Staff Report

PLANNING DIVISION
COMMUNITY & NEIGHBORHOOD DEVELOPMENT

To: Salt Lake City Historic Landmark Commission

From: Michael Maloy, AICP, Senior Planner, michael.maloy@slcgov.com
Brittney Topel, Planning Intern, brittney.topel@slcgov.com

Date: November 3, 2016

Re: **PLNHLC2016-00495** – Solar Panels at 226 W Fern Avenue

MINOR ALTERATION

PROPERTY ADDRESS: 226 W Fern Avenue
PARCEL IDENTIFICATION NUMBER: 08-25-455-037
HISTORIC DISTRICT: Capitol Hill Local Historic District
ZONING DISTRICT: SR-1A Special Development Pattern Residential, and H Historic Preservation Overlay District
MASTER PLAN: Low Density Residential (5 - 15 dwelling units per acre), Capitol Hill Community Master Plan (1999)

REQUEST:

Sela Kanuch, Zing Solar, on behalf of Erika Story, property owner, requests approval to locate solar panels on the front roof plane of a single-family residence at 226 W Fern Avenue (see Attachment A – Vicinity Map), which is in the Capitol Hill Local Historic District (see Attachment B – Historic District Map). This type of project must be reviewed as a Minor Alteration by the Historic Landmark Commission.

RECOMMENDATION:

As outlined in the analysis and findings in this staff report, Planning Staff recommends the Historic Landmark Commission approve the petition with conditions (see Attachment H – Motions).

MOTION (consistent with Staff Recommendation):

Based on the analysis and findings listed in the staff report, testimony received, and proposal presented, I move that the Commission approve Petition PLNHLC2016-00495 for Minor Alteration to install a small solar energy collection system at 226 W Fern Avenue with the following condition, which is based upon compliance with the applicable standards of review:

1. All solar panels on the front roof plane, oriented toward Fern Avenue, shall be removed. Solar panels may be relocated to other permissible sites described in City Code 21A.40.190.B.3 subparagraphs a through e.

ATTACHMENTS:

- **A.** Vicinity Map
- **B.** Historic District Map
- **C.** Property Photographs
- **D.** Applicant Materials
- **E.** Analysis of Standards
- **F.** Applicable Design Guidelines
- **G.** Public Process and Comments
- **H.** Motions

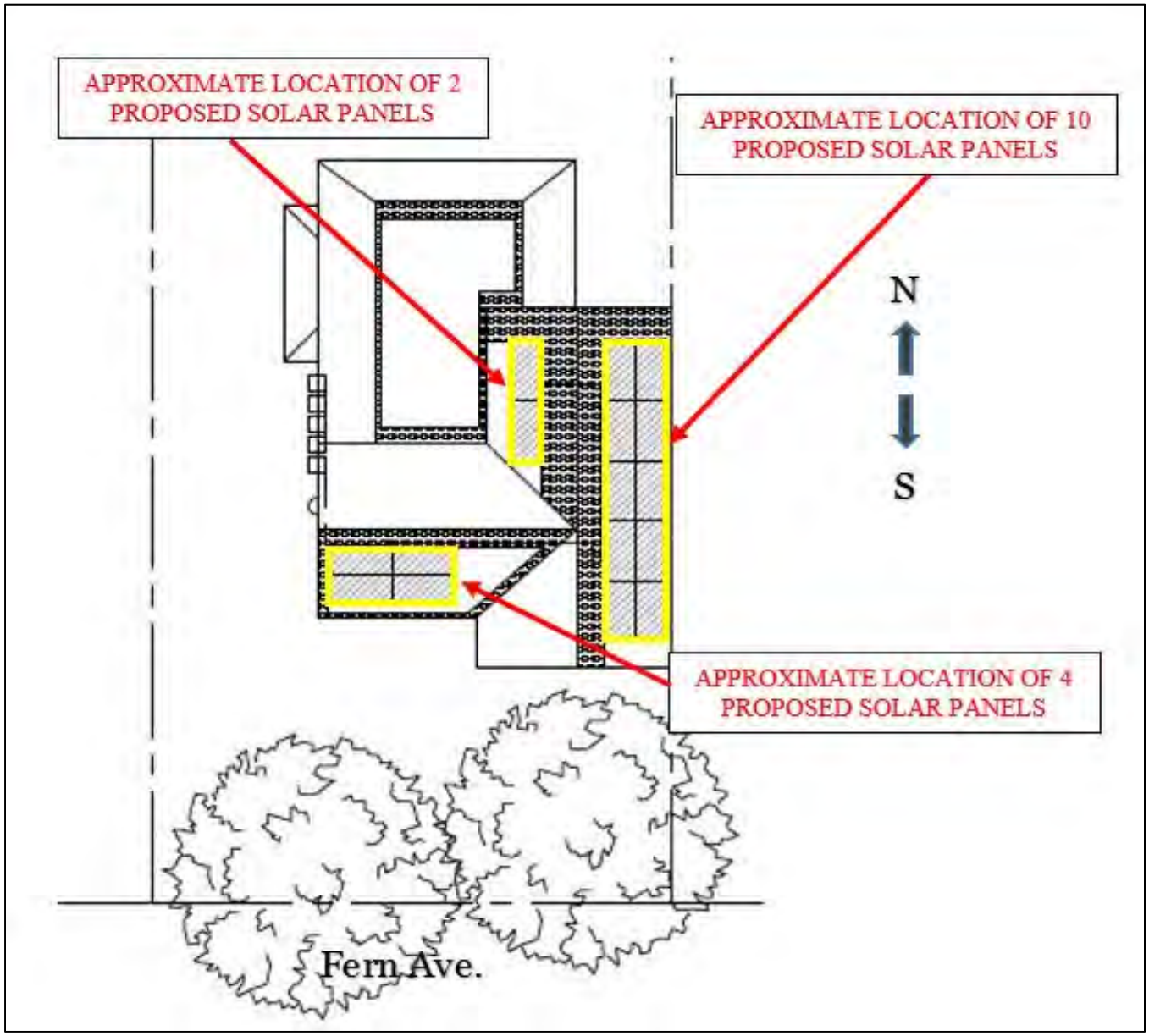
BACKGROUND AND PROJECT DESCRIPTION:

The subject property is a single family home located at approximately 226 W Fern Avenue. The home, which is a Victorian Italianate built in 1886, is in the Capitol Hill Historic District. In the 2006 reconnaissance level survey, the house is classified as a “contributing structure” and rated “B” (see Attachment C – Property Photographs).

The request is to install a 16 panel solar energy collection system on the roof of the structure. City Code 21A.40.190.B identifies priority locations where small energy collection systems can be located that may be reviewed administratively. Based on these locations, 12 of the 16 solar panels may be reviewed administratively: 10 panels on the east roof plane, and 2 on the west. However, 4 solar panels are proposed for front roof plane, which is visible from the public right of way. In accordance with Section 21A.40.190.B, the 4 south facing solar panels must be reviewed by the Historic Landmark Commission.

The proposed location of the solar panels was chosen to maximize sun exposure for the small solar energy collection system. Staff discussed moving the location of the 4 solar panels to the north facing roof plane of the residence so they would not be as readily visible from the street, but the applicant stated that the south facing roof plane was the most effective area for the small solar energy collection system. The applicant also claimed that there are limited roof sections available and the proposed locations are the most productive sections that provide the best energy "offset" for the property owner.

Each solar panel measures approximately 5.4 feet long by 3.2 feet wide, or 17-¼ square feet. The total area of all 16 solar panels is approximately 276 square feet. The panels will be supported by a mounting bracket and will project above the roof approximately 3 inches. To comply with fire code, all solar panels will be located at least 3 feet from all roof ridges and roof edges (see Attachment D – Applicant Materials).



KEY ISSUES:

As described previously, staff is concerned with the proposed location of solar panels on the front façade, which is visible from the public right-of-way (see Attachment E – Analysis of Standards and Attachment F – Applicable Design Guidelines). In response to staff's recommendation to relocate the solar panels, the applicant prepared and submitted a report that states the anticipated energy production and cost savings for the following scenarios (see Attachment D – Applicant Materials):

1. **South Facing Rooftop System.** Preferred plan with 4 solar panels on front roof plane, and
2. **North Facing Rooftop System.** Alternate plan with 0 solar panels on front roof plane. It should be noted that the *alternate plan has an equal number of panels*.

Issue 1 – Energy Comparison. The "designed offset" of the preferred plan—which is based on energy consumption records for the subject property—is 102.41%, which means the proposal will generate 2.41% more power than anticipated demand. The designed offset of the alternate plan is 96.48%, which is 5.93% less than the preferred plan and 3.52% percent less than anticipated demand.

Issue 2 – Cost Comparison. The preferred plan is expected to save the homeowner $16,403 over the span of twenty-five years. If the south facing solar panels were relocated to the north side of the home, as suggested by staff, the total projected savings of the alternate plan over the same twenty-five year span would be $15,474—a difference of $929.

NEXT STEPS:

If the petition is approved by the Historic Landmark Commission, the applicant would need to apply for a building permit. If the petition is denied, the applicant would need to modify plans for reconsideration or file an appeal within 10 days following publication of the record of decision.

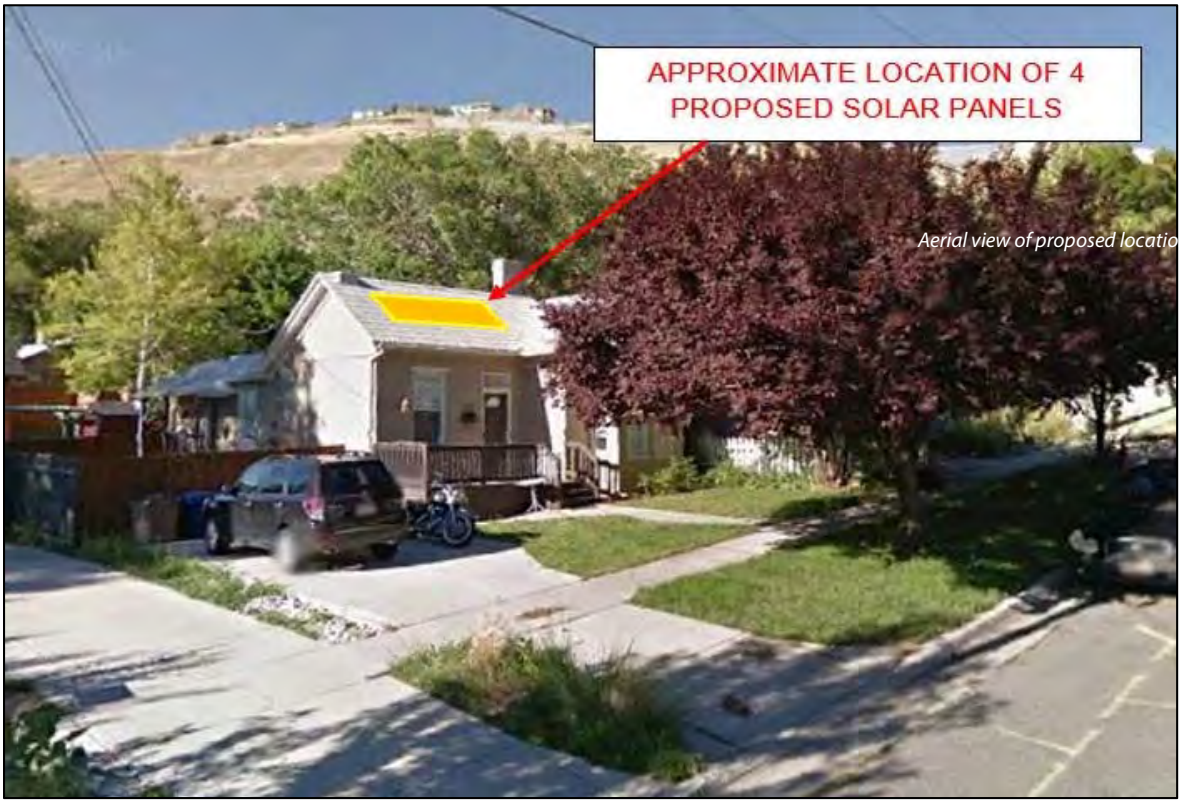
ATTACHMENT A: VICINITY MAP


REED AVENUE
SUBJECT PROPERTY
FERN AVENUE
300 WEST
200 WEST
700 NORTH
300 W
200 W

ATTACHMENT B: HISTORIC DISTRICT MAP

★ ***Approximate location of subject property***

ATTACHMENT C: PROPERTY PHOTOGRAPHS



Aerial view of proposed locatio

ATTACHMENT D: APPLICANT MATERIALS

October 27, 2016

Michael and Brittney,

With the address on **226 W Fern Avenue (Erika Story)**, we have tried all possibilities and options for panel location. The best location in order to provide the most effective results to save energy and to be cost effective is to have the layout that is presented.

Moving panels located on the South to the North instead, will cause a drastic reduction in production. Going from 102.41 % to 96.48 % offset. The other panels on the roof have maxed out the locations they are on.

No panel is able to be moved to the West side of the roof due to the 3 feet rule offset. And putting panels on the accessory structure, the shed, is not acceptable, it will cause more problems and construction costs.

Please let me know if there is more that is needed.

Thank you!

Sela Kanuch
Zing Solar
skanuch@zingsolar.com

South Facing Rooftop System Simulation

(Zing Solar's Proposal Layout)

DESIGNED OFFSET	102.41%

Customer Information	
Customer Name:	Erick Story
Customer Address:	226 West Fern Ave.
Customer City:	Salt Lake City
State, Zip:	UT, 84106
Customer Email Address:	0
Customer Phone Number:	801) 618-9248
Yearly Usage	6257

Loan Details		
Total Cost:	$	26,437
	$	-
	$	-
Utah State Tax Credit:	$	(2,000)
	$	-
Federal Tax Credit:	$	(7,931)
Net Cost With All Incentives Applied:	$	16,506
Expected Savings Breakdown		
25 Year Cost With Current Utility:	$	34,769
Net Cost of Solar:	$	16,506
Remaining Utility Cost:	$	1,860
Total Savings Over 25 Years	**$**	**16,403**

Green Sky Email Details	Year 1	Year 2	Year 5	Year 12	Year 25
GreenSky Plan 3215 NINP 12mo 20year	5.99%	5.99%	5.99%	5.99%	5.99%
Loan Payment of Full Amount	$0.00	$118.16	$118.16	$118.16	$0.00
Loan Payment with Zing Alliance Participation	$0.00	$105.23	$105.23	$105.23	$0.00
Payment With Utility Company	$60.71	$63.74	$73.79	$103.83	$195.79

Solar Engine Email Details	Year 1	Year 2	Year 5	Year 12	Year 25
Solar Engine 20 Year Loan	4.99%	4.99%	4.99%	4.99%	4.99%
Loan Payment of Full Amount	$109.93	$114.91	$114.91	$114.91	$0.00
Loan Payment with Zing Alliance Participation	$99.21	$102.36	$102.36	$102.36	$0.00
	Year 1	Year 2	Year 5	Year 12	Year 25
Solar Engine 12 Year Loan	3.99%	3.99%	3.99%	3.99%	3.99%
Loan Payment of Full Amount	$87.90	$160.23	$160.23	$160.23	$0.00
Loan Payment with Zing Alliance Participation	$79.33	$142.73	$142.73	$142.73	$0.00
	Year 1	Year 2	Year 5	Year 12	Year 25
Payment With Utility Company	$60.71	$63.74	$73.79	$103.83	$195.79

Number Of Panels:	16	System Size:	4.96 kW
Estimated 1st Year Production:	6408 kWh	Estimated Offset:	102%
Solar Panel Type:	LG LG310N1C-G4		
Solar Inverter Type:	Enphase M250 Micro Inverters		

South facing panels save the customer more money per month and more money over time with a savings of $16,403 over the span of twenty-five years.

Aurora Shade Report

Customer
Erick Story

Designer
Cash Mills

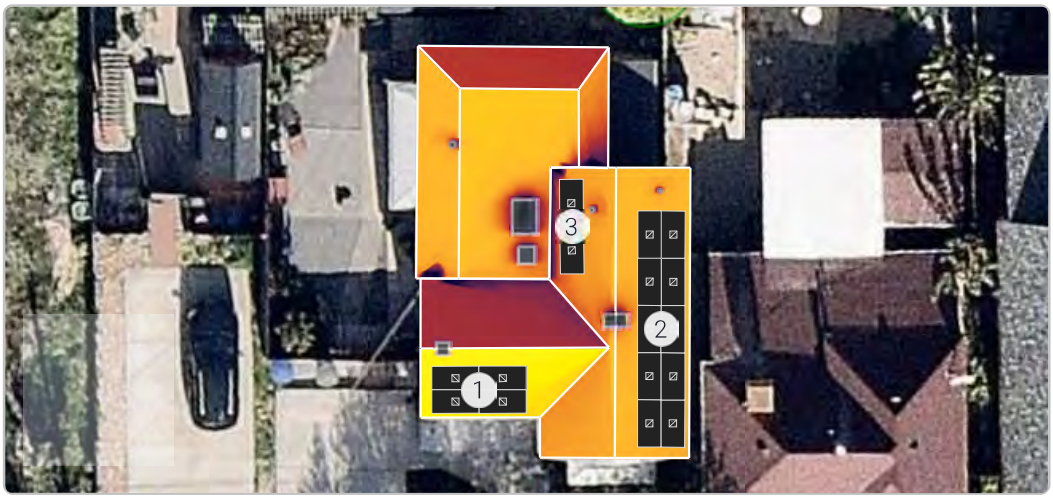
Organization
Zing Solar

Address
226 West Fern Ave. Salt Lake City
Utah 84106

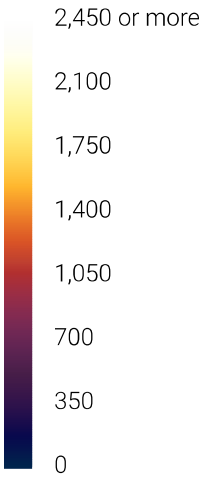
Coordinates
(40.8, -111.9)

Date
25 October 2016

Annual irradiance



kWh/m^2/year



Summary

Array	Panel Count	Azimuth (deg.)	Pitch (deg.)	Annual TOF (%)	Annual Solar Access (%)	Annual TSRF (%)
1	4	180	36	100	97	97
2	10	90	36	81	99	80
3	2	269	36	79	91	72
Weighted average by panel count	-	-	-	-	97.5	83.3

Monthly solar access (%) across arrays

Array	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	96	96	97	97	97	98	98	98	97	97	96	96
2	99	99	99	99	99	99	99	99	99	99	99	99
3	91	89	90	92	92	92	92	92	90	88	86	90

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Erick Story

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Cash Mills

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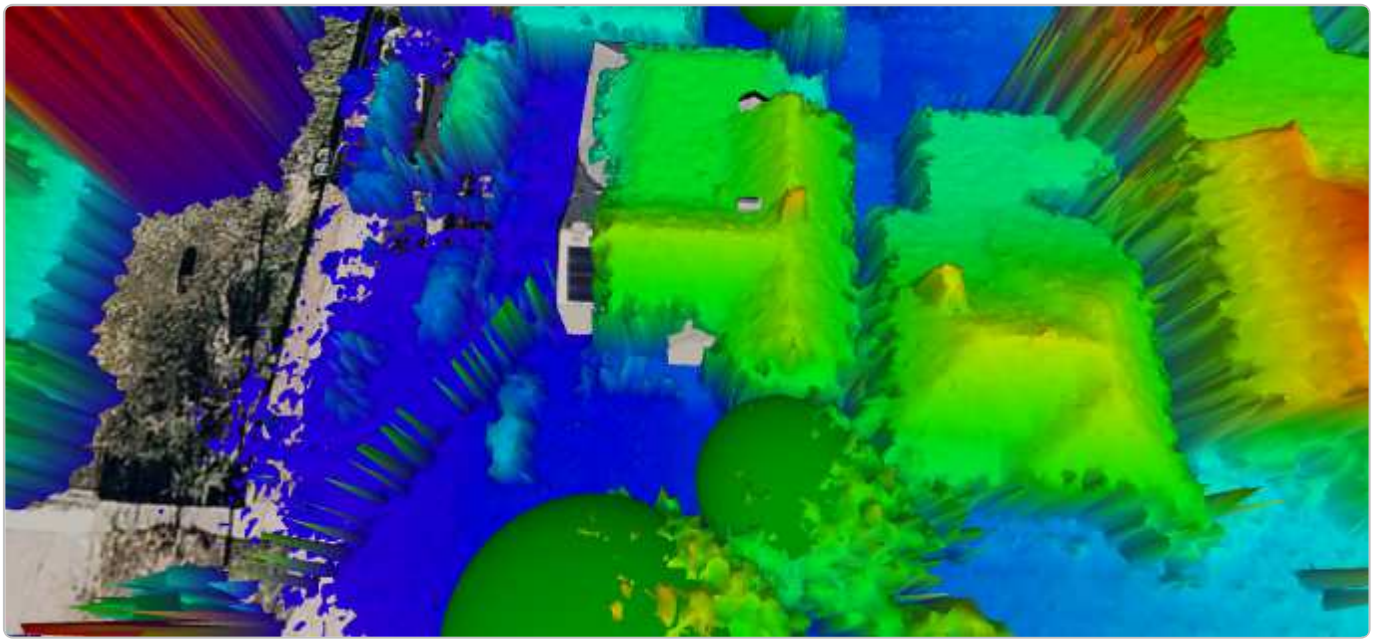
Coordinates
(40.8, -111.9)

Date
25 October 2016

Zoomed out satellite view

3D model

3D model with LIDAR overlay



Customer	Designer	Organization
Erick Story	Cash Mills	Zing Solar
Address	**Coordinates**	**Date**
226 West Fern Ave. Salt Lake City Utah 84106	(40.8, -111.9)	25 October 2016

Street view and corresponding 3D model

I, **Cash Mills**, certify that I have generated this shading report to the best of my abilities, and I believe its contents to be accurate.

North Facing Rooftop System Simulation

(The city's proposal)

DESIGNED OFFSET	96.48%

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Customer City:	Salt Lake City
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Customer Phone Number:	801) 618-9248
Yearly Usage	6257

Loan Details		
Total Cost:	$	26,437
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Utah State Tax Credit:	$	(2,000)
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Net Cost With All Incentives Applied:	$	16,506
Expected Savings Breakdown		
25 Year Cost With Current Utility:	$	34,769
Net Cost of Solar:	$	16,506
Remaining Utility Cost:	$	2,789
Total Savings Over 25 Years	**$**	**15,474**

Green Sky Email Details	Year 1	Year 2	Year 5	Year 12	Year 25
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Payment With Utility Company	$60.71	$63.74	$73.79	$103.83	$195.79

Number Of Panels:	16	System Size:	4.96 kW
Estimated 1st Year Production:	6037 kWh	Estimated Offset:	96%
Solar Panel Type:	LG LG310N1C-G4		
Solar Inverter Type:	Enphase M250 Micro Inverters		

Production in Kilowatts per hour dropped because of tilt/orientation of panels and because of reduction in number of panels. This in turn affects the customer in their yearly savings and over a twenty-five years span saves them only $15,474

Aurora Shade Report

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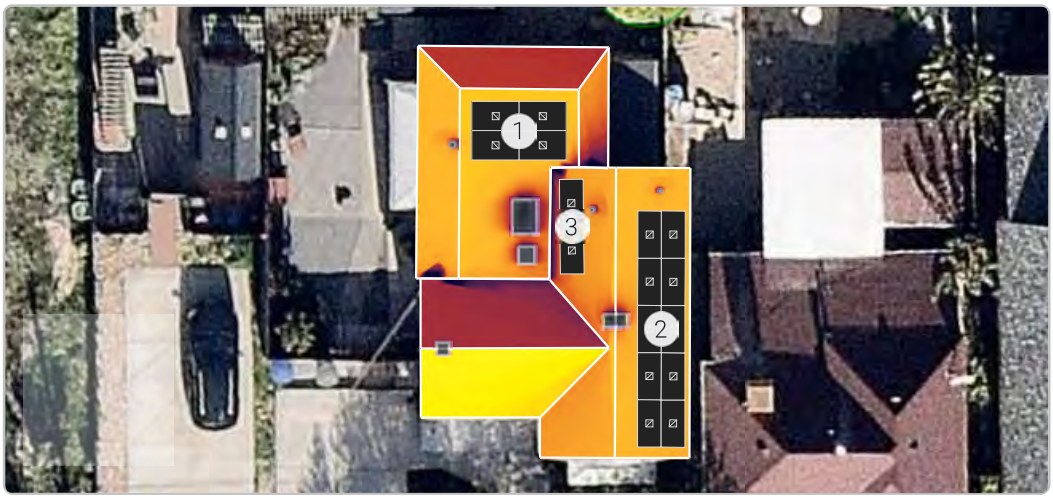

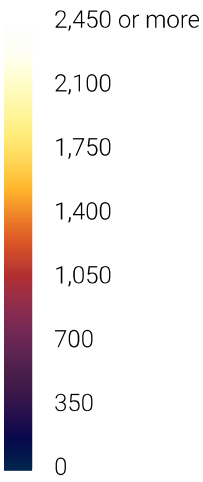

Summary

Array	Panel Count	Azimuth (deg.)	Pitch (deg.)	Annual TOF (%)	Annual Solar Access (%)	Annual TSRF (%)
1	4	180	0	87	97	84
2	10	90	36	81	99	80
3	2	269	36	79	91	72
Weighted average by panel count	-	-	-	-	97.5	80.1

Monthly solar access (%) across arrays

Array	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	95	94	97	98	98	98	99	98	98	95	92	94
2	99	99	99	99	99	99	99	99	99	99	99	99
3	91	89	90	92	92	92	92	92	90	88	86	90

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Cash Mills

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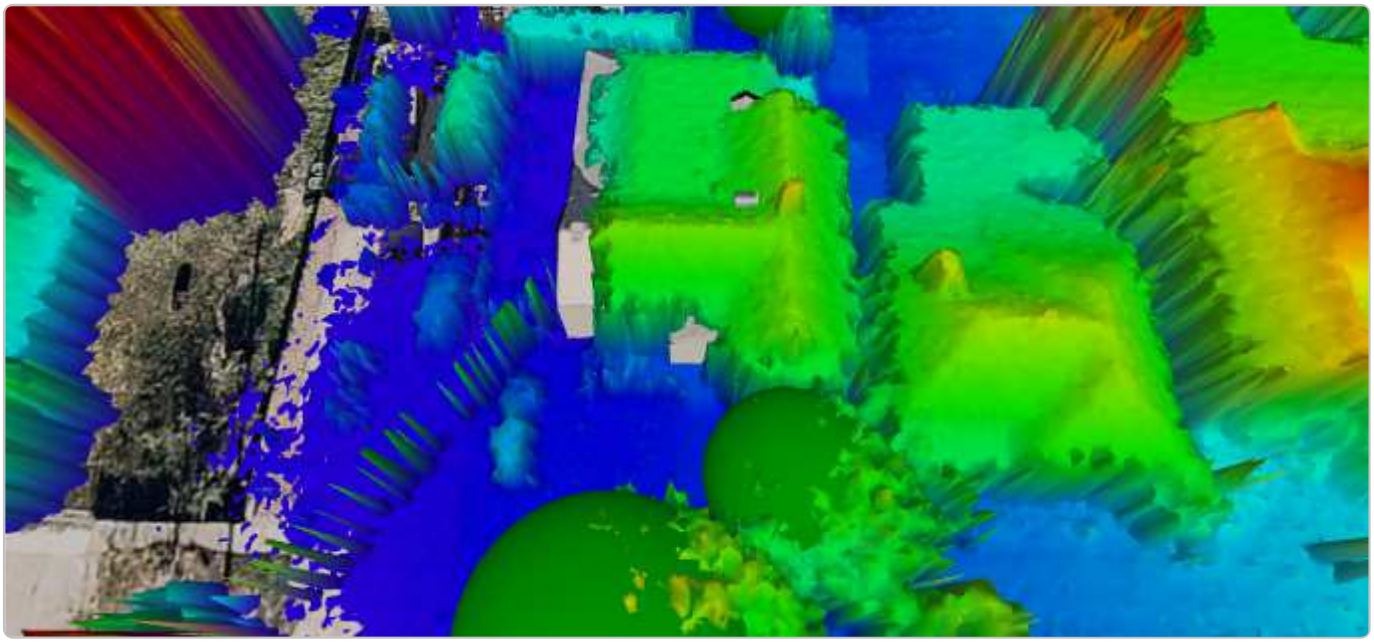
Zoomed out satellite view

3D model

3D model with LIDAR overlay



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Erick Story	Cash Mills	Zing Solar
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Street view and corresponding 3D model

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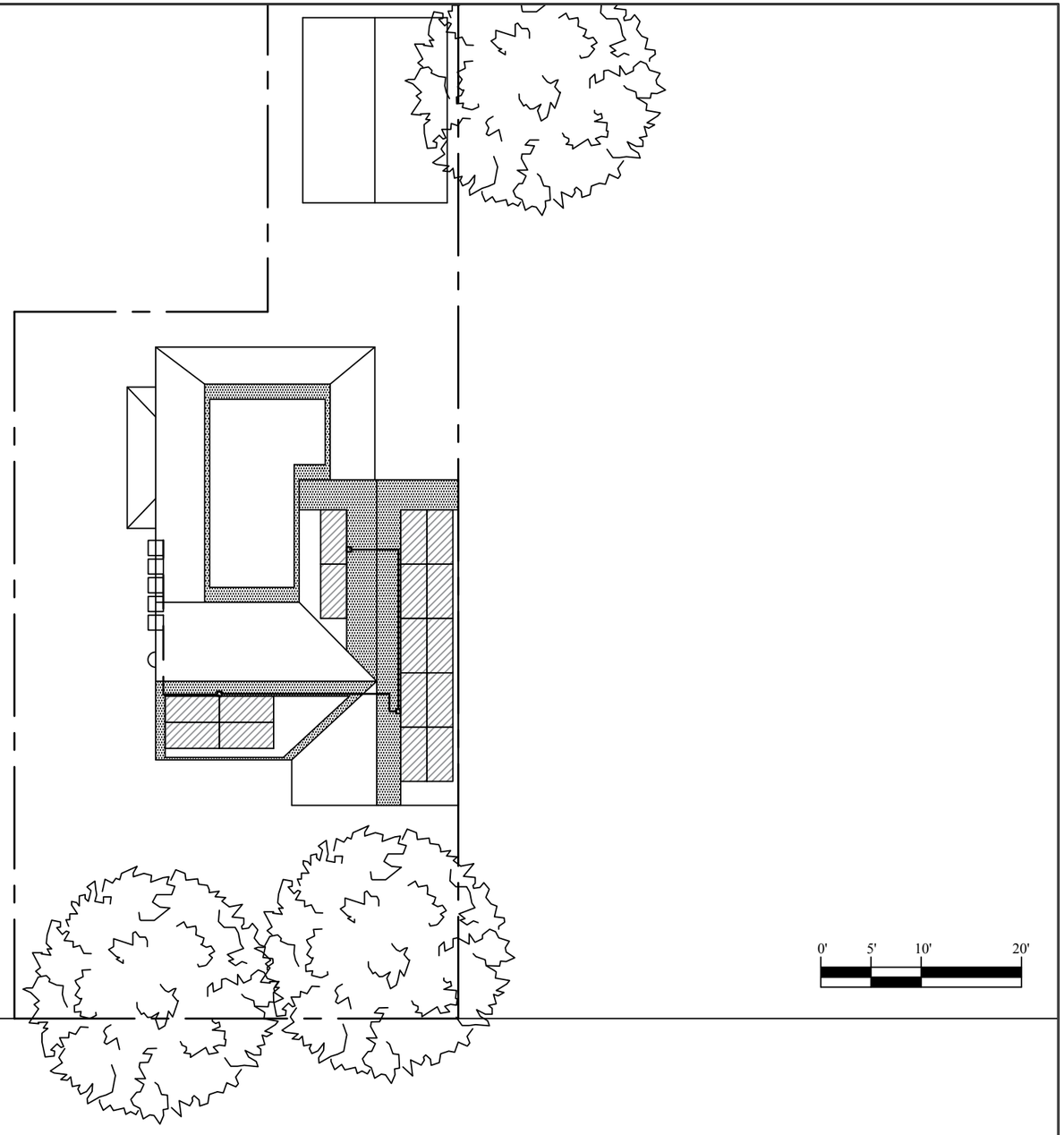
MAP OF LOCATION



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PROFESSIONAL STRUCTURAL ENGINEER
No. 5150370
BRETT D. VEAZIE
STATE OF UTAH

09/15/2016

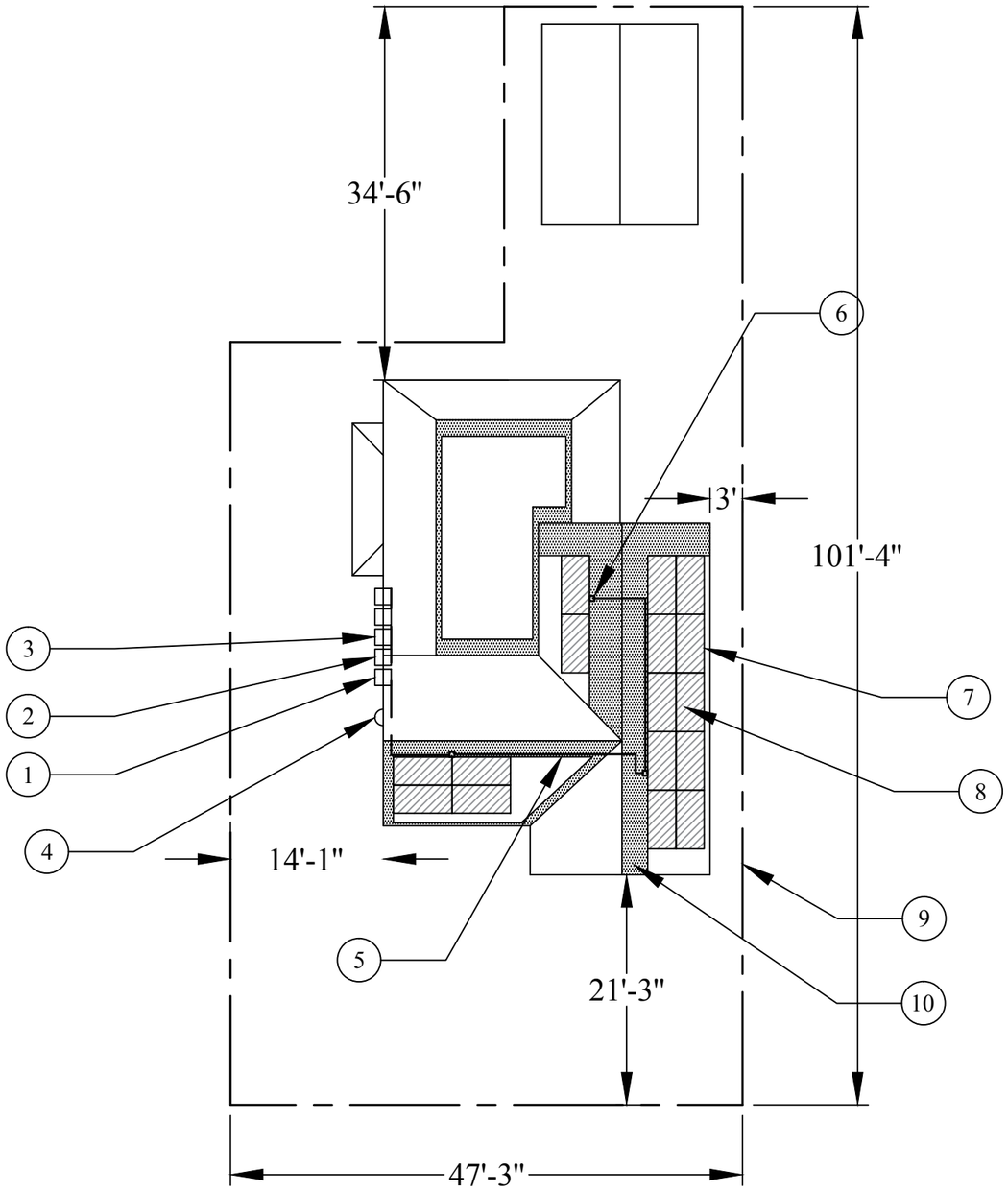
STRUCTURAL ONLY

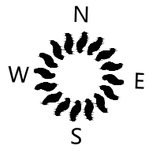
VECTOR ENGINEERS
9138 S. State Street, Suite 101 (801) 990-1775
Sandy, Utah 84070 (801) 990-1776 Fax

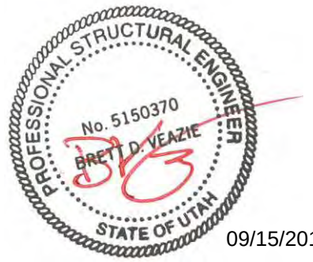
0' 5' 10' 20'

	SYSTEM SIZE: 4.96 kW DC DATE: 9/13/2016 DESIGNER: AR	Ericka Story 226 West Fern Ave Salt Lake City, UT 84106	zingsolar 826 E STATE ROAD, SUITE 270, AMERICAN FORK, UT 84003 (888) 244-0231	SHEET NAME: COVER SHEET NUMBER: PV 1.0

1. MAIN SERVICE LOCATION/ POINT OF INTERCONNECTION
2. UTILITY METER LOCATION
3. AC DISCONNECT SWITCH
4. GAS METER LOCATION
5. 140' OF EMT CONDUIT (OR ROMEX RUN THROUGH ATTIC WHERE FEASIBLE) FROM JUNCTION BOX TO ELECTRICAL PANEL
6. JUNCTION BOX ATTACHED TO ARRAY USING RACKING EQUIPMENT TO KEEP JUNCTION BOX OFF OF ROOF
7. (16) PV MODULES AND MICRO-INVERTERS
8. PV CIRCUIT 1
9. PROPERTY LINE
10. FIRE CODE ACCESS POINTS AND OFFSETS







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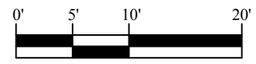


SYSTEM SIZE:
4.96 kW DC

DATE:
9/13/2016

DESIGNER:
AR

Ericka Story

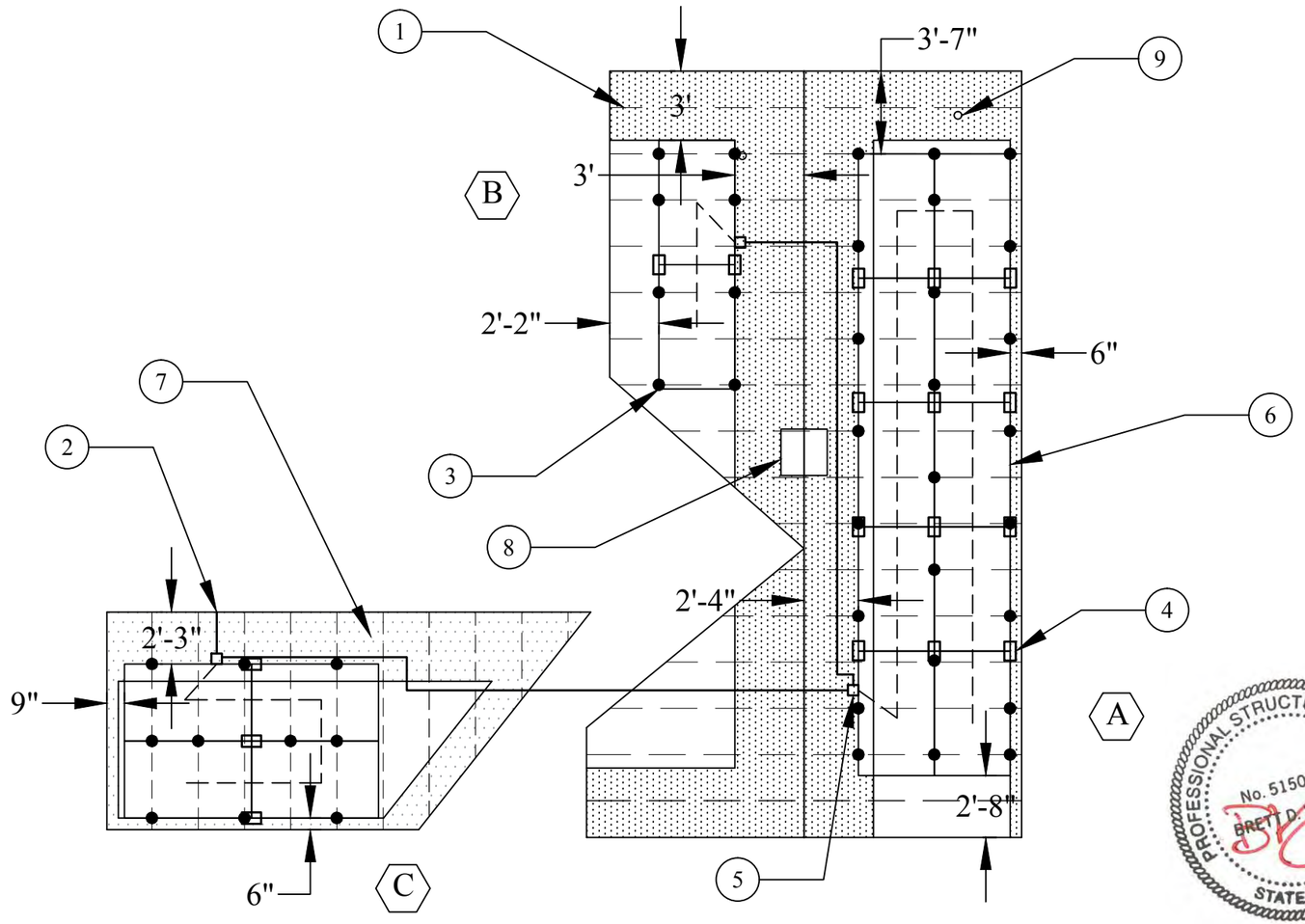
226 West Fern Ave
Salt Lake City, UT 84106

zingsolar
826 E STATE ROAD, SUITE 270,
AMERICAN FORK, UT 84003
(888) 244-0231

SHEET NAME:
SITE PLAN

SHEET NUMBER:
PV 2.0

1. 2" X 4" TRUSS SYSTEM 24" ON CENTER
2. TIE INTO METER #51287765
3. ECOFASTEN ROCK-IT COMPOSITION MOUNT LAGGED INTO RAFTERS (42 PLACES WITH A MAX OF 4' SPACING BETWEEN)
4. ECOFASTEN ROCK-IT COUPLINGS (17 PLACES) IN BETWEEN EACH PANEL
5. JUNCTION BOX ATTACHED TO ARRAY USING RACKING EQUIPMENT TO KEEP JUNCTION BOX OFF OF ROOF
6. PV MODULES AND MICRO-INVERTERS. MODULES WILL NOT BE INSTALLED OVER OR BLOCK ANY ATTIC VENTS, PLUMBING VENTS, FURNACE OR WATER HEATER VENTS ETC.
7. FIRE CODE ACCESS POINTS AND OFFSETS
8. ROOF VENT(S)
9. PLUMBING VENT(S)



ROOF SECTION DATA								
ROOF SECTION	A	B	C					
MODULES	10	2	4					
TILT	36	36	36					
AZIMUTH	90	270	180					
SOLAR ACCESS AVG.	93%	91%	93%					

PROFESSIONAL STRUCTURAL ENGINEER
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Sandy, Utah 84070 (801) 990-1776 Fax

0' 5' 10' 20'

SYSTEM SIZE:
4.96 kW DC

DATE:
9/13/2016

DESIGNER:
AR

Ericka Story

226 West Fern Ave
Salt Lake City, UT 84106

zingsolar

826 E STATE ROAD, SUITE 270,
AMERICAN FORK, UT 84003
(888) 244-0231

SHEET NAME:
ROOF PLAN

SHEET NUMBER:
PV 3.0

WEATHER DATA	
WEATHER STATION:	(SALT LAKE CITY INT"L ARPT WEATHER STATION)
HIGH TEMP, 2% AVG.	36 °C
MIN DESIGN TEMP	-16 °C
GROUND SNOW LOAD	43 psf
WIND SPEED	115 psf

1. HIGH TEMPERATURE 2% AVERAGE BASED ON ASHRAE HIGHEST MONTH 2% DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION
2. MINIMUM DESIGN TEMPERATURE BASED ON ASHRAE MINIMUM MEAN EXTREME DRY BULB TEMPERATURE FOR ASHRAE LOCATION MOST SIMILAR TO INSTALLATION LOCATION
3. ALTERNATE POWER SOURCE PLACARD SHALL BE PERMANENTLY ATTACHED TO A/C DISCONNECT
4. ELECTRICAL INSTALL SHALL COMPLY WITH 2014 NATIONAL ELECTRICAL CODE
5. ALL SOLAR MODULES, EQUIPMENT, AND METALLIC COMPONENTS SHALL BE BONDED
6. IF THE EXISTING MAIN SERVICE DOES NOT HAVE VERIFIABLE GROUNDING ELECTRODE, IT IS THE PV CONTRACTOR'S RESPONSIBILITY TO INSTALL A SUPPLEMENTAL GROUNDING ELECTRODE
7. EACH MODULE SHALL BE GROUNDED PER MANUFACTURER INSTRUCTIONS AND APPROVED METHODS
8. PV INSTALLATION SHALL NOT OBSTRUCT ANY PLUMBING, MECHANICAL OR BUILDING ROOF VENTS
9. CONNECTORS THAT ARE NOT READILY ACCESSIBLE AND THAT ARE USED IN THE CIRCUITS OPERATING AT OR OVER 30V AC OR DC SHALL REQUIRE A TOOL FOR OPERATING AND ARE REQUIRED TO BE MARKED "DO NOT DISCONNECT UNDER LOAD" OR "NOT FOR CURRENT INTERRUPTING"
10. THIS SYSTEM IS IN FULL COMPLIANCE WITH THE UTAH FIRE CODE FOR PHOTOVOLTAIC INSTALLATION AND ARTICLE 690 OF THE NATIONAL ELECTRIC CODE (NEC NFPA 70)
11. BUILDING CONSTRUCTION TYPE: TYPE V
12. BUILDING OCCUPANCY TYPE: R3

09/15/2016

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SYSTEM SIZE:
4.96 kW DC

DATE:
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AR

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Salt Lake City, UT 84106

zingsolar

826 E STATE ROAD, SUITE 270,
AMERICAN FORK, UT 84003
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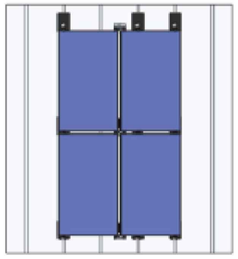
SHEET NAME:
LOCATION NOTES

SHEET NUMBER:
PV 4.0

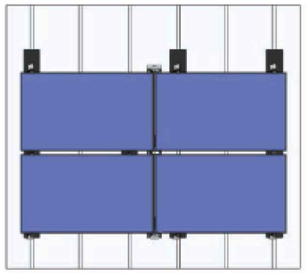
Bracket Spacing

Portrait Orientation



Maximum bracket spacing in portrait orientation is 48" OC.

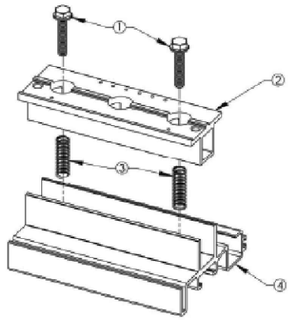
Landscape Orientation



Maximum bracket spacing in landscape orientation is 72" OC.

Spacing may vary depending upon project specific structural requirements; i.e. high snow and wind load areas may require lesser spacing E-W than the maximum.

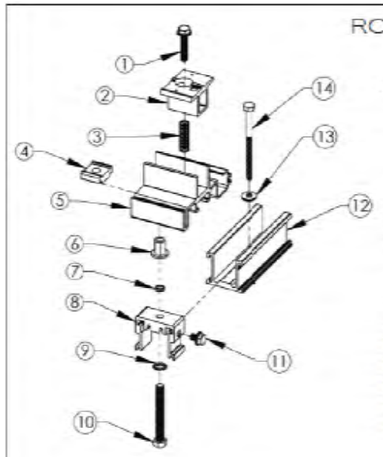
Rock-It Coupling Assembly



NOTE: Items 1-4 ship assembled

1 5/16"-18 x 1.5" Hex Flange Bolt 300 Series SS
2 Rock-It Coupling Mid Clamp 6005A-T5 AL
3 Compression Spring 300 Series SS
4 Rock-It Coupling Shelf 6005A-T5 AL

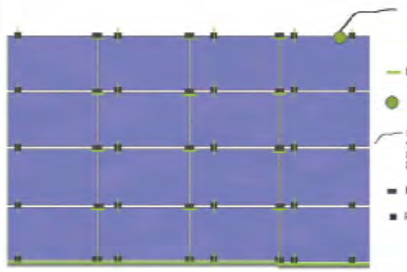
Rock-It Mount Assembly

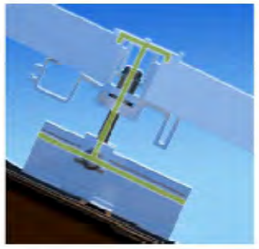


NOTE: Items 1-11 ship assembled

1 5/16"-18 x 1.5" Hex Flange Bolt 300 Series SS
2 Rock-It Mid-Clamp 6005A-T5
3 Compression Spring 300 Series SS
4 Tie Plate 6005A-T5 AL
5 Rock-It Shelf 6005A-T5 AL
6 Flange Level Nut 300 Series SS
7 Packaging O-Ring (Remove Prior to Installation)
8 Rock-It Pedestal 6005A-T5 AL
9 3/8" ID Star Lock Washer 300 Series SS
10 3/8"-16 Hex Tap Bolt 300 Series SS
11 5/16"-18 x .375" Hex Flange Bolt 300 Series SS
12 Rock-It-Slide 6005A-T5 AL
13 5/16" ID EPDM Bonded Washer 300 Series SS
14 5/16" x 4" Hex Lag Screw or 5/16"-18 X 1.50" Hex Bolt 300 Series SS

Bonding Assembly and Bonding Path





Integrated Bonding

Grounding Lug Install

Necessary Components:
- Burndy CL50-1TN Ground Lug (UL Listing #KDER.E9999)
- 14 AWG - 4 AWG Copper Ground Wire
- 8-32 x 0.5" Serrated Flange Head Bolt (300 Series SS)
- 8-32 Serrated Flange Nut (300 Series SS)
- 11/32" and 1/4" wrenches or ratchets/sockets

1 The Ground Lug is installed into the T slot on the Rock-It Mount.

2 Slide the Flange Head Bolt on the Ground Lug into T slot on Rock-It Mount.

3 Tighten Flange Nut/Bolt.

4 Place wire in Ground Lug channel and tighten set screw to complete assembly.

Rock-It System

- Fastest, easiest to level system on the market
- ETL listed to UL SUB 2703
- Class A Fire rating with Type 1 modules
- Integrated electrical bonding
- SIMPLE- only 3 components
- Fixed wire management tray
- North-South adjustability of up to 4"
- Only one tool required (1/2" deep well socket)

Max No. of Panels	300 Modules per ground lug	**Materials**	300 Series Stainless, 6000 Series Aluminum
Max System Voltage	1000VDC	**Coating**	Black Anodization/Mill Finish
Class A Fire Rating	With UL1703 Type 1 Rated Modules	**Lug Specifications**	Burndy CL50-1TN Ground Lug (UL Listing #KDER E9999)
Leveling Range	3-4"	**Ground Wire Per above Lug spec.**	14 AWG- 4 AWG Copper Ground Wire
Rock-It Slide Range	4"	**Max Module Size**	64.96"(1650mm) x 39.05"(992mm) x 2"(50mm)
Min/Max Roof Slope	1/2:12/12:12	**Max Downforce/Uplift Rating**	45 PSF
Max Anchor Spacing	72"	**Rock-It Mount Load Rating**	547lbs with Single 5/16" Lag 3.0 Safety Factor
Skirt Box QTY	6 units	**Slide Fastening Hole**	5/16" diameter
Mount Box QTY	12 units	**Module Cantilever**	Lesser of 25% Width, or Module Installation Manual
Rock-It Slide Box QTY	50 units		
Coupling Box QTY	12 units	**Warranty**	10 Year Material and Workmanship

Codes: National Electric Code, ANSI/NFPA 70, NEC 250, NEC 690, IRC, IBC 2015
Standards: UL 2703, UL 1703

ETL US

EcoFasten Solar®

www.ecofastensolar.com info@ecofastensolar.com 877-859-3947

SYSTEM SIZE: 4.96 kW DC

DATE: 9/13/2016

DESIGNER: AR

Ericka Story

226 West Fern Ave
Salt Lake City, UT 84106

zingsolar

826 E STATE ROAD, SUITE 270,
AMERICAN FORK, UT 84003
(888) 244-0231

SHEET NAME: MOUNTING DETAILS

SHEET NUMBER: PV 5.0

THIS PV SYSTEM WILL HAVE THE FOLLOWING MARKINGS:

1 -- A SIGN WILL BE PROVIDED AT THE SERVICE PANELBOARD NOTING THE TOTAL RATED AC AMPS AND AC VOLTAGE OF THE PV SYSTEM. NEC 690.54

2 -- MATERIALS USED FOR MARKINGS WILL BE WEATHER RESISTANT. THE UNDERWRITERS LABORATORIES MARKING AND LABELING SYSTEM 969 (UL969) WILL BE USED AS STANDARD TO DETERMINE WEATHER RATING.

3 -- MARKING STATING “PHOTOVOLTAIC SYSTEM EQUIPPED WITH RAPID SHUTDOWN” WILL BE PLACED AT THE MAIN SERVICE DISCONNECT.

4 -- THE MARKING WILL BE MADE TO THE FOLLOWING SPECIFICATIONS:

- RED BACKGROUND
- WHITE LETTERING
- MINIMUM 3/8” LETTER HEIGHT
- ALL CAPITAL LETTERS
- ARIAL OR SIMILAR FONT, NON-BOLD
- REFLECTIVE, WEATHER RESISTANT MATERIAL SUITABLE FOR THE ENVIRONMENT (DURABLE ADHESIVE MATERIALS MAY MEET THIS REQUIREMENT)

5 -- MARKING STATING "WARNING: PHOTOVOLTAIC POWER SOURCE" WILL BE PLACED ON ALL INTERIOR AND EXTERIOR CONDUIT, RACEWAYS, ENCLOSURES, CABLE ASSEMBLIES, AND JUNCTION BOXES TO ALERT THE FIRE SERVICE TO AVOID CUTTING THEM. MARKINGS WILL BE PLACED ON ALL EXTERIOR DC CONDUIT, RACEWAYS, ENCLOSURES, AND CABLE ASSEMBLIES EVERY 10 FEET, AT TURNS AND ABOVE AND/OR BELOW PENETRATIONS AND ALL DC COMBINER AND JUNCTION BOXES.

6 -- A SIGN WILL BE PROVIDED ADJACENT TO THE "RAPID SHUTDOWN" DISCONNECT LABELING IT AS THE "RAPID SHUTDOWN DISCONNECT" (NEC 690.12,#5)

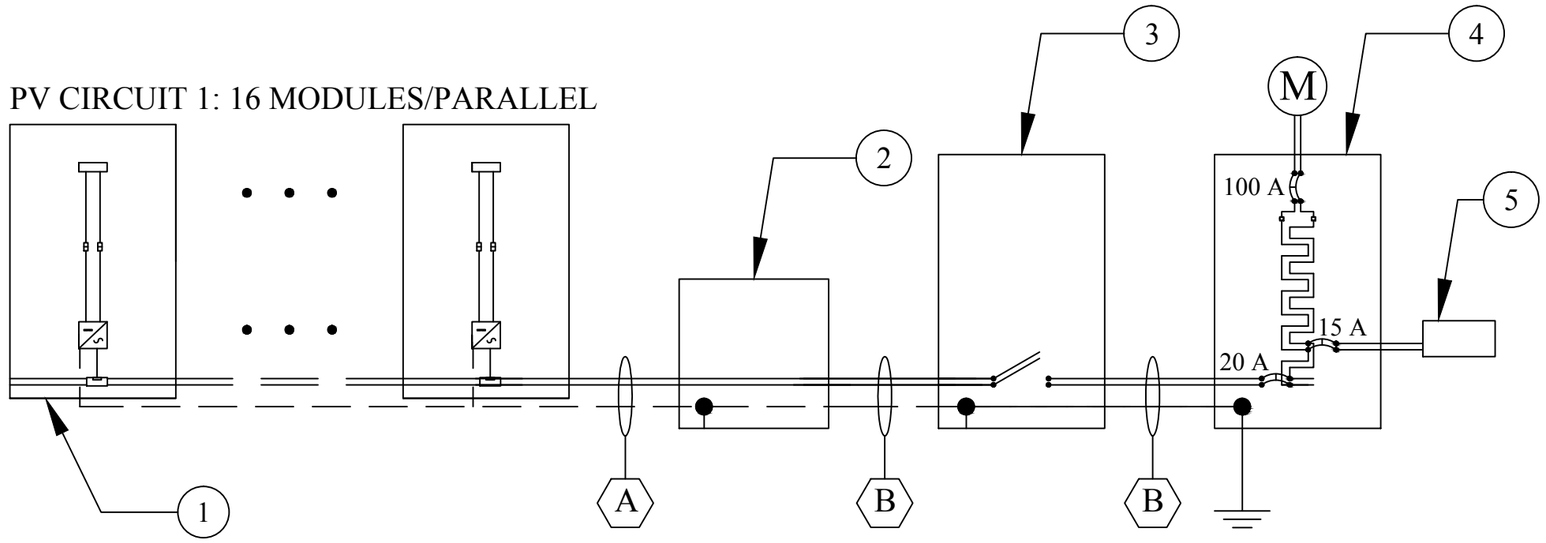
	SYSTEM SIZE: 4.96 kW DC DATE: 9/13/2016 DESIGNER: AR	Ericka Story 226 West Fern Ave Salt Lake City, UT 84106	zingsolar 826 E STATE ROAD, SUITE 270, AMERICAN FORK, UT 84003 (888) 244-0231	SHEET NAME: SYSTEM MARKINGS SHEET NUMBER: PV 6.0

1. PV MODULE WITH INVERTER ATTACHED
2. JUNCTION BOX. ALL WIRES TO BE PROVIDED WITH STRAIN RELIEF AT ALL ENTRY TO JUNCTION BOXES AS REQUIRED BY THE BOX LISTING
3. VISIBLE LOCKABLE "KNIFE" A/C DISCONNECT 30A/240V
4. EXISTING 240V/100A BUS RATED LOAD-CENTER (NON-CENTER FED PANEL) BREAKER WILL BE FURTHEST POSITION AWAY FROM DISCONNECT. BACK-FED CIRCUIT BREAKER SHALL COMPLY WITH 2014 NEC ARTICLES 690.10(E) AND 408.36(D)
5. ENVOY S (DRAWS 0.22 AMPS)

PV MODULE SPECIFICATIONS		
MODULE MAKE AND MODEL	LG LG310N1C-G4	
MAXIMUM POWER (DC)	310	WATTS
MAX POWER-POINT VOLTAGE (VMPP)	32.8	VOLTS
MAX POWER-POINT CURRENT (IMPP)	9.45	AMPS
OPEN CIRCUIT VOLTAGE (VOC)	40.4	VOLTS
SHORT CIRCUIT CURRENT (ISC)	9.96	AMPS
TEMPERATURE COEFFICIENT VOC	-0.28	%/°C
MAXIMUM SYSTEM VOLTAGE	1000V DC (UL)	

INVERTER SPECIFICATIONS		
INVERTER MAKE AND MODEL	ENPHASE M250-60-2LL-S22	
RATED OUTPUT POWER (AC)	250	WATTS
NOMINAL OUTPUT VOLTAGE (AC)	240	VOLTS
MAX OUTPUT CURRENT (AC)	1	AMPS
MAX INPUT VOLTAGE (DC)	48	VOLTS
MAX INPUT CURRENT (DC)	15	AMPS
MAX OCPD RATING (AC)	20	AMPS
MAX NUMBER OF PANELS PER CIRCUIT	16	

PV CIRCUIT 1: 16 MODULES/PARALLEL



AC PHOTOVOLTAIC SYSTEM RATINGS		
MAX AC OPERATING CURRENT	16	AMPS
MAX AC OPERATING VOLTAGE	240	VOLTS

* ROMEX WILL BE RAN THROUGH THE ATTIC WHERE POSSIBLE

RACEWAY AND CONDUCTOR SCHEDULE					
TAG	CONDUCTOR TYPE	MINIMUM WIRE SIZE	# OF CONDUCTORS	RACEWAY / CABLE TYPE	MINIMUM CONDUIT SIZE
A	ENPHASE ENGAGE CABLE (USE-2)	12	3	USE-2 / FREE AIR	N/A
	BARE COPPER (EGC/GEC)	6	1	BARE / FREE AIR	
B	THWN-2 OR NM (ROMEX) *	10	3	EMT / ROMEX	1/2"
	THWN-2 OR NM (ROMEX) (EGC/GEC)	10	1		

SYSTEM SIZE:
4.96 kW DC

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DESIGNER:
AR

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Salt Lake City, UT 84106

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826 E STATE ROAD, SUITE 270,
AMERICAN FORK, UT 84003
(888) 244-0231

SHEET NAME:
ELECTRICAL

SHEET NUMBER:
EL 1.0

1. THE ENPHASE M250, M215 (M215-60-2LL-SXX-IG), AND C250 FOURTH GENERATION MICROINVERTERS MEET THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE ARTICLE 690.35 FOR UNGROUNDED PHOTOVOLTAIC POWER SYSTEMS. NEC 690.35 ALLOWS FOR PHOTOVOLTAIC POWER SYSTEMS TO BE INSTALLED WITH UNGROUNDED PHOTOVOLTAIC SOURCE AND OUTPUT CIRCUITS. SYSTEMS THAT MEET THE REQUIREMENTS OF NEC 690.35 ARE EXEMPT FROM THE SYSTEM GROUNDING REQUIREMENTS OF NEC 690.41 SYSTEM GROUNDING.
2. NEC ARTICLE 690.43 EQUIPMENT GROUNDING SPECIFIES THAT ALL EXPOSED NON-CURRENT-CARRYING METAL PARTS OF PV MODULE FRAMES, ELECTRICAL EQUIPMENT, AND CONDUCTOR ENCLOSURES SHALL BE PROVIDED WITH EQUIPMENT GROUNDING. 690.43(C) STRUCTURE AS EQUIPMENT GROUNDING CONDUCTOR ALLOWS FOR EQUIPMENT TO BE USED AS THE EQUIPMENT GROUNDING CONDUCTOR IN A PHOTOVOLTAIC SYSTEM. SPECIFICALLY, “DEVICES LISTED AND IDENTIFIED FOR GROUNDING THE METALLIC FRAMES OF PV MODULES OR OTHER EQUIPMENT SHALL BE PERMITTED TO BOND THE EXPOSED METAL SURFACES OR OTHER EQUIPMENT TO MOUNTING SURFACES.” THE DEVICES LISTED AND IDENTIFIED FOR GROUNDING THE EQUIPMENT MAY BE STAND-ALONE GROUNDING COMPONENTS OR UL-2703 LISTED MOUNTING HARDWARE. IN AN ENPHASE MICROINVERTER SYSTEM, IF THE MICROINVERTERS AND MODULES ARE BONDED TO THE RACKING ASSEMBLIES WITH THE USE OF LISTED AND APPROVED GROUNDING CLIPS OR GROUNDING COMPONENTS, THE EQUIPMENT GROUNDING CONDUCTOR PROVIDED TO THE MICROINVERTERS THROUGH THE ENPHASE ENGAGE CABLE MAY ALSO BE USED TO GROUND THE OTHER PHOTOVOLTAIC SYSTEM COMPONENTS.
3. POSTED ON SITE TO COMPLY WITH NEC 690.54: SOLAR PHOTOVOLTAIC GENERATION POWER SOURCE UTILITY DISCONNECT SWITCH AC OUTPUT CURRENT: (WILL BE ENTERED SPECIFIC TO THE JOB). OPERATING AC VOLTAGE (WILL BE ENTERED).
4. ALL ILLEGAL WIRE-TAP SITUATIONS WILL BE CORRECTED PRIOR TO INSTALL.
5. ALL WIRING WILL BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS DESIGNED AND LISTED FOR SUCH USE. WIRING MUST BE PERMANENTLY AND COMPLETELY HELD OFF OF THE ROOF SURFACE.

SYSTEM SIZE:
4.96 kW DC

DATE:
9/13/2016

DESIGNER:
AR

Ericka Story

226 West Fern Ave
Salt Lake City, UT 84106

zingsolar

826 E STATE ROAD, SUITE 270,
AMERICAN FORK, UT 84003
(888) 244-0231

SHEET NAME:
ELECTRICAL

SHEET NUMBER:
EL 2.0

ATTACHMENT E: ANALYSIS OF STANDARDS

21A.40.190 Small Solar Energy Collection Systems

A. Standards: All small solar energy collection systems shall comply with the following requirements except as provided in section 21A.40.190.B relating to small solar energy collection systems in the historic preservation overlay districts. Per section 21A.34.020 of this title the historic landmark commission or staff have authority to modify the setbacks, location and height to ensure compliance with the overlay district regulations. Excluding subsection B of this section, if there is any conflict between the provisions of this subsection and any other requirements of the zoning, site development, and subdivision ordinances, the zoning administrator shall determine which requirements apply to the project in order to achieve the highest level of neighborhood compatibility.

Standard	Finding	Rationale
Standard 1: Setbacks, Location and Height: **a.** A freestanding small solar energy collection system shall be located a minimum of six feet (6') from all property lines and other structures, except the structure on which it is mounted. **b.** A small solar energy collection system may be located on a principal or accessory structure, including legal principal or accessory structures located less than the required minimum setback for the zoning districts. **c.** A small solar energy collection system shall not exceed by more than three feet (3') the maximum building height (based on the type of building - principal or accessory - the system is located on) permitted in the zoning district in which it is located or shall not extend more than twelve feet (12') above the roofline of the structure upon which it is mounted, whichever is less. **d.** A development proposed to have a small solar energy collection system located on the roof or attached to a structure, or an application to establish a system on an existing structure, shall provide a structural certification as part of the building permit application.	**Complies**	**a.** The proposed small solar energy collection system is proposed to be located on the roof of the existing residence. The location of the system will not overhang the roof and will not encroach into any front, side or rear lot area. As long as the system is mounted on the main structure, it is allowed to be less than 6 feet from the property lines if it is determined by the Historic Landmark Commission to meet all other standards of the ordinance. **b.** The proposed small solar energy collection is located on the primary structure. The subject property does have a small accessory structure within the rear yard, however the applicant claims it is not a suitable location (probably due to construction costs). **c.** The proposed small solar energy collection system is proposed to be mounted as flush with the roof as possible, parallel to the roof plane, below the ridge of the roofline. The solar panels themselves will project approximately 3 inches above the roof, but not above the roof ridge. In addition, the existing single-story residence is well below the maximum height of 23 feet for the zoning district. **d.** If the solar panels are approved, the applicant will need to submit all necessary documentation for the installation and structural details for the proposed small solar energy collection system when a building permit is applied for.
Standard 2: Coverage: A small solar energy collection system mounted to the roof of a building shall not exceed ninety percent (90%) of the total roof area of the building upon which it is installed. A system constructed as a separate accessory structure on the ground shall count toward the total building and yard coverage limits for the lot on which it is located.	**Complies**	The small solar energy collection system is proposed to be mounted on the main residence and not on an accessory building. The proposed size of the small solar energy collection system is approximately 276 square feet.
Standard 3: Code Compliance: Small solar energy collection systems shall comply with all applicable building and electrical codes contained in the international building code adopted by Salt Lake City.	**Complies**	Should the proposed small solar energy collection system be approved, it will need to comply with all applicable codes adopted by Salt Lake City. This standard will need to be met should the proposal be approved and a building permit is applied for.
Standard 4: Solar Easements: A property owner who has installed or intends to install a small solar energy collection system shall be responsible for negotiating with other property owners in the vicinity for any desired solar easement to protect solar access for the system and shall record the easement with the Salt Lake County recorder.	**Complies**	The applicant will be responsible for negotiating with other property owners for any desired solar easements. This standard is not applicable to the approval of this project.
Standard 5: Off Street Parking and Loading Requirements: Small solar energy collection systems shall not remove or encroach upon required parking or loading areas for other uses on the site or access to such parking or loading areas.	**Complies**	The proposed small solar energy collection system is located on the main residence and is not located upon any required parking area.

21A.34.020.G H Historic Preservation Overlay District – Standards for Certificate of Appropriateness for Altering of a Landmark Site or Contributing Structure

In considering an application for a certificate of appropriateness for alteration of a landmark site or contributing structure, the historic landmark commission, or the planning director, for administrative decisions, shall find that the project substantially complies with all of the following general standards that pertain to the application and that the decision is in the best interest of the city:

Standard	Finding	Rationale
Standard 1: A property shall be used for its historic purpose or be used for a purpose that requires minimal change to the defining characteristics of the building and its site and environment;	**Does not comply**	The building was constructed in 1886 as a single family home. No change of use is proposed, however, significant changes in character will be made to the front façade with the presence of the solar panels.
Standard 2: The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided;	**Does not comply**	No historic building materials will be removed, however the character of the front roof plane will be altered.
Standard 3: All sites, structure and objects shall be recognized as products of their own time. Alterations that have no historical basis and which seek to create a false sense of history or architecture are not allowed.	**Complies**	The small solar energy collection system is a utility feature and is not being installed in a manner to create a false sense of history or architecture. This standard is met.
Standard 4: Alterations or additions that have acquired historic significance in their own right shall be retained and preserved.	**Complies**	No significant historic features will be lost. The proposal complies with this standard.
Standard 5: Distinctive features, finishes and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved.	**Does not comply**	The historic roof of this property is a prominent feature. The distinctive color of the solar panels against the color of the shingles on the roof may have a negative impact on the overall historic character of the property.
Standard 6: Deteriorated architectural features shall be repaired rather than replaced wherever feasible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, texture and other visual qualities. Repair or replacement of missing architectural features should be based on accurate duplications of features, substantiated by historic, physical or pictorial evidence rather than on conjectural designs or the availability of different architectural elements from other structures or objects.	**Not Applicable**	The subject proposal does not include repair or replacement of deteriorated architectural features. This standard does not relate to the proposal.
Standard 7: Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.	**Not applicable**	The proposed work does not include any treatments of historic materials. This standard is not applicable to the request.
Standard 8: Contemporary designs for alterations and additions to existing properties shall not be discouraged when such alterations and additions do not destroy significant cultural, historical, architectural or archaeological material, and such design is compatible with the size, scale, color, material and character of the property, neighborhood or environment.	**Does not comply**	Because the color of the proposed solar panels are black and the roof is grey, staff finds the color contrast (and use of modern materials) on the front roof plane will not be compatible with the color, material, and character of the property or historic neighborhood.
Standard 9: Additions or alterations to structures and objects shall be done in such a manner that if such additions or alteration were to be removed in the future, the essential form and integrity of the structure would be unimpaired. The new work shall be differentiate from the old and shall be compatible in massing, size, scale and architectural features to protect the historic integrity of the property and its environment.	**Complies**	The proposed small solar energy collection system can be easily removed without impairing any form and integrity of the structure other than minimal damage to the asphalt shingle roof. This standard is met.

Standard 10: Certain building materials are prohibited including the following: vinyl, asbestos, or aluminum cladding when applied directly to an original or historic material.	**Not applicable**	Small solar energy collection systems are considered an accessory to the building and no original material will be affected.
Standard 11: Any new sign and any change in the appearance of any existing sign located on a landmark site or within the H historic preservation overlay district, which is visible from any public way or open space shall be consistent with the historic character of the landmark site or H historic preservation overlay district and shall comply with the standards outlined in part IV, Chapter 21A.46 of this title.	**Not applicable**	No signs are proposed. This standard is not applicable.

21A.40.190.B Small Solar Energy Collection Systems and Historic Preservation Overlay Districts

Regulation	Finding	Rationale
3. Small Solar Energy Collection System Location Priorities: In approving appropriate locations and manner of installation, consideration shall include the following locations in the priority order they are set forth below. The method of installation approved shall be the least visible from a public right of way, not including alleys, and most compatible with the character defining features of the historic building, structure, or site. Systems proposed for locations in subsections B3a through B3e of this section, may be reviewed administratively as set forth in subsection 21A.34.020F1, "Administrative Decision", of this title. Systems proposed for locations in subsection B3f of this section, shall be reviewed by the historic landmark commission in accordance with the procedures set forth in subsection 21A.34.020F2, "Historic Landmark Commission", of this title. **a.** Rear yard in a location not readily visible from a public right of way. **b.** On accessory buildings or structures in a location not readily visible from a public right of way. **c.** In a side yard in a location not readily visible from a public right of way. **d.** On the principal building in a location not readily visible from a public right of way. **e.** On the principal building in a location that may be visible from a public right of way, but not on the structure's front facade. **f.** On the front facade of the principal building in a location most compatible with the character defining features of the structure.	**Does not Comply**	**a.** The rear yard is not an option for installation as the yard area would not be large enough to place the system and also conform to all setbacks and distance requirements. In addition, vegetation that is present in the rear yard could prevent adequate exposure for the proposed solar panels. **b.** As stated previously, the subject property does have a small accessory structure within the rear yard, however the applicant claims it is not a suitable location (probably due to construction costs). **c.** According to data from the Salt Lake City Geographic Information System (GIS) the existing residence has (approximately) an east side yard setback of 0'-0", and a west side yard setback of 11'-0", which may be large enough to mount solar panels if deemed appropriate. **d.** If approved, the applicant will place 2 of the 16 proposed solar panels on a roof plane that is not readily visible from a public right of way. **e.** If approved, the applicant will place 10 of the 16 proposed solar panels on a roof plane that may be visible from a public right of way, but not on the front façade. **f.** If approved, the applicant will place 4 of the proposed 16 panels on the front façade of the principal building. Although, staff finds that the proposal will alter a character defining feature of the structure and will not be compatible, staff received two comments in support of the request (see Attachment G – Public Process and Comments).

ATTACHMENT F: APPLICABLE DESIGN GUIDELINES

The following are applicable historic design guidelines related to this request. On the left are the applicable design guidelines and on the right, a list of the corresponding Zoning Ordinance standards for which the design guidelines are applicable. The following applicable design guidelines can be found in *A Preservation Handbook for Historic Residential Properties & Districts in Salt Lake City*

Applicable Design Guidelines	Corresponding Standards for a Certificate of Appropriateness
Design Objective 7.6 – The visual impact of skylights and other rooftop devices should be minimized. • **Skylights or solar panels should be installed to reflect the plane of the historic roof.** • **Flat skylights and solar panels that are parallel with the roof plane may be appropriate on the rear and sides of the roof.** • **Avoid locating a skylight or solar panel on a front roof plane wherever possible.**	Standards 2, 5, 8 and 9

ATTACHMENT G: PUBLIC PROCESS AND COMMENTS

Public Notice, Meetings and Comments

The following is a list of public meetings that have been held, and other public input opportunities, related to the proposed project.

Notice of Public Hearing:

- Public hearing notice mailed on October 20, 2016
- Public hearing notice posted on subject property on October 20, 2016
- Public meeting agenda posted on the Salt Lake City Planning Division and Utah Public Meeting Notice websites on October 20, 2016

Public Comment:
Staff received the following Public Comment related to this project:

> October 22, 2016
>
> Dear Michael Maloy,
>
> I live on Fern Avenue and have solar panels myself. I think it's great that more of us are having them put in and it's the environmentally responsible thing to do. I'm all in favor of her project. When I had mine put in the district wouldn't let me put them on the street face which is facing south. That's the most direct and efficient way to use the panels. Please consider liberalizing the use of solar to a greater extent in our city. Renewables is the wave of the future, coal and fossil fuels should be phased out as much as possible. Please approve her project to use the best use of solar energy—we'll all be better off in the decades to come.
>
> Thanks very much,
>
> Brian Richards
> 210 Fern Avenue

Department Comment:
Staff received the following Department Comment related to this project:

> October 20, 2016
>
> Hi Michael,
>
> Please be sure to tell the (Historic Landmark Commission) about how we worked closely with stakeholders and the Historical folks on this a few years ago, and this was a great compromise so that homeowners who couldn't put solar panels anywhere else could use the front face of their roof.
>
> Vicki Bennett
> Sustainability Environment Director

ATTACHMENT H: MOTIONS

Consistent with Staff Recommendation:

Based on the analysis and findings listed in the staff report, testimony received, and proposal presented, I move that the Commission approve Petition PLNHLC2016-00495 for Minor Alteration to install a small solar energy collection system at 226 W Fern Avenue with the following condition:

1. All solar panels on the front roof plane, oriented toward Fern Avenue, shall be removed. Solar panels may be relocated to other permissible sites described in City Code 21A.40.190.B.3 subparagraphs a through e.

This motion is based upon compliance with the following applicable standards of review (Commissioner then states Standard 2 to support the motion):

1. A property shall be used for its historic purpose or be used for a purpose that requires minimal change to the defining characteristics of the building and its site and environment;
2. **The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided;**
3. All sites, structures and objects shall be recognized as products of their own time. Alterations that have no historical basis and which seek to create a false sense of history or architecture are not allowed;
4. Alterations or additions that have acquired historic significance in their own right shall be retained and preserved;
5. Distinctive features, finishes and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved;
6. Deteriorated architectural features shall be repaired rather than replaced wherever feasible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, texture and other visual qualities. Repair or replacement of missing architectural features should be based on accurate duplications of features, substantiated by historic, physical or pictorial evidence rather than on conjectural designs or the availability of different architectural elements from other structures or objects;
7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible;
8. Contemporary design for alterations and additions to existing properties shall not be discouraged when such alterations and additions do not destroy significant cultural, historical, architectural or archaeological material, and such design is compatible with the size, scale, color, material and character of the property, neighborhood or environment;
9. Additions or alterations to structures and objects shall be done in such a manner that if such additions or alterations were to be removed in the future, the essential form and integrity of the structure would be unimpaired. The new work shall be differentiated from the old and shall be compatible in massing, size, scale and architectural features to protect the historic integrity of the property and its environment;
10. Certain building materials are prohibited including the following:
    a. Aluminum, asbestos, or vinyl cladding when applied directly to an original or historic material.
11. Any new sign and any change in the appearance of any existing sign located on a landmark site or within the H historic preservation overlay district, which is visible from any public way or open space shall be consistent with the historic character of the landmark site or H historic preservation overlay district and shall comply with the standards outlined in chapter 21A.46 of this title.

Not Consistent with Staff Recommendation:

Based on information contained within the staff report, testimony received, and proposal presented, I move that the Commission deny Petition PLNHLC2016-00495 for Minor Alteration to install a small solar energy collection system at 226 W Fern Avenue. (Commissioner then states findings based on the above standards to support the motion.)