County of Milwaukee
Interoffice Communication

DATE: November 13, 2020

TO: Supervisor Marcelia Nicholson, Chair, Milwaukee County Board of Supervisors

FROM: Donna Brown-Martin, Director, Department of Transportation

SUBJECT: MCTS Information on Protecting Drivers from COVID-19 Report

BACKGROUND

The County Board adopted resolution (File No. 20-677) requesting the Milwaukee County Transit System (MCTS) and Department of Transportation provide an informational report regarding costs involved with outfitting the MCTS bus fleet with 'full' superior shield models to protect drivers from COVID-19. According to the resolution, methods and costs associated with enhancing driver safety – addressing risks associated with COVID-19 and unruly passengers – including, but not limited to 'full' superior bus shields, bulletproof shields, and improved ventilations systems is being sought by the Board.

The resolution refers to a shield being used by the Dallas Area Rapid Transit (DART) agency and ponders whether Milwaukee County ought to consider doing the same for its drivers who are on the frontlines of the pandemic. The Board is also interested in knowing whether federal dollars from the Coronavirus Aid, Relief, and Economic Security (CARES) Act could fund enhanced protection in whole or in part.

MCTS staff track industry trends in health and safety, seek to learn more about new methods and technologies, discuss pending changes with its labor representatives and often seeks to learn more about a new method or technology by taking a pilot project approach. This report is designed to address questions raised within the resolution and describe the current state of shields and related technologies at MCTS.

Bus Operator Shields

MCTS has been working closely with the Amalgamated Transit Union (ATU) on the topic of driver shields for many years. When MCTS initially evaluated bus operator shields, we were very careful to ensure that our purchase would comply with Federal Motor Vehicle Safety Standards (FMVSS) that ensure shield materials meet fracture test requirements and possess a necessary degree of transparency.[1]

The manufacturer of each shield is required to stamp a certification mark on each piece of laminate or glass that includes a unique manufacturer's code assigned by the National Highway Traffic Safety Administration (NHTSA) as evidence that the material has passed all tests. Risks that FMVSS are attempting to mitigate include glare and reflections caused by bus operator shields especially at night, and injuries resulting from impacts caused by motor vehicle accidents.

[1] Federal Motor Vehicle Safety standards are identified in Code of Federal Regulations, Title 49 Chapter V § 571.205 Standard No. 205, Glazing materials. This standard specifies requirements for glazing materials for use in motor vehicles and motor vehicle equipment. The purpose of the standard is to reduce injuries resulting from impact to glazing surfaces, to ensure a necessary degree of transparency in motor vehicle windows for driver visibility, and to minimize the possibility of occupants being thrown through the vehicle windows in collisions.

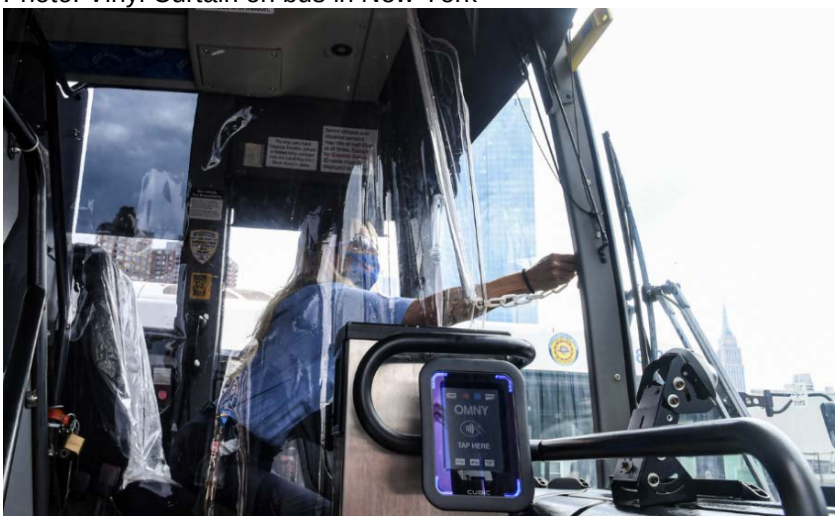
The first generation of bus operator shields purchased by MCTS came from the Bentech Company in 2013. They were installed on all buses to protect operators from physical assault. Today, health professionals view bus operator shields as also providing a measure of protection like a sneeze guard.

Photo: 1st Generation Shield by Bentech Co. still installed on 177 buses

Photo: 2nd Generation Shield by New Flyer Co. still installed on 163 buses

Many of the shields installed on buses nationally after the COVID outbreak are akin to sneeze guards only. These plexi-glass barriers do not provide sturdy protection from assault or comply with NHTSA standards for glazing. Some systems started with clear plastic shower curtains to protect bus operators before moving onto plexi-glass. Whenever a passenger boards the curtain is pulled closed. Before the bus begins moving it is pulled open to allow an unobstructed view of the roadway.

Photo: Vinyl Curtain on bus in New York



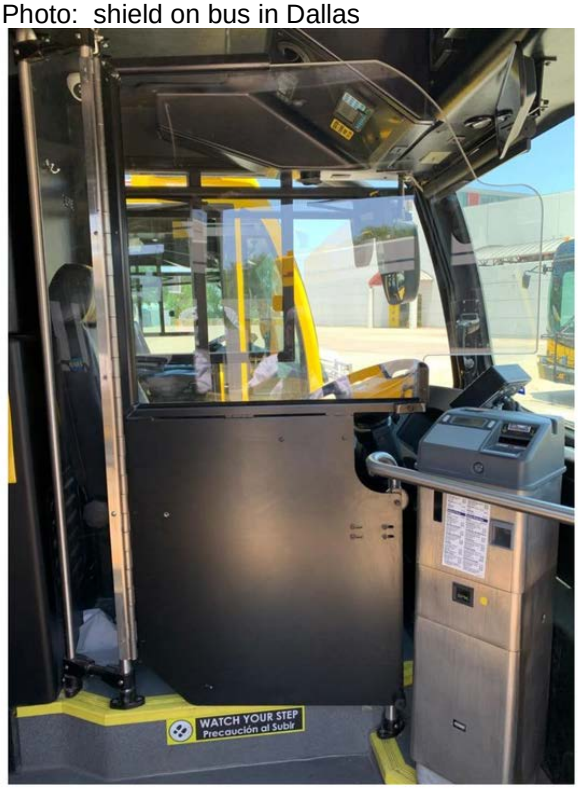
The curtain method is inconvenient compared to the shields that MCTS has on buses because it requires manual opening and closing of the curtain every time the bus stops to pick up passengers.

Plexiglass shields that are not NHTSA certified would also have to be closed upon boarding every passenger and then opened again before the bus pulls out into traffic.

The resolution identifies a shield being used in Dallas, Texas as a 'full' superior model because it extends nearly as far as the front windshield. Unfortunately, the Dallas shield is not NHTSA certified as it was made in-house of plexiglass, but the certified shield that MCTS has in 51 of our newest Gillig brand buses is similar in size.

Photo: shield on Gillig buses

Photo: shield on bus in Dallas



The MCTS shield shown in the photo above includes a panel that can be pushed forward or pulled back like a sliding window. More information about these latest versions of our bus operator shields from Arow Global can be found online here: https://arowglobal.com/products/arowguard-bus-driver-protection-system/

As you can see from the photos of MCTS shields, the designs have changed and improved over the years. MCTS contemplates the purchase of newer designs when they are available in the industry, and new replacement buses are being purchased. As a matter of practice, each new design is discussed with ATU and carefully considered for issues of operator protection and safety of use with respect to glare and visibility. Over the years we learned that larger shields tend to wiggle and wobble more than smaller ones.

A leading manufacturer, Arow Global is pilot testing a new shield that is similar in size to the shield deployed in Dallas but is certified by NHTSA. The pilot test is very small currently – consisting of three shields – one at each of three different transit systems. Until MCTS knows that the transit industry considers the product to be safe, and the manufacturer can guarantee its reliability, we would not recommend it.

If the cost of this new shield is similar to the cost of the AROWGuard Shields that we already have on our newest buses, the total cost to retrofit 320 buses that are currently equipped with older versions of shields would be nearly $2 million. The cost of this shield is $5,375 per bus cost with a labor cost of $600 per shield for a total cost of $5,975 each. Even at that cost, the shields would not be bullet proof. In fact, our industry contacts at Arow Global have indicated that they are not aware of anyone in the industry manufacturing or deploying a door and shield that is bullet proof.

Ventilation Improvements and Air Treatment

The regular activity of stopping at bus stops and opening the front and rear doors for passenger boarding and alighting maintains a measure of air flow and air circulation on buses. Despite this airflow, once you are in a bus you are enclosed with other passengers. Bus manufacturers have spent decades minimizing airflow in order to maximize the efficiency of onboard heating and air conditioning systems.

MCTS will continue to work with bus builders and original equipment manufacturer (OEM) suppliers to understand any new advancements or recommendations that they may have for increasing air flow. As a matter of practice, we look to industry leaders for solutions, rather than small scale companies that don't have a record of working within our industry. We want to know that a new product is guaranteed to work in the real environment of the bus, and not just be demonstrated in the controlled environment of a laboratory. We also need to know that a product will not damage other operational systems on the bus. If a low-cost add-on damages an expensive HVAC system, the warranty can't foretell the hardship and high costs to restore/replace the damage.

With that said, air treatment alternatives are increasing in number on the market. To help prevent airborne spread of the virus, there are a variety of approaches being proposed, including but not limited to: ultraviolet germicidal irradiation, photoelectrochemical oxidation, aerosolized viricide, and HEPA filters. As MCTS becomes interested in a new system or technology on a bus, it occasionally will pursue such interest in a controlled way by adding a new system to a small number of new buses being purchased as replacement vehicles. This approach allows us to pilot test a system and verify that it works as advertised, rather than leaping right into the cost of retrofitting every bus.

Two of the newer technologies available for buses are considered in more detail herein.

<u>Photoelectrochemical Oxidation</u>

Photoelectrochemical oxidation systems are being installed on some transit buses in Wisconsin. In this type of system, a continuous low dose of airborne hydroperoxide (H202) is generated via UV catalytic advanced oxidation technology. The products are marketed as proven to kill 99% of COVID, H1N1, Avian Flu, etc. The system manufacturer states in the past 20 years, over 4 million units have been deployed in various applications in over 60 countries. More information about this technology can be found here: https://www.rgf.com/products/air/magnetic-mount-package-phi/#undefined

In an on-bus application, the unit would be added to the vehicle's HVAC system. The per vehicle cost, including installation for the HVAC add-on unit is about $3,350 per bus for a total of $1,240,000 for the 370-bus fleet. In addition, annual maintenance cost consisting of replacement of a germicidal UV light unit once per year including labor is about $370 per bus for a total annual operating cost of $137,000. Like any systems connected to HVAC units, the farther you sit from the vent, the less efficiently you experience the heating, cooling, or virus killing effect.

In addition, it is also important to note that some of the new products on the market since the COVID outbreak began are already being 'flagged' as problematic for existing equipment. The American Public Transportation Association (APTA) has gone so far as to report to its members that UV light is known to cause damage to material such as plastics and rubbers that are commonly found in transit vehicles and facilities. As such, a leading manufacturer of bus seats, American Seating, does not recommend the use of UV light sterilization on their products in transit.

Aerosolized Viricide

Adding an aerosolized viricide treatment system to each bus requires installation of a particle sensor that constantly monitors the amount of clear, odorless viricide that is present in the air in the bus and when necessary then releases a boost of viricide from an atomizer device. There is no visible haze of viricide in the air as it is released. The whole process is controlled by an adaptive system that uses artificial intelligence to monitor results from the on-board sensors and automatically adjusts the atomizer boost based upon the fresh air intake and other conditions in the vehicle.

With a constant supply of viricide in the air, it is expected that 98% of airborne viral particles can be inactivated within 30 seconds and within 1 to 3 minutes the system is 99% effective. A system like this one is expected to cost on the order of $6,500 per vehicle, and at a cost of $55 per gallon for the viricide, the operating costs for each bus will be on the order of $8 per day. The cost of equipping the fleet with this technology would be on the order of $2.4 million and on-going operating costs would be around $800,000 to $1 million annually. Information about the aerosolized viricide system can be found here: https://grignardpure.com/#1600283491805-0bea6050-853d

Summary

New shields and ventilation systems have a range of costs, as previously mentioned:

A) $1.9 million capital cost to retrofit 320 buses with latest AROWGuard Shield
B) $1.24 million capital cost to add a photoelectrochemical oxidation system to HVAC on every bus
C) $2.4 million capital cost to add an aerosolized viricide treatment system to every bus

The CARES Act funds issued by FTA formula to Milwaukee County for MCTS could be used for one or more of the COVID related project expenditures listed above; however, once the CARES Act funds are expended, MCTS will have difficulty in preparing and managing to future budgets.

Added annual on-going costs would impact operating budgets in all future years. Those new costs could range from $137,000 per year for a photoelectrochemical oxidation system up to $1 million per year for an aerosolized viricide treatment system. Furthermore, future budgets, beginning with 2022, will be increasingly difficult to prepare since over $12.7 million in CARES Act funds have already been committed to the 2021 budget, but as much as an additional $15 million may be needed in 2021 if ridership and passenger revenue does not return to pre-pandemic levels.

Finally, to learn more about the steps that MCTS is taking daily to keep passengers and employees safe and healthy overall, please visit the MCTS website here: https://www.ridemcts.com/about-mcts/health

RECOMMENDATION

MCTS takes a controlled approach to exploring new products and technologies including the use of pilot projects when possible. Should the Board support capital initiatives that have been identified in this report a pilot approach is recommended by way of deploying a new technology on a small number of new buses as a part of a vehicle replacement program. Otherwise, this report is for informational purposes only, unless otherwise directed.

Prepared by: Dan Boehm, President & Managing Director, MCTS

Approved by:

Julie Esch, Deputy Director
_____

Donna Brown-Martin
Director, Department of Transportation

cc: David Crowley, Milwaukee County Executive
Mary Jo Meyers, Chief of Staff, Milwaukee County Executive
Kelly Bablitch, Chief of Staff, County Board of Supervisors
Steve Cady, Research Director, Office of the Comptroller
Joseph Lamers, Director, DAS-PSB