RECEIVED
By Alameda County Environmental Health 3:25 pm, Oct 25, 2016

Mr. Jeremy Harris
1919 Crew LLC
Pier 54 Suite 202
San Francisco, CA 94158

Ms. Dilan Roe
Alameda County Health Care Services Agency
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Re: 1919 Market Street
Oakland, California 94805
ACEH Case# RO0003205
APNs 5-410-13-1, 5-410-14, 5-410-25

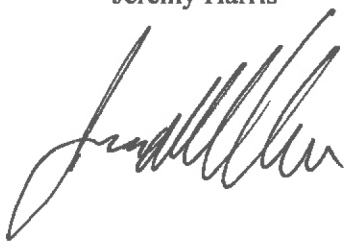
Dear Ms. Roe:

1919 Crew LLC has retained Pangea Environmental Services, Inc. (Pangea) as the environmental consultant for the project referenced above. Pangea is submitting the attached report on my behalf.

I declare, under penalty of perjury, that the information and/or recommendations contained in the attached report is true and correct to the best of my knowledge.

Sincerely,

Jeremy Harris



AEI Consultants
Environmental & Engineering Services

October 17, 2016

Vapor Intrusion Mitigation System Basis of Design and Operations & Maintenance Plan

Property Identification:
1919 Market Street
Oakland, California 94607
Toxics Case No. RO0003205

AEI Project No. 364173

Prepared for:
1919 Crew LLC
c/o Danny Haber
The Negev
Pier 54, Suite 202
Sam Francisco, California 94158

Prepared by:
AEI Consultants
520 Third Street, Suite 209
Oakland, California 94607
(510) 907-3145

Environmental & Engineering Due Diligence

Site Investigation & Remediation

Energy Performance & Benchmarking

Industrial Hygiene

This page intentionally left blank.

TABLE OF CONTENTS

APPENDICES

SIGNATURES

This document was prepared by, or under the direction of, the undersigned:

Veronica T. Statham, P.E.
Senior Engineer

Trent A. Weise, P.E.
Principal Engineer

1. INTRODUCTION

On behalf of 1919 Crew LLC, AEI Consultants (AEI) is pleased to present this *Vapor Intrusion Mitigation System Basis of Design and Operations & Maintenance Plan* which was prepared for the proposed legalization of live/work lofts at 1919 Market Street in Oakland, California ("the Site"). The project includes the legalization of 63 live/work units at the Site. This plan was prepared at the request of the Alameda County Department of Environmental Health (ACDEH) during the October 11, 2016 conference call between 1919 Crew LLC ("the Owner"), Pangea Environmental Services, Inc. (Pangea), AEI, and the ACDEH.

Subsurface investigations previously performed at the Site by others have identified several volatile organic compounds (VOCs), including benzene, tetrachloroethylene (PCE), carbon tetrachloride, and chloroform, in soil gas at the Site at concentrations that may pose a potential risk to indoor air quality for future residential users at the Site. To protect indoor air quality, remediation and construction of a vapor intrusion mitigation system (VIMS) at the Site is proposed to mitigate the potential risk. A detailed description of the project background is provided in the *Workplan for Site Assessment, Pilot Study and Vapor Mitigation*, submitted by Pangea under separate cover.

1.1. Document Purpose and Scope

This document has been prepared by AEI to establish the basis for the detailed engineering design of the proposed VIMS at the Site, present key design components of the proposed VIMS, and provide specific procedures for its planned long term operation and maintenance (O&M). The O&M procedures presented herein are to be implemented by the Owner or a Responsible Party designated by the Owner.

2. BASIS OF DESIGN

2.1 Design Objectives and Basis

The primary goal of the proposed VIMS is to prohibit VOCs in soil gas from migrating into indoor air or accumulating in enclosed building spaces at concentrations that may pose an unacceptable risk to the health of a future residential user at the Site. The nature and extent of VOCs in the subsurface is described in [report name], submitted under separate cover by Pangea.

The October 2011 *Vapor Intrusion Mitigation Advisory, Revision 1, Final* (VIMA) issued by the California Department of Toxic Substances Control (DTSC) and methane mitigation standards established by the Los Angeles Department of Building and Safety (LADBS), both of which provide the general requirements for the design, implementation, and long term O&M of designed sub-slab mitigation systems, were used to guide the design of the proposed VIMS as described further below.

2.2 Design Elements

The proposed VIMS is a redundant system and includes both a venting system and an engineered barrier system. The venting system provides a route for the VOC-affected soil gas that would otherwise collect beneath the building slab and barrier system to vent directly to the atmosphere outside the building while also providing a slight negative pressure beneath the building. The

barrier system is intended to sufficiently retard the migration of VOC-affected soil gas into the on-site building such that VOCs in soil gas do not represent an unacceptable risk to future residential users of the Site.

The elements of the engineered barrier system and venting system are depicted in the *Vapor Intrusion Mitigation System (VIMS) and Soil Vapor Extraction (SVE) System Design Drawings* dated October 17, 2016, included herein as Appendix A, and are also further described below:

- **Venting System** – Sub-slab components of the venting system include a network of an engineered vent material, such as Vapor-Vent™ by Land Science®, embedded within a three-inch thick permeable layer of clean coarse sands directly beneath the building slab. The engineered vent material will be connected to vent risers that trend through the building interior, conveying the collected soil gas to the roof for discharge to the atmosphere. The vent risers will be two-inch diameter, solid, ductile iron pipe (DIP) or cast iron pipe (CIP) to protect the pipe from potential future damage. Vent risers will be labeled "CONTAINS VAPORS: DO NOT BREAK OR CUT." The engineered vent material will be installed in accordance will the applicable manufacturer recommendations and specifications. Manufacturer specifications for Vapor-Vent™ are included as Appendix B.

  The venting system is designed to be passive, with the appropriate connections to allow future modification to an active system if deemed necessary. The venting system can be converted to an active system with the addition of a blower connected to the VIMS riser piping at the roof. The blower would be used to mechanically extract VOC-affected soil gas through the venting system and provide active sub-slab depressurization. A fan (RP 140 Radon Fan, or approved alternate) will be installed at each riser location. Manufacturer cut sheets for the proposed blowers are included as Appendix C.

- **Engineered Barrier System** – The proposed engineered barrier system will be a minimum 20-mils dry thickness, post-slab, very low permeability vapor barrier, such as Retro-Coat™ by Land Science®, applied to the building floor slab across the entire building footprint. The vapor barrier will be applied across the foundation of existing structure. Potential preferential pathways such as cracks, minor punctures to the slab, or other penetrations will be sealed using Retro-Coat™ Caulk and Retro-Coat™ Gel, as appropriate. The engineered barrier system will be installed in accordance with the applicable manufacturer recommendations and specifications. Manufacture specifications for Retro-Coat™ are included as Appendix D.

- **Closure of Potential Preferential Pathways** – Unused utilities will be abandoned and sealed where appropriate. Utility lines will be sealed at or near the building perimeter and between designated VIMS sectors using a sand/cement slurry or controlled density fill (CDF) plug to limit vapor migration within the utility trench. Mechanical and electrical conduits originating from beneath the building floor slabs will also be sealed with a conduit seal to prevent migration of VOC-affected soil gas into the building.

2.3 Implementation

AEI, the VIMS Design Engineer, will be present on-site during construction of the VIMS to observe that the implementation is consistent with the construction documents. In addition, construction

quality assurance and quality control (QA/QC) protocol will be implemented during the installation, including:

- Appropriately qualified and manufacturer-certified contractors will be used with experience installing the specified engineered barrier and engineered vent material products.
- A pre-installation meeting will be held. Attendees will include the selected Contractor, Owner, Architect, VIMS Design Engineer, and other trades that may be affected by the installation of the systems or must know to protect the systems during the performance of their activities.
- Installation materials will be purchased from a single manufacturer to ensure compatibility and conformity of the products. The manufacturer will provide certification-testing documentation that the materials specified meet or exceed the minimum design requirements.
- Testing procedures to ensure that the applied barrier system has been installed in accordance with the design and manufacturer recommendations and without defects. These tests may include, but are not limited to, visual inspection and verification of application thickness.
- Testing procedures for ensuring that the installed venting system operates as designed will be conducted. These tests may include, but are not limited to, monitoring and/or sampling.

Upon completion of the final VIMS, a report will be prepared documenting that the installation was performed in accordance with the design and manufacturer specifications and that the specific construction QA/QC procedures were performed and yielded satisfactory results. The report will also include a signed and stamped record drawing set documenting the 'as-built' construction of the VIMS, including necessary field changes to the design.

3. OPERATION & MAINTENANCE PLAN

Because the VIMS is an engineered protection for the building, proper O&M is required to ensure that the system is not damaged and remains operational over the life of the building, or until soil gas concentrations have been reduced to below levels of concern. This long-term O&M plan has been prepared for this purpose.

Long-term O&M of the VIMS will be the responsibility of Owner or Designated Responsible Party. The Owner or Designated Responsible Party shall be responsible for ensuring that the VIMS is maintained by Site personnel who have reviewed the record drawings and this plan, and are thereby familiar with the system operations.

3.1 Normal Operation of System

There are no mechanized components to the passive VIMS. VOC-affected soil gas is passively vented to the outdoor ambient air due to temperature and pressure gradients, the roof vents are open to allow the passive VIMS to operate continuously. Note that if the system is made active in the future, emissions monitoring and a Bay Area Air Quality Management District (BAAQMD) permit may be necessary and this O&M Plan will be updated.

3.2 Monitoring and Regular Maintenance

At a minimum, system inspection will be conducted on a quarterly basis. The system components will be repaired or replaced for operational reliability as the need of repair or replacement is identified during each scheduled monitoring period. No major replacement or troubleshooting should be performed without the help of a Professional Engineer registered in the State of California and specializing in the design of VIMS.

3.3 Recordkeeping and Reporting

During the operation and maintenance of the MMS, the monitoring and maintenance tasks discussed above will be performed and recorded in a monitoring and maintenance logbook. The logbook pages will be numbered to avoid loss of entry or to control unnecessary extraneous entry. The logbook shall include:

- Copies of completed inspection forms for each inspection event.
- Copies of any pictures taken during inspection events, repair activities, etc.
- Copies of any approvals, work plans, design drawings and specifications, and/or other necessary engineering design documents prepared for any major alteration to the VIMS.
- Information/entries recording emergencies, unusual events, or activities that may have affected the VIMS.
- Information/entries recording any adjustments, changes, or repairs to the VIMS.

It is the duty of the Owner or Designated Responsible Party to ensure that the proper records are maintained. In addition, the Owner or Designated Responsible Party will prepare an annual summary of its inspections, which will include copies of the entries made in the log book, for submittal to the ACDEH. The annual summary will include an evaluation of the VIMS effectiveness, any deficiencies noted, and proposed repairs in the case deficiencies are observed.

3.4 System Disruptions, Alterations, Repairs, and Improvements

If future building improvement plans include cutting or drilling through the floor slab, thus breaching the vapor barrier, repairs should be implemented to properly seal the barrier breach and, if necessary, repair cut or damaged sections of sub-slab components of the venting system. An appropriately qualified and manufacturer-certified contractor must conduct the repairs.

A Site-Specific Health and Safety Plan (SSHSP) must be prepared for any such work. The SSHSP must include appropriate provisions for monitoring of indoor air for VOCs, for adequate ventilation of the work area, and any other necessary safety measures. The SSHSP should be provided to the Owner or Designated Responsible Party for review and approval prior to the work. All breaches or significant modifications to the VIMS must be approved in writing by the Owner or Designated Responsible Party. Approvals shall be kept in the log book.

A Professional Engineer registered in the State of California and specializing in the design of such systems shall be retained to provide a work plan, design drawings and specifications, and/or other necessary engineering design documents for any extensive repairs or significant alterations to the VIMS. The record drawings will be revised to reflect changes in the VIMS and kept in the logbook.

3.5 Annual Review

As noted above, the Owner or Designated Responsible Party will prepare an annual summary of its inspections for submittal to the ACDEH. The annual summary will include an evaluation of the VIMS effectiveness, any deficiencies noted, and proposed repairs in the case deficiencies are observed. The annual summary will also include a recommendation for continued O&M or cessation of the VIMS operation, as appropriate. The annual summary will be provided to the ACEHD no later than February 15 of the calendar year following the reporting period.

3.6 Measures for the Termination of Long Term O&M

At any time, the termination of long term O&M requirements can be proposed as warranted by the operational data. At a minimum, every five years the need for long term O&M will be reviewed. Justification for ceasing long term O&M requirements may include:

- Collecting representative soil gas samples showing that COPC concentrations have been reduced to levels below levels of concern.
- Documentation that the inspections and performance measures have not shown a reduction in operational performance of the VIMS and that notification procedures are sufficient.

3.7 Event Response

In the event of a fire, earthquake, or other occurrence with the potential to damage the VIMS, the VIMS shall be inspected for damage and evaluated for necessary repairs.

4. REFERENCES

The regulatory record for this Site can be found on the State of California GeoTracker Website at http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=T10000009433 .

California Department of Toxic Substances Control (DTSC). 2011. *Vapor Intrusion Mitigation Advisory, Revision 1, Final*. October.
https://dtsc.ca.gov/SiteCleanup/upload/VIMA_Final_Oct_20111.pdf

Los Angeles Department of Building and Safety (LADBS). Methane Mitigation Standards.
http://ladbs.org/services/core-services/plan-check-permit/methane-mitigation-standards

Appendix A
Vapor Intrusion Mitigation System (VIMS) and Soil Vapor Extraction (SVE) System Design Drawings

AEI Consultants

VAPOR INTRUSION MITIGATION SYSTEM (VIMS) AND SOIL VAPOR EXTRACTION (SVE) SYSTEM

THE NEGEV
1919 MARKET STREET
OAKLAND, CALIFORNIA

CONTENTS

GENERAL NOTES

GENERAL

1. ALL MATERIALS TO BE USED FOR CONSTRUCTION WILL BE NEW.
2. CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, STANDARDS, AND APPLICABLE CODES BY CITY OF OAKLAND. THERE ARE ADDITIONAL NOTES, SPECIFICATIONS, AND REQUIREMENTS CONTAINED THROUGHOUT THE PLAN SET AS WELL AS REFERENCES TO SPECIFICATIONS FROM APPLICABLE GOVERNING AUTHORITIES AND INDUSTRY STANDARDS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN, REVIEW, AND ADHERE TO ALL THESE DOCUMENTS.
3. "ENGINEER" REFERS TO AEI CONSULTANTS (AEI). "OWNER" REFERS TO 1919 CREW LLC. "CITY" REFERS TO THE CITY OF OAKLAND. "CONTRACTOR" REFERS TO ALL CONTRACTORS RESPONSIBLE FOR THE INSTALLATION OF THE MATERIAL DESCRIBED HEREIN.
4. REVISIONS TO THESE PLANS MUST BE REVIEWED AND APPROVED IN WRITING BY ENGINEER PRIOR TO CONSTRUCTION OF AFFECTED ITEMS. REVISIONS SHALL BE ACCURATELY SHOWN ON REVISED PLANS.
5. STANDARD CONSTRUCTION ACTIVITIES SHALL BE LIMITED TO THE DAYS AND HOURS REGULATED BY THE CITY AND THE OWNER.
6. ALL TESTS AND INSPECTIONS REQUIRED BY GOVERNING AGENCIES WILL BE ARRANGED BY ENGINEER AND PAID FOR BY THE OWNER.
7. MEASURES WILL BE TAKEN BY THE CONTRACTOR TO PROTECT ADJACENT PROPERTIES, PUBLIC AND PRIVATE, AT ALL TIMES DURING CONSTRUCTION; NOT CAUSE ANY MUD, SILT, OR DEBRIS TO BE DEPOSITED ONTO ADJACENT PROPERTIES OR STORM DRAIN. ANY MUD, SILT, OR DEBRIS CAUSED DURING CONSTRUCTION THAT ENTERS ONTO ANY ADJACENT PROPERTY WILL BE REMOVED IMMEDIATELY.
8. DIRT AND DEBRIS TRACKED FROM THE THE SITE ONTO PUBLIC ROADS WILL BE CLEANED AND/OR WASHED DAILY, OR AS NEEDED, TO MAINTAIN SAFE ROAD CONDITIONS FOR PEDESTRIANS, CYCLISTS, AND MOTORISTS.
9. WHEN SPECIFICATIONS OR STANDARDS FROM DIFFERENT AUTHORITIES DIFFER FOR THE SAME SUBJECT MATTER, NOTIFY ENGINEER AND REQUEST CLARIFICATION.
10. EMERGENCY TELEPHONE NUMBERS FOR CITY ENGINEER, AMBULANCE, POLICE, FIRE DEPARTMENTS, AND THOSE AGENCIES RESPONSIBLE FOR MAINTENANCE OF UTILITIES IN THE VICINITY OF THE JOB SITE SHALL BE POSTED.

PERMITTING

1. ALL APPLICABLE PERMITS SHALL BE APPLIED FOR AND OBTAINED BY THE CONTRACTOR.
2. CONTRACTOR WILL ARRANGE AND SCHEDULE ALL INSPECTIONS REQUIRED BY THE BUILDING PERMIT.

RECORD DRAWINGS

1. THE CONTRACTOR SHALL KEEP ACCURATE AS-BUILT DRAWINGS WHICH SHOW THE FINAL LOCATION, ELEVATION, AND DESCRIPTION OF WORK.

STATEMENT OF RESPONSIBILITY

1. CONTRACTOR SHALL COMPLY WITH STATE, COUNTY, AND CITY LAWS AND ORDINANCES; AND REGULATIONS OF THE DEPARTMENT OF INDUSTRIAL RELATIONS, OSHA, AND INDUSTRIAL ACCIDENT COMMISSION RELATING TO SAFETY AND CHARACTER OF WORK, EQUIPMENT, AND LABOR PERSONNEL.

SCOPE OF WORK

THE SCOPE OF WORK INCLUDES CONSTRUCTION OF A VAPOR INTRUSION MITIGATION SYSTEM (VIMS) AND SOIL VAPOR EXTRACTION (SVE) SYSTEM TO MITIGATE AND REMEDIATE, RESPECTIVELY, IMPACTED SOIL VAPOR AT THE SUBJECT SITE IN ACCORDANCE WITH THE REQUIREMENTS OF THE ALAMEDA COUNTY DEPARTMENT OF ENVIRONMENTAL HEALTH (ACDEH). EXTRACTED SOIL VAPOR FROM THE SVE SYSTEM WILL BE TREATED WITH GRANULAR ACTIVATED CARBON PRIOR TO DISCHARGE TO ATMOSPHERE UNDER A PERMIT TO OPERATE ISSUED BY BAY AREA AIR QUALITY MANAGEMENT DISTRICT (BAAQMD).

PREPARED BY

AEI CONSULTANTS
520 3RD STREET, SUITE 209
OAKLAND, CA 94607
PHONE: (925) 746-6000
TRENT WEISE, PE (C64480)
PHONE: (408) 559-7600

REGISTERED PROFESSIONAL ENGINEER
TRENT A. WEISE
No. C64480
Exp. 6/17
CIVIL
STATE OF CALIFORNIA
10/14/16

PREPARED FOR

1919 CREW, LLC
c/o DANNY HABER
THE NEGEV
PIER 54, SUITE 202
SAN FRANCISCO, CALIFORNIA 94158

REV.	DATE	DESCRIPTION	APPROVED BY
	10/14/16	ISSUED FOR REVIEW; NOT FOR CONSTRUCTION	TW

AEI Consultants
2500 CAMINO DIABLO, WALNUT CREEK, CALIFORNIA

CLIENT: The Negev

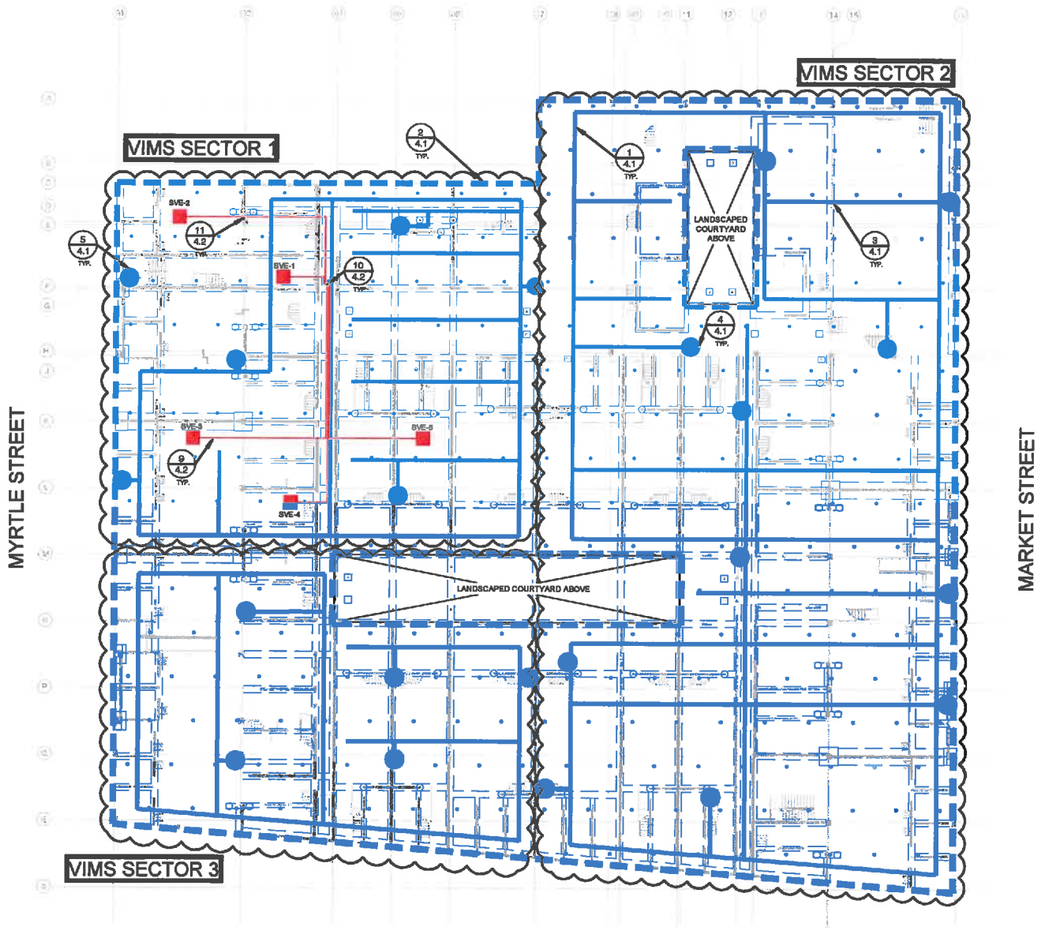
PROJECT: 1919 Market Street
Oakland, California

TITLE SHEET AND GENERAL NOTES

DRAWN BY: V. Statham
PREPARED BY: V. Statham
REVIEWED BY: T. WEISE, P.E.
APPROVED BY: T. WEISE, P.E.

DATE: 10/14/2016 SCALE: NTS
PROJECT NO: 324097

1.1
DRAWING NUMBER



LEGEND

- GRADE BEAMS
- APPROXIMATE EXTENT OF VAPOR BARRIER (RETRO-COAT OR ENGINEER APPROVED EQUIVALENT)
- APPROXIMATE LAYOUT OF SUB-SLAB VENTING SYSTEM (VAPOR-VENT OR ENGINEER APPROVED EQUIVALENT)
- APPROXIMATE LOCATION OF VIMS RISER TO ROOF (2-INCH DIAMETER IRON PIPE; SYMBOL NOT TO SCALE)
- APPROXIMATE LOCATION OF SVE WELL (WELL DESIGN BY OTHERS; SYMBOL NOT TO SCALE)
- APPROXIMATE LAYOUT OF SVE SYSTEM CONVEYANCE PIPING (2-INCH DIAMETER SCH 40 PVC PIPE UNLESS OTHERWISE NOTED ON DETAILS); TERMINATES, AT LOCATION SHOWN, AT SYSTEM MANIFOLD

SHEET NOTES

1. BACKGROUND DRAWINGS IS S-2.1 - NORTHERN FOUNDATION PLAN BY FTF ENGINEERING, DATED 08/29/2016.
2. GRADE BEAM LOCATIONS TO BE CONFIRMED WITH STRUCTURAL.
3. SYSTEM DETAILS AND NOTES ON SHEETS 4.1 AND 4.2.

0 20 40
SCALE IN FEET

N

REGISTERED PROFESSIONAL ENGINEER
TRENT A. WEISE
No. C64480
Exp. 6/17
CIVIL
STATE OF CALIFORNIA
10/14/16

REV.	DATE	DESCRIPTION	APPROVED BY
	10/14/16	ISSUED FOR REVIEW; NOT FOR CONSTRUCTION	TW

AEI Consultants
2500 CAMINO DIABLO, WALNUT CREEK, CALIFORNIA

CLIENT:
The Negev

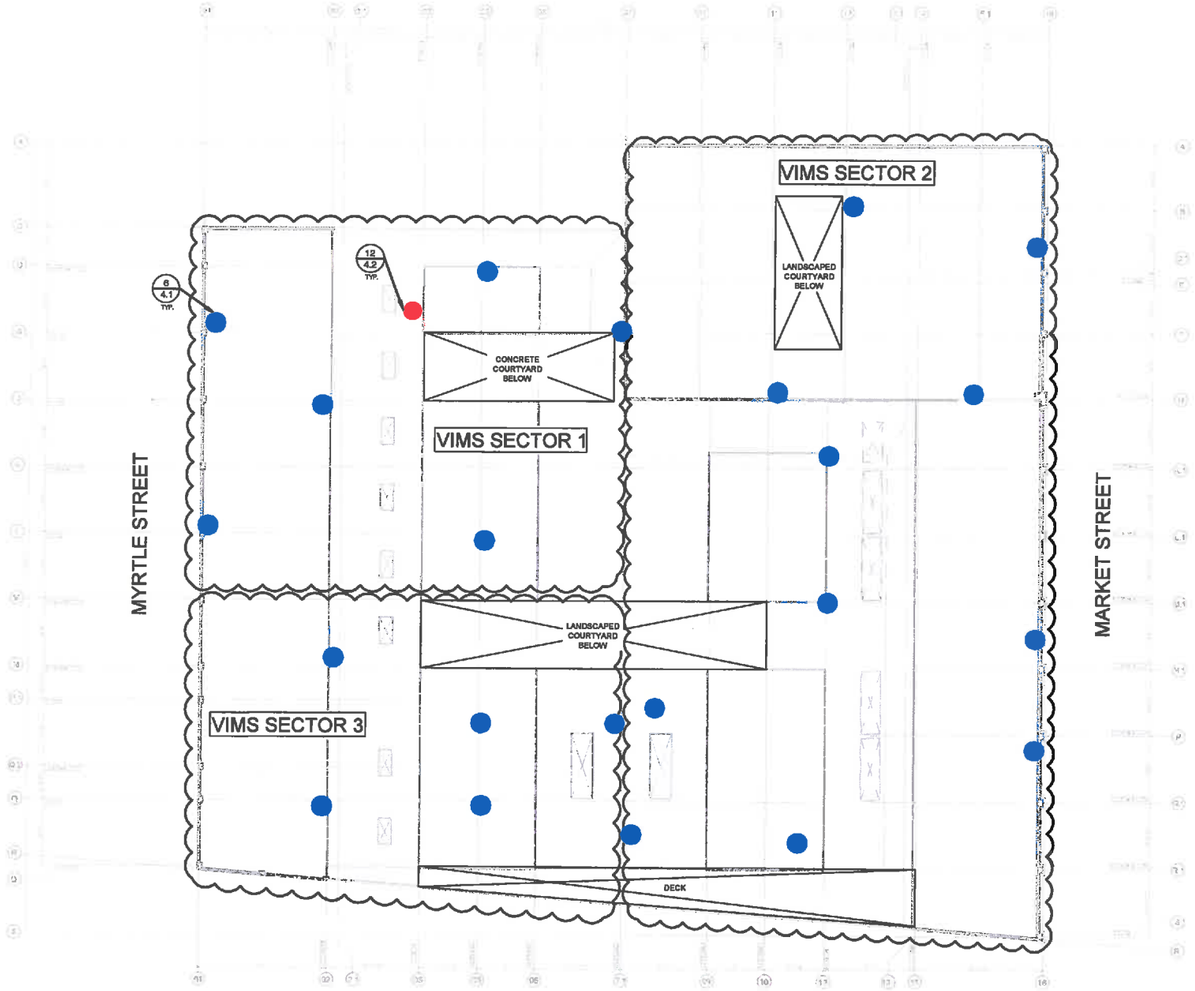
PROJECT:
1919 Market Street
Oakland, California

VIMS AND SVE SYSTEM LAYOUT - SUB-SLAB

DRAWN BY: V. Statham
PREPARED BY: V. Statham
REVIEWED BY: T. WEISE, P.E.
APPROVED BY: T. WEISE, P.E.

DATE: 10/14/2016
SCALE: 1"=30'
PROJECT NO: 324097

2.1
DRAWING NUMBER



N

LEGEND

- APPROXIMATE LOCATION OF VIMS RISER (2-INCH DIAMETER IRON PIPE; SYMBOL NOT TO SCALE)
- APPROXIMATE LOCATION OF SVE RISER (2-INCH DIAMETER IRON PIPE; SYMBOL NOT TO SCALE)

SHEET NOTES

1. BACKGROUND DRAWINGS IS A1.14 - PROPOSED ROOF PLANS BY JHD, DATED 10/09/2015.
2. SYSTEM DETAILS AND NOTES ON SHEETS 4.1 AND 4.2.

REGISTERED PROFESSIONAL ENGINEER
TRENT A. WEISE
No. C64480
Exp. 6/17
CIVIL
STATE OF CALIFORNIA
10/14/16

0 20 40
SCALE IN FEET

REV.	DATE	DESCRIPTION	APPROVED BY
	10/14/16	ISSUED FOR REVIEW; NOT FOR CONSTRUCTION	TW

AEI Consultants
2500 CAMINO DIABLO, WALNUT CREEK, CALIFORNIA

CLIENT:
The Negev

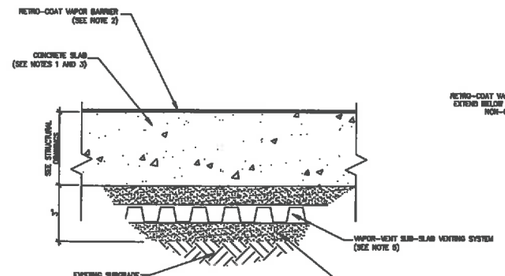
PROJECT:
1919 Market Street
Oakland, California

VIMS AND SVE SYSTEM LAYOUT - ROOF

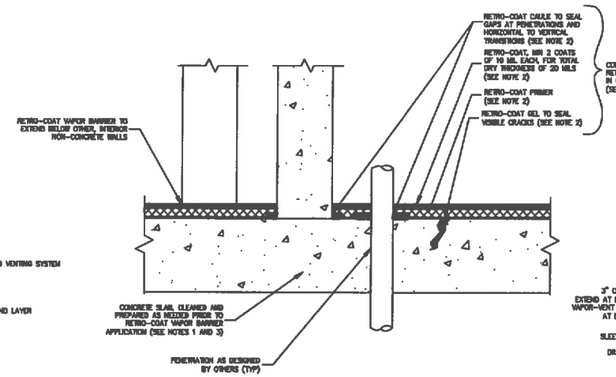
DRAWN BY: V. Statham
PREPARED BY: V. Statham
REVIEWED BY: T. WEISE, P.E.
APPROVED BY: T. WEISE, P.E.

DATE: 10/14/2016 SCALE: 1"=30'
PROJECT NO: 324097

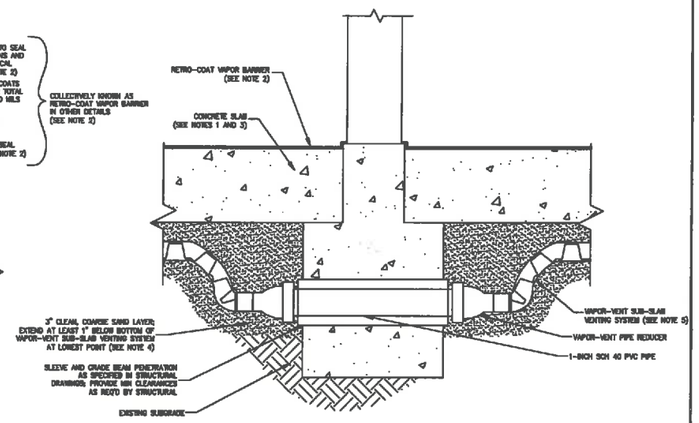
3.1
DRAWING NUMBER



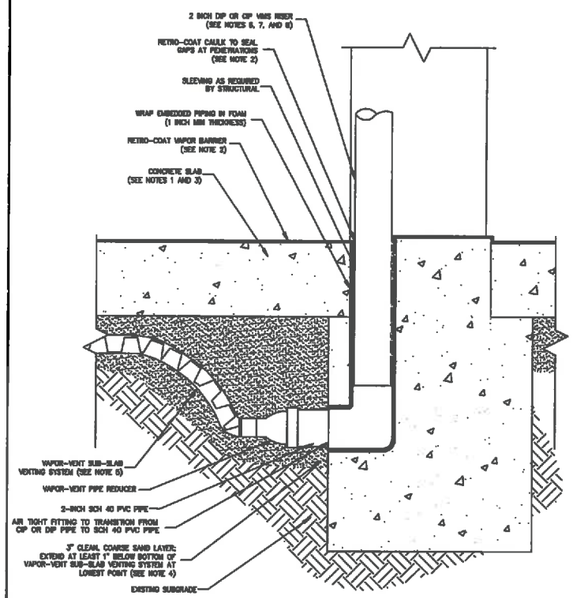
1 VIMS SYSTEM CROSS-SECTION AT SUB-SLAB (TYPICAL) NOT TO SCALE



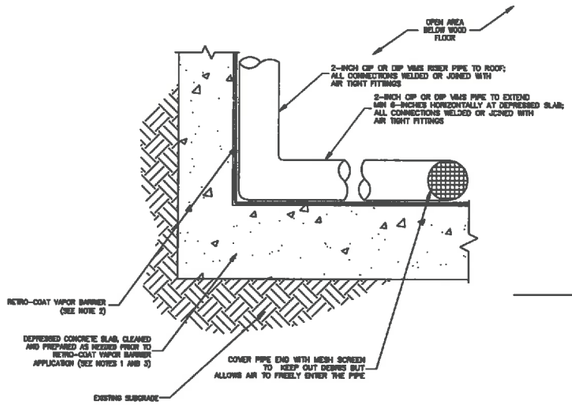
2 VAPOR BARRIER APPLICATION SEQUENCE (TYPICAL) NOT TO SCALE



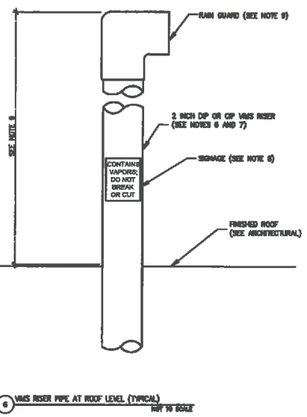
3 SUB-SLAB VENTING SYSTEM TRANSITION AT INTERIOR GRADE BEAM (TYPICAL) NOT TO SCALE



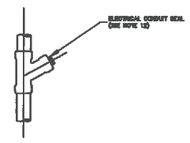
4 HORIZONTAL TO VERTICAL TRANSITION AT VIMS RISER PIPE (TYPICAL) NOT TO SCALE



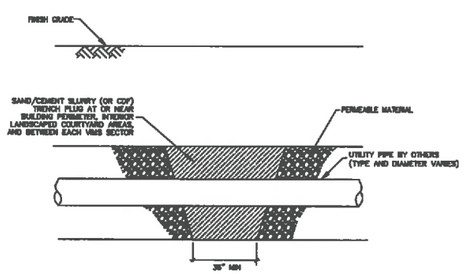
5 VIMS CROSS SECTION THROUGH DEPRESSED SLAB BETWEEN GRIDLINES D-02 AND C-01 NOT TO SCALE



6 VIMS RISER PIPE AT ROOF LEVEL (TYPICAL) NOT TO SCALE



7 INTERIOR CONDUIT SEAL (TYPICAL) NOT TO SCALE



8 SOIL CUT-OFF BARRIER IN UTILITY TRENCH (TYPICAL) NOT TO SCALE

VIMS NOTES

1. SLABS, FOOTINGS, GRADE BEAMS, PILE CAPS, AND OTHER FOUNDATION ELEMENTS TO BE CONFIRMED WITH STRUCTURAL DETAILS.
2. THE VAPOR BARRIER SHALL BE RETRO-COAT BY LAND SCIENCE, OR ENGINEER APPROVED EQUIVALENT. WHERE USED HEREIN, "RETRO-COAT" INCLUDES RETRO-COAT GEL, RETRO-COAT CAULK, RETRO-COAT PRIMER, AND RETRO-COAT TO BE USED AS NEEDED AND AS RECOMMENDED BY THE MANUFACTURER. VAPOR BARRIER SHALL BE STORED, HANDLED, AND INSTALLED IN ACCORDANCE WITH ALL MANUFACTURER RECOMMENDATIONS AND SPECIFICATIONS.
3. CONCRETE SLAB SHALL BE ADEQUATELY PREPARED IN ACCORDANCE WITH ALL MANUFACTURER RECOMMENDATIONS PRIOR TO VAPOR BARRIER MEMBRANE APPLICATION. WHERE THEY OCCUR, SLAB PENETRATIONS SHALL NOT BE IN CONTACT WITH ADJACENT PENETRATIONS OR STEEL COLUMNS TO ALLOW FOR PROPER VAPOR BARRIER SEALING OF THE ENTIRE PENETRATION CIRCUMFERENCE.
4. PERMEABLE LAYER SHALL BE CLEAN, COARSE SANDS. SURFACE OF LAYER SHALL BE SMOOTH-ROLLED AS NEEDED FOR SLAB PLACEMENT.
5. THE SUB-SLAB VENTING SYSTEM SHALL BE VAPOR-VENT BY LAND SCIENCE, OR ENGINEER APPROVED EQUIVALENT. SUB-SLAB VENTING SYSTEM SHALL BE STORED, HANDLED, AND INSTALLED IN ACCORDANCE WITH ALL MANUFACTURER RECOMMENDATIONS AND SPECIFICATIONS.
6. THE VIMS VERTICAL RISER PIPES TO THE ROOF SHALL BE 2 INCH DIAMETER DUCTILE IRON PIPE (DIP) OR CAST IRON PIPE (CIP) WITHIN THE BUILDING ENVELOPE. TRANSITIONS FROM/TO PVC, AS APPLICABLE, SHALL OCCUR BELOW THE VAPOR BARRIER OR ABOVE THE FINISHED ROOF.
7. THE VIMS VERTICAL RISER PIPES SHALL BE FULLY SUPPORTED THROUGH THE ENTIRE HEIGHT OF THE BUILDING SUCH THAT NO DOWNWARD FORCE DUE TO THE WEIGHT OF THE RISER IS EXERTED ON THE SUB-SLAB VENTING SYSTEM AND PVC ASSEMBLY LOCATED BENEATH THE SLAB. THE RISER PIPES SHALL BE AFFIXED TO THE STRUCTURE PER DETAILS PROVIDED BY THE PLUMBING CONTRACTOR AS A DESIGN-BUILD ITEM. ATTACHMENT METHODS MAY INCLUDE STRAPS, BRACES, OR OTHER MECHANISMS TO FULLY SUPPORT THE WEIGHT OF THE PIPE.
8. THE VIMS VERTICAL RISER PIPES SHALL BE PROMINENTLY LABELED AS "CONTAINS VAPORS; DO NOT BREAK OR CUT," AT A MINIMUM OF ONCE PER FLOOR LEVEL AND AT ANY LOCATIONS PIPES ARE EXPOSED.
9. THE TOP OF THE RISER PIPE SHALL EXTEND TO AN ELEVATION OF 1 FOOT ABOVE THE TOP OF WIND SCREEN, ROOF PARAPET, OR TOP EDGE OF ROOF LEVEL; BE LOCATED A MINIMUM OF 15 FEET AWAY FROM FRESH AIR INTAKES FOR HVAC SYSTEMS OR OTHER OPENINGS SUCH AS WINDOWS, DOORS, ETC.; AND SHALL BE SUPPORTED BY UNISTRUTS ATTACHED TO AN ADJACENT COLUMN OR STABILIZED WITH GUY WIRES THAT ARE ATTACHED TO THE ROOF. THE TOP OF THE RISER PIPES SHALL BE COMPLETED WITH A RAIN GUARD OR PIPE CAP THAT SHALL KEEP OUT DEBRIS AND RAIN BUT ALLOW AIR TO FREELY EXIT THE PIPE.
10. A MINIMUM AREA OF 10 FEET BY 10 FEET SHALL BE PROVIDED AT THE ROOF LEVEL AT EACH VIMS RISER PIPE LOCATION, IN THE EVENT RISER PIPES ARE RETROFITTED WITH ACTIVE BLOWERS.
11. ELECTRICAL SERVICE SHALL BE PROVIDED AT THE ROOF LEVEL IN THE EVENT VIMS RISER PIPES ARE RETROFITTED WITH ACTIVE BLOWERS. IF RETROFITTED WITH BLOWER, BLOWER SHALL BE RP 140 RADON FAN, OR ENGINEER APPROVED ALTERNATE. A POWERED JUNCTION BOX SHALL BE PROVIDED AT EACH RISER LOCATION.
12. ALL MECHANICAL AND ELECTRICAL CONDUITS THROUGH THE SLAB SHALL BE ADEQUATELY SEALED. SEE MEP DRAWINGS FOR CONDUIT SEAL LOCATIONS AND SEALING PRODUCT.

REV.	DATE	DESCRIPTION	APPROVED BY
	10/14/16	ISSUED FOR REVIEW; NOT FOR CONSTRUCTION	TW

REGISTERED PROFESSIONAL ENGINEER
TRENT A. WEISE
No. C64480
Exp. 6/17
CIVIL
STATE OF CALIFORNIA
10/17/16

AEI Consultants
2500 CAMINO DIABLO, WALNUT CREEK, CALIFORNIA

CLIENT:
The Negev

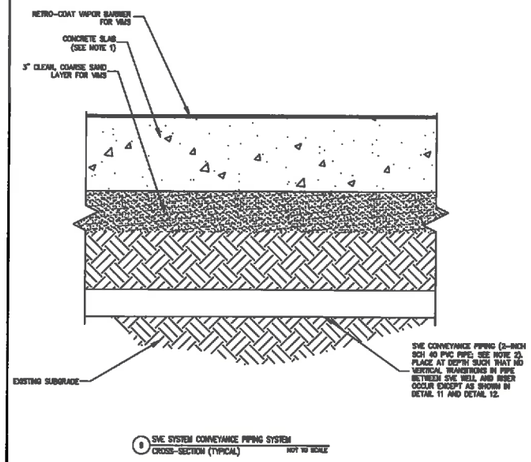
PROJECT:
1919 Market Street
Oakland, California

VIMS DETAILS AND NOTES

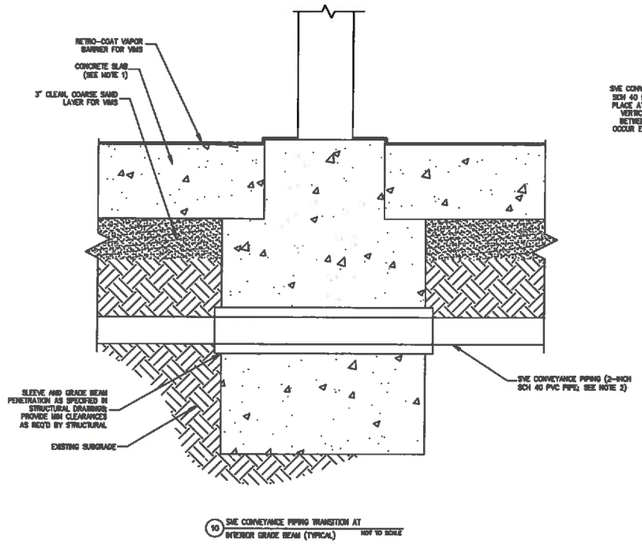
DRAWN BY: V. Statham
PREPARED BY: V. Statham
REVIEWED BY: T. WEISE, P.E.
APPROVED BY: T. WEISE, P.E.

DATE: 10/14/2016
SCALE: NTS
PROJECT NO: 324097

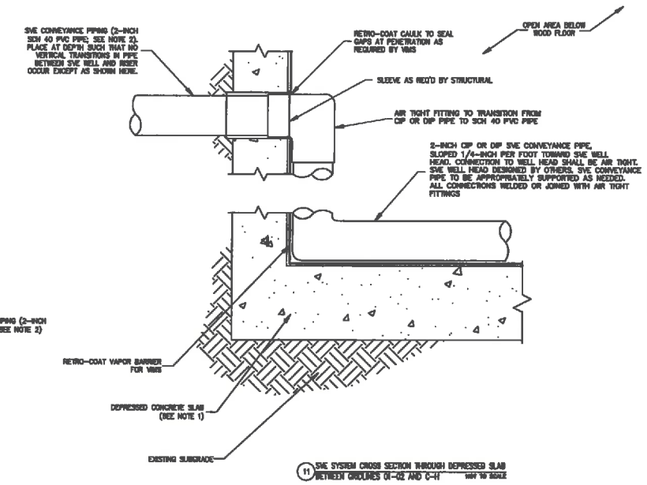
4.1
DRAWING NUMBER



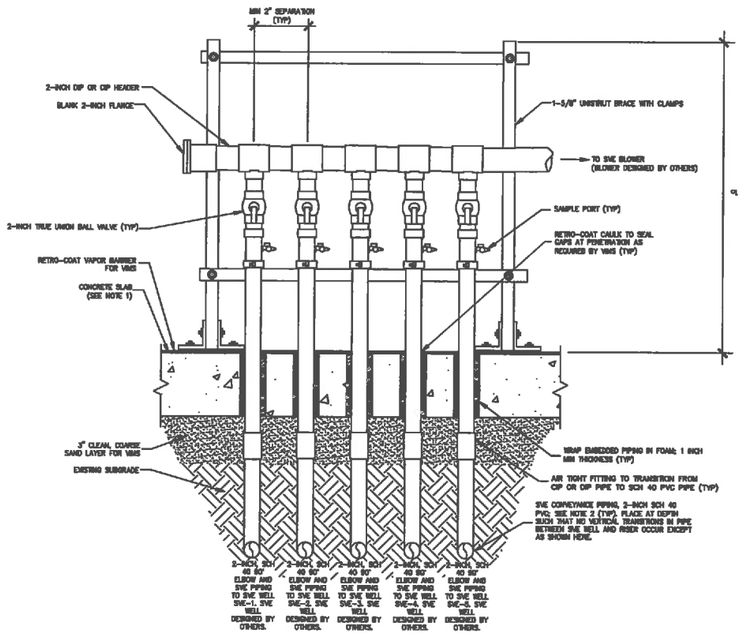
9 SVE SYSTEM CONVEYANCE PIPING SYSTEM CROSS-SECTION (TYPICAL) NOT TO SCALE



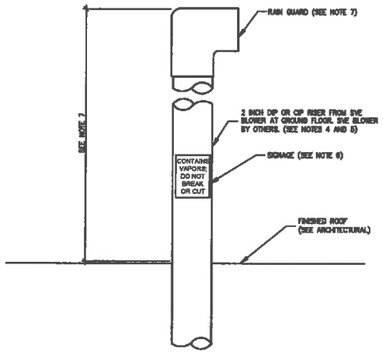
10 SVE CONVEYANCE PIPING TRANSITION AT INTERIOR GRADE BEAM (TYPICAL) NOT TO SCALE



11 SVE SYSTEM CROSS SECTION THROUGH DEPRESSED SLAB BETWEEN GRIDLINES G-GE AND C-H NOT TO SCALE



12 SVE SYSTEM MANIFOLD AT BLOWER NOT TO SCALE



13 SVE SYSTEM RISER THROUGH BUILDING AND AT ROOF NOT TO SCALE

SVE SYSTEM NOTES

1. SLABS, FOOTINGS, GRADE BEAMS, PILE CAPS, AND OTHER FOUNDATION ELEMENTS TO BE CONFIRMED WITH STRUCTURAL DETAILS.
2. UNLESS OTHERWISE NOTED, SVE CONVEYANCE PIPING AT SUB-SLAB SHALL BE 2 INCH DIAMETER SCHEDULE 40 PVC AND SHALL BE SLOPED 1/4 INCH PER FOOT TOWARDS THE SVE WELLS, TO PROVIDE FOR DRAINAGE TO WELLS AS NEEDED.
3. SVE WELL AND WELLHEAD TO BE DESIGNED BY OTHERS. SVE BLOWER AT GROUND LEVEL TO BE DESIGNED BY OTHERS.
4. THE SVE VERTICAL RISER PIPE TO THE ROOF SHALL BE 2 INCH DIAMETER DUCTILE IRON PIPE (DIP) OR CAST IRON PIPE (CIP) WITHIN THE BUILDING ENVELOPE. TRANSITIONS FROM/TO PVC, AS APPLICABLE, SHALL OCCUR BELOW THE VAPOR BARRIER OR ABOVE THE FINISHED ROOF.
5. THE SVE VERTICAL RISER PIPE SHALL BE FULLY SUPPORTED THROUGH THE ENTIRE HEIGHT OF THE BUILDING SUCH THAT NO DOWNWARD FORCE DUE TO THE WEIGHT OF THE RISER IS EXERTED ON THE BLOWER AT GRADE LEVEL. THE RISER PIPE SHALL BE AFFIXED TO THE STRUCTURE PER DETAILS PROVIDED BY THE PLUMBING CONTRACTOR AS A DESIGN-BUILD ITEM. ATTACHMENT METHODS MAY INCLUDE STRAPS, BRACES, OR OTHER MECHANISMS TO FULLY SUPPORT THE WEIGHT OF THE PIPE.
6. THE SVE VERTICAL RISER PIPE SHALL BE PROMINENTLY LABELED AS "CONTAINS VAPORS; DO NOT BREAK OR CUT," AT A MINIMUM OF ONCE PER FLOOR LEVEL AND AT ANY LOCATIONS PIPE IS EXPOSED.
7. THE TOP OF THE SVE VERTICAL RISER PIPE SHALL EXTEND TO AN ELEVATION OF 1 FOOT ABOVE THE TOP OF WIND SCREEN, ROOF PARAPET, OR TOP EDGE OF ROOF LEVEL; BE LOCATED A MINIMUM OF 15 FEET AWAY FROM FRESH AIR INTAKES FOR HVAC SYSTEMS OR OTHER OPENINGS SUCH AS WINDOWS, DOORS, ETC.; AND SHALL BE SUPPORTED BY UNISTRUTS ATTACHED TO AN ADJACENT COLUMN OR STABILIZED WITH GUY WIRES THAT ARE ATTACHED TO THE ROOF. THE TOP OF THE RISER PIPE SHALL BE COMPLETED WITH A RAIN GUARD OR PIPE CAP THAT SHALL KEEP OUT DEBRIS AND RAIN BUT ALLOW AIR TO FREELY EXIT THE PIPE.

REGISTERED PROFESSIONAL ENGINEER TRENT A. WEISE No. C64480 Exp. 9/17 CIVIL STATE OF CALIFORNIA
10/17/16

REV.	DATE	DESCRIPTION	APPROVED BY
	10/14/16	ISSUED FOR REVIEW; NOT FOR CONSTRUCTION	TW

AEI Consultants
2500 CAMINO DIABLO, WALNUT CREEK, CALIFORNIA

CLIENT:
The Negev

PROJECT:
1919 Market Street
Oakland, California

SVE SYSTEM DETAILS AND NOTES

DRAWN BY: V. Statham
PREPARED BY: V. Statham
REVIEWED BY: T. WEISE, P.E.
APPROVED BY: T. WEISE, P.E.

DATE: 10/14/2016 SCALE: NTS
PROJECT NO: 324097

4.2
DRAWING NUMBER

Appendix B
Vapor-Vent™ Soil Gas Collection System Specifications

AEI Consultants

Vapor-Vent™
SOIL GAS COLLECTION SYSTEM
Version 1.5

SECTION 02 56 19 – GAS CONTROL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Substrate preparation.
2. Vapor-Vent™ installation.
3. Vapor-Vent accessories.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 2 Section “Earthwork”, “Pipe Materials”, “Sub-drainage systems”, ”Gas Control System”, “Fluid-Applied gas barrier”.
2. Division 3 Section “Cast-in-Place Concrete” for concrete placement, curing, and finishing.
3. Division 5 Section “Expansion Joint Cover Assemblies”, for expansion-joint covers assemblies and installation.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide a gas venting material that collects gas vapors and directs them to discharge or to collection points as specified in the gas vapor collection system drawings and complies with the physical requirements set forth by the manufacturer.

1.4 SUBMITTALS

A. Submit Product Data for each type of gas venting system specified, including manufacturer’s specifications.

B. Sample – Submit representative samples of the following for approval:

1. Gas venting, Vapor-Vent.
2. Vapor-Vent accessories.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who is certified in writing and approved by vapor intrusion barrier manufacturer Land Science Technologies for the installation of the Geo-Seal® vapor intrusion barrier system.

B. Manufacturer Qualification: Obtain gas venting, vapor intrusion barrier and system components from a single manufacturer Land Science Technologies

C. Pre-installation Conference: A pre-installation conference shall be held prior to installation of the venting system, vapor intrusion barrier and waterproofing system to assure proper site and installation conditions, to include contractor, applicator, architect/engineer and special inspector (if any).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site as specified by manufacturer labeled with manufacturer’s name, product brand name and type, date of manufacture, shelf life, and directions for handling.

B. Store materials as specified by the manufacturer in a clean, dry, protected location and within the temperature range required by manufacturer. Protect stored materials from direct sunlight.

C. Remove and replace material that is damaged.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Land Science Technologies, San Clemente, CA. (949) 481-8118

1. Vapor-Vent™

2.2 GAS VENT MATERIALS

A. Vapor-Vent – Vapor-Vent is a low profile, trenchless, flexible, sub slab vapor collection system used in lieu or in conjunction with perforated piping. Vapor-Vent is offered with two different core materials, Vapor-Vent POLY is recommended for sites with inert methane gas and Vapor-Vent is recommended for sites with aggressive chlorinated volatile organic or petroleum vapors. Manufactured by Land Science Technologies

B. Vapor-Vent physical properties

VENT PROPERTIES	**TEST METHOD**	**VAPOR-VENT POLY**	**VAPOR-VENT**
Material		Polystyrene	HDPE
Comprehensive Strength	ASTM D-1621	9,000 lbs / ft^2	11,400 lbs / ft^2
In-plane flow (Hydraulic gradient-0.1)	ASTM D-4716	30 gpm / ft of width	30 gpm / ft of width
Chemical Resistance		N/A	Excellent
FABRIC PROPERTIES	**TEST METHOD**	**VAPOR-VENT POLY**	**VAPOR-VENT**
Grab Tensile Strength	ASTM D-4632	100 lbs.	110 lbs.
Puncture Strength	ASTM D-4833	65 lbs.	30 lbs.
Mullen Burst Strength	ASTM D-3786	N/A	90 PSI
AOS	ASTM D-4751	70 U.S. Sieve	50 U.S. Sieve
Flow Rate	ASTM D-4491	140 gpm / ft^2	95 gpm / ft^2
UV Stability (500 hours)	ASTM D-4355	N/A	70% Retained
DIMENSIONAL DATA			
Thickness		1”	1”
Standard Widths		12”	12”
Roll Length		165 ft	165 ft
Roll Weight		65 lbs	68 lbs

2.3 AUXILIARY MATERIALS

A. Vapor-Vent End Out

B. Reinforced Tape.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which gas vent system will be installed, with installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 SUBSTRATE PREPARATION

A. Verify substrate is prepared according to project requirements.

3.3 PREPARATION FOR STRIP COMPOSITE

A. Mark the layout of strip geocomposite per layout design developed by engineer.

3.4 STRIP GEOCOMPOSITE INSTALLATION

A. Install Vapor-Vent over substrate material where designated on drawings with the flat base of the core placed down and shall be overlapped in accordance with manufacturer's recommendations.

B. At areas where Vapor-Vent strips intersect cut and fold back fabric to expose the dimpled core. Arrange the strips so that the top strip interconnects into the bottom strip. Unfold fabric to cover the core and use reinforcing tape, as approved by the manufacturer, to seal the connection to prevent sand or gravel from entering the core.

C. When crossing Vapor-Vent over footings or grade beams, **consult with the specifying environmental engineer and structural engineer for appropriate use and placement of solid pipe materials**. Place solid pipe over or through concrete surface and attach a Vapor-Vent End Out at both ends of the pipe before connecting the Vapor-Vent to the pipe reducer. Seal the Vapor-Vent to the Vapor-Vent End Out using fabric reinforcement tape. Refer to Vapor-Vent detail provided by Land Science Technologies.

D. Place vent risers per specifying engineer's project specifications. Connect Vapor-Vent to Vapor-Vent End Out and seal with fabric reinforced tape. Use Vapor-Vent End Out with the specified diameter piping as shown on system drawings.

3.5 PLACEMENT OF OVERLYING AND ADJACENT MATERIALS

A. All overlying and adjacent material shall be placed or installed using approved procedures and guidelines to prevent damage to the strip geocomposite.

B. Equipment shall not be directly driven over and stakes or any other materials may not be driven through the strip geocomposite.

Appendix C
Blower Cut Sheets

AEI Consultants

RadonAway®
The world's leading radon fan manufacturer

RP Series

Radon Mitigation Fan

All RadonAway® fans are specifically designed for radon mitigation. RP Series Fans provide superb performance, run ultra-quiet and are attractive. They are ideal for most sub-slab radon mitigation systems.

Features

- Energy efficient
- Ultra-quiet operation
- Meets all electrical code requirements
- Water-hardened motorized impeller
- Seams sealed to inhibit radon leakage (RP140 & RP145 double snap sealed)
- ETL Listed - for indoor or outdoor use
- Thermally protected motor
- Rated for commercial and residential use

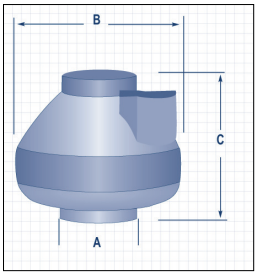
MODEL	P/N	FAN DUCT DIAMETER	WATTS	MAX. PRESSURE"WC	TYPICAL CFM vs. STATIC PRESSURE WC				
					0"	.5"	1.0"	1.5"	2.0"
RP140*	23029-1	4"	15-21	0.8	135	70	-	-	-
RP145	23030-1	4"	41-72	2.1	166	126	82	41	3
RP260	23032-1	6"	50-75	1.6	272	176	89	13	-
RP265	23033-1	6"	91-129	2.3	334	247	176	116	52
RP380	28208	8"	95-152	2.3	497	353	220	130	38

Made in USA with US and imported parts

ETL Listed

All RadonAway inline radon fans are covered by our 5-year, hassle-free warranty

*Energy Star® Rated



Model	A	B	C
RP140	4.5"	9.7"	8.5"
RP145	4.5"	9.7"	8.5"
RP260	6"	11.75"	8.6"
RP265	6"	11.75"	8.6"
RP380	8"	13.41"	10.53"

For Further Information Contact

8/15
P/N 02008

RadonAway®

The World's Leading
Radon Fan Manufacturer



RP Series

Installation & Operating Instructions

RadonAway
3 Saber Way | Ward Hill, MA 01835
www.radonaway.com

P/N IN020-REV R 08/15

RadonAway Ward Hill, MA.

Series Fan Installation & Operating Instructions

Please Read and Save These Instructions.

DO NOT CONNECT POWER SUPPLY UNTIL FAN IS COMPLETELY INSTALLED. MAKE SURE ELECTRICAL SERVICE TO FAN IS LOCKED IN "OFF" POSITION. DISCONNECT POWER BEFORE SERVICING FAN.

1. **WARNING!** WARNING! For General Ventilating Use Only. Do Not Use to Exhaust Hazardous, Corrosive or Explosive Materials, Gases or Vapors. See Vapor Intrusion Application Note #AN001 for important information on VI applications. RadonAway.com/vapor-intrusion
2. **WARNING!** NOTE: Fan is suitable for use with solid state speed controls however use of speed controls is not generally recommended.
3. **WARNING!** Check voltage at the fan to insure it corresponds with nameplate.
4. **WARNING!** Normal operation of this device may affect the combustion airflow needed for safe operation of fuel burning equipment. Check for possible backdraft conditions on all combustion devices after installation.
5. **NOTICE!** There are no user serviceable parts located inside the fan unit. **Do NOT attempt to open.** Return unit to the factory for service.
6. **WARNING!** Do not leave fan unit installed on system piping without electrical power for more than 48 hours. Fan failure could result from this non-operational storage.
7. **WARNING!** TO REDUCE THE RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

   a) Use this unit only in the manner intended by the manufacturer. If you have questions, contact the manufacturer.

   b) Before servicing or cleaning 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.

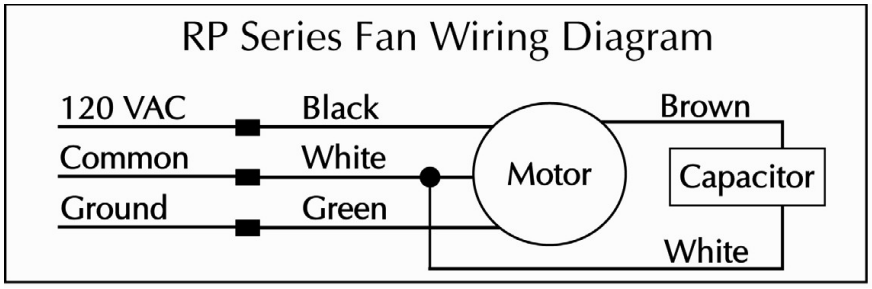
   c) Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire rated construction.

   d) 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 manufacturers guideline and safety standards such as those published by the National Fire Protection Association, and the American Society for Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), and the local code authorities.

   e) When cutting or drilling into a wall or ceiling, do not damage electrical wiring and other hidden utilities.

   f) Ducted fans must always be vented to outdoors.

   g) 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.



RP Series

RP140	**p/n 23029-1**
RP145	**p/n 23030-1**
RP260	**p/n 23032-1**
RP265	**p/n 23033-1**
RP380	**p/n 28208**

1.0 SYSTEM DESIGN CONSIDERATIONS

1.1. INTRODUCTION

The RP Series Radon Fans are intended for use by trained, professional, certified/licensed Radon mitigators. The purpose of this instruction is to provide additional guidance for the most effective use of an RP Series Fan. This instruction should be considered as a supplement to EPA/radon industry standard practices, state and local building codes and state regulations. In the event of a conflict, those codes, practices and regulations take precedence over this instruction.

1.2. FAN SEALING

The RP Series Fans are factory sealed, no additional caulk or other materials are required to inhibit air leakage.

1.3. ENVIRONMENTALS

The RP Series Fans are designed to perform year-round in all but the harshest climates without additional concern for temperature or weather. For installations in an area of severe cold weather, please contact RadonAway for assistance. When not in operation, the fan should be stored in an area where the temperature is never less than 32 degrees F. or more than 100 degrees F.

1.4. ACOUSTICS

The RP Series Fan, when installed properly, operates with little or no noticeable noise to the building occupants. The velocity of the outgoing air should be considered in the overall system design. In some cases the "rushing" sound of the outlet air may be disturbing. In these instances, the use of a RadonAway Exhaust Muffler is recommended.

(To ensure quiet operation of ENERGY STAR qualified in-line and remote fans, each fan shall be installed using sound attenuation techniques appropriate for the installation. For bathroom and general ventilation applications, at least 8 feet of insulated flexible duct shall be installed between the exhaust or supply grille(s) and the fan). RP Series fans are not suitable for kitchen range hood remote ventilation applications.

1.5. GROUND WATER

In the event that a temporary high water table results in water at or above slab level, water may be drawn into the riser pipes thus blocking air flow to the RP Series Fan. The lack of cooling air may result in the fan cycling on and off as the internal temperature rises above the thermal cutoff and falls upon shutoff. Should this condition arise, it is recommended that the fan be turned off until the water recedes allowing for return to normal operation.

1.6. SLAB COVERAGE

The RP Series Fan can provide coverage up to 2000+ sq. ft. per slab penetration. This will primarily depend on the sub-slab material in any particular installation. In general, the tighter the material, the smaller the area covered per penetration. Appropriate selection of the RP Series Fan best suited for the sub-slab material can improve the slab coverage. The RP140/145/155 are best suited for general purpose use. The RP260 can be used where additional airflow is required and the RP265/380 is best suited for large slab, high airflow applications. Additional suction points can be added as required. It is recommended that a small pit (5 to 10 gallons in size) be created below the slab at each suction hole.

1.7. CONDENSATION & DRAINAGE

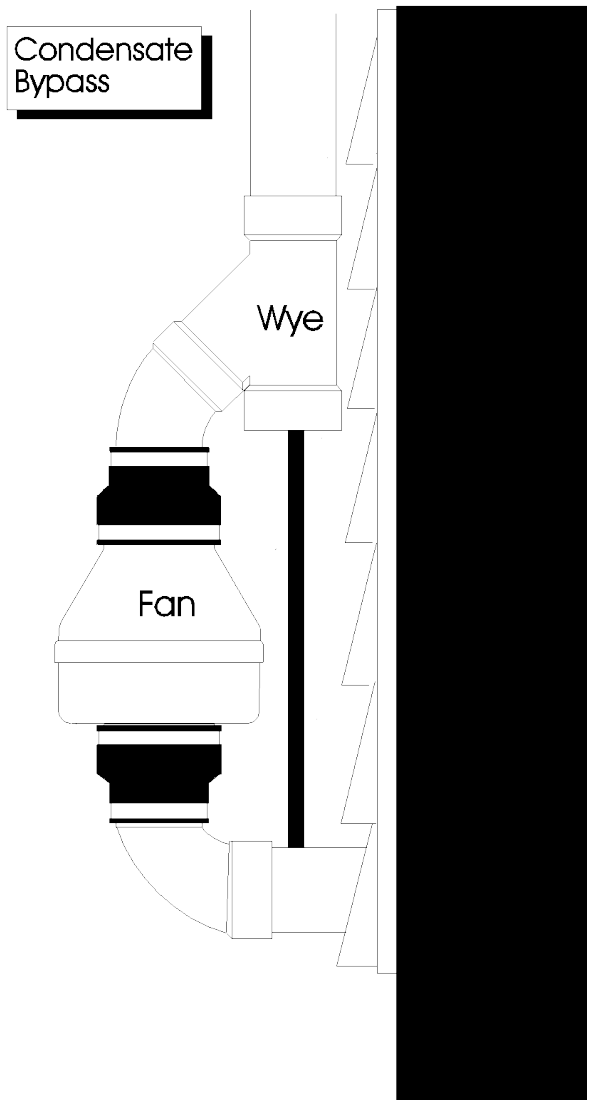
Condensation is formed in the piping of a mitigation system when the air in the piping is chilled below its dew point. This can occur at points where the system piping goes through unheated space such as an attic, garage or outside. The system design must provide a means for water to drain back to a slab hole to remove the condensation. The RP Series Fan **MUST** be mounted vertically plumb and level, with the outlet pointing up for proper drainage through the fan. Avoid mounting the fan in any orientation that will allow water to accumulate inside the fan housing. The RP Series Fans are **NOT** suitable for underground burial.

For RP Series Fan piping, the following table provides the minimum recommended pipe diameter and pitch under several system conditions.

Pipe Dia.	Minimum Rise per Ft of Run*				
	@25 CFM	@50 CFM	@100 CFM	@200 CFM	@300 CFM
6"	-	3/16	1/4	3/8	3/4
4"	1/8	1/4	3/8	2 3/8	-
3"	1/4	3/8	1 1/2	-	-

*Typical RP1xx/2xx Series Fan operational flow rate is 25 - 90 CFM 0n 3" and 4" pipe. (For more precision, determine flow rate by measuring Static Pressure, in WC, and correlate pressure to flow in the performance chart in the addendum.)

Under some circumstances in an outdoor installation a condensate bypass should be installed in the outlet ducting as shown. This may be particularly true in cold climate installations which require long lengths of outlet ducting or where the outlet ducting is likely to produce large amounts of condensation because of high soil moisture or outlet duct material. Schedule 20 piping and other thin-walled plastic ducting and Aluminum downspout will normally produce much more condensation than Schedule 40 piping. Schedule 40 piping is preferred for radon mitigation, all joints should fully sealed using the appropriate pipe cement on socket type fittings or flexible coupling firmly attached via worm drive screw clamps. Sealing ducting or pipe with duct tape is not acceptable on radon mitigation installations. No pipe penetrations are permitted, other than the condensation bypass. Silicon caulk is permitted for sealing purposes.



The bypass is constructed with a 45 degree Wye fitting at the bottom of the outlet stack. The bottom of the Wye is capped and fitted with a tube that connects to the inlet piping or other drain. The condensation produced in the outlet stack is collected in the Wye fitting and drained through the bypass tube. The bypass tubing may be insulated to prevent freezing.

1.8. SYSTEM MONITOR & LABEL

A System Monitor, such as a manometer (P/N 50017) or audible alarm (P/N 28001-2) is required to notify the occupants of a fan system malfunction. A System Label (provided with Manometer P/N 50017) with instructions for contacting the installing contractor for service and also identifying the necessity for regular radon tests to be conducted by the building occupants, must be conspicuously placed where the occupants frequent and can see the label.

1.9. VENTILATION

If used as a ventilation Fan any type of ducting is acceptable, however, flexible nonmetallic ducting is recommended for easy installation and quieter operation. Insulated flexible ducting is highly recommended in cold climates to prevent the warm bathroom air from forming condensation in the ducting where it is exposed to colder attic air. The outlet of the fan should always be ducted to the outside. Avoid venting the outlet of the fan directly into an attic area. The excess moisture from the bathroom can cause damage to building structure and any items stored in the attic. Multiple venting points may be connected together using a "T" or "Y" fitting. Ideally Duct should be arranged such that equal duct lengths are used between intake and "T" or "Y" fitting, this will result in equal flow rates in each intake branch. If adjustable intake grilles are used on multi-intake systems then the opening on each grill should be equal in order to minimize noise and resistance. Straight smooth runs of rigid metal ducting will present the least resistance and maximize system performance. The Equivalent Length of Rigid Metal Ducting resulting in .2" WC pressure loss for each Fan Model is provided in the specification section of these Instructions. Flexible ducting, if used, must always be as close to being fully extended as possible. Formed rigid metal duct elbows will present the least resistance and maximize system performance, recommended bend radius of elbow is at least 1.5 x duct diameter.

RP Series fans are not suitable for kitchen range hood remote ventilation applications. For quietest performance, the fan should be mounted further away from the inlet duct, near the outside vent. A minimum distance of 8 feet is recommended between the fan or T/Y of a multi-intake system and intake grille(s).

Backdraft dampers allow airflow in only one direction preventing cold/hot drafts from entering the vented area and minimize possible condensation and icing within the system while the fan is not operating. Backdraft dampers are highly recommended at each intake grille for bathroom ventilation in all cold climate installations. Installation instructions are included with Spruce backdraft dampers.

The ducting from this fan to the outside of the building has a strong effect on the airflow, noise and energy use of the fan. Use the shortest, straightest duct routing possible for best performance, and avoid installing the fan with smaller ducts than recommended. Insulation around the ducts can reduce energy loss and inhibit mold growth. Fans installed with existing ducts may not achieve their rated airflow.

1.10. ELECTRICAL WIRING

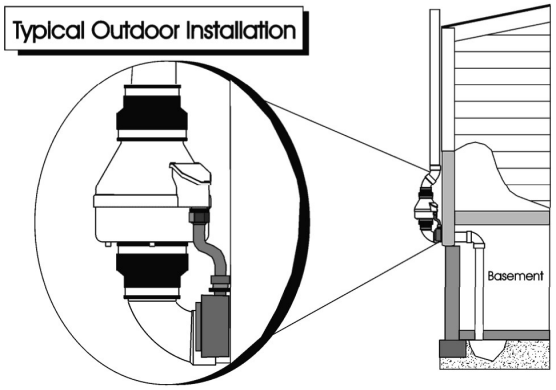
The RP Series Fans operate on standard 120V 60 Hz. AC. All wiring must be performed in accordance with the National Fire Protection Association's (NFPA)"National Electrical Code, Standard #70"-current edition for all commercial and industrial work, and state and local building codes. All wiring must be performed by a qualified and licensed electrician. Outdoor installations require the use of a U.L. listed watertight conduit. Ensure that all exterior electrical boxes are outdoor rated and properly sealed to prevent water penetration into the box. A means, such as a weep hole, is recommended to drain the box.

1.11. SPEED CONTROLS

The RP Series Fans are rated for use with electronic speed controls, however, they are generally not recommended. If used, the recommended speed control is Pass & Seymour Solid State Speed Control Cat. No. 94601-I.

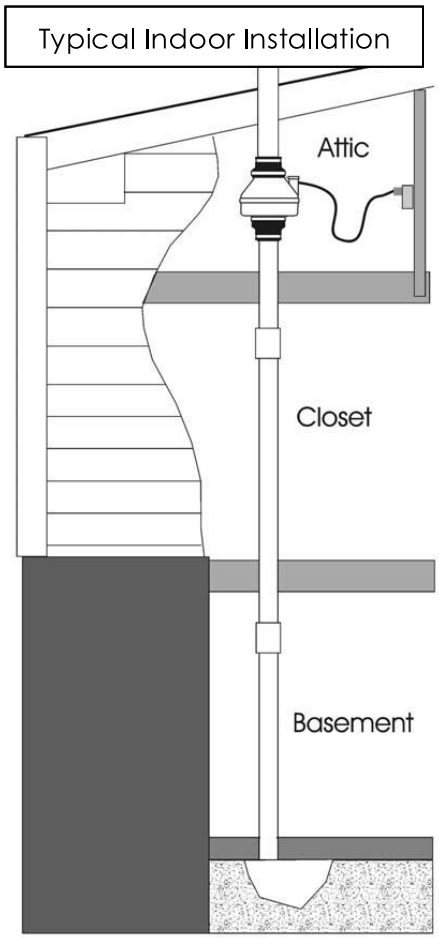
2.0 INSTALLATION

The RP Series Fan can be mounted indoors or outdoors. (It is suggested that EPA recommendations be followed in choosing the fan location.) The RP Series Fan may be mounted directly on the system piping or fastened to a supporting structure by means of optional mounting bracket



2.1 MOUNTING

Mount the RP Series Fan vertically with outlet up. Insure the unit is plumb and level. When mounting directly on the system piping assure that the fan does not contact any building surface to avoid vibration noise.



2.2 MOUNTING BRACKET (optional)

The RP Series Fan may be optionally secured with the RadonAway P/N 25007 (25033 for RP385) mounting bracket. Foam or rubber grommets may also be used between the bracket and mounting surface for vibration isolation.

2.3 SYSTEM PIPING

Complete piping run, using flexible couplings as means of disconnect for servicing the unit and vibration isolation. Used as a Radon Fan the fan is typically outside of the building thermal boundary, and is venting to the outside, installation of insulation around the fan is not required. If used as a ventilation fan insulation may be installed around the fan and duct work, insulation should be sized appropriately for the duct size used and secured with duct tape.

2.4 ELECTRICAL CONNECTION

Connect wiring with wire nuts provided, observing proper connections (See Section 1.10). Note that the fan is not intended for connection to rigid metal conduit.

Fan Wire	Connection
Green	Ground
Black	AC Hot
White	AC Common

2.5 VENT MUFFLER (optional)

Install the muffler assembly in the selected location in the outlet ducting. Solvent weld all connections. The muffler is normally installed at the end of the vent pipe.

2.6 OPERATION CHECKS & ANNUAL SYSTEM MAINTENANCE

_____**Verify** all connections are tight and **leak-free**.

_____**Insure** the RP Series Fan and all ducting is secure and vibration-free.

_____**Verify** system vacuum pressure with manometer. **Insure** vacuum pressure is within normal operating range and **less than** the maximum recommended operating pressure.

(Based on sea-level operation, at higher altitudes reduce by about 4% per 1000 Feet.)
(Further reduce Maximum Operating Pressure by 10% for High Temperature environments)
See Product Specifications. If this is exceeded, increase the number of suction points.

_____**Verify Radon levels by testing to EPA protocol.**

RP SERIES PRODUCT SPECIFICATIONS

The following chart shows fan performance for the RP Series Fan:

Typical CFM Vs Static Pressure "WC									
	0"	.25"	.5"	.75"	1.0"	1.25"	1.5"	1.75"	2.0"
RP140	135	103	70	14	-	-	-	-	-
RP145	166	146	126	104	82	61	41	21	3
RP260	272	220	176	138	103	57	13	-	-
RP265	334	291	247	210	176	142	116	87	52
RP380*	497	401	353	281	220	176	130	80	38

* Tested with 6" inlet and discharge pipe.

Power Consumption 120 VAC, 60Hz 1.5 Amp Maximum		Maximum Recommended Operating Pressure* (Sea Level Operation)**	
RP140	17 - 21 watts	RP140	0.8" W.C.
RP145	41 - 72 watts	RP145	1.7" W.C.
RP260	52 - 72 watts	RP260	1.5" W.C.
RP265	91 - 129 watts	RP265	2.2" W.C.
RP380	95 - 152 watts	RP380	2.0" W.C.

**Reduce by 10% for High Temperature Operation*
***Reduce by 4% per 1000 feet of altitude*

	Size	Weight	Inlet/Outlet	L.2
RP140	8.5H" x 9.7" Dia.	5.5 lbs.	4.5" OD (4.0" PVC Sched 40 size compatible)	25
RP145	8.5H" x 9.7" Dia.	5.5 lbs.	4.5" OD (4.0" PVC Sched 40 size compatible)	15
RP260	8.6H" x 11.75" Dia.	5.5 lbs.	6.0" OD	48
RP265	8.6H" x 11.75" Dia.	6.5 lbs.	6.0" OD	30
RP380	10.53H" x 13.41" Dia.	11.5 lbs.	8.0" OD	57

L.2 = Estimated Equivalent Length of Rigid Metal Ducting resulting in .2in WC pressure loss for Duct Size listed. Longer Equivalent Lengths can be accommodated at Flows Lower than that at .2in WC pressure loss (see CFM Vs Static Pressure "WC Table).

Recommended ducting: 3" or 4" RP1xx/2xx, 6" RP380, Schedule 20/40 PVC Pipe

Mounting: If used for Ventilation use 4", 6" or 8" Rigid or Flexible Ducting

Mount on the duct pipe or with optional mounting bracket.

Storage temperature range: 32 - 100 degrees F.

Normal operating temperature range: -20 - 120 degrees F.

Maximum inlet air temperature: 80 degrees F.

Continuous Duty

Class F Insulation [RP140 Class B]

Class B Insulation

Thermally Protected

3000 RPM

Rated for Indoor or Outdoor Use

LISTED
Electric Fan

Intertek
77728

Conforms to
UL STD. 507

Certified to
CAN/CSA STD.
C22.2 No.113

ENERGY STAR
RP140 Only

TESTED/CERTIFIED
2100
Home Ventilating Institute

IMPORTANT INSTRUCTIONS TO INSTALLER

Inspect the GP/XP/XR/RP/SF Series Fan for shipping damage within 15 days of receipt. Notify **RadonAway® of any damages immediately**. RadonAway® is not responsible for damages incurred during shipping. However, for your benefit, RadonAway® does insure shipments.

There are no user serviceable parts inside the fan. **Do not attempt to open.** Return unit to factory for service.

Install the GP/XP/XR/RP/SF Series Fan in accordance with all EPA standard practices, and state and local building codes and state regulations.

Provide a copy of this instruction or comparable radon system and testing information to the building occupants after completing system installation.

WARRANTY

RadonAway® warrants that the GPX01/XP/XR/RP/SF Series Fan (the "Fan") will be free from defects in materials and workmanship for a period of 90 days from the date of purchase (the "Warranty Term").

RadonAway® will replace any Fan which fails due to defects in materials or workmanship during the Warranty Term. The Fan must be returned (at Owner's cost) to the RadonAway® factory. Any Fan returned to the factory will be discarded unless the Owner provides specific instructions along with the Fan when it is returned regardless of whether or not the Fan is actually replaced under this warranty. Proof of purchase must be supplied upon request for service under this Warranty.

This Warranty is contingent on installation of the Fan in accordance with the instructions provided. This Warranty does not apply where any repairs or alterations have been made or attempted by others, or if the unit has been abused or misused. Warranty does not cover damage in shipment unless the damage is due to the negligence of RadonAway®.

5 YEAR EXTENDED WARRANTY WITH PROFESSIONAL INSTALLATION.

RadonAway® will extend the Warranty Term of the fan to five (5) years from date of purchase or sixty-three (63) months from the date of manufacture, whichever is sooner, if the Fan is installed in a professionally designed and professionally installed active soil depressurization system or installed as a replacement fan in a professionally designed and professionally installed active soil depressurization system by a qualified installer. Proof of purchase and/or proof of professional installation may be required for service under this warranty. Outside the Continental United States and Canada the extended Warranty Term is limited to one (1) year from the date of manufacture.

RadonAway® is not responsible for installation, removal or delivery costs associated with this Warranty.

LIMITATION OF WARRANTY

EXCEPT AS STATED ABOVE, THE GPx01/XP/XR/RP SERIES FANS ARE PROVIDED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL RADONAWAY BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR RELATING TO, THE FAN OR THE PERFORMANCE THEREOF. RADONAWAY'S AGGREGATE LIABILITY HEREUNDER SHALL NOT IN ANY EVENT EXCEED THE AMOUNT OF THE PURCHASE PRICE OF SAID PRODUCT. THE SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY SHALL BE THE REPAIR OR REPLACEMENT OF THE PRODUCT, TO THE EXTENT THE SAME DOES NOT MEET WITH RADONAWAY'S WARRANTY AS PROVIDED ABOVE.

For service under this Warranty, contact RadonAway for a Return Material Authorization (RMA) number and shipping information. No returns can be accepted without an RMA. If factory return is required, the customer assumes all shipping costs, including insurance, to and from factory.

RadonAway® 3 Saber Way
Ward Hill, MA 01835 USA TEL (978) 521-3703
FAX (978) 521-3964
Email to: Returns@RadonAway.com

Record the following information for your records:

Serial No._____
Purchase Date_____

Appendix D
Specifications for Retro-Coat™

AEI Consultants

Land Science Technologies
Specifications for Retro-Coat™
Version 1.0

Part 1 – Scope

1.1 Product and Application

This specification describes the application of the Retro-Coat™ System. The minimum thickness of the system is between 25-30 mils, including a 20 mil minimum application of Retro-Coat.

1.2 Acceptable Manufacturers

A. Retro-Coat as manufactured by Land Science Technologies San Clemente, CA.

1.3 Performance Criteria

A. Retro-Coat as manufactured by Land Science Technologies San Clemente, CA.

1. Diffusion Coefficient (Columbia Labs)
   PCE: 7.6 x 10^{-14} m^2/s
   TCE: 8.2 x 10^{-14} m^2/s

2. Tensile Elongation (ASTM D-638)
   Minimum: 6000 psi

3. Tensile Elongation (ASTM D-638)
   Minimum: 6 %

4. Flexural Strength (ASTM D-790)
   Minimum: 7000 psi

5. Hardness, Shore D (ASTM D-2240)
   Maximum: 85

6. Gardner Impact (ASTM D-2794)
   Minimum: 80 inch-pounds

7. Bond Strength to Quarry Tile
   Minimum: 1000 psi

8. Vapor Transmission Rate (ASTM E-96)
   Maximum: .07 perms

9. Water Absorption (ASTM D-570)
   Maximum: .02% in 24 hours

10. 60° Gloss
    Minimum: 100.

1.4 Materials

A. Retro-Coat “A” shall be a modified epoxy containing special flexibilizers and specially formulated resins for superior chemical resistance and enhanced resilience. No solvents are allowed.

B. Retro-Coat “B” shall be customized blend of hardeners specifically formulated to maximize chemical resistance. No solvents are allowed.

1.5 Applicator

A. Applicator must be a certified contractor of Land Science Technologies.

Part 2 – Application

2.1 Surface Preparation

A. All existing surfaces that will be covered with the systems specified herein should be mechanically ground, shot blasted or sand blasted to yield a minimum 60 grit surface texture. All loosely adhered coatings will be removed. Any grease and other contaminants found on the concrete must also be removed.

B. All open cracks 1/2" and greater should be v-notched to a 3/4" width by 1/2" depth and cleaned of any debris. Such cracks should be filled with Retro-Coat Gel and struck off flush with the surrounding surface.

C. Cut back and/or remove any expansion joint backing or filler strips to a minimum of 1 ½" deep. Insert disposable filler in the joints to prevent filling with the overlayment materials and to allow for accurate location of final saw cuts in the overlayment.

2.2 Material Application

A. Retro-Coat CAULK

1. Apply Retro-Coat CAULK around the base of all pipe penetrations making sure to fill any gap between the penetration and concrete slab

2. Apply Retro-Coat CAULK to the joint created between horizontal and vertical transitions. The caulking material should be applied and pressed into the joint filling any gaps that might be present.

B. Retro-Coat PRIMER

1. Apply Retro-Coat PRIMER to all areas at a thickness of 6 mil and allow to dry tack free. In areas where the concrete surface is in need of slight repair or needs to be leveled, a slurry form of Retro-Coat PRIMER called Retro-Coat PRIMER-S can be applied with a flat squeegee. Retro-Coat PRIMER-S is self priming and does not need to be primed again.

C. Retro-Coat

1. Mix Retro-Coat, Part A with a low-speed (<750 rpm) jiffy-style mixer for about 30 seconds, or until uniform in color, then mix in Retro-Coat Coating, Part B for another 30-60 seconds.

2. Dump contents onto floor in a ribbon pattern, squeegee, and then back roll at a coverage rate of 160 SF/gallon to achieve a film thickness of 10 mils.

3. Apply second coat 10 mil coat to achieve a total thickness of 20 mils. Repeat as necessary to achieve specified thickness.

4. If a flooring material will be placed over Retro-Coat after it is applied, or appearance is not a priority, (1) 20 mil coat can be applied.

2.3 Protection of Finished Work

A. Prohibit foot traffic on floor for 24 hours after laying (at 70ºF). At 50ºF,this time should be extended to 48 hours.

B. Rinse off any chemicals that may come in contact within 7 days of installation with the freshly laid floor immediately.

2.4 Cleanup

A. Properly dispose of all unused and waste materials.

B. Tools can be washed in warm, soapy water when wet, but after drying, can only be cleaned by grinding or with a paint stripper.

C. Unused resin can be set off with proper amount of hardener and disposed of in regular trash bins.

Part 3 – Quality Control

3.1 Warranty

A. Installer shall provide a one year warranty against delamination, chemical attack and normal wear and tear.

B. Manufacturer will provide a one year material warranty.

3.2 Quality Control

A. Installer shall use a notched squeegee to apply Retro-Coat to the specified mil thickness and calculations shall be done to determine if the correct amount of material has been applied. Retro-Coat contains 100% solids at the time of application; therefore no material shrinkage will occur during the curing process. One gallon will cover 80 square feet.

B. A wet mil film gauge can be used to spot check the Retro-Coat thickness to make certain the minimum 20 mil thickness has been applied, though some discretion should be used because high points or low points on the underlying surface can adversely affect the thickness measurements.

3.3 Floor Care

A. The standard smooth surface of Retro-Coat should be cleaned on a regular basis by damp mopping the floor with conventional commercial cleaners. It is important to first remove any grease or oils by a suitable cleaner, preferably a citrus based cleaner. Rinse with clear water to help eliminate film buildup and then allow to dry. Never use abrasive powder cleaners like Ajax or Comet as they tend to scratch the floor.

B. Additional steps can also be taken to prolong the look and life of a seamless floor:

1. Protect the floor during transference of heavy equipment
2. Educate the drivers inside the building the importance of avoiding “jack-rabbit” starts and stops, as well as keeping the metal forks lifted
3. Regular cleaning should take place as to not allow the buildup of abrasive material, such as sand or dirt, on the coating
4. Eliminate all metal wheels
5. Change over to light-colored polyurethane wheels
6. Do not slide heavy metal totes, drums or bins across the floor
7. Immediately hose down chemical spills, especially on newly laid floors.