



**INDOOR AIR QUALITY ASSESSMENT DURING
CONSTRUCTION
November, 2014**

**WINCHESTER HIGH SCHOOL
80 Skillings Road
Winchester, MA 01890**

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1. EXECUTIVE SUMMARY

BACKGROUND

Consigli retained Cashins & Associates, Inc., to perform an indoor air quality (IAQ) assessment at areas adjacent to Phase I of the project at the Winchester High School in Winchester, Massachusetts. This testing was conducted in order to determine whether various IAQ parameters were in compliance with the project's Indoor Air Quality Management Plan.

SCOPE OF WORK

On November 21, 2014, a Senior Indoor Air Quality Consultant from Cashins & Associates performed air sampling as required by the Indoor Air Quality Management Plan developed by Cashins & Associates.

Measurements were taken for the following:

- Carbon Dioxide
- Temperature
- Relative Humidity
- Carbon Monoxide
- Volatile Organic Compounds (VOCs)
- Dust

It should be noted that readings for carbon dioxide are taken during these assessments not to measure ventilation or HVAC effectiveness, but to ensure that exhaust from combustion engines are not entering the space. Different techniques would be employed in order to assess the effectiveness of the school's ventilation system. Thus, carbon dioxide readings listed here are not to be read as an accurate measurement of the amount of fresh air bring brought into classroom spaces.

FINDINGS

Real-time readings for CO, VOCs, and dust were all below upper limits set forth in the IAQ Management Plan.

2. INTRODUCTION

Cashins & Associates, Inc. was retained by Consigli to provide professional industrial hygiene consulting services. Our scope of work consisted of measuring various basic indoor air quality parameters during construction activities at Winchester High School in Winchester, Massachusetts. This assessment took place on November 21, 2014, and focused on areas adjacent to Phase I of the project.

3. INDOOR AIR QUALITY PARAMETERS

The following is a breakdown of upper limits related to indoor air quality as stipulated in section 01 81 19 of the Project Specification:

Analyte	Upper Limit
Airborne dust	150 $\mu\text{g}/\text{m}^3$ (Occupied), 500 $\mu\text{g}/\text{m}^3$ (Work Area)
Volatile Organic Compounds (VOCs)	5 ppm (5,000 ppb)
Carbon Monoxide (CO)	9 ppm

4. METHODOLOGIES

A TSI Q-Track indoor air quality meter was used to measure carbon dioxide and carbon monoxide at representative locations of the school. The range of measurements obtained is reported in Table 1.

A RAE Instruments part per billion photo-ionization detector (PID) was utilized to screen the school building for the presence of TVOC. The PID is a screening tool that provides information as to total volatile organic compound loading in the space. The instrument does not provide information pertaining to which specific compounds are present in the air.

Dust concentrations were measured using a MIE pDR-1000AN passive air sampler. This real-time aerosol monitor measures both respirable and thoracic fractions, with optimal responses to particles in the 0.1-10 micron size range. The monitor was zeroed on June 19, 2014 prior to the monitoring event by using a hand-inflatable “zero air” pouch in conjunction with an inlet filter cartridge.

5. FINDINGS

5.1 Findings: Basic IAQ Parameters

We have listed in Tables 1 through 3 the results of the real-time air sampling. Three rounds of sampling were conducted at various times of the day in order to gain a more representative data set. It should be noted that these readings are taken in areas adjacent to classrooms, not inside the classrooms themselves.

Table 1: Real-time Air Quality Readings

<i>Location</i>	<i>CO₂ (ppm)</i>	<i>CO (ppm)</i>	<i>TVOC (ppb)</i>	<i>Dust (µg/m³)</i>
1st floor				
Main office	731	<0.1	15	11
@ B102	683	<0.1	2	18
@ B105	693	<0.1	10	28
@ Photography	836	< 0.1	64	11
Exit 34	522	<0.1	4	50
@ A101	501	<0.1	2	16
@ WOMEN'S Room	464	<0.1	2	17
@ Cafeteria	476	<0.1	2	31
Library	522	<0.1	2	7
2nd floor				
@ B209	694	<0.1	68	10
@ C212	397	<0.1	3	7
@ C202	665	<0.1	2	18
@ C201	741	<0.1	10	14
@ C210	639	<0.1	1	15
@ B210	776	<0.1	3	7
@ B207	782	<0.1	6	18
@ B201	704	<0.1	2	15
@ A210	701	<0.1	1	19
@ A211	709	<0.1	2	11
@ A202	788	<0.1	17	7
Stair landing	480	<0.1	1	9
3rd Floor				
@ A302	599	<0.1	84	8
@ Science Lecture	663	<0.1	67	15
@ A306	675	<0.1	29	8
@ B301	698	<0.1	55	8
@ B308	720	<0.1	75	8
@ B306	718	<0.1	74	15
B wing hall @ TCP	709	<0.1	73	9
@ C301	753	<0.1	67	8
C wing hall @ work	650	<0.1	18	7
1st floor E wing				
@ music suite construction	585	<0.1	1	64
Band room corridor	548	<0.1	1	39

Table 1: Real-time Air Quality Readings

<i>Location</i>	<i>CO₂ (ppm)</i>	<i>CO (ppm)</i>	<i>TVOC (ppb)</i>	<i>Dust (µg/m³)</i>
Band room	918	<0.1	8	12
Woodshop	405	<0.1	29	12
Hall near WOMEN'S locker	460	<0.1	3	29
@ Men's locker room	439	<0.1	2	8
@ Boiler room	436	<0.1	1	14
Exterior	333	<0.1	1	15

6. DISCUSSION

Real-time readings for CO, VOCs, and dust were all below upper limits set forth in the IAQ Management Plan.

No significant construction-related odors were detected at the time of this assessment.

Indoor air quality related to construction activities will be monitored on a regular basis by Cashins & Associates throughout this project in order to ensure that concentrations of various airborne contaminants remain at acceptable levels.

Please call if you have any questions or if we can be of further assistance.

Sincerely,
 Cashins & Associates, Inc.



Zachary Keefe, CIE
 Senior Indoor Air Quality Consultant