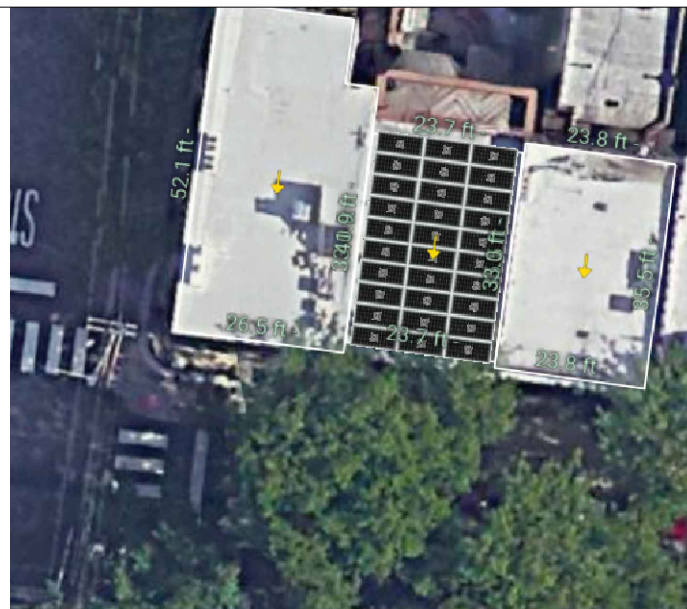


① PROJECT LOCATION  
N.T.S.



② BIRDS EYE VIEW  
N.T.S.

# SOLAR ENERGY PROJECT AT THE RESIDENCE

CUSTOMER ADDRESS	----
REVISION NUMBER	Example Roof Flat Raised Roof Mount - Rev 0.dwg

### NJ APPLICABLE CODES & STANDARDS

IRCNJ 2018 – BUILDING  
R324.6.2.2  
NFPA 70 – FIRE  
NEC 2017 – ELECTRICAL  
IMC 2018 – MECHANICAL  
IBC 2018 – WIND & SNOW LOADS  
ASCE – 7-10 & 7-16

NOTE: THERE ARE NO  
PLANS FOR  
DEMOLITION WITH  
THIS INSTALLATION

BLOCK: 14305  
LOT: 16

3 STORY DWELLING  
PAULUS HOOK HISTORIC DISTRICT

BUILDING DESCRIPTION: 3S-BT-B-D-1U  
LOT SIZE: 25' X 73.5'  
ZONING DISTRICT: H  
AREA (ACRES): 85.59  
AREA (SQ. FT.): 3,728,420

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A2	EXISTING STREET FRONT VIEW
A3	ROOF WITH ARRAY LAYOUT
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A5	WARREN STREET VIEW
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E1	ELECTRICAL DIAGRAM
Z1	ZONING REFERENCE
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R3	RACKING DATASHEET
R4	RACKING EXAMPLE PHOTOS
R5	SAFETY RAIL DATASHEET
B1	CREW'S ASBUILT

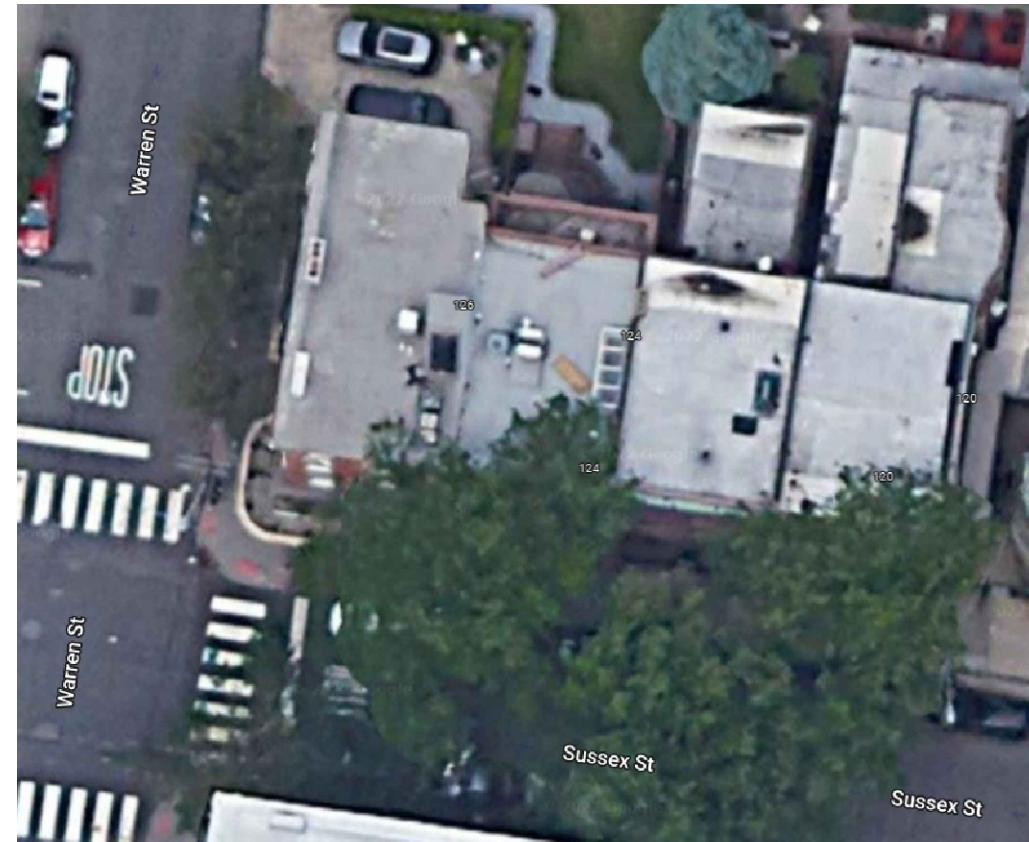
REV	DATE	DESCRIPTION
0	10/19/22	ISSUED FOR PERMIT SET

EPC Contractor	Structural Engineer:	SCALE: NTS	DRAWN BY: PA	PROJECT NAME & ADDRESS: RESIDENCE	DRAWING TITLE: COVER PAGE	SHEET: T1
		AS PROJECT #8998			DWG. NAME & REV# Example Roof Flat Raised Roof Mount - Rev 0.dwg	
		CUSTOMER PROJECT #				
		DATE: December 17, 2022				

① EXISTING ROOF VIEW  
1" = 1'-0"



Sussex Street



REV	DATE	DESCRIPTION
0	10/19/22	ISSUED FOR PERMIT SET

EPC Contractor

Structural Engineer:

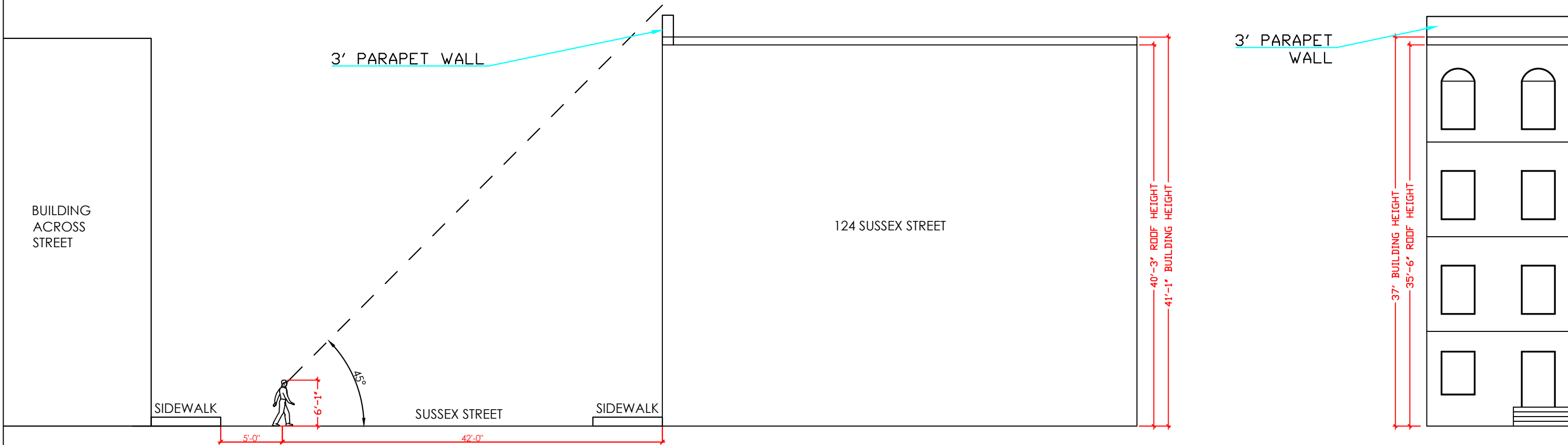
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AE PROJECT #8998	
CUSTOMER PROJECT #----	
DATE: December 17, 2022	

PROJECT NAME & ADDRESS:	RESIDENCE
	----
	----

DRAWING TITLE:	ARRAY LAYOUT
DWG. NAME & REV#	
Example Roof Flat Raised Roof Mount - Rev 0.dwg	

SHEET:
① A1

① EXISTING STREET FRONT VIEW  
1" = 1'-0"



REV	DATE	DESCRIPTION
0	10/19/22	ISSUED FOR PERMIT SET

EPC Contractor

Structural Engineer:

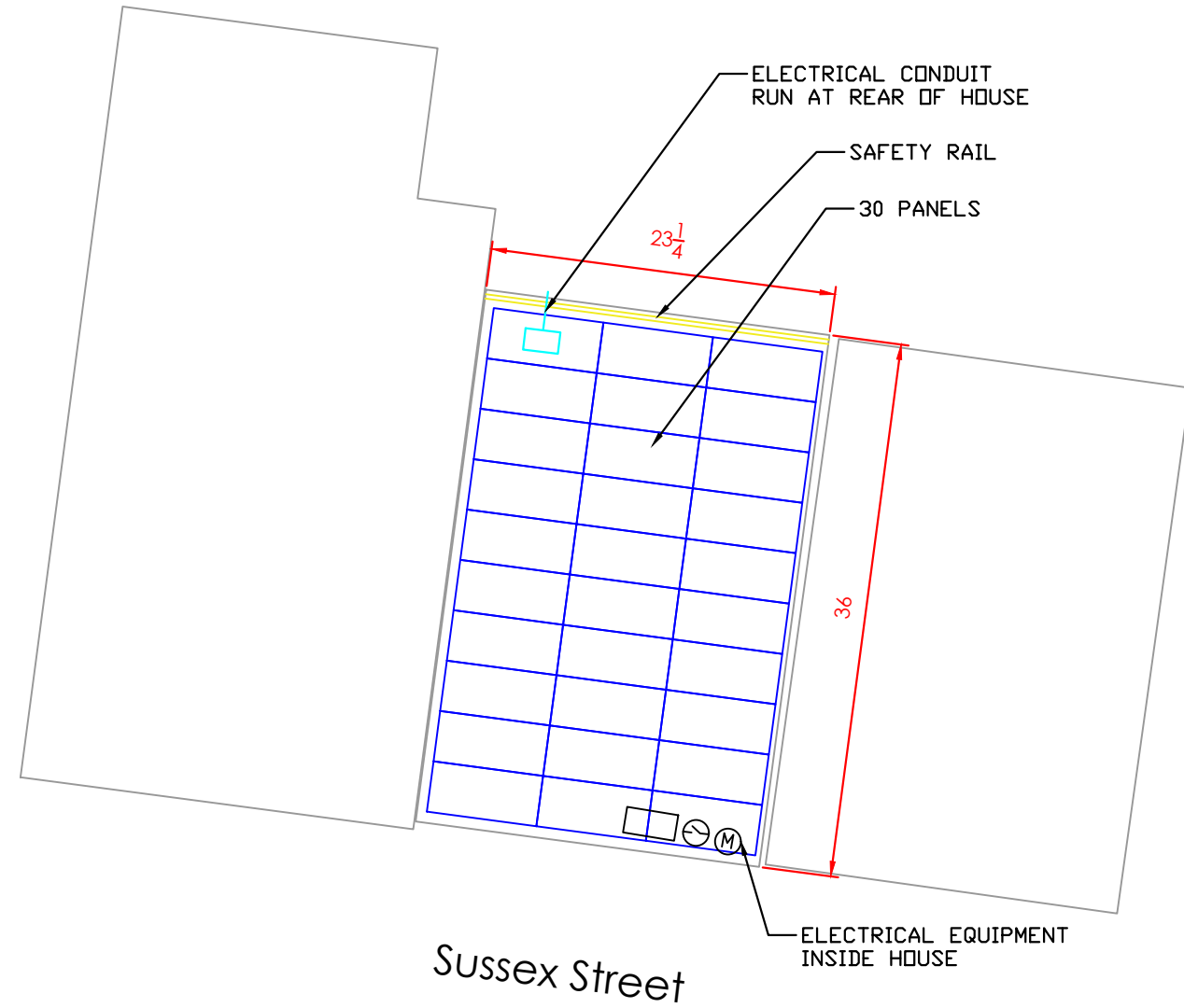
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 AE PROJECT # 8998  
 CUSTOMER PROJECT # ----  
 DATE: December 17, 2022

PROJECT NAME & ADDRESS:  
 RESIDENCE  
 ----  
 ----

DRAWING TITLE:  
 EXIST STREET  
 DWG. NAME & REV#  
 Example Roof Flat Raised Roof Mount - Rev 0.dwg

SHEET:  
 (A2)

① PROPOSED ARRAY LAYOUT VIEW  
1' = 1'-0"

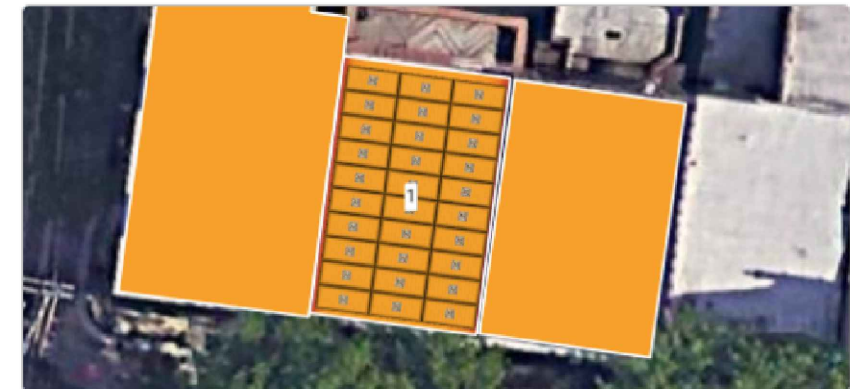


Address  
124 Sussex St  
Jersey City, NJ 07302,  
USA

Coordinates  
(40.714841, -74.039238)

Date  
18 October 2022

Annual irradiance



Summary

Array	Panel Count	Azimuth (deg.)	Pitch (deg.)	Annual TOF (%)	Annual Solar Access (%)	Annual TSRF (%)
1	30	98	5	87	100	87

REV	DATE	DESCRIPTION
0	10/19/22	ISSUED FOR PERMIT SET

EPC Contractor

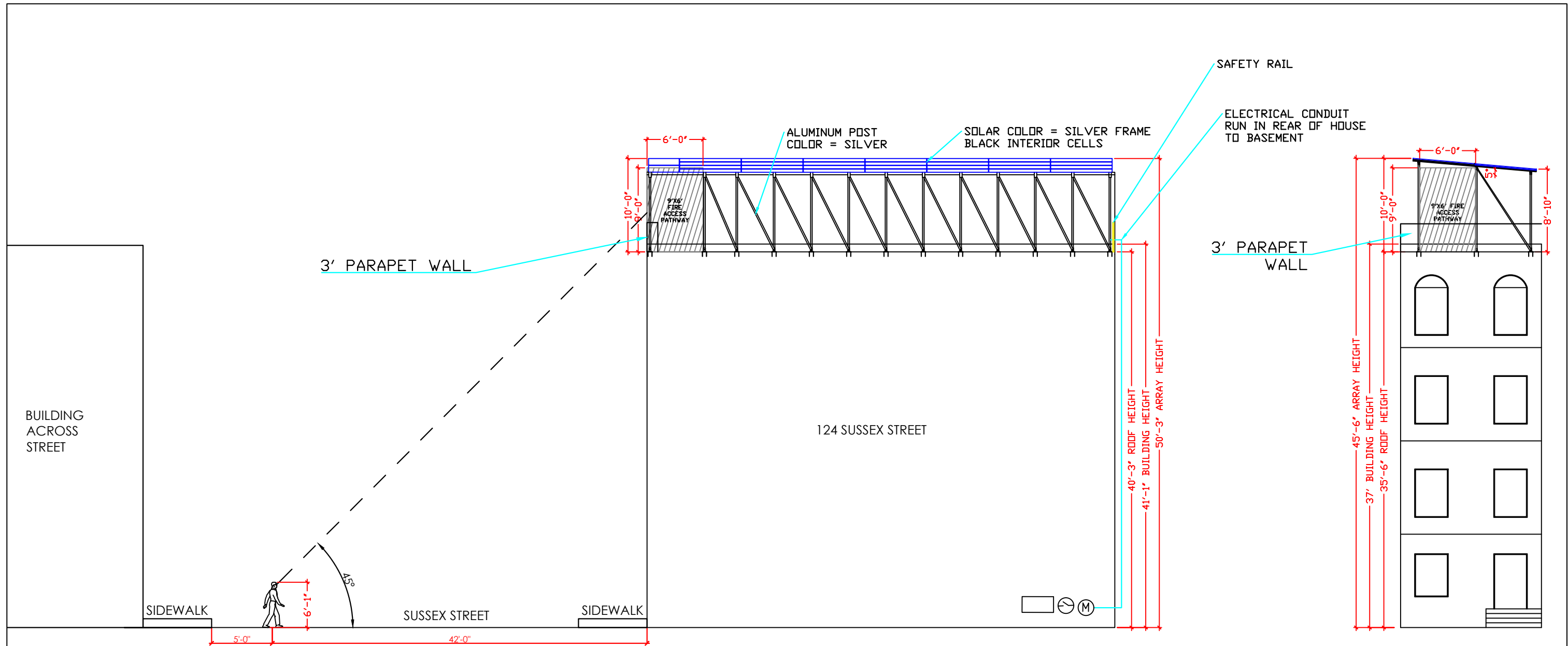
Structural Engineer:

SCALE: NTS DRAWN BY: PA  
AE PROJECT #8998  
CUSTOMER PROJECT #----  
DATE: December 17, 2022

PROJECT NAME & ADDRESS:  
RESIDENCE  
-----

DRAWING TITLE:  
ARRAY LAYOUT  
DWG. NAME & REV#  
Example Roof Flat Raised Roof Mount - Rev 0.dwg

SHEET:  
A3



① SIDE LAYOUT VIEW  
3/32" = 1'

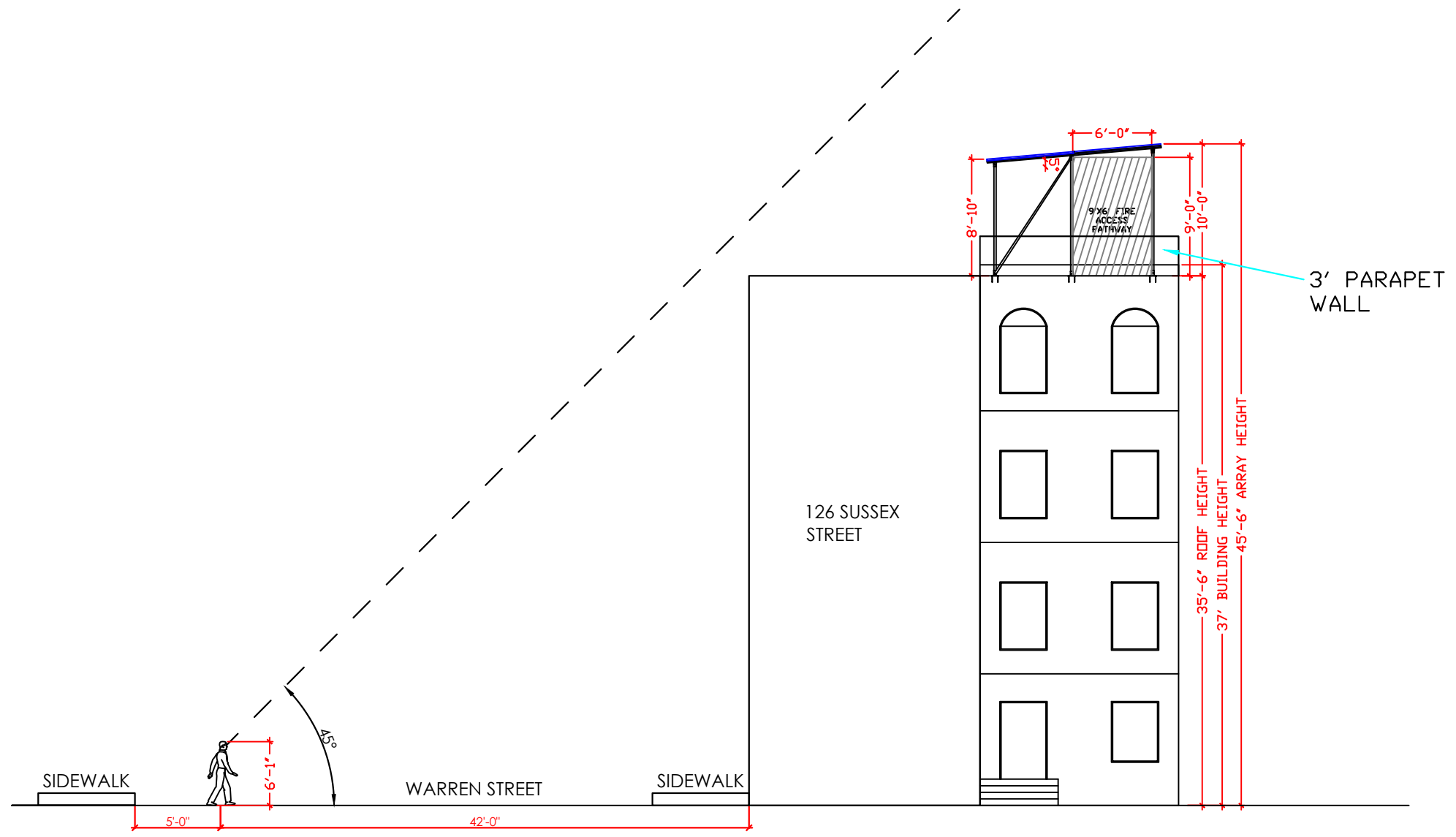
② FRONT ELEVATION LAYOUT VIEW  
3/32" = 1'

REV	DATE	DESCRIPTION
0	10/19/22	ISSUED FOR PERMIT SET

EPC Contractor	Structural Engineer:
----------------	----------------------

SCALE: NTS	DRAWN BY: PA
AE PROJECT #8998	PROJECT NAME & ADDRESS:
CUSTOMER PROJECT #----	RESIDENCE
DATE: December 17, 2022	----

DRAWING TITLE:	SHEET:
ELEVATION LAYOUT	(A4)
DWG. NAME & REV#	
Example Roof Flat Raised Roof Mount - Rev 0.dwg	



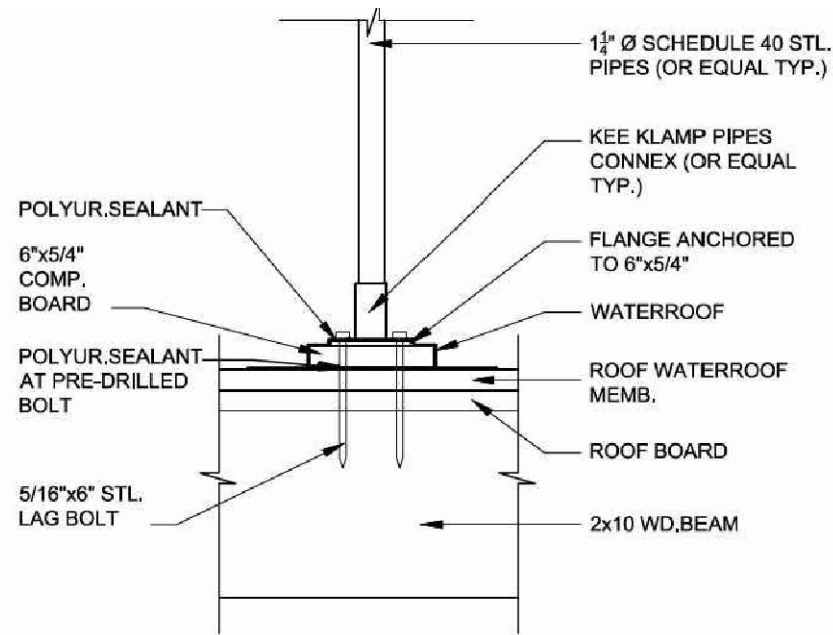
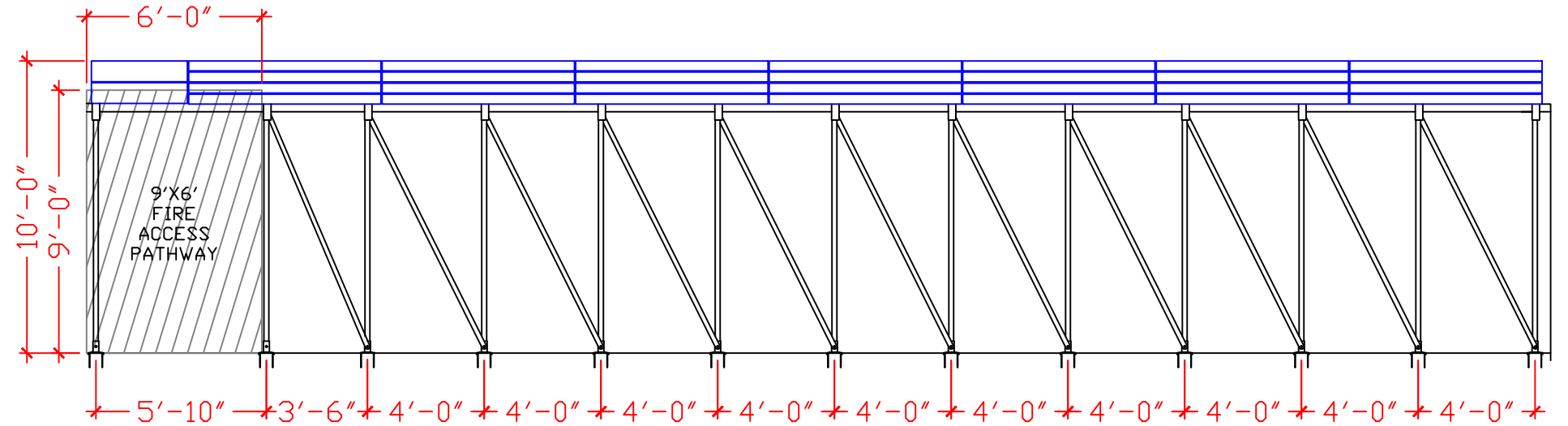
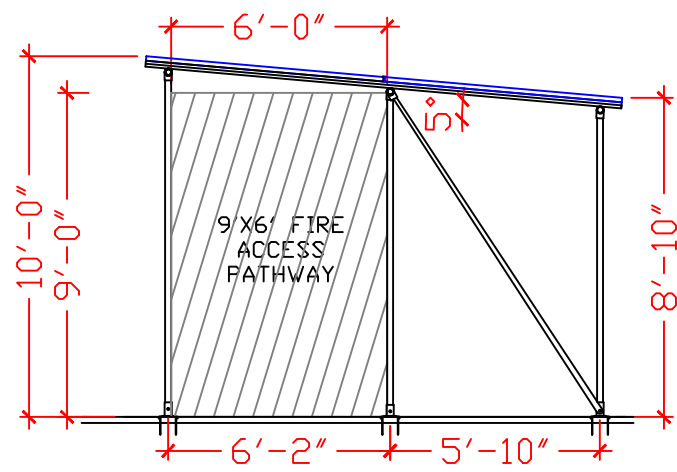
① WARREN STREET SIDE LAYOUT VIEW  
3/32" = 1'

REV	DATE	DESCRIPTION	EPC Contractor	Structural Engineer:	SCALE: NTS	DRAWN BY: PA	PROJECT NAME & ADDRESS:	DRAWING TITLE:	SHEET:
					AS PROJECT #8998		RESIDENCE	ELEVATION LAYOUT	(A5)
					CUSTOMER PROJECT #----		----	DWG. NAME & REV#	
0	10/19/22	ISSUED FOR PERMIT SET			DATE: December 17, 2022		----	Example Roof Flat Raised Roof Mount - Rev 0.dwg	



① ARRAY CANNOT BE SEEN  
 GRAND STREET SIDE LAYOUT VIEW  
 3/32" = 1'

REV	DATE	DESCRIPTION	EPC Contractor	Structural Engineer:	SCALE: NTS	DRAWN BY: PA	PROJECT NAME & ADDRESS:	DRAWING TITLE:	SHEET:
0	10/19/22	ISSUED FOR PERMIT SET			AS PROJECT #8998		RESIDENCE	ELEVATION LAYOUT	(A6)
					CUSTOMER PROJECT #----		----	DWG. NAME & REV#	
					DATE: December 17, 2022		----	Example Roof Flat Raised Roof Mount - Rev 0.dwg	



1 ATTACHMENT DETAIL  
SCALE: N.T.S.

1 ATTACHMENT DETAIL  
3/16" = 1'

REV	DATE	DESCRIPTION
0	10/19/22	ISSUED FOR PERMIT SET

EPC Contractor

Structural Engineer:

SCALE: NTS DRAWN BY: PA  
 AE PROJECT #8998  
 CUSTOMER PROJECT #----  
 DATE: December 17, 2022

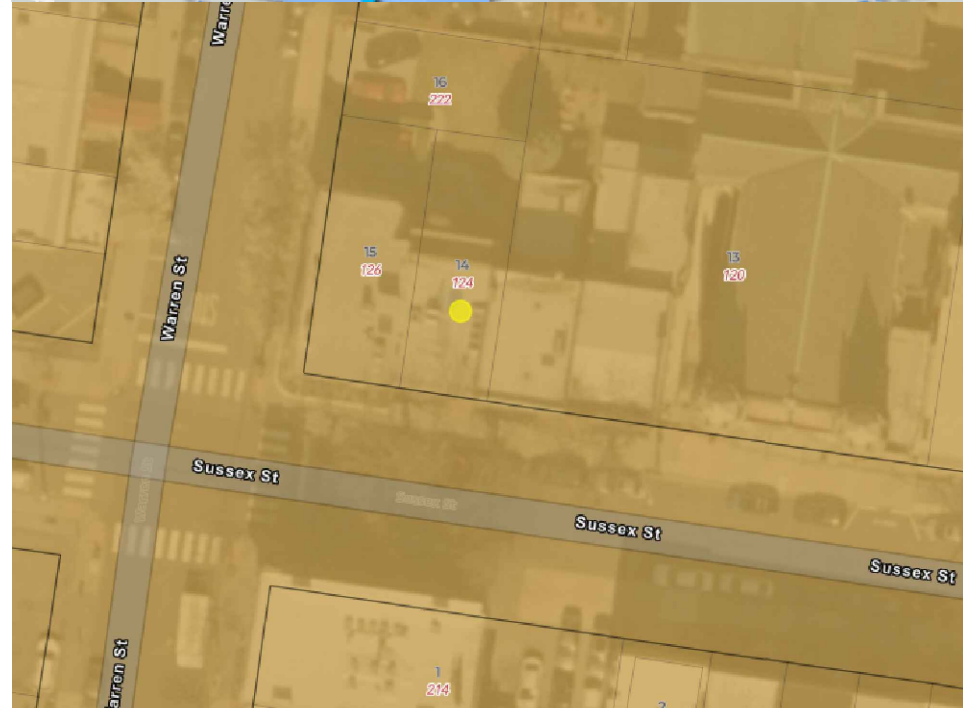
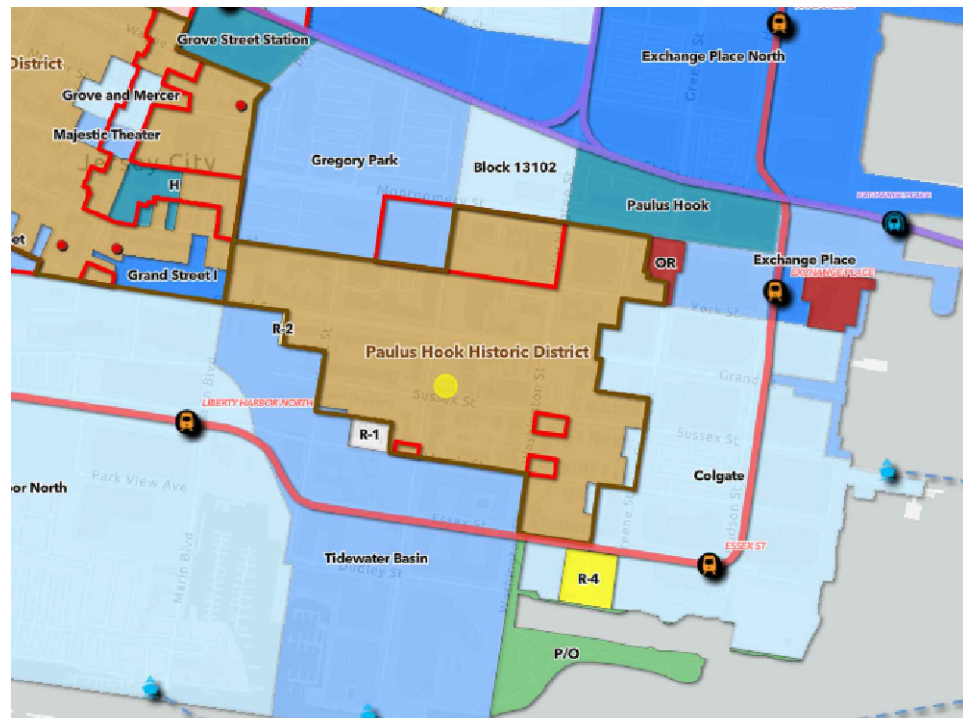
PROJECT NAME & ADDRESS:  
 RESIDENCE

DRAWING TITLE:  
 ATTACHMENT DETAIL  
 DWG. NAME & REV#  
 Example Roof Flat Raised Roof Mount - Rev 0.dwg

SHEET:

(S1)

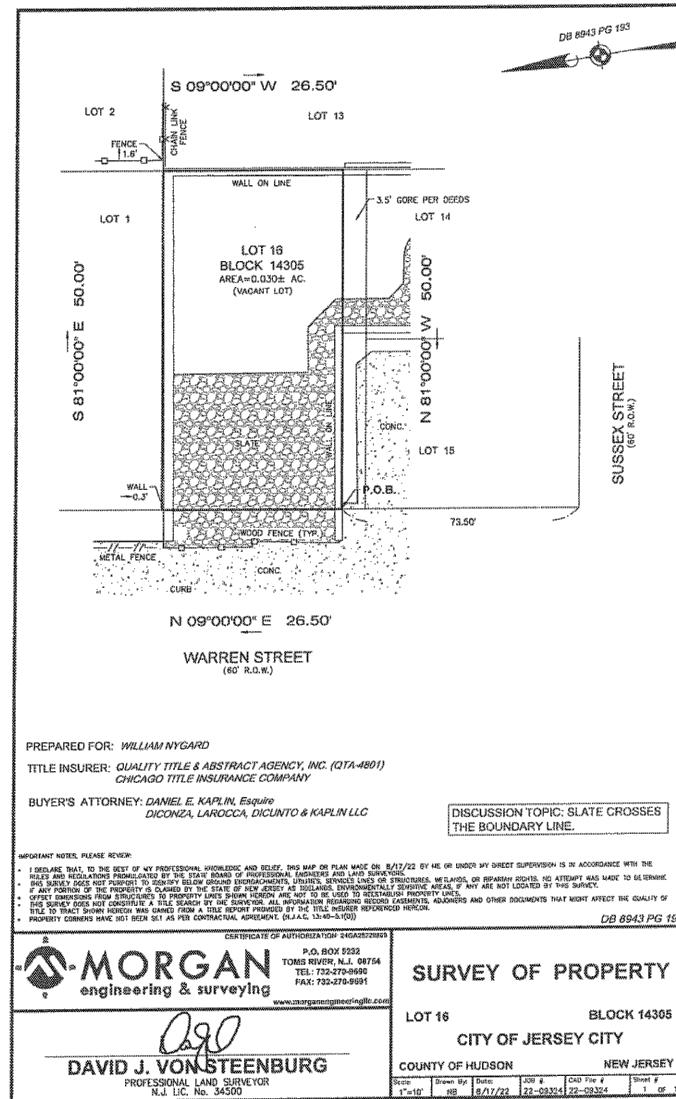




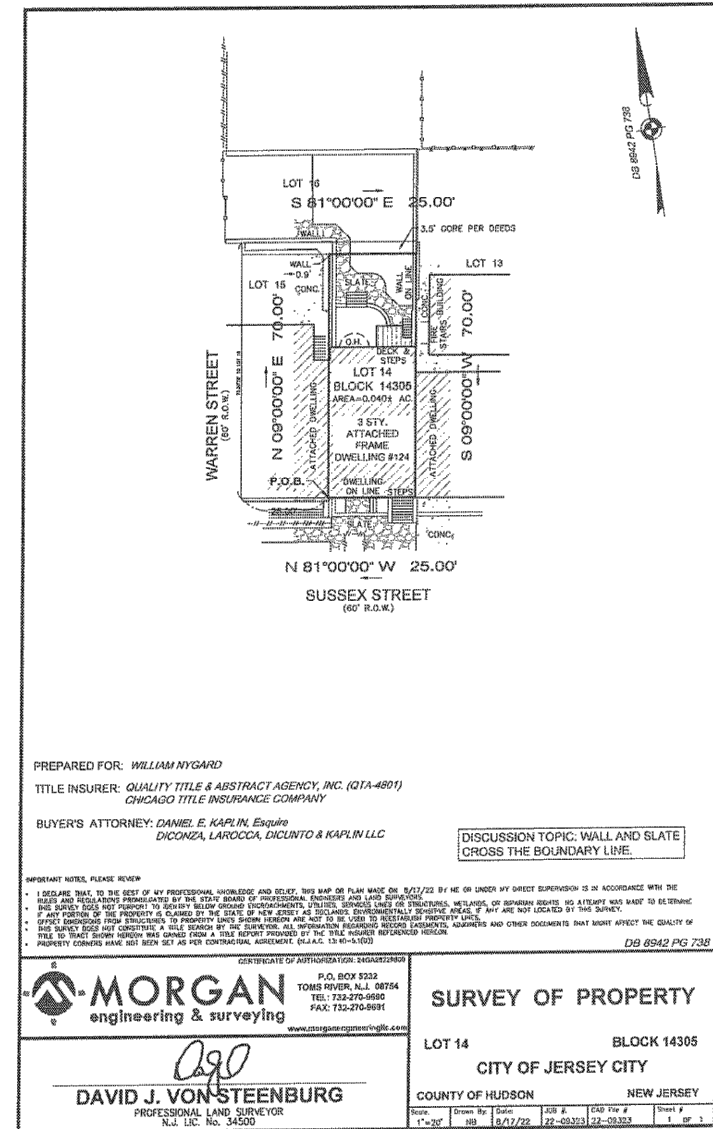
**BLOCK:** 14305  
**LOT:** 16

**3 STORY DWELLING**  
**PAULUS HOOK HISTORIC DISTRICT**

**BUILDING DESCRIPTION:** 3S-BT-B-D-1U  
**LOT SIZE:** 25' X 73.5'  
**ZONING DISTRICT:** H  
**AREA (ACRES):** 85.59  
**AREA (SQ. FT.):** 3,728,420



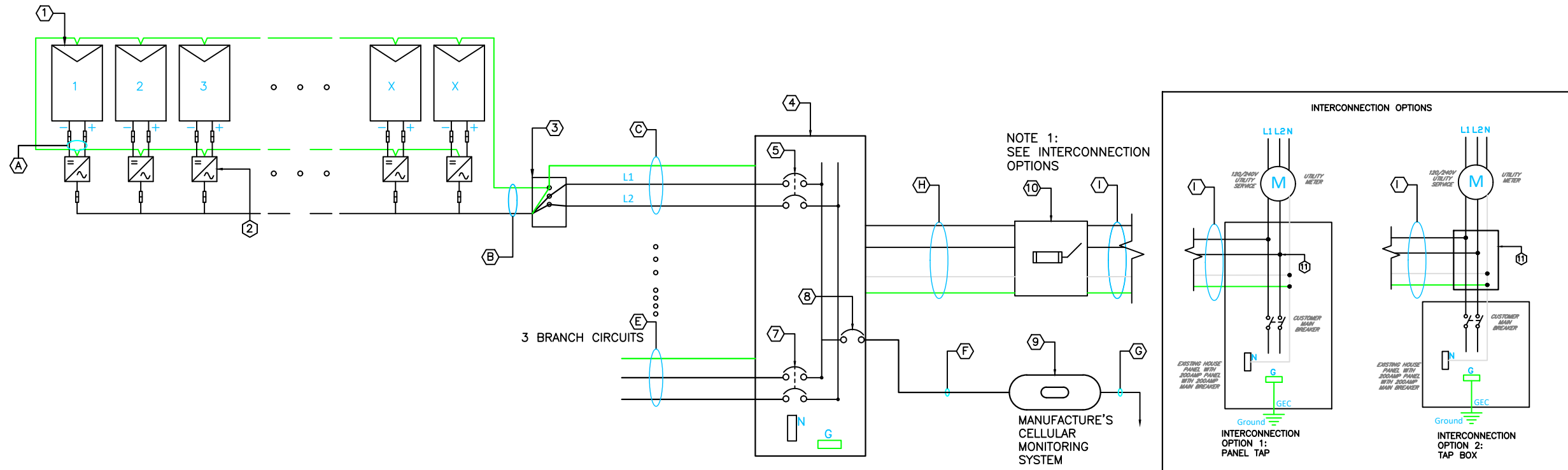
② SITE SURVEY  
3/32" = 1'



③ BLOCK SITE PLAN  
3/32" = 1'

REV	DATE	DESCRIPTION
0	10/19/22	ISSUED FOR PERMIT SET

EPC Contractor	Structural Engineer:	SCALE: NTS DRAWN BY: PA PROJECT NAME & ADDRESS: RESIDENCE DATE: December 17, 2022	DRAWING TITLE: ZONING DWC. NAME & REV# Example Roof Flat Raised Roof Mount - Rev 0.dwg	SHEET: Z1
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1 ELECTRICAL THREE LINE DIAGRAM  
N.T.S.

**EQUIPMENT DESIGNATIONS**

ITEM	DESCRIPTION	DETAIL				REMARKS					
		Panel	Panel	Ambient	Lowest	Temp	Temp	Temp	NEC	Panel	Panel
1	PV MODULE	Silfab, SIL-490 HN				490	DC WATTS PER	30	TOTAL	14,700	DC KW
2	MICRO INVERTER	ENPHASE IQ 8A-72-2-US				30	TOTAL MICRO INVERTERS	TOTAL	10,470	AC WATTS	
3	JUNCTION BOX NON-FUSED	STRING JBOX FOR ROOF PENTRATION				SOLAR DECK - BRANCH CIRCUIT OUTPUT EMT INSIDE					
4	AC COMBINER PANEL	ENPHASE X-IQ-AM1-240-4 IQ COMBINER 4 BOX				125 AMP PANEL	2P BREAKER SPACES	4			
5	BRANCH CIRCUIT #1 BREAKER SIZE	20 Amp	FOR	10	MICRO INVERTERS	2 Pole, 10 Ka, 240V	MAX PER BRANCH	11			
6	BRANCH CIRCUIT #2 BREAKER SIZE	20 Amp	FOR	10	MICRO INVERTERS						
7	BRANCH CIRCUIT #3 BREAKER SIZE	20 Amp	FOR	10	MICRO INVERTERS						
8	CONVINENCE BREAKER FOR COM. DEVICE	10 or 15 AMP				2 Pole, 10 Ka, 240V					
9	COMMUNICATION DEVICE	ENPHASE ENVOY				240V, COMMUNICATION PORT IS AVAILABLE FOR UTILITY'S USE.					
10	AC DISCONNECT	SQD - D222NRB, NEMA 3R				60 AMP DISC.	FUSED AT	60 AMP			
11	MAIN PANEL TAP OR TAPBOX	12"X12" BOX - W/TAP CONNECTOR OR ILSCO-IPC KUP-L-TAP				PER NEC 690.64					

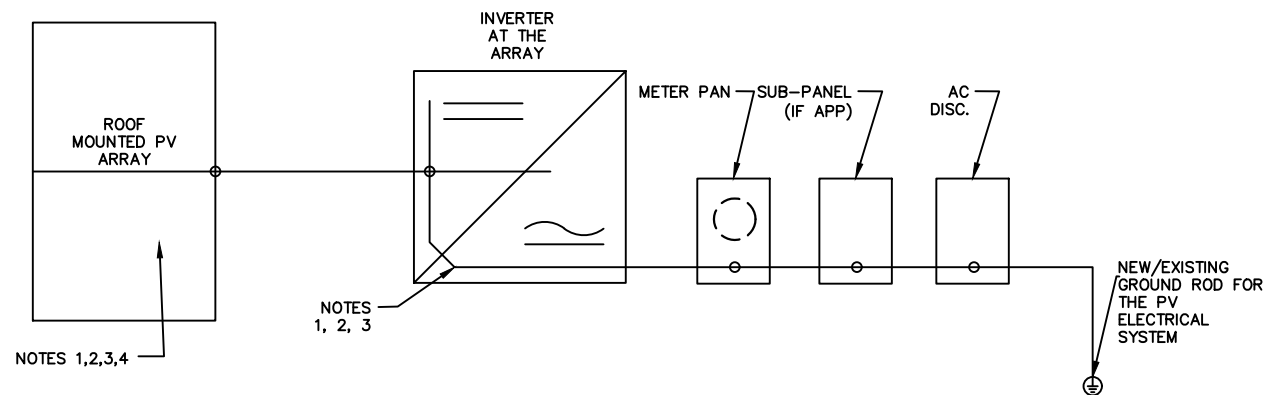
**WIRING SCHEDULE**

ITEM	DESCRIPTION	FILL	SIZE	TYPE	MINIMUM CONDUIT	CONDUIT TYPE	MAT.	V DROP	EGC	NOTES	APPROX. DISTANCES
A	PV SOURCE CIRCUIT	NA	10 AWG	PV WIRE	FREE AIR	NA	CU	<1%	10 AWG		
B	INVERTER MANUFACTURE CABLE	3	12 AWG	THWN-2	FREE AIR	NA	CU	<1%	12 AWG		12' TO JUNCTION BOX
C	AC OUTPUT CIRCUIT FROM JUNCTION BOX	3	10 AWG	THHN	1/2"	PVC	CU	<1%	10 AWG	MAX WIRE RUN 104 FEET	40' TO LOAD CENTER
D	AC OUTPUT CIRCUIT FROM JUNCTION BOX	3	10 AWG	THHN	1/2"	PVC	CU	<1%	10 AWG	MAX WIRE RUN 104 FEET	40' TO LOAD CENTER
E	AC OUTPUT CIRCUIT FROM JUNCTION BOX	3	10 AWG	THHN	1/2"	PVC	CU	<1%	10 AWG	MAX WIRE RUN 104 FEET	40' TO LOAD CENTER
F	COMMUNICATION DEVICE CIRCUIT	2	14 AWG	THHN	FREE AIR	NA	CU	<1%	14 AWG	LOCATED IN SOLAR LOAD CENTER	
G	PATCH CABLE TO NETWORK ROUTER	NA	NA	NA	NA	NA	CU	NA	NA		
H	SOLAR AC LOAD CENTER. AC OUTPUT CIRCUIT	4	6 AWG	THHN	3/4"	PVC	CU	<1%	10 AWG		10' TO DISCONNECT
I	SOLAR AC DISCONNECT OUTPUT CIRCUIT	4	6 AWG	THHN	3/4"	PVC	CU	<1%	8 AWG		10' TO INTERCONNECTION

Inverter		PV Panel Characteristics										
Module Compatibility	Panel	Panel	Ambient	Lowest	Temp	Temp	Temp	NEC	Panel	Panel		
60,66, or 72 Cell	Volts DC	Volts DC	Temp	Ambient	Coeff	Coeff	Coeff	Multiplier	Max Power	Short Ckt		
MAX DC INPUT WATT	Open	MPP	STC	Temp.	Pmpp	Voc	Isc		(imp)	(isc)		
500	Ckt		°C	°C	%/°C	%/°C	%/°C					
Inverter	MAX Amps	Max Power										
ENPHASE IQ 8A-72-2-US	1.45	349	53.96	45.23	25	-16	-0.36	-0.25	0.064	1.2	10.83	11.36

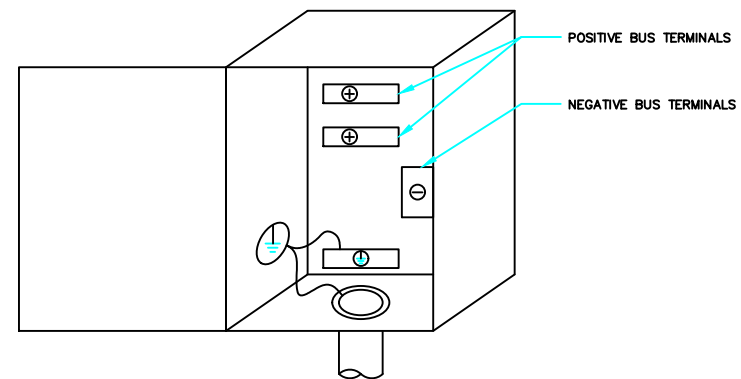
NEC LABELING	
POINT OF INTERCONNECTION	
RATED AC OUTPUT CURRENT (AMPS)	43.5
NOMINAL OPERATING VOLTAGE	240 V

REV	DATE	DESCRIPTION	EPC Contractor	Structural Engineer	SCALE: NTS	DRAWN BY: PA	PROJECT NAME & ADDRESS:	DRAWING TITLE	SHEET:
0	10/19/22	ISSUED FOR PERMIT SET					RESIDENCE	ELECTRICAL DIAGRAM	E1
					AN PROJECT #8998			DWG. NAME & REV#	
					CUSTOMER PROJECT # - - - -			Example Roof Flat Raised Roof Mount - Rev 0.dwg	
					DATE: December 17, 2022				

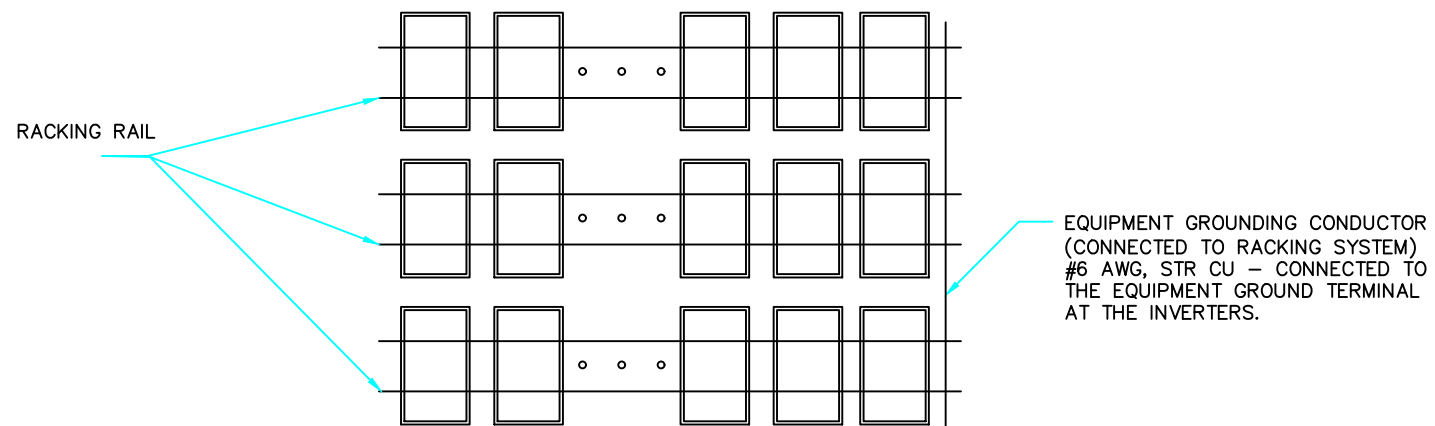


- NOTES:
- 1.) EQUIPMENT GROUNDING CONDUCTOR SHALL BE SIZED PER NEC BY THE ELECTRICAL CONTRACTOR
  - 2.) ALL GROUND CONNECTIONS SHALL BE MADE WITH IRREVERSIBLE CRIMP AND ARE UL APPROVED GROUND LUGS.
  - 3.) DO NOT BOND TOGETHER ARRAYS SERVING DIFFERENT COMBINER BOXES.
  - 4.) RACKING SHALL BE BONDED AND SHALL BE SIZED BY THE ELECTRICAL CONTRACTOR.

1 OVERALL GROUNDING DETAIL  
N.T.S.



2 TYPICAL EQUIPMENT GROUNDING DETAIL  
N.T.S.



3 ARRAY GROUNDING SCHEME  
N.T.S.

**SM SOLAR MOUNT BONDING CONNECTION GROUND PATHS** INSTALLATION GUIDE PAGE

**BONDING MIDCLAMP ASSEMBLY**  
1. Stainless steel midclamp joins 2 per module frame modules to bond modules to module through clamp.  
2. serrated flange nut bonds stainless steel clamp to stainless steel T-bolt.  
3. serrated T-bolt head penetrates rail annotation to bond T-bolt, rail, clamp, and modules to grounded SH rail.

**ENDCLAMP ASSEMBLY**  
1. serrated flange nut bonds aluminum Endclamp to stainless steel T-bolt.  
2. serrated T-bolt head penetrates rail annotation to bond T-bolt, nut, and Endclamp to grounded SH rail.  
*Note: End clamp does not bond to module frame.*

**BONDING RAIL SPICE BAR**  
1. Stainless steel sliding sleeves slide and cap into splice bar and rail, creating bond between splice bar and each rail-section.  
2. aluminum splice bar spans across rail gaps to create rail to rail bond. Rail on at least one side of splice will be grounded.  
*Note: Splice bar used bonded connection are non-structural. The splice bar function is rail alignment and bonding.*

**RAIL TO L-FOOT w/BONDING T-BOLT**  
1. serrated flange nut inserts L-foot annotation to bond L-foot to stainless steel T-bolt.  
2. serrated T-bolt head penetrates rail annotation to bond T-bolt, nut, and L-foot to grounded SH rail.

**BONDING MICROINVERTER MOUNT**  
1. This nut with captive lock washer bonds metal microinverter frame to stainless steel T-foot.  
2. serrated T-bolt head penetrates rail annotation to bond T-bolt, nut, and L-foot to grounded SH rail.  
*Remove ground bonding existing and monitor case for attachment through the front color of optional microinverter systems. See page 1 for details.*

**RACK SYSTEM GROUND**  
1. WEEB® weather diaphragm rivet installed into cross-bond between rail and L-foot.  
2. Solid copper wire connected to lug is required to provide final system ground connection.  
*NOTE: Steel lug can also be used when assured to the side of the rail. See page 1-5 for details.*

4 UNIRAC MANUFACTURE GROUNDING DETAIL  
N.T.S.

REV	DATE	DESCRIPTION	RPC Contractor	Structural Engineer:	SCALE: NTS	DRAWN BY: PA	PROJECT NAME & ADDRESS:	DRAWING TITLE:	SHEET:
0	10/19/22	ISSUED FOR PERMIT SET			AE PROJECT #8998		RESIDENCE	GROUNDING DETAIL	E2
					CUSTOMER PROJECT #			DWG. NAME & REV#	
					DATE: December 17, 2022			Example Roof Flat Raised Roof Mount - Rev 0.dwg	

### MAIN SERVICE PANEL

NEC 690.13 (B), 705.10, 705.12 (B)(2)(3)(b)&(c)  
OUTSIDE DOOR LABELS

**WARNING:**  
THIS EQUIPMENT FED BY MULTIPLE  
SOURCES. TOTAL RATING OF ALL  
OVERCURRENT DEVICES, EXCLUDING  
MAIN SUPPLY OVERCURRENT  
DEVICE, SHALL NOT EXCEED  
AMPACITY OF BUSBAR.

**WARNING:**  
ELECTRIC SHOCK HAZARD.  
TERMINALS ON BOTH THE LINE  
AND LOAD SIDES MAY  
BE ENERGIZED IN THE OPEN POSITION.

**CAUTION**  
SOLAR ELECTRIC  
SYSTEM CONNECTED

INSIDE OF MAIN SERVICE PANEL

**WARNING:**  
DUAL POWER SUPPLY  
SOURCES: UTILITY GRID AND  
PV SOLAR ELECTRIC SYSTEM

INSIDE FOR SOLAR BREAKER, IF APP.

**WARNING:**  
POWER SOURCE  
OUTPUT CONNECTION  
DO NOT RELOCATE THIS  
OVERCURRENT DEVICE

INSIDE FOR SOLAR BREAKER, IF APP.

**DO NOT RELOCATE THIS  
OVERCURRENT DEVICE**

INSIDE NEAR SOLAR BREAKER, IF APP.

**PHOTOVOLTAIC SOLAR BREAKER**

### SOLAR CONDUIT

INSIDE CONDUIT LABEL 1 PER 10FT. PER NEC 690.31 (G3-4)  
REFLECTIVE

**WARNING: PHOTOVOLTAIC  
POWER SOURCE**

OUTSIDE CONDUIT LABEL 1 PER 10FT. PER NEC 690.31 (G)(3)

**CAUTION SOLAR CIRCUIT**

### SOLAR JUNCTION BOX

ON AC JUNCTION BOX PER NEC 690.31 (B)

**CAUTION SOLAR CIRCUIT**

ON AC PULL BOX

**CAUTION PV OUPUT CIRCUIT**

### AC DISCONNECT

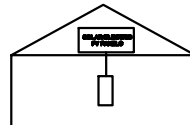
NEC 690.4(B), 690.13(B), 690.54  
ON AC DISCONNECT

#### PHOTOVOLTAIC AC DISCONNECT

RATED AC OUTPUT CURRENT	XX AMPS
NOMINAL OPERATING AC VOLTAGE	XXXVAC

**WARNING:**  
ELECTRIC SHOCK HAZARD.  
TERMINALS ON BOTH THE LINE  
AND LOAD SIDES MAY  
BE ENERGIZED IN THE OPEN POSITION.

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

### AC COMBINER SOLAR LOAD CENTER

NEC 690.31 (B), 690.13 (B), 705.10, 705.12 (B)(2)(3)(b)&(c)

OUTSIDE OF SOLAR LOAD CENTER

**WARNING:**  
ELECTRIC SHOCK HAZARD.  
TERMINALS ON BOTH THE LINE  
AND LOAD SIDES MAY  
BE ENERGIZED IN THE OPEN POSITION.

INSIDE OF SOLAR LOAD CENTER

**WARNING:**  
DUAL POWER SUPPLY  
SOURCES: UTILITY GRID AND  
PV SOLAR ELECTRIC SYSTEM

INSIDE LOAD CENTER FOR SOLAR BREAKER

**PHOTOVOLTAIC SOLAR BREAKER**

INSIDE LOAD CENTER NEAR SOLAR BREAKER

**DO NOT RELOCATE THIS  
OVERCURRENT DEVICE**

## 1 LABELS

N.T.S.

#### NOTES


1. ALL LABELING SHALL COMPLY WITH REQUIREMENTS OF NEC 690 AND UL.
2. TEXT SIZE SHALL BE CONFIRMED BY THE CONTRACTOR BUT IN NO CASE TEXT SHALL BE SMALLER THAN 3/8" HIGH.
3. ELECTRICAL CONTRACTOR SHALL VERIFY WORDING & DATA LISTED ON ALL SIGNS AND PLACARDS.

REV	DATE	DESCRIPTION	EPC Contractor	Structural Engineer:	SCALE: NTS	DRAWN BY: PA	PROJECT NAME & ADDRESS:	DRAWING TITLE:	SHEET:
							RESIDENCE	NEC LABELING	(E3)
					AE PROJECT #8998			DWG. NAME & REV#	
					CUSTOMER PROJECT #			Example Roof Flat Raised Roof Mount - Rev 0.dwg	
0	10/19/22	ISSUED FOR PERMIT SET			DATE December 17, 2022				

**SILFAB COMMERCIAL**

SIL-490 HN









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\* Chubb provides error and omission insurance to Silfab Solar Inc.

ELECTRICAL SPECIFICATIONS		490 HN	
		STC	NOCT
Test Conditions			
Module Power (Pmax)	Wp	490	362
Maximum power voltage (Vpmax)	V	45.23	41.61
Maximum power current (Ipmax)	A	10.83	8.69
Open circuit voltage (Voc)	V	53.96	49.64
Short circuit current (Isc)	A	11.36	9.12
Module efficiency	%	20.9%	19.3%
Maximum system voltage (VDC)	V	1500	
Series fuse rating	A	20	
Power Tolerance	Wp	0 to +10	

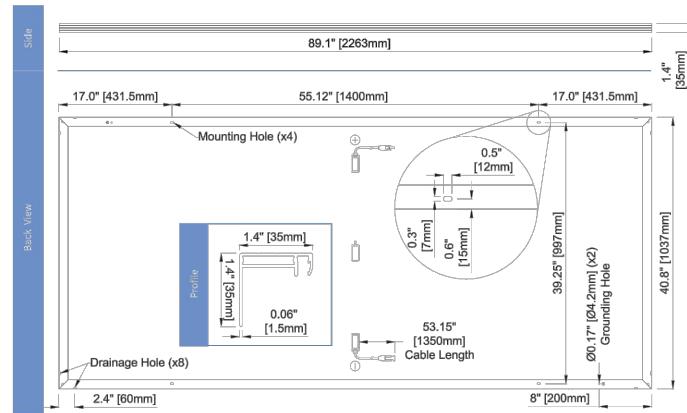
Measurement conditions: STC 1000 W/m<sup>2</sup> • AM 1.5 • Temperature 25 °C • NOCT 800 W/m<sup>2</sup> • AM 1.5 • Measurement uncertainty ± 3%  
Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by 0 to +10W.

MECHANICAL PROPERTIES / COMPONENTS	METRIC	IMPERIAL
Module weight	25.8kg ±0.2kg	56.9lbs ±0.4lbs
Dimensions (H x L x D)	2263 mm x 1037 mm x 35 mm	89 in x 40.8 in x 1.37 in
Maximum surface load (wind/snow)*	2400 Pa rear load / 5400 Pa front load	50.1 lb/ft <sup>2</sup> rear load / 112.8 lb/ft <sup>2</sup> front load
Hail impact resistance	ø 25 mm at 83 km/h	ø 1 in at 51.6 mph
Cells	156 Half cells - Si mono PERC 9 busbar - 83 x 166 mm	156 Half cells - Si mono PERC 9 busbar - 3.26 x 6.53 in
Glass	3.2 mm high transmittance, tempered, DSM antireflective coating	0.126 in high transmittance, tempered, DSM antireflective coating
Cables and connectors (refer to installation manual)	1350 mm, ø 5.7 mm, MC4 from Staubli	53.15 in, ø 0.22 in (12AWG), MC4 from Staubli
Backsheet	High durability, superior hydrolysis and UV resistance, multi-layer dielectric film, fluorine-free PV white backsheet	
Frame	Anodized Aluminum (Silver)	
Bypass diodes	3 diodes-30SQ04ST (45V max DC blocking voltage, 30A max forward rectified current)	
Junction Box	UL 3730 Certified, IEC 62790 Certified, IP68 rated	

TEMPERATURE RATINGS	WARRANTIES		
Temperature Coefficient Isc	+0.064 %/°C	Module product workmanship warranty	25 years**
Temperature Coefficient Voc	-0.28 %/°C	Linear power performance guarantee	30 years
Temperature Coefficient Pmax	-0.36 %/°C		≥ 97.1% end 1st yr ≥ 91.6% end 12th yr ≥ 85.1% end 25th yr ≥ 82.6% end 30th yr
NOCT (± 2°C)	45 °C		
Operating temperature	-40/+85 °C		

CERTIFICATIONS	SHIPPING SPECS		
Product	ULC ORD C1703, UL1703, CEC listed, UL 61215-1/-2, UL 61730-1/-2, IEC 61215-1/-2, IEC 61730-1/-2, CSA C22.2#61730-1/-2, IEC 62716 Ammonia Corrosion; IEC61701:2011 Salt Mist Corrosion Certified, UL Fire Rating: Type 1	Modules Per Pallet:	31
Factory	ISO9001:2015	Pallets Per Truck	23
		Modules Per Truck	713

\* Warning: Read the Safety and Installation Manual for mounting specifications and before handling, installing and operating modules.  
\*\* 12 year extendable to 25 years subject to registration and conditions outlined under "Warranty" at [silfabsolar.com](http://silfabsolar.com)  
PAN files generated from 3rd party performance data are available for download at: [silfabsolar.com/downloads](http://silfabsolar.com/downloads)



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1 SOLAR MODULE DATASHEET  
N.T.S.

REV	DATE	DESCRIPTION	RPC Contractor	Structural Engineer:	SCALE: NTS	DRAWN BY: PA	PROJECT NAME & ADDRESS: RESIDENCE	DRAWING TITLE: PANEL DATA SHEET	SHEET: R1
0	10/19/22	ISSUED FOR PERMIT SET							

### Enphase IQ Combiner 4/4C

X-IQ-AM1-240-4  
X-IQ-AM1-240-4C



The **Enphase IQ Combiner 4/4C** with Enphase IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.

**Smart**

- Includes IQ Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05, included only with IQ Combiner 4C)
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

**Simple**

- Centered mounting brackets support single stud mounting
- Supports bottom, back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80A total PV or storage branch circuits

**Reliable**

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Three-year labor reimbursement program coverage included for both the IQ Combiner SKUs
- UL listed

UL LISTED  
To learn more about Enphase offerings, visit [enphase.com](http://enphase.com)



### IQ8 Series Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high-speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.

**Easy to install**

- Lightweight and compact with plug-in connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

**High productivity and reliability**

- Produce power even when the grid is down\*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

**Microgrid-forming**

- Complies with the latest advanced grid support\*\*
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) requirements

**Enphase 25 Year Warranty**

Part of the Enphase Energy Series, IQ8 Series Microinverters integrate with the Enphase IQ Battery, Enphase IQ Gateway, and the Enphase AC Monitoring and control system.

**UL CERTIFIED**

IQ8 Series Microinverters are UL Listed as PV Rapid Shut Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.

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IQ8SE-05-0001-01-EN-US-2022-03-07

## IQ8 Series Microinverters

INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US	IQ8M-72-2-US	IQ8A-72-2-US	IQ8H-240-72-2-US	IQ8H-208-72-2-US <sup>(1)</sup>
Commonly used module pairings <sup>2</sup>	W	235 - 350	235 - 440	260 - 460	295 - 500	320 - 540+	295 - 500+
Module compatibility		60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell					
MPPT voltage range	V	27 - 37	29 - 45	33 - 45	36 - 45	38 - 45	38 - 45
Operating range	V	25 - 48			25 - 58		
Min/max start voltage	V	30 / 48			30 / 58		
Max input DC voltage	V	50			60		
Max DC current <sup>3</sup> [module Isc]	A				15		
Overvoltage class DC port					II		
DC port backfeed current	mA				0		
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit					
OUTPUT DATA (AC)		IQ8-60-2-US	IQ8PLUS-72-2-US	IQ8M-72-2-US	IQ8A-72-2-US	IQ8H-240-72-2-US	IQ8H-208-72-2-US <sup>(1)</sup>
Peak output power	VA	245	300	330	366	384	366
Max continuous output power	VA	240	290	325	349	380	360
Nominal (L-L) voltage/range <sup>4</sup>	V	240 / 211 - 264					208 / 183 - 250
Max continuous output current	A	1.0	1.21	1.35	1.45	1.58	1.73
Nominal frequency	Hz	60					
Extended frequency range	Hz	50 - 68					
AC short circuit fault current over 3 cycles	Arms			2			4.4
Max units per 20 A (L-L) branch circuit <sup>5</sup>		16	13	11	11	10	9
Total harmonic distortion		<5%					
Overvoltage class AC port		III					
AC port backfeed current	mA	30					
Power factor setting		1.0					
Grid-tied power factor (adjustable)		0.85 leading - 0.85 lagging					
Peak efficiency	%	97.5	97.6	97.6	97.6	97.6	97.4
CEC weighted efficiency	%	97	97	97	97.5	97	97
Night-time power consumption	mW	60					
MECHANICAL DATA							
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)					
Relative humidity range		4% to 100% (condensing)					
DC Connector type		MC4					
Dimensions (HxWxD)		212 mm (8.3") x 175 mm (6.9") x 30.2 mm (1.2")					
Weight		1.08 kg (2.38 lbs)					
Cooling		Natural convection - no fans					
Approved for wet locations		Yes					
Pollution degree		PD3					
Enclosure		Class II double-insulated, corrosion resistant polymeric enclosure					
Environ. category / UV exposure rating		NEMA Type 6 / outdoor					
COMPLIANCE							
		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 1071-01					
CERTIFICATIONS							
		This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer's instructions.					

(1) The IQ8H-208 variant will be operating in grid-tied mode only at 208V AC. (2) No enforced DC/AC ratio. See the compatibility calculator at <https://link.enphase.com/module-compatibility> (3) Maximum continuous input DC current is 10.6A (4) Nominal voltage range can be extended beyond nominal if required by the utility. (5) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

IQ8SE-DS-0001-01-EN-US-2022-03-17

## Enphase IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C (X-IQ-AM1-240-4C)	IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.
ACCESSORIES AND REPLACEMENT PARTS (not included, order separately)	
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 A
Max. fuse/circuit rating (output)	90 A
Branch circuits (solar and/or storage)	Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included)
Max. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75" x 19.5" x 6.63"). Height is 21.06" (53.5 cm) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40° C to +46° C (-40° to 115° F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	To 2000 meters (6,560 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 1071, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

To learn more about Enphase offerings, visit [enphase.com](http://enphase.com)  
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## 1 INVERTER DATASHEET

N.T.S.

REV	DATE	DESCRIPTION	EPC Contractor	Structural Engineer:	SCALE: NTS	DRAWN BY: PA	PROJECT NAME & ADDRESS:	DRAWING TITLE:	SHEET:
					AS PROJECT # 8998		RESIDENCE	INV. DATA SHEET	
					CUSTOMER PROJECT # ----		----	DWG. NAME & REV#	(R2)
					DATE: December 17, 2022		----	Example Roof Flat Raised Roof Mount - Rev 0.dwg	
0	10/19/22	ISSUED FOR PERMIT SET							



SunModo offers the next generation Flat Roof Mount System with SunTurf™. The streamlined design is robust, versatile, and specially engineered for multiple configurations.

By spanning over roof obstructions, the system takes full advantage of the available roof surface thereby maximizing the PV system size and increasing your ROI.

**The SunTurf™ Roof Mount Advantage**

- ✓ Elevated solar arrays to maximize roof space and system size.
- ✓ Easy access to roof surfaces for maintenance and repair.
- ✓ Components optimized for strength, durability and fast installation.
- ✓ Easily scalable from kilowatts to multimewatts PV Arrays.
- ✓ UL 2703 Listed by Intertek.

**Key Features of SunTurf™ Roof Mount System**

The SunTurf™ flat roof system is perfect to elevate above obstructions such as HVAC, Pipes and Vents. The streamlined design combines the simplicity of a pipe-based system with next-level engineering. No drilling is required to attach the aluminum rails to the horizontal pipe. The system can be easily adjusted to account for multiple roof pitches on site.

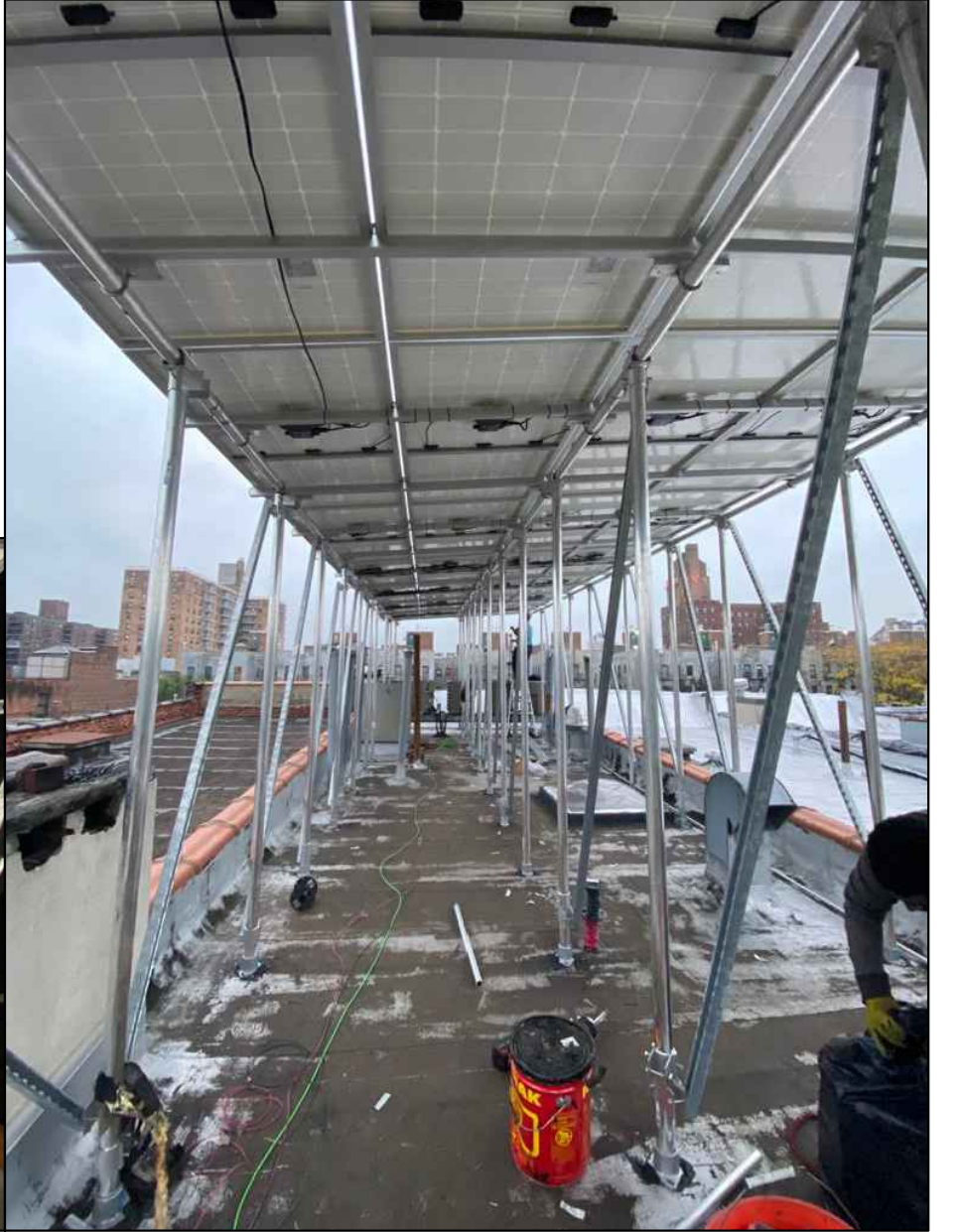
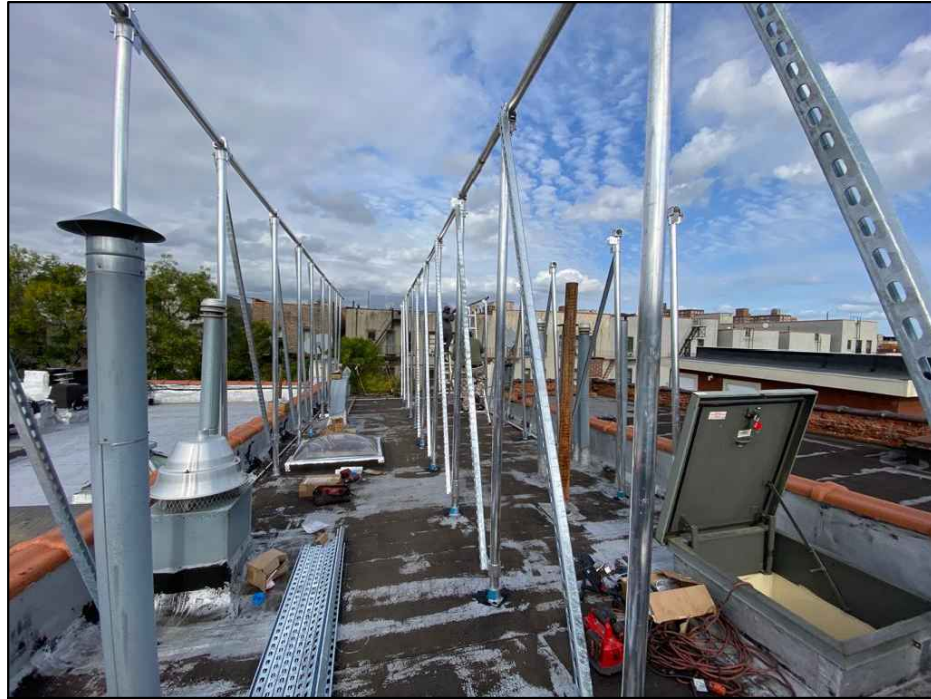
**Technical Data**

Application	Flat Roof
Material	High grade aluminum, galvanized steel and 304 stainless steel hardware
Module Orientation	Portrait and landscape
Tilt Angle	Range between 10 to 50 degrees
Mounting Options	Wood roof joists, metal beams and concrete roof surfaces
Structural Integrity	IBC compliant, stamped engineering letters available
Certification	UL 2703 Listed by ETL
Warranty	25 Years

SunModo, Corp. Vancouver, WA., USA • www.sunmodo.com • 360.844.0048 • info@sunmodo.com

① SunModo data sheet  
N.T.S.

<b>REV</b>	<b>DATE</b>	<b>DESCRIPTION</b>	<b>EPC Contractor</b>	<b>Structural Engineer:</b>	<b>SCALE</b> NTS	<b>DRAWN BY:</b> PA	<b>PROJECT NAME &amp; ADDRESS:</b>	<b>DRAWING TITLE:</b>	<b>SHEET:</b>
							RESIDENCE	RACKING DATASHEET	
						AE PROJECT #8998		DWG. NAME & REV#	
						CUSTOMER PROJECT #----		Example Roof Flat Raised Roof Mount – Rev 0.dwg	
0	10/19/22	ISSUED FOR PERMIT SET				DATE: December 17, 2022			(R3)



① EXAMPLE PHOTOS  
N.T.S.

REV	DATE	DESCRIPTION	EPC Contractor	Structural Engineer:	SCALE: NTS	DRAWN BY: PA	PROJECT NAME & ADDRESS: RESIDENCE ----- -----	DRAWING TITLE: EXAMP. PHOTOS	SHEET: R4
----	----	----			AE PROJECT #8998	CUSTOMER PROJECT #-----		DWG. NAME & REV# Example Roof Flat Raised Roof Mount - Rev 0.dwg	
0	10/19/22	ISSUED FOR PERMIT SET			DATE: December 17, 2022				



# SafetyRail 2000 GUARDRAIL SYSTEM

## Description

The SafetyRail 2000 is a non-penetrating, passive fall protection system for workplace safety that can be used from rooftop to ground level applications. It can be used as a portable or permanent system.

Rail sections are constructed of 1-5/8" inch steel tubing. The rails secure to 108 pound cast iron bases that have four ports, allowing the rails to be placed in infinite positions. When the bases are installed in a run with a 90° return on each end, the combined mass and the geometry of installation creates an OSHA compliant barrier for roof edge protection.

## Basic Use

The SafetyRail 2000 System creates a compliant barrier for roof edge protection. Its unique design eliminates the cost and danger of potential trip hazards created by intermediate counterweights used in other guardrail systems. It provides the economies of a fully portable system for commercial, industrial and worksite applications including rail car platforms, manhole barricade, ramps, construction sites, dig sites, mezzanines, assembly and break areas, crowd control, hoist areas and more.

## OSHA Compliance

- Compliant with regulations for guardrails:
- 29 CFR 1910.23
  - 29 CFR 1926.502

## Features

- No intermediate counter weights required
- Can be used as a portable or permanent guardrail
- Quick installation
- No drilling needed
- Deemed OSHA compliant by an independent accredited engineering firm
- Powder Coat and Galvanized finishes available
- Custom colors available from the RAL Color Codes
- Optional EPDM rubber pads and BUR pads available for added roof surface protection

## Minimum Requirements

In order to meet OSHA regulations for fall protection, outriggers must be utilized (returns/counter weights). Whether the Danger Side Run is 5' or 1000' in length, you must have these in place at the beginning and at the end of the run. Outriggers are standard rail kits that are connected at approximately 90° to the Danger Side Run of each end rail section.

A COMPANY OF INNOVATION — NOT IMITATION

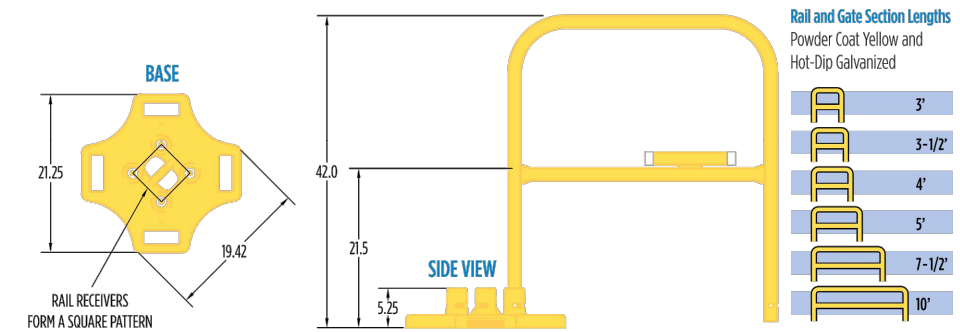


**S**afetyRail 2000 is an OSHA compliant guardrail system for commercial, industrial and worksite applications.

See reverse side for additional specifications and test results



## Product Specifications



**Roof Edge Protection:** Provide freestanding fall protection system on roof

**Approved product:** SafetyRail 2000 Guardrail System

**Standards:** System shall have top and mid rail in accordance with OSHA Standards – 29 CFR 1910.23 and 29 CFR 1926.502

**Structural Load:** 200 lb (90.7 kg), minimum, in any direction to all components in accordance with OSHA Regulations 29 CFR 1910.23 and 29 CFR 1926.502

**Height:** 42 inches (1067 mm)

**Railings:** 1- 5/8 inch (41 mm) O.D. hot rolled pickled electric weld tubing, free of sharp edges and snag points

**Mounting Bases:** Class 30 gray iron material cast with four receiver posts. Base weight 108 lbs and 48 lbs per square foot. Rubber pads on base bottoms.

**Receiver Posts:** Shall have a positive locking system into slots that allow rails to be mounted in any direction. Friction locking systems are not allowed. Receiver posts shall have drain holes.

**Hardware:** Securing pins shall be 1010 carbon steel, zinc plated and yellow chromate dipped. Pins shall consist of collared pin and lanyard that connects to lynch pin.

**Finishes:** Available in standard Powder Coat Yellow and Hot-Dip Galvanized. Custom colors available.

## Options

**Step-Rail:** Variable height railing enables a continuous run of the SafetyRail when the roof steps up or down

**Raised Mid-Rail:** Railing to fit over duct work for continuous run of SafetyRail

**LP Outrigger:** Supports placed under ducting or conduit to continue run of SafetyRail Guardrail System when rail section cannot be used

**SG200:** Sliding (cantilever) gate

**Finishing Rail:** D-shaped railing extension for ladder landings, length or rail section and D-loop as indicated on the drawings

**Surface Protection Pads:** EPDM Rubber Pads and Bur Pads are available

## Independent Test Results

### Test Conclusions:

- The portable guardrail system was found to comply with OSHA regulation 1926.502 for Fall Protection.
- The top rail was capable of withstanding a 200 pound horizontal and vertical load.
- The midpoint of the top rail deflected to 40.75 inches above the floor level when subjected to a 200 pound vertical load.

- The mid rail was capable of withstanding, without failure, a force of 150 pounds, applied in the vertical and horizontal directions.

Tests were conducted by GME Consultants, Consulting Engineers, Minneapolis, MN 55447. Complete Report available from BlueWater.

### Wind Load Calculations

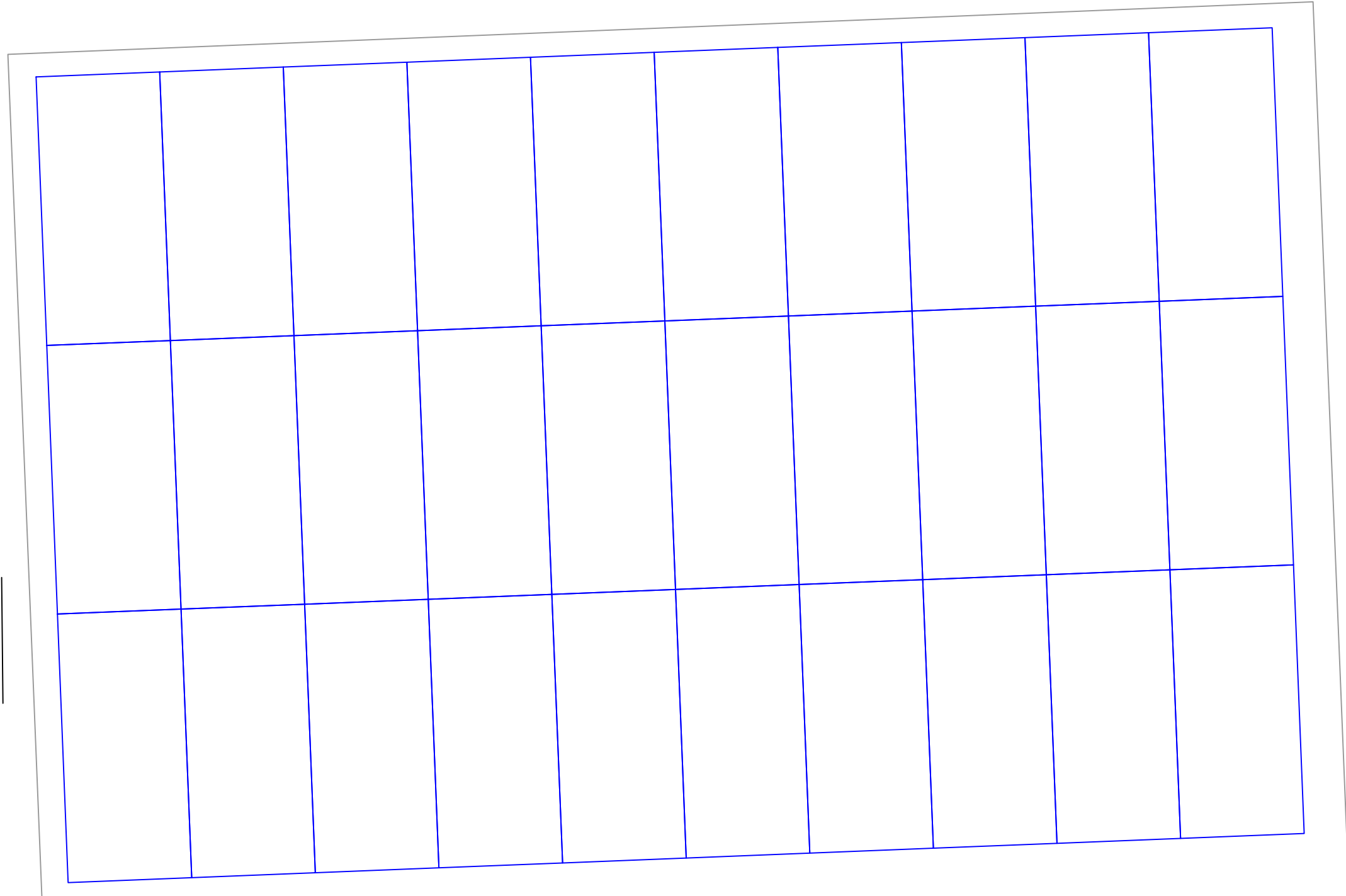
Available on request.

PROJECT:	
CONTRACTOR:	
DATE:	



1 SAFETY RAIL  
N.T.S.

REV	DATE	DESCRIPTION	EPC Contractor	Structural Engineer:	SCALE: NTS	DRAWN BY: PA	PROJECT NAME & ADDRESS:	DRAWING TITLE:	SHEET:
							RESIDENCE	EXAMP. PHOTOS	
					AE PROJECT # 8998			DWG. NAME & REV#	(R5)
					CUSTOMER PROJECT # ----			Example Roof Flat Raised Roof Mount - Rev 0.dwg	
0	10/19/22	ISSUED FOR PERMIT SET			DATE: December 17, 2022				



REV	DATE	DESCRIPTION
0	10/19/22	ISSUED FOR PERMIT SET

EPC Contractor

Structural Engineer:

SCALE: NTS  
 DRAWN BY: PA  
 AE PROJECT #8998  
 CUSTOMER PROJECT #-----  
 DATE: December 17, 2022

PROJECT NAME & ADDRESS:  
 RESIDENCE  
 -----  
 -----

DRAWING TITLE:  
 AS-BUILT STRING CONFIGURATION  
 DWG. NAME & REV#  
 Example Roof Flat Raised Roof Mount - Rev 0.dwg

SHEET:  
 (B1)