PART 1  GENERAL

1.01   SECTION INCLUDES

A.  Overview of indoor air quality management requirements and procedures

B.  Introductory Information, Bidding Requirements, Division 1, General Requirements as written, shall be a part of this section and apply as if repeated here.

1.02   RELATED SECTIONS

A.  01352 General LEED® Requirements

B.  15770 Air Handling Units

C.  15800 Air Distributions

1.03   REFERENCES


C.  EPA. EPA Protocol for Environmental Requirements, Testing for Indoor Air Quality Baseline IAQ.


1.04   OBJECTIVES

A.  Meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3.

B.  Protect construction workers and future building occupants from indoor air quality problems resulting from construction activities.

C.  Reduce the production and circulation of pollutants during construction.

D.  Protect equipment and absorptive materials stored and installed on-site from moisture, dust and dirt accumulation during construction.

E.  Prepare the building for occupancy following construction and prior to occupancy.
1.05 DESCRIPTION OF WORK

A. The site superintendent (or other person designated by the Contractor) shall be responsible for all aspects of LEED coordination (during construction) related to indoor air quality management.

B. Indoor air quality management activities shall include:
   1. Identifying, implementing and documenting measures to achieve the indoor air quality management objectives
   2. Supervising on-site indoor air quality management activities on a daily basis
   3. Coordinating indoor air quality management tasks with subcontractors to ensure timely and orderly progress of the work
   4. Conducting indoor air quality management inspections and making necessary repairs
   5. Maintaining an indoor air quality inspection log to document observations, deficiencies and corrective actions
   6. Preparing indoor air quality management documentation and submittals as detailed herein
   7. Reporting indoor air quality management progress to the Consultant

1.06 SUBMITTALS

A. Schedule Q1 – IAQ Management Inspection Log
   1. Complete the log on a weekly basis. The log shall commence when the building is enclosed and carry through to building turnover.
   2. The inspection log shall be completed for each weekly inspection and must document:
      a. Indoor air quality management measures implemented onsite
      b. Deficiencies related to those measures and,
      c. Corrective actions taken to remedy the deficiencies
   3. Each deficiency must be initialed and each log signed after all corrective measures have been completed and documented.
   4. Submit an up-to-date copy of the IAQ Management Inspection Log to the Consultant on a monthly basis.
   5. Submit a compilation of the completed logs to the Consultant after construction and prior to Contractor demobilization.

B. Schedule Q2 - Photo Documentation Checklist
   1. Provide photographs as specified in the checklist.
   2. Photographs must be taken on three different occasions during construction to prove continuous compliance.
   3. Photographs must be accompanied by the date taken and a description of the indoor air quality management measure depicted.
4. Coordinate with photo requirements of General LEED Requirements 01352 paragraph 1.09B.2

5. Submit the completed checklist and accompanying photos to the Consultant after construction and prior to Contractor demobilization.

PART 2 PRODUCTS

2.01 FILTRATION MEDIA REQUIREMENTS

A. Air filter MERV (minimum efficiency reporting value) ratings shall be determined by ASHRAE 52.2-1999.

B. Air handling equipment not used during construction:
   1. Filters in 100% outdoor air and recirculating systems with flow rates more than 283 L/s (600 cfm) must have a MERV-13 rating.
   2. Filters in 100% outdoor air and recirculating systems with flow rates less than 283 L/s (600 cfm) must have the highest supply air filtration level commercially available for the specific equipment.
   3. Fan units that provide no outdoor air or serve only a single zone are exempt from filtration requirements above.

C. Air handling equipment used during construction:
   1. Filters in 100% outdoor air and recirculating systems with flow rates more than 283 L/s (600 cfm) must have a MERV-13 rating.
   2. Filters in 100% outdoor air and recirculating systems with flow rates less than 283 L/s (600 cfm) must have the highest supply air filtration level commercially available for the specific equipment.
   3. Fan units that provide no outdoor air or serve only a single zone are exempt from filtration requirements above.
   4. Install new filters with a MERV = 8 (or higher) at all return/exhaust grilles/inlets before any HVAC system is operated.

PART 3 EXECUTION

3.01 POLLUTANT SOURCE IDENTIFICATION

A. Identify potential sources of indoor air pollutants on the construction site.
   1. Any construction activity or material that produces odour and/or dust is considered a source of air pollutants. Pollutant sources include, but are not limited to:
      a. Materials that produce detectable odour:

<table>
<thead>
<tr>
<th>paints</th>
<th>coatings</th>
<th>grouts</th>
</tr>
</thead>
<tbody>
<tr>
<td>stains</td>
<td>adhesives</td>
<td>epoxy flooring</td>
</tr>
<tr>
<td>sealants</td>
<td>caulkingsolvents</td>
<td></td>
</tr>
<tr>
<td>pesticides</td>
<td>fuels</td>
<td>cleaning products</td>
</tr>
</tbody>
</table>
b. Materials that create dust:

<table>
<thead>
<tr>
<th>concrete products</th>
<th>drywall</th>
<th>wood products</th>
</tr>
</thead>
<tbody>
<tr>
<td>acoustic ceiling tile</td>
<td>insulation</td>
<td>ceramic tile</td>
</tr>
</tbody>
</table>

c. Equipment that emit products of combustion or create odour and/or dust:

<table>
<thead>
<tr>
<th>generators</th>
<th>compressors</th>
<th>cutting tools/saws</th>
</tr>
</thead>
<tbody>
<tr>
<td>torches/welders</td>
<td>vehicles</td>
<td>portable heaters</td>
</tr>
</tbody>
</table>

d. Construction activities that disrupt pollutants:

<table>
<thead>
<tr>
<th>demolition</th>
<th>repair</th>
<th>renovation</th>
</tr>
</thead>
</table>

e. Other:

<table>
<thead>
<tr>
<th>exterior site work</th>
<th>standing water</th>
<th>tobacco smoke</th>
</tr>
</thead>
</table>

3.02 MINIMIZE POLLUTANTS

A. Minimize pollutants generated inside the building from the sources identified under article 3.01 using the following measures:

1. Prohibiting smoking inside the building at all times during construction
2. Fuelling up equipment outside the building
3. Storing gasoline or solvents outside the building
4. Restricting outdoor vehicular/equipment traffic and operation where emissions can enter the building
5. Reducing on-site emissions by using equipment that burns propane/natural gas or is powered by electricity
6. Exhausting pollutant sources directly outside using temporary or permanent ventilation equipment. Where exhaust is not feasible, locally re-circulate air through a portable air cleaner.
7. Collecting and bagging sawdust from woodworking tools
8. Covering and/or sealing all indoor sources of odour and dust
9. Using painting techniques that minimize odour (e.g. roller instead of spraying)
10. Using cleaning practices that minimize dust (e.g. vacuum instead of sweeping)
11. Using cleaning products that minimize pollution, fumes, VOC’s, etc.
12. Prohibiting the burning of garbage
3.03 POLLUTANT CONTAINMENT MEASURES

A. Prevent the movement of pollutants from the sources identified under article 3.01 to other areas in the building using the following measures:

1. When possible, perform pollutant generating activities outside the building.
2. Move equipment, work and other pollutant sources to locations where they will have the minimum impact on indoor air quality.
3. Setup small, contained, designated work areas to contain pollutants:
   a. Avoid open areas and areas with high drafts
   b. Erect dust curtains and barriers
   c. Depressurize areas using temporary or permanent ventilation equipment
4. Use portable fans to exhaust pollutants (e.g. gas engine exhaust) to the exterior through windows, doors, etc. Ensure that adjacent windows, doors, etc. will not allow pollutants to re-enter the building.
5. Close windows and doors adjacent to pollutant sources (e.g. dust, vehicle emissions, etc.) outside of the building. If windows and doors have not been installed, temporarily seal exterior openings with plastic, wood, etc.
6. Pressurize occupied or completed areas of the building using temporary or permanent ventilation equipment.

3.04 HOUSEKEEPING MEASURES

A. Prevent the accumulation of moisture, dust and dirt in the building from the sources identified under article 3.01 using the following measures:

1. Frequently cleaning interior surfaces to minimize dust and dirt accumulation by:
   a. Dusting with damp rags
   b. Wet mopping
   c. Sweeping using wetting agents and sweeping compounds
   d. Vacuuming with equipment that contains HEPA filtration and/or a wet scrubber
   
   Note: Localized cleaning should occur immediately after a construction activity is completed and/or at the end of each day. A full building clean-up must be performed at least once a week.
2. Close exterior windows and doors or create temporary enclosures using plastic or wood to prevent moisture accumulation indoors.
3. Immediately remove any water accumulated indoors to protect interior surfaces and materials.
4. Cover, seal and protect materials stored and installed on-site from moisture, dust and dirt accumulation.
5. Elevate materials stored on-site off the ground to protect from moisture and dirt accumulation.

6. Do not install materials with evidence of moisture damage or excessive moisture accumulation.

7. If necessary, use ventilation/dehumidification to control humidity levels within the building.

8. Promptly clean all spills (fuels, lubricants, paints, adhesives, etc.).

9. Clean or remove excess application of solvent-containing products.

3.05 HVAC PROTECTION MEASURES

A. During/Before Installation

1. Cover (with plastic) and elevate (off ground) all ductwork, fittings, insulation, acoustic lining and equipment stored on site during construction.

2. Seal all supply, return and exhaust openings as well as all temporary ductwork openings not under immediate work (e.g. open ends in ductwork runs) with plastic. Openings must be sealed immediately after installation in areas that will no longer be under work.

3. Close/cover all hatches and access doors in HVAC equipment that will not be under work.

4. Seal all HVAC equipment openings (e.g. inlets/outlets of air handlers, fans, VAV boxes, etc.) with plastic until ductwork is connected.

5. Do not use mechanical rooms to store or collect construction waste materials.

6. Install ceiling tiles and seal all openings into the plenum with plastic prior to final cleaning.

B. After Installation (select Option 1 or Option 2 for each HVAC system)

1. Do not use mechanical rooms to store or collect construction waste materials.

2. Option 1: HVAC Equipment Not Used During Construction (Recommended)
   a. Do not operate any permanent HVAC equipment or systems during construction.
   b. Seal all openings in HVAC systems, ductwork and plenums as described in paragraph 3.05A above.
   c. If an HVAC system protection measures are not implemented, or if the system is operated during construction, the Contractor must provide duct cleaning services, plus all necessary access doors, at no extra cost to the contract.
   d. After all construction and final cleaning work is complete the Contractor shall:
      1) Remove all HVAC protection measures
2) Install new filters in all air handling equipment as per paragraph 2.01

3) Start-up systems

4) Prepare systems for Testing, Adjusting and Balancing Contractor and Commissioning Agent.

3. Option 2: HVAC Equipment Used During Construction
   a. Install new filters in all air handling equipment as per paragraph 2.01 before any HVAC system is operated. Provide a duct-mounted filter (external to equipment) if necessary.
   b. Install new filters with a MERV = 8 (or higher) as per 2.01A at all return/exhaust grilles/inlets before any HVAC system is operated.
   c. Temporarily shut down the return/exhaust side of HVAC systems during heavy construction/demolition.
   d. Permanently close off the return/exhaust side of HVAC systems in areas with high dust levels. Cover duct openings with plastic in these areas.
   e. If an HVAC system is operated without the above protection measures in place, the Contractor must provide duct cleaning services, plus all necessary access doors, at no extra cost to the contract.
   f. After all construction and final cleaning work is complete the Contractor shall:
      1) Remove all temporary filters installed on return all grilles.
      2) Install new filters in all air handling equipment as per paragraph 2.01
      3) Prepare systems for Testing, Adjusting and Balancing Contractor and Commissioning Agent.

3.06 BUILDING FLUSH-OUT PRIOR TO OCCUPANCY

A. After all construction, final cleaning and Testing, Adjusting and Balancing work is complete, and prior to building occupancy, conduct a building flush-out by:
   1. Supplying a total air volume of 4,300 m$^3$ of outdoor air per m$^2$ (or 14,100 ft$^3$ per ft$^2$) of floor area,
   2. Maintaining a temperature of at least 16$^\circ$C (60$^\circ$F) and,
   3. Where mechanical cooling is operated, maintaining a relative humidity no higher than 60%.

Note: The estimated time required to carry-out the building flush-out is twelve (12) days. Work to be completed prior to Substantial Performance of the work of the Construction Contract.

B. Perform all corrective work related to general deficiencies, Testing, Adjusting and Balancing, and Commissioning prior to commencing the building flush-out.
C. Install new filters in all air handling equipment as per paragraph 2.01 prior to commencing the building flush-out.

D. Replace all filtration media in air handling equipment with new filters as per paragraph 2.01 after the building flush-out and immediately prior to occupancy. Filtration media is to be replaced at the expense of the Contractor.

3.07 SCHEDULING

A. Schedule construction activities to minimize the amount of VOC’s, odours and fumes absorbed by porous materials (e.g. ceiling tiles, carpet, etc.).

B. Complete applications of wet and odorous materials such as paints, sealants, and coatings before installing absorbent “sink” materials such as ceiling tiles, carpets, and fabric-covered furnishings.

C. Allow for Testing, Adjusting and Balancing to be carried out following construction and before occupancy (refer to HVAC Protection Measures).

D. Allow for corrective work related to general deficiencies, Testing, Adjusting and Balancing, and Commissioning to be carried out following construction and before occupancy.

3.08 INSPECTIONS AND MAINTENANCE

A. The Contractor shall inspect all indoor air quality management measures and remedy any deficiencies on a weekly basis.

1. Inspections shall be recorded in the IAQ Management Inspection Log (see article 1.06A) and shall denote the measures implemented at the time of inspection, any deficiencies as well as corrective actions taken.

2. Provide photos as specified by article 1.06B at various occasions during construction to prove continuous compliance.

B. All Pollutant Containment, Housekeeping and HVAC protection measures will be reviewed by the Consultant during each site visit.

1. All deficiencies identified by the Consultant must be remedied and documented in the IAQ Management Inspection Log within 48 hours of notification.

2. The Contractor shall clean or replace any equipment or materials that is incorrectly stored or improperly protected at no extra cost to the contract.

3.09 REMOVAL OF PROTECTION MEASURES

A. All products/materials installed as a part of indoor air quality management measures shall be removed prior to building turnover. Any remedial work required as a result of removing the measures is the responsibility of the Contractor.

END OF SECTION
## SCHEDULE Q1 – IAQ MANAGEMENT INSPECTION LOG
(Complete Weekly. Submit most recent copy to the Consultant on a monthly basis)

<table>
<thead>
<tr>
<th>Date</th>
<th>IAQ Management Measures</th>
<th>Deficiencies</th>
<th>Corrective Action Taken</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept 17/06</td>
<td>Dust curtain and HVAC pressurization protecting finished offices on 2\textsuperscript{nd} floor.</td>
<td>Standing water present adjacent to sprinkler room in basement</td>
<td>Water removed. Adjacent materials were not damaged</td>
<td>G.L.</td>
</tr>
</tbody>
</table>

I hereby certify that the information provided is complete and correct:

<table>
<thead>
<tr>
<th>Signature of Authorized Official</th>
<th>Position</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Enermodal Engineering Ltd.
**SCHEDULE Q2 – PHOTO DOCUMENTATION CHECKLIST**
(Submit with photos to Consultant after construction and prior to demobilization)

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Completed By:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Location:</td>
<td>Company:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indoor Air Quality Management Measure</th>
<th>Date of Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#1</td>
</tr>
<tr>
<td>Tobacco smoke prohibited inside the building (signage)</td>
<td></td>
</tr>
<tr>
<td>Gasoline and solvents stored outside the building</td>
<td></td>
</tr>
<tr>
<td>Outdoor equipment restricted around building (signage)</td>
<td></td>
</tr>
<tr>
<td>Electric, propane or natural gas powered equipment</td>
<td></td>
</tr>
<tr>
<td>Pollutant sources exhausted to outside</td>
<td></td>
</tr>
<tr>
<td>Portable air cleaner used to filter air in work areas</td>
<td></td>
</tr>
<tr>
<td>Sawdust from wood working tools collected and bagged</td>
<td></td>
</tr>
<tr>
<td>Indoor sources of odour and dust covered/sealed</td>
<td></td>
</tr>
<tr>
<td>Painting techniques used to minimize odour</td>
<td></td>
</tr>
<tr>
<td>Temporary dust curtains and barriers</td>
<td></td>
</tr>
<tr>
<td>Designated cutting and work areas</td>
<td></td>
</tr>
<tr>
<td>Materials covered, sealed and protected</td>
<td></td>
</tr>
<tr>
<td>Materials stored elevated off the ground</td>
<td></td>
</tr>
<tr>
<td>Building sealed from the exterior environment</td>
<td></td>
</tr>
<tr>
<td>Wetting agents, sweeping compounds, wet rags/mops</td>
<td></td>
</tr>
<tr>
<td>Vacuuming with HEPA filtration and/or wet scrubber</td>
<td></td>
</tr>
<tr>
<td>Ventilation/dehumidification to remove moisture</td>
<td></td>
</tr>
<tr>
<td>Protecting stored ductwork, lining, insulation &amp; fittings</td>
<td></td>
</tr>
<tr>
<td>Scheduled construction activities</td>
<td></td>
</tr>
<tr>
<td>Openings in ducts sealed w/ plastic</td>
<td></td>
</tr>
<tr>
<td>Openings &amp; hatches in HVAC equip. sealed w/ plastic</td>
<td></td>
</tr>
<tr>
<td>Supply, return and exhaust openings sealed w/ plastic</td>
<td></td>
</tr>
<tr>
<td>Ceiling plenum openings sealed w/ plastic</td>
<td></td>
</tr>
<tr>
<td>Ceiling tiles installed prior to final cleaning</td>
<td></td>
</tr>
</tbody>
</table>

I hereby certify that the information provided is complete and correct:

---

Signature of Authorized Official ______________  Position ______________  Date ______________

Enermodal Engineering Ltd.