FARALLON consulting

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

VAPOR INTRUSION MITIGATION DESIGN PLAN

OLYMPIC MEDICAL FACILITY

CAPITAL INDUSTRIES, INC.
5801 THIRD 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

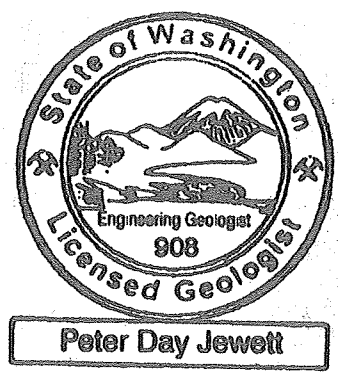
March 9, 2009

Prepared by:

Daniel Caputo
Project Chemist

Reviewed by:

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



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ACRONYMS AND ABBREVIATIONS

ABP	Art Brass Plating
Agreed Order	Agreed Order No. DE 5348 between the Washington State Department of Ecology and Capital Industries, Inc.
ASTM	American Society for Testing Materials
Blaser	Blaser Die Casting
Capital	Capital Industries, Inc.
CEF	cancer exceedance factor
COPCs	contaminants of potential concern
Ecology	Washington State Department of Ecology
Farallon	Farallon Consulting, L.L.C.
IPIM	Inhalation Pathway Interim Measures
IPIMAL	Inhalation Pathway Interim Measures Action Level
MTCA	Washington State Model Toxics Control Act Cleanup Regulation
NCEF	non-cancer exceedance factor
Olympic Facility	Olympic Medical Building
PSC	Philip Services Corporation
PTC	Pioneer Technologies Corporation
PVC	Schedule 40 polyvinyl chloride or 3043 polyvinyl chloride heavy wall pipe
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI Work Plan	Remedial Investigation Work Plan
SSDS	sub-slab depressurization system
TCE	trichloroethene
EPA	U.S. Environmental Protection Agency
VIA Work Plan	Vapor Intrusion Assessment Work Plan
VIMD Plan	Vapor Intrusion Mitigation Design Plan
VIM Work Plan	Vapor Intrusion Mitigation Work Plan
VOC	volatile organic compound
WAC	Washington Administrative Code

1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Vapor Intrusion Mitigation Design Plan (VIMD Plan) on behalf of Capital Industries, Inc. (Capital) to provide the design specifications for the vapor intrusion mitigation system at the Olympic Medical Building located at 5900 1st Avenue South in Seattle, Washington (Olympic Facility) located southwest of the Capital property (Figure 1). Mitigation of vapor intrusion from volatile contaminants of potential concern (COPCs) has been determined to be necessary at the Olympic Facility by the Washington State Department of Ecology (Ecology) in accordance with Exhibits B and D of Agreed Order No. DE 5348 entered into by Capital and Ecology on January 24, 2008 (Agreed Order). Vapor intrusion mitigation design specifications have been developed in accordance with the Vapor Intrusion Mitigation Work Plan (VIM Work Plan) (Farallon 2008c). The need for mitigation of vapor intrusion was based on the analytical results of ambient air samples collected by others (PSC 2005; Geoengineers 2006). The data collected by others were evaluated in accordance with the Vapor Intrusion Assessment Work Plan (VIA Work Plan) (Farallon 2008b).

1.1 VIMD PLAN PURPOSE

The purpose of the VIMD Plan is to provide the specifications of the vapor intrusion mitigation system developed by Advanced Radon Technologies that will mitigate the intrusion of volatile COPCs that have the potential to migrate from groundwater in the Water Table Zone, as defined in the Remedial Investigation Work Plan (RI Work Plan) (Farallon 2008a), to indoor ambient air within the Olympic Facility. The mitigation measures that have been developed 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 attached as Exhibit D of the Agreed Order.

1.2 VIMD PLAN ORGANIZATION

The VIMD Plan is organized as follows:

- Section 1 presents the purpose of the VIMD Plan;
- Section 2 provides descriptions of and background information on the Capital Site and Olympic Facility;
- Section 3 describes the vapor intrusion mitigation system design;
- Section 4 discusses reports and work plans that will be prepared following the VIMD Plan; and
- Section 5 provides a list of documents used in preparation of the VIMD Plan.

2.0 SITE DESCRIPTION AND BACKGROUND

2.1 SITE DESCRIPTION

The Olympic Facility is located within the Area of Investigation that Capital is currently evaluating for the Remedial Investigation (RI). The limits of the Capital Site will be determined by the results of the RI being conducted concurrently with vapor intrusion mitigation at the Olympic Facility. The scope of work for the RI is presented in the RI Work Plan (Farallon 2008a). The Capital Property, Site, and Area of Investigation have been defined separately for the purposes of the RI and are presented below relative to the Olympic Facility.

2.1.1 Capital Site, Property, and Area of Investigation

The Capital Site is defined by the Agreed Order as the extent of concentrations of COPCs that exceed the applicable cleanup levels caused by the release of COPCs from the Capital Property. The Capital Site will be defined by the results of the RI.

The Capital Property is defined as the property located at 5801 3rd Avenue South, between South Mead Street on the north and South Fidalgo Street on the south, and between 4th Avenue South on the east and 1st Avenue South on the west in Section 39, Township 24 South, Range 4 East in Seattle, King County, Washington (Figures 1 and 2). The Capital Property consists of four contiguous King County Assessor Parcels: Nos. 1722802255 (5801 3rd Avenue South), 1722801620 (5801 3rd Avenue South), 1722802245 (5820 1st Avenue South), and 1722801530 (5801 3rd Avenue South), together totaling 182,468 square feet. Parcel Nos. 1722802255, 1722801620, and 1722802245 are developed with five adjoining tilt-up, slab-on-grade buildings designated as Plants 1 through 5. Parcel No. 1722801530 is located north of Plant 4 and has been used for storage of finished products, which include containers and dumpsters.

The Capital Area of Investigation is defined as the area south of South Mead Street, east of 1st Avenue South, north of South Front Street, and west of 4th Avenue South, and includes the property on the northwest corner of 4th Avenue South and South Mead Street (Figure 2). The Capital Area of Investigation is located within the Seattle city limits in King County, Washington (Figure 1) and is zoned as industrial light manufacturing (King County, Washington 2007). Properties located within the Capital Area of Investigation include a mixture of light industrial, commercial, and residential properties.

2.1.2 Olympic Facility

The Olympic Facility is located within the Capital Area of Investigation, and is down-gradient and southwest of Capital Plant 2 at 5900 1st Avenue South, in Seattle Washington (Figure 1). The King County Tax Assessor website identifies the Olympic Facility as Parcel No. 2024049050, which is developed with a two-story, tilt-up, elevated slab-on-grade building. The Olympic Facility building is divided into three areas for office, manufacturing, and warehouse uses (Figure 2). The building was constructed in 1957 and currently is occupied by Olympic Medical, a manufacturer of professional medical equipment and supplies.

2.2 BACKGROUND

Corrective action under Resource Conservation and Recovery Act (RCRA) Facility Operation Permits and Chapter 173-340 of the Washington State Model Toxics Control Act (MTCA) Cleanup Regulation (WAC 173-340) required PSC to assess and mitigate vapor intrusion of volatile organic compounds (VOCs) associated with releases at the former waste management facility at 734 South Lucile Street. PSC developed and began implementing an IPIM approach (PSC 2002a) that integrates the analytical results of groundwater and indoor air samples to assess the need for further investigation or mitigation by way of an interim measure. The IPIM approach is defined or summarized in the following documents:

- *Revised Inhalation Pathway Interim Measures Work Plan* (PSC 2002);
- *Summary of Inhalation Pathway Interim Measure Approach* (PSC 2006);
- Exhibit D of the Agreed Order; *Draft Interim Vapor Intrusion Plan* (Arrow Environmental [Arrow] et al. 2007); and
- *Vapor Intrusion Assessment Work Plan, Capital Industries, Inc.* (Farallon 2008b).

As part of the IPIM approach, PSC conducted groundwater investigations in the Georgetown neighborhood west of 4th Avenue South (W4 Investigation Area). These investigations identified Capital as the source of COPCs released into the subsurface. Capital became the lead business for interim vapor intrusion measures for properties located down-gradient of the Capital Property.

PSC investigations in the W4 Investigation Area identified VOC source areas at Art Brass Plating (ABP) located at 5516 3rd Avenue South, and Blaser Die Casting (Blaser) located at 5700 3rd Avenue South. ABP and Blaser are also the lead businesses for interim VI in the W4 Investigation Area. In order to establish a consistent interim process to assess and mitigate potential VI threats in the W4 Investigation Area, an Interim VI Plan was prepared on behalf of PSC, ABP, Blaser, and Capital (Arrow et al. 2007). The Interim VI Plan (Arrow et al. 2007) listed the facilities identified by Ecology with the potential for vapor intrusion, assigned to each lead business, and proposed an interim VI approach with methodologies from the PSC IPIM approach for consistent implementation by each lead business.

Capital is identified by Ecology as the lead business for the Olympic Facility located down-gradient and south of Capital Plant 2 (Figure 1). Elevated concentrations of trichloroethene (TCE) were detected in reconnaissance groundwater samples collected from direct-push borings and groundwater samples collected from monitoring wells located proximate to the Olympic Facility (Pioneer Technologies Corporation [PTC] 2005). The cancer exceedance factor (CEF) and non-cancer exceedance factor (NCEF) were calculated using the cancer and non-cancer groundwater Inhalation Pathway Interim Measures Action Levels (IPIMALs) based on the IPIM approach (PSC 2006). The CEF exceeded the benchmark of 10 as determined by Ecology, which required that Tier 3 ambient air samples be collected for analysis under the IPIM approach at the Olympic Facility.

A Tier 3 assessment of the vapor intrusion was conducted at the Olympic Facility by PSC (2005) by sampling ambient indoor and outdoor air to determine whether commercial ambient air CEFs and NCEFs exceeded the benchmarks of 10 as determined by Ecology. Commercial indoor air CEFs calculated from concentrations of TCE detected in indoor ambient air samples collected at Olympic exceeded this benchmark (PTC 2005) (Figure 3; Table 1). Based on the concentrations of TCE detected in indoor ambient air, a mitigation system was proposed by PSC for the warehouse area located on the eastern side of the Olympic Facility.

Subsequent indoor air sampling conducted by GeoEngineers Inc. (GeoEngineers 2006) on behalf of Olympic Medical detected concentrations of TCE that exceeded the CEF and NCEF in ambient air in both the warehouse and manufacturing portions of the Olympic Facility (2006) (Figure 3; Table 1). A mitigation system was determined to be unnecessary in the office area based on the corrected commercial ambient air CEFs and NCEFs calculated for the office area. The corrected commercial ambient air CEFs and NCEFs were calculated by subtracting the outdoor CEFs and NCEFs from the indoor values. Ambient air analytical data and calculated CEFs, NCEFs, and corrected indoor CEFs from previous investigations are presented in Table 1.

3.0 VAPOR INTRUSION MITIGATION DESIGN

This section presents the vapor intrusion mitigation system design for the sub-slab depressurization system (SSDS) developed by Advanced Radon Technologies for the Olympic Facility. The design has been developed to achieve the objectives presented in the VIM Work Plan and in accordance with the IPIM approach (PSC 2002) and Arrow et al. (2007). The design elements include an overview of the mitigation system, a summary of the diagnostic testing, a summary of design components, a summary of the City of Seattle permit application, and a summary of post-installation performance testing.

3.1 DESIGN OVERVIEW

Mitigation via installation of a SSDS has been approved by Ecology under the IPIM (PSC 2002) approach as an adequate system to depressurize the soil beneath the floor slab to prevent VOCs in groundwater in the Water Table Zone from entering the interior of the building. The general SSDS design has been reviewed and approved by Ecology for effectively mitigating vapor intrusion at slab-on-grade commercial facilities. The SSDS is designed to be consistent with the American Society for Testing Materials (ASTM) E2121-03 Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings (ASTM 2003) and U.S. Environmental Protection Agency (EPA) radon mitigation standards (EPA 1993; EPA 1994).

The SSDS depressurizes the ground immediately below the slab by using exhaust fan(s) that generate sufficient negative pressure to prevent the flux of air from the soil, through the slab, and into the building. This type of system is applicable to a wide variety of VOCs that migrate through soil, largely through diffusion.

The SSDS decreases the pressure below the building slab by pulling air from the subsurface. Negative subsurface pressure induces the flow of air and VOCs between the building and slab downward, through the slab, and into the subsurface. An exhaust fan pulls the air and VOCs from the subsurface and vents them to the ambient air via an exhaust stack located on the roof of the building. Negative pressure is applied to the sub-surface at sumps installed at locations determined during diagnostic testing. The exhaust fan is connected to the sumps via risers and piping network. The number of fans and layout of the riser/piping network is determined by diagnostic testing.

3.2 DIAGNOSTIC TESTING

Diagnostic testing was conducted at the Olympic Facility from October 7 to 14, 2008 to determine the design parameters for the depressurization system. The results of the diagnostic testing have been used by Advanced Radon Technologies to develop an SSDS specific to the Olympic Facility that will mitigate vapor intrusion to levels that are below IPIMALs. A summary of design data collection activities and design components are presented in the sections below. A detailed summary of diagnostic testing will be included in the draft Post-Installation Vapor Intrusion Mitigation Report.

The scope of work for the diagnostic testing included:

- Coring 5-inch-diameter borings at anticipated sump locations;
- Coring multiple 3/8-inch-diameter borings surrounding each 5-inch-diameter boring in the concrete slab;
- Removing 10 to 20 gallons of soil from beneath the slab at each 5-inch-diameter boring to create a sump;
- Placing an diagnostic exhaust fan over the 5-inch-diameter boring/sump;
- Measuring the negative soil vapor pressure at each of the 3/8-inch-diameter borings at a constant vacuum pressure using a micromanometer; and
- Measuring the exhaust volume reading at each 5-inch-diameter boring while multiple static vacuum pressures are applied.

The negative soil vapor pressure readings collected at each 3/8-inch-diameter boring were used to determine the number of sumps required to depressurize the warehouse and manufacturing areas of the Olympic Facility. Exhaust volume readings were used to determine the size and number of the exhaust fan(s) needed.

A schematic of the final SSDS design prepared by Advanced Radon Technologies is presented on Sheet Nos. M1 through M4 of the City of Seattle Mechanical Expedited (Full) Permit application included in Appendix A.

3.3 DESIGN COMPONENTS

Results of the diagnostic testing determined that seven sump locations connected to one exhaust fan that discharges through one exhaust stack were adequate for the SSDS. Sump locations are proposed near walls to facilitate simple routing of risers and piping. The exhaust fan and exhaust stack will be mounted on the roof of the Olympic Facility. Risers will be networked via piping on the roof.

The design components were determined by Advanced Radon Technologies from the data collected by the diagnostic testing. The SSDS includes sumps, risers and piping, exhaust fan, exhaust stack, and monitoring gauges. Each of these components is discussed below and is detailed on Sheet Nos. M1 through M4 of the City of Seattle Mechanical Expedited (Full) Permit application prepared by Advanced Radon Technologies included in Appendix A.

3.3.1 Sumps

Sumps provide the interface between the subsurface and the suction applied by the exhaust fan. Each sump consists of a 5-inch-diameter boring directly above a 10- to 20-gallon sub-slab cavity that was installed during the design phase. The 5-inch-diameter boring was drilled through the 5-inch-thick concrete floor slab and the core was removed. Sub-slab material was removed from the below the slab to create a 10- to 20-gallon cavity. The 5-inch-diameter boring was fitted with

a rubber seal and water-proof sealant to prevent air from being drawn from the interior of the building. A schematic of each sump location is presented on Sheet No. M4 of Appendix A.

3.3.2 Risers and Piping

Risers and piping will provide the conduit from the sumps to the exhaust fan, which will be mounted on the roof of the Olympic Facility. Risers will be seated in the rubber seal within the sump, sealed with water-proof 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 will be sealed with roof flashing and water-proof sealant. Four-inch-diameter Schedule 40 polyvinyl chloride or 3043 polyvinyl chloride (PVC) heavy wall pipe will extend from the sump to approximately 5 feet above floor surface, and 3-inch-diameter PVC pipe will extend from 5 feet above floor surface through the roof of the Olympic Facility. Risers and associated sumps will be located adjacent to either interior or exterior walls to provide structural support. Risers will be securely fastened to walls with pipe supports at multiple heights and offsets, and 45-degree elbows will be used to adjust risers around ceiling supports and sprinkler lines where necessary. The specific details for each riser are presented on Sheet No. M4 of Appendix A.

Piping will connect risers to the exhaust fan mounted to the top of the roof of the Olympic Facility. All of the piping will connect to form one network, and will be angled so that the connection to the exhaust fan is at the highest point and the connection to each riser is at the lowest point. Piping will be angled to prevent water vapor from condensing into pools at low spots within piping. Piping will consist of 3-inch- and 4-inch-diameter PVC pipe. The 3-inch-diameter PVC pipe will connect to risers and the initial extensions toward the exhaust fan. The 4-inch-diameter PVC pipe will be used for piping approaching and connected to the regenerative blower. Specifications of piping are presented in detail on Sheet No.: M3 of Appendix A.

3.3.3 Exhaust Fan

The exhaust fan will provide the suction to the sumps via the risers and piping of the SSDS. The specifications for the exhaust fan were determined by Advanced Radon Technologies based on information collected during the diagnostic testing conducted at the Olympic Facility. The exhaust fan will be mounted to a raised platform on the roof of the Olympic Facility. Vibration isolators will be used between the exhaust fan and platform to prevent roof vibration and excess noise. The exhaust fan will be connected and sealed to piping and the exhaust stack. During the diagnostic testing, exhaust data collected was used to determine the number and size of exhaust fan(s) needed. Advanced Radon Technologies determined that one Rotron DR656K72X 3-horsepower regenerative blower manufactured by Ametek Technical and Industrial Products would be sufficient to meet the needs of the SSDS at the Olympic Facility. The regenerative blower schedule presents the specific details of the exhaust fan on Sheet No. M4 of Appendix A.

3.3.4 Exhaust Stack

The exhaust stack will discharge the VOCs/air emissions to the ambient air at a height that does not pose a threat to human health or the environment. Constructed of stainless steel and PVC, the exhaust stack will effectively extend the exhaust fan outlet to a height approximately 7 feet

above roof level. The exhaust stack will consist of a stainless steel pipe attached to the exhaust fan, with PVC used to extend the exhaust stack to maximum height. The exhaust stack will be angled 45 degrees off vertical from approximately 6 feet above roof level to 7 feet above roof level; the outlet will be cut on the vertical to prevent precipitation from entering the exhaust stack while continuing to exhaust VOC vapors/air. A schematic showing the specific details of the exhaust stack are presented on Sheet No. M4 of Appendix A.

3.3.5 Pressure Gauges

A pressure gauge will be installed at each riser to measure and confirm that negative pressure is being applied throughout the SSDS. 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 building, subsurface conditions, riser and piping network, and fan, the pressure will exceed the limits of the commonly used manometer. A Magnehelic pressure gauge will be used to measure the pressure of the system in place of a manometer. These pressure gauges are more prone to failure during constant use; therefore, a valve system will be installed to disconnect pressure gauges during non-monitoring events.

The pressure gauge and valve system will be mounted to the riser with solid or flexible tubing. Mounted location will be based in relation to sources of possible impact from facility operations. A main valve will be installed between the riser and the pressure gauge that will regulate pressure applied to the gauge from the riser. A second valve will be installed to control the pressure between the first valve and the pressure gauge. The relief valve will open the pressure gauge to the ambient air pressure during non-monitoring events and relieve the pressure within the tubing after the main valve is closed. The main valve will remain closed and the relief valve will remain open when the system monitoring is not in progress. During system monitoring events, the main value will be opened and the relief valve will be closed to engage the pressure gauge. These pressure gauges will provide confirmation that negative pressure is being applied by the exhaust fan to the subsurface via each riser.

3.4 PERMIT APPLICATION

A permit application was prepared by Advanced Radon Technologies and submitted to the City of Seattle to obtain a Mechanical Expedited (Full) Permit. The permit application included:

- Completed Mechanical Plan cover sheet;
- Year of code with which the permit complies;
- Vicinity map;
- Site plan, to scale, showing adjacent zoning;
- Legal description of the property;
- Assessor's parcel number; and
- Any related building permit numbers.

The permit was approved by the City of Seattle on November 18, 2008. The permit application is included in Appendix A. An email from the City of Seattle to Advanced Radon Technologies indicating that the application review has been completed is included in Appendix B.

3.5 POST-INSTALLATION PERFORMANCE/CONFIRMATION TESTING

Upon completion of the SSDS installation at the Olympic Facility, pressure field extension testing and air sampling will be conducted to confirm that the SSDS is adequately depressurizing the immediate subsurface and mitigating indoor air to levels below IPIMALs.

3.5.1 Pressure Field Extension Testing

Negative pressure field extension measurements were collected during the diagnostic testing to determine the size and extent that the SSDS needed to depressurize the targeted area. A post-construction round of negative pressure measurements will be collected and compared to pre-installation measurements to determine if the SSDS is adequately depressurizing the warehouse and manufacturing areas of the Olympic Facility.

The process that was used to measure pre-installation negative pressure will be used to confirm that the subsurface is adequately depressurized by conducting negative pressure field extension testing while the final SSDS is operational. Post-installation 3/8-inch-diameter borings will be advanced at locations in close proximity to 3/8-inch-diameter borings used during design phase diagnostic testing if possible. Using a micromanometer, the negative soil vapor pressure at each 3/8-inch-diameter post-installation boring will be recorded for comparison to measurements recorded during pre-installation PFE testing. Locations of both pre-installation and post-installation PFE test borings and the measurements collected at each boring will be recorded and presented in the post-installation Vapor Intrusion Mitigation Report.

3.5.2 Air Sampling

An initial operation assessment will be conducted by collecting indoor and outdoor ambient air samples before and after startup of the SSDS. Air samples will be collected using 6-liter Summa canisters equipped with particulate filters and 8-hour flow controllers at the approximate sampling locations used during previous investigations. Comparison of indoor and outdoor ambient air analytical results and analytical results from before and after startup of the SSDS will be used to assess the effectiveness of the SSDS. Samples will be analyzed for TCE using EPA Method TO-15. Results of air sampling will be presented in the post-installation Vapor Intrusion Mitigation Report.

4.0 REPORTING

4.1 DRAFT POST-INSTALLATION VAPOR INTRUSION MITIGATION REPORT

A draft post-installation Vapor Intrusion Mitigation Report describing the data collection, design, and installation of the SSDS at the Olympic Facility will be prepared by Farallon and submitted to Capital for review within 45 days of receipt of post-installation ambient air analytical data. Following review and approval by Capital, the report will be provided to Ecology for review and comment. The report will include:

- A summary of the results of the data collection used for the design of the SSDS;
- The design of the SSDS;
- A brief narrative of the scope of work and procedures followed for the installation of the SSDS;
- A summary of the field activities;
- Final design and operation parameters for the SSDS; and
- Figures depicting the final design, including the number, location, and configuration of SSDS components.

4.2 DRAFT VAPOR INTRUSION INSPECTION, MONITORING, MAINTENANCE WORK PLAN

The draft Vapor Intrusion Inspection, Monitoring, and Maintenance Work Plan (VIIMM Work Plan) will propose continuing operational maintenance, inspection, and monitoring tasks for the Olympic Facility. The draft VIIMM Work Plan will be submitted 4 weeks from the completion of the SSDS at the Olympic Facility.

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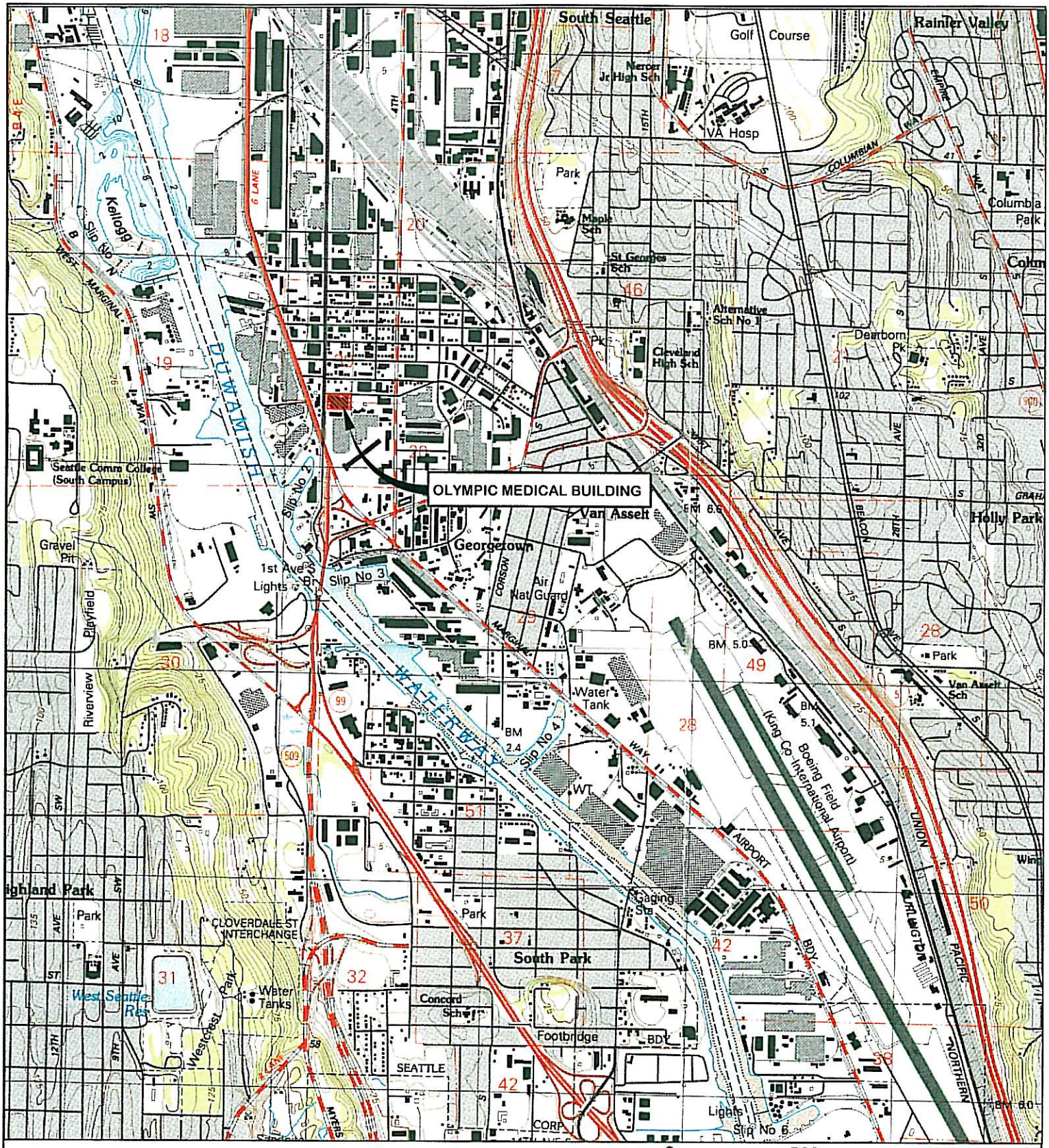
FIGURES

VAPOR INTRUSION MITIGATION DESIGN PLAN
Olympic Medical Facility
Capital Industries, Inc.
5801 Third 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 MITIGATION DESIGN PLAN
OLYMPIC MEDICAL BUILDING
SEATTLE, WASHINGTON

FARALLON PN: 457-004

Drawn By: DEW	Checked By: DC	Date: 11/19/08	Disk Reference: FLOORJIM21

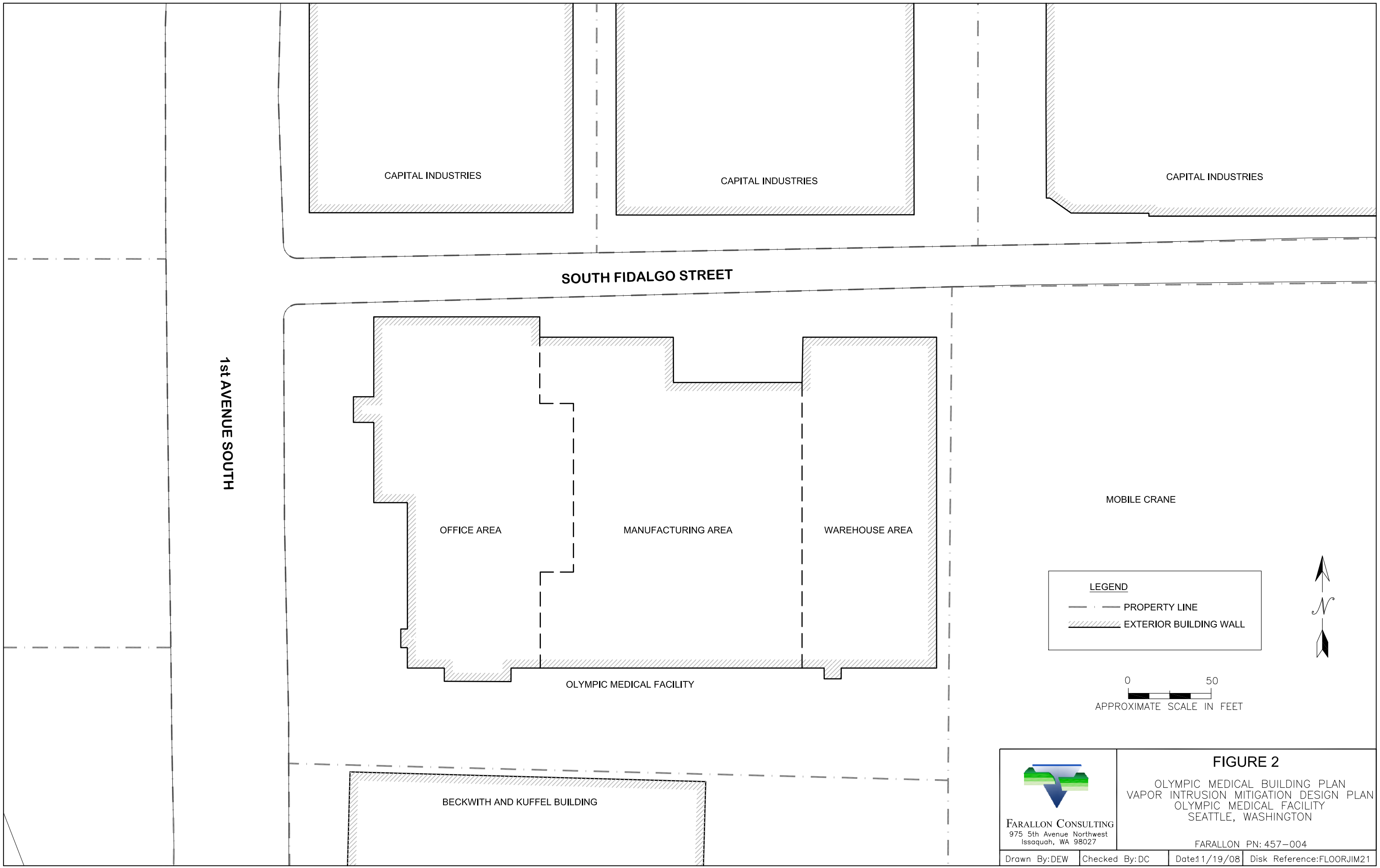


FIGURE 2

OLYMPIC MEDICAL BUILDING PLAN
VAPOR INTRUSION MITIGATION DESIGN PLAN
OLYMPIC MEDICAL FACILITY
SEATTLE, WASHINGTON

FARALLON PN: 457-004

FARALLON CONSULTING
975 5th Avenue Northwest
Issaquah, WA 98027

Drawn By: DEW	Checked By: DC	Date: 11/19/08	Disk Reference: FLOORJIM21

CAPITAL INDUSTRIES

CAPITAL INDUSTRIES

CAPITAL INDUSTRIES

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
GEOENGINEERS	03/2006	0.44	**22**	0.28	8

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
GEOENGINEERS	03/2006	1.5	**75**	0.94	**61**

SOUTH FIDALGO STREET

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
GEOENGINEERS	03/2006	0.28	**14**	0.18	---

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
PSC	10/2004	1.4	**70**	0.88	---

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
PSC	10/2004	2.6	**130**	1.63	---

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
PSC	10/2004	3.5	**175**	2.19	**45**

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
PSC	10/2004	3.7	**185**	2.31	**55**

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
GEOENGINEERS	03/2006	2.1	**105**	1.31	**91**

MOBILE CRANE

1st AVENUE SOUTH

AA001

59001–AA1

59001–IA2

59001–9–IA2

AA002

59001–IA1

AA005

AA003

AA004

R–59001–IA1

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
GEOENGINEERS	03/2006	1.6	**80**	1.00	**66**

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
PSC	07/2005	4.4	**220**	2.75	**212.5**

OFFICE AREA

MANUFACTURING AREA

WAREHOUSE AREA

R–59001–AA1

SAMPLED BY	DATE	TCE (ug/m)	CEF	NCEF	CORRECTED INDOOR CEFs
PSC	07/2005	0.15	7.5	0.09	---

OLYMPIC MEDICAL FACILITY

BECKWITH AND KUFFEL BUILDING

0 50

APPROXIMATE SCALE IN FEET

LEGEND

PROPERTY LINE

EXTERIOR BUILDING WALL

AA001 ● AIR SAMPLE (GEOENGINEERS, 03/06)

R–59001–AA1 ■ AIR SAMPLE (PSC, 07/05)

59001–9–IA2 ◆ AIR SAMPLE (PSC, 10/04)

PSC = PHILIP SERVICES CORPORATION

TCE = TRICHLOROETHENE

CEF = CANCER EXCEEDANCE FACTOR

NCEF = NONCANCER EXCEEDANCE FACTOR

-- = DENOTES VALUE IS NOT APPLICABLE

RESULTS IN **BOLD** DENOTE CONCENTRATIONS ABOVE WASHINGTON STATE DEPARTMENT OF ECOLOGY EXCEEDANCE FACTOR BENCHMARK.

ALL SAMPLE LOCATIONS ARE APPROXIMATE

FARALLON CONSULTING
975 5th Avenue Northwest
Issaquah, WA 98027

FIGURE 3

OLYMPIC MEDICAL BUILDING PLAN
SHOWING AIR ANALYTICAL RESULTS
VAPOR INTRUSION MITIGATION DESIGN PLAN
OLYMPIC MEDICAL FACILITY
SEATTLE, WASHINGTON

FARALLON PN: 457–004

Drawn By: DEW | Checked By: DC | Date: 11/19/08 | Disk Reference: FLOORJIM21

TABLE

VAPOR INTRUSION MITIGATION DESIGN PLAN
Olympic Medical Facility
Capital Industries, Inc.
5801 Third Avenue South
Seattle, Washington

Farallon PN: 457-004

Table 1
Olympic Medical Facility TCE Air Analytical Results
Vapor Intrusion Mitigation Design Plan
Capital Industries, Inc.
Seattle, Washington
Farallon PN: 457-004

Sample Identification	Sampled By	Sample Date	Sample Location	Commercial Air IPIMALs[1]		TCE (µg/m³)[2]	CEF[3]	NCEF[3]	Corrected Indoor CEF[4]
				Cancer (µg/m³)	Noncancer (µg/m³)				
59001-IA1	PSC	10/2004	Office	0.02	1.6	1.4	**70**	0.88	--
59001-IA2	PSC	10/2004	Warehouse	0.02	1.6	3.5	**175**	2.19	**45**
59001-9-IA2	PSC	10/2004	Warehouse	0.02	1.6	3.7	**185**	2.31	**55**
59001-AA1	PSC	10/2004	Outdoor	0.02	1.6	2.6	**130**	1.63	--
R-59001-IA1	PSC	07/2005	Manufacturing	0.02	1.6	4.4	**220**	2.75	**212.5**
R-59001-AA1	PSC	07/2005	Outdoor	0.02	1.6	0.15	7.5	0.09	--
AA001	GeoEngineers	03/2006	Outdoor	0.02	1.6	0.28	**14**	0.18	--
AA002	GeoEngineers	03/2006	Warehouse	0.02	1.6	2.1	**105**	1.31	**91**
AA003	GeoEngineers	03/2006	Manufacturing	0.02	1.6	1.6	**80**	1.00	**66**
AA004	GeoEngineers	03/2006	Manufacturing	0.02	1.6	1.5	**75**	0.94	**61**
AA005	GeoEngineers	03/2006	Office	0.02	1.6	0.44	**22**	0.28	8
Ecology Exceedance Factor Benchmarks[5]							**10**	**10**	**10**

Notes:

Results in **bold** denote concentrations above Ecology Exceedance Factor Benchmark.

-- denotes value not applicable.

[1]Commercial Air IPIMALs for TCE as part of the IPIM Approach, developed by PSC and Ecology.

[2]Analyzed by U.S. Environmental Protection Agency Method TO-15 SIM .

[3]CEFs and NCEFs are calculated by dividing the corrected indoor air concentrations by cancer and noncancer-based indoor air IPIMALs, respectively.

[4]Corrected indoor CEFs are calculated by subtracting the outdoor CEF from the individual indoor CEFs for each sampling location.

[5]A CEF/NCEF of 10 indicates that exposure to indoor air concentrations could potentially lead to a cumulative risk of 1E-05, and further evaluation is recommended to determine if the location should proceed to Tier 4.

Ecology = Washington State Department of Ecology

CEF = cancer exceedance factor

GeoEngineers = GeoEngineers, Inc.

IPIM = Inhalation Pathway Interim Measure

IPIMAL = Inhalation Pathway Interim Measure Action Level

µg/m³ = micrograms per cubic meter

NCEF = noncancer exceedance factor

PSC = Philip Services Corporation

TCE = trichloroethene

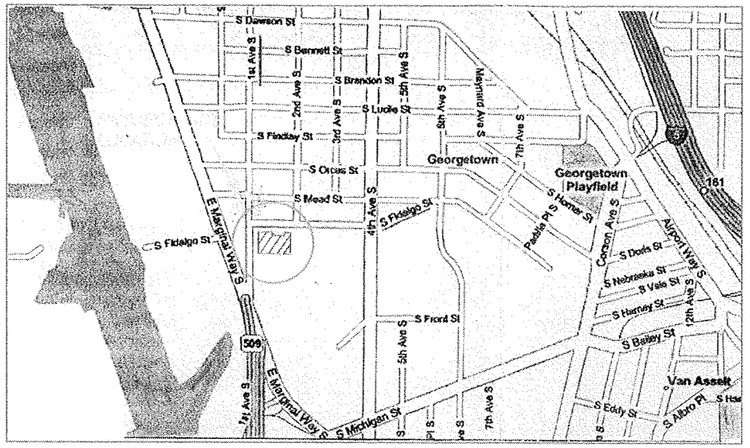
APPENDIX A
OLYMPIC MEDICAL BUILDING CITY OF SEATTLE PERMIT APPLICATION

VAPOR INTRUSION MITIGATION DESIGN PLAN
Olympic Medical Facility
Capital Industries, Inc.
5801 Third 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)
5	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

GENERAL NOTES

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.

M-1	COVER SHEET
M-2	SITE PLAN
M-3	ROOF PLAN
M-4	DETAILS & SCHEDULE

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

R. GERARD
STATE OF WASHINGTON
EXPIRES 7/30/09

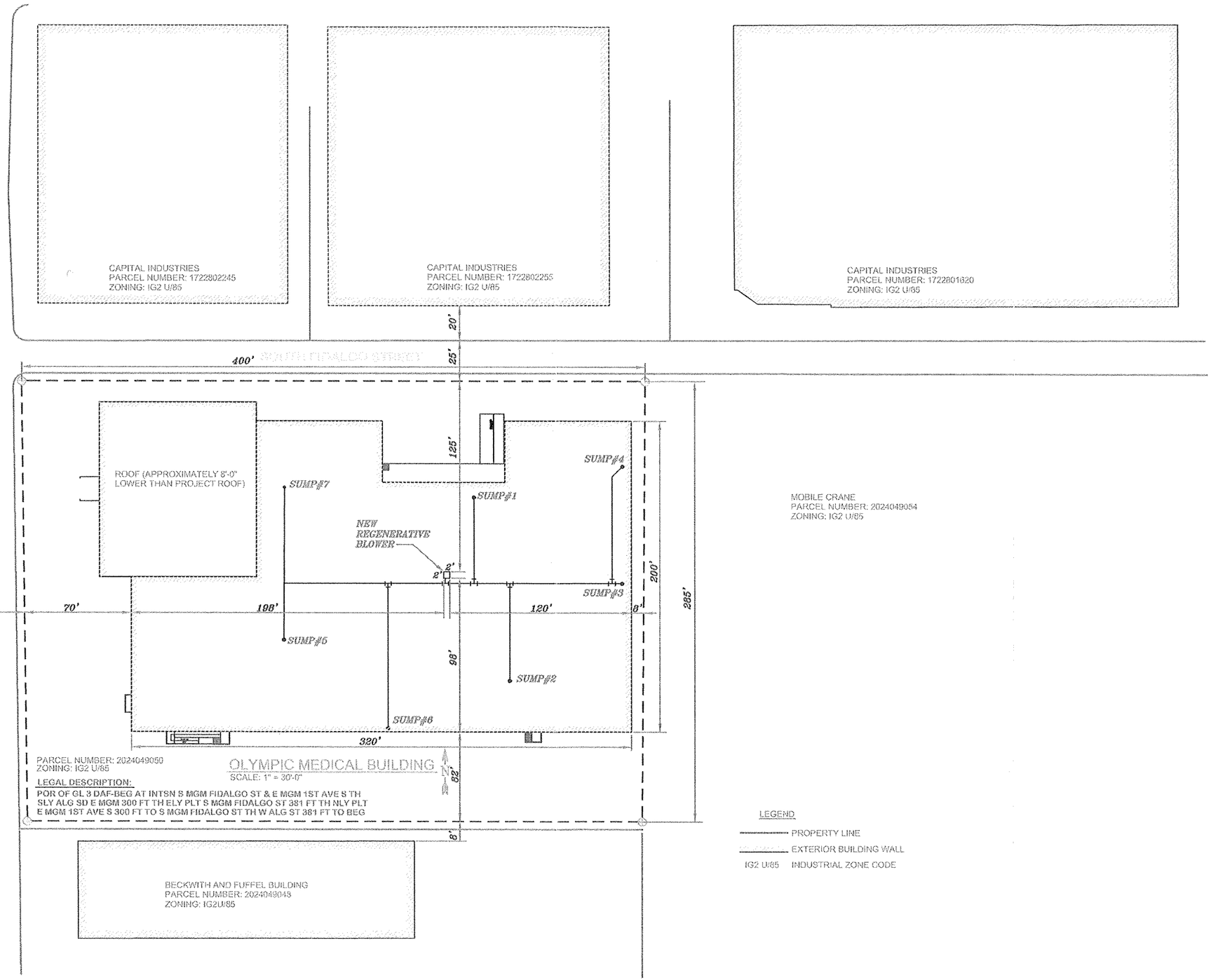
MITIGATION TESTING AND INSTALLATION
NORTH 2801 MONROE, SUITE A
SPOKANE, WASHINGTON
(509) 326-5127

RADON MITIGATION

PROJECT:
SEATTLE, WASHINGTON
98108-3248

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

SHEET NO.:



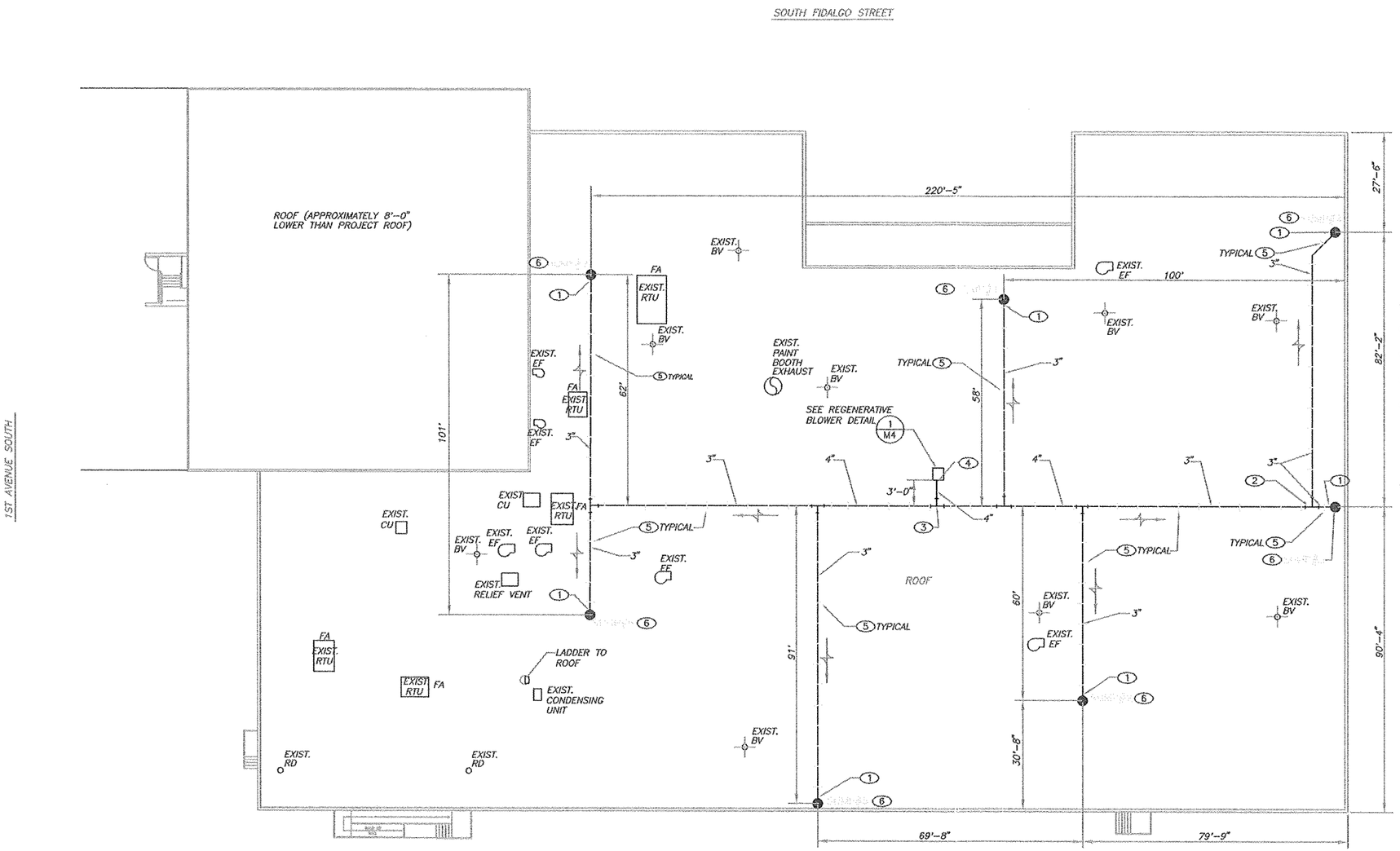
SCALE: 1"=30'

ADVANCED RADON TECHNOLOGIES
RADON MITIGATION TESTING AND INSTALLATION
NORTH 2801 MONROE, SUITE A
SPOKANE, WASHINGTON
(509) 328-5127

PROJECT:
OLYMPIC MEDICAL BUILDING
SEATTLE, WASHINGTON
98108-3248

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

SHEET NO.:



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.

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.

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

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

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

R. GERARD
REGISTERED PROFESSIONAL ENGINEER
STATE OF WASHINGTON
EXPIRES 1/30/09

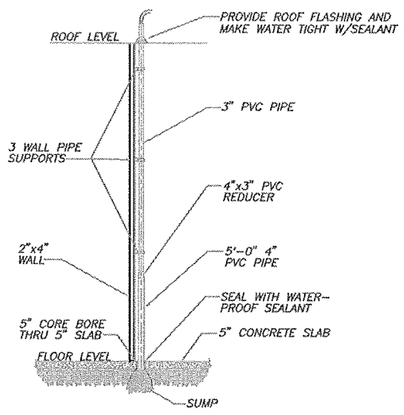
326-5127

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

PROJECT: OLYMPIC MEDICAL BUILDING
901 1ST AVENUE SOUTH
SEATTLE, WASHINGTON
98108-9248

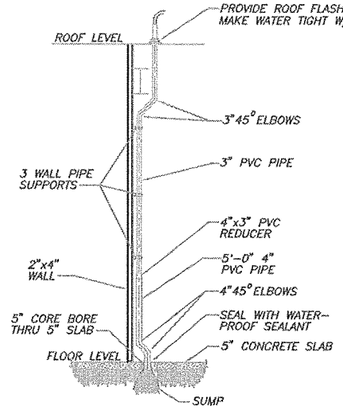
JOB NO.: 6198563
DATE: 11/07/08
DRAWN: KJ
CHECKED: DG

SHEET NO.:



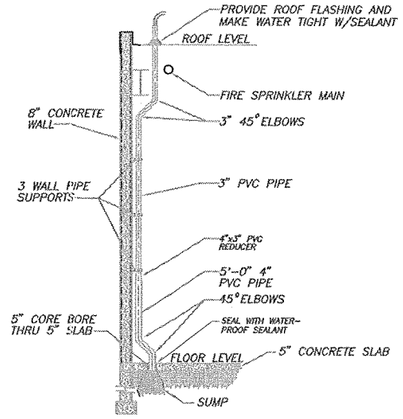
SUMP NO. 1

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



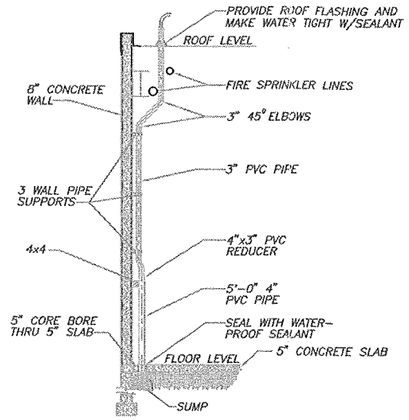
SUMP NO. 2

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



SUMP NO. 3

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



SUMP NO. 4

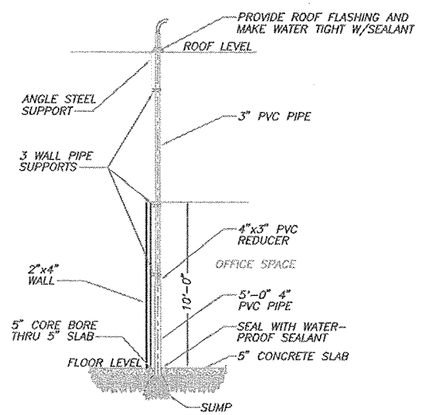
SCALE: 1/4" =1'-0"

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.

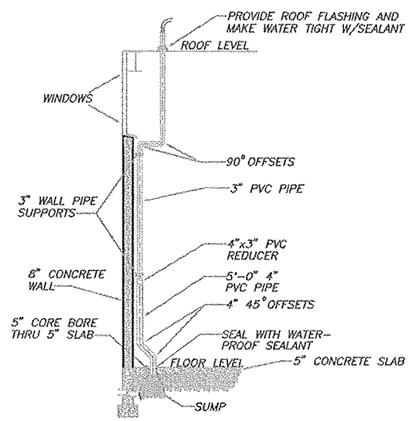
NOTES:

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: rotronindustrical@ametek.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.



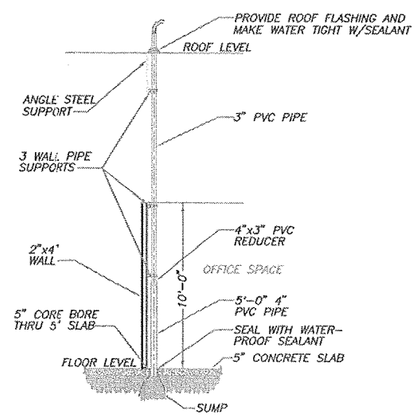
SUMP NO. 5

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



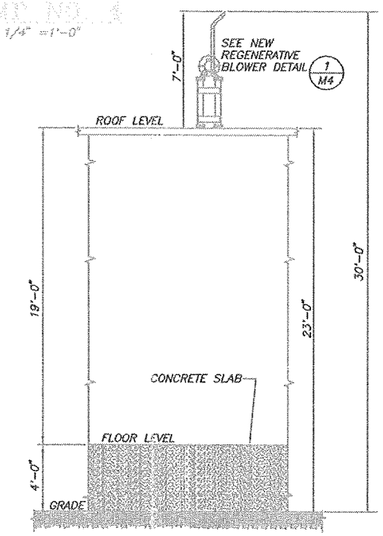
SUMP NO. 6

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



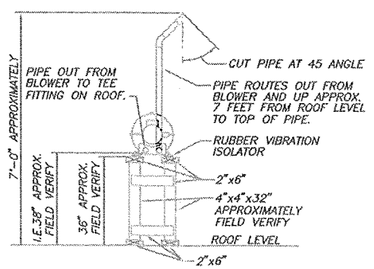
SUMP NO. 7

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



ELEVATION VIEW

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



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

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

RICHARD GERHARD LANGLEY
REGISTERED PROFESSIONAL ENGINEER
STATE OF WASHINGTON
EXPIRES 7/29/09

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.:

APPENDIX B
OLYMPIC MEDICAL BUILDING CITY OF SEATTLE PERMIT

VAPOR INTRUSION MITIGATION DESIGN PLAN
Olympic Medical Facility
Capital Industries, Inc.
5801 Third Avenue South
Seattle, Washington

Farallon PN: 457-004

Project # 6198563

Address	5900 1st Ave S	**Permit Number**	**6198563**
Location		**Permit Status**	Closed: Permit Closed
Records Filed At		**Application Date**	Nov 07, 2008
Application Type / Mechanical Action	MECHANICAL / ALTER EXISTING INSTALLATION	**Issue Date**	Dec 19, 2008
Work Type	FULL REVIEW	**Expiration Date**	Jun 19, 2010
Category	COMMERCIAL	**Finaled Date**	Jan 27, 2009
King Co. Assessor's #		**Applicant**	**TED WEILER** 5900 1ST AV S SEATTLE, WA 98108 (206) 268-5151
Zone/Overlays and ECA			
Legal Description		**Contractor**	
Description of Work	Install 3 horsepower fan on roof, per plan.	**Permit Remarks**	

Building ID			
Sprinkler Standard		**Vent/Exhaust Action**	
Vent/Exhaust Quantity	0		

Project # 6198563

Inspections

Required Inspections - Not Yet Scheduled

Type				Comments
None				

Required Inspections - Scheduled

Type	Date		Inspector	Comments
None				

Completed Inspections

(Multiple same-type inspections may be required to complete a project)

Type	Date	Result	Inspector	Comments
MECH FINAL	Jan 23, 2009	Passed	LEEJM	01/22/2009 WEBUSR Contact : David Gerard 509-370-0804

Waived Inspections

Type				Comments
MECH COVER				

Definition of Terms

MECH COVER	A mechanical cover inspection is provided to verify conformance to code requirements before closing walls, ceilings, floors or underground.
MECH FINAL	A mechanical final inspection is provided to verify that a completed mechanical installation conforms to code requirements.

Project # 6198563

Reviews

Review Cycles

Review Type	Cycle #	Status	Target Date	Assignment Date	Complete Date	Assigned To
ADDRESSING	1	Approved		Nov 07, 2008	Nov 07, 2008	Cruz, M.
FINAL	1	Approved	Nov 19, 2008	Nov 14, 2008	Nov 17, 2008	Go, S.
MECHANICAL	1	Corrections Required	Nov 11, 2008	Nov 07, 2008	Nov 07, 2008	Go, S.
MECHANICAL	2	Approved		Nov 07, 2008	Nov 07, 2008	Go, S.
NOISE	1	Approved		Nov 07, 2008	Nov 07, 2008	George, D.
ZONING	1	Approved	Nov 11, 2008	Nov 07, 2008	Nov 10, 2008	Falk, L.

Definition of Terms

Incomplete	Either no one has been assigned to do this review or the assigned reviewer hasn't had a chance to complete the review yet. At this time, it is not determined if there will be corrections.
Conditional Approval	The reviewer has approved the review cycle, but certain conditions must be met before a status of 'Approved' can be reached.
Corrections Required	The reviewer has completed the review but corrections are required before continuing the review.
Approved	The reviewer has approved the review and no corrections are required.
Target Date	"Target Dates" represent the "Measured Performance Goal" for completion of DPD Plan Reviews. "Target Dates" are identified for each project based upon: 1) the complexity of the project; as well as, 2) the current review cycle (i.e. Initial Plan Review, Corrections Review, etc.). **(Target dates are not necessarily the "actual" date that all reviews will be completed.)** Please refer to the message posted at the top of this page for demand-based time lines and/or contact Plans Routing (i.e. the Routing Coordinator) for a more accurate estimate based upon current workloads.

Project # 6198563

Fees & Receipts

Go to **Not all fees are eligible for online payment*

Fees

Date Paid	Status	Description	Fee	Quantity	Amount	Waived	Paid
11/07/08	Paid	VALUE BASED - PERMIT (INTAKE)	$325.00	0.50	$162.50	N	$162.50
11/07/08	Paid	VALUE BASED - PLAN REVIEW (INTAKE)	$325.00	1	$325.00	N	$325.00
12/19/08	Paid	VALUE BASED - PERMIT (ISSUANCE)	$162.50	1	$162.50	N	$162.50
12/19/08	Paid	NOISE SURVEY REVIEW - MINIMUM	$155.00	0.50	$77.50	N	$77.50
				Total Amount	**$727.50**	**Total Paid**	**$727.50**

Project # 6198563

Contacts

Project Contacts

Name	Primary	Capacity
TED WEILER 5900 1ST AV S SEATTLE, WA 98108 (206) 268-5151	YES	Applicant
DAVE GERARD 2801 N MONROE SPOKANE, WA 99205 (509) 370-0804	NO	Applicant