



PROPOSED AMENDMENT

Chapter 18.79 is added to Title 18 of the Long Beach Municipal Code to read as follows:

CHAPTER 18.79

Methane Gas Mitigation

18.79.010 – Applicability

Methane mitigation shall be required for new buildings (structures), additions to buildings (structures), or changes of use that are located in the following areas:

- A. All areas overlying petroleum-bearing formations and within the limits of a reservoir's boundary, as mapped by the Geologic Energy Management Division (CalGEM). Properties which partially fall into areas described in this item are fully subject to this Chapter for the entire property.
- B. Proposed development of structures and/or impermeable surfaces adjacent to a structure within a distance less than or equal to 300 ft from any active or 100 ft of an idle and/or abandoned oil/gas well.
- C. Proposed development of structures within 1,000 ft from the refuse footprint of any existing or new landfill or disposal site.
- D. Upon a determination by the Development Coordinator that a hazard may exist from methane intrusion at a geographical location or in an area outside the boundaries identified in 18.79.010A through C, the Development Coordinator may enforce any or all of the requirements of Chapter 18.79 as required to preclude potential fire or explosion from methane concentration.
- E. Coastal Zone Methane Soil Gas Investigation within the Coastal Zone are subject to the local development permit requirements and procedures in Division IX of Chapter 21.25 in Title 21 – Zoning.

18.79.020 - Definitions

The following terms, as used in this chapter, shall have the signification attached to them in this section unless otherwise clearly apparent from this context:

- A. Combustible soil gas – flammable gas within soil pores.
- B. Development Coordinator – The City Building Official or designee

- C. Flammable Gas - gaseous substance capable of sustaining combustion or explosion, as defined in California Fire Code.
- D. Gas Membrane Barrier - A manufactured membrane barrier designed to prevent the transmission of methane with a minimum dry thickness of 15 mils and a gas transmission rate (GTR) of less than 40 milliliter per square meter day (ml/m²-D) when tested in accordance with American Society for Testing and Materials (ASTM) D1434.
- E. Gas Collection Aggregate: Aggregate used in the venting layer and gas collection trenches not containing more than 5% fines passing the No. 200 sieve.
- F. Methane Gas - the hydrocarbon substance commonly known as “natural gas,” chemical formula CH₄. For the purposes of definition in this Chapter, natural gas from the distribution system of a utility company is exempt and excluded from the scope of the application of the provisions of this ordinance.
- G. Methane Gas Detection and Alarm System - one or more electrical devices capable of continuous monitoring for the presence of methane gas in accordance with 18.79.060F.8. Alarm system consists of audible and visual alarm capable of alerting occupants that a hazardous atmosphere exists.
- H. Methane System – Collection of building systems designed to mitigate the accumulation of methane gas to less than hazardous levels within a structure. This includes a designed collection system of piping components located beneath a structure to vent combustible soil gas to the atmosphere; heating, ventilation, and air conditioning (HVAC) systems to introduce outdoor air into a structure to ventilate accumulated methane; and sensors and alarms to detect concentrations of methane gas, activate HVAC and/or active methane mitigation, and alert occupants to the presence of methane gas.
 - 1. Active Methane System: the complete designed piping system originating below a building and terminating above the building with a motorized evacuation device to exhaust accumulated gases.
 - 2. Passive Methane System: a non-powered piping system originating below a building and terminating outside of the building using natural air flow for venting accumulated gases.
- I. Mitigation Plan - A site-specific plan for the purpose of addressing potential hazards due to the presence of combustible soil gases. The Mitigation Plan must be approved by the City plan check staff prior to construction.
- J. Qualified Professional - A California Registered Professional Civil Engineer, Petroleum Engineer or Geologist for general mitigation design.
- K. Soil Gas Investigation - A scientific investigation performed in accordance with 18.79.030 reviewed and approved by the Development Coordinator, conducted under the direction of

Qualified Professional for the purpose of determining the locations and concentrations of combustible soil gas.

- L. Standards – a set of prescriptive details referenced and included as a part of this Chapter.
- M. Subslab Vent Piping: Minimum 3 in. diameter polyvinyl chloride (PVC), high-density polyethylene (HDPE), acrylonitrile butadiene styrene (ABS), or strip composite perforated pipe or equivalent.
- N. Vertical Vent Risers: Minimum 3 in diameter cast-iron or galvanized steel pipes connecting subslab piping to the atmosphere.

18.79.030 - Methane Soil Gas Investigation

- A. Methane soil gas testing shall be required if a property under development falls under the criteria identified in 18.79.010. The requirement for testing may be waived if the development meets the exemption criteria below:
 - 1. Single- or two-family homes with first floor areas, including garage space(s), patios, and other impervious surfaces connected to the structure, less than 5,000 sq. ft shall not require site testing and can default to methane mitigation standards stipulated in Section 18.79.050B, Level I.
 - 2. Site testing shall not be required if the methane mitigation system(s) meets design Level III in Section 18.79.050B.
- B. Site soil testing shall be performed after site remediation, in accordance with the Long Beach Oil/Gas Well Abandonment Chapter 18.78 Section 18.78.130, CalGEM requirements, and/or local site cleanup requirements. Site soil testing shall be performed prior to site grading or a minimum of 30 days after any site grading.
- C. Site soil testing:
 - 1. Initial, Shallow Soil Testing:
 - i. minimum of 2 tests per Site or 1 per 10,000 square feet (sf) of site area, or portion thereof. Probes shall be installed no less than 4 feet below ground surface (ft bgs). Where groundwater is less than 4 ft bgs, probes shall be installed above the ground water level;
 - ii. Probes shall be constructed in accordance with Department of Toxic Substances Control (DTSC) Advisory – Active Soil Gas Investigations dated July 2015 (DTSC Active Soil Gas Investigation Advisory).
 - iii. Probes shall be sampled a minimum of once, 2- to 48-hours after installation depending on installation methods in accordance with the DTSC Active Soil Gas Investigation Advisory.
 - iv. Methane and pressure shall be recorded for each sample location during each sampling event.
 - 2. Soil Gas Probe Test:

- i. Minimum of 2 tests per Site or 1 per 20,000 sf of site area or portion thereof installed in the locations with the highest concentration of soil gas was reported in shallow soil testing;
 - ii. Probes shall be installed at depths of 5-, 10-, and 20-ft below the lowest building slab or footing elevation. Probes shall be a minimum of 12-inches above the groundwater level; probes are not required to be installed within groundwater;
 - iii. Probes shall be constructed in accordance with the DTSC Active Soil Gas Investigation Advisory.
 - iv. Probes shall be sampled a minimum of two times. The first sampling event shall be no sooner than 2- to 48-hours after installation depending on installation methods in accordance with the DTSC Active Soil Gas Investigation Advisory. The second sampling event shall be a minimum of 24-hours after the first. Samples shall not be collected during increasing barometric pressure from a pre-frontal weather condition.
 - v. Methane and pressure shall be recorded for each sample location during each sampling event.
3. Reporting: results of shallow and soil gas probe tests shall be recorded on methane mitigation plans with corresponding site design level indicated. Depth to groundwater, if encountered, shall be included in the report. The test results shall be stamped and signed by a Qualified Person. Included with the test results shall be a site plan indicating the locations of shallow and soil gas tests as well as the location(s) and dimension(s) of proposed and existing buildings.

18.79.040 - Exemptions

Exemptions to these methane mitigation requirements are as follows:

- A. Open parking garage structures with permanent natural ventilation as defined by California Building Code, Title 24 Section 406.5.2; however, on- or below-grade, enclosure building features such as elevator pits, stairwells, storage rooms, and/or elevator lobbies shall be equipped with methane mitigation features described in this policy; or
- B. Modifications to existing structures that are less than 50% of the existing structure area shall not be required to perform site testing and/or methane mitigation.

18.79.050 – Methane Mitigation Design Requirements

- A. The methane mitigation design requirements shall be based upon the results of the site soil gas investigation as prescribed in Section 18.79.030 and as contained in this Section.
- B. Projects that fall within 1,000 ft from the refuse footprint of any existing or new landfill or disposal site shall obtain an approval pursuant to Title 27, California Code of Regulations from the Local Enforcement Agency (LEA); i.e., Los Angeles County Public Health. The City of Long Beach Building and Safety Bureau or the City of Long Beach Health Department may

require methane mitigation, regardless of the outcome from the LEA review. Oversight documentation shall be provided to the City of Long Beach.

- C. The methane mitigation design requirements are provided in accordance with the following methane concentration levels (Table 1).
1. No Action: Concentrations of methane less than 1,000 parts per million by volume (ppmv) and pressure less than or equal to zero.
 2. Level I: Concentrations of methane less than 50,000 ppmv and measured pressure less than 2 inches of water column (2" WC).
 3. Level II: Concentrations of methane up to 50,000 ppmv with pressure greater than 2" WC or concentrations of methane between 50,000 ppmv and 300,000 ppmv at all pressures.
 4. Level III: Concentrations of methane greater than 300,000 ppmv. Structures which are developed over or within close proximity (as defined in Chapter 18.78) to abandoned oil wells shall comply with Level III methane mitigation.

TABLE 1
SITE DESIGN LEVEL AND MITIGATION FEATURES

SITE DESIGN LEVEL	LEVEL I	LEVEL II		LEVEL III
		<50,000 PPMV	≥50,000 PPMV <300,000 PPMV	
METHANE CONCENTRATION	<50,000 PPMV	<50,000 PPMV	≥50,000 PPMV <300,000 PPMV	≥300,000 PPMV
PRESSURE	<2" WC	≥2" WC	ALL PRESSURES	ALL PRESSURES
MITIGATION REQUIREMENTS				
Gas Membrane Barrier (18.79.060 C)	X	X	X	X
Perforated Horizontal Pipes (18.79.060B.E.2)	X	X	X	X
Vent Risers (18.79.060.E.4)	X	X	X	X
Gas Detection System (in-room and vent risers) (18.79.060.F)		X	X	X
Alarm System (18.79.060.F)		X	X	X
Control Panel (18.79.060.F)		X	X	X
Mechanical Ventilation (18.79.060.G)		X	X	X
Mechanical Sub Slab Extraction (18.79.060.H)				X
Pavement Venting (18.79.060.I.1)		X	X	X
Signs (18.79.060.I.2)	X	X	X	X

SITE DESIGN LEVEL	LEVEL I	LEVEL II		LEVEL III
METHANE CONCENTRATION	<50,000 PPMV	<50,000 PPMV	≥50,000 PPMV <300,000 PPMV	≥300,000 PPMV
PRESSURE	<2" WC	≥2" WC	ALL PRESSURES	ALL PRESSURES
MITIGATION REQUIREMENTS				
Conduit or Cable Seal Fittings (18.79.060B.J.1)	X	X	X	X
Trench Dam (18.79.060B.J.3)	X	X	X	X

18.79.060 – Methane Mitigation Components

- A. The methane gas mitigation system shall be designed by a Qualified Professional.
- B. During Construction, special inspection for the methane mitigation measures will be conducted by the project Qualified Professional in order to certify the project final inspection. The City of Long Beach will perform inspections of methane mitigation components in accordance with Section 18.79.090.
- C. Gas membrane barrier
 1. Gas membrane barrier shall be continuous beneath slab and foundations and vertically along subterranean building elements except beneath footings and grade beams.
 2. Penetrations through the gas membrane barrier shall be booted to prevent gas migration.
- D. Gas membrane barrier protection
 1. Protection Layer shall be placed above and below the gas membrane barrier.
 2. Protection layers shall consist of one of the following:
 - i. 2-inch minimum sand layer
 - ii. 2-inch minimum mud slab
 - iii. 16 oz/sy nonwoven geotextile suitable for cushion application
 - iv. Alternative nonwoven geotextiles supported by analyses performed by a Qualified Professional
- E. Subslab ventilation
 1. Subslab venting layer
 - i. Placement shall be between gas membrane barrier protection layer, subgrade, and pipe trenches.
 - ii. Venting layer may consist of one of the following:
 1. Gravel Blanket: A minimum thickness of 2 in. of gas collection aggregate or a thickness equal to 2 times the largest particle size, whichever is greater, shall be placed above the subgrade and pipe trenches.
 2. A 200-mil (minimum) thickness double-sided geocomposite.

2. Subslab vent piping
 - i. Subslab vent piping shall be embedded in a pipe trench and backfilled with aggregate meeting the requirements of Gas Collection Aggregate. Aggregate shall surround the pipe a minimum of 4 in. in all directions.
 - ii. Vent piping shall be placed such that no portion of the foundation is more than 25 ft from a horizontal, perforated vent pipe.
 - iii. Vent piping with a diameter of 3 inch shall not be spaced greater than 50 ft apart horizontally on center (OC).
 - iv. Vent piping with a diameter of 4 inch shall not be spaced greater than 100 ft apart horizontally OC.
 - v. The total length of solid horizontal piping shall not exceed 100 ft.
 - vi. Solid horizontal vent piping shall maintain a minimum 1% positive slope towards the vent riser.
 - vii. Where piping transitions through building foundations, the penetration shall be accomplished in compliance with the California Building Code.
 - viii. Subslab venting shall be connected to vertical vent risers.
 - ix. Vertical risers shall always be equal or larger in diameter than the Horizontal pipes.
3. Groundwater: The methane mitigation design shall account for groundwater in the design by one of the following methods:
 - i. Provide a combined gas collection and dewatering system by sloping subslab vent piping and collecting discharge water in accordance with Public Works permitting requirements such as industrial waste or stormwater based on characterization and permit requirements.
 - ii. Eliminate subslab vent piping and trenches and provide mat slab with underslab sloping 1% toward perimeter landscaping.
4. Vertical Vent Riser
 - i. Vent risers shall be connected to horizontal ventilation piping and be provided at a frequency in accordance with Table 2.
 - ii. Riser length shall be a maximum of 100' measured along solid pipe (including bends) for design levels I and II.
 - iii. Vent Risers max spacing shall be 100' measured between vent risers for design levels I and II.
 - iv. When the application of the spacing and location requirement of Table 2 results in the requirement of a fractional number of Vent Risers, any fraction shall be construed as one Vent Riser.
 - v. Building Footprint shall be defined as the area in square feet contained within the exterior walls at or below the grade level.
 - vi. Perforated pipe shall be connected to vertical vent riser pipe with a California Plumbing Code approved transition/adaptor and contain no more than 5 ft of solid pipe from outside edge of footing to the perforated pipe transition under the building. Exceptions may be made for specific structural conditions of a building.
 - vii. Transition to vertical riser pipe material shall occur no less than 6 in. above grade.
 - viii. Solid, horizontal vent piping in trenches shall maintain a positive slope towards the vent riser.

- ix. Vent riser pipes shall be located on the exterior of a structure except in Level I and II designs where structures are wider than 200 ft. Vent risers may be located within a structure for Level III mitigation if fans/blowers are located at the termination of the vent riser and fans are exterior to the structure. If within a structure, vent risers shall be within a sealed chase that does not communicate with other parts of the structure.
 - x. Vent riser pipe shall not be installed within 5 ft of electrical panels, water heaters, fireplaces or other sources of heat or ignition.
 - xi. Riser pipes shall be protected from damage.
5. Terminations
- i. Riser pipes shall terminate at a minimum of 10 ft above surrounding grade or not less than 6 in. above the adjacent roof level.
 - ii. Riser pipe terminations shall be located at least 1 ft away from a parapet wall.
 - iii. Riser pipe shall terminate at a distance of a minimum of 10 ft from and 3 ft above any building opening or air intake and within the property line.
 - iv. The termination of all vent riser pipes shall be provided with a “T” connection or other approved rain cap to prevent the intrusion of rainwater. The rain cap shall be non-restricting to air flow.
6. Shut-off valve
- i. Valve shall be provided within the first three feet of the vent riser to isolate the vent riser from the horizontal vent piping.
 - ii. Valves shall be chained or otherwise locked open unless vent risers are being tested or replaced.
7. Sampling Port
- i. A sampling port shall be designed and installed in the vent riser pipe.
 - ii. The sampling port shall be accessible and in the exterior wall surface near ground level for the purpose of testing the vent system.
 - iii. The port shall be provided with a threaded plug or cap. No flush plugs are allowed.
 - iv. A square metal brass tag or rigid plastic engraved sign identifying the tee as a methane collection system vent shall be installed adjacent to the test tee.
 - v. The vertical riser shall be pressure tested in accordance with Section 712.0 of the California Plumbing Code (CPC) using the sampling port.

TABLE 2
VENT RISER FREQUENCY

MIN. VENT RISER PIPE DIAMETER (inches)	NUMBER OF VENT RISERS PER BUILDING FOOTPRINT AREA (square feet)
3	1/7,500 (min of 2 risers)
4	1/10,000 (min of 2 risers)

- F. Methane Gas Detection and Alarm System (Level II and III)
1. Location: Sensors shall be installed in the lowest occupied spaces of the building to detect the possible presence of methane in the air as well as within vent risers for Level III design. Sensors shall be placed at the ceiling line of the lowest building level. A minimum of one sensor shall be required per room of the lowest level.
 2. Sensors shall be provided at the following frequency (Table 3):

**TABLE 3
FREQUENCY OF AUTOMATIC SENSORS**

ROOM FLOOR AREA OR CONCEALED SPACE AREA (SF)	NUMBER OF SENSORS
10,000 and More	Minimum of 3 Sensors plus one for every 20,000 and fraction thereof in excess of 10,000
More than 5,000 and less than 10,000	3 Sensors
More than 1,000 and Up to 5,000	2 Sensors
0 and Up to 1,000	1 Sensor
Elevator Shafts and Enclosed Stairwells	1 Sensor
Vent Risers	1 Sensor per Vent Riser (Level III Only)

3. The sensors shall be able to detect explosive gas at concentrations between 0 and 100% of the lower explosive limit (LEL) for methane (5% methane by volume) with a sensitivity of 1% of the LEL and a detection limit of 5% of the LEL.
4. Detectors and wiring shall be immune to radio frequency and infrared remote-transmitter frequency interface.
5. Control Panel: The sensors shall be connected to a compatible control panel. The control panel shall issue an alarm, HVAC response, and/or autodial response following detection of methane. An auto dialer shall be required to allow message alerting to building maintenance of the alarm conditions, including gas alarms and fault conditions.

6. Backup Power: Backup power for control panel shall be provided for a minimum of 24 hours for standby mode plus 5 minutes of alarm under full load condition; backup should be available within 60 seconds of power loss.
7. Detection and Response: The methane gas detection sensors shall detect methane in the air as well as within the vent riser
 - i. The interior low-level alarm shall be for methane concentrations at or greater than 10% of the LEL. The low-level alarm shall trigger HVAC system activation to flush accumulated methane in the lowest level of the building. A warning annunciator shall illuminate on the control panel, and a notification shall be sent to building maintenance, building owner, and/or engineering consultant to investigate the source of the alarm and implement an engineering solution to resolve the condition.
 - ii. The interior high-level alarm should be for methane concentrations at or greater than 25% of the LEL. The high-level alarm shall sound an audible/visible alarm, trigger an evacuation of the affected building, and alert building maintenance and a central station monitoring company. Building HVAC ventilation shall continue operation.
 - iii. The vent riser sensor shall activate vent riser blowers upon detection of methane at 75% of the LEL.
8. Alarms
 - i. Visual and audible alarms shall be required to be provided at a minimum frequency of one per 10,000 sq. ft of building space and one per business unit in multi-unit commercial structures. Visual alarm shall meet NFPA 72 (adopted edition) standards.
 - ii. Audible alarm shall be a minimum of 15 decibels (db) above ambient noise.
 - iii. Visual alarm shall be 15 candelas.
9. Single-Station Gas Detection Sensor(s)
 - i. Single family and up to 4-unit multi-unit residential structures may install single-station methane gas detection sensors with battery backup in the lowest occupied space of the structure.
 - ii. The battery should be sized to operate the single-station gas detector at least 20 hours in standby mode and 5 minutes in alarm mode.
 - iii. The location of the detector should be provided on the plans.
 - iv. Hard-wired sensors with a central control panel may be installed in lieu of single-station gas sensors.

G. Mechanical Ventilation

1. In the event of an in-room sensor gas alarm activation, automated mechanical ventilation system for the building shall be set to activate using 100% outdoor air makeup. The system may be designed to one of the following levels:
 - i. 10% LEL detection of in-room sensor triggers ventilation that can achieve a minimum of 4 air exchanges per hour (ACH). No battery backup is required for this system. Parts of fans in this option shall be of nonferrous or non-sparking materials or their casing shall be lined or constructed of such material.

- ii. Continuous operation of the mechanical ventilation system without connection to in-room sensor that is able to provide a minimum of 1 ACH. 24-hour back up power is required for mechanical ventilation system when sensors and alarms are not provided.
 - iii. Mechanical ventilation system that starts up at least once every 6 hours to provide a minimum of 24 air exchange per day. 24-hour back up power is required for mechanical ventilation system when sensors and alarms are not provided.
2. In the event of concurrent fire alarm system, fire alarm will override methane alarm HVAC response.

H. Active Sub-Slab Ventilation System

1. Automatic gas sensors shall be installed to measure gas in the vent riser.
2. Location: Sensors shall be installed within the vent risers.
3. The forced sub-slab air venting system shall provide a minimum of three air changes per hour of the vent piping and the gravel trench.
4. The vent riser sensor shall not activate interior alarms.
5. Unless the porosity of the gravel is established by a test prepared by a Qualified Professional, the porosity of the gravel shall be taken as 25%.

I. Miscellaneous Systems

1. Pavement Venting: Hardscapes covering 5,000 sq. ft or more and located within 15 ft of any structures requiring methane mitigation shall also be vented with pavement vents or by installing landscaping areas immediately adjacent to the building exterior walls at least 2-ft wide covering at least 80% of building perimeter.
2. Signs: Vent pipe shall be clearly marked with signing to indicate that the pipe may contain combustible gas. A Warning Sign should be placed at the main building entrance.

J. Utilities and Trench Dams

1. All underground electrical conduit penetrating the slab or foundation of the building shall be provided with a seal-off device.
2. Manholes, tanks, or other intermediately occupied structures shall be mitigated in accordance with these requirements.
3. Trench Dam: Utilities entering a structure shall have a trench dam constructed.
4. Electrical Classifications: For the purpose of determining the appropriate electrical wiring method and equipment, boundaries of the hazardous area classification are specified in Tables 4, 5, and 6:

TABLE 4
OUTDOOR HAZARDOUS AREA CLASSIFICATIONS

LOCATION	MEASURED SOIL GAS CONCENTRATIONS (PPMV)	HAZARDOUS AREA CLASSIFICATION
Below finished grade	<12,500 >12,500	Unclassified Class I, Div 1
Sumps	Total submerged Partially submerged	Unclassified Class I, Div 1
Above grade	NA	Unclassified

TABLE 5
BUILDING HAZARDOUS AREA CLASSIFICATIONS

LOCATION	MEASURED SOIL GAS CONCENTRATIONS (PPMV)	HAZARDOUS AREA CLASSIFICATION
Below Membrane	<1,000 >1,000	Unclassified Class I, Div 1
Below grade within the raised floor foundation or lowest building slab without gas barrier membrane	NA	Class I, Div 1
Above grade within the raised floor foundation footing without gas barrier membrane but with adequate ventilation	<12,500 >12,500	Unclassified Class I, Div 2
Above membrane but below lowest building slab or raised floor foundation	<12,500 >12,500	Unclassified Class I, Div 2
Within building	NA	Unclassified
Sumps	Totally Submerged Partially Submerged	Unclassified Class I, Div 1

**TABLE 6
VENT RISER HAZARDOUS AREA CLASSIFICATIONS**

LOCATION	DISTANCE	HAZARDOUS AREA CLASSIFICATION
Passive System Vent Outlet	0 to 3 feet 3 to 5 feet >5 feet	Class I, Div 1 Class I, Div 2 Unclassified
Active System Vent Outlet	0 to 5 feet 5 to 10 feet >10 feet	Class I, Div 1 Class I, Div 2 Unclassified
Joints and fittings not enclosed within wall spaces*	0 to 3 feet >3 feet	Class I, Div 2 Unclassified
Joints and fittings in framed walls*	Any distance within the frame stud bay	Class I, Div 1
In the vent system	NA	Class I, Div 1
Gas sampling port	0 to 3 feet >3 feet	Class I, Div 2 Unclassified

* The hazardous area designation for these areas is considered as unclassified under the following conditions:

1. All joints and fittings are welded in approved manner,
2. Approved double walled vent risers are provided, or
3. Approved four inch or smaller threaded steel pipe venting system or equivalent approved piping system is installed.

K. Methane Mitigation Plan Requirements

1. Projects with No Action methane mitigation shall submit results of soil gas testing in accordance with Section 18.79.030 with foundation plans.
2. Methane mitigation design plans for signed and stamped by a Qualified Professional shall be submitted to the City of Long Beach for Design Levels I, II, and III, and include, at a minimum, the following:
 - i. Plan view layout(s) of:
 1. Horizontal venting pipe with solid and perforated pipes
 2. Locations of vent riser pipes
 3. Vent riser termination
 4. Pavement venting
 5. Mat slab sloping direction(s), if applicable
 6. Signage
 7. Sensors
 8. Alarms
 - ii. Plan view layouts shall be provided with structural (horizontal and vertical vent riser pipes) or architectural backgrounds (pavement venting signage, sensors, alarms, and vent riser terminations).
 - iii. Landscaping shall be indicated on plans incorporating landscaping into mitigation design (e.g., in lieu of pavement venting and/or if mat slab sloping is utilized).
 - iv. Details shall be provided that show the following:

1. Typical horizontal and vertical cross-sections
 2. Typical grade beam and footing tie-ins
 3. Geocomposite overlaps and seaming, if applicable
 4. Typical boots
 5. Overlaps and repairs
 6. Vertical terminations (if applicable)
 7. Future slab and membrane penetration repairs (post-slab pours)
 8. Mat slab sloping
 9. Utility trench dams
 10. Utility conduit seals
 11. Vent riser signage, sampling port, shut off valve, and termination
 12. Aggregate gradation
 13. Typical sensor height and mounting
 14. Typical alarm height and mounting
 15. Typical signage with lettering height and color
- v. Additionally, notes shall be included which indicate:
1. Results of methane site testing
 2. Material specifications (geomembrane gas barrier, geocomposite, piping, strip composite)
 3. Gas Collection Aggregate gradation
 4. Calculations, if applicable (e.g., puncture, head loss)
 5. Headloss calculation for subslab blower sizing
 6. Battery backup calculations for sensors and alarms
 7. Fan specification including fan curves
 8. Geomembrane Gas Barrier smoke testing requirements and frequency including note indicating:
 - a. "All systems shall be final smoke tested under the observation of the project inspector or specialty inspector approved by the building official prior to covering."

18.79.070 - Operations and Maintenance

- A. Emergency/Contingency Plan
 1. Plan shall be prepared by the Qualified Professional dictating emergency response procedures, location of control panel, and automatic sensors.
 2. Specifications for repair of the membrane shall be included as well as as-built information for the sub slab system.
 3. The Emergency/Contingency Plan will be included in the building's final Commissioning Report.
- B. Methane gas detection sensor and alarm testing shall be performed annually and maintained by the owner for a minimum period of 5 years and shall be made available to the City Building and Safety and Fire Department upon request. Additional testing may be required by Long Beach Fire Department.
- C. All methane gas detection and alarm systems system testing shall submit to the Long Beach Fire Department electronically via a method approved by the Fire Code Official.

18.79.080 - Plan Review and Inspection Fees

- A. Methane plan check, and inspection fees shall be applicable to a project with methane mitigation in accordance with Long Beach Master Schedule of Fees and Charges.
- B. A separate alarm system plan review and inspection fee shall be applied for the methane Levels II and III systems per the Long Beach Fire Code requirements.

18.79.090 - Inspections

All methane mitigation components shall be inspected by the City inspection staff. The Contractor shall provide a minimum of 24 hours advance notice and provide access for inspections, including the following construction activities:

- A. Foundation - Before placement of the methane barrier, an integrity check of the vent collector and inspection of the sub-slab vent pipe routing shall be conducted. The elbow connecting perforated pipe to solid pipe beneath the riser pipe shall be left unconnected for this check and connected after the inspection prior to backfill.
- B. Methane Barrier - Smoke testing of the methane barrier shall be performed before placement of the concrete slab or protection layer above the methane barrier. The installer shall provide certification of installation and, where applicable, membrane thickness documentation or proof (e.g., membrane coupons).
- C. Exterior Wall Vent Riser (Prior to Screening) - A visual inspection of vent pipe joint integrity and routing shall be conducted.
- D. Final Inspections before building occupancy shall be conducted to verify the following:
 - 1. Caution Sign - Caution signs shall be located on the vent riser at each floor level and above the roofline.
 - 2. Warning Sign - A warning sign shall be located at the main building entry.
 - 3. Rain Caps - shall be fitted to the top of the vent risers.
 - 4. Test Tee - A 2-in. diameter test tee with plug (no flush plugs) shall be installed and painted red.
 - 5. Test Tee Signage - Install a permanent metal or rigid plastic placard adhered to the wall immediately above or adjacent to the test tee plug or cap. Sign to be red with white letters and read "Methane Vent Test Location."
 - 6. Testing of sensors/alarms/auto dialer/HVAC, and venting relay. Certification that the system is installed per plan and operates as designed will be acceptable. Long Beach Fire Department shall observe testing of methane detection sensors, alarms, dialer, and HVAC response.

18.79.100 - Qualified Professional Project Certification

The Qualified Professional is required to submit a certification to the City inspector prior to final approval of the grading/building certificate of occupancy stating the following:

- A. I am a Qualified Engineer/Geologist in the State of California and that I am knowledgeable in the field of methane mitigation systems.
- B. The methane mitigation system has been constructed and installed under my direct supervision and in accordance with the approved plans (a copy of the As-Built plans must be enclosed).
- C. The structure is free from methane gas and can be safely occupied (a copy of the test results must be enclosed).

18.79.110 - Covenant and Agreement

Before the building final inspection, a recorded Covenant and Agreement shall be submitted to the Development Coordinator as defined below:

- A. Methane Mitigation Design Requirement Levels I and II
The Owner of the property acknowledges for himself, his heirs, successors in interest or assigns the following:
 - a. The building is constructed within the City of Long Beach Methane Zone and/or within 300 ft of an active, 100 ft of an abandoned oil well, or 1,000 ft of a landfill and is subject to methane gas intrusion from the underlying soil.
 - b. The methane mitigation system approved and on file with the Development Director has been installed on the property.
- B. Methane Mitigation Design Requirement Level III
The Owner of the property acknowledges for himself, his heirs, successors in interest or assigns the following:
 - a. The building is constructed within the City of Long Beach Methane Zone and/or within 300 ft of an active, 100-ft of an abandoned oil well, or 1,000 ft of a landfill and is subject to methane gas intrusion from the underlying soil.
 - b. That a methane mitigation system, approved and on file with the Building Official of the City of Long Beach, has been installed on the property.
 - c. The property owner will maintain and operate the system in accordance with the requirements specified in the plans, all as approved under jurisdiction of the Building Official and Fire Marshal of the City of Long Beach.
 - d. An irrevocable consent to the City of Long Beach to permit its authorized representatives to enter onto the said premises during regular business hours for the purpose of inspecting and testing for methane intrusion.

LONG BEACH METHANE ZONES – MAP

