# Portables vs. Permanent learning environments

Health and Safety in the classroom using individualized preventative maintenance and monitoring procedures

## Why are we getting rid of portables?

- Students in Surrey deserve a better learning environment and our government is working with the Surrey School District to get kids out of portables and into classrooms as quickly as possible."
- "We want every student to get the best educational experience possible, and that means learning in positive, engaging and inspiring classrooms."

-Rob Fleming, Minister of Education

## Why are we getting rid of portables?

- No HVAC system poor ventilation
- Poor lighting and lack of natural light
- Susceptible to mould and mildew
- Susceptible to Rodents and other pests
- Meant to be used as a temporary building (pressed wood products, vinyl walls- formaldehyde and other VOC's)
- Safety and security for staff and students



## Realistic Goals and Expectations

- Due to budget constraints, portables/modulars are not going to disappear quickly
- According to the SSD, there are currently 333 portables in use
- The Surrey School District continues to grow and it is anticipated an additional 20 to 25 portables will be required in 2020
- 7,000 out of 73,000 students in SSD 36 are educated in a portable structure
- This is the equivalent to nearly 1 in 10 students

MOUNTAINVIEW MONTESSORI ELEMENTARY

"In my days I'll never see the end of portables in Surrey, I don't think most of us ever will."

- Terry Allen, Board Vice-Chair

OFFICE BUILDING A

# Realistic Goals and Expectations

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OFFICE RHILDING A MOUNTAINVIEW MONTESSORI ELEMENTARY Goals: 1. Ensure portable learning environments provide basic health and safety for students and staff 2. Assess the schools based on health and safety and overcrowding when considering where school replacement funds should go

# Preventative Maintenance of School Buildings



Currently the health and safety procedures are the same for all buildings (whether permanent or portable).

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All health and safety procedures are the same for all buildings regardless of age.

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Routine preventative maintenance work schedules include: checking fire extinguishers, emergency lighting and hydrants, checking and replacing filters, checking HVAC systems.



No special maintenance or provisions exist for buildings (portables) which are meant to be temporary, but end up being used for 27 years.



# Is this reasonable ?



# Mountainview Montessori

A case study



# Introduction to: Mountainview Montessori Modular Complex

- A school composed of 100% portables
- NO ventilation system (open a window/exterior door for fresh air)
- Gas-fueled furnace warms and recirculates indoor air (no fresh air taken in)
- Rodents in the crawlspace of the portables for a decade
- Systemic drainage issues and water damage/leaks on the ceiling tiles and walls
- Mould (Aspergillius sp.) underneath the kindergarten portables and in the gym
- Asbestos in the caulking and glue that holds the vinyl flooring down
- Lead in the gym drinking fountain/kitchen that must be flushed each day
- Portables are at least 27 years old (1992 manufacture dates) and were placed on the ground in Feb. 2000

\* All these facts have been checked and confirmed with the district and are supported by documentation

# Air Quality based on Carbon Dioxide Concentration

#### Why Measure [CO<sub>2</sub>] in Portables?

- Carbon dioxide (CO<sub>2</sub>) is a result of human metabolism and there are almost 30 occupants in a single portable.
- Concentrations within a building are often used to indicate whether adequate fresh air is being supplied to the space.
- Moderate to high levels of carbon dioxide can cause headaches and fatigue, and higher concentrations can produce nausea, dizziness, and vomiting.
- Allen et al. found statistically significant declines in cognitive function scores when CO<sub>2</sub> concentrations were increased to levels between 950-1400ppm
- Schools are an environment where increased CO<sub>2</sub> levels can reduce the cognitive function of students and staff which could significantly impact productivity and learning.

Allen, Joseph G., Piers MacNaughton, Usha Satish, Suresh Santanam, Jose Vallarino, and John D. Spengler. 2015. "Associations of Cognitive Function Scores with Carbon Dioxide, Ventilation, and Volatile Organic Compound Exposures in Office Workers: A Controlled Exposure Study of Green and Conventional Office Environmental Health Perspectives 124 (6): 805-812. doi:10.1289/ehp.1510037. http://dx.doi.org/10.1289/ehp.1510037.

# Should Teachers be Responsible for classroom ventilation?

Questions asked to Teachers *	YES	SOMETIMES	NO
Do you keep your exterior door open?	3	1	6
Do you open all the windows everyday?	3	1	6
Do you open the windows in Summer?	9	1	1
Do you open the windows in Winter?	2	0	8
Do you feel your classroom is well ventilated?	0	0	(10)
Do you have a fan in the classroom?	10	0	0
Do your students seem drowsy, report headaches or nausea?	3	5	2
Do you notice a difference in air quality in Winter vs. Summer?	9	1	0
Did you know this school has no HVAC/ventilation system?	1	0	9
Have you made a work safe BC complaint about air quality?	0	0	(10)

\*Anonymous survey of 10 teachers at Mountainview regarding passive ventilation practices

# CO2 levels (ppm)Potential Health Problems250-350background (normal) outdoor air level350-1,000typical level found in occupied spaces with good air exchange1,000-2,000level associated with complaints of drowsiness and poor air2,000-5,000Mountainview Montessori class levels2,000-5,000Mountainview Montessori class levels

\* Measurements taken in Summer when windows are open. Since teachers don't typically open the windows in Winter, levels would need to be re-assessed and will likely be higher.

\* When all windows and 2 fans were operating, these CO<sub>2</sub> concentration levels were brought down below 1000 ppm at Mountainview Montessori. However the initial measurements were taken during class time without altering or disturbing the teacher's normal ventilation practices.



# Mould and portables

- Mould is associated with dampness and lack of ventilation
- Dampness in a classroom can be monitored by tracking the humidity
- Poor drainage underneath portables make the crawlspace an attractive space for mould to grow
- Materials such as oriented strand board (OSB) are cellulose based products which often already contain spores and just need to get wet for mould to begin growing.
- While healthy people may not be as susceptible to the effects of mould, it can seriously harm the young.
- According to the Ontario Ministry of Health and Long-Term Care, mould can cause coughing and bleeding in the lungs of infants and young children.
- A. niger, and A. versicolor. Species molds have been classified by some authorities as being toxigenic or pathogenic and instant action is required when they appear in occupied indoor environment\*. (qPCR)

\* Microorganisms in home and indoor work environments: Diversity, Health Impacts, Investigation and control. Flanning Brian, Samson, Robert A., and Miller, David J (Ed.), Tayler and Francis, 2001.Atlas of Clinical Fungi, Second Edition. G. S. de Hoog, J. Guarro, J. Gene, and M. J. Figueras. Centraalbureau voor Schimmelcultures, 2000.

## Case study: Mountainview Montessori



7 months has passed, and parents of the children in affected classrooms were not, and still have not been, notified of the mould growing beneath the classrooms.

#### Remediation and Follow-up

- Pinchin recommended that building occupants and staff be notified of the heavy mould growth beneath the classrooms, why weren't parents notified?
- Is there a Standard Operating Procedure for communicating with parents when school affect on their child's health?
- Is there mould in the wet, water damaged ceiling tiles/walls inside the classrooms?
- Will the asbestos under the vinyl flooring get disturbed because the OSB is delaminating? (the glue that holds the wood pieces together is failing).
- Why didn't I know my child's school had no ventilation system? Is this legal?
- Proper ventilation can aid in mitigating environmental deficiencies



# How are project priorities determined?

#### School Replacement (REPL)

Project Priority	Facility Name	Project Code	Project Description	Estimated total project value
HIGH	RIVERDALE ELEMENTARY	REPL	Replace with 80K/400 Elementary School	\$31,000,000
MEDIUM	MOUNTAINVIEW MONTESSORI	REPL	Replace existing modular (40K/325) with New school building.	\$31,000,000
MEDIUM	PORT KELLS ELEMENTARY	REPL	Replace school with 80K/525 + NLC elementary - site expansion may be required to accommodate expansion	\$31,000,000
TOTAL				

#### School Enhancement Program (SEP)

Project Priority	Facility Name	Project Code	Project Type	Estimated total project value		
HIGH	Various Schools	SEP	Mechanical/HVAC	\$3,000,000		
HIGH	Various Schools	SEP	Health and Safety	\$1,500,000		
HIGH	Bear Creek Elementary	SEP	Heating and Ventilation Upgrades (Ph 2)	1,623,938		
HIGH	Various Schools	SEP	Energy	1,055,000		
HIGH	Peace Arch Elementary	SEP	Heating and Ventilation Upgrades (Ph 1)	1,029,025		
Total \$8,207,963						

















## Interim interventions for Mountainview

1) Place Mountainview as HIGH priority for school replacement

2) Install a proper HVAC system by September 2019

3) Remediate the mould issues under the crawlspace permanently (OSB replacement) by September 2019

4) Excavate and remove the rodent feces under the crawlspace by September 2019

5) Implement basic air quality monitoring in each portable classroom:

Temperature

Humidity

Carbon Dioxide (already in new portables)

6) Inform parents of the school's deficiencies and allow them to withdraw their children for space in other schools if these safety-related deficiencies are not addressed. These families should get a guarantee that they can return to the school when the issues are addressed. Parents should not have to choose between their kids health and their preferred educational curriculum.

