

Denver School of Science & Technology Middle School  
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Denver, CO 80238

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## **Construction Indoor Air Quality (IAQ) Management Plan**

Denver School of Science & Technology Middle School at 2000 Valentia Street, Denver, CO 80238 is attempting to become a LEED certified construction project. This process incorporates environmentally friendly and sustainable site and building. **ALL** subcontractors are expected to join Denver School of Science & Technology (Owner), Confluence Builders (GC/CM) and Klipp (Architect) in every effort to achieve this certification.

One step in reaching LEED certification is to maximize the indoor air quality (IAQ) during the construction/renovation process in order to help sustain the comfort and well being of the construction workers, building occupants and future tenants.

The strategy for achieving this aspect of LEED certification is to adopt an IAQ Management Plan to protect the HVAC system during construction, control pollutant sources, interrupt pathways for contamination and sequence installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile and gypsum wallboard as required to meet LEED credit EQ 3.1.

Requirements of the IAQ Management Plan for the construction and pre-occupancy phases of the project are as follows:

1. During construction, meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ guidelines for Occupied Buildings Under Construction, 1995, Chapter 3.
2. Protect stored on-site or installed absorptive materials from moisture damage. Sources of moisture contamination include precipitation, air intakes, cleaning procedures, flushing procedures, testing procedures, leaks, etc. The approach for preventing moisture-related problems is to identify all sources of moisture and to keep materials from getting wet. Porous or absorptive materials including insulation, ceiling tiles, carpeting, etc. that become damp or wet will be dried immediately; and any of these materials that remain wet or damp for more than 4 hours will be replaced with new materials. An exception to this made be made at the owner's discretion with respect to carpet tile. In this case, if found wet, the carpeting may be re-used if it is immediately professionally cleaned, sanitized and vacuumed so that it is dry within 4 hours of cleaning. Also, any materials found to have mold or mildew odors will be replaced with new materials. This is the responsibility of All Contractors.

3. If air handlers must be used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999
4. Replace all filtration media immediately prior to occupancy. Filtration media shall have a Minimum Efficiency Reporting Value of 13, as determined by ASHRAE 52.2-1999 for media installed at the end of construction.
5. Provide cut sheets of filtration media used during construction and installed immediately prior to occupancy with MERV values highlighted.
6. Provide photographs of construction IAQ management measures such as protection of ducts and onsite stored or installed absorptive materials.

### **Construction IAQ Management Plan** **SMACNA Guidelines**

#### **1. HVAC Protection:**

- a. The most significant potential IAQ contamination sources from construction are dust, moisture and Volatile Organic Compounds (VOCs). The approach for preventing dust-related problems is to identify all sources of dust and protect the HVAC systems. During construction, the return air system openings shall have temporary filters (min. MERV 8) that receive frequent periodic maintenance if the HVAC system is being utilized. When activities that produce high dust levels are occurring such as drywall sanding, masonry work, wood sawing, and insulating, the return system openings will be sealed off completely for the duration of the task. This activity is the responsibility of the General Contractor and subcontractors.
- b. The use of ventilation systems and air movers during construction will be limited to 100% outside air (not re-circulating).
- c. When the HVAC system is needed during construction operations, the supply system openings will be covered with a particulate filter to prevent dust migration back up the supply side. This activity is the responsibility of the General Contractor and subcontractors.
- d. If the HVAC is not used at times during construction, the supply **and** return air system openings shall be sealed off to prevent the migration and accumulation of dust and debris in the duct system. The diffusers (if installed) should also be sealed with plastic and low adhesion masking tape. This activity is the responsibility of the General Contractor and subcontractors.
- e. Uninstalled ductwork and equipment must be stored away from dust-producing areas. Terminal units must be wrapped in plastic. Ducts sections must have ends capped with plastic. For installed ducts and equipment, provide protective caps at open ends. This is the responsibility of the Mechanical Contractor.

- f. Filtration is critical during construction and during startup of the HVAC system. Filter media must meet the ASHRAE requirement for MERV Level 8. This is the responsibility of the Mechanical Contractor.
- g. An HVAC system is determined to have excessive dust or debris when an accumulation of particles can be observed under (not on) diffusers, or ventilation is restricted. The General Contractor, Mechanical Contractor, Design Team and Bond Manager will monitor the condition of the ducts during the construction process by periodic inspection to ensure that they are kept clean. If the ducts are found to be contaminated due to inadequate protection, the ducts will be cleaned. The Commissioning Agent will have the final authority as to the determination of the presence of excessive dust or debris and the adequacy of any cleaning operations.
- h. For documentation that the above guidelines are followed during the construction phase of the project, pictures will be taken bi-weekly by the General Contractor.
- i. No storage will be allowed in any mechanical rooms in the building, and any of these rooms requiring access by the contractor will be kept neat and clean
- j. Replace filtration media immediately prior to occupancy. See specification for requirements. This is the responsibility the Mechanical Contractor.

## **2. Source Control**

- a. Use of low or no VOC products as indicated by the specifications **will** be utilized to reduce potential problems. This activity will be verified and checked by the General Contractor. Subcontractors are responsible for ensuring their products meet the requirements in the specifications.
- b. During activities such as staining or finishing we will use large air movers (fans) to create immediate cross ventilation and constant fresh air.
- c. No gasoline or diesel equipment will be permitted into the building. Any cutting, drilling, or other activity will be done with electric powered equipment or the machinery will be located outside away from any doors or operable windows in the area. Subcontractors will be responsible for coordinating these activities with the General Contractor.
- d. No smoking will be allowed in the onsite at any time. Subcontractors will be responsible for taking their smoke breaks when normal break times occur and then only off the job site. Smoking is only permitted across 21<sup>st</sup> Avenue in the empty lot.
- e. Containers of wet products are to be kept closed when not in use.

## **3. Pathway Interruption:**

- a. At the “link” connection between the Middle School Addition and the existing High School infection control procedures will need to take place in order to not contaminate the occupied space. This will require the construction of temporary walls to separate the construction area from the occupied area. Utilization of pressure differentials between the construction area and the occupied areas will be needed to prevent contaminated air from entering clean areas. This will also require ventilating using 100% outside air to exhaust contaminated air directly to the outside during installation of VOC-emitting materials.
- b. Scrubbers will be required with the use of equipment in the courtyard area if there are any operable windows or air intakes near.

#### **4. Housekeeping:**

- a. Institute cleaning activities concentrating on HVAC equipment and building spaces to remove contaminants from the building prior to occupancy. All coils, air filters, and ductwork should remain clean during installation and should be cleaned prior to performing the testing, adjusting and balancing of the systems. This activity is the responsibility of the Mechanical Contractor.
- b. The work area shall be vacuumed on a weekly basis, with a dual filter vacuum. This activity will be the responsibility of the General Contractor.
- c. Suppress dust with wetting agents or sweeping compounds. Use an efficient and effective dust collecting method such as a damp cloth, wet mop, or vacuum with particulate filters. Activities which produce high dust levels shall be cleaned up immediately upon completion or at the end each day the activity continues. This is the responsibility of all contractors.
- d. Spills or excess applications of solvent-containing products must be removed immediately. This is the responsibility of all contractors.
- e. All walls will be dusted prior to application of finishes. This will be the responsibility of the Painting Contractor.
- f. All of the stud tracks are to be vacuumed prior to installation of insulation. This is the responsibility of the General Contractor.
- g. Provide photographs during construction of the above activities to document compliance. This is the responsibility of the General Contractor to coordinate.
- h. Building materials shall be stored in a clean area prior to unpacking for installation.
- i. Materials which become contaminated through direct exposure to moisture from precipitation, plumbing leaks or condensation shall be replaced.

**5. Scheduling:**

- a. The primer and first coat of paint must be installed on all surfaces prior to the installation of carpet and ceiling tiles.
- b. Only extremely low-VOC paint (5 g/L or less) may be installed after absorptive ceilings and floorings are installed.
- c. All materials to be stained shall be stained off-site, with the exception of wood slat ceiling. Items to be stained on-site must be finished prior to installation of absorptive ceilings and floorings.
- d. Move in will not occur until after TCO is achieved. Completion of punch list items which will not cause significant VOCs, dust or other contamination of the space may occur after occupancy only as necessary and as approved by the tenant.

**6. Monitoring:**

- a. Monitoring of the IAQ Plan will be the responsibility of the General Contractor.
- b. Contractor site coordination meetings are held weekly. At these meetings, the appropriate components of the IAQ Management Plan will be reviewed as a regular action topic and the implementation of the plan will be documented in the minutes of the meeting.

**7. Flush-out and/or Testing:**

- a. At the owner's discretion, the finished space may be flushed-out to remove remaining contaminants, and/or tested to ensure satisfactory indoor air quality. Any assistance the owner requires for these operations will be the responsibility of the General Contractor.
- b. After construction ends, prior to occupancy and with all interior finishes installed, we will perform a building flushout by supplying a total air volume of 14,000cu.ft. of outdoor air per SF of floor area while maintaining an internal temperature of at least 60° F and relative humidity no higher than 60%, OR
- c. If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cu.ft. of outdoor air per sq.ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm/sq.ft. of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14,000 cu.ft./sq.ft. of outside air has been delivered to the space.

**CONCLUSION:**

The construction process is traditionally an indoor air polluting activity and often results in the contamination of buildings during construction as well as continued contamination after the building is occupied. The HVAC systems are especially prone to contamination from construction particulate matter that contains dust, VOCs, microorganisms and other contaminants. These contaminants can remain in the HVAC systems for years after occupancy. This plan's approach is to identify and document activities present on our site and reduce IAQ problems from dust, moisture and VOCs. Therefore, the strategies and activities outlined above in this plan minimize the construction contamination prior to building occupation.

Plan implemented by: Kristin Heglie

Organization: Confluence Builders

Role in Project: Assistant Project Manager

Signature: \_\_\_\_\_

Date: February 6, 2009

Subcontractor Company	Name	Date
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