Memo: Proposed Capital Health and Safety Improvements at Meridian Hall and Meridian Arts Centre

Date: 17 August, 2020

1. Introduction

As we prepare for the future when we can welcome back employees, artists, and patrons into our venues, and celebrate performing arts in a safe and comfortable environment. TO Live has made a commitment to protect the Health and Safety of everyone entering our venues. In order to increase confidence and allay fears of employees, artist, and patrons, TO Live's proposal includes additional Health and Safety improvements to be implemented in our venues. These improvements will include installation of the following equipment:

(1) Installation of UV Lamps in the HVAC system and UV Lights for disinfecting shared work environments;
(2) Electrostatic Sprayers; and
(3) Thermal Cameras.

This proposal does not supersede the guidelines and best practises provided by public health authorities. This is in addition to physical distancing practices followed by engineering controls, administrative controls and lastly, personal protective equipment (PPE) to reduce transmission. We believe that these improvements will assist in mitigating potential hazards to maintain a safe environment.

The cost presented in this proposal is strictly for Capital Health and Safety improvements and does not include Operational Health and Safety costs incurred during COVID-19 and post. The items excluded from the capital proposal are hand sanitizers, gloves, masks, protective barriers, increase in cleaning cost, contract tracing technology, increase in HVAC services. This list is not exhaustive. The operating list and costs will evolve as public health guidance and requirements are being developed for businesses.

TOTAL CAPITAL HEALTH AND SAFETY COST:

Description	2020**
Total Equipment and Installation Cost for both Meridian Hall and Meridian Arts Centre	$ 872,800

** *This is a one time cost and will be spent in 2020*

1.1 MAC and MH H&S Improvements

As we know that aerosolized transmission of COVID-19 through the air is considered possible and it is recommended this exposure to the virus should be controlled. Changes to HVAC systems can help reduce aerosolized airborne transmissions (Ref: ASHRAE Statements). Air Filters and UV light can both help with improving the air quality. UV disinfection products can also help reduce bacteria and viruses from surfaces and tools. Air filters clean solid particles from the air and ultraviolet lights purify the air, removing chemicals and biological contaminants.

Contaminated surfaces are a potential source for dissemination of many bacterial and fungal pathogens and enhanced environmental cleaning and disinfection are therefore recommended as one component of control measures. Electrostatic sprayers can help with effective decontamination and potential elimination of viruses from surfaces.

In addition to installing UV systems and using electrostatic sprayers, there is another system that can help prevent virus spread and control. Thermal cameras, it can help detect radiating heat from a body and estimate core body temperature. Measuring temperature is an important measure as a high temperature or fever is just one common symptom of the virus.

1.1.1 Benefits of UV Lamp System and UV Lights for disinfecting shared environments

Light energy in the ultraviolet-C (UV-C) wavelength has been used extensively in HVAC equipment since the mid-1990s to maintain cleanliness and provide energy saving. UV-C helps with inactivating infectious agents in occupied rooms, on surfaces, and in ventilation systems.

- Improves airflow, returns and maintains the heat-transfer levels of cooling coils and reduces maintenance.
- Improves airflow levels and eliminates organic material on surfaces, which helps improve indoor air quality (IAQ) by reducing pathogens and odors.
- The impact of UV-C on mechanical systems and occupants translates into substantial economic benefits, including reductions in energy consumption, energy cost, staff time needed for chemical or mechanical cleaning; and increases in occupant satisfaction and productivity.
- Substantial labor and material savings by using UV lights on shared environments such as lighting/sound/video consoles, work benches, other share work spaces over traditional disinfecting methods.

As per the preliminary results of the TO Live's public statement survey, 92% of respondents (n = 813) believe that an improved air treatment is essential when making a decision to attend a performing arts event in a post COVID-19 environment. This item was rated higher over other behavioural practises i.e. social distancing, personal protective equipment, and other precautions.

1.1.2 Benefits of Electrostatic Sprayer

Electrostatic sprayers are specifically designed to target areas that may have been exposed to COVID-19 and other infectious microbes. It can be applied on portable devices and large open areas. The application is well-suited for irregular devices with multiple angles.

The goal of using an electrostatic sprayer is to evenly coat the target surface with the disinfectant chemical, as traditional sprayers and hand wiping can provide incomplete

coverage, increasing the chances of infective organisms to survive. There are also huge labour savings, as a small team can disinfect a theatre in a fraction of time over traditional disinfecting methods.

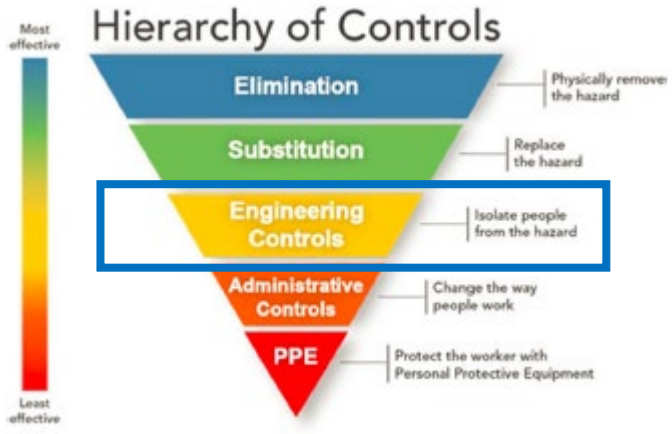
As per the preliminary TO Live public statement survey results, 93% of respondents felt the cleaning of theatre seats was somewhat or absolutely necessary in their decision to return to performing arts

1.1.3 Benefits of Thermal Cameras

Thermal cameras are being implemented as a means of detecting people with fever like symptoms in high traffic areas. They are considered for it's accuracy, non-contact skin temperature measurement, looking for anomalies that may indicate a fever. These camera's will be used to scan audiences upon entry at a rate substantial faster than any other temperature taking methods. This will limit lines and unnecessary gathering of crowds.

2. Equipment Installation at MH and MAC

Considering the hierarchy of controls, UV-C energy from the lamps, electrostatic spraying, and thermal cameras are used as an engineering control to interrupt the transmission of pathogenic organisms in enclosed spaces. The lamps will be installed in the duct work, downstream of the cooling coils, to provide additional benefit of irradiating the coils, keeping them clean, while addressing the primary concern of disinfecting the air. In addition to UV lamps installed in the HVAC system, it will also be installed as standalone equipment in non-public spaces such as sound console, lighting console etc. The thermal camera's will be installed at the main public and staff entrances.



3. Overall MH and MAC Cost

Equipment	Estimated 2020 Cost
UV Lamps for MH	$ 547,450
UV Lamps for MAC	$ 114,450
UV lights for disinfecting shared environments *(30 units total)*	$ 14,400

Thermal Cameras *(10 units total)*	$ 144,000
Electrostatic Sprayers *(7 units total)*	$ 52,500
MH TOTAL COST	**$ 652,900**
MAC TOTAL COST	**$ 219,900**
TOTAL MH AND MAC	**$ 872,800**

- MH UV Lamp Installation in HVAC System (*base case*)= **$547,450**
    - There is an option to install these lamps in a phased approach. Phase 1 will include installation of UV lamps in four (4) AHU's that serve the audience areas.
    - MH Phase 1: **$148,250**
- MAC UV Lamp Installation in HVAC System (*base case*)= **$114,450**

Items	**MH 15 AHU**	**MAC 9 AHU**
	Install downstream of the Coil	***Install downstream of the Coil***
UV Lamp	$ 70,700	$ 32,700
Installation *(2.5 x cost)*	$ 176,750	$ 81,750
Asbestos *($20K per unit)***	$ 300,000	N/A
TOTAL (2020)	***$547,450***	***$114,450***

MH Phase 1 Cost (4 AHU's)	
UV Lamps - 4 AHU's	$ 19,500
Installation *(2.5 x cost)*	$48,750.0
Asbestos *($20K per unit)*	$ 80,000.00
TOTAL (2020)	**$ 148,250**

- UV lights for disinfecting shared tools (30 units for both MAC and MH): **$14,400**
- Thermal Cameras for both MAC and MH (10 units for both MAC and MH): **$144,000**
- Electrostatic Sprayers for both MAC and MH (7 units for both MAC and MH): **$52,500**

4. Conclusions and Recommendations

1. UV lamps have been used in ducts for years, and their use is becoming increasingly frequent as concern about indoor air quality increases.
2. In addition to air purification, installation of UV lamps in AHU's will result in reduction of maintenance costs on coil cleaning. Also, lead to energy savings as the coils won't get plugged frequently and therefore the fans can run efficiently.
3. The installation at MH can be done in phases – starting from spaces occupied for extended period of time. Phase 1 will include installation of UV lamps in AHU's that serve the audience areas and other phases to continue based on the available funding.
4. The electrostatic sprayer can provide a rapid and effective means to reduce contamination on the surfaces, open spaces, and portable equipment.
5. Measurements from thermal camera are almost instant, there is no contact, and data can be viewed at a distance, so there is minimal disruption in public places and little risk of cross-contamination or harm. the system can be used with minimal training.