City *of* Tigard

Tigard Business Meeting –Agenda

TIGARD CITY COUNCIL & LOCAL CONTRACT REVIEW BOARD

MEETING DATE AND TIME:	JANUARY 16, 2024 - 6:30 p.m. Business Meeting **REVISED 1/15/2024 - VIRTUAL ATTENDANCE ONLY**
MEETING LOCATION:	**Virtual attendance only due to inclement weather - See PUBLIC NOTICE below.**

PUBLIC NOTICE: Due to inclement weather this meeting will be held virtually with Council, staff, and consultants participating remotely. Please see below how to comment by phone or in writing.

How to comment:

- Written public comment may be submitted electronically at www.tigard-or.gov/Comments by noon the day before the meeting date.
- ~~If attending the meeting in person, please fill out the public comment sign-in sheet at the front of the room and come to the microphone when your name is called.~~ The meeting is virtual with no in-person comment.
- If you prefer to call in, please call 503-966-4101 when instructed to be placed in the queue. We ask that you plan on limiting your testimony to three minutes.
- You may comment by video through the Teams app. Go to this link to learn how to participate: January 16, 2024 Council Meeting (https://www.tigard-or.gov/Home/Components/Calendar/Event/4955/372).

Upon request, the City will endeavor to arrange for the following services:

- Qualified sign language interpreters for persons with speech or hearing impairments; and
- Qualified bilingual interpreters.

Since these services must be scheduled with outside service providers, it is important to allow as much lead time as possible. Please notify the City of your need by 5:00 p.m. on the Thursday preceding the meeting by calling: 503-718-2419 (voice) or 503-684-2772 (TDD - Telecommunications Devices for the Deaf).

SEE ATTACHED AGENDA

VIEW LIVESTREAM ONLINE: https://www.tigard-or.gov/boxcast

CABLE VIEWERS: The City Council meeting will be shown live on Channel 21 (1st Tuesdays) and Channel 28 (2nd & 4th Tuesdays) at 6:30 p.m. The meeting will be rebroadcast at the following times on Channel 28:

Thursday 6:00 p.m. Friday 10:00 p.m. Saturday 7:30 p.m. Sunday 11:30 a.m. Monday 6:00 a.m.

City *of* Tigard

Tigard Business Meeting –Agenda

TIGARD CITY COUNCIL & LOCAL CONTRACT REVIEW BOARD MEETING
MEETING DATE AND TIME: January 16, 2024 - Revised 1/15/2024 - VIRTUAL ATTENDANCE ONLY

6:30 PM

1. BUSINESS MEETING

   A. Call to Order

   B. Roll Call

   C. Pledge of Allegiance

   D. Call to Council and Staff for Non-Agenda Items

2. PUBLIC COMMENT

   A. Follow-up to Previous Public Comment

   B. Public Comment – Written

   C. ~~Public Comment – In Person~~ This meeting is being held virtually. No in-person public comment.

   D. Public Comment – Phone-In

   E. Public Comment – Video

   F. Police Chief/Police Department Update

3. COUNCIL LIAISON REPORTS **6:45 p.m. estimated time**

4. CONSENT AGENDA: (Local Contract Review Board) The Consent Agenda is used for routine items including approval of meeting minutes, contracts or intergovernmental agreements. Information on each item is available on the city's website in the packet for this meeting. These items may be enacted in one motion without separate discussion. Council members may request that an item be removed by motion for discussion and separate action. **6:55 p.m. estimated time**

A. PAVEMENT MANAGEMENT PROGRAM ENGINEERING AND INSPECTION SERVICES

- *Consent Agenda - Items Removed for Separate Discussion: Any items requested to be removed from the Consent Agenda for separate discussion will be considered immediately after the Council has voted on those items which do not need discussion.*

5. BUILDING RESILIENT INFRASTRUCTURE AND COMMUNITIES - TIGARD LIBRARY MICROGRID **7:00 p.m. estimated time**

6. COUNCIL GOALS UPDATE **8:00 p.m. estimated time**

7. EXECUTIVE SESSION: The Tigard City Council may go into Executive Session. If an Executive Session is called to order, the appropriate ORS citation will be announced identifying the applicable statute. All discussions are confidential and those present may disclose nothing from the Session. Representatives of the news media are allowed to attend Executive Sessions, as provided by ORS 192.660(4), but must not disclose any information discussed. No Executive Session may be held for the purpose of taking any final action or making any final decision. Executive Sessions are closed to the public.

8. NON-AGENDA ITEMS

9. ADJOURNMENT **8:40 p.m. estimated time**

AIS-5418	**4. A.**
Business Meeting	
Meeting Date:	01/16/2024
Length (in minutes):	Consent Item
Agenda Title:	Pavement Management Program Engineering and Inspection Services
Authored By:	Toni Riccardi
Presented By:	Project Manager Nichole George
Item Type:	Motion Requested Local Contract Review Board
Public Hearing Newspaper Legal Ad Required?:	No
Public Hearing Publication Date in Newspaper:	10/13/2023

Information

EXPLANATION OF ISSUE

The purpose of this action is to award a contract for engineering and inspection services under the city's Pavement Management Program

ACTION REQUESTED

Staff recommends the Local Contract Review Board award the contract for engineering and inspection services under the Pavement Management Program to Wallis Engineering for an estimated amount of $3,300,000 over five years and authorize the City Manager to take the steps necessary to execute the contract.

BACKGROUND INFORMATION

The city's yearly Pavement Management Program (PMP) helps protect the city's investment in our street infrastructure. The program typically includes a combination of minor maintenance projects (slurry seal applications) and major maintenance projects (pavement overlays) that help prolong the life of our streets and maintain our Pavement Condition Index (currently at 82). Under the program, the city averages fifteen miles of crack sealing and slurry seal and one mile of pavement overlay and ADA ramps each year. The city's annual pavement marking work also falls under the Pavement Management Program.

The contract before the Local Contract Review Board tonight is for design and engineering services related to the program. Work included under this contract will include:

- Evaluation of existing pavements;
- Recommendation of pavement treatments (overlay thickness, grind-and-inlay, etc.) to be used;
- Evaluation of existing curb ramps;
- Design of curb ramp retrofits to meet ADA requirements;
- Survey work as necessary;
- Design of paving work;
- Design of street striping and marking;

- Coordination with utilities and other agencies;
- Preparation of final plans and specifications;
- Establishing provisions for recovery of survey monuments and replacing monuments as necessary;
- Construction management; and
- Construction testing and inspection.

As this work must be completed by an engineering firm, it falls under the Qualification Based Solicitation (QBS) process (Tigard Public Contracting Rule 70.016). The city issued a Qualification Based Request for Proposal for the project on October 13, 2023, with the notice published in the Daily Journal of Commerce. Upon closing, the city received two proposals (and their respective qualification scores out of a possible 275):

- Wallis Engineering. (251 pts.)
- Harper Houf Peterson Righellis, Inc. (237 pts.)

After the qualification scoring based on the identified criteria in the RFP (2024-05) the proposal from Wallis Engineering, as you see above, was found to be the top ranking firm, based in part on their previous work with the city. As such, and in accordance with Tigard Public Contracting Rule 70.016B.5.A, the city entered into negotiations with Wallis Engineering for contract pricing. The city and Wallis Engineering were able to reach an agreed upon price for the work and it is presented to the Local Contract Review Board tonight. As this work fell under the Qualification Based Solicitation process and a cost was agreed upon between the city and the top-ranking firm, the city did not need to request pricing from the other firm (Tigard Public Contracting Rule 70.016.B.5.) The contract will be for four years with one additional one-year option. The cost of the contract for the first year is estimated at just over $615,000. Using an annual increase (the contractor will be able to request an annual increase tied to the CPI) estimate of three percent, the total estimated cost of the contract over its possible life (five years) is just under $3,300.000.

ALTERNATIVES & RECOMMENDATION

The Local Contract Review Board may reject this contract and direct staff to issue a single year contract only and resolicit the work each year, which would result in additional costs for additional procurement processes.

ADDITIONAL RESOURCES

The Local Contract Review Board last awarded a contract for this work on October 13, 2018.

Fiscal Impact

Cost: 3,300,000

Budgeted (yes or no): Yes

Where budgeted?: Street Maintenance Fund

Additional Fiscal Notes:

Additional Fiscal Notes: The proposed contract is estimated at $615,000 for the first year of the contract. Each additional year is eligible for a CPI-tied rate increase leading to an estimated total contract cost of $3,300,000 over five years.

Attachments

No file(s) attached.

AIS-5314 **5.**

Business Meeting

Meeting Date: 01/16/2024

Length (in minutes): 60 Minutes

Agenda Title: Building Resilient Infrastructure and Communities - Tigard Library Microgrid

Authored By: Gary Pagenstecher

Presented By: Project Planner Gary Pagenstecher

Item Type: Motion Requested
Resolution

Public Hearing Legal Ad Required?: No

Publication Date:

Information

EXPLANATION OF ISSUE

The City of Tigard Resiliency Initiative is a microgrid feasibility study. It is being conducted to learn more about pre-disaster energy resilience in Tigard through the installation of microgrids at three scales: 1) at the Tigard library to support resilient operation of the back-up emergency operations center (EOC); 2) at the neighborhood scale for community solar and publicly accessible energy and services; and 3) at the district-scale, for resilience plus climate benefits, and economic development.

This presentation continues the July 11, 2023, briefing on the Initiative and will share findings and recommendations of the Library PV and Battery Microgrid Feasibility Study (attached), prepared by our consulting engineer PAE. Project partners also include the Energy Trust of Oregon and Portland General Electric, and Tigard staff from multiple departments. These stakeholders will be present to provide perspectives on the Initiative's proposed library microgrid and answer any questions Council may have.

PAE's study identifies distributed energy resources (DERs), including photovoltaics (PV) and battery energy storage systems (BESS) and existing fossil-fuel based generation capacity, for facility and community resiliency through an "island-capable" microgrid control system at the Tigard Library. The analysis explores the implementation of a microgrid system for both the purpose of peak load shedding and resilience scenarios of varying durations in which the library is used as an EOC, as a heating and cooling center, and whole building operations.

Development of renewable energy at the Tigard Library supports the City's goal to be carbon neutral by 2050. The BESS design developed in cooperation with Portland General Electric will leverage the utility's "Schedule 200" battery incentive program which allows the utility to control the BESS for grid support during on-grid operation. The microgrid system provides both local and regional resiliency and sustainability benefits.

Provisions for the future Microgrid system have been incorporated within Facilities projects currently underway at the library, which include HVAC equipment upgrades, lighting system upgrades, and a new gas generator. The scope of this coordination provides space and pathways for future electrical components needed for a microgrid system. Coordinating with the city's internal Engineering team has also taken place to accommodate the Fanno Creek trail extension project schedule. Due to supply chain issues, two of the

three HVAC air handlers still have not arrived and are not due until May of 2024. The silver lining of these unexpected delays is the ability to ensure Microgrid compatibility and build construction efficiencies into the design of the HVAC project.

The microgrid system cost estimated by PAE at $3.41M has been reviewed by ETO's Trade Ally, A&R Solar, through ETO's Development Assistance program. The A&R Microgrid Report verifies equipment specifications and estimates pricing for those specifications at $3.92M (attached). A roof replacement is anticipated to be a part of the project to match the 25-year life expectancy of the solar PV installation and is estimated to raise the total project cost to $6M.

Implementation funding is expected to include an assortment of grants and contributions from project partners and take advantage of the investment tax credits available under the Inflation Reduction Act. In support of the fundraising strategy, staff has prepared the attached Resolution for Council's consideration and adoption (attached).

ACTION REQUESTED

Receive project update, adopt the proposed resolution, give staff direction.

BACKGROUND INFORMATION

Dates of Previous and Potential Future Considerations

July 11, 2023 - first project briefing. Staff provided background about microgrids, resiliency, sustainability and the rationale for the three-tiered study. Councilors expressed general support for the project and specifically expressed interest in engagement.

Public Involvement

In addition to the July 11 briefing, the microgrid project has been mentioned at multiple Council meetings. The project has most recently been the subject of a CD climate action engagement meeting in December. In early 2024, staff will implement a public awareness campaign for the library microgrid project with a project web page and in coordination with library education and program staff. After the project is installed and commissioned, an interactive system performance display monitor, which is part of the PAE system design, will be prominently located in the library lobby to engage and inform the public.

Impacts (Community, Budget, Policies and Plans/Strategic Connection)

The project is responsive to the Council's 2023-25 goal to address climate change by reducing the city's carbon emissions and prioritizing carbon responsibility in city operations. Implementation of this high-visibility project at the city library will contribute to building understanding of the city's climate work and how the organization is supporting it; and build awareness in support of residents' own carbon emissions reduction.

Specifically, the microgrid project will begin implementation of the 2019 Climate Resiliency Plan's strategy to lower GHG emissions by expanding distributed energy resources in the city to 50MW by 2030.

Budget savings from the microgrid project are expected from the energy generated by the library solar PV system and by use of the battery and controller for both demand management and controlling the time-of-day energy is purchased when energy prices are lower.

The library microgrid project will provide energy resilience during grid failure, a key to ensuring the city can provide continuity of emergency response services.

ALTERNATIVES & RECOMMENDATION

Adopt the Resolution in support of the Tigard Library Microgrid and its funding plan. Alternatively, council can accept the Tier 1 Microgrid report without taking a formal action, or can ask that staff return to council at a later date with additional information.

ADDITIONAL RESOURCES

Fiscal Impact

Cost: $6 Million

Budgeted (yes or no): No

Where Budgeted (department/program): TBD

Additional Fiscal Notes:

Implementation funding may include grants (FEMA Building Resilient Infrastructure and Communities, ODOE Community Renewable Energy Program), PGE's Aid in Construction investments through enrollment in the Distributed Standby Generation Schedule 200 program, PGE's Renewable Development Fund, a portion of the city's Pandemic Relief funds allocated to Climate Resiliency Plan implementation, and application of the Inflation Reduction Act's Investment Tax Credit for 30% of eligible costs.

The estimated project cost noted here includes both the total microgrid project cost and roof replacement work.

Attachments

Resolution

PAE Tier 1 Feasibility

A&R Microgrid Report

CITY OF TIGARD, OREGON.
TIGARD CITY COUNCIL
RESOLUTION NO. 24-

A RESOLUTION IN SUPPORT OF THE TIGARD LIBRARY MICROGRID PROJECT TO IMPROVE THE CITY'S RESILIENCE AND EMERGENCY OPERATIONS AND TO REDUCE MUNICIPAL GREENHOUSE GAS EMISSIONS

WHEREAS, the Tigard Library Microgrid project meets the City Council's 2023-25 goal to address climate change by reducing the city's carbon emissions and prioritizing carbon responsibility in City operations; and

WHEREAS, implementation of this high-visibility project will broaden the public's understanding of the City's climate work; build awareness of how residents can consider their own emissions reduction; and enhance the city's resilience by enabling off-grid electricity generation at an important public building; and

WHEREAS, the project meets objective 3.5 in the city's 2020-25 Strategic Plan by addressing climate impacts to the maximum extent practicable, especially for those most vulnerable and by preparing the city's landscapes and public spaces for a changing climate; and

WHEREAS, the project meets the City's Emergency Operations Plan's Plan Development, Maintenance and Implementation objective 6.6 where it is a priority of the City to fund and maintain an Emergency Management Operation that ensures the City's ability to respond to and recover from disasters.

WHEREAS, the project meets multiple Comprehensive Plan goals and policies related to disaster preparedness, emergency response, energy conservation and pursuit of alternative energy sources.

NOW, THEREFORE, BE IT RESOLVED by the Tigard City Council that:

SECTION 1: the Tigard City Council supports the Library Microgrid project and directs staff to seek grants, tax credits and partnership agreements to fully fund its construction and operation.

SECTION 2: This resolution is effective immediately upon passage.

PASSED: This _____ day of _____ 2024.

_____
Mayor - City of Tigard

ATTEST:

_____
City Recorder - City of Tigard

Tigard Microgrid

Tier 1 – Library PV and Battery Microgrid Feasibility Study

June 9, 2023

pae-engineers.com

This page intentionally left blank

Table of Contents

1.0 Project Description 1
1.1 Overview 1
1.2 Executive Summary 1
1.3 Codes and Standards 2
1.4 Owner Specific Requirements 2
2.0 Energy Performance Analysis 3
2.1 Introduction 3
2.2 Model Inputs 4
2.3 Building Use and Operation 10
2.4 Annual Building Energy Demand 13
2.5 Microgrid Resiliency Analysis 15
3.0 Electrical 17
3.1 Electrical Service & Distribution 17
3.2 Distributed Energy Resources (DERs) 17
3.3 Microgrid Control System 18
3.4 Grounding System 19
3.5 Pathways and Raceways 19

Figures

Figure 1: Emergency Operations Center (EOC) Analysis Zones 3
Figure 2: Temperature Distribution, Hours Per Year 4
Figure 3: Average Monthly Temperatures with Maximum and Minimum (°F) 4
Figure 4: IES Model Renderings (Sun Position: June 30th at 3 pm) 5
Figure 5: Lighting Load Profile 10
Figure 6: Plug Load Profile 11
Figure 7: Occupancy Load Profile 11
Figure 8: Annual Hourly Electric Load Profile 13
Figure 9: Annual Daily Electric Load Profile – Model to Meter Comparison 14
Figure 10: Modeled Energy End Use Breakdown 14

Tables

Table 1: Modeled Scenarios 3
Table 2: Envelope Performance 6
Table 3: Lighting Power Densities 7
Table 4: Receptacle and Occupant Gains for Normal Operations 7
Table 5: Receptacle and Occupant Gains for EOC 8
Table 6: HVAC Airside Systems 9
Table 7: HVAC Waterside Systems 9
Table 8: DHW Systems 9
Table 9: Community Room Equipment for EOC Scenario 12
Table 10: Pantry and Cooking Equipment for EOC Scenario 12
Table 11: Annual Energy Use 13
Table 12: Energy Use Intensity Breakdown, in kBtu/sf/yr 15

June 9, 2023

Project Directory

Owner	**City of Tigard**
Electrical Engineer	**PAE** 151 SW 1st Avenue Suite 300 Portland, Oregon 97204 **Matt Jones, PE, LEED, AP** Principal-in-Charge matt.jones@pae-engineers.com **Karina Hershberg, PE, LEED AP** Project Manager karina.hershgberg@pae-engineers.com **Craig Collins, PE** Electrical Engineer of Record craig.collins@pae-engineers.com **Anthony Hosti** Electrical Engineer anthony.hosti@pae-engineers.com **Matt Hyder, WELL AP, LEED GA** ReGen Building Energy Modeling Lead matt.hyder@pae-engineers.com **Carley Webster, CDT** Assistant Project Manager carley.webster@pae-engineers.com

1.0 Project Description

1.1 Overview

The information presented in this narrative report is associated with Tier 1 of the Tigard FEMA Microgrid Study which is a three-part study evaluating microgrid solutions to leverage distributed energy resources (DER) including photovoltaics (PV) and battery energy storage systems (BESS) and existing fossil-fuel based generation capacity for facility and community resiliency in the city of Tigard, Oregon.

The engineering assessments, reports and preliminary design drawings prepared by PAE for the Tier 1 FEMA scope evaluate a single building microgrid resiliency solution for the Tigard Library.

The intent of this narrative deliverable and associated preliminary design documents is to facilitate ETO Trade Ally pricing and for use by City of Tigard in pursuit of project implementation funding. Permit documents are a separate scope of work.

1.2 Executive Summary

PAE determined the following distributed energy resources (DERs) were required to support the City's operational and carbon reduction requirements associated with construction of an island capable microgrid control system at the Tigard Library.

1. Photovoltaic Capacity
    a. Rooftop: 250 kW
    b. (5) Carports: 260kW
    c. Annual Energy production from PV: 582,100 kWh
        1) Annual energy from onsite PV will be able to supply 55% of building energy consumption (electricity and natural gas equivalency in kWh) based on energy model results following Chiller Plant Upgrade.
2. BESS Capacity
    a. Battery Inverter Power: 1,000 kW
    b. Battery Energy Storage Capacity: 2,700 kWh
3. Generator Capacity
    a. 500 kW
    b. Existing, Natural Gas Fired
4. Microgrid Control System
    a. Open transition following grid failure.
    b. Close transition following grid restoration.
    c. Cycle charging dispatch strategy while islanded.

1.3 Codes and Standards

The following codes, guidelines, regulations and other references that were considered in the design of the microgrid system and associated components. The list below is provided for reference only and is not a guarantee of Code compliance.

- 2020 Oregon Electrical Code
- 2022 Oregon Fire Code
- National Fire Protection Association (NFPA) Standards
- American National Standards Institute (ANSI)
- Institute of Electrical and Electronics Engineers (IEEE)
- National Electrical Manufactures Association (NEMA)
- Underwriters Laboratories (UL)

1.4 Owner Specific Requirements

PAE was asked to consider the deployment of a single building microgrid at the Tigard Library, which is an existing facility at 13500 SW Hall Blvd. The list of owner requirements was as follows:

1. Microgrid to support full building load for standard to major outage durations with the intent to operate the library as a warming or cooling center during daylight hours. For catastrophic outages, the intent is to support a sub-set of facility loads to operate as a backup Emergency Operations Center. For additional information on the defined outage durations, see Section 2.5 below.
2. PAE's microgrid design needs to consider infrastructure and energy use impacts of the upcoming Chiller Plant Upgrade scope of work, which is currently underway.
3. Utilization of a 500 kW natural gas generator that is slated to be installed as part of, or subsequent to, the Chiller Plant Upgrade but prior to the FEMA Tier 1 microgrid project construction scope.
4. The existing gas-fired boilers at the library should be assumed to remain through the microgrid project construction scope.
5. Microgrid scope should include development of renewable energy production on site via deployment of photovoltaics. Development of renewable energy at Tigard Library supports the City's goal to be carbon neutral by 2050.
6. The open space on the north side of the Library is to be reserved for development of new covered storage facilities and space for battery energy storage system (BESS) deployment and should not be evaluated for photovoltaic system siting.
7. BESS design should be developed in cooperation with Portland General Electric (local Utility) to leverage the utility's "Schedule 200" battery incentive program which will allows the utility to control the BESS for grid support during on-grid operation.
8. Any current or future electric vehicle charging should not be considered in Net Zero Energy calculations. The existing two electric vehicle chargers should be supported under full load microgrid operation of the library microgrid. No new electric vehicle infrastructure is to be included in the microgrid development scope.

2.0 Energy Performance Analysis

2.1 Introduction

The Tigard Microgrid project analysis for FEMA Tier 1 is to explore the implementation of a Battery Energy Storage System (BESS) and Solar PV array for both the purpose of peak load shedding and a resilience scenario in which the library is used as an Emergency Operations Center (EOC). A calibrated energy model was developed to analyze the hourly trends of the current library for this analysis. This section describes the energy modeling approach and inputs used for the analysis.

Electricity demand data at 15 minute intervals for the meter at the library was received from PGE. This data was used to create a calibrated model that matches the hourly profile and demand as closely as possible. This calibrated model used the inputs seen throughout this section. The exception is that the calibrated model uses existing conditions at the time of the PGE meter data which includes packaged DX units for cooling. It is currently planned that these units, which are at end of life, are to be replaced with a new air cooled chiller within the next year. Because of this, all analysis shown throughout this report represent the energy and loads potential with the new air cooled chiller and added AHU-4 for the entrance lobby.

The following scenarios were simulated as a part of this analysis:

Table 1: Modeled Scenarios

Scenario	Model parameter
Normal operations	Library operations running typical hours and loads. Model calibrated based on PGE electric meter data. Existing Packaged DX cooling replaced with planned Air-cooled chiller design that is anticipated for installation in the coming year.
Emergency Operations Center (EOC)	Library operations running 24/7 in EOC spaces only, all other spaces considered shut down and not open to the public. EOC spaces include community space, adjacent restrooms and pantry, and entrance lobby space. Equipment loads and occupancy densities updated to reflect changing operations during an EOC scenario. Existing Packaged DX cooling replaced with planned Air-cooled chiller design that is anticipated for installation in the coming year.

The shaded areas in green in the image below shows the areas operational during an EOC scenario. All other areas outside of the EOC area are assumed to be in use only during normal operations scenarios. Additional detail can be found in the Building Use section below.



Figure 1: Emergency Operations Center (EOC) Analysis Zones

2.2 Model Inputs

SOFTWARE

The building energy analysis is performed using the version 2022.1 of IES Virtual Environment energy modeling software.

WEATHER DATA

The project is part of climate zone 4c and the weather file used for the analysis is selected as the Portland-Hillsboro Airport TMYx 2007-2021 weather file, which is the closest available location to the project site in Tigard.

The climate summary for the Tigard Library based on the Portland-Hillsboro Airport TMYx 2007-2021 weather file is shown in the following table and charts.

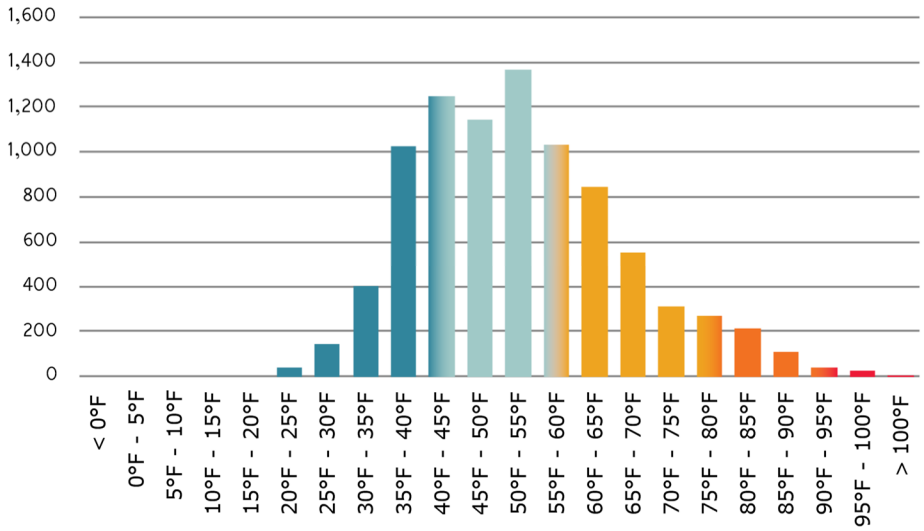


Figure 2: Temperature Distribution, Hours Per Year

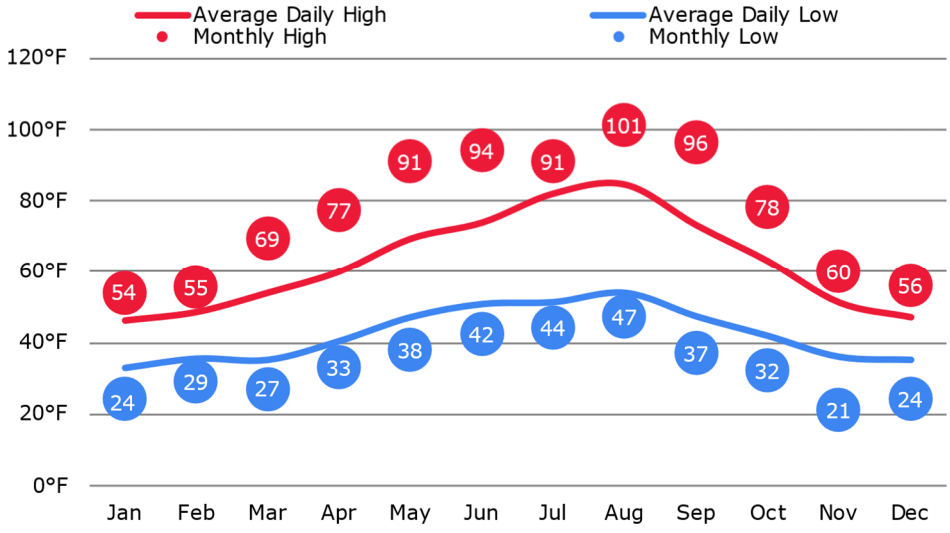


Figure 3: Average Monthly Temperatures with Maximum and Minimum (°F)

BUILDING ENVELOPE

The figures below show the 3D energy model geometry which was based on the As-Built design drawings dated May 19th, 2003 for the existing building.

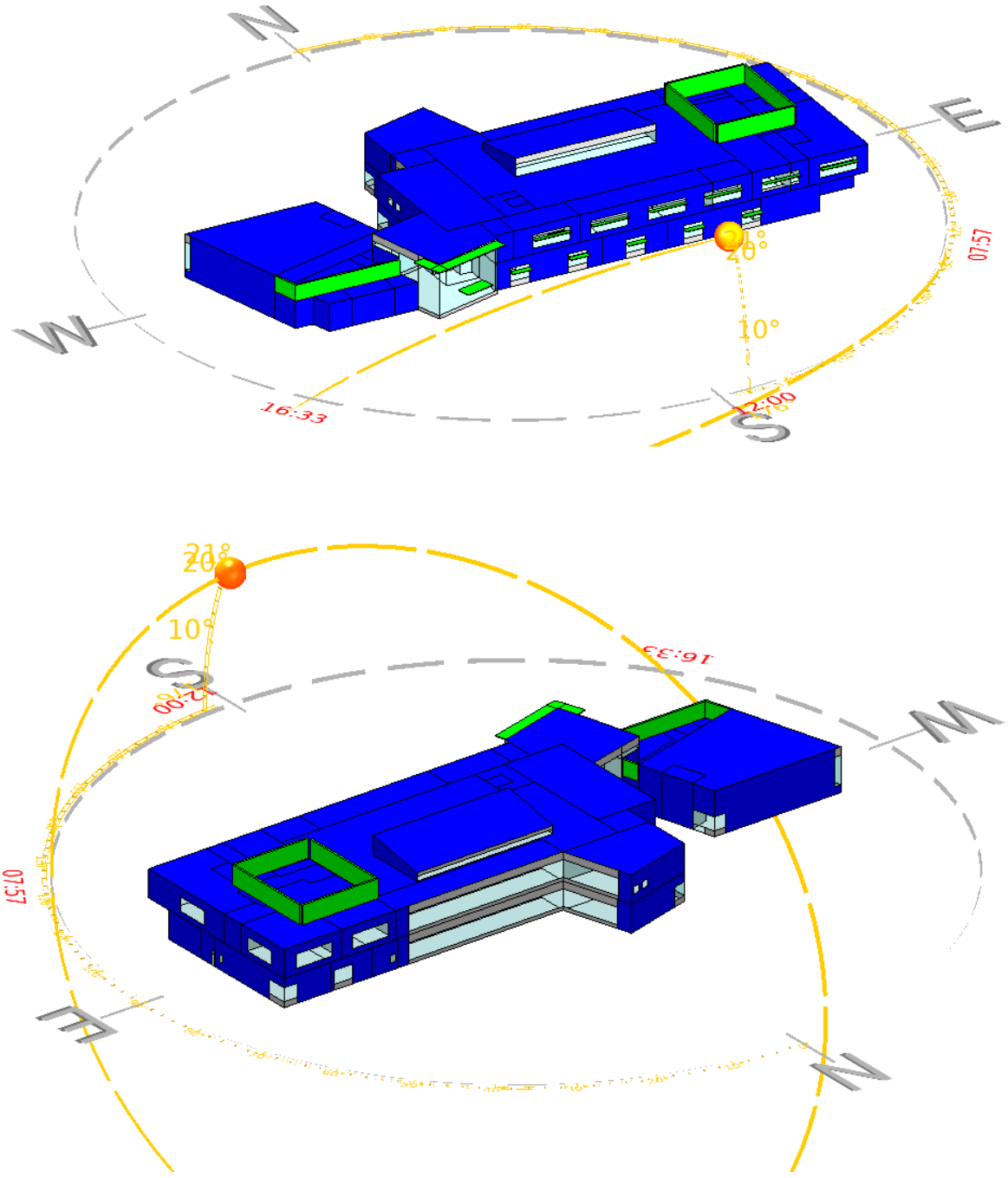


Figure 4: IES Model Renderings (Sun Position: June 30th at 3 pm)

The following table summarize the envelope performance criteria used in the energy model. Any constructions that could not be verified were assumed to meet the ASHRAE 90.1-1999 energy code that was in effect at the time of design and construction of this project.

Table 2: Envelope Performance

Building Assembly	Parameter	Proposed Design
Roofs	Type 1 - Typical roof	2" concrete deck with insulation above
	Insulation	R-15 continuous insulation[1]
	Assembly U-Value	U-0.063
Floors	Type 1 – Ground floor	Concrete slab
	Insulation	None
	Assembly F-Value	F-0.730
Walls	Wall Type	Metal framing with Batt Insulation, no c.i.
	Insulation	R-13 between frame members
	Assembly U-Value	U-0.124
	Wall Type	Metal frame with thermal break, backpan insulation
	Insulation	R-10 backpan
	Assembly U-Value	U-0.23
Vertical Glazing (Including Glazed Doors)	Window to Wall Ratio	26.2%
	Double Pane, metal framing, clear	Metal frame with thermal break, double pane glass, Per ASHRAE 90.1-1999
	Assembly U-value	U-0.57
	Assembly SHGC	0.39 SHGC
	VLT	66% VLT

INTERNAL GAINS

The tables in this section summarize the inputs used for internal gains.

Lighting

Lighting power for the project are unknown. LPD values are based on requirements in ASHRAE 90.1-1999 which would reflect typical fluorescent lighting design but reduced to match typical lighting power use of a similar building type and calibrate to PGE utility meter data.

The following table summarizes the lighting power densities used in the energy model.

Table 3: Lighting Power Densities

Space Type	Floor Area (sf)	ASHRAE 90.1-1999 (W/sf) [1]	Proposed Design (W/sf)
Conference, meeting	4,776	1.50	1.05
Corridor, transition	3,513	0.70	0.49
Electrical room	1,071	1.30	0.91
Food preparation	183	2.20	1.54
Library – reading area	5,988	1.80	1.26
Library - stacks	19,849	1.90	1.33
Office - Open	4,511	1.30	0.91
Office – Enclosed	1,615	1.50	1.05
Restrooms	2,059	1.00	0.70
Stairs	610	0.90	0.63
Storage	1,675	0.70	0.49
TOTAL	**47,320**	**1.58**	**1.10**

Notes:
1. ASHRAE-90.1 values are shown for reference only.

Receptacles and People Gain

The following table summarizes the equipment and occupancy related inputs used in the energy model. The first table represents the building under normal operations. The second table represents the building under an EOC (Emergency Operations Center) scenario. During this scenario, it is assumed it will be occupied 24/7 and have different occupancy and equipment density gains.

Table 4: Receptacle and Occupant Gains for Normal Operations

Space Type	Receptacle Load Density (W/sf)	Receptacle Load Diversity Factor	Occupant Density (sf/pers)	Occupant Diversity Factor
Conference, meeting	1.0	60%	50	60%
Community room	1.0	60%	50	30%
Corridor, transition	0.2	100%	-	-

Space Type	Receptacle Load Density (W/sf)	Receptacle Load Diversity Factor	Occupant Density (sf/pers)	Occupant Diversity Factor
Electrical room (IDF)	15 (4,000 W each)	70%	-	-
Food preparation	1.5	100%	100	100%
Library – reading area	1.5	100%	200	40%
Library - stacks	1.5	100%	200	40%
Office (open)	1.5	100%	200	80%
Office (enclosed)	1.0	100%	200	80%
Restrooms	0.5	100%	-	-
Stairs	-	-	-	-
Storage	-	-	-	-

The following table summarizes the equipment and occupancy related inputs used in the energy model during an EOC scenario.

Table 5: Receptacle and Occupant Gains for EOC

Space Type	Receptacle Load Density (W/sf)	Receptacle Load Diversity Factor	Occupant Density (sf/pers)	Occupant Diversity Factor
Conference, meeting	-	-	-	-
Community room	4.2	61%	50	50%
Corridor, transition (within EOC area)	0.2	100%	-	-
Electrical room on 1st floor (IDF)	15 (4,000 W)	70%	-	-
Food preparation (pantry)	33.2	41%	100	100%
Library – reading area	-	-	-	-
Library - stacks	-	-	-	-
Office (open)	-	-	-	-
Office (enclosed)	-	-	-	-
Restrooms	0.5	100%	-	-
Stairs	-	-	-	-
Storage	-	-	-	-

HVAC AND DHW SYSTEMS

The table below describes the building systems modeled in the proposed and in the ASHRAE baseline models.

Table 6: HVAC Airside Systems

Space Type	Proposed Design
HVAC System	VAV AHU units served by hydronic cooling and VAV boxes with reheat.
Fan Efficiency	Supply Fan: 0.93-1.00 W/cfm Return Fan: 0.23-0.40 W/cfm
VAV box minimum turndown	30%
AHU supply air temperature	55°F - 70°F
Heat recovery	None

Table 7: HVAC Waterside Systems

Space Type	Proposed Design
HHW equipment	(2) natural gas condensing boilers
HHW loop temperatures	Supply: 140°F, no reset Return: 40°F delta T
Heating efficiency	ASHPs: 2.35 COP @30°F
HHW pumps	Primary: 5.8 W/gpm Secondary: 18.46 W/gpm
CHW equipment	(1) 365 ton air-cooled scroll chiller
Cooling Efficiency	ACC: 3.02 COP (10.3 EER) @ 95°F OAT
CHW temperatures	Supply: 44°F, no reset Return: 12°F delta T
CHW pumps	Primary: 19.08 W/gpm
CW equipment	No cooling tower
CT fan power	-
CW temperatures	-
CW pumps	-

Table 8: DHW Systems

Space Type	Proposed Design
Domestic Hot Water System	Electric water heater storage tanks: 99% efficiency

2.3 Building Use and Operation

BUILDING USE DURING NORMAL OPERATIONS

The typical building use during normal operations has been simulated as a library space. Load profiles for equipment, lighting, and occupancy meet typical use and diversity of a library space use.

The hours of operation for the Tigard library are seen in the following list. The HVAC systems and electric load profiles are set to meet these hours throughout the year, minus holidays. Note that load profiles extend outside of these hours for employees that are in the building before opening and after closing.

— Monday – Thursday: 10:00 AM to 8:00 PM

— Friday – Sunday: 10:00 AM to 6:00 PM

The following figures show the typical daily profiles for the library used in the energy model during normal operations.

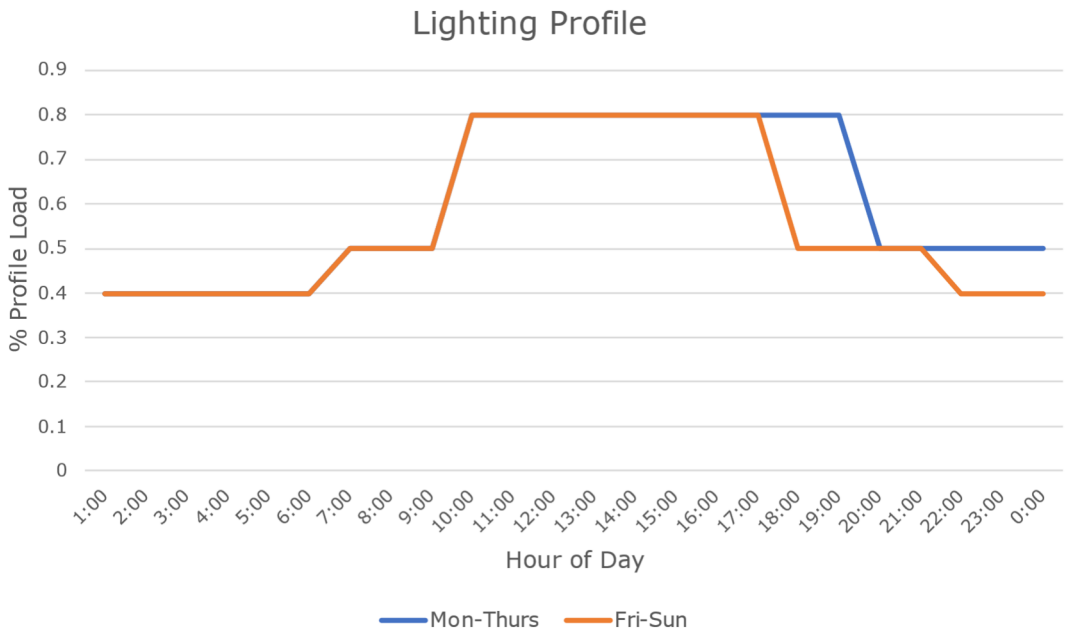


Figure 5: Lighting Load Profile

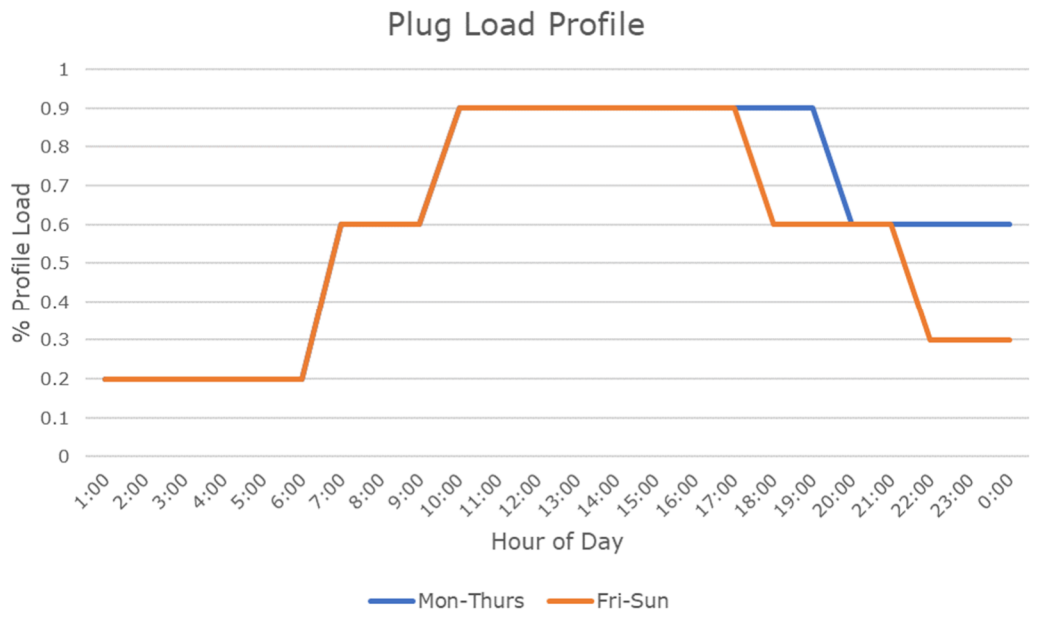


Figure 6: Plug Load Profile

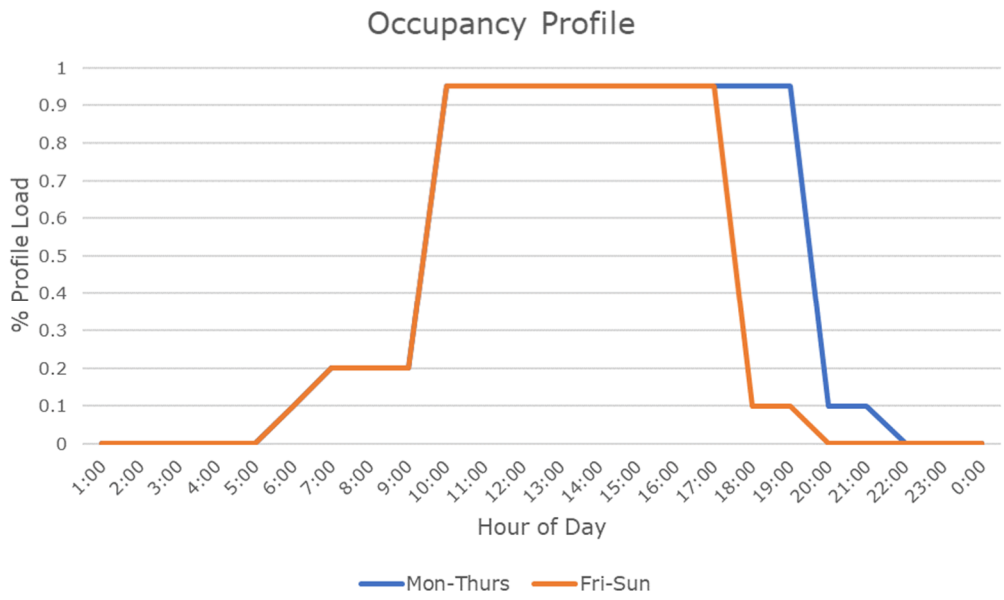


Figure 7: Occupancy Load Profile

BUILDING USE DURING EOC OPERATIONS

During an EOC event, the energy model operations and load profiles will differ significantly. Library operations are set to run 24/7 in EOC spaces only, all other spaces considered shut down and not open to the public. EOC spaces include community space, adjacent restrooms and pantry, entrance lobby space, and 1st floor IDF room. Equipment loads and occupancy densities updated to reflect changing operations during an EOC scenario.

The current design of the library shows that the 1st floor IDF room is served by a terminal unit connected to AHU-1. This IDF room would need to be operational during an EOC scenario. Therefore, it is recommended for resiliency to add a single zone mini-split system or similar to this space to both eliminate the need to operate AHU-1 during an emergency event and to reduce energy during normal operations. All EOC model simulations include that the 1st floor IDF has been decoupled from AHU-1 with a mini-split heat pump for independent cooling.

The following table details the equipment to be needed during an EOC scenario separated by Community Space equipment and cooking equipment for the pantry.

Table 9: Community Room Equipment for EOC Scenario

Equipment for Community Room	Quantity	Amps	Volts	Modeled Watts Each (W) [1]	Modeled Watts Total (W) [1]
VHF Radios with Chargers	40	1.5	120	20	800
800 MHz Radios with Chargers	40	1.5	120	20	800
Cell Phone Chargers	75	3	120	20	1,500
Chromebook/ Laptops	40	2	120	240	9,600
TV Monitors	4	1	120	120	480

Notes:

1. Watts for energy model include peak power use. Diversity added as not all equipment will be operational or charging at the same time or will be at 100% of load during operations.

Table 10: Pantry and Cooking Equipment for EOC Scenario

Equipment for Pantry	Quantity	Amps	Volts	Modeled Watts Each (W) [1]	Modeled Watts Total (W) [1]
Refrigerator	1	15	120	1,800	1,800
Microwave	1	6.5	120	780	780
Dishwasher	1	10	120	1,200	1,200
Coffee Maker	2	8	120	960	1,920

Notes:

1. Watts for energy model include peak power use. Diversity added as not all equipment will be operational or charging at the same time or will be at 100% of load during operations.

2.4 Annual Building Energy Demand

To analyze the library energy use and demand, historic PGE meter data at 15 minute intervals for the 2022 calendar year was received for the library building. The following chart shows the annual demand for the 2022 calendar year.

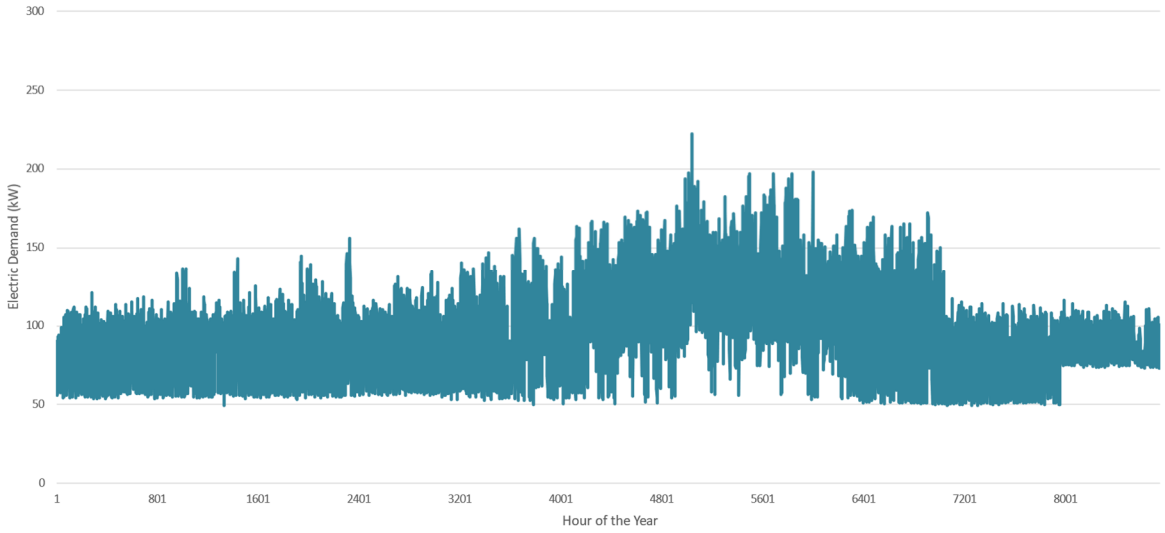


Figure 8: Annual Hourly Electric Load Profile

As can be seen from the chart above, electricity use is higher in the summer for building cooling use. Heating for the library uses natural gas fired boilers which keeps electricity in winter months lower. Gas use for the project is based on typical CBECS (Commercial Building Energy Consumption Survey) benchmarking data for a library building type, however, gas is not used as a part of the resiliency analysis.

The table below shows the annual electricity use for the historic PGE data for 2022 calendar year.

Table 11: Annual Energy Use

Fuel Source	Energy Usage	EUI [1] (kBtu/sf/yr)
Electricity (kWh)	823,529	58.9
Natural Gas (kWh)	300,400	21.7
Total (kWh)	**1,123,929**	**80.6**

Notes:
1. EUI based on a modeled square footage of 47,320

The calibrated model energy use was compared to PGE data both for hourly profiles and daily electricity use trends. The chart below shows the model electricity as compared to the PGE data. Note that the model includes the future chiller upgrade while the PGE data will not yet reflect this change.

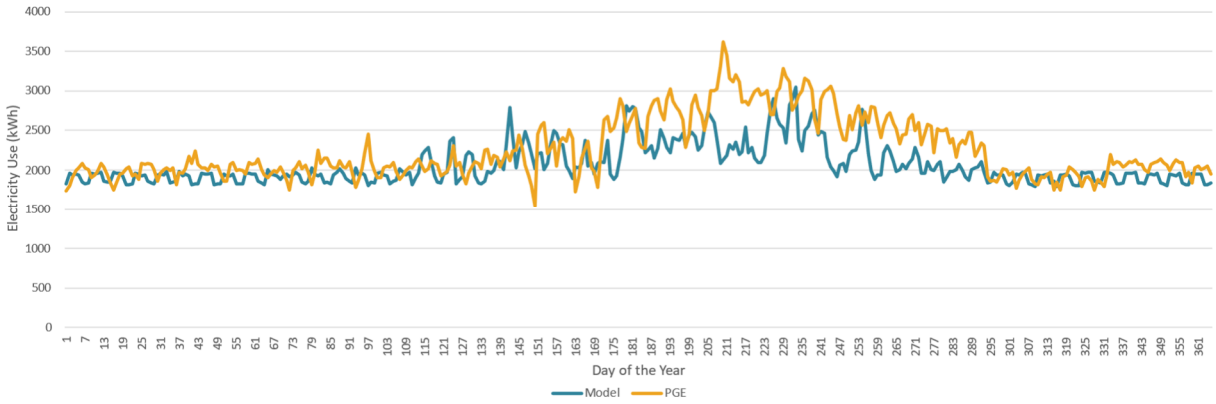


Figure 9: Annual Daily Electric Load Profile – Model to Meter Comparison

The total electricity meter data received does not show what end uses the energy was used for such as lighting, equipment, cooling, etc. Because of this, CBECS benchmarking data was used to calibrate the model for an approximate distribution of energy based on the library building use and type. Using the CBECS benchmarking data, the expected energy use breakdown and EUI from the energy model is shown in the figure below.

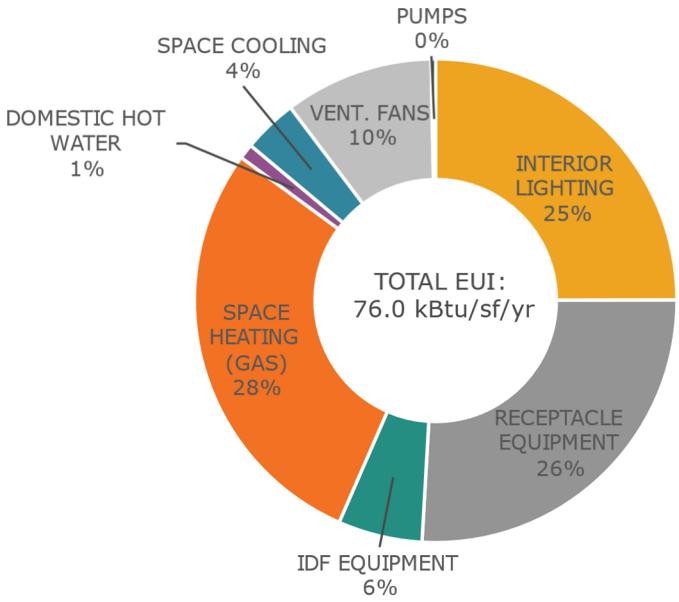


Figure 10: Modeled Energy End Use Breakdown

Table 12: Energy Use Intensity Breakdown, in kBtu/sf/yr

	Calibrated Model
Receptacle equipment	19.7
Interior lighting	19.0
Space heating (Gas)	21.7
Space cooling	2.8
Pumps & aux.	0.2
Vent. Fans	7.6
Domestic hot water	0.8
IDF elec.	4.3
EUI	**76.0**

2.5 Microgrid Resiliency Analysis

As part of the design of the microgrid for the Tigard Library, PAE conducted a thorough analysis of the best and most feasible approach to creating a microgrid at the Tigard library. Analysis focused on three levels of outage: standard, major, and catastrophic. The distinction between each outage type being the length of the outage. A standard outage we defined as a single day outage, a major outage we defined as up to 7 days and a catastrophic outage we defined as 2 weeks or more. The goal of the analysis being to understand how the overall system would perform in the absence of grid power.

PAE took a two-fold approach in our analysis of the design options for the Tigard Library Microgrid. First, we explored a range of options for photovoltaic (PV) array integration at the library using Helioscope. We explored several rooftop PV design options and the use of ground-mount carports for additional PV capacity at the project site. After we had a thorough understanding of the PV options available on the site, we then turned to battery sizing.

PAE used two primary tools to conduct our analysis of the battery size including a proprietary "Resiliency Tool" created by the engineers at PAE and we employed Homer Grid to analyze the economic feasibility of the different options we explored. PAE's proprietary tool focuses on the electrical system itself and helps determine the appropriate battery size to serve a facility electrical load without addressing any economic constraints. Once we had selected a range of battery sizes using the PAE resiliency tool, we then ran the analysis in HOMER Grid to determine the economics of each choice. HOMER Grid also allowed PAE to import the results of the analysis in Helioscope so that the entirety of the microgrid design PAE created could be analyzed together.

In addition, HOMER Grid allows the creation of complex electrical pricing schedules as part of its analysis framework. PAE, in partnership with the PGE, recreated the utility rate schedules impacting the cost of grid energy at the library as part of PAE's economic analysis.

PAE completed two reports for the City of Tigard. The PV Analysis Report can be found in Appendix A. The Battery Energy Storage System (BESS) Analysis Report can be found in Appendix B. Together, these two reports were utilized to determine the best and most economically feasible approach to creating a microgrid at the Tigard Library.

SolarEdge PV inverters and Canadian Solar PV panels are the basis of design for the PV arrays proposed. And the battery based microgrid solutions from ELM Microgrid are the basis of design for the microgrid controller and battery energy storage system. For full details see the reports in the appendix.

The last piece of analysis in the microgrid design focused on how the library electrical loads could be managed in the case of the three outage cases explored. PAE worked with city staff to determine which control systems could be integrated into the microgrid controller and which could not. The final control solution for building load management during a grid outage will incorporate limited automation between the microgrid controller and the facility Building Automation and lighting control systems but will be dependent on manual load shedding by City Staff to achieve resiliency for the major or catastrophic outage conditions. See Section 3.3 below for additional information.

3.0 Electrical

3.1 Electrical Service & Distribution

The facility receives power from PGE through an underground utility feeder via an 800 amp 480Y/277V, 3PH, 4W service. The existing secondary service lateral routes to the main switchboard MDP-A, which serves a secondary main switchboard, MDP-B, on the second floor of the building. MDP-B then serves all branch circuit load panels in the building. MDP-B also currently serves 2 ATS switches designed to operate the generator in the case of emergency. The building is equipped with a 50kW backup generator.

The city is currently undertaking a generator upgrade project to replace the existing 50 kW natural gas genset with a 500 kW natural gas genset. PAE's microgrid design includes the upsized 500 kW generator which will continue to serve as an emergency power source but will also be enabled for full load building backup as a microgrid controlled asset.

The microgrid scope of work includes a new main service switchboard (4RDP-0) and will intercept the existing utility service lateral into the building and serve as a point of common coupling (PCC) for all distributed energy resources (DERs). The 4RDP-0 board will house the microgrid interconnect device controllable circuit breaker to establish the island mode operation of the local electrical power system in the event of a grid outage. The existing MDP-A and MDP-B switchboards will be re-fed and remain in service.

The 4RDP-0 switchboard will be rated for 2000-amp service to support the code compliant interconnection of the on-site DERs and to provide full export capacity of the BESS power to PGE for grid stabilization and support services as required for Schedule 200 program participation. PGE will perform an analysis to determine if replacement of the main service transformer is required if the project moves forward with construction and utility service reconfiguration.

The complete schematic design for the library power system configured for microgrid operation can be seen in the single line diagrams (SLDs) in Appendix C. SLDs include the necessary demolition of existing power system components as well as the new system components and wiring to be installed.

Refer to Appendix D for Microgrid Site Plan design drawing developed by R&W Engineers in collaboration with PAE for the Chiller Plant Upgrade scope of work.

3.2 Distributed Energy Resources (DERs)

NATURAL GAS GENERATOR

The city is in the process of upgrading the generator from a 50 kW natural gas genset to a 500 kW natural gas genset. The upsized generator will provide power to both the emergency power ATS (ATS-E) as part of the Emergency Power Supply System (EPSS) and to the new 4RDP-0 switchboard for optional standby backup of the entire facility load. The generator will be controlled by both the microgrid controller and ATS-E in a failsafe emergency situation if the microgrid control system is unavailable during a utility outage. The generator will be dispatched by the microgrid control system utilizing a "cycle-charging" dispatch strategy.

PHOTOVOLTAIC SYSTEM

The PV arrays on site will be divided into two main sub-system. The first system will be on the roof and will include 248 kW of DC nameplate capacity. The second system will consist of several carport arrays built over a significant portion of the library parking lot and will account for the other 259 kW of DC nameplate capacity for a total system size of 507 kW. The full PV system report can be found in Appendix A.

BATTERY ENERGY STORAGE SYSTEM (BESS)

The BESS will be equipped with a grid following and grid forming inverter and with power and energy ratings as determined by PAE for off grid resiliency. The battery inverter rating will be 1.0MW and coupled to a 2.7 MWh battery that will provide for full load backup for several hours in the event of a grid outage. Resiliency duration will be extended by the microgrid control system via selective utilization of PV and generator capacities with the system prioritizing PV energy when available during daylight hours. The full Microgrid Resiliency Report can be found in Appendix B.

3.3 Microgrid Control System

PAE worked with city staff to determine which parts of the library load could be integrated with the building's microgrid controller and which could not. It was determined that the buildings mechanical and HVAC equipment which is currently controlled by the BAS can be integrated into the microgrid controller. As well, the lighting control system can be integrated although the system will need to be upgraded as the current control systems are too old to be integrated with the available microgrid controllers. The rest of the library load will need to be shed manually through either turning off or unplugging equipment at the receptacle, turning off circuit breakers in the branch panels, or through changes in human behavior like not turning on extra lights or not plugging in large receptacle loads during an outage event.

The microgrid control system will be provided to manage or control the following aspects of facility operation and grid interactivity.

1. Resilient Operation:
    a. BAS - the buildings automated HVAC and mechanical equipment control system
    b. Lighting Control – integration will require a lighting control system upgrade.
    c. DER Dispatch- ensures the sum total of power from DERs equals the load needed with the goal of ensuring the highest level of renewable energy possible when in islanded mode.
2. Grid Connected Operation:
    a. PGE BESS dispatch – serves as a point of interface with PGE's GenOnSys for remote utility control of the BESS when grid connected.
    b. Grid energy cost optimization – taking advantage of available renewable energy (PV) during peak usage and peak rate windows.

It is important to note that the proposed microgrid design is an open transition microgrid which means there will be a short duration interruption of power during loss of utility power. This approach to system design is less complex and less costly than a closed transition scheme. The microgrid system is not a UPS system for the building and as such any existing UPS systems will have to be maintained to ensure that all the critical elements of the library load are not disrupted in the event of an outage.

At this time a complete in-depth control schematic and sequence of operations for construction has not been included. This level of control design will be completed in later stages of project development.

3.4 Grounding System

The new microgrid switchboard 4RDP-0 will serve as the new service entrance equipment and will be the point of neutral to ground bonding within the facility. The existing neutral to ground bonding in the existing MDP-A switchboard will be disconnected and removed.

The remainder of the facility grounding system is existing to remain as currently configured. Each electrical and telecom room currently has its own ground bar that will remain connected to the facility grounding electrode system.

3.5 Pathways and Raceways

Microgrid scope of work will include new underground conduit and associated trenching work throughout the project site including the facility parking lot to support the installation of PV carports.

New above grade conduits will be included to integrate the rooftop PV system. Conduit provisions installed in the chiller plant and generator upgrade scope of work will be leveraged for deployment of the microgrid system. PAE has coordinated with R&W engineers to ensure adequate spare conduits have been provided in prior phases of work.

Appendix A - PV Report



Tigard Library:

Preliminary PV Results

APRIL 28, 2023

PAE

pae-engineers.com

Executive Summary

This report provides the results from the preliminary PV analysis for the Tigard Public Library in Tigard, OR.

This report utilizes the as built information provided by the city as well as our own records as PAE was part of the original design team for the library. Our analysis here does not take into account the forthcoming adjustments to roof spacing that may lead to a small increase in usable PV area on the library roof.

SUMMARY OF KEY FINDINGS

- The east/west orientation for the roofs arrays resulted in the highest overall production. It is recommended that the PV contractor provide optimized options for both an east/west and fixed tilt racking solution.
- The addition of carport solar arrays can more than double the overall production on the site which would improve the resilience of this site and its use as an Emergency Operations Center and should thus be considered in this design.
- Most of the parking spots have adequate solar access.
- Sections of the proposed PV carports are impacted by the trees on site. A detailed shading evaluation is recommended to determine if the impact is too significant. Intentional tree trimming might be sufficient to address shading concerns.

Study Methodology

The initial PV analysis considered two variable categories for each roof location:

Racking

Orientation

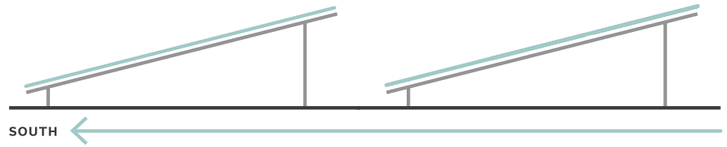
LOCATIONS

Rooftops

Parking Lot Canopies

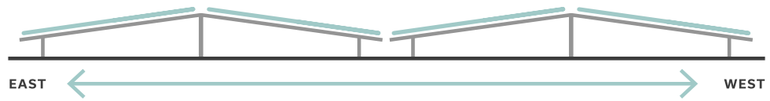
Panel Orientation

SINGLE VS. DUAL TILT RACKING



SINGLE TILT RACKING CONFIGURATION

Traditionally, PV arrays are integrated on building rooftops to face south with single tilt racking systems, which is the optimal, highest efficiency orientation.

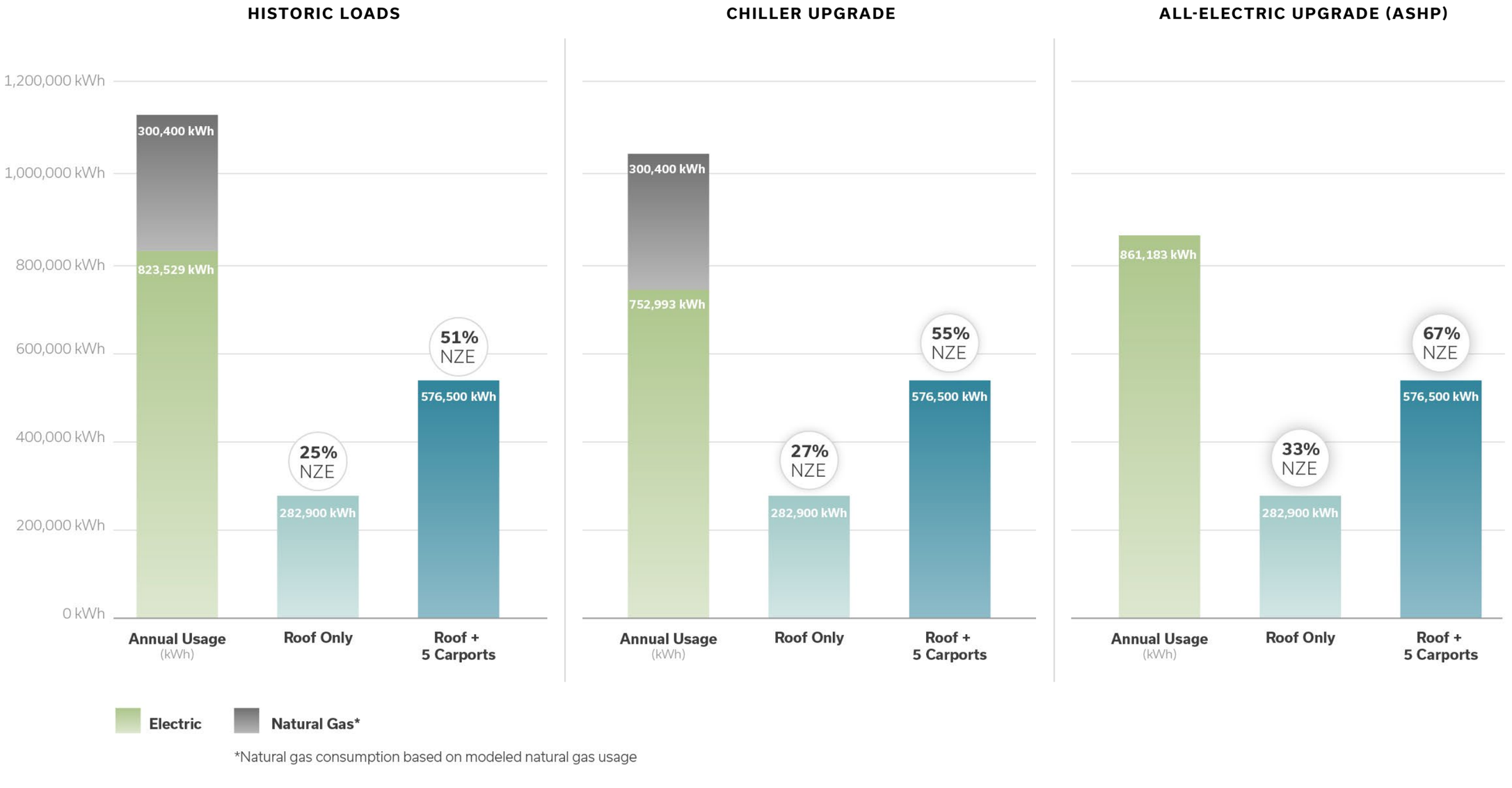


DUAL TILT RACKING CONFIGURATION

In recent years, as panel efficiency has increased and panel cost has decreased, east/west orientated arrays with dual tilt racking have gained market prominence. An east-west orientated mounting for a PV array can provide multiple benefits, even though it is technically a less optimal sun angle. The panel density of an east-west array can be increased since there are no inter-row shading setbacks. This allows for more overall panels to be installed, so although the production from each panel is reduced, total annual production is increased. This orientation also extends the production time period because it catches more morning and evening daylight.

Net Zero Energy Analysis

TIGARD LIBRARY MICROGRID NZE RESULTS



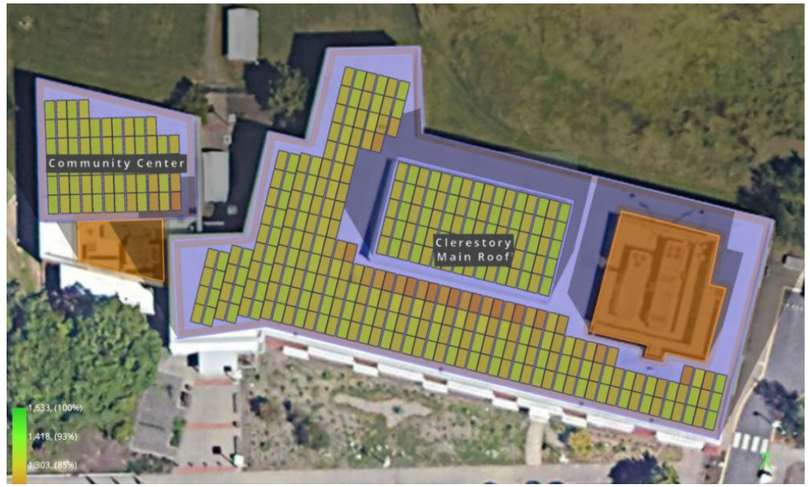
*Natural gas consumption based on modeled natural gas usage

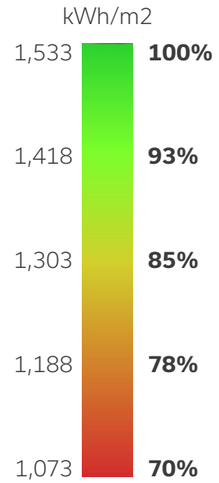
Rooftop Results

FIXED TILT (SOUTH) VS. EAST/WEST ORIENTATIONS

OPTION 1

East/West Orientation





OPTION 2

Fixed Tilt (South) Orientation



RESULTS
EAST + WEST RACKING

	kW	MWh
Main Roof	154	176
Clerestory	53	60
Community Center	41	47
TOTAL	**266**	**283**

RESULTS
FIXED TILT (SOUTH) RACKING

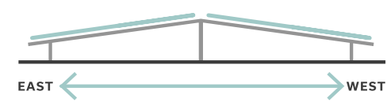
	kW	MWh
Main Roof	124	150
Clerestory	48	58
Community Center	38	46
TOTAL	**210**	**253**

MODEL SUMMARY

- Basis of design is Canadian Solar CS7N-660MB. A panel of equal or better efficiency is acceptable.
- Basis of design inverter is Solar Edge

KEY CONSIDERATIONS

- The East/West Orientation shows the best overall annual production potential for the project.
- It's likely that the panel count will decrease in the final design due to optimization for installation efficiency.
- Based on specifications provided, the new chiller will likely increase the usable area on the roof. Depending on how much space is gained there may be a small increase in the number of panels or an improvement on shading zones.



The E-W Dual Tilt Orientation has the highest simulated output.

Carport Results

MODEL SUMMARY

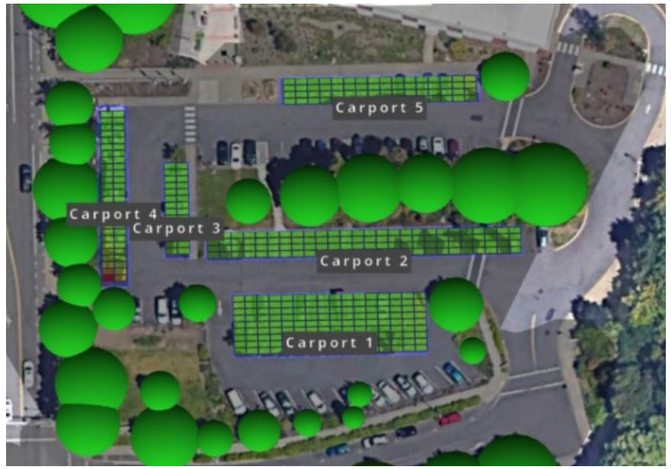
- Model is based on options by Baja Carports
- Basis of Design tilt angle is 7 degrees
- Trees were modeled at 25 feet tall.
- Additional factors such as tree species, height at maturity and exact distance between trees and canopies should be evaluated in the final studies
- Trimming strategies should be evaluated with the guidance of an arborist especially with Carport 2 and 4 as in modeling both have sections that are heavily impacted by the surrounding trees.

KEY FINDINGS

- Property is surrounded by trees. A strategic trimming plan with the guidance of an arborist should be implemented if Carports are going to be utilized to ensure maximum production during peak seasons.
- Trees on the southern most parking spaces make carports infeasible.

OPTION 1
CENTRAL PARKING AREA

- Fixed Tilt Carports
- Trees modeled at 25 ft.
- 7-degree tilt

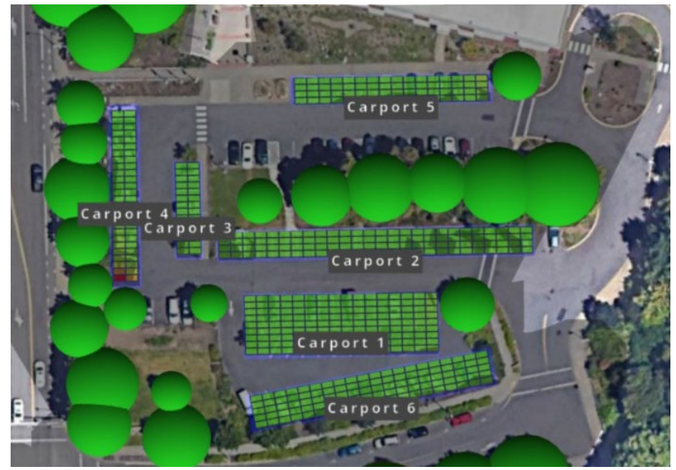


PARKING | 5 CARPORTS
7 DEGREE TILT

Without Trees	kW	MWh
Carport 1	95	110
Carport 2	69	80
Carport 3	19	22
Carport 4	34	39
Carport 5	42	49
TOTAL	**259**	**300**

OPTION 2

- Add southern most parking canopy (assumes no conflict with current existing trees)



PARKING | 6 CARPORTS
7 DEGREE TILT W/ ADDITIONAL SOUTH CANOPY

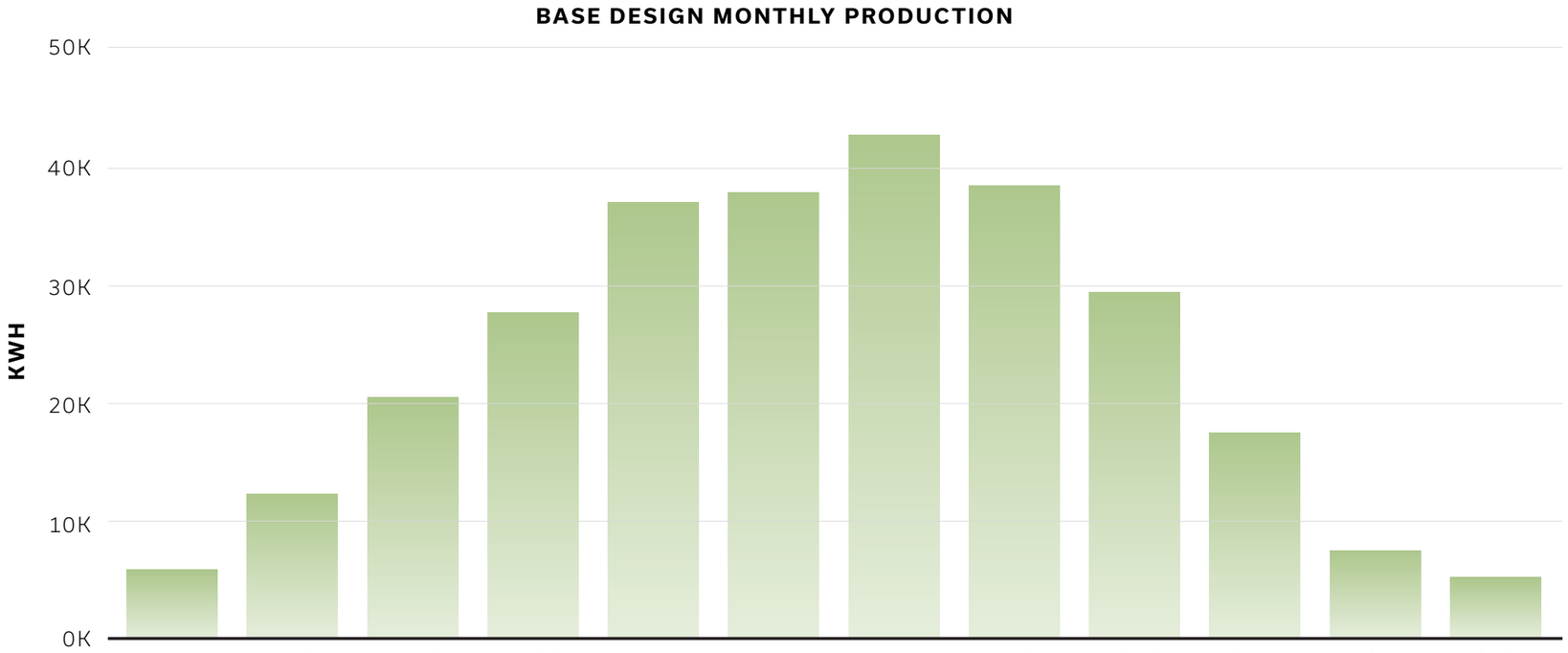
With Trees	kW	MWh
Carport 1	95	110
Carport 2	69	80
Carport 3	19	22
Carport 4	34	39
Carport 5	42	49
Carport 6	66	76
TOTAL	**325**	**376**

Results Summary

BASIS OF DESIGN

- E-W orientation for rooftop arrays
- Flushmount carports at a height of 12′
- Trees Modeled at 25′

- Panels are Canadian Solar - CS7N-660MB-AG
- Optimizers are Solar Edge - P700
- Inverters are Solar Edge - SE30KUS (3), SE40KUS (5), SE100K (2)



	ARRAY AREA	MOUNTING OPTION	KW	MWH	# OF PANELS
ROOF TOP ARRAYS	Main Roof	South	124	150	188
		East/West	**154**	**176**	**234**
	Clerestory	South	48	58	72
		East/West	**53**	**60**	**80**
	Community Center	South	38	46	57
		East/West	**41**	**47**	**62**
	Total of All Roof Top Arrays	South	210	253	317
		East/West	**266**	**283**	**376**
EXPANSION OPTIONS	5 Carports	Fixed Tilt	259	300	392
	6 Carports	**Fixed Tilt**	**325**	**376**	**492**
	Total Possible on Campus		**573**	**659**	**868**

Appendix B - Resiliency Report



Tigard Library:

Creating Resiliency

A PRELIMINARY ANALYSIS OF RESILIENCY OPTIONS FOR TIGARD LIBRARY

MAY 22, 2023

PAE

pae-engineers.com

Executive Summary

The following scenarios and systems are considered in this report.

Resources:

PHOTO-VOLTAIC PANEL ARRAY SIZE

- Roof Only: 248 kW
- Roof + 5 Carports: 509 kW

BESS SIZE

- Full Battery Support: 250kW/2700 kWh
- Reasonable Battery Support: 250 kW/1320 kWh

Load Profiles:

100% BUILDING LOAD

- All Systems
- All Systems minus Space Conditioning and Hot Water

50% BUILDING LOAD

- All Systems
- All Systems minus Space Conditioning

EOC BUILDING LOAD

Outage Types:

- Typical Outage: 24 Hours
- Major Outage: 7 Days
- Catastrophic Outage: 14+ Days

CONCLUSIONS

This study found that building a resilience strategy that depends only on PV and BESS creates challenges that will be difficult to overcome and economically limiting. While EOC operation reduces the overall load, the winter months still present a challenge.

This study concludes that a Whole Building resiliency strategy is the most economically feasible and is achievable with a reasonable BESS size coupled with generator support in the winter months.

This report also presents a brief overview of Capex vs Opex expenses for each design presented.

NEXT STEPS

- Selecting a Resiliency Strategy: Whole Building vs. EOC operation
- Selecting a PV Array Size
- Selecting a BESS Size

Report Contents

2 Executive Summary

3 What is Resiliency

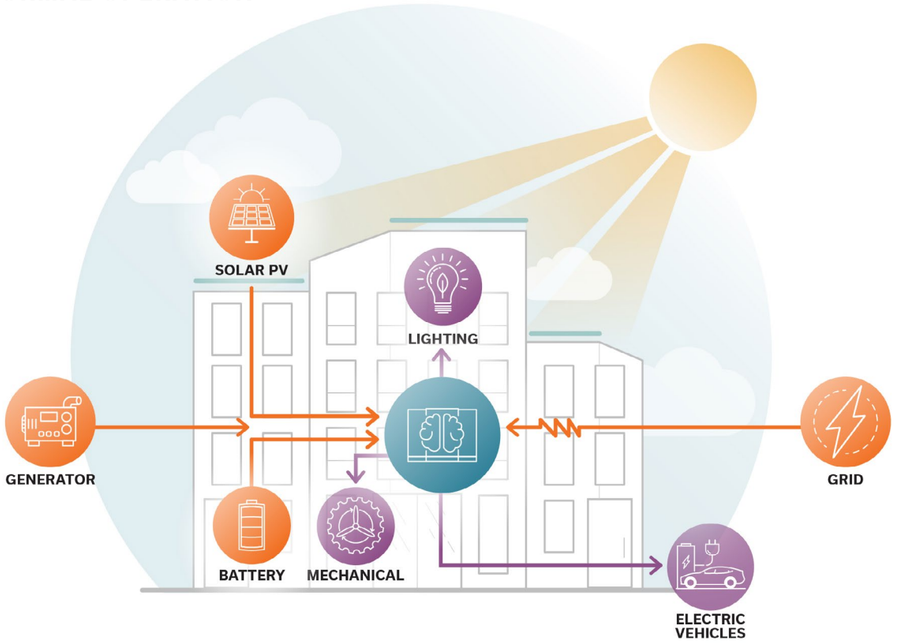
6 Resiliency Scenarios

15 Design Results

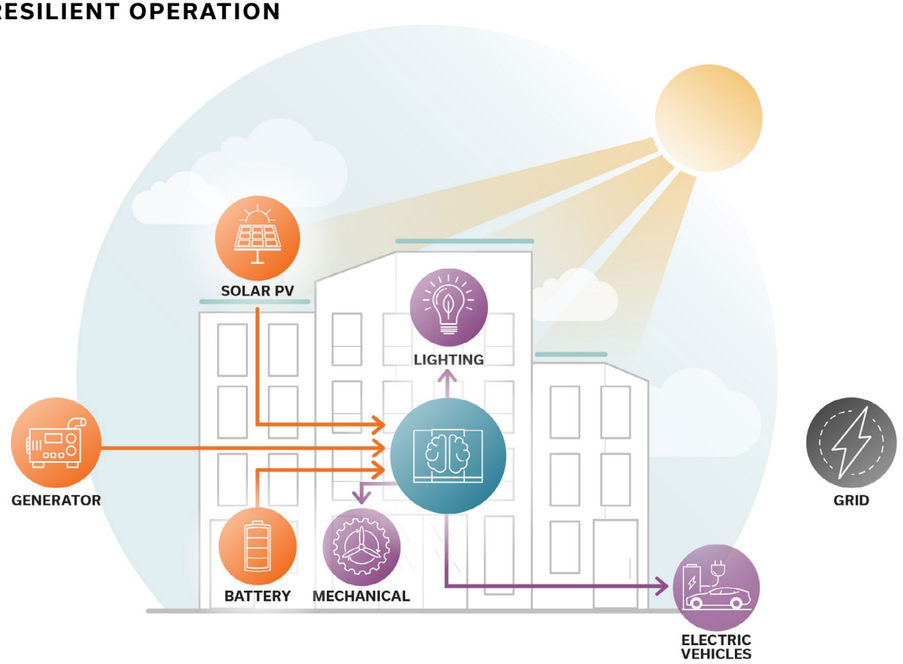
16 Preliminary Financial Results

17 Recommendations and Next Steps

NORMAL OPERATION



RESILIENT OPERATION



Developing a Framework for Energy Resilience

How have we addressed Resiliency in this study?



ROBUSTNESS

Robustness is the ability to withstand or overcome adverse conditions. In the case of resiliency it means that the system design needs to be able to withstand different levels of disaster all with the same system. In this study we explore how the proposed systems will handle a typical outage, a major outage, and a catastrophic outage.



RESOURCEFULNESS

Resourcefulness is the ability to find quick and clever ways to overcome difficulties. In terms of resiliency, it means the system design needs to be adaptable to changing conditions. As well, a system design needs to be able to address the predictable outages it may face but also be designed in such a way that when unexpected events occur, the system should be able to be adapted to that changing need. In this study we explore multiple pathways to serve the library load that show the resourcefulness of the design.



RAPID RECOVERY

Rapid recovery is the ability to quickly return to a condition of stasis after an event that breaks the status quo. In terms of resiliency, this means that the system needs to be able to respond quickly to a sudden loss of power. The system currently utilized by the Library is already designed in such a manner. The addition of PV and BESS systems to the over all resiliency strategy fills in the gaps and adds strength and breadth to the tools available to achieve the electrical needs of the library during an outage. This study did not directly address rapid recovery.



REDUNDANCY

Redundancy is the inclusion of extra components which are not strictly necessary to functioning, in order to address the possibility of failure in another system. In terms of resiliency, this means a system should be designed with fail safes. The addition of PV and BESS systems introduce redundancy to the Library resiliency strategy. The systems this study proposes can work alone or in tandem with the existing generator depending on the season and the severity of the outage. Together, the existing system and the additions proposed in this study strengthen resiliency of the Tigard Library.

WHAT IS RESILIENCY?

Resiliency is the symbiosis of the four categories laid out above. It is the ability of a designed system to respond to sudden and/or enduring loss of a primary power source. Resiliency is a multi-faceted approach to maintaining some semblance of normal operations in a time when the system's power has been interrupted. Resiliency can have many different tiers and in this study we show a variety of ways in which full or partial resiliency can be achieved in the Tigard Library using the various systems already available as well as with the addition of the systems we propose.

CONCLUSIONS

This study found that the best course of action for the city of Tigard is to maximize the size of their BESS from Day 1 for a whole building microgrid design. If the initial battery size is insufficient to support the library's overall electrical need then additional battery can always be added later. Though early versions of the design might require manual load shedding, this study has provided a series of options that will allow the Library to maximize the impact of the battery at multiple sizes according to the need created by different levels of outage event.

Mapping a Path to Resiliency

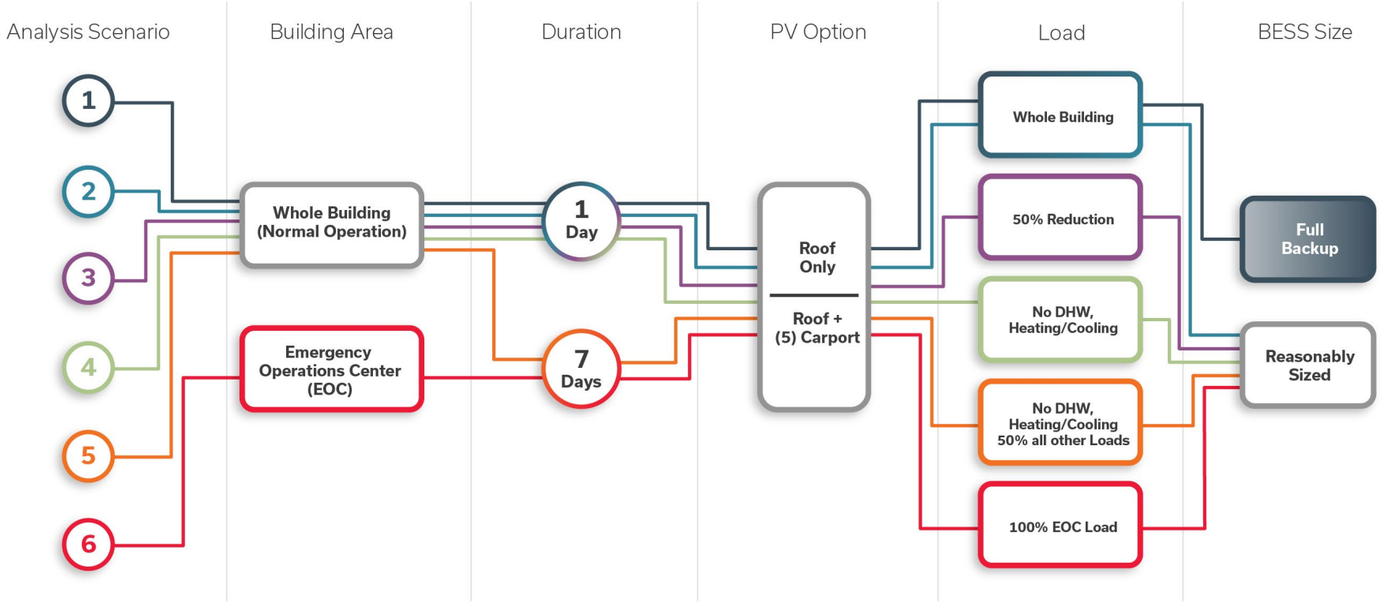
METHODOLOGY

The goal in this study was to determine the system criteria to support three different levels of outage events that the Tigard Library could experience. The analysis considered both a full building load operation mode and a reduced function emergency operation mode.

The study utilized a variety of modeling software tools including 3rd party platforms, as well as PAE-developed tools. Variables considered were:

- Building area
- Supported building load
- PV system size
- 248 kW from Roof Only
- 509 kW from Roof and (5) Carports
- Operating duration
- Battery Energy Storage System (BESS) Size
- Maximized
- Reasonably sized (250kW/1320kWh)
- Economics
- High level CapEx vs OpEx

The analysis included the following scenarios:



The results is different design paths that can meet the needs of the library at the different outage levels. However, the different solutions provide varying levels of resiliency and cost effectiveness.

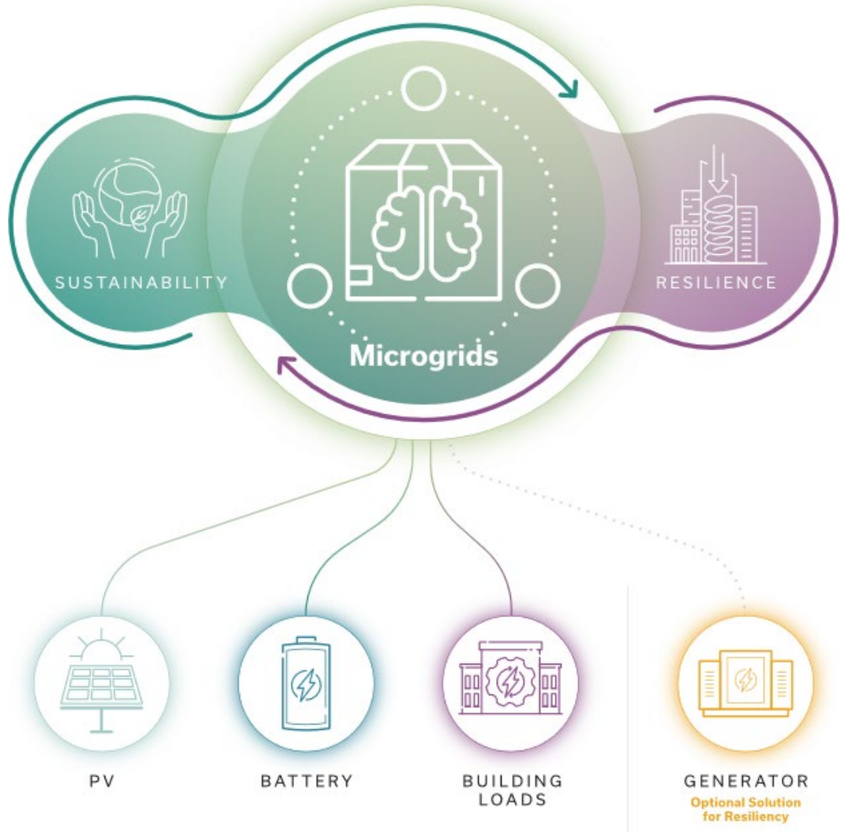
In scenarios where the results from PAE's Resiliency Tool suggest that the PV/BESS system was insufficient to meet the load needs, a secondary analysis was run in HOMER Grid to confirm that when the PV/BESS system fails to meet the load, the future 500 kW generator (planned as part of a different City of Tigard scope) will be capable of supporting the remaining load.

In all of the scenarios presented in this study where the PV/BESS system fails to support the load, the additional analysis found that the generator could pick up the remaining load.

General Notes:

In this Report the term "Reasonable BESS size" means a pair of two 250 kW/ 660 kWh microgrid solution from ELM Microgrid (formally Fieldsight). This system size is a proposed upper limit to help keep cost and space factors constrained to within reasonable limits of the project.

This study assumes no contribution from a fossil fuel generator, unless otherwise stated.



Variables Considered in this Analysis

DURATION OF AN OUTAGE

- We propose 4 different viable options that meet the needs of the Tigard Library at all three levels of outage in all seasons.

REDUNDANCY

- 2 solutions considered generally do not rely on a generator to meet the Library's needs.
- The other 2 solutions rely more heavily on the generator to meet the projected electrical needs of the system.

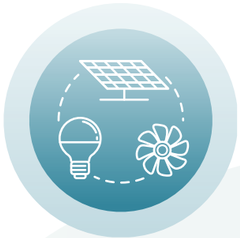
PV ARRAY SIZE

- We propose 2 different sizes of PV array for the library: 248 kW from Rooftop arrays and 509 kW from Rooftop arrays with the addition of 5 Carports.

BESS SIZE

- We propose 3 different sizes of BESS to support the generator and PV array.

A Guide to Reading the Resiliency Tool Outputs



Loads and Sources Used in the Model. Grey means the load/source is included in the calculations. White means it is not.



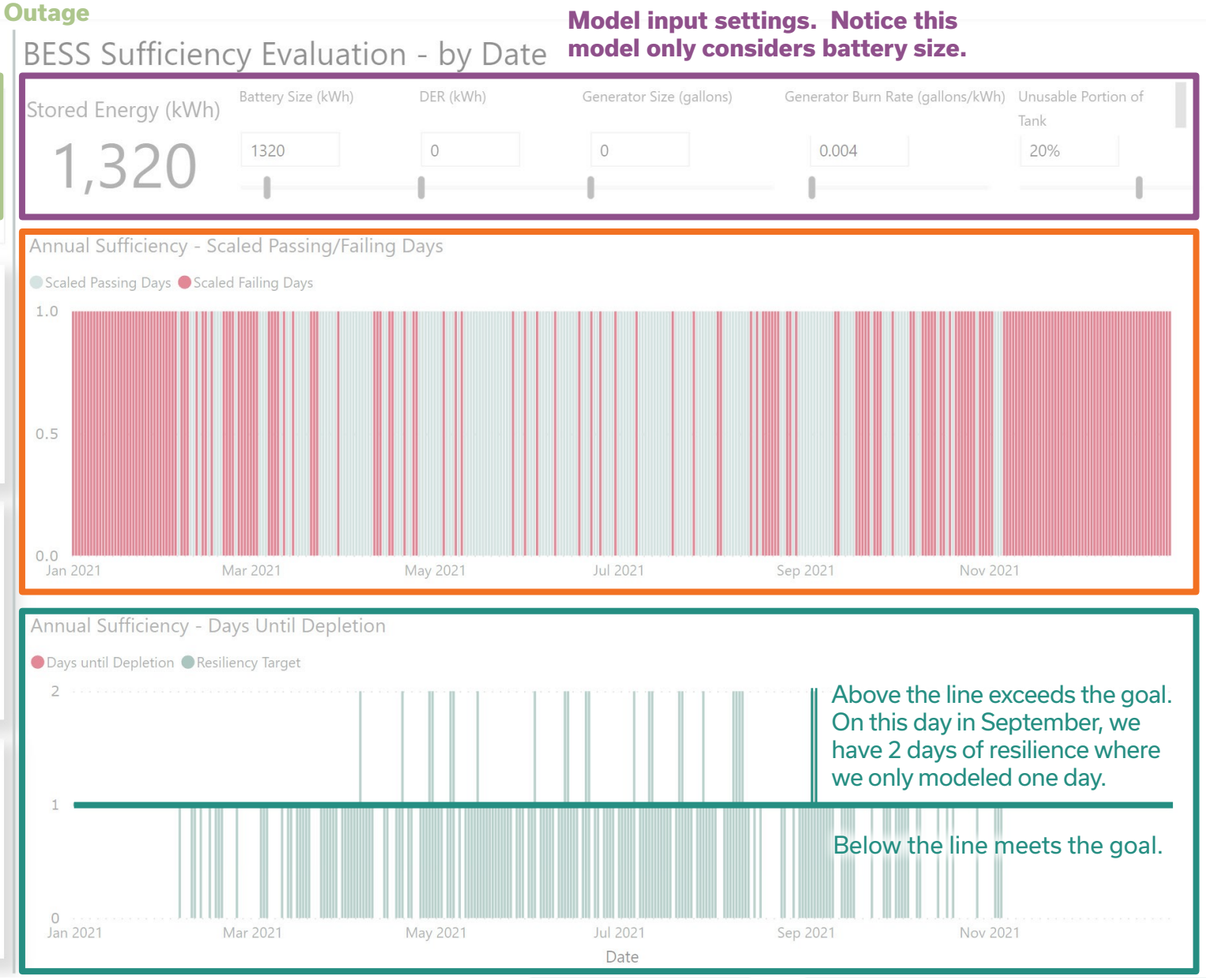
Percentage of included load considered in this model. 1.0 means 100% of load. A 0.5 means 50% of total load.



Percentage of PV design considered in this model.







Model input settings. Notice this model only considers battery size.



A simple pass/fail graph of the results. Green means our resilience goals are met. Red means they are not.



This graph builds on the above graph. For days where the resilience target is met, this graph lets you know how well the target was met.

TIGARD LIBRARY

Whole Building Scenarios

Design Results

	PV SYSTEM LOCATION	PV SYSTEM SIZE	BESS SIZE MODELED	SYSTEM COST
SYSTEM DESIGN 1	Rooftop Only	248 kW	2,700 kWh	PV: $3.20/Watt Battery: $550/kWh
SYSTEM DESIGN 2	Rooftop and 5 Carports	508 kW	2,300 kWh	Roof PV: $3.20/Watt Carport PV: $7.00/Watt Battery: $550/kWh
SYSTEM DESIGN 3	Rooftop Only	248 kW	1,320 kWh	PV: $3.20/Watt Battery: $550/kWh
SYSTEM DESIGN 4	Rooftop and 5 Carports	508 kW	1,320 kWh	Roof PV: $3.20/Watt Carport PV: $7.00/Watt Battery: $550/kWh

Key Terms and Definitions

OPERATIONAL CARBON OPTIMIZATION
a solution that attempts to prevent the use of Carbon producing entities like a fossil fuel generator.

ECONOMICALLY OPTIMIZED
a solution that assesses the cost/benefit of different design elements and balances them against the needs of the project. Generally a lower cost option that still provides for the basic needs of the system.

PARTIAL RESILIENCY
a solution that maintains some part but not all of the normal electrical load during an outage.

FULL RESILIENCY
a solution that maintains the entirety of the normal electrical load even during an outage.

FULL LOAD
the normal electrical load when the grid is providing power.

PARTIAL LOAD
anything less than the normal electrical load when the grid is providing power.

REASONABLE BESS SIZE
In this report the term "Reasonable BESS Size" means two 250 kW/660 kWh microgrid solutions from ELM Microgrid (formally Fieldsight).

Outage Type

TYPICAL OUTAGE
- This study modeled a **24-hour outage**.
- 4 System Designs Proposed

MAJOR OUTAGE
From time to time a major outage occurs from inclimate weather events such as a winter storm, a wind storm or a fire event that leaves significant sections of the grid off-line for an extended period of time. This study modeled a **7 day outage**.

CATASTROPHIC OUTAGE
The west coast is long overdue for an earthquake that could cripple basic infrastructure. This study modeled a **2 week outage**.

Resiliency Scenario #1

TYPICAL OUTAGE: 24 HOURS

Scenario Overview

INPUTS:

- Whole Building
- 100% Building Load
- 1 Day Operation
- BESS sized to support all conditions

OUTPUTS:

- Full Resiliency
- Full load, all conditions, all systems

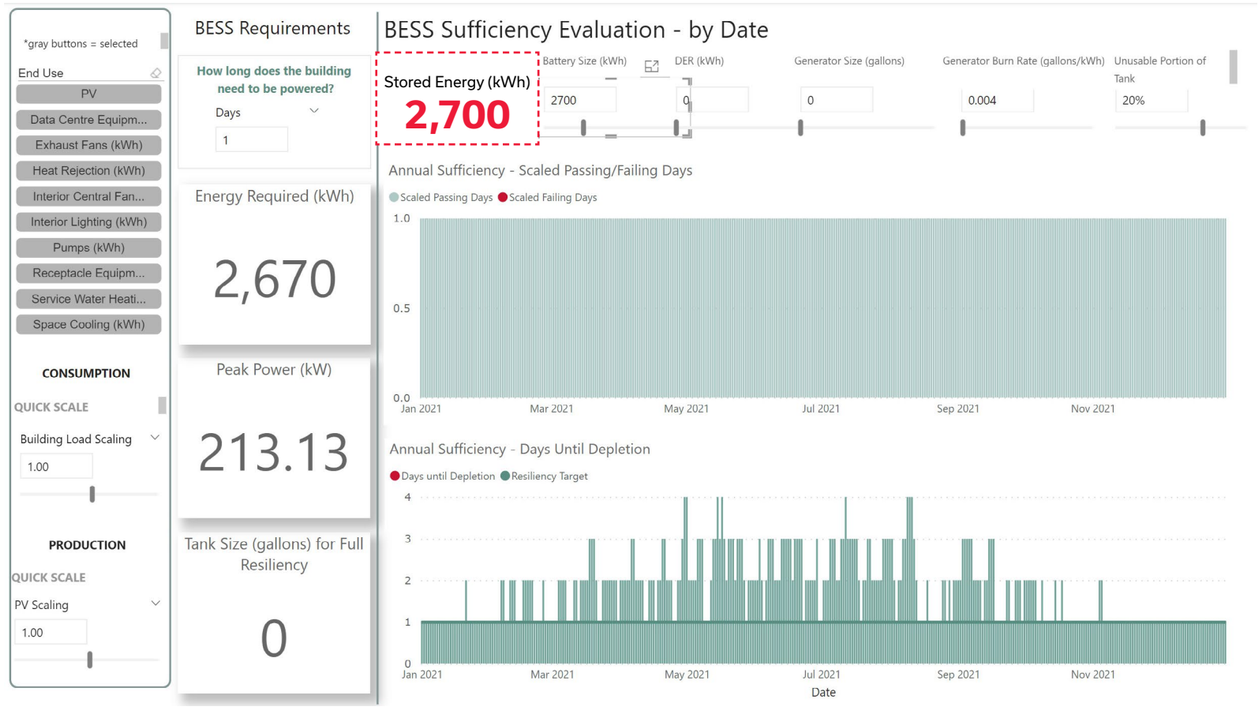
KEY FINDINGS:

- This scenario considered the question: what would it take to keep the building running under normal operation during a Level 1 outage?
- In practice the actual system would be four stacked 250kW/600 kWh microgrid solutions from ELM Fieldsight
- In the Rooftop Only PV Array scenario the building would fall 30 kWh short of its overall need, but the system has the backup of a 500 kW generator that would pick up this slack and recharge the battery in the winter months.
- In the Rooftop Array + 5 Car Ports scenario the building would have excess battery power to prevent the battery from full discharge allowing consideration of enrollment in one of PGEs DER programs.
- Both solutions may require generator backup in the winter months as PV production is unlikely to fully support the building load during extreme conditions not necessarily reflected in the average weather file.

SYSTEM DESIGN 1:

Rooftop Only PV

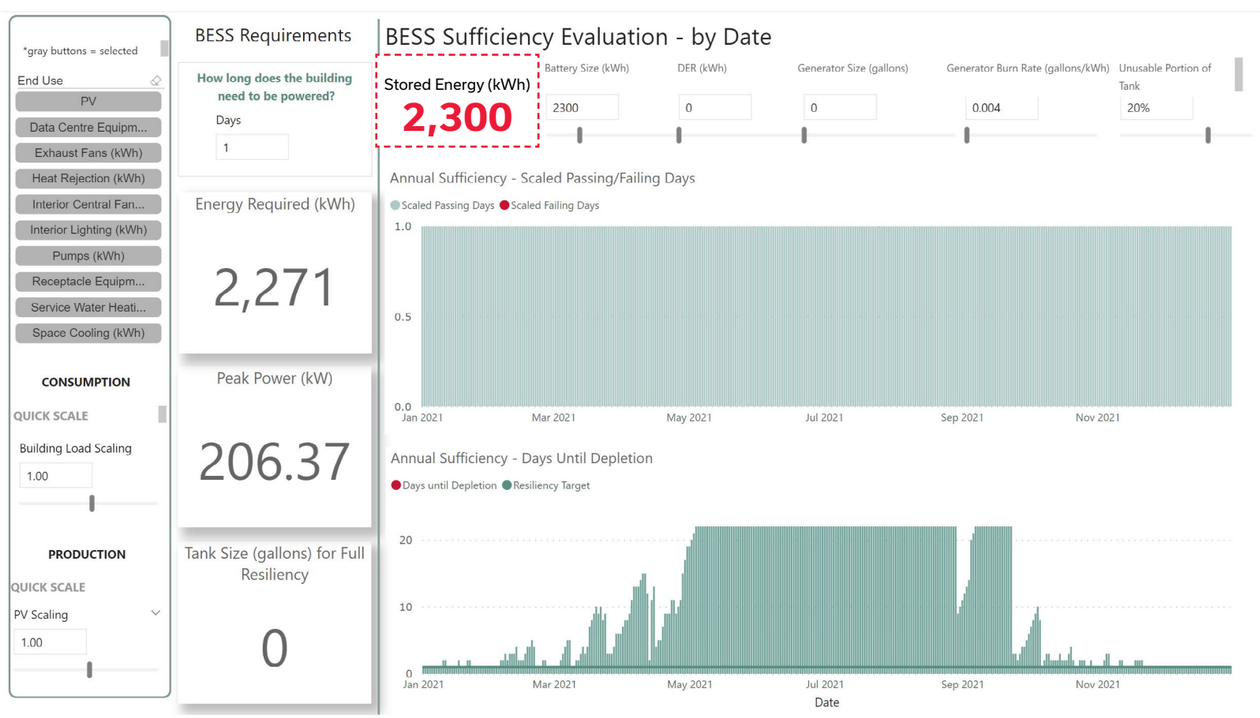
SYSTEM NPC: $4.30M



SYSTEM DESIGN 2:

Rooftop and 5 Car Ports

SYSTEM NPC: $5.65M



Resiliency Scenario #2

TYPICAL OUTAGE: 24 HOURS

Scenario Overview

INPUTS:

- Whole Building
- 100% Building Load
- 1 Day Operation
- Reasonable BESS Size

OUTPUTS:

- Partial Resiliency

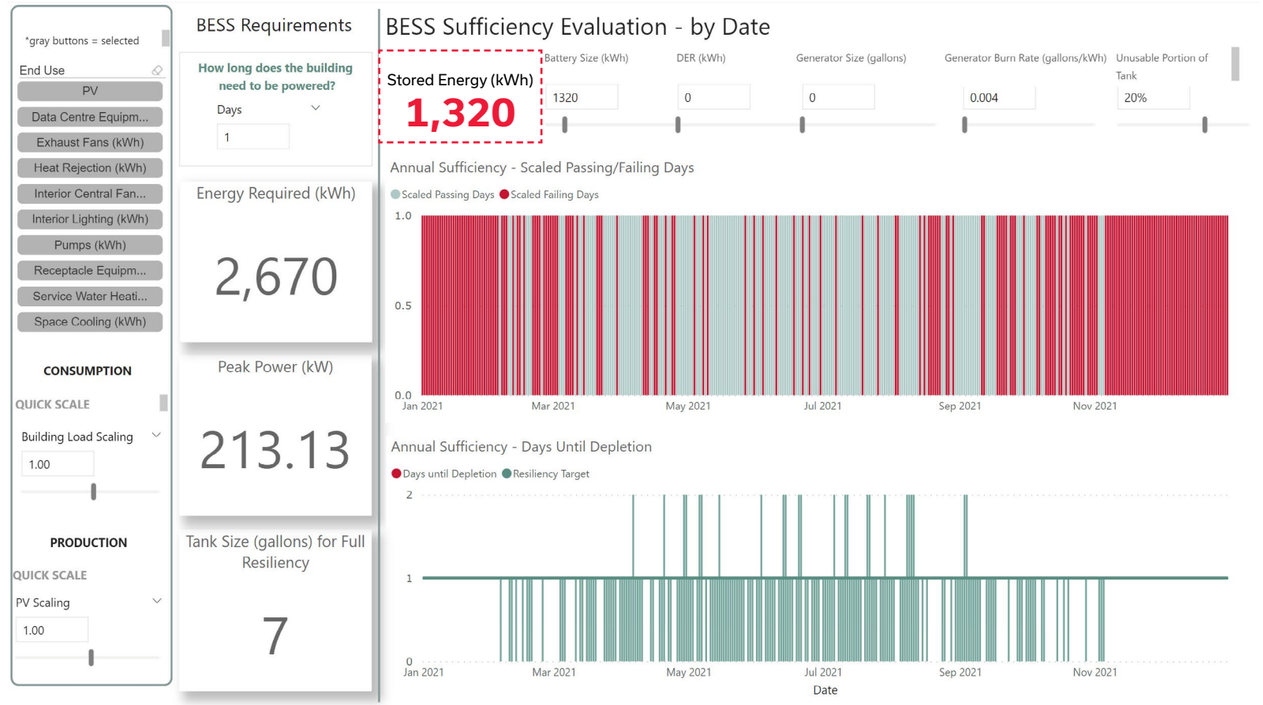
KEY FINDINGS:

- This is a lower cost option that relies on generator support to meet electrical need.
- In the Rooftop Only array the system would need significant support from the generator even in the spring and summer.
- In the Rooftop Array + 5 Car Ports scenario the system would be mostly resilient in the spring and summer months with support from the generator only being necessary in the winter months.

SYSTEM DESIGN 3:

Rooftop Only

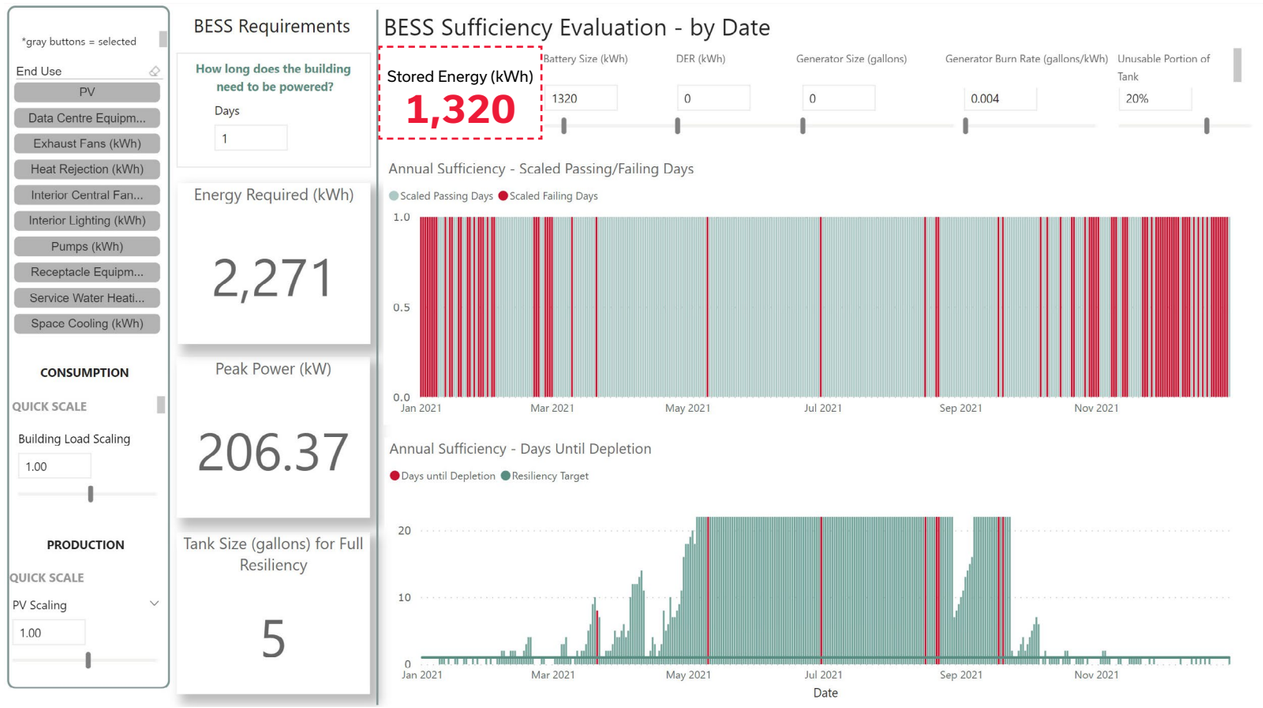
SYSTEM NPC: $2.87M



SYSTEM DESIGN 4:

Rooftop and 5 Car Ports

SYSTEM NPC: $4.70M



Resiliency Scenario #3

TYPICAL OUTAGE: 24 HOURS

Scenario Overview

INPUTS:

- Whole Building
- 50% Building Load
- 1 Day Operation
- Reasonable BESS Size

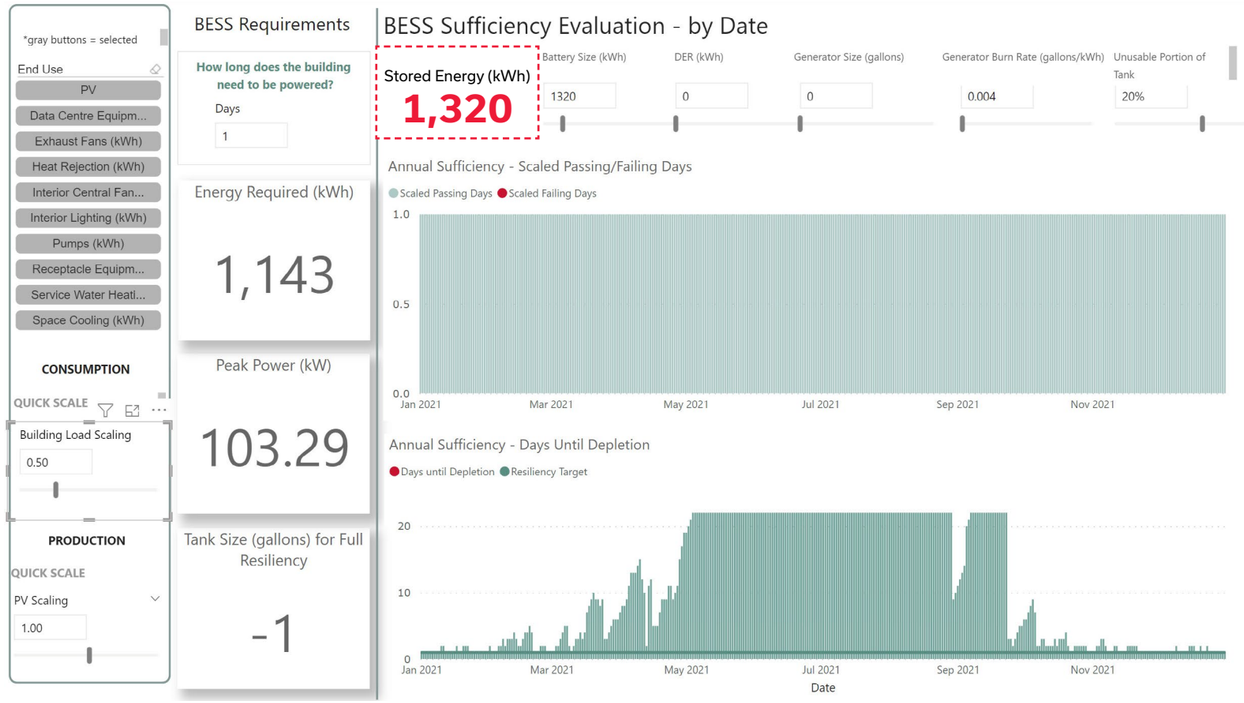
OUTPUTS:

- Partial Resiliency

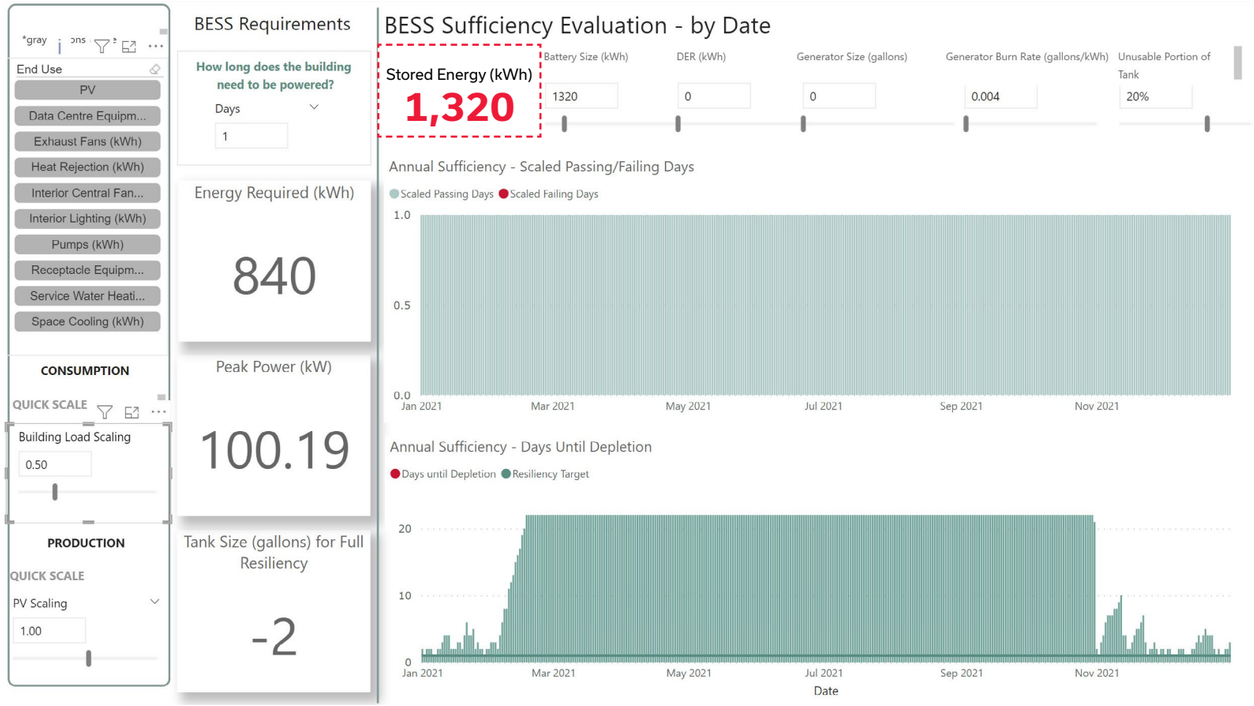
KEY FINDINGS:

- This is a lower cost option that also considers environmental impact. By shedding 50% of the load in the building, the PV/ BESS systems are able to provide energy resilience through most of the year.
- Both solutions may require generator backup in the winter months as PV production is unlikely to fully support the building load.

SYSTEM DESIGN 3:
Rooftop Only



SYSTEM DESIGN 4:
Rooftop and 5 Car Ports



Resiliency Scenario #4

TYPICAL OUTAGE: 24 HOURS

Scenario Overview

INPUTS:

- Whole Building
- 100% Building Load without Space Conditioning and Hot Water
- 1 Day Operation
- Reasonable BESS Size

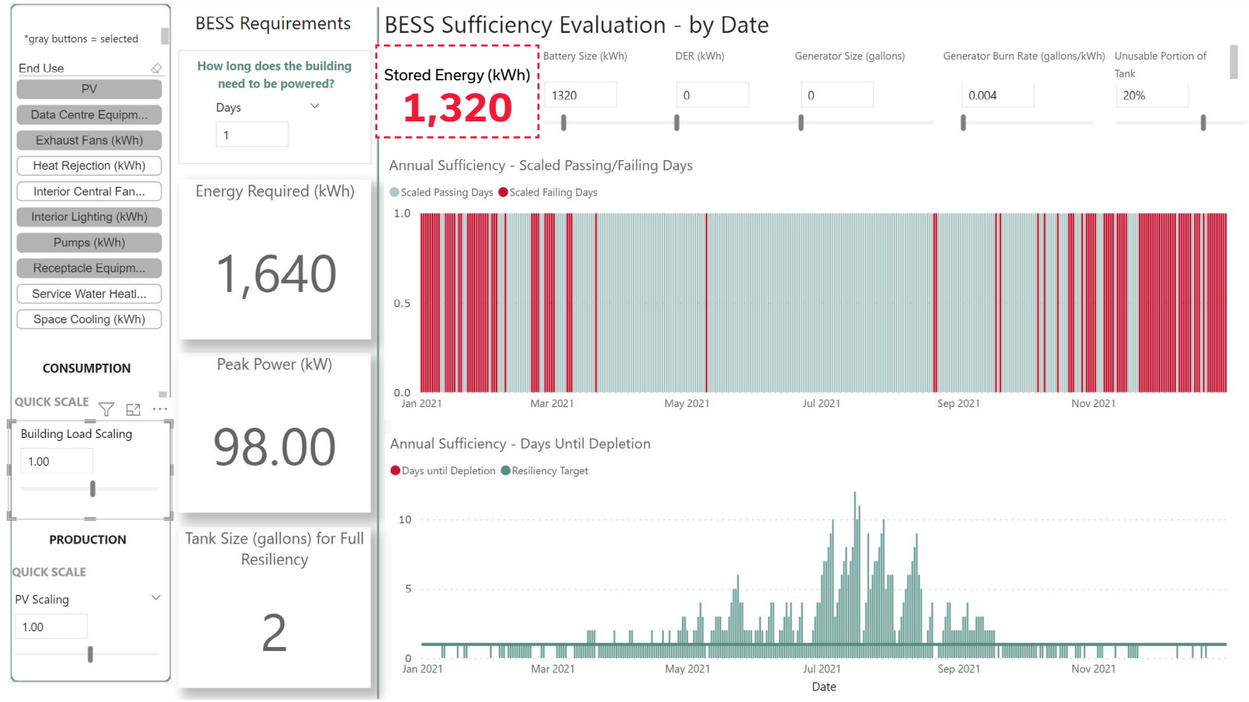
OUTPUTS:

- Partial Resiliency

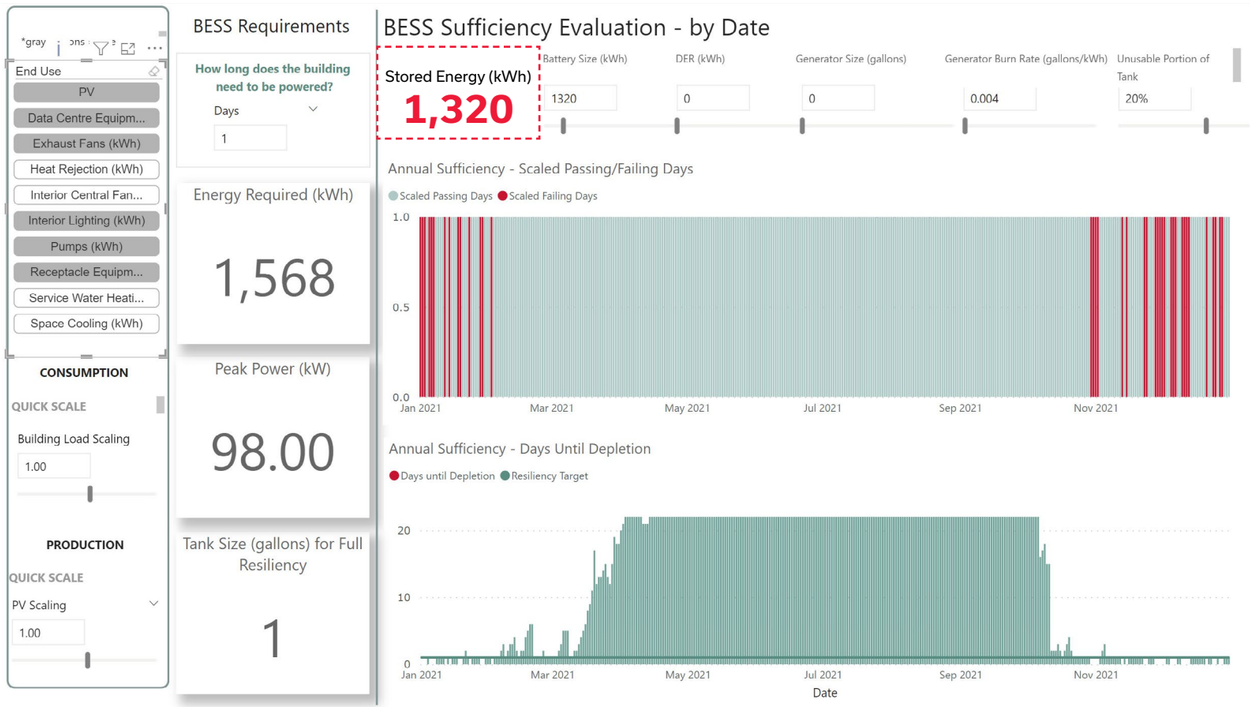
KEY FINDINGS:

- In this scenario we explore means of manual load shedding to illustrate a scenario where the BESS may not be able to meet the electrical load of the entire building, but can provide sufficient support for basic needs during an outage. The goal being to reduce the need to backup the system with a fossil fuel generator.
- In all scenarios explored in this study the trade off when the PV/ BESS system is insufficient for the load is an increased need for generator support in the winter months.

SYSTEM DESIGN 3:
Rooftop Only



SYSTEM DESIGN 4:
Rooftop and 5 Car Ports



Resiliency Scenario #5

MAJOR OUTAGE: 7 DAYS

Scenario Overview

INPUTS:

- Whole Building
- 50% Building Load without Space Conditioning
- 7 Day Operation
- Reasonable BESS Size

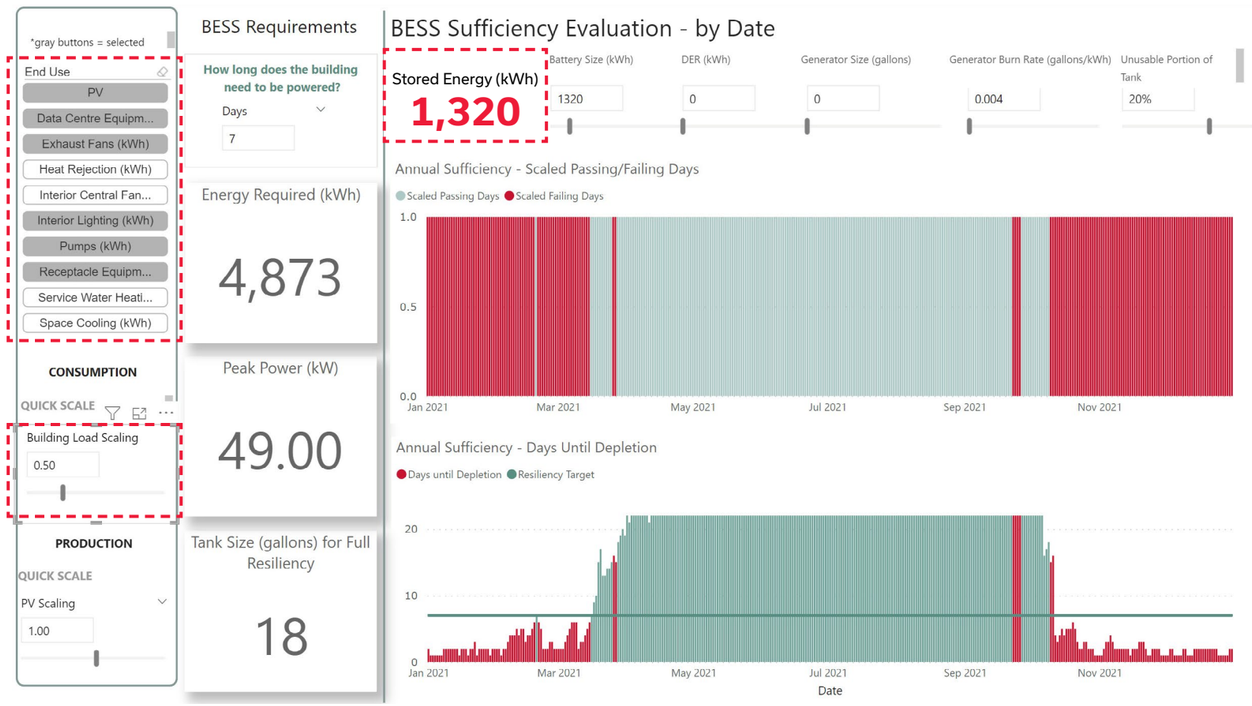
OUTPUTS:

- Partial Resiliency

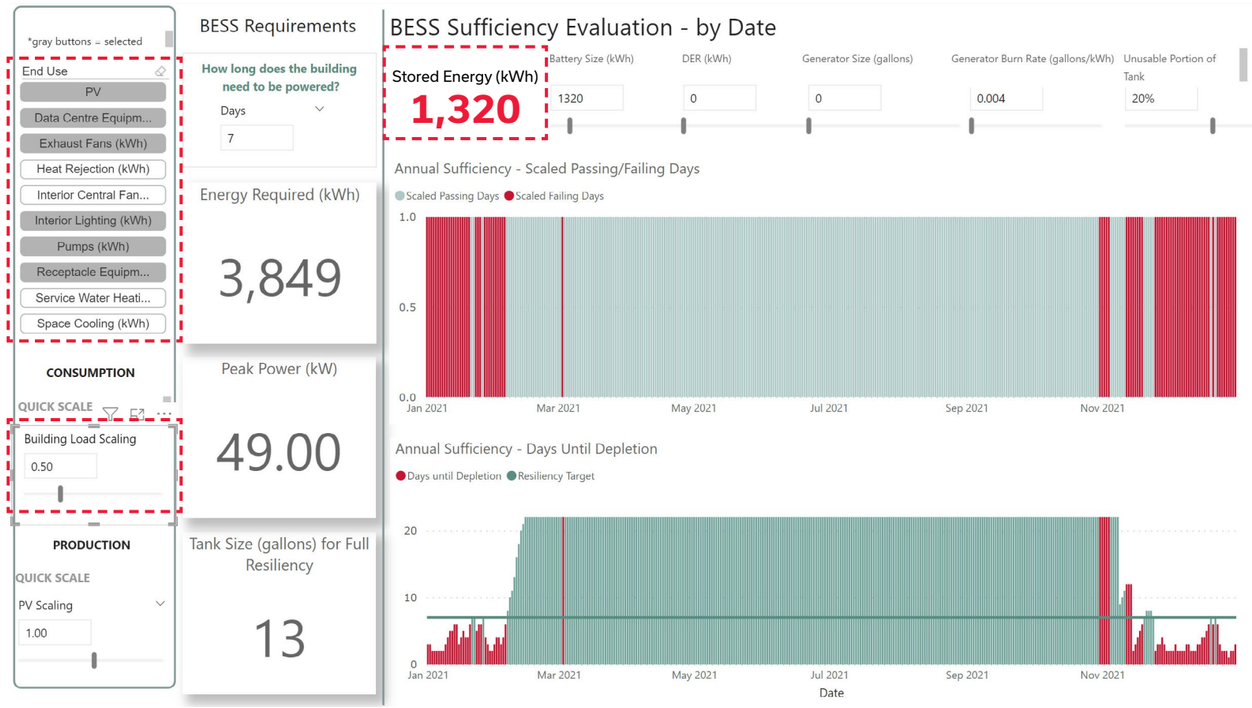
KEY FINDINGS:

- The increased duration of the outage substantially increases the resiliency needs of the system.
- In either design, even with the increased demand of the longer outage the system remains resilient in the spring and summer months only needing backup from the generator in the winter months.
- Both solutions meet the needs of the load in all seasons with the backup of the generator.

SYSTEM DESIGN 3:
Rooftop Only



SYSTEM DESIGN 4:
Rooftop and 5 Car Ports



TIGARD LIBRARY

EOC Scenarios

Resiliency Scenario #6

MAJOR OUTAGE: 7 DAYS

Scenario Overview

INPUTS:

- EOC Operation
- EOC Load Conditions
- 7 Day Operation
- Reasonable BESS Size

OUTPUTS:

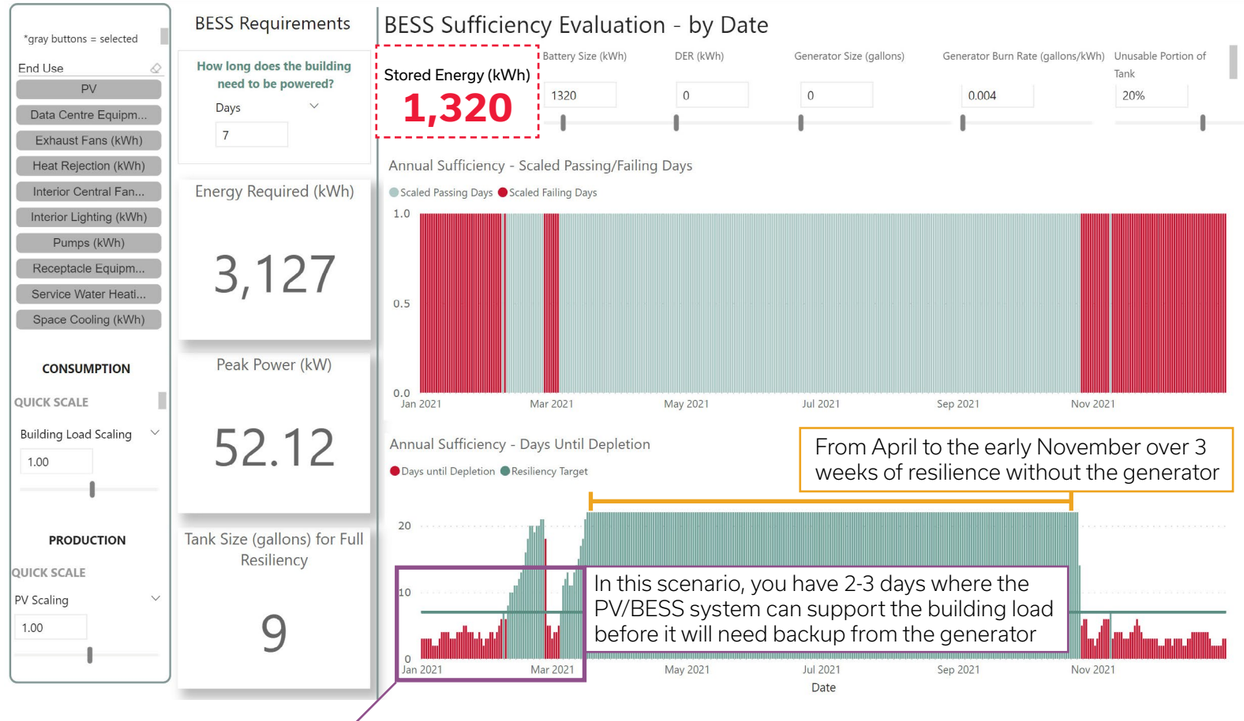
- Partial Resiliency

KEY FINDINGS:

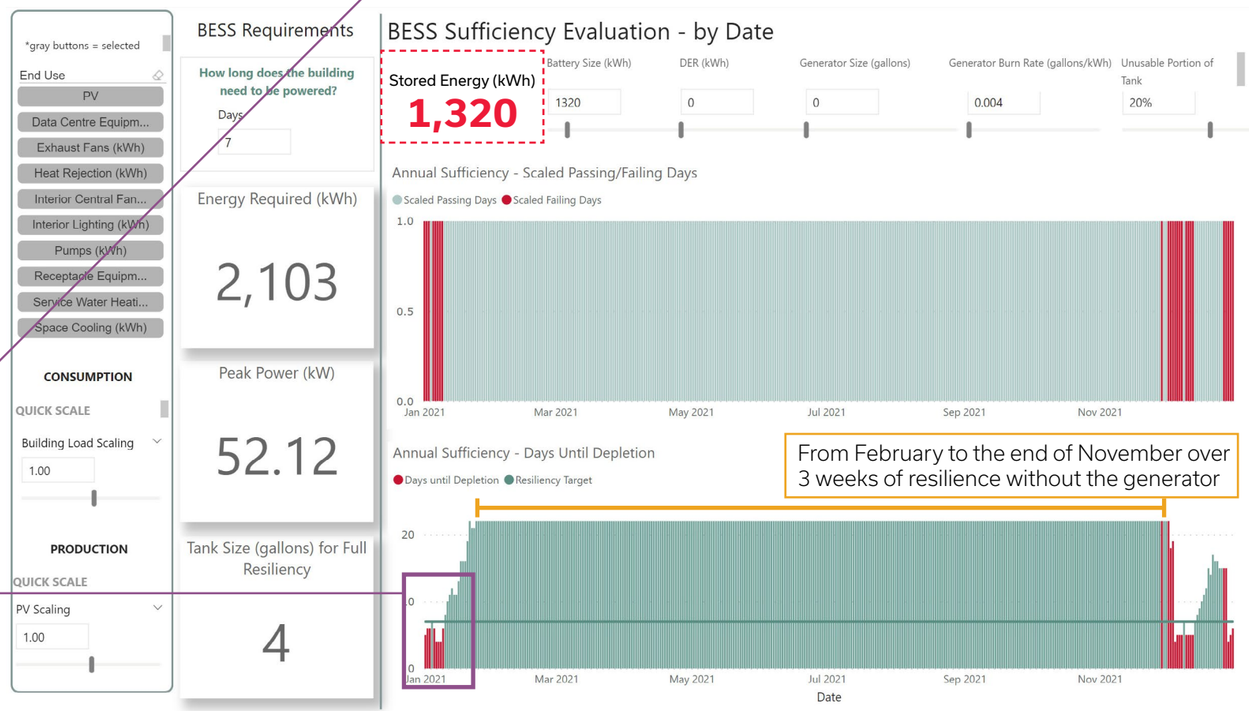
- There exists a gap between the needs of the system and the realities of a disaster. In the case of a catastrophic earthquake gas lines will have to be inspected before they can return to normal operation. In the winter months, this leaves a gap between need and ability to service that need that is not addressed by the proposed system.
- In the scenario with Rooftop PV Array and 5 Car Ports the gap between need and the ability to service that need is significantly smaller. With Rooftop arrays only, the gap can be as large as 4+ months where in the Car Port scenario that window shrinks to 1-2 months.
- Outside of the winter months both system designs have a strong resilience. While modeled at 2 weeks results show that when the sun is out basic power can be provided for EOC operation for nearly 3 weeks.

Assuming in the case of a catastrophic earthquake that the gas lines need to be turned off for inspection. This analysis shows that the PV/BESS system can support the building load for about 4-5 days before it would need support from the generator. If the gas lines can be restored in this time frame then this system is fully resilient. If gas can-not be restored in this time frame then the system enters a period where the necessary electrical needs cannot be met by the PV/BESS system.

SYSTEM DESIGN 3:
Rooftop Only



SYSTEM DESIGN 4:
Rooftop and 5 Car Ports



TIGARD LIBRARY

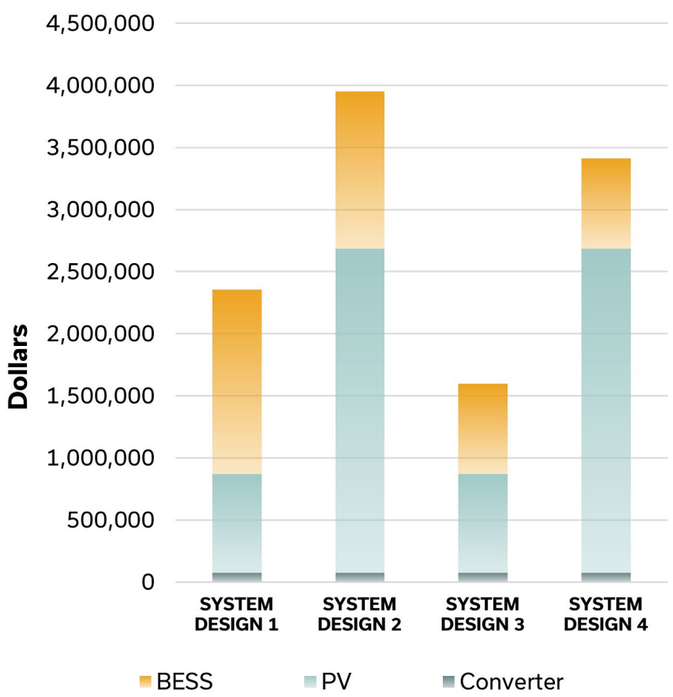
Results Summary



Preliminary Financial Analysis

	NPC	TOTAL SYSTEM LCOE	CAPEX	UTILITY SAVINGS $/YR
SYSTEM DESIGN 1	$4.30M	$0.31	$2.35M	$32,973
SYSTEM DESIGN 2	$5.65M	$0.40	$3.95M	$16,786
SYSTEM DESIGN 3	$2.87M	$0.21	$1.60M	$33,518
SYSTEM DESIGN 4	$4.70M	$0.32	$3.41M	$17,616

CAPITAL COST BY ELEMENT



COST BASIS

ROOFTOP PV ARRAY	$3.20/W
CARPORT PV ARRAY	$7.00/W
BESS	$550/kWh *Based on General Quote from ELM Microgrid*
UTILITY	$0.175/kWh *Based on Tariff Schedules Modeled in HOMER Grid*
UTILITY SCHEDULES	Schedule 83 + Subschedules *38,103,105,108,110,112,115,118, 135,146,150,153*



Recommendations and Next Steps

It is our recommendation that the City should move forward with a whole building microgrid with as much BESS as they can afford on Day 1. This might require manual load shedding during extreme weather conditions but over time the City can add to the BESS until they have adequate backup to meet their resilience operating needs.

NEXT STEPS:

— Final decision on whole building vs EOC microgrid basis of design
— Design team to complete SD design for basis of design microgrid system
— ETO trade partner to provide pricing estimate on basis of design system

Appendix C - Microgrid Single Line Diagrams

ABBREVIATIONS - ELECTRICAL

AFF	ABOVE FINISHED FLOOR	KVAR	KILOVOLT-AMPERE REACTIVE
ADA	AMERICANS DISABILITIES ACT	LA	LIGHTNING ARRESTOR
A	AMPERE (AMP)	LED	LIGHT EMITTING DIODE
AL	ALUMINUM	LRC	LIGHTING RELAY CONTROL PANEL
ARCH	ARCHITECT / ARCHITECTURAL	LTG	LIGHTING
ATS	AUTOMATIC TRANSFER SWITCH	LV	LOW VOLTAGE
AWG	AMERICAN WIRE GAUGE	MATV	MASTER ANTENNA TELEVISION
BAS	BUILDING AUTOMATION SYSTEM	MAX	MAXIMUM
BESS	BATTERY ENERGY STORAGE SYSTEM	MBJ	MAIN BONDING JUMPER
C	CONDUIT	MCA	MINIMUM CIRCUIT AMPACITY
CAT	CATEGORY CABLE	MCB	MAIN CIRCUIT BREAKER
CB	CIRCUIT BREAKER	MCC	MOTOR CONTROL CENTER
CCTV	CLOSED CIRCUIT TELEVISION	MDP	MAIN DISTRIBUTION PANEL
CKT	CIRCUIT	MECH	MECHANICAL
CLG	CEILING	MEMS	MICROGRID ENERGY MANAGEMENT SYSTEM
CT	CURRENT TRANSFORMER	MH	METAL HALIDE
CU	COPPER	MID	MICROGRID INTERCONNECT DEVICE
DER	DISTRIBUTED ENERGY RESOURCE(S)	MIN	MINIMUM
DN	DOWN	MLO	MAIN LUGS ONLY
DW	DISHWASHER	MOCP	MAXIMUM OVERCURRENT PROTECTION
ECB	ENCLOSED CIRCUIT BREAKER	MTS	MANUAL TRANSFER SWITCH
EM	EMERGENCY	MV	MEDIUM VOLTAGE
EMT	ELECTRICAL METALLIC TUBING	MW	MICROWAVE
EP	EXPLOSION PROOF	NIC	NOT IN CONTRACT
EPO	EMERGENCY POWER OFF	NL	NIGHT LIGHT CIRCUIT
EWC	ELECTRIC WATER COOLER	PA	PUBLIC ADDRESS
FA	FIRE ALARM	PCS	POWER CONTROL SYSTEM
FLA	FULL LOAD AMPS	PDZ	PRIMARY DAYLIGHT ZONE
FLUOR	FLUORESCENT	PE	PHOTOELECTRIC CELL
FCIC	FURNISHED BY CONTRACTOR	PF	POWER FACTOR
	INSTALLED BY CONTRACTOR	PNL	PANELBOARD
FOIC	FURNISHED BY OWNER	PVC	POLYVINYL CHLORIDE
	INSTALLED BY CONTRACTOR	PWR	POWER
FOIO	FURNISHED BY OWNER	REF	REFRIGERATOR
	INSTALLED BY OWNER	SDP	SUB-DISTRIBUTION PANEL
GD	GARBAGE DISPOSAL	SDZ	SECONDARY DAYLIGHT ZONE
GEC	GROUNDING ELECTRODE CONDUCTOR	STR	STARTER
GEN	GENERATOR	SV	SOLENOID VALVE
GFP	GROUND FAULT PROTECTION	SW	SWITCH
GFI	GROUND FAULT INDICATOR	TD	TIME DELAY
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	TP	TAMPERPROOF
GRC	GALVANIZED RIGID CONDUIT	TTB	TELEPHONE TERMINAL BOARD
GND	GROUND	TTC	TELEPHONE TERMINAL CABINET
HP	HORSEPOWER	TV	TELEVISION
HPS	HIGH PRESSURE SODIUM	TYP	TYPICAL
HV	HIGH VOLTAGE	UG	UNDERGROUND
HZ	HERTZ	UPS	UNINTERRUPTIBLE POWER SUPPLY
IG	ISOLATED GROUND	V	VOLTAGE
INC	INCANDESCENT	VA	VOLT-AMPERE
INV	INVERTER	VFD	VARIABLE FREQUENCY DRIVE
JB	JUNCTION BOX	VP	VAPORPROOF
KW	KILOWATT	W	WATTS
KWH	KILOWATT HOUR	WP	WEATHERPROOF
KV	KILOVOLT	XFMR	TRANSFORMER
KVA	KILOVOLT-AMPERE		

ELECTRICAL EQUIPMENT DESIGNATION

E 4 L - 1 - 1A - A

POWER TYPE:
- BLANK - NORMAL POWER
- E - EMERGENCY POWER
- U - UNINTERRUPTIBLE POWER

VOLTAGE:
- 2 - 208Y/120V
- 4 - 480Y/277V
- 5 - 4160Y/2400V
- 15 - 12470Y/7200V

EQUIPMENT:
- D - MAIN DISTRIBUTION PANEL
- S - SUB DISTRIBUTION PANEL
- B - BUSWAY
- M - MOTOR CONTROL CENTER
- A - AUTOMATIC TRANSFER SWITCH
- P - POWER PANEL
- L - LIGHTING PANEL
- T - TRANSFORMER
- U - UPS
- LRC - LIGHTING RELAY CONTROL PANEL

BUILDING LEVEL:
- 0 - BASEMENT
- 1 - FIRST LEVEL
- 2 - SECOND LEVEL
- 3 - THIRD LEVEL
- 4 - FOURTH LEVEL
- ETC.

GRID LOCATION:
- 1A - NEAR INTERSECTION OF GRID LINES 1 AND A

IDENTIFIER:
- A - FIRST IN SERIES OF EQUIPMENT
- B - SECOND IN SERIES OF EQUIPMENT
- ETC.

DESIGNATION SYMBOLS

--- / 123	EQUIPMENT DESIGNATOR SEE SCHEDULE.
E / X	EXISTING TO REMAIN, EXISTING TO BE REMOVED
R / F	EXISTING TO BE RELOCATED, FUTURE
N	NEW, POINT OF CONNECTION
1	NOTE

POWER - SINGLE LINE DIAGRAM & RISER

- CIRCUIT BREAKER, WITH GROUND FAULT PROTECTION, DRAW OUT
- DISTRIBUTION SWITCHBOARD / PANELBOARD, WITH INTERNAL BUS
- UTILITY POLE
- PANELBOARD
  PANEL INCOMING DESIGNATOR: MLO UNLESS MARKED MCB
  AMPACITY (AMPS)
- TRANSFORMER
- SERVICE TRANSFORMER, WITH VAULT
- GENERATOR, AUTOMATIC TRANSFER SWITCH
- METER: UTILITY, BASIC, ADVANCED, POWER QUALITY
- TRANSDUCER: CURRENT, POTENTIAL (VOLTAGE), COMBINED
- SURGE PROTECTIVE DEVICE, PUSH BUTTON
- ELECTRICAL BUSWAY, BUSWAY PLUG-IN CIRCUIT BREAKER
- FEEDER CONTINUATION CALLOUT, FEEDER TAG
- CALCULATED AVAILABLE SHORT-CIRCUIT CURRENT
- FEEDER: DROP, RISE, CAP, BREAK, CONTINUATION
- SWITCH, FUSED SWITCH
- DISCONNECT, FUSED DISCONNECT
- MOTOR, MOTOR WITH CONTROLLER, MOTOR WITH STARTER
- PV ARRAY, INVERTER

GENERAL NOTES:

A. THIS IS A STANDARD LEGEND SHEET, THEREFORE, SOME SYMBOLS MAY APPEAR ON THIS SHEET THAT DO NOT APPEAR ON THE DRAWINGS.

ELECTRICAL SHEET LIST

SHEET #	SHEET NAME
E001	SYMBOLS, LEGENDS AND ABBREVIATIONS - ELECTRICAL
E701	DIAGRAMS - ELECTRICAL - DEMOLITION
E702	DIAGRAMS - ELECTRICAL - NEW CONSTRUCTION
Grand total: 3	

PAE
pae-engineers.com
LUMA
Lumald.com

Tigard Microgrid BRIC Grant

P:\Standard Files\01 Production\01 Revit\01 Templates

STAMP:

NO.	REVISION	DATE

SET TITLE:
Project Status

DRAWN BY:	Author
CHECKED BY:	Checker
SCALE:	NONE
DATE:	2022-12-20
JOB NO.	23-####

SHEET TITLE:
SYMBOLS, LEGENDS AND ABBREVIATIONS - ELECTRICAL

SHEET NUMBER:
E001

6/14/2023 12:47:43 AM Autodesk Docs://23-785 - Tigard Microgrid BRIC Grant/23-785 - Tigard Microgrid BRIC Grant E23.rvt

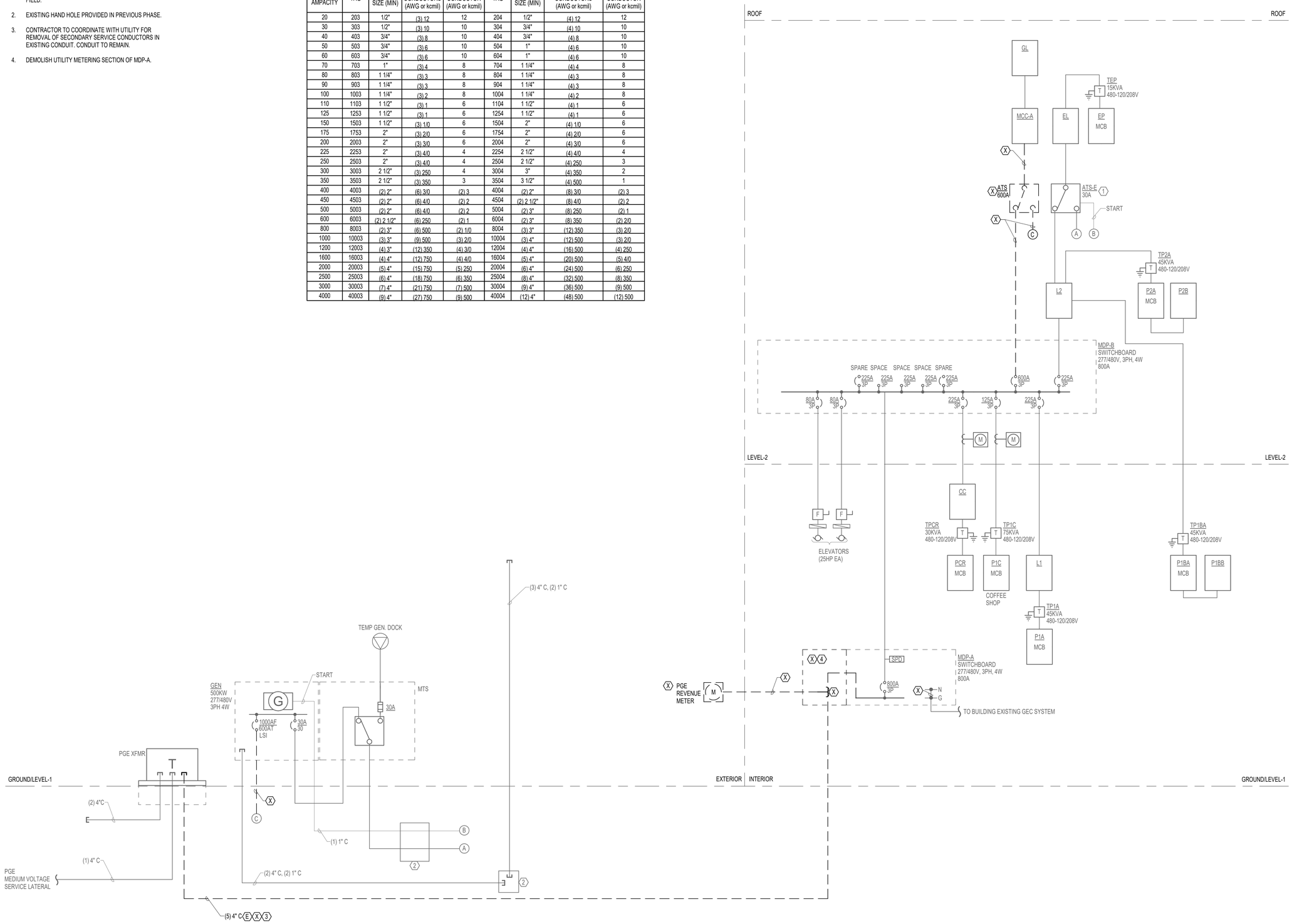
GENERAL NOTES:

A. EQUIPMENT IS EXISTING TO REMAIN UNLESS OTHERWISE NOTED.

NOTES:

1. CONTRACTOR TO UPDATE EQUIPMENT LABELING IN FIELD.
2. EXISTING HAND HOLE PROVIDED IN PREVIOUS PHASE.
3. CONTRACTOR TO COORDINATE WITH UTILITY FOR REMOVAL OF SECONDARY SERVICE CONDUCTORS IN EXISTING CONDUIT. CONDUIT TO REMAIN.
4. DEMOLISH UTILITY METERING SECTION OF MDP-A.

	FEEDER SCHEDULE COPPER: 3 PHASE, 3 WIRE + GROUND				FEEDER SCHEDULE COPPER: 3 PHASE, 4 WIRE + GROUND			
NOMINAL AMPACITY	TAG	CONDUIT SIZE (MIN)	PHASE CONDUCTORS (AWG or kcmil)	GROUND CONDUCTOR (AWG or kcmil)	TAG	CONDUIT SIZE (MIN)	PHASE & NEUTRAL CONDUCTORS (AWG or kcmil)	GROUND CONDUCTOR (AWG or kcmil)
20	203	1/2"	(3) 12	12	204	1/2"	(4) 12	12
30	303	1/2"	(3) 10	10	304	3/4"	(4) 10	10
40	403	3/4"	(3) 8	10	404	3/4"	(4) 8	10
50	503	3/4"	(3) 6	10	504	1"	(4) 6	10
60	603	3/4"	(3) 6	10	604	1"	(4) 6	10
70	703	1"	(3) 4	8	704	1 1/4"	(4) 4	8
80	803	1 1/4"	(3) 3	8	804	1 1/4"	(4) 3	8
90	903	1 1/4"	(3) 3	8	904	1 1/4"	(4) 3	8
100	1003	1 1/4"	(3) 2	8	1004	1 1/4"	(4) 2	8
110	1103	1 1/2"	(3) 1	6	1104	1 1/2"	(4) 1	6
125	1253	1 1/2"	(3) 1	6	1254	1 1/2"	(4) 1	6
150	1503	1 1/2"	(3) 1/0	6	1504	2"	(4) 1/0	6
175	1753	2"	(3) 2/0	6	1754	2"	(4) 2/0	6
200	2003	2"	(3) 3/0	6	2004	2"	(4) 3/0	6
225	2253	2"	(3) 4/0	4	2254	2 1/2"	(4) 4/0	4
250	2503	2"	(3) 4/0	4	2504	2 1/2"	(4) 250	3
300	3003	2 1/2"	(3) 250	4	3004	3"	(4) 350	2
350	3503	2 1/2"	(3) 350	3	3504	3 1/2"	(4) 500	1
400	4003	(2) 2"	(6) 3/0	(2) 3	4004	(2) 2"	(8) 3/0	(2) 3
450	4503	(2) 2"	(6) 4/0	(2) 2	4504	(2) 2 1/2"	(8) 4/0	(2) 2
500	5003	(2) 2"	(6) 4/0	(2) 2	5004	(2) 3"	(8) 250	(2) 1
600	6003	(2) 2 1/2"	(6) 250	(2) 1	6004	(2) 3"	(8) 350	(2) 2/0
800	8003	(2) 3"	(6) 500	(2) 1/0	8004	(3) 3"	(12) 350	(3) 2/0
1000	10003	(3) 3"	(9) 500	(3) 2/0	10004	(3) 4"	(12) 500	(3) 2/0
1200	12003	(4) 3"	(12) 350	(4) 3/0	12004	(4) 4"	(16) 500	(4) 250
1600	16003	(4) 4"	(12) 750	(4) 4/0	16004	(5) 4"	(20) 500	(5) 4/0
2000	20003	(5) 4"	(15) 750	(5) 250	20004	(6) 4"	(24) 500	(6) 250
2500	25003	(6) 4"	(18) 750	(6) 350	25004	(8) 4"	(32) 500	(8) 350
3000	30003	(7) 4"	(21) 750	(7) 500	30004	(9) 4"	(36) 500	(9) 500
4000	40003	(9) 4"	(27) 750	(9) 500	40004	(12) 4"	(48) 500	(12) 500



1 26 - Single Line Diagram - Demolition Plan
NONE

PAE
pae-engineers.com
LUMA
Lumald.com

Tigard Microgrid BRIC Grant

P:\Standard Files\01 Production\01 Revit\01 Templates

STAMP:

NO.	REVISION	DATE

SET TITLE:
Project Status

DRAWN BY:	Author
CHECKED BY:	Checker
SCALE:	NONE
DATE:	2022-12-20
JOB NO.	23-####

SHEET TITLE:
DIAGRAMS - ELECTRICAL - DEMOLITION

SHEET NUMBER:
E701

Autodesk Docs://23-1789 - Tigard Microgrid BRIC Grant/23-1789 - Tigard Microgrid BRIC Grant E23.rvt
6/14/2023 10:47:46 AM

GENERAL NOTES:

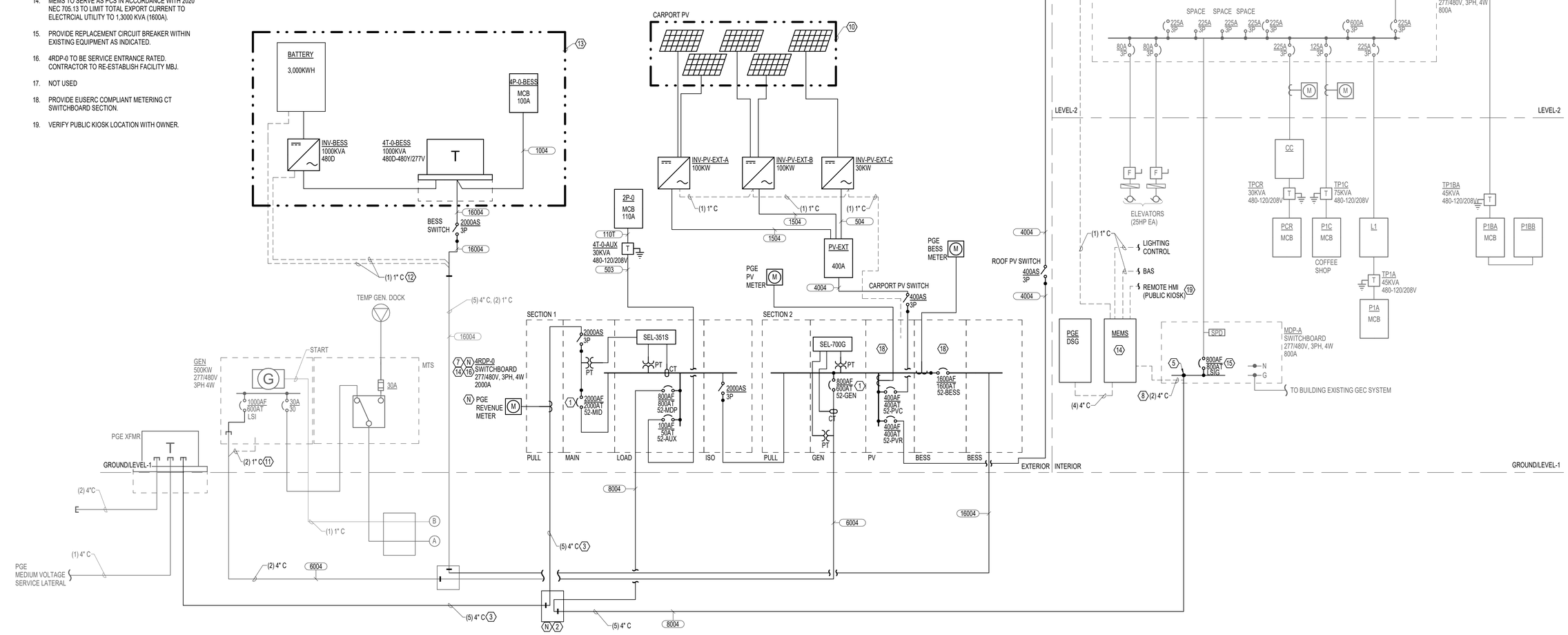
A. EXISITNG EQUIPMENT IS INDICATED WITH HALF-TONE LINE WEIGHT.

B. NEW EQUIPMENT IS INDICATED WITH FULL-TONE LINE WEIGHT.

NOTES:

1. PROVIDE ELECTRICALLY OPERABLE CIRCUIT BREAKER.
2. CONTRACTOR TO PROVIDE HAND HOLE FOR INTERCEPTION, EXTENSION AND REROUTING OF EXISTING CONDUIT RUN AS INDICATED.
3. CONTRACTOR TO COORDINATE WITH UTILITY FOR INSTALLATION OF SECONDARY SERVICE CONDUCTORS IN EXISTING CONDUIT.
4. BOLTED PRESSURE SWITCH WITH VISIBLE INSPECTION WINDOW OR MECHANICAL SWITCH POSITION INDICATOR.
5. PV FEEDER TAP AND NEW MDP-A FEEDER TO BE LANDED ON EXISTING SWITCHBOARD BUS UPSTREAM FROM THE EXISTING 800A FEEDER BREAKER TO MDP-B.
6. ROOF PV SYSTEM MAXIMUM DC NAMEPLATE CAPACITY TO BE 250KW.
7. ALL CIRCUIT BREAKERS WITHIN SWITCHBOARD 4RDP-0 TO BE EQUIPPED WITH INTEGRAL POWER AND ENERGY METERING AND ADJUSTABLE LSIG TRIP SETTING CAPABILITIES.
8. UTILIZE SPARE CONDUITS FOR MICROGRID CONTROL COMMUNICATIONS BETWEEN MEMS CABINET AND 4RDP-0.
9. NOT USED.
10. CARPORT PV SYSTEM MAXIMUM DC NAMEPLATE CAPACITY TO BE 260KW.
11. UTILIZE SPARE CONDUITS FOR MICROGRID CONTROL COMMUNICATIONS BETWEEN MEMS CABINET AND GEN.
12. UTILIZE SPARE CONDUITS FOR MICROGRID CONTROL COMMUNICATIONS BETWEEN MEMS CABINET AND BESS.
13. BESS EQUIPMENT TO BE SUPPLIED AND FIELD LISTED UNDER UL9540 AS A SINGLE PRE-ENGINEERED SYSTEM BY THE BESS MANUFACTURER.
14. MEMS TO SERVE AS PCS IN ACCORDANCE WITH 2020 NEC 705.13 TO LIMIT TOTAL EXPORT CURRENT TO ELECTRCIAL UTILITY TO 1,3000 KVA (1600A).
15. PROVIDE REPLACEMENT CIRCUIT BREAKER WITHIN EXISTING EQUIPMENT AS INDICATED.
16. 4RDP-0 TO BE SERVICE ENTRANCE RATED. CONTRACTOR TO RE-ESTABLISH FACILITY MBJ.
17. NOT USED
18. PROVIDE EUSERC COMPLIANT METERING CT SWITCHBOARD SECTION.
19. VERIFY PUBLIC KIOSK LOCATION WITH OWNER.

	FEEDER SCHEDULE COPPER: 3 PHASE, 3 WIRE + GROUND				FEEDER SCHEDULE COPPER: 3 PHASE, 4 WIRE + GROUND			
NOMINAL AMPACITY	TAG	CONDUIT SIZE (MIN)	PHASE CONDUCTORS (AWG or kcmil)	GROUND CONDUCTOR (AWG or kcmil)	TAG	CONDUIT SIZE (MIN)	PHASE & NEUTRAL CONDUCTORS (AWG or kcmil)	GROUND CONDUCTOR (AWG or kcmil)
20	203	1/2"	(3) 12	12	204	1/2"	(4) 12	12
30	303	1/2"	(3) 10	10	304	3/4"	(4) 10	10
40	403	3/4"	(3) 8	10	404	3/4"	(4) 8	10
50	503	3/4"	(3) 6	10	504	1"	(4) 6	10
60	603	3/4"	(3) 6	10	604	1"	(4) 6	10
70	703	1"	(3) 4	8	704	1 1/4"	(4) 4	8
80	803	1 1/4"	(3) 3	8	804	1 1/4"	(4) 3	8
90	903	1 1/4"	(3) 3	8	904	1 1/4"	(4) 3	8
100	1003	1 1/4"	(3) 2	8	1004	1 1/4"	(4) 2	8
110	1103	1 1/2"	(3) 1	6	1104	1 1/2"	(4) 1	6
125	1253	1 1/2"	(3) 1	6	1254	1 1/2"	(4) 1	6
150	1503	1 1/2"	(3) 1/0	6	1504	2"	(4) 1/0	6
175	1753	2"	(3) 2/0	6	1754	2"	(4) 2/0	6
200	2003	2"	(3) 3/0	6	2004	2"	(4) 3/0	6
225	2253	2"	(3) 4/0	4	2254	2 1/2"	(4) 4/0	4
250	2503	2"	(3) 4/0	4	2504	2 1/2"	(4) 250	3
300	3003	2 1/2"	(3) 250	4	3004	3"	(4) 350	2
350	3503	2 1/2"	(3) 350	3	3504	3 1/2"	(4) 500	1
400	4003	(2) 2"	(6) 3/0	(2) 3	4004	(2) 2"	(8) 3/0	(2) 3
450	4503	(2) 2"	(6) 4/0	(2) 2	4504	(2) 2 1/2"	(8) 4/0	(2) 2
500	5003	(2) 2"	(6) 4/0	(2) 2	5004	(2) 3"	(8) 250	(2) 1
600	6003	(2) 2 1/2"	(6) 250	(2) 1	6004	(2) 3"	(8) 350	(2) 2/0
800	8003	(2) 3"	(6) 500	(2) 1/0	8004	(3) 3"	(12) 350	(3) 2/0
1000	10003	(3) 3"	(9) 500	(3) 2/0	10004	(3) 4"	(12) 500	(3) 2/0
1200	12003	(4) 3"	(12) 350	(4) 3/0	12004	(4) 4"	(16) 500	(4) 250
1600	16003	(4) 4"	(12) 750	(4) 4/0	16004	(5) 4"	(20) 500	(5) 4/0
2000	20003	(5) 4"	(15) 750	(5) 250	20004	(6) 4"	(24) 500	(6) 250
2500	25003	(6) 4"	(18) 750	(6) 350	25004	(8) 4"	(32) 500	(8) 350
3000	30003	(7) 4"	(21) 750	(7) 500	30004	(9) 4"	(36) 500	(9) 500
4000	40003	(9) 4"	(27) 750	(9) 500	40004	(12) 4"	(48) 500	(12) 500



1 26 - Single Line Diagram - New Construction
NONE

PAE
pae-engineers.com

LUMA
Lumald.com

Tigard Microgrid BRIC Grant

P:\Standard Files\01 Production\01 Revit\01 Templates

STAMP:

NO.	REVISION	DATE

SET TITLE:
Project Status

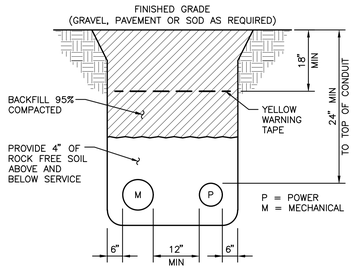
DRAWN BY:	Author
CHECKED BY:	Checker
SCALE:	NONE
DATE:	2022-12-20
JOB NO.	23-####

SHEET TITLE:
DIAGRAMS - ELECTRICAL - NEW CONSTRUCTION

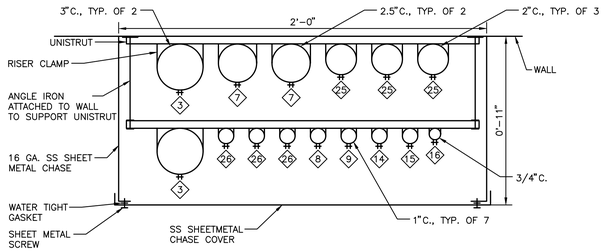
SHEET NUMBER:
E702

6/14/2023 10:47:10 AM Autodesk Docs://23-1780 - Tigard Microgrid BRIC Grant/23-1780 - Tigard Microgrid BRIC Grant E23.rvt

Appendix D - Microgrid Site Plan



3 E2.4 **TRENCHING SECTION**
NOT TO SCALE



NOTES:
1. SEAL ALL PENETRATIONS W/ SILICONE WATER TIGHT.
2. PROVIDE CROSS BREAKS OR REINFORCEMENTS PER SMAACNA.
3. RISER SUPPORTS AT MAXIMUM 15' O.C. VERTICALLY PER CODE. ATTACH PER STRUCTURAL.
4. DCW PIPING BETWEEN TRENCH AND FIRST FLOOR CEILING ONLY.

4 E2.4 **CONDUIT CHASE DETAIL**
SCALE: 3" = 1'-0"

GENERAL NOTES

A. REFER TO SHEET E0.1 FOR ELECTRICAL SYMBOL LEGEND AND ABBREVIATIONS.

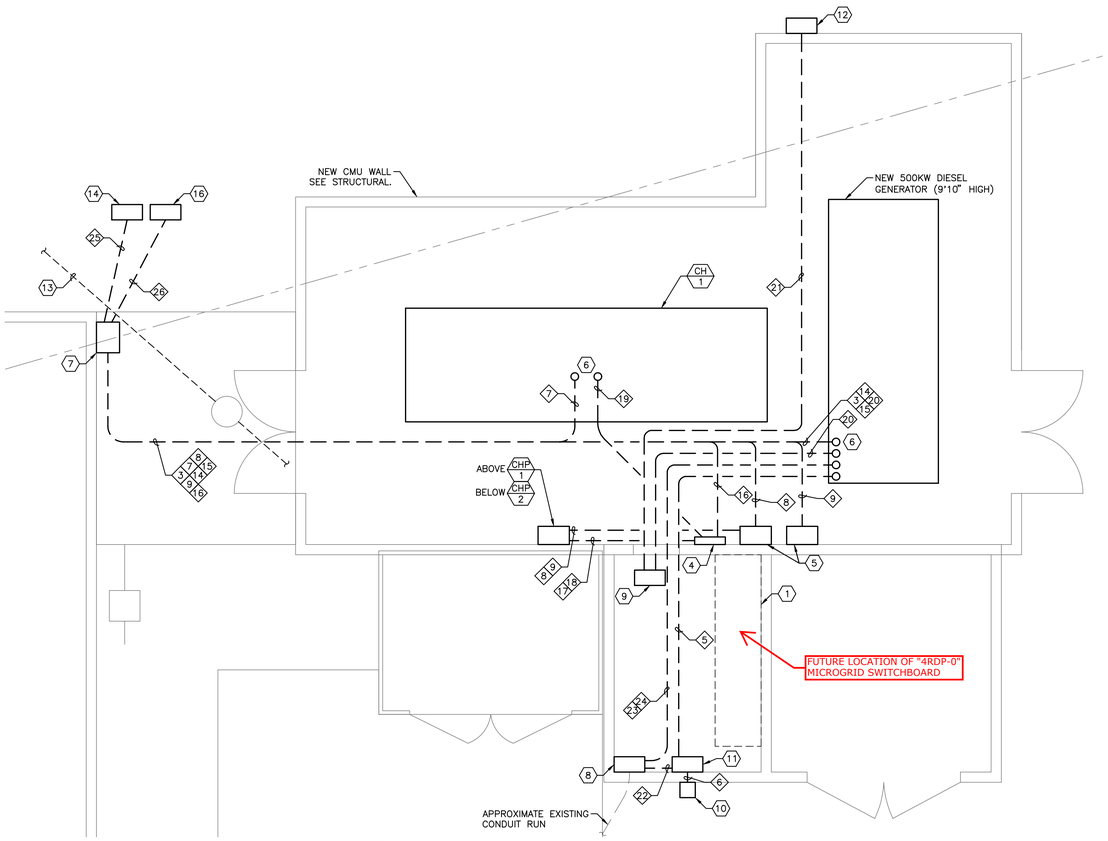
B. REFER TO SHEET E3.1, E3.2, E3.3, AND E3.4 FOR ELECTRICAL ONE-LINE DIAGRAM.

C. REFER TO SHEET E3.5 FOR ELECTRICAL SCHEDULES.

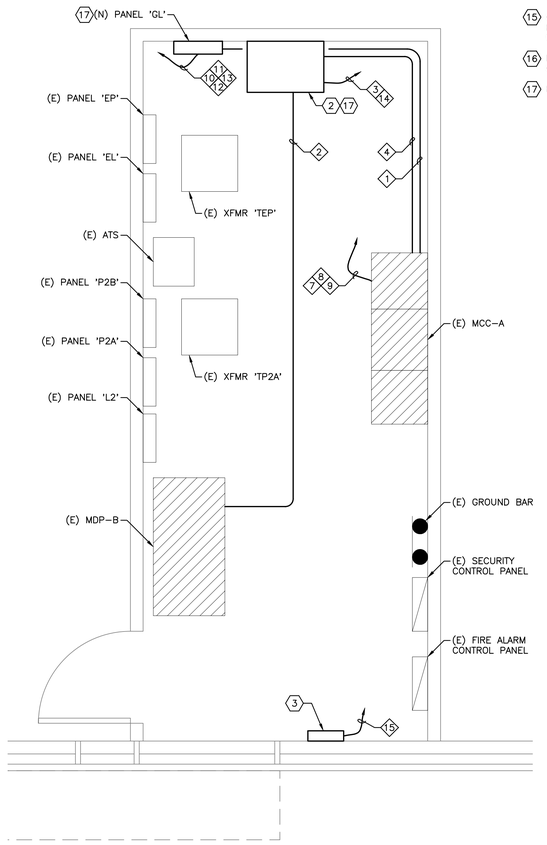
D. ALL CONDUIT ROUTING SHOWN IS DIAGRAMMATIC, EXACT CONDUIT ROUTING TO BE COORDINATED IN THE FIELD.

NOTES THIS SHEET

1. POTENTIAL LOCATION FOR FUTURE RESILIENT DISTRIBUTION PANEL 'RDP-A'.
2. INSTALL NEW AUTOMATIC TRANSFER SWITCH, SEE ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION. FIELD COORDINATE EXACT INSTALLATION LOCATION WITH OWNER.
3. INSTALL NEW GENERATOR ANNUNCIATOR PANEL, FIELD COORDINATE EXACT LOCATION WITH OWNER.
4. MECHANICAL CONTROL PANEL. FIELD COORDINATE ALL CONNECTION REQUIREMENTS WITH MANUFACTURER PRIOR TO INSTALLATION.
5. 10HP NEMA 3R VFD FOR CHILLED WATER PUMP.
6. COORDINATE CONDUIT STUB-UP AREA WITH EQUIPMENT MANUFACTURER.
7. VERTICAL CHASE FOR ELECTRICAL CONDUITS TO BE ROUTED ALONG ROOF TO ELECTRICAL ROOM. EXACT CONDUIT ROUTING TO BE DETERMINED IN THE FIELD. SEE DETAIL 4/E2.4 FOR ADDITIONAL INFORMATION. WHERE CHASE GOES OVER PARAPET, PROVIDE WATER TIGHT SS COVERING OPEN TO ROOF BELOW.
8. INSTALL HANDHOLE TO INTERCEPT EXISTING EMERGENCY GENERATOR FEED, GENERATOR CONTROL SIGNAL, GENERATOR BATTERY CHARGER, AND GENERATOR BLOCK HEATER. FIELD COORDINATE EXACT LOCATION OF EXISTING CONDUIT RUN PRIOR TO INSTALLATION OF HANDHOLE.
9. INSTALL HANDHOLE FOR FUTURE EXTENSION OF CONDUITS TO RDP-A. FIELD COORDINATE EXACT INSTALLATION LOCATION WITH OWNER.
10. INSTALL NEW 30A 480V 3-PHASE GENERATOR PLUG.
11. INSTALL NEW MANUAL TRANSFER SWITCH, SEE ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION. FIELD COORDINATE EXACT INSTALLATION LOCATION WITH OWNER.
12. INSTALL HANDHOLE FOR CONNECTION OF FUTURE BESS SYSTEM TO FUTURE RESILIENT DISTRIBUTION PANEL RDP-A. FIELD COORDINATE EXACT INSTALLATION LOCATION WITH OWNER.
13. APPROXIMATE LOCATION OF (E) STORM SEWER. TOP OF SEWER APPROXIMATELY 3' B.G.
14. INSTALL HANDHOLE FOR FUTURE POWER OF STORAGE BUILDINGS. FIELD COORDINATE EXACT INSTALLATION LOCATION WITH OWNER.
15. CONDUIT TO BE ROUTED ABOVE CONCRETE FOOTING, BLOCKOUTS WILL BE REQUIRED. COORDINATE EXACT CONDUIT ROUTING AND REQUIREMENTS WITH CIVIL.
16. INSTALL HANDHOLE FOR FUTURE AV OF STORAGE BUILDINGS. FIELD COORDINATE EXACT INSTALLATION LOCATION WITH OWNER.
17. PROVIDE DRIP PAN ABOVE EQUIPMENT.



1 E2.4 **BUILDING EXTERIOR - ELECTRICAL**
SCALE: 1/4" = 1'-0"



2 E2.4 **EQUIPMENT ROOM - ELECTRICAL**
SCALE: 1/2" = 1'-0"

MICROGRID SITE PLAN - PROVIDED FOR REFERENCE ONLY.

MICROGRID INFRASTRUCTURE PROJECT SCOPE PROVISIONS PROVIDED BY PAE AND INCORPORATED INTO CHILLER PLANT UPGRADE DESIGN BY R&W. CONTRACTOR TO REQUEST FULL CHILLER PLANT UPGRADE CURRENT ADDENDUM DESIGN DRAWINGS FROM CITY OF TIGARD FOR COMPLETE SCOPE OF DESIGN.

REV	DATE	DESCRIPTION	BY
0	3/28/2023	ISSUED FOR PERMIT	MDJ
A	9/9/2022	ISSUED FOR EQUIPMENT ORDERING	MDJ

THIS LINE IS 2 INCHES
AT FULL SCALE
IF IT DOES NOT MEASURE 2 INCHES, SCALE ACCORDINGLY

R&W ENGINEERING, INC.
"Engineering Integrated Solutions"
9615 S.W. Allen Blvd., Suite 107
Beaverton, Oregon 97005
Phone: (503) 726-3346
Fax: (503) 726-3326
E-mail: rweng@rweng.com

TIGARD PUBLIC LIBRARY
13500 SW HALL BLVD. TIGARD, OR 97223

ENLARGED FLOOR PLANS - ELECTRICAL

DRAWN:	R&W
CONTACT:	M. FOSTER
PROJECT #:	868.003.001
DATE:	3/3/2023
DRAWING NO.	E2.4
SHEET	6 OF 11

January 4, 2024

TIGARD MICROGRID PROJECT
SOLAR ASSESSMENT REPORT

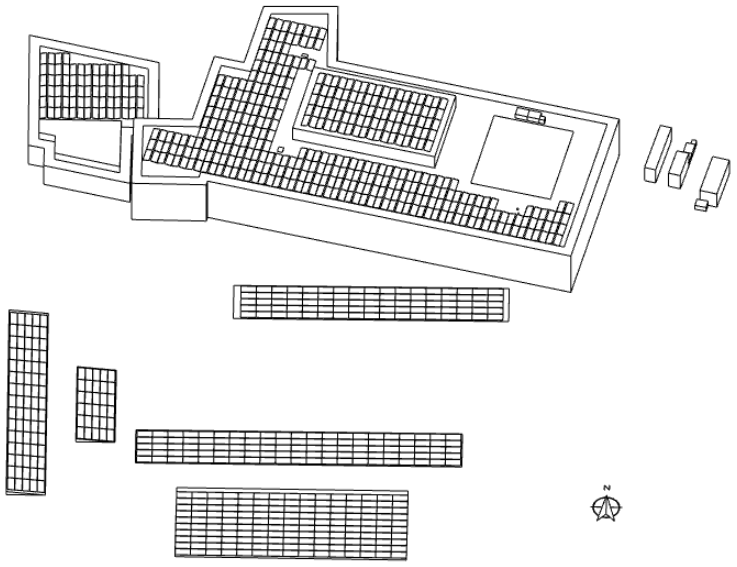
Executive Summary

This report is an assessment of the optimal solar designs and battery energy storage system (BESS) for the Tigard Microgrid Project. The project is located at the Tigard Library 13500 SW Hall Blvd, Tigard, OR 97223. The City of Tigard's goal for this project is to help meet their carbon neutral by 2050 goal, reduced electrical bills and to use the library as an emergency operations center in case of emergencies.

This ETO Solar Development Assistance report is informed through the PAE Engineering Tigard Microgrid Feasibility Study. The PAE feasibility study was completed in June of 2023 and provides the basis of design for the BESS system. Additionally, this Solar Development Assistance report was informed through satellite imagery, an on-site visit and preliminary structural engineering. The estimated annual energy production and Total Solar Resource Fraction (TSRF) was conducted through industry-leading solar production software, Helioscope.

The findings of this report indicated no major issues that would prohibit the City of Tigard from installing a solar PV system and BESS at the library building. The City intends to apply for multiple grants in 2024 and hopes to start construction in 2025.

Preliminary Layout



Outline of PV design

	Tigard Microgrid Project
Module Count	Roof - (455) Qcell 485W Carports - (446) Qcell 590W
Inverter Count	(4) SolarEdge 100k
Total System Size (DC)	483.7kW
Year 1 Energy Production	536,616kWh
Total Solar Resource Fraction (TSRF)	82.9%
Racking Equipment	Roof - PanelClaw dual tilt 10 degree ballasted Carports - through-bolted to carport frame

Solar Equipment Warranties

	Manufacturer	Warranty length
Solar modules	Q cells	12-year product 25-year performance
Inverters	SolarEdge	12-year (can be extended to 20 years)
Optimizers	SolarEdge	25-year
Rooftop ballasted racking	PanelClaw	25-year

Outline of BESS design

The battery system will have a capacity of 1,500kW and 2,700kWh. The BESS system is designed to use available PV power during peak usage and rates times. This will reduce the peak demand charges on the owner's electric bill as well as ensure the use of renewables as often as possible. Additionally, the BESS and solar PV system is sized to provide emergency power for the emergency operation center within the library for 7 days.

The owner intends to participate in the PGE Schedule 200 program. This program will allow the utility to use the BESS in grid demand response applications. PGE will contribute $39.50 per nominated kW for ancillary services and $82.40 per nominated kW for demand response and ancillary services. There has not been confirmation with PGE on what the nominated kW rating for this project will be.

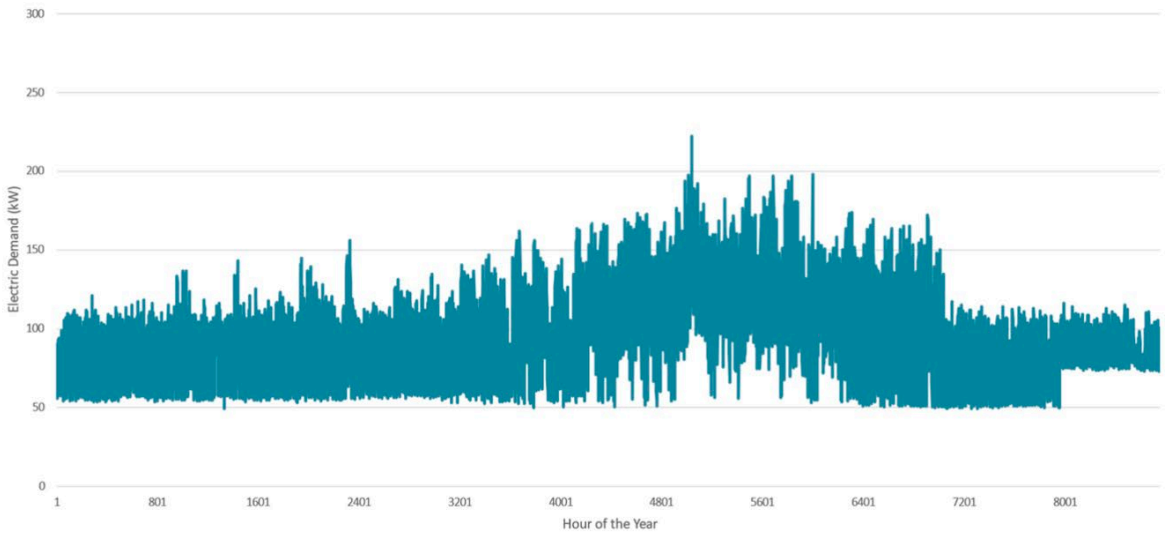
	Tigard Microgrid Project
Battery manufacturer	Current Energy ELM
Battery kW	1,500kW
Battery kWh	2,700kWh
Microgrid controller	ELM Field Sight

Battery Equipment Warranties

	Manufacturer	Warranty length
Battery	Current Energy ELM	2-year material and workmanship 5-year parts

Energy consumption

The utility, PGE, provided 15 min interval data for the 2022 calendar year. The data shows the library building has an average electrical demand of 134kW. The summer months show an increase in electrical demand due to HVAC cooling loads. Overall, the building consumes 823,529kWh of electricity and 300,400kWh of natural gas per year.



Historic PGE meter data at 15 minute intervals for the 2022 calendar year– Tigard Microgrid Feasibility Study, PAE

Customer Microgrid Benefits

The benefits of the microgrid to the customer includes peak load shedding and resiliency for the building to act as an emergency operations center. The BESS has the ability to provide power to the building in instances of high energy demand. The library's electrical bill is based on PGE's schedule 83 which includes a number of charges that will be reduced by the BESS. These charges include on-peak usage, generation demand, on-peak demand, and transmission charge.

During an emergency event a portion of the building will operate as an emergency operations center. The battery, PV system and backup generator are designed to provide power for seven days. Additionally, the BESS microgrid controller will integrate the solar PV system and backup generator.

Grid Microgrid Benefits

The microgrid system is designed to provide benefits to the grid as well as to the customer. The grid benefits include participation in the PGE's Schedule 200. As a part of Schedule 200, the BESS will provide grid stabilization and support services to the utility. The battery has the additional capability to provide grid services through peak shaving, demand response, and time of use shift.

Shade Analysis

The library's site is surrounded by trees both on the property and adjacent to the property. The arrays located on the building have minimal shading outside of three trees located at the southwest corner. These trees combined with a slightly lower roof height reduce the western most roof array's production slightly. The two other arrays on the roof of the building have no shading concerns. The average TSRF for the roof top arrays is 82.1%.

The five carports located to the south of the building have variable shading concerns. All five carports have some shading from trees with the three south facing carports having the least shading concerns. The two east facing carports have the most shading concerns due to trees on the southern end of the carports. Additionally, the western most carport has a series of trees due west which will block a fair amount of afternoon and evening sun. The average TSRF for the carport arrays is 81.3%. However, the western most carport has a TSRF of 65%. Overall, the site is a good location for solar. We recommend the City implement a strategic tree trimming plan to ensure the solar arrays do not become more shaded over time.

Structural Considerations and Roof Age

Our analysis of the building did not indicate any structural concerns for the ballasted rooftop building. The building is relatively new, constructed in 2004. Additionally, the owners intend to replace the roof before the solar installation. Preliminary engineering for the dual tilt ballasted racking system shows the system will have a 2.67PSF load. Furthermore, the preliminary engineering shows (10) mechanical attachments will be required. These attachments are for seismic purposes, but the number and location can be refined with a full engineering review.

Cost Estimate Range

This estimate includes all engineering, permits, equipment procurement, and installation costs required for a turnkey system. The lower end of the costs signifies what the installation of this system would cost today. The higher end estimates what this project could cost in one to two years. This microgrid project is fairly complex allowing plenty of areas for costs to change over time. The costs for trade exposed components such as steel and modules will likely see the most change. Additionally, the BESS market is still evolving. Battery costs have been trending down, but the market as a whole is still volatile. For planning and grant application purposes, the City should assume costs will increase over time similar to other construction projects.

	Low estimate	High estimate
Project cost/watt (including the cost of storage)	$7.27/watt	$8.10/watt
Project cost	$3,563,210	$3,919,531

Financial Summary

Our estimated costs for the PV system is $1,688,510. This PV price includes the carports, trenching, PV related wiring conduit and PV equipment. Our estimated cost for the battery system is $1,874,700. This battery cost includes the battery, isolation transformer, microgrid controller, control equipment, service gear and all battery related wiring and conduit. The total project cost, if installed today is $3,563,210. However, the owners intend to apply for several grants as well as installing a new roof and conducting HVAC upgrades which will extend the project time frame. Assuming a 10% increase in costs to cover any changes in material or labors costs before installation may be prudent.

Additional Funding

The City of Tigard intends to apply for multiple grants including the FEMA/BRIC, Hazard Mitigation Projects grant. This FEMA grant is meant to help cost effective projects which are designed to increase resilience and public safety. The City will also apply for the Oregon Department of Energy Community Renewable Energy Grant Program. The OR Department of Energy Grant is meant to provide funding for community renewable energy and energy resiliency projects. The Oregon Department of Energy also has a Solar + Storage rebate for low-income services providers that the city plans to apply for. In addition, the City intends to work with the electric utility, PGE, for funding through the Schedule 200 program and apply for funding from the PGE Renewable Development Fund. Finally, ETO has agreed to provide an exception for this project. Allowing the city to receive a $15,000 installation incentive.

Payback

Using a simple payback method, it is estimated this project will pay for itself in year 24. The average annual electrical bill savings during this time period is $101,788. This financial module includes the costs for installing the PV system and BESS at today's price as well as a 30% IRA direct payment on year 1 and the $18,000 ETO installation incentive. It also includes a $72,500 cost for component replacement in year 15. Additional annual or semi-annual O&M costs have not been included at this time. If the city is awarded the Oregon Department of Energy Community Renewable Energy Grant and the Oregon Department of Energy Solar + Storage rebate they could see an additional $1,045,000 in funding. This additional funding would bring the payback down to year 17. The FEMA/BRIC, Hazard Mitigation grant and the PGE Renewable Development Fund grant may cover up to 75% or up to 85% of eligible costs respectfully. It should be noted that several of these grants are competitive, and each grant has its own eligibility requirements as well as eligible installation costs. For example, one grant may cover the solar installation but not the costs for the battery system. Another example would be one grant may cover the solar installation but not the costs of the carport steel structures. It will be important for the city to thoroughly understand each of the grant requirements to maximize their success. A final note, this financial model does not include PGE Schedule 200 payments for grid services as these funding and payment services have not been confirmed. Overall, this project will be more financially successful with the additional funding sources.

Permitting, Zoning, and Interconnection

There are no permitting or zoning concerns for this project. The electrical interconnection is somewhat complicated with the significant amount of new electrical equipment that will be needed for the PV and BESS. The point of interconnection will also be somewhat difficult as the single line calls for an interconnection at existing underground conductors between the utility transformer and MDS. A handhold or vault will need to be installed for this interconnection plan. Overall, nothing has been identified that would prohibit this project from proceeding.

Additional Findings

The clerestory located on the main roof of the building is tilted slightly to the north and currently has standing metal seam roofing. Though not ideal for solar production, the tilt to the north will be mostly mitigated by the east-west racking system. This roof section will also be converted to a membrane roof matching the rest of the building's roof surfaces.

Next Steps

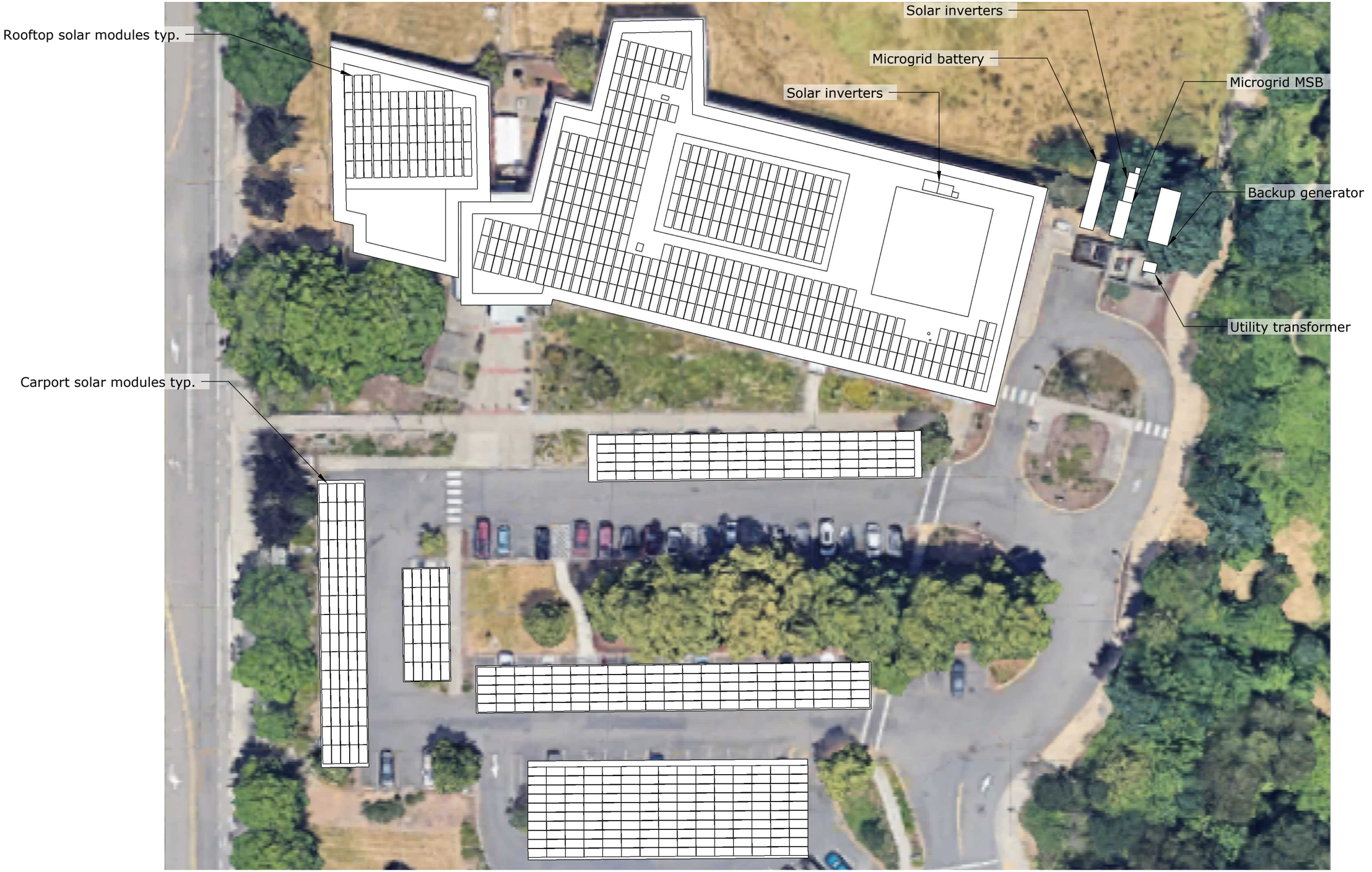
The City is very motivated to see this microgrid project through. They have outlined the following steps to keep the project progressing: a City Council Workshop on January 16th, a Targeted Engagement with potential partners in December through March and submitting grant applications in spring of 2024. The City plans to start construction in 2025 and have everything completed in 2027. Based on the information gathered for this SDA, the City of Tigard's plan is very reasonable and most likely will result in a successful project.

About the Company Performing this Assessment

This assessment was prepared by A&R Solar, a seasoned solar installer operating in Oregon and Washington. Since 2007, A&R Solar has installed over 300 commercial projects throughout the Pacific Northwest, including half of the community solar in Washington and many of the region's largest rooftop systems.

A&R Solar is an employee-owned Social Purpose Corporation and a Certified B Corp. Our team has more NABCEP (North American Board of Certified Energy Practitioners) certified solar professionals than any other solar installer in the Pacific Northwest.

Learn more about A&R Solar at www.a-rsolar.com.



1 SITE OVERVIEW
Scale: 1" : 40'

N

A&RSOLAR
3211 Martin Luther King Jr Way S.
Seattle, WA 98144 (206)707-9937

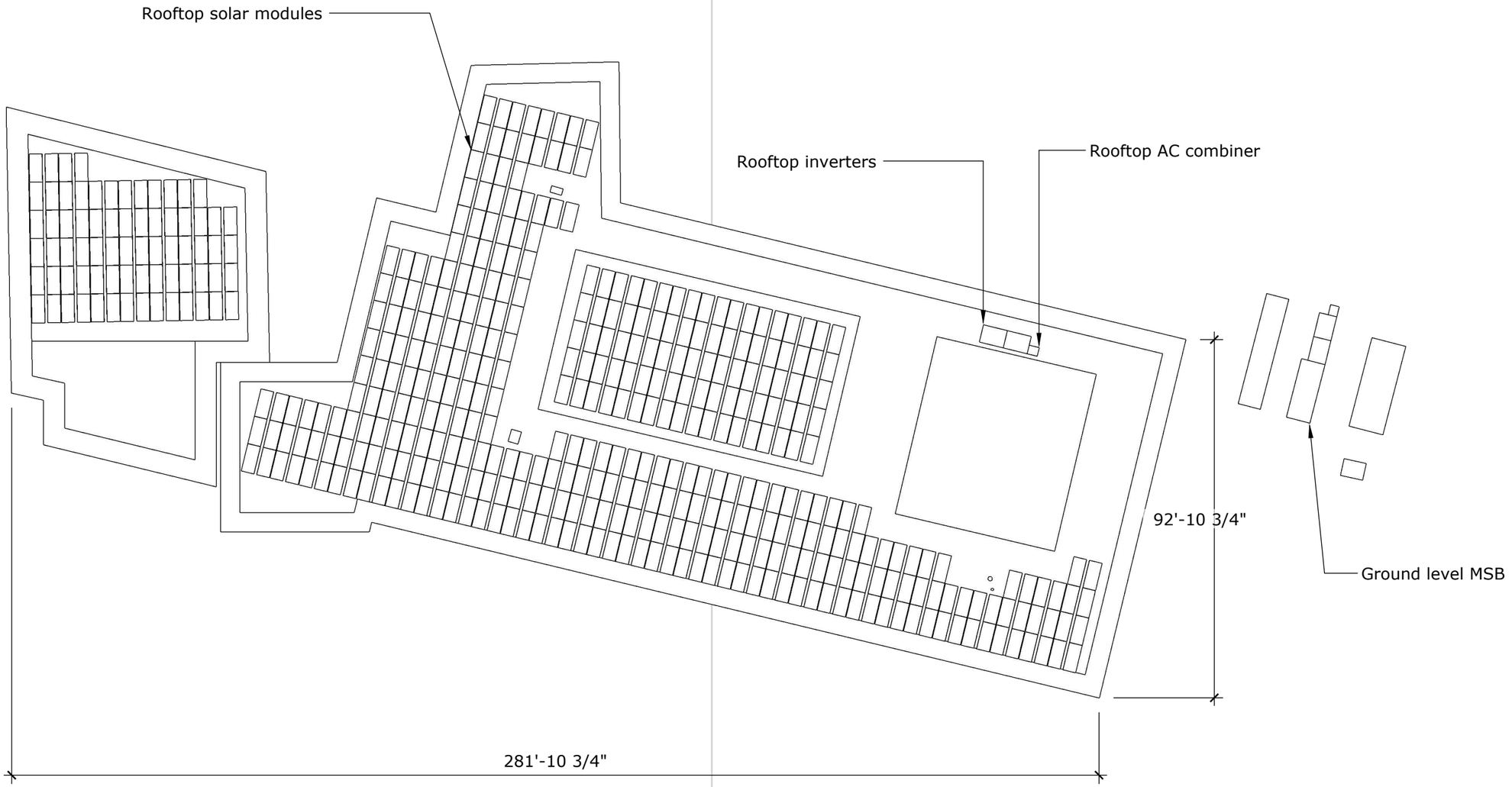
THIS DRAWING CONSTITUTES THE CONFFIDENTIAL INFORMATION OF A&R SOLAR AND ITS RECEPTOR POSSESSION DOES NOT CONFER ANY RIGHT IN OR LICENSE TO USE IT OR THE INFORMATTION DISCLOSED HERE IN NOR ANY RIGHT TO REPRODUCE THIS DRAWING OR ANY PART HERE IN WITHOUT THE WRITTEN CONSENT OF A&R SOLAR.

City of Tigard Library
400 kW AC, 487.3 kW DC

13500 SW Hall Blvd, Tigard, OR 97223

REVISIONS	
REV. #	DATE:
0	
1	
2	
DESIGNED:	

A1 SITE OVERVIEW



1 ROOF LAYOUT
Scale: 1" : 30'

N

EQUIPMENT SCHEDULE

Ref.	Category	Equipment	QTY
1	Modules	Qcells Q.Peak DUO XL-G10.c 485W	456
2	Optimizers	S1201 SolarEdge Dual Optimizer	228
3	Jbox	Jbox	XX
4	Inverters	SolarEdge SE100KUS	2
5	AC Combiner	480V 400A NEMA -3R	1

A&R SOLAR
3211 Martin Luther King Jr Way S.
Seattle, WA 98144 (206)707-9937

THIS DRAWING CONSTITUTES THE CONFFIDENTIAL INFORMATION OF A&R SOLAR AND ITS RECEPTOR POSSESSION DOES NOT CONFER ANY RIGHT IN OR LICENSE TO USE IT OR THE INFORMATTION DISCLOSED HERE IN NOR ANY RIGHT TO REPRODUCE THIS DRAWING OR ANY PART HERE IN WITHOUT THE WRITTEN CONSENT OF A&R SOLAR.

City of Tigard Library
400 kW AC, 487.3 kW DC

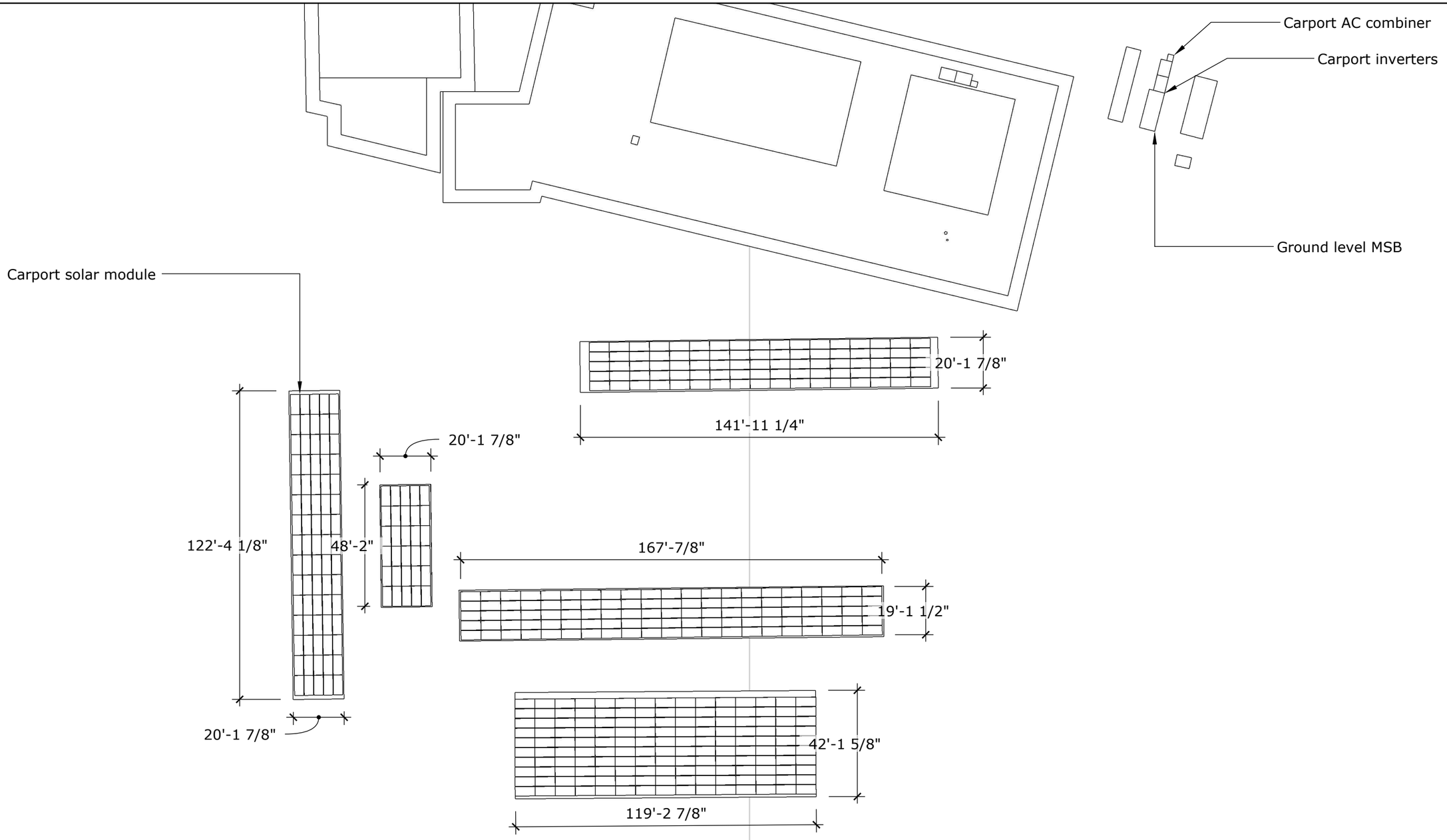
13500 SW Hall Blvd, Tigard, OR 97223

REVISIONS

REV. #	DATE:
0	
1	
2	

DESIGNED:

A2 ROOF LAYOUT



1 CARPORT LAYOUT
Scale: 1" : 40'

N

EQUIPMENT SCHEDULE

Ref.	Category	Equipment	QTY
1	Modules	Qcells Q.Peak DUO XL-G11.3 590W	445
2	Optimizers	S1201 SolarEdge Dual Optimizer	223
3	Jbox	Jbox	XX
4	Inverters	SolarEdge SE100KUS	2
5	AC Combiner	480V 400A NEMA -3R	1

A&R SOLAR
3211 Martin Luther King Jr Way S.
Seattle, WA 98144 (206)707-9937

THIS DRAWING CONSTITUTES THE CONFFIDENTIAL INFORMATION OF A&R SOLAR AND ITS RECEPTOR POSSESSION DOES NOT CONFER ANY RIGHT IN OR LICENSE TO USE IT OR THE INFORMATTION DISCLOSED HERE IN NOR ANY RIGHT TO REPRODUCE THIS DRAWING OR ANY PART HERE IN WITHOUT THE WRITTEN CONSENT OF A&R SOLAR.

City of Tigard Library
400 kW AC, 487.3 kW DC

13500 SW Hall Blvd, Tigard, OR 97223

REVISIONS

REV. #	DATE:
0	
1	
2	

DESIGNED:

A3 CARPORT LAYOUT

E-W 10 degree Qcell 485W (Working) City of Tigard Library (ETO), 13500 SW Hall Blvd, Tigard OR

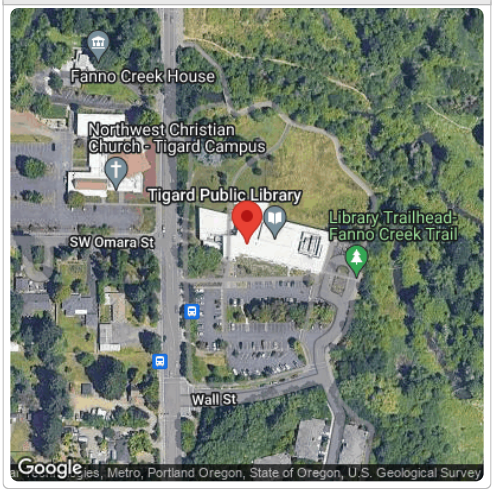
Report

Project Name	City of Tigard Library (ETO)
Project Address	13500 SW Hall Blvd, Tigard OR
Prepared By	Jerome Lyons estimating@a-rsolar.com

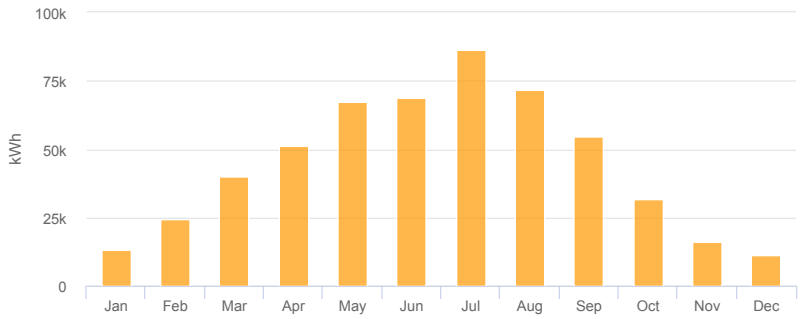
System Metrics

Design	E-W 10 degree Qcell 485W (Working)
Module DC Nameplate	483.7 kW
Inverter AC Nameplate	400.0 kW Load Ratio: 1.21
Annual Production	536.6 MWh
Performance Ratio	82.5%
kWh/kWp	1,109.4
Weather Dataset	TMY, 10km grid (45.45,-122.75), NREL (prospector)
Simulator Version	c909a98b52-2c934c7eed-625ffc4e1d-0c843e6d99

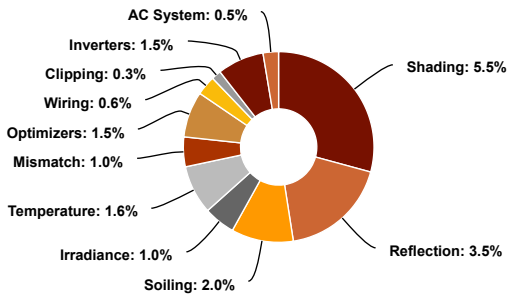
Project Location



Monthly Production



Sources of System Loss



Annual Production

	Description	Output	% Delta
Irradiance (kWh/m²)	Annual Global Horizontal Irradiance	1,322.3	
	POA Irradiance	1,345.4	1.7%
	Shaded Irradiance	1,270.8	-5.5%
	Irradiance after Reflection	1,226.6	-3.5%
	Irradiance after Soiling	1,202.1	-2.0%
	Total Collector Irradiance	**1,202.3**	**0.0%**
Energy (kWh)	Nameplate	581,347.8	
	Output at Irradiance Levels	575,475.1	-1.0%
	Output at Cell Temperature Derate	566,435.5	-1.6%
	Output After Mismatch	561,007.4	-1.0%
	Optimizer Output	552,710.5	-1.5%
	Optimal DC Output	549,232.3	-0.6%
	Constrained DC Output	547,522.0	-0.3%
	Inverter Output	539,308.3	-1.5%
	Energy to Grid	**536,611.7**	**-0.5%**
Temperature Metrics			
	Avg. Operating Ambient Temp	13.2 °C	
	Avg. Operating Cell Temp	19.9 °C	
Simulation Metrics			
	Operating Hours	4664	
	Solved Hours	4664	

Condition Set

Description	Condition Set 1											
Weather Dataset	TMY, 10km grid (45.45,-122.75), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Uploaded By	Characterization									
	Q.PEAK DUO XL-G11.3 590 (Q-Cells)	HelioScope	Spec Sheet Characterization, PAN									
	Q.PEAK DUO XL-G10.c 485 (Qcells)	HelioScope	Spec Sheet Characterization, PAN									
Component Characterizations	Device	Uploaded By	Characterization									
	SE100KUS (2022) (SolarEdge)	HelioScope	Spec Sheet									
	S1201 (SolarEdge)	HelioScope	Mfg Spec Sheet									

Components

Component	Name	Count
Inverters	SE100KUS (2022) (SolarEdge)	4 (400.0 kW)
Strings	10 AWG (Copper)	26 (4,175.1 ft)
Optimizers	S1201 (SolarEdge)	459 (550.8 kW)
Module	Qcells, Q.PEAK DUO XL-G10.c 485 (485W)	456 (221.2 kW)
Module	Q-Cells, Q.PEAK DUO XL-G11.3 590 (590W)	445 (262.6 kW)

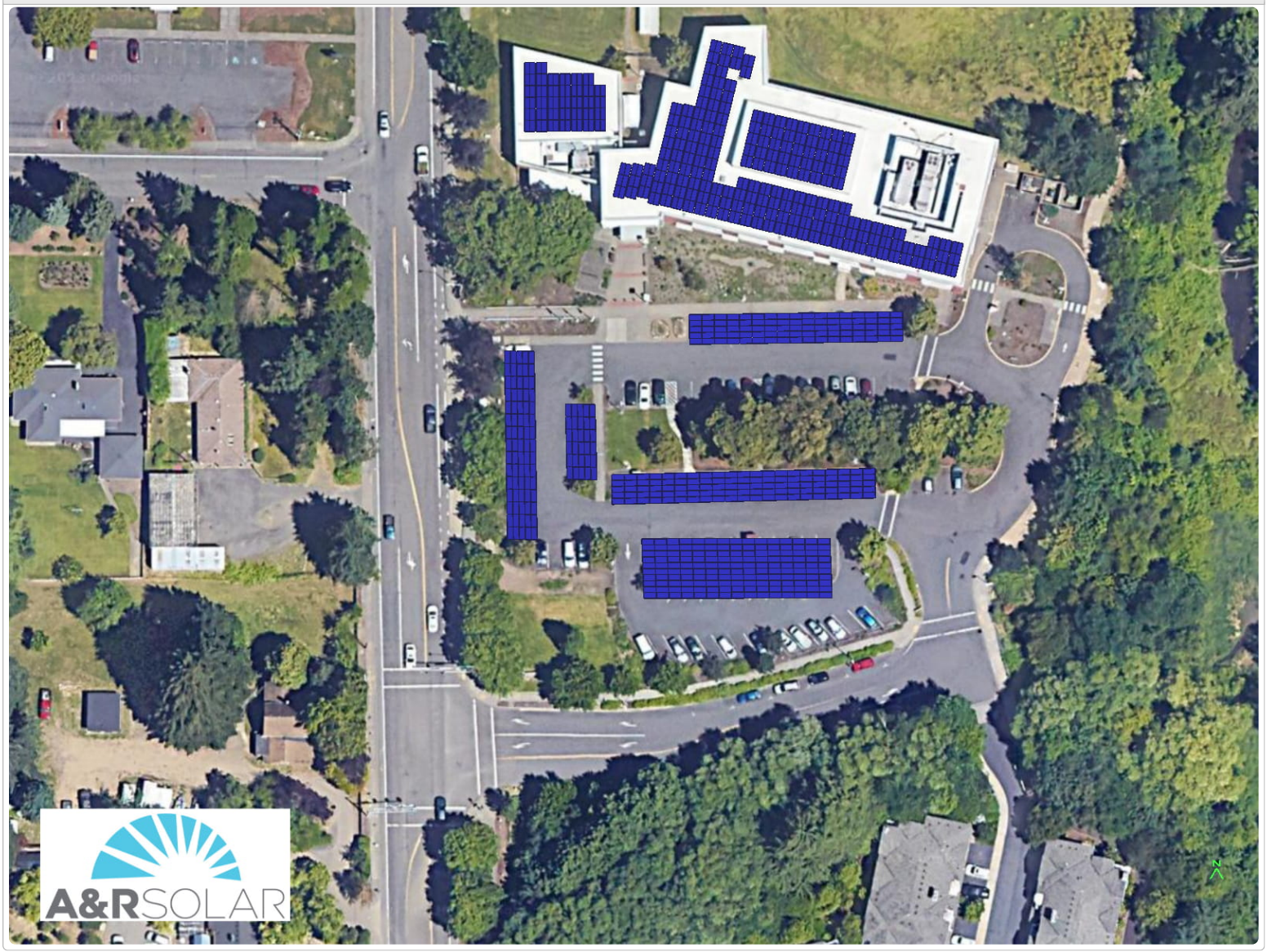
Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	13-35	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	East-West	Landscape (Horizontal)	10°	180°	0.7 ft	1x1	36	72	34.9 kW
Field Segment 2	East-West	Landscape (Horizontal)	10°	193.77693°	0.7 ft	1x1	147	294	142.6 kW
Field Segment 3	East-West	Landscape (Horizontal)	10°	193.4669°	0.7 ft	1x1	45	90	43.7 kW
Field Segment 4	Carport	Landscape (Horizontal)	7°	179.1894°	0.1 ft	1x1	85	85	50.2 kW
Field Segment 5	Carport	Landscape (Horizontal)	7°	89.07423°	0.1 ft	1x1	75	75	44.3 kW
Field Segment 6	Carport	Landscape (Horizontal)	7°	178.62556°	0.1 ft	1x1	105	105	62.0 kW
Field Segment 7	Carport	Landscape (Horizontal)	7°	88.70686°	0.1 ft	1x1	30	30	17.7 kW
Field Segment 8	Carport	Landscape (Horizontal)	7°	179.83267°	0.1 ft	1x1	150	150	88.5 kW

Detailed Layout



E-W 10 degree Qcell 485W (Working) City of Tigard Library (ETO), 13500 SW Hall Blvd, Tigard OR

Shading Heatmap



Shading by Field Segment

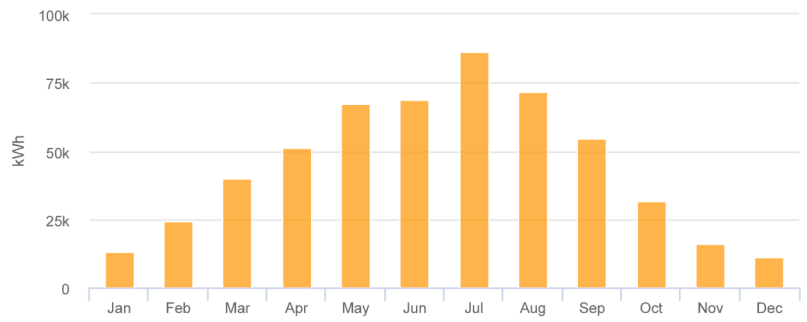
Description	Tilt	Azimuth	Modules	Nameplate	Shaded Irradiance	AC Energy	TOF[2]	Solar Access	Avg TSRF [2]
Field Segment 1	10.0°	180.0°	72	34.9 kWp	1,195.4kWh/m^2	36.5 MWh[1]	85.3%	91.4%	78.0%
» subarray 1	10.0°	90.0°	36	17.5 kWp	1,182.0kWh/m^2	18.1 MWh[1]	84.9%	90.8%	77.1%
» subarray 2	10.0°	270.0°	36	17.5 kWp	1,208.9kWh/m^2	18.4 MWh[1]	85.6%	92.1%	78.8%
Field Segment 2	10.0°	193.8°	294	142.6 kWp	1,275.9kWh/m^2	158.5 MWh[1]	85.3%	97.6%	83.2%
» subarray 1	10.0°	103.8°	147	71.3 kWp	1,292.2kWh/m^2	80.3 MWh[1]	86.8%	97.1%	84.3%
» subarray 2	10.0°	283.8°	147	71.3 kWp	1,259.5kWh/m^2	78.1 MWh[1]	83.7%	98.1%	82.1%
Field Segment 3	10.0°	193.5°	90	43.7 kWp	1,304.8kWh/m^2	49.5 MWh[1]	85.3%	99.8%	85.1%
» subarray 1	10.0°	103.5°	45	21.8 kWp	1,328.2kWh/m^2	25.2 MWh[1]	86.7%	99.9%	86.6%
» subarray 2	10.0°	283.5°	45	21.8 kWp	1,281.4kWh/m^2	24.3 MWh[1]	83.8%	99.8%	83.6%
Field Segment 4	7.0°	179.2°	85	50.2 kWp	1,284.2kWh/m^2	56.2 MWh[1]	91.3%	91.8%	83.8%
Field Segment 5	7.0°	89.1°	75	44.3 kWp	998.0kWh/m^2	39.5 MWh[1]	85.3%	76.3%	65.1%
Field Segment 6	7.0°	178.6°	105	62.0 kWp	1,327.7kWh/m^2	71.7 MWh[1]	91.2%	94.9%	86.6%
Field Segment 7	7.0°	88.7°	30	17.7 kWp	1,258.4kWh/m^2	19.4 MWh[1]	85.3%	96.2%	82.1%
Field Segment 8	7.0°	179.8°	150	88.5 kWp	1,367.0kWh/m^2	105.2 MWh[1]	91.3%	97.7%	89.2%
Totals, weighted by kWp			**901**	**483.7 kWp**	**1,270.8kWh/m^2**	**536.6 MWh**	**87.8%**	**94.5%**	**82.9%**

[1] approximate, varies based on inverter performance
[2] based on location Optimal POA Irradiance of 1,533.2kWh/m^2 at 35.2° tilt and 187.4° azimuth

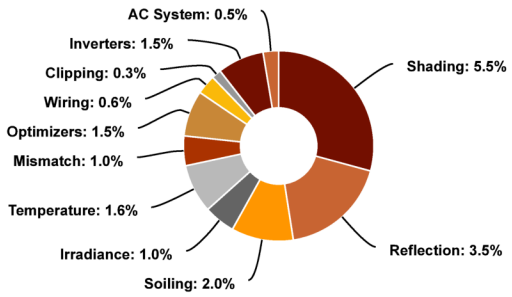
Solar Access by Month

Description	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
Field Segment 1	73%	80%	87%	94%	97%	97%	98%	97%	84%	84%	76%	71%
Field Segment 2	96%	96%	97%	98%	98%	98%	98%	98%	98%	97%	97%	95%
Field Segment 3	99%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%
Field Segment 4	68%	80%	94%	95%	94%	95%	95%	95%	95%	91%	72%	67%
Field Segment 5	75%	73%	75%	76%	79%	76%	76%	76%	76%	75%	78%	75%
Field Segment 6	91%	95%	95%	94%	94%	94%	96%	96%	97%	95%	93%	89%
Field Segment 7	95%	96%	96%	95%	97%	97%	97%	96%	96%	96%	97%	95%
Field Segment 8	91%	97%	98%	98%	98%	98%	99%	99%	99%	98%	95%	86%
Solar Access, weighted by kWp	**87.9%**	**91.5%**	**94.1%**	**94.8%**	**95.4%**	**95.4%**	**95.8%**	**95.8%**	**94.8%**	**93.7%**	**90.3%**	**86.3%**
AC Power (kWh)	**13,254.5**	**24,544.1**	**39,976.7**	**51,257.6**	**67,256.5**	**68,638.4**	**86,567.0**	**71,741.9**	**54,456.7**	**31,652.8**	**16,082.7**	**11,183.0**

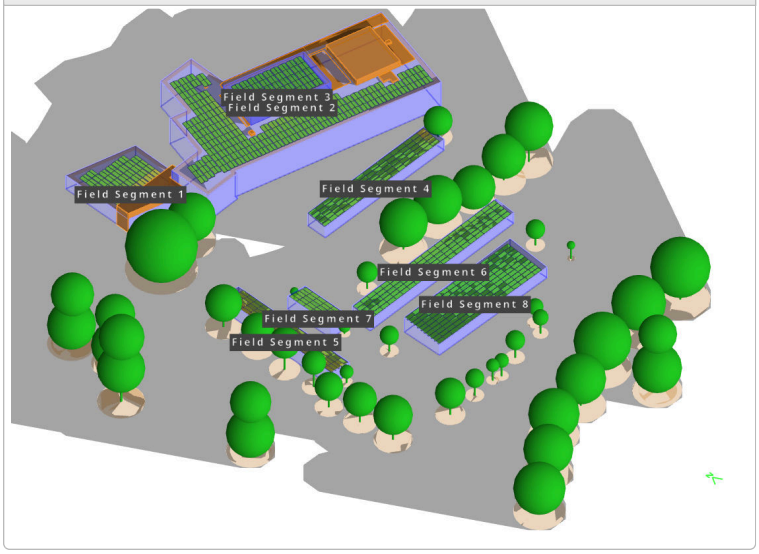
Monthly Production



Sources of System Loss



Southwestern Angle



Southeastern Angle



GENERAL NOTES:

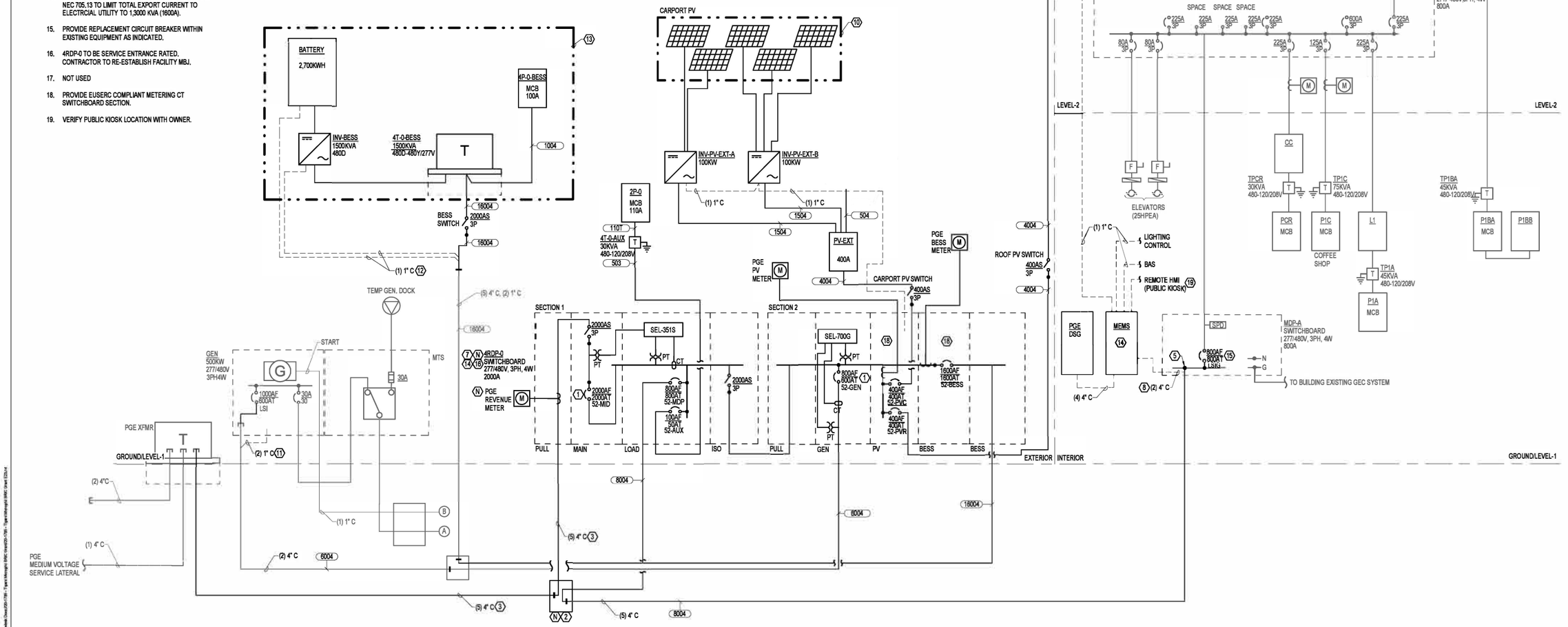
A. EXISITNG EQUIPMENT IS INDICATED WITH HALF-TONE LINE WEIGHT.

B. NEW EQUIPMENT IS INDICATED WITH FULL-TONE LINE WEIGHT.

NOTES:

1. PROVIDE ELECTRICALLY OPERABLE CIRCUIT BREAKER.
2. CONTRACTOR TO PROVIDE HAND HOLE FOR INTERCEPTION, EXTENSION AND REROUTING OF EXISTING CONDUIT RUN AS INDICATED.
3. CONTRACTOR TO COORDINATE WITH UTILITY FOR INSTALLATION OF SECONDARY SERVICE CONDUCTORS IN EXISTING CONDUIT.
4. BOLTED PRESSURE SWITCH WITH VISIBLE INSPECTION WINDOW OR MECHANICAL SWITCH POSITION INDICATOR.
5. PV FEEDER TAP AND NEWMDP-A FEEDER TO BE LANDED ON EXISTING SWITCHBOARD BUS UPSTREAM FROM THE EXISTING 800A FEEDER BREAKER TO MDP-B.
6. ROOF PV SYSTEM MAXIMUM DC NAMEPLATE CAPACITY TO BE 22 1KW.
7. ALL CIRCUIT BREAKERS WITHIN SWITCHBOARD 4RDP-0 TO BE EQUIPPED WITH INTEGRAL POWER AND ENERGY METERING AND ADJUSTABLE LSIG TRIP SETTING CAPABILITIES.
8. UTILIZE SPARE CONDUITS FOR MICROGRID CONTROL COMMUNICATIONS BETWEEN MEMS CABINET AND 4RDP-0.
9. NOT USED.
10. CARPORT PV SYSTEM MAXIMUM DC NAMEPLATE CAPACITY TO BE 262KW.
11. UTILIZE SPARE CONDUITS FOR MICROGRID CONTROL COMMUNICATIONS BETWEEN MEMS CABINET AND GEN.
12. UTILIZE SPARE CONDUITS FOR MICROGRID CONTROL COMMUNICATIONS BETWEEN MEMS CABINET AND BESS.
13. BESS EQUIPMENT TO BE SUPPLIED AND FIELD LISTED UNDER UL9540 AS A SINGLE PRE-ENGINEERED SYSTEM BY THE BESS MANUFACTURER.
14. MEMS TO SERVE AS PCS IN ACCORDANCE WITH 2020 NEC 705.13 TO LIMIT TOTAL EXPORT CURRENT TO ELECTRCIAL UTILITY TO 1,3000 KVA (1600A).
15. PROVIDE REPLACEMENT CIRCUIT BREAKER WITHIN EXISTING EQUIPMENT AS INDICATED.
16. 4RDP-0 TO BE SERVICE ENTRANCE RATED. CONTRACTOR TO RE-ESTABLISH FACILITY MBJ.
17. NOT USED
18. PROVIDE EUSERC COMPLIANT METERING CT SWITCHBOARD SECTION.
19. VERIFY PUBLIC KIOSK LOCATION WITH OWNER.

	FEEDER SCHEDULE COPPER: 3 PHASE, 3 WIRE + GROUND				FEEDER SCHEDULE COPPER: 3 PHASE, 4 WIRE + GROUND			
NOMINAL AMPACITY	TAG	CONDUIT SIZE (MIN)	PHASE CONDUCTORS (AWG or kcmil)	GROUND CONDUCTOR (AWG or kcmil)	TAG	CONDUIT SIZE (MIN)	PHASE & NEUTRAL CONDUCTORS (AWG or kcmil)	GROUND CONDUCTOR (AWG or kcmil)
20	203	1/2"	(3) 12	12	204	1/2"	(4) 12	12
30	303	1/2"	(3) 10	10	304	3/4"	(4) 10	10
40	403	3/4"	(3) 8	10	404	3/4"	(4) 8	10
50	503	3/4"	(3) 6	10	504	1"	(4) 6	10
60	603	3/4"	(3) 6	10	604	1"	(4) 6	10
70	703	1"	(3) 4	8	704	1 1/4"	(4) 4	8
80	803	1 1/4"	(3) 3	8	804	1 1/4"	(4) 3	8
90	903	1 1/4"	(3) 3	8	904	1 1/4"	(4) 3	8
100	1003	1 1/4"	(3) 2	8	1004	1 1/4"	(4) 2	8
110	1103	1 1/2"	(3) 1	6	1104	1 1/2"	(4) 1	6
125	1253	1 1/2"	(3) 1	6	1254	1 1/2"	(4) 1	6
150	1503	1 1/2"	(3) 1/0	6	1504	2"	(4) 1/0	6
175	1753	2"	(3) 2/0	6	1754	2"	(4) 2/0	6
200	2003	2"	(3) 3/0	6	2004	2"	(4) 3/0	6
225	2253	2"	(3) 4/0	4	2254	2 1/2"	(4) 4/0	4
250	2503	2"	(3) 4/0	4	2504	2 1/2"	(4) 250	3
300	3003	2 1/2"	(3) 250	4	3004	3"	(4) 350	2
350	3503	2 1/2"	(3) 350	3	3504	3 1/2"	(4) 500	1
400	4003	(2) 2"	(6) 3/0	(2) 3	4004	(2) 2"	(8) 3/0	(2) 3
450	4503	(2) 2"	(6) 4/0	(2) 2	4504	(2) 2 1/2"	(8) 4/0	(2) 2
500	5003	(2) 2"	(6) 4/0	(2) 2	5004	(2) 3"	(8) 250	(2) 1
600	6003	(2) 2 1/2"	(6) 250	(2) 1	6004	(2) 3"	(8) 350	(2) 2/0
800	8003	(2) 3"	(6) 500	(2) 1/0	8004	(3) 3"	(12) 350	(3) 2/0
1000	10003	(3) 3"	(9) 500	(3) 2/0	10004	(3) 4"	(12) 500	(3) 2/0
1200	12003	(4) 3"	(12) 350	(4) 3/0	12004	(4) 4"	(16) 500	(4) 250
1600	16003	(4) 4"	(12) 750	(4) 4/0	16004	(5) 4"	(20) 500	(5) 4/0
2000	20003	(5) 4"	(15) 750	(5) 250	20004	(6) 4"	(24) 500	(6) 250
2500	25003	(6) 4"	(18) 750	(6) 350	25004	(8) 4"	(32) 500	(8) 350
3000	30003	(7) 4"	(21) 750	(7) 500	30004	(9) 4"	(36) 500	(9) 500
4000	40003	(9) 4"	(27) 750	(9) 500	40004	(12) 4"	(48) 500	(12) 500



1 26 - Single Line Diagram - New Construction
NONE

STAMP:

NO.	REVISION	DATE

SET TITLE:

City of Tigard Microgrid

DRAWN BY:	Author
CHECKED BY:	Checker
SCALE:	NONE
DATE:	11-30-23
JOB NO.	23-####

SHEET TITLE:

Preliminary Single Line

SHEET NUMBER:

E702

AIS-5403 **6.**

Business Meeting

Meeting Date: 01/16/2024

Length (in minutes): 40 Minutes

Agenda Title: City Council Goals Update

Authored By: Nicole Hendrix

Presented By: Senior Management Analyst Hendrix, Assistant City Manager Nyland, Chief McDonald, Program Manager Ezell and CD Director Asher

Item Type: Update, Discussion, Direct Staff

Public Hearing Legal Ad Required?: No

Publication Date:

Information

EXPLANATION OF ISSUE

The City Council and Leadership Team identified City Council goals and strategies for 2023-2025 building on the work and success of previous years, while also addressing new challenges and emerging community needs. The City Council Goals established for 2023-2025 are Reduce Houselessness, Address Climate Change, Modernize & Improve City Services, and Enhance Community Safety.

City teammates will provide the City Council with a second progress report on the 2023-2025 City Council goals and strategies since their adoption. These updates will be provided by the Council Goal Team Leads and include a status update on strategies, accomplishments, and opportunities. Separate from this high-level briefing, Council Goal Leads will present more in-depth updates to City Council throughout the year.

ACTION REQUESTED

- Receive briefing on the 2023-2025 Council Goals.
- Offer questions and guidance based on briefing.

BACKGROUND INFORMATION

Dates of Previous and Potential Future Considerations

This is the second progress report on the 2023-2025 City Council Goals. The first update was presented to City Council September 12, 2023. City Council will continue to receive progress reports, with more detailed, goal-specific, presentations throughout the year.

Public Involvement

Each Goal has various efforts underway to engage, inform, and connect with community on these issues. Those specific efforts will be highlighted during the team presentation.

Impacts (Community, Budget, Policies and Plans/Strategic Connection)

Council Goal updates show progress and opportunity for the City Council Goals and Community Promise. The goals help work toward our Strategic Plan vision to be, "an equitable community that is walkable, healthy, and accessible for everyone."

ALTERNATIVES & RECOMMENDATION

The Tigard team recommends City Council receive briefing and provide any guidance or questions in response.

ADDITIONAL RESOURCES

N/A

Attachments

Powerpoint - Council Goals



City Council Goals 2023-2025 Progress Report #2

January 16, 2024

City Council

Tigard: An equitable community that is walkable, healthy, and accessible for everyone.

CITY OF Tigard

Council Action

- Receive high level briefing on 2023-2025 Council Goals.
- More detailed briefings will be provided throughout the year.
- Offer questions and guidance based on briefing.





Tigard: An equitable community that is walkable, healthy, and accessible for everyone.

CITY OF Tigard

Reduce Houselessness

Outcomes

- Available transitional housing
- Wrap around services secured through partners
- City support to the business community to offset impacts

Strategies	Status
1.1 Create transitional housing + secure wraparound services	In Progress
1.2 Adopt a time, place + manner ordinance	Complete
1.3 Create grant programs to support businesses	Complete
1.4 Secure ongoing state funding	In Progress
1.5 Provide Council with options for tenant protections	In Progress

Reduce Houselessness

Key Accomplishments

- Time, Place, Manner ordinance updated based on community feedback
- Just Compassion Campus construction has begun
- Tigard Business Sustainability Fund established in partnership with the Tigard Chamber of Commerce
- Provided updated resource cards for local non-profits and officers
- Discussed the City's strategy to address houselessness with Town Center Advisory Commission and Tigard Youth Advisory Council

Opportunities

- Site and fund Safe Lots in Tigard
- Continue to review and refine Time, Place, Manner ordinance
- Expand services for our houseless community members
- Implement tenant protections & policies designed to prevent houselessness

Address Climate Change

Outcomes

- Reduce the City's carbon emissions
- Center climate in the Council's decision-making
- Develop a shared understanding of climate policy options with the City Council

Strategies	Status
2.1 Prioritize carbon responsibility in the City of Tigard operations, projects, and policies	In Progress
2.2 Build understanding on the City's climate work and how the organization is supporting it	In Progress
2.3 Provide incentives for the community to transition to more climate friendly choices	In Progress
2.4 Develop educational materials to build awareness and support homeowners / renters in reducing their carbon emissions	In Progress

Address Climate Change

Key Accomplishments

- Policy paper submitted through the Zero Coalition linking housing production to carbon-responsible development practices
- Application submitted for climate and community planning for River Terrace 2.0
- Web reorganization and new materials to education about climate action in Tigard
- SolSmart "Silver" designation (progress has started toward "Gold")
- Internal committee formed and meeting to focus on citywide operations and community education

Address Climate Change

Opportunities

- Update on Tigard's emissions trends (2019 through 2022)
- Tigard Public Library – Seed Library and Microgrid
- Inflation Reduction Act "Direct Pay" reimbursement for EV purchases and other clean energy projects

Modernize & Improve City Services

Outcomes

- Total Tyler ERP modules implemented according to assessment recommendations
- Facility modernization project is at the design and construction phases

Strategies	Status
3.1 Appropriate the necessary teammate and financial resources for the Tyler ERP	In progress
3.2 Acquire land for safe and modern public facilities	In progress
3.3 Secure funding for facilities	Bond/Levy TBD
3.4 Conduct an education/awareness campaign to build understanding and gauge levels of community support	In progress

Modernize & Improve City Services: Tyler

Key Accomplishments

- Tyler Munis successful Go Live in October
- Improvements in change management process and communication
- Additional capacity for Human Resources and Utility Billing
- Tyler trainings underway
- Significant work complete to assess and prioritize Tyler needs

Modernize & Improve City Services: Tyler

Opportunities

- Go Live for Utility Billing
- Finalizing schedule and scope for Utility Billing, Asset Management, Permitting & License, Service Request modules
- Ensuring fiscal year 2025 proposed budget includes necessary Tigard Tyler resources



Modernize & Improve City Services: Facilities

Key Accomplishments

- Evaluating multiple sites for police and public works facilities

Opportunities

- Purchase site(s) for new public facilities
- Continue planning public facilities funding strategy
- Awareness and education communication planning

Enhance Community Safety & Access

Outcomes

- Improve traffic safety, provide equitable mobility options, and support climate goals
- Generate revenue to support desired public safety service levels
- Improve mobility for all in the community

Strategies	Status
4.1 Identify + secure funding to complete the Hall Boulevard jurisdictional transfer	In Progress
4.2 Pass a Public Safety renewal levy	In Progress
4.3 Increase funding to expand connectivity + support an active, healthy, accessible community	In Progress

Enhance Community Safety & Access

Key Accomplishments

- Secured $3M for Hall improvements through state legislature
- Participated in 121 community events to share information about the Public Safety Renewal Levy
- Renewal levy subcommittee formed
- Second poll in January
- Dedicated officer in downtown to address increased calls for service

Opportunities

- Continue conversations with region, state, and federal agencies for funding Hall Blvd improvements
- Continuing community engagement efforts in 2024
- The next 10-week Community Academy begins Thursday March 7th



Thank you

We welcome your thoughts and questions!

Tigard: An equitable community that is walkable, healthy, and accessible for everyone.

CITY OF Tigard