KLAMATH COMMUNITY COLLEGE

Request for Quotation RFP # 2023 PV23

For: Provide and install of additional Photovoltaic system and battery back -up expansion on the Apprenticeship Center at Klamath Community College in Klamath Falls, Oregon.

DUE DATE AND TIME: 1:00 P.M., PST, February 12th, 2024 to the reception desk building 9

Issuing Office: Klamath Community College Facilities, 7390 South 6th Street Klamath Falls, OR 97603 Contact: Tim Williams <u>WilliamsL@klamathcc.edu</u> (541)880-2244

PHOTOVOLTAIC SERVICES RFP- LEGAL ADVERTISEMENT

Notice is hereby given that Klamath Community College District, hereinafter, "College," or "KCC," is requesting proposals from qualified firms to provide an expansion of Photovoltaic services and battery backup *expansion* on the Apprenticeship Center at Klamath Community College in Klamath Falls, Oregon. Services will include design/build services.

The Request for Proposal (RFP) document may be obtained either by visiting the Klamath Community College Website: www.klamathcc.edu or by contacting Tim Williams at (541) 880-2244 or via email WilliamsL@klamathcc.edu or by contacting Tim Williams at (541) 880-2244 or via email WilliamsL@klamathcc.edu or by contacting Tim Williams at (541) 880-2244 or via email WilliamsL@klamathcc.edu between the hours of 8:00 am and 4:00 pm, Monday through Friday. Questions pertaining to the submission process can be directed to Tim Williams

Emailed or electronic versions of the proposal will not be accepted. **Deadline for** submitting proposals will be no later than 1:00P.M., Pacific Standard Time, 12th day, February, 2024.

Proposals will be received at:

Klamath Community College Attn: Tim Williams Receptionist Desk, Building 9, Founders Hall 7390 South 6th Street Klamath Falls, OR 97603 Each proposal submitted must contain a statement as to whether the Proposer is a resident bidder as defined in ORS 279A.120.

The Proposer shall be required to follow those requirements set forth in the competitive procurement standards of 2 CFR Part 200, including but not limited to:

- Proposals will be evaluated based on a matrix to evaluate the best value for KCC. The matrix is provided in the quotation documents.
- All applicable requirements of Appendix 2 to 2 CFR Part 200.

Procurement of Federally Funded Projects

All procurement transactions, including the procurement of design-build services, shall be in accordance with Federal regulations adopted by the Department of Commerce at 2 C.F.R. Part 200 and the EDA regulations contained in 13 C.F.R. Chapter III, especially 13 C.F.R. Part 305 and 13 C.F.R. section 302.17 ("Conflicts of Interest").

Minority-owned and women-owned enterprises are encouraged to submit proposals in response to this solicitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award of any contract entered into pursuant to this advertisement.

The College may reject any proposal not in compliance with all prescribed public proposal procedures and requirements, and may reject for good cause any or all proposals upon a finding of the College that it is in the public interest to do so.

Evaluation of proposals will begin immediately after submittal date.

Klamath Community College Apprenticeship Center Photovoltaic Services

REQUEST FOR QUOTATION (RFP)

Photovoltaic design-build Services

Invitation

Klamath Community College, Oregon is requesting quotations from qualified firms to provide for Expansion of Photovoltaic services on the Apprenticeship Center building at Klamath Community College. Services will include all installation services for the photovoltaic system and battery back-up *expansion* project.

Project Scope

The project will consist of an addition to existing photovoltaic system and battery back -up expansion on the Apprenticeship Center Building

- Design a photovoltaic system that will work with drawings and specification for the project provided by OPSIS Architecture. Basic out line of project attachment D 1-6. Vendor should familiarize themselves with the overall project and appropriate related sections to their work.
- Supply and install all materials need for proper operation of Photovoltaic system and battery back -up expansion.
- Project is subject to BOLI Requirements.
- Project is targeted to be operational 2024. All good faith efforts will be made to meet the time line. KCC is aware of Possible material and supply issues and will work with vendor to work toward completion.

Submittal of Proposals

Interested firms may submit responses to this invitation by completing the documentation requested herein and submitting five (3) copies within a sealed envelope clearly marked with the words *RFP Provide and installation of Photovoltaic Services and battery back -up expansion to*:

Klamath Community College Reception Desk Building 9 Attn: Tim Williams 7390 South 6th Street Klamath Falls, OR 97603

Proposals must be received no later than: February 12th day, 2023, 1:00 pm. No quotation may be submitted after the time and date set for the proposal opening.

Attachment B

All proposals submitted shall contain a statement as to whether the bidder (responder) is a resident or nonresident bidder (responder), as defined in ORS 279.029.

Attachment C

Each proposal shall show compliance with Equal Opportunity requirements and provide Worker's Compensation Insurance for its employees as per ORS 656.029. All subject employers working under the contract are either employers that will comply with ORS 656.017 or employers that are exempt under ORS 656.126. Klamath Community College is an Equal Opportunity Employer.

KCC will not be liable in any manner for expenses incurred by the vendor(s) in response to this quotation.

The Klamath Community College Board may waive any or all informalities and irregularities, may reject any proposal not in compliance with all prescribed public procurement procedures and requirements, and may reject for good cause any or all proposals upon a finding of the College that it is in the public interest to do so.

The basis of selection will be an initial screening of proposals by the selection committee and a panel interview, if necessary. The selection committee may at their discretion invite the recommended finalist(s) for interviews. Interview requirements will be distributed to the finalist(s) selected for interview. The selection committee will forward a recommendation to the Vice -president CFO of Administrative Services

The Request for Proposal (RFP) document may be obtained either by visiting the Klamath Community College Website: www.klamathcc.edu or by Tim Williams at (541) 880-2244 between the hours of 8:00 am and 4:00 pm, Monday through Friday. Questions pertaining to the submission process can be directed to Tim Williams WilliamsL@klamathcc.edu.

Klamath Community College may, for good cause, reject any or all proposals upon a finding it is in the public interest to do so and to rescind the award of any contract at any time before the execution of said contract by all parties with no liability against the College.

1. SELECTION PROCESS

- 1.1 Proposers must submit five (5) copies of the proposal, with one (1) copy clearly marked as the original to Klamath Community College Architectural Services Selection Panel, 7390 South 6th Street, Klamath Falls, OR 97603.
- 1.2 Quotations must be received no later than, 3:00 pm January 31st 2024. Emailed, facsimile or any type of electronic response to the Request for Quotation will not be accepted. Quotations received after the due date and time will be returned unopened. It is the responsibility of the vender to ensure that their document is received at the correct location and on time.
- 1.3 The vendor will be selected on the basis of several factors, including, but not limited to: cost, experience, qualifications and references. Proposals submitted in response to this RFP will be reviewed and evaluated by a selection committee. The award recommendation will be submitted to the VP CFO of Administrative Services. The College is open to negotiating the terms and conditions related to the scope of work and related fees and costs. The

College will proceed to negotiate a contract with the top-ranking firm.

- 1.4 By signing and returning the proposal the vender acknowledges they have read and understand the terms and conditions contained in the solicitation document and accept and agree to be bound by the terms and conditions of the solicitation document.
- 1.5 Contractors shall use recyclable products to the maximum extent economically feasible in the performance of the contract work set forth in this document.
- 1.6 Any addenda issued for the RFP will be mailed to all known proposers on the College's list of responding firms. And will be posted to the KCC web site.

2. WRITTEN QUESTIONS, COMMENTS AND ADDENDA

- 2.1 Protests, questions and comments pertaining to the solicitation will be directed Tim Williams <u>WilliamsL@klamathcc.edu</u> 541-880-2244 All protests, questions/comments must be submitted in writing. No oral questions will be accepted. Questions will be answered by addenda to the RFQ. Proposers are asked to submit questions, if any, as early as possible during the quotation process. No questions will be accepted five workdays prior to submittal date.
- 2.2 If in the College's opinion, additional information or interpretation is necessary; such information will be supplied in the form of addenda. Addenda shall have the same binding effect as though contained in the main body of the Request for Proposal.

3. PROPOSAL COSTS/CONTRACT AWARD

- 3.1 All costs of the quotation process are solely the responsibility of the vender. The College reserves the right to reject any or all proposals, or to modify or cancel this solicitation. Award of a contract is subject to Board approval.
- 3.2 Contract terms and conditions are negotiable after contractor selection.

4. PROPOSAL SUBMITTAL REQUIREMENTS/EVALUATION CRITERIA.

Instructions. An original and five (3) copies of your proposal should be submitted on 8 ½ by 11-inch paper. Proposals should include a response to each of the following categories and the signed certifications (Attachment A; B; C). Proposals shall be limited to 15 one-sided pages, not including the cover page, the cover letter, or staff resumes which shall be limited to one page per staff member. (5 points)

4.1 Firm Description. Provide a brief description of your firm's history, the type of work you have done, and your capabilities. If this is a joint venture, provide the information for each of the firms involved. List key staff and their experience

and capabilities as well sub-consulting firms that will be part of your team, including engineers and cost-estimators, and your history with those sub-consulting firms on prior projects. **(5) points)**

- **4.2 Experience on similar projects.** Please include information on 3 related past projects including the engineers estimate, contractors bid amount, and actual project final cost. Provide your history of completing similar projects on time and within budget. Specifically identify at least two Oregon educational project completed in the last 10 years and include construction costs. **(10 points)**
- 4.3 **Overall Project Approach.** Describe your firm's knowledge and understanding of the project and your overall approach to complete the project. Describe methods and concepts proposed for this project to meet client needs as well as budgetary considerations. Including obtaining utility net metering agreement approval, and all Incentive programs and paperwork to obtain those incentives (10 points)
- **4.4 Approach to Schedule and Availability.** Describe how you will ensure that the owner's requirements are met in terms of schedule. Describe recent, current and projected workloads of your staff and resources and the proposed amount of time each staff would spend on the project. **(5 points)**
- **4.5 Experience in Klamath Falls.** Please describe your team's experience working in Southern Oregon and Klamath Falls including experience by all sub-consulting firms, and your familiarity with the community and construction climate. Responsiveness to service requests including deficiency reporting and service. (15 points)
- **4.6 References.** Please provide us with the names, email addresses and phone numbers of at least three project references that are knowledgeable about your work product and process. **(10 points)**
- **4.7 Project value.** Provide specific technical information to understand the systems potential value. This would include information such as the potential systems generation capacity, expandability, maintenance, and other relevant project specifics and project total cost. **(25 points)**
- 4.8 KCC will require a "full" NABCEP certification. North American Board of Energy Practitioners. <u>https://www.nabcep.org/</u>

And

Oregon General Electrical Contractor CCB #_____ (15 points)

5. ADDITIONAL REQUIREMENTS

- 5.1 Proposer agrees to comply with the legal requirements of the State of Oregon, the standard and customary professional responsibilities for Designbuild services as well as any special conditions which are made part of this solicitation or which are subsequently negotiated.
- 5.2 Each proposal submitted must contain a statement as to whether the Proposer is a resident bidder as defined in ORS 279A.120.
- 5.3 Minority-owned and women-owned enterprises are encouraged to submit proposals in response to this solicitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award of any contract entered into pursuant to this advertisement.
- 5.4 The College may reject any proposal not in compliance with all prescribed public proposal procedures and requirements, and may reject for good cause any or all proposals upon a finding of the College that it is in the public interest to do so.
- 5.5 Vender shall be licensed by the State of Oregon to do the work required under this contract. Vender shall obtain, pay for, and maintain in current status all applicable permits and licenses and all work shall comply with building codes in effect at the time the work is performed.
- 5.6 All subcontracting or assignments of contract shall be subject to the written approval of the College and proposer shall be wholly responsible for the performance of all sub-Firms and for their acts and omissions. Nothing contained in the contract documents shall be construed to create any contract between the College and any sub-Firms.

6. CANCELLATION: Klamath Community College reserves the right to cancel award of a contract at any time before execution of the contract by both parties if cancellation is deemed to be in the College's best interest. In no event shall Klamath Community College have any liability for the cancellation of the award.

(This score sheet is provided for your information only)

Klamath Community College

Provide SERVICES EVALUATION SCORE SHEET

Propo	ser Name:	Reviewer:		
Requi	red Submissions:	Certificate of non-discrimination Certificate of Compliance Residency statement	Yes Yes Yes	No No No
Revie POIN	w criteria: TS:			
1. Fir	m description		(5 points maximum)
	Comments:			
2. Ex	perience on similar projec	ots		(10 points maximum)
	Comments:			
3. Ov	verall project approach			
	Comments:			(10 points maximum)
4. Ap	proach to schedule/Availa	ability		
				(5 points maximum)
	Comments:			
5. Kla	amath Falls Experience			(15 Points Maximum)
6. Re	ferences (Pass/Fail)			(10 points maximum)

7. Project Value

		Comments:	
8.	QUAI KCC https:	IFIACTIONS AND CERTIFICATIONS will require a "full" NABCEP certification. North American Boa //www.nabcep.org/	ard of Energy Practitioners.
	And Oreg	on General Electrical Contractor CCB #	(15 points)
		Comments:	
	And Oreg	//www.nabcep.org/ on General Electrical Contractor CCB # Comments:	(15 points)

(25 points maximum)

TOTAL POINTS (110 possible)

Attachment A

Certifications

Please sign and return with your proposal

I/we have received and reviewed the RFQ and any Addenda issued by Klamath Community College and this submission is our entire proposal.

Addenda _____ to ____ noted

Firm Name _____

Authorized Signature _____

Printed Name_____

Date_____

Attachment B

Klamath Community College

REQUEST FOR QUOTATION

BIDDER/PROPOSER RESIDENCY STATEMENT

Pursuant to ORS 279A.120, Oregon's reciprocal Preference Law, public contracting agencies shall, for the purposes of determining the lowest responsible bidder/proposer and the awarding of a contract, add a percent increase on the bid of a non-resident bidder/proposer equal to the percent, if any, of the preference given to that bidder/proposer in the state in which the bidder/proposer resides.

As defined in ORS 279A.120, "Resident Bidder/proposer" means a bidder/proposer that has paid unemployment taxes or income taxes in this state in the twelve calendar months immediately preceding submission of the bid, has a business address in this state, and has stated in the bid whether the bidder/proposer is a "Resident Bidder/proposer". A "non-resident Bidder/proposer" is a bidder/proposer who does not meet the definition of a "Resident Bidder/proposer" as stated above.

Bidder/proposer/Proposer ____IS ___ IS NOT

a "Resident Bidder/proposer" as set forth above.

2. If a Resident Bidder/proposer, enter your Oregon Business address below:

3. If a Non-resident Bidder/proposer, enter state of residency:

Bidder/proposer/Proposer hereby certifies that the information provided is true and accurate.

Signature:	Date:
Printed or Typed name:	-
Title:	-
Firm:	_
Telephone:	_

Attachment C

Klamath Community College

REQUEST FOR PROPOSALS

CERTIFICATE OF NON-DISCRIMINATION

Pursuant to ORS 279A.110, discrimination in subcontracting is prohibited. Any contractor who contracts with a public contracting agency shall not discriminate against minority, women or emerging small business enterprises in the awarding of contracts.

By signature of the authorize representative of the bidder/proposer/proposer, the bidder/proposer/proposer herby certifies to Klamath Community College that this bidder/proposer/proposer has not discriminated against minority, women, or emerging small business enterprises in obtaining any subcontracts; and, further, that if awarded the contract for which this bid or proposal is submitted, shall not so discriminate.

Date: _____

Signature:

Printed or Typed Name: _____

ATTACHMENT D











EQUIPMENT SCHEDULE FOR BATTERY BACK-UP

Model Nun	mber	Manufacturer	Vmp @ STC	Imp @ STC	Isc @ STC	Voc @ STC	Max-Series Fuse (OCPD)	Pmp	Number of Modules
SILFAB 490 HN	I/ 35MM	Silfab	45.2V	10.83A	11.36A	54.0V	20A	490W	56

PHOTOVOLTAIC SOURCE CIRCUIT DETAILS	e Max. Circuit Imp @ STC Isc @ STC ASHRAE 0.4% AVG Min. Circuit Circuit Circuit Insulation Conductor Conduit Type and % of Y_Drop Voltage Voltage Distance Type Size (cu) Size in Circuit	425.3V 10.8A 11.36A 65C 271.0V 30' XLPE 600V 10AV/G CU FREE-AIR 0.30%	10.83A X 1.24Ω//1000//271.01816Vdc NOTESEGC size: 12AWG (use insulation type listed above), GEC size: 6AWG (BARE)
HOTOVOLTAIC SOUI	Isc @ STC ASHR DB +	11.36A	
DHG	Imp @ STC	10.8A	271.01816Vdc
	Max. Circuit Voltage	425.3V	33A X 1.24Ω]/1000]/;
	ASHRAE Extreme DB Min.	-20C	((2 X 30.03FT X 10.8
	Number of Modules in Series	7	_DROP CALCULATION
	Key	0	>`

	onduit Type % of V_Drop in and Size Circuit	1" EMT 7.93%	d above)	
VERTER)	Conductor C Size (Cu)	10AWG CU	nsulation type liste	
ut PRIOR TO IN	Circuit Insulation Type	THWN-2	size: 12AWG (use i	
single outp	Circuit Distance	100'	OTES EGC	
S (parallel strings to	Min. Circuit Voltage	271.0V	Z	
CIRCUIT DETAI	lsc x 1.56	141.8A	:71.01816Vdc	
AIC OUTPUT	Imp @ STC	86.6A	1.24Ω)/1000)/2	
PHOTOVOLT	Max. Circuit Voltage	425.3V	((2 X 100FT X 86.64A X	
	Number of Strings	80	OP CALCULATION	
	ey	3	V_DRI	

					INVERT	ER OUTPUT CIRCI	UIT DETAILS (GR	(ID-TIED)					
Key	Inverter Make/ Model	Max. Continuous Output	MPPT Range	Connected Array Wattage	Number of Inverters	Grid Connection Voltage	Continuous Output Current	Max OCPD size	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
(:			
9	Sol-Ark 30K-3P-208V	30000W	170-500V	27440W	7	3-208	83.3A	125A	10'	THWN-2	2/0AWG AL	1 1/2" EMT	0.11%
:													
>'	DROP CALCULATION	(((2 X 10	OFT X 83.2741161	840469A X 0.1590)	/1000) X 0.866)/2	08Vac		NOTES FG	C and Neutral	size: 100M/G CI1 /	se insulation to	ine listed shows	

TOTAL SYSTEM VOLTAGE DROP CALCULATED AGE DROP TOTAL CALCULATED 8.23% VOLTAGE DROP TOTAL CALCULATED 0.11%

Project Name:	Klamath Community Col	lege	
Sheet Title: 222.95 kWdd	c and 27.44kWdc Hybrid Commerci	al Flush-Roof-Mount Sy	stem
Location: 7390	South 6th St., KLAMATH FALLS, OF	~	
Date: 11/09/2023	Scale: N/A	Sheet: 3/5	



222.95 kWdc and 27.44kWdc Hybrid Commercial Flush-Roof-Mount System 5/5 Sheet: Klamath Community College 7390 South 6th St., KLAMATH FALLS, OR Scale: N/A Conduit Type and Size % of V_Drop in Circuit % of V_Drop in Circuit 0.16% 0.16% Condult Type and Size Date: 11/09/2023 Project Name: 2" EMT Sheet Title: Location: Conductor Size Conductor Size Conductor Conduit Type % of V_Drop in Size and Size Circuit % of V_Drop in Circuit % of V_Drop In Circuit EQUIPMENT SCHEDULE % of V_Drop in Circuit and Neutral size: 8AWG (use 0.22% 0.52% NOTES-- MBJ size: 2AWG CU, and Neutral size: 1/D Al per set (insulation type listed above) 0.47% 0.61% Circuit Insulation Type C THVN-2 Circuit Insulation Type Conduit Type and Size Conduit Type and Size Conduit Type and Size 1 1/2" EMT Number of Modules FREE-AIR Circuit Distance 455 Circuit Distance 250MCM AL Conductor Size (Cu) Conductor Size (Cu) Conductor Size (Cu) Max OCPD size Max OCPD size Circuit Insulation Type 150A VOTES-XHHW-2 MOSt bmp Circuit Insulation Type Circuit Insulation Type PHOTOVOLTAIC SOLIRCE CIRCUT(S) DEFAILS (under transition Individual stringe PRIOR TO INVERTER)
Max. Circuit Voltage Augustion Augustion Control of Circuit Conduction Conduct Type X of V_Drop In
Max. Circuit Voltage Augustion Augustion Circuit Voltage Defause Intervent Individual Provided Pr Circuit Insulation Type % of V_Drop Circuit Conduit Type % of V_Dro and Size Circuit -- EGC size: 6AW INVERTER OUTPUT CIRCUIT DETAILS Number of Grid Connection Continuous Inverters Voltage Output Current Grid Connection Continuous Voltage Output Current 120.3A 120.3A EGC size: 10AWG 6AWG CU 1" EMT EGG in single conduit. EGC size: 8AWG. **Circuit Distance** Max-Series Fuse (OCPD) Conduit Type and Size 00 NOTES ... Circuit Circuit Distance 10AWG (use i Circuit 100. INVERTER OUTPUT CIRCUIT DETAILS PHOTOVOLTAIC SOURCE CIRCUIT DETAILS (USING DC to DC OPTIMIZERS) PHOTOVOLTAIC SOURCE CIRCUIT DETAILS (USING DC to DC OPTIMIZERS) Max OCPD size 850.0V NOTES-- EGC 4ize: 10 Min. Circuit Voltage 70° THWN-2 6AWG CU NOTES-- 1: POS, 1: NEG and 1: EGC in single co 300A Min. Circuit Voltage Min. Circuit Voltage
 Orcents
 Min. Circuit Voltage
 Circuit
 Circuit
 Conductor

 Ampedia
 Min. Circuit Voltage
 Circuit
 C
 Ans. Circuit: Voltage
 Circuit.
 Circuit.
 Circuit.
 Conductor

 Ans. Circuit: Voltage
 Fampecity v1.32
 Min. Circuit Voltage
 Circuit.
 Conductor

 1000.0V
 S0.1A
 EX6.1A
 S80.0V
 Distance
 University

 110X.0FT X175300583259414 X0.7780/1000/85004c
 NOTES-1: P05.1:14E3 m11:EG66 mildee
 NOTES-1: P05.1:14E3 m11:EG66 mildee
 DISCONNECT OUTPUT RATINGS (PER PARALLEL SET) SOURCE CIRCUIT DETAILS (USING DC to DC OPT PHOTOVOLTAIC SOURCE CIRCUIT(S) DETAILS (wire transition individual strings PRIOR TO INVERTER) Voc @ STC 850.0V PHOTOVOLTAIC SOURCE CIRCUIT(S) DETAILS (wire transition individual strings PRIOR TO INVERTER) 850.0V Output Current {per parallel set} Number of Inverters ASHRAE D.4% AVG DB + Temp Adder 240 6A 850V to 1000Vdc 3430W 1 (((2 X 30FT X 120.284834488068A X 0.126A)/1000) X 0.866)/480/ac Max. Dutput Max. Power Per String © Single Current Phase 18A 15300W ASHRAE 0.4% AVG DB + Temp Adder 850V to 1000Vdc 222950W 1 (((2 X 30FT X 120.28483488068A X 0.1260)/1000) X 0.866//480Vac ASHRAE 0.4% AVG DB + Temp Adder PHOTOVOLTAIC MODULE RATING 65C 65 Isc @ STC 11.36A {{\2 x 30FT x 240.569668976135A X 0.08470}{x 0.866}{480v} Connected Array Wattage **Grid Connection Voltage** Connected Array Wattage Circuit Wattage 13720W Circuit Wattage Circuit Wattage 17640W -20C 1000.0V 17.9A 15190W ((2 X 100FT X 17.8705882352941A X 1.240)/1000)/850Vdc 3-480 Imp @ STC 10.83A Circuit Ampacity Circuit Ampacity Circuit Ampacity 16.1A 20.8A Vmp @ STC 0.38% 0.14% TOTAL SYSTEM VOLTAGE DROP CALCULATED 1000.0V 41.6A 51.8A [12.8A [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12 MPPT Range MPPT Range DC TO DC OPTIMIZER DETAILS Max. Input Current 14.10A NEMA RATNG OUTDOOR Max. Circuit Voltage Max. Circuit Voltage Max. Circuit Voltage 1000.0V 1000.0V Manufacturer Max. Circuit Voltage Circuit Ampacity A 1000.0V 48.3A ([2 X 70FT X 16.14.1764705382A X 0 DC VOLTAGE DROP TOTAL CALCULATED AC AVERAGE VOLTAGE DROP TOTAL CALCULATED 12.5-105Vdc ASHRAE Extreme DB Min. MPPT Range ASHRAE Extreme DB Min. -20C ((2 X 100FT X ASHRAE Extreme DB Min. Max. Continuous Output Max. Continuous Output Disconnect Model -20C Max. Circuit Voltage 100000W ((2 X 70FT X 16.141 Number of Modules/Optimizers in Series (2:1 ratio Panel:Optimizer) Number of Modules/Optimizers in Series (2:1 ratio Panel:Optimizer) Number of Modules/Optimizers in Series (2:1 ratio Panel:Optimizer) Make/ DC-DC Optimizer Make/ Model SOLAREDGE/ P1101 Model Number Inverter Make/ Model Inverter Make/ Model V_DROP CALCULATION DROP CALCULATION **Disconnect Make** DROP CALCULATIO DROP CALCULATION DROP CALCULATION DROP CALCULATION Number of Strings Number of Strings 4b 3 V_DROP CALCULATION Number of Strings V_DROP CALCULATION CULATION Eaton Key Key Key Key Key Key 4a Key Key Key a Key 5 Key





EQUIPMENT SCHEDULE FOR BATTERY BACK-UP

Model Nun	mber	Manufacturer	Vmp @ STC	Imp @ STC	Isc @ STC	Voc @ STC	Max-Series Fuse (OCPD)	Pmp	Number of Modules
SILFAB 490 HN	I/ 35MM	Silfab	45.2V	10.83A	11.36A	54.0V	20A	490W	56

PHOTOVOLTAIC SOURCE CIRCUIT DETAILS	e Max. Circuit Imp @ STC Isc @ STC ASHRAE 0.4% AVG Min. Circuit Circuit Circuit Insulation Conductor Conduit Type and % of Y_Drop Voltage Voltage Distance Type Size (cu) Size in Circuit	425.3V 10.8A 11.36A 65C 271.0V 30' XLPE 600V 10AV/G CU FREE-AIR 0.30%	10.83A X 1.24Ω//1000//271.01816Vdc NOTESEGC size: 12AWG (use insulation type listed above), GEC size: 6AWG (BARE)
HOTOVOLTAIC SOUI	Isc @ STC ASHR DB +	11.36A	
DHG	Imp @ STC	10.8A	271.01816Vdc
	Max. Circuit Voltage	425.3V	33A X 1.24Ω]/1000]/;
	ASHRAE Extreme DB Min.	-20C	((2 X 30.03FT X 10.8
	Number of Modules in Series	7	_DROP CALCULATION
	Key	0	>`

	onduit Type % of V_Drop in and Size Circuit	1" EMT 7.93%	d above)	
VERTER)	Conductor C Size (Cu)	10AWG CU	nsulation type liste	
ut PRIOR TO IN	Circuit Insulation Type	THWN-2	size: 12AWG (use i	
single outp	Circuit Distance	100'	OTES EGC	
S (parallel strings to	Min. Circuit Voltage	271.0V	Z	
CIRCUIT DETAI	lsc x 1.56	141.8A	:71.01816Vdc	
AIC OUTPUT	Imp @ STC	86.6A	1.24Ω)/1000)/2	
PHOTOVOLT	Max. Circuit Voltage	425.3V	((2 X 100FT X 86.64A X	
	Number of Strings	80	OP CALCULATION	
	ey	3	V_DRI	

					INVERT	ER OUTPUT CIRCI	UIT DETAILS (GR	(ID-TIED)					
Key	Inverter Make/ Model	Max. Continuous Output	MPPT Range	Connected Array Wattage	Number of Inverters	Grid Connection Voltage	Continuous Output Current	Max OCPD size	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
(:			
9	Sol-Ark 30K-3P-208V	30000W	170-500V	27440W	4	3-208	83.3A	125A	10'	THWN-2	2/0AWG AL	1 1/2" EMT	0.11%
1													
>'	DROP CALCULATION	(((2 X 10	OFT X 83.2741161	840469A X 0.1590)	/1000) X 0.866)/2	08Vac		NOTES FG	C and Neutral	size: 100M/G CI1 /	se insulation to	ine listed shows	

TOTAL SYSTEM VOLTAGE DROP CALCULATED AGE DROP TOTAL CALCULATED 8.23% VOLTAGE DROP TOTAL CALCULATED 0.11%

Project Name:	Klamath Community Col	lege	
Sheet Title: 222.95 kWdd	c and 27.44kWdc Hybrid Commerci	al Flush-Roof-Mount Sy	stem
Location: 7390	South 6th St., KLAMATH FALLS, OF	~	
Date: 11/09/2023	Scale: N/A	Sheet: 3/5	



222.95 kWdc and 27.44kWdc Hybrid Commercial Flush-Roof-Mount System 5/5 Sheet: Klamath Community College 7390 South 6th St., KLAMATH FALLS, OR Scale: N/A Conduit Type and Size % of V_Drop in Circuit % of V_Drop in Circuit 0.16% 0.16% Condult Type and Size Date: 11/09/2023 Project Name: 2" EMT Sheet Title: Location: Conductor Size Conductor Size Conductor Conduit Type % of V_Drop in Size and Size Circuit % of V_Drop in Circuit % of V_Drop In Circuit EQUIPMENT SCHEDULE % of V_Drop in Circuit and Neutral size: 8AWG (use 0.22% 0.52% NOTES-- MBJ size: 2AWG CU, and Neutral size: 1/D Al per set (insulation type listed above) 0.47% 0.61% Circuit Insulation Type C THVN-2 Circuit Insulation Type Conduit Type and Size Conduit Type and Size Conduit Type and Size 1 1/2" EMT Number of Modules FREE-AIR Circuit Distance 455 Circuit Distance 250MCM AL Conductor Size (Cu) Conductor Size (Cu) Conductor Size (Cu) Max OCPD size Max OCPD size Circuit Insulation Type 150A VOTES-XHHW-2 MOSt bmp Circuit Insulation Type Circuit Insulation Type PHOTOVOLTAIC SOLIRCE CIRCUT(S) DEFAILS (under transition Individual stringe PRIOR TO INVERTER)
Max. Circuit Voltage Augustion Augustion Control of Circuit Conduction Conduct Type X of V_Drop In
Max. Circuit Voltage Augustion Augustion Circuit Voltage Defause Intervent Individual Provided Pr Circuit Insulation Type % of V_Drop Circuit Conduit Type % of V_Dro and Size Circuit -- EGC size: 6AW INVERTER OUTPUT CIRCUIT DETAILS Number of Grid Connection Continuous Inverters Voltage Output Current Grid Connection Continuous Voltage Output Current 120.3A 120.3A EGC size: 10AWG 6AWG CU 1" EMT EGG in single conduit. EGC size: 8AWG. **Circuit Distance** Max-Series Fuse (OCPD) Conduit Type and Size 00 NOTES .--Circuit Circuit Distance 10AWG (use i Circuit 100. INVERTER OUTPUT CIRCUIT DETAILS PHOTOVOLTAIC SOURCE CIRCUIT DETAILS (USING DC to DC OPTIMIZERS) PHOTOVOLTAIC SOURCE CIRCUIT DETAILS (USING DC to DC OPTIMIZERS) Max OCPD size 850.0V NOTES-- EGC 4ize: 10 Min. Circuit Voltage 70° THWN-2 6AWG CU NOTES-- 1: POS, 1: NEG and 1: EGC in single co 300A Min. Circuit Voltage Min. Circuit Voltage
 Orcents
 Min. Circuit Voltage
 Circuit
 Circuit
 Conductor

 Ampedia
 Min. Circuit Voltage
 Circuit
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 Ans. Circuit: Voltage
 Circuit.
 Circuit.
 Circuit.
 Conductor

 Ans. Circuit: Voltage
 Fampecity v1.32
 Min. Circuit Voltage
 Circuit.
 Conductor

 1000.0V
 S0.1A
 EX6.1A
 S80.0V
 Distance
 University

 110X.0FT X175300583259414 X0.7780/1000/85004c
 NOTES-1: P05.1:14E3 m11:EG66 mildee
 NOTES-1: P05.1:14E3 m11:EG66 mildee
 DISCONNECT OUTPUT RATINGS (PER PARALLEL SET) SOURCE CIRCUIT DETAILS (USING DC to DC OPT PHOTOVOLTAIC SOURCE CIRCUIT(S) DETAILS (wire transition individual strings PRIOR TO INVERTER) Voc @ STC 850.0V PHOTOVOLTAIC SOURCE CIRCUIT(S) DETAILS (wire transition individual strings PRIOR TO INVERTER) 850.0V Output Current {per parallel set} Number of Inverters ASHRAE D.4% AVG DB + Temp Adder 240 6A 850V to 1000Vdc 3430W 1 (((2 X 30FT X 120.284834488068A X 0.126A)/1000) X 0.866)/480/ac Max. Dutput Max. Power Per String © Single Current Phase 18A 15300W ASHRAE 0.4% AVG DB + Temp Adder 850V to 1000Vdc 222950W 1 (((2 X 30FT X 120.28483488068A X 0.1260)/1000) X 0.866//480Vac ASHRAE 0.4% AVG DB + Temp Adder PHOTOVOLTAIC MODULE RATING 65C 65 Isc @ STC 11.36A {{\2 x 30FT x 240.569668976135A X 0.08470}{\2000} X 0.866} Connected Array Wattage **Grid Connection Voltage** Connected Array Wattage Circuit Wattage 13720W Circuit Wattage Circuit Wattage 17640W -20C 1000.0V 17.9A 15190W ((2 X 100FT X 17.8705882352941A X 1.240)/1000)/850Vdc 3-480 Imp @ STC 10.83A Circuit Ampacity Circuit Ampacity Circuit Ampacity 16.1A 20.8A Vmp @ STC 0.38% 0.14% TOTAL SYSTEM VOLTAGE DROP CALCULATED 1000.0V 41.6A 51.8A [12.8A [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12.8] [12 MPPT Range MPPT Range DC TO DC OPTIMIZER DETAILS Max. Input Current 14.10A NEMA RATNG OUTDOOR Max. Circuit Voltage Max. Circuit Voltage Max. Circuit Voltage 1000.0V 1000.0V Manufacturer Max. Circuit Voltage Circuit Ampacity A 1000.0V 48.3A ([2 X 70FT X 16.14.1764705382A X 0 DC VOLTAGE DROP TOTAL CALCULATED AC AVERAGE VOLTAGE DROP TOTAL CALCULATED 12.5-105Vdc ASHRAE Extreme DB Min. MPPT Range ASHRAE Extreme DB Min. -20C ((2 X 100FT X ASHRAE Extreme DB Min. Max. Continuous Output Max. Continuous Output Disconnect Model -20C Max. Circuit Voltage 100000W ((2 X 70FT X 16.141 Number of Modules/Optimizers in Series (2:1 ratio Panel:Optimizer) Number of Modules/Optimizers in Series (2:1 ratio Panel:Optimizer) Number of Modules/Optimizers in Series (2:1 ratio Panel:Optimizer) Make/ DC-DC Optimizer Make/ Model SOLAREDGE/ P1101 Model Number Inverter Make/ Model Inverter Make/ Model V_DROP CALCULATION DROP CALCULATION **Disconnect Make** DROP CALCULATIO DROP CALCULATION DROP CALCULATION DROP CALCULATION Number of Strings Number of Strings 4b 3 V_DROP CALCULATION Number of Strings V_DROP CALCULATION CULATION Eaton Key Key Key Key Key Key 4a Key Key Key a Key 5 Key

SINGLE-LINE & EQUIPMENT SCHEDULE ELECTRICAL DIAGRAM





EQUIPMENT SCHEDULE FOR BATTERY BACK-UP

				PHOTOVOLTAIO	MODULE RATING	is			
Key	Model Number	Manufacturer	Vmp @ STC	Imp @ STC	lsc @ STC	Voc @ STC	Max-Series Fuse (OCPD)	Pmp	Number of Modules
0	SILFAB 490 HN/ 35MM	Silfab	45.2V	10.83A	11.36A	54.0V	20A	490W	56

		PV-	LINK DETAILS		
Key	PV-Link Make/ Model	MPPT Range	Max. Input Current	Max. Output Current	Max. Power Per String @ Single Phase
0	SOLAREDGE/ S500	8-60Vdc	15.00A	15.0A	5700W

			PHOTOV	OLTAIC SOURC	E CIRCUIT DET	TAILS (USING DC to	DC SUBSTRING O	PTIMIZERS)			
Key	Number of Modules in Series	ASHRAE Extreme DB Min.	Max. Circuit Voltage	Circuit Ampacity	Circuit Wattage	ASHRAE 0.4% AVG DB + Temp Adder	Min. Circuit Voltage	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
ତ୍ତ	9	-20C	420.0V	12.3A	4410W	65C	360.0V	39'	XLPE 600V	10AWG CU	FREE-AIR	0.33%
\ \	_DROP CALCULATION	((2 X 3	3.61FT X 12.25A X 1.2	24Ω)/1000)/360V	/dc			NOTE	S EGC size: 6AWG (E	BARE)		

	_	-	PH	IOTOVOLTAIC S	SOURCE CIRCU	IT DETAILS (USING	DC to DC OPTIMIZ	ZERS)				
Key	Number of Modules/Optimizers in Series	ASHRAE Extreme DB Min.	Max. Circuit Voltage	Circuit Ampacity	Circuit Wattage	ASHRAE 0.4% AVG DB + Temp Adder	Min. Circuit Voltage	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
60	10	-20C	420.0V	13.6A	4900W	65C	360.0V	43'	XLPE 600V	10AWG CU	FREE-AIR	0.40%
	V_DROP CALCULATION	((2 X 42.9FT)	x 13.6111111111111	A X 1.24Ω)/1000	/360Vdc			NOTE	S EGC size: 6AWG (BARE)		

		PHOTOVOLTA	C SOURCE O	CIRCUIT(S) DETA	ILS (wire tra	nsition in	dividual st	rings PRIOR TO	INVERTER)		
Key	Number of Strings	Max. Circuit Voltage	Circuit Ampacity	Circuit Ampacity x 1.25	Min. Circui	t Voltage	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
4	1	420.0V	15.0A	18.8A	360.	OV	125'	THWN-2	6AWG CU	1 1/2" EMT	0.51%
V_DF	ROP CALCULATION	((2 X 125FT	X 15A X 0.491	Ω)/1000)/360Vdc			NOTES 3:	POS, 3: NEG and 1	: EGC in single co	onduit. EGC size: 1	DAWG.
_											

				BA	ATTERY OL	JTPUT CIR	CUIT DETAIL	s					
Key	Inverter Make/ Model	Max. Continuous Output	Power Rating: 60-Minutes / 2-Minutes	DC Voltage Min / Max	Usable Energy	Max Output Current	Continuous Output Current	Max OCPD size	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
6	SOLAREDGE / BAT-10K1P	5000W	7500W	350 Vdc - 450Vdc	9.7 kWh	21.4A	14.3A	30A	40'	THWN-2	10AWG CU	3/4" EMT	0.40%
V_DR	OP CALCULATION	((2 X	40FT X 14.28571428	57143A X 1.24Ω),	/1000)/350\	/dc		NOTES	EGC: 10A	WG (use ins	ulation type lis	ted above)	

			_		INVERT	ER OUTPUT CIRC	UIT DETAILS (GI	RID-TIED)					
Key	Inverter Make/ Model	Max. Continuous Output	MPPT Range	Connected Array Wattage	Number of Inverters	Grid Connection Voltage	Continuous Output Current	Max OCPD size	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
6	SOLAREDGE/ SE11400H-US (240V)	11400W	400-480V	13720W	2	5-240	47.5A	60A	10'	THWN-2	6AWG CU	1" EMT	0.19%
V_	DROP CALCULATION		((2 X 10FT X	47.5A X 0.491Ω)/10	00)/240Vac			NOTES E	GC and Neutra	size: 10AWG CU (use insulation	type listed above)	

				INVERTER	COMBINING LO	DADCENTER RAT	INGS	-	-		
Key	Loadcenter Make	Loadcenter Model	NEMA RATNG	Grid Connection Voltage	Continuous Output Current	Max OCPD size	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
\bigcirc	SolarEdge	BI-NUSGN-02	OUTDOOR	S-240	95.0A	125A	25'	THWN-2	1/0AWG CU	1" EMT	0.24%
V_I	DROP CALCULATION	((2)	K 25FT X 95A X 0.	122Ω)/1000)/240V	эс	NC	OTES EGC, and Ne	utral size: 8AWG (use insulation t	ype listed above)	

TOTAL SYSTEM VOLTAGE DROP (ALCULATED
DC VOLTAGE DROP TOTAL CALCULATED	1.13%
AC AVERAGE VOLTAGE DROP TOTAL CALCULATED	0.42%

	Project Name:	Klamath Community Col	lege	
	Sheet Title: 27.44kWdc Hy	ybrid Commercial Flush-Roof-Mou	unt System	
	Location: 7390	South 6th St., KLAMATH FALLS, O	R	
	Date: 6/14/2023	Scale: N/A	Sheet: 3/3	

EQUIPMENT SCHEDULE

				P	HOTOVOLTAIC	MODULE RATINGS						
к	(ey	y Model Number Manufacturer Vmp @ STC Imp @ STC Isc @ STC Voc @ STC Max-Series Fuse (OCPD) Pmp Number of Modules										
	1 SiL-490/35MM Frame Silfab 45.2V 10.83A 11.36A 54.0V 20A 490W 483											

		DC TO DC	OPTIMIZER DETAI	LS							
Key	Key DC-DC Optimizer Make/ Model MPPT Range Max. Input Current Max. Output Current Max. Power Per String @ Single										
2 SOLAREDGE/ P1101 12.5-105Vdc 14.10A 18A 15300W											

			PH	OTOVOLTAIC	SOURCE CIRCL	JIT DETAILS (USING	DC to DC OPTIMIZ	ZERS)				
Кеу	Number of Mode/Optimizers ASHRAE Extreme DB Min. Max. Circuit Voltage Circuit Ampacity Circuit Wattage ASHRAE 0.4% AVG DB + Temp Adder Min. Circuit Voltage Circuit Insulation DB + Temp Adder Conductor Voltage Conductor Size Conduct Type and Size % of V_Drop in Circuit											
3a	28	-20C	1000.0V	16.1A	13720W	65C	850.0V	100'	XLPE 600V	10AWG CU	FREE-AIR	0.47%
,	V_DROP CALCULATION	/850Vdc	NOTES EGC size: 6AWG (BARE)									

		PHOTOVOLTAIC SOURCE CIRCUIT DETAILS (USING DC to DC OPTIMIZERS)											
Key	Number of Mode/Optimizers ASHRAE Extreme DB Min. Max. Circuit Voltage Circuit Ampacity Circuit Wattage ASHRAE 0.4% AVG DB + Temp Adder Min. Circuit Voltage Conduit Type and Size Conduit Type and Size												
3b	31	-20C	1000.0V	17.9A	15190W	65C	850.0V	100'	XLPE 600V	10AWG CU	FREE-AIR	0.52%	
	V_DROP CALCULATION ((2 X 100FT X 17.8705882352941A X 1.24Ω)/1000)/850Vdc NOTES EGC size: 10AWG (use insulation type listed above), GEC size: 6AWG (BARE)												

			PH	OTOVOLTAIC S	SOURCE CIRCU	IT DETAILS (USING	DC to DC OPTIMIZ	ERS)		_		
Key	ey Models Optimizeris for series ASHRAE Extreme DB Min. Voltage Mas. Circuit Voltage Circuit Watage DB + Temp Adder Voltage Circuit State Circ											
3c	36	-20C	1000.0V	20.8A	17640W	65C	850.0V	100'	XLPE 600V	10AWG CU	FREE-AIR	0.61%
	V DROP CALCULATION ((2 X 100FT X 20.7529411764706A X 1.240)/1000)/850Vdc NOTES EGC size: 6AWG (BARE)											

		PHOTOVOLTAI	C SOURCE C	CIRCUIT(S) DETA	ILS (wire tra	nsition in	dividual st	rings PRIOR TO	INVERTER)	-	
Key	Number of Strings Max. Circuit Voltage Circuit Ampacity AL25 Min. Circuit Voltage Circuit Distance Insulation Type Size (Cu) and Size Size (Cu)										
4a	3	1000.0V	48.3A	60.3A	850.0	850.0V 70' THWN-2 8AWG CU 1" EMT C				0.21%	
V_D	V_DROP CALCULATION ((2 X 70FT X 16.1411764705882A X 0.778Ω)/1000)/850Vdc NOTES 1: POS, 1: NEG and 1: EGC in single conduit. EGC size: 10AWG.										

		PHOTOVOLTA	C SOURCE (CIRCUIT(S) DETA	ILS (wire tra	insition in	dividual st	rings PRIOR TO	INVERTER)			
Key	y Number of Strings Max. Circuit Voltage Circuit Ampacity AL25 Min. Circuit Voltage Circuit Insulation Type Size (Cu) Size (Cu											
4b	3	1000.0V	50.1A	62.6A	850.0V 70' THWN-2 8AWG CU 1" EMT					0.23%		
V_DF	V_DROP CALCULATION ((2 X 70FT X 17.8705882352941A X 0.778Ω)/1000)/850Vdc NOTES 1: POS, 1: NEG and 1: EGC in single conduit. EGC size: 10AWG.											

		PHOTOVOLTA	C SOURCE O	CIRCUIT(S) DETA	ILS (wire tra	nsition in	dividual st	rings PRIOR TO	INVERTER)	-		
Key	Number of Strings Max. Circuit Voltage Circuit Ampacity Circuit Ampacity x1.25 Min. Circuit Voltage Circuit Distance Circuit Insulation Type Conduit Type Size (Cu) % of V_Drop in Circuit											
4c	2	1000.0V	41.6A	51.8A	850.0V 130' THWN-2 8AWG CU 1" EMT 0.					0.49%		
V_DF	V_DROP CALCULATION ((2 X 130FT X 20.7529411764706A X 0.778Ω)/1000)/850Vdc NOTES 1: POS, 1: NEG and 1: EGC in single conduit. EGC size: 8AWG.											

					INVERTER OUTPU	IT CIRCUIT DETAI	LS						
Ke	Key Inverter Make/ Model Max. Continuous Output MPPT Range Connected Array Wattage Number of Inverters Grid Connection Output Current Continuous Output Current Circuit Insulation Type Circuit Curcuit Insulation Type Conduit Type and Size % of V										% of V_Drop in Circuit		
	a SOLAREDGE/ SE120KUS (480V)	120000W	850V to 1000Vdc	117600W	1	3-480	144.3A	200A	30'	THWN-2	4AWG CU	1 1/4" EMT	0.48%
	V_DROP CALCULATION (((2 X 30FT X 144.341801385681A X 0.308Ω)/1000) X 0.866)/480Vac NOTES GND size: 8AWG, and Neutral size: 8AWG (use insulation type listed above)												

					INVERTER OUTPU	JT CIRCUIT DETA	ILS				-		
Key	Key Inverter Make/ Model Max. Continuous Output MPPT Range Connected Array Wattage Number of Inverters Grid Connection Voltage Continuous Output Array CPD is a Insulation Type Circuit Insulation Type and Size (Cu) Conduit Type and Size (Cu) % of V_Dro in Circuit										% of V_Drop in Circuit		
5b	SOLAREDGE/ SE120KUS (480V)	120000W	850V to 1000Vdc	119070W	1	3-480	144.3A	200A	30'	THWN-2	4AWG CU	1 1/4" EMT	0.48%
V_DROP CALCULATION (((2 X 30FT X 144.341801385681A X 0.308Ω)/1000) X 0.866)/480Vac NOTES EGC size: 10AWG, and Neutral size: 8AWG (use insulation type in the insulatin type in the insulation type in the insulation ty									on type listed above)				

			D	ISCONNECT OUTPUT RA	ATINGS (PER PARAL	LEL SET)					
Key	Key Disconnect Make Disconnect Model NEMA RATNG Grid Connection Voltage Output Current (per parallel set) Max OCPD size Circuit Circuit Conduit Type % of V_Drop in Grid Circuit										
			OUTDOOR	3-480	288.7A	400A	30'	XHHW-2	1/0AWG AL	1 1/2" EMT	0.63%
	V_DROP CALCULATION (((2 X 30FT X 288.683602771363A X 0.201Ω)/1000) X 0.866)/480Vac NOTES MBJ size: 2AWG CU, and Neutral size: 1/0 Al per set (insulation type listed above)										

					1	1			0110 5120	circuit			
		OUTDOOR	3-480	288.7A	400A	30'	XHHW-2	1/0AWG AL	1 1/2" EMT	0.63%			
V_DROP CALCULATION	(((2 X 30FT X 288.683602771363A X	0.201Ω)/1000) X 0.866)/48)Vac	NOTES N	/IBJ size: 2AWG Cl	J, and Neutral size:	1/0 Al per set (i	insulation type lis	ed above)			
TOTAL SYSTEM	VOLTAGE DE	OP CALCULATED											
DC VOLTAGE DROP TOT	FAL CALCULATE	D 0.83%											
AC AVERAGE VOLTAG	E DROP TOTAL	1.11%											
CALCULAT	TED		r							Pr	oiect Name:		
											K	CC ADDITION GRIE	D TIE SYSTEM
										She	eet Title:236.67kWdc Gr	rid-Tied Commercial Flus	h-Roof-Mount Sy
										Loc	cation: MAP: 39S09E	12 / LOT: 102, 103, 104, H	KLAMATH FALLS,
										Dat	ite: 6/9/2023	Scale: N/A	Sheet:

EQUIPMENT SCHEDULE FOR BATTERY BACK-UP

	PHOTOVOLTAIC MODULE RATINGS												
Кеу	Model Number	Manufacturer	Vmp @ STC	Imp @ STC	lsc @ STC	Voc @ STC	Max-Series Fuse (OCPD)	Pmp	Number of Modules				
1	SILFAB 490 HN/ 35MM	Silfab	45.2V	10.83A	11.36A	54.0V	20A	490W	56				

	PHOTOVOLTAIC SOURCE CIRCUIT DETAILS											
Key	Number of Modules in Series	ASHRAE Extreme DB Min.	Max. Circuit Voltage	Imp @ STC	lsc @ STC	ASHRAE 0.4% AVG DB + Temp Adder	Min. Circuit Voltage	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
2	7	-20C	425.3V	10.8A	11.36A	65C	271.0V	30'	XLPE 600V	10AWG CU	FREE-AIR	0.30%
,	V_DROP CALCULATION ((2 X 30.03FT X 10.83A X 1.24Ω)/1000)/271.01816Vdc NOTES EGC size: 12AWG (use insulation type listed above), GEC size: 6AWG (BARE)											

		PHOTOVOLT	AIC OUTPUT	CIRCUIT DETAI	LS (parallel strings to	single out	put PRIOR TO IN	IVERTER)				
Кеу	Number of Strings Max. Circuit Voltage Imp @ STC Isc x 1.56 Min. Circuit Voltage Circuit Distance Circuit Insulation Type Conductor Size (Cu) Conduit Type and Size % of V_Drop in Circuit											
3	8	425.3V	425.3V 86.6A 141.8A 271.0V 100' THWN-2 10AWC							7.93%		
V_DF	ROP CALCULATION	((2 X 100FT X 86.64A X	1.24Ω)/1000)/	271.01816Vdc	NOTES EGC size: 12AWG (use insulation type listed above)							

	INVERTER OUTPUT CIRCUIT DETAILS (GRID-TIED)												
Key	Inverter Make/ Model	Max. Continuous Output	MPPT Range	Connected Array Wattage	Number of Inverters	Grid Connection Voltage	Continuous Output Current	Max OCPD size	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
4	Sol-Ark 30K-3P-208V	30000W	170-500V	27440W	3-208	83.3A 125A 10' THWN-2 2/0AWG AL 11/2" EMT (
V_DROP CALCULATION (((2 X 10FT X 83.2741161840469A X 0.159Ω)/1000) X 0.866)/208Vac							NOTES EGC and Neutral size: 10AWG CU (use insulation type listed above)						

TOTAL SYSTEM VOLTAGE DROP CALCULATED									
DC VOLTAGE DROP TOTAL CALCULATED	8.23%								
AC AVERAGE VOLTAGE DROP TOTAL CALCULATED	0.11%								

Project Name:	Klamath Community Col	lege							
Sheet Title: 222.95 kWdc and 27.44kWdc Hybrid Commercial Flush-Roof-Mount Syste									
Location: 7390	South 6th St., KLAMATH FALLS, OI	3							
Date: 11/09/2023	Scale: N/A Sheet: 3/5								

EQUIPMENT SCHEDULE

	PHOTOVOLTAIC MODULE RATINGS												
Key	Model Number	Manufacturer	Vmp @ STC	Imp @ STC	Isc @ STC	Voc @ STC	Max-Series Fuse (OCPD)	Pmp	Number of Modules				
1	SIL-490/ 35MM Frame	Silfab	45.2V	10.83A	11.36A	54.0V	20A	490W	455				

		DC TO DC	OPTIMIZER DETAI	LS							
Key	Key DC-DC Optimizer Make/ MPPT Range Max. Input Max. Output Max. Power Per String @ Single Current Current Phase										
2	2 SOLAREDGE/ P1101 12.5-105Vdc 14.10A 18A 15300W										

			PH	OTOVOLTAIC	SOURCE CIRCL	JIT DETAILS (USING	DC to DC OPTIMIZ	ZERS)				
Key	Number of Modules/Optimizers in Series (2:1 ratio Panel:Optimizer)	ASHRAE Extreme DB Min.	Max. Circuit Voltage	Circuit Ampacity	Circuit Wattage	ASHRAE 0.4% AVG DB + Temp Adder	Min. Circuit Voltage	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
3a	28	-20C	1000.0V	16.1A	13720W	65C	850.0V	100'	XLPE 600V	10AWG CU	FREE-AIR	0.47%
	V_DROP CALCULATION ((2 X 100FT X 16.1411764705882A X 1.24Ω)/1000)/850Vdc						UP					

I		PHOTOVOLTAIC SOURCE CIRCUIT DETAILS (USING DC to DC OPTIMIZERS)											
	Кеу	Number of Modules/Optimizers in Series (2:1 ratio Panel:Optimizer)	ASHRAE Extreme DB Min.	Max. Circuit Voltage	Circuit Ampacity	Circuit Wattage	ASHRAE 0.4% AVG DB + Temp Adder	Min. Circuit Voltage	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit
[3b	31	-20C	1000.0V	17.9A	15190W	65C	850.0V	100'	XLPE 600V	10AWG CU	FREE-AIR	0.52%
I	١	_DROP CALCULATION	((2 X 100FT)	(17.8705882352941	A X 1.24Ω)/1000	/850Vdc		NOTES EGC size: 1	0AWG (use	insulation type listed a	above), GEC siz	e: 6AWG (BARE)	

	_		PHOTOVOLTAIC SOURCE CIRCUIT DETAILS (USING DC to DC OPTIMIZERS)													
Key	Number of Modules/Optimizers in Series (2:1 ratio Panel:Optimizer)	ASHRAE Extreme DB Min.	Max. Circuit Voltage	Circuit Ampacity	Circuit Wattage	ASHRAE 0.4% AVG DB + Temp Adder	Min. Circuit Voltage	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit				
3c	36	-20C	1000.0V	20.8A	17640W	65C	850.0V	100'	XLPE 600V	10AWG CU	FREE-AIR	0.61%				
	V DROP CALCULATION ((2 X 100FT X 20.7529411764706A X 1.24Q)/1000)/850Vdc NOTES EGC size: 6AWG (BARE)															

	PHOTOVOLTAIC SOURCE CIRCUIT(S) DETAILS (wire transition individual strings PRIOR TO INVERTER)											
Key	Number of Strings	Max. Circuit Voltage	Circuit Ampacity	Circuit Ampacity x 1.25	Min. Circuit	t Voltage	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit	
4a	3	1000.0V	48.3A	60.3A	850.0V		70'	THWN-2	6AWG CU	1" EMT	0.21%	
V_D	V_DROP CALCULATION ((2 X 70FT X 16.1411764705882A X 0.778Ω)/1000)/850Vdc						NOTES 1:	POS, 1: NEG and 1	: EGC in single co	nduit. EGC size: 1	DAWG.	

	PHOTOVOLTAIC SOURCE CIRCUIT(S) DETAILS (wire transition individual strings PRIOR TO INVERTER)											
Key	Number of Strings	Max. Circuit Voltage	Circuit Ampacity	Circuit Ampacity x 1.25	Min. Circuit	t Voltage	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop i Circuit	
4b	3	1000.0V	50.1A	62.6A	850.0V		70'	THWN-2	6AWG CU	1" EMT	0.14%	
V_DF	V_DROP CALCULATION ((2 X 70FT X 17.8705882352941A X 0.778Ω)/1000)/850Vdc						NOTES 1:	POS, 1: NEG and 1	: EGC in single co	nduit. EGC size: 10	JAWG.	

	PHOTOVOLTAIC SOURCE CIRCUIT(S) DETAILS (wire transition individual strings PRIOR TO INVERTER)											
Key	Number of Strings	Max. Circuit Voltage	Circuit Ampacity	Circuit Ampacity x 1.25	Min. Circui	t Voltage	Circuit Distance	Circuit Insulation Type	Conductor Size (Cu)	Conduit Type and Size	% of V_Drop in Circuit	
4c	2	1000.0V	41.6A	51.8A	850.0V		130'	THWN-2	6AWG CU	1" EMT	0.49%	
V_D	V_DROP CALCULATION ((2 X 130FT X 20.7529411764706A X 0.778Ω)/1000)/850Vdc						NOTES 1:	POS, 1: NEG and	1: EGC in single c	onduit. EGC size: 8	AWG.	

		INVERTER OUTPUT CIRCUIT DETAILS												
ĸ	(ey	Inverter Make/ Model	Max. Continuous Output	MPPT Range	Connected Array Wattage	Number of Inverters	Grid Connection Voltage	Continuous Output Current	Max OCPD size	Circuit Distance	Circuit Insulation Type	Conductor Size	Conduit Type and Size	% of V_Drop in Circuit
	5a	SOLAREDGE/ SE100KUS	100000W	850V to 1000Vdc	222950W	1	3-480	120.3A	150A	30'	THWN-2	3/0AWG AL	2" EMT	0.16%
	V_DROP CALCULATION (((2 X 30FT X 120.284834488068A X 0.126Ω)/1000) X 0.866)/480Vac								NOTES GNE) size: 8AWG, a	nd Neutral size: 8	AWG (use insulation	on type listed above)	

		INVERTER OUTPUT CIRCUIT DETAILS											
Ke	y Inverter Make/ Model	Max. Continuous Output	MPPT Range	Connected Array Wattage	Number of Inverters	Grid Connection Voltage	Continuous Output Current	Max OCPD size	Circuit Distance	Circuit Insulation Type	Conductor Size	Conduit Type and Size	% of V_Drop in Circuit
5	SOLAREDGE/ SE100KUS	100000W	850V to 1000Vdc	3430W	1	3-480	120.3A	150A	30'	THWN-2	3/0AWG AL	2" EMT	0.16%
	V_DROP CALCULATION (((2 X 30FT X 120.284834488068A X 0.126Ω)/1000) X 0.866)/480Vac							NOTES EGC	size: 10AWG,	and Neutral size: 8	AWG (use insulati	on type listed above)	

	DISCONNECT OUTPUT RATINGS (2 SETS)											
Key	Disconnect Make	Disconnect Model	NEMA RATNG	Grid Connection Voltage	Output Current (per parallel set)	Max OCPD size	Circuit Distance	Circuit Insulation Type	Conductor Size	Conduit Type and Size	% of V_Drop in Circuit	
	Eaton		OUTDOOR	3-480	240.6A	300A	30'	XHHW-2	250MCM AL	3" EMT	0.22%	
	V DROP CALCULATION (((2 X 30FT X 240.569668976135A X 0.0847Ω)/1000) X 0.866)/480Vac					NOTES MBJ size: 2AWG CU, and Neutral size: 1/0 Al per set (insulation type listed above)						

TOTAL SYSTEM VOLTAGE DROP CALCULATED							
DC VOLTAGE DROP TOTAL CALCULATED	0.14%						
AC AVERAGE VOLTAGE DROP TOTAL CALCULATED	0.38%						

Project Name:	lamath Community College							
Sheet Title: 222.95 kWdc and 27.44kWdc Hybrid Commercial Flush-Roof-Mount System								
Location: 7390	South 6th St., KLAMATH FALLS, OI							
Date: 11/09/2023	Scale: N/A	Sheet:	5/5					

