4. REDUCED SCOPE PRELIM EAH 1-20-20

CITY OF DENVER BUILDING CODES:
1. 2015 INTERNATIONAL RESIDENTIAL CODE
2. 2015 INTERNATIONAL EXISTING BUILDING CODE
3. 2015 INTERNATIONAL PLUMBING CODE
4. 2015 INTERNATIONAL MECHANICAL CODE
5. 2015 INTERNATIONAL ENERGY CONSERVATION CODE
6. 2017 NATIONAL ELECTRICAL CODE

THE ENTIRE PROPERTY IS IN THE ZONE AE FLOODPLAIN OF HARVARD GULCH AS SHOWN ON FEMA FIRM, MAP NUMBER 0800460212G, MAP REVISED NOVEMBER 17, 2015.

Floodplain layers (taken from FEM’S National Hazard Layer) can be downloaded from FEMA’S Map Service Center free of charge at (https://hazards.fema.gov/femaportal/NFHL/).

A. BASE FLOOD ELEVATION (BFE) = 5345.9’ (NAVD1988).
B. FLOOD PROTECTION ELEVATION (FPE) = 5347.4’ (NAVD 1988).
C. ALL NEW EXTERIOR MACHINERY AND EQUIPMENT SHALL BE ELEVATED ABOVE THE FPE TO PREVENT FLOOD DAMAGE. THIS INCLUDES BUT IS NOT LIMITED TO: ALL ELECTRICAL EQUIPMENT (TRANSFORMERS, ELECTRIC METERS, ELECTRICAL PANELS, JUNCTION BOXES, SWITCHES, RECEPTACLES, ETC.), MECHANICAL EQUIPMENT (HEAT PUMPS, AC UNITS, DUCTWORK, ETC.), GAS FACILITIES (GAS METER AND REGULATOR), AND COMMUNICATIONS EQUIPMENT (PANELS, PEDESTALS, ETC.).
D. IT IS CRUCIAL THAT UTILITIY COMPANIES (XCEL, COMCAST, CENTURYLINK, ETC.) ARE NOTIFIED OF ELEVATION REQUIREMENTS WHEN CALLING IN SERVICE REQUESTS. EXTERIOR MACHINERY AND EQUIPMENT THAT IS INSTALLED BELOW THE REQUIRED ELEVATION WILL BE REQUIRED TO BE RELOCATED AT THE CONTRACTOR’S EXPENSE. CONTRACTORS SHALL MARK MINIMUM ELEVATIONS FOR UTILITY COMPANY INSTALLERS AND COORDINATE SAID INSTALLATIONS.
THE ENTIRE PROPERTY IS IN THE ZONE AE FLOODPLAIN OF
HARVARD GULCH AS SHOWN ON FEMA FIRM, MAP NUMBER
0800460212G, MAP REVISED NOVEMBER 17, 2005.
Floodplain layers (taken from FEM’s National Hazard Layer)
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 TRANSFORMERS, ELECTRIC METERS, ELECTRICAL PANELS,
JUNCTION BOXES, SWITCHES, RECEPTACLES, ETC.), MECHANICAL
EQUIPMENT (HEAT PUMPS, AC UNITS, DUCTWORK, ETC.), GAS
FACILITIES (GAS METER AND REGULATOR), AND COMMUNICATIONS
EQUIPMENT (PANELS, PEDESTALS, ETC.).

D. IT IS CRUCIAL THAT UTILITIY COMPANIES (XCEL, COMCAST,
CENTURYLINK, ETC.) ARE NOTIFIED OF ELEVATION REQUIREMENTS
WHEN CALLING IN SERVICE REQUESTS. EXTERIOR MACHINERY AND
EQUIPMENT THAT IS INSTALLED BELOW THE REQUIRED ELEVATION
WILL BE REQUIRED TO BE RELOCATED AT THE CONTRACTOR’S
EXPENSE. CONTRACTORS SHALL MARK MINIMUM ELEVATIONS FOR
UTILITY COMPANY INSTALLERS AND COORDINATE SAID
INSTALLATIONS.
EXISTING BASEMENT PLAN

SCALE: 1/4" = 1'-0"

EXISTING MAIN FLOOR PLAN

SCALE: 1/4" = 1'-0"
EXISTING ROOF PLAN
SCALE: 1/4" = 1'-0"

EXISTING ROOF FRAMING PLAN
SCALE: 1/4" = 1'-0"

FOR PORCH WAS AN ADD ON AND IS FRAMED SEPARATELY
THIS PROPERTY HAS ASBESTOS!
PLEASE SEE THE ASBESTOS INSPECTION REPORT AND MITIGATION QUOTE IN THE PROJECT MANUAL.
PROPOSED ROOF PLAN

SCALE: 1/4" = 1'-0"

PROPOSED ROOF FRAMING PLAN

SCALE: 1/4" = 1'-0"

PORCH WAS AN ADD-ON AND IS FRAMED SEPARATELY
FIRE PROTECTION SPRINKLER SYSTEMS ARE NOT REQUIRED FOR A SINGLE FAMILY RESIDENCE PER THE DENVER CITY CODE.
BASEMENT LAYOUT

SCALE: 1/4" = 1'-0"

MAIN FLOOR LAYOUT

SCALE: 1/4" = 1'-0"
A. BASE FLOOD ELEVATION (BFE) = 5345.9' (NAVD 1988).

B. FLOOD PROTECTION ELEVATION (FPE) = 5347.4' (NAVD 1988).

C. ALL NEW EXTERIOR MACHINERY AND EQUIPMENT SHALL BE ELEVATED ABOVE THE FPE TO PREVENT FLOOD DAMAGE. THIS INCLUDES BUT IS NOT LIMITED TO: ALL ELECTRICAL EQUIPMENT (TRANSFORMERS, ELECTRIC METERS, ELECTRICAL PANELS, JUNCTION BOXES, SWITCHES, RECEPTACLES, ETC.), MECHANICAL EQUIPMENT (HEAT PUMPS, AC UNITS, DUCTWORK, ETC.), GAS FACILITIES (GAS METER AND REGULATOR), AND COMMUNICATIONS EQUIPMENT (PANELS, PEDESTALS, ETC.).

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BASEMENT LAYOUT
SCALE: 1/4" = 1'-0"
1. REPLACE ALL EXISTING SWITCHES, OUTLET AND COVER PLATES WITH NEW DECOR FIXTURES - WHITE.

2. ALL EXISTING LIGHTS WILL BE REPLACED WITH LED LIGHT FIXTURES.
A. BASE FLOOD ELEVATION (BFE) = 5345.9' (NAVD1988).

B. FLOOD PROTECTION ELEVATION (FPE) = 5347.4' (NAVD 1988).

C. ALL NEW EXTERIOR MACHINERY AND EQUIPMENT SHALL BE ELEVATED ABOVE THE FPE TO PREVENT FLOOD DAMAGE. THIS INCLUDES BUT IS NOT LIMITED TO: ALL ELECTRICAL EQUIPMENT (TRANSFORMERS, ELECTRIC METERS, ELECTRICAL PANELS, JUNCTION BOXES, SWITCHES, RECEPTACLES, ETC.), MECHANICAL EQUIPMENT (HEAT PUMPS, AC UNITS, DUCTWORK, ETC.), GAS FACILITIES (GAS METER AND REGULATOR), AND COMMUNICATIONS EQUIPMENT (PANELS, PEDESTALS, ETC.).

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PROPOSED BASEMENT ELECTRICAL

PROPOSED MAIN FLOOR ELECTRICAL
NEW PV SYSTEM: 5.280 kWp
UNIVERSITY OF DENVER - CAMPUS CRAFT
2468 S RACE ST
DENVER, CO 80210

1.1.1 PROJECT NOTES:
1.1.2 THIS PHOTOVOLTAIC (PV) SYSTEM SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE (NEC) ARTICLE 690, ALL MANUFACTURER’S LISTING AND INSTALLATION INSTRUCTIONS, AND THE RELEVANT CODES AS SPECIFIED BY THE AUTHORITY HAVING JURISDICTIONS (AHJ) APPLICABLE CODES.
1.1.3 THE UTILITY INTERCONNECTION APPLICATION MUST BE APPROVED AND PV SYSTEM INSPECTED PRIOR TO PARALLEL OPERATION.
1.1.4 ALL PV SYSTEM COMPONENTS; MODULES, UTILITY-INTERACTIVE INVERTERS, AND SOURCE CIRCUIT COMBINED BOXES ARE IDENTIFIED AND LISTED FOR USE IN PHOTOVOLTAIC SYSTEMS AS REQUIRED BY NEC 690.4:
PV MODULES:
UL1703, IEC61730, AND IEC61215, AND NFPA 70 CLASS C FIRE
INVERTERS:
UL 1741 CERTIFIED, IEEE 1547, 929, 519
COMBINER BOX(ES):
UL 1703 OR UL 1741 ACCESSORY
1.1.5 MAX DC VOLTAGE CALCULATED USING MANUFACTURER PROVIDED TEMP COEFFICIENT FOR VOC. IF UNAVAILABLE, MAX DC VOLTAGE CALCULATED ACCORDING TO NEC 690.7.
1.1.6 ALL INVERTERS, PHOTOVOLTAIC MODULES, PHOTOVOLTAIC PANELS, AND SOURCE CIRCUIT COMBINERS INTENDED FOR USE IN A PHOTOVOLTAIC POWER SYSTEM WILL BE IDENTIFIED AND LISTED FOR THE APPLICATION PER 690.4 (D). SHALL BE INSTALLED ACCORDING TO ANY INSTRUCTIONS FROM LISTING OR LABELING [NEC 110.3].
1.1.7 ALL SIGNAGE TO BE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE. IF EXPOSED TO SUNLIGHT, IT SHALL BE UV RESISTANT. ALL PLAQUES AND SIGNAGE WILL BE INSTALLED AS REQUIRED BY THE NEC AND AHJ.

1.2.1 SCOPE OF WORK:
1.2.2 PRIME CONTRACTOR IS RESPONSIBLE FOR THE DESIGN AND SPECIFICATIONS OF THE GRID-TIED PHOTOVOLTAIC SYSTEM RETROFIT. PRIME CONTRACTOR WILL BE RESPONSIBLE FOR COLLECTING EXISTING ONSITE REQUIREMENTS TO DESIGN, SPECIFY, AND INSTALL THE EXTERIOR ROOF-MOUNTED PORTION OF THE PHOTOVOLTAIC SYSTEMS DETAILED IN THIS DOCUMENT.

1.3.1 WORK INCLUDES:
1.3.2 PV ROOF ATTACHMENTS - UNIRAC FLASHKIT PRO
1.3.3 PV RACKING SYSTEM INSTALLATION - UNIRAC LIGHT
1.3.4 PV MODULE AND INVERTER INSTALLATION - PANASONIC VBHN330SA17/SOLAR EDGE SE3800H-US (240V)
1.3.5 PV EQUIPMENT GROUNDING
1.3.6 PV SYSTEM WIRING TO A ROOF-MOUNTED JUNCTION BOX
1.3.7 PV LOAD-CENTERS (IF INCLUDED)
1.3.8 PV METERS/MONITORING (IF INCLUDED)
1.3.9 PV DISCONNECTS
1.3.10 PV FINAL COMMISSIONING
1.3.11 (E) ELECTRICAL EQUIPMENT RETROFIT FOR PV
1.3.12 SIGNAGE PLACED IN ACCORDANCE WITH LOCAL BUILDING CODE

SCREW OF WORK:
SYSTEM SIZE: STC: 16 X 330W = 5.280KW
PTC: 16 X 311.7W = 4.987KW DC
(16) PANASONIC VBHN330SA17
(1) SOLAR EDGE SE3800H-US (240V)
ATTACHMENT TYPE: UNIRAC FLASHKIT PRO
MSP UPGRADE: NO

OWNER
NAME: UNIVERSITY OF DENVER - CAMPUS CRAFT

PROJECT MANAGER
NAME: JOEL SCOTT
PHONE: 720-509-9298

CONTRACTOR
NAME: LIV SOLAR, LLC
PHONE: 720-509-9298

AUTHORITIES HAVING JURISDICTION
BUILDING: CITY OF DENVER
ZONING: CITY OF DENVER
UTILITY: XCEL ENERGY - COLORADO

DESIGN SPECIFICATIONS
OCCUPANCY: II
CONSTRUCTION: SINGLE-FAMILY
ZONING: RESIDENTIAL
GROUND SNOW LOAD: 35 PSF
WIND EXPOSURE: B
WIND SPEED: 107 MPH
APPLICABLE CODES & STANDARDS
BUILDING: IBC 2015 IRC 2015
ELECTRICAL: NEC 2017
FIRE: IFC 2015

PAPER SIZE: 11" x 17" (ANSI B)
COVER PAGE
DATE: 04.11.2020
DESIGN BY: E.K.
CHECKED BY: M.M.
REVISIONS
T-001.00
(SHEET 1)
2.1.1 SITE NOTES: 2.4.9

2.1.1 A LADDER WILL BE IN PLACE FOR INSPECTION IN COMPLIANCE WITH OSHA REGULATIONS.
2.1.3 THE PV MODULES ARE CONSIDERED NON-CONDUCTIBLE AND THIS SYSTEM IS AN UTILITY INTERACTIVE SYSTEM WITH NO STORAGE BATTERIES.
2.1.4 THE SOLAR PV INSTALLATION WILL NOT OBSTRUCT ANY PLUMBING, MECHANICAL, OR BUILDING ROOF VENTS.

2.1.5 PROPER ACCESS AND WORKING CLEARANCE AROUND EXISTING AND PROPOSED ELECTRICAL EQUIPMENT WILL BE PROVIDED AS PER SECTION NEC 110.26.
2.1.6 ROOF CONSTRUCTIONS SHALL BE DESIGNED, INSTALLED AND MAINTAINED IN ACCORDANCE WITH THIS CODE AND THE APPROVED MANUFACTURER'S INSTRUCTIONS SUCH THAT THE ROOF COVERING SERVES TO PROTECT THE BUILDING STRUCTURE.

2.2 EQUIPMENT LOCATIONS:

2.2.1 ALL EQUIPMENT SHALL MEET MINIMUM SETBACKS AS REQUIRED BY NEC 110.26.
2.2.2 WIRING SYSTEMS INSTALLED IN DIRECT SUNLIGHT MUST BE RATED FOR EXPECTED OPERATING TEMPERATURES AS SPECIFIED BY NEC 690.31 (A) AND NEC TABLES 310.15 (B)(2)U AND 310.15 (B)(3)C.
2.2.3 JUNCTION AND BOXES PERMITTED INSTALLED UNDER PV MODULES ACCORDING TO NEC 690.34.
2.2.4 ADDITIONAL AC DISCONNECT(S) SHALL BE PROVIDED WHERE THE INVERTER IS NOT WITHIN SIGHT OF THE AC SERVICING DISCONNECT.
2.2.5 ALL EQUIPMENT SHALL BE INSTALLED ACCESSIBLE TO QUALIFIED PERSONNEL ACCORDING TO NEC APPLICABLE CODES.
2.2.6 ALL COMPONENTS ARE LISTED FOR THEIR PURPOSE AND RATED FOR OUTDOOR USAGE WHEN APPROPRIATE.

2.3 STRUCTURAL NOTES:

2.3.1 RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO CODE-COMPLIANT INSTALLATION MANUAL. TOP CLAMPS REQUIRE A DESIGNATED SPACE BETWEEN MODULES, AND RAILS MUST ALSO EXTEND A MINIMUM DISTANCE BEYOND EITHER EDGE OF THE ARRAYS/ARRAY.
2.3.2 RACKING SYSTEM & PV ARRAY WILL BE INSTALLED ACCORDING TO RAIL MANUFACTURER'S INSTRUCTIONS.
2.3.3 JUNCTION BOX WILL BE INSTALLED PER MANUFACTURERS' SPECIFICATIONS, IF ROOF-PENETRATING TYPE, IT SHALL BE FLASCHED & SEALcaled PER LOCAL REQUIREMENTS.
2.3.4 ROOF TOP PENETRATIONS FOR PV RACEWAY WILL BE COMPLETED AND SEALEd WITH APPROVED SEALANT PER CODE BY A LICENSED CONTRACTOR.
2.3.5 ALL RELATED ROOF ATTACHMENTS TO BE SPAced NO GREATER THAN THE SPAN DISTANCE SPECIFIED BY THE RACKING MANUFACTURER.
2.3.6 WHEN POSSIBLE, ALL RELATED RACK ATTACHMENTS WILL BE STAGGERED AMONGST THE ROOF FRAMING MEMBERS.

2.4 GROUNDING NOTES:

2.4.1 GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, AND GROUNDING DEVICES EXPOSED TO THE ELEMENTS SHALL BE RATED FOR SUCH USAGE.
2.4.2 PV SYSTEMS REQUIRE AN EQUIPMENT GROUNDING CONDUCTOR. ALL METAL ELECTRICAL EQUIPMENT AND STRUCTURAL COMPONENTS BONDED TO GROUND, IN ACCORDANCE WITH 250.134 OR 250.134(A) ONLY THE DC CONDUCTORS ARE UNGROUNDED.
2.4.3 PV EQUIPMENT SHALL BE GROUNDED ACCORDING TO NEC 690.43 AND MINIMUM NEC TABLE 250.122.
2.4.4 METAL PARTS OF MODULE FRAMES, MODULE RACKING, AND ENCLOSURE CONSIDERED GROUNDING ARE INSTALLED IN ACCORDANCE WITH 250.134 AND 250.134(A).
2.4.5 EACH MODULE WILL BE GROUNDED USING WEBB GROUNDING CLIPS AS SHOWN IN MANUFACTURER DOCUMENTATION AND APPROVED BY THE AHJ. IF WEBBS ARE NOT USED, MODULE GROUND LUGS MUST BE INSTALLED AT THE SPECIFIED GROUNDING LUG HOLES PER THE MANUFACTURERS INSTALLATION REQUIREMENTS.
2.4.6 THE GROUNDING CONNECTION TO A MODULE SHALL BE ARRANGED SUCH THAT THE REMOVAL OF A MODULE DOES NOT INTERRUPT A GROUNDING CONDUCTOR TO ANOTHER MODULE.
2.4.7 GROUNDING AND BONDING CONNECTORS, IF INSULATED, SHALL BE COLOR RED OR MARKED GREEN IF 4 AWG OR LARGER (NEC 250.119).

2.5 GROUNDING ELECTRIC DEVICE SYSTEM MUST COMPLY WITH NEC 690.47 AND NEC 250.50 THROUGH 250.106. IF EXISTING SYSTEM IS INACCESSIBLE OR INADEQUATE.
2.5.1 GROUNDING ELECTRIC DEVICE SYSTEM PROVIDED ACCORDING TO NEC 250. NEC 690.47 AND ADC.
2.5.2 DC PV ARRAYS SHALL BE PROVIDED WITH DC GROUND-FAULT PROTECTION MEETING THE REQUIREMENTS OF 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS.

2.6 DISCONNECT INSTRUCTIONS:

2.6.1 DISCONNECT SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAIN ENERGIZED.
2.6.2 DISCONNECTING SWITCHES SHALL BE WIRED SUCH THAT WHEN THE SWITCH IS OPENED THE CONDUCTORS REMAIN ENERGIZED AND THE REQUIREMENTS OF 690.41(B)(1) AND (2) TO REDUCE FIRE HAZARDS.
2.6.3 ISOLATING DEVICES OR EQUIPMENT DISCONNECTING MEANS SHALL BE ALLOWED TO BE REMOVED WITHOUT DISCONNECTING OTHER CONDUCTORS OR EQUIPMENT.
2.6.4 ISOLATING DEVICES OR EQUIPMENT DISCONNECTING MEANS SHALL BE ALLOWED TO BE REMOVED WITHOUT DISCONNECTING OTHER CONDUCTORS OR EQUIPMENT.
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2.7 WIRING & CONDUIT NOTES:

2.7.1 WIRING & CONDUIT NOTES:
2.7.2 Modules wiring shall be located and secured under the array according to NEC 200.7, Ungrounded systems dc conductors colored or marked as follows: dc-positive red, or other color excluding white, grey and green.
2.7.3 Module wiring shall be located and secured under the array according to NEC 200.7, Ungrounded systems dc conductors colored or marked as follows: dc-positive red, or other color excluding white, green, and grey.
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2.8 GROUNDING AND BONDING NOTES:

2.8.1 GROUNDING AND BONDING NOTES:
2.8.2 Grounding and bonding conductors, if insulated, shall be colored green or marked green if 4 awg or larger (Nec 250.119).
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NEW PV SYSTEM: 5.280 kWp

ENGINEER OF RECORD:

DATE: 04.11.2020

DESIGN BY: E.N.

CHECKED BY: M.M.

UNIVERSITY OF DENVER - CAMPUS
CRAFT
2468 S RACE ST
DENVER, CO 80210

CONTRACTOR
LIV SOLAR, LLC
PHONE: 720-509-6298
ADDRESS: 4621 W 101 ST CIR
WESTMINSTER, CO 80031

PAPER SIZE: 11" x 17" (ANSI B)

A-101.00
(SHEET 3)
NEW PV SYSTEM: 5.280 kWp

ENGINEER OF RECORD: 04.11.2020

DESIGN BY: E.N. M.M.

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CRAFT
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DENVER, CO 80210

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CONTRACTOR: LIV SOLAR, LLC
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ADDRESS: 4821 W 101ST CIR
WESTMINSTER, CO 80031

LIC. NO.: 4821 W 101ST CIR
HIC. NO.: LIV SOLAR, LLC
ELE. NO.: UNIVERSITY OF DENVER - CAMPUS

ENGINEER OF RECORD: 04.11.2020

DATE: 04.11.2020
CHECKED BY: M.M.
REVISIONS

ELECTRICAL PLAN
A-102.00
(SHEET 4)
SOLAR ATTACHMENT PLAN

MODULE: PANASONIC VBHN330SA17 330 WATTS

FLUSH MOUNT SOLAR MODULES ATTACHED TO ROOF SURFACE (SEE SHEET S-501 FOR MOUNTING DETAILS)

ROOF MATERIAL IS ASPHALT SHINGLE

15'-8"

20'-11"

ROOF RAFTERS

GENERAL NOTES
1. FIELD VERIFY ALL MEASUREMENTS
2. ITEMS BELOW MAY NOT BE ON THIS PAGE

NEW PV SYSTEM: 5.280 kWp

ENGINEER OF RECORD
04.11.2020

DESIGN BY:
E.N.
M.M.

UNIVERSITY OF DENVER - CAMPUS
CRAFT
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LIV SOLAR, LLC

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ADDRESS: 4621 W 101ST CIR
WESTMINSTER, CO 80031

PAPER SIZE: 11" x 17" (ANSI B)

LIC. NO.:
ELE. NO.:

HIC. NO.:

PHONE:
720-509-9298

DATE:
04.11.2020

CHECKED BY:
M.M.

REVATIONS

1/8" = 1'

SOLAR ATTACHMENT PLAN (SHEET 5)

A-103.00
A. MODULE STRINGING
B. MODULE STRINGING

1. SYSTEM EQUIPPED WITH RAPID SHUTDOWN DISCONNECT PER NEC 690.12.
2. SYSTEM COMPLIANT WITH NEC 690.13

PV PRODUCTION METER NOTES:

PV PRODUCTION METER - 200A SELF-CONTAINED METER SOCKET
WITH LEVER BYPASS, COMPLIANT WITH THE MOST RECENT REVISION
OF THE XCEL ENERGY STANDARD, SPECIFICALLY SECTION 4.11.
PV GENERATION WIRING TO THE LINE SIDE TERMINALS.
PV PRODUCTION METER TO HAVE STAMPED BRASS, ALUMINUM, OR
STAINLESS STEEL TAG, 2468 S RACE ST, DENVER, CO 80210,
INCLUDING THE UNITING NUMBER AND "PV PROD" IN ACCORDANCE
WITH THE REQUIREMENTS FOR METER IDENTIFICATION IN SECTION
4.14.4 OF THE XCEL ENERGY STANDARD. LOCATED WITHIN 10' OF THE
EXISTING UTILITY METER

UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN
PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS
AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS.
## SYSTEM SUMMARY

<table>
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<tr>
<th>STRING 1</th>
<th>STRING 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>15A</td>
<td>15A</td>
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</tbody>
</table>

### POWERBOX MAX OUTPUT CURRENT
- 15A
- 15A

### NOMINAL STRING VOLTAGE
- 367V
- 380V

### ARRAY OPERATING VOLTAGE
- 6.95A
- 6.95A

### ARRAY STC POWER
- 5.280W

### MAX AC CURRENT
- 16A

### DERATED (DEAD) AC POWER
- 3.820W

## ASHRAE EXTREME LOW
- 29.5°C (-21.1°F), SOURCE: DENVER-STAPLETON (39.75°; -104.87°)

## ASHRAE 2% HIGH
- 34.7°C (94.5°F), SOURCE: DENVER-STAPLETON (39.75°; -104.87°)

### ELECTRICAL METERS
- Owner Approved

### DESIGNER OF RECORD
- 04.11.2020

### UNIVERSITY OF DENVER - CAMPUS
- CRAFT
- 2468 S RACE ST
- DENVER, CO 80210

### CONTRACTOR
- LIV SOLAR, LLC
- PHONE: 720-509-9298
- ADDRESS: 4821 W 101ST CIR
- WESTMINSTER, CO 80031
- LIC. NO.: 4821 W 101ST CIR
- ELE. NO.: 720-509-9298

### NEW PV SYSTEM: 5.280 kWp

### ENGINEER OF RECORD
- E.N.
- M.M.

### UNIVERSITY OF DENVER - CAMPUS
- CRAFT
- 2468 S RACE ST
- DENVER, CO 80210

### PAPER SIZE: 11" x 17" (ANSI B)

### DRAWING SETS FOR THIS WORK ARE NOT TO BE DUPLICATE FOR USE WITHOUT WRITTEN PERMISSION FROM THE CONTRACTOR FOR VIOLACTION OF U.S. COPYRIGHT LAWS.

### PLOTTED BY:
- 2020

### SHEET 7

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### BILL OF MATERIALS

#### CATEGORY

<table>
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<tr>
<th>MAKE AND MODEL</th>
<th>PREP</th>
<th>QTY</th>
<th>UNIT</th>
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<tbody>
<tr>
<td>VBHN330SA17</td>
<td>PM-16</td>
<td>16</td>
<td>PIECES</td>
</tr>
<tr>
<td>SOLAR EDGE SE3800H-US (240V)</td>
<td>PO-16</td>
<td>16</td>
<td>PIECES</td>
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<tr>
<td>SOLAR EDGE P370</td>
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<td>PIECES</td>
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<tr>
<td>SOLAR EDGE SE3800H-US (240V)</td>
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<td>SOLAR EDGE SE3800H-US (240V)</td>
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<td>PIECE</td>
</tr>
</tbody>
</table>

#### DESCRIPTION

- **Make and Model**
  - **Panasonic** VBHN330SA17
  - **Solar Edge** SE3800H-US (240V)
  - **Solar Edge** P370
  - **Eaton** DG327LRB
  - **Eaton** DG327LRB
  - **Eaton** DG327LRB
  - **Eaton** DG327LRB
  - **Eaton** DG327LRB
  - **Eaton** DG327LRB

### ASHRAE EXTREME LOW
- 29.5°C (-21.1°F), SOURCE: DENVER-STAPLETON (39.75°; -104.87°)

### ASHRAE 2% HIGH
- 34.7°C (94.5°F), SOURCE: DENVER-STAPLETON (39.75°; -104.87°)

---

### SYSTEM DESIGN TABLES

#### PANELS

<table>
<thead>
<tr>
<th>REF.</th>
<th>QTY</th>
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</thead>
<tbody>
<tr>
<td>PM-16</td>
<td>16</td>
<td>PANASONIC VBHN330SA17</td>
</tr>
<tr>
<td>PO-16</td>
<td>16</td>
<td>SOLAR EDGE P370</td>
</tr>
</tbody>
</table>

#### INVERTERS

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>IT</td>
<td>1</td>
<td>SOLAR EDGE SE3800H-US (240V)</td>
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</table>

#### MODULES

<table>
<thead>
<tr>
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<tr>
<td>SW1</td>
<td>1</td>
<td>EATON DG327LRB</td>
</tr>
<tr>
<td>CB1</td>
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#### POWER OPTIMIZERS

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#### DISCONNECTS

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CAUTION!

POWER TO THIS BUILDING IS ALSO SUPPLIED FROM ROOF MOUNTED SOLAR ARRAYS WITH SAFETY DISCONNECTS AS SHOWN:

NEW PV SYSTEM: 5.280 kWp

ENGINEER OF RECORD: 04.11.2020

DESIGN BY: E.N., M.M.

UNIVERSITY OF DENVER - CAMPUS
2468 S RACE ST
DENVER, CO 80210

CONTRACTOR
LIV SOLAR, LLC
PHONE: 720-509-9298
ADDRESS: 4821 W 101ST CIR
WESTMINSTER, CO 80031

LICENSED UNDER THE TRADEMARK "LIV SOLAR". THIS DRAWING SET IS PROTECTED BY U.S. AND FOREIGN COPYRIGHT LAWS AND RIGHTS OF PROTECTION OR COPYRIGHT UNDER THE TREATIES OF PARIS. DUPLICATE SETS ARE NOT TO BE MADE OR DISTRIBUTED WITHOUT WRITTEN PERMISSION FROM CONTRACTOR. UNAUTHORIZED USE OF THIS DRAWING SET WITHOUT WRITTEN PERMISSION FROM CONTRACTOR IS IN VIOLATION OF U.S. COPYRIGHT LAWS AND WILL BE SUBJECT TO CIVIL DAMAGES AND PROSECUTIONS.

PAPER SIZE: 11" x 17" (ANSI B)

PLACARDS

DATE: 04.11.2020
DESIGN BY: E.K.
CHECKED BY: M.M.
REVISIONS
E-603.00
SHEET KEYNOTES

1. ROOF MATERIAL: ASPHALT SHINGLE
2. ROOF STRUCTURE: SINGLE SPAN RAFTER
3. ATTACHMENT TYPE: UNIRAC FLASHKIT PRO
4. MODULE MANUFACTURER: PANASONIC
5. MODULE MODEL: VBHN330SA17
6. MODULE LENGTH: 62.6''
7. MODULE WIDTH: 41.5''
8. MODULE WEIGHT: 40.81 LBS.
9. SEE SHEET A-103 FOR DIMENSION(S)
10. MIN. FIRE OFFSET: 18" FROM RIDGE, AT LEAST 2 PATHWAY TO A STREET OR DRIVEWAY MINIMUM 3' WIDE
11. RAFTER SPACING: 16 IN. O.C.
12. RAFTER SIZE: 2X6 NOMINAL
13. LAG BOLT DIAMETER: BOLT/SCREW SUPPLIED WITH RACKING
14. LAG BOLT EMBEDMENT: 2-1/2"
15. TOTAL # OF ATTACHMENTS: 53
16. TOTAL AREA: 288.66 SQ. FT.
17. TOTAL WEIGHT: 757.32 LBS.
18. WEIGHT PER ATTACHMENT: 14.29 LBS.
19. DISTRIBUTED LOAD: 2.62 PSF
20. MAX. HORIZONTAL STANDOFF: 48 IN.
21. MAX. VERTICAL STANDOFF:
   LANDSCAPE: 26 IN., PORTRAIT: 33 IN.
22. STANDOFF STAGGERING: YES
23. RAIL MANUFACTURER (OR EQUIVALENT): UNIRAC
24. RAIL MODEL (OR EQUIVALENT): LIGHT
25. RAIL WEIGHT: 0.491 PLF.
26. MAX. RAFTER SPAN: 16 FT.
27. MODULE CLEARANCE: 3 IN. MIN., 6 IN. MAX.

FIELD VERIFY ALL MEASUREMENTS

NEW PV SYSTEM: 5.280 kWp

ENGINEER OF RECORD
04.11.2020

CONTROLLER
LIV SOLAR, LLC
PHONE: 720-509-9298
ADDRESS: 4821 W 101ST CIR
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UNIVERSITY OF DENVER - CAMPUS
2468 S RACE ST
DENVER, CO 80210

ASSEMBLY DETAILS
DATE: 04.11.2020
DESIGN BY: E.H.
CHECKED BY: M.M.
REVISIONS

S-501.00 (SHEET 6)
Panasonic’s unique ball-injection technology uses ultra-thin amorphous silicon layers. These thin dual layers reduce losses, resulting in higher energy output than conventional panels.

Advanced bifacial cell designed for increased energy output. The cell utilizes sunlight reflected back from the rear side material, which captures more light and converts into energy.

Our competitive advantages

**High Efficiency at High Temperatures**
As temperature increases, HIT™ continues to perform at high levels due to the industry leading temperature coefficient of -0.25%/°C. No other module even comes close to our temperature characteristics. That means more energy throughout the day.

**Quality and Reliability**
Panasonic’s vertical integration, 21 years of experience manufacturing HIT™ and 20 internal tests beyond those mandated by current standards provide extreme quality assurance.

**Low Degradation**
HIT™-type™ cells result in extremely Low Light Induced Degradation (LLID) and zero Potential Induced Degradation (PID) which supports reliability and longevity. This technology reduces annual degradation to 0.26% compared to 0.71% in conventional panels, guaranteeing more power for the long haul.

**Enhanced Frame Design**
A new Aluminium frame increases durability and strength, being able to handle loads of up to 5000Pa. Also, the water drainage system gives rainwater and snow melt a place to go, reducing water stains and soiling. Less dirt on the module means more sunlight getting through to generate power.

**25 Year Product and Performance Warranty**
Industry leading 25 year product workmanship and performance warranty is backed by a century old company - Panasonic. Power output is guaranteed to 90.7% after 25 years, far greater than other manufacturers.

**Higher Efficiency 19.7%**
Enables higher power output and greater energy yields. HIT™ provides maximum production for your limited roof space.

CONTRACTOR
LIV SOLAR LLC
PHONE: 720-509-9298
ADDRESS: 4821 W 101ST CIR
WESTMINSTER, CO 80031
LIC. NO.: LIV-0001201
ELE. NO.: 4821 W 101ST CIR

NEW PV SYSTEM: 5.280 kWp
UNIVERSITY OF DENVER - CAMPUS
CRAFT
2468 S RACE ST
DENVER, CO 80210
ENGINEER OF RECORD

PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT

DATE: 01.11.2020
CHECKED BY: M.M.
REVISIONS
R-001.00 (SHEET 1/6)
Single Phase Inverter with HD-Wave Technology for North America

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014 and 2017, per article 690.11 and 690.12
- UL1741-SA certified, for CPUC Rule 21 grid compliance
- Extremely small
- Built-in module-level monitoring
- Outdoor and indoor installation
- Optional: Revenue grade data, ANSI C12.20 Class 0.5 (0.5% accuracy)

SolarEdge.com
Power Optimizer
For North America
P320 / P340 / P370 / P400 / P405 / P505

PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses, from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PRVSS)
- Module-level voltage shutdown for installer and firefighter safety

Resource Document

R-003.00

(SHEET 12)
SOLARMOUNT defined the standard in solar racking. New enhancements are designed to get installers off the roof faster than ever before. Components are pre-assembled and optimized to reduce installation steps and save labor time. Our new grounding & bonding process eliminates copper wire and grounding straps to reduce costs. Utilize the microinverter mount with a wire management clip for an easier installation.

ELIMINATE THE GROUNDWIRE FROM YOUR SOLARMOUNT ARRAY
LOSE THE COPPER & LUGS
INTEGRATED GROUNDING

UL2703 BONDING & GROUNDING MECHANICAL LOADING SYSTEM FIRE CLASSIFICATION

GET OFF THE ROOF FASTER THAN EVER BEFORE
OPTIMIZED COMPONENTS • VERSATILITY • AVAILABILITY • DESIGN TOOLS

UNIVERSITY OF DENVER - CAMPUS
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PAPER SIZE: 11" x 17" (ANSI B)

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04.11.2020

DESIGN BY:
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PAPER SIZE: 11" x 17" (ANSI B)

RESOURCE DOCUMENT
DATE: 04.11.2020
DESIGN BY: E.H.
CHECKED BY: M.M.

R-004.00 SHEET 13

PRODUCT LINE: SOLARMOUNT
DRAWING TYPE: PART DETAIL
DESCRIPTION: LIGHT RAIL
REVISION DATE: October 2016
LEGAL NOTICE

PRODUCT PROTECTED BY ONE OR MORE US PATENTS
DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

1 1/16" BOLT LOCATION

3/4" BOLT LOCATION

Standard Rail Lengths:
165"
240"

SM-P02
FLASHKIT PRO is the complete attachment solution for composition shingle roofs. Linirac partnered with EcoFasten Solar to bring best-in-class design and performance together in one package. Kitted in 10 packs for maximum convenience, flashings and hardware are available in Mill or Dark finishes. With FLASHKIT PRO, you have everything you need for a quick, professional installation.

**NEW PV SYSTEM: 5.280 kWp**

**ENGINEER OF RECORD**

**04.11.2020**

**DESIGN BY:**

E.N.

M.M.

**UNIVERSITY OF DENVER - CAMPUS CRAFT**

2468 S RACE ST

DENVER, CO 80210

**PAPER SIZE:** 11” x 17” (ANSI B)

**CONTRACTOR**

LIV SOLAR, LLC

PHONE: 720-509-9290

ADDRESS: 4621 W 101ST CIR

WESTMINSTER, CO 80031

**LIC. NO.:**

**ELE. NO.:**

**DATE:**

**CHECKED BY:**

**REVISIONS**

R-005.00

(SHEET 1/4)