PES Environmental, Inc.
Engineering & Environmental Services

A Report Prepared for:

Rockwood Atrium, LLC
c/o TMG Partners
100 Bush Street, 26th Floor
San Francisco, California 94104

COMPLETION REPORT
CONSTRUCTION OF METHANE COLLECTION, CONTROL AND MONITORING SYSTEM
THE ATRIUM PROPERTY
1650 65TH STREET
EMERYVILLE, CALIFORNIA

APRIL 14, 2005

By:

Alan J. Anselmo, P.E.
Associate Engineer

Robert S. Creps, P.E.
Principal Engineer

241.054.01.005

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LIST OF ILLUSTRATIONS

1.0 INTRODUCTION

On behalf of Rockwood Atrium, LLC, PES Environmental, Inc. (PES) has prepared this report to document construction completion of the passive methane gas collection, control and monitoring system located at the Atrium property, 1650 65th Street, Emeryville, California (the Site; Plate 1). The Site contains one slab-on-grade, concrete tilt-up wall building with an approximate footprint of 120,000 square feet. The building features include a wood-frame roof, concrete and wood roof support piers, and wood-framed interior shear walls (Plate 2). This report provides information related to: (1) the design and permitting of the methane system; (2) the on-Site construction activities; and (3) a detailed description of the methane collection, control and monitoring system.

Phase I Environmental Site Assessments (ESAs) of the Site previously conducted by Engineering Science, Inc. (ESI) in 1989 (ESI, 1989) and by Property Condition Assessments, LLC (PCA) in 2002 (PCA, 2002) reported that the Site was constructed over a former municipal industrial landfill. This finding prompted three methane-related studies for the Site. LFR Levine-Fricke (LFR) conducted two studies, one on January 22, 2003 and one on March 13, 2003 (LFR, 2004). The results of the LFR testing indicated that methane gas was present in the subsurface at depths ranging from 1 to 4 feet below grade (bg).

PES performed additional methane characterization studies on November 24 through 26, 2003 and January 20 through 23, 2004 (PES, 2004). Results from these studies indicated that methane is present in soil beneath the building slab at concentrations that exceed 25 percent (%) of the lower explosive limit (LEL) for methane and that many of the sampled locations contained methane at levels that exceeded the LEL[1]. Given: 1) the presence of elevated levels of methane located immediately beneath the concrete floor slab; and 2) the uncertainty of the long-term viability of the concrete floor slab as a competent barrier in extraordinary circumstances (e.g., major seismic events, inadvertent perforation during construction activities, etc.), installation of a methane collection, control and monitoring system was required to be implemented by the City of Emeryville Fire Department.

2.0 METHANE COLLECTION, CONTROL AND MONITORING SYSTEM DESIGN AND PERMITTING

The reports containing the results of LFR's and PES' methane characterization studies (LFR, 2004; PES, 2004) were submitted to the City of Emeryville Fire Department for review. In a letter dated March 17, 2004, the City of Emeryville Fire Department requested submission of a

[1] The flammable range of methane is approximately 5 to 15 percent (by volume) in air. The lower limit of 5 percent is referred to as the Lower Explosive Limit (LEL), and the upper limit of 15 percent is referred to as the Upper Explosive Limit (UEL). To provide for the protection of pubic health and safety and the environment, Title 27 of the California Code of Regulations stipulates that the concentration of methane gas must not exceed 1.25 percent by volume in air (25 percent of the LEL) within structures above landfills.

work plan to address and mitigate the identified methane condition at the Site. A copy of the City of Emeryville Fire Department's March 17, 2004 letter is included in Appendix A. As a result of the City of Emeryville Fire Department's March 17, 2004 letter, PES prepared plans and specifications for the construction of a passive methane collection, control and monitoring system. The plans and specifications were submitted to the City of Emeryville Building Division for review and issuance of a building permit. The building permit was obtained by Devcon Construction Incorporated (Devcon) in June 2004. A copy of the building permit (permit no. 0404-143BPE) is included in Appendix A. The Bay Area Air Quality Management District (BAAQMD) determined that the passive methane collection, control and monitoring system is exempt from BAAQMD permitting requirements per Regulation 2-1-103. A copy of the BAAQMD exemption letter is also included in Appendix A.

3.0 CONSTRUCTION ACTIVITY SUMMARY

The methane collection, control and monitoring system was constructed by Devcon and their subcontractors concurrent with tenant improvements to the on-Site building between June 2004 and December 2004. The methane collection and control system (i.e., ventilation wells and piping) was constructed by WRS Infrastructure and Environment, Inc. (WRS) of San Leandro, California, and the methane monitoring system (i.e., gas monitoring sensors and controls) was constructed by ICR Electrical Contractors (ICR) of Antioch, California.

The construction activities commenced on June 29, 2004 with sawcutting the concrete floor slab in preparation for the installation of the vertical subslab gas ventilation wells and piping. Following completion of the sawcutting activities, WRS installed the ventilation wells in July and August 2004, along with the subsurface piping. The aboveground collection and control system piping was installed by WRS from July through September 2004. The methane monitoring system was installed by ICR in multiple phases concurrent with the building tenant improvements from July through December 2004. Final connection and testing of the gas monitoring sensors was conducted by ICR on December 1, 2004. Complete operation of the methane collection, control and monitoring system began in March 2005, after final connection of the alarm communicator (i.e., auto-dialer) to the telephone system.

The City of Emeryville Building Division and Fire Department provided oversight and conducted periodic inspections during construction of the methane collection, control and monitoring system. Additionally, PES provided construction oversight services and conducted periodic inspections during the construction process.

4.0 DESCRIPTION OF METHANE COLLECTION, CONTROL AND MONITORING SYSTEM

The methane collection, control and monitoring system is comprised of the following two separate systems: (1) a methane collection and control system; and (2) a methane monitoring system. A detailed description of the methane collection, control and monitoring system is presented below, and as-built drawings are included in Appendix B. The operation and maintenance procedures for the methane collection, control and monitoring system are presented in an Operation and Maintenance Manual (PES, 2005).

4.1 Description of Methane Collection and Control System

The methane gas collection and control system consists of 24 vertical subslab gas ventilation wells. The wells are connected through a series of lateral and vertical piping to several main header pipes. These main header pipes passively vent the collected gases out through the roof of the building to the atmosphere. The system serves to lessen the potential for methane intrusion and accumulation within the building.

4.1.1 Ventilation Wells

The vertical gas ventilation wells are installed at approximately 60- to 70-foot spacings throughout the Atrium building adjacent to each of the main interior roof support columns. The wells were installed beneath the concrete floor slab of the building to a total depth of approximately 5 feet bg. The locations of the 24 wells are presented on Sheet 02 of the as-built drawings in Appendix B.

The lower 3-1/2-foot portion of the 24 vertical wells was constructed of 3-inch-diameter Schedule 40 perforated polyvinyl chloride (PVC) pipe and backfilled with permeable material (pea gravel). The top of the perforated casing is connected to a 3-inch-diameter Schedule 40 PVC pipe blank, followed by 90-degree elbow and lateral piping to the adjacent roof support column. A 6-inch thick bentonite chip layer is present above the permeable material. Non-shrink, non-metallic grout was placed on top of the bentonite chip layer to the surface. Ventilation well construction details are shown on Sheet 03 of the as-built drawings in Appendix B.

4.1.2 Collection and Control System Piping

Each 3-inch diameter subgrade lateral PVC pipe from the ventilation well is connected by a 90-degree elbow to a vertical riser PVC pipe, which exits the subgrade adjacent to the roof support column. The aboveground vertical riser pipes are fit tight to the roof support columns, and the lower 8 feet of the risers are constructed of Schedule 80 PVC pipe. The 3-inch diameter vertical riser piping from the wells are connected to 4- or 6-inch diameter lateral overhead header pipes. A total of two to six wells are grouped together by location and

connected via overhead lateral piping to six vertical 6-inch diameter PVC riser pipes that penetrate through the roof of the building. A portion of the aboveground PVC piping has been painted to match the interior color of the building. The remaining unpainted PVC piping can be painted to match the interior colors of the building without jeopardizing the integrity of the system. Methane gas warning labels have been affixed to the collection and control system piping. The labels read: "Flammable Methane Gas". The methane collection and control system layout and details are shown on Sheets 02 and 03, respectively, of the as-built drawings in Appendix B.

4.1.3 Valve Assemblies

On each aboveground vertical riser pipe from the ventilation wells, a 3-inch diameter valve has been installed. The valves were installed near the top of the vertical riser piping at approximately 20 feet above grade. The valve allows for pipe closure, if required, due to construction or maintenance activities.

4.2 Description of Methane Monitoring System

The methane monitoring system consists of a series of gas monitoring sensors that measure the presence of methane gas in interior areas such as electrical rooms and restrooms. The gas monitoring sensors are connected to a main alarm and communication system that will alert monitoring personnel in the unlikely event of gas accumulation within the interior of the building.

4.2.1 Gas Monitoring Sensors

A total of 23 gas monitoring sensors have been installed inside the building to monitor for the presence of potential methane accumulation within enclosed spaces. Twenty-one of the monitoring probes are located on the first floor in areas including restrooms, electrical rooms, and general open space areas. Two additional sensors are installed on the second floor in stairwells. All sensors were mounted one-foot below the ceiling but not more than 10-feet above the floor. The methane monitoring system layout is shown on Sheet 04 of the as-built drawings in Appendix B.

The installed methane sensors are infrared point detectors, Model Number IR2100, manufactured by General Monitors. The sensors continuously monitor for the presence of combustible gases and vapors, including methane, within the 0 to 100 percent LEL range and provide alarm indication.

4.2.2 Gas Monitoring Alarm and Communication System

The sensors are connected via shielded wiring that is routed overhead to a central system display panel located near the building entrance on the south side of the building. The location

is shown on Sheet 04 of the as-built drawings in Appendix B. The central station has a programmable logic controller, a touch screen, an alarm communicator, and a battery back-up power system. The status of the methane gas monitoring system is displayed on a 10-inch touch screen that is located at the central station. The touch screen is operated by simply touching the screen to select the appropriate function. The main view screen displayed by the touch screen shows a plan view layout of the 23 gas sensor locations relative to the building. Two additional view screens, which display the methane gas concentration levels present at each sensor, can be accessed by touching the screen to select "LEL1" or "LEL2", as appropriate. In the event of an alarm, the main view screen shows the alarm condition by flashing the corresponding gas sensor location. The system can be reset by selecting "Reset" on the main view screen. Details for the system are presented on Sheet 05 of the as-built drawings in Appendix B.

5.0 REFERENCES

Emeryville Fire & Emergency Services, 2004. Letter to PES Environmental, Inc. regarding 1650 65th Street. March 17.

Engineering Science, Inc. (ESI), 1989. Environmental Phase I Survey, 1650 65th Street Property, Emeryville, California. April.

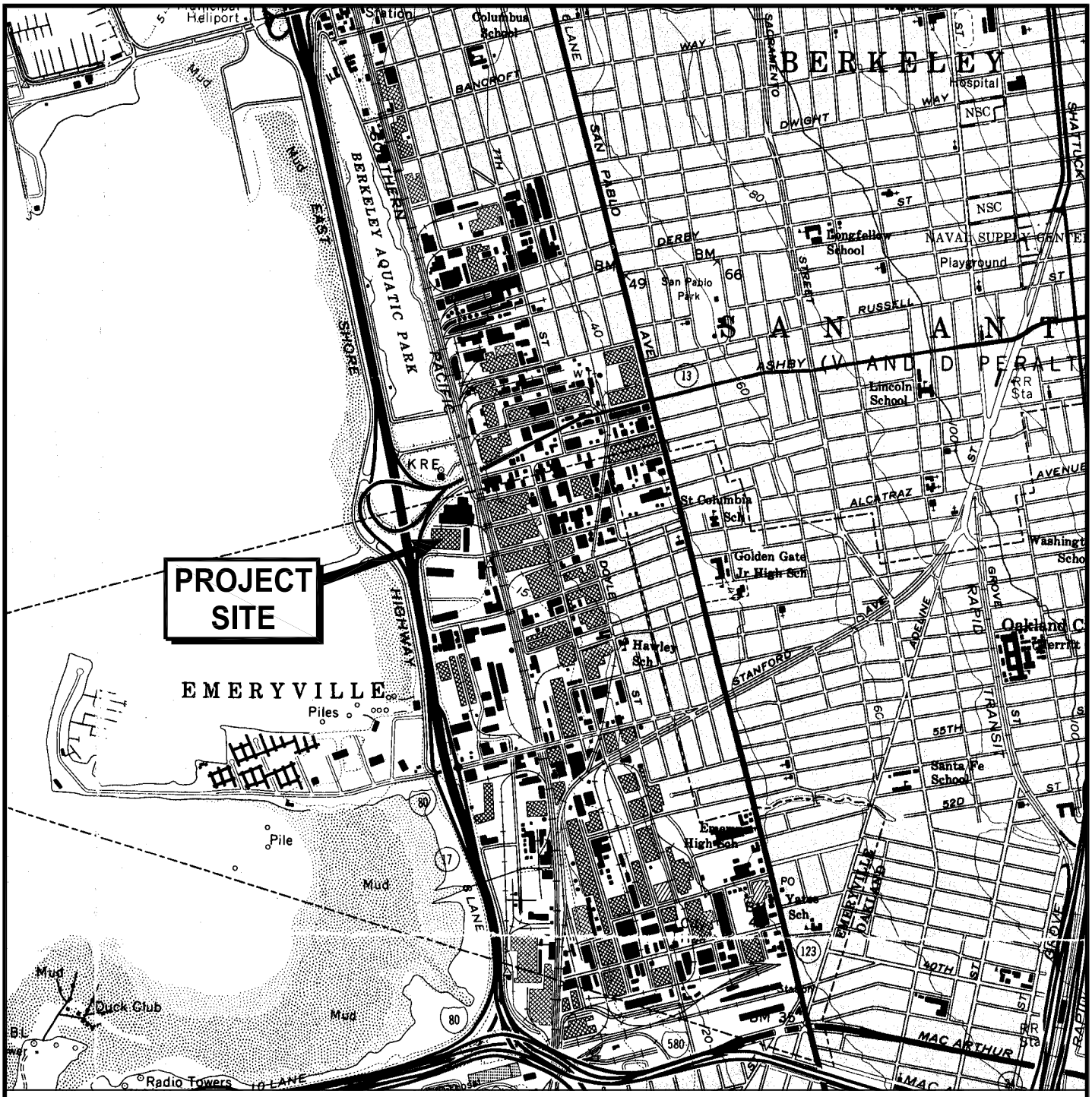
LFR Levine-Fricke (LFR), 2004. Phase II Methane in Soil-Gas Investigation, Atrium Property, 1650 65th Street, Emeryville, California. January 23.

PES Environmental, Inc. (PES), 2004. Summary Report of Methane Characterization Study, The Atrium at Emery Bay Plaza, 1650 65th Street, Emeryville, California. March 2.

PES, 2005. Operation and Maintenance Manual, Methane Collection, Control and Monitoring System, The Atrium Property, 1650 65th Street, Emeryville, California. April 14.

Property Condition Assessments, LLC (PCA), 2002. Phase I Environmental Site Assessment, EmeryBay Portfolio, Emeryville, California. December 26.

ILLUSTRATIONS



U.S.G.S. Topo Map - Oakland West, California, 7.5-minute quadrangle. Map version1997; current as of 1993

PES Environmental, Inc.
Engineering & Environmental Services

Site Location Map
1650 65th Street
Emeryville, California

FIGURE
1

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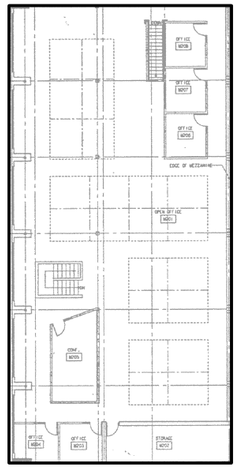
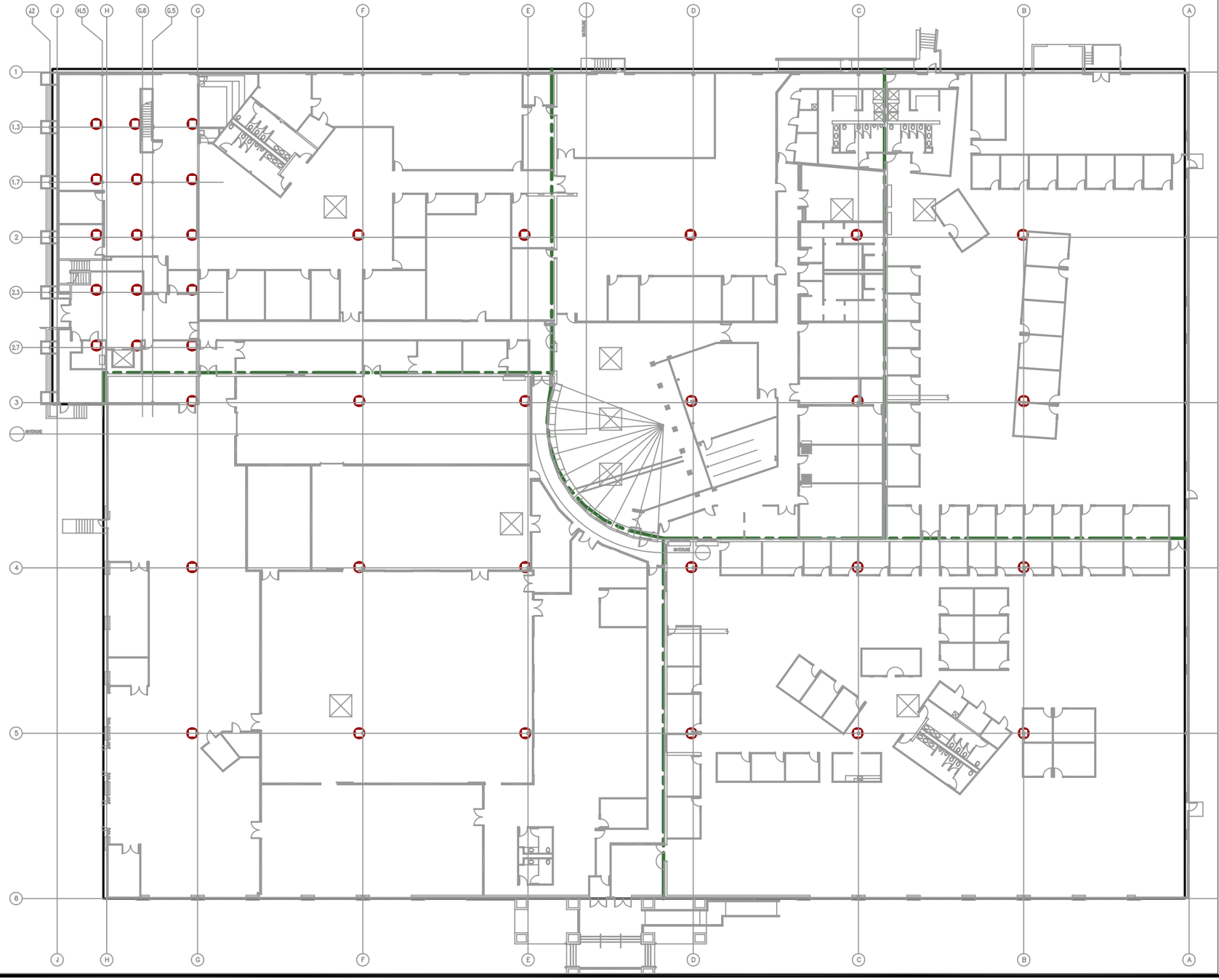
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE



Second Floor



Explanation

- Roof Support Column
- Shear Wall

N

0 40

APPROXIMATE SCALE IN FEET

PES Environmental, Inc.
Engineering & Environmental Services

SIte Plan
1650 65th Street
Emeryville, California

PLATE
2

241.054.01.005	241-05401005_OM_02	*AJA*	4/05
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE

APPENDIX A

REGULATORY AGENCY CORRESPONDENCE

EMERYVILLE FIRE & EMERGENCY SERVICES

2333 POWELL STREET, EMERYVILLE, CALIFORNIA 94608
TEL (510) 596-3750 FAX: (510) 420-1785

STEPHEN L. CUTRIGHT, FIRE CHIEF
DAN DYER, ASSISTANT CHIEF

RECEIVED MAR 19 2004

March 17, 2004

PES Environmental, Inc.
1682 Novato Boulevard, Suite 100
Novato, CA 94947 - 7021

Attention: Mr. Alan Anselmo

Re: 1650-65th Street,

Mr. Anselmo,

I have reviewed the reports prepared by your company (*"Summary Report of Methane Characterization Study"* dated March 2, 2004) and the Levine Fricke report (*"Phase II, Methane in Soil-Gas Investigation"*, dated January 23, 2004). Based on the information included in these reports, The City of Emeryville Fire Department agrees with the recommendations presented in the PES Environmental, Inc. report dated March 2, 2004.

Pursuant to the applicable codes, including, but not limited to the Uniform Fire Code and the Health and Safety Code, the Emeryville Fire Department hereby requests that the property owner, Rockwood Atrium, LLC, submit for our review and approval a finalized work plan that addresses the identified methane condition at the site as well as the proper means to mitigate the situation.

If you have any questions regarding this matter, please do not hesitate to call me at (510) 596-3759

Sincerely,

George Warren

George Warren
Deputy Fire Marshal

June 03, 2004

Rockwood Atrium, LLC c/o TMG Partners
100 Bush Street, 26th Floor
San Francisco, CA 94104

RECD JUN - 9 2004

Attention: **Mr. Ken Dupee**

Application Number: **9639**
Plant Number: **16096**
Equipment Location:
1650 65th Street
Emeryville, CA 94608

Dear Applicant:

We have completed our evaluation of your application for an Authority to Construct and/or Permit to Operate the following equipment:

S-1 **Passive methane collection control and monitoring system (CCMS)**
[Exempt per Regulation 2-1-103]

We have determined that your operation is exempt from permitting per the following:

2-1-103 Exemption, Source not Subject to any District Rule: Any source that is not already exempt from the requirements of Section 2-1-301 and 302 as set forth in Sections 2-1-105 to 2-1-128, is exempt from Section 2-1-301 and 302 if the source meets all of the following criteria:

103.1 The source is not subject to any of the provisions of Regulation 6[1], Regulation 8[2] excluding Rules 1 through 4, Regulations 9 through 12; and

103.2 The source is not subject to any of the provisions of Sections 2-1-316 through 319; and

103.3 Actual emissions of precursor organic compounds (POC), non-precursor organic compounds 10 lb/highest day, but total emissions are less than 150 pounds per year, per pollutant.

Note 1: Typically, any source may be subject to Regulation 6, Particulate Matter and Visible Emissions. For the purposes of this section, Regulation 6 applicability shall be limited to the following types of sources that emit PM_{10}: combustion source; material handling/processing; sand, gravel or rock processing; cement, concrete and asphaltic concrete production; tub grinder; or similar PM_{10}-emitting source, as deemed by the APCO.

Note 2: If an exemption in a Regulation 8 Rule indicates that the source is subject to Regulation 8, Rules 1 through 4, then the source must comply with all applicable provisions of Regulation 8, Rules 1 through 4, to qualify for this exemption.

103.4 The source is not an ozone generator (a piece of equipment designed to generate ozone) emitting 1 lb/day or more of ozone.

This exemption applies solely to permits. The equipment must be operated in compliance with any applicable District regulations and with other regulatory agency requirements. The District's regulations may be viewed online at www.baaqmd.gov/regs/rulereg.htm. Note that this exemption is not permanent. Any change in your operation or in District regulations may require you to obtain permits in the future.

Please include your application number with any correspondence with the District. If you have any questions on this matter, please call **Allan Chiu, Air Quality Engineer II**, at (415) 749-4648.

Very truly yours,

Jack P. Broadbent
Executive Officer/APCO

by
Engineering Division

AC:veh

BUILDING DEPARTMENT
CITY OF EMERYVILLE

Date 5-25-04 Lot No.

Building Permit No. 0404-113 BPE

Address 5525 65th St. - Atrium

Work methane detection, control & monitoring system

Owner Rockwood Atrium LLC

Contractor Devcon

By [signature] Builder or Contractor

City Inspector

DO NOT COVER OR CONCEAL ANY WORK UNTIL INSPECTED AND APPROVED BY THE BUILDING INSPECTOR.

	DATE	INSP.
Plot & Setbacks		
Forms		
Foundation		
Slab		
Sub-Floor		
Ground Plumbing		
Ground Electrical		
Sub-Floor Insulation		
[illegible]		
Stove [illegible]		
Water [illegible]		
Roof Sheathing		
Rough Electrical		
Rough Plumbing		
Rough Mechanical		
Frame [illegible]		
Exterior Frame		
Insulation		
Drywall		
Gas Test		
Final Electrical		
Final Plumbing		
Final Building		
Fire Sprinkler		
Fire (Other)		

FOR INSPECTIONS CALL (510) 596-4315
24 HRS. PRIOR TO INSPECTION

FOR FIRE INSPECTION CALL (510) 596-3759

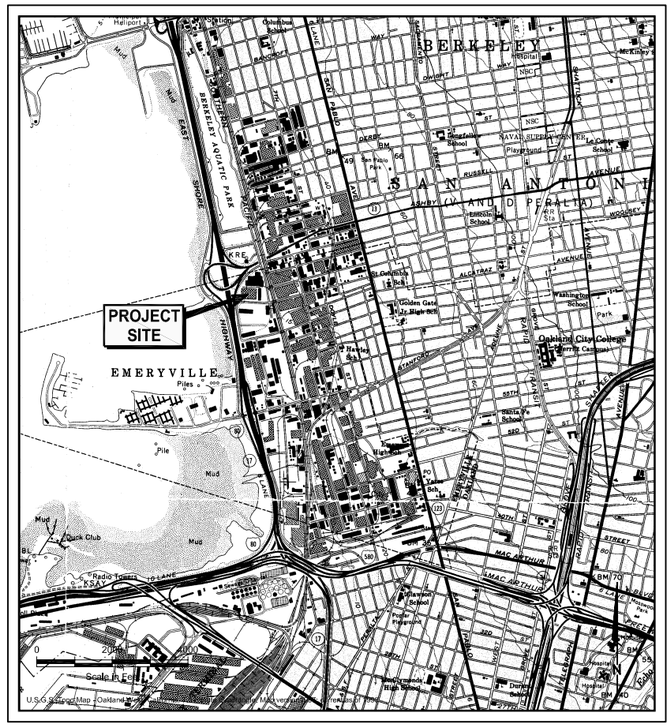
APPENDIX B

AS-BUILT DRAWINGS

As-Built Construction Drawings
for
Methane Collection, Control and Monitoring System

The Atrium at Emery Bay Plaza
1650 65th Street
Emeryville, California

Construction Drawings Sheet Index	
Sheet No.	**Title**
01	**Cover Sheet**
02	**As-Built Methane Collection and Control System Layout**
03	**As-Built Methane Collection and Control System Details**
04	**As-Built Methane Monitoring System Layout**
05	**As-Built Methane Monitoring System Details**



SITE LOCATION MAP

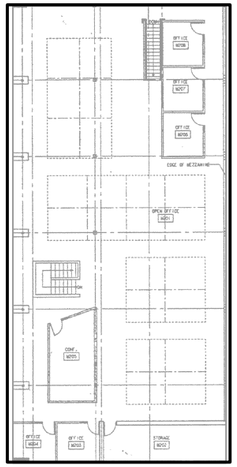
Engineer:

PES Environmental, Inc.
1682 Novato Boulevard
Suite 100
Novato, California 94947
(415) 899-1600

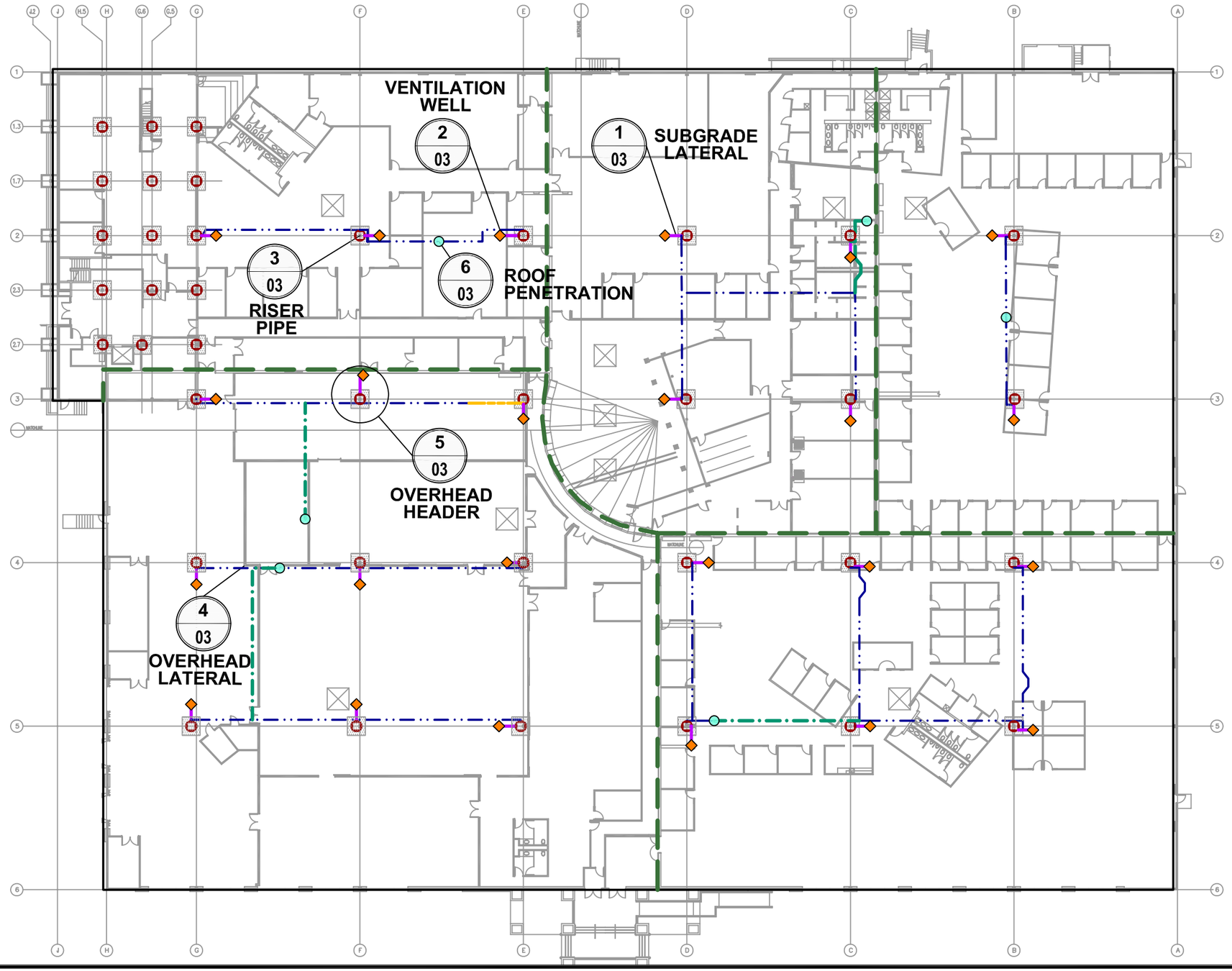
Primary Contact: Alan J. Anselmo, P.E.
Secondary Contact: Robert S. Creps, P.E.

Owner:

Rockwood Atrium, LLC
c/o TMG Partners
100 Bush Street, 26th Floor
San Francisco, California 94104



Second Floor



Explanation

- Roof Support Column
- Thickened Concrete Slab (14-in.)
- Shear Wall
- Methane Ventilation Well
- 6-in. Roof Vent Riser
- Subgrade Piping (3-in. PVC)
- Overhead Lateral (3-in. PVC)
- Overhead Header (6-in. PVC)
- Overhead Lateral (4-in. PVC)

PES Environmental, Inc.
Engineering & Environmental Services

As-Built Methane Collection and Control System Layout
1650 65th Street
Emeryville, California

SHEET
02

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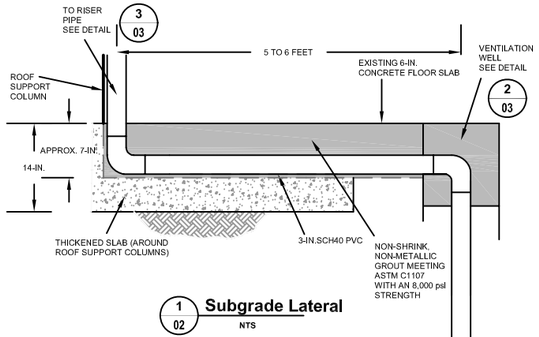
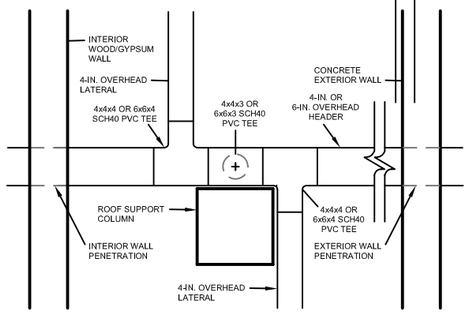
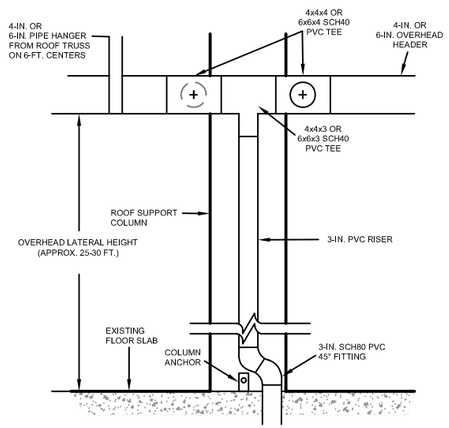


1 02 **Subgrade Lateral** NTS

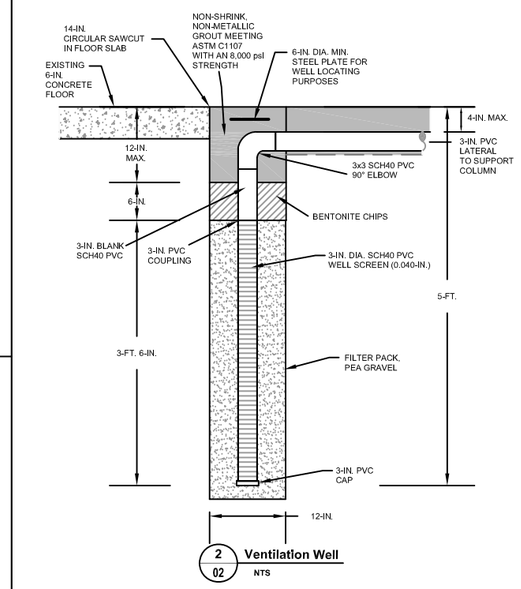


TOP VIEW



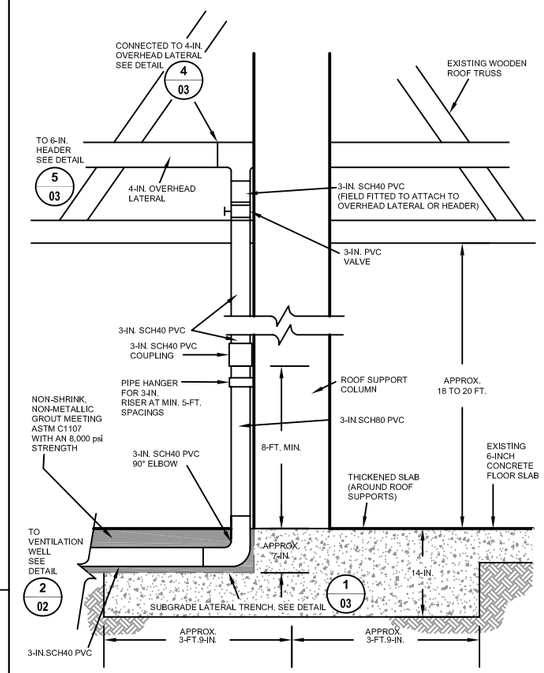
SIDE VIEW

5 02 **Overhead Header** NTS

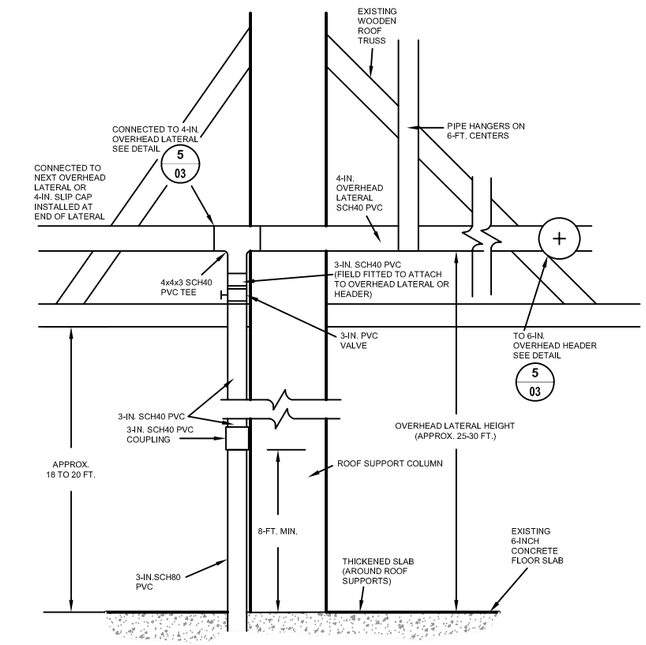


2 02 **Ventilation Well** NTS

6 02 **Roof Penetration and Roof Vent Riser** NTS



3 02 **Riser Pipe** NTS



4 02 **Overhead Lateral** NTS

NOTES:

1. For columns G4 and G5, the riser pipe is protected by encasement within a concrete column guard.

2. All exposed PVC piping (i.e., riser pipes, overhead laterals, etc.) and associated metal brackets, supports, and appurtenances are painted to match the existing roof support column and/or roof truss, as applicable. Methane gas warning labels are affixed to the piping, which read: "Flammable Methane Gas."

PES Environmental, Inc.
Engineering & Environmental Services

As-Built Methane Collection and Control System Details
1650 65th Street
Emeryville, California

SHEET
03

241.054.01.005	241-054_0305_S02-AB	*AJA*	4/05
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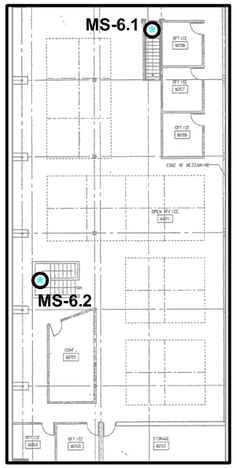

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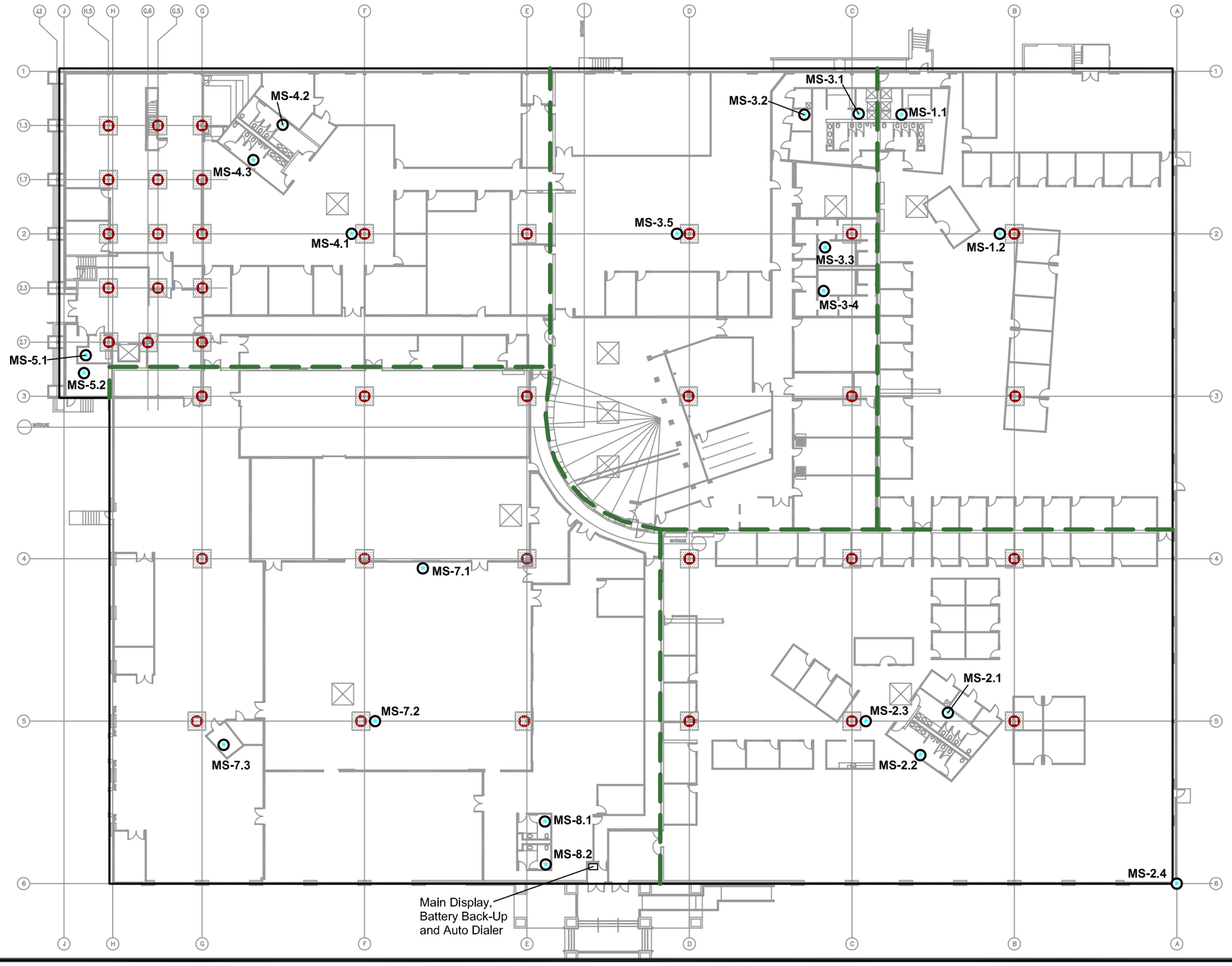


N

0 40

SCALE IN FEET

Explanation

- Roof Support Column
- Shear Wall
- Thickened Concrete Slab (14-in.)
- MS-1.1 Methane Monitoring Sensor

General Notes

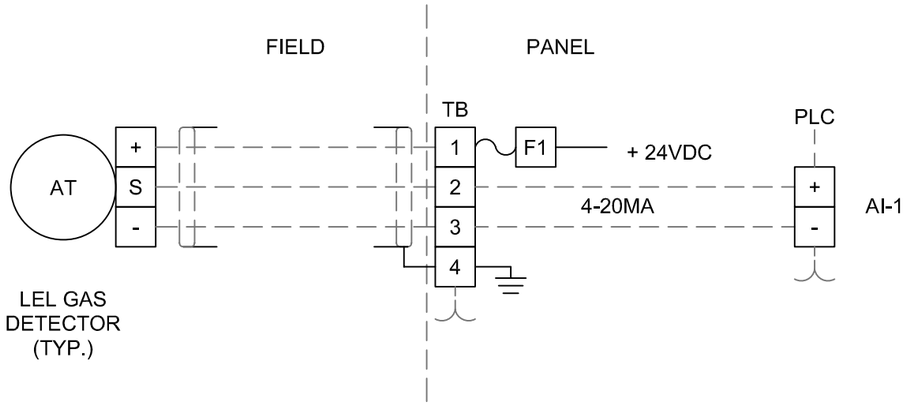
1. The gas detection system sensors are the infrared type. (General Monitors, model IR2100)
2. The gas detection system is not combined with the fire/life safety system at any point.
3. The system sensors are 24VDC powered with a 2-hour system battery backup.
4. All sensor cables are plenum rated, Class A, Type-1 shielded wire.
5. There are no splices in the sensor cables.
6. All cables/wires within 10 feet of the floor are in conduits dedicated to the gas detection system.
7. All sensors are accessible by no more than an 8-foot high "A-Frame" ladder.
8. The system display panel is located in the front of the building, easily viewable from the entryway.
9. There is a dual-line auto dialer (Silent Knight, model 5208) connected to the central station (system controller).
10. The central station has a programmable logic controller (Automation Direct), a touch screen (Automation Direct, 10-In. Panel View), and a battery back-up system.

PES Environmental, Inc.
Engineering & Environmental Services

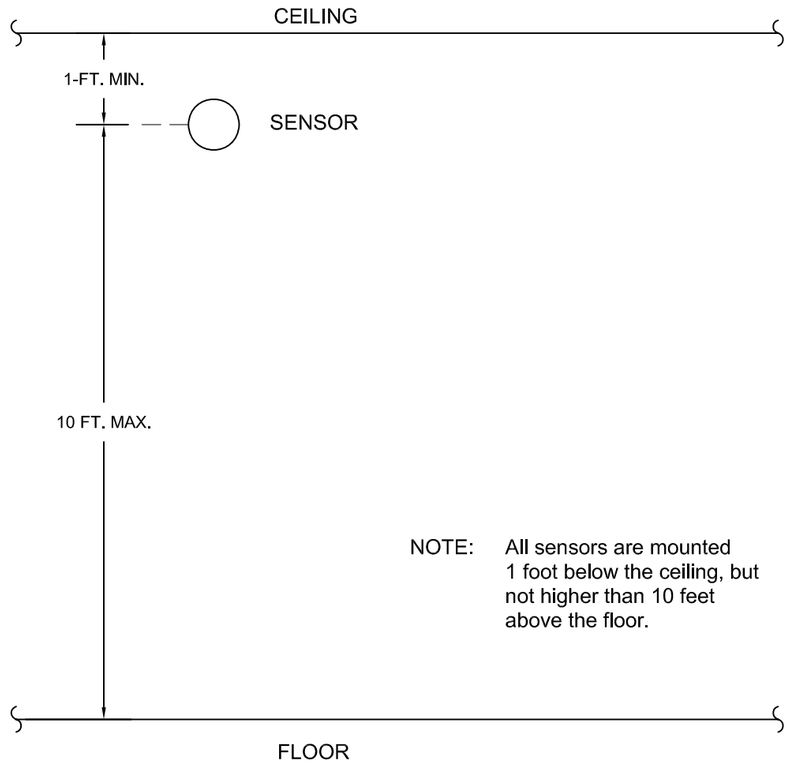
As-Built Methane Monitoring System Layout
1650 65th Street
Emeryville, California

SHEET
04

241.054.01.005	241-05401005_AB_04	AJA	4/05
JOB NUMBER	DRAWING NUMBER	REVIEWED BY	DATE

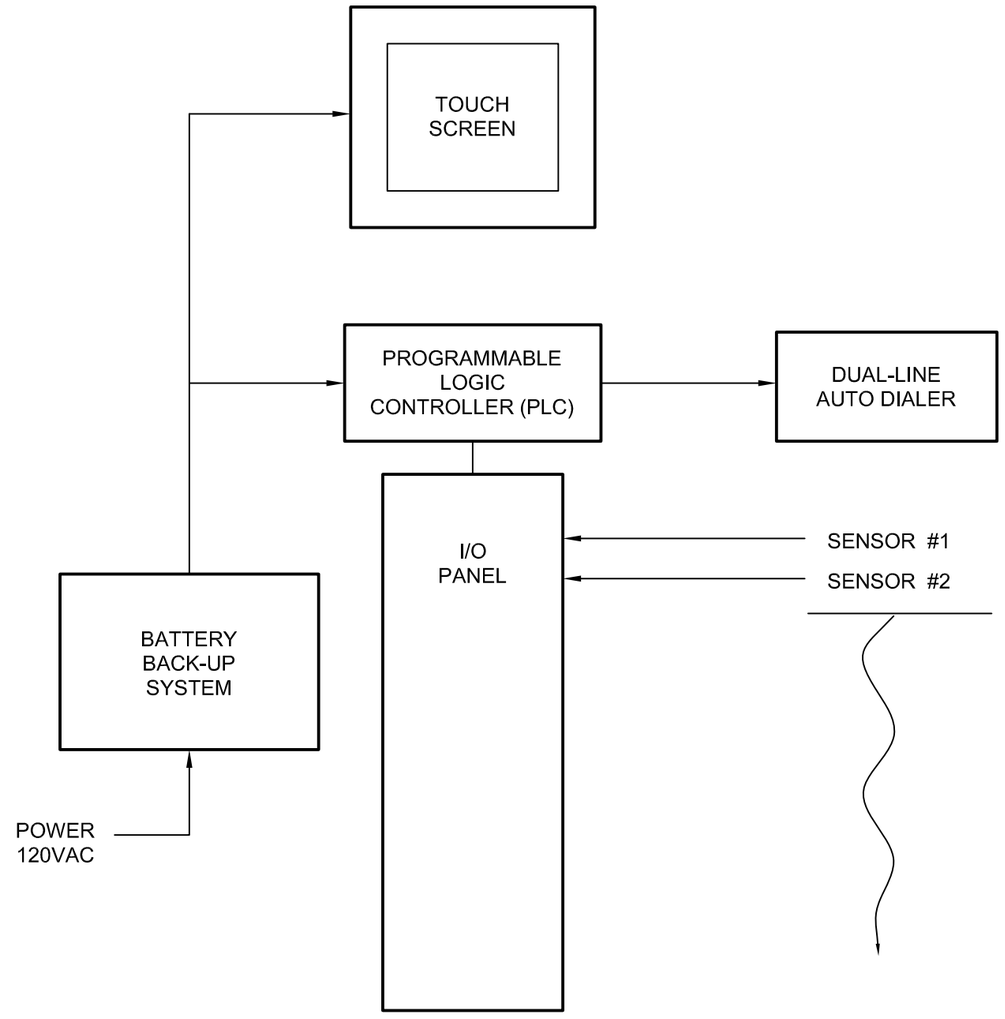


TYPICAL GAS DETECTOR
WIRING DIAGRAM



NOTE: All sensors are mounted 1 foot below the ceiling, but not higher than 10 feet above the floor.

Not to Scale



SINGLE LINE DIAGRAM

PES Environmental, Inc.
Engineering & Environmental Services

As-Built Methane Monitoring System Details
1650 65th Street
Emeryville, California

SHEET
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241.054.01.005	241-054_0305_S02-AB	*AJA*	4/05
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CONSTRUCTION OF METHANE COLLECTION, CONTROL AND MONITORING SYSTEM
THE ATRIUM PROPERTY
1650 65TH STREET
EMERYVILLE, CALIFORNIA

APRIL 14, 2005

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