CASCADIA
RENEWABLES

Appendix

Suquamish House of Awakened Culture

Prepared by Cascadia Renewables – info@cascadiarenewables.com

Methodology

Our feasibility studies employ a systematic approach, ensuring clarity and precision. Each step is designed with multiple stakeholders in mind, from communities and clients to potential EPC and solar contractors. By focusing our feasibility study with these stakeholders in mind, we ensure that all pertinent details are addressed and allow for a comprehensive assessment of the project's viability, enabling streamlined/rapid project acquisition (RFP Development) and responsible project construction. Cascadia Renewables is committed to efficiency. In that vein, duplicating work is something we try to minimize both internally as well as externally. This philosophy extends through to our methodology as we strive to provide accurate, concise, and relevant information to all potential project stakeholders in an organized and easy-to-understand manner.

Step 1 - Community Engagement and Customer Onboarding: The project's foundation begins with a kickoff meeting. Here, we gather essential details like the context for completing this project, the site's scope in relation to its community service, how the community defines resiliency, and all the necessary contextual information to enable a thorough assessment of the site's conditions.

Step 2 - Data Collection: A structured data collection process ensures we have all relevant utility, structural, and electrical data, schematics, and plans to inform subsequent steps. This includes letters of support indicating alignment with stakeholder objectives.

Step 3 - Engineering Review: All acquired data and schematics undergo engineering evaluation to ensure feasibility from structural, architectural, and electrical perspectives. Our team works with our engineering partners to determine the relevant roof loading risk category, wind exposure, wind speed tolerance, roof snow load, and available structural capacity (if any) for the incorporation of solar equipment.

Step 4 - On-Site Assessment: A thorough on-site assessment is the best practice to ensure accurate project development. Conducted by senior staff, this assessment identifies and verifies site characteristics, installation points of access, equipment locations, construction hurdles etc. This hands-on approach ensures a comprehensive understanding of the real-world project environment, bridging gaps left by building plans or schematics.

Step 5 - Preliminary PV System Design: Utilizing advanced modeling software, we formulate an initial PV system layout. Our design methodology's precision is underpinned by our ability to draw on extensive datasets, ensuring reliable shade assessments using both on-site and LIDAR data. The design focuses on identifying the maximum fit PV System, potential equipment locations, and the total system capacity of the site. It also accounts for necessary fire/permitting equipment setback stipulations. To ensure transparency and ease of replication, our designs are made available to all stakeholders in both PDF and DXF formats. This facilitates future design adaptations and expansions by any project stakeholder.

Step 6 - Conceptual Equipment Specification and Review Process:

On at least a quarterly basis, our team conducts a comprehensive review of emerging and upcoming products in the solar and storage market.

This review is multifaceted and evaluates the following:

- **Cost Effectiveness:** We assess the financial feasibility of products to ensure they offer value for money.

- **Bankability:** Emphasis is placed on selecting Tier 1 products, ensuring longevity, warranty validity, reliability, and performance.
- **Origin of Manufacture:** We prioritize products made in the USA, supporting local industries, ensuring stringent quality standards, and enhancing local grant competitiveness.
- **Efficiency to Install:** Products are evaluated for their ease of installation, reducing project timelines and potential challenges.
- **O&M Considerations:** We analyze the long-term operational and maintenance requirements, ensuring sustainability and reduced lifecycle costs.
- **Lead Time:** Products with manageable lead times are prioritized to ensure timely project execution.
- **Safety:** Paramount to our selection process is the safety profile of equipment. We select products that adhere to the highest safety standards, ensuring the welfare of both installers and end-users.

This equipment selection process ensures that our feasibility studies and project designs are grounded in the latest, most efficient, and most reliable technologies. By staying abreast of market innovations, we ensure the projects are future-proofed, sustainable, and deliver maximum value.

Step 7 - Optimization and Preliminary Financial Calculations: Preliminary system design/BESS+PV optimizations are run to weigh project cost effectiveness, energy resiliency, and carbon reduction. These optimizations consider utility interval consumption data, utility carbon fuel mix, and preliminary system design specifications, shedding light on optimal battery energy storage system (BESS) sizes, capacities, and system financial performance.

Step 8 - Review and Client Feedback: At this point in the feasibility study process, we schedule a midpoint client meeting to facilitate open communication and iterative design, ensuring the design aligns with client objectives while addressing potential challenges. This midpoint client meeting is a working design meeting where our staff can, in real-time, explore a handful of potential system design options and configurations with client stakeholders. This is meant to provide an educational, hands-on, collaborative opportunity for the client to put their fingerprints on the final system design while also understanding the logistical constraints of a project of this magnitude.

The second stage of our feasibility study collates the community engagement/feedback to develop a final project conceptual design. This starts by considering all remaining project risks or blind spots.

Step 9 - Enhancing Resilience: Through final conceptual design modeling, we can quantify the project's resilience by calculating daily BESS, solar, and generator (when relevant) dispatch scenarios, ensuring the project meets broader community and utility objectives.

Step 10 - Permitting and Regulatory Compliance: Given the ever-changing nature of permitting requirements, our team is committed to consistently updating and documenting our conversations with local permitting authorities. We document local electrical and structural permitting requirements, ensuring relevant regulatory steps are identified and planned for.

Step 11 - System Schematics: Our detailed schematics undergo an impartial engineering review, ensuring they adhere to industry standards.

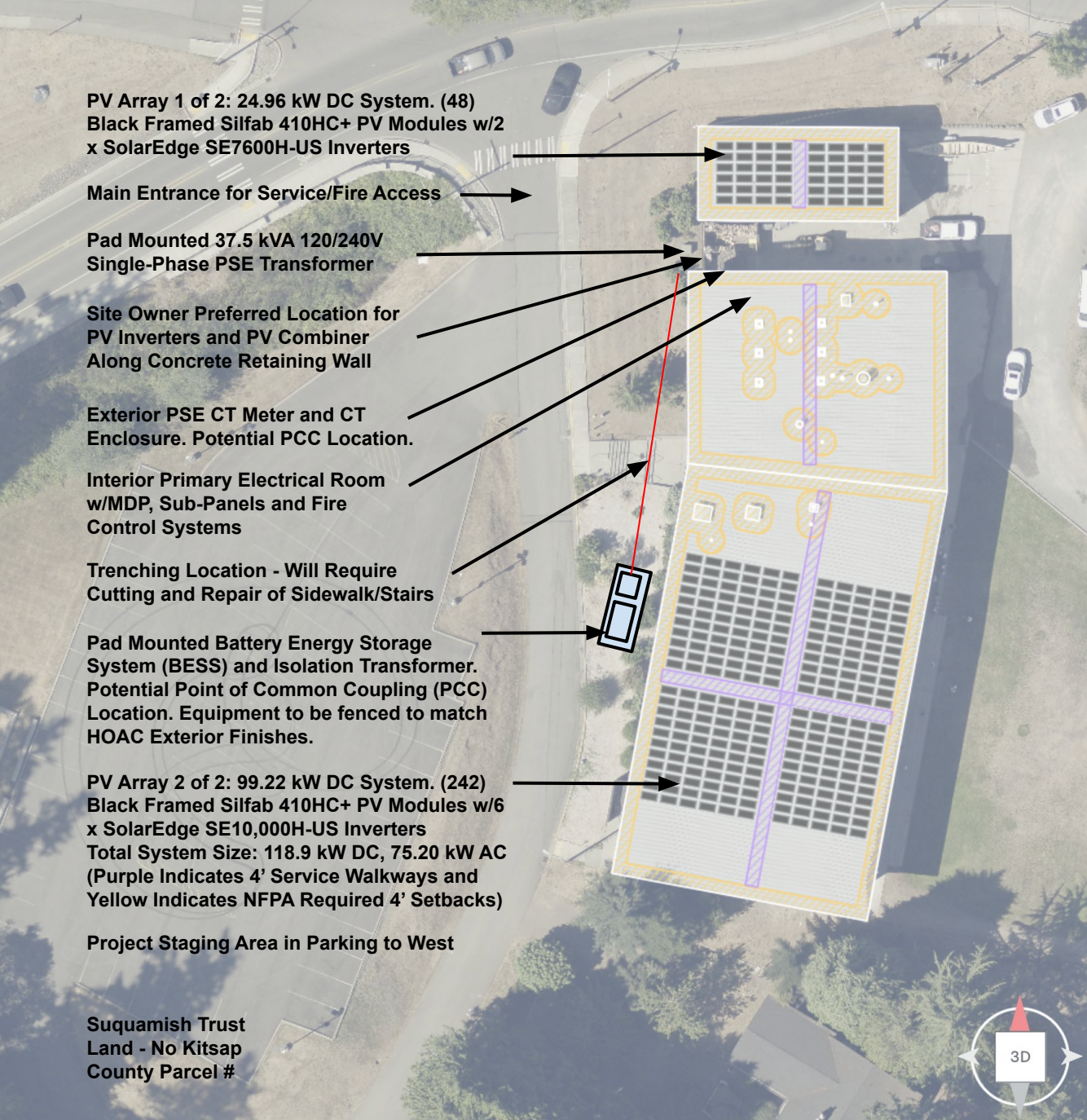
Step 12 - Final Conceptual System Design: With all of the feedback from the engineering review, AHJs, community stakeholders, and our comprehensive on-site assessment, we then create a final conceptual design. All facets of this design are updated–from PV size and module specifications to BESS system size and defined autonomy goals. We also delve into the environmental impact of the project and explore potential avenues for grant funding, incentives, and finance opportunities.

Step 13 - System Estimating: Finally, our feasibility studies utilize a structured and systemic estimating process rooted in our team's extensive experience in solar and storage project estimation and construction. For each project, we generate a detailed itemized budget. Every system cost is specifically priced with labor estimates referencing the latest Davis Bacon prevailing wage rates.

The goal of our estimating process is to provide a clear understanding of project costs, potential barriers, and associated risks. This aids in budgeting, grant application, and managing/minimizing change orders during construction.

We intend to facilitate a collaborative value engineering process for contractors and EPCs through a modern approach to contract acquisition (RFP/RFQ). We recognize the ever-changing landscape of clean energy technology and the explosion of demand in this sector. We have designed our deliverables with the aim that they can be leveraged to attract the most experienced, skilled, and relevant contractors to quickly assess and engage with a project without duplicative work throughout the project's development. As an impartial third-party consultant, we prioritize the community's interests. Our estimates offer clarity and strategy, allowing clients to make informed decisions about project costs, grant writing, and contractor engagement.

Step 14 - Final Client Presentation: The culmination of our methodology is the final presentation to the client. Here, we present the entirety of our findings and deliverables. Throughout the feasibility study process, the overarching objective remains to provide a thorough, accurate, and actionable assessment, empowering communities to make informed decisions about their clean energy, emergency management, and community resilience efforts.


PV Array 1 of 2: 24.96 kW DC System. (48) Black Framed Silfab 410HC+ PV Modules w/2 x SolarEdge SE7600H-US Inverters
Main Entrance for Service/Fire Access
Pad Mounted 37.5 kVA 120/240V Single-Phase PSE Transformer
Site Owner Preferred Location for PV Inverters and PV Combiner Along Concrete Retaining Wall
Exterior PSE CT Meter and CT Enclosure. Potential PCC Location.
Interior Primary Electrical Room w/MDP, Sub-Panels and Fire Control Systems
Trenching Location - Will Require Cutting and Repair of Sidewalk/Stairs
Pad Mounted Battery Energy Storage System (BESS) and Isolation Transformer. Potential Point of Common Coupling (PCC) Location. Equipment to be fenced to match HOAC Exterior Finishes.
PV Array 2 of 2: 99.22 kW DC System. (242) Black Framed Silfab 410HC+ PV Modules w/6 x SolarEdge SE10,000H-US Inverters
Total System Size: 118.9 kW DC, 75.20 kW AC
(Purple Indicates 4' Service Walkways and Yellow Indicates NFPA Required 4' Setbacks)
Project Staging Area in Parking to West
Suquamish Trust Land - No Kitsap County Parcel #
3D

Shade Report - The Suquamish Tribe - House of Awakened Culture

Customer
The Suquamish Tribe - House of Awakened Culture

Address
7235 NE Pkwy, Suquamish, WA 98392, USA

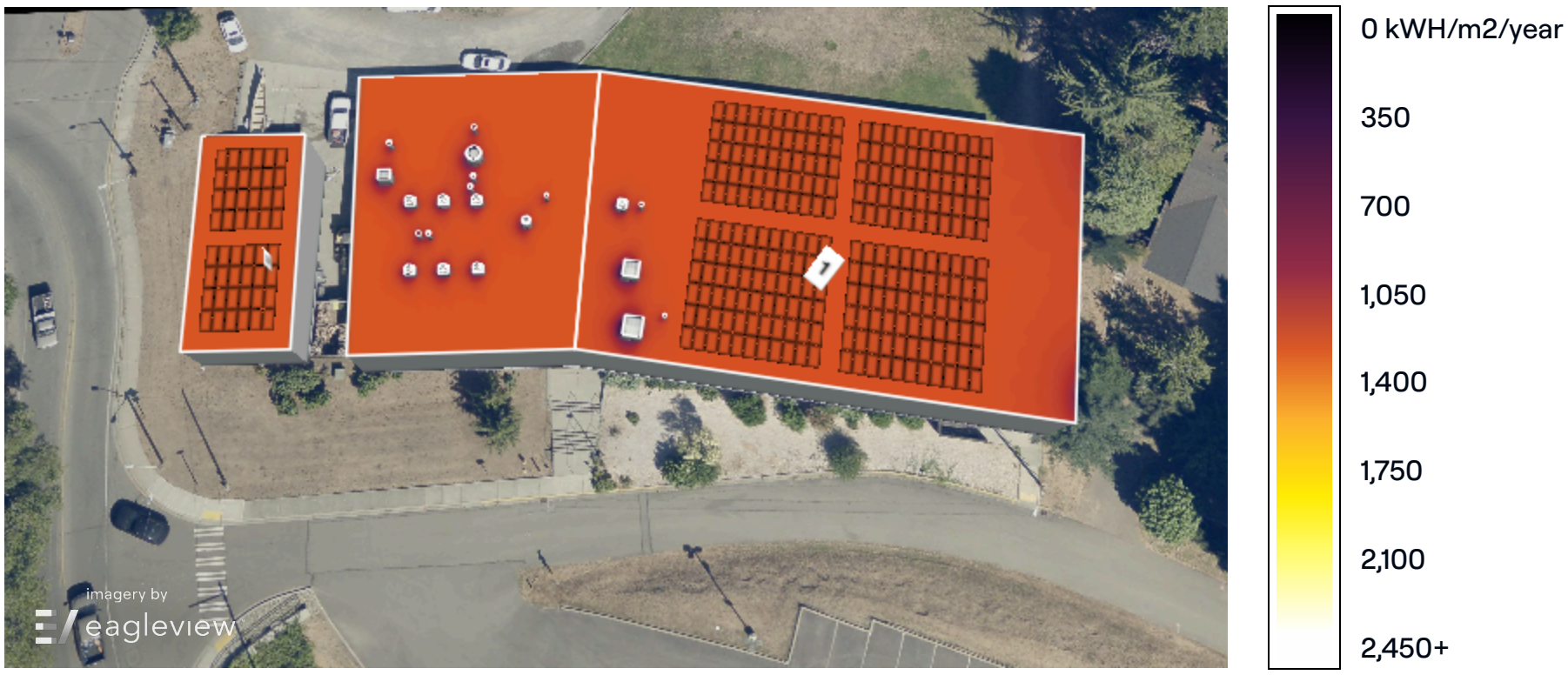
Designer
Joshua Miller

Coordinates
47.7292428824169, -122.5526558992423

Organization
Cascadia Renewables

Date
10/17/2024

Annual irradiance



Summary

Array ID	Panel count	Azimuth	Pitch	Annual TOF	Annual solar access	Annual TSRF
1	242	281°	5°	83%	100%	83%
2	48	270°	5°	84%	100%	84%
			Weighted average by panel count:		100%	83.2%

Monthly solar access % across arrays

Array ID	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	98	100	100	100	100	100	100	100	100	100	99	96
2	100	100	100	100	100	100	100	100	100	100	100	99

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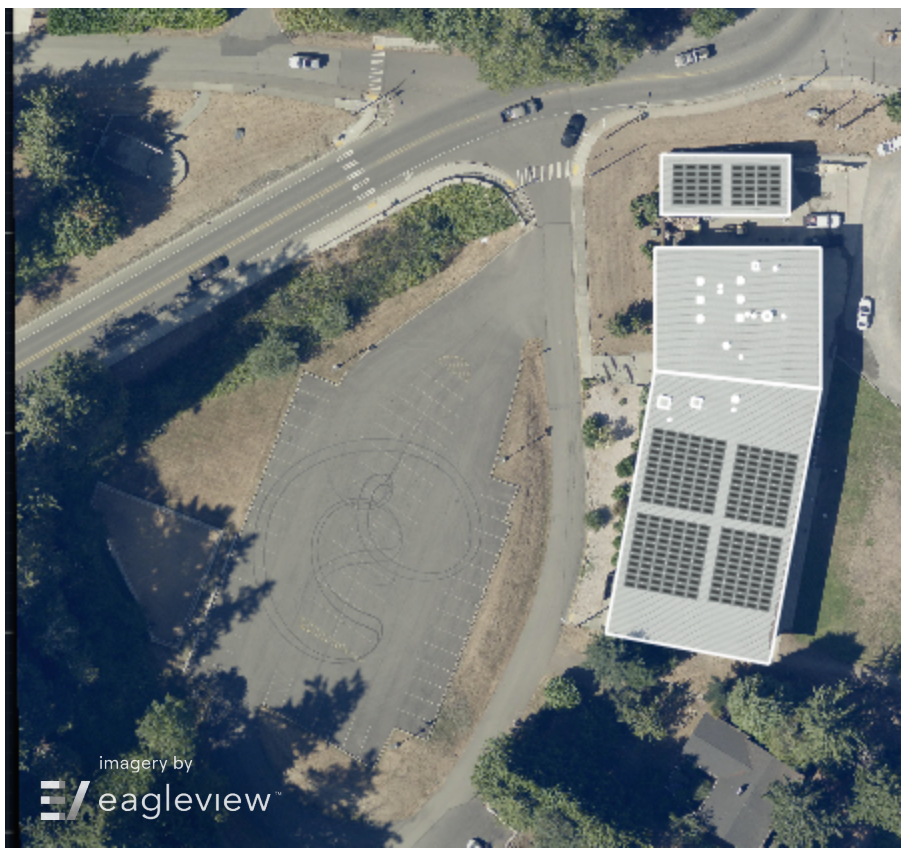
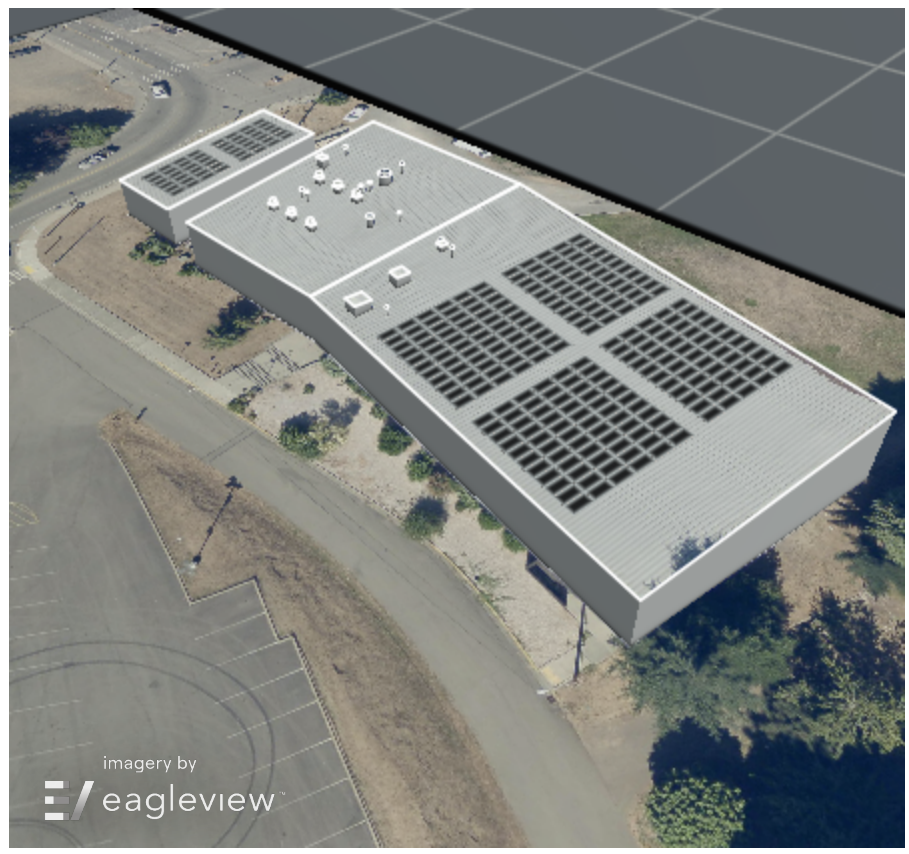
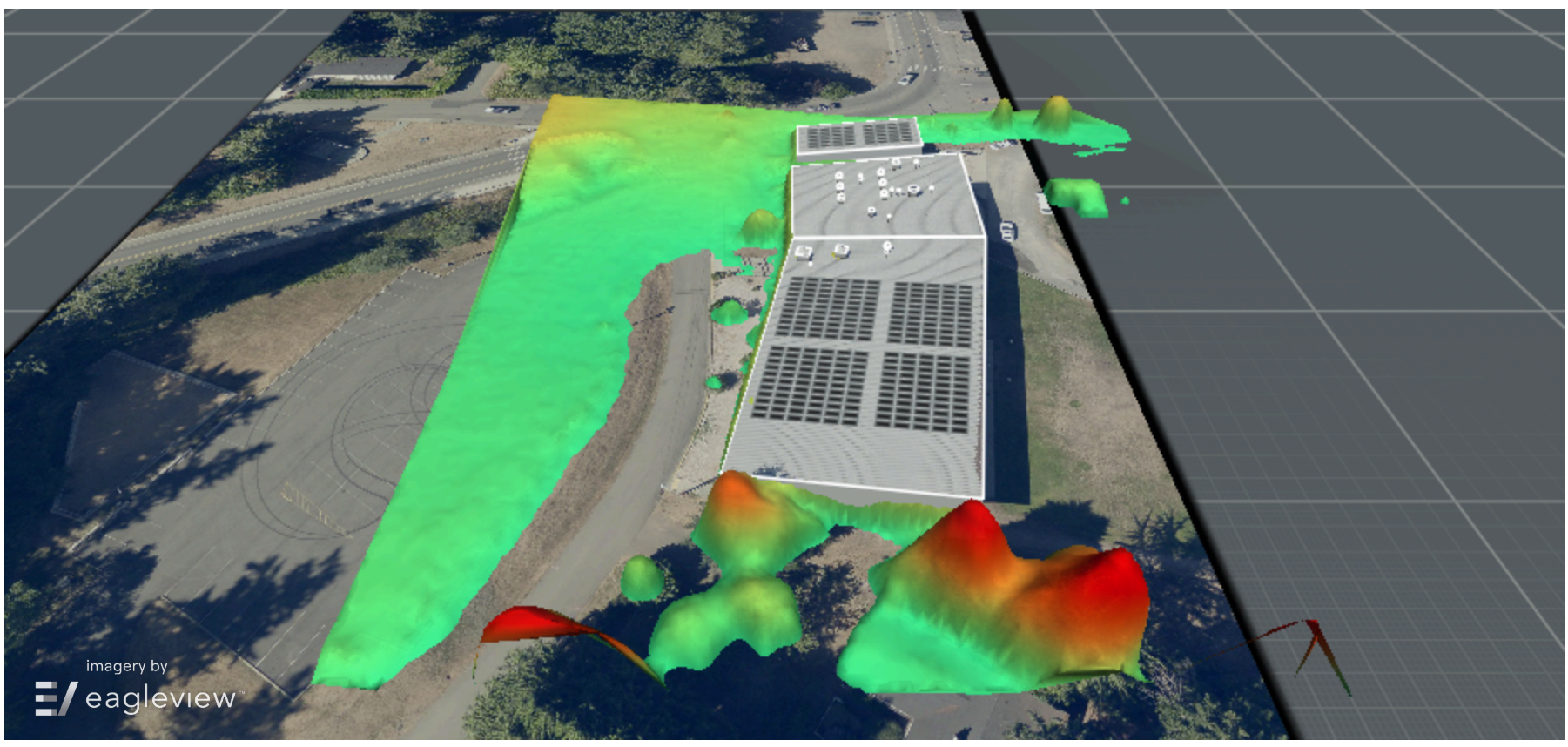
Zoomed out satellite view



3D model



3D model with LIDAR overlay



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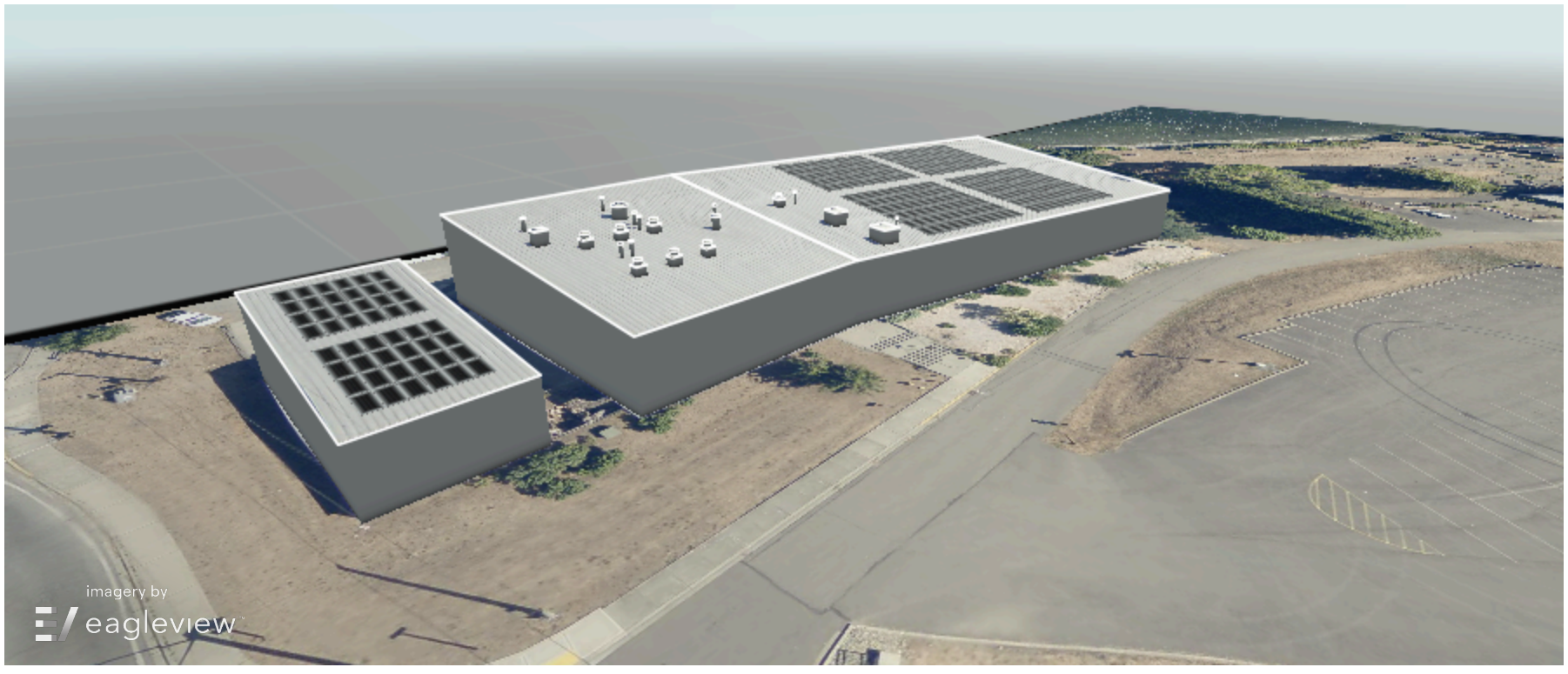
Street view with corresponding 3D model



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

Energy Analysis, Dispatch, and Financial Report

Prepared By: Cascadia Renewables
E: info@cascadiarenewables.com

PV/BESS SYSTEM OVERVIEW

Payment Options	Cash Purchase
IRR - Term	10.2%
LCOE PV Generation	$0.000 /kWh
Net Present Value	$193,143
Payback Period	1.0 Years
Total Payments	$1,631,108
Total Incentives	$1,631,108
Net Payments	$0
Electric Bill Savings - Term	$580,834
Upfront Payment	$1,631,108

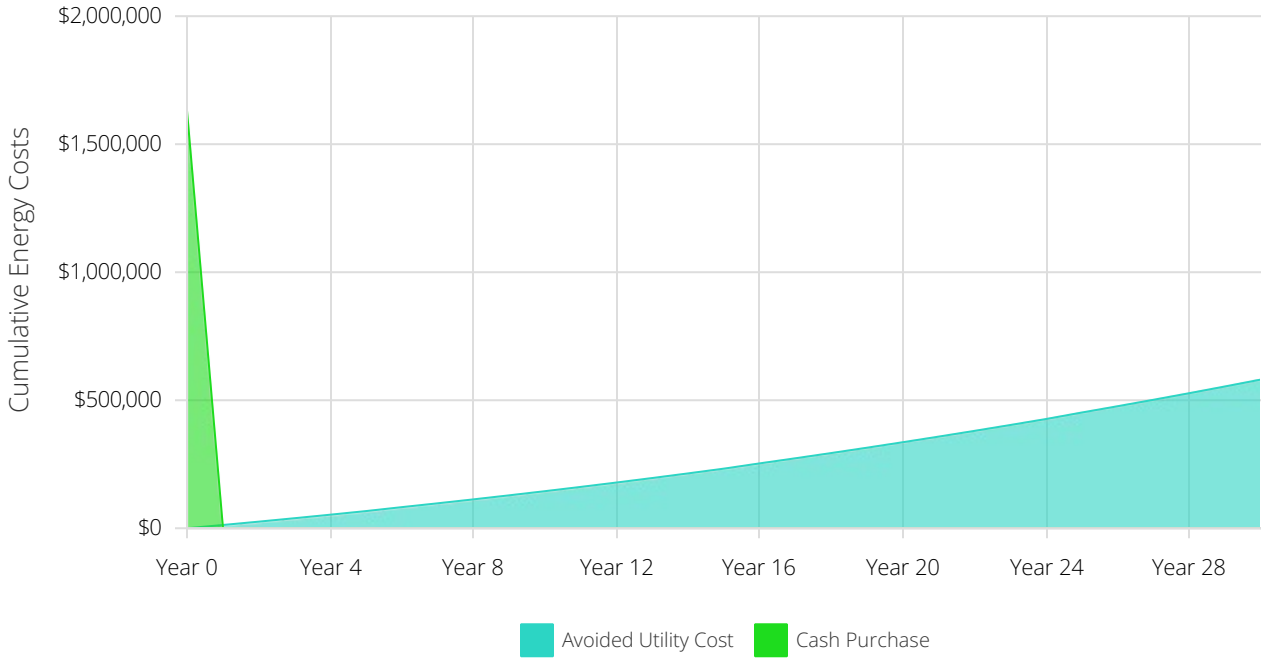
COMBINED SOLAR PV RATING

Power Rating: 118,900 W-DC

COMBINED ESS RATINGS

Energy Capacity: 526.0 kWh
Power Rating: 96.0 kW

CUMULATIVE ENERGY COSTS BY PAYMENT OPTION



ENERGY AND FINANCIAL ANALYSIS

PV SYSTEM DETAILS

GENERAL INFORMATION

Facility: Meter #1
Address: 7325 NE Pkwy Suquamish WA 98392

SOLAR PV SYSTEM RATING

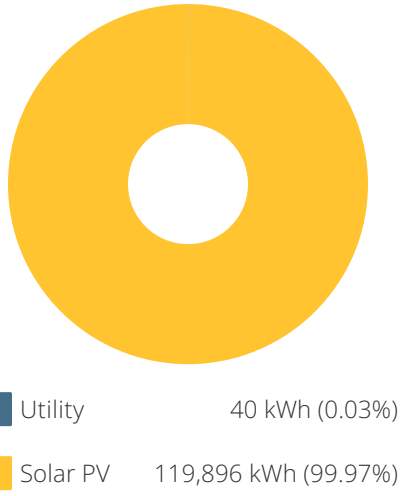
Power Rating: 118,900 W-DC

SOLAR PV EQUIPMENT DESCRIPTION

Solar Panels: 118.9 kW-DC Standard Modules

ENERGY CONSUMPTION MIX

Annual Energy Use: 119,936 kWh

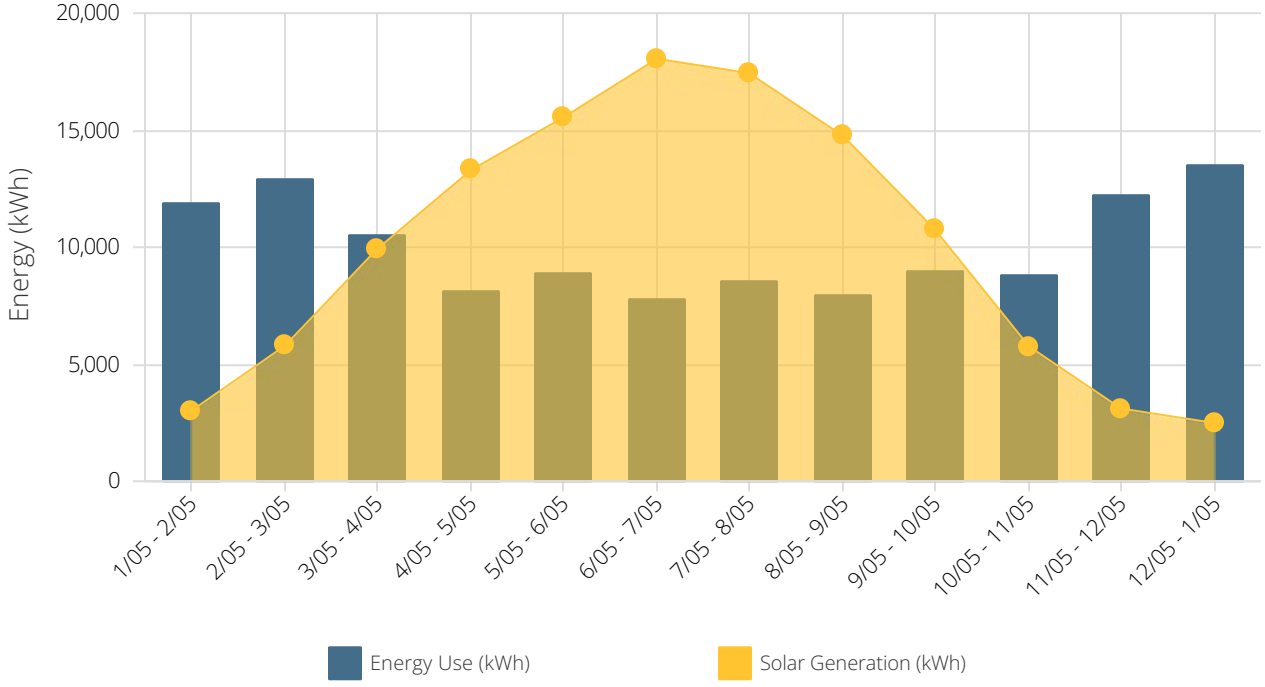


SOLAR PV EQUIPMENT TYPICAL LIFESPAN

Solar Panels: Greater than 30 Years
Inverters: 15 Years

Solar PV System Cost and Incentives	
Solar PV System Cost	$331,300
Grant Amount	-$331,300
Net Solar PV System Cost	**$0**

MONTHLY ENERGY USE VS SOLAR GENERATION



ENERGY STORAGE SYSTEM (ESS) DETAILS

GENERAL INFORMATION

Facility: Meter #1
Address: Suquamish WA 98392

ESS EQUIPMENT DESCRIPTION

Battery Banks: 96kw/526kWh Energy Storage System
Inverters: 96kw/526kWh Energy Storage System

ESS EQUIPMENT TYPICAL LIFESPAN

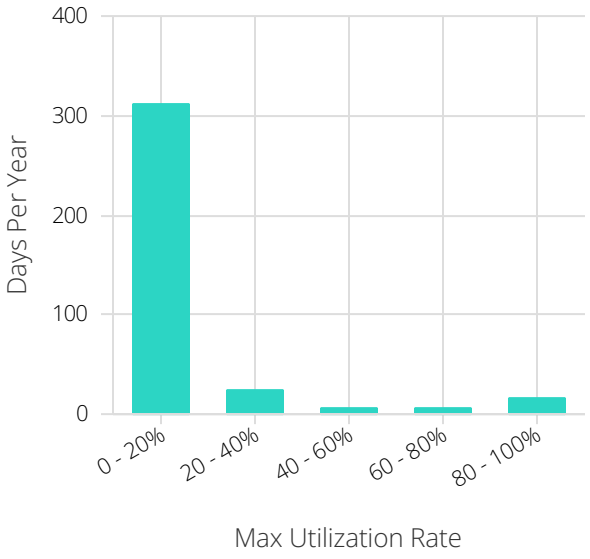
Battery Banks: 15 Years
Inverters: 15 Years

ESS Cost and Incentives	
ESS Cost	$1,299,808
Grant Amount	-$1,299,808
Net ESS Cost	**$0**

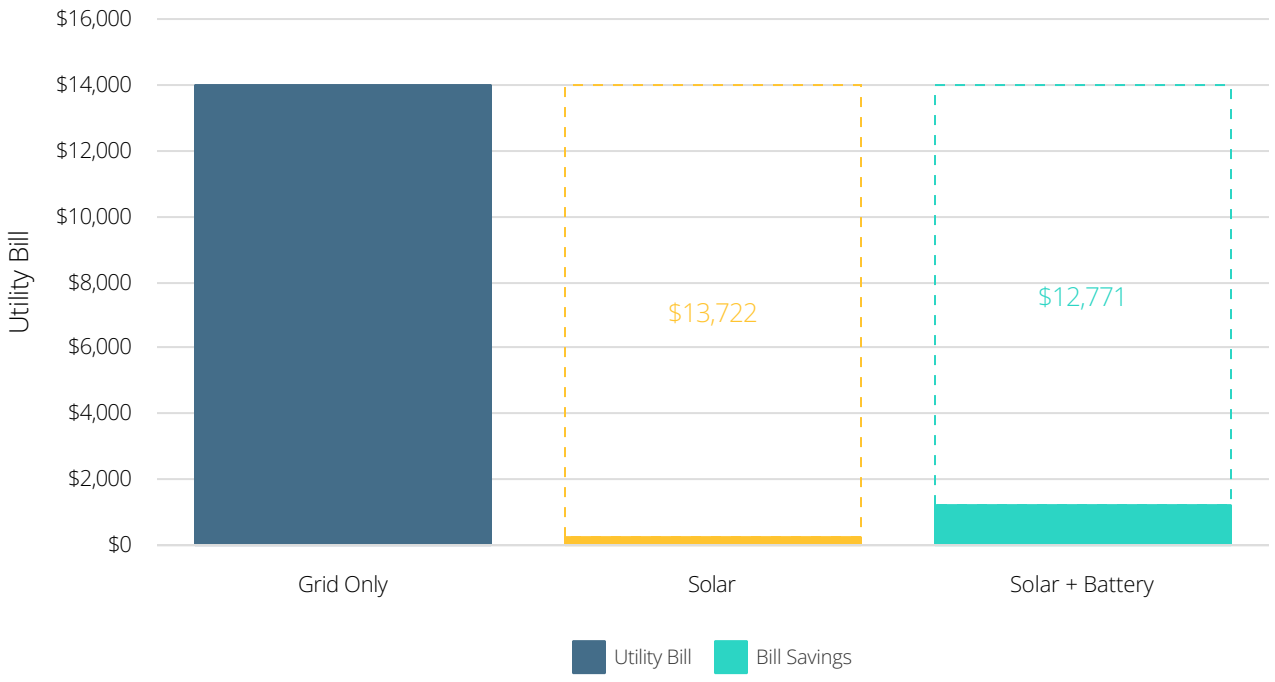
ESS SYSTEM RATINGS

Energy Capacity: 526.0 kWh
Power Rating: 96.0 kW

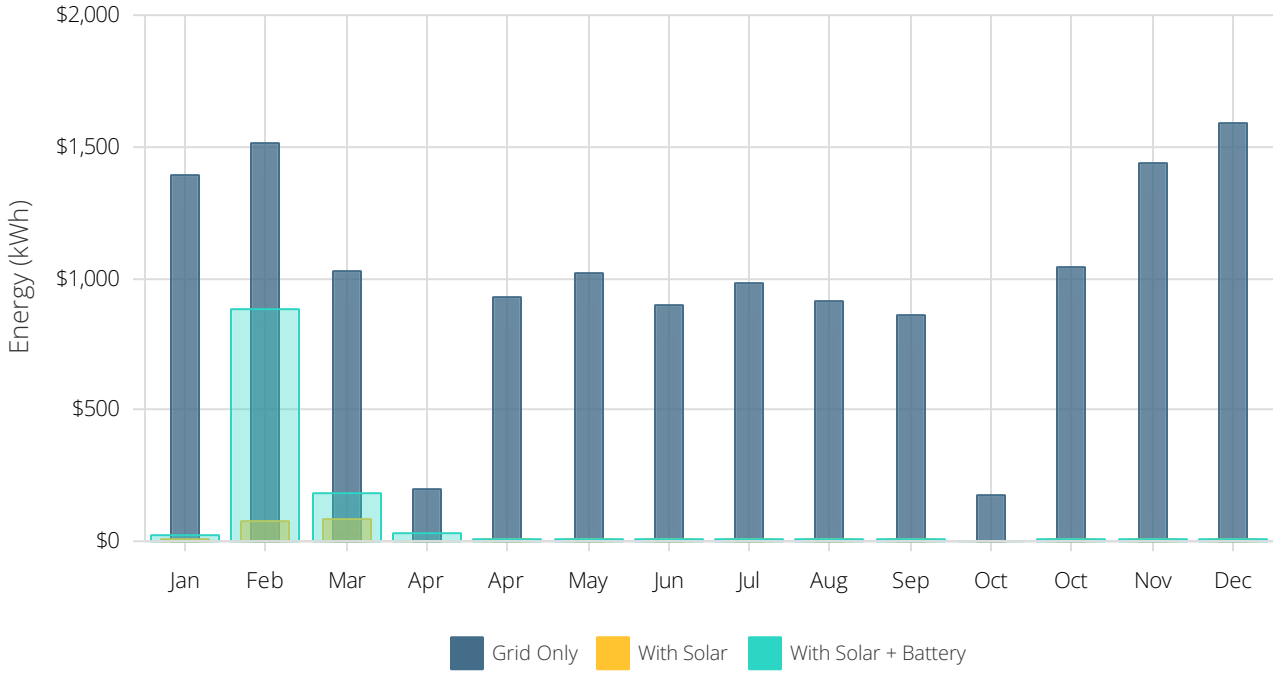
ENERGY STORAGE ANNUAL UTILIZATION



Simulated Annual Electricity Bill Savings



Simulated Monthly Electricity Bill Savings



Energy Output and Demand Savings From Solar PV and Energy Storage				
Date Range	ESS Energy Discharge (kWh)	Solar PV Generation (kWh)	ESS Energy as % of PV Energy	Total Demand Savings
1/5/2024 - 2/5/2024	318	2,999	10.60%	$0
2/5/2024 - 3/5/2024	879	5,794	15.17%	$0
3/5/2024 - 4/5/2024	1,657	9,918	16.71%	$0
4/5/2024 - 5/5/2024	1,372	13,298	10.32%	$0
5/5/2024 - 6/5/2024	1,414	15,534	9.10%	$0
6/5/2024 - 7/5/2024	1,034	18,051	5.73%	$0
7/5/2024 - 8/5/2024	1,024	17,437	5.87%	$0
8/5/2023 - 9/5/2023	1,285	14,754	8.71%	$0
9/5/2023 - 10/5/2023	1,608	10,754	14.95%	$0
10/5/2023 - 11/5/2023	956	5,763	16.59%	$0
11/5/2023 - 12/5/2023	547	3,108	17.60%	$0
12/5/2023 - 1/5/2024	474	2,486	19.07%	$0
Total	12,568	119,896	10.48%	$0

REBATES & INCENTIVES

This section summarizes all incentives available for this project. The actual rebate and incentive amounts for this project are shown in each example.

EPIC Grant

Approximately $67 million will be available to support the following project areas: - Clean and resilient energy projects benefitting historically marginalized communities (like low-income and communities of color) - Electric grid modernization and innovation Innovative large-scale and dual-use solar - Solar paired with battery storage for community facilities and low-income community solar - Clean energy project siting and permitting - Building, industry, aviation and maritime decarbonization - State match to unlock federal funding

Total Incentive Value: $331,300

WA DoC Solar + Storage Grant (ESS)

WA DoC Solar + Storage Grant.

Total Incentive Value: $1,299,808

UTILITY RATES

The table below shows the rates associated with your current utility rate schedule (24). Your estimated electric bills after solar are shown on the following page.

Customer Charges				Energy Charges			
Season	Charge Type	Rate Type	24	Season	Charge Type	Rate Type	24
W	Flat Rate	per billing period	$10.21	W	Flat Rate	Import	$0.11692
S	Flat Rate	per billing period	$10.21	S	Flat Rate	Import	$0.11372

CURRENT ELECTRIC BILL

The table below shows your annual electricity costs based on the most current utility rates and your previous 12 months of electrical usage.

RATE SCHEDULE: PSE - 24

Time Periods	Energy Use (kWh)	Charges		
Bill Ranges & Seasons	Total	Other	Energy	Total
1/5/2024 - 2/5/2024 W	11,840	$10	$1,384	$1,395
2/5/2024 - 3/5/2024 W	12,880	$10	$1,506	$1,516
3/5/2024 - 4/5/2024 W / S	10,480	$10	$1,220	$1,230
4/5/2024 - 5/5/2024 S	8,080	$10	$919	$929
5/5/2024 - 6/5/2024 S	8,880	$10	$1,010	$1,020
6/5/2024 - 7/5/2024 S	7,800	$10	$887	$897
7/5/2024 - 8/5/2024 S	8,520	$10	$969	$979
8/5/2023 - 9/5/2023 S	7,960	$10	$905	$915
9/5/2023 - 10/5/2023 S / W	8,976	$10	$1,026	$1,036
10/5/2023 - 11/5/2023 W	8,840	$10	$1,034	$1,044
11/5/2023 - 12/5/2023 W	12,200	$10	$1,426	$1,437
12/5/2023 - 1/5/2024 W	13,480	$10	$1,576	$1,586
Total	119,936	$123	$13,861	$13,984

NEW ELECTRIC BILL

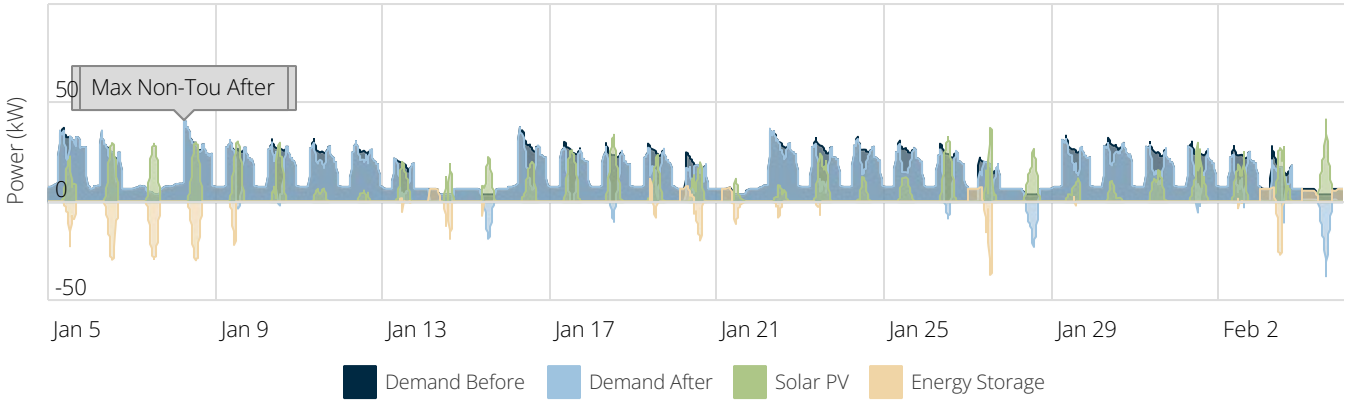
RATE SCHEDULE: PSE - 24

Time Periods	Energy Use (kWh)	Charges		
Bill Ranges & Seasons	Total	Other	Energy	Total
1/5/2024 - 2/5/2024 W	9,347	$10	$1,093	$1,103
2/5/2024 - 3/5/2024 W	7,444	$10	$870	$881
3/5/2024 - 4/5/2024 W / S	1,802	$10	$210	$220
4/5/2024 - 5/5/2024 S	-4,273	$10	$486	$476
5/5/2024 - 6/5/2024 S	-5,756	$10	$655	$644
6/5/2024 - 7/5/2024 S	-9,434	$10	$1,073	$1,063
7/5/2024 - 8/5/2024 S	-8,083	$10	$919	$909
8/5/2023 - 9/5/2023 S	-6,376	$10	$725	$715
9/5/2023 - 10/5/2023 S / W	-557	$10	$61	$51
10/5/2023 - 11/5/2023 W	3,779	$10	$442	$452
11/5/2023 - 12/5/2023 W	9,302	$10	$1,088	$1,098
12/5/2023 - 1/5/2024 W	11,176	$10	$1,307	$1,317
Total	8,371	$123	$1,090	$1,213

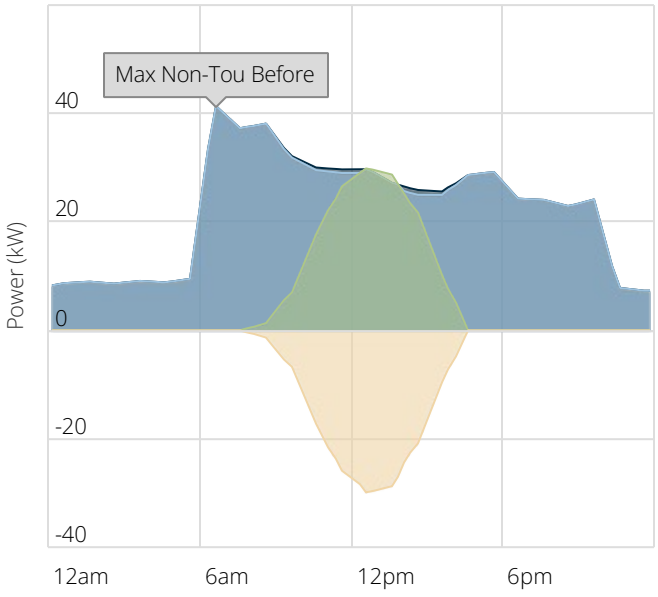
ANNUAL ELECTRICITY SAVINGS: $12,771

DEMAND PROFILES

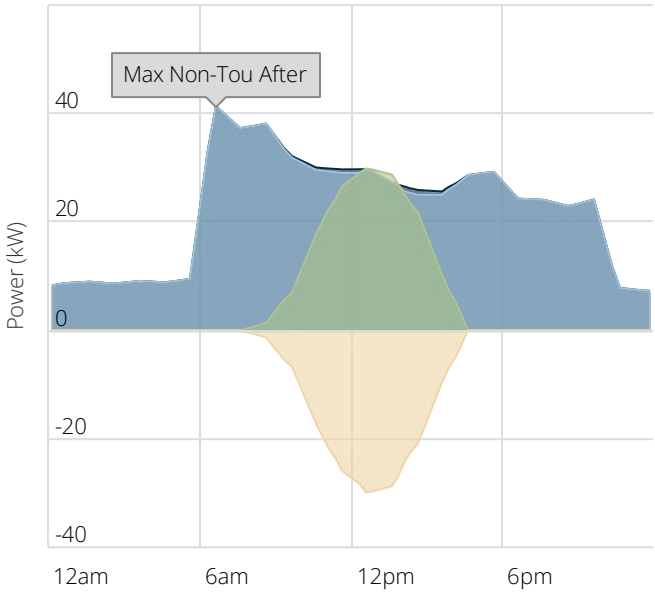
Date Range: 1/5/2024 - 2/5/2024



Max Demand Before 1/8/2024



Max Demand After 1/8/2024

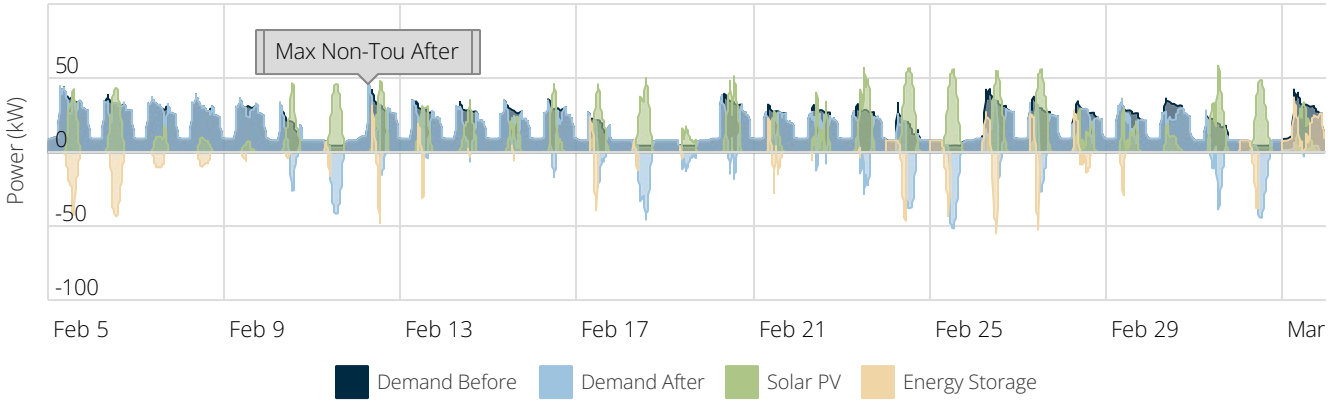


Legend: Demand Before | Solar PV | Energy Storage | Demand After

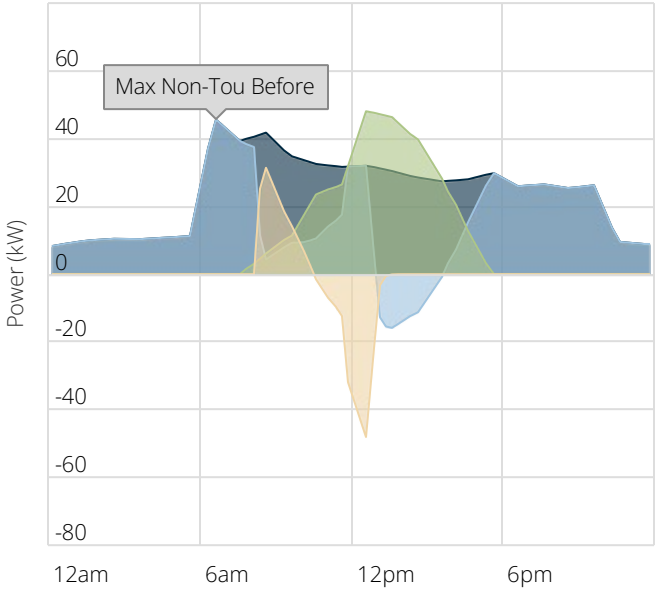
Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (1/5/2024 - 2/5/2024). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

DEMAND PROFILES

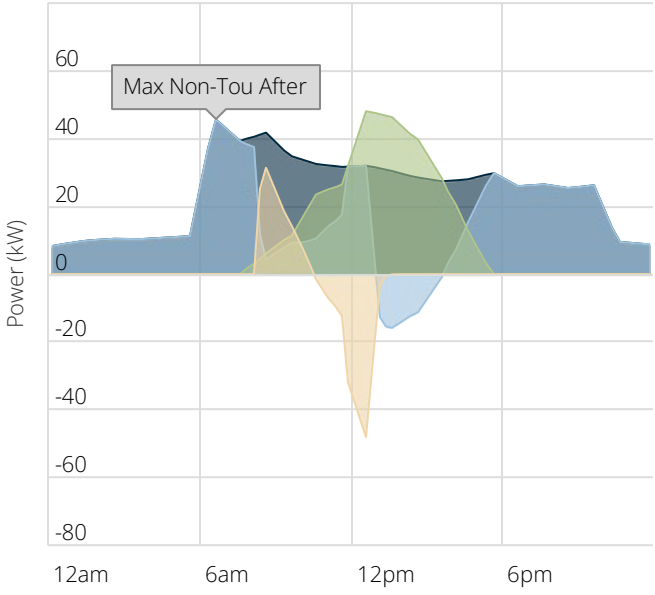
Date Range: 2/5/2024 - 3/5/2024



Max Demand Before 2/12/2024



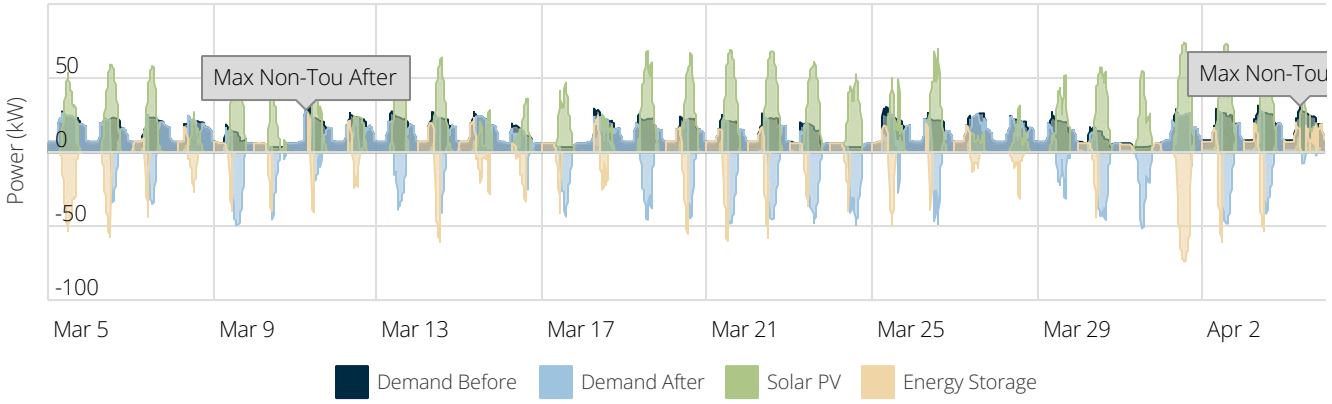
Max Demand After 2/12/2024



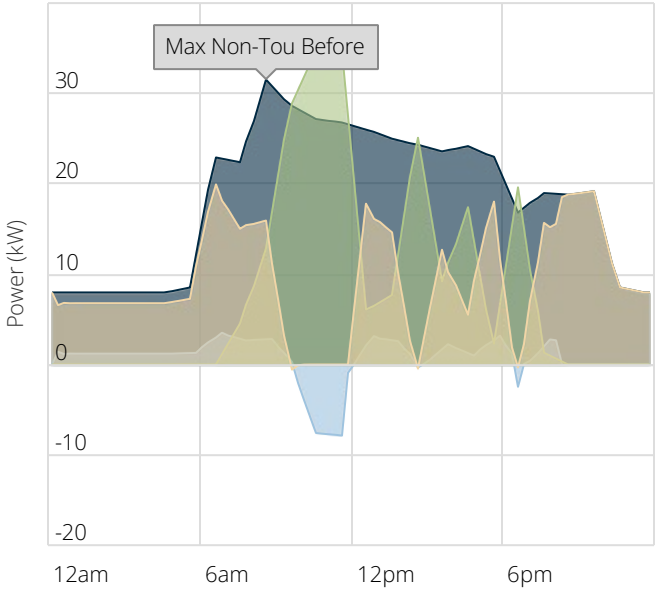
Legend: Demand Before | Solar PV | Energy Storage | Demand After

Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (2/5/2024 - 3/5/2024). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

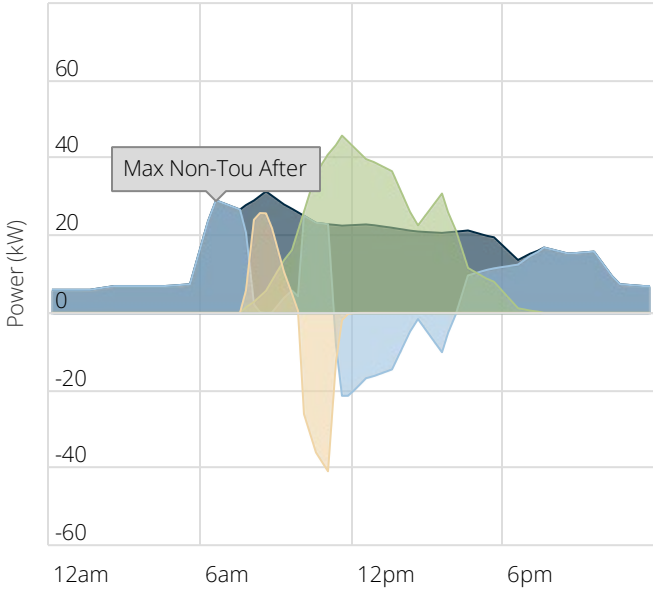
DEMAND PROFILES



Max Demand Before 4/4/2024



Max Demand After 3/11/2024

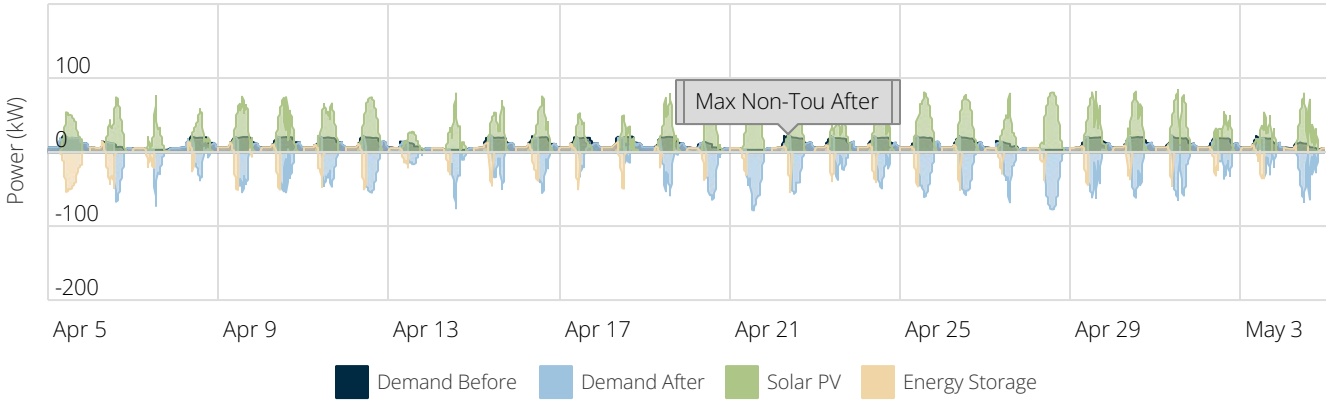


Legend: Demand Before | Solar PV | Energy Storage | Demand After

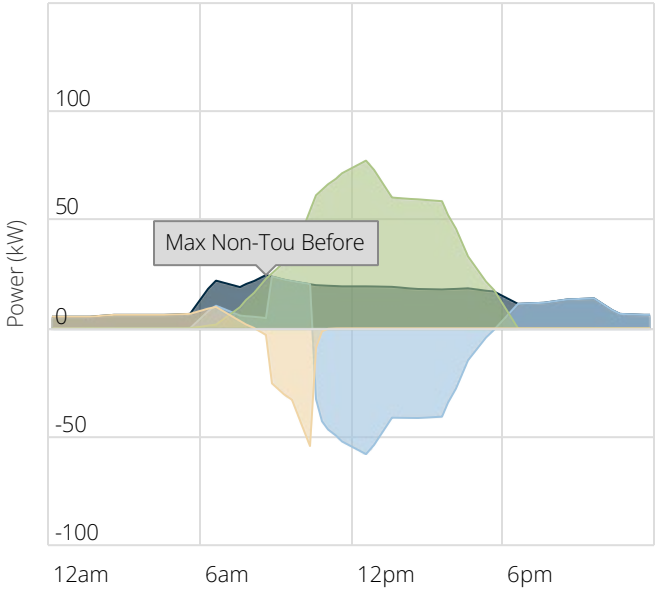
Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (3/5/2024 - 4/5/2024). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

DEMAND PROFILES

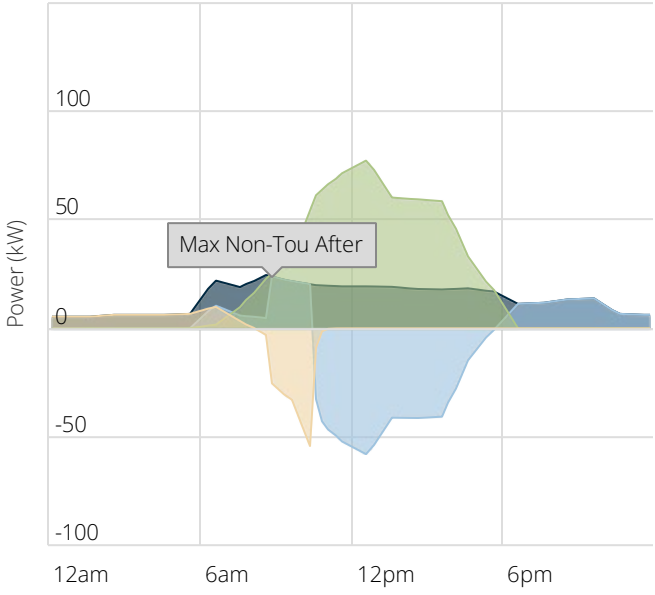
Date Range: 4/5/2024 - 5/5/2024



Max Demand Before 4/22/2024



Max Demand After 4/22/2024

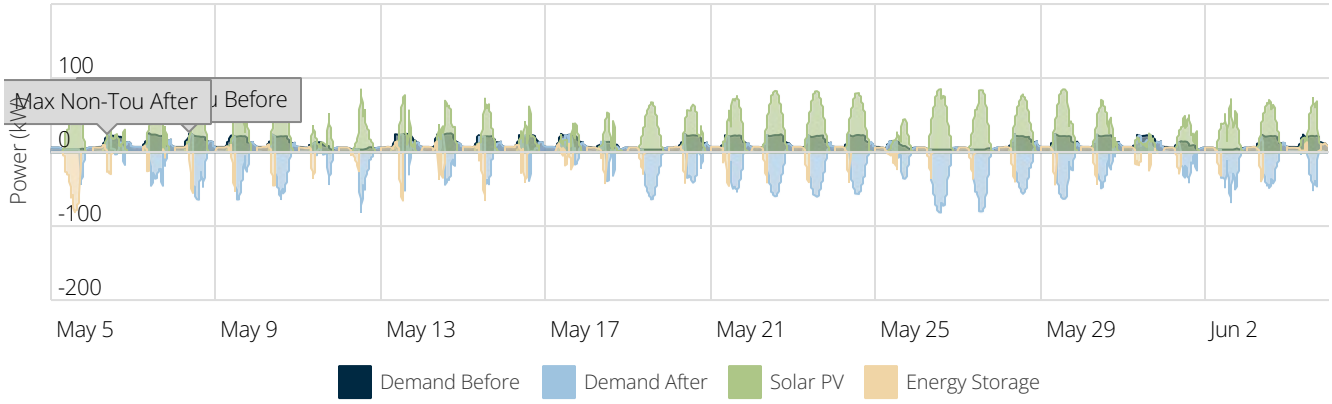


Legend: Demand Before | Solar PV | Energy Storage | Demand After

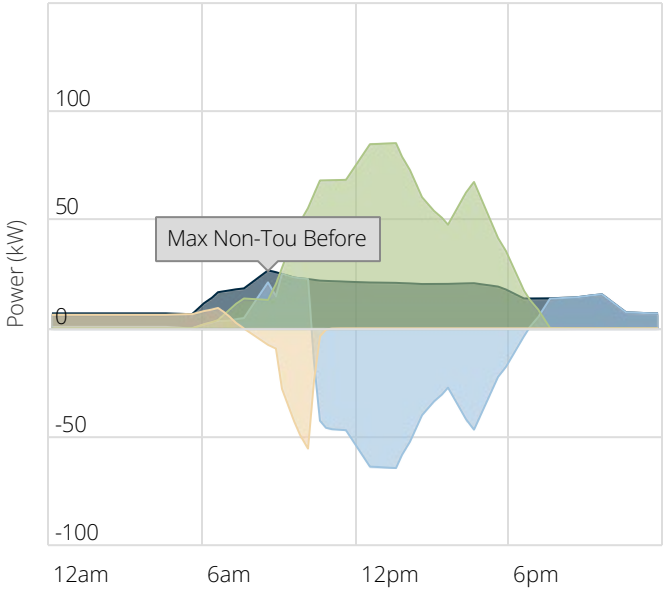
Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (4/5/2024 - 5/5/2024). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

DEMAND PROFILES

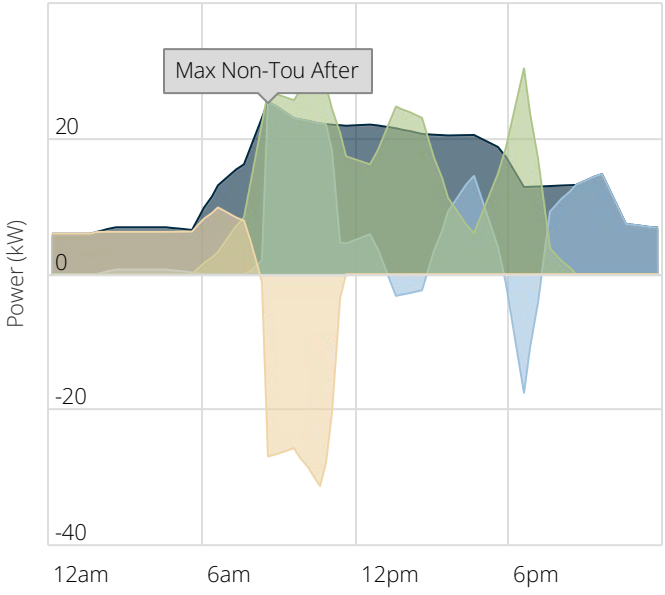
Date Range: 5/5/2024 - 6/5/2024



Max Demand Before 5/8/2024



Max Demand After 5/6/2024

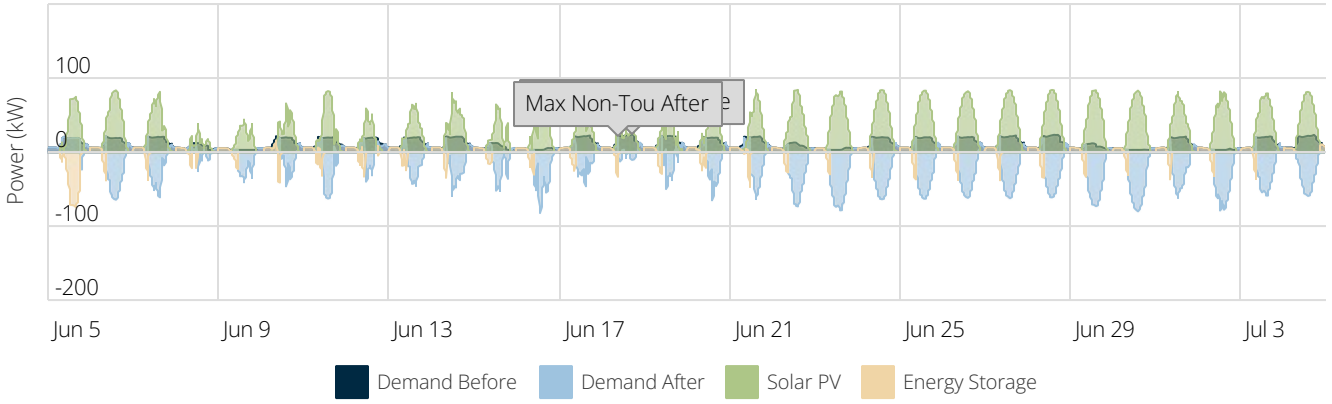


Legend: Demand Before | Solar PV | Energy Storage | Demand After

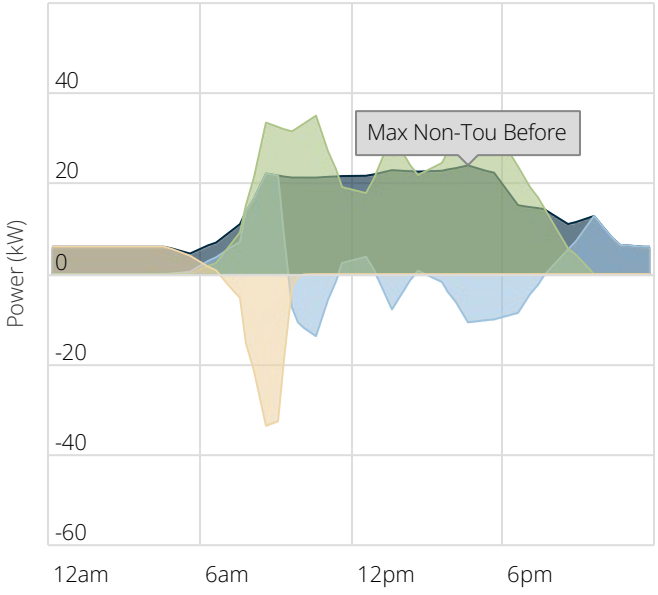
Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (5/5/2024 - 6/5/2024). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

DEMAND PROFILES

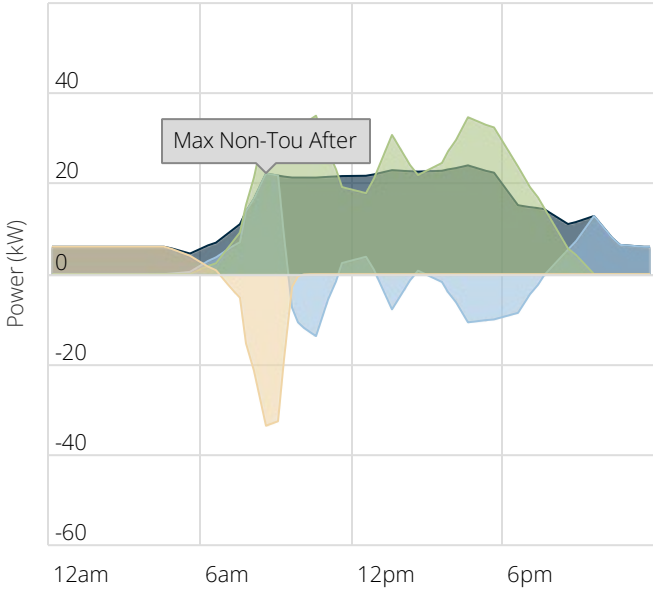
Date Range: 6/5/2024 - 7/5/2024



Max Demand Before 6/18/2024



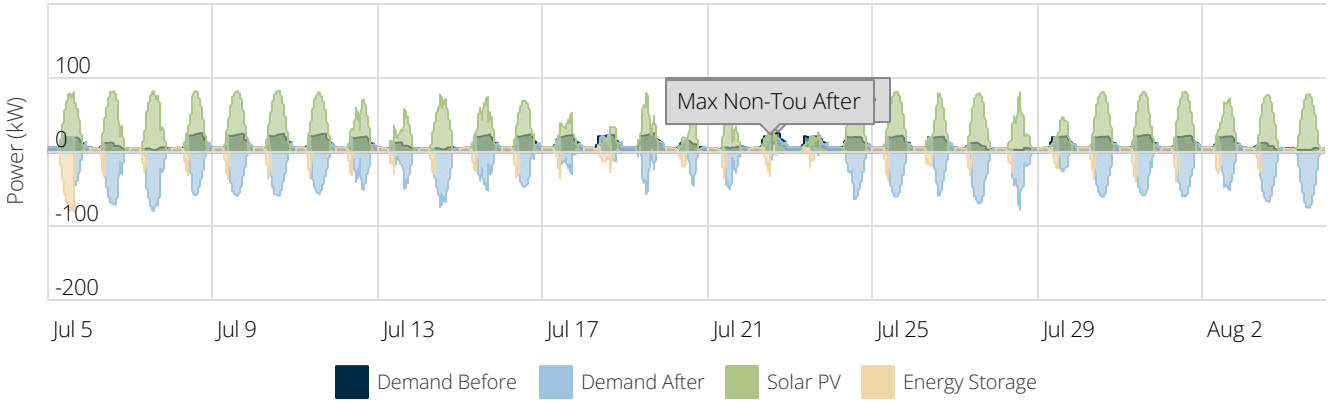
Max Demand After 6/18/2024



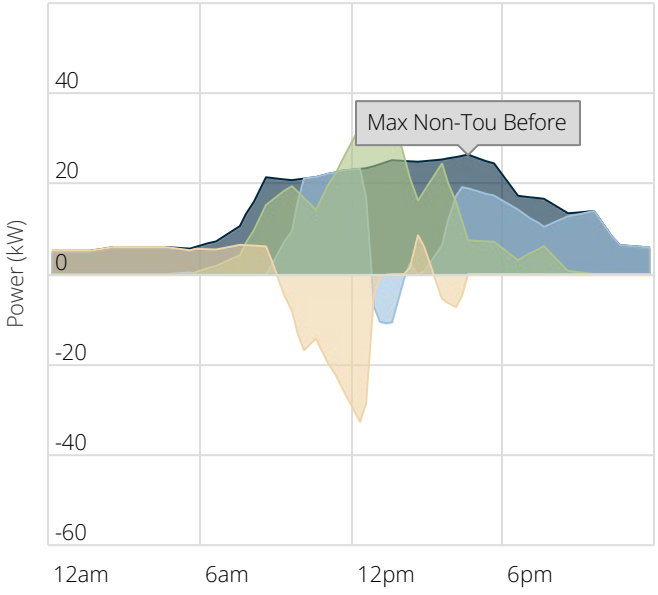
Legend: Demand Before | Solar PV | Energy Storage | Demand After

Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (6/5/2024 - 7/5/2024). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

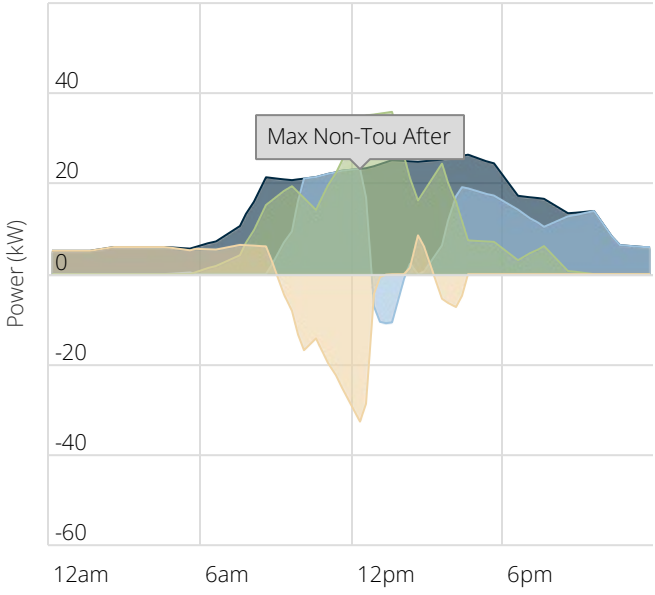
DEMAND PROFILES



Max Demand Before 7/22/2024



Max Demand After 7/22/2024

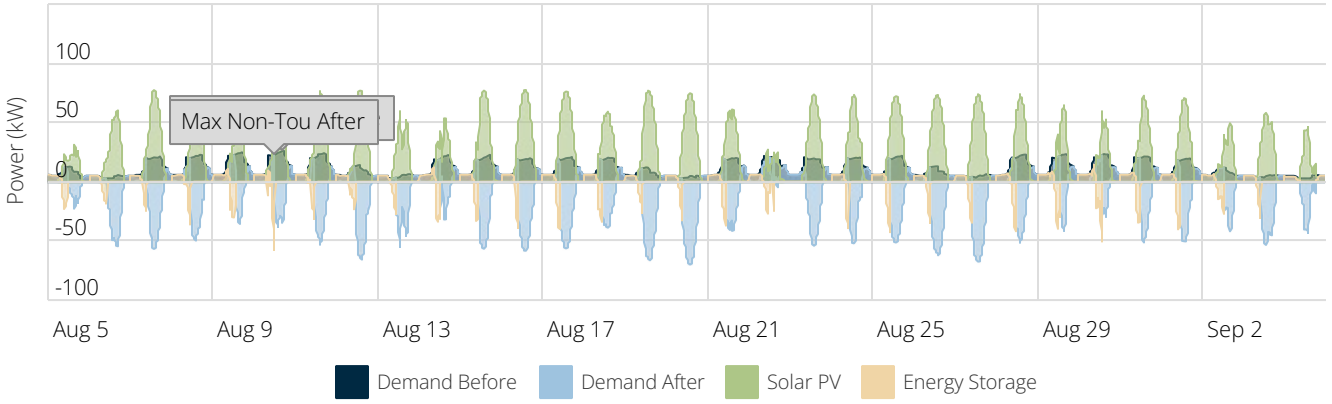


Legend: Demand Before | Solar PV | Energy Storage | Demand After

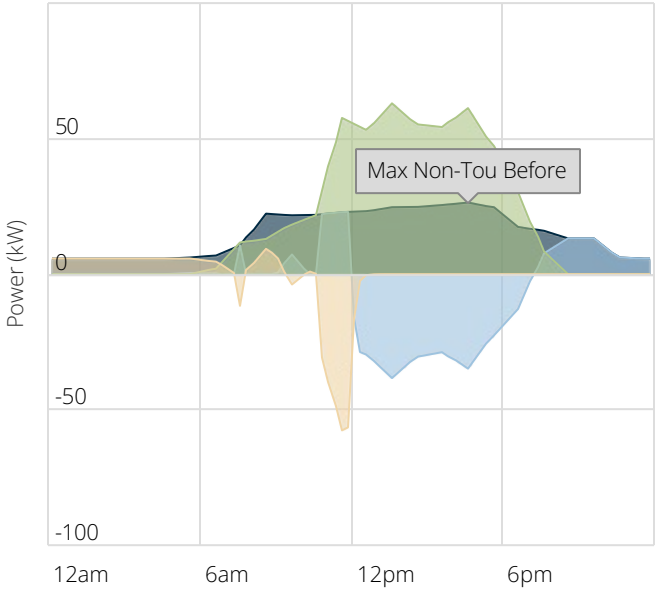
Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (7/5/2024 - 8/5/2024). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

DEMAND PROFILES

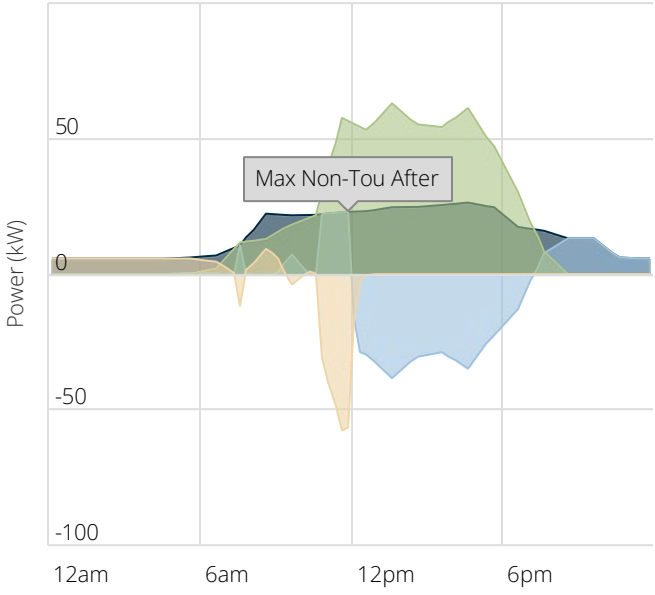
Date Range: 8/5/2023 - 9/5/2023



Max Demand Before 8/10/2023



Max Demand After 8/10/2023

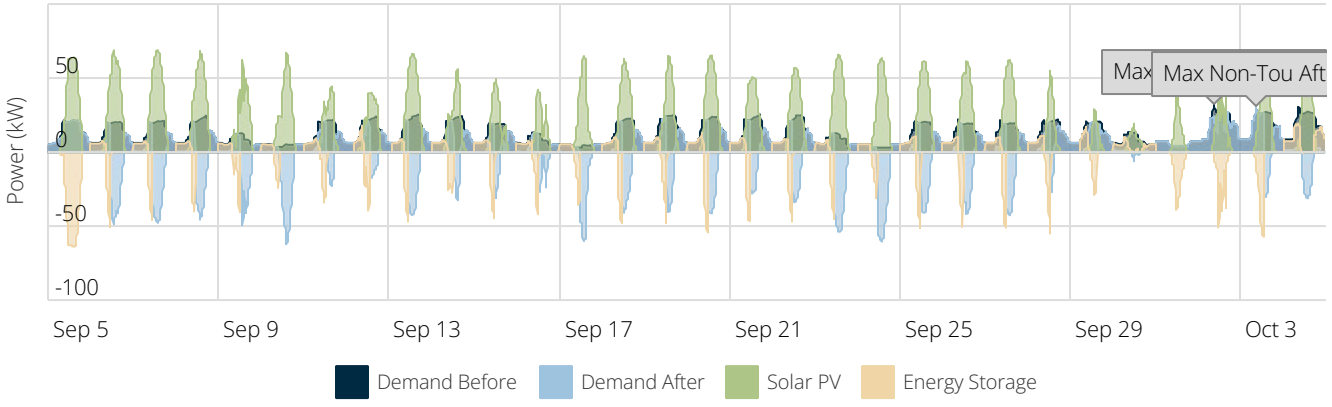


Legend: Demand Before | Solar PV | Energy Storage | Demand After

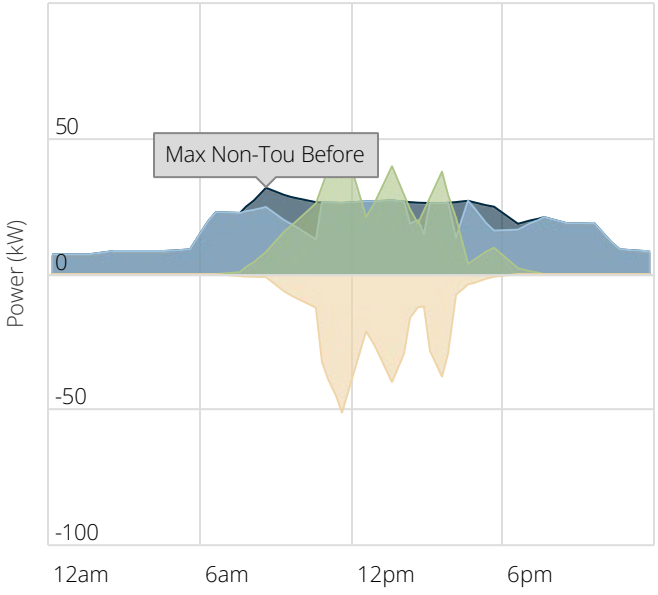
Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (8/5/2023 - 9/5/2023). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

Date Range: 9/5/2023 - 10/5/2023

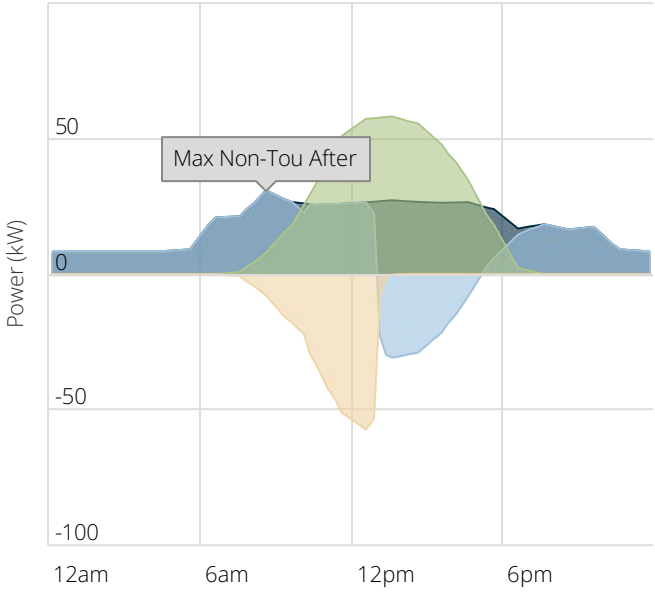
DEMAND PROFILES



Max Demand Before 10/2/2023



Max Demand After 10/3/2023

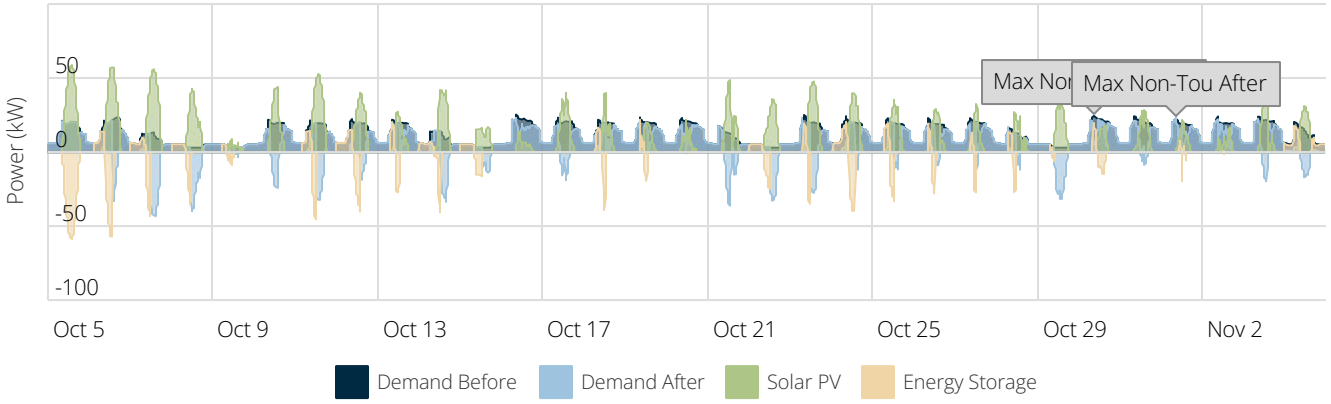


Legend: Demand Before | Solar PV | Energy Storage | Demand After

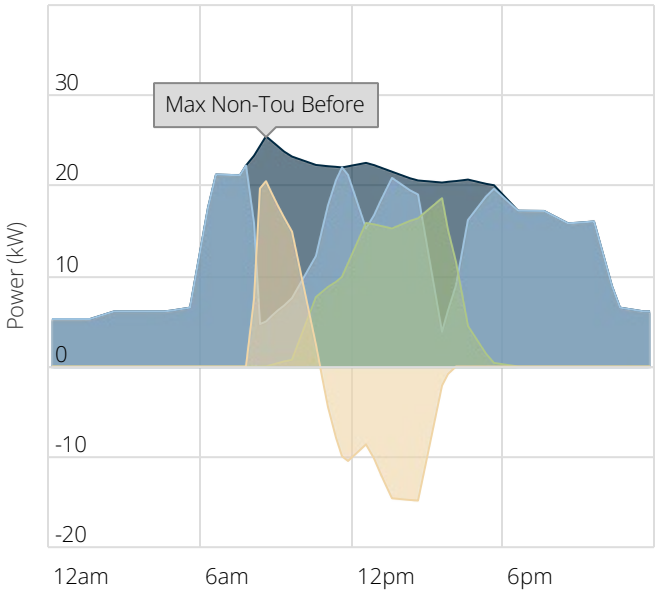
Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (9/5/2023 - 10/5/2023). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

DEMAND PROFILES

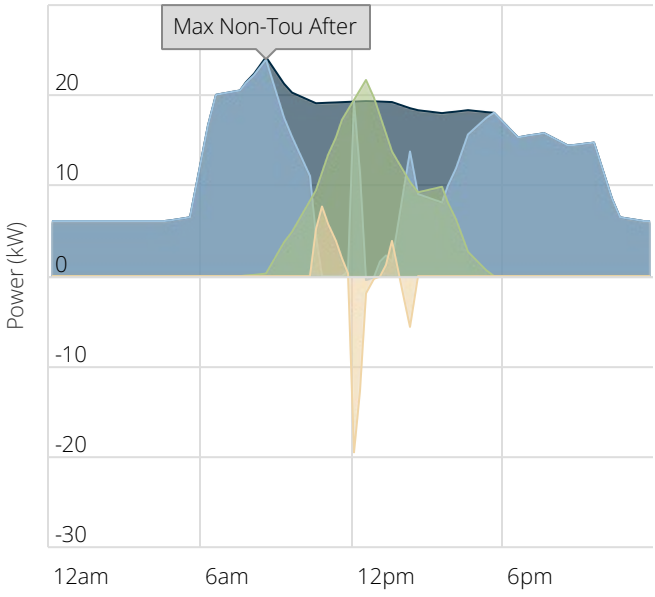
Date Range: 10/5/2023 - 11/5/2023



Max Demand Before 10/30/2023



Max Demand After 11/1/2023

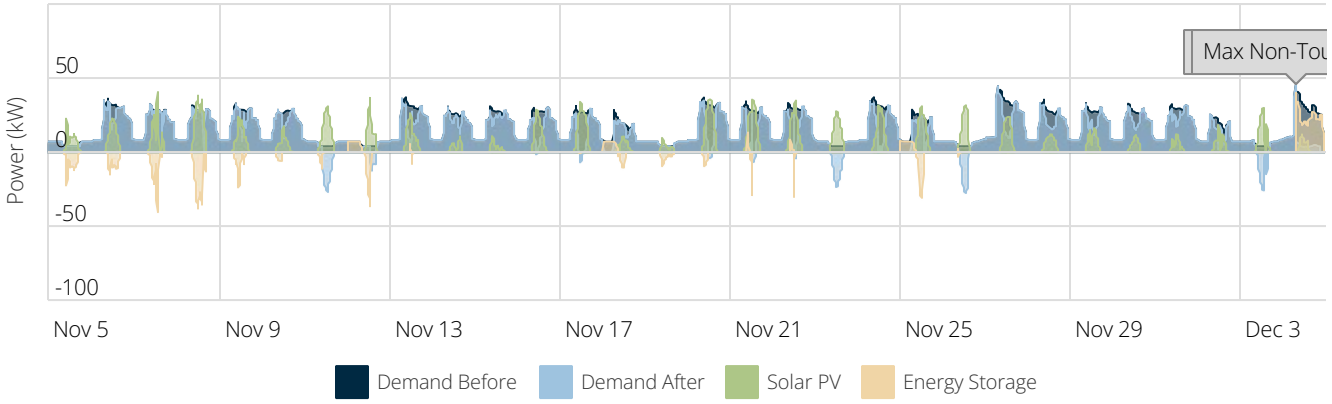


Legend: Demand Before | Solar PV | Energy Storage | Demand After

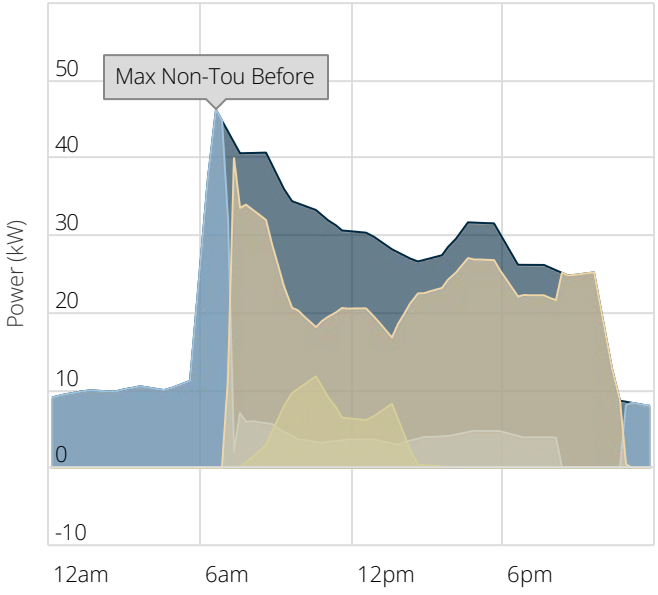
Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (10/5/2023 - 11/5/2023). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

DEMAND PROFILES

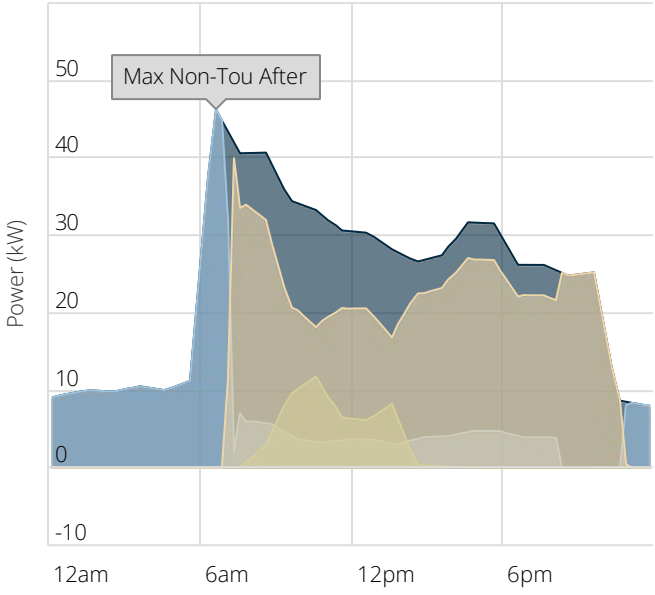
Date Range: 11/5/2023 - 12/5/2023



Max Demand Before 12/4/2023



Max Demand After 12/4/2023

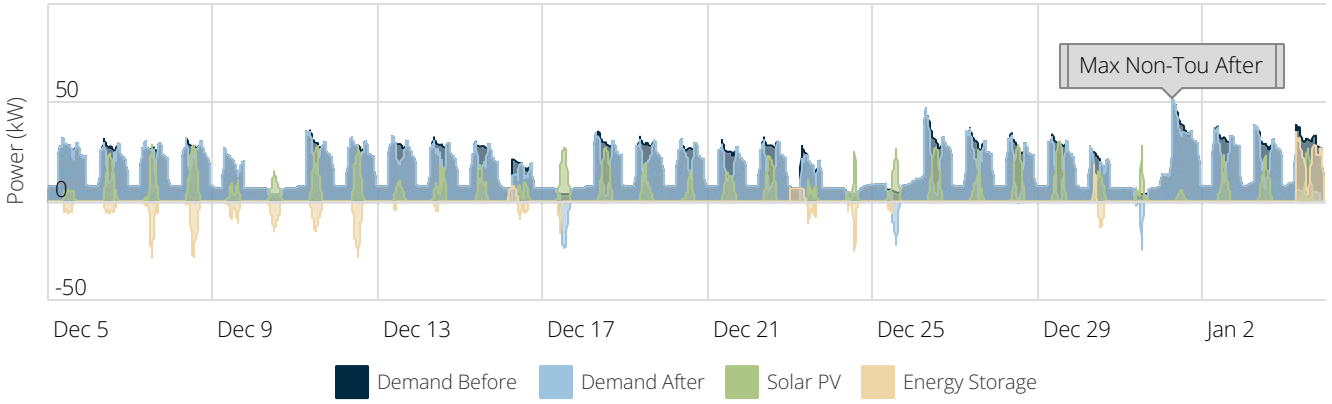


Legend: Demand Before | Solar PV | Energy Storage | Demand After

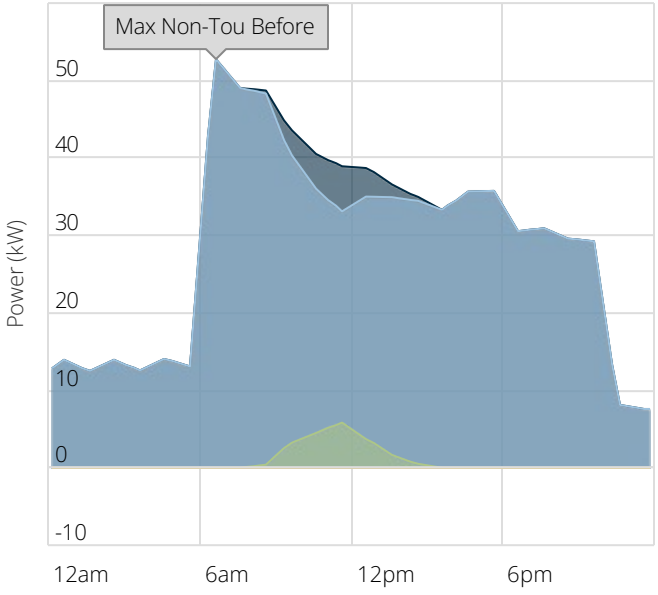
Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (11/5/2023 - 12/5/2023). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

DEMAND PROFILES

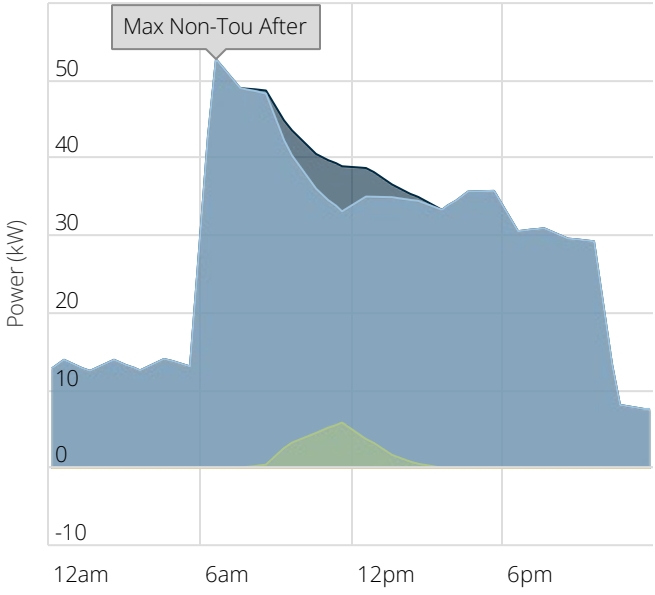
Date Range: 12/5/2023 - 1/5/2024



Max Demand Before 1/1/2024



Max Demand After 1/1/2024



Legend: Demand Before | Solar PV | Energy Storage | Demand After

Monthly Demand Profile: The top chart illustrates the monthly demand profile for the relevant bill cycle (12/5/2023 - 1/5/2024). Noted on the chart you will see max non-coincidental demand simulated before and after the conceptual system implementation. The bottom provides a enlarged version of this max non-coincidental demand simulated over 24 hours.

CASH FLOW ANALYSIS

Cash Purchase

Assumptions and Key Financial Metrics

IRR - Term	10.2%	Net Present Value	$193,143	Payback Period	1.0 Years
ROI	35.6%	PV Degradation Rate	0.56%	Discount Rate	5.0%
Energy Cost Escalation Rate	3.0%	Federal Income Tax Rate	0.0%	State Income Tax Rate	0.0%
Total Project Costs	$1,631,108				

Years	Project Costs	Electric Bill Savings	Grant Amount	PV Generation (kWh)	Total Cash Flow	Cumulative Cash Flow
Upfront	-$1,631,108	-	-	-	-$1,631,108	-$1,631,108
1	-	$12,771	$1,631,108	119,895	$1,643,879	$12,771
2	-	$13,124	-	119,224	$13,124	$25,895
3	-	$13,487	-	118,553	$13,487	$39,382
4	-	$13,859	-	117,881	$13,859	$53,241
5	-	$14,242	-	117,210	$14,242	$67,483
6	-	$14,635	-	116,538	$14,635	$82,119
7	-	$15,040	-	115,867	$15,040	$97,158
8	-	$15,455	-	115,195	$15,455	$112,613
9	-	$15,881	-	114,524	$15,881	$128,495
10	-	$16,320	-	113,853	$16,320	$144,814
11	-	$16,770	-	113,181	$16,770	$161,584
12	-	$17,232	-	112,510	$17,232	$178,816
13	-	$17,708	-	111,838	$17,708	$196,524
14	-	$18,196	-	111,167	$18,196	$214,720
15	-	$18,697	-	110,496	$18,697	$233,417
16	-	$19,583	-	109,824	$19,583	$253,001
17	-	$20,047	-	109,153	$20,047	$273,048
18	-	$20,522	-	108,481	$20,522	$293,570
19	-	$21,007	-	107,810	$21,007	$314,577
20	-	$21,502	-	107,139	$21,502	$336,079
21	-	$22,008	-	106,467	$22,008	$358,087
22	-	$22,526	-	105,796	$22,526	$380,613
23	-	$23,054	-	105,124	$23,054	$403,667
24	-	$23,594	-	104,453	$23,594	$427,262
25	-	$24,146	-	103,781	$24,146	$451,407
26	-	$24,709	-	103,110	$24,709	$476,117
27	-	$25,285	-	102,439	$25,285	$501,402
28	-	$25,873	-	101,767	$25,873	$527,274
29	-	$26,473	-	101,096	$26,473	$553,747
30	-	$27,086	-	100,424	$27,086	$580,834
Totals:	-$1,631,108	$580,834	$1,631,108	3,304,796	$580,834	-

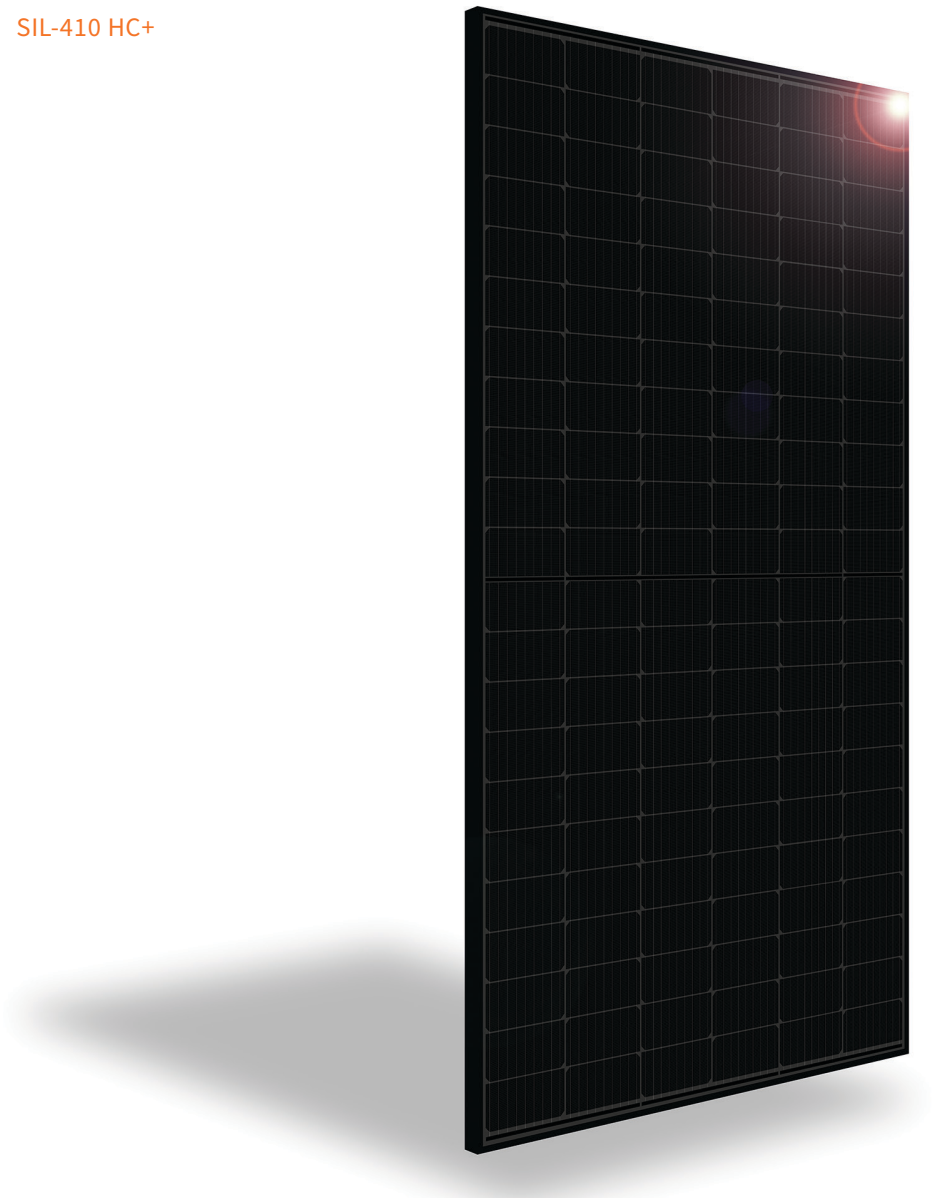
ENVIRONMENTAL BENEFIT

Environmental Reference	Impact
CO2 Offset (tons):	1,879
Miles driven:	4,270,696
Trees Planted (equivalent):	28,176

SILFAB PRIME

SIL-410 HC+

SILFAB SOLAR®



RELIABLE ENERGY.
DIRECT FROM THE SOURCE.

Designed to outperform.

Dependable, durable, high-performance solar panels engineered for North American homeowners.

SILFABSOLAR.COM

TOP PERFORMER 2023 PVEL kiwa PV MODULE RELIABILITY SCORECARD

PV MODULE INDEX REPORT 2023 HIGH ACHIEVEMENT IN PERFORMANCE PVEL

CE IEC Intertek

ELECTRICAL SPECIFICATIONS		410	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	410	306
Maximum power voltage (Vpmax)	V	38.99	36.24
Maximum power current (Ipmax)	A	10.52	8.43
Open circuit voltage (Voc)	V	45.59	42.76
Short circuit current (Isc)	A	11.15	8.99
Module efficiency	%	20.7%	
Maximum system voltage (VDC)	V	1000	
Series fuse rating	A	20	
Power Tolerance	Wp	0 to +10	

Measurement conditions: STC 1000 W/m² • AM 1.5 • Temperature 25 °C • NOCT 800 W/m² • AM 1.5 • Measurement uncertainty ≤ 3%
Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by 0 to +10W.

MECHANICAL PROPERTIES / COMPONENTS	METRIC	IMPERIAL
Module weight	21.3kg ±0.2kg	47lbs ±0.4lbs
Dimensions (H x L x D)	1914 mm x 1036 mm x 35 mm	75.3 in x 40.8 in x 1.37 in
Maximum surface load (wind/snow)*	5400 Pa rear load / 5400 Pa front load	112.8 lb/ft² rear load / 112.8 lb/ft² front load
Hail impact resistance	ø 25 mm at 83 km/h	ø 1 in at 51.6 mph
Cells	132 Half cells - Si mono PERC 9 busbar - 83 x 166 mm	132 Half cells- Si mono PERC 9 busbar - 3.26 x 6.53 in
Glass	3.2 mm high transmittance, tempered, anti-reflective coating	0.126 in high transmittance, tempered, anti-reflective coating
Cables and connectors (refer to installation manual)	1350 mm, ø 5.7 mm, MC4 from Staubli	53 in, ø 0.22 in (12AWG), MC4 from Staubli
Backsheet	High durability, superior hydrolysis and UV resistance, multi-layer dielectric film, fluorine-free PV backsheet	
Frame	Anodized Aluminum (Black)	
Bypass diodes	3 diodes-30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)	
Junction Box	UL 3730 Certified, IEC 62790 Certified, IP68 rated	

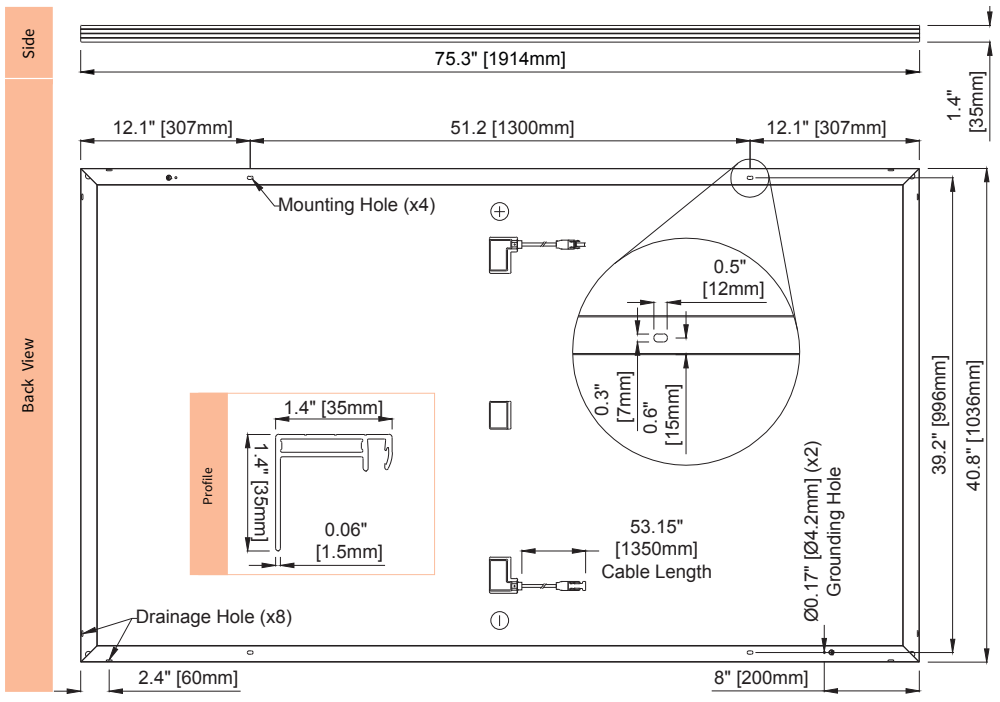
TEMPERATURE RATINGS	
Temperature Coefficient Isc	+0.064 %/°C
Temperature Coefficient Voc	-0.28 %/°C
Temperature Coefficient Pmax	-0.36 %/°C
NOCT (± 2°C)	45 °C
Operating temperature	-40/+85 °C

WARRANTIES	
Module product workmanship warranty	25 years**
Linear power performance guarantee	30 years
	≥ 97.1% end 1st yr ≥ 91.6% end 12th yr ≥ 85.1% end 25th yr ≥ 82.6% end 30th yr

CERTIFICATIONS	
Product	UL 61215-1:2017 Ed.1, UL 61215-2:2017 Ed.1, UL 61730-1:2017 Ed.1, UL 61730-2:2017 Ed.1 , CSA C22.2#61730-1:2019 Ed.2, CSA C22.2#61730-2:2019 Ed.2, IEC 61215-1:2016 Ed.1, IEC 61215-2:2016 Ed.1, IEC 61730-1:2016 Ed.2, IEC 61730-2:2016 Ed.2, IEC 61701:2020 (Salt Mist Corrosion), IEC 62716:2013 (Ammonia Corrosion), CEC Listing, UL Fire Rating: Type 2
Factory	ISO9001:2015

SHIPPING SPECS	
Modules Per Pallet:	26 or 26 (California)
Pallets Per Truck	32 or 30 (California)
Modules Per Truck	832 or 780 (California)

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



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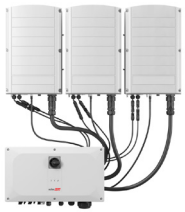
T +1 905.255.2501
F +1 905.696.0267

Silfab - SIL-410-HC+-20240809

SolarEdge Commercial Product Offering

Three Phase Inverters

- 12.5kW-40kW models
- Fixed voltage inverters for superior efficiency and longer strings
- Integrated arc fault protection and optional rapid shutdown

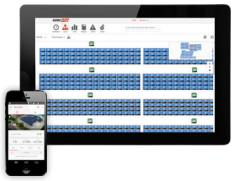


Three Phase Inverters with Synergy Technology

- 50kW-120kW models
- Combines large capacity with ease of installation
- Reduces time onsite with automatic system validation before grid connection

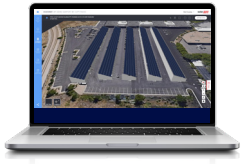
Power Optimizers

- P605-P1100 models for module outputs up to 600W
- Module-level optimization with 1:1 or 2:1 Power Optimizer to PV module ratio
- Advanced safety features for maximum protection of people and property
- Supports all module types including high power and bi-facial



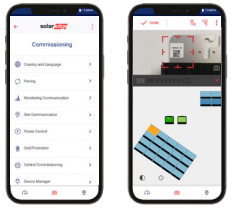
Monitoring Platform

- Free, real-time system visibility at the module level, anytime, anywhere
- Pinpointed alerts for faster maintenance and higher system uptime
- Dedicated Monitoring installer app and mySolarEdge app for system owners



SolarEdge Designer

Online tool to plan, build and validate your SolarEdge systems from inception to installation



Software Tools

- **SetApp:** Easy inverter commissioning direct from the installer's smartphone
- **Mapper:** Quick creation of virtual site maps in the Monitoring Platform via a mobile app

Communications Devices

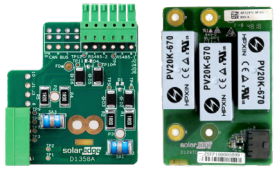
Multiple options for wireless connection of inverters to the SolarEdge monitoring server, such as Wi-Fi, cellular and ZigBee

Energy Meter & Current Transformers

Supports high accuracy production/consumption monitoring, and export limitation

Performance Monitoring

Calculate site performance ratio and measure environmental conditions



Surge Protection Devices

Protect the AC/DC power lines and RS485 communication buses of SolarEdge Three Phase Inverters from electrical surges, such as lightning.

SUQUAMISH TRIBE - HOUSE OF AWAKENED CULTURE

Northeast Parkway 7235, Suquamish, Washington, 98392, United States | Oct 29, 2024

NOTIFICATIONS

- Warning: Connecting 3 strings to SE10000H-US Home Hub (PCS) with 2 inputs requires a combiner box.
- Warning: Connecting 3 strings to SE10000H-US Home Hub (PCS) with 2 inputs requires a combiner box.
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SYSTEM OVERVIEW

290 PV modules | 8 Inverters | 290 Optimizers

SIMULATION RESULTS

Installed DC Power	Max Achieved AC Power	Annual Energy Production	CO2 Emission Saved (Annually)	Equivalent Trees Planted (Annually)
116.00 kWp	75.20 kW	125.39 MWh	88.65 t	4,072

PV MODULES

# Module	Model	Peak power	Racking type	Orientation	Azimuth	Tilt
290	Silfab Solar Inc., SIL-400 HC+ (user-defined)	116 kWp			180°	0°
Total: 290		116 kWp				

SUQUAMISH TRIBE - HOUSE OF AWAKENED CULTURE

Northeast Parkway 7235, Suquamish, Washington, 98392, United States | Oct 29, 2024

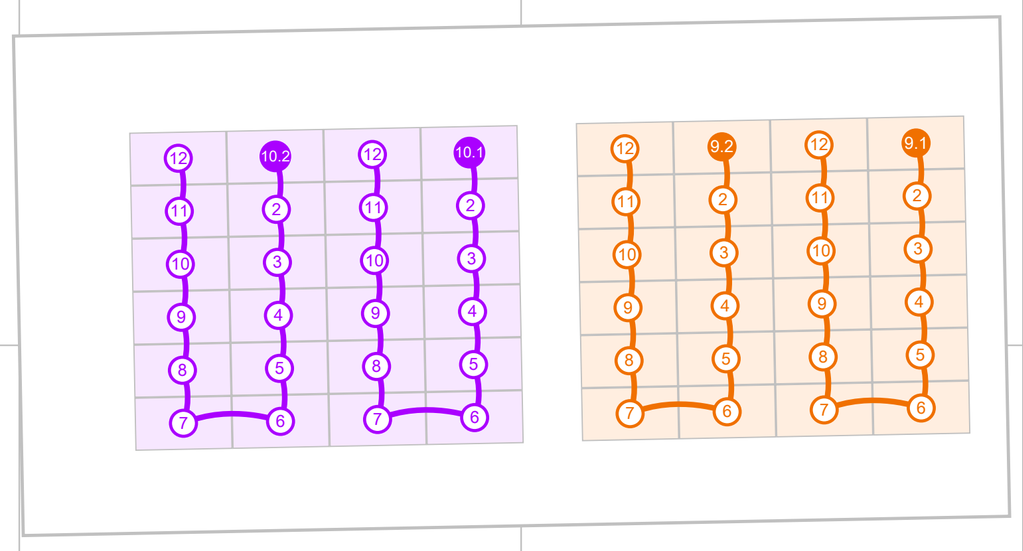
BILL OF MATERIALS (BOM)

Items	Part Number	Quantity	Price ($)	Total ($)
SE10000H-US Home Hub (PCS)		6		
SE7600H-US Home Hub (PCS)		2		
S440		290		
SIL-400 HC+		290		

ELECTRICAL DESIGN

Inverters & Storage	Strings per inverter	Optimizers per string	PV modules per string
4 xSE10000H-US Home Hub (PCS) 15.13kW | 151% Oversizing	1 x string	13 x S440	13
	2 x strings	14 x S440	14
2 xSE10000H-US Home Hub (PCS) 14.39kW | 144% Oversizing	3 x strings	13 x S440	13
2 xSE7600H-US Home Hub (PCS) 8.86kW | 117% Oversizing	2 x strings	12 x S440	12

10ft 1:100



solaredge

SUQUAMISH TRIBE - HOUSE OF AWAKENED CULTURE STRING DESIGN REPORT

Address: Northeast Parkway 7235, Suquamish, Washington, 98392, United States | Oct 29, 2024

3 SE10000H-US Home Hub (PCS) 144%
- 3.1 13 x S440 13
- 3.2 13 x S440 13
- 3.3 13 x S440 13

4 SE10000H-US Home Hub (PCS) 151%
- 4.1 13 x S440 13
- 4.2 14 x S440 14
- 4.3 14 x S440 14

5 SE10000H-US Home Hub (PCS) 151%
- 5.1 13 x S440 13
- 5.2 14 x S440 14
- 5.3 14 x S440 14

6 SE10000H-US Home Hub (PCS) 144%
- 6.1 13 x S440 13
- 6.2 13 x S440 13
- 6.3 13 x S440 13

7 SE10000H-US Home Hub (PCS) 151%
- 7.1 13 x S440 13
- 7.2 14 x S440 14
- 7.3 14 x S440 14

8 SE10000H-US Home Hub (PCS) 151%
- 8.1 13 x S440 13
- 8.2 14 x S440 14
- 8.3 14 x S440 14

9 SE7600H-US Home Hub (PCS) 117%
- 9.1 12 x S440 12
- 9.2 12 x S440 12

10 SE7600H-US Home Hub (PCS) 117%
- 10.1 12 x S440 12
- 10.2 12 x S440 12

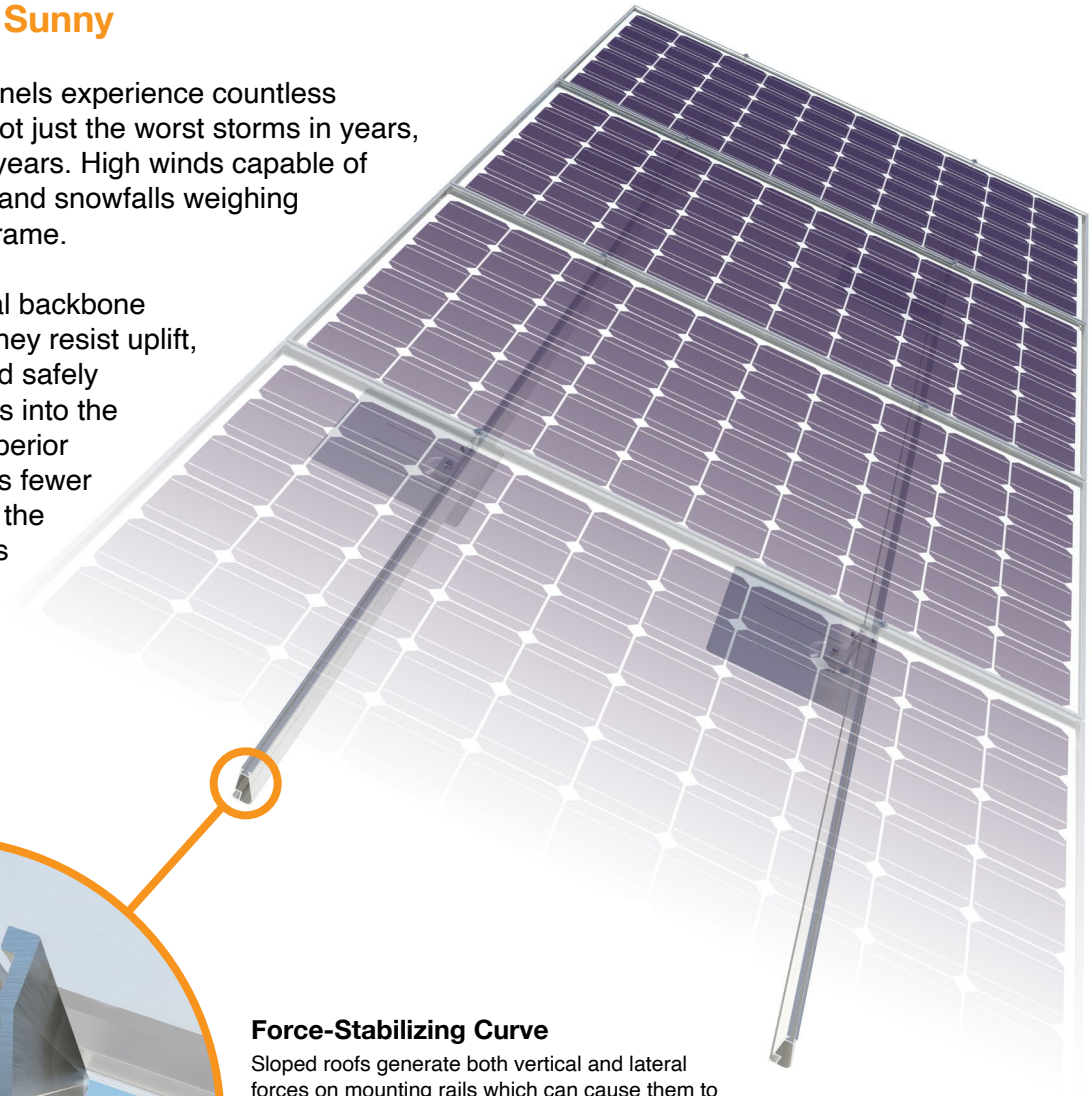
IRONRIDGE

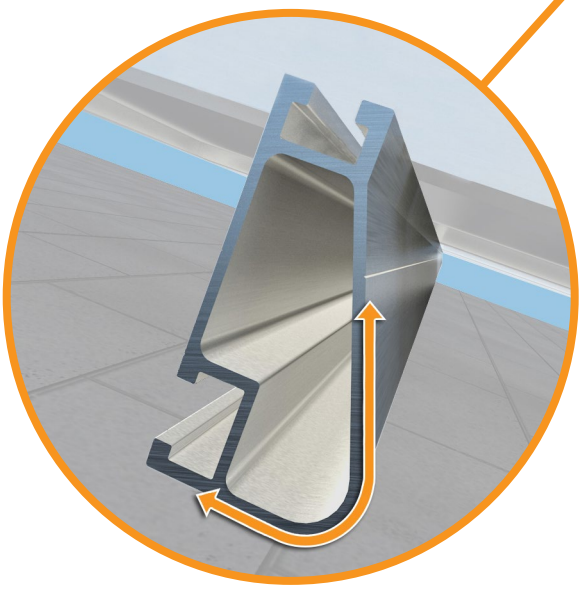
XR Rail® Family

Solar Is Not Always Sunny

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

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





Force-Stabilizing Curve

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

Compatible with Flat & Pitched Roofs

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

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

Corrosion-Resistant Materials

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

XR Rail® Family

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

XR10

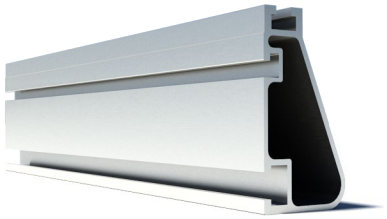
XR10 is a sleek, low-profile mounting rail, designed for regions with light or no snow. It achieves spans up to 6 feet, while remaining light and economical.

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

XR100

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

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



XR1000

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

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

Rail Selection

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

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

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

IRONRIDGE
28357 INDUSTRIAL BLVD., HAYWARD, CA 94545

Project Details			
Name	Suquamish Tribe - House of Awakened Culture	**Date**	10/17/2024
Location	7325 Northeast Parkway, Suquamish, WA 98392	**Total modules**	290
Module	Silfab: SIL-400 HC+ (35mm)	**Total watts**	116,000
Dimensions	Dimensions: 75.35" x 40.79" x 1.38" (1914.0mm x 1036.0mm x 35.0mm)	**Attachments**	536
ASCE	7-16	**Rails per row**	2

System Weight	
Total system weight	16,028.7 lbs
Weight/attachment	29.9 lbs
Racking weight	2,410.3 lbs
Distributed weight	2.5 psf

Load Assumptions	
Wind exposure	B
Wind speed	98 mph
Ground snow load	25 psf
Attachment spacing portrait	4.0'
Site Elevation	197.0 ft
S_{DS}	1.077

Roof Information			
Roof Material Family	Metal	**Roof material**	Standing Seam
Risk category	II	**Roof attachment**	Lynx with L-Foot
		Staggered attachments	No
Attachment hardware	Square		
Roof shape	Gable		

IRONRIDGE
28357 INDUSTRIAL BLVD., HAYWARD, CA 94545

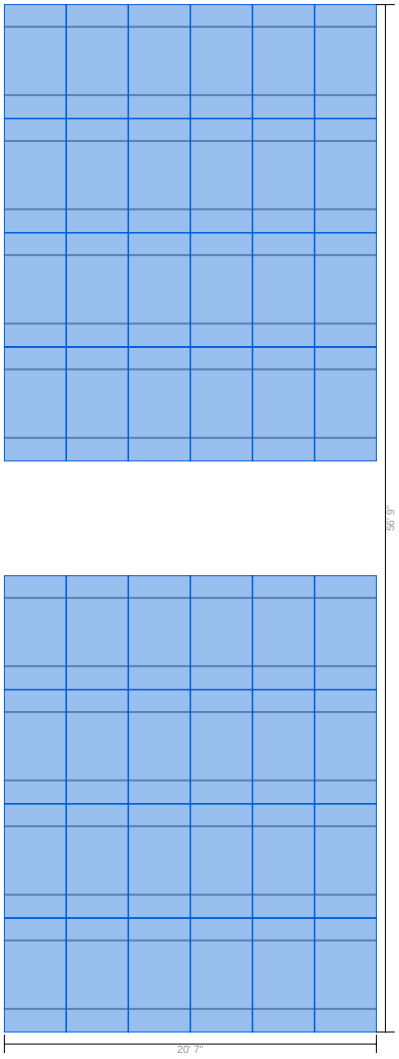
Roof Plane A

Height	12 ft	Slope	8 °	Rafter spacing	16 in

Roof Plane A: Roof Section 1

Details		Weights
Panels: 48	Provided rail: 544' [32 x 204"]	Total weight: 2,716.7 lbs
Rail orientation: East-West	Attachments: 96	Weight/attachment: 28.3 lbs
Panel orientation: Portrait	Splices: 16	Total Area: 1,045.3 sq ft
Entry type: Graphical	Clamps: 80	Distributed weight: 2.6 psf

Diagram



Segments

Identifier	Columns	Row length	Rail length	Cantilever	Rail	Attachments	Splices	Clamps
A	6	20' 9"	20' 9"	4"	68' [4 x 204"]	12	2	10
			Row segment totals (x 8) →		**544' [32 x 204"]**	**96**	**16**	**80**

Span Details XR100 - Portrait

Zone	Module Position	Max span	Max cantilever
Zone 1/2e	Normal	7' 4"	2' 11"
	Exposed	7' 4"	2' 11"
Zone 2n/2r/3e	Normal	7' 4"	2' 11"
	Exposed	7' 4"	2' 11"
Zone 3r	Normal	7' 4"	2' 11"
	Exposed	7' 4"	2' 11"

Reaction Forces XR100 - Portrait

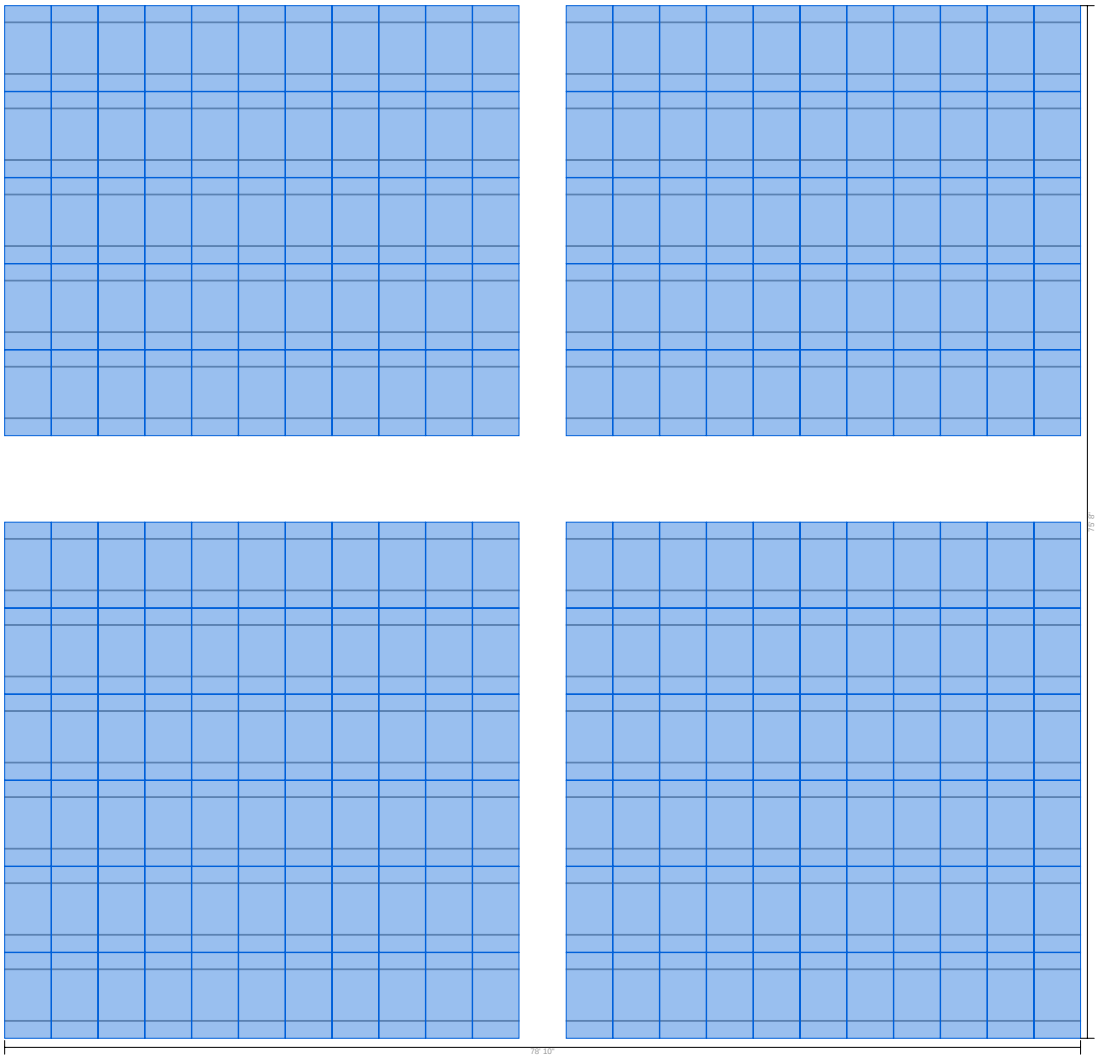
Zone	Module Position	Uplift (PSF)	Down (lbs)	Uplift (lbs)	Lateral Par (lbs)	Lateral Perp (lbs)
Zone 1/2e	Normal	11.0	307	137	48	24
	Exposed	16.5	307	218	48	24
Zone 2n/2r/3e	Normal	14.4	307	206	48	24
	Exposed	21.5	307	322	48	24
Zone 3r	Normal	17.1	307	252	48	24
	Exposed	25.6	307	390	48	24

IRONRIDGE
28357 INDUSTRIAL BLVD., HAYWARD, CA 94545

Roof Plane A: Roof Section 2

Details		Weights
Panels: 242	Provided rail: 2244' [132 x 204"]	Total weight: 13,312.0 lbs
Rail orientation: East-West	Attachments: 440	Weight/attachment: 30.3 lbs
Panel orientation: Portrait	Splices: 88	Total Area: 5,256.3 sq ft
Entry type: Graphical	Clamps: 440	Distributed weight: 2.5 psf

Diagram



Segments

Identifier	Columns	Row length	Rail length	Cantilever	Rail	Attachments	Splices	Clamps
A	11	37' 10"	37' 10"	11"	102' [6 x 204"]	20	4	20
			Row segment totals (x 22) →		**2244' [132 x 204"]**	**440**	**88**	**440**

Span Details XR100 - Portrait

Zone	Module Position	Max span	Max cantilever
Zone 1/2e	Normal	7' 4"	2' 11"
	Exposed	7' 4"	2' 11"
Zone 2n/2r/3e	Normal	7' 4"	2' 11"
	Exposed	7' 4"	2' 11"
Zone 3r	Normal	7' 4"	2' 11"
	Exposed	7' 4"	2' 11"

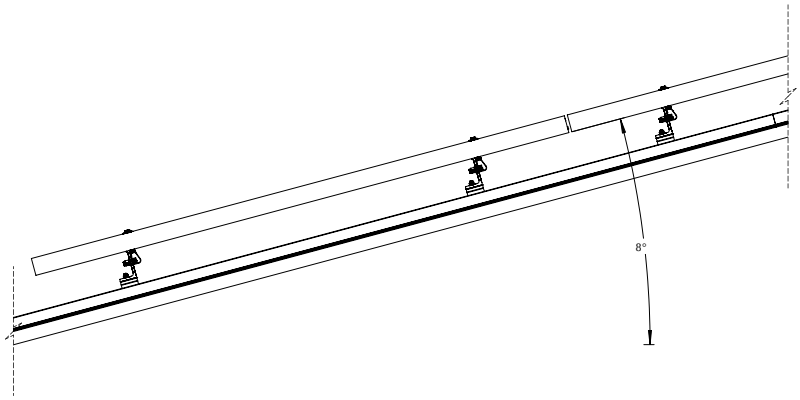
IRONRIDGE
28357 INDUSTRIAL BLVD., HAYWARD, CA 94545

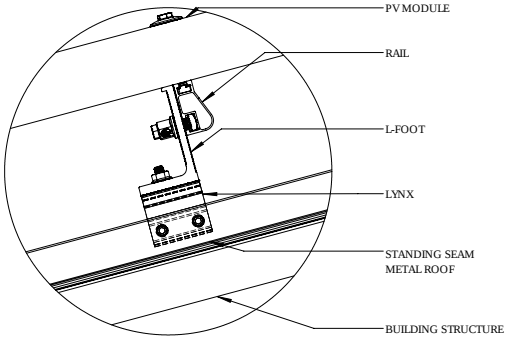
Reaction Forces XR100 - Portrait

Zone	Module Position	Uplift (PSF)	Down (lbs)	Uplift (lbs)	Lateral Par (lbs)	Lateral Perp (lbs)
Zone 1/2e	Normal	11.0	307	137	48	24
	Exposed	16.5	307	218	48	24
Zone 2n/2r/3e	Normal	14.4	307	206	48	24
	Exposed	21.5	307	322	48	24
Zone 3r	Normal	17.1	307	252	48	24
	Exposed	25.6	307	390	48	24

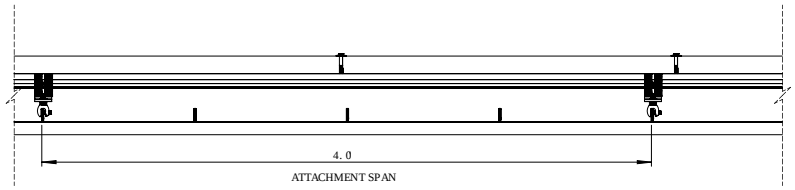
IRONRIDGE
28357 INDUSTRIAL BLVD., HAYWARD, CA 94545

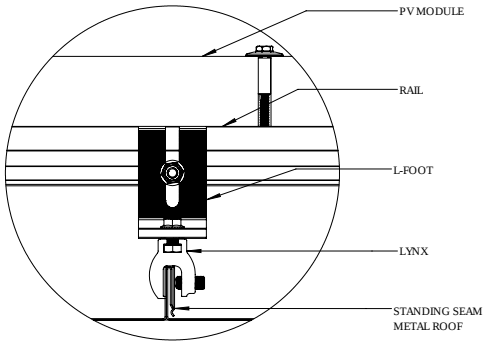
Side View (portrait)



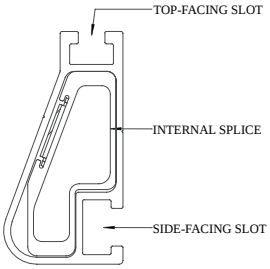


Front View (portrait)

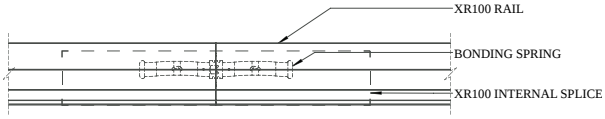




Splice Details

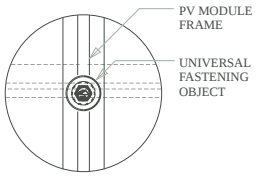


XR100

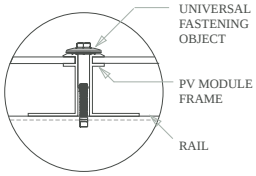


Splice Connection

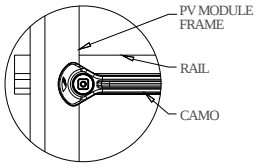
Clamp Detail



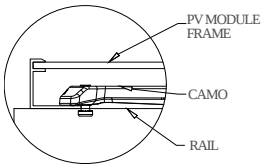
Mid Clamp, Plan



Mid Clamp, Front

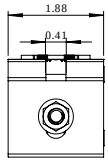


CAMO End Clamp, Plan

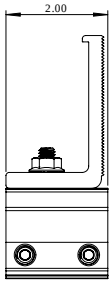


CAMO End Clamp, Front

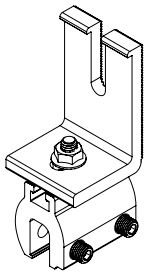
Lynx Standing Seam Metal Clamp



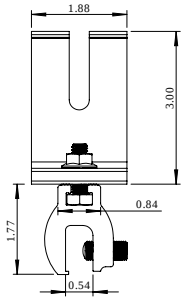
Plan View



Side View



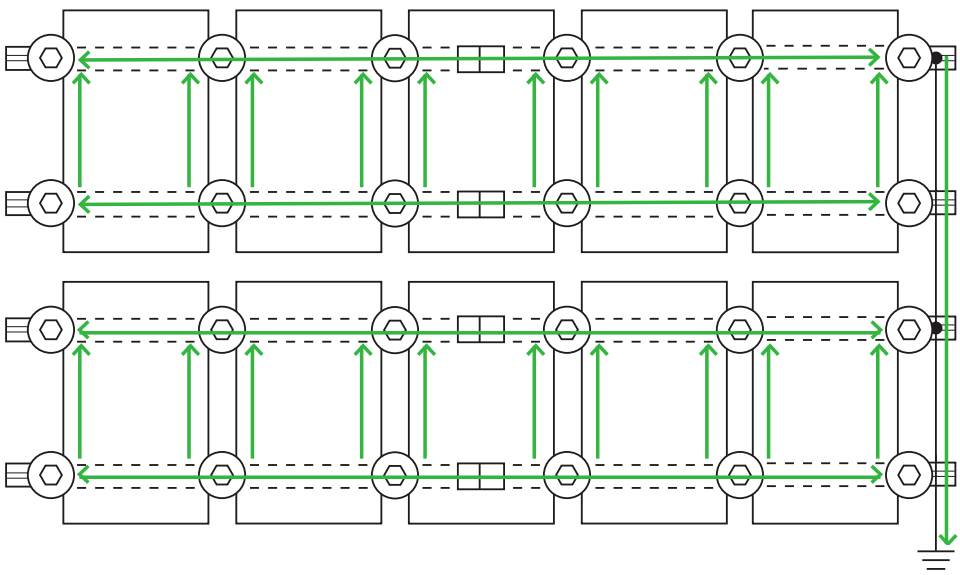
Perspective View



Front View

IRONRIDGE
28357 INDUSTRIAL BLVD., HAYWARD, CA 94545

Grounding Diagram



* Grounding Lugs and Wire are not required in systems using Enphase microinverters.

Bill of Materials

Part	Spares	Total Qty
Rails & Splices		
XR-100-204B XR100, Rail 204" Black	0	164
XR100-BOSS-01-M1 Bonded Splice, XR100	0	104
Clamps & Grounding		
UFO-CL-01-B1 Universal Module Clamp, Black	0	520
CAMO-01-M1 Hidden End Cam (universal clamp)	0	120
XR-LUG-03-A1 Grounding Lug, Low Profile	0	30
Attachments		
QM-LYNX-SS-M1 Lynx Standing Seam Metal Clamp (incl. h/w)	0	536
LFT-03-B1 Slotted L-Foot, Black	0	536
BHW-SQ-02-A1 Square-Bolt Bonding Hardware	0	536

ATTACHMENTS

PRE-INSTALLATION

☐ Verify module compatibility. See Page 21 for info.

TOOLS REQUIRED

- ☐ Cordless Drill (non-impact)
- ☐ Impact Driver (for lag bolts)
- ☐ Torque Wrench (0-250 in-lbs)
- ☐ 7/16” Socket
- ☐ 1/2" Socket
- ☐ 9/16" Socket
- ☐ 7/32" Drill Bit
- ☐ 3/8" Socket
- ☐ 1/8" Drill Bit
- ☐ 1/4" Drill Bit
- ☐ T30 Bit
- ☐ Channel Lock Pliers
- ☐ #3 Phillips Bit
- ☐ 3/16" Hex Bit

BONDING HARDWARE TORQUE VALUES

Please refer to each attachment's individual section for full details on all torque values and instructions.

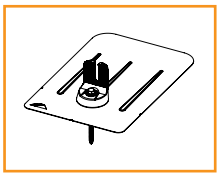
- ☐ 3/8" Bonding Hardware Nuts (7/16" Socket): 250 in-lbs
- ☐ All Tile Hook Carriage Bolts (7/16" Socket): 132 in-lbs
- ☐ Flat Roof Attachment Nuts (9/16” Socket): 250 in-lbs
- ☐ Lynx Set Screw (3/16" Hex Drive): 150 in-lbs
- ☐ Lynx Flange Nut (1/2" Socket): 150 in-lbs

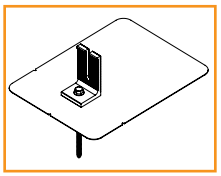
➢ **If using previous version of Integrated Grounding Mid Clamps, End Clamps, Expansion Joints and for a list of approved 3rd party components please refer to Alternate Components Addendum (Version 1.9)**

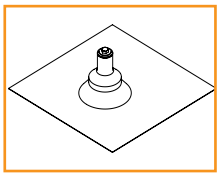
ATTACHMENTS

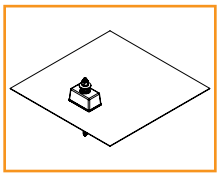
COMPOSITION SHINGLE

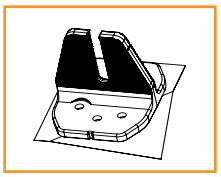

FlashFoot2


FlashVue

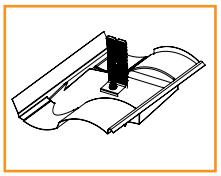

QM L-Mount

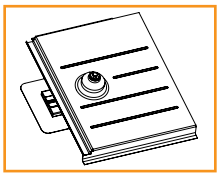

QM QBase

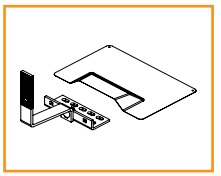

QM Classic Comp Mount

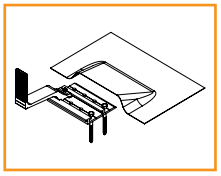

HUG (Halo UltraGrip)

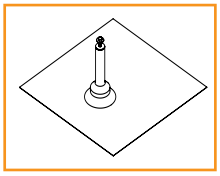
TILE

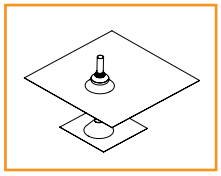

Knockout Tile


QM Tile Replacement

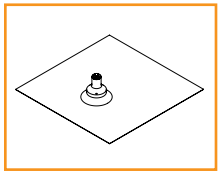

All Tile Hook and Flashing (optional)

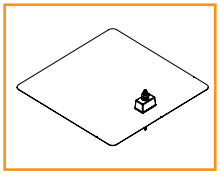

QM Quick Hook and Flashing (optional)

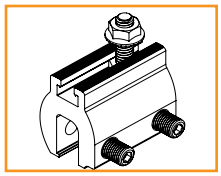

QM QBase Tile


QM Tile Conduit Penetration

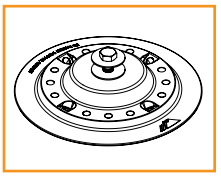
ADDITIONAL ROOF TYPES

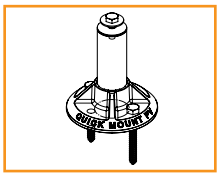

QM Qbase Shake - Slate - Metal Shingle


QM Classic Mount Shake


QM Lynx Metal Roof Attachment

LOW SLOPE ROOF


Flat Roof Attachment



QM QBase Mount

PRE-INSTALLATION

☐ Verify module compatibility. See Page 21 for info.

TOOLS REQUIRED

- ☐ Cordless Drill (non-impact)
- ☐ Impact Driver (for lag bolts)
- ☐ Torque Wrench (0-250 in-lbs)
- ☐ 7/16” Socket
- ☐ 1/2" Socket
- ☐ 9/16" Socket
- ☐ 7/32" Drill bit
- ☐ 1/8" Drill bit
- ☐ 1/4" Drill bit
- ☐ T30 Torx Bit
- ☐ Channel Lock Pliers
- ☐ #3 Phillips Bit
- ☐ Paddle Bit

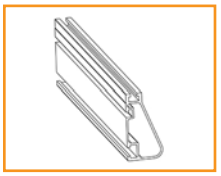
BONDING HARDWARE TORQUE VALUES

Please refer to each attachment's individual section for full details on all torque values and instructions.

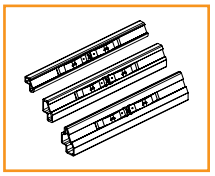
- ☐ Universal Fastening Object (7/16" Socket): 80 in-lbs
- ☐ Rail Grounding Lug Nut (7/16" Socket): 80 in-lbs
- ☐ Module Grounding Lug
  - ☐ Grounding Nut (7/16" Socket): 60 in-lbs
  - ☐ Grounding Lug Terminal Screws (7/16" Socket): 20 in-lbs
- ☐ Microinverter Kit Nuts (7/16" Socket): 80 in-lbs
- ☐ Frameless Module Kit Nuts (7/16" Socket): 80 in-lbs
- ☐ 3/8" Bonding Hardware Nuts (7/16" Socket): 250 in-lbs
- ☐ Contour Clamp (T-30 Torx Bit): 80 in-lbs

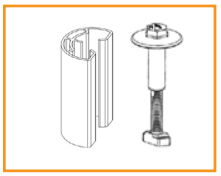
➢ **Unless otherwise noted, all components have been evaluated for multiple use. They can be uninstalled and reinstalled in the same or new location.**

COMPONENTS

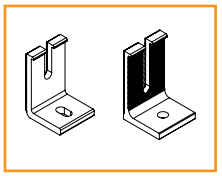

XR Rail


Wire Clip

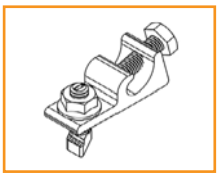

BOSS

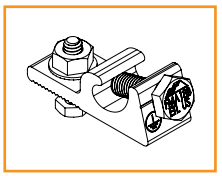

UFO and Stopper Sleeve (30-46MM)

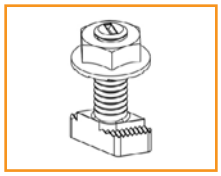

CAMO

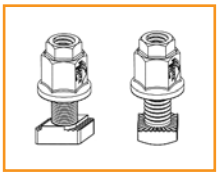

Ironridge L-Foot and QM L-Foot

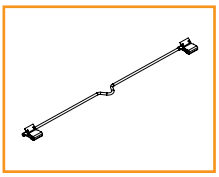
End Cap

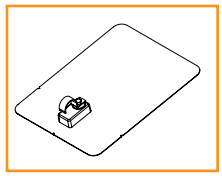

Rail Grounding Lug

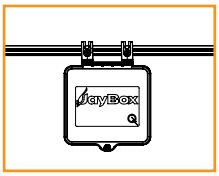

Module Grounding Lug


Microinverter Kit

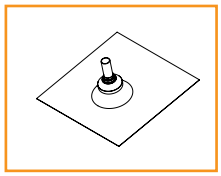

3/8" Bonding Hardware

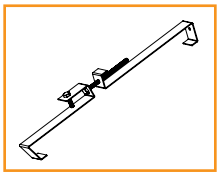

8" Bonding Jumper Single Use Only


QM Classic Conduit Comp Mount

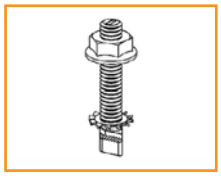


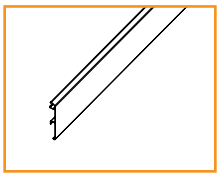
JAYBOX

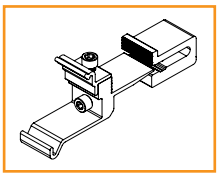

QM Composition Conduit Penetration


QM Tile Conduit Mount


Frameless End/Mid Clamp


Frameless Module Kit


Contour Trim


Contour Clamp

Rail: XR100	Gable Roof Flush Mount System Span Table (inches) - Portrait or Landscape Installation Max Module Length: 80", Max Module SF: 24 SF Exposure B																																						
Wind Speed (mph)	Roof Slope (deg.)	Ground Snow: 0 psf			10 psf			20 psf			30 psf			40 psf			50 psf			60 psf			70 psf*			80 psf*			90 psf*			100 psf*			110 psf*			120 psf*			Exposed Mod.			Edge Mod.		
		Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
90 mph	8-20	123	123	123	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	124	120	107	106	87	79
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48	121	121	121	113	96	88
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	117	117	117	110	99	90
95 mph	8-20	123	123	123	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	124	112	99	99	82	74
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48	121	120	113	107	88	83
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	117	117	110	104	96	85
100 mph	8-20	123	123	122	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	124	103	92	92	77	72
	21-27	121	121	121	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48	121	112	106	101	84	78
	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	117	117	104	99	90	81
105 mph	8-20	123	123	114	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	124	97	87	86	73	66
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	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	117	111	99	96	85	77
110 mph	8-20	123	120	107	102	102	102	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	119	91	81	81	69	64
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	28-45	117	117	117	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	117	105	96	90	81	73
115 mph	8-20	123	113	101	102	102	101	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	109	86	76	76	66	59
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	28-45	117	117	112	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	113	100	89	85	78	72
120 mph	8-20	123	107	96	102	102	96	86	86	86	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	102	81	72	72	64	54
	21-27	121	115	109	99	99	99	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48	111	89	83	84	69	64
	28-45	117	117	106	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	108	96	85	81	74	67
130 mph	8-20	123	96	85	102	96	85	86	86	85	84	84	84	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	90	73	65	67	55	44
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	28-45	117	109	98	98	98	98	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	98	87	77	75	69	61
140 mph	8-20	110	87	77	102	87	77	86	86	77	84	84	77	75	75	75	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	78	66	59	64	45	36
	21-27	118	96	88	99	96	88	84	84	84	83	83	83	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48	92	73	67	72	58	48
	28-45	113	101	90	98	98	90	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	90	80	72	69	64	56
150 mph	8-20	98	79	72	98	79	72	86	79	72	84	79	72	75	75	72	68	68	68	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	72	60	45	57	38	32
	21-27	108	87	80	99	87	80	84	84	80	83	83	80	76	76	76	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48	84	67	61	66	48	38
	28-45	105	96	83	98	96	83	83	83	83	82	82	82	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	82	74	65	64	59	48
160 mph	8-20	88	72	65	88	72	65	86	72	65	84	72	65	75	72	65	68	68	65	64	64	64	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	66	49	36	50	33	27
	21-27	100	80	74	99	80	74	84	80	74	83	80	74	76	76	74	69	69	69	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48	78	64	52	64	41	33
	28-45	97	87	77	97	87	77	83	83	77	82	82	77	76	76	76	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	76	69	60	59	54	40
170 mph	8-20	80	67	59	80	67	59	80	67	59	80	67	59	75	67	59	68	67	59	64	64	59	58	58	58	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	64	40	32	44	29	24
	21-27	93	74	68	93	74	68	84	74	68	83	74	68	76	74	68	69	69	68	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48	72	55	41	59	35	27
	28-45	90	81	72	90	81	72	83	81	72	82	81	72	76	76	72	72	72	72	67	67	67	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	72	64	54	54	45	34
175 mph	8-20	77	64	55	77	64	55	77	64	55	77	64	55	75	64	55	68	64	55	64	64	55	58	58	55	55	55	55	52	52	52	49	49	49	48	48	48	45	45	45	60	36	30	42	27	24
	21-27	90	72	65	90	72	65	84	72	65	83	72	65	76	72	65	69	69	65	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48	72	49	37	56	33	26
	28-45	87	78	69	87	78	69	83	78	69	82	78	69	76	76	69	72	72	69	66	66	66	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	67	64	48	49	42	32
180 mph	8-20	73	64	48	73	64	48	73	64	48	73	64	48	73	64	48	68	64	48	64	64	48	58	58	48	55	55	48	52	52	48	49	49	48	48	48	48	45	45	45	57	34	28	39	26	21
	21-27	87	69	64	87	69	64	84	69	64	83	69	64	76	69	64	69	69	64	64	64	64	59	59	59	56	56	56	53	53	53	50	50	50	48	48	48	48	48	48	68	44	33	53	32	24
	28-45	84	76	67	84	76	67	83	76	67	81	76	67	75	75	67	72	72	67	66	66	66	64	64	64	59	59	59	56	56	56	53	53	53	51	51	51	49	49	49	65	59	44	48	40	30

= min 72" span = min 64" span = min 48" span

= Shaded cells indicate conditions in which UFO Mid Clamp connection capacity is exceeded. See Note 9 on page 2 for details.

* = Note: additional installation requirement for CAMO module clamp. See Note 10 on Page 3 for details.

REV 02/09/2021

Grouping of ASCE 7-16 Roof Zones (Gable)						
Roof Slope	8° - 27°			28° - 45°		
Group	Group 1	Group 2	Group 3	Group 1	Group 2	Group 3
ASCE 7-16 Roof Zones	1 2e	2n 2r 3e	3r	1 2e 2r	2n 3r	3e

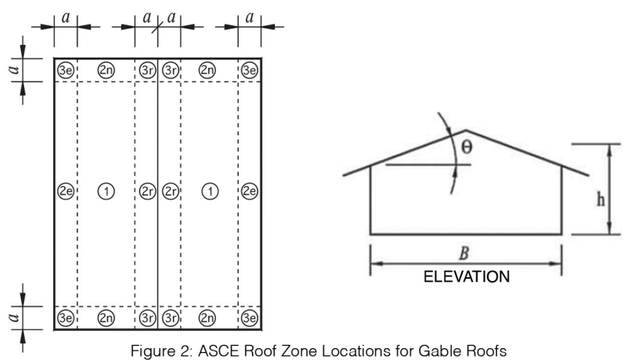


Figure 2: ASCE Roof Zone Locations for Gable Roofs

Notation (Per ASCE 7-16)

a = 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft (0.9 m). If an overhang exists, the edge distance shall be measured from the outside edge of the overhang. The horizontal dimensions used to compute the edge distance shall not include any overhang distances.

B = Horizontal dimension of building measured normal to wind direction, in ft (m).

h = Mean roof height, in ft (m).

θ = Angle of plane of roof from horizontal, in degrees.

IRONRIDGE
28357 INDUSTRIAL BLVD., HAYWARD, CA 94545

Project Details			
ID	1380613	**Name**	Suquamish Tribe - House of Awakened Culture
Location	7325 Northeast Parkway, Suquamish, WA 98392	**Module**	Silfab: SIL-400 HC+ (35mm)
Total modules	290	**Total watts**	116.00 kW
Total attachments	536	**Total splices**	104

Roof sections details

Roof section 1

Modules	Orientation	Entry type	Weight/attachment	Distributed weight	Provided rail	Attachments	Splices	Clamps
48	Portrait	Graphical	28.4 lbs	0.4 psf	544' [32 x 204"]	96	16	80

Segments

Columns	# Arrays	Row length	Rail length	Cantilever	Rail	Attachments	Splices	Clamps	Cantilever violations
6	8	20' 9"	20' 9"	4"	544' [32 x 204"]	96	16	80	None

Roof section 2

Modules	Orientation	Entry type	Weight/attachment	Distributed weight	Provided rail	Attachments	Splices	Clamps
242	Portrait	Graphical	30.3 lbs	2.1 psf	2244' [132 x 204"]	440	88	440

Segments

Columns	# Arrays	Row length	Rail length	Cantilever	Rail	Attachments	Splices	Clamps	Cantilever violations
11	22	37' 10"	37' 10"	11"	2244' [132 x 204"]	440	88	440	None

IRONRIDGE
28357 INDUSTRIAL BLVD., HAYWARD, CA 94545

Bill of Materials

Part	Spares	Total Qty	MSRP	Total
Rails & Splices				
XR-100-204B XR100, Rail 204" Black	0	164	$114.79	$18,825.56
XR100-BOSS-01-M1 Bonded Splice, XR100	0	104	$11.52	$1,198.08
Clamps & Grounding				
UFO-CL-01-B1 Universal Module Clamp, Black	0	520	$5.25	$2,730.00
CAMO-01-M1 Hidden End Cam (universal clamp)	0	120	$9.79	$1,174.80
XR-LUG-03-A1 Grounding Lug, Low Profile	0	30	$9.65	$289.50
Attachments				
QM-LYNX-SS-M1 Lynx Standing Seam Metal Clamp (incl. h/w)	0	536	$9.99	$5,354.64
LFT-03-B1 Slotted L-Foot, Black	0	536	$5.16	$2,765.76
BHW-SQ-02-A1 Square-Bolt Bonding Hardware	0	536	$2.98	$1,597.28
Accessories				
XR-WC-01-B1 XR Wire Clip	0	580	$1.05	$609.00
XR-100-CAP01-B1 End Cap, XR100 (L-R Pair)	0	60	$1.99	$119.40
BHW-MI-01-A1 Microinverter/MLPE Bonding Hardware, T-Bolt	0	294	$2.14	$629.16
QM-JBX-RL02-B1 JayBox, Rail-Mounted	0	2	$69.08	$138.16
BX-CT-EC-P1 Cable Tie And Edge Clip	0	290	$1.38	$400.20
BX-CT-UV-P1 Black Cable Tie With UV	0	290	$0.27	$78.30

Total MSRP	**$35,909.84**
Discount (0.0%)	**($0.00)**
Total Price	**$35,909.84**
$/Watt	**$0.31**
Weight	**2,433.8 lbs**

HOUSE OF THE AWAKENED CULTURE MICROGRID
GRID-TIE SOLAR + STORAGE SYSTEM
7325 NE PARKWAY
SUQUAMISH, WA, 98392

Remove The

SCOPE OF WORK

THE PROJECT SCOPE INCLUDES THE INSTALLATION OF A GRID-TIED SOLAR PHOTOVOLTAIC AND BATTERY ENERGY STORAGE SYSTEM AT THE HOUSE OF THE AWAKENED CULTURE COMMERCIAL PROPERTY IN SUQUAMISH, WA.

THE INSTALLATION CONSISTS OF A FLUSH TO ROOF MOUNT SOLAR ARRAY, 8 STRING-INVERTER(S), BATTERY ENERGY STORAGE SYSTEM, AND RELATED ELECTRICAL METERING AND SAFETY EQUIPMENT. ALL EQUIPMENT WILL BE INSTALLED AS REQUIRED BY APPLICABLE CODES AND THE LOCAL UTILITY COMPANY. DURING DAYLIGHT HOURS THIS PHOTOVOLTAIC SYSTEM (SOLAR ELECTRIC) WILL PROVIDE ELECTRICITY IN PARALLEL WITH THE LOCAL UTILITY SERVICE PROVIDER. DURING A GRID OUTAGE, THE ENERGY STORAGE SYSTEM WILL PROVIDE THE FACILITY ELECTRICAL SYSTEM WITH BACKUP POWER.

SYSTEM DESCRIPTION

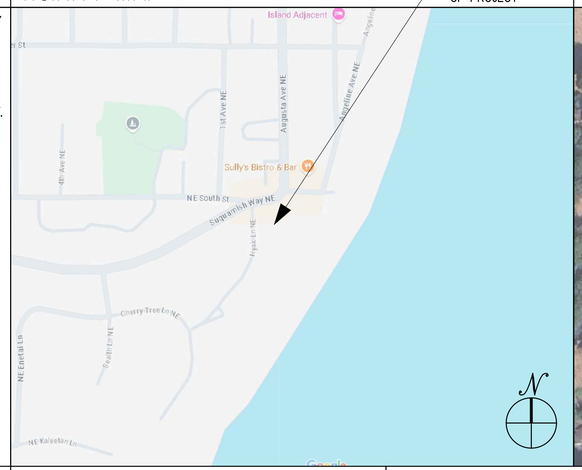
FACILITY SERVICE VOLTAGE: 120/240V, 1 PHASE, 3 WIRE
(290) SILFAB SOLAR, SIL-410 HC+, 410WDC, MONOCRYSTALLINE, CEC PTC RATING: WDC
(6) SOLAREDGE, SE10000H-US, 10kW, STRING-INVERTER(S), 240VAC, 1ϕ
(2) SOLAREDGE, SE7600H-US, 7.6kW, STRING-INVERTER(S), 240VAC, 1ϕ
(290) SOLAREDGE POWER OPTIMIZERS, S440, 440WDC, IP68/NEMA6P

118.900kW DC - SOLAR PV
75.200kW AC - SOLAR PV

(1) KORE POWER INC., MARK 1 BATTERY STACKS, 214kWh, 820.0VAC IN THE SHIELD 030 ENCLOSURE
(2) KORE POWER INC., MARK 1 BATTERY STACKS, 156kWh, 820.0VAC IN THE SHIELD 030 ENCLOSURE
(4) OZTEK, OZPCS-RS35, 35kVA (DE-RATED TO: 24kVA), 240VAC, 1PH, 2 WIRE, 100AAC
96.000kW AC - BESS
526kWh TOTAL BATTERY STORAGE CAPACITY

VICINITY MAP

PROPOSED LOCATION OF PROJECT



AERIAL IMAGE

PROPOSED LOCATION OF PROJECT

SHEET INDEX

SHEET NUMBER	SHEET TITLE
T-1	TITLE PAGE
ELECTRICAL	
E-0.0	ELECTRICAL SPECIFICATIONS
E-1.0	OVERALL SITE PLAN
E-1.1	ENLARGED SITE PLAN
E-1.2	PLAN DETAILS
E-2.0	DC SINGLE LINE DIAGRAM
E-2.1	AC SINGLE LINE DIAGRAM
E-2.2	ELECTRICAL SPECS AND TABLES
E-2.3	RFP WIRE SCHEDULE
E-4.0	DATA SHEETS
E-4.1	DATA SHEETS

GENERAL NOTES

ALL ELECTRICAL WORK TO BE INSTALLED BY A QUALIFIED AND LICENSED ELECTRICAL CONTRACTOR.

ALL SOLAR MODULES SHALL BE UL LISTED 61730 & CEC APPROVED. ALL INVERTERS SHALL BE UL LISTED 1741 CERTIFIED & CEC APPROVED. ALL ELECTRICAL COMPONENTS AND MATERIALS SHALL BE LISTED FOR ITS PURPOSE AND INSTALLED IN A WORKMAN LIKE MANNER. ALL OUTDOOR EQUIPMENT SHALL MEET APPROPRIATE NEMA STANDARDS.

THE ELECTRICAL CONTRACTOR IS ADVISED THAT ALL DRAWINGS AND COMPONENT MANUALS ARE TO BE UNDERSTOOD PRIOR TO INSTALLATION. THE CONTRACTOR IS ADVISED TO HAVE ALL SWITCHES IN THE "OFF" POSITION AND FUSES REMOVED PRIOR TO INSTALLATION OF FUSE-BEARING COMPONENTS.

THIS SYSTEM IS INTENDED TO BE OPERATED IN PARALLEL WITH THE UTILITY SERVICE PROVIDER. ANTI-ISLANDING PROTECTION IS A REQUIREMENT OF UL 1741 AND IS INTENDED TO PREVENT THE OPERATION OF THE PV SYSTEM WHEN THE UTILITY GRID IS NOT OPERATIONAL.

PERMISSION TO OPERATE THE SYSTEM IS NOT AUTHORIZED UNTIL FINAL INSPECTIONS AND APPROVALS ARE OBTAINED FROM THE LOCAL AUTHORITY HAVING JURISDICTION AND THE LOCAL UTILITY SERVICE PROVIDER.

THE METHOD OF ATTACHMENT CREATES A UNIFIED STRUCTURE TO MEET DEAD LOAD, WIND LOAD, AND SEISMIC REQUIREMENTS. SOLAR MODULES WILL BE SECURED TO THE EXISTING ROOF AS SPECIFIED ON THE STRUCTURAL SHEETS. EXISTING ROOF EQUIPMENT WILL NOT BE EFFECTED BY THE PV SYSTEM. ALL STRUCTURAL DESIGN AND INSTALLATION COMPONENTS ARE THE RESPONSIBILITY OF OTHERS AND OUTSIDE THE SCOPE OF THIS DOCUMENT.

ALL FASTENERS SHALL BE CORROSION RESISTANT APPROPRIATE FOR SITE CONDITIONS. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR ENGINEERING RECOMMENDATIONS.

ALL ROOFING REPAIR MUST MAINTAIN EXISTING CLASS AND TYPE OF ROOF AND ALL WORK SHALL BE IN ACCORDANCE WITH THE ROOFING MANUFACTURER'S INSTALLATION REQUIREMENTS.

ALL LAYOUT DIMENSIONS ARE SHOWN TO THE NEAREST 1 INCH U.O.N.

APPLICABLE CODES AND STANDARDS

INTERNATIONAL BUILDING CODE, 2021
NATIONAL ELECTRICAL CODE, 2023
UL-61730 - SOLAR MODULES
UL-1741 SA - INVERTERS, COMBINER BOXES
UL-1741 SB - PCS/BATTERY-INVERTER
UL-2703 - RACKING MOUNTING SYSTEMS AND CLAMPING DEVICES FOR PV MODULES
UL-1642 - STANDARD FOR LITHIUM BATTERIES
UL-9540A AND UL9540 - ENERGY STORAGE SYSTEMS AND EQUIPMENT
UL-1973 - BATTERIES FOR USE IN LIGHT ELECTRIC RAIL (LER) APPLICATIONS AND STATIONARY APPLICATIONS.

GENERAL ABBREVIATIONS

(E)	EXISTING
ACI	AMERICAN CONCRETE INSTITUTE
AHJ	AUTHORITY HAVING JURISDICTION
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AL	ALUMINUM
APPROX	APPROXIMATE
ARY	ARRAY
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASHRAE	AMERICAN SOCIETY OF HEATING REFRIGERATING AND AIR CONDITIONING ENGINEERS
AZ	AZIMUTH
BLDG	BUILDING
CL	CENTERLINE
DAS	DATA ACQUISITION SYSTEM
DIA	DIAMETER
E-W	EAST-TO-WEST
FBO	FURNISHED BY OTHERS
FF	FORWARD FACING
GALV	GALVANIZED
HDG	HOT DIP GALVANIZED
HVAC	HEATING VENTILATION AND AIR CONDITIONING
IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIAMETER
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
MFR	MANUFACTURER
MOD	SOLAR MODULE
NEC	NATIONAL ELECTRICAL CODE
N-S	NORTH-TO-SOUTH
NTS	NOT TO SCALE
OAE	OR APPROVED EQUIVALENT
O.C.	ON CENTER
OD	OUTSIDE DIAMETER
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
(P)	PROPOSED
PV	PHOTOVOLTAIC
PVC	POLY VINYL CHLORIDE
SCH	SCHEDULE
SS	STAINLESS STEEL
SSS	SOLAR SUPPORT STRUCTURE
STC	STANDARD TEST CONDITIONS
TBD	TO BE DETERMINED
TOF	TILT AND ORIENTATION FACTOR
TP	TAMPER PROOF
TSRF	TOTAL SOLAR RESOURCE FACTOR
TYP.	TYPICAL
UL	UNDERWRITERS LABORATORIES
U.O.N.	UNLESS OTHERWISE NOTED
VIF	VERIFY IN FIELD
WP	WEATHER PROOF

PROJECT DIRECTORY

OWNER
HOUSE OF THE AWAKENED CULTURE

AUTHORITY HAVING JURISDICTION
WASHINGTON STATE LABOR AND INDUSTRIES

UTILITY
PUGET SOUND ENERGY

PROJECT TEAM

OWNER REPRESENTATIVE
FIRM: CASCADIA RENEWABLES
CONTACT: CALLUM MCSHERRY
PHONE: (360)-441-6210

SYSTEM DESIGNER
FIRM: MAYFIELD RENEWABLES
CONTACT: PRESTON KAHL
PHONE: (541)-754-2001

ELECTRICAL ENGINEER
FIRM: HANNA ENGINEERING
CONTACT: PHILIP HANNA, PE
PHONE: (541)-359-7768

Remove The

CASCADIA RENEWABLES

STAMP:

NOT FOR CONSTRUCTION

GRID-TIE SOLAR + STORAGE SYSTEM
HOUSE OF THE AWAKENED CULTURE
7325 NE PARKWAY
SUQUAMISH, WA, 98392

PROJECT NUMBER:
24-3913C

SCALE
NTS
ORIGINAL SIZE 24"X36"
SHEET SIZE ARCH "D"
0 ½" 1"

REV	ISSUED	PM	ENG	CHK	REVISION DESCRIPTION
	12/17/24	PK		RM	60% IFR - ISSUED FOR REVIEW

SHEET NO. & NAME:
T-1
TITLE PAGE

ELECTRICAL SPECIFICATIONS

GENERAL: (GRID-TIE WITH STORAGE, NEC 2023)

1. THE ELECTRICAL CONTRACTOR SHALL EXAMINE THE DRAWINGS OF ALL TRADES WHOSE WORK RELATES TO OR IS DEPENDENT ON ELECTRICAL WORK TO BECOME FULLY INFORMED OF THE EXTENT AND CHARACTER OF THEIR SPECIFIED WORK AND BE ABLE TO COORDINATE IT WHILE AVOIDING POSSIBLE INTERFERENCE WITH THE ELECTRICAL WORK.
2. IT IS THE INTENTION OF THESE SPECIFICATIONS AND DRAWINGS TO CALL FOR FINISHED WORK, TESTED AND READY FOR OPERATION. WHEREVER THE WORD "PROVIDED" IS USED, IT SHALL MEAN, "FURNISH AND INSTALL COMPLETE AND READY FOR USE."
3. THE CONTRACTOR IS RESPONSIBLE FOR THE COMPLETE AND SATISFACTORY ELECTRIC INSTALLATION IN ACCORDANCE WITH THE TRUE INTENT OF THE DRAWINGS AND SPECIFICATIONS. THEY SHALL PROVIDE, WITHOUT EXTRA CHARGE, ALL INCIDENTAL ITEMS REQUIRED, AS A PART OF THIS ELECTRICAL INSTALLATION. THE INSTALLATION SHALL BE SO MADE THAT ITS SEVERAL COMPONENT PARTS WILL FUNCTION TOGETHER AS A WORKABLE SYSTEM, AND SHALL BE LEFT WITH ALL PARTS ADJUSTED AND IN WORKING ORDER.
4. ALL WORK SHALL COMPLY WITH NATIONAL ELECTRICAL CODE (NEC), NATIONAL FIRE PROTECTION ASSOCIATION CODES (NFPA), INTERNATIONAL CODE COUNCIL (ICC) CODES, INCLUDING INTERNATIONAL ENERGY CONSERVATION CODE (IECC), AND ALL APPLICABLE LOCAL, STATE, MUNICIPAL, AND CITY CODES, ORDINANCES AND REGULATIONS.
5. THE NAMING OF THE MANUFACTURER OR BRAND WITH CATALOG NUMBER OR OTHER PRODUCT IDENTIFICATION WITHOUT THE WORDS "OR EQUAL" IN THE SPECIFICATIONS OR NOTES SHALL INDICATE THAT IT IS THE ONLY PRODUCT APPROVED FOR PURCHASE. IF THE WORDS "OR EQUAL" ARE USED, THEY SHALL BE INTERPRETED AS ESTABLISHING A QUALITY OR PERFORMANCE STANDARD FOR THE MATERIAL OR PRODUCT TO BE PURCHASED. THIS SHALL INDICATE THAT THE ELECTRICAL CONTRACTOR IS NOT RESTRICTED TO THE USE OF THE NAMED AND IDENTIFIED PRODUCT IF A SUBSTITUTE APPROVED BY THE ARCHITECT/ENGINEER IS AVAILABLE; HOWEVER, WHERE A SUBSTITUTION IS REQUESTED, IT WILL BE PERMITTED ONLY WITH THE WRITTEN APPROVAL OF THE ARCHITECT/ENGINEER. NO SUBSTITUTE MATERIAL OR PRODUCT SHALL BE ORDERED, FABRICATED, SHIPPED, OR PROCESSED IN ANY MATTER PRIOR TO THE APPROVAL OF THE ARCHITECT/ENGINEER. THE ELECTRICAL CONTRACTOR SHALL ASSUME ALL RESPONSIBILITY FOR ADDITIONAL EXPENSES, AS REQUIRED, MAKING CHANGES FROM THE ORIGINAL MATERIAL OR PRODUCT SPECIFIED.
6. THE TERM "AS REQUIRED" REFERS TO COMPONENTS THAT MAY BE REQUIRED TO COMPLETE THE NOTED SYSTEM INDICATED IN THE PROJECT DOCUMENTS.
7. THE TERM "VERIFY" REFERS TO A CONDITION WHICH MUST BE CONFIRMED PRIOR TO PROCEEDING WITH THE ORDERING OF MATERIAL OR THE FABRICATION AND INSTALLATION OF A COMPONENT.
8. ABBREVIATIONS THROUGHOUT THE DOCUMENTS COMPLY WITH DOCUMENT ABBREVIATION LIST ON LEGEND OR ARE THOSE IN COMMON USE. ENGINEER WILL DEFINE THE INTENT OF ANY IN QUESTION.
9. THE DRAWINGS ARE DIAGRAMMATIC IN CHARACTER. LOCATIONS SHOWN FOR ELECTRICAL EQUIPMENT, DEVICES, CIRCUITING, ECT., ARE APPROXIMATE. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE WORK WITH THE ARCHITECTURAL, PLUMBING, HVAC, AND OTHER TRADE DRAWINGS FOR THE EXACT DIMENSIONS, CLEARANCES, AND ROUGHING-IN LOCATIONS. THE ELECTRICAL CONTRACTOR SHALL COOPERATE WITH THE OTHER TRADES IF FIELD ADJUSTMENTS ARE REQUIRED TO ACCOMMODATE THE WORK OF OTHERS.
10. DRAWINGS SHALL NOT BE SCALED FOR ROUGH-IN MEASUREMENTS OR USED AS SHOP DRAWINGS. WHERE DIMENSIONS ARE SHOWN ON THE PLANS OR DETAILS, THESE DIMENSIONS ARE TO BE FIELD-VERIFIED BY THE ELECTRICAL CONTRACTOR AGAINST EXISTING FIELD CONDITIONS, INSTALLATION REQUIREMENTS OF OTHER TRADES, AND THE MANUFACTURER'S SUBMITTALS FOR EQUIPMENT TO BE INSTALLED. SHOULD ANY CONFLICTS ARISE WHICH CANNOT BE EASILY RESOLVED IN THE FIELD WITHOUT CHANGING THE DESIGN INTENT, THE ELECTRICAL CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY.
11. RECORD DOCUMENTS
    A. THE ELECTRICAL CONTRACTOR SHALL MAINTAIN ACCURATE RECORDS OF ALL DEVIATIONS IN WORK AS INSTALLED FROM WORK SPECIFIED ON THE DRAWINGS, OR IN THE SPECIFICATIONS, AND IDENTIFY ORIGIN OF CHANGE.
    B. THE FOLLOWING ITEMS ARE REPRESENTATIVE, BUT NOT ALL-INCLUSIVE, OR THE INFORMATION WHICH SHALL BE RECORDED ON THE AS-BUILT DRAWINGS:
    - ARRAY LAYOUT AND STRING WIRING.
    - POWER DISTRIBUTION SYSTEM, INCLUDING DISTRIBUTION EQUIPMENT AND EACH CONDUIT AND WIRE SIZE INSTALLED.
    - FINAL LAYOUT AND CIRCUITING FOR POWER AND LIGHTING, SURFACE RACEWAYS AND RELATED EQUIPMENT, INCLUDING EACH CONDUIT AND WIRE SIZE.
    - LAST LOCATION AND ARRANGEMENT OF UNDERGROUND UTILITIES AND CONNECTIONS TO EXISTING UTILITIES.
12. BEFORE ANY EQUIPMENT IS INSTALLED, DETERMINE THAT SAID EQUIPMENT WITH PROPERLY FIT WITHIN THE SPACE ALLOCATED. INSTALL ALL EQUIPMENT AND MATERIALS IN SUCH A MANNER AS TO PROVIDE REQUIRED ACCESS FOR SERVICING AND MAINTENANCE. ALLOW AMPLE SPACE FOR REMOVAL OF ALL PARTS THAT REQUIRE REPLACEMENT OR SERVICING.
13. SUFFICIENT ACCESS AND WORKING SPACE SHALL BE PROVIDED AND MAINTAINED ABOUT ALL ELECTRICAL EQUIPMENT TO PERMIT READY AND SAFE OPERATION AND MAINTENANCE OF SUCH EQUIPMENT PER NEC ARTICLE 110 REQUIREMENTS.
14. ALL MATERIALS AND EQUIPMENT SHALL BE NEW, UNDAMAGED, BEAR THE UL LABEL WHERE APPLICABLE, AND BE AS SPECIFIED FOR USE IN EACH SPECIFIC LOCATION. ANY INCIDENTAL ACCESSORIES NECESSARY TO COMPLETE THE WORK IN ALL RESPECTS AND MAKE IT READY FOR OPERATION, EVEN IF NOT SPECIFICALLY SPECIFIED, SHALL BE FURNISHED, DELIVERED, AND INSTALLED BY THE ELECTRICAL CONTRACTOR WITHOUT ADDITIONAL EXPENSE TO THE CLIENT.
15. MINOR DETAILS NOT USUALLY SHOWN OR SPECIFIED, BUT NECESSARY FOR THE PROPER INSTALLATION AND OPERATION OF A SYSTEM OR EQUIPMENT, SHALL BE INCLUDED IN THE ELECTRICAL CONTRACTOR'S ESTIMATE, AS IF SPECIFIED OR SHOWN HEREIN.
16. COORDINATE THE INSTALLATION OF ELECTRICAL MATERIALS AND EQUIPMENT ABOVE AND BELOW CEILINGS WITH SUSPENSION SYSTEM, MECHANICAL EQUIPMENT, AND OTHER BUILDING COMPONENTS. ALL COMPONENTS SHALL BE LOCATED AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE CEILING CAVITY SPACE CAREFULLY WITH ALL TRADES.
17. THE CONTRACTOR SHALL PREPARE AN OPERATING AND MAINTENANCE MANUAL COVERING ALL SYSTEMS AND EQUIPMENT INSTALLED UNDER THIS DIVISION. SUBMIT AN OUTLINE OF A PREVENTATIVE MAINTENANCE PROGRAM FOR EACH SYSTEM.
18. WARRANTIES :
19. THE CONDUIT SYSTEM AND ELECTRICAL ENCLOSURES SHALL BE SECURELY BONDED TOGETHER AND SUPPORTS PER NEC REQUIREMENTS.
20. CONDUIT JOINTS SHALL BE CUT SQUARE AND REAMED SMOOTH. BENDS OR OFFSETS SHALL BE MADE WITH AN APPROVED BENDER OR HICKEY, OR HUB-TYPE CONDUIT FITTINGS. BENDS SHALL BE MADE SO THAT THE CONDUIT IS NOT DAMAGED AND ITS INTERNAL DIAMETER IS NOT EFFECTIVELY REDUCED. THERE SHALL NOT BE MORE THAN THE EQUIVALENT OF FOUR QUARTER BENDS (360° TOTAL) BETWEEN PULL POINTS.
21. CONCEALED CONDUIT SYSTEMS SHALL BE RUN IN A DIRECT LINE WITH LONG SWEEP BENDS AND OFFSETS. EXPOSED CONDUIT RUNS SHALL BE PARALLEL TO AND AT RIGHT ANGLES TO BUILDING LINES, USING CONDUIT FITTINGS FOR ALL TURNS AND OFFSETS.
22. FEEDERS AND BRANCH CIRCUITS SHALL BE PROVIDED WITH APPROPRIATELY SIZED INSULATED EQUIPMENT GROUNDING CONDUCTOR, WHETHER SPECIFICALLY NOTED OR NOT. IF NOTED, THE ELECTRICAL CONTRACTOR IS REQUIRED TO USE THE SIZE OF GROUNDING CONDUCTOR INDICATED ON DRAWINGS. THIS CONDUCTOR SHALL BE CONNECTED FROM THE ELECTRICAL PANEL GROUND BAR TO THE DESIGNATED GROUNDING CONNECTION ON THE ELECTRICAL DEVICE SERVED. ENSURE LISTED GROUND BAR KITS HAVE BEEN INSTALLED PER NEC REQUIREMENTS IN THE ELECTRICAL PANELS.

FLOATING CONDUIT GROUNDS ARE NOT ACCEPTABLE. ENSURE ALL FEEDERS (NEW AND EXISTING) ARE PROVIDED WITH APPROPRIATELY-SIZED INSULATED GROUND WIRE, WHETHER NOTED OR NOT. IF NOTED, THE ELECTRICAL CONTRACTOR IS REQUIRED TO USE THE SIZE OF GROUND WIRE INDICATED ON DRAWINGS. THE GROUND WIRE SHALL BE CONNECTED FROM THE ELECTRICAL PANEL GROUNDED BUS BAR TO THE ELECTRICAL DEVICES. ENSURE FULL SIZE GROUND BUS HAS BEEN INSTALLED PER NEC IN EXISTING ELECTRICAL PANELS.

IF REQUIRED, PROVIDE GROUND BUS BAR KIT AND CONNECT AS REQUIRED PER NEC ARTICLE 2

23. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL JUNCTION AND PULL BOXES TO PROVIDE ACCESS POINTS FOR PULLING AND FEEDING CONDUCTORS INTO A RACEWAY SYSTEM. JUNCTION AND PULL BOXES AND THEIR COVERS SHALL BE FORMED FROM SHEET STEEL, AND SHALL BE BARE METAL OR FINISHED IN GRAY ENAMEL PAINT. BOXES SHALL BE IN INDUSTRY STANDARD SIZES.
24. CONDUCTOR SIZES #6 AWG AND SMALLER SHALL BE FACTORY COLOR-CODED WITH AN INDUSTRY STANDARD DESIGNATED COLOR FOR EACH PHASE AND A NEUTRAL CONDUCTOR. CONDUCTOR SIZES #4 AWG AND LARGER SHALL HAVE COLORS FIELD APPLIED USING THE COLOR MARKING TAPE OR BY PAINTING THE INSULATION. THESE COLORS SHALL BE USED CONSISTENTLY THROUGHOUT THE SYSTEM.
25. ALL JOINTS OR SPLICES FOR CONDUCTORS #8 AWG AND LARGER SHALL BE MADE WITH A MECHANICAL COMPRESSION CONNECTOR. AFTER THE CONDUCTORS HAVE BEEN MADE MECHANICALLY AND ELECTRICALLY SECURE, THE ENTIRE JOINT OR SPLICE SHALL BE COVERED WITH 3M SCOTCH BRAND NO. 33 TAPE, OR APPROVED EQUAL, TO MAKE THE INSULATION VALUE AT THE JOINT OR SPLICE EQUAL TO THE VALUE OF THE CONDUCTORS INSULATION. THE CONNECTORS SHALL BE UL APPROVED.
26. FOR ALUMINUM CONDUCTOR TERMINATIONS, ALUMINUM BI-METALLIC PIN CONNECTORS ARE RECOMMENDED UNLESS COMPACT-TYPE CONDUCTORS ARE USED. THESE CONNECTORS SHALL BE UL LISTED PER UL486B, RATED FOR USE UP TO 600V AND TEMPERATURE UP TO 90° C. CONNECTORS SHALL BE INSTALLED WITH MANUFACTURER'S SPECIFIED CRIMPING TOOLS AND DIES.
29. INSTALLATION IN AREAS OF DRYWALL CEILING SHALL BE COORDINATED SUCH THAT ACCESS PANELS ARE NOT REQUIRED. ELEMENTS REQUIRING ACCESS SHALL BE LOCATED IN THE AREAS OF ACCESSIBLE CEILING.
30. ELECTRICAL CABINETS AND ENCLOSURES LOCATED IN PUBLIC AREAS SHALL BE LOCKABLE TYPE.
31. PENETRATIONS THROUGH STRUCTURAL MEMBERS SHALL NOT BE PERMITTED WITHOUT SPECIFIC WRITTEN PERMISSION FROM STRUCTURAL ENGINEER AND ARCHITECT. SUBMIT REQUESTS FOR PENETRATIONS TO ARCHITECT FOR REVIEW AND DISPOSITION. PRIOR TO CORE DRILLING THROUGH FLOORS, VERIFY CLEARANCE OF BEAMS, DUCTWORK, ETC., IN CEILING SPACE BELOW, AND X-RAY FOR CONDUIT AND/OR REBAR IN SLAB.
32. ALL ROOF PENETRATIONS SHALL BE SEALED WATER TIGHT. PROVIDE FLASHING AND COUNTER FLASHING AS REQUIRED.
33. RACEWAYS SHALL BE PROVIDED WITH EXPANSION FITTINGS WHERE NECESSARY TO COMPENSATE FOR THERMAL EXPANSION AND CONTRACTION, AND TO ALLOW FOR MINOR MOVEMENT OF THE STRUCTURAL ELEMENTS OF THE BUILDING. EXPANSION FITTINGS FOR METAL RACEWAYS SHALL BE MADE ELECTRICALLY CONTINUOUS BY EQUIPMENT BONDING JUMPERS OR OTHER MEANS.

WIRING METHODS:

1. WIRING METHODS AND INSTALLATION PRACTICES SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE (NEC), LOCAL STATE CODES, AND OTHER APPLICABLE LOCAL CODES. THE INTERIOR OF RACEWAYS INSTALLED BELOW GRADE AND IN WET LOCATIONS ABOVE GRADE SHALL BE CONSIDERED WET LOCATIONS, NEC 300.5(B) AND 300.9.
2. EXPOSED PV SOURCE CIRCUIT WIRING SHALL BE USE-2 OR PV WIRE OR , 90 DEGREE C, WET RATED AND UV RESISTANT. EXPOSED CABLES, SUCH AS MODULE LEADS SHALL BE SECURED WITH MECHANICAL OR OTHER SUNLIGHT RESISTANT MEANS.
3. FOR FUNCTIONALLY GROUNDED PV SYSTEMS, PV SOURCE AND OUTPUT CIRCUIT CONDUCTORS SHALL BE RED FOR POSITIVE, BLACK FOR NEGATIVE AND GREEN FOR GROUND.
4. FIELD WIRING THAT IS NOT COLOR CODED SHALL BE MARKED AT BOTH ENDS WITH PERMANENT WIRE MARKERS TO IDENTIFY POLARITY, INVERTER NUMBER AND CIRCUIT IDENTIFICATION. SOURCE CIRCUITS SHALL BE IDENTIFIED AT THE POINTS OF TERMINATION, CONNECTION AND SPLICES.
5. CONDUIT TYPES USED IN THE PV INSTALLATION SHALL BE APPROVED FOR THEIR SPECIFIC APPLICATION AND SUPPORTED PROPERLY PER NEC.
6. STRAIGHT CONDUIT RUNS SHALL HAVE EXPANSION FITTINGS PER NEC 300.7, IF EXPOSED TO WEATHER AND MORE THAN ¼" OF EXPANSION AND CONTRACTION IS EXPECTED.
7. IF USED, WIRE NUTS ARE TO BE INSTALLED PER LOCATION REQUIREMENTS AND MANUFACTURERS SPECIFICATIONS BY A QUALIFIED/CERTIFIED PERSON. WIRE NUTS SHALL NOT BE USED ON DC CONDUCTORS.
8. DC MATERIALS SHALL BE LISTED WITH A DC VOLTAGE RATING GREATER THAN OR EQUAL TO THE MAXIMUM PV SYSTEM VOLTAGE, FOR PV SOURCE OR OUTPUT CIRCUITS. DC CIRCUITS USED IN ENERGY STORAGE SYSTEMS (ESS) SHALL UTILIZE MATERIALS LISTED WITH A DC VOLTAGE RATING GREATER THAN OR EQUAL TO THE MAXIMUM ESS DC VOLTAGE.
9. INTERCONNECT WIRING AND POWER CONDUCTORS INTERFACING THE UNIT MUST BE IN ACCORDANCE WITH THE NEC ANSI/NFPA 70 AND ANY APPLICABLE LOCAL CODES. CONDUCTORS MUST CONFORM TO THE MINIMUM BEND RADIUS SPECIFIED IN THE SPECIFIC NEC ARTICLE. KEEP WIRE BUNDLES AWAY FROM ANY SHARP EDGES TO AVOID DAMAGE TO WIRE INSULATION. CONDUCTORS SHOULD BE MADE OF COPPER AND RATED FOR 90 DEGREE C MINIMUM UNLESS OTHERWISE NOTED. FOR OUTDOOR INSTALLATIONS, INTERCONNECT CONDUITS AND FITTINGS MUST BE PROPERLY NEMA RATED AS REQUIRED BY THE NEC.
10. CONNECTORS SHALL BE TORQUED PER DEVICE LISTING OR MANUFACTURERS RECOMMENDATIONS.
11. AC WIRING SHALL BE COPPER WIRE, RATED AT 90 DEGREE CELSIUS, AND RATED FOR 600 VAC UNLESS OTHERWISE NOTED.
12. PROPERLY SUPPORT EXPOSED PV SOURCE CIRCUITS TO MAINTAIN THE INTEGRITY OF THE CONDUCTOR'S INSULATION.
13. CONDUIT THAT IS MOUNTED ON PITCHED ROOFS SHALL BE MOUNTED WITH FLASHED CONDUIT SUPPORTS PER NEC 386.30.
14. WIRING MUST BE PROPERLY SUPPORTED BY DEVICES OR MECHANICAL MEANS

DESIGNATED AND LISTED FOR SUCH USE, AND MUST BE PERMANENTLY AND COMPLETELY HELD OFF OF THE ROOF SURFACE PER NEC 110.2, 110.3(A), 110.3(B).

15. CONDUCTORS SHALL BE SUPPORTED PER NEC 300.19 AS REQUIRED.
16. FIELD MADE CONNECTORS FOR PV QUICK CONNECTS SHALL BE THE SAME TYPE AND MANUFACTURER AS THE PV MODULES AND USE THE MANUFACTURER SPECIFIED CRIMPING TOOL.
17. WHERE MATING CONNECTORS ARE NOT OF THE IDENTICAL TYPE AND BRAND, THEY SHALL BE LISTED AND IDENTIFIED FOR INTERMATEABILITY, AS DESCRIBED IN THE MANUFACTURER'S INSTRUCTIONS.

GROUNDING:

1. ONLY ONE CONNECTION TO DC CIRCUITS AND ONE CONNECTION TO AC CIRCUITS WILL BE USED FOR SYSTEM GROUNDING (REFERENCED TO THE SAME POINT). THIS WILL NORMALLY BE LOCATED AT THE INVERTER.
2. EQUIPMENT GROUNDING CONDUCTORS AND SYSTEM GROUNDING CONDUCTORS WILL HAVE AS SHORT A DISTANCE TO GROUND AS POSSIBLE AND A MINIMUM NUMBER OF TURNS.
3. NON-CURRENT CARRYING METAL PARTS SHALL BE CHECKED FOR PROPER EQUIPMENT GROUNDING; NOTING THAT TERMINAL LUGS BOLTED ON AN ENCLOSURE'S FINISHED SURFACE MAY BE INSULATED BECAUSE OF PAINT/FINISH. PAINT/FINISH AT POINT OF CONTACT SHALL BE PROPERLY REMOVED.
4. MODULES SHALL BE BONDED WITH EQUIPMENT GROUNDING CONDUCTORS BONDED TO A LOCATION APPROVED BY THE MANUFACTURER WITH A MEANS OF BONDING LISTED FOR THIS PURPOSE. RACKING SYSTEMS THAT COMPLY WITH UL2703 SHALL BE USED TO BOND MODULES TO RACKING SYSTEMS.
5. GROUNDING SYSTEM COMPONENTS SHALL BE LISTED FOR THEIR PURPOSE, INCLUDING BUT NOT LIMITED TO GROUND RODS, GROUNDING LUGS, GROUNDING CLAMPS, ETC.

DISCONNECTING MEANS:

1. MEANS SHALL BE PROVIDED TO DISCONNECT THE PV SYSTEM FROM ALL WIRING SYSTEMS INCLUDING POWER SYSTEMS, ENERGY STORAGE SYSTEMS, AND UTILIZATION EQUIPMENT AND ITS ASSOCIATED PREMISES WIRING.
2. THE DISCONNECTING MEANS SHALL NOT BE REQUIRED TO BE SUITABLE AS SERVICE EQUIPMENT AND SHALL BE RATED IN ACCORDANCE WITH ARTICLE 690 PART III, DISCONNECTING MEANS.
3. A SINGLE DISCONNECTING MEANS SHALL BE PERMITTED FOR THE COMBINED AC OUTPUT OF ONE OR MORE INVERTERS IN AN INTERACTIVE SYSTEM.

REQUIRED SAFETY SIGNS AND LABELS:

1. THE MARKING SHALL ADEQUATELY WARN OF THE HAZARD USING EFFECTIVE WORDS AND/OR COLORS AND/OR SYMBOLS. NEC 110.21
2. THE LABEL SHALL BE PERMANENTLY AFFIXED TO THE EQUIPMENT OR WIRING METHOD AND SHALL NOT BE HAND WRITTEN. NEC 110.21
3. THE LABEL SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED. NEC 110.21
4. LABELS AND MARKINGS SHALL BE APPLIED TO THE APPROPRIATE COMPONENTS IN ACCORDANCE WITH THE NEC.
5. DESIGN REQUIREMENTS FOR NEC REQUIRED LABELS, WHERE COLOR IS INDICATED, ARE SHOWN ON THE LABELS AND MARKINGS SHEET.
6. UNLESS OTHERWISE STATED ON LABEL SPECIFIC NOTES (SEE NOTE 6), OSHA 1910.145 AND ANSI Z535 RECOMMENDED SPECIFICATIONS ARE AS FOLLOWS:
   a. ROUNDED OR BLUNT CORNERS FREE OF SHARP EDGES.
   b. VISIBLE AT A MINIMUM DISTANCE OF 5ft OR GREATER.
   c. "DANGER" HEADER; RED BACKGROUND WITH WHITE LETTERING.
   d. "WARNING" HEADER; ORANGE BACKGROUND WITH BLACK LETTERING.
   e. "CAUTION" HEADER; YELLOW BACKGROUND WITH BLACK LETTERING.
   f. "NOTICE" LABEL HEADER TO BE IN BLUE WITH WHITE LETTERING.
   g. OTHER TEXT TO BE BLACK ON A WHITE BACKGROUND.

ENERGY STORAGE SYSTEMS MUST COMPLY WITH NEC ARTICLE 706, WHICH INCLUDES:

1. A DISCONNECTING MEANS SHALL BE PROVIDED FOR UNGROUNDED CONDUCTORS DERIVED FROM AN ESS AND SHALL BE PERMITTED TO BE INTEGRAL TO LISTED ESS EQUIPMENT. THE DISCONNECTING MEANS SHALL COMPLY WITH ALL OF THE FOLLOWING:
   a. THE DISCONNECTING MEANS SHALL BE READILY ACCESSIBLE.
   b. THE DISCONNECTING MEANS SHALL BE LOCATED WITHIN SIGHT OF THE ESS. WHERE IT IS IMPRACTICAL TO INSTALL THE DISCONNECTING MEANS WITHIN SIGHT OF THE ESS, THE DISCONNECT SHALL BE INSTALLED AS CLOSE AS PRACTICABLE, AND THE LOCATION OF THE DISCONNECTING MEANS SHALL BE FIELD MARKED ON OR IMMEDIATELY ADJACENT TO THE ESS. THE MARKING SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT INVOLVED AND SHALL NOT BE HANDWRITTEN.
   c. THE DISCONNECTING MEANS SHALL BE LOCKABLE OPEN IN ACCORDANCE WITH 110.25.
   d. EACH ESS DISCONNECTING MEANS SHALL PLAINLY INDICATE WHETHER IT IS IN THE OPEN (OFF) OR CLOSED (ON) POSITION AND BE PERMANENTLY MARKED "ENERGY STORAGE SYSTEM DISCONNECT." THE DISCONNECTING MEANS SHALL BE LEGIBLY MARKED IN THE FIELD TO INDICATE NOMINAL ESS AC VOLTAGE AND MAXIMUM ESS DC VOLTAGE.
2. FOR ONE-FAMILY AND TWO-FAMILY DWELLINGS, A DISCONNECTING MEANS OR ITS REMOTE CONTROL SHALL BE LOCATED AT A READILY ACCESSIBLE LOCATION OUTSIDE THE BUILDING.
3. OVERCURRENT PROTECTIVE DEVICES, EITHER FUSES OR CIRCUIT BREAKERS, USED IN ANY DC PORTION OF AN ESS SHALL BE LISTED FOR DC AND SHALL HAVE THE APPROPRIATE VOLTAGE, CURRENT, AND INTERRUPTING RATINGS FOR THE APPLICATION.
4. A PERMANENT PLAQUE OR DIRECTORY SHALL BE INSTALLED AT A BUILDING SUPPLIED BY A STAND-ALONE SYSTEM AT EACH SERVICE EQUIPMENT LOCATION, OR AT AN APPROVED READILY VISIBLE LOCATION. THE PLAQUE OR DIRECTORY SHALL DENOTE THE LOCATION OF EACH POWER SOURCE DISCONNECTING MEANS FOR THE BUILDING OR BE GROUPED WITH OTHER PLAQUES OR DIRECTORIES FOR OTHER ON-SITE SOURCES. WHERE MULTIPLE SOURCES SUPPLY THE BUILDING, THE PLAQUE OR DIRECTORY SHALL BE MARKED WITH THE WORDING "CAUTION: MULTIPLE SOURCES OF POWER." THE MARKING SHALL COMPLY WITH THE GUIDELINES PROVIDED ABOVE IN THE "REQUIRED SAFETY SIGNS AND LABELS" SECTION OF THIS ELECTRICAL NOTES PAGE.

RACEWAY LEGEND

- FIBER CABLE
- CAT-5 ETHERNET
- RS-485 DATACOM
- DC — DC CONDUCTOR/CONDUIT
- MV — MEDIUM VOLTAGE CONDUCTOR/CONDUIT
- AC — AC CONDUCTOR/CONDUIT
- COM — COMMUNICATION CONDUCTOR/CONDUIT
- OHV — OVER HEAD WIRE

GENERAL SYMBOL LEGEND

- STRING OF SOLAR MODULES
- INVERTER
- DC — DC SIDE OF INVERTER
- AC — AC SIDE OF INVERTER
- EQUIPMENT GROUNDING LOCATION
- GROUND OR GROUNDING ELECTRODE
- SPLICE OR TAP
- NON-DRAWOUT CIRCUIT BREAKER
- FUSE
- SWITCH
- N.O. — RELAY OR CONTACT N.O.
- N.C. — RELAY OR CONTACT N.C.
- (3) 4000:5 — CURRENT TRANSFORMER
- TRANSFORMER
- M — METER
- HH — HANDHOLE
- C — CAMERA
- TELEPHONE OR DATA OUTLET
- DUPLEX CONVENIENCE OUTLET, 120V, 20A, GROUNDING TYPE SPECIFICATION GRADE
- J — JUNCTION-BOX
- OMITTED MODULE
- SPARE MODULE
- NON-ACTIVE MODULE
- DAS — DATA AQUISITION SYSTEM
- THERMO COUPLE TEMPERATURE SENSOR
- PYRANOMETER - SOLAR RADIATION
- CELL/ MODULE TEMPERATURE SENSOR
- ANEMOMETER
- BAROMETRIC PRESSURE SENSOR
- HUMIDITY SENSOR
- RAIN GAUGE
- REMOVABLE DRAWOUT BREAKER
- FUTURE REMOVABLE DRAWOUT BREAKER
- REMOVABLE DRAWOUT BREAKER 2
- 480V / 120V — POTENTIAL TRANSFORMER

CASCADIA RENEWABLES

STAMP:

NOT FOR CONSTRUCTION

GRID-TIE SOLAR + STORAGE SYSTEM
HOUSE OF THE AWAKENED CULTURE
7325 NE PARKWAY
SUQUAMISH, WA, 98392

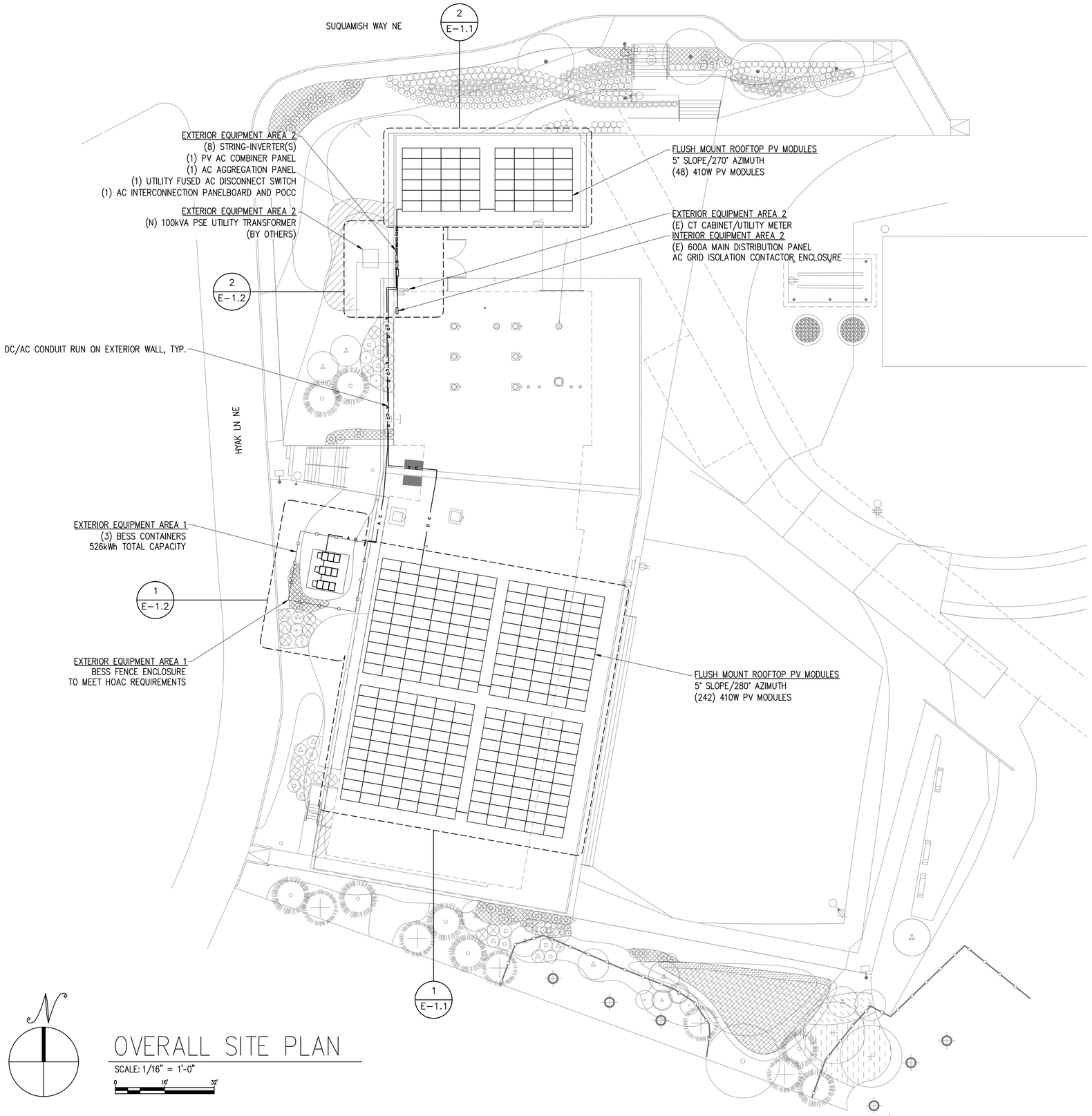
PROJECT NUMBER: 24-3913C

SCALE: NTS
ORIGINAL SIZE 24"X36"
SHEET SIZE ARCH "D"
0 ½" 1"

REV	ISSUED	PM	ENG	CHK	REVISION DESCRIPTION
	12/17/24	PK	PK	RM	60% IFR - ISSUED FOR REVIEW

SHEET NO. & NAME:
E-0.0
ELECTRICAL SPECIFICATIONS

PRINT DATE: 12/17/2024 6:58 PM DWG LOCATION: G:\Shared drives\Design\03. CLIENTS\Cascadia Renewables\04. PROJECTS\24-3913C - House of Awakened Culture\06. Working Planset (DO NOT MODIFY)\02 Working Set\E-0.0 ELECTRICAL SPECIFICATIONS.dwg



OVERALL SITE PLAN

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

0 16' 32'

SHEET NOTES

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL UNDERGROUND UTILITIES MARKED PRIOR TO CONSTRUCTION.
2. CONNECTORS SHALL BE BY THE SAME MANUFACTURER AS THOSE ON THE MODULES.
3. CONDUIT RUNS SHOWN ARE INDICATIVE OF PATH AND CONVEY ORIGIN AND TERMINATION. CONTRACTOR TO DETERMINE BEST ROUTE PER FIELD CONDITIONS. FINAL CONDUIT PATH SHALL BE APPROVED WITH CONTRACTOR SITE SUPERVISOR PRIOR TO INSTALLATION.
4. CONTRACTOR SHALL ENSURE THE EXACT OUTER DIAMETER OF THE PROVIDED HOME RUN WIRING MEETS CONNECTOR SPECIFICATIONS.
5. ALL DIMENSIONS ARE FOR REFERENCE ONLY. PLEASE REFER TO MANUFACTURERS DRAWINGS TO CONFIRM ALL DIMENSIONS. ALL DIMENSIONS DISPLAYED ON THIS SHEET ARE ROUNDED TO THE NEAREST 1" U.O.N.
6. UTILITY OWNED EQUIPMENT IS SHOWN FOR REFERENCE PURPOSES ONLY. IT IS NOT FOR CONSTRUCTION AND MAY BE CHANGED BY THE UTILITY AT ANY TIME.

CASCADIA RENEWABLES

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NOT FOR CONSTRUCTION

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HOUSE OF THE AWAKENED CULTURE
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SUQUAMISH, WA, 98392

PROJECT NUMBER:
24-3913C

SCALE
AS SHOWN
ORIGINAL SIZE 24"X36"
SHEET SIZE ARCH "D"
0 ½" 1"

REV	ISSUED	PM	ENG	CHK	REVISION DESCRIPTION
	12/17/24	PK	RM		60% IFR - ISSUED FOR REVIEW

SHEET NO. & NAME:

E-1.0

OVERALL SITE PLAN

SEE 2/E-1.1
MATCHLINE

(E) ROOFTOP OBSTRUCTION, TYP

4'-0" OBSTRUCTION SETBACK, TYP.

5° SLOPE

ROOFTOP MOUNTED DC CONDUIT RUN

3.03.13 | 4.03.13 | 5.02.13
3.01.14 | 4.01.14 | 4.02.14 | 5.03.13
3.02.14 | 5.01.13

6.03.13 | 7.03.13 | 8.02.13
6.01.14 | 7.01.14 | 7.02.14 | 8.03.13
6.02.14 | 8.01.13

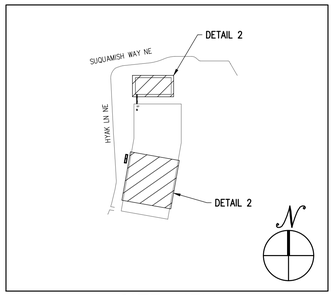
79'-3"
4'-0"
37'-7"

4'-0" PERIMETER SETBACK, TYP.

(E) EXTERIOR BLDG.

5'-8" | 37'-7" | 4'-0" CENTER ACCESS PATHWAY, TYP. | 72'-11" | 5'-8"

1 COMMUNITY HOUSE BLDG. - ROOF PLAN
SCALE: 3/16" = 1'-0"



SITE KEY

64'-0"
4'-6" | 25'-1" | 4'-11" | 25'-1"

5° SLOPE

1.01.12 | 1.02.12 | 2.01.12 | 2.02.12

4'-9"
20'-6"
30'-0"

PV EQUIPMENT MOUNTED ON (E) EXTERIOR CONCRETE RETAINING WALL

4'-0" CENTER ACCESS PATHWAY

4'-0" PERIMETER SETBACK, TYP.

MATCHLINE
SEE 1/E-1.1

2 LONGHOUSE BLDG. - ROOF PLAN
SCALE: 3/16" = 1'-0"

SHEET NOTES

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL UNDERGROUND UTILITIES MARKED PRIOR TO CONSTRUCTION.
2. CONNECTORS SHALL BE BY THE SAME MANUFACTURER AS THOSE ON THE MODULES.
3. CONDUIT RUNS SHOWN ARE INDICATIVE OF PATH AND CONVEY ORIGIN AND TERMINATION. CONTRACTOR TO DETERMINE BEST ROUTE PER FIELD CONDITIONS. FINAL CONDUIT PATH SHALL BE APPROVED WITH CONTRACTOR SITE SUPERVISOR PRIOR TO INSTALLATION.
4. CONTRACTOR SHALL ENSURE THE EXACT OUTER DIAMETER OF THE PROVIDED HOME RUN WIRING MEETS CONNECTOR SPECIFICATIONS.
5. ALL DIMENSIONS ARE FOR REFERENCE ONLY. PLEASE REFER TO MANUFACTURERS DRAWINGS TO CONFIRM ALL DIMENSIONS. ALL DIMENSIONS DISPLAYED ON THIS SHEET ARE ROUNDED TO THE NEAREST 1" U.O.N.

STRING LEGEND

POSITIVE SIDE OF STRING
PATH OF EACH SERIES STRING
NEGATIVE SIDE OF STRING
INVERTER #
STRING LENGTH
STRING #

STRING NAMING CONVENTION

A = FREE AIR
B = RACEWAY
# = # OF STRINGS.

DC WIRE TAG CONVENTION

CASCADIA RENEWABLES

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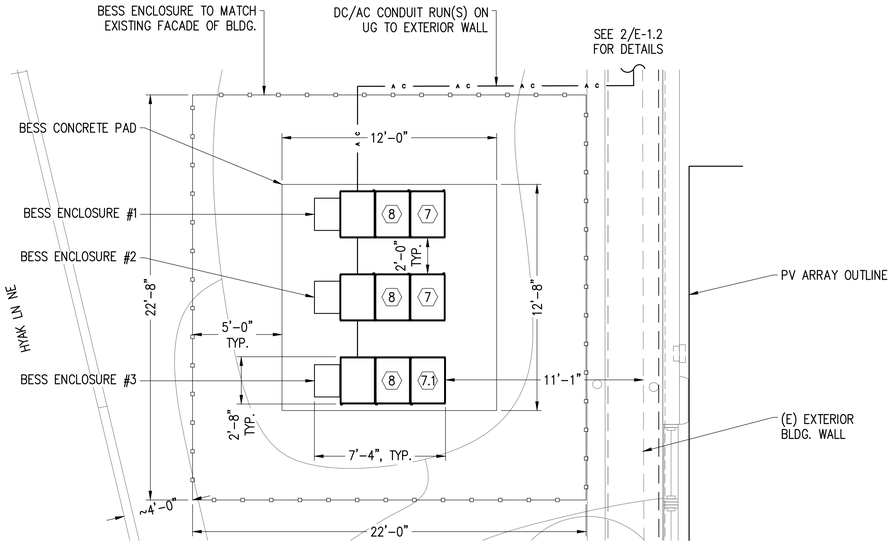
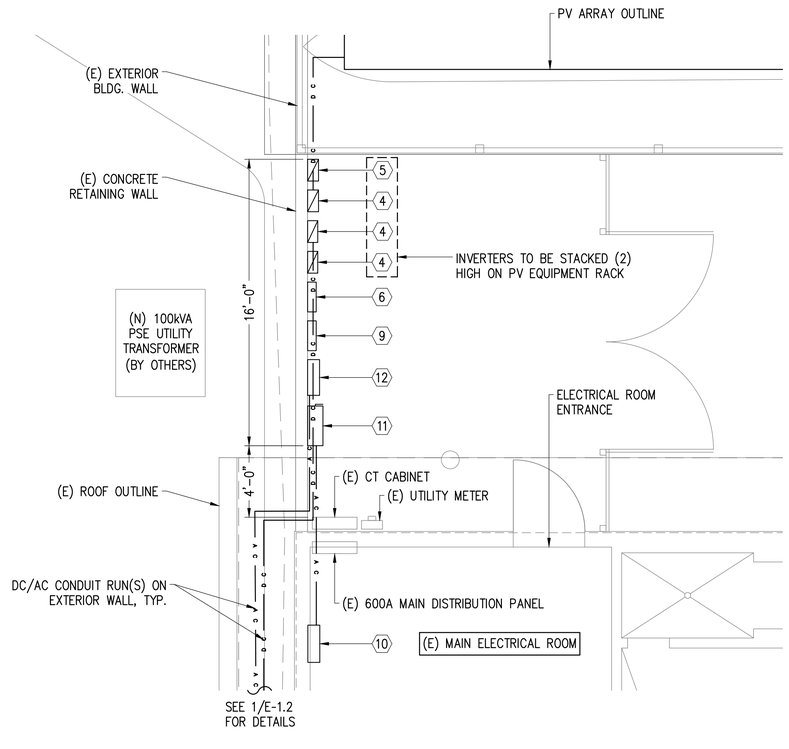
	12/17/24	PK	PK	RM	60% IFR - ISSUED FOR REVIEW

SHEET NO. & NAME:
E-1.1
ENLARGED SITE PLAN



1 EQUIPMENT AREA 1 - PLAN DETAIL

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



2 EQUIPMENT AREA 2 - PLAN DETAIL

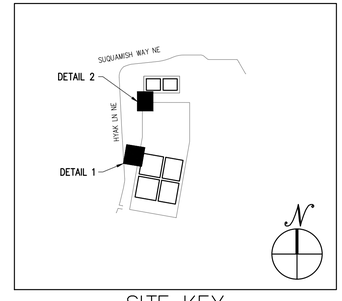
SCALE: 1/4" = 1'-0"

SHEET NOTES

1. ALL EQUIPMENT DIMENSIONS ARE APPROXIMATE, VERIFY ALL DIMENSIONS WITH APPROVED EQUIPMENT RECORD DRAWINGS PRIOR TO POURING CONCRETE PADS.
2. CONDUIT ROUTES SHOWN ARE DIAGRAMMATIC AND DO NOT REFLECT ALL OBSTRUCTIONS. SUBCONTRACTOR TO DETERMINE EXACT ROUTING BASED ON SITE CONDITIONS.
3. CONTRACTOR TO COORDINATE ALL PLANNED CONDUIT ROUTES PRIOR TO INSTALLATION.

ELECTRICAL EQUIPMENT SCHEDULE

TAG	QTY.	DESCRIPTION
4	6	SOLAREDGE SE10000H-US STRING-INVERTER, 240VAC, 42.00AAC, 1PH, 3W, NEMA 4X
5	2	SOLAREDGE SE7600H-US STRING-INVERTER, 240VAC, 32.00AAC, 1PH, 3W, NEMA 4X
6	1	PV AC COMBINER PANELBOARD, 120/240V, 1PH, 3W, 400A, MLO, NEMA 3R MIN., TBDkAIC
7	4	KORE POWER INC - MARK 1 BATTERY STACKS, 78KWH CAPACITY, 160ADC, UL9540A, UL1973
7.1	3	KORE POWER INC - MARK 1 BATTERY STACKS, 71.5KWH CAPACITY, 160ADC, UL9540A, UL1973
8	4	OZTEK, OZPCS-RS35 BATTERY-INVERTER (PCS), 35kVA (DE-RATED TO: 24kVA), 120/240VAC, 100AAC, 1PH, 3W, IP20
9	1	AC AGGREGATION PANELBOARD, 120/240V, 1PH, 3W, 600A, MLO, NEMA 3R MIN., TBDkAIC
10	1	AC GRID ISOLATION CONTACTOR ENCLOSURE, SEL-751 PROTECTION RELAY, W/FUSING, GRID MONITOR CTs/PTs
11	1	UTILITY REQUIRED FUSED AC DISCONNECT SWITCH, 120/240V, 2-POLE, 3W, 600A, (3) 600A FUSES, NEMA 3R, TBDkAIC
12	1	AC INTERCONNECTION PANELBOARD, 120/240V, 1 PHASE, 3 WIRE, 600A W/MOTORIZED BREAKER, NEMA 3R, TBDkAIC



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REVISION DESCRIPTION
60% IFR - ISSUED FOR REVIEW

PROJECT NUMBER: 24-3913C

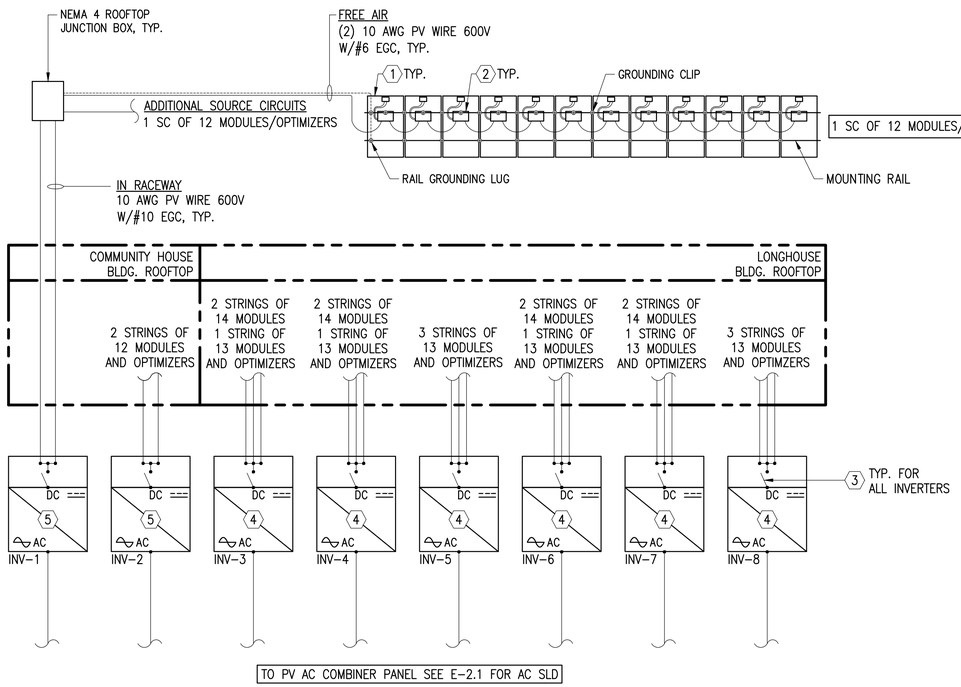
SCALE
AS SHOWN
ORIGINAL SIZE 24"X36"
SHEET SIZE ARCH "D"
0 ½" 1"

v.2.1

SHEET NO. & NAME:

E-1.2

PLAN DETAILS



POWER OPTIMIZER OPERATING CALCULATIONS		
MANUFACTURER / MODEL #	SOLAREDGE S440	CALCULATED
MAX. INPUT POWER	440	410
MAX. INPUT VOLTAGE	60	49.13
MAX. INPUT CURRENT	14.5	13.94
MAX. OUTPUT CURRENT	15	
MODULES PER OPTIMIZER	1	

ELECTRICAL EQUIPMENT SCHEDULE

TAG	QTY.	DESCRIPTION
1	290	SILFAB SOLAR SIL-410 HC+ 410WDC SOLAR MODULE
2	290	SOLAREDGE S440 440WDC POWER OPTIMIZER, 60VDC, 15ADC, NEMA 6P
3	8	INTEGRATED DC DISCONNECT AND STRING COMBINER
4	6	SOLAREDGE SE10000H-US STRING-INVERTER, 240VAC, 42.00AAC, 1PH, 3W, NEMA 4X
5	2	SOLAREDGE SE7600H-US STRING-INVERTER, 240VAC, 32.00AAC, 1PH, 3W, NEMA 4X

SHEET NOTES

1. ALL DC WIRING SHALL BE 600V RATED. INSTALLATION SHALL COMPLY WITH ALL PERTINENT SECTIONS OF THE NEC REGARDING VOLTAGE CLASS.
2. ALL DC CONDUCTORS TO BE COPPER (CU), ALL AC CONDUCTORS TO BE ALUMINUM (CU) UNLESS OTHERWISE NOTED.
3. ALL CONDUIT TO BE EMT, SCHD 40/80 PVC OR RIGID METAL. MIN. 7/8" OFF OF ROOF SURFACE. EXTERIOR FITTINGS TO BE WATER TIGHT.
4. REFERENCE ELECTRICAL EQUIPMENT MANUALS FOR CONDUIT OPENINGS AS CONDUITS ARE SIZED TO NEC MINIMUMS.

CASCADIA RENEWABLES

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NOT FOR CONSTRUCTION

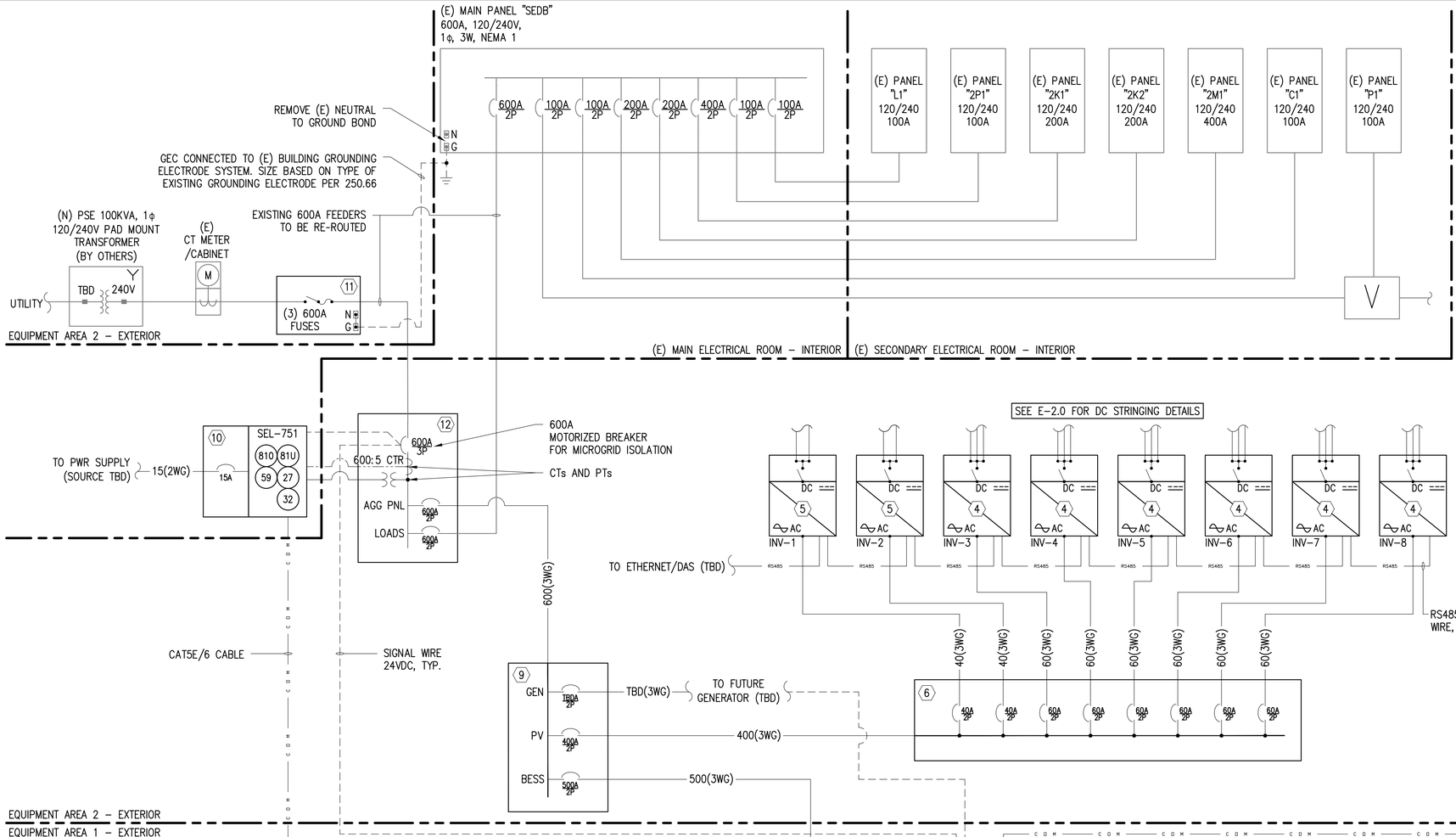
GRID-TIE SOLAR + STORAGE SYSTEM
HOUSE OF THE AWAKENED CULTURE
7325 NE PARKWAY
SUQUAMISH, WA, 98392

PROJECT NUMBER:
24-3913C

SCALE
NTS
ORIGINAL SIZE 24"X36"
SHEET SIZE ARCH "D"
0 ½" 1"

REV	ISSUED	PM	ENG	CHK	REVISION DESCRIPTION
	12/17/24	PK		RM	60% IFR - ISSUED FOR REVIEW

SHEET NO. & NAME:
E-2.0
DC SINGLE LINE DIAGRAM



SHEET NOTES

1. ALL AC CONDUCTORS TO BE ALUMINUM (CU) UNLESS OTHERWISE NOTED.
2. ALL CONDUIT TO BE EMT, SCHD 40 PVC OR RIGID METAL. MIN. 7/8" OFF OF ROOF SURFACE. EXTERIOR FITTINGS TO BE WATER TIGHT.
3. ALL AC EQUIPMENT AND OVER CURRENT DEVICES SHALL BE FULLY RATED, U.O.N.
4. OZTEK OZPCS-RS35 PCS SUPPLIES 35kVA AC POWER TO BE DE-RATED TO 24kVA.
5. WIRING AND COMPONENTS IN BESS ARE BY THE MANUFACTURER AND ARE INTEGRAL TO EACH CUSTOMIZABLE ENCLOSURE. BESS CONNECTIONS ARE SHOWN FOR REFERENCE ONLY. SEE MANUFACTURER SPECIFICATIONS FOR MORE DETAILS.

MICROGRID SEQUENCE OF OPERATION NOTES:

NORMAL OPERATION:

1. DURING NORMAL OPERATION THE GRID ISOLATION BREAKER WILL REMAIN CLOSED AND THE SYSTEM WILL OPERATE IN PARALLEL WITH THE UTILITY.
2. THE AC COUPLED BESS WILL NOT BE ALLOWED TO EXPORT TO THE GRID AND CHARGING OF THE BESS WILL BE BY THE PV ONLY.
3. THE SEL-751 RELAY WILL BE SET TO FAIL SAFE, SO THAT IF IT FAILS OR LOSES COMMUNICATION IT WILL SHUT DOWN THE BESS INVERTERS.

UTILITY GRID OUTAGE:

1. WHEN THE GRID FAILS THE SEL-751 RELAY OPENS THE MOTORIZED GRID ISOLATION BREAKER, THE BESS GOES FROM GRID FOLLOWING MODE TO GRID FORMING MODE WITHIN 100ms. THE BESS WILL POWER THE ENTIRE FACILITY.
2. PV WILL SENSE NO UTILITY VOLTAGE AND AUTOMATICALLY SHUT DOWN (ANTI-ISLAND) WITHIN 2 SECONDS.
3. BESS WILL PULSATE A VOLTAGE FREQUENCY SIGNAL WHERE THE PV WILL THEN TURN BACK ON WITHIN 5 MINUTES WHERE IT WILL CHARGE THE BATTERIES AND PROVIDE POWER TO THE MAIN BUILDING LOADS.
4. IF THE GENERATOR IS NEEDED TO HELP POWER LOADS OR CHARGE THE BATTERIES THE MICROGRID CONTROLLER WILL SEND A START SIGNAL TO THE GENERATOR AND CLOSE THE GENERATOR CONTACTOR. THE GENERATOR WILL THEN BE CONNECTED TO THE BESS SYSTEM HELPING CHARGE AND POWER LOADS.
5. WHEN GRID POWER RETURNS THE SEL-751 RELAY WILL SENSE GRID POWER AND WILL CLOSE THE MOTORIZED BREAKER. THE BESS GOES FROM GRID FORMING TO GRID FOLLOWING.

ELECTRICAL EQUIPMENT SCHEDULE

TAG	QTY.	DESCRIPTION
4	6	SOLAREDGE SE10000H-US STRING-INVERTER, 240VAC, 42.00AAC, 1PH, 3W, NEMA 4X
5	2	SOLAREDGE SE7600H-US STRING-INVERTER, 240VAC, 32.00AAC, 1PH, 3W, NEMA 4X
6	1	PV AC COMBINER PANELBOARD, 120/240V, 1PH, 3W, 400A, MLO, NEMA 3R MIN., TBDkAIC
7	4	KORE POWER INC - MARK 1 BATTERY STACKS, 78KWH CAPACITY, 160ADC, UL9540A, UL1973
7.1	3	KORE POWER INC - MARK 1 BATTERY STACKS, 71.5KWH CAPACITY, 160ADC, UL9540A, UL1973
8	4	OZTEK, OZPCS-RS35 BATTERY-INVERTER (PCS), 35kVA (DE-RATED TO: 24kVA), 120/240VAC, 100AAC, 1PH, 3W, IP20
9	1	AC AGGREGATION PANELBOARD, 120/240V, 1PH, 3W, 600A, MLO, NEMA 3R MIN., TBDkAIC
10	1	AC GRID ISOLATION CONTACTOR ENCLOSURE, SEL-751 PROTECTION RELAY, W/FUSING, GRID MONITOR CTs/PTs
11	1	UTILITY REQUIRED FUSED AC DISCONNECT SWITCH, 120/240V, 2-POLE, 3W, 600A, (3) 600A FUSES, NEMA 3R, TBDkAIC
12	1	AC INTERCONNECTION PANELBOARD, 120/240V, 1 PHASE, 3 WIRE, 600A W/MOTORIZED BREAKER, NEMA 3R, TBDkAIC

CASCADIA RENEWABLES

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SHEET NO. & NAME: E-2.1 AC SINGLE LINE DIAGRAM

SITE SPECIFIC INFORMATION:
SITE LOCATION: SUQUAMISH, WA, 98392
TEMPERATURE DESIGN LOCATION: SEATTLE WEST POINT, WA, USA
ASHRAE 2% HIGH TEMPERATURE: 21.6°C
ASHRAE LOWEST EXPECTED TEMPERATURE: -2.7°C

MODULE INFORMATION:
SILFAB SOLAR, SIL-410 HC+, 410WDC (STC)
CELL TYPE: MONOCRYSTALLINE
Voc: 45.59VDC (49.13VDC AT -2.7°C)
Vmp: 38.99VDC (34.55VDC AT 21.6°C)
Isc: 11.15ADC
Imp: 10.52ADC
SERIES FUSE RATING: 20ADC
Voc CORRECTION (%/°C): -0.280%
Vmp CORRECTION (%/°C): -0.360%
MODULE DIMENSIONS: 75.30" X 40.80" X 1.37"

BATTERY (BESS) INFORMATION:
KORE POWER INC., MARK 1 BATTERIES
BATTERY STACKS IN PARALLEL (MAX.): 3
ESS TOTAL CAPACITY: 526kWh
MAX. CHARGE/DISCHARGE CURRENT: 160ADC

PCS INFORMATION:
OZTEK, OZPCS-RS35, BATTERY-INVERTER 240VAC, 1ϕ
WEIGHTED EFFIECIENCY (PTC): 97%
OPERATING VOLTAGE RANGE: 380-820VDC
MAXIMUM DC INPUT VOLTAGE: 820VDC
NOMINAL POWER INPUT: 36500WDC
MAXIMUM POWER OUTPUT: 35kVA (DE-RATED TO 24kVA)
CONTINUOUS CURRENT OUTPUT: 100AAC
NOMINAL AC VOLTAGE OUTPUT: 240VAC
MAX. AC OVERCURRENT PROTECTION ALLOWED: 125AAC

PV INVERTER INFORMATION:
SOLAREDGE, SE10000H-US, STRING-INVERTER*, 240V, 1ϕ
WEIGHTED EFFICIENCY (PTC): 99%
MAXIMUM DC INPUT POWER: 15500WDC
MAXIMUM DC INPUT VOLTAGE: 480VDC
NOMINAL DC INPUT VOLTAGE: 380VDC
MAXIMUM AC POWER OUTPUT: 10000WAC
MAXIMUM AC CURRENT OUTPUT: 42.00AAC
NOMINAL AC VOLTAGE OUTPUT: 240VAC
MAX. AC OVERCURRENT PROTECTION ALLOWED: 60AAC

SOLAREDGE, SE7600H-US, STRING-INVERTER*, 240V, 1ϕ
WEIGHTED EFFICIENCY (PTC): 99%
MAXIMUM DC INPUT POWER: 11800WDC
MAXIMUM DC INPUT VOLTAGE: 480VDC
NOMINAL DC INPUT VOLTAGE: 380VDC
MAXIMUM AC POWER OUTPUT: 7600WAC
MAXIMUM AC CURRENT OUTPUT: 32AAC
NOMINAL AC VOLTAGE OUTPUT: 240VAC
MAX. AC OVERCURRENT PROTECTION ALLOWED: 40AAC

POWER OPTIMIZER:
SOLAREDGE, S440
RATED INPUT POWER: 440WDC
MPPT MINIMUM VOLTAGE: 8VDC
MPPT MAXIMUM VOLTAGE: 60VDC
MAXIMUM SHORT CIRCUIT CURRENT: 14.5ADC
MAXIMUM INPUT VOLTAGE: 60VDC
WEIGHTED EFFICIENCY: 98.6%
MAXIMUM OUTPUT VOLTAGE: 60VDC
MAXUMUM CONTINUOUS OUTPUT CURRENT: 15ADC

ARRAY SPECIFICATIONS
MODULES: 290
PV INVERTERS: 8
OPTIMIZERS: 290
PCS INVERTERS: 4
BESS UNITS: 3

MAXIMUM CONTINUOUS SINGLE STRING OPTIMIZER OUTPUT CURRENT: 15ADC
NOMINAL OPERATING VOLTAGE: 380VDC

VOLTAGE CALCULATIONS FOR (1) MODULES IN SERIES PER OPTIMIZER INPUT: NEC 690.7
LOW TEMPERATURE FOR DESIGN (ASHRAE LOW TEMP) = -2.7°C
ARRAY Voc AT STC: 45.59VDC X 1 MODULE IN SERIES = 45.59VDC
TEMPERATURE ADJUSTED Voc:
[45.59VDC X (1 + ((-2.7°C - 25°C) X (-0.280%)))] = 49.13VDC
MAX. Voc PER OPTIMIZER MANUFACTURER REQ. = 60VDC
49.13VDC ≤ 60VDC (OK)

*INVERTER LIMITS INPUT CURRENT OF CIRCUITS TO A MAX COMBINED INPUT OF 45ADC. HIGHER CURRENT SOURCE MAY BE USED.

1 ELECTRICAL SPECIFICATIONS
SCALE: NTS

PRINT DATE: 12/17/2024 6:58 PM DWG LOCATION: C:\Shared drives\Design\03. CLIENTS\Cascadia Renewables\04. PROJECTS\24-3913C - House of Awakened Culture\06. Working Planset (DO NOT MODIFY)\02 Working Set\E-2.2 ELECTRICAL SPECS AND TABLES.dwg

CASCADIA RENEWABLES

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SHEET NO. & NAME:
E-2.2
ELECTRICAL SPECS AND TABLES

WIRING SCHEDULE - COPPER				WIRING SCHEDULE - ALUMINUM			
AMPS	(2WG)	(3W)	(3WG)	AMPS	(2WG)	(3W)	(3WG)
	1Ø, 2 WIRE, GROUND	1Ø, 3 WIRE	1Ø, 3 WIRE, GROUND OR 3Ø, 3 WIRE, GROUND		1Ø, 2 WIRE, GROUND	1Ø, 3 WIRE	1Ø, 3 WIRE, GROUND OR 3Ø, 3 WIRE, GROUND
20	(2#12 & 1#12 G) 3/4"C		(3#12 & 1#12 G) 3/4"C	20			
30	(2#10 & 1#10 G) 3/4"C		(3#10 & 1#10 G) 3/4"C	30			
40	(2#8 & 1#10 G) 3/4"C		(3#8 & 1#10 G) 3/4"C	40			
50	(2#6 & 1#10 G) 3/4"C		(3#6 & 1#10 G) 1"C	50			
60	(2#6 & 1#10 G) 3/4"C		(3#6 & 1#10 G) 1"C	60	(2#4 & 1#8 G) 1"C		(3#4 & 1#8 G) 1 1/4"C
70	(2#4 & 1#8 G) 1"C		(3#4 & 1#8 G) 1 1/4"C	70	(2#2 & 1#6 G) 1 1/4"C		(3#2 & 1#6 G) 1 1/4"C
80	(2#2 & 1#8 G) 1"C		(3#2 & 1#8 G) 1 1/4"C	80	(2#2 & 1#6 G) 1 1/4"C		(3#2 & 1#6 G) 1 1/4"C
90	(2#2 & 1#8 G) 1"C		(3#2 & 1#8 G) 1 1/4"C	90	(2#2 & 1#6 G) 1 1/4"C		(3#2 & 1#6 G) 1 1/4"C
100	(2#1 & 1#8 G) 1 1/4"C	(3#1) 1 1/4"C	(3#1 & 1#8 G) 1 1/2"C	100	(2#1 & 1#6 G) 1 1/4"C	(3#1) 1 1/4"C	(3#1 & 1#6 G) 1 1/2"C
110	(2#1 & 1#6 G) 1 1/4"C	(3#1) 1 1/4"C	(3#1 & 1#6 G) 1 1/2"C	110	(2#1/0 & 1#4 G) 1 1/4"C	(3#1/0) 1 1/2"C	(3#1/0 & 1#4 G) 1 1/2"C
125	(2#1 & 1#6 G) 1 1/4"C	(3#1) 1 1/4"C	(3#1 & 1#6 G) 1 1/2"C	125	(2#2/0 & 1#4 G) 1 1/2"C	(3#2/0) 1 1/2"C	(3#2/0 & 1#4 G) 2"C
150	(2#1/0 & 1#6 G) 1 1/4"C	(3#1/0) 1 1/2"C	(3#1/0 & 1#6 G) 1 1/2"C	150	(2#3/0 & 1#4 G) 1 1/2"C	(3#3/0) 2"C	(3#3/0 & 1#4 G) 2"C
175	(2#2/0 & 1#6 G) 1 1/2"C	(3#2/0) 1 1/2"C	(3#2/0 & 1#6 G) 2"C	175	(2#4/0 & 1#4 G) 2"C	(3#4/0) 2"C	(3#4/0 & 1#4 G) 2"C
200	(2#3/0 & 1#6 G) 1 1/2"C	(3#3/0) 2"C	(3#3/0 & 1#6 G) 2"C	200	(2-250 KCMIL & 1#4 G) 2"C	(3-250 KCMIL) 2 1/2"C	(3-250 KCMIL & 1#4 G) 2 1/2"C
225	(2#4/0 & 1#4 G) 2"C	(3#4/0) 2"C	(3#4/0 & 1#4 G) 2"C	225	(2-300 KCMIL & 1#2 G) 2"C	(3-300 KCMIL) 2 1/2"C	(3-300 KCMIL & 1#2 G) 2 1/2"C
250	(2-250 KCMIL & 1#4 G) 2"C	(3-250 KCMIL) 2 1/2"C	(3-250 KCMIL & 1#4 G) 2 1/2"C	250	(2-350 KCMIL & 1#2 G) 2 1/2"C	(3-350 KCMIL) 2 1/2"C	(3-350 KCMIL & 1#2 G) 3"C
300	(2-350 KCMIL & 1#4 G) 2"C	(3-350 KCMIL) 2 1/2"C	(3-350 KCMIL & 1#4 G) 3"C	300	(2-500 KCMIL & 1#2 G) 2 1/2"C	(3-500 KCMIL) 3"C	(3-500 KCMIL & 1#2 G) 3"C
380	(2-500 KCMIL & 1#3 G) 2 1/2"C	(3-500 KCMIL) 3"C	(3-500 KCMIL & 1#3 G) 3"C	380	(2-750 KCMIL & 1#1 G) 3"C	(3-750 KCMIL) 3 1/2"	(3-750 KCMIL & 1#1 G) 3 1/2"
400	2[(2#3/0 & 1#3 G) 1 1/2"C]	2[(3#3/0) 2"C]	2[(3#3/0 & 1#3 G) 2"C]	400	2[(2-250 KCMIL & 1#1 G) 2"C]	2[(3-250 KCMIL) 2 1/2"C]	2[(3-250 KCMIL & 1#1 G) 2 1/2"C]
450	2[(2#4/0 & 1#2 G) 2"C]	2[(3#4/0) 2"C]	2[(3#4/0 & 1#2 G) 2"C]	450	2[(2-300 KCMIL & 1#1/0 G) 2"C]	2[(3-300 KCMIL) 2 1/2"C]	2[(3-300 KCMIL & 1#1/0 G) 2 1/2"C]
500	2[(2-250 KCMIL & 1#2 G) 2"C]	2[(3-250 KCMIL) 2 1/2"C]	2[(3-250 KCMIL & 1#2 G) 2 1/2"C]	500	2[(2-350 KCMIL & 1#1/0 G) 2 1/2"C]	2[(3-350 KCMIL) 2 1/2"C]	2[(3-350 KCMIL & 1#1/0 G) 3"C]
600	2[(2-350 KCMIL & 1#1 G) 2 1/2"C]	2[(3-350 KCMIL) 2 1/2"C]	2[(3-350 KCMIL & 1#1 G) 3"C]	600	2[(2-500 KCMIL & 1#2/0 G) 2 1/2"C]	2[(3-500 KCMIL) 3"C]	2[(3-500 KCMIL & 1#2/0 G) 3"C]

CONDUCTOR SIZES ARE BASED ON 60° TERMINATIONS LESS THAN 100A AND 75° TERMINATIONS GREATER THAN 100A

CONDUIT SIZES ARE BASED ON NEC TABLE 4 (PVC) AND TABLE 5 (THWN-2 INSULATION)

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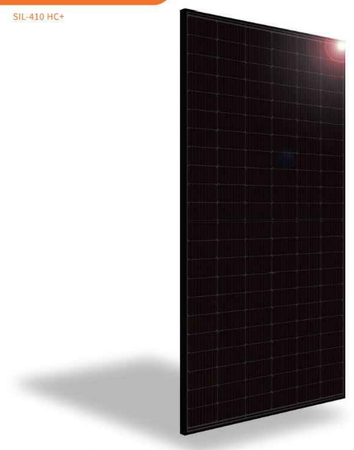
E-2.3
RFP WIRE SCHEDULE

SILFAB PRIME

SIL-410 HC+

SILFAB SOLAR



RELIABLE ENERGY.
DIRECT FROM THE SOURCE.

Designed to outperform.

Dependable, durable, high-performance solar panels engineered for North American homeowners.

SILFABSOLAR.COM

ELECTRICAL SPECIFICATIONS		410	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	410	306
Maximum power voltage (Vpmax)	V	38.99	36.24
Maximum power current (Ipmax)	A	10.52	8.43
Open circuit voltage (Voc)	V	45.59	42.76
Short circuit current (Isc)	A	11.15	8.99
Module efficiency	%	20.7%	
Maximum system voltage (VDC)	V	1000	
Series fuse rating	A	20	
Power Tolerance	Wp	0 to +10	

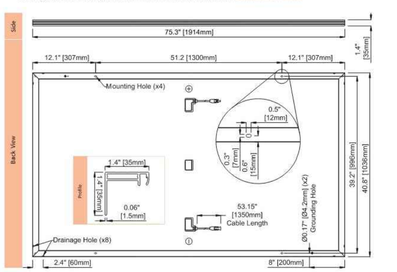
Measurement conditions: STC 1000 W/m² • AM 1.5 • Temperature 25 °C • NOCT 800 W/m² • AM 1.5 • Measurement uncertainty ± 3%
Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by 0 to +10W.

MECHANICAL PROPERTIES / COMPONENTS	METRIC	IMPERIAL
Module weight	21.3kg ±0.2kg	47lbs ±0.4lbs
Dimensions (H x L x D)	1914 mm x 1036 mm x 35 mm	75.3 in x 40.8 in x 1.37 in
Maximum surface load (wind/snow)*	5400 Pa rear load / 5400 Pa front load	112.8 lb/ft² rear load / 112.8 lb/ft² front load
Hail impact resistance	ø 25 mm at 83 km/h	ø 1 in at 51.6 mph
Cells	132 Half cells - Si mono PERC 9 busbar - 83 x 166 mm	132 Half cells - Si mono PERC 9 busbar - 3.26 x 6.53 in
Glass	3.2 mm high transmittance, tempered, anti-reflective coating	0.126 in high transmittance, tempered, anti-reflective coating
Cables and connectors (refer to installation manual)	1350 mm, ø 5.7 mm, MC4 from Staubli	53 in, ø 0.22 in (12AWG), MC4 from Staubli
Backsheet	High durability, superior hydrolysis and UV resistance, multi-layer dielectric film, fluorine-free PV backsheet	
Frame	Anodized Aluminum (Black)	
Bypass diodes	3 diodes 30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)	
Junction Box	UL 3730 Certified, IEC 62790 Certified, IP68 rated	

TEMPERATURE RATINGS		WARRANTIES	
Temperature Coefficient Isc	+0.064 %/°C	Module product workmanship warranty	25 years**
Temperature Coefficient Voc	-0.28 %/°C	Linear power performance guarantee	30 years ≥ 97.1% end 1st yr ≥ 93.6% end 12th yr ≥ 85.1% end 25th yr ≥ 82.6% end 30th yr
Temperature Coefficient Pmax	-0.36 %/°C		
NOCT (± 2°C)	45 °C		
Operating temperature	-40/+85 °C		

CERTIFICATIONS		SHIPPING SPECS	
Product	UL 61215-1:2017 Ed.1, UL 61215-2:2017 Ed.1, UL 61730-1:2017 Ed.1, UL 61730-2:2017 Ed.1 , CSA C22.2#61730-1:2019 Ed.2, CSA C22.2#61730-2:2019 Ed.2, IEC 61215-1:2016 Ed.1, IEC 61215-2:2016 Ed.1, IEC 61730-1:2016 Ed.2, IEC 61730-2:2016 Ed.2, IEC 61701:2020 (Salt Mist Corrosion), IEC 62716:2013 (Ammonia Corrosion), CEC Listing, UL Fire Rating: Type 2	Modules Per Pallet:	26 or 26 (California)
		Pallets Per Truck	32 or 30 (California)
Factory	ISO9001:2015	Modules Per Truck	832 or 780 (California)

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



SILFAB SOLAR INC.

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F +1 905.696.0267

Residential Power Optimizer

For North America

S440 / S500B / S650B

25 YEAR WARRANTY

POWER OPTIMIZER

PV power optimization at the module level

- Specifically designed to work with SolarEdge residential inverters
- Detects abnormal PV connector behavior, preventing potential safety issues
- Module-level voltage shutdown for installer and firefighter safety
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch loss, from manufacturing tolerance to partial shading
- Faster installations with simplified wire management and easy assembly using a single bolt
- Flexible system design for maximum space utilization
- Compatible with bifacial PV modules
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)

solaredge.com

solaredge

Residential Power Optimizer

For North America

S440 / S500B / S650B

		S440	S500B	S650B	
INPUT					
Rated Input DC Power[1]		440[2]	500[2]	650	W
Absolute Maximum Input Voltage (Voc)		60	125	85	Vdc
MPPT Operating Range		8 – 60	12.5 – 105	12.5 – 85	Vdc
Maximum Input Current (Maximum Isc of Connected PV Module)[3]		14.5	15		Adc
Maximum Input Short Circuit Current[4]			18.75		Adc
Maximum Efficiency			99.5		%
Weighted Efficiency			98.6		%
Overvoltage Category			II		
OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)					
Maximum Output Current			15		Adc
Maximum Output Voltage		60	80		Vdc
OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR INVERTER OFF)					
Safety Output Voltage per Power Optimizer			1 ± 0.1		Vdc
STANDARD COMPLIANCE					
Photovoltaic Rapid Shutdown System			CSA C22.2#330, NEC 2014 – 2023		
EMC			FCC Part 15 Class B, IEC 61000-6-2, IEC 61000-6-3		
Safety			CSA C22.2#107.1, IEC 62109-1 (Class II Safety), UL 1741		
Material			UL 94 V-0, UV Resistant		
RoHS			Yes		
Fire Safety			VDE-AR-E 2100-712:2013-05		
INSTALLATION SPECIFICATIONS					
Maximum Allowed System Voltage			1000		Vdc
Dimensions (W x L x H)		129 x 155 x 30 / 5.07 x 6.10 x 1.18	129 x 165 x 45 / 5.07 x 6.49 x 1.77		mm / in
Weight		720 / 1.6	790 / 1.74		gr / lb
Input Connector			MC4		
Input Wire Length			0.1 / 0.32		m / ft
Output Connector			MC4		
Output Wire Length			(+) 2.3; (-) 0.10 / (+) 7.54, (-) 0.32		m / ft
Operating Temperature Range[5]			-40 to +85		°C
Protection Rating			IP68 / NEMA6P		
Relative Humidity			0 - 100		%

(1) Rated power of the module at STC will not exceed the power optimizer Rated Input DC Power. Modules with up to +5% power tolerance are allowed
(2) For S440 with part number S440-1GM4MRM, the Rated Input DC Power is 650W, and the Maximum Input Current is 15A.
(3) For installations after Aug 16, 2024, the Rated Input DC Power for S500B is 650W.
(4) The Maximum Input Short Circuit Current is adjusted for worst case conditions of ambient temperature, irradiance, bifacial gain, and so on, in accordance with NEC and CSA.
(5) Power derating is applied for ambient temperatures above +85°C / +185°F for S440, and for ambient temperatures above +75°C / +167°F for S500B and S650B. Refer to the Power Optimizers Temperature Derating technical note for more details.

PV System Design Using a SolarEdge Inverter[6]		SolarEdge Home Wave/Hub Single Phase	Three Phase for 208V Grid	Three Phase for 277/480V Grid	
Minimum String Length (Power Optimizers)	S440	8	10	18	
	S500B, S650B	6	8	14	
Maximum String Length (Power Optimizers)		25	50[7]		
Maximum Usable Power Delivered per String		5700	6000	12,750	W
Maximum Allowed Connected Power per String[8][9]	Inverters with Rated AC Power ≤ 5700W	For the inverter's maximum input DC power[10]	One string: 7200 Two strings or more: 7800	15,000	W
	Inverters with Rated AC Power of 6000W	5900			
	Inverters with Rated AC Power ≥ 7600W	6800, only when connected to at least two strings			
Parallel Strings of Different Lengths or Orientations		Yes			

(6) It is not allowed to mix S-series and P-series Power Optimizers in new installations in the same string.
(7) A string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement.
(8) Refer to the Single String Design Guidelines application note for details.
(9) For the 208V grid, the maximum is permitted only when the difference in connected power between strings is 5,000W or less.
(10) For the 240V or 277/480V grids, the maximum is permitted only when the difference in connected power between strings 2,000W or less.

RoHS

SolarEdge Home Wave Inverter

For North America

SE3000H-US / SE3800H-US / SE5000H-US / SE5700H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

12-25 YEAR WARRANTY

INVERTERS

Optimized installation with HD-Wave technology

- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014-2023 per articles 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

solaredge.com

solaredge

SolarEdge Home Wave Inverter

For North America

SE3000H-US / SE3800H-US / SE5000H-US / SE5700H-US / SE6000H-US / SE7600H-US / SE10000H-US / SE11400H-US

Applicable to inverters with part number	SE3000H-US	SE3800H-US	SE5000H-US	SE5700H-US	SE6000H-US	SE7600H-US	SE10000H-US	SE11400H-US	Units
OUTPUT									
Rated AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	5760 @ 240V 5000 @ 208V	6000 @ 240V 5000 @ 208V	7600	10000 @ 240V 10000 @ 208V	11400 @ 240V 10000 @ 208V	VA
Maximum AC Power Output	3000	3800 @ 240V 3300 @ 208V	5000	5760 @ 240V 5000 @ 208V	6000 @ 240V 5000 @ 208V	7600	10000 @ 240V 10000 @ 208V	11400 @ 240V 10000 @ 208V	VA
AC Output Voltage Min. – Nom. – Max. (211 – 240 – 264)	✓	✓	✓	✓	✓	✓	✓	✓	Vac
AC Output Voltage Min. – Nom. – Max. (183 – 208 – 229)	-	✓	-	✓	✓	-	✓	✓	Vac
AC Frequency (Nominal)	59.3 – 60 – 60.5[1]								Hz
Maximum Continuous Output Current @240V	12.5	16	21	24	25	32	42	47.5	A
Maximum Continuous Output Current @208V	-	16	-	24	24	-	-	48.5	A
Power Factor	1, Adjustable – 0.85 to 0.85								
GFDI Threshold	1								A
Utility Monitoring, Islanding Protection, Country Configurable Thresholds	Yes								
INPUT									
Maximum DC Power @240V	4650	5900	7750	8900	9300	11800	15500	17650	W
Maximum DC Power @208V	-	5100	-	7750	7750	-	15500		W
Transformer-less, Ungrounded	Yes								
Maximum Input Voltage	480								Vdc
Nominal DC Input Voltage	380						480		Vdc
Maximum Input Current @240V[2]	8.5	10.5	13.5	16	16.5	20	27	30.5	Adc
Maximum Input Current @208V[2]	-	9	-	13.5	13.5	-	27		Adc
Max. Input Short Circuit Current	45								Adc
Reverse-Polarity Protection	Yes								
Ground-Fault Isolation Detection	600k Sensitivity								
Maximum Inverter Efficiency	99			99.2					%
CEC Weighted Efficiency	99							99 @ 240V 98.5 @ 208V	%
Nighttime Power Consumption	< 2.5								W
ADDITIONAL FEATURES									
Supported Communication Interfaces	RS485, Ethernet, wireless SolarEdge Home Network (optional)[3], Wi-Fi (optional), Cellular (optional)								
Revenue Grade Metering, ANSI C12.20	Optional[4]								
Consumption Metering	Optional[4]								
Inverter Commissioning	With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection								
Rapid Shutdown - NEC 2014-2023 per articles 690.11 and 690.12	Automatic Rapid Shutdown upon AC Grid Disconnect								
STANDARD COMPLIANCE									
Safety	Conforms to UL 1741, UL 1741SA, UL 1741SB, UL 1699B Certified by CSA 22.2#107.1, C22.2#330, C22.1#9, ANSI/CAN/UL 9540								
Grid Connection Standards	IEEE1547 and IEEE-1547.1, Rule 21, Rule 14H								
Emissions	FCC Part 15 Class B								
INSTALLATION SPECIFICATIONS									
AC Output Conduit Size / AWG Range	1" Maximum / 14 – 6 AWG								
DC Input Conduit Size / # of Strings / AWG Range	1" Maximum / 1 – 2 strings / 14 – 6 AWG								
Dimensions with Safety Switch (H x W x D)	17.7 x 14.6 x 6.8 / 450 x 370 x 174								in / mm
Weight with Safety Switch	22 / 10		25.1 / 11.4		27.5 / 12.5		26.2 / 11.9		lb / kg
Noise	< 25						< 50		dBA
Cooling	Natural Convection								
Operating Temperature Range	-40 to +140 / -40 to +60[5]								°F / °C
Protection Rating	NEMA 4X (Inverter with Safety Switch)								

(1) For other regional settings please contact SolarEdge support.
(2) A higher current source may be used; the inverter will limit its input current to the values stated.
(3) For more information, refer to the SolarEdge Home Network datasheet.
(4) Inverter with Revenue Grade Production and Consumption Meter (P/N: SEwaaH-US000BEI4). For consumption metering, current transformers should be ordered separately: SEACT0750-200NA-20 or SEACT0750-400NA-20. 20 units per box.
(5) Full power up to at least 50°C / 122°F, for power de-rating information refer to the Temperature Derating technical note for North America.

CE

CASCADIA RENEWABLES

CASCADIA RENEWABLES

STAMP:

NOT FOR CONSTRUCTION

GRID-TIE SOLAR + STORAGE SYSTEM
HOUSE OF THE AWAKENED CULTURE
7325 NE PARKWAY
SUQUAMISH, WA, 98392

REV	ISSUED	PM	ENG	CHK	REVISION DESCRIPTION
1	12/17/24	PK	PK	RM	60% IFR - ISSUED FOR REVIEW

PROJECT NUMBER:
24-3913C

SCALE
NTS
ORIGINAL SIZE 24"X36"
SHEET SIZE ARCH "D"
0 ½" 1"

v.2.1

SHEET NO. & NAME:
E-4.0
DATA SHEETS

PRELIMINARY

OZPCS-RS35 Specifications

DC CONNECTION

Operating Voltage Range	380 - 820 VDC
Full Power Voltage Range	400 - 800 VDC
Max DC Current	+/- 95 A
Max DC Power	36.5 kW
Wiring Configuration	2 Wire

AC CONNECTION

Max AC Power	35kVA @ 208 V_{RMS}
Max AC Current	
100Arms	Continuous
130Arms	10 seconds max
AC Line Voltage	120/208 Vrms 3-phase 120/240Vrms split-phase
AC Line Frequency	60 Hz
Power Factor	-1 to +1
Current Harmonics	IEEE 1547 Compliant, <3%THD
Typical Efficiency	97 %

ENVIRONMENTAL

Operating temp	-20°C to 45°C
Derated	45°C to 55°C
Short term	Full power operation up to 60°C
Cooling	Forced air by internal variable speed fans
Max Elevation	
No Derating	1,000m
Derated	1,000m - 3,000m
Enclosure	3U, 19" Rack Mount
Weight	44kg / 100 Lbs
Ingress protection	IP20

USER INTERFACE

Isolated Communication Link	Modbus RS-485
Register Mapping	SunSpec PCS
Isolated Digital Inputs	Emergency Shutoff, Bias Enable
Isolated Digital Outputs	User Configurable 1 & 2
Indicator LEDs	4
Warranty	5 years standard 5 year optional warranty extension

REDUCE TIME TO MARKET
- Easy paralleling allows for quick product scaling
- 19" rack mount design

FEATURES
- UL1741-SB Smart Inverter functions
- Integrated data logging

OPTIMIZED FOR 120/208V AND 120/240V COMMERCIAL APPLICATIONS
- Single stage conversion
- 60 Hz

INDUSTRY STD INTERFACE
- SunSpec certified
- Modbus RS-485

Rackable, Stackable.

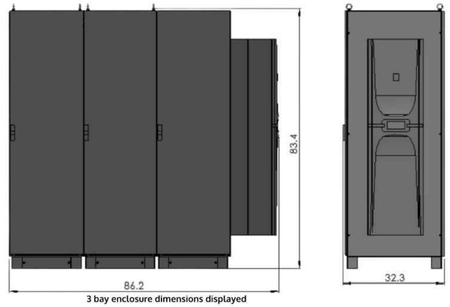
For released product – Q2. 2023

11 Continental Boulevard, Merrimack, NH 03054
603. 546. 0090 OztekCorp.com

OZTEK
Fit for the Future.

The Shield O30 Series
Outdoor Rated Battery Storage Cabinet

Kronus Engineering
The Battery Experts



3 bay enclosure dimensions displayed

System Highlights

Power Capacity: 24-144 kW 1P 120/240 VAC
35-210 kW 3P 208 VAC

Energy Capacity: 72-312 kWh

Battery Modules: KORE Mark One

Inverter Modules: Oztek RS35

Connectivity: Integration with onsite solar and EV Charging

UL Certification: UL1973 & UL9540a Batteries
UL1741-SA, UL1741-SB Inverter

NEMA 3R cabinet: Resistant to water, rain, ice formation, sleet, and snow

O&M: Simple & safe maintenance

Container: 2-5 cabinets

This NEMA 3R modular cabinet was developed to provide a flexible, reliable, and safe energy storage system that can be placed outside almost any site.

Because of its shrinkable and expandable design, this energy solution is able to meet a range of load requirements and applications. It can be used to help sites reduce their energy costs through peak shaving or arbitrage. It can also help companies save data, machinery, production materials, and more from unexpected shut down by providing back up power during grid failures.

These cabinets are perfect for laboratories, data centers, and commercial and industrial projects. Email us at Info@KronusEngineering.com if you would like to see if The Shield could work for your project.

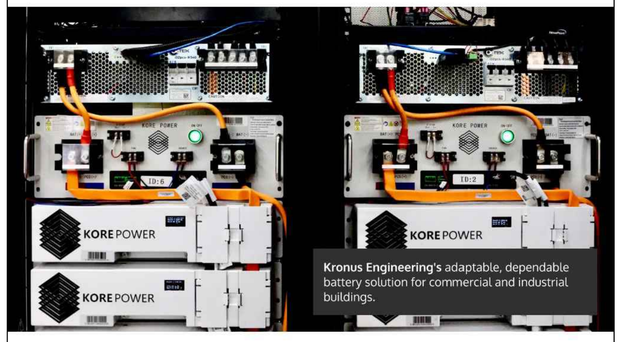
The Shield O30 Series Storage Cabinet Specifications

Categories	Specifications	
Nominal Specs	Volts	208VAC
	3P 208 VAC	35 - 210 kW
	1P 120/240 VAC	24 - 144 kW
	kWh	72 - 312 kWh
System Output	max combined output per phase (A)	100AAC
	AC output voltage range	120/240, 208VAC
	AC Frequency	50/60Hz
	AC Connection	Power Distribution Block
Storage	Type	Lithium - NMC
	Nominal Capacity	72-312 kWh
	Charge Time	1-7 hours
	Nominal Voltage	700VDC
	Expected Cycle life (to 80% original capacity)	4,000
Environmental	Water/ IP rating	NEMA 3R
	Temerature Control	Heating and Air Conditioning
	Operating Temp Range	-40°C to 45°C
Mechanical	Dimensions LxWxH for (3 bay)	86in (W) x 84in (H) x 33in (D)
	Weight (3 bay)	2,500 lbs
	Lift Points	Forklift or Crane
Safety	UL Certification	UL1973 and UL9540A batteries, UL1741-SA/SB inverter
Additional Add-ons	Control Panel	Touch Screen w/ Web Interface
	Remote Gen Start	Dry Contact
	Remote Comms	Modbus/ CANbus
	Energy Management System	Demand Management and Load Shifting

KronusEngineering.com | Info@KronusEngineering.com | 5490 Western Ave, Boulder, CO 80301

The DOLOMITE 70 Battery Storage System

Kronus Engineering
The Lithium Battery Experts



Kronus Engineering's adaptable, dependable battery solution for commercial and industrial buildings.

Product Features and Applications

Backup Power: The DOLOMITE 70 is scalable to meet a wide range of energy and power needs. It offers reliable backup battery storage to provide security in the case of a power outage for commercial and industrial facilities.

Peak Shaving: When used for peak shaving, the DOLOMITE 70 charges during base time periods and discharges during peak hours to shave costs during peak hours. Energy bills are typically reduced by 20% to 40%.

Flexibility: The system leverages latest technology in lithium-ion batteries providing consistent power for thousands of cycles.

Connectivity: The DOLOMITE 70 can run standalone or be connected to a renewable resource, grid power, or localized microgrid.

System Safety: Comprehensive safety features and software controls are fully integrated into the DOLOMITE 70 ensuring a safe, high-performance product.

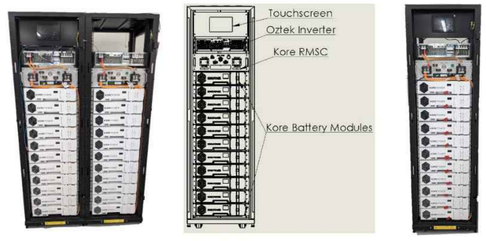
- Simple, scalable, and cost effective, the DOLOMITE 70 leverages **KORE Power's Mark 1** battery modules and BMS to meet a range of energy storage and cost saving needs.

Base System
Energy: 70kWh
Power: 40kW
Voltage: 480VAC

- Battery storage advantages over traditional generators:
  - emissions free
  - silent operations
  - less maintenance
  - smaller carbon footprint
  - quicker startup times

The DOLOMITE 70 Specifications

System Specifications	DOLOMITE
Base Energy	70kWh
Base Power	40kW
System Voltage	480VAC
Battery Voltage	330-820VDC
System Encolsure	24" W x 32" D x 79" H
System Weight	1,500lbs
System Scalability Range	Up to 1MWh
Temperature Range	-5°C to 45°C
Number of Cycles	4,000
Battery Chemistry	NMC
IP Rating	IP20
Enclosure Rating	Nema 1
Enviroment	Climate controlled, insulated, indoor or outdoor enclosure options available
Communication	CAN/Modbus
Additional Features	HMI Available, Built in Energy Management System
Certifications	Batteries: UL1973 & UL9540a Inverter: UL1741-SA&SB



kronusengineering.com | info@kronusengineering.com | 5735 Arapahoe Ave, Unit C, Boulder, CO 80303

CASCADIA RENEWABLES

CASCADIA RENEWABLES

STAMP:

NOT FOR CONSTRUCTION

GRID-TIE SOLAR + STORAGE SYSTEM
HOUSE OF THE AWAKENED CULTURE
7325 NE PARKWAY
SUQUAMISH, WA, 98392

REV	ISSUED	PW	ENG	CHK	REVISION DESCRIPTION
	12/17/24	PK	PK	RM	60% IFR - ISSUED FOR REVIEW

PROJECT NUMBER:
24-3913C

SCALE
NTS
ORIGINAL SIZE 24"X36"
SHEET SIZE ARCH "D"
0 ½" 1"

SHEET NO. & NAME:
E-4.1
DATA SHEETS

PRINT DATE: 12/17/2024 6:58 PM DWG LOCATION: G:\Shared drives\Design\03. CLIENTS\Cascadia Renewables\04. PROJECTS\24-3913C - House of Awakened Culture\06. Working Planset (DO NOT MODIFY)\02 Working Set\E-4.1 DATA SHEETS.dwg

BRADLEY ENGINEERING, INC.
811 Yew St.
Bellingham, WA 98229
Ph. 360-752-5795

November 5th, 2024

Suquamish Tribe – House of Awakened Culture
7325 NE Parkway
Suquamish, WA 98392

Re: Suquamish Tribe – House of Awakened Culture Solar Evaluation

To whom it may concern,

I, Austin Rapp, a representative of Bradley Engineering Inc., have reviewed the proposed solar system by Cascadia Renewables to provide a structural evaluation of the existing roof given the additional load of the proposed solar system.

PROJECT DESCRIPTION
The proposed solar array at 7325 NE Parkway consists of 290 total modules on a 1/12 pitch roof. The solar modules will be supported by typical flush mount rails and will be fastened by non-penetrating standing seam roof clamps. The maximum dead load to be considered is 2.6 psf.

SITE CONDITIONS
Risk Category: III
Wind Speed: 110 mph
Wind Exposure: D
Roof Snow Load: 25 psf

CONCLUSIONS & RECOMMENDATIONS
The as-built roof framing consists of 4X12 rafters spanning 16’ maximum and spaced at 4-foot centers. The 4X12 rafters are hung from large (>20” deep) GLBs that clear span the entire structure. However, we were unable to obtain the actual GLB width and depth.

Performing a beam analysis on the roof rafters, the as built 4X12 rafters spanning between the large GLBs can certainly support the additional load of 3 psf, as proposed by Cascadia Renewables, with no additional modifications necessary.

The last item to check would be the large GLBs that carry the 4X12 rafters, but without the exact depth and width its impossible to perform an accurate beam analysis. However, considering a few factors, it would be safe to presume that the large GLBs can also support the additional proposed solar load. Some of the factors include the recent construction of the building and its relevancy to current codes (architectural plans are dated 01/3/2011) and the 4X12 rafters were slightly oversized so it would be reasonable rationale to assume that the girders carrying the rafters would be designed to be just as conservative if not more. Additionally, the design loading of the large GLB girders could be further reduced using the IBC allowable live load reduction factor which makes it even more likely that the as-built GLB girders can support the proposed solar loading by Cascadia Renewables, while still maintaining code compliance, with no additional modifications necessary.

In conclusion, Bradley Engineering, Inc. can say with certainty that the 4X12 rafters can indeed support the proposed solar load. It is also very likely that the GLB girders can support the additional solar load through reasonable assumptions. However, due to lack of exact dimensions of the GLB girders, we cannot determine with 100% certainty. At the time of preparing actual permit documents, it will be required to gather the GLB girder dimensions and perform an analysis on those beams considering the additional proposed solar load.

LIMITATIONS

Bradley Engineering Inc. conclusions are based on digital review of approved architectural drawings indicating the rafter members (and confirmed via pictures of the structure) dated January 3rd, 2011. The architectural drawings did not indicate the size of the GLB girders carrying the 4X12 rafters nor were we able to obtain dimensions from an on-site contact. A specific analysis will be required on the girder GLBs carrying the 4X12 rafters. Bradley Engineering Inc. did not visit the subject structure in person and our evaluation is strictly limited to the information provided on the permitted architectural plans and reasonable assumptions given the information provided.

Sincerely,

Austin Rapp, B.S. M.E
Ph. (360) 325-2515

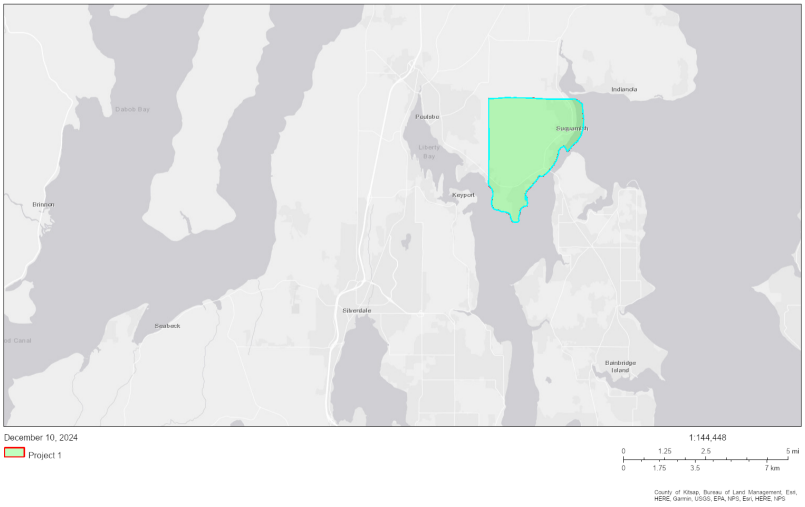
David Bradley, P.E.
Ph. (360) 752-5795

EJScreen Community Report

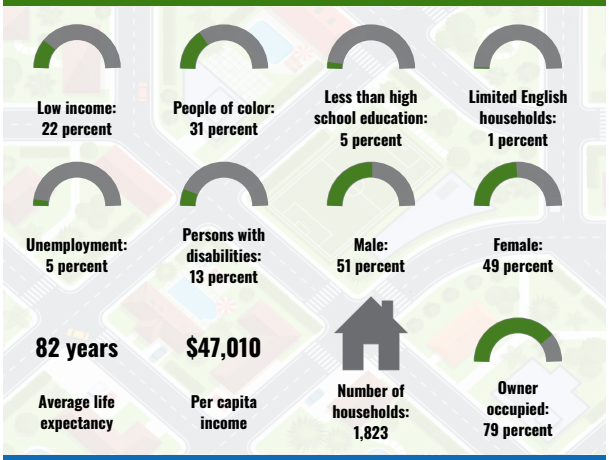
This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Suquamish, WA

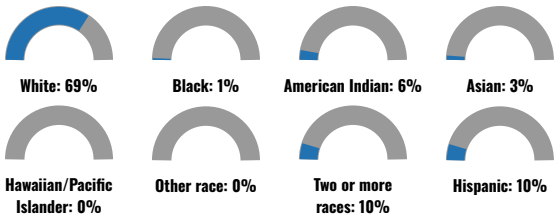
City: Suquamish
Population: 4,446
Area in square miles: 7.15



COMMUNITY INFORMATION



BREAKDOWN BY RACE



BREAKDOWN BY AGE

LIMITED ENGLISH SPEAKING BREAKDOWN

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2018-2022. Life expectancy data comes from the Centers for Disease Control.

LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	88%
Spanish	7%
Russian, Polish, or Other Slavic	1%
Other Indo-European	2%
Tagalog (including Filipino)	1%
Other Asian and Pacific Island	1%
Other and Unspecified	1%
Total Non-English	12%

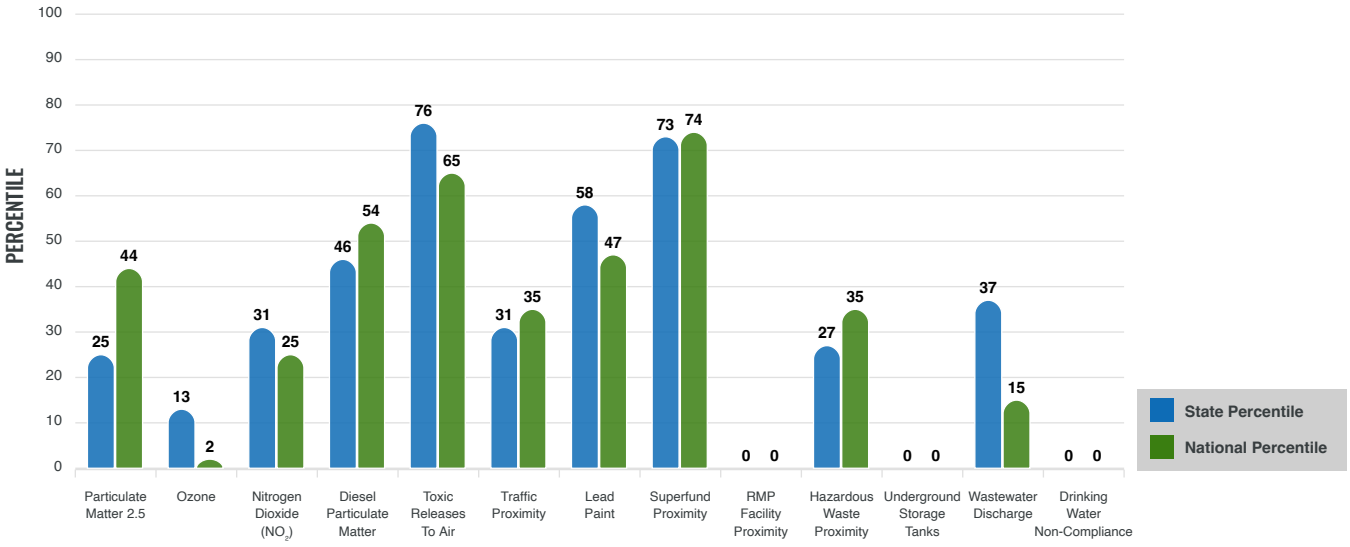
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

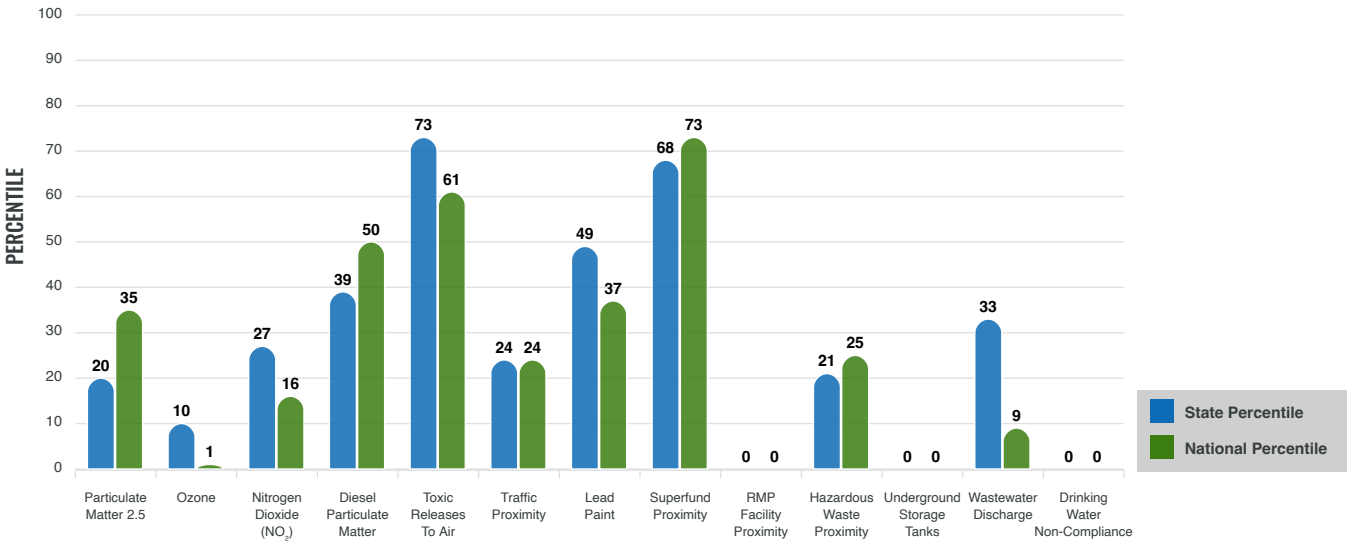
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low income, percent persons with disabilities, percent less than high school education, percent limited English speaking, and percent low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



Report for City: Suquamish

Report produced December 10, 2024 using EJScreen Version 2.3

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
ENVIRONMENTAL BURDEN INDICATORS					
Particulate Matter 2.5 ($\mu g/m^3$)	7.85	9.51	18	8.45	39
Ozone (ppb)	49.2	51.8	9	61.8	1
Nitrogen Dioxide (NO_2) (ppbv)	4.5	6.3	23	7.8	18
Diesel Particulate Matter ($\mu g/m^3$)	0.171	0.256	37	0.191	55
Toxic Releases to Air (toxicity-weighted concentration)	2,000	1,800	79	4,600	72
Traffic Proximity (daily traffic count/distance to road)	250,000	1,200,000	23	1,700,000	28
Lead Paint (% Pre-1960 Housing)	0.18	0.23	56	0.3	45
Superfund Proximity (site count/km distance)	0.59	0.53	78	0.39	86
RMP Facility Proximity (facility count/km distance)	0	0.51	0	0.57	0
Hazardous Waste Proximity (facility count/km distance)	0.35	2.9	21	3.5	29
Underground Storage Tanks (count/km^2)	0	6.1	0	3.6	0
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.0076	300	30	700000	10
Drinking Water Non-Compliance (points)	0	1	0	2.2	0
SOCIOECONOMIC INDICATORS					
Demographic Index USA	1.01	N/A	N/A	1.34	43
Supplemental Demographic Index USA	1.21	N/A	N/A	1.64	29
Demographic Index State	1.38	1.47	53	N/A	N/A
Supplemental Demographic Index State	1.1	1.37	38	N/A	N/A
People of Color	31%	33%	53	40%	49
Low Income	22%	23%	56	30%	42
Unemployment Rate	5%	5%	60	6%	59
Limited English Speaking Households	1%	4%	55	5%	61
Less Than High School Education	5%	8%	48	11%	37
Under Age 5	3%	5%	31	5%	33
Over Age 64	23%	17%	77	18%	75

*Diesel particulate matter index is from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	9
Air Pollution	26
Brownfields	0
Toxic Release Inventory	1

Other community features within defined area:

Schools	2
Hospitals	0
Places of Worship	1

Other environmental data:

Air Non-attainment	No
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	Yes
Selected location contains a "Justice40 (CEJST)" disadvantaged community	No
Selected location contains an EPA IRA disadvantaged community	Yes

Report for City: Suquamish

Report produced December 10, 2024 using EJScreen Version 2.3

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	16%	18%	26	20%	18
Heart Disease	5.4	4.8	68	5.8	44
Asthma	11.1	10.9	56	10.3	75
Cancer	7.5	6.5	74	6.4	72
Persons with Disabilities	13.1%	13.4%	52	13.7%	52

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	5%	11%	51	12%	45
Wildfire Risk	0%	12%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	5%	8%	48	13%	33
Lack of Health Insurance	4%	6%	33	9%	27
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access Burden	Yes	N/A	N/A	N/A	N/A
Food Desert	No	N/A	N/A	N/A	N/A

Report for City: Suquamish

Report produced December 10, 2024 using EJScreen Version 2.3


ELM
ELM
MICROGRID
MGSERIES
POWER
YOUR
BUSINESS

THE ELM ADVANTAGE

Every MG Energy Storage system Includes the Following:

Power Management

Solar and Generator Input
Solar Automated Control
Generator Automated Control
Building Automated Control
Grid Power
TOU Shifting
Peak Shaving
OFF Grid Compatability

TurnKey Solution

Pre-Assembled
Pre-Engineered
Pre-Wired
Pre-Installed Safety Labels
Pre-Tested

Includes

ELM Controller Software
Built In Cimate Control
Built In Fire suppression
Indoor, Seismic, and Outdoor (NEMA) Enclosure Options
Expandable at any time

MG Series Technical Specifications	MG30	MG125	MG250	MG500	MG1000
Three Phase Operation					
AC Voltage	480 VAC	480 VAC	480 VAC	480 VAC	480 VAC
AC Input/Output Current	36A	150A	300A	600A	1255A
AC Output Power (Discharge)	30kW	125kW	250kW	500kW	1000kW
AC Input Power (Charge)	30kW	125kW	250kW	500kW	1000kW
Battery Capacity	78kWh	220kWh	660kWh	1,100kWh	2,640kWh
AC Frequency (Field Settable)	60 Hz	60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
MAX AC Overcurrent Protection	200A	250A	400A	800A	1600A
Peak Efficiency	97%	97%	97%	97%	97%
AC Connection	3 Phase, 3 Wire	3 Phase, 3 Wire	3 Phase, 3 Wire	3 Phase, 3 Wire	3 Phase, 3 Wire
Equipment Specifications					
External Dimensions(L x W x H)	60" x 36" 84"	60" x 36" 104"	124" x 75" 111"	170" x 75" x 111"(201" length includes HVAC)	(2) 170" x 75" x 111"(201" with HVAC) + INV
Weight	3,100 lbs.	5,500 lbs.	17,000 lbs.	25,000 lbs.	59,000 lbs.
Lifting Provisions	Pallet Jack/Fork Lift	Fork Lift Slots	Fork Lift Slots	Fork Truck or Lift Strap	Fork Truck or Lift Strap
Paint Tested	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray
Fire Suppression	3M Novec 1230	3M Novec 1230	Hybrid - 3M Novec 1230 Dry Pipe Water	Hybrid - 3M Novec 1230 Dry Pipe Water	Hybrid - 3M Novec 1230 Dry Pipe Water
Handles	Stainless Steel Lockable	Stainless Steel Lockable	Reversible/Lockable	Reversible/Lockable	Reversible/Lockable
Temperature Range	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C
MG Series Expansion Modules					
Max kWh	156kWh	220kWh	880kWh	1,320kWh	1,320kWh
External Dimensions(L x W x H)	60" x 36" 84"	60" x 36" 104"	124" x 75" 111"	170" x 75" x 111"(201" length includes HVAC)	170" x 75" x 111"(201" length includes HVAC)
Weight	4,400 lbs.	5,300 lbs.	20,000 lbs.	28,000 lbs.	28,000 lbs.
Lifting Provisions	Pallet Jack/Fork Lift	Fork Lift Slots	Fork Lift Slots	Fork Truck or Lift Strap	Fork Truck or Lift Strap
Paint Tested	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray	1000 Salt Hour Spray
Fire Suppression	3M Novec 1230	3M Novec 1230	Hybrid - 3M Novec 1230 Dry Pipe Water	Hybrid - 3M Novec 1230 Dry Pipe Water	Hybrid - 3M Novec 1230 Dry Pipe Water
Handles	Stainless Steel Lockable	Stainless Steel Lockable	Reversible/Lockable	Reversible/Lockable	Reversible/Lockable
Temperature Range	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C	-20°C to 50°C

ALL MG SERIES PRODUCTS	
Control Software	
ELM Autonomous MicroGrid Site Control System	☑
Access & Alerts on Desktop & Mobile 24/7	☑
Asset Monitoring System Level & Individual	☑
Individual Microgrid Component Pages	☑
Local HMI IP 65 Touchscreen	☑
Communications: Wifi, Ethernet, Cellular	☑
Operation Parameters	
Islanded Mode	Off Grid Applications
Grid Tied Mode	Peak Shaving Backup Power Demand Response
Distributed Generation	Time of Use Operation
Key System Components	
NEMA 3R Enclosure	☑
Bi Directional Storage Inverter	☑
DC Disconnect (Battery)	☑
AC Disconnect (Inverter)	☑
AC Disconnect (Utility Interconnect)	☑
AC Circuit Breaker (Load Panel)	☑
PV Disconnect	☑
Utility Disconnect	☑
Climate Controls	☑
Certifications	
Batteries	UL 1973, UL 9540A
Inverter	UL 1741 SA
System	UL 9540

ELM

WWW.ELMLLC.COM

MicroGrid Energy Storage System

Fire Safety Design Analysis

Battery Energy Storage System

Submitted By:
ELM FieldSight, LLC

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www.elmmicrogrid.com

Table of Contents

Revision Table

Date	Description	Initial
2/28/2022	Added Sequence of Events matrix, updated Novec and water activation	JP
4/27/2022	Added water solenoid activation to sequence of events matrix	JP
6/1/2022	Updated sequence of events matrix; made water optional per AHJ	JP
10/25/2022	Added NFPA 855 language to deflagration panel design	JP

Introduction

General

The ELM Microgrid Battery Energy Storage System (BESS) is designed to be a stand-alone battery system that can provide its customers with on-grid peak shaving, demand response, PV smoothing, etc. capabilities. The BESS can also operate in an off-grid environment to supply power to its site. The BESS also incorporates the ELM FieldSight Microgrid controller that manages the operations of the BESS as well as any other equipment at the site such as photovoltaic, wind, generators, grid connections, battery management systems, etc.

The ELM Microgrid BESS utilizes the latest in battery and storage inverter technologies to offer their customers the best, most efficient, and safest power systems. The batteries used in the BESS are a Lithium-Ion chemistry which provide high energy density, long lasting durability, and affordable solutions.

Lithium-ion batteries are in widespread use worldwide from electronic devices to energy storage facilities, while generally safe, this battery chemistry is subject to a catastrophic failure mode known as thermal runaway. This thermal runaway event can present a significant fire hazard to the system and any personnel near the system

Due to the Lithium-Ion chemistry, ELM has incorporated a series of fire safety features into their BESS solution to meet or exceed all current safety codes including NFPA 855. The purpose of this document is to outline those fire safety features and define their controls.

Fire Safety Overview

General

The ELM BESS has 8 different levels of protection to prevent, mitigate, and contain any possible thermal runaway events.

Level 1 Protection – Site Controller

Every ELM BESS system is delivered with an ELM Microgrid site controller. The site controller is designed to communicate, monitor, and control all of the equipment within the energy system.

Included in this communication architecture is the monitoring of the batteries and the ambient temperature of the containers. Should the temperature within the battery modules exceed a maximum operating temperature that is predefined to be lower than the setpoint established by the battery manufacturer, the site controller will shut the system down by disabling the storage inverter and opening the rack level battery contactors and remain in this state until temperatures fall within the normal operating range again.

Notification:

- ELM Site Controller sends out an email/text alert that the system has faulted.
- If the temperatures fall back within the operating limits, the system will restart itself and the ELM Site Controller sends out an email/test alert that the system fault has been cleared.

Level 2 Protection - BMS

Every ELM BESS system is delivered with a Battery Management System (BMS) that is designed and UL tested by the battery manufacturer. The BMS is designed to monitor the status of all the battery modules and cells within the battery system and protect the batteries should any of its operating parameters exceed the allowable limits of the battery. The BMS protects the batteries by opening rack level contactors that will physically disconnect the batteries from the rest of the energy management system and thus shut down the BESS. Some of the operating parameters that the BMS monitors includes:

- Over and Under temperature limits
- Over and Under voltage limits
- Over current charge/discharge events
- Communications loss
- Surge protection device

The level 1 temperature protection limits are more conservative than the level 2 protections.

Notification:

- ELM Site Controller sends out an email/text alert that the system has faulted.
- If the temperatures fall back within the operating limits and the battery BMS allows the site controller to close battery contactors, the system will restart itself and the ELM Site Controller sends out an email/test alert that the system fault has been cleared.

Level 3 Protection – Li-Ion Tamer

If the previous two levels have failed to successfully shut down the system, the battery may begin to off-gas before it enters a runaway condition. ELM has integrated the Li-Ion Tamer product by Nexceris into their system. The Li-Ion Tamer off-gas monitors along with the Li-Ion Tamer controller is designed to diagnose when and where single-cell off-gas events have happened. Off-gas events occur early in the failure mode of lithium-ion batteries and awareness as to when off-gas events occur provides a very early warning of failures and enables prevention of these failures with proper mitigation.

When the Li-Ion Tamer system detects this off-gassing event, it sends a signal to the ELM site controller. When the ELM site controller receives this signal, it shuts the system off by disabling the storage inverter and opening the rack level battery contactors. Before the system can resume, the off-gassing event has to clear AND a person has to push the resume button on the system touchscreen. The system will not restart on its own without manual intervention.

Notification:

- ELM Site Controller sends out an email/text alert that the system has an e-stop/fire event
    - ELM Site Controller also sends out a modbus register that an e-stop/fire event has occurred
- If the system is restarted manually, ELM Site Controller sends out an email/text alert that they system e-stop/fire event has cleared.
    - ELM Site Controller also sends out a modbus register that an e-stop/fire event has cleared

Level 4 Protection – Active Venting (if required)

The active venting system on the battery energy storage system is remotely controlled by a switch that is located away from the container. The active venting system will only turn on when the remote switch is turned on. When the active venting system is turned on, it will circulate the air inside the container with external air at a rate of more than 70 CFM. The Active Venting system has an embedded actuated damper to prevent leakage with outside air when the active venting system is not activated.

Notification:

- If the system is restarted manually, ELM Site Controller sends out an email/text alert that the system e-stop/fire event has cleared.
    - ELM Site Controller also sends out a modbus register that an e-stop/fire event has cleared

Level 5 Protection – Clean Gas Fire Suppression

The battery energy storage system is equipped with a clean gas Novec 1230 fire suppression system. The Novec 1230 is contained within pressurized fire extinguishing bottles within the container. The fire extinguishing bottle is connected to dispersion nozzles inside the container.

The clean gas fire suppression system is controlled by an approved Release Agent Control Panel.

The trigger mechanism for the clean gas fire suppression system include smoke and thermal sensors and a manual release station

Notification:

- ELM Site Controller sends out an email/text alert that the system has an e-stop/fire event
    - ELM Site Controller also sends out a modbus register that an e-stop/fire event has occurred
    - ELM Site Controller also sends out a modbus register that Clean Gas Suppression has deployed
- If the system is restarted manually, ELM Site Controller sends out an email/text alert that they system e-stop/fire event has cleared.
    - ELM Site Controller also sends out a modbus register that an e-stop/fire event has cleared
- The Releasing Agent Control Panel will utilize a dry contact to signal that the clean gas fire suppression system has deployed

Level 6 Protection – Dry Pipe Fire Suppression (if required)

The battery energy storage system is equipped with a dry pipe fire suppression system. The dry pipe system has a 2" NPT female inlet. It is designed to be connected a to a dry pipe at the installation site that can have water applied to the system from a remote valve location. The dry pipe fire suppression system is comprised of schedule 40 black pipe that is routed through the container and into its Victaulic Open Spray Nozzles.

The dry pipe fire suppression system is controlled by the Releasing Agent Control Panel.

The trigger mechanism for the dry pipe fire suppression system is the smoke and thermal sensors within the container. If these sensors are triggered, then a signal is sent to the building Fire Alarm System where it can be decided if water needs to be turned on to flood the container.

Notification:

- ELM Site Controller sends out an email/text alert that the system has an e-stop/fire event
    - ELM Site Controller also sends out a modbus register that an e-stop/fire event has occurred
    - ELM Site Controller also sends out a modbus register that Clean Gas Suppression has deployed
- If the system is restarted manually, ELM Site Controller sends out an email/text alert that they system e-stop/fire event has cleared.
    - ELM Site Controller also sends out a modbus register that an e-stop/fire event has cleared
- The Releasing Agent Control Panel will utilize a dry contact to signal that the fire alarm is active

Level 7 Protection – Battery Module UL9540A certified

If the previous protection levels have failed to prevent a runaway thermal event within a battery module, the battery modules themselves have been UL 9540A tested by their manufacturer. The UL9540A testing is performed by the manufacturer to demonstrate that a fire within the battery will not propagate and spread throughout the system. Thus it should contain a fire to the point it started

Level 8 Protection – Deflagration Panels

If all previous protections have failed, and the pressure within the container continues to increase due to a thermal event, the container is designed with deflagration panels in the ceiling of the container compliant with NFPA 855-2020 AMD 2, part 4.12. The panels are designed such that if there is an explosion, the primary force of the explosion will be directed up through the deflagration panels rather than out through the doors of the container.

Sequence of Events

Sequence of Events Matrix

Since the events of a fire situation do not necessarily happen in a linear fashion, the following matrix shows the sequence of events that should occur for different stages of the fire protection system.

		BESS and Fire Panel Operation																		
Use this matrix to determine the sequence of safety features built into the ELM Battery Energy Storage System		*Disable Storage Inverter*	*Open Rack Level Battery Contactors*	*Active ventilation turned on*	*ELM text and email notifications are sent out.*	*ELM modbus register list signal is sent*	*Display and Sound Event on BESS Fire Panel*	*Activate (First Alarm) Slow Pulse and Strobe*	*Activate (Second Alarm) Fast Pulse and Strobe*	*Activate (Discharge) Steady Tone and Strobe*	*Immediately Release Novec 1230*	*Initiate the Evacuation Timer (Discharge Time Delay)*	*Send an Alarm Signal to Building Fire Alarm System and BESS Controller*	*Send a Supervisory Signal to Building Fire Alarm System and BESS Controller*	*Activate Remote Sprinkler Solenoid*	*Send a Trouble Signal to Building Fire Alarm System and BESS Controller*	*Disables Release of Novec 1230*	*Battery system is 9540A tested to prevent thermal runaway propagation*	*Deflagration panel releases*
System Condition	ELM Temperature Protection	x	x		x	x														
	Battery BMS Temperature Protection	x	x		x	x														
	Li-Ion Tamer Early Gas Detection	x	x		x	x														
	E-Stop Button is Pushed	x	x		x	x														
	Active Venting with Remote Switch			x																
	1st Smoke Detector	x	x		x	x	x	x					x							
	2nd Smoke Detector	x	x				x		x			x								
	Heat Detector	x	x		x	x	x			x			x		x					
	Expiration of the Discharge Time Delay						x			x	x		x							
	Manual Release Station	x	x		x	x	x			x	x		x							
	BESS Fire Panel Component Fault						x									x				
	Loss of Primary AC Power to BESS Fire Panel						x									x				
	Fire Panel Control Head Monitor	x	x		x	x	x							x						
	Fire Panel Maintenance Key Switch	x	x		x	x	x							x		x	x			
	Novec Cylinder Pressure Supervisory Switch	x	x		x	x	x							x						
	Thermal Runaway Prevention																	x		
	Thermal Runaway Pressure build up																		x	

System trip and timer delay settings

All of the responses to the system conditions noted in the SOE Matrix happen immediately when the condition is met. The following items show additional setpoints and delay timers that are implemented for the system conditions:

- ELM Temperature Protection setpoint: 50C (adjustable)

- Battery BMS Temperature Protection setpoint:
    - Samsung: 65C
    - Kore Power: 59C
- Novec Gas Discharge Time Delay: Typical is 30 seconds, but can be adjusted based on site specific requirements

Glossary of Terms (Solar + Storage)

AHJ: Authority having Jurisdiction: This refers to the structural and electrical code requirements for a given site. Some AHJs cover structural and electrical oversight, whereas others specialize in one or the other. There are hundreds of unique AHJs throughout WA State, each with their permitting process, code requirements, and standards that must be considered in the design phase of a project.

AC Coupling: A method of connecting a battery energy storage system (BESS) to a solar panel system where the solar panels are connected to an inverter that produces AC electricity, and then a separate inverter charges the battery from the AC electricity. This allows the battery system to provide power during a grid outage.

Architectural/Roof Condition: This refers to the current physical condition and structural soundness of a building or roof. It is an important consideration when planning to install solar panels, as the roof needs to have adequate structural capacity, and the roof membrane (shingles, metal roof, TPO/PVC) should have adequate life to support the PV System.

Automatic Transfer Switch (ATS): An automatic transfer switch is used to automatically switch the power source from the primary source (typically the utility power) to a secondary source (like a generator or battery system) when the primary source fails. When the primary power source is restored, the ATS automatically switches back.

Ballasted Solar Mounting System: A type of solar panel mounting system where the panels are held in place with weights rather than being attached directly to the roof or ground. This is useful on roofs where penetrations must be minimized, such as flat commercial roofs. Seismic anchors are typically required based on the site's seismic category risk factor.

Battery Charge/Discharge Rates: These are measures of how quickly a battery can be charged or discharged. It's usually expressed in terms of a "C" rate. For example, a battery with a 1C charge rate can be charged at a rate equal to its capacity over one hour.

Battery Depth of Discharge (DoD): This is the percentage of a battery's energy that has been used. For example, if a battery has a 100 kWh capacity and 40 kWhs have been used, the DoD is 40% while the Soc is 60%.

Battery State of Charge (SoC): The current charge level of a battery, usually expressed as a percentage. If a battery is fully charged, the SoC is 100% while the DoD is 0%.

Battery Runtime Estimate (Autonomy Calculation): An estimate of how long a battery can provide power given a specific power draw. This estimate is based on the battery's state of charge, rate of discharge, and efficiency.

Charge Controller: A device used in solar power systems to regulate the voltage and current coming from the solar panels and into a battery system. It ensures that the batteries do not overcharge, which can damage them, and also prevents reverse current flow at night when the panels aren't producing electricity.

Conduit Route: The planned path for electrical conduit, which is a tube used to protect and route electrical wiring. The route needs to be planned to avoid obstacles, comply with electrical codes, and minimize the length (and therefore cost) of the wiring. Conduit type is determined by the AHJ and building type (commercial vs residential) along with the form of the electricity (DC vs AC).

Consumption/Production Analysis: This is an examination of how much energy a system or building consumes compared to how much it produces. This is especially relevant for systems like solar power that can both consume energy (from the grid) and produce energy.

DC Coupling: An alternative to AC coupling where the solar panels and battery are both connected to the same inverter. The solar panels produce DC electricity, which can be used directly to charge the batteries or can be converted by the inverter to AC electricity for use in the building or to feed back into the grid.

DC Optimized String Inverter: This is a type of solar power setup that combines elements of string inverters and microinverters. Each solar panel is paired with a DC optimizer, which improves the

efficiency of the system, and then the electricity from multiple panels is inverted from DC to AC by a single inverter.

Demand Management: The strategies or techniques used to manage energy usage, often with the goal of reducing peak demand and total energy use. This can involve shifting energy usage to off-peak times, improving energy efficiency, or using onsite generation like solar panels.

Demand Profile: A graph or data set showing the amount of electricity used over a certain period of time. This information is often used to determine peak demand times and can help in designing energy management strategies.

Demand Response: This is a strategy for managing energy demand whereby utilities incentivize customers to reduce their electricity usage during peak demand periods. This can be achieved through price signals or direct load control agreements.

Electrical Bus: A conductor, or a group of conductors, that serve as a common connection for two or more electrical circuits. It is used in power distribution to consolidate and distribute power from the source to the loads. In a circuit breaker panel, the bus bars are the strips of metal that the breakers connect to.

Energy (kWh): A unit of energy equivalent to one kilowatt of power consumed or produced for one hour.

Energy Storage System (ESS): A system designed to store electrical energy and release it when needed. Battery systems are a common type of ESS used in conjunction with solar power systems to store excess generation for use at night or during power outages.

ESS Mounting Pad: A solid foundation on which an Energy Storage System (ESS) is installed. It's designed to support the weight of the system and protect it from ground moisture and other environmental conditions.

Geotech Report: A report that assesses the geological and soil conditions of a site. It's often used to determine the suitability of a location for construction or other projects, including solar installations.

Ground Mount Solar: A type of solar installation where the panels are mounted on the ground rather than on a rooftop. This can be advantageous in situations where the roof isn't suitable for solar, or if there is ample unused land available. This often, however, increases the cost of smaller PV systems since a structure must be erected to support the panels themselves.

Hosting Capacity: The amount of additional electrical distributed generation (solar PV system capacity) that can be installed on the electrical grid without causing issues with power quality or reliability.

Inverter: A device that changes direct current (DC) to alternating current (AC). In the context of solar power, it changes the DC electricity produced by solar panels into AC electricity that can be used in a home or fed back into the electrical grid.

Isolation Transformer: A transformer used to transfer electrical power from a source of alternating current power to some equipment while isolating the powered device from the power source, usually for safety reasons.

Line Side Tap: A connection made on the line side of the main service disconnect, as opposed to the load side. It's often used to connect solar panels or other distributed generation sources to the electrical service.

LIDAR Assessment: Light Detection and Ranging (LIDAR) is a remote sensing method that uses light in the form of a pulsed laser to measure variable distances to the Earth. In the context of solar energy, a LIDAR assessment can be used to simulate site specific shading, barriers on a roof, or assess potential sites for solar installations.

Load Calculation: The process of determining how much power is used by all the electrical devices in a building. This calculation is used to size electrical services, design electrical circuits, and plan energy generation systems like solar panels.

Load Center: A panel box that serves as a central connection point for household circuits. It contains circuit breakers or fuses which protect the home's electrical wiring from overloads and can be used to disconnect power to all or part of the home.

Microgrid: A small-scale power grid that can operate independently or in conjunction with the area's main electrical grid. A microgrid can generate, distribute, and regulate the flow of electricity to consumers based on local needs and conditions.

Microgrid Controller: A crucial component of a microgrid system, the microgrid controller manages and controls the operation of the microgrid. It monitors the power generation and loads, and makes decisions to maintain stable electricity supply within the microgrid.

Microgrid Relay: An electronic device used in microgrids to protect and control the electrical equipment within the microgrid. The microgrid relay is capable of isolating faults in the system and can coordinate with other devices to maintain the stability of the microgrid.

Microinverter: A type of inverter used in solar power systems where each solar panel has its own inverter. This allows each panel to operate independently of the others, improving efficiency when some panels are shaded or otherwise underperforming.

Module Degradation Rate: This is the rate at which a solar panel's output decreases over time. The typical module degradation rate is about 0.5% to 1% per year.

Net Energy Metering (NEM): A billing mechanism that credits solar energy system owners for the electricity they add to the grid. For example, if a residential customer has a PV system, the electricity their panels generate can offset the electricity they consume from the grid.

OCPD (Overcurrent Protection Device): A device (like a fuse or circuit breaker) designed to interrupt an electrical circuit when the current exceeds a specific value for a specific period of time. It helps protect electrical equipment from damage due to excess current.

Over Current: A condition where the current (the flow of electricity) exceeds the rated limit of an electrical device or circuit. This can be caused by a short circuit, overload, or faulty design. Overcurrent can cause damage or even failure to the equipment, so protective measures like fuses and circuit breakers are used to prevent it.

Period of Autonomy: The length of time that a stand-alone system (like a solar panel system with battery storage) can meet the energy requirements of the load without additional energy input.

Photovoltaic (PV): The process of converting light into electricity using semiconducting materials that exhibit the photovoltaic effect. Solar panels use this principle to generate electricity when exposed to sunlight.

Point of Interconnection: The place where a distributed generation system, like a solar power system, connects to the electrical grid.

Power (kW): A measure of the rate of energy use or generation, equal to one thousand watts. Power is typically used to describe the capacity of a generator or the peak demand of a load.

Power Purchase Agreement (PPA): A financial agreement where a developer arranges for the design, permitting, financing, and installation of a solar energy system on a customer's property. The developer sells the power generated to the host customer at a fixed rate.

PV Fire Safety Setbacks: Guidelines or requirements for how far solar panels or other PV system equipment must be set back from features like roof edges or ridges, to allow for safe access in case of a fire.

Rapid Shutdown: A safety requirement for solar PV systems that ensures the system can quickly cut off power in the event of an emergency, like a fire or electrical fault.

Roof Attachment System: The specific equipment and techniques used to secure solar panels to a roof. This might involve mounting rails, brackets, clamps, or other hardware, and must be designed to withstand environmental conditions like wind and snow loads.

Roof Structural Analysis: An assessment of a roof's ability to support additional loads, such as solar panels or other equipment. This typically involves evaluating the roof's materials, construction, condition, and the local environmental conditions.

Seismic Zone: A geographical area with a particular level of seismic activity, or likelihood of experiencing earthquakes. Building codes often include requirements for seismic zones to ensure buildings can withstand the expected level of earthquake activity.

Single Line Diagram: Also known as a one-line diagram, this is a simplified notation for representing a three-phase power system. Instead of representing each of the three phases with a separate line, they are all shown as a single line. Key components like generators, transformers, and loads are usually represented by standardized schematic symbols.

Single Phase: A type of power system where the voltage varies in a sinusoidal fashion. In contrast to three-phase power, single-phase power is simpler and is commonly used in residential settings along with in small community buildings (like churches, meeting halls etc).

Site Map: A map or plan showing the layout of a site, including buildings, roads, and other features. In the context of a solar installation, a site map might also show the proposed location of the solar panels, inverters, main disconnects, meter equipment, ESS and other equipment.

Solar Pathfinder: A device used to assess the potential solar energy available at a specific location. It uses a fisheye lens to capture a panoramic image of the site, showing any obstacles that might shade the solar panels at different times of the day and year.

Staging Area: An area where materials, tools, and equipment are prepared and organized before being moved to the construction site. Having an efficient staging area can help improve productivity and safety during the installation process.

String Inverter: A type of inverter used in solar power systems where the solar panels are arranged in series into "strings", and each string is connected to a single inverter. This is a common setup for larger installations because it's cost-effective and efficient, but it can be less effective if shading is an issue, as the performance of the whole string can be affected by a single shaded panel.

Three Phase: This type of power system uses three conductors carrying alternating current of the same frequency and amplitude but with a phase difference of one-third of a cycle. Three-phase power is used in industrial and commercial applications due to its greater power density and flexibility.

UL9540/UL9540A: Standards for energy storage systems and equipment developed by Underwriters Laboratories (UL). UL 9540 covers the safety of the entire energy storage system, while UL 9540A specifically deals with the testing of thermal runaway fire propagation within battery systems.

Utility Tariff: A document set by a utility company outlining the rates and terms for its services. For electricity, this often includes different rates for different times of day or different levels of usage.

Voltage (120/240, 120/208, 277/480): These are common voltage standards for electrical power systems in North America. 120/240V is common in residential settings, 120/208V is often used in commercial settings or apartment buildings, and 277/480V is typically found in industrial or large commercial settings.

Workmanship Warranty: A type of warranty that covers the installation work. If there are issues with the solar system that are due to mistakes made during installation, a workmanship warranty will typically cover the cost of repairs. This is separate from the equipment warranties offered by the manufacturers of the solar panels, inverters, and other components.

CASCADIA
RENEWABLES

Site Visit Photos and Project Information - Feasibility Study Addendum

Suquamish Tribe
House of Awakened Culture
7325 NE Parkway
Suquamish, WA 98392

Date of Site Visit: Wednesday, September 4, 2025
Site Visit Conducted by: Markus Virta, Joshua Miller
Project Address/Location: 7325 NE Parkway, Suquamish, WA 98392
Primary Contact/Representative: Cherrie May, Manager, Office of Emergency Management
Primary Contact/Representative Phone Number: 360-394-8507 (Office), 360-271-4403 (Cell)
Primary Contact/Representative Email: cmay@suquamish.nsn.us
Additional Contacts/Phone Numbers:
Contact(s)/Support Staff @ Site Visit: Todd, Facilities Manager

Table of Contents

Summary

Project Overview

Cascadia Renewables conducted a site visit for The Suquamish Tribe's House of Awakened Culture on September 4, 2024 to assess the potential for solar plus storage, in our capacity as an internal vendor providing technical assistance or the WA Department of Commerce *Solar Plus Storage for Resilient Communities* grant program.

There is a single meter feeding the facility, with a rooftop location, which has the maximum available capacity for a 219.40 kW (Peak DC Output) PV system with associated ESS for resiliency and arbitrage functionality.

Site Visit Notes/Findings/Questions

Engagement log: *Summary of this site visit in terms of who was there our biggest conclusion.*

Date: *September 4, 2024*
Time: *11am-1pm*
Attendees:

- *Cherrie May, Emergency Manager, Suquamish Tribe*
- *Todd (last name TBD), Facilities Manager, Suquamish Tribe*
- *Joshua Miller, Sr PV Design and Project Manager, Cascadia Renewables*
- *Markus Virta, Managing Partner, Cascadia Renewables*

Summary:
The site visit focused on the House of Awakened Culture (HOAC), a key facility for the Suquamish Tribe. Discussions revolved around the integration of solar panels and battery energy storage systems (BESS) to enhance the building's resiliency. The tribe emphasized aesthetics, requesting black PV modules with concealed conduit routing and a cedar fence around the BESS, which will likely be placed on the southwest corner of the property. The site is critical to the tribe's cultural and emergency functions.

Conceptually, what is the site?
Identify what purpose the site serves and what it is being considered for (hinting at why resilience is important):

The House of Awakened Culture serves as a monumental community gathering place for the Suquamish Tribe. It functions as a space for ceremonies, cultural events, and community resilience activities. The tribe is considering this site for a solar and battery energy system to support its role as a hub during emergencies. The focus on aesthetics and resilience underlines the importance of maintaining cultural integrity while preparing for disruptions, highlighting the need for sustainable energy solutions.

The building is a 13,169-square-foot structure modeled after traditional Puget Sound longhouses. It includes:

- *A 6,200-square-foot auditorium with seating for hundreds*
- *Commercial kitchen*
- *Restrooms*
- *Dressing rooms*
- *Indigenous Foods Garden These features make it versatile for both cultural activities and emergency responses. It is designed to handle gatherings of various sizes and serves as a potential emergency distribution hub.*

Located on the Port Madison Indian Reservation, the HOAC draws from the historical significance of the nearby Old Man House, which was a large communal longhouse. It is positioned along the shoreline of Agate Passage, half a mile from where the Old Man House stood, symbolizing the tribe's cultural revitalization.

The HOAC is a central cultural and social space for the Suquamish Tribe. It plays an essential role in maintaining the tribe's cultural practices, serving as a venue for ceremonies, educational programs, and community events. Additionally, it serves as a key location for emergency preparedness, acting as a care center or distribution hub during crises.

The facility serves the Suquamish Tribe and members of other Puget Sound tribes, hosting events that attract thousands of visitors, including the annual Canoe Journey, which brings together regional tribal communities.

Project Goals:
Outages to Prevent: *The project aims to mitigate the impact of both short, seasonal outages and potentially larger, more prolonged grid failures.*
Resiliency Goals: *For the tribe, resiliency includes ensuring that the facility remains operational as a gathering point for care and coordination during emergencies. The aesthetic and functional integration of solar and battery storage is crucial for maintaining this capacity.*
Outage Patterns: *The community has noted an increase in short seasonal outages and is preparing for larger, more extended outages by reinforcing the site's energy independence.*

Big Outage Preparedness: *Yes, there is a strong focus on preparing for significant outages, as the facility is central to the tribe's cultural and emergency management activities.*

Site Visit Finding in Brief

Key Structural information: The single story wood-framed buildings appear in excellent condition with no structural improvements required. A full plan set was provided by Suquamish personnel for the structural engineering analysis.

Key Roof Condition information: The standing seam metal roof appears to have not been cleaned or serviced since it was originally installed. There is a significant amount of seagull/bird droppings across the entirety of the roof surface that indicates that the site will require regular maintenance and cleaning. On site personnel stated that there are leakage issues along the valley and central roof area of the primary building. Repairs are not currently scheduled or budgeted, so the PV system installation must be laid out to avoid this area.

Key Shading information: The smaller west-facing boat shed building has no shading issues. The larger primary building is in close proximity to a large grove of trees along the south end that should be taken into account when laying out the PV array locations.

Key Electrical Infrastructure information: The building's electrical infrastructure is centrally located on the site between the southern primary building and the northern boat shed, with the Main Distribution Panel and sub-panels located in the interior main electrical room at the north end of the primary building, and the PSE meter and CT enclosure located on the north exterior of that building. The main electrical room is accessible from an external access door adjacent to the meter/CT enclosure, or through the main entrance hallway. The incoming primary electrical service feeds the 600 A, 120/240V Main Distribution Panel.

Key Existing Utilities information: The site is fed by a pad-mounted 37.5 kVA Puget Sound Energy transformer that is located 20' west of the main electrical room and PSE meter location, just outside of the secured chainlink fence area where the PV inverters, combiner panel and possible PCC location will be. The conceptual BESS location would be just to the south of the transformer along the west building face, or farther to the south along the west side just to the south of the main building entrance sidewalk.

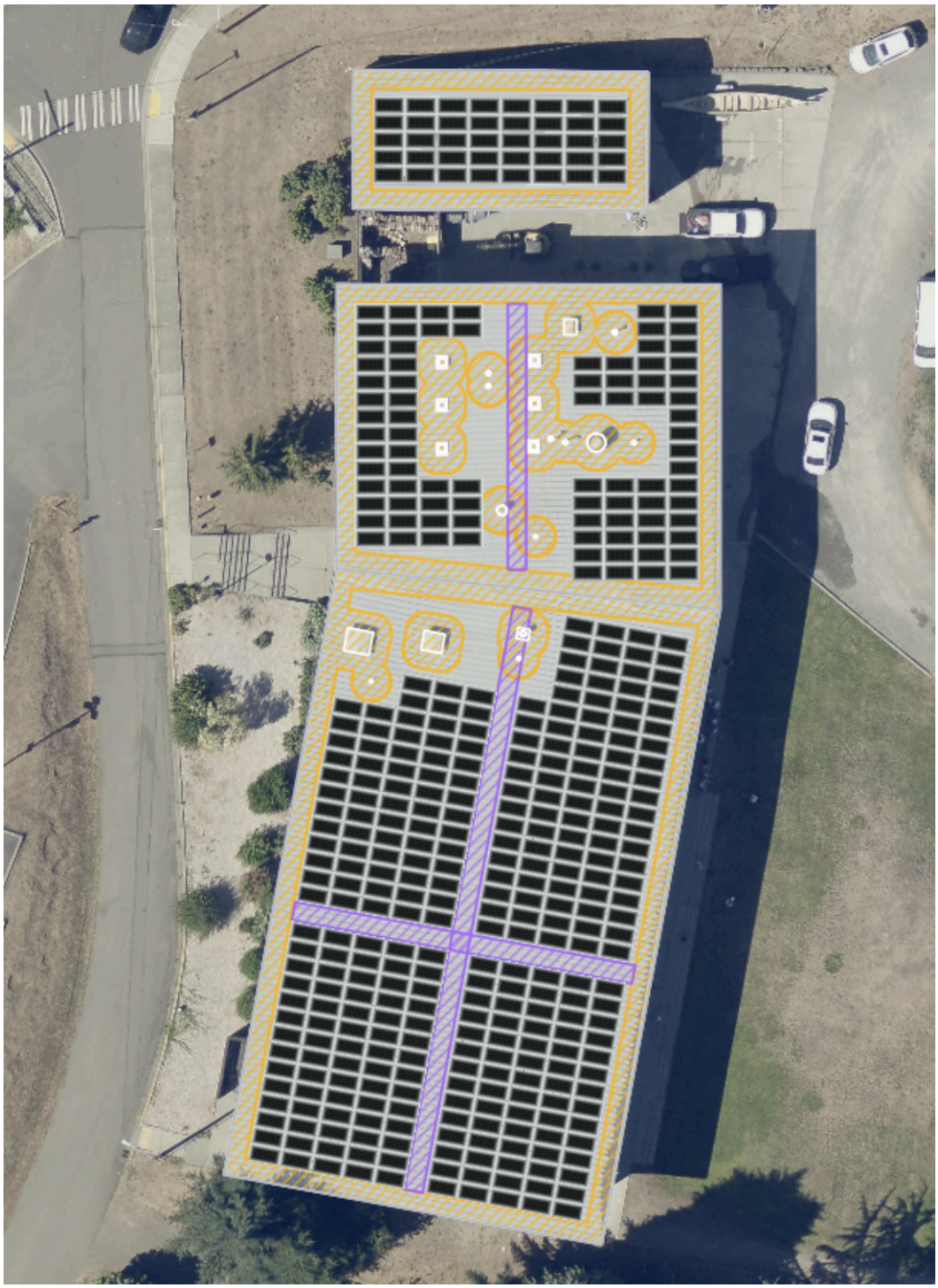
Key Accessibility for Construction information: The site is easily accessible from the lower west and north sides with standard extension ladders on to the single story standing seam metal roof areas where the PV will be installed. Forklift or manlift access may not be required for this site.

Project Site Plan/One Line/Reference Drawings from Owner Provided Plans:

*Plans were provided on a memory stick and will be uploaded here.

Pre Site Visit Aurora Layout for On Site Reference:

Pre Site Visit MAX System Size (DC): 219.40 kW DC
Notes on Items/Locations to Follow-up on at Site Visit: Review all PV locations for unseen vents/etc from Google Earth images. Type of standing seam?



Site Visit Reference Photos and Information

Site Entrance/Overall Building Reference:

Notes on Access to Site (Gate Codes/etc): This is a publicly accessible building off of Suquamish Way NE

Electric Utility Provider Owned Equipment

Primary Utility Pole/Pad Mounted Transformer:

Description of Location: West side of the property, 20’ northwest of the main electrical room external access door.
UtilityTransformer Rating: 37.5 kVA
Utility Transformer Voltage: 120/240V
Utility Transformer Phase: 1-Phase

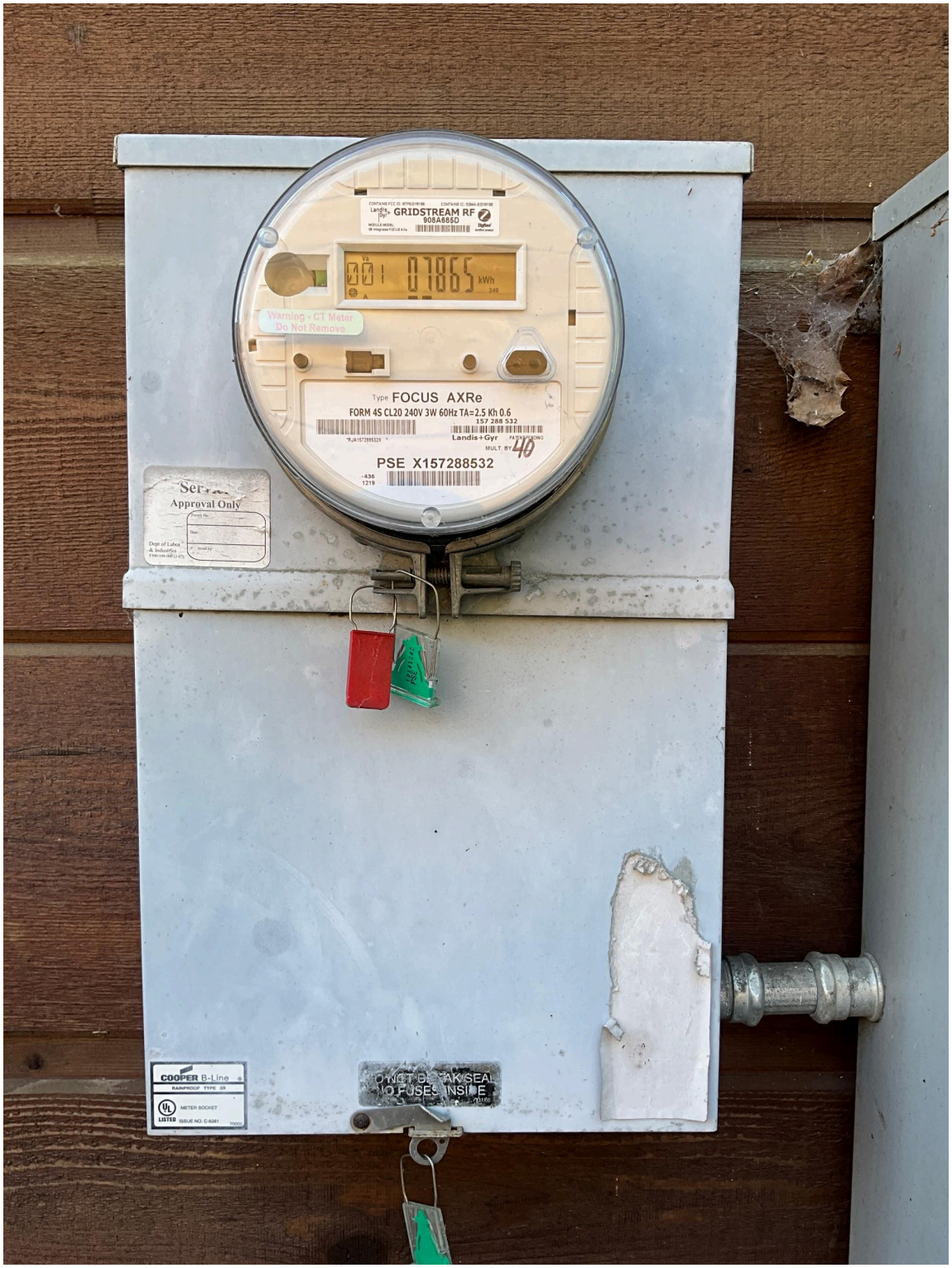

37.5
WARNING
240/120
RF

Utility Meter Location:

Description of Location: North exterior wall of the primary building, adjacent to the CT enclosure.

Utility Meter Type and Meter/Account Number Close-up:

Electric Utility Provider: Puget Sound Energy
Utility Meter #: X157288532
Utility Meter Type (CT/etc): CT


GRIDSTREAM RF
908A665D
07865
kWh
Warning - CT Meter
Do Not Remove
Type FOCUS AXRe
FORM 4S CL20 240V 3W 60Hz TA=2.5 Kh 0.6
157 288 532
Landis+Gyr
MULT. BY 40
PSE X157288532
Approval Only
COOPER B-Line
RAINPROOF TYPE 3R
METER SOCKET
LISTED

Utility CT Panel:

Description of Location: North exterior wall of the primary building, adjacent to the PSE meter.

Emergency/Back-up Generator

Generator Location:

Notes on Location/Access: N/A - No on site generator

Customer Owned Primary Electrical Equipment

Manual Utility Disconnect Switch If Applicable (Not Main Breaker):

Description of Location: N/A

Main Distribution Panel Location/Access:

Description of Location: External access door on the north end of the primary building, or internal access from the main entrance hallway.


TURN OFF
LIGHTS & FAN

Main Distribution Panel w/Surrounding Equipment:

Main Distribution Panel - SEDB Manufacturer Label:

Site Name of Panel: SEDB
Equipment Manufacturer: Eaton, Cutler-Hammer
Main Service Bus Capacity: 600 A
Main Service Voltage and Phase: 120/240V, 1-Phase
Main Distribution Center Type: Panelboard
Amps for PV Interconnection under 120% Rule: 120 A

Main Distribution Panel - SEDB Main Breaker:

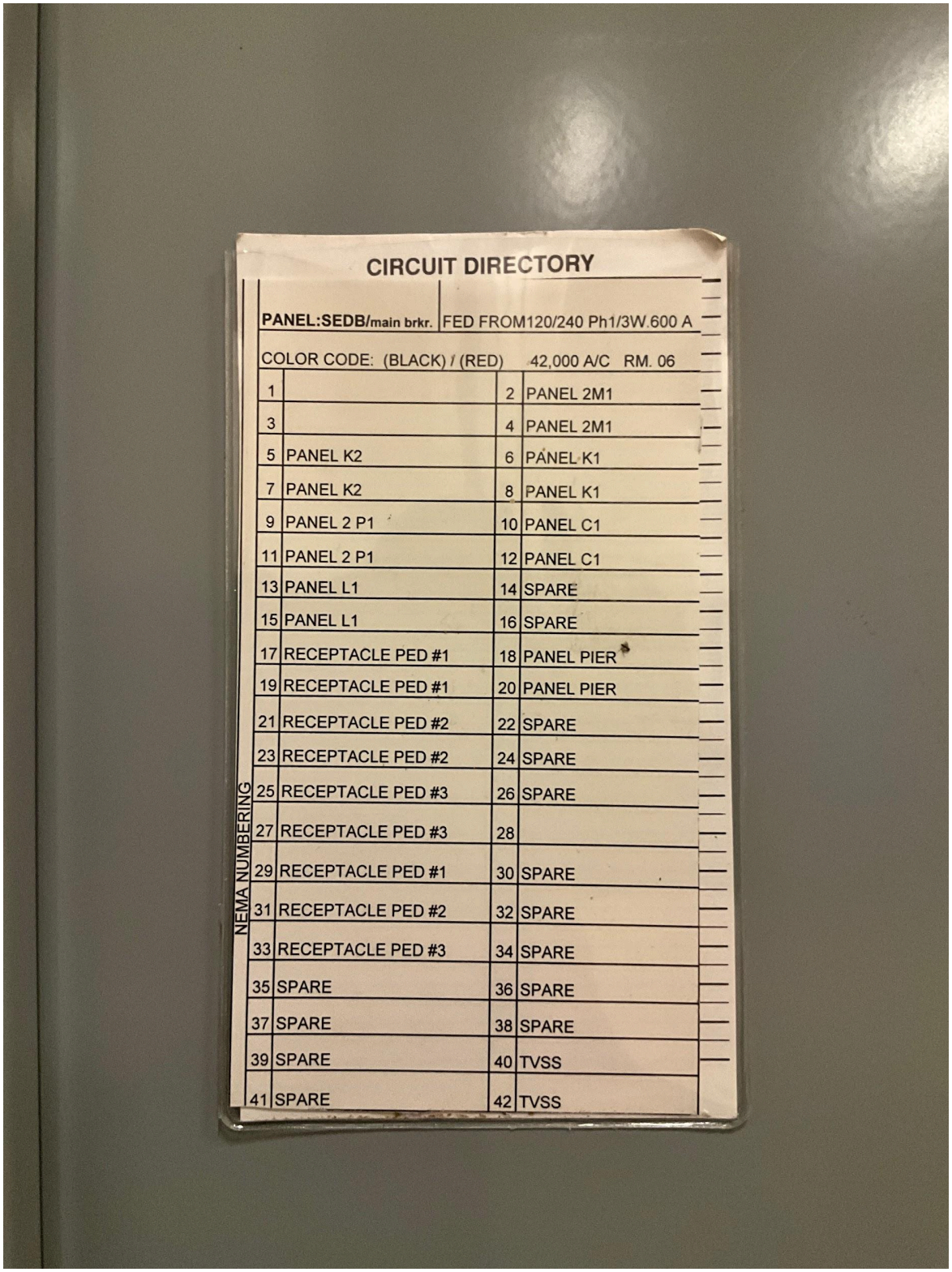
Main OCPD Rating: 600 A
Is it Programmable: Yes

Main Distribution Panel - SEDB - Load Breakers Close-up/Detail:


DANGER
ELECTRIC ARC FLASH HAZARD
Will cause severe injury or death.
Turn OFF ALL power before opening. Follow ALL requirements in NFPA 70E for safe work practices and for Personal Protective Equipment.
Terminals are Insulated
Cutler-Hammer
Industrial Circuit Breaker
DK 65k
On
Off
2
4
5
7
6
8
200
200

Spare Breaker Location in MDP - SEDB for Possible PV/BESS Interconnection:

Main Distribution Panel - SEDB Breaker Schedule for Load Calculations and Interconnection:



CIRCUIT DIRECTORY

PANEL:SEDB/main brkr. FED FROM120/240 Ph1/3W.600 A

COLOR CODE: (BLACK) / (RED) 42,000 A/C RM. 06

NEMA NUMBERING

1		2	PANEL 2M1
3		4	PANEL 2M1
5	PANEL K2	6	PANEL K1
7	PANEL K2	8	PANEL K1
9	PANEL 2 P1	10	PANEL C1
11	PANEL 2 P1	12	PANEL C1
13	PANEL L1	14	SPARE
15	PANEL L1	16	SPARE
17	RECEPTACLE PED #1	18	PANEL PIER
19	RECEPTACLE PED #1	20	PANEL PIER
21	RECEPTACLE PED #2	22	SPARE
23	RECEPTACLE PED #2	24	SPARE
25	RECEPTACLE PED #3	26	SPARE
27	RECEPTACLE PED #3	28	
29	RECEPTACLE PED #1	30	SPARE
31	RECEPTACLE PED #2	32	SPARE
33	RECEPTACLE PED #3	34	SPARE
35	SPARE	36	SPARE
37	SPARE	38	SPARE
39	SPARE	40	TVSS
41	SPARE	42	TVSS


PNL SEDB
120/240V 1Ph 3W
FED FROM
UTILITY TRANSFORMER

Customer Owned Secondary Electrical Equipment

Other Electrical/HVAC/Fire Control/Etc Equipment in Electrical Room:


PROTECTOR
EATON ELECTRICAL
PTX160
DANGER
HIGH VOLTAGE
SEE WARNING LABEL
PROTECTOR
EATON ELECTRICAL
1-800-809-2772
www.EatonElectrical.com
Suppression Circuit Status
1 LED per phase, normally on - OK
PTX160
DANGER
HIGH VOLTAGE
SEE WARNING LABEL

Possible AC/DC/PCC Wire Run Locations/Access to Main Electrical Room:

Notes on Access: Single wall penetration directly from the exterior area where the PCC and PV inverter may be installed adjacent to the PSE meter and CT enclosure.

Possible PCC/Equipment Mounting Locations In/Adjacent to Main Electrical Room:

Notes on Location: On site personnel prefer that the PCC and PV inverter be mounted along the 4’ tall west wall adjacent to the PSE meter, CT enclosure, and transformer. This location will require additional rack mounts to extend the the mounting location above the wall height.

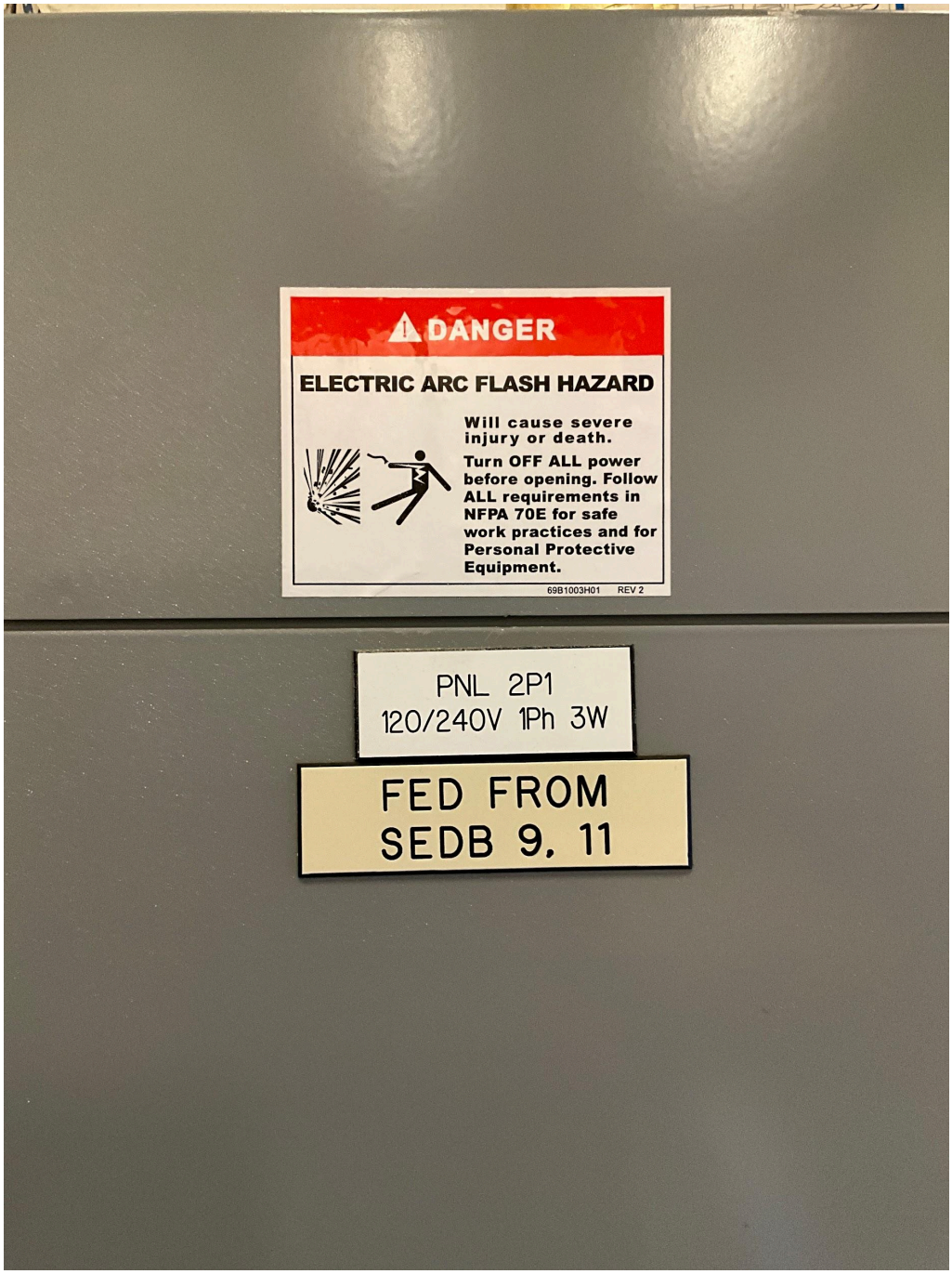
Sub Panel 2P1 Location/Access:

Description of Location: In main electrical room, adjacent to the MDP

Sub Panel 2P1 w/Surrounding Equipment:

Sub Panel 2P1 Manufacturer Label:

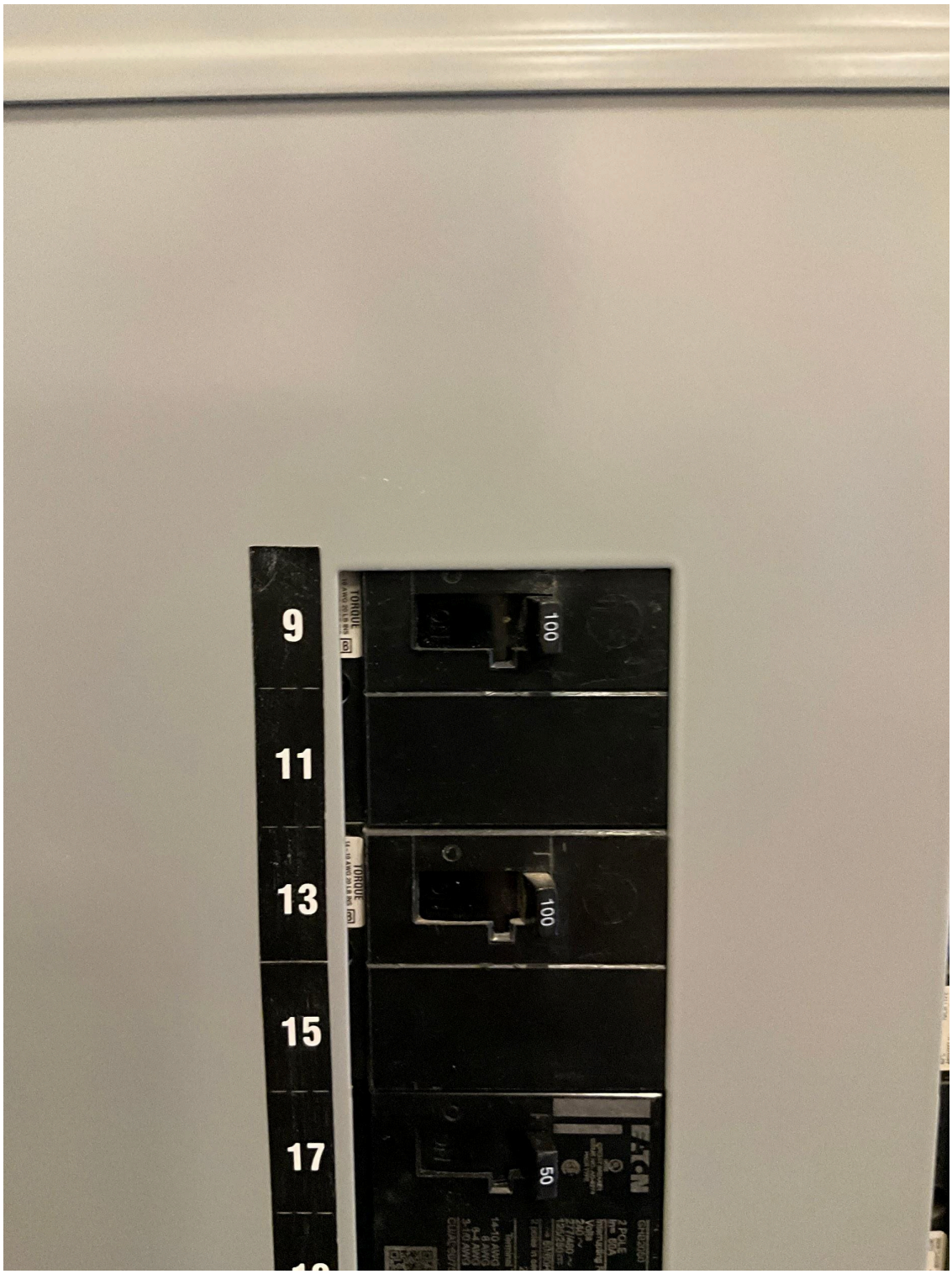
Site Name of Panel (ie Panel H1): 2P1
Equipment Manufacturer: Eaton, Cutler-Hammer
Bus Capacity: 100 A
Voltage and Phase: 120/240V, 1-Phase
Type (loadcenter/panelboard, switchboard, switchgear): Panelboard
Is this a designated generator/back-up panel: No



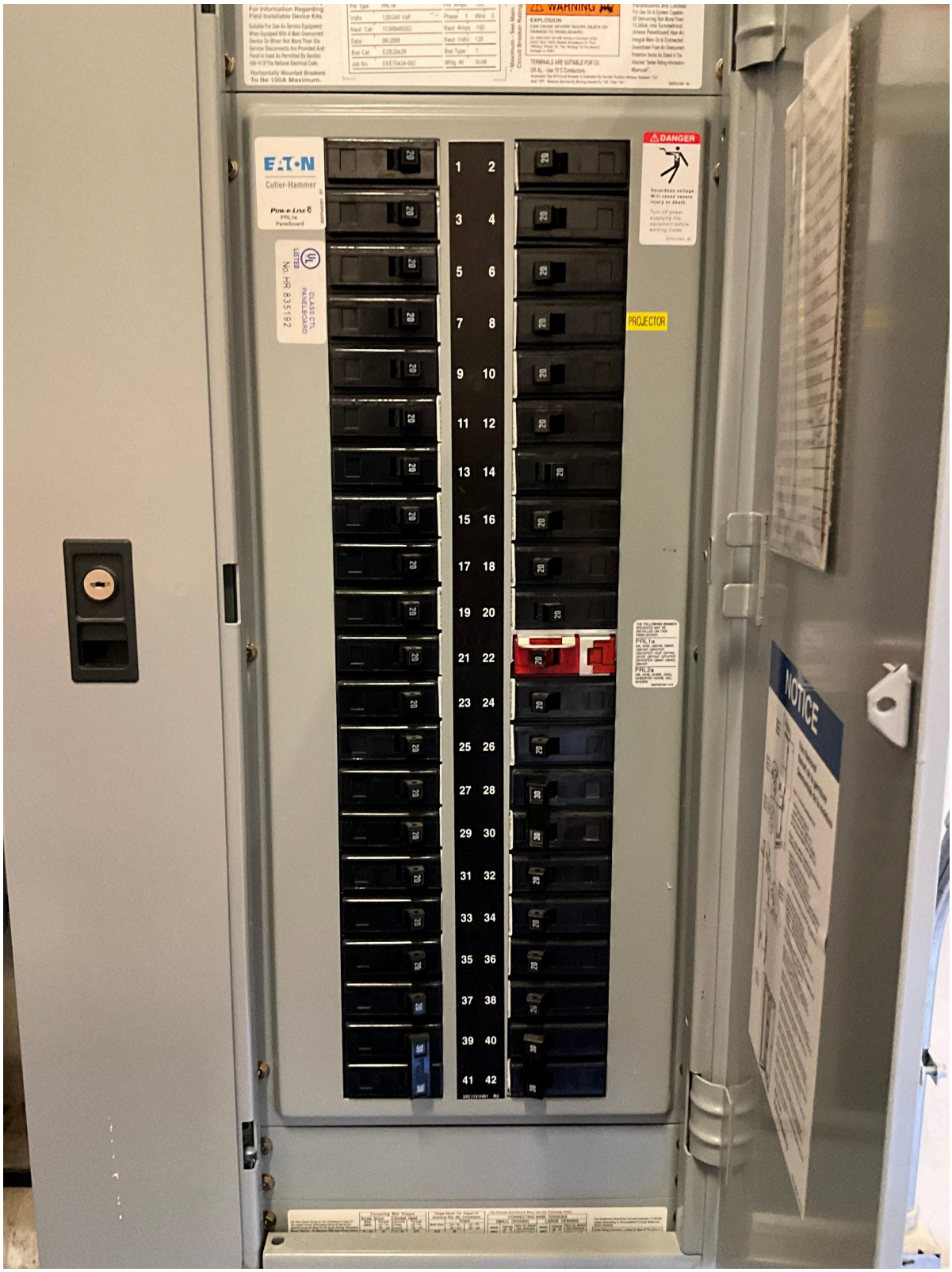

DANGER
ELECTRIC ARC FLASH HAZARD
Will cause severe injury or death.
Turn OFF ALL power before opening. Follow ALL requirements in NFPA 70E for safe work practices and for Personal Protective Equipment.
69B1003H01 REV 2
EATON | Cutler-Hammer
Must Be Installed Per Applicable Code and Manufacturer's Recommendations
Refer To Listing On Rear Of Deadfront Cover Assembly For Information Regarding Field Installable Device Kits.
Suitable For Use As Service Equipment When Equipped With A Main Overcurrent Device Or When Not More Than Six Service Disconnects Are Provided And Panel Is Used As Permitted By Section 408-14 Of The National Electrical Code.
Horizontally Mounted Breakers To Be 100A Maximum.
Pnl. Type PRL1A
Pnl. Amps 100
Volts 120/240 Volt
Phase 1 Wire 3
Neut. Cat 1C96646G02
Neut. Amps 100
Date 09/2008
Neut. Volts 120
Box Cat. EZB2042R
Box Type 1
Job No. SSE70424-002
Mfdg. At SUM
* Maximum - See Main Circuit Breaker Rating
WARNING
EXPLOSION
CAN CAUSE SEVERE INJURY, DEATH OR DAMAGE TO PANELBOARD.
On 240/120V 3O-4W Delta,Δ Connect Only 240V, Not 120V Rated Breakers To The "Wildleg" Phase "B". The "Wildleg" To The Neutral Voltage is 208V.
TERMINALS ARE SUITABLE FOR CU OR AL - Use 75°C Conductors.
Automatic Trip Of Circuit Breaker Is Indicated By Handle Position Midway Between "On" And "Off". Restore Service By Moving Handle To "Off" Then "On"
Through Feed And Subfeed Panelboards Are Limited For Use On A System Capable Of Delivering Not More Than 10,000A, rms Symmetrical, Unless Panelboard Has An Integral Main Or Is Connected Downstream From An Overcurrent Protective Device As Stated In The Attached "Series Rating Information Manual".
900P051H01 R4
EATON
Cutler-Hammer
POW-R-LINE C
PRL1a
Panelboard
900P045H01 R7
UL LISTED
No. HR 835192
CLASS CTL PANELBOARD
1 2
3 4
5 6
7 8
20
DANGER
Hazardous voltage. Will cause severe injury or death.
Turn off power supplying this equipment before working inside.
267P916H01 R3
PROJECTOR

Sub Panel 2P1 Main Breaker:

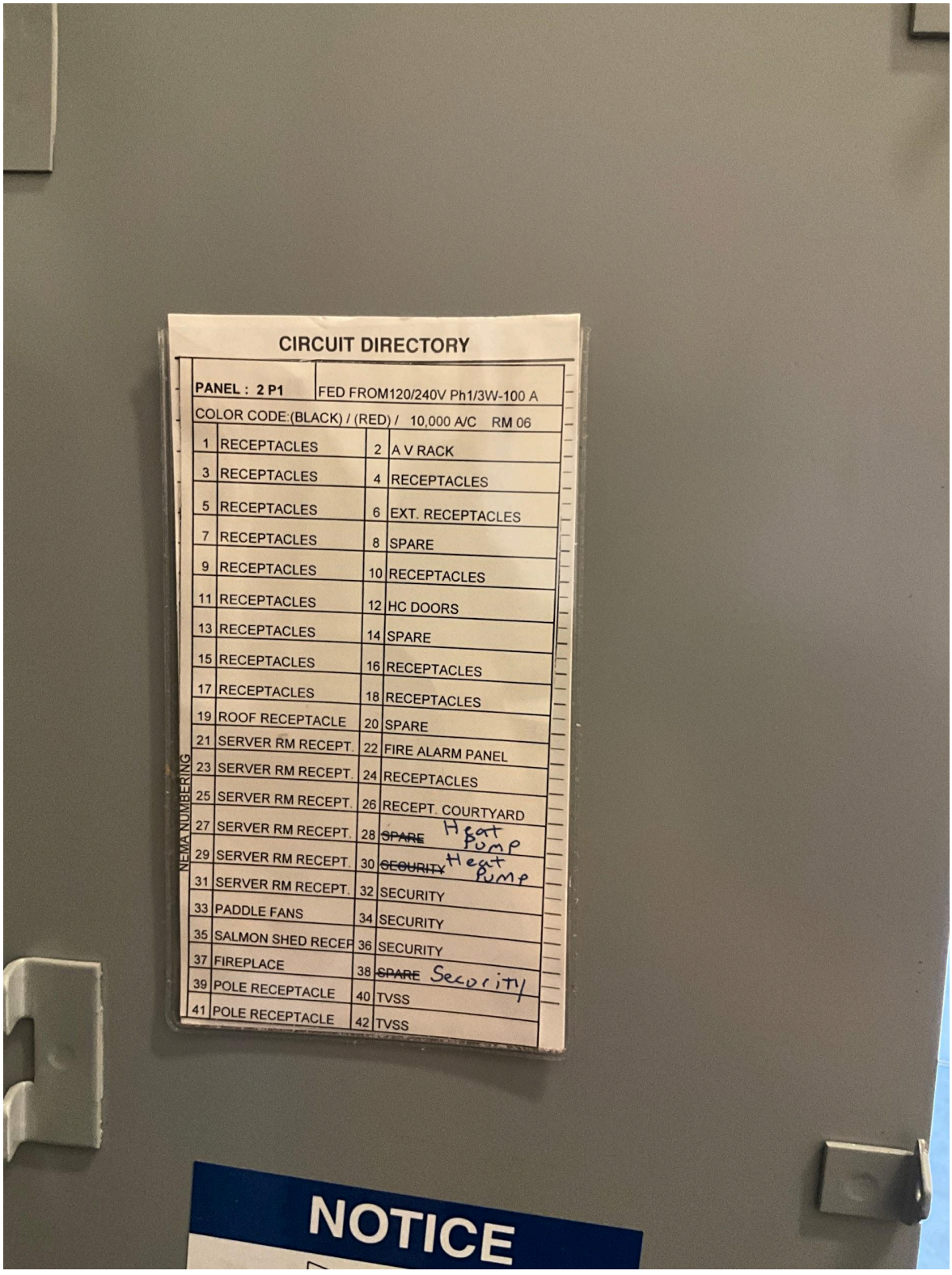
OCPD Rating: 100 A
Location Note if Fed from Main in MDP/Etc: Fed from MDP



Sub Panel 2P1 Breaker Close-up/Detail:



Sub Panel 2P1 Breaker Schedule for Load Calculations and Interconnection:



CIRCUIT DIRECTORY

PANEL : 2 P1 | FED FROM120/240V Ph1/3W-100 A

COLOR CODE:(BLACK) / (RED) / 10,000 A/C RM 06

NEMA NUMBERING

1	RECEPTACLES	2	A V RACK
3	RECEPTACLES	4	RECEPTACLES
5	RECEPTACLES	6	EXT. RECEPTACLES
7	RECEPTACLES	8	SPARE
9	RECEPTACLES	10	RECEPTACLES
11	RECEPTACLES	12	HC DOORS
13	RECEPTACLES	14	SPARE
15	RECEPTACLES	16	RECEPTACLES
17	RECEPTACLES	18	RECEPTACLES
19	ROOF RECEPTACLE	20	SPARE
21	SERVER RM RECEPT.	22	FIRE ALARM PANEL
23	SERVER RM RECEPT.	24	RECEPTACLES
25	SERVER RM RECEPT.	26	RECEPT. COURTYARD
27	SERVER RM RECEPT.	28	~~SPARE~~ Heat Pump
29	SERVER RM RECEPT.	30	~~SECURITY~~ Heat Pump
31	SERVER RM RECEPT.	32	SECURITY
33	PADDLE FANS	34	SECURITY
35	SALMON SHED RECEP	36	SECURITY
37	FIREPLACE	38	~~SPARE~~ Security
39	POLE RECEPTACLE	40	TVSS
41	POLE RECEPTACLE	42	TVSS

NOTICE

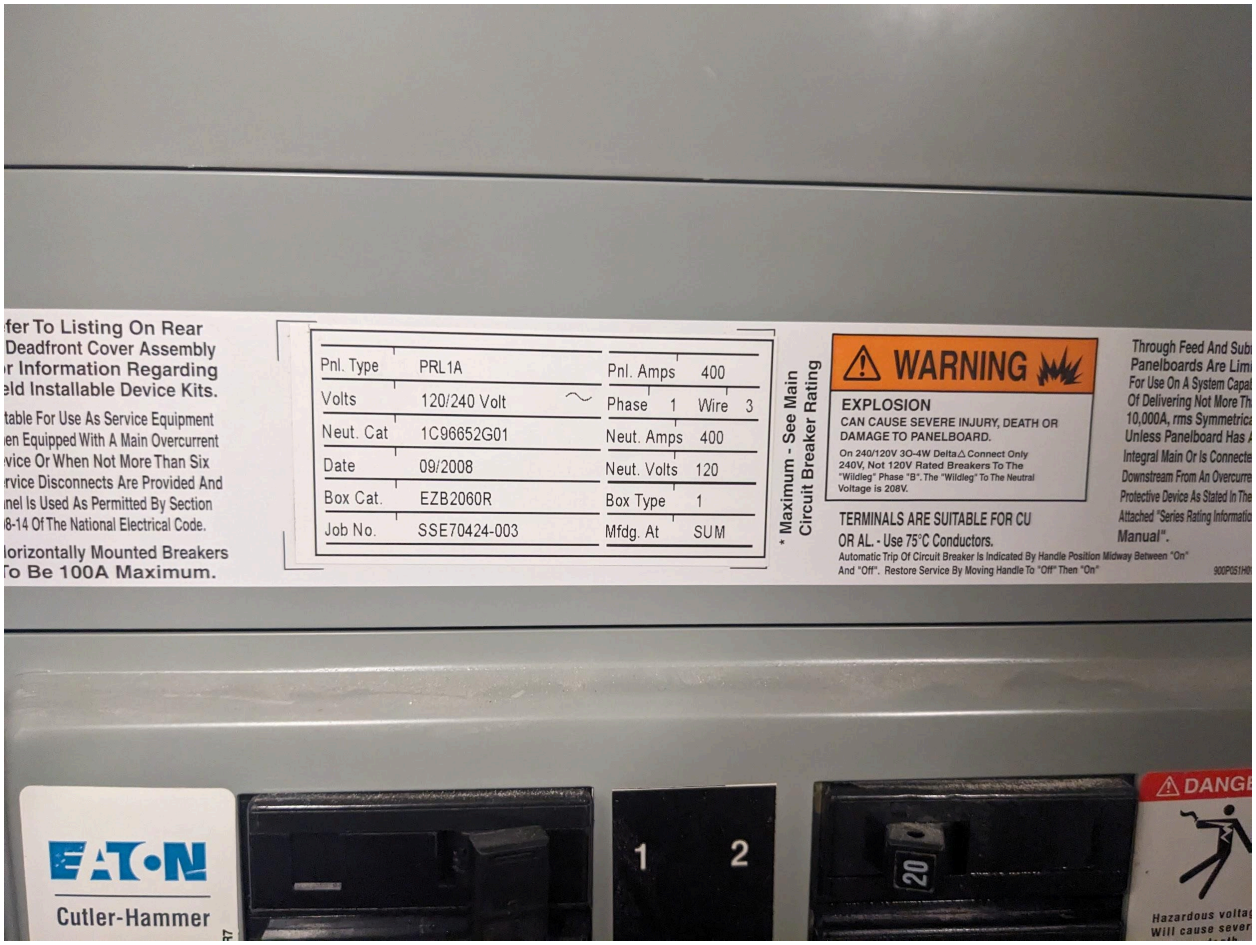
Sub Panel 2M1 and L1 Location/Access:

Description of Location: Upstairs maintenance room

Sub Panel 2M1 and L1 w/Surrounding Equipment:

Sub Panel 2M1 Manufacturer Labels:

Site Name of Panel (ie Panel H1): 2M1
Equipment Manufacturer: Eaton Cutler-Hammer
Bus Capacity: 400A
Voltage and Phase: 120/240V, 1-Phase
Type: Panelboard
Is this a designated generator/back-up panel: No

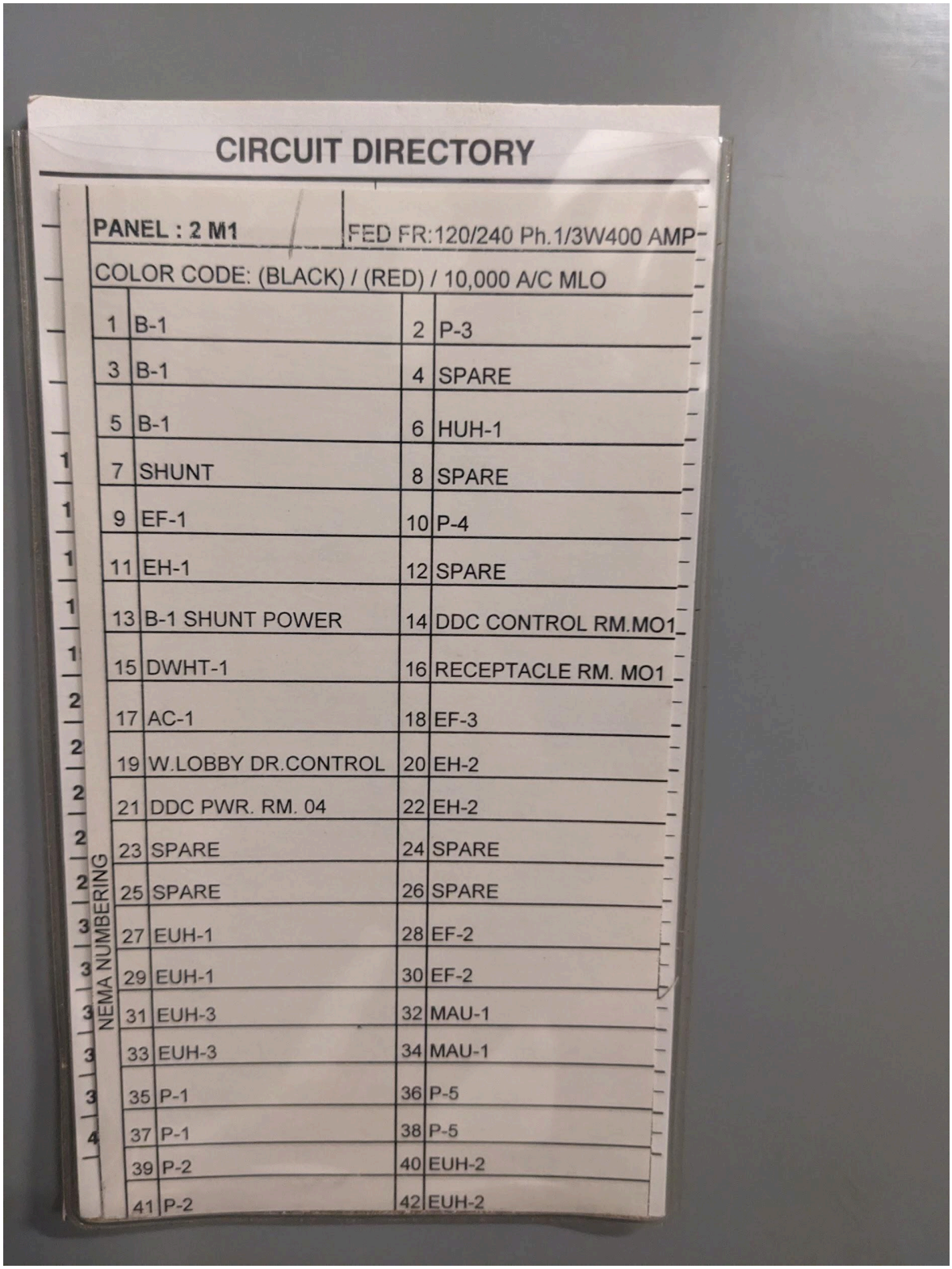


Sub Panel 2M1 Main Breaker:

OCPD Rating: 400A
Location Note if Fed from Main in MDP/Etc: Fed from MDP

Sub Panel 2M1 Breaker Close-up/Detail:

Sub Panel 2M1 Breaker Schedule for Load Calculations and Interconnection:



CIRCUIT DIRECTORY

PANEL : 2 M1 | FED FR:120/240 Ph.1/3W400 AMP

COLOR CODE: (BLACK) / (RED) / 10,000 A/C MLO

1	B-1	2	P-3
3	B-1	4	SPARE
5	B-1	6	HUH-1
7	SHUNT	8	SPARE
9	EF-1	10	P-4
11	EH-1	12	SPARE
13	B-1 SHUNT POWER	14	DDC CONTROL RM.MO1
15	DWHT-1	16	RECEPTACLE RM. MO1
17	AC-1	18	EF-3
19	W.LOBBY DR.CONTROL	20	EH-2
21	DDC PWR. RM. 04	22	EH-2
23	SPARE	24	SPARE
25	SPARE	26	SPARE
27	EUH-1	28	EF-2
29	EUH-1	30	EF-2
31	EUH-3	32	MAU-1
33	EUH-3	34	MAU-1
35	P-1	36	P-5
37	P-1	38	P-5
39	P-2	40	EUH-2
41	P-2	42	EUH-2

NEMA NUMBERING

Additional Breaker Fed from 2M1 to TBD Location:

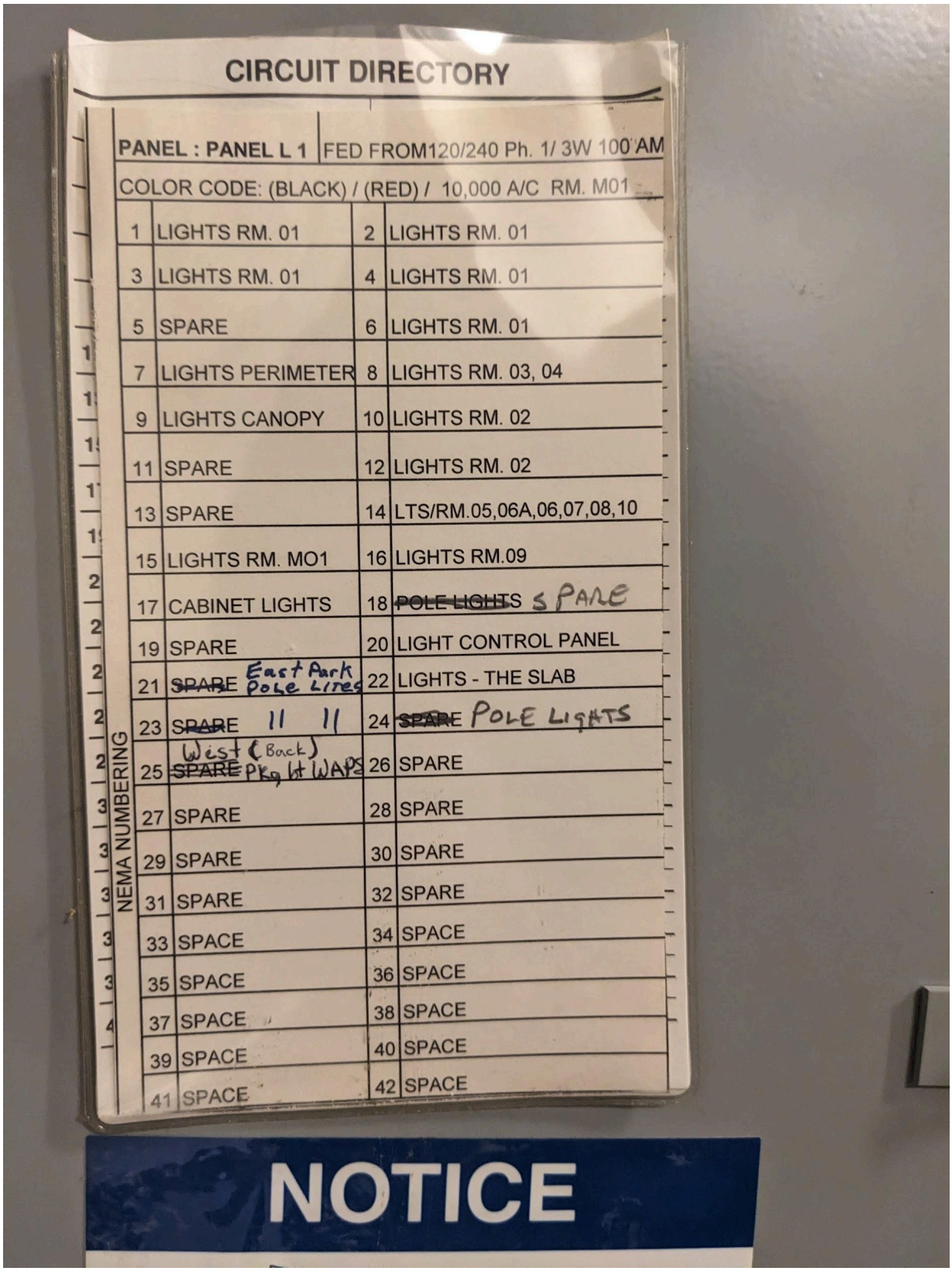
Sub Panel L1 Breaker Close-up/Detail:


EATON
Cutler-Hammer
POW-R-LINE C
PRL1a
Panelboard
UL LISTED
No. HR 835160
CLASS CTL
PANELBOARD
SHUNT TRIP
DANGER
Hazardous voltage.
Will cause severe injury or death.
Turn off power supplying this equipment before working inside.
1 2
3 4
5 6
7 8
9 10
11 12
13 14
15 16
17 18
19 20
21 22
23 24
25 26
27 28
29 30
31 32
33 34
35 36
37 38
39 40
41 42
PRL1a
PRL2a

Sub Panel L1 Manufacturer Labels:

Site Name of Panel (ie Panel H1): L1
Equipment Manufacturer: Eaton Cutler-Hammer
Bus Capacity: 100A
Voltage and Phase: 120/240V, 1-Phase
Type: Panelboard
Is this a designated generator/back-up panel: No

Sub Panel L1 Breaker Schedule for Load Calculations and Interconnection:



CIRCUIT DIRECTORY

PANEL : PANEL L 1 | FED FROM120/240 Ph. 1/ 3W 100 AM

COLOR CODE: (BLACK) / (RED) / 10,000 A/C RM. M01

NEMA NUMBERING

1	LIGHTS RM. 01	2	LIGHTS RM. 01
3	LIGHTS RM. 01	4	LIGHTS RM. 01
5	SPARE	6	LIGHTS RM. 01
7	LIGHTS PERIMETER	8	LIGHTS RM. 03, 04
9	LIGHTS CANOPY	10	LIGHTS RM. 02
11	SPARE	12	LIGHTS RM. 02
13	SPARE	14	LTS/RM.05,06A,06,07,08,10
15	LIGHTS RM. MO1	16	LIGHTS RM.09
17	CABINET LIGHTS	18	~~POLE LIGHTS~~ SPARE
19	SPARE	20	LIGHT CONTROL PANEL
21	~~SPARE~~ East Park Pole Lites	22	LIGHTS - THE SLAB
23	~~SPARE~~ 11 11	24	~~SPARE~~ POLE LIGHTS
25	~~SPARE~~ West (Back) Pkg Lt WAPS	26	SPARE
27	SPARE	28	SPARE
29	SPARE	30	SPARE
31	SPARE	32	SPARE
33	SPACE	34	SPACE
35	SPACE	36	SPACE
37	SPACE	38	SPACE
39	SPACE	40	SPACE
41	SPACE	42	SPACE

NOTICE


EATON
Cutler-Hammer
Pow-R-Line C
PRL1a
Panelboard
CLASS CTL
DANGER
1 2
3 4
5 6
7 8
9 10
11 12
13 14
15 16
17 18
19 20
21 22
23 24
25 26
27 28
29 30
31 32
33 34
35 36
37 38
39 40
41 42
PRL1a
PRL2a

Sub Panel K1 and K2 Location/Access:

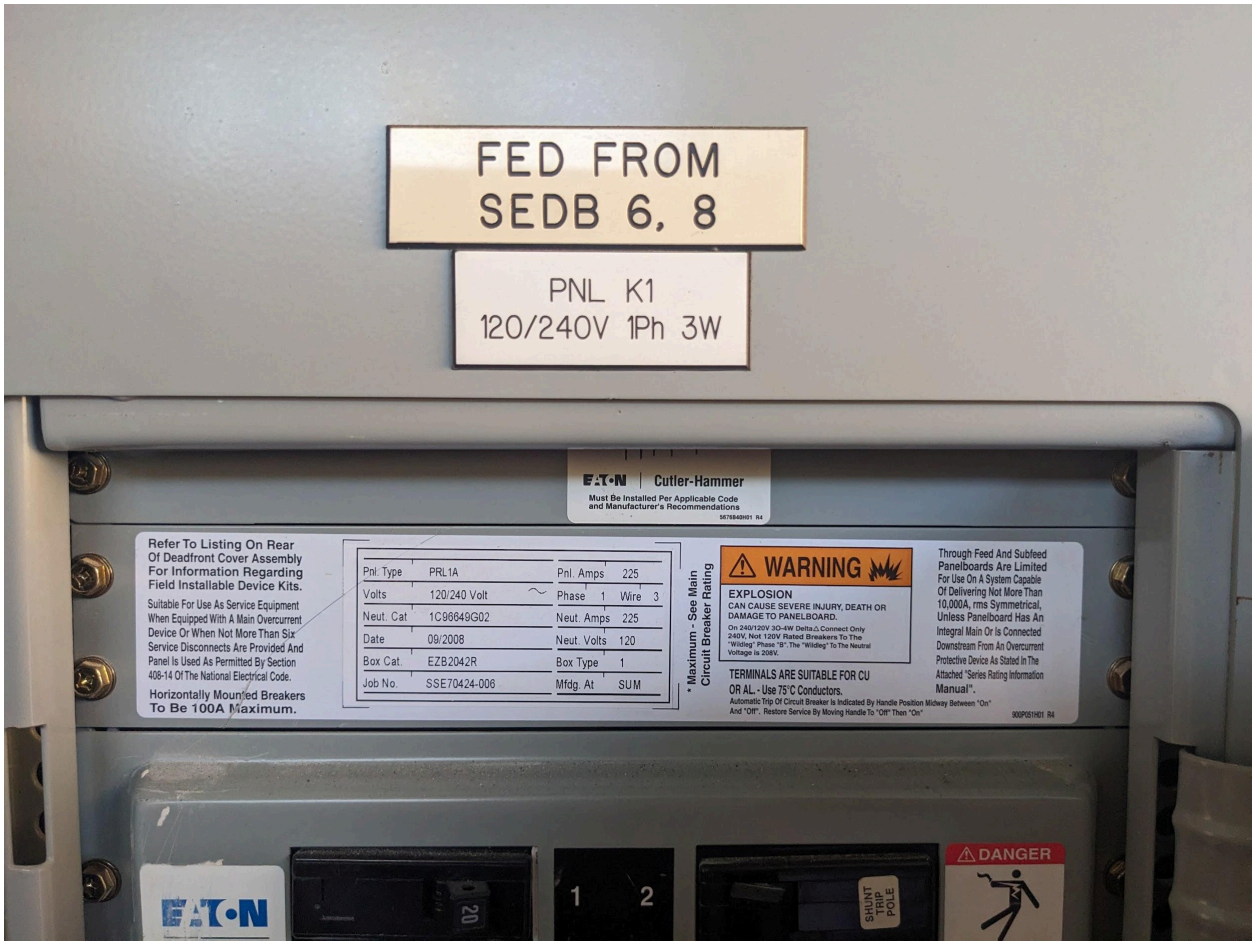
Description of Location: Located in secondary electrical room, adjacent to the main electrical room.

Sub Panel K1 and K2 w/Surrounding Equipment:


FED FROM
SEDB 6, 8
FED FROM
SEDB 5, 7
NOTICE

Sub Panel K1 Manufacturer Label:

Site Name of Panel (ie Panel H1): K1
Equipment Manufacturer: Eaton, Cutler-Hammer
Bus Capacity: 225 A
Voltage and Phase: 120/240, 1-Phase
Type (loadcenter/panelboard, switchboard, switchgear): Panelboard
Is this a designated generator/back-up panel: No



he Short Circuit Rating Of This Panelboard Is Equal To
The Lowest Current Interrupting Rating Of Any Device
Installed Except As Noted In The Series Ratings Information
Manual Attached. The Maximum RMS Symmetrical Amperes
Rating Is:
Type - PRL1a - 250,000 A @ 240V
Type - PRL2a - 250,000 A @ 480Y/277

Connecting Wire Torques

Screw Driver		Socket Head	
Wire AWG	Torque Lb • in (N • m)	Across Flats (mm)	Torque Lb • in (N • m)
18 - 10	35 (4.0)	5 / 16" (7.9)	275 (31.1)
8	40 (4.5)	3 / 8" (9.5)	375 (42.4)
6 - 4	45	1/2"	500

Torque Values For Copper Or Aluminum Bus Bar Connections

Bolt Size	Torque Lb • in (N • m)	Lb • Ft (N • m)
#10	30 (3.4)	
1 / 4"	68 (7.7)	
3 / 8"		20

For Ground And Neutral Bars, Use the Following Chart:

CONNECTING WIRE TORQUES

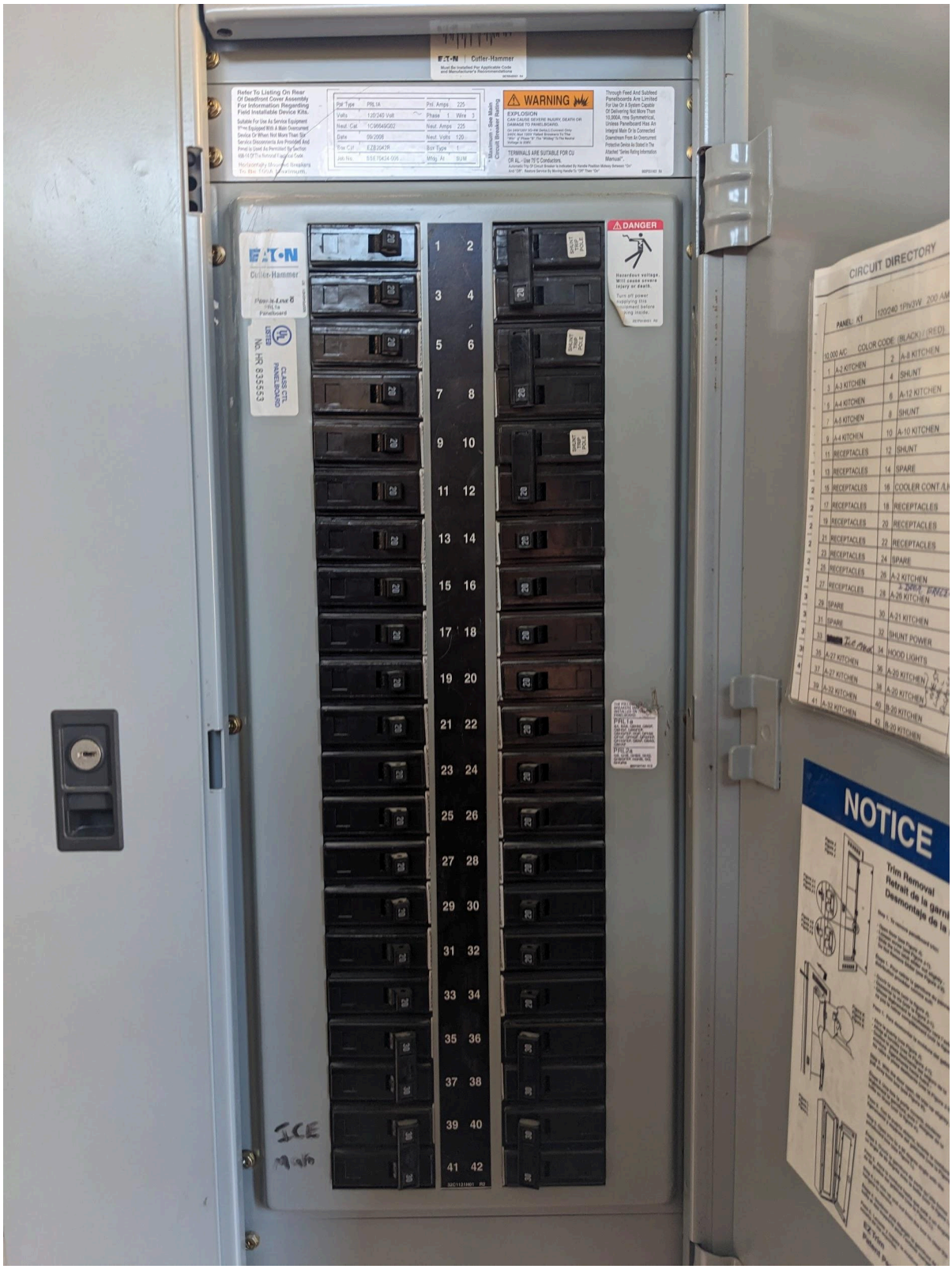
SMALL OPENING				LARGE OPENING			
WIRE AWG	TORQUE LB - IN (N • m)	MAX NO. WIRES PER OPENING NEUT.	GRD.	WIRE AWG	TORQUE LB - IN (N • m)	MAX NO. WIRES PER OPENING NEUT.	GRD.
14 - 12	35 (4.0)	1	2	14 - 10	35 (4.0)	1	2
10	35 (4.0)	1	1	8	40 (4.5)	1	1

Use Equipment Grounding Terminal Assembly
Unless Grounding Is Accomplished Through Me
Starter Raceway.

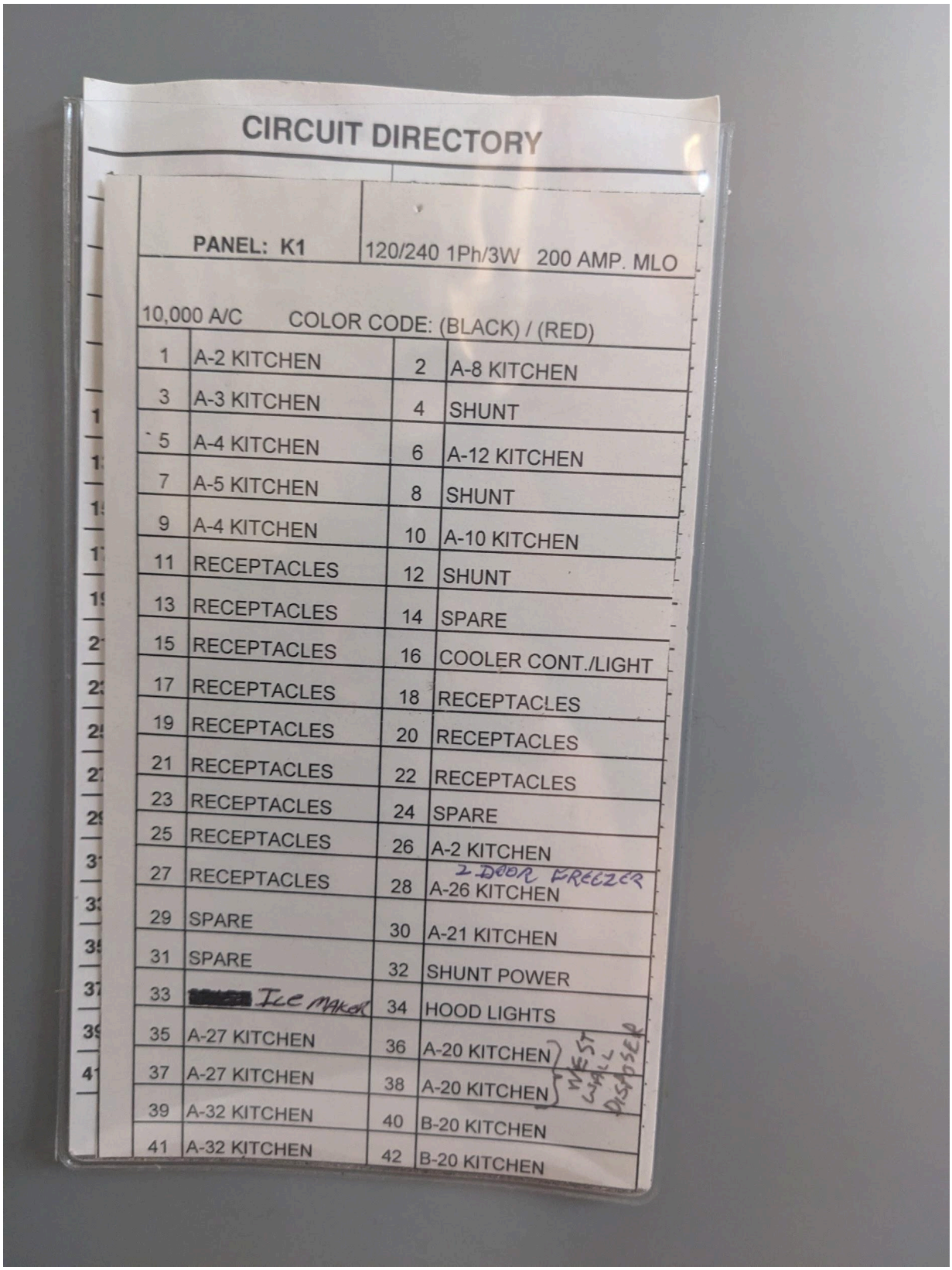
Series Rating Information, Located On Back Of Trim Door
Be Consulted Before Installation Of Any Panelboard If Seri
Ratings Is To Be Used.
Call 1-800-525-5582 For Replacement Manual If Lost.

To Close The Window, Close Door.

Sub Panel K1 Breaker Close-up/Detail:



Sub Panel K1 Breaker Schedule for Load Calculations and Interconnection:



CIRCUIT DIRECTORY

PANEL: K1		120/240 1Ph/3W 200 AMP. MLO	
10,000 A/C		COLOR CODE: (BLACK) / (RED)	
1	A-2 KITCHEN	2	A-8 KITCHEN
3	A-3 KITCHEN	4	SHUNT
5	A-4 KITCHEN	6	A-12 KITCHEN
7	A-5 KITCHEN	8	SHUNT
9	A-4 KITCHEN	10	A-10 KITCHEN
11	RECEPTACLES	12	SHUNT
13	RECEPTACLES	14	SPARE
15	RECEPTACLES	16	COOLER CONT./LIGHT
17	RECEPTACLES	18	RECEPTACLES
19	RECEPTACLES	20	RECEPTACLES
21	RECEPTACLES	22	RECEPTACLES
23	RECEPTACLES	24	SPARE
25	RECEPTACLES	26	A-2 KITCHEN
27	RECEPTACLES	28	2 DOOR FREEZER A-26 KITCHEN
29	SPARE	30	A-21 KITCHEN
31	SPARE	32	SHUNT POWER
33	[redacted] ICE MAKER	34	HOOD LIGHTS
35	A-27 KITCHEN	36	A-20 KITCHEN (WEST WALL DISPOSER)
37	A-27 KITCHEN	38	A-20 KITCHEN
39	A-32 KITCHEN	40	B-20 KITCHEN
41	A-32 KITCHEN	42	B-20 KITCHEN

Sub Panel K2 Manufacturer Label:

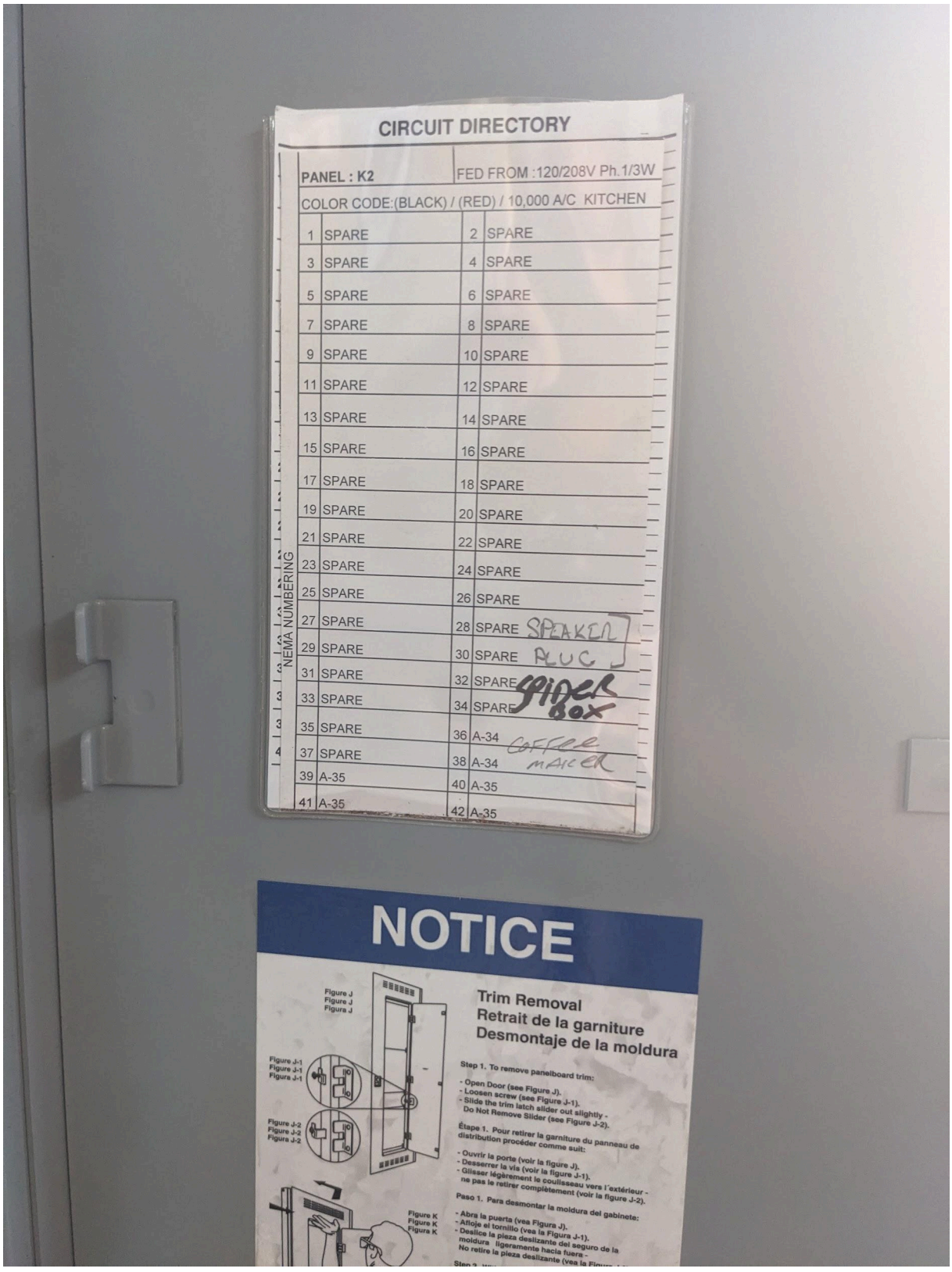
Site Name of Panel (ie Panel H1): K2
Equipment Manufacturer: Eaton, Cutler-Hammer
Bus Capacity: 225A
Voltage and Phase: 120/240V, 1-phase
Type (loadcenter/panelboard, switchboard, switchgear): Panelboard
Is this a designated generator/back-up panel: No

Sub Panel K2 Main Breaker:

OCPD Rating: 200A (Location 5 and 7)
*Location Note if Fed from Main in MDP/Etc: F*ed from MDP

Sub Panel K2 Breaker Close-up/Detail:

Sub Panel K2 Breaker Schedule for Load Calculations and Interconnection:



CIRCUIT DIRECTORY

PANEL : K2 — FED FROM :120/208V Ph.1/3W

COLOR CODE:(BLACK) / (RED) / 10,000 A/C KITCHEN

NEMA NUMBERING

1	SPARE	2	SPARE	
3	SPARE	4	SPARE	
5	SPARE	6	SPARE	
7	SPARE	8	SPARE	
9	SPARE	10	SPARE	
11	SPARE	12	SPARE	
13	SPARE	14	SPARE	
15	SPARE	16	SPARE	
17	SPARE	18	SPARE	
19	SPARE	20	SPARE	
21	SPARE	22	SPARE	
23	SPARE	24	SPARE	
25	SPARE	26	SPARE	
27	SPARE	28	SPARE	SPEAKER
29	SPARE	30	SPARE	PLUG
31	SPARE	32	SPARE	SPIDER BOX
33	SPARE	34	SPARE	
35	SPARE	36	A-34	COFFEE MAKER
37	SPARE	38	A-34	
39	A-35	40	A-35	
41	A-35	42	A-35	

NOTICE

Figure J
Figure J
Figure J

Figure J-1
Figure J-1
Figure J-1

Figure J-2
Figure J-2
Figure J-2

Figure K
Figure K
Figure K

Trim Removal
Retrait de la garniture
Desmontaje de la moldura

Step 1. To remove panelboard trim:
- Open Door (see Figure J).
- Loosen screw (see Figure J-1).
- Slide the trim latch slider out slightly - Do Not Remove Slider (see Figure J-2).

Étape 1. Pour retirer la garniture du panneau de distribution procéder comme suit:
- Ouvrir la porte (voir la figure J).
- Desserrer la vis (voir la figure J-1).
- Glisser légèrement le coulisseau vers l'extérieur - ne pas le retirer complètement (voir la figure J-2).

Paso 1. Para desmontar la moldura del gabinete:
- Abra la puerta (vea Figura J).
- Afloje el tornillo (vea la Figura J-1).
- Deslice la pieza deslizante del seguro de la moldura ligeramente hacia fuera - No retire la pieza deslizante (vea la Figura

Energy Storage System (ESS)

ESS Indoor/Outdoor Installation Location #1:

Notes on Location: Located on the west side of the building, just outside of the main electrical room adjacent to the PSE transformer. This location is not ideal as there is a downslope from the driveway that may make forklift access difficult.
Type of Base Soil/Pavement/Concrete/Etc: Soil with water lines.
Fencing Required: Yes

ESS Indoor/Outdoor Installation Location #2:

*Notes on Location: *Preferred location by on site staff.* On the west side of the building, to the south of the main west entrance.
Type of Base Soil/Pavement/Concrete/Etc: Soil with the requirement to cut and repair the sidewalk in order to connect into the main electrical room to the north.
Fencing Required: Yes

BESS Fencing Example Requested by Owners:

*The on site personnel requested that the fence/wall surrounding the BESS be constructed with wood and concrete to match the overall building architectural style since the BESS location is visible adjacent to the main west entrance.

ESS AC Combiner Panel/PCC Installation Location:

Network Connection Location for ESS:

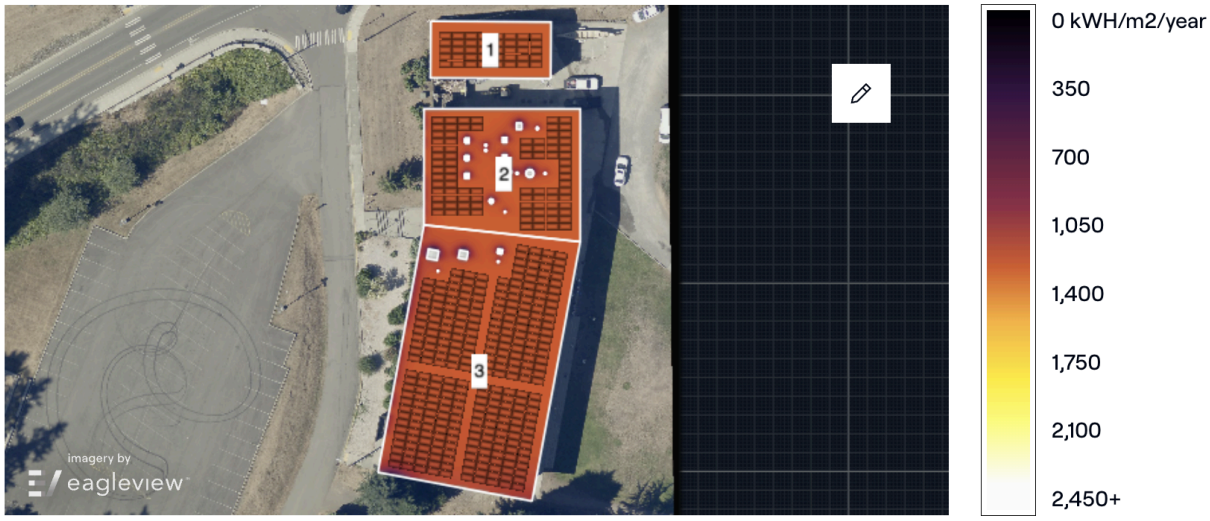
Trenching Location/Route to Energy Storage System (ESS):

Notes on Type of Soil/Ground: Soil with water/power that will need a utility locate. The line will cross the main entrance sidewalk and stairs that will need to be cut and replaced. The owners indicated that the steps may need to be completely redone to accommodate handicap access. Any marginal increases in cost for these upgrades beyond the standard cut and repair will be covered by the Tribe.
*Will Concrete/Pavement Cutting be Required: Y*es

Possible Staging Area for ESS Installation:

Pre Site Visit Aurora Solar Report/TSRF Image for On Site Reference:

Pre Site Visit MAX System Size (DC): 219.40 kW DC
Notes on Items/Locations to Follow-up on at Site Visit: Review all PV locations for unseen vents/etc from Google Earth images. Type of standing seam?



Summary

Array ID	Panel count	Azimuth	Pitch	Annual TOF	Annual solar access	Annual TSRF
1	40	270°	5°	84%	100%	84%
2	86	270°	5°	84%	99%	83%
3	296	281°	5°	83%	98%	82%
			Weighted average by panel count:		98.4%	82.4%

Solar/PV Design - Rooftop Information

Roof Access Location for PV Installation:

Notes on Access: Easy single story access from a short extension ladder.

Building Height Measurement:

Note on where image was taken for Aurora Reference: Northwest corner

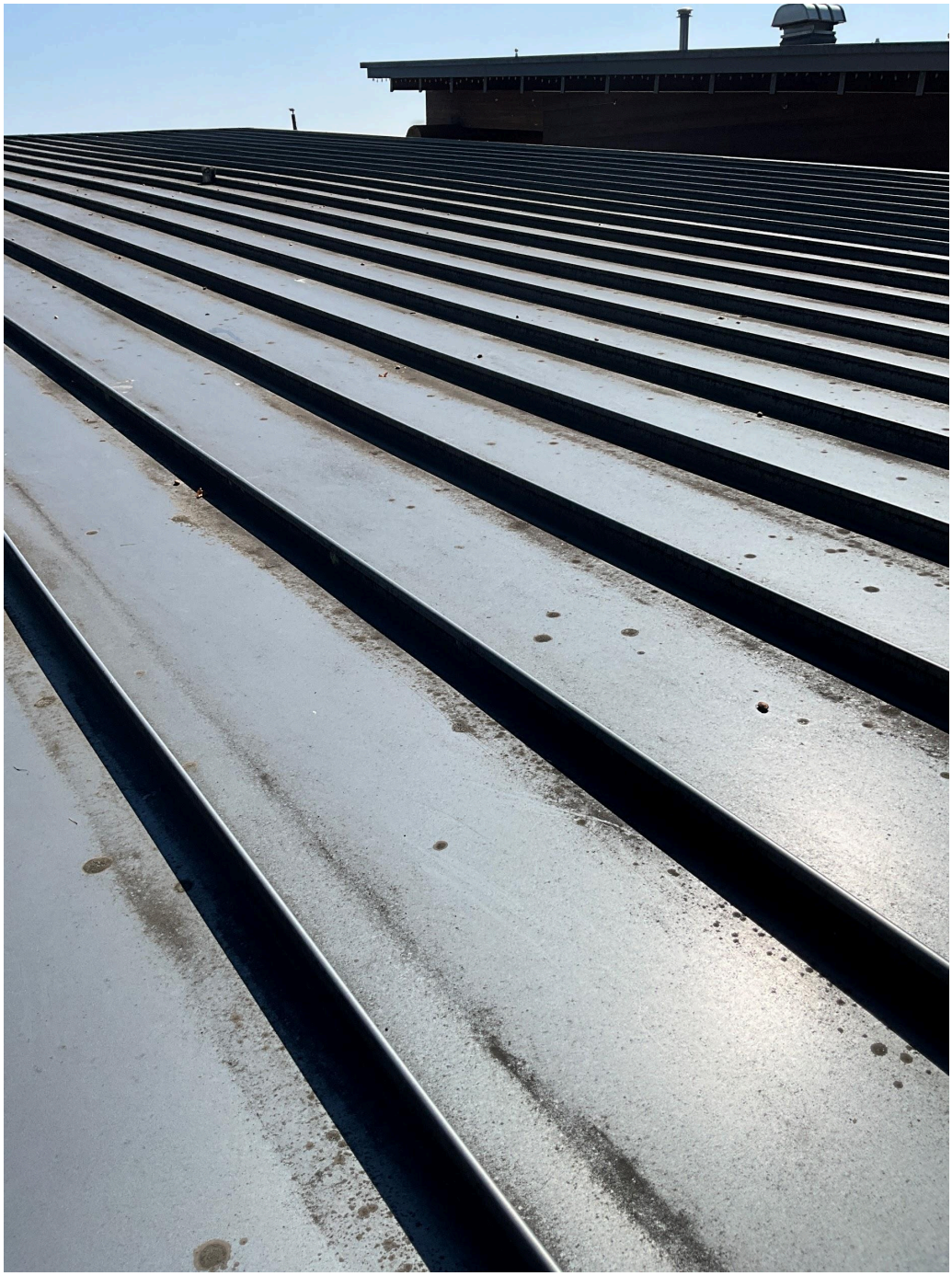
Solar/PV Installation Location Reference Photos - Roof #1:

Notes on Obstructions/Vents/etc: No vents or obstructions. There are roof anchors that are installed that can be moved, as they are bolted on to the standing seams.


SUQUAMISH
AUBURN
CHEVROLET

Roof #1 Material Quality/Age Close-up:

Estimated Roof Age: 12 years
Roof Material: Standing seam metal
Notes on Damage/Concerns: The roof does not appear to have been cleaned since it was installed. There is a significant amount of debris and bird droppings that will require cleaning prior to the install and regular cleaning afterwards to keep the modules debris free. There is no visible structural damage to the roof surface.




RR. APP'D
NO. 339 TC
STANLEY
Life Guard
ft
in

Roof #1 Angle Verification (App or Angle Finder):

Roof Angle (Rise/Run or Angle): 4.8 degree, 1/12
Roof Orientation: West

Roof #1 Parapet Height (If Applicable): N/A

Roof #1 Solar Access/Pathfinder for Aurora Verification (Left Side of Array Location):

Notes on Shading/Obstructions: No shading issues

Roof #1 Solar Access/Pathfinder Photo 2 for Aurora Verification (Right Side of Array Location):

Roof #1 Measurements for Aurora Verification:

Ridge to Vent Measurement: 64’6”
Edge to Edge Measurement: 30’6”


DEWALT
7
64 FT

Roof #1 PV/DC Conduit Routing Locations to Inverter Location:

Solar/PV Installation Location Reference Photos - Roof #2:

Notes on Obstructions/Vents/etc: No access was provided at the time of the site visit. The area where the vents are located, and along the valley will be avoided due to the ongoing leakage issues that have not been addressed by the Tribe.

Roof #2 Material Quality/Age Close-up:

Estimated Roof Age: 12 years
Roof Material: Standing seam metal

Roof #2 Angle Verification (App or Angle Finder):

Roof Angle (Rise/Run or Angle): 4.8 degrees, 1/12
Roof Orientation: West

Roof #2 Parapet Height (If Applicable): N/A

Roof #2 PV/DC Conduit Routing Locations to Inverter Location:

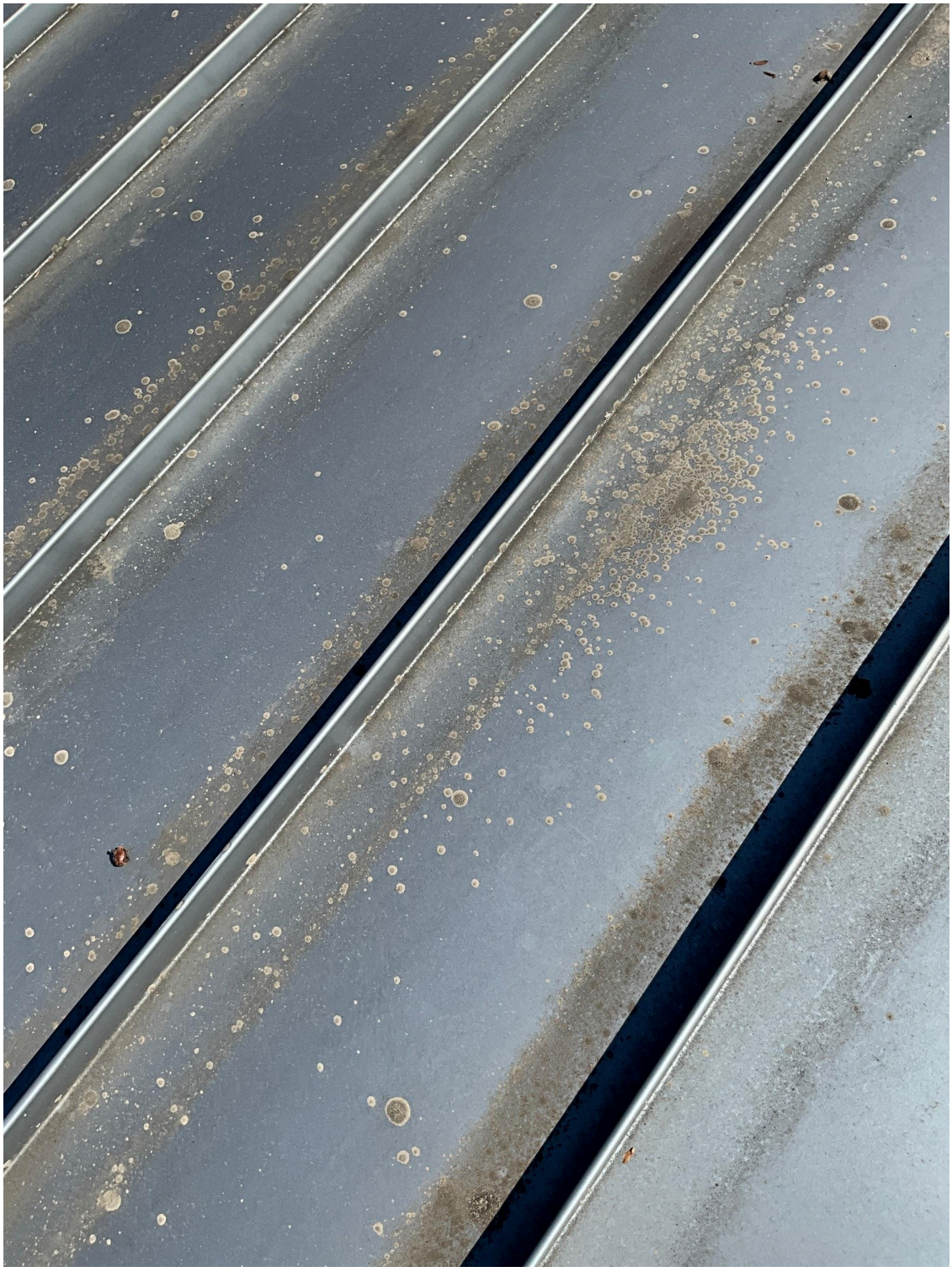
Solar/PV Installation Location Reference Photos - Roof #3:

Notes on Obstructions/Vents/etc: No obstructions on the southern half of the primary building.


DEAD
END
PRIVATE
PROPERTY

Roof #3 Material Quality/Age Close-up:

Estimated Roof Age: 12 years
Roof Material: Standing seam metal
Notes on Damage/Concerns: No leakage issues in this area according to on site personnel.



Roof #3 PV/DC Conduit Routing Locations to Inverter Location:

Solar/PV Design - Interior/Ground Level Information

Possible Staging Area for Solar/PV Panel Installation:

Solar/PV Installation Location - Ground-Level View of Roof #1:

Solar/PV Installation Location - Ground-Level View of Roof #2:

Solar/PV Installation Location - Ground-Level View of Roof #3:

Proposed Solar/PV Ground Level/Interior Inverter Installation Location:

Proposed Solar/PV AC Disconnect Location:

Network Connection Location for Solar/PV:

Proposed AC Conduit Run Locations - Interior/Exterior:

Roof Framing and Support Details for Structural Engineering Review - Roof 1: N/A (No internal access)

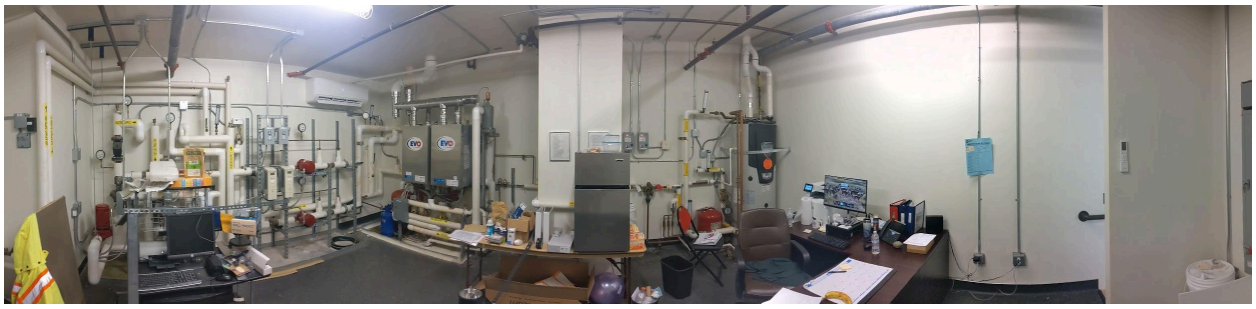
Roof Framing and Support Details for Structural Engineering Review - Roofs 2:

Roof Framing and Support Details for Structural Engineering Review - Roof 3:

Interior Sprinkler Photos (Minimizes Fire Setbacks per 2015 IBC):

Additional Site Visit Reference Photos/Notes

Heating loads in upstairs mechanical room:




SHIELD
WARNING

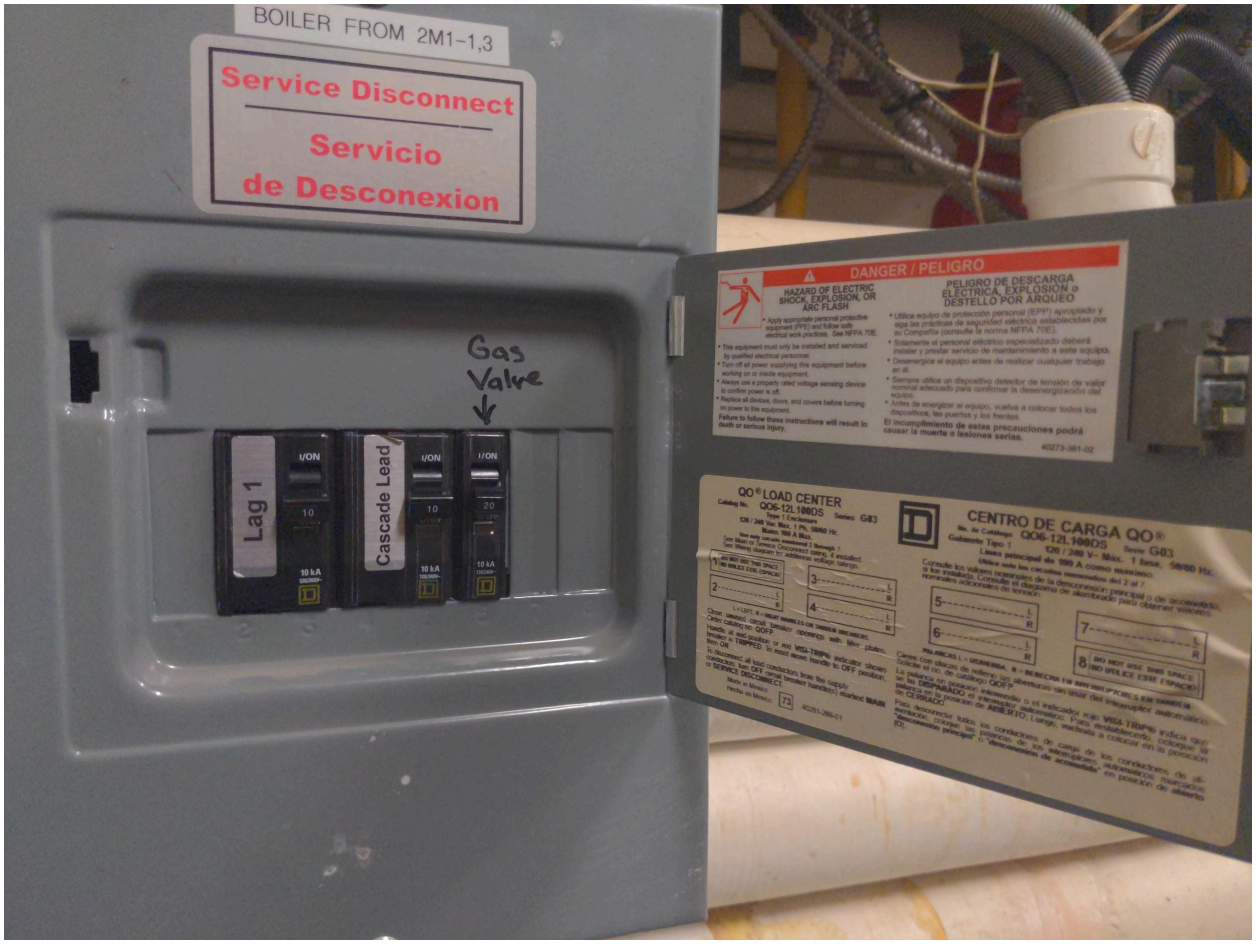

BEFORE OPERATING
MODEL NO. SNR151-100
(NO. DE MODELE)
SERIAL NO. 1834 111571389
(NO. DE SERIE)
LOCHINVAR, LLC
300 MADDOX SIMPSON PARKWAY
LEBANON, TN 37090
FACTORY EQUIPPED FOR NATURAL GAS
ALTITUDE 0-4,500 FT
INPUT RATING 150,000 BTU/HR
MINIMUM INPUT RATING 30,000 BTU/HR
RECOVERY @ 100F RISE 165 GPH US
CAPACITY RATED/MEASURED 91/87 gal US/gal US
STANDBY LOSS 2/1,000 %/HR/BTU/HR
THERMAL EFFICIENCY 96.0 %
NATURAL PROPANE
MAX INLET GAS PRESSURE 14.0 14.0 IN WC
MIN INLET GAS PRESSURE 4.0 8.0 IN WC
MANIFOLD PRESSURE 0.01 -0.04 IN WC
CRN T4412.4C
CONTROL NO.:M9
THIS LABEL IS A DUPLICATE. ASME NAMEPLATE IS ATTACHED TO THE HEAT EXCHANGER
CERTIFIED BY SERMETA
MAWP WATER 160 PSI
MFG SNM1.18.17.00137 YR 18
DESIGN CERTIFIED
AHRI CERTIFIED
CSA
LOW LEAD CONTENT
CERTIFIED
ANSI:Z21.10.3-2015/CSA 4.3-2015 CATEGORY IV
DIRECT VENT AUTOMATIC CIRCULATING TANK WATER HEATER
CHAUFFE-EAU DE CIRCULATION AUTOMATIQUE A EVENT DIRECT
EQUIPEE POUR LE GAZ NATUREL
ALTITUDE 0-4,500 FT
PRESSION MAX. DE L'EAU 10.0 bar
CAPACITE DE L'EAU 348/348 L/L
ESTIMATION D'ENTREE 44 KW
ESTIMATION MIN. D'ENTRÉE 8.79 KW
RETABLISSEMENT @ 56°C D'ELEVAT 621 L/hr
NATURAL PROPANE
PRESSION DE GAZ MAX D'ADMISSIO 34.9 34.9 mbar
PRESSION DE GAZ MIN D'ADMISSIO 10.0 19.9 mbar
PRESSION DIVERSE 0.05 -0.10 mbar
STORAGE UNIT
MODEL NO. RJS101-96445
SERIAL NO. 1834111535057
MAWP, WATEF 150 PSI
LOCHINVAR, LLC
300 MADDOX SIMPSON PARKWAY
LEBANON, TN 37090
A SUITABLE TEMPERATURE - PRESSURE RELIEF VALVE SHALL BE INSTALLED AT THE TIME OF INSTALLATION OF THE UNIT
LOCAL CODES SHALL GOVERN THE INSTALLATION OF THE RELIEF DEVICES.
VENTING: FOR EITHER DIRECT VENT INSTALLATION OR FOR INSTALLATION USING INDOOR COMBUSTION AIR OR WITH OPTIONAL CONCENTRIC SIDEWALL DIRECT VENT KIT (SEE TABLE A). THIS WATER HEATER REQUIRES A SPECIAL VENTING SYSTEM. REFER TO THE INSTALLATION INSTRUCTIONS FOR PARTS LIST AND METHOD OF INSTALLATION.
INSTALLATION: SUITABLE FOR WATER (POTABLE) HEATING ONLY.
MINIMUM WALL THICKNESS 12", MAXIMUM THICKNESS 60".
ELECTRICAL: 120V/1PH/60HZ LESS THAN 12 AMPS.
COMPLIES WITH THE REQUIREMENTS OF ASHRAE STANDARD 90.1.
MINIMUM CLEARANCES TO COMBUSTIBLES
DEGAGEMENTS MINIMAUX A ASSURER ENTRE LES PAROIS DE L'APPAREIL ET LES CONSTRUCTIONS COMBUSTIBLES
TOP (DESSUS) 0 IN BACK (ARRIERE) 0 IN
CLOSET FRONT (PLACARD AVANT) 0 IN LEFT (GAUCE) 0 IN
FLUE (CONDUIT DE FUMMER) 0 IN RIGHT (DROIT) 0 IN
SERVICE CLEARANCES
ESPACE A RESERVER POUR LA MAINTENANCE
FRONT (AVANT) 24 IN
TOP (DESSUS) 18 IN
LEFT (GAUCE) 24 IN
RIGHT (DROIT) 24 IN
TABLE A
S(N.L.)R126-201 S(N.L.)R126-201
100140490 100140484
VENTILATION: POUR INSTALLATION AVEC EVACUATION DIRECTE OU AVEC AIR COMBURANT OU AVEC CONCENTRIQUE EN OPTION VENTILATION LATERALE DIRECT KIT(VOIR LE TABLEAU A) CE CHAUFFE-EAU DOIT ETRE DOTE D'UN CIRCUIT D'EVACUATION SPECIAL. CONSULTER LES INSTRUCTIONS D'INSTALLATION POUR CONNAITRE LA LISTE DES PIECES ET LA METHODE D'INSTALLATION.
INSTALLATION: POUR CHAUFFAGE DE L'EAU (POTABLE) SEULEMENT
ELECTRIQUE: 120 V/1 PH/60 HZ, MOINS DE 12 AMPERES

Suquamish Community Center Valve Tag List

1. Supply shut off to P-1
2. Supply shut off to P-2
3. Down stream shut off from P-1
4. Down stream shut off from P-2
5. Supply shut off to P-4
6. Return shut off from P-4
7. Supply shut off to P-5
8. Return shut off from P-5
9. Isolation shut off for pump P-5
10. Low point drain for primary zone
11. Low point drain for secondary zone
12. Supply shut off to wall cabinet heater (east end)
13. Return shut off to wall cabinet heater (east end)
14. Supply shut of to B-1 Boiler
15. Return shut off from B-1 Boiler
16. Supply shut off to B-2 Boiler
17. Return shut off from B-2 Boiler
18. Shut off to expansion tank
19. NP water supply shut off to Boiler
20. PRV/relief valve and strainer for makeup water to Boiler
21. Makeup water bypass to Boilers
22. Makeup water isolation value
23. Supply shut off to unit heater
24. Return shut off from unit heater
25. Circ setter from unit heater
26. Supply shut off to Bench heating radiant piping
27. Return shut off from Bench heating radiant piping
28. Circ setter shut off from Bench heating radiant piping
29. Supply shut off to gathering hall radiant piping south
30. Return shut off from gathering hall radiant piping south
31. Circ setter return valve from gathering hall radiant piping
32. Supply shut off gathering hall north radiant piping
33. Return shut off gathering hall north radiant piping
34. Circ setter from gathering hall north radiant piping
35. Supply shut off to lobby radiant piping
36. Return shut off from lobby radiant piping
37. Circ setter shut off from lobby radiant piping
38. Circ setter for 3-way by-pass
39. Supply shut off to Base board to green room
40. Return shut off from Base board from green room


EVO
EVO
HEATING RETURN
HEATING SUPPLY
HEATING RETURN
PROPANE GAS
PHILIPS


HEATING SUPPLY
LIT CSD1U1: HWH 299
CSD-1 REPORT
QU 031-HW-031-07-07
LIT CG500:
CG500 ASME REPORT
WARNING
ATTENTION!
Important Documents
Enclosed
WARNING!


BOILER FROM 2M1-1,3
Service Disconnect
Servicio
de Desconexion
Gas
Valve
Lag 1
Cascade Lead
I/ON
DANGER / PELIGRO
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH
PELIGRO DE DESCARGA ELÉCTRICA, EXPLOSIÓN o DESTELLO POR ARQUEO
QO® LOAD CENTER
CENTRO DE CARGA QO®
QO6-12L100DS
G03


HEATING RETURN
HEATING SUPPLY
P-1
HEATING RETURN
P-2
LL POCKET


ABB
HVAC
OFF
HAND
P-1 VFD
ABB
HVAC
OFF
HAND
P-2 VFD


P-1 FROM 2M1-35,37
P-2 FROM 2M1-39,41
ON
SIEMENS
GENERAL DUTY
ENCLOSED SWITCH
Amps.
30
Volts A.C.
240
See notes and additional rating information inside.
Suitable for use as service equipment.
DANGER
HAZARDOUS VOLTAGE
WILL CAUSE DEATH OR
SERIOUS INJURY.
Turn off switch before removing or
installing fuses. Turn off power ahead
of switch before doing work. Inside.
Close cover before turning power on.
PELIGRO
VOLTAJE PELIGROSO
CAUSARÁ LA MUERTE O
LESIONES GRAVES.
Apagar el interruptor antes de remover
o instalar el fusible. Desconectar el
suministro de energía al interruptor
antes de efectuar cualquier trabajo
dentro de la unidad. Cerrar la cubierta
antes de conectar la energía.
OFF


BOSCH
EMS

BOSCH

SPLIT TYPE AIR CONDITIONER

MODEL NAME	Climate 5000
AIR HANDLER UNIT	BMS500-AAU036-1AHWXC
MATERIAL#	8733956184
Serial No No Serie	399A-238-000011-8733956184
POWER SOURCE	208/230V~ 60Hz, 1Ph
DESIGN PRESSURE	Hi 550 PSIG /3.79MPa
	Lo 340 PSIG /2.34MPa

The Rated Input Current of The Power Conversion Equipment

208/230V	0.55A
MINIMUM CIRCUIT AMPACITY	3.0A
MAX.FUSE	15.0A

c UL us LISTED

Split Air Conditioner
45ZR

MADE IN CHINA

UL FILE NUMBER: SA33108

AHRI CERTIFIED

399A-238-000011-8733956184

Bosch Thermotechnology Corp

Kitchen coolers:


MODEL: PH1830
SERIAL NO: 426198-05 2008
VOLTS/AMPS/WATTS: 120 V/ 13.7 A / 1650 W
CARTER HOFFMANN, LLC
Mundelein, IL 60060
LISTED
838G
NSF
D048861
energy
ENERGY STAR


FED FROM
SEDB 6, 8
PNL K1
FED FROM
SEDB 5, 7
PNL K2
NOTICE


FED FROM
SEE M. & T.


FED FROM
SEDB 5, 7
PNL K2
120/240V 1Ph 3W
Cutler-Hammer
Must Be Installed Per Applicable Code and Manufacturer's Recommendations
Refer To Listing On Rear Of Deadfront Cover Assembly For Information Regarding Field Installable Device Kits.
Suitable For Use As Service Equipment When Equipped With A Main Overcurrent Device Or When Not More Than Six Service Disconnects Are Provided And Panel Is Used As Permitted By Section 408-14 Of The National Electrical Code.
Horizontally Mounted Breakers To Be 100A Maximum.
Pnl. Type PRL1A
Pnl. Amps 225
Volts 120/240 Volt
Phase 1 Wire 3
Neut. Cat 1C96649G02
Neut. Amps 225
Date 09/2008
Neut. Volts 120
Box Cat. EZB2042R
Box Type 1
Job No. SSE70424-005
Mfdg. At SUM
* Maximum - See Main Circuit Breaker Rating
WARNING
EXPLOSION
CAN CAUSE SEVERE INJURY, DEATH OR DAMAGE TO PANELBOARD.
On 240/120V 3O-4W Delta-Δ Connect Only 240V, Not 120V Rated Breakers To The "Wildleg" Phase "B". The "Wildleg" To The Neutral Voltage is 208V.
TERMINALS ARE SUITABLE FOR CU OR AL. - Use 75°C Conductors.
Automatic Trip Of Circuit Breaker Is Indicated By Handle Position Midway Between "On" And "Off". Restore Service By Moving Handle To "Off" Then "On"
Through Feed And Subfeed Panelboards Are Limited For Use On A System Capable Of Delivering Not More Than 10,000A, rms Symmetrical, Unless Panelboard Has An Integral Main Or Is Connected Downstream From An Overcurrent Protective Device As Stated In The Attached "Series Rating Information Manual".
DANGER


EATON
Cutler-Hammer
POW-R-LINE C
PRL1a
Panelboard
LISTED
No. HR 835552
CLASS CTL
PANELBOARD
DANGER
Hazardous voltage.
Will cause severe
injury or death.
Turn off power
supplying this
equipment before
working inside.
1 2
3 4
5 6
7 8
9 10
11 12
13 14
15 16
17 18
19 20
21 22
23 24
25 26
27 28
29 30
31 32
33 34
35 36
37 38
39 40
41 42
COFFEE
MAKER

CIRCUIT DIRECTORY

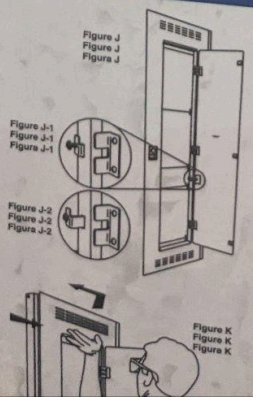
PANEL : K2 | FED FROM :120/208V Ph.1/3W

COLOR CODE:(BLACK) / (RED) / 10,000 A/C KITCHEN

NEMA NUMBERING

1	SPARE	2	SPARE
3	SPARE	4	SPARE
5	SPARE	6	SPARE
7	SPARE	8	SPARE
9	SPARE	10	SPARE
11	SPARE	12	SPARE
13	SPARE	14	SPARE
15	SPARE	16	SPARE
17	SPARE	18	SPARE
19	SPARE	20	SPARE
21	SPARE	22	SPARE
23	SPARE	24	SPARE
25	SPARE	26	SPARE
27	SPARE	28	SPARE SPEAKER
29	SPARE	30	SPARE PLUG
31	SPARE	32	SPARE SPIDER
33	SPARE	34	SPARE BOX
35	SPARE	36	A-34 COFFEE
37	SPARE	38	A-34 MAKER
39	A-35	40	A-35
41	A-35	42	A-35

NOTICE



Trim Removal
Retrait de la garniture
Desmontaje de la moldura

Step 1. To remove panelboard trim:

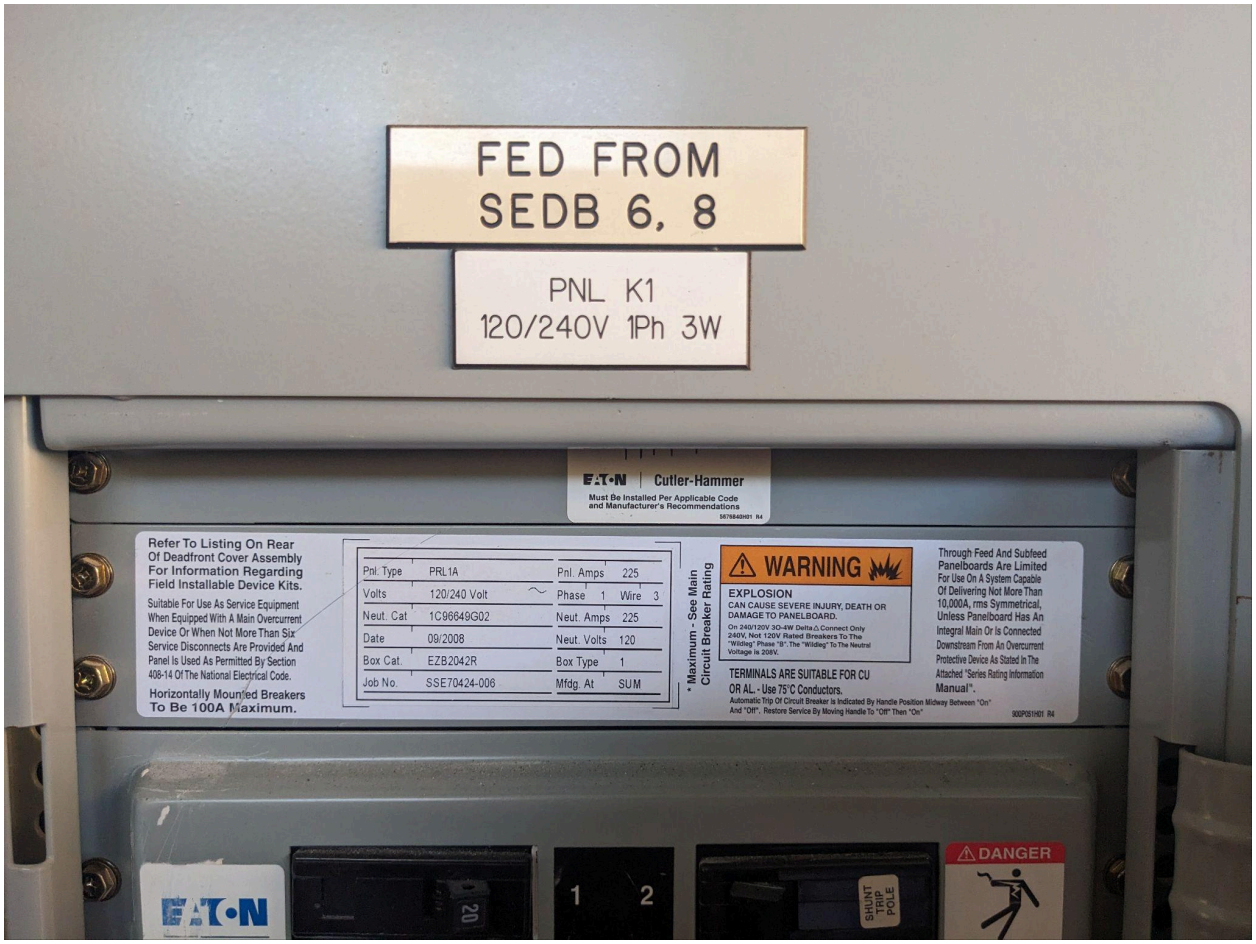
- Open Door (see Figure J).
- Loosen screw (see Figure J-1).
- Slide the trim latch slider out slightly - Do Not Remove Slider (see Figure J-2).

Étape 1. Pour retirer la garniture du panneau de distribution procéder comme suit:

- Ouvrir la porte (voir la figure J).
- Desserrer la vis (voir la figure J-1).
- Glisser légèrement le coulisseau vers l´extérieur - ne pas le retirer complètement (voir la figure J-2).

Paso 1. Para desmontar la moldura del gabinete:

- Abra la puerta (vea Figura J).
- Afloje el tornillo (vea la Figura J-1).
- Deslice la pieza deslizante del seguro de la moldura ligeramente hacia fuera - No retire la pieza deslizante (vea la Figura


FED FROM
SEDB 6, 8
PNL K1
120/240V 1Ph 3W
EATON | Cutler-Hammer
Must Be Installed Per Applicable Code and Manufacturer's Recommendations
Refer To Listing On Rear Of Deadfront Cover Assembly For Information Regarding Field Installable Device Kits.
Suitable For Use As Service Equipment When Equipped With A Main Overcurrent Device Or When Not More Than Six Service Disconnects Are Provided And Panel Is Used As Permitted By Section 408-14 Of The National Electrical Code.
Horizontally Mounted Breakers To Be 100A Maximum.
Pnl. Type PRL1A
Pnl. Amps 225
Volts 120/240 Volt
Phase 1 Wire 3
Neut. Cat 1C96649G02
Neut. Amps 225
Date 09/2008
Neut. Volts 120
Box Cat. EZB2042R
Box Type 1
Job No. SSE70424-006
Mfdg. At SUM
* Maximum - See Main Circuit Breaker Rating
WARNING
EXPLOSION
CAN CAUSE SEVERE INJURY, DEATH OR DAMAGE TO PANELBOARD.
On 240/120V 3O-4W Delta Δ Connect Only 240V, Not 120V Rated Breakers To The "Wildleg" Phase "B". The "Wildleg" To The Neutral Voltage Is 208V.
TERMINALS ARE SUITABLE FOR CU OR AL - Use 75°C Conductors.
Automatic Trip Of Circuit Breaker Is Indicated By Handle Position Midway Between "On" And "Off". Restore Service By Moving Handle To "Off" Then "On"
Through Feed And Subfeed Panelboards Are Limited For Use On A System Capable Of Delivering Not More Than 10,000A, rms Symmetrical, Unless Panelboard Has An Integral Main Or Is Connected Downstream From An Overcurrent Protective Device As Stated In The Attached "Series Rating Information Manual".
EATON
20
1 2
SHUNT TRIP POLE
DANGER

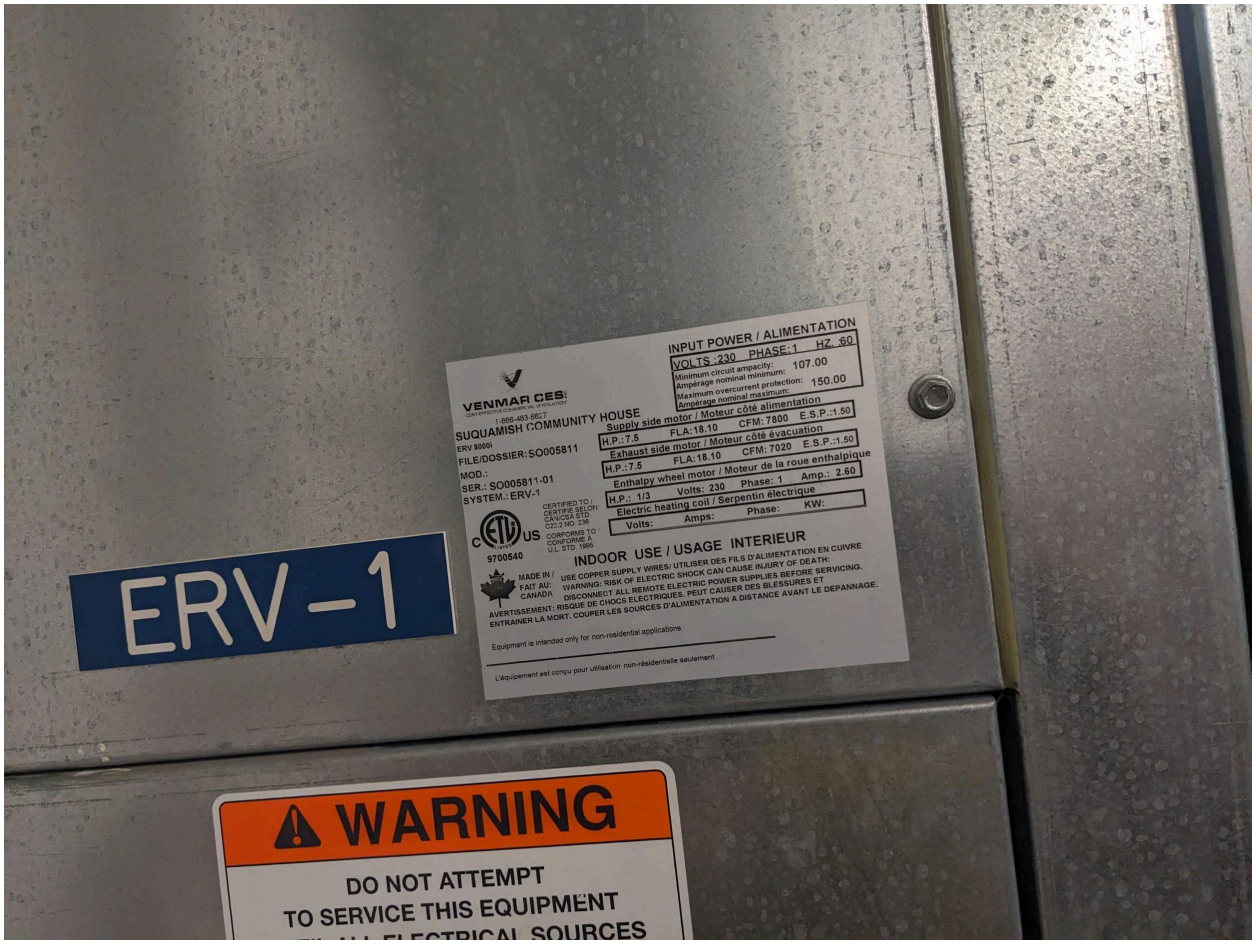

Cutler-Hammer
WARNING
EXPLOSION
CAN CAUSE SEVERE INJURY, DEATH OR DAMAGE TO PANELBOARD.
TERMINALS ARE SUITABLE FOR CU OR AL - Use 75°C Conductors.
EATON
Cutler-Hammer
Type PRL1a Panelboard
CLASS CTL PANELBOARD
DANGER
Hazardous voltage. Will cause severe injury or death.
CIRCUIT DIRECTORY
PANEL: K1
120/240 1Ph/3W 200 AM
COLOR CODE (BLACK) / (RED)
1 A-2 KITCHEN
2 A-8 KITCHEN
3 A-3 KITCHEN
4 SHUNT
5 A-4 KITCHEN
6 A-12 KITCHEN
7 A-6 KITCHEN
8 SHUNT
9 A-4 KITCHEN
10 A-10 KITCHEN
11 RECEPTACLES
12 SHUNT
13 RECEPTACLES
14 SPARE
15 RECEPTACLES
16 COOLER CONT /LI
17 RECEPTACLES
18 RECEPTACLES
19 RECEPTACLES
20 RECEPTACLES
21 RECEPTACLES
22 RECEPTACLES
23 RECEPTACLES
24 SPARE
25 RECEPTACLES
26 A-2 KITCHEN
27 RECEPTACLES
28 A-26 KITCHEN
29 SPARE
30 A-21 KITCHEN
31 SPARE
32 SHUNT POWER
33 [redacted] Ice Maker
34 HOOD LIGHTS
35 A-27 KITCHEN
36 A-20 KITCHEN
37 A-27 KITCHEN
38 A-20 KITCHEN
39 A-32 KITCHEN
40 A-20 KITCHEN
41 A-32 KITCHEN
42 A-20 KITCHEN
NOTICE
Trim Removal
Retrait de la garni
Desmontaje de la
ICE
Main

CIRCUIT DIRECTORY

PANEL: K1		120/240 1Ph/3W 200 AMP. MLO	
10,000 A/C		COLOR CODE: (BLACK) / (RED)	
1	A-2 KITCHEN	2	A-8 KITCHEN
3	A-3 KITCHEN	4	SHUNT
5	A-4 KITCHEN	6	A-12 KITCHEN
7	A-5 KITCHEN	8	SHUNT
9	A-4 KITCHEN	10	A-10 KITCHEN
11	RECEPTACLES	12	SHUNT
13	RECEPTACLES	14	SPARE
15	RECEPTACLES	16	COOLER CONT./LIGHT
17	RECEPTACLES	18	RECEPTACLES
19	RECEPTACLES	20	RECEPTACLES
21	RECEPTACLES	22	RECEPTACLES
23	RECEPTACLES	24	SPARE
25	RECEPTACLES	26	A-2 KITCHEN
27	RECEPTACLES	28	2 DOOR FREEZER A-26 KITCHEN
29	SPARE	30	A-21 KITCHEN
31	SPARE	32	SHUNT POWER
33	[redacted] ICE MAKER	34	HOOD LIGHTS
35	A-27 KITCHEN	36	A-20 KITCHEN (WEST WALL DISPOSER)
37	A-27 KITCHEN	38	A-20 KITCHEN
39	A-32 KITCHEN	40	B-20 KITCHEN
41	A-32 KITCHEN	42	B-20 KITCHEN


Connecting Wire Torques
Screw Driver
Socket Head
Wire AWG
Torque Lb • in (N • m)
Across Flats (mm)
Torque Lb • in (N • m)
18 - 10
35 (4.0)
5 / 16"
275 (31.1)
8
40 (4.5)
3 / 8"
375 (42.4)
Torque Values For Copper Or Aluminum Bus Bar Connections
Torque
Bolt Size
Lb • In (N • m)
Lb • Ft (N • m)
#10
30 (3.4)
1 / 4"
68 (7.7)
3 / 8"
20
For Ground And Neutral Bars, Use the Following Chart:
CONNECTING WIRE TORQUES
SMALL OPENING
LARGE OPENING
WIRE AWG
TORQUE LB - IN (N • m)
MAX NO. WIRES PER OPENING
NEUT.
GRD.
14 - 12
35 (4.0)
1
2
14 - 10
35 (4.0)
1
2

Fan room:



Meeting room: