



**INDOOR AIR QUALITY ASSESSMENT DURING  
CONSTRUCTION  
February, 2015**

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

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**Job #: 5316**

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## 1. EXECUTIVE SUMMARY

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### 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 February 25, 2015, 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 and VOCs were all below upper limits set forth in the IAQ Management Plan. Dust levels were found to be slightly elevated in the blue stair landings. It is recommended that the construction side of these barriers be sealed with the same rubber membrane used to seal other construction barriers. This should help prevent dust from passing through these leaky window systems.

Dust levels in all other areas assessed were found to be acceptable.

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

## 2. INTRODUCTION

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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 February 25, 2015, and focused on areas adjacent to Phase I of the project.

## 3. INDOOR AIR QUALITY PARAMETERS

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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

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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>CO<sub>2</sub></i> <i>(ppm)</i>	<i>CO</i> <i>(ppm)</i>	<i>TVOC</i> <i>(ppb)</i>	<i>Dust</i> <i>(µg/m<sup>3</sup>)</i>
<b>1<sup>st</sup> floor</b>				
Main Office	751	<0.1	10	79
@ exit 34	825	<0.1	101	88
@ Room A101	823	<0.1	86	85
@ Room A102	694	<0.1	0	73
B hall @ women's room	836	<0.1	59	81
@ Room B101	807	<0.1	26	38
@ Photography	828	<0.1	43	54
@ Cafeteria	842	<0.1	61	46
<b>East Wing</b>				
Hall @ Music Suite	443	<0.1	0	39
@ Shop class	448	<0.1	0	23
Band Room	423	<0.1	0	15
West Exit	392	<0.1	0	10
Men's Locker	380	<0.1	0	16
@ Boiler Room	434	<0.1	0	14
<b>2<sup>nd</sup> floor</b>				
West side @ work	903	<0.1	15	33
@ Room C210	874	<0.1	12	12
@ Room C207	915	<0.1	0	10
@ Room C202	920	<0.1	3	6
@ Room C205	899	<0.1	21	<1
@ Room B209	1118	<0.1	37	5
B Hall @ bubbler	976	<0.1	15	60
@ Room B207	1070	<0.1	19	67
@ Room B203	1069	<0.1	21	62
@ Room B201	861	<0.1	17	71
@ Room A211	791	<0.1	26	16
Social Studies Dept.	891	<0.1	15	24
@ Room A210	1015	<0.1	11	34
@ Room A201	1165	<0.1	47	39
@ Room A202	1224	<0.1	19	44
Blue stair landing	1041	<0.1	104	362
<b>3<sup>rd</sup> Floor</b>				
Blue stair landing	962	<0.1	57	396
Science Teacher's Room	1048	<0.1	303	67

**Table 1: Real-time Air Quality Readings**

<i>Location</i>	<i>CO<sub>2</sub></i> <i>(ppm)</i>	<i>CO</i> <i>(ppm)</i>	<i>TVOC</i> <i>(ppb)</i>	<i>Dust</i> <i>(µg/m<sup>3</sup>)</i>
@ Room A302	973	<0.1	340	81
Science Lecture Room	877	<0.1	180	45
@ Room A305	708	<0.1	0	8
@ Room B301	1008	<0.1	140	37
@ Room B303	902	<0.1	111	20
B Wing Hall	1047	<0.1	159	40
@ Room B307	1050	<0.1	120	5
@ Room C302	1176	<0.1	84	10
@ Room C306	1044	<0.1	7	23
@ Room C309	990	<0.1	13	12
West Hall	1066	<0.1	384	19
@ Room C308	823	<0.1	40	3

## 6. DISCUSSION

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

In the blue stairwells and landings, dust was found to be slightly higher than the upper limit of  $0.15 \text{ mg/m}^3$ . It is recommended that these construction barriers are sealed more tightly using the same rubber membrane material applied to other construction barriers. This should help reduce dust to below upper threshold levels.

All areas of the school in and around classrooms were found to have acceptable dust levels.

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