REPORT TO

CORPORATE SERVICES, STRATEGIC PLANNING AND PROPERTY COMMITTEE

STATUS UPDATE REGARDING THE COLLECTION OF INTERIOR AIR TEMPERATURES IN NON-AIR CONDITIONED SCHOOLS (ALL WARDS)

"I can do all this through Him who gives me strength."
Philippians 4:13 (NIV)

Created, Draft	First Tabling	Review
February 6, 2017	February 15, 2017	

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INFORMATION REPORT

Vision:
At Toronto Catholic we transform the world through witness, faith, innovation and action.

Mission:
The Toronto Catholic District School Board is an inclusive learning community uniting home, parish and school and rooted in the love of Christ.

We educate students to grow in grace and knowledge to lead lives of faith, hope and charity.

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A. EXECUTIVE SUMMARY

This report provides a status update regarding the collection of daily interior air temperatures at schools that do not have air-conditioning nor displacement ventilation systems.

Temperature collection will begin in May and continue to the end of September at twelve (12) schools, one per Ward. Temperature reading will be collected either through the Building Automation systems, if the school is equipped with some mechanical ventilation or with temperature-recording data loggers. The data will be collated and analysed to assist with the planning and prioritization for future passive cooling measures.

The cumulative staff time dedicated to developing this report was 25 hours.

B. PURPOSE

1. This report is provided as a follow up to the June 6, 2016 report presented at Corporate Services, Strategic Planning and Property Committee, regarding Passive Cooling for Schools without Air-conditioning. The Board direction to staff is below:

    1. *That we consider the strategies outlined in the report and include the following items:*

        a) Increase insulation on all west and south facing walls in our buildings;
        b) Operable windows should have upper operable windows beyond the 100 mm (10 cm) openings);
        c) Install white roofs with solar panels initially to reduce Hydro usage or to run air conditioning;
        d) Investigate green roofs to include native plans or succulents that do not require frequent watering (desert types);

    2. *That staff begin collection of day-to-day temperature data in order to prioritize the implementation of passive cooling measures in our*

schools. Priority for data collection and monitoring to be for those schools without air conditioning, air displacement ventilation.

C. BACKGROUND

1. School buildings present unique challenges for meeting heating, ventilation and air conditioning (HVAC) requirements. Room occupancy and use, building age, size, as well as the presence or absence of a mechanical ventilation system are all factors that influence indoor air temperature. The local climate and outdoor air temperatures also impact indoor air temperatures.

2. There are approximately 139 TCDSB schools that have mechanical ventilation systems (this does not include schools that are only equipped with washroom exhaust fan). Of these, approximately 83 schools have tempered or air conditioned air as part of the ventilation system. In some cases, air-conditioning may only be provided to a portion of rooms or spaces within the building. The majority of schools with mechanical ventilation systems are operated by a building automation system (BAS), which provides remote-access and diagnosis of the mechanical system as well as temperature adjustments. The BAS can also provide temperature readings but in some cases, the BAS monitors a zone in the building rather than individual classrooms.

3. For older schools that do not have mechanical ventilation systems and/or BAS, the indoor air temperature is primarily monitored through the boiler controls and radiator controls throughout the heating season for the months of October to May. These temperature controls would not be in use during the warmer months when the heating season is completed. The only way therefore to capture room temperatures in these classrooms would be to install individual thermometers in each room, approximately 6,106 rooms in total, system-wide.

4. In order to facilitate the collection of the space temperature data, the Energy Department will install data loggers in the classrooms that are likely to be warmer than the rest of the school. Room temperature in selected classrooms will captured at the following twelve (12) schools, which represent different

building ages, construction types, and may have partial mechanical ventilation:

Trustee Ward	School	Size	Build Year	Does the school have mechanical ventilation - Full or Partial?
1	St Benedict	56,069	1966	Partial
2	St Gregory	72,237	1999	Yes
3	St Matthew	41,336	1950	Partial
4	St Charles Garnier	37,501	1975	Partial
5	St Charles	37,147	1959	Partial
6	St Clare	65,326	1694	Partial
7	St Kevin	20,335	1965	Partial
8	The Divine Infant	37,512	1986	Partial
9	Holy Rosary	35,725	1921	No
10	St Cecilia	69,965	1914	Partial
11	Notre Dame	68,512	1949	Partial
12	St Barbara	34,627	1965	Partial

D. EVIDENCE/RESEARCH/ANALYSIS

1. Environment Canada and Climate Change (ECCC) data from the past six years indicates that there have been between six (6) to ten (10) hot degree days (over 30°C.) during the school year in Toronto per year, as previously noted in the two following reports presented to Board; *Report On Cost-Benefit Analysis Of Displacement Ventilation And Full Air Conditioning, October 2015* and

Report on Passive Cooling For Schools Without Air Conditioning (All Wards), June 6, 2016.

2. The ECCC also provides data for the average daily temperature for the months of May, June and September for the past six years noted below:

Average Temperature (°C)			
Year	**May**	**June**	**September**
2012	18.2	21.6	18.2
2013	13.3	17.5	16.5
2014	12.2	18.3	17.4
2015	13.9	17.0	19.9
2016	12.8	18.4	20.1

3. There is no legislation requiring air-conditioning in new or existing buildings in Ontario. In 2006, the Board-approved "Heat Protocol in Schools". This document outlines responses and strategies to heat alerts and extreme heat alerts declared by the City of Toronto Medical Officer of Health. In 2016, the City of Toronto Hot Weather Response Plan (HWRP) was updated. Toronto Public Health (TPH) receives warnings of heat alerts from ECCC and will make those known to the public. The Occupational Health and Safety (OHS) Act of Ontario, does not regulate maximum temperature in workplaces. The OHS Council has provided a Heat Stress Awareness guidelines for workers, which the Board has distributed to the various joint-health and safety committees.

4. A separate report regarding updates to the Board's Hot Weather Protocol will be provided in March 2017 upon completion of consultation with TCDSB stakeholders.

E. ACTION PLAN

1. The collection of daily indoor air temperature will be undertaken using temperature-recording data logging devices. Data loggers will be placed in one or two classrooms per floor in each of the selected schools for the months of May, June and September. The use of the data loggers may also be extended into the winter months. Indoor air temperatures during the heating months can

be monitored through the boiler and the controls for the room radiators or terminal units.

2. The preferred model of data logger has the capability of transmitting indoor temperature data wirelessly and can read indoor temperatures between -30°C and 70°C to an accuracy of 1%. Each device has memory storage capability to record 30,000 measurements and has a typical battery life of one year. Data loggers would need be collected from each room, in order to download the information into a computer.

3. Staff will also note the room conditions and features for the rooms where temperature readings are taken, as well as noting other factors that may influence indoor air temperature. The analysis will also include outdoor weather and temperature data as provided by the ECCC.

F. METRICS AND ACCOUNTABILITY

1. Temperature readings collected through BAS and data loggers are a more consistent and reliable way to capture accurate readings throughout the day (and at night) than by collecting the data manually. The information can be electronically loaded into the appropriate spreadsheet or tables for analysis.

2. The Board currently communicates heat stress awareness information as well as City of Toronto Heat Alerts to schools, in keeping with Hot Weather Protocol. The report on Passive Cooling Measures (2016) includes some actions that can be undertaken by schools such as adding fans to circulate air in classrooms as well as turning off lights, and closing blinds/curtains to reduce solar heat gain. Taking students outside to a shady part of the yard is another option.

3. The results of the room temperature analysis will be of value to plan and implement passive cooling measures at schools. In addition, this information may help support requests to the Ministry of Education to provide funding to introduce air-conditioning or other cooling measures in existing schools, as currently School Renewal funding is not permitted to be used to introduce "new" systems into schools unless in response to a legislative requirement.

4. The schools with BAS and mechanical ventilation systems (but not air-conditioning) can take advantage of "night cooling", to bring cooler, external air into the building prior to the start of the school day. This practise is also beneficial in schools with air conditioning as it reduces the daytime cooling load on the building, and saves on energy.

5. The Board recently approved becoming a Net Zero school board – in order to achieve this with both existing and new buildings, there would need to be a balance between the amount of energy used or required to operate the school and the amount of energy (primarily electricity) that the building produces through renewable measures such as solar photovoltaic panels. As an example, the roof-top solar panels at Blessed Cardinal, which has partial air-conditioning in the building, produces approximately 20% of the electricity used by the building.

6. The estimated staff time to place the data loggers at the twelve schools, monitor the readings, and collate the information is approximately 280 hours. The data loggers should remain in place for the months of July and August in order to continue data-collection through September.

G. IMPLEMENTATION, STRATEGIC COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT PLAN

1. The information collected from the indoor room temperature analysis will be provided to the Board in a subsequent report, in October 2017.
2. A report regarding the goals and measures required to become a Net Zero school board will also be presented in the fall of 2017.
3. The updated Hot Weather Protocol is currently being circulated for consolation amoungst various TCDSB stakeholder groups with a subsequent report to Board planned for March 2017.
4. School staff and parents at the selected schools will be informed by letter that temperatures readings will be collected their school for the months of May, June and September and that this information will be part of a Board report to be presented in October.

H. CONCLUDING STATEMENT

This report is for consideration of the Board.