REVIEW

RAP

ROSE VILLA RESILIENCY

ACTION PLAN Phase 1

GREEN HAMMER PAE EQUILIBRIUM ROSE VILLA

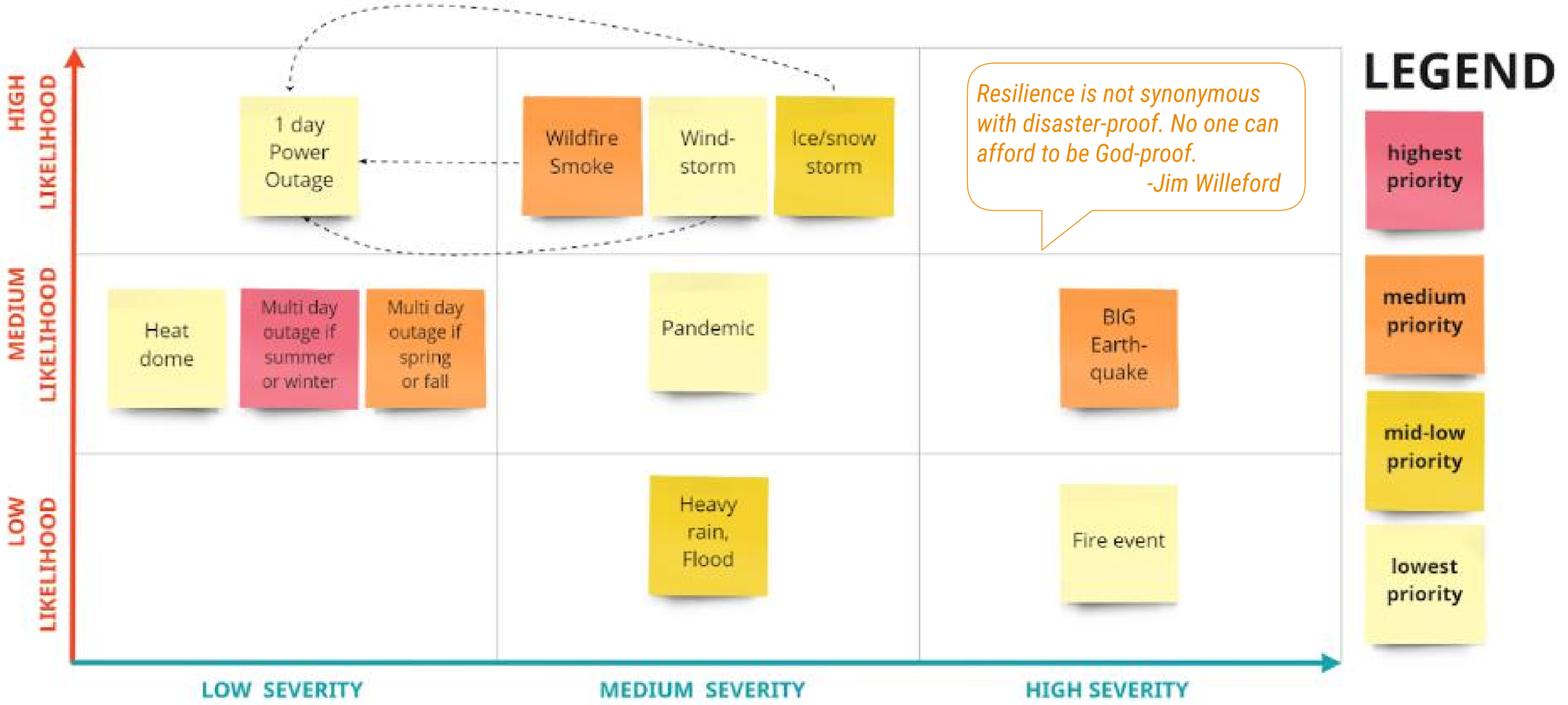
OCTOBER 24 2022

For RV, a resilient campus is defined by its ability to maintain:

Stability of its operations
Safety of its community and
Sustainability of its built environment.

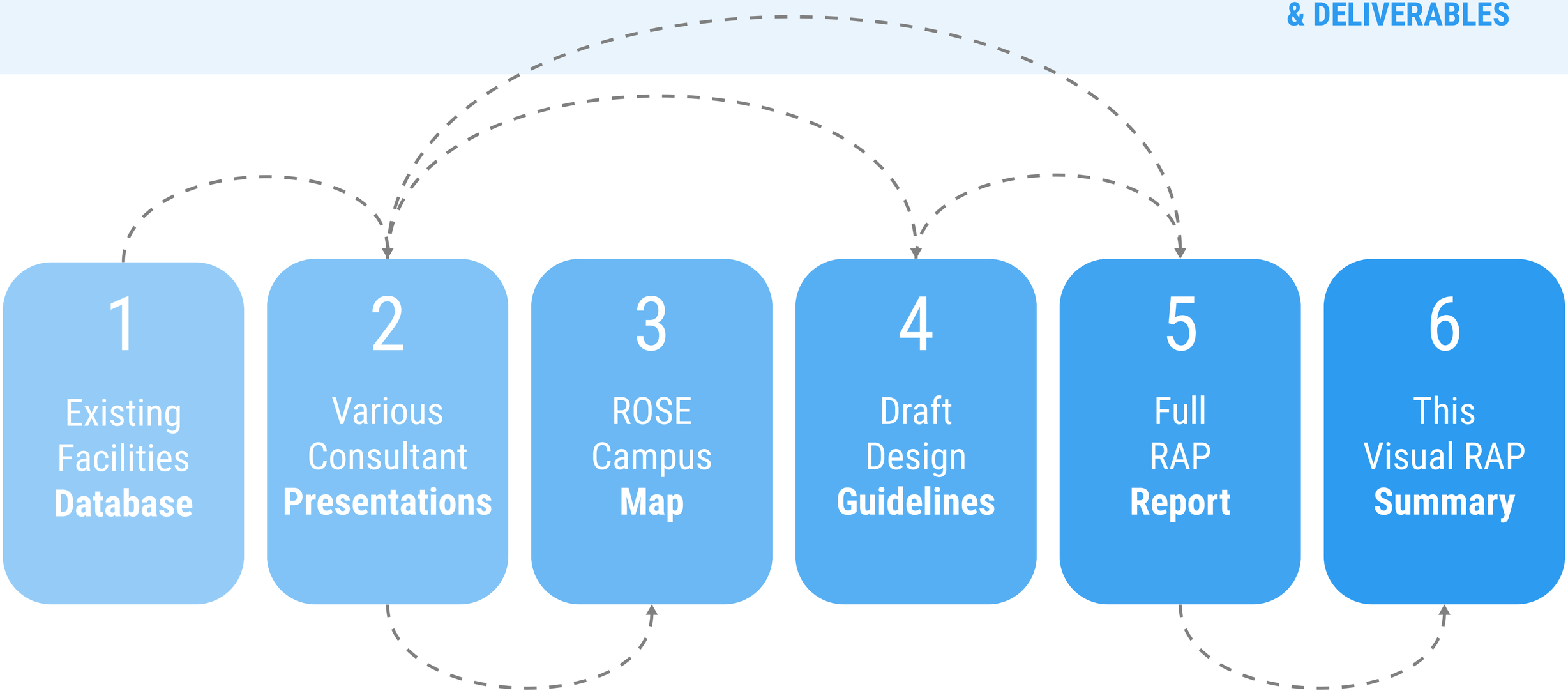
ROSE VILLA RESILIENCY

DEFINITION + REASONS



Rose Villa's Resiliency Team delivered **6 distinct resources** to help guide the future phases of RV's Resiliency Action Plan.

PHASE 1
RESOURCES
& DELIVERABLES



For RV, a resilient campus is defined by its ability to maintain:
Stability of its operations,
Safety of its community and
Sustainability of its built environment.

PHASE 1
SUMMARY

1. The RAP is a long range plan that **requires long-range vision**, endurance and community buy-in in order to be successful.

2. The goals and strategies proposed in comprehensive plan are both **aspirational and achievable,** and they will result in long-term **operational savings.**

3. We need to determine how the RAP will be **coordinated with RV Capital Planning**; Refinement of goals and strategies in **Phase 2** must be developed with budget in mind.

ROSE VILLA'S
RAP FLOW CHART

PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5
SET Goals & Strategies by end of 2023	ANALYZE Scope & Cost by end of 2023	ACHIEVE Goals & Capital Plan by end of **2025**	ACHIEVE Goals and Assess Progress by end of year **2030**	ACHIEVE Goals and Set new ones by end of year **2040**
	Does Capital Improvement start in Phase 2?	Develop Capital Improvement Plan		Capital budget aligned w/ phased RAP Goals
Draft Design Guidelines	*Refine Design Guidelines*	Develop Facilities Maintenance Plan		Maintenance Schedule aligned w/ RAP Goals
Review Response Plans	*Update Response Plans*	Restock and Refresh Emergency Supplies and Re-educate Residents & Staff about Emergency Response Plans		
Phase 1 Report Establishes RAP Goals & Strategies	*Phase 2 Report Provides Strategy Analysis Cost estimation & Detailed work plans*	Reinforce Furniture, Equip	Reinforce Pre-1975 homes	Reinforce ROSE Havens
		Reduce Energy Use Marginally	Reduce Energy Use by 20%	Reduce Energy Use by 50%
		Backup Energy for 3-5 days	Backup Energy for 1-2 wks	Backup Energy for 2-3 wks
		Reduce Water Use Marginally	Reduce Water Use by 13%	Reduce Water Use by 25%
		Backup Water Sanitation for 2 wks	Backup Water & Sanitation for 4 wks	Backup Water & Sanitation for +4 wks
		TBD	TBD	TBD

Guiding Documents	Capital Improvement Plan & Facilities Maintenance Plan align with and fully support the phased resilience goals
Emergency Response	Emergency Supplies are fresh and fully stocked & Residents/staff are educated about Response plans
Structural Resilience	All buildings meet code for safe evacuation at a min. & 1+ ROSE Havens are retrofit for immediate occupancy
ENERGY resilience	RV reduces campus energy use by 50% & has microgrid(s) that power critical loads for >2-3 weeks without the grid
WATER resilience	RV reduces campus water use by 25% & has >4 weeks of backup water supply and sanitation in an emergency
FIRE/AIR resilience	Goals to be further discussed and confirmed in Phase 2

All residents and staff are ready for a variety of emergencies by having easy access to supplies and knowledge about where to go and what to do.

EMERGENCY RESPONSE PLAN

GOALS + STRATEGIES

IMPROVE STOCKPILES

that already exist on campus, including updating inventories, adding supplies once gaps are identified and changing storage locations if necessary so that items are more easily accessible after a large earthquake

REVISE READYFORCE RESPONSE GUIDE

with ReadyForce team by reviewing plans, confirming assumptions and then revising the guide (and any maps) as necessary. Designate a RV staff liason to the ReadyForce resident team. Update annually.

CREATE CAMPUS RESPONSE MAPS

to help ensure quick and coordinated action during an emergency and/or routine maintenance and operations. A Utility Map could include locations of water and power lines, key facilities and equipment. A Campus Emergency Map could include gas and water shut off locations, emergency supply storage locations, planned shelter/service locations, evacuation routes, etc.

HOST ANNUAL "REFRESH" PARTIES

where residents and staff re-learn what to do in emergency situations, restock emergency supplies, and have fun connecting with their community. Educational events that week could include friendly competitions for which neighborhoods can conserve the most water and/or energy. Can also serve as a good time to request endowments to support larger RAP efforts such as the ROSE Pavilion.

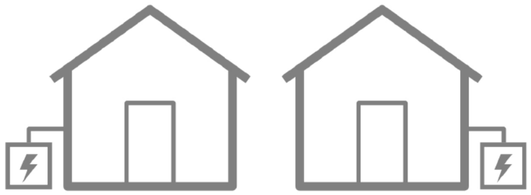
PHASE 2

ONGOING

ROSE
PETALS
DEFINITION + PARTS

ROSE (Resilient Operations + Sustainable Energy) Petals represent Rose Villa's various types of new &/or improved buildings that together meet the campus' resiliency goals!

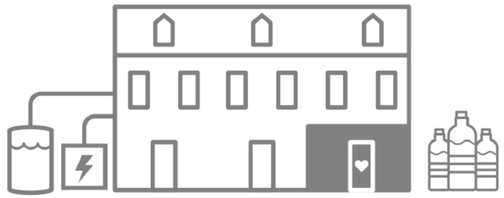
Seismic and energy retrofits are synchronized.



ROSE Homes

Retrofit of pre-1975 cottages in Phase 4-5

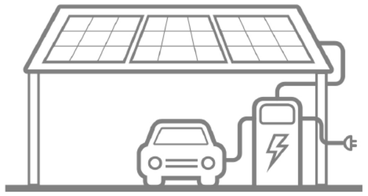
- **meets code for safe evacuation** — could retrofit for immediate occupancy
- **50% energy savings + some solar** — could become Zero Energy
- **25% water savings** — could collect rainwater
- **Better indoor air** — could resist fires better



ROSE Havens

Retrofit of common space(s) in Phase 5

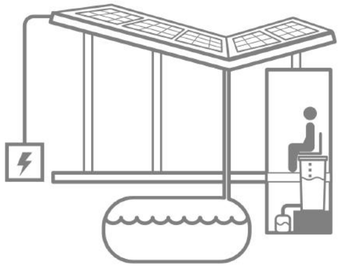
- **1 space meets code for immediate occupancy** — could do more than 1 seismic retrofit
- **some energy savings** — could become Zero Energy
- **water catchment and some water savings**
- could clean air better and could resist fires better



ROSE Ports

Retrofit of carports in Phase 4

- **reinforce for PV**
- **charging stations w/ EV carshare**
- could collect rainwater
- **fewer campus emissions w/ electric car share program**



ROSE Pavilion Phase 5

- **meets code for immediate occupancy** — could be a better shelter if enclose it
- **Zero Energy** — could be Net Positive Energy
- **Zero Water by collecting/storing rainwater**
- could provide space w/ clean air if enclose the structure

Current Goal solid

Reach Goals dashed

RAP Map of Resilient Operations & Sustainable Energy Petals

- ROSE Homes
- ROSE Ports
- ROSE Havens
- ROSE Lots
- ROSE Pavilion

For example, seismic retrofits to cottages are **synchronized** with energy efficiency upgrades; ROSE Ports provide electric charging at a convenient neighborhood **scale;** the most critical upgrades are phased earlier, and adding solar and rain catchment are beneficial to Rose Villa *even if* there were never any emergencies.

STRATEGY ATTRIBUTES

SYNCHRONIZED with each other to minimize costs and time of design and construction

SCALED appropriately so solutions occur at building, neighborhood and campus levels

PHASED to incease resiliency over time from safe evacuation to sheltering in place

BENEFICIAL before emergencies, including comfort, health, savings, & sustainability

SEISMIC SUMMARY

1. There is a **37% chance that an earthquake of 7.1+ magnitude** will occur in the Cascadia Subduction Zone in the next 50 years.

2. **Focus first on structurally retrofitting pre-1975 buildings (cottages)** so they meet current structural code for safe evacuation (or immediate occupancy).

3. **It may make more sense to rebuild rather than retrofit the cottages** once we more deeply analyze associated costs and RV's priorities.

4. **Structurally hardening rooms within a building is very difficult and not advised.** Hardening rooms and buildings are both very expensive options to consider.

SEISMIC RESILIENCE

GOALS + STRATEGIES

INCREASE SAFE EVACUATION

Cottages don't meet seismic code

Secure objects

Retrofit TBD% cottages

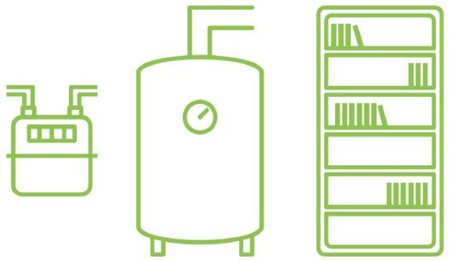
Retrofit other half of pre-1975 cottages (100%)

INCREASE QUAKE-SAFE PLACES

Phase 3 — No campus buildings meet code for "immediate occupancy"

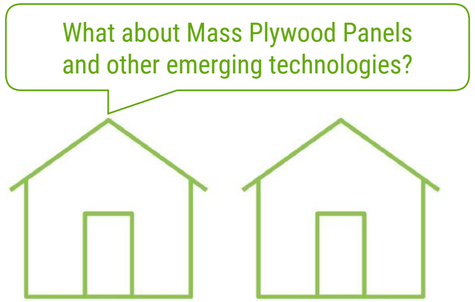
Phase 4 — Consider increasing cottage resiliency from Category II to IV

Phase 5 — **Retrofit 1+ Haven to meet code for "immediate occupancy"**



SECURE OBJECTS

by strapping tall free-standing furniture and equipment to walls/roofs throughout campus. Install earthquake-sensor shut-off valves at all existing gas meters.



REINFORCE COTTAGES

built before 1975 that don't meet current structural code to meet Category II risk level for safe evacuation. (possibly Category IV). Renovate enough cottages in Phase 4 to meet that stated goals.

HARDEN HAVENS

which are designated common areas within existing building to serve as shelter(s) after a large earthquake for those unable to reoccupy their residences. Strongly recommended to harden entire building if proceed with this idea.

BUILD A PAVILLION

that serves as an emergency shelter built to withstand a large earthquake. Also serves as a special outdoor social gathering space with garden and river views.

PHASE 3 | PHASE 4 | PHASE 5

ENERGY SUMMARY

1 After all efficiency measures are implemented,ilt is likely that most, and potentially all, **normal loads could be supported with a PV (photovoltaic) and battery microgrid** system in the summer months when PV production is greatest, IF PV were installed on all available roofs.

2 **Focus first on least energy efficient buildings** as well as building/spaces that are to serve as ROSE Havens.

3 **First reduce energy loads with passive efficiency upgrades**, then right-size mechanical systems that actively use energy.

4 **Invest in PV when tax incentives and funding opportunities** make it most cost-effective and/or in conjunction with roof replacements.

ENERGY RESILIENCE

GOALS + STRATEGIES

REDUCE ENERGY USE GOAL & ENERGY SUPPLY DURATION GOAL

	REDUCE ENERGY USE GOAL	ENERGY SUPPLY DURATION GOAL
Phase 3	~48 kBtu/sf/year (current energy use)	3-5 days
Phase 4	Save 20% ~38 kBtu/sf/year	1-2 weeks more if sunny
Phase 5	Save 50% ~24 kBtu/sf/year	2-3 weeks more if sunny

UPDATE FIXTURES

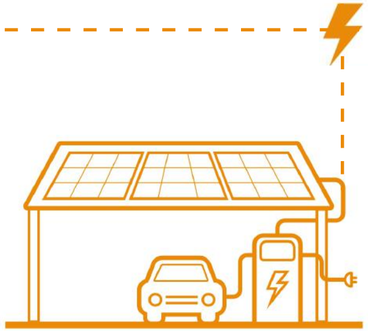
with high-efficiency lighting, appliances & equipment per Design Guidelines. Replace at EOL or turnover in Phase 3. In Phase 4&5 replace to meet stated goals.

SUPPLY CRITICAL

energy loads at ROSE Havens via generators and promote personal power packs for homes

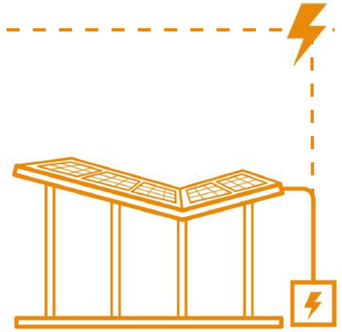
RETROFIT COTTAGES

into ROSE Homes by increasing insulation & air tightness, replacing windows and inefficient systems & fixtures and adding solar panels with battery storage.



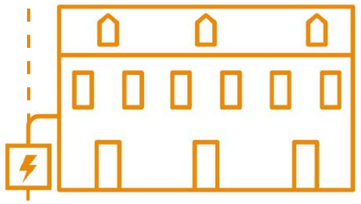
RETROFIT CARPORTS

into ROSE Ports by adding solar panels, batteries and EV charging capable of charging a fleet of shared electric vehicles and RV surreys.



ADD SOLAR TO PAVILION

to create the ROSE Pavilion which renewably powers its lights, outdoor kitchen appliances and charges the batteries for emergency use.



CREATE A MICROGRID

by connecting the campus' PV, battery and generator resources into an integrated system, allowing campus to operate reduced loads with or without grid power.

PHASE 3 PHASE 4 PHASE 5

WATER SUMMARY

A 50% increase in water efficiency across campus will result in a **savings of 6 million gallons of water per year** on for Rose Villa. About half of Rose Villa's fixtures/systems are currently water inefficient.

1. Rose Villa can fund water resiliency measures by allocating the cost **savings from lower water bills to fund such investments.**

2. **Filtered rainwater is the best source of safe drinking water in an emergency** as it's renewable, relatively free of harmful contaminants compared to greywater (ROSIE) and the Williamette River which will likely contain toxic effluent after a large quake.

3. **Human waste management can be managed rudimentarily in an emergency**. Living Machines require too much maintenance and space for not enough benefit to Rose Villa.

WATER RESILIENCE

GOALS + STRATEGIES

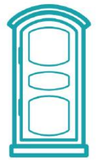
REDUCE WATER USE GOAL		WATER SUPPLY & SANITATION GOAL	
1,009,870 gal/month (current water use)	Phase 3	2 weeks duration	
Save 13% ~878,587 gallons/month	Phase 4	2 weeks (or more if rainy)	2-4 weeks for sanitary
Save 25% ~757,403 gallons/month	Phase 5	4 weeks (or more if rainy)	

UPGRADE FIXTURES

with high-efficiency faucets, toilets, and showerheads at EOL or residence turnover during Phase 3. Require replacement in Ph. 4/5 to meet goals. See Design Guidelines.

SUPPLY WATER + SANITATION

at ROSE Havens including water bottles for residents + staff. For sanitation, use ReadyForce baggy system or bucket system with wash stations. Existing Hurricane filter cleans pool's saltwater to be suitable for washing. Cannot be filtered for drinking water.



IMPROVE SANITATION

by upgrading to portapotties or Groover portable toilets. When stored, Groover toilets (including privacy tents) take up 10x less room than collapsible porta-potties and cost 1/4 of the price. They require water (from pool or ROSIE) to flush and daily emptying.

What about atmospheric water generators and other emerging technologies?!

STORE & USE RAINWATER

in tanks across campus. Use some of it to irrigate campus landscape and store the rest for emergency use; rainwater requires filtering to be potable. Water tanks can be above or below ground; the latter is more seismically resilient.

CATCHMENT + COMPOSTING

at the ROSE Pavilion are the final strategies that make this beautiful Pavilion sustainable and resilient to disasters that disrupt normal operations. Rainwater is caught and stored in a large cistern below ground and composting toilets provide water-free restrooms for social events and/or nearby gardeners.

PHASE 3 PHASE 4 PHASE 5

Air quality and fire resistance have quickly become a key issue to address across the West due to increasing wild fire events. The intent is to develop resilience goals around these issues in Phase 2 since we did not focus on them in Phase 1 discussions.

AIR/FIRE RESILIENCE

GOALS + STRATEGIES

IMPROVE AIR QUALITY

By updating air filters, adding air filtration equipment such as the Airwash system, etc. Rose Villa is currently executing a similar retrofit at The Oaks to ensure residents have very healthy air indoor quality including low CO2 and PM2.5 counts.

FIRE RESISTIVE MATERIALS

If there is a fire on Rose Villa's campus, buildings will more easily catch fire if their exterior materials are flammable. Our Resilience Design Guidelines propose fire resistive materials and landscaping based on the FireWise guide, which is in the additional resources section of the full report.

ON-SITE FIRE FIGHTING WATER

If a wildfire were burning close to campus, Rose Villa could consider preemptively hosing down its buildings and landscape to help prevent fire spread onto campus. There are currently three large sources of water that can be used to fight fires on campus—the pool, ROSIE, and the Willamette River, plus the Pavilion's cistern by Phase 5.

FIRE DRILLS

Consider adding a fire drill procedure to the ReadyForce Emergency Response Guide e and/or Campus Emergency Planning documents

Keeping an eye on emerging technologies,
is a key strategy to achieving our goals,
especially given the RAP's extended timeframe.

EMERGING TECHNOLOGIES & OTHER GAME CHANGERS

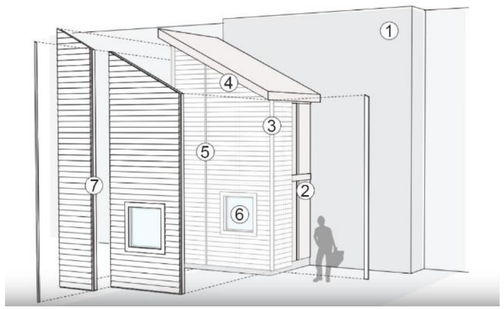


Figure: Prototype mockup - lab strongwall 1) existing structure mockup 3) corner condition 4) eave condition 5) panel to panel condition 6) window condition 7) 2" MPP. ***Images (above and opposite):*** *Freres Lumber MPP Facility Lyons, Oregon - Credit: Mark Fretz*

MASS PLYWOOD PANELS (MPPs)

is a system of prefabricated panels made of plywood and rigid insulation that are rapidly installed on the exterior of existing buildings after detailed 3D imaging & analysis of the existing building's conditions. This MPP system could meet RV's energy AND structural goals for all pre-1975 cottages while drastically minimizing on-site construction time. It would start as a pilot project with Mark Fretz at UO/OSU and could be deployed to other cottages & neighborhoods if successful.

Energy Efficiency of Cottages | Structural Resiliency of Cottages

ATMOSPHERIC WATER GENERATORS (AWGs)

could realistically produce ~800 gallons /day, by sucking moisture from the air and condensing it into pure liquid water. This would be more than RV needs in a water emergency, and it could be used to offset water bills during normal operation. Solar panels theoretically produce all the energy it needs to operate, however our team would want to confirm this and much more. Pictured above is a Phantor.

Independent Water Supply

?

OTHER GAME CHANGERS...

More technologies will become available in the next 5-10 years that may make Rose Villa's resiliency goals all the more achievable. Let's keep an eye on emerging technologies that can be real game changers for the campus. Grants, fundraising and tax incentives may all come into play.

PHASE 2
ANALYSIS
PURPOSE + OUTCOMES

Analyze the feasibility of RAP Goals and strategies so as to recommend an detailed action plan for Phases 3-5, including cost analysis. To be **developed in conjunction with Rose Villa's Capital Planning and Facilities Maintenance Plan efforts.**

Structural Analysis and Recommendations for

- Cottage retrofit plan
- Hardening Haven plan
- PV Pavilion plan

Water Analysis and Recommendations for

- Water efficiency plan
- Rainwater storage plan
- Sanitation plans

Air Quality/Fire Analysis and Recommendations

- Refine Goals
- Refine Strategies

Energy Analysis and Recommendations for

- Energy efficiency plan
- ROSE Port/carshare plan
- Phased microgrid plan

Emergency Response Plan Recommendations for

- Campus Maps
- Guide updates
- Refresh plan

Capital Planning and Facilities Maintainence Coordination

- budgets/cost/funding
- timing/sychronization
- goal/strategy adjustment

DISCUSSION
SUMMARY
& NEXT STEPS

There are many unanswered questions that will be addressed in Phase 2. But to get there, first we want to better understand...

What elements are you **most excited about?**

What elements are you **most concerned about?**

What elements do you **not understand well yet?**

What do you need to do **to proceed to Phase 2?**