FARALLON consulting

975 5th Avenue Northwest, Issaquah, Washington 98027
Tel: (425) 295-0800 Fax: (425) 295-0850
www.farallonconsulting.com

VAPOR INTRUSION, INSPECTION, MONITORING, AND MAINTENANCE WORK PLAN

OLYMPIC MEDICAL FACILITY
5900 FIRST AVENUE SOUTH
SEATTLE, WASHINGTON

AGREED ORDER NO. DE 5348

Submitted by:
Farallon Consulting, L.L.C.
975 5th Avenue Northwest
Issaquah, Washington 98027

Farallon PN: 457-004

For:
Mr. Ron Taylor
Capital Industries, Inc.
5801 Third Avenue South
Seattle, Washington

November 2, 2009

Prepared by:

Daniel Caputo
Project Chemist

Reviewed by:

Peter Jewett, L.G., L.E.G.
Principal

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APPENDICES

ACRONYMS AND ABBREVIATIONS

Agreed Order	Agreed Order No. DE 5348 between the Washington State Department of Ecology and Capital Industries, Inc.
Capital	Capital Industries, Inc.
COPCs	constituents of potential concern
Ecology	Washington State Department of Ecology
Farallon	Farallon Consulting, L.L.C.
IPIM	Inhalation Pathway Interim Measures
IPIMALs	Inhalation Pathway Interim Measures Action Levels
PFE	Negative Pressure Field Extension
PSC	Philip Services Corporation
SSDS	Sub-Slab Depressurization System
VI Mitigation System	Vapor Intrusion Mitigation System
VIA Work Plan	Vapor Intrusion Assessment Work Plan dated September 2008, prepared by Farallon, Consulting, L.L.C.
VIM Work Plan	Vapor Intrusion Mitigation Work Plan dated October 2008, prepared by Farallon, Consulting, L.L.C.
VIIMM Work Plan	Vapor Intrusion, Inspection, Monitoring, and Maintenance Work Plan dated August 2009, prepared by Farallon, Consulting, L.L.C. (this report)
VOC	volatile organic compounds

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Vapor Intrusion, Inspection, Monitoring, and Maintenance Work Plan (VIIMM Work Plan) on behalf of Capital Industries, Inc. (Capital) to describe the procedures for inspection, maintenance, and monitoring of the vapor intrusion mitigation system (VI mitigation system) installed at the Olympic Medical facility located at 5900 First Avenue South in Seattle, Washington (Figure 1). The VIIMM Work Plan has been prepared as part of the Remedial Investigation currently being conducted in accordance with Exhibits B and D of Agreed Order No. DE 5348, which was entered into by Capital and the Washington State Department Ecology (Ecology) on January 24, 2008 (Agreed Order).

1.1 PURPOSE

The purpose of the VIIMM Work Plan is to describe the procedures to be used to inspect, monitor, and maintain the VI mitigation system installed in the Olympic Medical facility to prevent migration of vapors with constituents of potential concern (COPCs) from groundwater to indoor ambient air within the building. The inspection, monitoring, and maintenance procedures are consistent with the Inhalation Pathway Interim Measures (IPIM) Work Plan prepared by Philip Services Corporation (PSC) (2002) and the Draft Interim Vapor Intrusion Plan prepared by Arrow et al. (2007), which is provided as Exhibit D of the Agreed Order.

1.2 VAPOR INTRUSION INSPECTION, MONITORING, AND MAINTENANCE WORK PLAN ORGANIZATION

The VIIMM Work Plan has been organized into the following sections: Section 1 presents the VIIMM Work Plan purpose; Section 2 provides a Site description, a summary of the VI Mitigation Work Plan, and an overview of the Olympic Medical facility VI mitigation system design; Section 3 discusses system inspection, monitoring, and maintenance procedures; and Section 4 discusses the reports that will be prepared to describe the results of the inspection, monitoring, and maintenance activities. The documents used in preparation of the VIIMM Work Plan are referenced in Section 5.

2.0 SITE DESCRIPTION AND SYSTEM DESIGN

2.1 SITE DESCRIPTION

The Olympic Medical facility is located within the Capital Area of Investigation, down-gradient and southwest of the Capital property (Figure 2). Mitigation of vapor intrusion was deemed necessary based on the analytical results of ambient air samples collected by others (PSC 2005a; GeoEngineers Inc. 2006). Farallon evaluated the data collected by others in accordance with the *Vapor Intrusion Assessment Work Plan, Capital Industries, Inc., 5801 Third Avenue South, Seattle, Washington* (Farallon 2008b) (VIA Work Plan). The VI mitigation system was designed according to specifications defined in the *Vapor Intrusion Mitigation Work Plan, Olympic Medical Facility, Seattle, Washington* (Farallon 2008c) (VIM Work Plan); and was installed at the Olympic Medical facility in January 2009. The City of Seattle Department of Planning and Development Mechanical Expedited (Full) Permit Application includes a schematic of the sub-slab depressurization system (SSDS) installed in the Olympic Medical facility and is provided in Appendix A.

2.2 VAPOR INTRUSION MITIGATION WORK PLAN

The preparation and design of the VI mitigation system at the Olympic Medical facility was completed in accordance with the VIM Work Plan, which summarized the procedures to be used to mitigate intrusion of vapors with concentrations of volatile COPCs that migrate from groundwater to buildings located within the Capital Site. The VIM Work Plan includes procedures for collecting VI mitigation system design data; preparing the VI mitigation system design; and installing, implementing, and operating the VI mitigation system.

2.3 VAPOR INTRUSION MITIGATION SYSTEM

The VI mitigation system addressed in this VIIMM Work Plan includes the SSDS installed at the Olympic Medical facility. The VI mitigation system is designed to maintain negative pressure directly beneath the building, thereby acting as a "sink" for soil vapors in the vicinity of the structure. The VI mitigation system installed at the Olympic Medical facility was designed and installed by Advanced Radon Technologies and began operation on January 23, 2009.

Prior to installation of the VI mitigation system, diagnostic testing was conducted at the Olympic Medical facility to determine the layout and number of sump locations necessary to depressurize the warehouse and manufacturing areas of the facility. The results of the diagnostic testing determined that seven sump locations connected to one exhaust fan that discharges through one exhaust stack would be adequate for the mitigation system at the Olympic Medical facility (Farallon 2009a). Schematics of the SSDS design and layout are provided in Appendix A. A detailed discussion of the VI mitigation system design is presented in the *Vapor Intrusion Mitigation Design Plan, Olympic Medical Facility* dated March 9, 2009, prepared by Farallon (2009a).

A total of seven sumps, each consisting of a 5-inch-diameter boring directly above a 10- to 20-gallon sub-slab cavity, were installed during the diagnostic testing phase. A schematic of each sump location is presented on Sheet No. M4 of Appendix A. Risers and piping connect each sump to the exhaust fan, which is mounted on the roof of the Olympic Medical facility. Risers are seated on a rubber seal within the sump, sealed with waterproof sealant, and extend from the sump located at and below ground level through the ceiling and/or roof. Each location where risers penetrate the roof is sealed with roof flashing and waterproof sealant. The specific details for each riser are presented on Sheet No. M4 of Appendix A.

Piping connects the risers to the exhaust fan mounted on the roof of the Olympic Medical facility. All of the piping forms one network and is positioned so the connection to the exhaust fan is at the highest point of the network and the connection to each riser is at the lowest point of the network. Piping is angled to prevent water vapor from condensing into pools at low spots within the piping. Piping specifications are presented on Sheet No. M3 of Appendix A.

A Rotron DR656K72X 3-horsepower regenerative exhaust fan manufactured by Ametek Technical and Industrial Products provides the suction to the sumps via the risers and piping of the mitigation system. The specifications for the exhaust fan were determined by Advanced Radon Technologies based on information collected during the diagnostic testing conducted at the Olympic Medical facility (Farallon 2009a). The exhaust fan is mounted to a raised platform on the roof of the Olympic Medical facility. Vibration isolators are used between the exhaust fan and the platform to prevent roof vibration and excess noise. The exhaust fan is connected and sealed to the piping and the exhaust stack. The regenerative blower schedule presents the specific details of the exhaust fan on Sheet No. M4 of Appendix A

The exhaust stack is constructed of stainless steel and polyvinyl chloride (PVC) that effectively extends the point of emission to a height of approximately 7 feet above roof level. The exhaust stack outlet is angled and cut on the vertical to prevent precipitation from entering the exhaust stack while continuing to exhaust emissions. A schematic showing the specific details of the exhaust stack are presented on Sheet No. M4 of Appendix A.

A pressure gauge was installed at each riser to measure and confirm that negative pressure is being applied throughout the mitigation system. Previously constructed systems in the area have included manometer on each leg of the system to monitor system performance; however, due to the size of the Olympic Medical facility, subsurface conditions, the riser and piping network, and the fan, system pressure exceeds the limits of the commonly used manometer. Therefore, a Magnehelic pressure gauge rather than a manometer is used to measure system pressure. A valve system was installed to enable disconnection of pressure gauges during non-monitoring events.

The pressure gauge and valve system was mounted to the riser with flexible tubing. A main valve was installed between the riser and the pressure gauge to regulate the pressure applied to the gauge from the riser. A relief valve was installed to control the pressure between the first valve and the pressure gauge. The relief valve can open the pressure gauge to ambient air pressure during non-monitoring events and relieve the pressure within the tubing after the main valve has been closed. The main valve will remain closed and the relief valve will remain open

when the VI monitoring system is not operating. During VI system monitoring events, the main value will be opened and the relief valve will be closed to activate the pressure gauge. The pressure gauge will provide confirmation that negative pressure is being applied by the exhaust fan to the subsurface via each riser. The negative pressure applied by the exhaust fan will not allow soil gas removed from the subsurface to enter indoor air. Opening the relief valve will allow indoor air to enter the tubing, thereby relieving negative pressure remaining in the pressure gauge when it is not in use. A schematic of the pressure gauge and valve set-up, as well as the product literature and specifications associated with the devices, is included in Appendix B.

3.0 INSPECTION, MONITORING, AND MAINTENANCE PROCEDURES

This section presents the inspection and monitoring procedures to be conducted by Capital at the Olympic Medical facility, the protocols for evaluating and enhancing VI mitigation system effectiveness, system operation and maintenance, and guidelines to shut down the VI mitigation system. The inspection and monitoring activities were developed based on and will be conducted in accordance with the *Verification of Depressurization System Effectiveness and Long-Term Operation and Maintenance Plan for Inhalation Pathway Interim Measures* developed for the PSC (2005b) Georgetown Facility. Monitoring procedures at the Olympic Medical facility will be conducted parallel to the groundwater monitoring conducted at the Capital Site as part of the Capital Remedial Investigation. Table 1 provides a summary of inspection and monitoring tasks and the frequency at which they will occur.

3.1 INSPECTION AND MONITORING

Periodic inspection and monitoring will be conducted during operation of the VI mitigation system to confirm that the Olympic Medical facility SSDS is operating effectively. The inspections and monitoring will be conducted by Capital until inspection and monitoring responsibilities have been transferred to a separate entity with Ecology approval. Formal inspection and monitoring of the VI mitigation system will include the following:

- Annual system inspection;
- Biannual negative pressure field extension (PFE) monitoring, and
- Biannual air quality monitoring.

3.1.1 Tenant Inspections

Tenant inspections will be conducted on a monthly basis to ensure that the SSDS is operating properly. During inspections, the tenants will conduct a check of each riser pressure gauge that is accessible. Capital will send a monthly reminder to the tenant at the Olympic Medical facility to prompt the recipients to check the pressure gauges to confirm that the VI mitigation system is operating properly. The current tenants of the Olympic Medical facility have agreed to perform inspections. Inspections will be documented in an inspection log book located at the Olympic Medical facility. The Reminder Notice to Tenants is provided in Appendix C. An example of the Log Book located at the Olympic Medical facility is provided in Appendix D.

If the SSDS system is not operating properly, Olympic Medical facility tenant will contact Capital and/or Farallon. Contact information for the Olympic Medical facility, Capital, and Farallon is provided below.

- Olympic Medical
  Ms. Lana Hauge, Operations Manager
  5900 First Avenue South
  Seattle, Washington 98108
  (206) 268-5166

- Capital Industries, Inc.
  Mr. Ray Carr, Plant Manager
  5801 Third Avenue South
  Seattle, Washington 98108
  (206) 762-8585

- Farallon Consulting, L.L.C.
  Mr. Daniel Caputo, Project Chemist
  975 5th Avenue Northwest, Suite 100
  Issaquah, Washington 98027
  (425) 295-0800

3.1.2 Annual Inspections

Annual inspections will be conducted to observe and document the condition of the SSDS and to record changes to the Olympic Medical facility and surrounding area that could affect the SSDS performance. To the extent feasible, annual inspections will be conducted at the same time of year to facilitate documenting inspection results in a single submittal. The Sub-Slab Depressurization System Inspection Form presented in Appendix E will be used to document the annual inspections.

The annual inspection will consist of observing and documenting the condition of VI mitigation system components and any structural changes or modifications to the Olympic Medical facility and adjacent buildings and structures, and recording the pressure gauge measurements at each of the seven sumps at the Olympic Medical facility. The pressure gauge measurements previously documented on the Sub-Slab Depressurization System Inspection Form will be used for comparison during the inspection. Photographs will be taken during the inspection to document any deterioration of materials (e.g., cracks in piping, mounting damage) and other pertinent changes in the condition of the VI mitigation system, the building structure, or other factors that could impact system operation and effectiveness.

3.1.3 Negative Pressure Field Extension Monitoring

PFE monitoring will be conducted at the Olympic Medical facility on a biannual basis during the heating season to measure the pressure differential across the building slab while the VI mitigation system is operating. The results of the PFE monitoring will be used to confirm that the negative pressure field extends to points far removed from the sump locations. The 10 test holes located throughout the slab of the Olympic Medical facility will be used for the PFE monitoring to determine the radius of influence of each sump. A negative pressure of 0.005 inches of water column or more at each of the test holes is considered acceptable. The test holes will be plugged between monitoring events to maintain the integrity of the depressurization applied by the mitigation system.

3.1.4 Air Quality Monitoring

Air quality monitoring will be conducted on a biannual basis in conjunction with biannual PFE monitoring. A site-specific Sampling and Analysis Plan (SAP) will be prepared to guide the air quality monitoring and will specify the number of air samples to be collected, sampling locations, and related air monitoring criteria. A draft SAP will be submitted to Ecology for review at least 30 days prior to the scheduled sampling event. Air quality monitoring, evaluation of results, and comparison with indoor air IPIM action levels (IPIMALs) will be conducted in accordance with the methodology specified in the VIA Work Plan.

An SAP relative to air quality monitoring will be submitted at least 30 days prior to the scheduled monitoring event. The air quality monitoring SAP will provide the sampling and analysis procedures to be conducted during each biannual air quality monitoring event.

3.2 SYSTEM RE-EVALUATION AND ENHANCEMENT

The results of air quality monitoring, PFE monitoring, groundwater monitoring, and/or annual inspections will be evaluated to determine whether modifications to the VI mitigation system are necessary. The VI mitigation system will be re-evaluated or modified to enhance effectiveness, if warranted, based on inspection and monitoring results. The following criteria will be used to determine whether re-evaluation of the VI mitigation system is warranted:

- Inspection results indicate a significant structural change in the Olympic Medical facility (e.g., remodeling that could introduce additional pathways for vapor intrusion);
- Air quality monitoring results indicate an indoor air IPIMAL exceedance; and/or
- Groundwater sampling analytical results indicate a minimum tenfold increase in cumulative VI risk/hazard, as defined in the VIA Work Plan, in the vicinity of the Olympic Medical facility.

The scope of work to re-evaluate and, if necessary, enhance VI mitigation system effectiveness will be provided on a case-by-case basis and discussed with Ecology. If a significant structural change is observed in the Olympic Medical facility or if the analytical results for groundwater samples indicate a significant increase in volatile organic compounds (VOC) concentrations, Capital will contact Ecology within 3 weeks of the building inspection date or receipt of analytical results.

3.3 SYSTEM MAINTENANCE

VI mitigation system maintenance will be performed on an as-needed basis following the first year of operation, and will be based on conditions observed during the annual inspections or on reports from the Olympic Medical facility tenant. Components that may require maintenance include the exhaust fan, pressure gauges, and piping. The exhaust fan is not amenable to periodic maintenance and is relatively easy to replace. Therefore, the fan will be operated until excessive noise, vibration, or significantly reduced pressure gauge readings are noted, at which point the fan will be repaired or replaced. An operational failure of the fan would be indicated

by pressure gauges that will be checked during monthly tenant inspections and annual inspections.

Pressure gauges are less robust than manometers over continued use and may fail after prolonged use. The pressure gauges were installed on multiple "legs" connecting the exhaust fan to the sub-slab sumps to aid in identification of a failed gauge. With this design, a failed pressure gage will be identifiable when it is the only gauge not reading the correct system pressure when compared against the other gauges. If a pressure gauge failure is confirmed, a replacement pressure gauge will be installed and tested. If a manometer is identified that can effectively monitor the existing and anticipated pressure ranges, one may be used in place of a pressure gauge.

Replacement of cracked or otherwise damaged system piping observed during annual inspections or identified by the building tenant may be required. Proposed modifications to the SSDS will be presented to Ecology for approval prior to proceeding with the work.

3.4 SYSTEM SHUTDOWN

The analytical results of groundwater monitoring will be evaluated to determine whether continued operation of the SSDS at the Olympic Medical facility is necessary to mitigate migration of VOCs from groundwater to indoor air. The analytical results for the groundwater samples collected from monitoring wells proximate to the Olympic Medical facility will be periodically collected for analysis, and results compared against groundwater IPIMALs. If concentrations of VOCs are below the respective IPIMALs, continued operation of the SSDS at the Olympic Medical facility may not be necessary. Capital will discuss with Ecology the shutdown procedures, public communications, and post-shutdown monitoring requirements when operation of the SSDS at the Olympic Medical facility is deemed no longer necessary.

4.0 REPORTING

The results of the SSDS inspections and monitoring at the Olympic Medical facility will be presented in an Annual Report. Each Annual Report will contain a brief narrative of the procedures followed for the inspection, monitoring, and maintenance activities; a copy of completed inspection forms; a summary of pressure gauge readings; the results of PFE monitoring; and the results from air quality monitoring events. Each Annual Report will document potentially significant changes in conditions or other issues observed during the inspections, present supporting photographs, and recommend follow-up investigations and/or corrective actions, if necessary. Each Annual Report will include an evaluation of the most recent groundwater monitoring results to identify changes in VOC concentrations that could trigger re-evaluation of SSDS effectiveness, and to determine when operation of the SSDS may no longer be necessary. Following review and approval by Capital, the Annual Report will be submitted to Ecology for review and comment within 60 days of the annual inspection.

Inspection and monitoring results and any maintenance that occurred during the preceding quarter will be discussed in Quarterly Progress Reports.

5.0 BIBLIOGRAPHY

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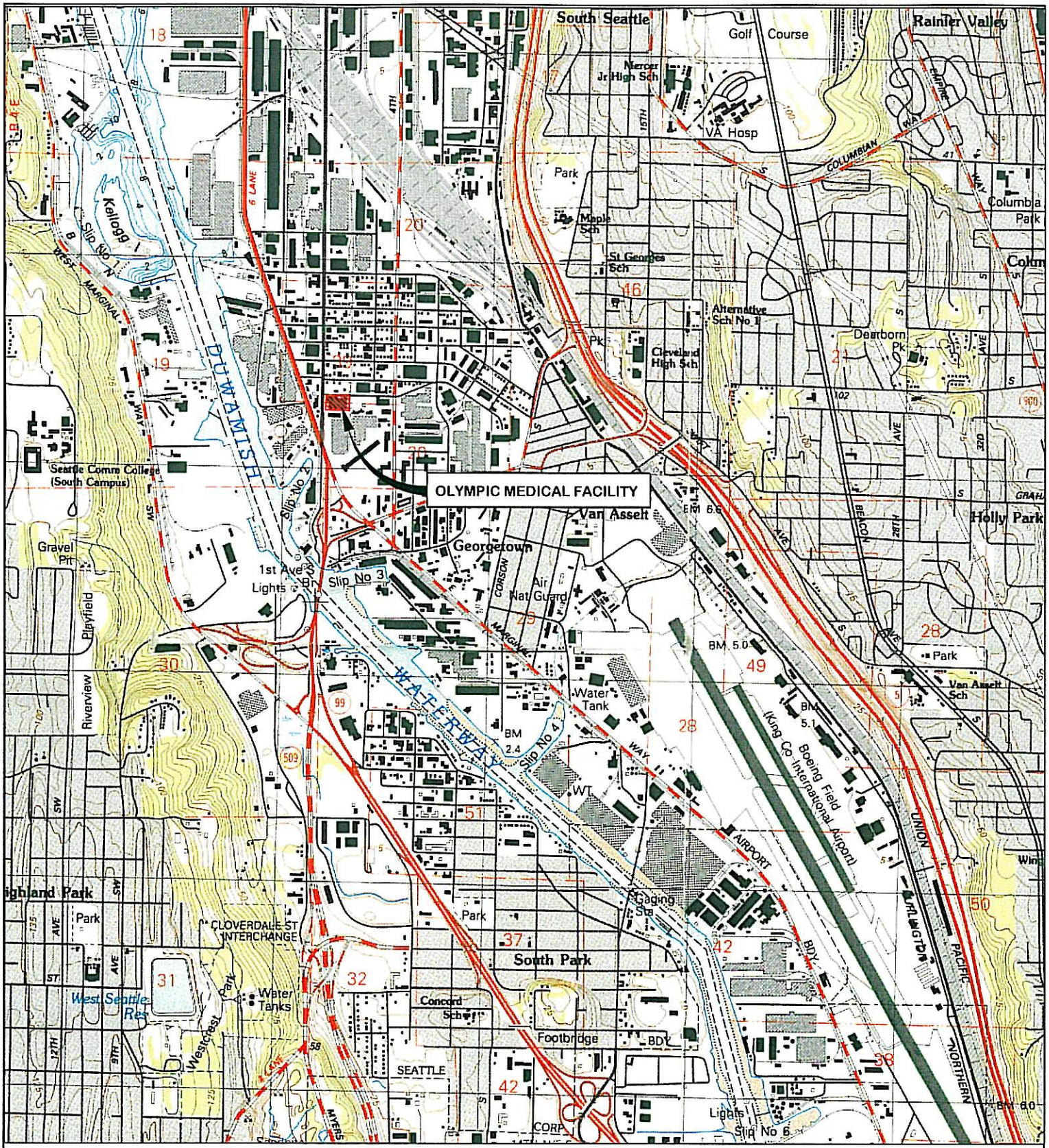
FIGURES

VAPOR INTRUSION, INSPECTION, MONITORING,
AND MAINTENANCE WORK PLAN
Olympic Medical Facility
5900 First Avenue South
Seattle, Washington

Farallon PN: 457-004



REFERENCE: 7.5 MINUTE USGS QUADRANGLE SOUTH SEATTLE, WASHINGTON. DATED 1983

0 500

APPROXIMATE SCALE IN METERS

FARALLON CONSULTING
975 5th Avenue Northwest
Issaquah, WA 98027

FIGURE 1

VICINITY MAP
VAPOR INTRUSION, INSPECTION, MONITORING AND MAINTENANCE WORK PLAN
OLYMPIC MEDICAL FACILITY
SEATTLE, WASHINGTON

FARALLON PN: 457-004

Drawn By: DEW	Checked By: DC	Date: 8/24/09	Disk Reference: FLOORJIM21

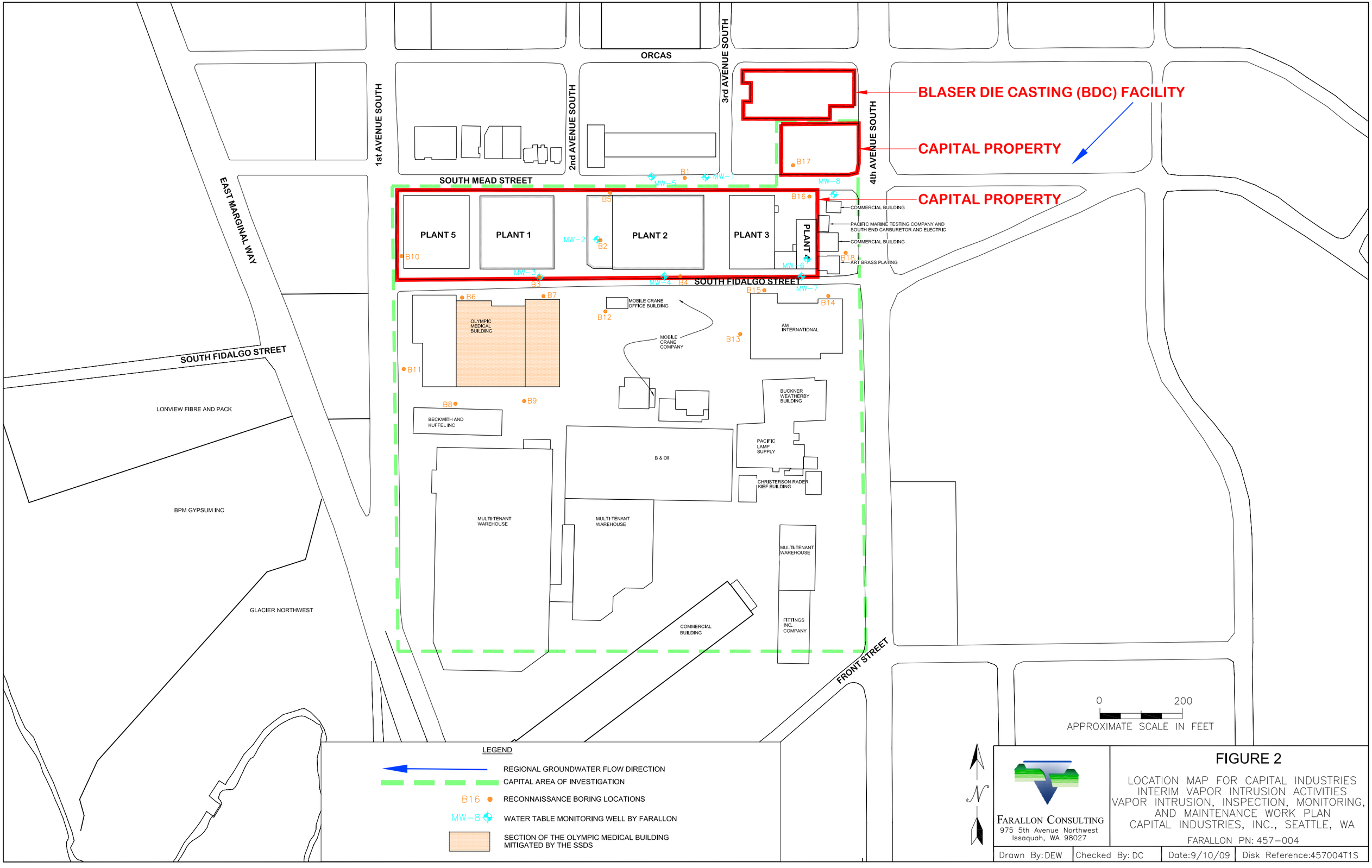


FIGURE 2

LOCATION MAP FOR CAPITAL INDUSTRIES
INTERIM VAPOR INTRUSION ACTIVITIES
VAPOR INTRUSION, INSPECTION, MONITORING, AND MAINTENANCE WORK PLAN
CAPITAL INDUSTRIES, INC., SEATTLE, WA

FARALLON PN: 457-004

FARALLON CONSULTING
975 5th Avenue Northwest
Issaquah, WA 98027

Drawn By: DEW	Checked By: DC	Date: 9/10/09	Disk Reference: 457004T1S

CAPITAL INDUSTRIES

CAPITAL INDUSTRIES

CAPITAL INDUSTRIES

SOUTH FIDALGO STREET

1st AVENUE SOUTH

AA008

P-1

P-9

AA007

S-4

P-4

S-7

S-1

MANUFACTURING AREA

P-2

P-8

S-3

MOBILE CRANE

OFFICE AREA

P-3

AA006

WAREHOUSE AREA

S-5

P-6

S-2

P-7

P-11

P-10

S-6

OLYMPIC MEDICAL FACILITY

BECKWITH AND KUFFEL BUILDING

LEGEND

PROPERTY LINE

EXTERIOR BUILDING WALL

P-4 PRESSURE FIELD EXTENSION TEST HOLE LOCATION

S-2 SUMP / PRESSURE GAUGE LOCATION

AA008 AIR SAMPLE (APRIL 2004)

N

0 50

APPROXIMATE SCALE IN FEET

FARALLON CONSULTING
975 5th Avenue Northwest
Issaquah, WA 98027

FIGURE 3

OLYMPIC MEDICAL FACILITY SUMP TEST HOLE, AIR SAMPLE LOCATIONS, VAPOR INTRUSION, INSPECTION, MONITORING, AND MAINTENANCE WORK PLAN
CAPITAL INDUSTRIES, INC., SEATTLE, WA

FARALLON PN: 457-004

Drawn By: DEW	Checked By: DC	Date: 9/10/09	Disk Reference: FLOORJIM21

TABLE

VAPOR INTRUSION, INSPECTION, MONITORING,
AND MAINTENANCE WORK PLAN
Olympic Medical Facility
5900 First Avenue South
Seattle, Washington

Farallon PN: 457-004

Table 1
Summary of Inspection and Monitoring Tasks
Vapor Intrusion Inspection, Monitoring, and Maintenance Work Plan
Olympic Medical Facility
Seattle, Washington
Farallon PN: 457-004

Inspection and Monitoring Task	Frequency/Dates	Performed by:	Documented In:
Check all riser pressures	Monthly	Olympic Medical	Olympic Medical VI Inspection Log Book
System inspections	Annually; each January	Farallon	VI Annual Report
PFE tests	Biannually; every other January starting 01/2011	Farallon	VI Annual Report (when applicable)
Performance air-sampling	Biannually; every other January starting 01/2011	Farallon	VI Annual Report (when applicable)

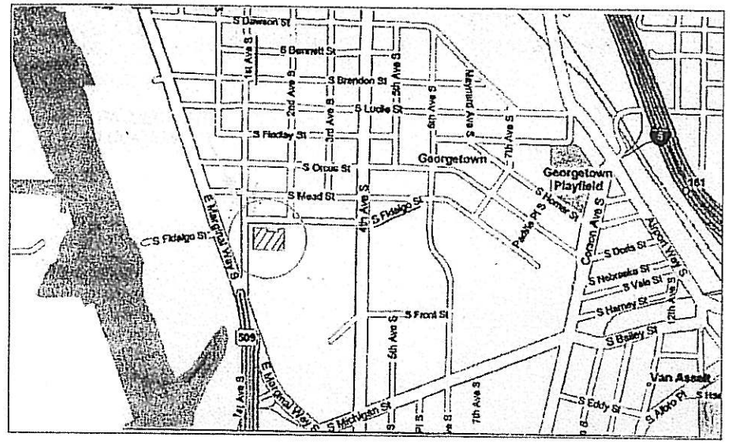
APPENDIX A
CITY OF SEATTLE PERMIT APPLICATION

VAPOR INTRUSION, INSPECTION, MONITORING,
AND MAINTENANCE WORK PLAN
Olympic Medical Facility
5900 First Avenue South
Seattle, Washington

Farallon PN: 457-004

OLYMPIC MEDICAL BUILDING
City of Seattle
Department of Planning & Development

Olympic Medical Building
5900 1st. Avenue South
Seattle, Washington
98108-3248



MECHANICAL ENGINEER:

MANDATORY CODE COMPLIANCE

	VOC PIPING (VOLATILE ORGANIC COMPOUND)
	CONTINUATION OF PIPING
	TEE DOWN
	TEE UP
	ELBOW DOWN
	ELBOW UP
	EXHAUST FAN
	CAPPED END
	PLAN NOTE
	SECTION DESIGNATION SHEET ON WHICH SECTON IS DRAWN
	DETAIL DESIGNATION DETAIL NUMBER SHEET ON WHICH DETAIL IS DRAWN

AFF	ABOVE FINISHED FLOOR
BV	BALL VENT
CU	CONDENSING UNIT
EF	EXHAUST FAN
FA	FRESH AIR INTAKE
IE	INVERT ELEVATION
RD	ROOF DRAIN
RV	RELIEF VENT
RTU	ROOF TOP UNIT
TYP	TYPICAL
VOC	VOLATILE ORGANIC COMPOUND
VTR	VENT THRU ROOF

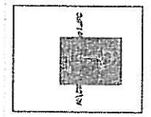
1. EQUIPMENT AND MATERIAL REMOVED SHALL BECOME PROPERTY OF THE CONTRACTOR UNLESS NOTED OTHERWISE AND SHALL BE REMOVED OFF-SITE.
2. DRAWINGS ARE PARTLY DIAGRAMMATIC AND DON'T NECESSARILY SHOW EXACT CONDITIONS OF CONSTRUCTION. LOCATION OF PIPING SHALL BE FIELD VERFIED TO DETERMINE THAT IT CLEARS ALL OPENINGS AT STRUCTURAL MEMBERS, CHASES AND THAT EQUIPMENT, ETC. HAVING FIXED LOCATIONS WILL BE CLEARED.
3. EXAMINE PREMISES AND BECOME FAMILIAR WITH EXISTING CONDITONS BEFORE STARTING WORK. FIELD VERIFY CONSTRUCTION MATERIALS OF FLOORS, WALLS, CEILINGS AND ROOFS BEFORE STARTING WORK. OTHER EXISTING MATERIALS AND EQUIPMENT ARE NOT SHOWN ON THESE DRAWINGS SUCH AS DUCTWORK, HVAC EQUIPMENT, HEATING PIPING, GAS PIPING, CONDUIT, ETC. THE CONTRACTOR SHALL FIELD VERIFY LOCATIONS AND SIZES OF EXISTING MATERIALS AND EQUIPMENT AND SHALL OFFSET NEW PIPING AS NECESSARY AROUND EXISTING MATERIALS AND EQUIPMENT.
4. REMOVE MEANS, REMOVE AND DISPOSE OF UNLESS SPECIFICALLY DIRECTED OTHERWISE.
5. DO NOT ALLOW ANY WORK (PIPING/EQUIPMENT) TO BE COVERED UP OR ENCLOSED UNTIL INSPECTED, TESTED AND APPROVED BY AUTHORITY HAVING JURISDICTION AND/OR THE OWNER'S REPRESENTATIVE.
6. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. WHERE CONFLICTS OCCUR, BRING THOSE TO THE ATTENTION OF THE DESIGN ENGINEER IMMEDIATELY AND BEFORE INSTALLING THE PIECE OF EQUIPMENT OR ITEM.
7. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY SAW CUTTING AND CORE DRILLING AND PATCHING OF FLOORS, WALLS, CEILINGS AND ROOFS IN ORDER TO INSTALL THE NEW VOC SYSTEMS.
8. THE CONTRACTOR SHALL ARRANGE AND PAY FOR ALL PERMITS, INSPECTIONS AND FEES REQUIRED IN CONNECTION WITH THIS PROJECT.

PLOT SCALE: 1/4"=1'-0"

R. GERARD WASHINGTON STATE REGISTERED PROFESSIONAL ENGINEER
EXPIRES 1/15/09

326-5127

RADON MITIGATION TESTING AND INSTALLATION
NORTH 2801 MONROE, SUITE A
SPOKANE, WASHINGTON
(509) 326-5127



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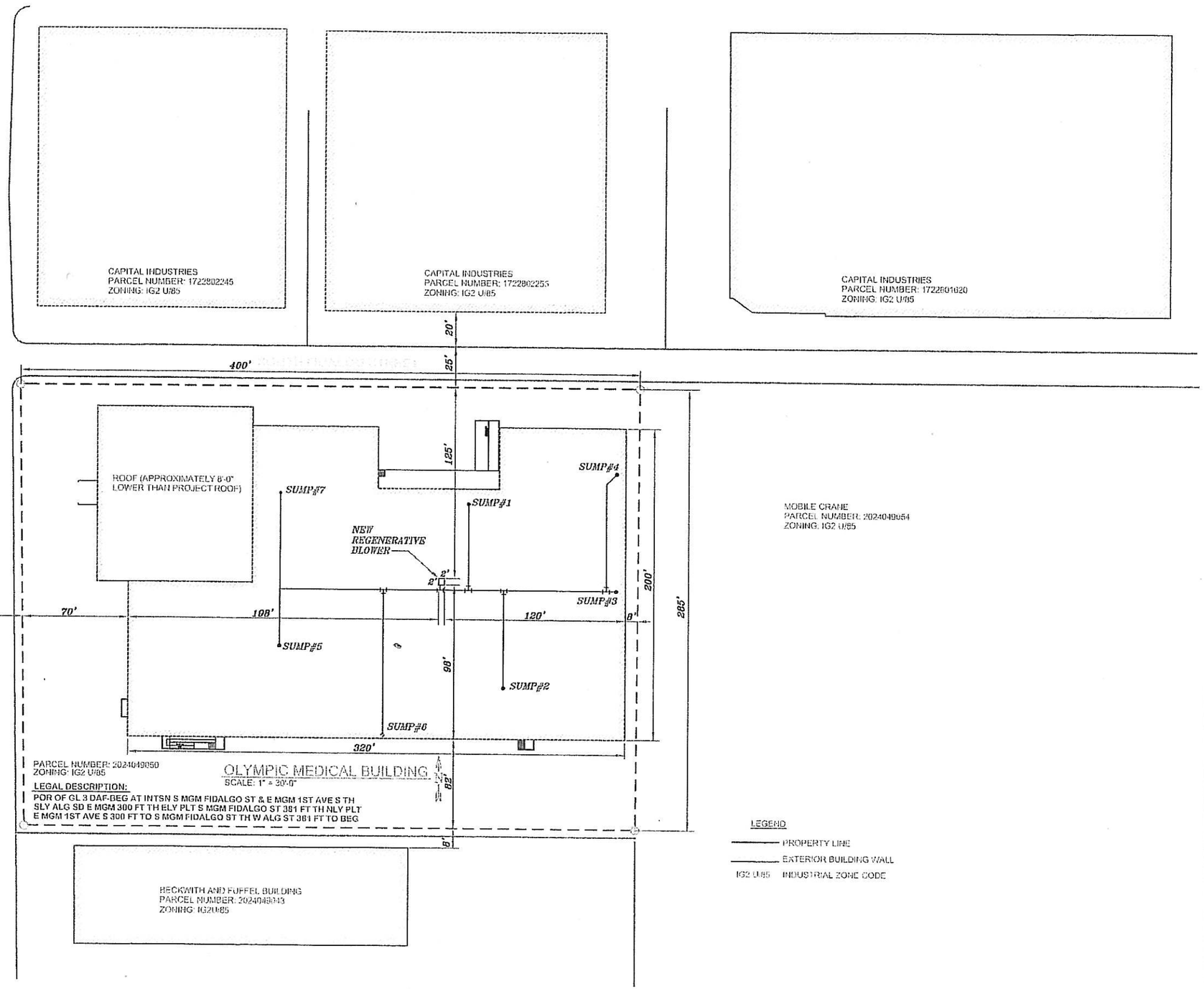

SCALE: 1" = 30'

GERARD KLEIN
REGISTERED PROFESSIONAL ENGINEER
STATE OF WASHINGTON
EXPIRES 11/5/09

326-5127

RADON MITIGATION TESTING AND INSTALLATION
NORTH 2801 MONROE, SUITE A
SPOKANE, WASHINGTON
(509) 326-5127

PROJECT:
SEATTLE, WASHINGTON
98108-3248

JOB NO.: 6198563
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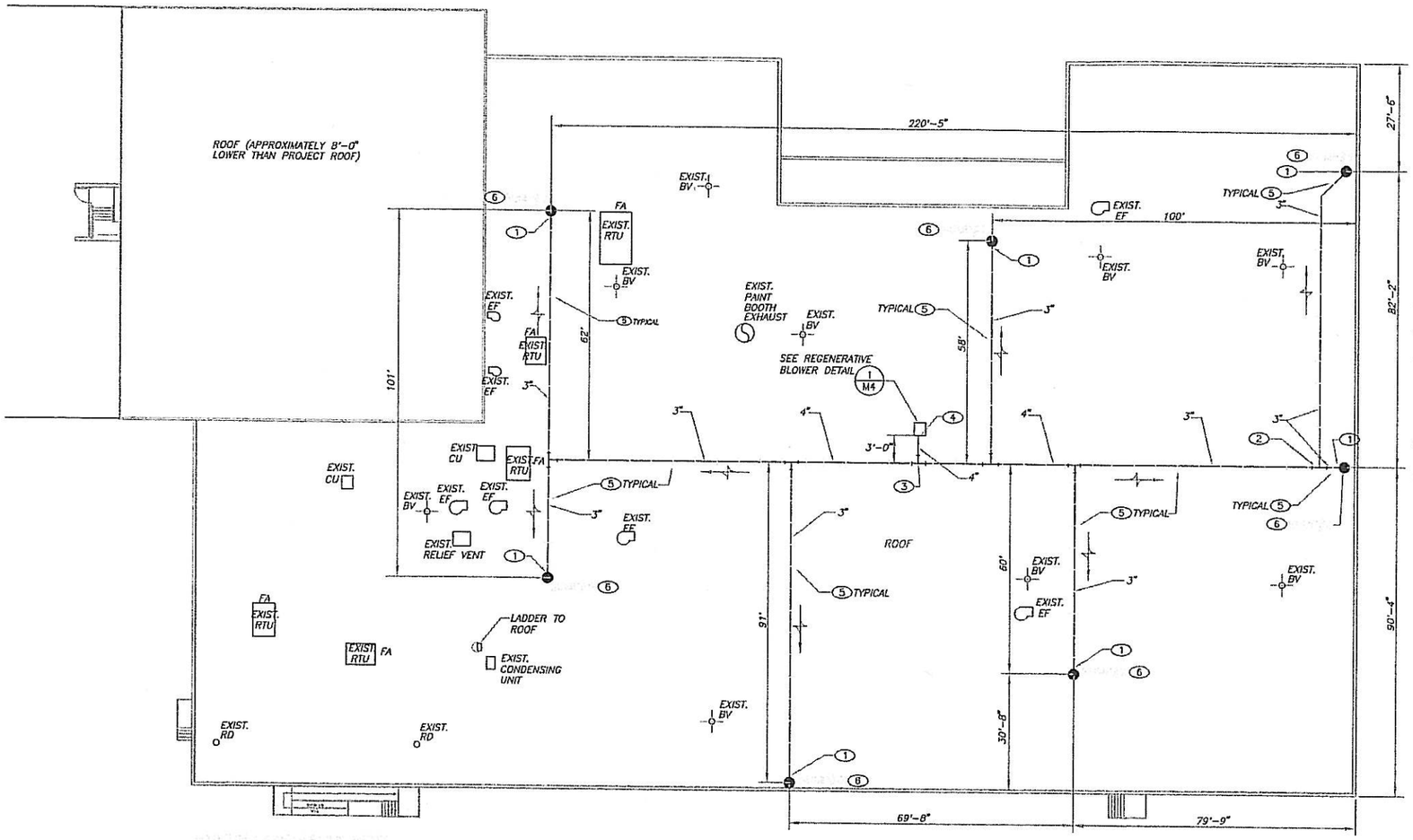
CHECKED: DG

SHEET NO.:



EXIST. RTU = 80 sq. ft. x 5 = 400 sq. ft.
EXIST. EF = 4 sq. ft. x 7 = 28 sq. ft.
EXIST. CU = 9 sq. ft. x 4 = 36 sq. ft.
EXIST. BV = 1 sq. ft. x 9 = 9 sq. ft.
EXIST. RV = 2 sq. ft. x 1 = 2 sq. ft.
EXIST. RD = .5 sq. ft. x 2 = 1 sq. ft.
NEW BLOWER= 4 sq. ft. x 1 = 4 sq. ft.
TOTAL APPROX. SQ.FT. = 480 sq. ft.

SCALE: 1/16" =1'-0"

ROOF AREA = 52,800 GSF
EXISTING HVAC EQUIPMENT AREA = 476 GSF
NEW HVAC EQUIPMENT AREA = 4 GSF
ROOF COVERAGE = $\frac{\text{EXIST. HVAC (476) + NEW HVAC (4)}}{52{,}800} \times 100\% = .91\%$

NEW REGENERATIVE BLOWER = 83 dBA
DISTANCE TO CLOSEST PROPERTY LINE = 130 FT.
dBA REDUCTION FROM EQUIPMENT (TABLE 2) 38 dBA
NET SOUND LEVEL = 83 dBA - 38 dBA = 45 dBA

PLOT SCALE: 1/4"=1'-0"

PLAN NOTES:

1. PIPE INVERT ELEVATION AT THIS APPROXIMATE LOCATION IS 12 INCHES ABOVE ROOF LEVEL.
2. PIPE INVERT ELEVATION AT THIS APPROXIMATE LOCATION IS 22 INCHES ABOVE ROOF LEVEL.
3. PIPE INVERT ELEVATION AT PIPE TEE AT THIS APPROXIMATE LOCATION IS 35 INCHES ABOVE ROOF LEVEL.
4. PIPE INVERT ELEVATION AT INLET CONNECTION TO BLOWER FAN IS 38 INCHES ABOVE ROOF LEVEL.
5. CONTRACTOR SHALL PROVIDE ROOF PIPE SUPPORT SADDLES A MINIMUM OF EVERY 6 FEET FOR PIPE SUPPORT ON ROOF. PIPING ON ROOF SLOPES 1/8" PER FOOT. PIPE SADDLE SUPPORT HEIGHTS VARY. CONTRACTOR SHALL FIELD VERIFY DURING INSTALLATION OF PIPE SADDLE SUPPORTS THE EXACT HEIGHTS FOR EACH SUPPORT SADDLE INSTALLED ON ROOF AS REQUIRED.
6. SEE DETAIL SHEET M4 FOR SUMP INSTALLATIONS SUMP #1 THROUGH SUMP #7.

RICHARD R. GERARD — STATE OF WASHINGTON — 15151 — REGISTERED PROFESSIONAL ENGINEER — EXPIRES 1/21/09

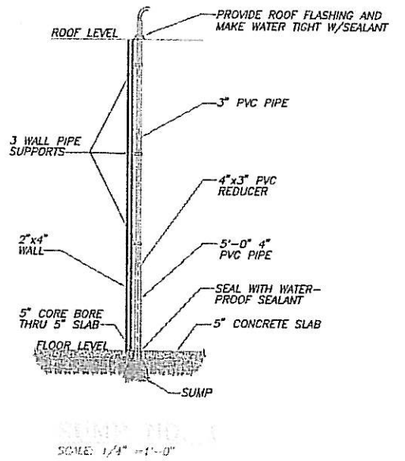
326-5127

RADON MITIGATION TESTING AND INSTALLATION
NORTH 2801 MONROE, SUITE A
SPOKANE, WASHINGTON
(509) 326-5127

PROJECT: SEATTLE, WASHINGTON 98108-3248

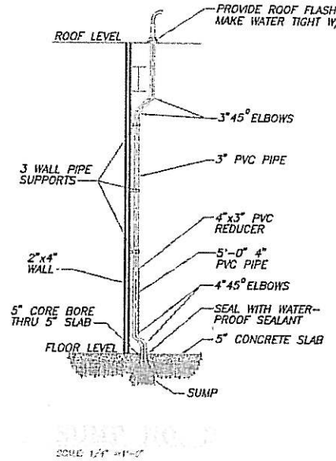
JOB NO.: 6198563
DATE: 11/07/08
DRAWN: KJ
CHECKED: DG

SHEET NO.:



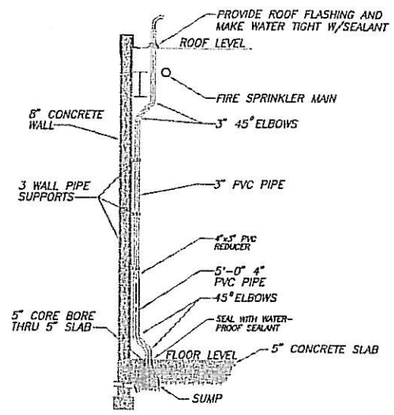
SUMP NO. 1

SCALE: 1/4" =1'-0"



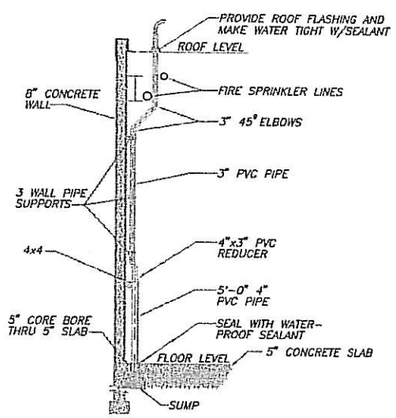
SUMP NO. 2

SCALE: 1/4" =1'-0"



SUMP NO. 3

SCALE: 1/4" =1'-0"



SUMP NO. 4

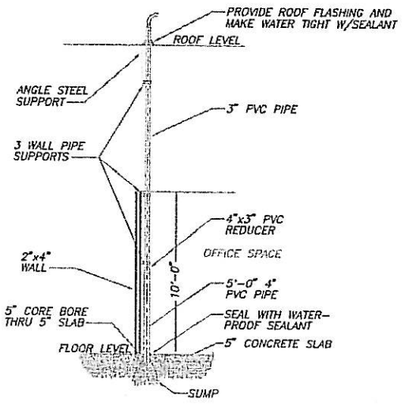
SCALE: 1/4" =1'-0"

REGENERATIVE BLOWER SCHEDULE

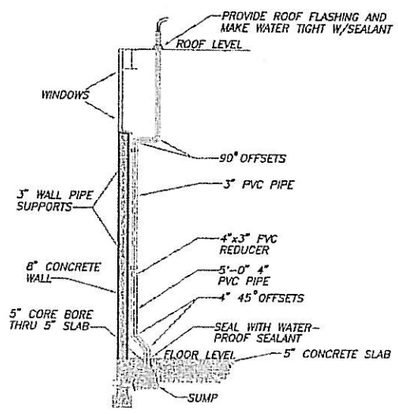
UNIT #	BRAND NAME	MODEL #	MOTOR ENCLOSURE SHAFT MATERIAL	HP	VOLTAGE	PHASE-FREQUENCY	INSULATION CLASS	NEMA RATED MOTOR AMPS	SERVICE FACTOR	LOCKED ROTOR AMPS	MAXIMUM BLOWER AMPS	RECOMMENDED NEMA STARTER SIZE	SHIPPING WEIGHT
1	ROTRON	DR656K72X	TEFC-CS	3	230/460	3-60-Hz	F	7.4/3.7	1.15	54/27	8.8/4.4	0/0	114 lb.

NOTES:

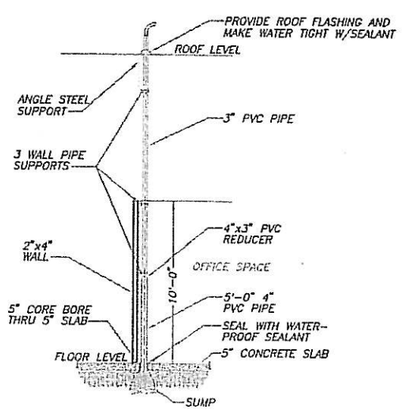
1. MAXIMUM FLOW: 210 SCFM; MAXIMUM PRESSURE: 106 IWG; MAXIMUM VACUUM: 6.39"Hg (87 IWG); CAST ALUMINUM BLOWER HOUSING, IMPELLER & COVER, CAST IRON MUFFLER EXTENSION & FLANGES (THREADED); PERMANENTLY SEALED BALL BEARINGS; INLET & OUTLET INTERNAL MUFFLING.
2. MANUFACTURED BY AMETEK TECHNICAL AND INDUSTRIAL PRODUCTS KENT, OHIO 44240 e-mail: rotroninductrialCametek.com internet: www.ametektmd.com
2. REGENERATIVE BLOWER MOTOR TO BE HIGH EFFICIENCY. BLOWER TO MEET 2006 NON-RESIDENTIAL ENERGY CODE EFFICIENCY REQUIREMENTS AS A MINIMUM.



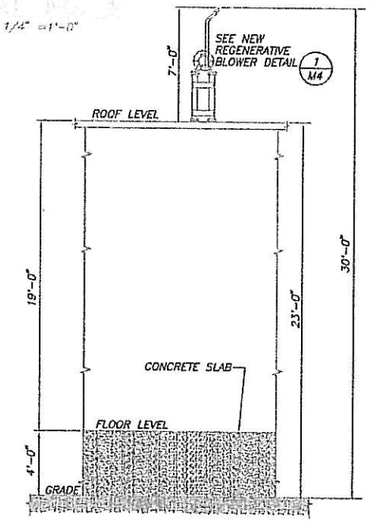
SCALE: 1/4" =1'-0"



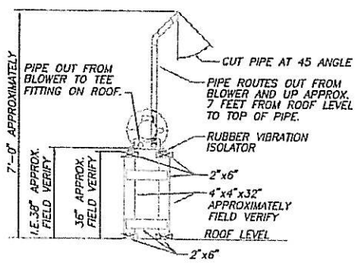
SCALE: 1/4" =1'-0"



SCALE: 1/4" =1'-0"



SCALE: 1/4" =1'-0"



SCALE: 1/2" =1'-0"

SCALE: 1/4" =1'-0"

R. GERARD ENGINEERING
SPOKANE, WASHINGTON
(509) 326-5127

RADON MITIGATION TESTING AND INSTALLATION

NORTH 2801 MONROE SUITE A
SPOKANE, WASHINGTON
(509) 326-5127

PROJECT: 98108-3248
SEATTLE, WASHINGTON

JOB NO.: 6198563
DATE: 11/07/08
DRAWN: KJ
CHECKED: DG

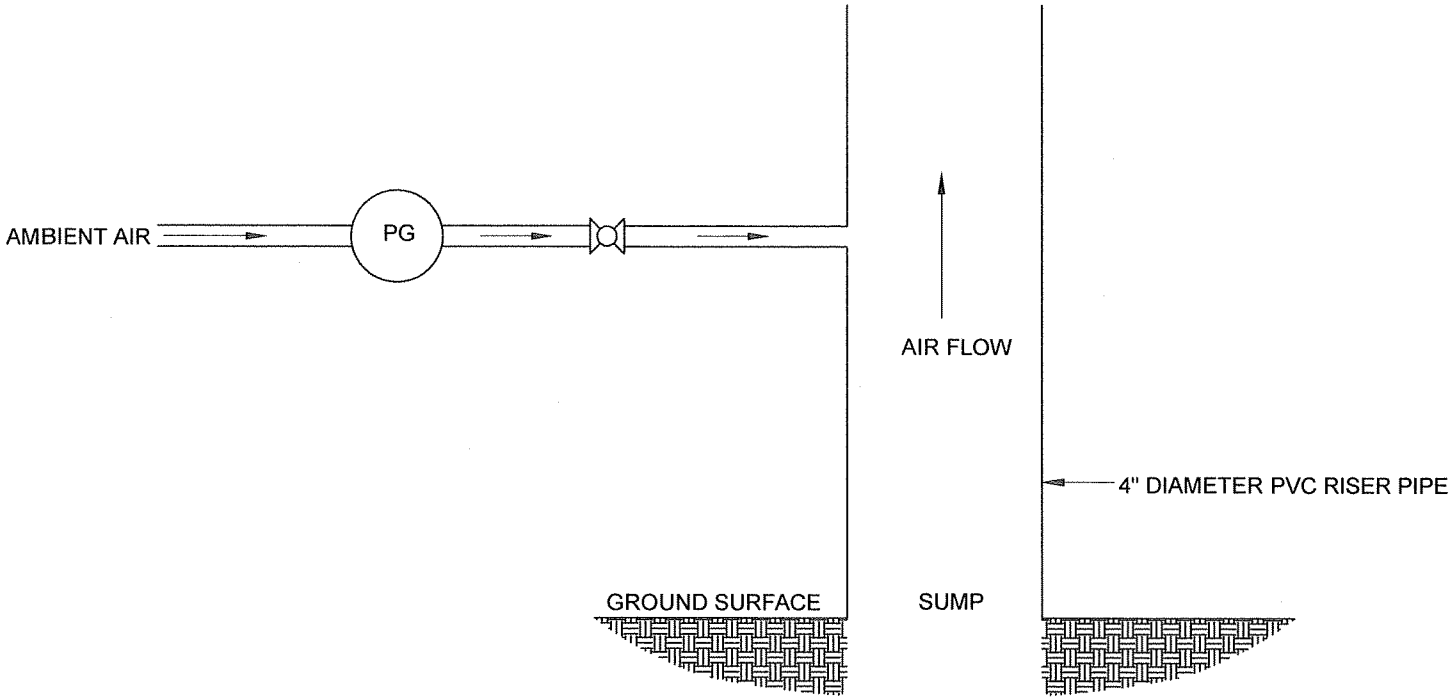
SHEET NO.:

APPENDIX B
PRESSURE GAUGE SCHEMATIC

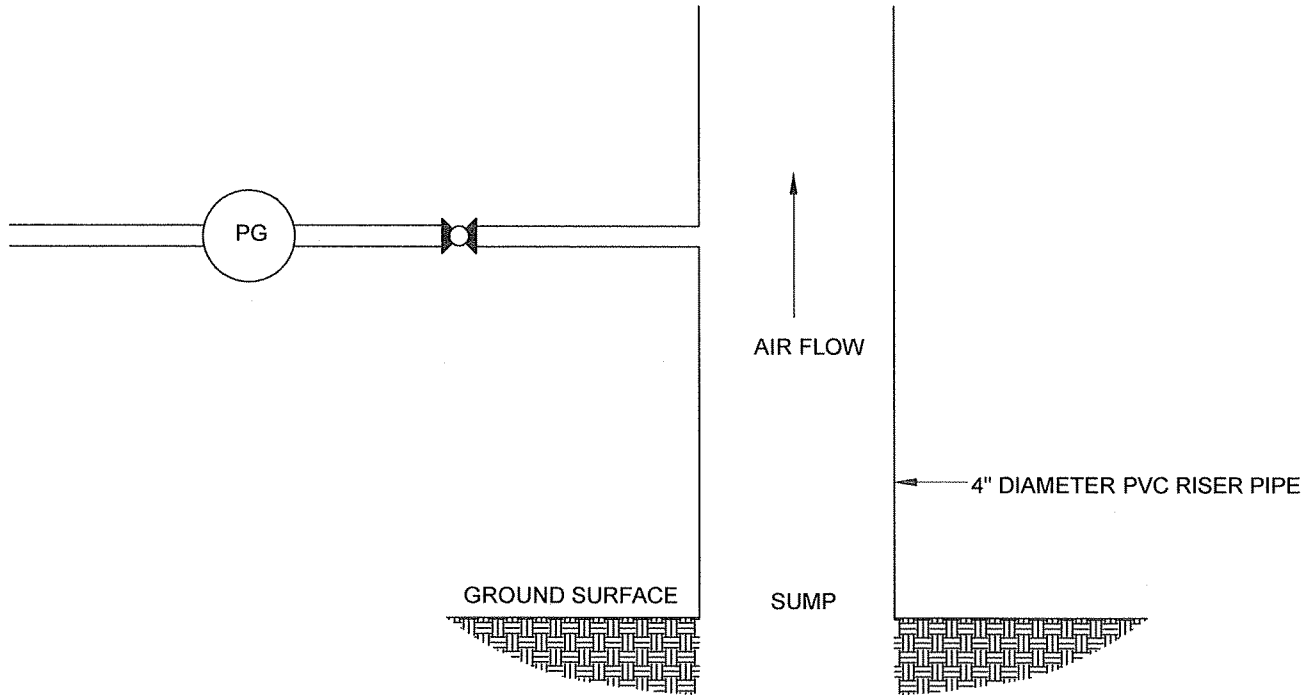
VAPOR INTRUSION, INSPECTION, MONITORING,
AND MAINTENANCE WORK PLAN
Olympic Medical Facility
5900 First Avenue South
Seattle, Washington

Farallon PN: 457-004

PRESSURE GAUGE SWITCH "ON"



PRESSURE GAUGE SWITCH "OFF"



LEGEND

- BALL VALVE "OPEN"
- BALL VALVE "CLOSED"
- (PG) PRESSURE GAUGE

FARALLON CONSULTING
975 5th Avenue Northwest
Issaquah, WA 98027

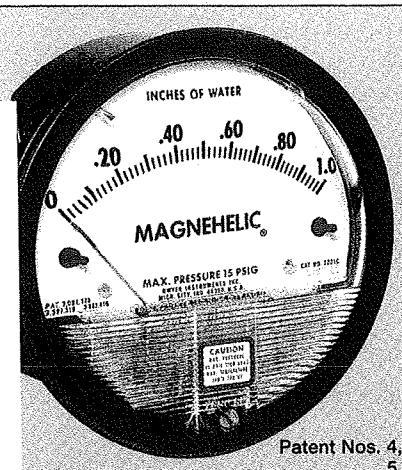
PRESSURE GAUGE SWITCH
OLYMPIC MEDICAL BUILDING
SEATTLE, WASHINGTON

FARALLON PN: 457-004

Drawn By: DEW	Checked By: DC	Date: 10/30/09	Disk Reference: FLOORJIM21

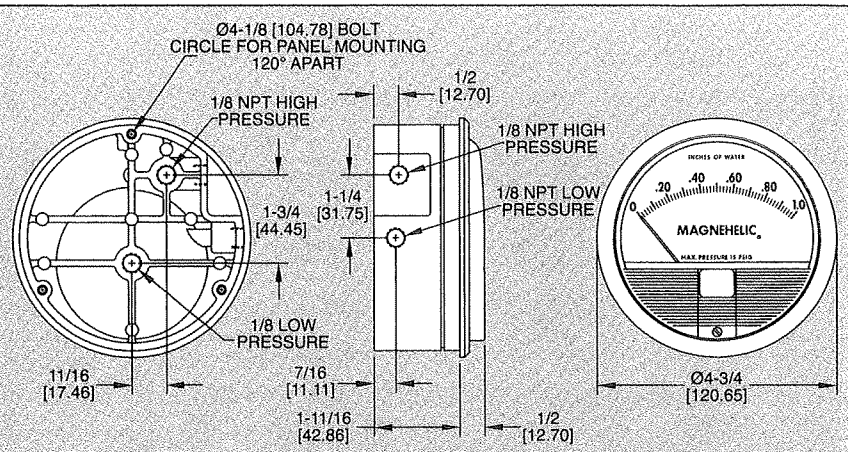
Series 2000 Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%



Patent Nos. 4,030,365
5,012,678

Standard Magnehelic® Pressure Gage has a large, easy-to-read 4" dial.



Dimensions, Standard Series 2000 Magnehelic® Pressure Gages. (Slightly different on medium and high pressure models)

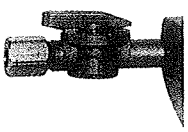
Select the Dwyer® Magnehelic® gage for high accuracy – guaranteed within 2% of full scale – and for the wide choice of 81 models available to suit your needs precisely. Using Dwyer's simple, frictionless Magnehelic® gage movement, it quickly indicates low air or non-corrosive gas pressures – either positive, negative (vacuum) or differential. The design resists shock, vibration and over-pressures. No manometer fluid to evaporate, freeze or cause toxic or leveling problems. It's inexpensive, too.

The Magnehelic® gage is the industry standard to measure fan and blower pressures, filter resistance, air velocity, furnace draft, pressure drop across orifice plates, liquid levels with bubbler systems and pressures in fluid amplifier or fluidic systems. It also checks gas-air ratio controls and automatic valves, and monitors blood and respiratory pressures in medical care equipment.

Note: May be used with Hydrogen. When ordering a Buna-N diaphragm pressures must be less than 35 psi.

Flush ...Surface...or Pipe Mounted

MOUNTING. A single case size is used for most models of Magnehelic® gages. They can be flush or surface mounted with standard hardware supplied. With the optional A-610 Pipe Mounting Kit they may be conveniently installed on horizontal or vertical 1¼" - 2" pipe. Although calibrated for vertical position, many ranges above 1" may be used at any angle by simply re-zeroing. However, for maximum accuracy, they must be calibrated in the same position in which they are used. These characteristics make Magnehelic® gages ideal for both stationary and portable applications. A 4⅝" hole is required for flush panel mounting. Complete mounting and connection fittings plus instructions are furnished with each instrument.



VENT VALVES

In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

HIGH AND MEDIUM PRESSURE MODELS

Installation is similar to standard gages except that a 4 13/16" hole is needed for flush mounting. The medium pressure construction is rated for internal pressures up to 35 psig and the high pressure up to 80 psig. Available for all models. Because of larger case, the medium pressure and high pressure models will not fit in a portable case size. Installation of the A-321 safety relief valve on standard Magnehelic® gages often provides adequate protection against infrequent overpressure.

SPECIFICATIONS

Service: Air and non-combustible, compatible gases. (Natural Gas option available.)
Wetted Materials: Consult factory.
Housing: Die cast aluminum case and bezel, with acrylic cover. Exterior finish is coated gray to withstand 168 hour salt spray corrosion test.
Accuracy: ±2% of full scale (±3% on - 0, -100 Pa, -125 Pa, 10MM and ±4% on - 00, -60 Pa, -6MM ranges), throughout range at 70°F (21.1°C).
Pressure Limits: -20" Hg. to 15 psig.† (-0.677 bar to 1.034 bar); MP option: 35 psig (2.41 bar), HP option: 80 psig (5.52 bar).
Overpressure: Relief plug opens at approximately 25 psig (1.72 bar), standard gages only.
Temperature Limits: 20 to 140°F.* (-6.67 to 60°C).
Size: 4" (101.6 mm) Diameter dial face.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Process Connections: 1/8" female NPT duplicate high and low pressure taps - one pair side and one pair back.
Weight: 1 lb 2 oz (510 g), MP & HP 2 lb 2 oz (963 g).
Standard Accessories: Two 1/8" NPT plugs for duplicate pressure taps, two 1/8" pipe thread to rubber tubing adapter and three flush mounting adapters with screws. (Mounting and snap ring retainer substituted for 3 adapters in MP & HP gage accessories.)
*Low temperature models available as special option.
†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options at lower left.

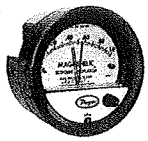
OPTIONS AND ACCESSORIES

Transparent Overlays

Furnished in red and green to highlight and emphasize critical pressures. ..... **$14.25 net**

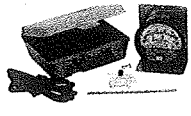
Adjustable Signal Flag

Integral with plastic gage cover. Available for most models except those with medium or high pressure construction. Can be ordered with gage or separate. **16.75**



LED Setpoint Indicator

Bright red LED on right of scale shows when setpoint is reached. Field adjustable from gage face, unit operates on 12-24 VDC. Requires MP or HP style cover and bezel. **80.00**



Portable Units

Combine carrying case with any Magnehelic® gage of standard range, except high pressure connection. Includes 9 ft. (2.7 m) of ⅜" I.D. rubber tubing, standhang bracket and terminal tube with holder. **33.50**

Air Filter Gage Accessory Package

Adapts any standard Magnehelic® gage for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft. (1.5 m) lengths of ¼" aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings on both tips and valves. **32.25**

Quality design and construction features

Bezel provides flange for flush mounting in panel.

Clear plastic face is highly resistant to breakage. Provides undistorted viewing of pointer and scale.

Precision litho-printed scale is accurate and easy to read.

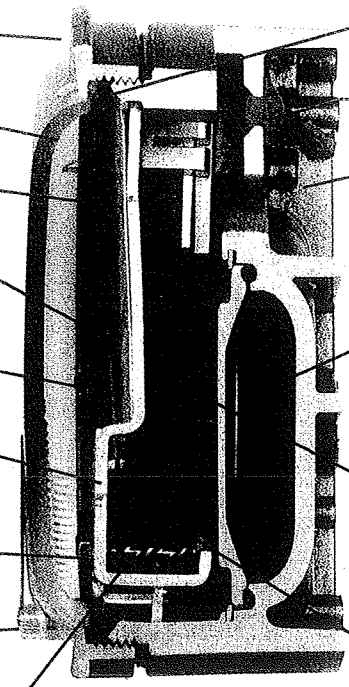
Red tipped pointer of heat treated aluminum tubing is easy to see. It is rigidly mounted on the helix shaft.

Pointer stops of molded rubber prevent pointer over-travel without damage.

"Wishbone" assembly provides mounting for helix, helix bearings and pointer shaft.

Jeweled bearings are shock-resistant mounted; provide virtually friction-free motion for helix. Motion damped with high viscosity silicone fluid.

Zero adjustment screw is conveniently located in the plastic cover, and is accessible without removing cover. O-ring seal provides pressure tightness.



O-ring seal for cover assures pressure integrity of case.

Blowout plug of silicone rubber protects against overpressure on 15 psig rated models. Opens at approximately 25 psig.

Die cast aluminum case is precision made and iridite-dipped to withstand 168 hour salt spray corrosion test. Exterior finished in baked dark gray hammerloid. One case size is used for all standard pressure options, and for both surface and flush mounting.

Silicone rubber diaphragm with integrally molded O-ring is supported by front and rear plates. It is locked and sealed in position with a sealing plate and retaining ring. Diaphragm motion is restricted to prevent damage due to overpressures.

Calibrated range spring is flat spring steel. Small amplitude of motion assures consistency and long life. It reacts to pressure on diaphragm. Live length adjustable for calibration.

Samarium Cobalt magnet mounted at one end of range spring rotates helix without mechanical linkages.

Helix is precision made from an alloy of high magnetic permeability. Mounted in jeweled bearings, it turns freely, following the magnetic field to move the pointer across the scale.

SERIES 2000 MAGNEHELIC® GAGE — MODELS AND RANGES

The models below will fulfill most requirements. Page V also shows examples of special models built for OEM customers. For special scales furnished in ounces per square inch, inches of mercury, metric units, etc., contact the factory.

Dual Scale English/Metric Models

Model Number	Range, In. W.C.	Range, Pa or kPa	Price
2000-0D†•	0-0.5	0-125 Pa	$63.50
2001D	0-1.0	0-250 Pa	63.50
2002D	0-2.0	0-500 Pa	63.50
2003D	0-3.0	0-750 Pa	63.50
2004D	0-4.0	0-1.0 kPa	63.50
2006D	0-6.0	0-1.5 kPa	63.50
2008D	0-8.0	0-2.0 kPa	63.50
2010D	0-10	0-2.5 kPa	63.50

Model Number	Range Inches of Water	Price
2000-00N†••	.05-0-.2	$70.50
2000-00†••	0-.25	70.50
2000-0†•	0-.50	63.50
2001	0-1.0	63.50
2002	0-2.0	63.50
2003	0-3.0	63.50
2004	0-4.0	63.50
2005	0-5.0	63.50
2006	0-6.0	63.50
2008	0-8.0	63.50
2010	0-10	63.50
2015	0-15	63.50
2020	0-20	63.50
2025	0-25	63.50
2030	0-30	63.50
2040	0-40	63.50
2050	0-50	63.50
2060	0-60	63.50
2080	0-80	63.50
2100	0-100	63.50
2150	0-150	63.50

Model Number	Range Zero Center Inches of Water	Price
2300-0†•	.25-0-.25	$71.50
2301	.5-0-.5	71.50
2302	1-0-1	71.50
2304	2-0-2	71.50
2310	5-0-5	71.50
2320	10-0-10	71.50
2330	15-0-15	71.50

Model Number	Range PSI	Price
2201	0-1	$63.50
2202	0-2	63.50
2203	0-3	63.50
2204	0-4	63.50
2205	0-5	63.50
2210*	0-10	106.00
2215*	0-15	106.00
2220*	0-20	106.00
2230**	0-30	139.00

*MP option standard
**HP option standard

Dual Scale Air Velocity Units

Model Number	Range in W.C. Velocity, F.P.M.	Price
2000-00AV†••	0-.25/300-2000	$70.50
2000-0AV†•	0-.50/500-2800	63.50
2001AV	0-1.0/500-4000	63.50
2002AV	0-2.0/1000-5600	63.50
2010AV	0-10/2000-12500	63.50

For use with pitot tube.

Model Number	Range MM of Water	Price
2000-6MM†••	0-6	$70.50
2000-10MM†•	0-10	63.50
2000-25MM	0-25	63.50
2000-50MM	0-50	63.50
2000-80MM	0-80	63.50
2000-100MM	0-100	63.50

Zero Center Ranges

2300-20MM†•	10-0-10	$71.50

Model Number	Range, CM of Water	Price
2000-15CM	0-15	$63.50
2000-20CM	0-20	63.50
2000-25CM	0-25	63.50
2000-50CM	0-50	63.50
2000-80CM	0-80	63.50
2000-100CM	0-100	63.50
2000-150CM	0-150	63.50
2000-200CM	0-200	63.50
2000-250CM	0-250	63.50
2000-300CM	0-300	63.50

Zero Center Ranges

2300-4CM	2-0-2	$71.50
2300-10CM	5-0-5	71.50
2300-30CM	15-0-15	71.50

Model Number	Range, Pascals	Price
2000-60PA†••	0-60	$70.50
2000-100PA†•	0-100	63.50
2000-125PA†•	0-125	63.50
2000-250PA	0-250	63.50
2000-300PA	0-300	63.50
2000-500PA	0-500	63.50
2000-750PA	0-750	63.50

Model Number	Range, Pascals	Price
Zero Center Ranges		
2300-60PA†••	30-0-30	$71.50
2300-100PA†•	50-0-50	71.50
2300-120PA	60-0-60	71.50
2300-250PA	125-0-125	71.50
2300-500PA	250-0-250	71.50

Model Number	Range, Kilopascals	Price
2000-1KPA	0-1	$63.50
2000-1.5KPA	0-1.5	63.50
2000-2KPA	0-2	63.50
2000-3KPA	0-3	63.50
2000-4KPA	0-4	63.50
2000-5KPA	0-5	63.50
2000-8KPA	0-8	63.50
2000-10KPA	0-10	63.50
2000-15KPA	0-15	63.50
2000-20KPA	0-20	63.50
2000-25KPA	0-25	63.50
2000-30KPA	0-30	63.50
Zero Center Ranges		
2300-1KPA	5-0-5	$71.50
2300-3KPA	1.5-0-1.5	71.50

Accessories

- **A-299**, Surface Mounting Bracket....$27.50
- **A-300**, Flat Flush Mounting Bracket....23.50
- **A-310A**, 3-Way Vent Valve....12.75
- **A-321**, Safety Relief Valve....16.25
- **A-432**, Portable Kit....33.50
- **A-605**, Air Filter Kit....32.25
- **A-610**, Pipe Mount Kit....19.00

Options — To order, add suffix: I.E. 2001-ASF

- ASF (Adjustable Signal Flag)....add $16.75
- HP (High Pressure Option)....add $86.50
- LT (Low Temperatures to -20°F)....$5.20
- MP (Med. Pressure Option)....add $43.75
- SP (Setpoint Indicator)....add $80.00

Scale Overlays — Red, Green, Mirrored or Combination, Specify Locations Add **$14.25 net**

†These ranges calibrated for vertical scale position.
• Accuracy +/-3%. • • Accuracy +/-4%

1011R01-0298P

APPENDIX C
REMINDER NOTICE TO TENANTS

VAPOR INTRUSION, INSPECTION, MONITORING,
AND MAINTENANCE WORK PLAN
Olympic Medical Facility
5900 First Avenue South
Seattle, Washington

Farallon PN: 457-004

APPENDIX D
DEPRESSURIZATION SYSTEM MONITORING LOG BOOK

VAPOR INTRUSION, INSPECTION, MONITORING,
AND MAINTENANCE WORK PLAN
Olympic Medical Facility
5900 First Avenue South
Seattle, Washington

Farallon PN: 457-004

APPENDIX E
INSPECTION FORM

VAPOR INTRUSION, INSPECTION, MONITORING,
AND MAINTENANCE WORK PLAN
Olympic Medical Facility
5900 First Avenue South
Seattle, Washington

Farallon PN: 457-004