

SECTION 01811 - INDOOR AIR QUALITY MANAGEMENT

PART 1 – GENERAL

1.1 Summary:

- A. Construction activities shall be controlled to avoid causing detectable odor, visible and/or respirable dust, and other air pollutants at levels known to present a risk of illness in occupied school areas; or in areas that will be occupied after construction is complete.
- B. Throughout duration of this project, contractor shall perform the Work required by contract documents without negatively affecting Indoor Air Quality (IAQ) in occupied areas. (Even in a new construction project, punch-list items may be performed after building is occupied.) Work shall be performed with special care, planning, and quality control to avoid disruption or interference with normal facility and educational operations; and to protect health and safety of students, MCPS staff, and general public.

1.2 References:

- A. Sheet Metal and Air Conditioning-Construction Managers National Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, Chapter 3 "Control Measures."
- B. Sheet Metal and Air Conditioning-Construction Managers National Association (SMACNA) Duct Cleanliness for New Construction Guidelines.
- C. ASHRAE Standard 52.2-1992: "Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size."
- D. South Coast Air Quality Management District (SCAQMD) Rule #1168: "Adhesive and Sealant -Applications," including most recent amendments
- E. Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 51 "Adhesive and Sealant Products."
- F. Green Seal (GS) Standard GS-11 "Paints"
- G. Carpet and Rug Institute (CRI) "Green Label" IAQ Testing Program for Carpet, Cushion and Adhesive.

1.3 Submittals:

- A. IAQ Control Plan:
 - 1. At least two weeks before initiating Work on each major project phase, contractor shall submit eight (8) copies of an IAQ Control Plan and an HVAC Protection Plan which must be approved by MCPS. Submittals shall include following:
 - a. Listing of products and equipment to be used, including MSDS Sheets where applicable. Listing shall also include requirements for Maryland Chemical Information List, (CIL).
 - b. Description of dusts, odors, fumes, or potentially harmful pollutants which could be released by work activities.
 - c. Description of potential pathways by which pollutants could migrate from work areas.

- d. Description of approved barriers planned between work areas and occupied space.
- e. Listing of work activities scheduled after normal school hours to avoid occupant exposure.
- f. Justification for activities which are proposed to be conducted during normal school hours (for occupied schools).
- g. Procedures for daily cleaning and waste disposal.
- h. Schedule for final cleaning and ventilation of finished areas prior to occupancy.

Compliance must be demonstrated with applicable sections of this specification. Requirements which are not applicable should be explained (e.g., a small-scale job which may be completed overnight when an area is unoccupied and cleaned before next school day may not need a barrier).

- 2. An onsite meeting shall be held with MCPS officials to review IAQ controls and HVAC protection.

B. Document duct testing and cleaning:

- 1. Submit for approval twenty (20) digital photographs of construction indoor air quality management measures as discussed in SMACNA "IAQ Guidelines for Occupied Buildings Under Construction," including protection of mechanical system and on-site storage of installed absorptive materials.

C. List temporary usage of building mechanical systems:

- 1. Submit product data of filtration media used during construction and installed immediately prior to occupancy with Minimum Efficiency Reporting Value (MERV), as determined by ASHRAE 52.2-1999, values highlighted. Data must include manufacturer's name and model number.

D. Submit all meeting minutes, checklists, worksheets, notifications and deficiency or resolution logs related to the project IAQ issues.

- 1. Construction indoor air quality management plans and implementation shall be discussed at the following meetings:
 - a. Work-initiation conference
 - b. Pre-installation conferences
 - c. Progress meetings
 - d. Coordination meetings
 - e. Owner's meetings

PART 2 – PRODUCTS

2.1 Air Filtration Media:

- A. Minimum Efficiency Reporting Value (MERV) as determined by ASHRAE 52.2-1999:
 - 1. MERV-8 for filtration media used at each return air grill if used during construction.
 - 2. MERV-8 or better, dependent upon equipment and designed static pressure limitations for filtration media installed at the end of construction.

2.2 Cleaning Products and Equipment:

- A. Least toxic and lowest-emitting practical spot removers and cleaning agents shall be used for each given application. Chemical products to be used shall already have been approved prior to use in occupied school facilities.
- B. High Efficiency Particulate Air (HEPA) – filter equipped vacuum cleaners shall be used for final cleaning.
- C. Adhesives applied within the building waterproofing envelope shall comply with VOC Content limits, as expressed in grams per liter, less water and exempt compounds, of South Coast Air Quality Management District (SCAQMD) Rule 1168 “Adhesive and Sealant Applications,” amended January 7, 2005, or more stringent levels, as follows:
 - 1. Indoor Carpet & Pad Adhesives: 50
 - 2. Wood Flooring Adhesive: 100
 - 3. Rubber Floor Adhesives: 60
 - 4. Subfloor Adhesives: 50
 - 5. Ceramic Tile Adhesives: 65
 - 6. VCT and Asphalt Tile (& Linoleum) Adhesives: 50
 - 7. Dry Wall and Panel Adhesives: 50
 - 8. Cove Base Adhesives: 50
 - 9. Multipurpose Construction Adhesives: 70
 - 10. Structural Glazing Adhesives: 100
 - 11. PVC Welding: 510
 - 12. CPVC Welding: 490
 - 13. ABS Welding: 325
 - 14. Plastic Cement Welding: 250
 - 15. Adhesive Primer for Plastic: 550
 - 16. Contact Adhesive: 80
 - 17. Special Purpose Contact Adhesive: 250
 - 18. Structural Wood Member Adhesive: 140
 - 19. Metal to metal substrates: 30

20. Plastic foam substrate: 50
 21. Porous substrate except wood: 50
 22. Wood substrate: 30
 23. Fiberglass substrate: 80
 24. All Other Welding & Installation Adhesives: 250
- D. Aerosol Adhesives applied within building waterproofing envelope shall comply with the VOC Content limits, as expressed in percentage of VOCs by weight, of Green Seal (GS) Standard GS-36 "Commercial Adhesives," October 19, 2000 as follows:
1. General Purpose Mist Spray: 65% VOCs by weight
 2. General Purpose Web Spray: 55% VOCs by weight
 3. Special Purpose Aerosol Adhesives (all types): 70% VOCs by weight
- E. Sealants applied within building waterproofing envelope shall comply with VOC Content limits, as expressed in grams per liter, less water and exempt compounds, of SCAQMD Rule 1168 "Adhesive and Sealant Applications," amended January 7, 2005, as follows:
1. Architectural Sealants: 250
 2. Non-membrane Roof: 300
 3. Single-Ply Roof Membrane: 450
 4. Other: 420
- F. Sealant primers applied within building waterproofing envelope shall comply with VOC Content limits, as expressed in grams per liter, less water and exempt compounds, of SCAQMD Rule 1168 "Adhesive and Sealant Applications", amended January 7, 2005, as follows:
1. Architectural, Nonporous: 250
 2. Architectural, Porous: 775
 3. Other: 750
- G. Paints and coatings applied within building waterproofing envelope shall comply with the following VOC Content limits as expressed in grams per liter, less water and exempt compounds, of Standard GS-11 "Paints". First Edition, May 20, 1993; Standard GC-03 "Anti-Corrosive Paints", Second Edition, January 7, 1997; and SCAQMD Rule #1113 "Architectural Coatings", January 1, 2004 as follows:
1. Flat: 50
 2. Non-flat: 150
 3. Anti-corrosive & anti-rust: 250
 4. Clear Wood Finishes, Varnish: 350
 5. Clear Wood Finishes, Lacquer: 550

- 6. Floor Coatings: 100
 - 7. Shellac, Clear: 730
 - 8. Shellac, Pigmented: 550
 - 9. Waterproofing Sealer: 250
 - 10. Sanding Sealer: 275
 - 11. Sealers, Other: 200
 - 12. Stains: 250
 - 13. Graphic Arts Coatings: 500
- H. Carpets shall meet testing and product requirements of the Carpet & Rug Institute Green Label Plus program.
 - I. Carpet cushion shall meet testing and product requirements of the Carpet & Rug Institute Green Label program.
 - J. Permanently installed composite wood and agrifiber products shall contain no added urea-formaldehyde.
 - K. Laminating adhesives used in composite wood and agrifiber product assemblies, shop-applied and applied on-site, shall contain no added urea-formaldehyde.
 - L. Ceiling and Wall Systems (gypsum board, insulation, acoustical ceiling systems and wall coverings) shall comply with the California Department of Health Services Standard Practice for The Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

PART 3 – EXECUTION

3.1 HVAC Protection:

- A. If permanent HVAC is used during construction, filtration media with a MERV of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999, and HVAC systems, equipment and pathways shall be dust and particulate free at time of substantial completion of that phase of construction in accordance with SMACNA "IAQ Guidelines for Occupied Buildings Under Construction."
- B. Replace filters during construction as necessary to protect equipment and indoor air quality. Inspection of filters shall be conducted and/or replaced based on loading of filter.
- C. HVAC supply and return ductwork, registers and equipment shall be kept clean, free of dust, debris, moisture, gaseous and microbial contamination during storage, handling installation and punch-out.
- D. After each phase of construction, install new filtration media throughout the HVAC system. Filtration media shall have a MERV of 8 or better, dependant upon equipment and designed static pressure limitations, as determined by ASHRAE 52.2-1999.

3.2 Source Control:

- A. Comply with the Product specifications, including SCAQMD, BAAQMD, Green Seal and CRI standards referenced herein, for Low-Emitting Materials (LEED IEQ Credit 4) in specific

Product Specifications, including but not limited to those contained within following categories:

1. Miscellaneous Carpentry
 2. Interior Architectural Woodwork
 3. Through-Penetration Firestop Systems
 4. Joint Sealants
 5. Ceramic Tile
 6. Resilient Floor Tile
 7. Resilient Wall Base and Accessories
 8. Carpet
 9. Acoustical Wall Panels
 10. Interior Painting
 11. Mechanical General Provisions
 12. Basic Piping Materials and Methods
 13. Firestopping for Mechanical Work
 14. Ducts
- B. Adhesives not specified in above sections shall comply with current VOC Content limits, as expressed in grams per liter, of SCAQMD Rule 1168 "Adhesive and Sealant Applications," amended October 3, 2003, as follows:
1. Indoor Carpet & Pad Adhesives: 50
 2. Wood Flooring Adhesive: 100
 3. Rubber Floor Adhesives: 60
 4. Subfloor Adhesives: 50
 5. Ceramic Tile Adhesives: 65
 6. VCT and Asphalt Tile (& Linoleum) Adhesives: 50
 7. Dry Wall and Panel Adhesives: 50
 8. Cove Base Adhesives: 50
 9. Multipurpose Construction Adhesives: 70
 10. PVC Welding: 510
 11. CPVC Welding: 490
 12. ABS Welding: 400
 13. Plastic Cement Welding: 350

14. Adhesive Primer for Plastic: 650
 15. Other Welding & Installation Adhesives: 250
 16. Metal to Metal Substrate: 30
 17. Plastic Foam Substrates: 120
 18. Porous Substrate except wood: 120
 19. Wood Substrate: 30
 20. Fiberglass Substrate: 200
- C. Prohibit smoking on MCPS property and near doors, windows and intakes.
 - D. Provide direct exhaust to exterior during installation of strong emitting materials, including touch-up activities if applicable. Keep exhaust away from intakes and occupied spaces.
 - E. Protect “absorptive” materials (which are woven, fibrous or porous in nature, such as carpet, ceiling tiles, insulation, and fabrics) from exposure to dust, debris and moisture contamination during product delivery, storage and handling from construction, demolition and punch-out activities.
 - F. “Bake-out” or “super-heating” of spaces to accelerate the release of gaseous emissions is not permitted.
 - G. Provide adequate ventilation of packaged dry products prior to installations. Remove from package and place in a secure, dry, well-ventilated space, free from contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree maximum continuously during ventilation period. Do not ventilate within limits of Work unless otherwise approved by Architect.

3.3 Control Measures:

- A. Conduct construction activities with potential odor or dust impacts on occupied areas behind barriers or after hours. Other IAQ control measures available include use of low emitting products, equipment, or procedures, isolation of work (barriers, proper pressurization, or scheduling), and housekeeping.
- B. Work adjacent to occupied school areas shall be separated by barriers which prevent penetration of dust and odors. Vertical barriers shall extend from floor to metal deck sealing penetrations. Once spaces within building become occupied, work areas must remain under negative pressure. Emergency exit doors shall be self-closing and weather-stripped. Construction shall include 2 in. x 4 in. wood stud fames and 5/8 in. sheetrock (joints sealed). Floor-to-floor penetrations shall also be sealed.
- C. Work activities in occupied buildings presenting a potential health hazard shall be conducted after normal school hours. Roofing, indoor cutting of steel, concrete, or masonry, vehicles powered by internal combustion engines which are operated inside the building, removal of asbestos-containing material, welding, and other activities producing significant dust, odors or fumes shall be conducted after hours unless contractor can demonstrate that controls will maintain acceptable IAQ in occupied areas.
- D. Construction areas shall be maintained under negative pressure in relation to occupied areas where practical. This may be accomplished by supplying outside air to occupied side or exhausting air from construction side. Exhaust air at a rate at least 10 percent greater than the rate of supply. Do not exhaust air where it can be drawn back into occupied spaces.

- E. Temporarily seal the building, including air intakes and exhaust vents, and any other building openings, when dust-generating or strong-emitting construction products or procedures are used on exterior of the building.
- F. Openings created to outside of building shall be enclosed after each work shift to protect building interior from moisture.
- G. Construction-related noise shall not cause noise levels to exceed 65 dBA in occupied school areas.
- H. Corridors through occupied areas shall not be used for project storage or for transportation of materials, equipment, trash, or debris.
- I. Contractors shall prevent workers from entering occupied school areas.
- J. Clean work area daily to prevent the accumulation of dust or debris.
- K. Store waste in enclosed waste containers as needed to prevent release of dust and odor.
- L. Transport trash, debris, carts, equipment, materials or supplies to and work areas without entering occupied school areas.
- M. Take immediate measures to dry any area where flooding, water leakage, or condensation occurs.
- N. Mold growth must be remediated following procedures approved by MCPS.
- O. Contractor shall be responsible for providing adequate manpower, equipment, and materials at appropriate times (including nights and weekends) to meet the requirements of this section and project schedule milestone dates.
- P. If MCPS or its designated representative determines that Contractor is violating this IAQ specification or endangering school occupants, Contractor must cease operations until corrective actions are taken.

3.4 Housekeeping:

- A. Suppress dust during construction and/or demolition activities with wetting agents or sweeping compounds.
- B. Broom clean and vacuum floors to keep dust from accumulating during construction and/or demolition.
- C. Ensure that food and food packaging are not left on jobsite.
- D. Give preference to low-toxic pest control chemicals, if needed.
- E. Final cleaning shall be detailed and shall use a HEPA-filter vacuum throughout.
- F. Remove spills or excess application of solvent-containing products as soon as possible. Use low-emitting cleaning agents described under "Cleaning Products and Equipment" Article 2.2.
- G. Keep work areas as dry as possible. Replace any absorptive material that is exposed to moisture longer than four hours.

3.5 Scheduling:

- A. If protection measures as described above cannot be ensured for "absorptive" materials during storage, do not store these material on-site.

- B. Provide a minimum of forty-eight hours of continuous ventilation after final installation of all construction material and prior to occupancy.

END OF SECTION

SECTION 01811 – INDOOR AIR QUALITY MANAGEMENT - APPENDIX

Background Information to Contractors Regarding Indoor Air Quality

1. What pollutants are associated with renovation?

During the course of major building renovation, a wide variety of odors, dusts, and other pollutants can be released. Projects produce an ever-changing mix of emissions as the work progresses. In general, construction sites have three basic sources of air pollutants:

- A. Demolition Dust. This is generated as old building materials are cleared.
- B. Construction Equipment. Emissions may occur from motor vehicles, compressors, welding, cutting, soldering, etc.
- C. Construction Products. Wet products involved with roofing, painting, adhesives, and solvent use may contribute to odors. Some of the more significant sources have involved concrete cutting, roofing, operation of construction vehicles in or near the building, and solvent use.
- D. Construction activity can indirectly impact air quality in several ways:
 1. Disruption of HVAC systems can adversely affect ventilation, comfort, moisture control, and pressurization as well as contributing to airborne dust.
 2. Interference with drain systems could allow sewer gas in the building.
 3. Damage to natural gas or steam piping could release contaminants.
 4. Temporary building openings or drainage modifications may cause water damage during precipitation events leading to mold growth.
 5. Construction demands interfere with normal building cleaning and maintenance.

2. How can pollutants move through a school?

Construction emissions become problematic only when they migrate into occupied areas. In this regard, understanding and controlling potential pathways of contaminant movement are essential to maintaining indoor or air quality. Critical factors to consider include:

- Return Air Systems. Contaminants may be drawn into air intakes, return grilles or plenums, or mechanical room equipment and then distributed throughout HVAC zones.
- Relative Pressurization. Pollutants tend to move into areas of negative pressure (e.g., drawn toward exhaust fans, higher building elevations). Openings between building areas or between floors must be sealed to prevent such pollutant migration.
- Tracking. Dust and odors may be spread into occupied areas on construction personnel or by equipment.

Although the generation of odor and dust is inevitable at construction sites, exposure of building occupants depends on the following:

- location of emissions in relation to occupied areas
- time of emissions in relation to building occupancy
- effectiveness of source controls
- effectiveness of pathway controls

Through proper planning and control, no odor or dust should be detected in occupied areas.

3. How can construction pollutants affect school occupants?

Excessive exposure to construction site pollutants may be associated with a variety of acute health complaints including mucous membrane irritation, allergic reactions, asphyxiation, and non-specific symptoms such as headache or nausea. Since each of these conditions could be caused by factors other than construction emissions, detailed diagnostic procedures (both medical and environmental) are needed to establish actual causation. In any large population, a small number of hypersensitive individuals may be present who may react to construction pollutants at levels much lower than other occupants. Although potential carcinogens may be present in some construction emissions, exposure is generally very brief and the risk thus negligible. Isolating building occupants from all dusts and odors generated by construction is usually the control strategy of choice.

Occupants of buildings under construction may also express concerns regarding discomfort, nuisance conditions, and perceptions of health effects. Construction process may disrupt HVAC operation, resulting in thermal discomfort. Nuisance conditions may also be observed such as odors, stains, and dust, which do not present a direct health threat. Construction process often places building occupants under stress where they may attribute health concerns to IAQ, which may, in fact, be unrelated.

4. What options are available to control construction-related pollutants?

Measures available to maintain IAQ during construction include:

- protect HVAC systems
- substitute lower-emitting products
- modify equipment operation
- change work practices
- add local exhaust
- cover sources of dust or odor
- depressurize work area
- pressurize occupied space
- erect barriers
- seal penetrations
- relocate pollutant sources
- temporarily seal outside air intakes
- enhance housekeeping
- schedule heavy work for after-hours

When implementing site controls, consider the following:

- Barriers should provide complete isolation with no penetrations or gaps and doors remaining closed when the building is occupied.
- Seal other potential pathways to occupied areas such as floor-to-floor pipe penetrations and nearby HVAC intakes.
- Conduct activities with heavy dust or odor emissions during occupied periods under negative pressure (portable exhaust fans in work area and/or positive pressure in occupied area).
- Schedule activities which still may have a health impact for non-occupied periods.
- Enhance dust control by limiting dust tracking from both outside and inside areas and ensuring custodial personnel, procedures, and scheduling are sufficient to maintain a clean building.

**END OF SECTION
APPENDIX**

