on our partners for fast and accurate delivery to meet your project needs.

AUTOMATED DESIGN TOOL

- Creating a bill of materials is just a few clicks away with U-Builder, a powerful online tool that streamlines the process of designing a code compliant solar mounting system. There's no need to print results and send to a distributor, just click, and share.



WHY ROOFMOUNT RM10 EVO?

LAY IT DOWN AND POWER UP! Unirac has taken the tried-and-true form and functionality of RM10 and evolved it to maximize the potential of flat roof solar projects. We have paired simplicity with power by improving the function, strength and reliability of the module clamps and modified the shape of the north row bay to optimize space and increase module density. Optional roof attachments, roof pads, and MLPE mounts provide a complete solution. Unirac's unmatched commercial project support makes construction easy, from permitting through installation.

FOR QUESTIONS OR CUSTOMER SERVICE CONTACT:
505-242-6411 | SALES@UNIRAC.COM | WWW.UNIRAC.COM
PUB20240AN01-V1

CONFORMS TO UL2703

ISO 9001:2015 14001:2015 CERTIFIED

ATTACHMENT SPECIFICATION SHEET

FLASHLOC™ RM

THE STRONGEST ATTACHMENT FOR EVERY FLAT ROOF

UNIRAC
BETTER SOLAR STARTS HERE

Unirac's **FLASH**LOC™ **RM** is a lightweight, durable, powder-coated cast aluminum roof attachment solution that provides fast, easy installation and helps save labor cost. **FLASH**LOC™ **RM** is compatible with most roofing materials and is applicable for almost all solar racking form factors. Rigorous mechanical, sealing, and ease-of-install testing has been successfully completed for assurance of long-term reliability.

FEATURES

FLASHLOC™ Technology – no more membrane SKUs or heat welding

- Works for all roof types – see Chemlink M-1's compatibility for details
- Labor and attachment savings
- Industry-leading install time
- 6,600-lb. uplift offset (ultimate)
- Includes 8 fastener holes
- Attachment can accommodate roofing screw sizes #12 - #15
- 25-year warranty

PRODUCT SPECIFICATIONS

- 7.5" diameter X 0.94" height
- Included hardware: 1 preassembled bolt and washer
- Chemlink M-1 and 1-Part included in kit

PART NUMBER	DESCRIPTION	PACK SIZE
310999	FLASHLOC RM KIT	10

*Check with your local distributor for finalized pricing.

FASTER INSTALLATION. 25-YEAR WARRANTY.

FOR QUESTIONS OR CUSTOMER SERVICE VISIT UNIRAC.COM OR CALL (505) 248-2702

AMERICAN MICROGRID SOLUTIONS

SYSTEM INFORMATION	
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DESIGNED BY/CHECKED BY:
ARUN S/RAM BALAJI

PAPER SIZE: 24" X 36"

SCALE: AS NOTED	REV:B
DATE: 06/17/2025	E-06.2

Existing

New black PV's

Proposed

Cinder Black