AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

Effective Methods to Clean and Disinfect Transit Vehicles

Thursday, April 30, 2020

Media Advisory

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To set up an interview with an expert, please contact
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AMERICAN PUBLIC TRANSPORTATION ASSOCIATION

Welcome and Introduction

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- This webinar will be **recorded** and made available on APTA's website
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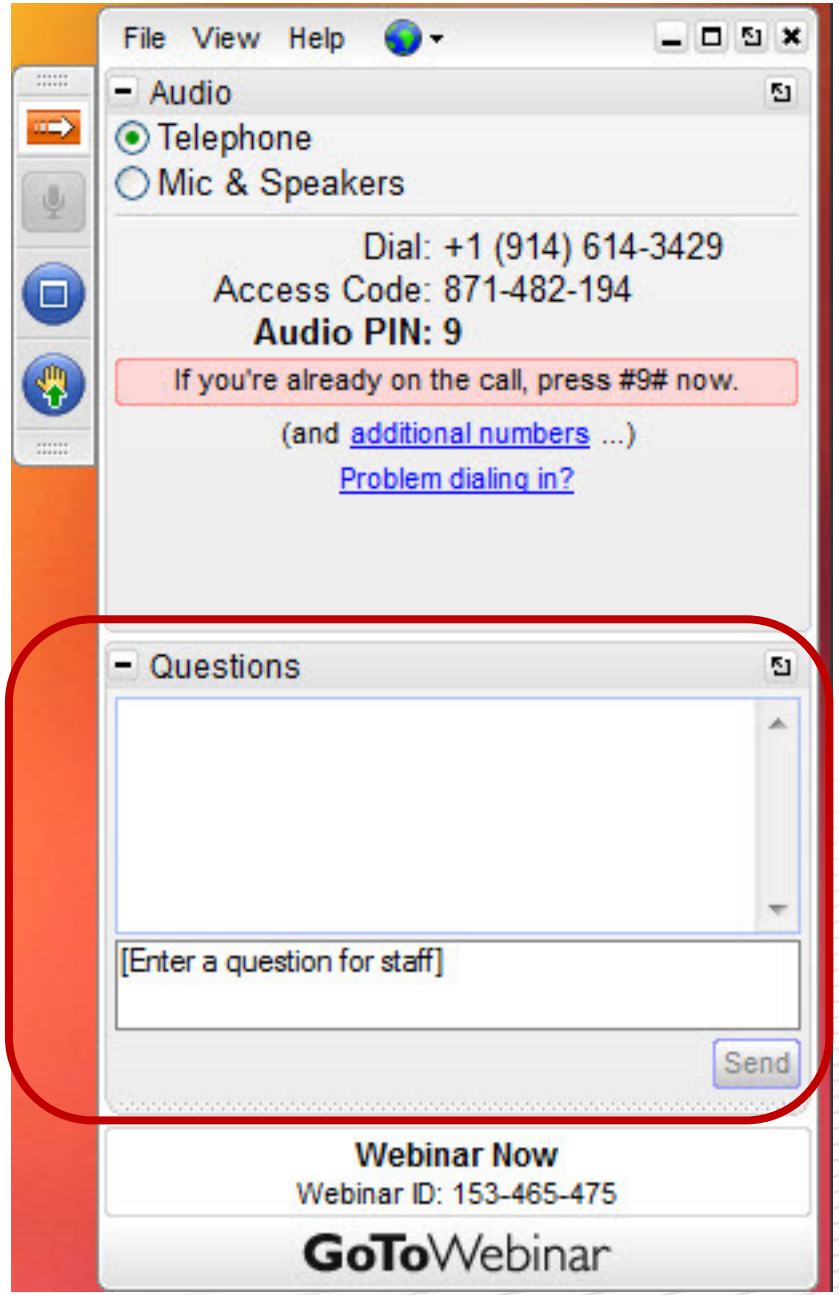
- To ask a question, use the **Questions Panel; questions will be answered at the end** of the presentations



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NYCT Enhanced Cleaning and Disinfection Processes

April 30, 2020

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Vice President and Chief Mechanical Officer, NYCT

Julie Green, PE
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Agenda

NYCT Subway Fleet Overview

2019 Deep Cleaning Program

2020 COVID-19 Mitigation Program

Pre- and post-cleaning test procedure

Lessons Learned

Next Steps

Questions

NYCT Subway Fleet Overview

R62 Sub-"A"

R142 Sub-"A"

R188 Sub-"A"

R32 Sub-"B"

R42 Sub-"B"

R62A Sub-"A"

R68A Sub-"B"

R46 Sub-"B"

R68 Sub-"B"

R44 SIR

R143 Sub-"B"

R160 Sub-"B"

R179 Sub-"B"

New Cars

R211 Sub-"B"

In-Design / Production

2019 Deep Cleaning Program

- NYCT's Subway Car Deep Cleaning Program was part of the Subway Action Plan II Program, and involved the one-time deep cleaning (exterior and interior) of approximately 3,000 subway cars
- Work was performed in 2019 by non-union Third-Party cleaning contractors on NYCT property; agreement reached with TWU to allow work to proceed
- Cleaning contractor chemicals, equipment, and processes were reviewed, demonstrated, approved, and documented prior to issuance of a contract to perform the work

2019 Deep Cleaning Program

- Cleaning contractor workshop held at NYCT railyard in December 2018 (attended by 85 firms)
- Non-traditional RFP issued immediately after workshop to seek alternate proposals (35 proposals received)
- Multiple parallel pilots held to qualify cleaning technologies and third party cleaning companies
  - Dry ice
  - Soda blast
  - Sponge blast
  - Oxalic acid
- Contracts issued to five firms by February 2019 and all deep cleaning work completed within seven months

2019 Deep Cleaning Schedule

	Cleaning Contractor	Location	Start Date	End Date	Cars Cleaned
EXTERIOR	Fleetwash	Coney Island	2/5/2019	3/22/2019	570
		Corona	2/7/2019	5/17/2019	506
		239th Street	3/25/2019	5/21/2019	410
		East 180th St.	4/1/2019	5/29/2019	405
		Jerome	4/15/2019	6/13/2019	425
		Jamaica	5/6/2019	6/28/2019	420
					3,036
INTERIOR	Imperial	Coney Island	1/31/2019	4/23/2019	570
	Modern	Unionport	2/19/2019	7/1/2019	815
	Hallcon	Jamaica	3/9/2019	6/19/2019	720
		Corona	6/17/2019	8/20/2019	506
	Imperial	Jerome	4/24/2019	6/24/2019	425
				Total:	**3,036**

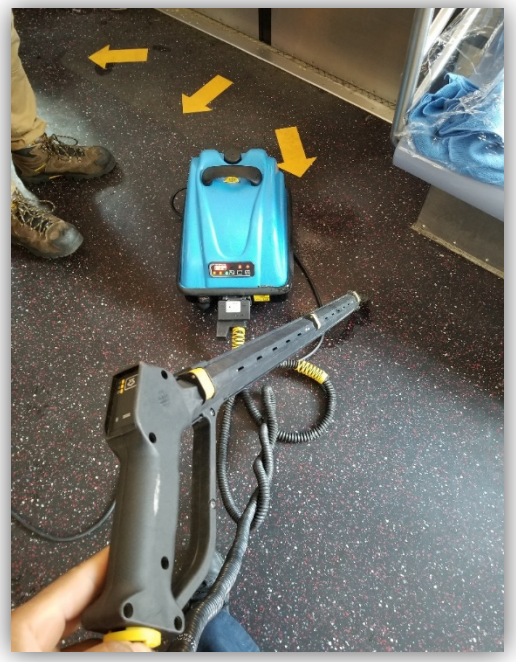
2019 Interior Deep Cleaning

Floor Polisher

Wet Vacuum

Bar Keepers Friend Cleanser

2019 Interior Deep Cleaning



Steam Cleaner

Spray Bottle with Cleanser

Microfiber cloths

Before and After Photos

Before and After Photos

2019 Exterior Deep Cleaning

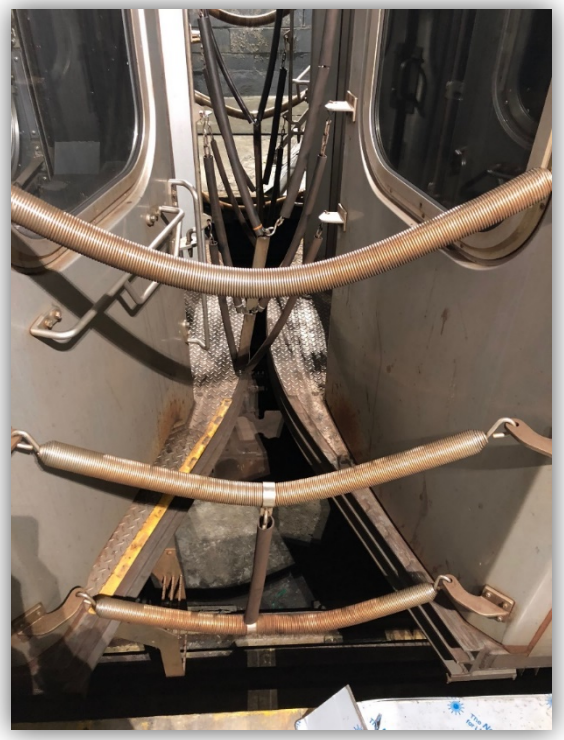
Mobile Trainwash Unit w/ Power Washer, Combustion Water Heater, and Safety Equipment

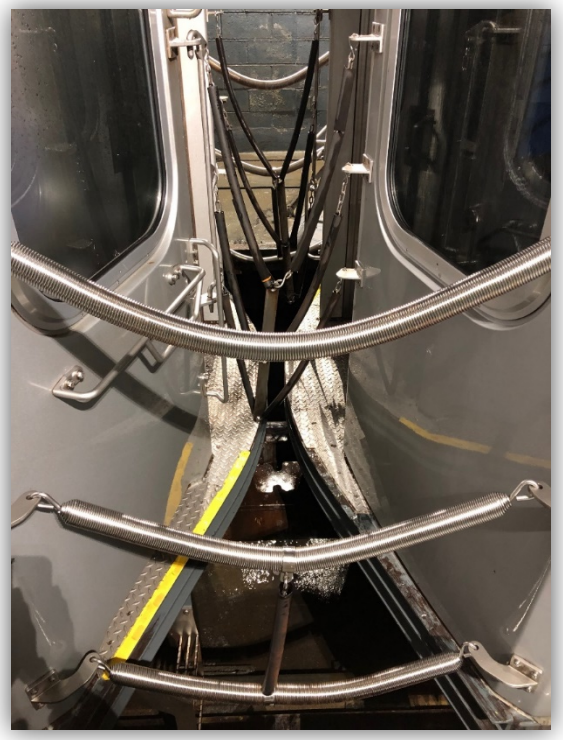
Mobile Trainwash Unit w/ Effluent Wet Vacuum, 500 gallon Effluent Storage Tank, and Safety Equipment

2019 Exterior Deep Cleaning

1. Tarps are secured to vehicle to protect undercar equipment and create a effluent capture trough
2. Detergent is applied by Mini Mobile Wash Unit
3. Without letting the chemical dry (critical step), detergent is scrubbed with bristle brooms
4. Hot high pressure power washers rinse car, avoiding direct application of high pressure water onto sensitive equipment/components
5. Effluent is wet vacuumed from trough to storage truck and removed from NYCT property for proper disposal
6. Stubborn areas are hand treated with Bar Keepers Friend
7. Tarps are removed, underbody equipment is gently misted, interior and exterior is inspected for water intrusion and overlooked washing magnets/clips

Before and After Photos





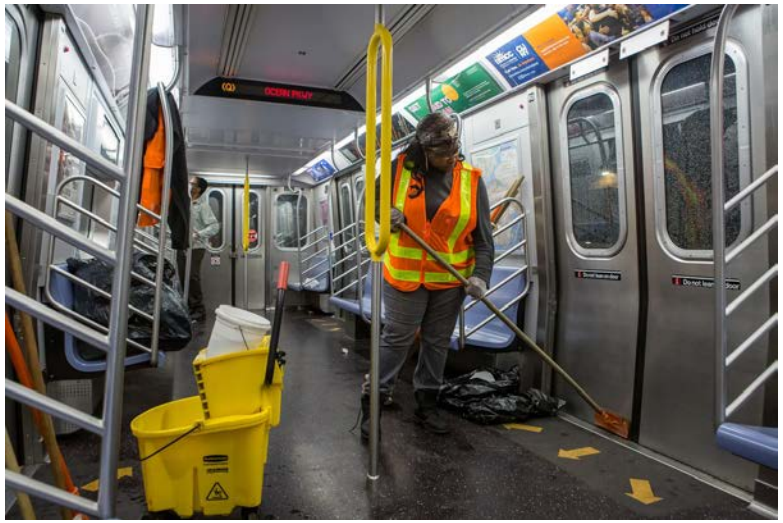
Before and After Photos

Note – the following optimizations were also addressed at all NYCT car washes in 2019:

- *Brush engagement with car shell*
- *Detergent optimization at brush head*
- *Detergent dwell time management*
- *Air stripper functionality*
- *Miscellaneous site issues*

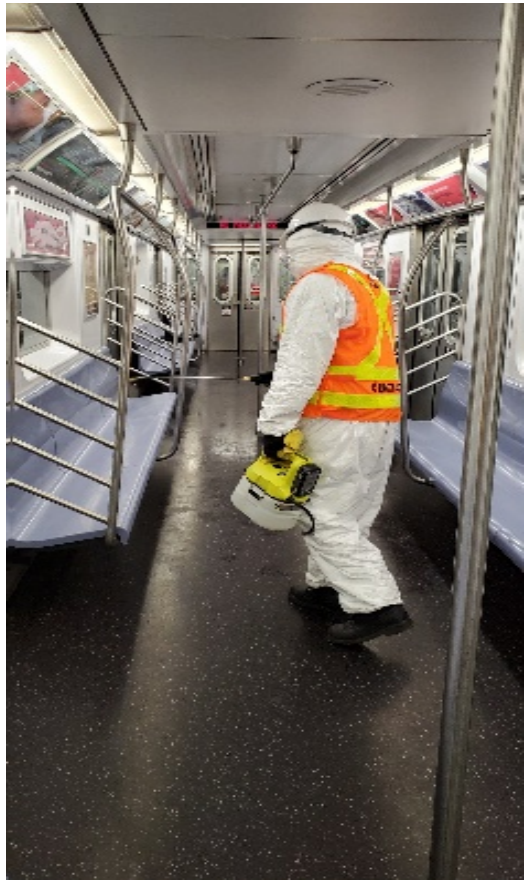
2020 COVID-19 Mitigation Program

- NYCT's pre-existing cleaning process is as follows:
  - End of run cleaning (known as Terminal Cleaning)
  - Daily cleaning overnight in the yards (known as Lay-up Cleaning)
  - Deep cleaning every 72 days (known as Reno Cleaning)
- On March 2, 2020, in response to COVID-19, NYCT commenced disinfecting touch surfaces of all subway cars every 72 hours using internal staff



Third-party Enhanced Disinfecting Process

- As NYCT's internal work-force became depleted due to COVID-19 infections, NYCT engaged third-party contractors in mid-March 2020 to perform an three-step treatment process on the interiors of NYCT's subway cars:
  - Perform thorough cleaning of Subway Car Interiors
  - Apply disinfectant solution to all surfaces
  - Apply additional disinfectant solution, known as antimicrobial shield, to all surfaces



Third-party Products Used

- Disinfectant Product:
  - Lemon Quat

    https://www.nclonline.com/products/view/LEMON_QUAT

- Antimicrobial Shield Products*:
  - Goldshield 75

    http://www.goldshield1.com/index.php/goldshield-for-industry
  - Zoono

    https://zoonousa.com/product/zoono-z71-surface-protectant/

*Yet to be validated for its effectiveness

Cleaning Verification - ATP Swab Testing

- Prior to performing any cleaning and after cleaning is finished, the Contractor performs an Adenosine Triphosphate (ATP) Swab Test on one car of 5% of the train sets awarded under the Contract
- The ATP testing is performed using UltraSnap™ Surface ATP sampling test swabs and the Hygiena SystemSURE Plus™ ATP Meter (a.k.a. luminometer)
- The ATP field testing is conducted to field screen the cleanliness of impacted surfaces in NYCT Subway Cars that have been cleaned/disinfected, for comparison to background (baseline) reference measurements taken prior to cleaning/disinfection
- Viral particles do not contain or produce ATP, so performing such testing will not directly confirm either the presence, or the absence, of viruses on surfaces.

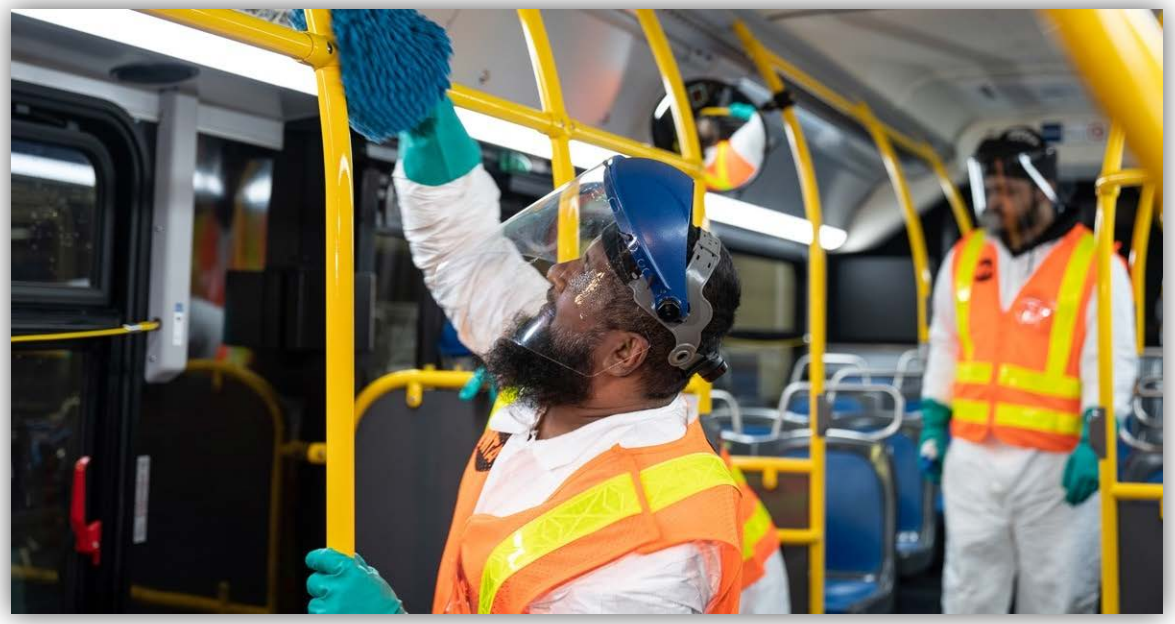
Subway Cars Cleaned in Railyards

Location	Cleaning Contractor	Total # of Cars Disinfected
East 180th Street	Modern	410
Corona	Modern	440
Jamaica	Modern	600
239th Street	Modern	410
East NY	HCH	734
Pitkin	HCH	381
Coney Island	HCH	228
Livonia	HCH	165
Jerome	HCH	115
207th Street	HCH	48
Jerome	LN Pro	315
Pelham	LN Pro	430
Concourse	LN Pro	268
240th Street	LN Pro	360
Coney Island	LN Pro	417
207th Street	Fleetwash	40
Pitkin	Fleetwash	53
Jamaica	Fleetwash	600
207th Street	Positive	5
Livonia	Lina Vivas	155
Coney Island	Lina Vivas	124
Various Shops/Yards	Bio Protectors	185
Total Cars Disinfected		6,483

- Phase I Complete - Approximately 6,500 subway cars thoroughly cleaned and disinfected by third-party cleaning firms between 3/18/2020 and 4/28/2020
- Phase II starts May 1, 2020 and is expected to last one month

NYCT Bus Cleaning Process

- NYCT Department of Bus cleaning and disinfecting process is similar to the process used by NYCT Department of Subway
- Thorough cleaning and disinfecting program by third-party contractors is currently underway in all Bus Depots



Subway Cars Cleaned in Terminal Stations

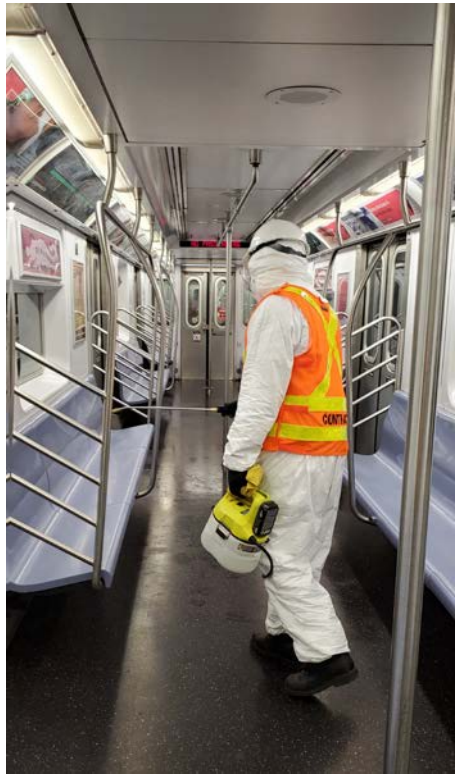
- Subway trains dwell in Terminal Stations between 5 and 20 minutes
- Terminal cleaning includes refuse removal and mopping of spills – will be expanded to include disinfection of touch points
- Third-party cleaning pilots commence on May 1, 2020 and work is expected to continue into the foreseeable future

Lessons Learned

- Frequent application of disinfectant products (every 72 hours or less) is the primary method to protect against COVID-19
- Engage solid engineering support to ensure equipment and methods used to mitigate against COVID-19 don’t damage the vehicles
- System Safety should provide final authorization of any new cleaning procedures or operational adjustments
- Strong data management (and vendor oversight) is critical to program success

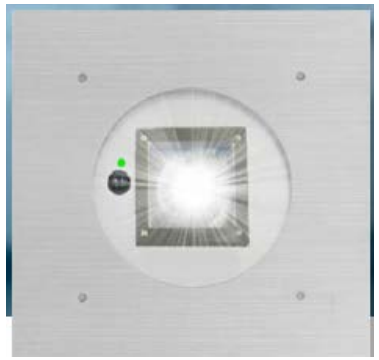
Next Steps

- Increase frequency of disinfectant application to every 24 hours
- Continue assessment of disinfection products to verify effectiveness in reducing bacterial load on the cars
- Pilot use of decals on floors to facilitate social distancing
- Consider use of UV lights as spot disinfection treatment and measure effectiveness
- Explore use of communications campaigns to inform passengers of the work being done to protect them in order increase confidence in riding the system
- Consider use of passenger “metadata” in a communications strategy to help passengers avoid high density places/times and more evenly distribute passengers across the system

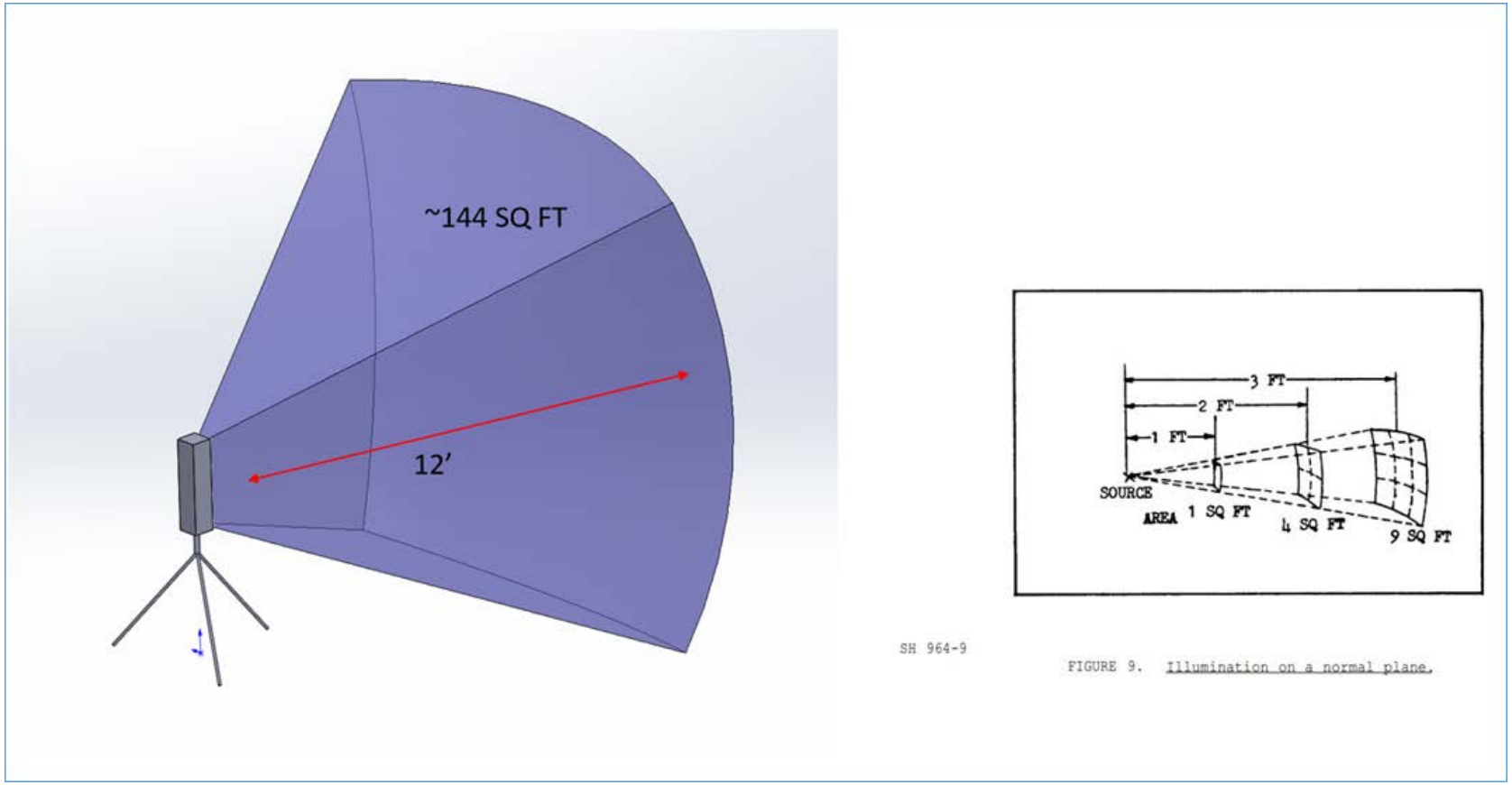


UV Light Disinfection

- NYCT is considering use of UV lights for spot treatment of rail cars and facilities where known COVID-19 infected persons have been present
- Integrated UV lights are under consideration for new subway car fleets with broad spectrum UV-A, UV-B and UV-C light to kill bacteria and viruses
- The UV lights may be ceiling or wall mounted, and may be pre-programmed to enable disinfection of an entire area without staff intervention



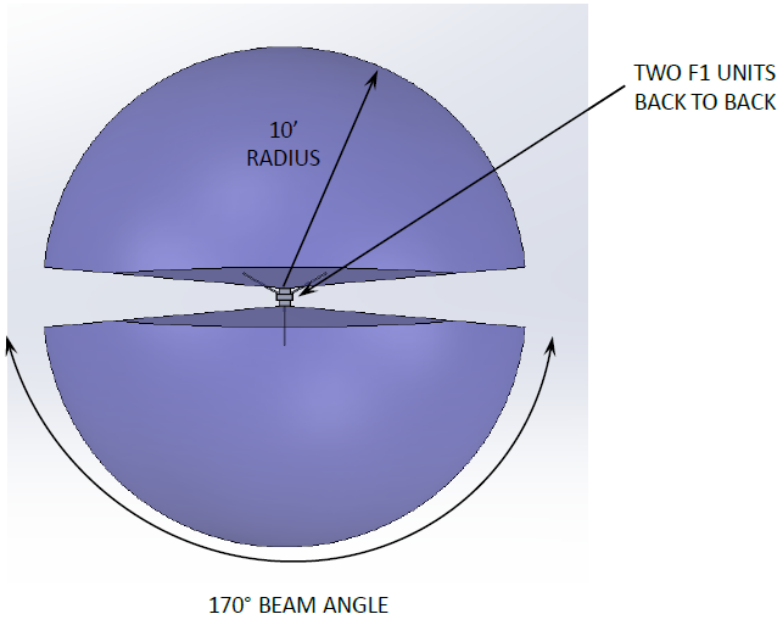
One UV Light on a Tripod



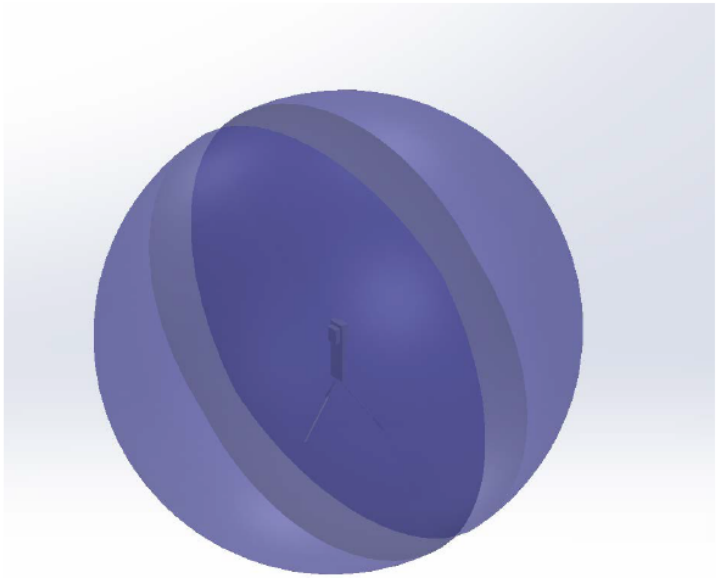
Two UV Lights on a Tripod Back to Back

WITH 10’ RADIUS AND 170° BEAM ANGLE

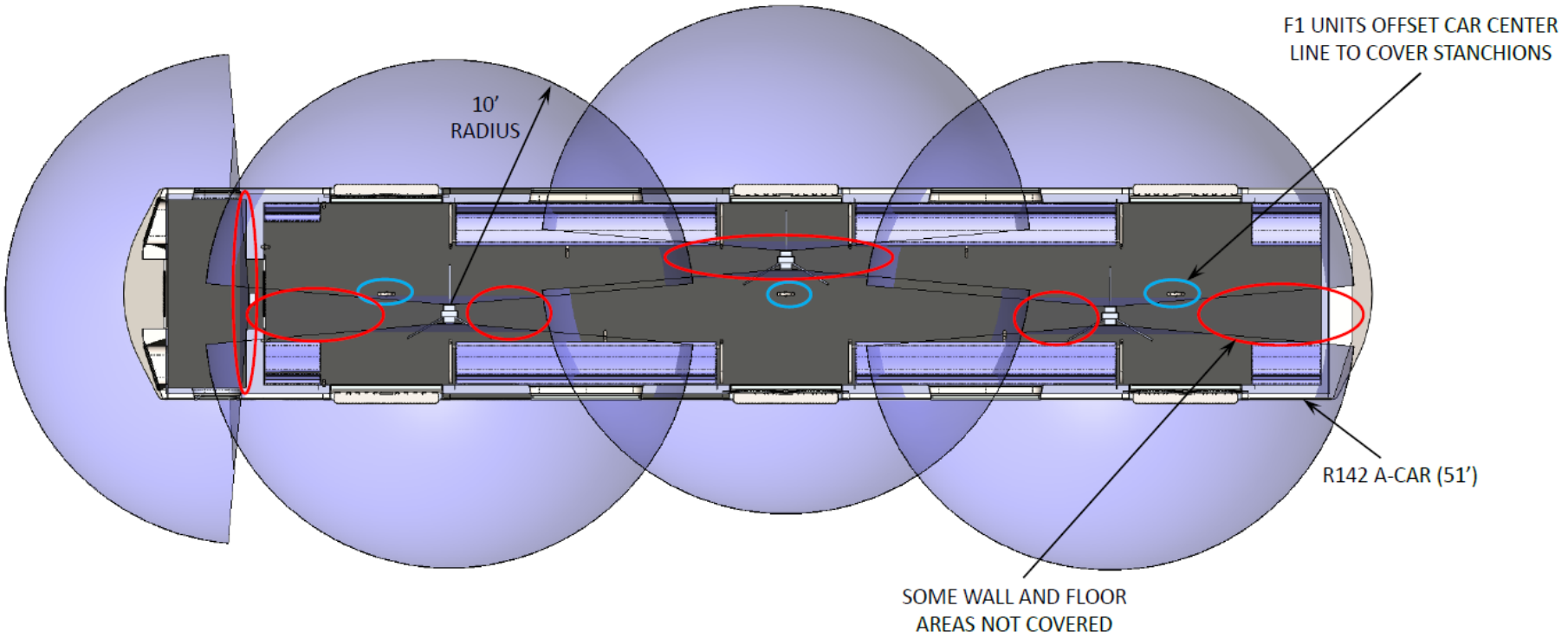
TOP VIEW



ISO VIEW

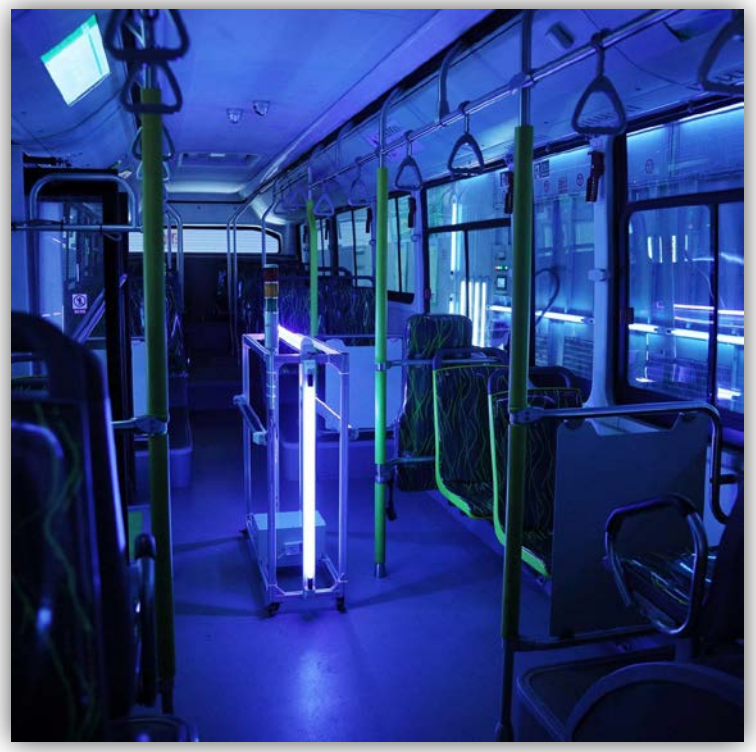


Subway Car Light Placement



UV Light Disinfection

- UV lights emit UV-A, B and C
  - UV-A will be transmitted through window glass but is the least harmful of the spectral bands. Long term exposure to UV-A causes tanning and sun-burn
  - UV-B and UV-C are both blocked by common window glass
- Factors in a subway car, bus or station that would affect the effectiveness of the UV lights:
  - If debris or a liquid spill exists on a surface to be sanitized, the UV light will only penetrate so far. It would likely only disinfect the top layer and not all the way through
  - On cars that have transverse seats (such as the Rail Road Commuter Rail Cars), the shadows thrown by lockers and transverse seats would limit the effectiveness of the sterilizing lights
- Potential for detrimental impact on plastic/rubbers/flooring inside the cars with regular use of the lights



Questions?

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Closing Remarks

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