

# FOR WAYLAND ARMS SLAB REPAIR & SEISMIC UPGRADE RFQ

● TRES WEST ENGINEERS, INC.

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7/10/2024

King County Housing Authority  
Wayland Arms Ventilation Eval TO#3

Wayland Arms Apartments  
307 S Division St, Auburn WA 98001

**RE: WAYLAND ARMS APARTMENTS \_ WHOLE HOUSE VENTILATION ISSUES**

Tres West Engineers has been retained to investigate a lack of ventilation at the Wayland Arms Apartments in Auburn.

KCHA has reported that the whole house exhaust systems ventilating each wing of the apartments appear to not be functioning correctly. TWE was asked to coordinate a survey to inspect the system and discuss options for solutions.

We discussed the issue with KCHA personnel at a site visit, but were unable to complete a physical examination for the interior of the apartments. We reviewed the existing as-built plans and the equipment schedules. We then checked manufacturer's specifications for the equipment. Our recommendations are based on the above information.

## Overview:

### Building Ventilation Systems:

#### Main Building Exhaust Fans

Plans show that this complex has two four story wings. The west side has 40 apartments and the east side has 36. Each wing is ventilated with an exhaust system consisting of a large (one 4100 and the other 4500 cfm each at 0.5 inch wg). The mechanical schedule shows these to be 208 volts single phase, but the electrical schedule shows that these are 208v/3 phase. Depending on how these are actually wired, this may indicate an issue. When a 3 phase fan shows a lack of airflow, it can be because it is miswired and running in reverse. Air still flows, but the pressure is significantly diminished causing a significant reduction in total airflow. A single phase fan with a reversible motor can also run backwards, but it is less likely.

The main fans are inline cabinet fans located in a small penthouse on the roof and discharging through wall louvers. They pull exhaust air through a 34" x 14" horizontal duct running the full length of each wings in the attic, this duct is connected to vertical ventilation chases in each room, which is intended to pull air in to the rooms from the building exterior. These central fans do not have enough static pressure or volume to properly ventilate the apartments. Additional fans are located in the ceiling of the kitchens and bathrooms to assist the central fans. They work in conjunction to take air from the building exterior through the kitchens and bathroom and push it into the chases.

The central fans provide a negative static in the main duct so that room air does not intermingle between units, but it is not enough to ventilate the rooms on their own.

### Room Exhaust Fans

Each apartment has two ceiling Panasonic exhaust fans.

The kitchen has a 100 cfm fan mounted near the range hood. The exhaust fan schedule shows that this is controlled by a humidity sensor. (Cut sheet attached at end of report.) A provided detail shows the fan connected to a six inch round duct that goes from the fan into to a wall chase that is connected to the attic main exhaust duct. All ducts in the apartments extends up 22 inches inside the chase to prevent odors

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from one apartment migrating to another. This detail shows each kitchen duct to have a volume damper with remote controller and a fire damper where it enters the chase. The same detail shows a bathroom fan with 4"x8" duct connecting from fan to chase. It does not show a volume damper, but it does show a fire damper.

If the exhaust fan in the kitchen is actually over the range (and no separate range hood provided), it presents a hazard with cooking grease accumulating in the duct. Range hoods and fans exhausting cooking appliance should be vented directly outside. They cannot share a duct conveying shower room venting. If the range actually has a ductless hood with grease screen, the kitchen ceiling fan shown on the plans is allowed to be used for ventilation.

These fans are small, but still need make – up air to function correctly. In buildings of this vintage, it was common to have trickle vents installed in the window sill to allow fresh air into the rooms when fans were exhausting air. Is it possible that new windows installed that eliminated these vents?

## **Items that may be causing ventilation issues.**

1. In the original plans, the shower room sensors may have been mistakenly mixed up with the kitchen sensors as we typically see humidity sensors in restrooms.
  - a. If the humidity sensor has actually been installed in the kitchen, the kitchen fan will not turn on until the humidity reaches a certain set level. Normal indoor humidity indoors in Washington is about 50%. If the bathroom has the controller specified, it may not be installed correctly or the occupant does not know how to turn it on. The rooftop exhaust fans are not capable of venting the building without help from these smaller fans.
2. The volume damper in the kitchen may be shut off. The detail shows that it is remotely operated.
3. The fire dampers may be closed. This sometimes occurs during duct cleaning.
4. If the rooms no longer have make up air either through trickle vents or outside air vents, the fans will not have enough static to vent the rooms.
5. The two large central fans may be turning the wrong direction.
6. The small fans, especially in the kitchen, may have accumulated enough grease and dirt in their scroll wheel blades that they no long can catch and throw air. If the small cupped blades are even half filled with dirt, they will not function to move air.
7. The scroll cage on the central large fan's blades can have the same issue as the small fans discussed in item #6.

## **Recommendations:**

When new buildings are completed, State codes require that they are commissioned. Commissioning consists of an agent checking each piece of equipment and each control item to verify proper operation. Mechanical systems are also checked and then set to verify that proper amounts of airflow are produced. This is typically referred to as balancing. If the system does not balance, the balancer can often explain where a problem may lie.

It is recommended that KCHA hire a balancer and commissioning agent (they are often the same company on small projects) to check the fans, dampers, controls, airflow and other components of the building. Were new windows installed that eliminated these trickle vents in the windows? These room fans are small, but still need make – up air to function correctly. In buildings of this vintage, it was common to have trickle vents installed in the window sill to allow fresh air into the rooms

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## Flex-ZFast™

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Flex-Z Fast™ installation bracket provides flexible, fast and easy installation



**Panasonic**

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<b>Brand</b>	Panasonic
<b>Item dimensions L x W x H</b>	10 x 10 x 10 inches
<b>Material</b>	Plastic
<b>Item Weight</b>	1.8 Ounces
<b>Style</b>	Modern

### About this item

- Home Fan with Humidity Control: Designed to help control bathroom condensation and humidity
- 20-Minute Timer for Controlled Ventilation: Home ventilation fan with a 20-minute delay-off timer
- Multi-Speed Functionality Fan: Multi-speed functionality for high speed when there is moisture
- Easy-Install Humidity Sensor Fan: Plug the sensor into your WhisperGreen Ventilation Fan
- Code-Compliant Ventilation: Relative Humidity adjustment for fine tuning in moist conditions

**The above sensor is scheduled to operate the kitchen fan.**



Roll over image to zoom in



## Panasonic FV-WCSW11-W EcoSwitch Single Function On/Off Wall Switch - Wall Light and Fan Switch - White

[Visit the Panasonic Store](#)

2.9 ★★★★★ 3 ratings

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- Home Light and Fan Control Switch: Ideal to control lights and for use with manual fan regulation
- Guaranteed to Last: Panasonic ventilation fans, switches, modules and accessories are high-quality
- Panasonic EcoSwitch: These products provide commercial-grade quality at residential-grade pricing

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**The above sensor is scheduled to operate the bathroom fan**

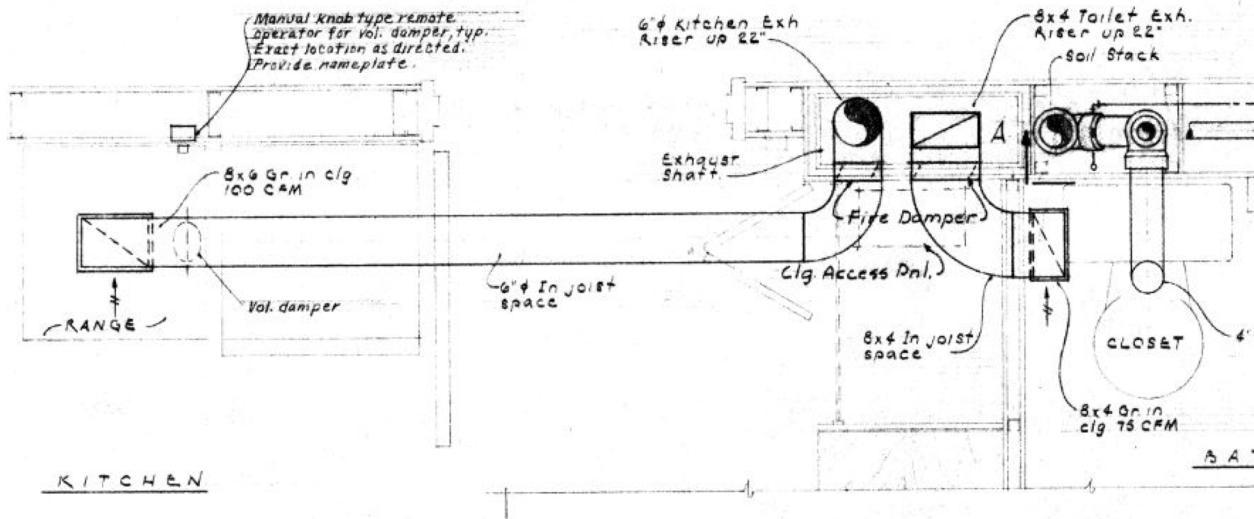
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EXHAUST FAN SCHEDULE																		
UNIT NO	MANUFACTURER	MODEL	LOCATION	CONFIGURATION	AREA SERVED	PERFORMANCE			DAMPER	CONTROLLED BY OR INTERLOCKED WITH	HP (WATTS)	BHP	ELECTRICAL		STARTER FURNISHED BY	DISCONNECT FURNISHED BY	WEIGHT (LBS)	REMARKS
						CFM	ESP	RPM					VOLTS	PH				
EF-1	GREENHECK	BDF-150	STAIRWELL	INLINE	SOUTHWING	4100	0.5	1725	-	24/7 OPERATION	1.5	1.3	208	1	NOTE 3	NOTE 2	210	2.3
EF-2	GREENHECK	BCF-210	STAIRWELL	INLINE	NORTHWING	4500	0.5	1725	-	24/7 OPERATION	2	1.92	208	1	NOTE 3	NOTE 2	360	2.3
EF-3	PANASONIC	FV-05-11VK1	KITCHEN	INLINE	SEE PLANS	100	0.25	-	BACKDRAFT	WALL SWITCH	(720)	-	120	1	MFR	MFR	15	1.4
EF-4	PANASONIC	FV-05-11VK1	BATHROOM	INLINE	SEE PLANS	50	0.25	-	BACKDRAFT	NOTE 6	(405)	-	120	1	MFR	MFR	15	1.5

**NOTES FOR EXHAUST FAN SCHEDULE**

- FAN MOTOR TO BE ECM
- EC TO PROVIDE A DISCONNECT
- EC TO PROVIDE A MAGNETIC MOTOR STARTER
- FAN TO BE PROVIDED WITH FV-VS15VK1 WITH FV-CSVK1 FOR STAGED OPERATION
- FAN TO BE PROVIDED WITH FV-VS15VK1 WITH FV-WCSW11-W FOR STAGED OPERATION.

## Exhaust fan schedule



Detail showing the duct connections from apartment to mechanical chase in each apartment.