

SMU

Indoor Air Quality Management Plan
New Construction



Indoor Environmental Quality
Construction IAQ Management Plan

[Project]



[INSERT LOGO]

INDOOR AIR QUALITY MANAGEMENT PLAN
During Construction and Before Occupancy

Project Name

Building Location

Date



INTENT

The intent of this Indoor Air Quality Management Plan is to prevent indoor air quality problems resulting from the construction process in order to support the comfort and well-being of construction workers and building occupants. As a team, our goal is to meet or exceed the recommended standards of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3. This plan has been developed, and will be implemented, to fulfil the LEED BD+C: New Construction Version 4 requirements of the Construction Indoor Air Quality Management Plan.

All subcontractors shall comply with the following job site IAQ management recommendations. Superintendents and/or foremen will provide training to their employees to ensure that construction IAQ management procedures are followed.

SECTION 1 – MOISTURE CONTROL PLAN

Dry conditions will be maintained for all interior materials stored on-site. Installed absorptive materials shall be protected from moisture damage as follows:

1. Absorptive materials will only be allowed to be stored in a conditioned building. No absorptive materials will be stored outside on site.
2. Cover absorptive materials with a shrink wrap to protect from dust until installed.
3. Maintain a relative humidity of 60% or less once absorptive materials have been installed. Log readings in the project daily reports.
4. Any materials with evidence of microbial growth or moisture damage will be properly disposed of and replaced with new, undamaged materials.
5. Ventilation with 100% outside air will occur at all times. Depending on the time of year, the following two methods would be implemented if necessary to maintain the prescribed conditions:
 - a. Fans if ventilation and air circulation are necessary during warm weather periods.
 - b. De-humidifiers if necessary to dissipate excessive humidity.

SECTION 2 – HVAC PROTECTION

The HVAC materials delivered to the site will be stored in an area away from the general construction activity stored on pallets above the ground and shrink wrapped to prevent dirt and dust particles from collecting on them. As each pallet is opened, the Subcontractor will cover the opening of exposed duct work to prevent dust particles from infiltrating the actual supply and/or returns.

The HVAC equipment will be protected from collecting dust and odors to the best of our ability. The HVAC Subcontractor will cover each end of duct work with self-adhering heavy poly



material, providing 100% coverage of each opening to avoid dirt and dust from collecting within each section of duct. This will be done for both supply return and exhaust ducts. During the installation, the cover of the duct runs will be opened to connect to the line runs, the duct openings will be recovered each day to prevent dust collection.

Prior to the commencement of the duct runs within the building, the interior of the building will be swept clean utilizing low-emitting clean sweep materials that prevent dust particles from becoming air borne. Only after this is completed will the HVAC installation commence.

The HVAC system on this project consists of a ducted supply and return network system. The system utilizes air handlers located in the building penthouse with horizontal and vertical supply/return duct risers. The building's permanent air distribution system will be operational during construction in order to temper the indoor air as required to allow for proper installation of finish materials. To ensure the proper installation and protection of ceiling materials, the ceiling tiles and return grilles will not be installed until just prior to substantial completion. The system shall be protected by providing MERV 8 filters at all permanent filter locations in the equipment, supply ductwork, and return ductwork, as well as the return duct riser openings, until the ceiling tiles are dropped.

The following measures will be taken to protect the mechanical equipment and air distribution system when used during construction in compliance with the Construction Indoor Air Quality Management Plan credit requirements:

1. MERV 8 filters will be placed at each return air grille and active outdoor air intakes as determined by ASHRAE Standard 52.2-1999 (with errata but without addenda). The filters will be in place and maintained at all times the system is running during construction.
2. Temporary filter media will also be placed over the return duct riser openings to protect the return duct system from airborne dust. These return riser temporary filters will remain in place prior to installation of ceiling tiles and return grilles as well as after the tile and grille installation. Temporary filter media will be evaluated and replaced as necessary.
3. All filtration media will be replaced with new MERV 13 immediately prior to occupancy.
4. If airborne construction dust is still being produced in the building once all ceiling tiles and return grilles have been dropped, then the return plenum will be protected by installing filtration media at the openings in the plenum.
5. The air conditioning system is the distribution method for air and potentially contaminants throughout the building. Keeping the system clean is a necessity.
6. All insulation shall be kept clean and dry at all times. Any insulation that has become wet shall be removed and replaced.



7. Fan Powered Boxes will be sealed and not operated during heavy dust producing activities. Should operation be required for temperature and humidity reasons, temporary media filtration will be utilized.
8. Temporary filtration media will be changed as required, but no less than once every two weeks. During times of heavy dust producing activities, the temporary filtration media will be changed as required, but no less than once every week.
9. Replace all filters with MERV 13 and properly clean the HVAC AHU's immediately before occupancy.

SECTION 3 – VOC SOURCE CONTROL

Construction sequencing will be planned in advance to meet the Owner's schedule while implementing the following:

1. Manufacturers' recommendations for the application of interior finishes will be strictly adhered to during the course of construction. No materials will be installed over wet or uncured substrates.
2. Complete "wet" construction procedures such as painting and sealing before storing or installing "dry" absorbent materials such as carpet or ceiling tiles. Only touch up painting will be allowed during and after absorbent material is installed.
3. To ensure minimal damage to finish goods, installation of ceiling tiles and return grilles will be one of the last activities completed prior to substantial completion of the building. Ceiling tiles and return grilles will not be put in place until the building has received a thorough above ceiling cleaning.
4. Fuels, solvents, and other sources of VOCs will be stored separately from absorbent materials.
5. No interior or exterior installed adhesive, sealant, caulking, primer, paint, or other wet product substitution will be allowed unless authorized by Contractor. All adhesives, sealants and sealant primers used must comply with volatile organic compound (VOC) requirements of the SCAQMD Rule #1168, aerosol adhesives must comply with GS-36, paints and coatings must comply with GS-11, anti-corrosive and anti-rust paints must comply with GS-03, and wood finishes, floor coatings, primers and shellacs must comply with SCAQMD #1113, as of the effective dates referenced in LEED 2009 for New Construction rating system and be verified using the *Subcontractor LEED Form*.
6. All carpet shall comply with the requirements of the Carpet and Rug Institute Green Label Plus program, hard surface flooring shall comply with the requirements of the FloorScore standard.
7. Furniture will be installed prior to building flush-out.



8. All cleaning chemicals and compounds will be submitted and approved to Contractor prior to being introduced into the building and conform to the green housekeeping specifications. MSDSs will be required on all approved products.
9. The Drywall Subcontractor will vacuum wall tracks and all chases with HEPA vacuum prior to closing up walls. Contractor personnel will verify prior to walls being closed.

SECTION 4 – NO TOBACCO PRODUCT POLICY

Tobacco products can create potential airborne hazards as well as leave residual contamination on surfaces. These contaminants are easily absorbed into building materials. The following policies will be implemented:

1. No smoking will be permitted on the construction site, or within 25 feet of the project entrance.
2. Contractor will place signs and educate construction staff at subcontractor safety meetings of the importance of protecting the project from tobacco smoke contamination.
3. A “zero tolerance” policy will be implemented. If a worker is discovered smoking, they will be permanently removed from the project.

SECTION 5 - HOUSEKEEPING

The jobsite shall be maintained in a neat and orderly manner and all trades will implement the following:

1. A covered break/lunch area will be provided on the west side of the Contractor office trailers. No eating, drinking, or snacking is permitted other than this designated area. Only water will be allowed in the building during construction.
2. Drinking water stations will be located in three areas on each floor. No disposable containers will be allowed in the building at any time. It is recommended that reusable sports-type bottles be used with company and employee name marked clearly on the container.
3. All vapors and gases in the building created as a result of construction will be effectively exhausted using 100% outside air.
4. A sweeping compound will be used during clean-up to suppress the dust. Construction activities will include at a minimum daily clean-up.
5. Dust collection systems will be used to cut-off saws, drywall sanders, and other similar tools. Collection bags will be emptied into receptacles located outside of the building.
6. All water will be vacuumed out of the building immediately – keeping the workspaces as dry as possible.



7. No use of interior restrooms is permitted. All construction trades will utilize portable toilets provided by General Contractor.

SECTION 6 – PATHWAY INTERRUPTION

All VOC producing materials will be identified for appropriate sequencing and scheduling to comply with the requirements of the IAQ Plan.

1. All contamination producing activities and VOC emitting materials shall be isolated from the clean or occupied spaces.
2. Each subcontractor is responsible for providing ventilation or exhaust equipment for their scope.
 - a. Portable fans discharging thru open window spaces will be provided as required. A source of air for the exhaust shall be provided, such as open windows, however these openings must be protected from rain.
 - b. If removal of window spaces is not practical then other means and methods of exhausting will need to be developed
 - c. If highly active chemical finishes requiring special exhaust are being applied, temporary exhaust systems shall be utilized.
 - d. No gasoline or fossil fuel powered equipment will be utilized in the buildings once enclosed.
3. Work Activities that require pre-planning, sequencing, and special ventilation or exhaust requirements are:
 - a. Welding and cutting operations in enclosed spaces. Only electric welding machines will be utilized with smoke eaters provided by Subcontractor.
 - b. Grinding concrete, saw-cut concrete, chipping concrete, coring concrete, and drilling for installation of concrete inserts.
 - c. Relocation of partitions that involve drywall, tape, bed and paint operations.
 - d. Installation and cutting of stone wall materials.
 - e. Installation of stone countertops, cutting of materials, and adhesives.
 - f. Installation of epoxy flooring, waterproofing, etc.
 - g. Tape and bed operations.
 - h. Interior painting.
 - i. Installation of flooring, glues, adhesives, and carpeting.



- j. Installation of rubber or linoleum flooring, glues, and associated adhesives.
 - k. Installation of millwork, cutting operations, glues, and associated adhesives.
 - l. Hollow metal repair, such as bondo type materials,
 - m. Installation of wall coverings and associated adhesives.
 - n. Installation of wood flooring, cutting operations, sanding, and clear coatings.
4. Portable fans discharging thru open window spaces will be provided as required. A source of air for the exhaust shall be provided, such as open windows, however, these openings must be protected from rain.
 5. If ventilation air is not suitable for space conditions, operations shall stop until the Subcontractor can provide adequate ventilation.
 6. If highly active chemical finishes requiring special exhaust are being applied, temporary exhaust systems shall be utilized and provided by Subcontractors.
 7. After operation commences, air handling units may be operated within the limitations of the systems as designed and installed. Buildings with dust or chemical operations shall be exhausted directly to the outside. High humidity or other adverse weather conditions may alter the operation of these units.
 - a. Dust producing operations shall be exhausted to the outside to the extent possible.
 - b. Exhaust fans may be installed in the building to remove dust and contaminants.
 - c. The air handler shall supply conditioned air to the buildings. Floors with heavy dust or chemical operations shall be exhausted to the outside.
 - d. During rain or high humidity conditions, the air supply coming from the coils shall be cooled to 55 degrees F or the air handler stopped to prevent moist air entry into the building. Exhaust fans shall not draw moist air into the buildings. It is preferable to have a little airflow than moist air entering the buildings.
 8. Return air dampers and openings shall be covered during operations that may contaminate the system.
 9. After installation of Tenant Interiors, should changes be required to the wallboard system, or any operations involving dust or VOC producing work, the area shall be isolated with plastic sheeting and vacuum cleaned before reopening the area.

SECTION 7 – Scheduling

Schedule the completion of dust producing and chemical operations prior to the installation of “sink” materials such as carpet and ceiling tile in adjacent vicinity.



Per the master project schedule, the following activities will be complete and documented with photographs before any “sink” materials are installed:

- a. All concrete work including topping slabs, grinding, and cutting and patching.
 - b. Installation of gypsum board walls and ceilings, and tape, bed, and sanding work.
 - c. Painting of all metals and gypsum walls and ceilings.
 - d. Application of all concrete sealers, hardeners, and stains, etc.
 - e. Millwork.
 - f. Ceramic tile, wood flooring, and stone flooring.
1. The ceiling plenum will be vacuumed before the gypsum ceiling is installed by each Subcontractor with material installed above ceiling.
 2. The ceiling tile will be installed prior to carpet, due to the small amount of dust and dirt that is created with cutting the sheetrock. The only activities that will occur after the carpet is installed is the wall covering and systems furniture (if applicable).
 3. Complete the HVAC control system sufficient to allow the operation of the supply and exhaust systems to control pressurization, air temperatures, humidity, and contaminants.
 - a. It is understood that the requirements shall be achieved within the limitations of the HVAC system as designed and installed.
 4. Group contaminating operations where possible to maximize exhaust use.
 - a. Contaminating activities will take place as needed during periods where HVAC system can be operated in exhaust mode to remove contaminants.
 5. Install cementitious board interior drywall products for shaft wall and early required wall construction if building is not completely closed in and in a controlled environment in order to prevent mold and wall material construction.
 - a. The cementitious product is being used at shaft walls and inside the MEP rooms. Subcontractor will provide the submittal data showing cementitious board (mold resistance products) were used in the building, and will take pictures of drywall with the product label. All other sheetrock will NOT be installed until the building is enclosed.
 6. Sequence VOC containing material use prior to building enclosure and installation of sink materials. Examples include cleaning solvents and epoxy flooring.
 - a. CONTRACTOR will identify all materials with high VOC that will be used in the building and will sequence the usage or installation of this material before we install the “sink” materials.



SECTION 8 – Indoor Air Quality Assessment [CHOSE APPLICABLE PATH]

Contractor will track construction activities and coordinate the building flush out in accordance with LEEDv4 BD+C: New Construction credit Indoor Air Quality Assessment.

The building flush out must be implemented after construction ends and the building has been completely cleaned. All interior finishes, such as millwork, doors, paint, carpet, acoustic tiles, and movable furnishings (e.g., workstations, partitions), must be installed, and major VOC punch list items must be finished.

Before the flush-out is completed, the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F and no higher than 80°F and relative humidity no higher than 60%.

Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic foot per minute per square foot of outdoor air or the design minimum outdoor air rate determined in EQ Prerequisite Minimum Indoor Air Quality Performance, whichever is greater. During each day of the flush-out period, ventilation must begin at least three hours before occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outdoor air has been delivered to the space.

[INSERT FLUSH OUT SCHEDULE & DURATION HERE]

Contractor will comply with the Contract Documents and coordinate Air Testing in accordance with LEEDv4 BD+C: Hospitality credit Indoor Air Quality Assessment.

Baseline IAQ testing will be conducted in occupied spaces for the contaminants listed in the below table. Testing will occur after construction ends and before occupancy, but under ventilation conditions typical for occupancy. Laboratories that conduct the tests for Volatile Organic Compounds must be accredited under ISO/IEC 17025 for the test methods they use.



Contaminant		Maximum concentration	ASTM and U.S. EPA methods	ISO method	
Particulates	PM10 (for all buildings)	50 µg/m ³ Healthcare only: 20 µg/m ³	EPA Compendium Method IP-10	ISO 7708	
	PM2.5 (for buildings in EPA nonattainment areas for PM2.5, or local equivalent)	15 µg/m ³			
Ozone (for buildings in EPA nonattainment areas for Ozone, or local equivalent)		0.075 ppm	ASTM D5149 - 02	ISO 13964	
Carbon monoxide (CO)		9 ppm; no more than 2 ppm above outdoor levels	EPA Compendium Method IP-3	ISO 4224	
Total volatile organic compounds (TVOCs)		500 µg/m ³ Healthcare only: 200 µg/m ³	EPA TO-1, TO-17, or EPA Compendium Method IP-1	ISO 16000-6	
Formaldehyde		27 ppb Healthcare only: 16.3 ppb	ASTM D5197, EPA TO-11, or EPA Compendium Method IP-6	ISO 16000-3	
Target volatile organic compounds*	1	Acetaldehyde	140 µg/m ³	ASTM D5197; EPA TO-1, TO-17, or EPA Compendium Method IP-1	ISO 16000-3, ISO 16000-6
	2	Benzene	3 µg/m ³		
	3	Carbon disulfide	800 µg/m ³		
	4	Carbon tetrachloride	40 µg/m ³		
	5	Chlorobenzene	1000 µg/m ³		
	6	Chloroform	300 µg/m ³		
	7	Dichlorobenzene (1,4-)	800µg/m ³		
	8	Dichloroethylene (1,1)	70 µg/m ³		
	9	Dimethylformamide (N,N-)	80 µg/m ³		
	10	Dioxane (1,4-)	3000 µg/m ³		
	11	Epichlorohydrin	3 µg/m ³		
	12	Ethylbenzene	2000 µg/m ³		
	13	Ethylene glycol	400 µg/m ³		
	14	Ethylene glycol monoethyl ether	70 µg/m ³		
	15	Ethylene glycol monoethyl ether acetate	300 µg/m ³		
	16	Ethylene glycol monomethyl ether	60 µg/m ³		
	17	Ethylene glycol monomethyl ether acetate	90 µg/m ³		
	19	Hexane (n-)	7000 µg/m ³		
	20	Isophorone	2000 µg/m ³		
	21	Isopropanol	7000 µg/m ³		
	22	Methyl chloroform	1000 µg/m ³		
	23	Methylene chloride	400 µg/m ³		
	24	Methyl t-butyl ether	8000 µg/m ³		
	25	Naphthalene	9 µg/m ³		
	26	Phenol	200 µg/m ³		
	27	Propylene glycol monomethyl ether	7000 µg/m ³		
	28	Styrene	900 µg/m ³		
	29	Tetrachloroethylene (Perchloroethylene)	35 µg/m ³		
	30	Toluene	300 µg/m ³		
	31	Trichloroethylene	600 µg/m ³		
	32	Vinyl acetate	200 µg/m ³		
	33-35	Xylenes, technical mixture (m-, o-, p-xylene combined)	700 µg/m ³		

ppb = parts per billion; ppm = parts per million; µg/m³ = micrograms per cubic meter

*The target volatile organic compounds are from CDPH Standard Method v1.1, Table 4-1. The Maximum concentration limits for these target compounds are the full CREL adopted by Cal/EPA OEHHA in effect on June 2014 <http://oehha.ca.gov/air/alreils.html>.

END OF SECTION

