300-330 NORTH BROAD ST., DOYLESTOWN, PA

ACTIVE SOIL DEPRESSURIZATION SYSTEM REPORT

For

NorthStar Federal Services, Inc.
55 Progress Place, Unit 1
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By

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1.0 System Description

The 300-330 Broad St., Doylestown building will hereafter be referred to as Chem-Fab. Chem-Fab is a slab on grade structure about 150 feet long by 75 feet wide, covering about 10,200 square feet. The building is occupied by six tenants. Each of the occupied units has finished floor coverings that limit the access to check sub-slab communication and to install a vapor intrusion mitigation (VIM) system. Different areas of the building are identified by either their street number or the type of business occupying the space. See Figure 1 and Figure 2

A sub-slab depressurization system was determined to be the most appropriate way to reduce occupant exposure to chemicals under the slab. Sub-slab communication testing was performed at eight different locations in the building. The test results indicated limited pressure field extension with varying requirements. Nine separate systems were installed with a total of 15 suction points. Two styles of fans were used a high flow AMG Fury fan and a high vacuum GBR76SOE fan. The GBR76SOE fan had the advantage of being able to adjust the fan voltage to allow the system to be optimized for system effectiveness and system efficiency.

During the installation the soil in System Eight suction pit was wet clay. After the system was activated the fan at System Eight started exhausting water. The suction pit was relocated closer to an existing sump pit. The new suction pit was dry just below the bottom of the slab where the suction piping was re-routed to. The sump pump in the pit outside was replaced with a unit that had a lower water table set point to assure there would be good drainage from the under slab to the pit.

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Figure 1: Chem-Fab over view

2.0 Sub-Slab Depressurization System Installation & Maintenance

The Chem-Fab VIM system consisted of ten separate fan systems. Each system had piping routed from the fan to one to three suction pits. The fans all exhaust above the existing roof. Typical fan installation detail for the GBR76 SOE fans is depicted in Figure 4, 5 and 6. Table 1 lists all the fans

System #	Fan	Fan Wattage	Fan Location	Number Suctions	CFM	Mag	Suction Type
Sys #1	Festa Fury	138	Outside	2	136	-1.3”	Fig 6
Sys #2	GBR76 SOE	240	Roof	2	67	-10.0”	Fig 4
Sys #3	Festa Fury	138	Roof	2	133	-1.5”	Fig 4
Sys #4	GBR76 SOE	210	Roof	2	33	-9.5”	Fig 4
Sys #5	Festa Fury	138	Roof	2	139	-1.25”	Fig 4
Sys #6	GBR76 SOE	288	Outside	1	106	-4.0”	Fig 6
Sys #7	GBR76 SOE	252	Outside	1	96	-3.5”	Fig 6
Sys #8	GBR76 SOE	294	Outside	1	112	-3.5”	Fig 6
Sys #9	GBR76 SOE	102	Outside	1	82	-2.0”	Fig 6
Sys #10	GBR76 SOE	180	Outside	2	90	-5.0”	Fig 6

Table 1: System Fan List

The fan electrical usage is approximately 876 Kw/hrs per 100 watts of fan consumption. If the current electrical utility rate is about $ 0.15 / Kw/hr, the year long cost for each 100 watts of fan electrical consumption would be $131.40 per year or about $10.95 per month. The total wattage is about 2000 watts or $219 per month at $ 0.15 / Kw/hr rate.

System maintenance is to twice a year check the magnehelic gauges to determine if reading is within 25% of their initial vacuum reading. Note that there can be some variation in the magnehelics reading due to periods of rain that saturate the soil and reduce system airflow which would increase the vacuum reading. Within a few days after the rain period the magnehelic gauge readings should return to their original vacuum reading.

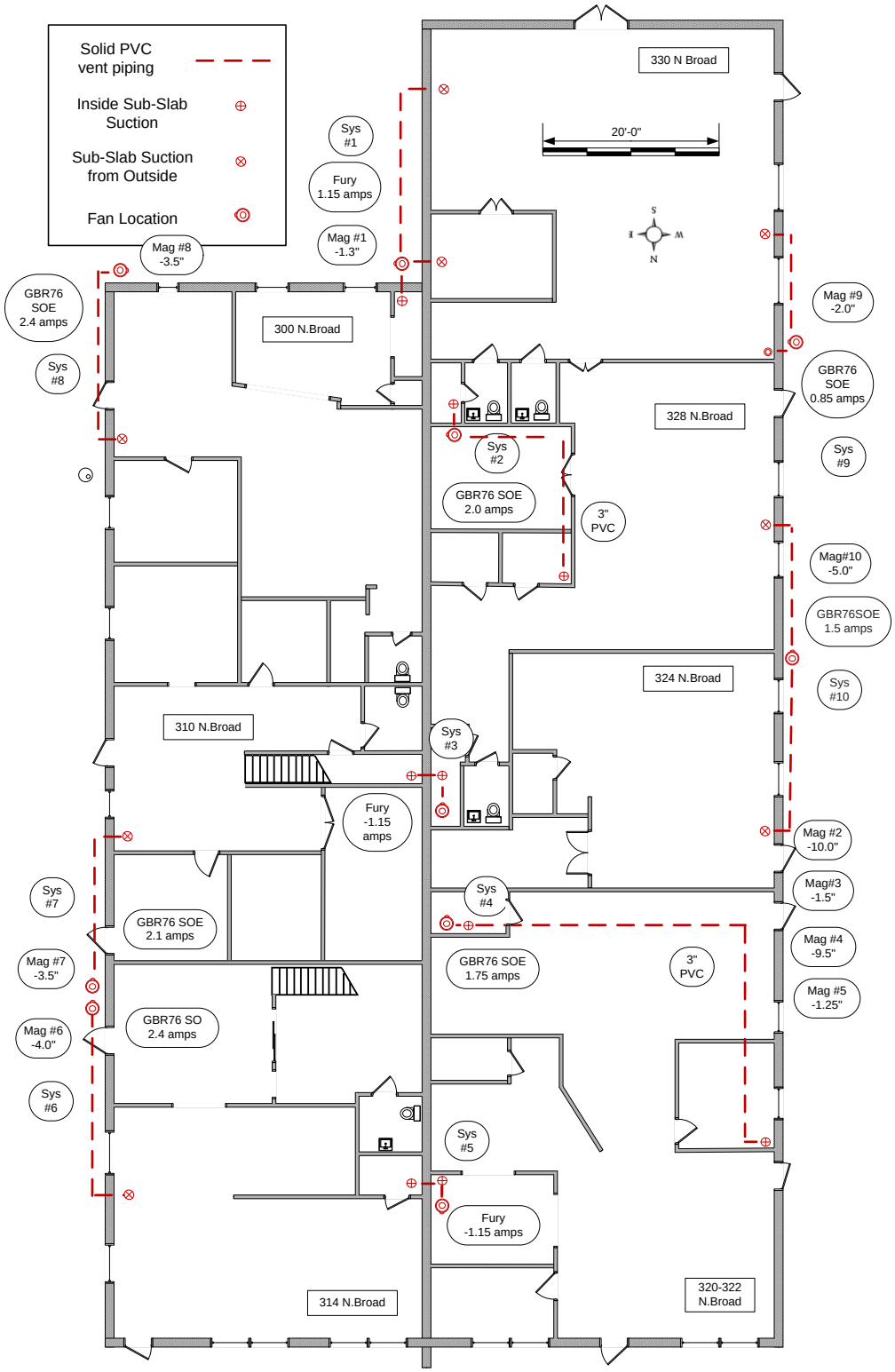


Figure 2: Mitigation System as built Layout

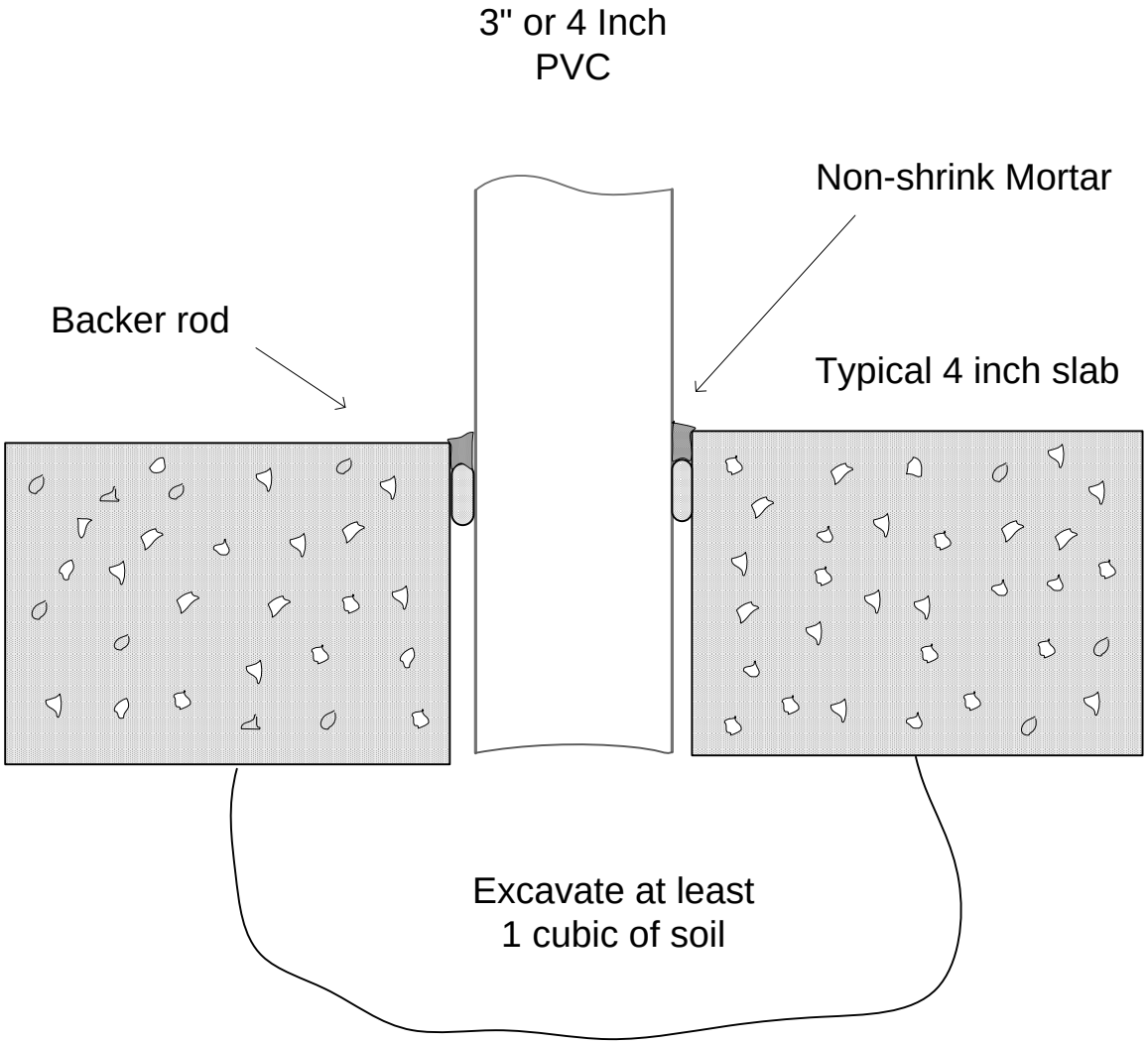


Figure 3: Detail of Sub-Slab Suction

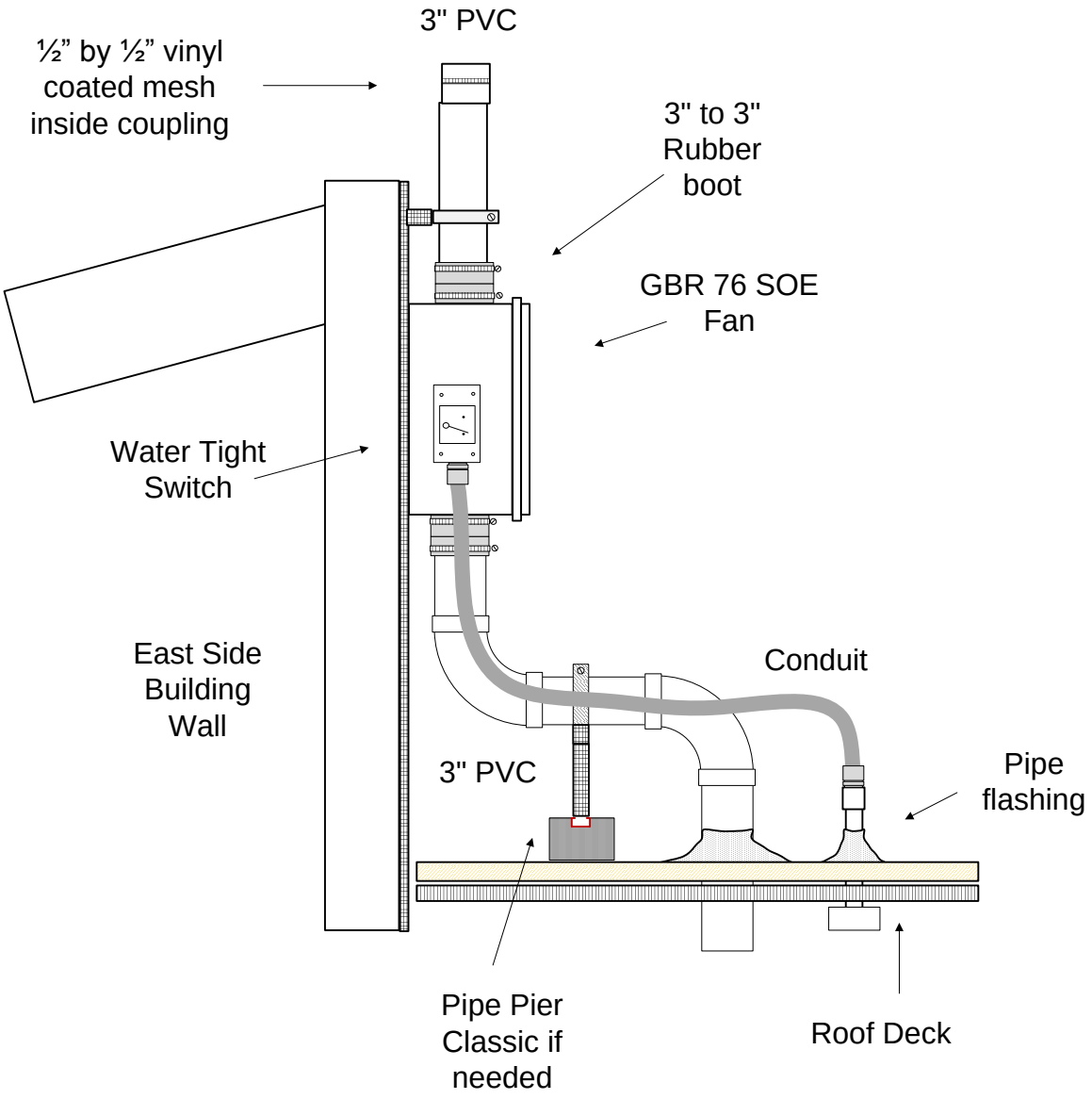


Figure 4: GBR76 SOE Roof Mount Details

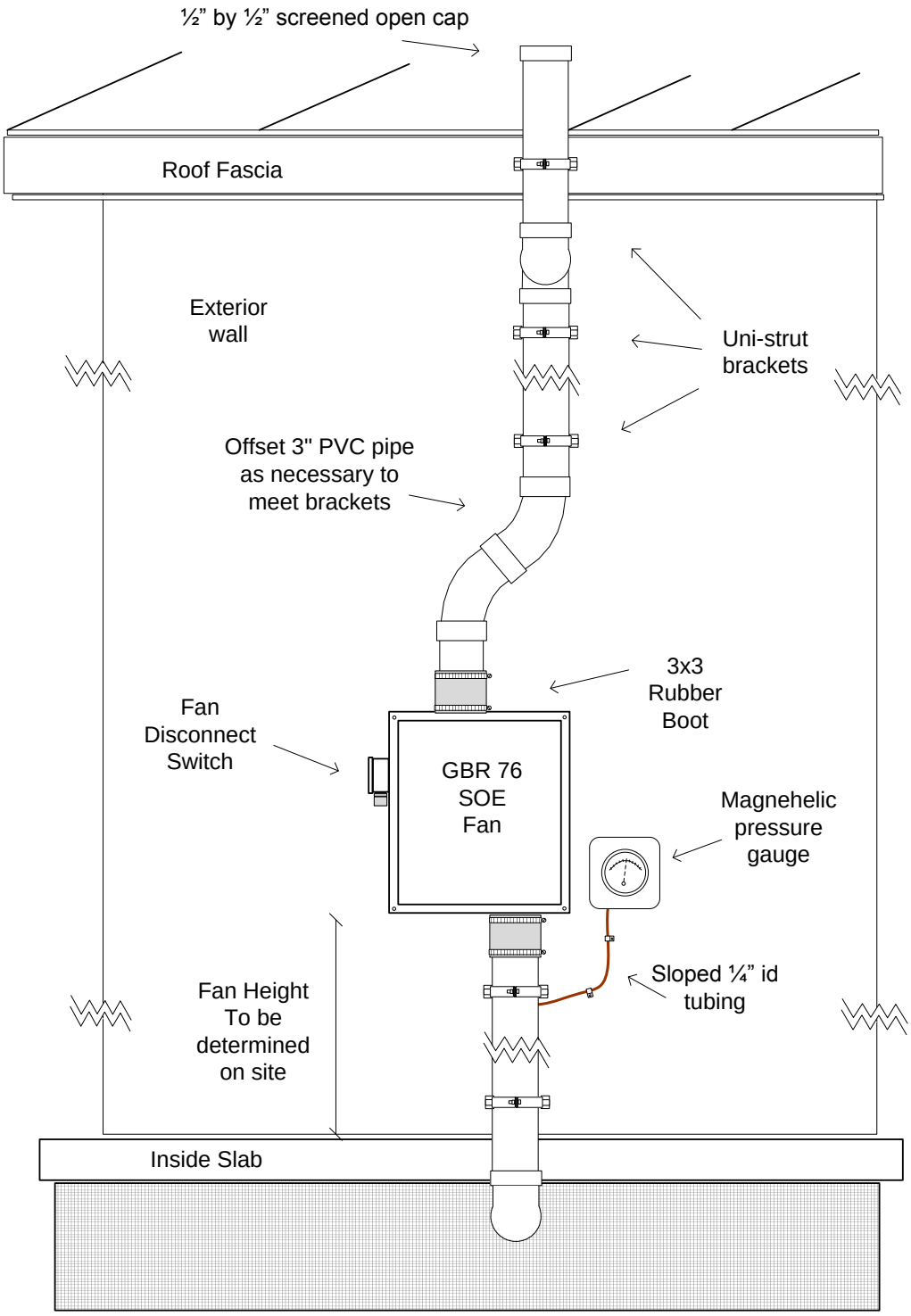


Figure 5: Front Detail of East Side Outside Fan

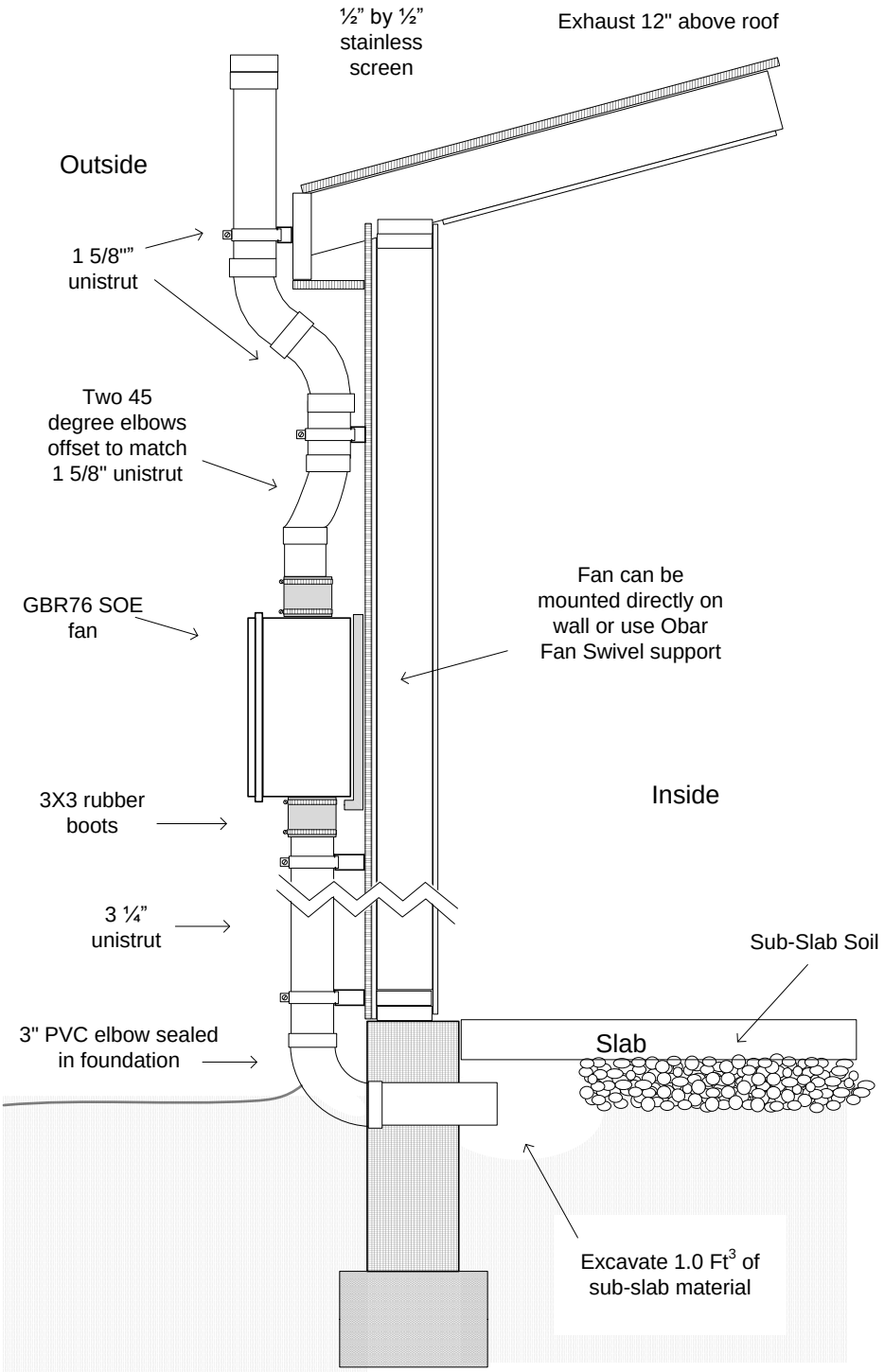


Figure 6: Side Detail of East Side Outside Fan

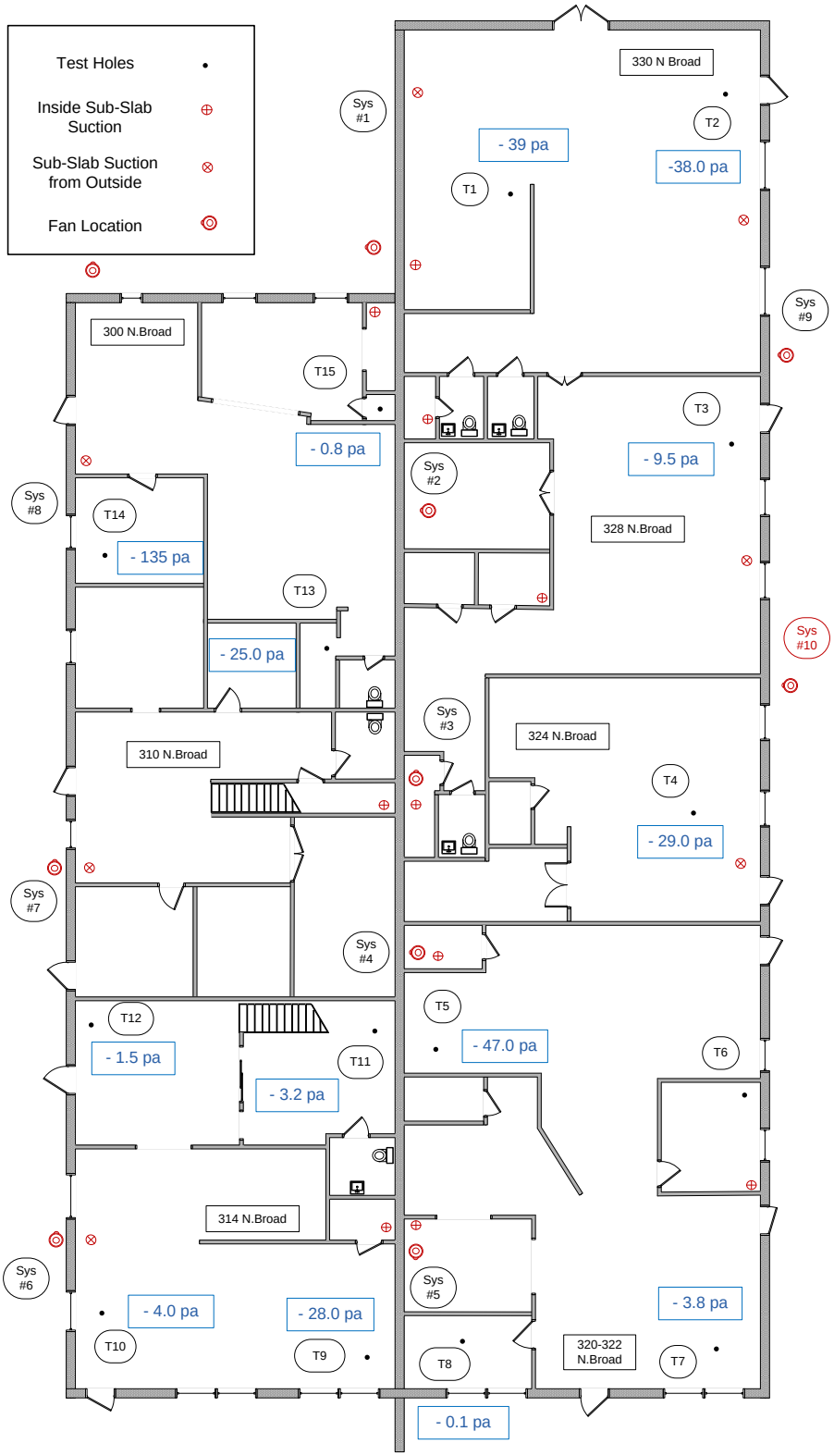


Figure 7: Sub-Slab Vacuum

Test Hole	Sub-Slab Vacuum
T1	- 39.0 pa / - 0.156”
T2	- 38.0 pa / - 0.152”
T3	- 9.5 pa / - 0.038”
T4	- 29.0 pa / - 0.116”
T5	- 47.0 pa / - 0.188”
T6	- 5.2 pa / - 0.021”
T7	- 3.8 pa / - 0.015”
T8	- 0.1 pa / - 0.0004”
T9	- 28.0 pa / - 0.112”
T10	- 4.0 pa / - 0.016”
T11	- 3.2 pa / - 0.013”
T12	- 1.5 pa / - 0.006”
T13	- 25.0 pa / - 0.100”
T14	- 135.0 pa / - 0.006”
T15	- 0.8 pa / - 0.003”

Table 8: Final Sub-Slab Vacuum

Figure 8: Measuring System Airflow & Amperage

Figure 9: System One

Figure 10: System Four

Figure 11: System Five

Figure 12: System Six and Seven

Figure 13: System Six and Seven Mufflers

Figure 14: System Eight

Figure 15: System Nine

Figure 16: System Nine pipe routed through interior to roof

Figure 17: System Ten

Figure 18: System Two, Three, Four, Five gauges

THE OBAR
COMPACT RADIAL

GBR76
BLOWER

Based on 25 years of experience and 2 years of research and development, the patent pending GBR series of compact radial blowers provide the perfect combination of performance and design.

PERFORMANCE

- GBR76 SOE 16” WC @ 0 Max flow 155 CFM.
- GBR76 UD 40” WC @ 0 Max flow 195 CFM.
- Built in speed control to customize performance.
- Condensate bypass built in.
- 12 month warranty 40,000 hr sealed bearings.

DESIGN

- Our modular design means the blower and manifold assembly can be removed and replaced as a unit.
  This makes repairs cost effective and easy and allows contractors to upgrade systems simply by swapping assemblies.
- The GBR series is based on a bypass blower designed to handle combustible materials.
  The housing is not required to be air tight so you can add gauges and alarms without compromising the system.
- Built in condensate bypass.
- Built in speed control.
- Quick disconnect electrical harness.
- All UL listed components including UL listed enclosure for outside use.
- Wall fastening lugs included.
- GBR series roof and wall mounts available to quickly configure the blowers for your installation while
- providing a custom built look.
- Compact design 16”x 14”x 8” weighing only 18 lbs.
- 3” schedule 40 inlet and exhaust.
- Universal Drive accepts voltage from 120-240V without alteration

Wattage 150-320 @ 16” WC, 110-200 @ 12” WC, 60-120 @ 8” WC, 37-50 @ 4” WC

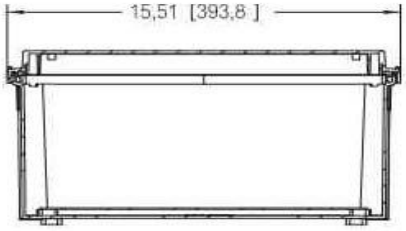
Blower Specifications

Notes:

- **Input Voltage Range:** 108-132 Volts AC RMS, 50/60 Hz, single phase.
- **Input Current:** 6 amps AC RMS
- **Operating Temperature (Ambient Air and Working Air):** 0°C to 50°C
- **Storage Temperature:** -40°C to 85°C
- **Dielectric Testing:** 1500 Volts AC RMS 60 Hz applied for one second between input pins and ground, 3mA leakage maximum.
- **Speed Control Methods:** PWM (Pulse Width Modulation) (1 kHz to 10 kHz)
  0 to 10 VDC speed control.
  Mechanical: A potentiometer is available for speed control of the blower. The potentiometer can be preset for a specific speed. Access for speed adjustment located in motor housing.
- **Approximate Weight:** 4.8 Lbs. / 2.2 Kg
- **Regulatory Agency Certification:** Underwriters Laboratories Inc. UL507 Recognized under File E94403 and compliant under the CE Low Voltage Directive 2006/95/EC.
- **Design Features:** Designed to provide variable airflow for low NOx & CO emission in high efficiency gas fired combustion systems. Built with non-sparking materials. Blower housing assembly constructed of die cast aluminum. Impeller constructed from hardened aluminum. Rubber isolation mounts built into blower construction to dampen vibration within the motor. Two piece blower housing assembly sealed with O-ring gasket for combustion applications. Customer is responsible to check for any leakage once the blower is installed into the final application.
- **Miscellaneous:** Blower inlet, discharge, and all motor cooling inlet and discharge vents must not be obstructed. Motor ventilation air to be free of oils and other foreign particles, (i.e. breathing quality air). Blower is to be mounted so ventilation air cannot be re-circulated.
  POWER CONNECTION: Blower connector, AMP Universal MATE-N-LOK, part no. 1-350943-0.
  SPEED CONNECTION: Blower connector, Molex Mini-Fit Jr., part no. 39-30-3056.
  Mating harnesses available upon request.

Enclosure Specifications
Rating:

Ingress Protection (EN 60529): 66/67



Screw cover

OBAR SYSTEMS INC 117 POCANTECS ROAD HIGHLAND LAKES NJ 07422 800 949 6227

Figure 19: Obar GBR76 SOE Warranty

Installation & Wiring Instructions for AMG In Line Centrifugal Duct Fans

Model: AMG Spirit, Fury, Legend, Hawk, Maverick, Prowler, Eagle

IMPORTANT NOTE : DO NOT CONNECT THE POWER SUPPLY UNTIL THE FAN IS COMPLETELY INSTALLED. MAKE SURE THE ELECTRICAL SERVICE TO THE FAN IS LOCKED IN "OFF" POSITION.

PLEASE READ AND SAVE THESE INSTRUCTIONS :

Warning – To reduce the risk of fire, electric shock or injury to persons, observe the following.

1. This unit is only for use in the manner intended by the manufacturer. If you have any questions contact the manufacturer Festa Manufacturing Enterprises LLC.
2. Installation work and electrical wiring must be done by qualified person'(s) in accordance with all applicable codes and standards, including fire-rated construction.
3. Sufficient air is needed for proper combustion and exhausting of gases through the flue, (chimney) of fuel burning equipment to prevent back drafting. Follow the heating equipment manufacturer's guideline and safety standards such as those published by the National Fire Protection Association (NFPA), and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and the local code authorities.
4. When cutting or drilling into wall or ceiling, do not damage electrical wiring and other hidden utilities.
5. Ducted fans must always be vented to the outdoors.
6. These units can be mounted indoors or outdoors.
7. Do not use these fans with solid state speed controllers.
8. The electric motor is protected by an internal overheat device to prevent/minimize motor damage. If the motor stops working, immediate inspection should be carried out by suitably qualified persons.
9. Before servicing or cleaning the unit, switch power off at service panel and lock the service disconnecting means to prevent power from being switched on accidentally. When the service disconnecting means cannot be locked, securely fasten a prominent warning device, such as a tag, to the service panel.
10. Do not use in a window.
11. If this unit is to be installed over a tub or shower, it must be marked as appropriate for the application and be connected to a GFCI (Ground Fault Circuit Interrupter) – protected branch circuit.
12. Never place a switch where it can be reached from a tub or shower.
13. CAUTION: For General Ventilating Use Only. Do Not use to Exhaust Hazardous Or Explosive Materials and Vapours.
12. CAUTION: This unit has an unguarded impeller. Do Not Use in Locations Readily Accessible To People or Animals.

Installation of FME AMG PATRIOT Radon Fans.

The FME AMG PATRIOT Fan can be mounted indoors or outdoors. We suggest that EPA recommendations be used in choosing the fan location. The AMG Fans may be mounted directly onto the piping system or fastened to a supporting structure. When mounting directly onto a vertical piping system, it is the installers responsibility to make provision to prevent the pipe system sliding into and onto the fan motor and impeller. When installing a system with short duct runs terminating close to the fan i.e. within 60" (1.5m) suitable guards should be incorporated. It is the responsibility of the installer to ensure that all aspects of the system are taken into consideration. Rigid ducting sections should be connected to fan spigots by flexible connectors and clips. The flexible connectors used should be suitable for routine servicing and vibration isolation.

Figure 20: Festa AMG Fury Fan Warranty