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APTA Mobility Recovery and Restoration Task Force
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Transit Leadership in the Post-COVID-19 Mobility Landscape

Part Two: Measures to Improve Workforce and Rider Behaviors and Influence Messaging and Branding

Abstract: In a post-COVID-19 world, transit agencies have a responsibility to ensure that their facilities are safe and also perceived to be safe by passengers and employees. This paper, Part Two of the series, discusses two aspects of achieving this perception of safety: behaviors and compliance among the workforce and riders and strategic messaging, branding and partnerships for transit agencies.

Keywords: behavior, communications, cooperation, COVID-19, data, employees, enforcement, facilities, healthcare partnership, leadership, masks, media, mobile clinic, mobile dispensary, normal next, outreach, P3 marketing, outreach, pandemic, passengers, personal protective equipment (PPE), planning, post-COVID branding, protocols, quarantine, safe place, safe destinations, SARS-CoV-2, social distancing, societal behavior, transit community, transit health, transit equity, vehicles, virus

Summary: Whereas the initial focus of addressing the COVID-19 pandemic was cleanliness and decontamination, the subject of Part One of this paper, it has become evident that there are two other factors that will play a major role in getting riders to return: the compliance of the general public and employees with recommended health practices and the ability of transit to communicate a message of safety and trustworthiness. This white paper delves into the behavior of passengers and agency staff, the influence of governing institutions on these behaviors, a branding story that will help transit return to the "normal next," and various partnerships the industry can utilize to take a leadership role in controlling the spread of disease.

Scope and purpose: This white paper is Part Two of a two-part series designed to capture the research and thought leadership findings that will support the restoration of services within the transit industry. This part focuses on behavioral change among transit customers and employees, as well as branding, partnership and imaging considerations. The primary goal of this document is to create a post COVID-19 transit environment that is safe and healthy to the riding public.

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Introduction and participants

Research and Thought Leadership Group

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Under the direction of Kimberly Slaughter, senior national practice consultant at HNTB, the individuals listed above formed a workgroup to capture the research and thought leadership findings that will support the restoration of services within our industry. We guided the work through the application of Adaptive Leadership Principles [1]. This means the work was conducted to separate technical solutions from behavioral solutions, and an emphasis was placed on building collaborative partnerships and focused messaging. We defined technical challenges as those that could be addressed through know-how and adaptive challenges as those that require people learning new behaviors. We worked with the understanding that adaptability is the essential ingredient for surviving and thriving as we move through and beyond the COVID-19 pandemic.

The work was built on the following goal: to create a post COVID-19 transit environment that is safe and healthy to the riding public. To achieve this, we provided these problem statements for each group to address:

- **Technical Solutions Group (Part One):** How do we use emerging data and research to make impacts on our services beyond the next 12 months?
- **Workforce and Ridership Behaviors Group (Part Two):** As leaders, how do we balance the need for technical solutions while addressing the emotional responses of our patrons and workforce?
- **Key Messaging and Branding Group (Part Two):** How do we create a culture of trust within the industry?

This paper is designed around the three areas identified above: technical solutions, workforce and ridership behaviors, and key messaging and branding. Applying the concepts of adaptive leadership, the group addressed the problem statements by exploring practical ideas and then gaining perspective on the application of these potential solutions. Heifetz and Linsky, authors of "Leadership on the Line" [1], describe this approach as moving from the dance floor to the balcony. It has also been called "contemplation in action." It is about stepping back to learn what is really happening within your environment.

We felt that this methodology was particularly important during this time of uncertainty. It is easy to get lost in the fog of the pandemic, and it is not always instinctual to be reflective during a crisis. The subgroup invited students from the current Leadership APTA class to assist in the process of moving from the dance floor to the balcony. Seventeen of these emerging senior and executive leaders from across the country volunteered to help and were assigned to support the leads within each of the three areas. By engaging these experienced stakeholders from within the industry, the Research and Thought Leadership Group was able to gain diverse perspectives to assist in guiding the outcome of the work. Leadership APTA participants aided with research and evaluation. The value of their diverse perspectives was key to the comprehensive findings of this paper.

That approach was complemented by the contributions of Flora Castillo, president of Pivot Strategies. Castillo challenged the group to consider the key partnerships that will need to be formed to execute the work identified in the plan. In particular, she assisted in identifying nontraditional partners, such as providers of public health services. You will see the outcome of this highlighted in Section 2 of this document.

One of the essential elements of this group's work has been to be intentional about inclusion and equity for any of the recommended work products. We exercised our intention by using the Rapid Equity Assessment designed at Los Angeles Metro, which is presented in Appendix D. While this tool was not an extensive assessment, it set the foundation of the work to be grounded in equity principles. Further assessments of equity impacts will need to continue during any execution of the findings.

Our professionals have used the most relevant science to recommend technical solutions. The behavioral work recognizes that it will take people adapting their practices to make the technical solutions effective and that communication with key messaging is the secret sauce to success. Our ability to make long-term change is embedded in building strong partnerships and using strategic messaging. These three prongs will bring an inclusive approach to restoring a transit environment that is safe and healthy to the riding public.

The sub-groups included the following members from the Leadership APTA Class 2020-21:

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Transit Leadership in the Post-COVID-19 Mobility Landscape

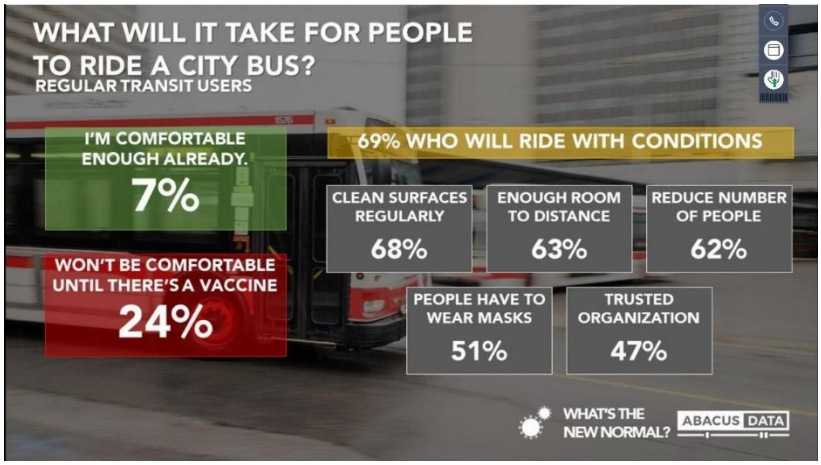
Part Two: Measures to Improve Workforce and Rider Behaviors and Influence Messaging and Branding

1. Influencing behaviors on transit

1.1 Overview

People naturally seek safety and self-preserving situations. This means patrons will be more likely to enter a space when they believe the environment they are entering is safe. For transit, this is supported by the poll collected over a two-month period by Abacus Data (**Figure 1**) on the perception of Canadians regarding the use of transit. This documented need for reassurance is further supported by Federal Reserve Chairman Jerome Powell, who provided his perspective on the importance of safety when he noted that "the recovery likely would depend on how Americans feel about their safety" [2]. The question then becomes, "How do we create the perception that transit is a safe place?"

FIGURE 1
Canadian Poll of Potential Transit Patrons [3]



This is a complex issue that requires of transit agencies a balance between providing technical solutions to the pandemic with due consideration for the emotional response and associated behavior of passengers and employees to those technical solutions. This white paper views that question through the lens of responding to future pandemic occurrences, either a new viral outbreak or the resurgence of COVID-19 after its perceived elimination or eradication.

Four possible steps toward building confidence in the safety and use of transit will be discussed in this section:

- First, providing an environment that truly is safe, ideally to pre-COVID levels, which is the topic of Part One of this paper, subtitled "Measures to Promote Safe Mobility."
- Second, providing documentation (real scientific data) as evidence that the space is safe. This data can also be found in Part One of this paper.
- Third, to message in a persuasive way about the cleaning and the data so that riders and employees believe transit is a safe mode of transportation and a safe place to work. For riders, the goal is to have them use the system at the same or greater level than before COVID-19 because it is the safest mode of transportation short of driving their automobiles.
- Finally, providing leadership at the highest levels to regulate and enforce safe measures required by the general public because transit agencies—and other public and private entities—exist within a larger societal and political context and do not have the mandate nor the wherewithal to enforce safe measures on the general public.

A secondary but important additional attribute is that patrons need to have a purpose for riding transit; they need safe destinations, including both work and non-work destinations. While this is outside the scope of this paper, it is of great influence on the effectiveness of measures undertaken to bring riders back.

1.2 Creating a safe place

Transit buses and trains fall into a conceptual framework known as the "three C's": crowded spaces, closed spaces and close-contact situations. Safety in a pandemic requires the mitigation, and even elimination, of the three C's to a point where the public may enjoy an adequate travel experience, from point of entry through facilities and vehicles to a final destination.

Transit systems in other parts of the world have provided evidence that subways, commuter trains and buses may not be a significant source of transmission, as long as the necessary measures are implemented and followed (see Section 1.5.1). This section outlines the steps to ensuring that potential users of the transit systems (passengers and transit employees) have confidence in the hygienic safety of transit vehicles and facilities, including the measures to ensuring that transit systems do not become the source of an outbreak.

A safe place should ideally be designated as commencing with the point of entry (portal) into a train station or bus stop environment and ending when one exits the train station/bus stop. Achieving this will require taking proactive physical enhancement actions that "move the needle" in patrons' perception that the transit environment is safe. There are several components to creating a safe place. They include the passengers, whose behavior and cooperation are needed to ensure success of any hygiene protocol; the transit employees, whose behavior sets an example for the patrons; the facilities, which must be hygienic and perceived to be hygienically clean; and the vehicles, which must likewise be hygienic and perceived to be hygienically clean.

1.2.1 Passengers

Passengers make up the largest proportion of a transit system's stakeholders. As such, they are widely spread across geographies, time, cultures and backgrounds, which makes them inherently difficult to reach and inform about current situations. Galvanizing these disparate groups into one unified group acting in concert with common purpose to maintain a hygienically safe space is the challenge. This is important because unless the majority of the passengers believe the other passengers will practice safe behaviors, they will not have the confidence that the system is safe to ride.

Communicating the cleansing protocols being taken by the transit agency and the actions required of each user of the system is of the utmost importance, must be noticeable and must be frequent. This communication

will build confidence that the entire system and all users are being considered when controlling the hygienic safety of the system.

Transit systems need to provide the adequate sanitary conditions to make such messages fully effective. In addition to robust decontamination of the facility, making personal protective equipment (PPE) available to customers (at least masks initially) will facilitate policy compliance. Generally, masks and sanitizer, both at terminals and in vehicles, are a minimum standard to control the impact of passengers on the cleansed environment.

Enforcement of the protocols required of the passengers is another key component of the effectiveness to create and maintain a safe place. The importance of the involvement of government agencies in enforcing the safe measures as mandated regulations is essential and is addressed in more detail in Section 1.5.

1.2.2 Transit agency employees

Transit employees are sometimes the most at risk due to their exposure to large volumes of passengers. In addition, because they are also the most visible and repetitive example to passengers of the need to take proper hygienic safety measures, their behavior will greatly influence the actions of passengers. For those reasons, it is important that employees be made aware of the strategies put in place by management to inform and motivate customers to comply and contribute to the effectiveness of the solutions being implemented. This ideally should include but not be limited to clear information on COVID-19 testing and care, attendance policy, medical leave of absence, and any other indication of what to expect during the pandemic, aligning with the Health Insurance Portability and Accountability Act of 1996 Privacy Rule(HIPAA), in addition to purely operational procedures regarding social distancing, PPE and customer service.

To reinforce employees' commitment, transit agencies and companies may elect to implement regular or periodic screening procedures to report to work, such as temperature checks, health questionnaires and symptom self-monitoring. This protocol typically includes issuance of a wristband or other distinctive item to indicate who has cleared the daily screening process and therefore been allowed to enter the facility. This procedure is also typically applied to contractors and visitors accessing any transit facility.

Another behavior influencer for employees is an agency's transparency with its Operations Disruption Plan to cover absences or major interruptions to operations, as this also reinforces to employees that this pandemic is a concern worthy of operation mitigation measures.

1.2.3 Facilities

Interventions in facilities—namely terminals, stops, buildings, yards, depots, shops and offices—will have an overarching effect on passengers and employees alike relative to the perception of hygienically safe places. Implementing and communicating proactive actions associated with frequency and intensity of cleaning, improvement of HVAC systems' air flow is paramount to influencing behavior. Refer to Appendix A for Houston Metro's Bus HVAC Analysis for an example.

Even with spotless facilities and access to sanitizing elements, until more data on the virus and its spread mechanism is established, a predominant recommendation is to avoid overly crowded spaces and close-contact situations. This point is qualified because, as mentioned in Section 1.5.1, in Taiwan there has been significant success with eliminating social distancing without resurgence of the virus spread to the point of having elementary school students now back into near-normal school conditions (see **Figure 2**). This provides a look into what is ahead as the U.S. catches up with the effective practices of other countries and adjusts and implements such measures. The success of those countries required both good governmental/agency planning and enforcement in addition to public cooperation.

FIGURE 2
Elementary School Classroom Environment in Taiwan

The current reality is that until proper measures are implemented in the overall U.S. society, measures such as organizing the flow of people in properly spaced queues instead of shoulder-to-shoulder multitudes will still be needed. This can also be combined with temperature checks (see **Figure 3** from Taiwan schools) to control access to or monitor individuals located in the facilities.

FIGURE 3
Monitoring Student Temperatures in Taiwan Elementary Schools

Physical modifications/reconfigurations to facilities are also a consideration to promoting proper behavior, including redesigning facility layouts, posting signage and floor markings (6 ft intervals), forcing walking one-way in halls, and closing or cording off areas to ensure proper distancing. Another option is the installation of glass shields in places where verbal interaction must occur, such as at dispatch windows, ticket booths and customer service desks.

1.2.4 Vehicles

Communicating vehicle hygienic preparation is also essential to reassure users that safe travel conditions exist. A transit system relies not only on revenue rolling stock (buses and trains), but also on nonrevenue and support vehicles like shuttles, relief cars, supervisor vans and maintenance trucks that demand strict cleanliness standards for the benefit of employees and contractors.

As mentioned in Section 1.2.3, social distancing will remain a significant consideration until the science and the societal behavior indicate otherwise. For vehicles, there should be a significant effort to minimize crowded spaces and close-contact situations. Strategies for social distancing in vehicles include the promotion of electronic fare collection to reduce contaminated surfaces and crowding at ticketing booths, vending machines and bus fare boxes and the installation of enclosed compartments in the driver's cabin. For agencies willing to forgo fare collection, the suspension of onboard fare collection and implementation of rear-door boarding is another potential additional measure.

Adequacy of transit revenue service is a fragile consideration, as it needs to balance retaining the satisfaction of riders who are using the system versus the operational cost of having low occupancy in vehicles. Transit systems may choose to operate mostly high-capacity vehicles (double decks, 60 ft buses) in lieu of small ones to encourage social distancing without affecting capacity and frequencies too much. This may be supported with the implementation of pop-up bus lanes or bus priority lanes to improve travel times, which would in turn improve frequencies and capacity with fewer vehicles in operation. Ridership analyses to identify the routes, times of day and specific trips with the highest travel demand, and scheduling additional service to support regular operations, may be of great benefit.

1.2.5 Challenges

Any process is only as strong as its weakest link. All the steps described previously may make perfect sense on paper, but at the end of the day the success of these policies will largely depend on a human factor: the willingness of customers, employees and all stakeholders of the transit system to follow the rules and behave in a way that benefits society as a whole.

Perhaps the most contentious and least accepted policy by customers is the use of masks. It is advisable to tie the requirement to cover mouth and nose with mandates from local, state and federal governments in order to make it enforceable by the police and other agencies. This important topic is addressed in Section 1.5.

Part One of this series provides step-by-step guidance on how transit agencies could mitigate the spread of COVID-19. For instance, practicing physical distancing, providing touch-free facilities, cleaning and disinfecting surfaces frequently, integrating an improved ventilation/HVAC system, and integrating an air purification system into a facility are all ways to lessen the impact of COVID, as summarized in Appendix B.

1.3 Data supporting a safe place

It is important to provide scientific data or other forms of reliable backup to support the claim that a transit agency is on point with its recommendations to protect patrons and agency employees in transit environments. Data and evidence should be provided for measures such as these:

- effectiveness of cleansing/decontamination of surfaces
- effectiveness of cleansing/decontamination of air
- methods of cleansing/decontaminating patrons at portal/entry to transit
- station and vehicle surface cleansing/decontamination
- PPE effectiveness
- social distancing effectiveness

- detection systems within transit environments
- communication of required "elevated action" by patrons/employees

Agencies also need messaging to ensure proper execution of these actions by patrons and employees, as well as branding of measures being taken (addressed in Section 2) for a positive effect on behavior.

What is the potential impact of not having supporting data for recommendations to prevent the spread of the virus? Transit has seen a glimpse into the potential consequences from the airline industry, which was pressed to make difficult early decisions that weighed the industry's financial viability against passenger safety. This is documented in a Los Angeles Times article from June 2020:

> The National Air Carrier Assn., a trade group for 18 low-cost passenger and cargo carriers, wrote last month to U.S. Transportation Secretary Elaine Chao, arguing against any capacity limits, including a requirement that airlines leave the middle seat vacant. The group wrote that imposing "arbitrary" capacity limits on carriers could lead to higher fares or even airline bankruptcies. [4]

This request was countered by an airline passenger-rights group:

> The head of an airline passenger rights group says that Chao and the U.S. Department of Transportation should impose rules to force airlines to space passengers out. [4]

As of August 2020, many airlines have seats filled along an entire aisle, which is an escalation from earlier measures and recommendations that kept the center seat between passengers empty to promote safer distancing. As is evident from **Table 1**, there is variability in the implementation of the measures from airline to airline, as documented in an article written by Business Insider in July 2020 [5].

TABLE 1
Airline Safety Measures During COVID-19

Airline	Blocking middle seats	Requiring face coverings for passengers	Disinfecting aircraft*	Taking passenger temperatures
Alaska	√	√	√	X
Allegiant	X	√	√	X
American	X	√	√	X
Delta	√	√	√	X
Frontier	Some	√	√	√
Hawaiian	√	√	√	X
JetBlue	√	√	√	X
Southwest	X**	√	√	X
Spirit	X	√	√	X
Sun Country	X	√	√	X
United	X	√	√	X

*Using an electrostatic sprayer or other disinfectant **Does not assign seats but is limiting flight loads

Sources: Alaska Airlines; Allegiant Air; American Airlines; Delta Air Lines; Frontier Airlines; Hawaiian Airlines; JetBlue; Southwest Airlines; Spirit Airlines; Sun Country Airlines; United Airlines

BUSINESS INSIDER

In addition, several quotes from medical practitioners in the Los Angeles Times article indicate varying opinions from medical practitioners on the safety of air travel. This further shakes the confidence of potential airline patrons.

> "It's not risk-free to travel on a commercial aircraft but the risk is relatively low," said Dr. Dean Winslow, an infectious disease specialist at the Stanford University Medical Center and a former flight surgeon with the U.S. Air Force. Winslow and other healthcare experts say the air in a plane is frequently recirculated, mixed with clean outside air and filtered, making it difficult for germs and viruses to travel throughout a cabin. But the airflow system doesn't help much, they note, if you are seated shoulder to shoulder with a sick passenger on a long-haul flight. [4]

> "Flying on planes is relatively safe from transmission of infectious particulate if you are not near anyone else," said Dr. Timothy Brewer, a professor of medicine, division of infectious diseases at UCLA's David Geffen School of Medicine. "If they are going to pack the plane … then there is a higher risk." [4]

Because the airline actions are not sufficiently supported by scientific data and medical practitioners, it creates perceived or real lack of safety for potential patrons and staff.

The most important point to take away from this is that virus mitigation recommendations must be well-supported by credible data and experts, such as medical practitioners, to ease the fear and uncertainty currently in place throughout the United States relative to riding transit. This will help to achieve the behavior and results desired by the transit community.

1.4 Engagement and outreach

To attract transit riders back, and to reassure transit employees about workplace safety, it is not enough to create a robustly safe place nor to have the data proving safety. In addition, it is critical that:

- both groups believe transit is a safe place;
- both groups are motivated to engage in behaviors that promote and ensure safety; and
- both groups are confident that others are also committed to safety goals.

These factors are both about perception (users and employees perceive transit as being safe) and positive behavior reinforcement for both groups to behave in ways that continue to keep transit safe. While each is presented as an independent item, they are interrelated. Also, they address two distinct constituencies, each requiring its own approach, which are discussed separately in the following sections.

1.4.1 Customer outreach and engagement

The transit property should create outreach that educates users on the actions it is taking to make and keep transit safe. It should also identify the protocols in process to detect any future infections or potential outbreaks. To the extent possible, this outreach should use multiple platforms—radio, print media, television, social media—to communicate what is being done to make transit safer for users, as well as the data that demonstrates that it works. This should include extensive coverage of the cleaning and decontamination protocols and data that demonstrates the results of the efforts.

In addition to the communication channels identified above, agencies should use visual communication in common places where patrons can clearly see what has been done to make the environment safer. Industry examples for this approach from airlines, hotels and restaurants include items such as visible logs inside restrooms showing when they were last cleaned.

Agencies should also share success stories that emphasize transit's role in transporting essential workers and meeting essential trip needs, regardless of societal conditions such as pandemics. This should generate goodwill.

Additionally, using the same platforms, the transit property must engage its riders to demonstrate that their own behaviors help to make transit safer, and provide the proof that these behaviors make a difference. This engagement should be a two-way communication that encourages riders to engage in safer behaviors and reassures them that their fellow riders are engaging in them as well. Such behaviors will be context-specific, but in the case of COVID-19 would include physical distancing, wearing of masks and excellent hygiene practices. The goal is to encourage this safe behavior from a sense of shared responsibility, rather than requiring enforcement or using a punitive approach.

1.4.2 Customer feedback

The outreach and engagement efforts should be supplemented by surveys of patrons to assess their feelings about the outreach and engagement, as well as their feelings about using the system. The feedback should be sought in a number of ways to capture as broad a cross-section as possible. This should include onboard paper surveys (in languages prevalent in the community), text surveys and online surveys. Refer to Appendix C for the results of a customer attitudinal survey at the Regional Transportation District in Denver.

1.4.3 Employee outreach and engagement

The transit property should create outreach that educates employees on the actions the agency is taking to keep them safe. Primarily, this would be internally focused but could also include an external component to make riders feel safer by helping them understand that transit employees are in partnership with them. This should include extensive coverage of the cleaning protocols and data that result due to the measures.

The transit property should engage its employees to demonstrate the behaviors that make transit safer for both riders and employees. This engagement should be a two-way communication that encourages employees to engage in these behaviors and reassures them that their fellow employees and riders are engaging in them as well. Such behaviors are context-specific, but during COVID-19 would include physical distancing, wearing of masks and excellent hygiene practices. As with customers, the goal is to encourage safer behavior from a sense of shared responsibility, rather than requiring enforcement of it.

An approach that could build a sense of team/community actions across employees would be a design contest, focused on safety measures, including team/group competitions to build group cohesiveness and positive reinforcement to promote safe behavior. Some ideas:

- design contest with prizes
- giving groups of employees the same branded mask to wear
- rewards to groups of employees for the highest level of compliance with safety programs
- other incentivizing recognition

1.4.4 Employee feedback

The outreach and engagement efforts should be supplemented by surveys of employees to assess their feelings about the safety measures implemented and the efficacy of such measures. It should also seek their ideas regarding improvements or new approaches. The feedback should be sought in a number of ways, knowing that it can often be difficult to capture feedback from operators.

1.5 Case studies: Government leadership in changing behaviors

The following case studies contrast COVID-19 pandemic responses in Taiwan, New York state and Texas. These sections focus on how the actions taken by government leadership directly affected behavior and ultimately outcomes related to the COVID-19 pandemic. The data related to COVID-19 cases and fatalities is changing every day. The following case studies use data available as of Aug. 5, 2020.

1.5.1 Taiwan: Example of preparedness and implementation

Taiwan commenced preventive action in December 2019, when there was initial news of a potential outbreak in China. This action was well ahead of all others because they country had set up an emergency preparedness response system as a lesson learned from the 2003 severe acute respiratory syndrome (SARS) pandemic.

1.5.1.1 Challenges

Due to its proximity to Mainland China (less than 100 miles), and the regional movement of people, goods and services, Taiwan was one of the most at-risk areas for widespread cases and deaths resulting from COVID-19 [6]. In addition to this, the Taiwanese government lacked access to information early on about coronavirus due to its complex relationship with China and its inability to participate in the World Health Organization.

1.5.1.2 Measures implemented

Taiwan's success in controlling the spread of COVID-19 is directly related to its early action and implementation of various measures, including travel bans and systematic and comprehensive quarantine of incoming international travelers [6]. Strict punishment for not following quarantine orders was also implemented, including fines of up to $10,000. Government officials used smartphone tracking of individuals in quarantine to ensure compliance. Smartphone data was also used to alert people who were potentially exposed to individuals diagnosed with COVID-19 [7].

The universal use of face masks was implemented early on, with masks in some designated areas, such as subways, being mandatory. Temperature checks were implemented at nearly every building, and social distancing measures were enforced throughout Taiwan.

A key component to the successful implementation of these measures was the transparency and constant communication, including daily briefings, delivered by the Central Epidemic Command Center (a division of the Taiwan CDC) [8].

1.5.1.3 Results

The result of these swift and comprehensive measures to combat the spread of COVID-19 is fewer than 500 cases and only seven deaths in a population of 24 million people (See **Table 2**). A study of Taiwanese COVID-19 cases indicates that the majority of cases were imported and not the result of community spread [8]. Taiwan's successful response to the COVID-19 pandemic means that people have, for the most part, returned to normal daily life. Vacations are being taken internally, restaurants and bars are open, and most people have returned to working in their offices.

TABLE 2
Taiwan COVID-19 Cases vs. Other Parts of the World

Country/City	Population	Number of COVID-19 Infections[1]	Number of COVID-19 Fatalities[1]
United States	328,000,000	4,850,000	159,000
United Kingdom	67,000,000	306,000	46,299
Texas	29,000,000	451,000	7,261
Taiwan	24,000,000	476	7
New York state	19,400,000	422,000	32,422
County of Los Angeles	10,000,000	196,000	4,758
London	9,300,000	35,792	6,885
New York City	8,336,817	231,000	23,027

1. Data as of Aug. 5, 2020.

Government leadership in Taiwan in the early days of the COVID-19 pandemic led to incredibly low case and death counts. Even in places where measures to contain the spread of the virus were either not acted on early enough or given up too soon, data indicates that government leadership is essential to changing behavior in a crisis mode.

1.5.2 New York state

In contrast to the Taiwan response, government officials in New York state were slow to respond to the COVID-19 crisis, even though officials believed they were prepared for the influx of cases. Mitigation measures were implemented after community spread was in motion. Despite the late implementation, mitigation measures in New York decreased daily average positive cases by 89 percent, a level that remains steady.

1.5.2.1 Challenges

During the first week of March, and after two known positive tests in New York City, Gov. Andrew Cuomo stated, “Excuse our arrogance as New Yorkers—I speak for the mayor also on this one—we think we have the best healthcare system on the planet right here in New York. So when you’re saying, what happened in other countries versus what happened here, we don’t even think it’s going to be as bad as it was in other countries” [9].

Government officials in New York point to flaws in federal testing (only those with a fever severe enough to require hospitalization and who had traveled to China in the past 14 days could get tested) in addition to the availability of testing leading to delays or complete failure in diagnosing COVID-19 cases. Contradictory messaging regarding the spread of COVID-19 and how it can be transmitted on surfaces led to public confusion regarding the risks of not making changes to daily behaviors. New York also failed to increase its supplies of ventilators and protective equipment, wrongly assuming that it would be able to draw on emergency government stockpiles [9].

1.5.2.2 Measures implemented

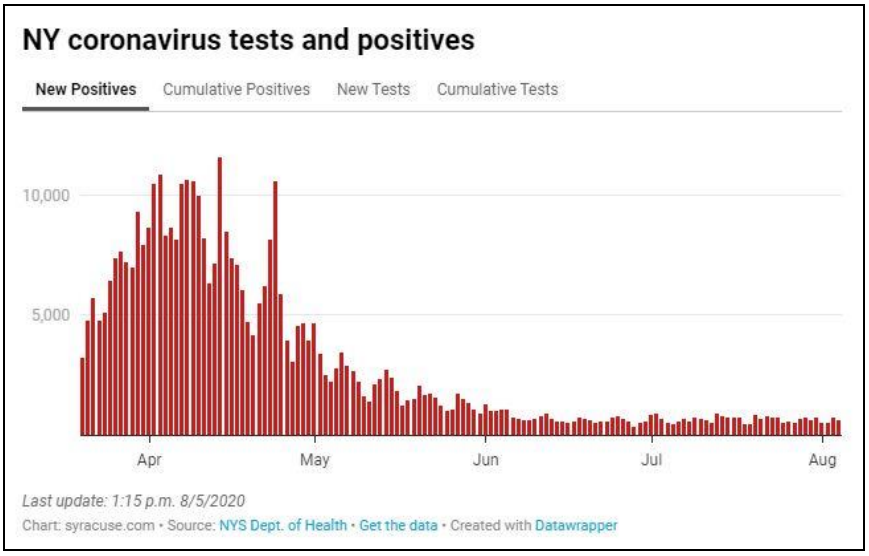
New York’s reaction was markedly late. Resistance from officials and business owners led to a slow rollout of COVID-19 closures, such as starting at 50 percent workforce density, moving to 25 percent and finally to essential services only. Gov. Cuomo issued a stay-at-home order on March 22, after the state had already reached 7,000 cases between March 1 and March 20. In contrast, California’s Gov. Gavin Newsom issued a

statewide stay-at-home order on March 19, when total cases were at 675 statewide [9]. A statewide mask mandate was issued April 15 in New York. Subway service was suspended May 6 between midnight and 5 a.m. for daily sanitation of vehicles.

1.5.2.3 Results

The late response resulted in 231,000 cases and over 23,000 deaths in New York City alone and 422,000 cases and 32,422 deaths statewide. Cases peaked in late March and early April with an average of 9,000 cases per day. After implementation of the stay-at-home order and other mitigation measures, new cases dropped below 1,000 per day in June and have remained at that level for over 60 days (see **Figure 4**).

FIGURE 4
Decline of COVID-19 in New York State



Source: https://www.syracuse.com/coronavirus-ny/

1.5.3 Texas

The curve of COVID-19 cases in Texas is almost a reverse image of New York. Early action by government leadership in Texas led to early success in containing the spread of COVID-19. However, early reopening led to an approximately 800 percent increase in daily cases.

1.5.3.1 Challenges

Ongoing political conflicts between Gov. Greg Abbott and the state's most populous cities (Houston, Dallas, San Antonio and Austin) resulted in a lack of consistency across jurisdictions. Cities that attempted to implement ongoing mitigations to combat the spread of COVID-19 did not receive support at the state level. Messaging from government leadership at the state level indicated that the health of the economy in Texas must take precedence over slowing the spread of COVID-19. Lt. Gov. Dan Patrick in March said he was willing to risk death to help the economy [10].

1.5.3.2 Measures implemented

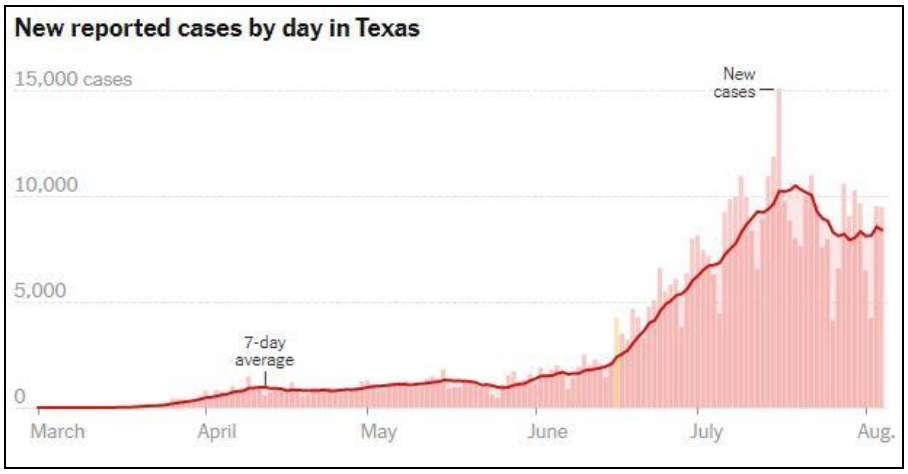
In March, Gov. Abbott took early action in imposing social distancing guidelines, limiting restaurants to takeout only, closing schools and implementing quarantine requirements for certain travelers. On March 30, the governor told all Texans to stay home for the next month except for essential services and activities [11].

In May, reopening began for restaurants, retail stores, movie theaters, salons, gyms, bars and bowling alleys. By June 3, almost all businesses were permitted to operate at 50 percent capacity. On June 12, restaurant capacity was expanded to 75 percent. After June 15, cases began to rise significantly each day. On June 26, Gov. Abbott closed all bars again and reduced restaurants to 50 percent capacity. A statewide mandate on masks was issued July 2 [11].

1.5.3.3 Results

In Texas, average daily cases remained below 1,000 from March to May. After reopening started in May, daily cases steadily increased to the highest levels seen in Texas since the onset of the pandemic, with averages of 8,000 to 10,000 cases per day. On April 4, total cases in Texas were at 6,110. By Aug. 4, the total was 451,181 cases (see **Figure 5**).

FIGURE 5
Rise of COVID-19 in Texas



Source: https://www.nytimes.com/interactive/2020/us/texas-coronavirus-cases.html

1.5.3.4 Conclusion

In the example of Taiwan, previous experience with the SARS pandemic, along with early action by government officials, led to very low total cases and fatalities, as well as a quick return to nearly normal daily life. The examples of New York state and Texas contrast not only with Taiwan's response and outcomes, but also with each other. Slow action in New York led to catastrophic counts in total cases and fatalities. Early opening in Texas has led to a new climax in total cases and fatalities, the highest since the pandemic began affecting the United States.

A crucial difference between the Taiwan example and the New York/Texas examples is the lack of a federal response. The data, as of Aug. 5, 2020, is the strongest evidence available to support the assertion that government leadership directly impacts the behavior of individuals.

2. Branding and imaging

2.1 Overview

Americans are looking at the viability, safety and adaptability of a new normal to gauge their trust in public transit. The transit industry plays a vital role in the daily operations of equitable inclusion of essential workers, paratransit riders and the community as a whole. This calls the industry to the forefront to identify new partnerships with other industries to optimize public transit assets, resources and political capital to bring solutions.

In order to accomplish this task, the post-COVID-19 image of public transit must lead the way to a new functionality and the health preservation of every person's way of life. Transit-healthcare partnerships may have the power to change the course of the pandemic as new vaccinations and treatments are developed and transit provides an essential link to them. Moreover, there are opportunities to partner with private enterprises, including disadvantaged firms, to market their brands to supply masks, gloves, sanitizers and other promotional ideas to promote and sustain safe and clean spaces.

This section contains recommendations for engaging the community with public transit agencies in the development of those innovative and adaptable models for branding, causing each agency to scale its capabilities to set a new image of a safer and more accommodating transportation experience.

The goals of this section are as follows:

1. To present pioneering ideas for sustainable imaging and branding of public transit's involvement with the global fight against COVID-19, which will engage action around future challenges and opportunities
2. To establish new collaborating models for community, healthcare and private-public partnerships that will enhance public transit's commitment to post-COVID innovations
3. To streamline the beginning of practical approaches to community transformation, sustainability and development, as ways for public transit to leverage its assets, resources and political capital to equity and solution-based planning against the future effects of COVID-19

2.2 The normal next

The obvious plight faced in today's public space is no longer just a threat, but it is the reality of a global pandemic. COVID-19 has wreaked havoc on the world's sense of normalcy. It caught everyone off-guard. Citizens are met with the challenge of living beyond the newly created melee of society's constant fear, skepticism, mistrust and guardedness. More pointedly, for those whose lives are attached to public transit in any sense, life has changed in a very identifiable way.

This section seeks to answer the question being asked in the transit industry: What does the "normal next" look like in public transit?

The words "normal next" carry with them a certain chasm of emotional, intellectual and practical visualizations about the exploration and expectation of what is present. Yet, as the industry looks into the near future, it begins the journey of developing a plan, a vision, for what is to come. Though there is uncertainty, there is also the realistic work that is being done in the present new normal. So how to imagine this industry's normal next? The answer is to create points of adaptability, innovation and resilience, throughout the interstitial spaces of community engagement/involvement, healthcare partnerships and private-public partnerships.

Adaptability is one of humanity's most unique and defining characteristics. But adaptation, according to a 2016 article in Environment International [12], is among one of the most advantageous strategies to reduce vulnerability in any human society, as it "calls for scientific and social advances in several aspects." Therefore, the post-COVID-19 image of public transit must produce a normalcy that engages society's sense of adaptability, proving that the industry is not only assistive but is leading the way to a new functionality and the preservation of every person's way of life.

Innovation is no foreign concept to the minds of Americans and other global citizens: In fact, it's one of the most intriguing topics in this time of uncertainty. People around the world are engaged in conversations about

what new technologies will help to keep everyone safe from COVID-19; people want to know who has the best innovation, the most effective tool, the most futuristic design.

2.2.1 Branding background

The future of mobility is access. It is centered around this one key element of the human experience, access, which is a value all too ready to be discounted by those who have it. For many transit customers, the problem is not only the ability to get to a particular destination but to get there safely, which is not always the easiest thing to do, considering where a person may be traveling to, through or from.

Consider a single mother of three, who lives in a less-than-affluent community, whose only means of getting to her essential job is public transit. She is determined to get to work, as it is her only source of income. She is grateful that she was not furloughed or laid off in the pandemic. But because she has three dependents, a home and other responsibilities that depend on her near–minimum wage earnings, she bolsters the fearful unknown that induces anxieties with masked faces, disposable gloves decorating streets and empty store shelves. She's on her way to work without the luxury of concern for whether she will encounter the virus.

Who will help her? Who will lift the burden of responsibility? Maybe it will be public transit!

2.2.2 Transit's essential role for cities

As Time magazine wrote in July, "If cities are to recover post-COVID, a thriving public transit system will surely have to be part of the mix" [13]. It is paramount to each city's functionality to raise the question that asks what role public transit will play in the creation of the normal next and how this industry can lead the community into an innovative plan of adaptability and resilience 12 to 18 months from now.

The need for public transit's involvement in the process of reopening and creating new dynamics is most vividly seen in transit-dependent communities, which remain the industry's most engaged customers. Whether heading to work, stores or day cares, commuters depend on public transit leaders to create safe, sustainable and reliable transportation for them and their loved ones.

Public transit must be in the mix, pushing the standard of human care to a new level, using the same political capital the industry has used to push other beneficial agendas in the past. Transit must be in the mix, because the communities that transit serves are looking for their systems to be the sociopolitical vehicles that drive change. Public transit must push its image as an industry that is leading in the fight against COVID-19 and in the fight for everyone's safety.

2.2.3 Transit's essential role in a functioning society

According to the FHWA report "The Importance of Transportation" [14], agencies must recognize that public transit services provide communities with the ability to remain mobile and with access to work, community resources, clinical care and recreational assets. Transit provides the vehicles that mobilize consumers, granting them the opportunities to continue to create the American dream, to fight through those issues that are most prevailing. The function of public transit extends far beyond the mobilization of bodies to physical destinations; it reaches into the ability of a person to gain access to independence and betterment.

It is imperative that the public transportation industry maintains its position of effectiveness, recognizing that a great deal of local and national government organizations depend on the services transit provides to mobilize the constituents that mean so much to society's functionality. Without public transit systems, people's scope of mobility would dissipate.

There is a need for the general public to acknowledge the role this industry plays in the everyday life of each citizen, directly or indirectly. Transit branding and imaging will have to communicate the enormous amount of work the industry produces and how it cultivates the public's ability to be successful.

2.2.4 Transit's image as a clean space

The imagery used in transit branding must be rooted in the idea that the public has to see transit staff working to sustain clean and healthy environments, using strict adherence to CDC and other health organization recommendations. Also, by working alongside the government agencies that have required certain points of regulatory restraints, transit projects the image of having partnered with them in the fight against COVID-19.

As national sports leagues have begun to use a disinfecting mist sprayer to sanitize players and staff before and after any event, it has become more well-known that it is possible to use innovative technologies as a central part of these efforts. Transit agency branding on such technologies sends a message of preparedness for the normal next and also provides assistance to low-income people who may not otherwise be able to access those items.

Part One of this series addresses sanitizing and decontamination recommendations in depth.

2.2.5 Transit's image as a cooperative space

Alongside efforts to present a message of care, concern and trust, transit agencies must continue to find ways to encourage the community's ownership of responsibility and partnership with the agency. This can be accomplished by engaging with passengers and publicizing their efforts through earned media of their involvement in sanitizing and decontamination initiatives.

To create an image of cooperation between the agency and its passengers is to establish a safety-aware public, encouraging the public to take part in the methods of sanitizing and decontamination. This tactic places a certain level of responsibility on the self, which is not easily mistrusted, thereby creating another dynamic of organic trust in the public transportation system. Customers are invited to take part in their own safety, and this makes them just as valuable to the agency as the agency may be to them.

Behavior change is discussed in detail in Section 1 of this document.

2.2.6 Transit as an end-to-end mobility service

Public transit's responsibility to the communities it serves goes beyond mobility; transit has a role in providing initiatives that create new opportunities for upward advancement and tangible transformation. Mobility-as-a-service (MaaS) presents the idea that transit can leverage public and private efforts through strategic partnerships, to develop a new approach that eliminates problems connectedness in a city.

Beyond resource optimization, there is the possibility of assisting everyday Americans in accomplishing travel planning and in-transit conveniences that allow for an exceptional customer experience. This provides for the feeling of being "covered" while en route. These initiatives toward improving the customer experience are vital and can be scalable to the density of each geographic region.

2.3 Community engagement and involvement

Public transit professionals have a need to engage the community in an innovative and relational branding of the public transit industry in a sustainable and socially equitable manner. LA Metro has developed a tool to help its agency ensure that all decisions encourage equity for all; see Appendix D.

Throughout COVID-19, public transit has been positioned for community interaction, engagement and involvement, providing essential services to front-line workers and the general public. The industry has continuously supported the American people by maintaining feasible employment levels, continued operations, more attentive care to ADA customers, grocery delivery services and many other initiatives.

While continuing to support communities in those ways, it is expected that public transit agencies will increase their involvement in communal spaces by branding and marketing in mass and sustaining efforts through the following:

1. Focusing and enhancing local bus services and rail service offerings
2. Providing honest agency-specific information through earned publication and social media outlets
3. Becoming an information hub for COVID-19-centric developments by providing real-time alerts and notifications
4. Providing access to the PPE people need

Everything is connected to health. When the crisis began, public transit was negatively impacted along with the rest of the world. With this in mind, agencies should assess and leverage transit assets, data modeling tools, political capital and other resources to eradicate the impacts this crisis has had on communities.

2.3.1 Providing essential services

From front-line workers to essential personnel, public transit has always been at the forefront in getting people to their destinations. Prior to COVID-19, public transit was an integral part of communities around the world. Many opportunities have been created over the years due to public transit, including education, employment, essential errands and general mobility. Only several years ago was there a focus on how to attract the “choice rider” among agencies nationwide. As time went on, agencies expanded park-and-ride service, express and limited bus, and enhanced rail systems to accommodate commuter patterns.

COVID-19 made many people realize that public transit is more than a daily commute: It is a way of life. Transit agencies around the nation are now at the forefront of the pandemic, with a focus on customers who rely on the system. It is now imperative that bus service provide front-line workers the mobility they need. In addition to front-line workers, communities are really understanding the need for mobility options. During and after the pandemic, there will be many opportunities created for public transit to further support the community and enhance daily life.

One opportunity will be to enhance local bus service and focus on core services. This can be done by reallocating resources from commuter-type services that are not heavily used and refocusing the system to meet rider demands. Agencies can promote public transit by enhancing headways on frequently used routes to promote social distancing and providing enhanced service to heavily frequented destinations. This may be as simple as additional trips provided to medical facilities, grocery stores and other needed community services. While agencies are facing financial strain due to lost fare box and sales tax revenue, this reallocation not only uses resources the agency already has but also keeps its employees working. Using existing resources and keeping workers employed sends a message to the community of the importance of public transit and of an agency being fiscally conscious and responsible.

2.3.2 Notification to passengers

Several agencies have done an outstanding job of sharing relevant and timely information with their passengers. Many will post to Facebook and/or Twitter to state how the agency is doing and if there are any reported COVID-19 cases. Sharing relevant, timely and honest communications that began during the height of the pandemic will further enhance trust within the community. To highlight the importance of public transit as the country begins to come out of the pandemic, transit agencies need to recognize the benefits of using

media/social media campaigns with front-line workers and for them to share their experience of how they use public transit to provide for the community. These campaigns can be done through television or social media with the intent to better show the community the importance of public transit.

Another example may be to team with a local essential business such as a grocery store and place bus route information at a key location within the store to remind shoppers that the bus is still a viable option for enhanced mobility. Many transit agencies have community advocates that will speak on behalf of the agency. This is an opportune time to tap into those advocates to not only use public transit but to speak about their experience to friends, colleagues and neighbors. These advocates will help the agency get the word out, especially to those communities where media outlets may not be as readily available.

As things begin to "come alive" post-pandemic, people will be looking at the world with a new lens from social distancing to a strained economy. With the unknowns of how long it will take to again embrace a sense of normalcy, society needs to be prepared to social distance for some time to come. Public transit can play a role in this by notifying the public about what the agency is doing to help stop the spread of COVID-19. This could be through collateral material posted at key locations such as transit centers and stations to marketing efforts on various media platforms. Feeling safe is something the community will be striving for, and while agencies are doing all they can to prevent the spread of COVID-19, it is their responsibility to demonstrate that to the riding public.

An example of something an agency can do is to place on the programmable marquee on the bus the last time the bus was cleaned. As riders wait at stops and see their arriving bus, they will also see a reminder that cleanliness is valued by the agency.

2.3.3 Transit connection to health

At the height of the pandemic, many industries, including public transit, were negatively affected. Agencies saw ridership drop to all-time lows and fares were halted, which resulted in additional financial strain on an already financially tight industry. To gain ridership back to pre-pandemic levels will likely take some time.

It is crucial to demonstrate to the public that transit is a safe means of mobility. By using research and data, agencies can show that using public transit in a safe manner will not increase their chances of becoming infected with COVID-19. Working with local leaders and healthcare professionals, they can use enhanced data to show how COVID-19 is spread. As part of this, agencies need to work with leaders to have appropriate PPE for their workers as well as PPE that they may be able to provide to passengers. This can be as easy as installing sanitizing stations on buses, trains and at transit centers so passengers can sanitize their hands prior to boarding and alighting. Doing all they can to promote a safe environment will make passengers feel safe and encourage a return to public transit.

2.4 Healthcare partnerships

The world is racing to discover a vaccine or treatment for COVID-19, and when these exist and have been manufactured, there will be an urgent demand to provide services to connect people to them. Transit agencies can be positioned to respond quickly, showcasing society's dire need for public transit services and exemplifying the industry's ability to mobilize human adaptability and innovation in medical advancement.

One suggested initiative in this segment is the Health Is Wealth campaign laid out in Section 2.4.1, which seeks to directly cause an intersection of the healthcare field and public transit. This type of collaboration achieves the following:

1. Use of public capital and federal appropriations
2. Use of private company innovation to sustain cleanliness and safety practices

3. Use of agencies' established brand value to assure consumers of mobility while using health services
4. Creating a new dynamic to engage underserved communities

Pertaining to branding, the transit industry needs to cast strong nets to gather new and diverse populations of riders who may have never found themselves in need of public transportation, and the industry will be able to create innovative methods of imaging and branding within communal spaces. This will change the image of public transportation, necessitating a demand for fresher ideas for a more creative, socially aware and customer-centric image.

Alongside the Health Is Wealth campaign, the industry's ability to partner with healthcare agencies would launch a new need for funding, appropriations and legislation. Identifying the best partnerships to accomplish multifaceted and multidimensional goals can be the wave of the future, with the industry looking to construct budding relationships with Big Pharma companies to support vaccination services, with the FTA's biohazard funding agendas, with local and regional hospitals and clinics, and with established facilities and mobile assets.

This section proposes a framework for a roadmap to recovery of ridership in transit. The pandemic has resulted in unprecedented global economic impacts that have not been seen for over 150 years [15]. It is possible things may never return to the pre-pandemic environment, but if transit can "normalize" the future as much as possible to resemble pre-pandemic conditions, that would increase the chances of gaining normalcy.

> **NOTE:** It is important to note that the pandemic is ongoing as of this writing, so the framework proposed here has built-in checks and balances to adjust to evolving conditions.

2.4.1 Health Is Wealth campaign

In late July 2020, the National Institutes of Health (NIH) and Moderna Inc. announced a phase 3 clinical trial of an investigation vaccine for COVID-19. According to NIH, this clinical trial is designed to evaluate whether an investigational vaccine can prevent symptomatic COVID-19 in adults. The vaccine, known as mRNA-1273, was co-developed by the Cambridge, Massachusetts–based biotechnology company Moderna and the National Institute of Allergy and Infectious Diseases (NIAID), part of NIH. The trial, which will be conducted at U.S. clinical research sites, is expected to enroll approximately 30,000 adult volunteers who do not have COVID-19. This is just one example of clinical trials occurring in the U.S.; there are a number of other trials taking place in other parts of the world.

While clinical trials are underway, now is the time for the transit industry to be proactive in considering a public transit vaccine/treatment service. There is an opportunity to start engaging with healthcare agencies, local and regional hospitals and clinics, and pharmaceutical companies to forge a partnership that will benefit both industries.

Traditionally, the healthcare and transit industry have not intersected much. The COVID-19 pandemic provides a golden opportunity to develop a mutually beneficial partnership that will benefit communities. A healthcare partnership could provide new and untapped opportunities. Potential partners could include the following:

- hospitals
- medical centers and clinics
- telemedicine providers
- pharmaceutical companies
- pharmacies
- educational institutions (medical and health science)

Partnerships could help in achieving the following:

- Use public and private capital and innovations to implement safety practices such as implementing social distancing, implementing contactless features, providing sanitizers and face masks to transit users, and disinfecting transit facilities and assets.
- Use the brand value of an established safety brand, such as disinfectant brands or hospitals, to assure users of the cleanliness of transit facilities.
- Transfer some of the risk of implementing the processes to the provider, with the transit agency providing oversight.
- Provide resources to a traditionally underserved community of transit riders.
- Provide education and testing to front-line workers who use transit services.

A partnership provides benefits to the community at large, using the assets and infrastructure of the transit agency in partnership with the healthcare provider. This could include using transit centers as locations for testing and vaccination. This would provide wider reach for healthcare providers to provide these services to the community. It would also reduce the pressure on hospitals and healthcare facilities that traditionally provide these services.

2.4.2 Funding, appropriations and legislation

A key component of any partnership's success will be dependent on availability of funding; understanding the limitations/challenges of laws and regulations; and advocating with the FTA, FDA and other federal agencies to facilitate this. Healthcare collaborations allow transit agencies to leverage their current resources and focus their advocacy to identify new biohazard funding sources to employ in efforts to mitigate and eradicate the impacts of COVID-19.

As part of the due diligence process, it is important to be able to identify any local, state or federal legislation that may play a role in the ability of the transit agency to partner with a healthcare company or vice versa. Furthermore, the agency needs to determine if there are any legal risks or liabilities for the partnership that would require the assistance or advice of legal experts.

An equally important component of a partnership would be to identify available funding partners and sources. The various funding sources will enable soft and hard costs such as human resources or technology investments to be made. Programming or funding experts within each sector should be consulted to better understand any limitations with the use of certain fund sources. Oftentimes, state and federal funding programs have annual call-for-projects funding cycles that will allow the agency to take full advantage of these opportunities and align the overall project schedule to coincide with the funding cycle.

Appendix E contains a proposed work plan to enable transit agencies and their healthcare partners to identify the right type of partnership, as well as a comprehensive vetting process that will reduce the risks to both parties.

2.4.3 Local/regional hospitals and clinics

The first step in the vetting process would be to develop a work plan or framework to use as the blueprint for partnering with the healthcare industry. The proposed framework outlined below provides guidance on a process that will vet the right type of partnership to mutually benefit both parties.

A healthcare partnership is designed to positively influence transit riders' confidence in the system. Another dimension of success would be dependent on the transit riders' ultimate destination—first, whether there is a destination for these riders to continue to use the bus; second, whether they feel their ultimate destination is a safe place; and, third, whether there are other transportation modes to shift to.

The cost of such a plan would be determined as part of the vetting process with the aforementioned work plan and ultimately agreements between the transit agency and its partners. Once the agency has developed a comprehensive plan, it should also take on a fiduciary responsibility to set appropriate policies and protocols.

To ensure that both partners are deeply invested, transit executives should have a seat at the table with the hospital and/or clinic boards, and the same opportunity should be made available to healthcare executives at transit agencies. Agencies also could identify and vet a liaison to ensure that the public's health and safety is of paramount consideration when implementing new services. The liaison could be responsible for creating new ways to support the crisis by establishing dedicated mobile vaccination centers, for example, or transit pods for dispensing testing kits, contact tracing or prescribed vaccinations.

These measures should build a brand of trust that will enhance transit ridership and customer experience. Providing such services caters to customers' needs in a multidimensional way (transit plus healthcare)—attracting and engaging customers to take care of themselves and one another.

2.4.4 Non-clinical factors

In addition to the clinical factors that affect human health, there are nonclinical factors that impact health and well-being. A more holistic look at these factors determined that policies and programs affect health factors that ultimately lead to health outcomes [16].

For instance, tobacco is a leading determinant of many health outcomes. Decreasing tobacco use is more influenced by the price of cigarettes and smoke-free environments in the community than by the availability of cessation clinics or "quitlines." Furthermore, social and economic factors, health behaviors, clinical care, and the physical environment all play a major role in a person's overall well-being. Educational background, employment status, income level, family and social support, and the sense of community safety play a major role in the overall well-being of a person, accounting for 40 percent of the overall health factor. That is followed by lifestyle (i.e., tobacco use, diet and exercise, alcohol and drug use, and sexual activity), which accounts for 30 percent of the overall health factor. Finally, access to care and the quality of care, and the physical environment (i.e., air and water quality, and housing and transportation) account for 20 percent and 10 percent, respectively, of overall well-being. Refer to Appendix F for a graphical representation of these health factors.

2.4.5 Potential partnership example (Houston)

2.4.5.1 Background

The Houston region is home to the fourth-largest U.S. city and region with over 7 million in population. In recent months, this region has been one of the epicenters of the COVID-19 pandemic. Texas ranks third in the nation with over 515,000 cases and over 9,000 deaths related to COVID-19. Harris County (which includes Houston) accounts for approximately 17 percent of cases and deaths. With conflicting state and local guidance to combat the virus, the Houston region has struggled to reverse the trend.

While these statistics are not good, there are opportunities for local partnerships to form to help reduce the spread of the virus, promote safety education, and enact specific implementable measures such as testing and ensuring safety of front-line workers across industries through partnerships between healthcare and transit providers in the Houston region.

> **NOTE:** The examples in this section are not prescriptive but are intended to provide a framework for possible approaches to healthcare/transit partnerships. Not every suggestion will be applicable to every pandemic outbreak, every community or every transit agency.

2.4.5.2 Assets of a possible partnership

The Houston region is uniquely positioned to be a model for a transit/healthcare partnership. Houston METRO and the Texas Medical Center are valuable resources for the region and are the leading providers of transit and medical services for this vast region. This section gives background information on both organizations and highlights the assets and access that each possess to help combat this crisis in the short and long term.

METRO's service area encompasses 1285 square miles and also serves portions of an eight-county region with its vanpool service; the agency employs about 3800 people. METRO has 1236 active buses. Most METRO buses typically operate on city streets, with the majority of routes serving several of Houston's major employment centers including downtown and the Texas Medical Center. Other services that METRO provides:

- METRORail: 22 miles of light rail service that connects to downtown, the Texas Medical Center, the universities and other activity centers
- METROLift: paratransit service
- HOV/HOT (Express) Lanes: High-occupancy vehicle/high-occupancy toll lanes on the main highways that run through Houston
- Park and rides: Direct nonstop service to downtown, the Texas Medical Center and other major employment centers in the METRO service area
- Transit centers: Serve as efficient hubs to allow bus and METRORail riders to take advantage of express trips or other route-to-route transfers
- Employer and commuter services: Vanpools/carpools, computerized ride matching, origin/destination mapping and on-site event
- RideSponsor: A program that encourages employees and members to ride METRO as a way to relieve demand for parking and improve air quality
- RideShare
- METRO STAR Vanpool
- Regional mobility Improvements
- METRONext: a $7.5 billion transit expansion program
- RideMETRO app
- Social media platforms including Twitter, Instagram and Facebook

Texas Medical Center—the largest medical complex in the world—is at the forefront of advancing life sciences. Home to the brightest minds in medicine, TMC nurtures cross-institutional collaboration, creativity, and innovation. Here are some of its services:

- 10 million patient encounters per year
- 180,000-plus annual surgeries
- 750,000 emergency room visits per year
- 9,200 total patient beds
- 50 million developed square feet
- 13,600-plus total heart surgeries
- $3 billion in construction projects underway
- 106,000-plus employees
- eight-largest business district in the U.S.

TMC consist of 47 member institutions of the following types:

- hospitals and medical centers
- Level 1 trauma centers
- hospitals
- clinics
- cancer, heart, children, etc. specific hospitals
- research institutions
- education and training institutions
- government health agencies
- blood centers, museums, YMCA

2.4.5.3 Goals and objectives of such a partnership

Prior to entering into a partnership, entities should identify specific goals and objectives. For the Houston region, the goals and objectives should align with short- and long-term strategies to combat COVID-19. Below is a possible model for consideration between Houston METRO and the Texas Medical Center and possibly specific member institutions:

1. Develop partnerships between METRO and the TMC to promote COVID-19 safety and transit safety, as well as other well-being initiatives.
2. Develop strategies for ongoing engagement.
3. Identify public and private funding opportunities.
4. Provide frequent service that aligns with hospital capacity.
5. Provide screening for communities of color and agency workforce.
6. Provide education and training partnership opportunities.
    a. Real-time statistics
    b. Seal of commitment to safety
        i. Following CDC guidelines
        ii. TMC requirements
        iii. Employees and customer
    c. Push medical content through the METRO app
        i. Instructional videos (right way to wear a mask)
        ii. PSAs
7. METRO app should have a public service/medical page within the app.

2.4.5.4 Types of partnerships

METRO's Red Line (light rail), several stations, transit center, and park and ride are in the heart of the TMC. METRO could partner with the TMC on the following:

- Distribute PPE to riders at these facilities.
- Refine transit services that align with hospital/member institution capacity and needs for staff and patients.
- Promote METRO service for commuter service to alleviate traffic congestion and parking issues in the TMC.
- Provide patient education on METRO service and measures being taken to ensure safety.
- Partner on the technology and branding side with University of Houston researchers who have created an air filter designed to trap and kill the coronavirus.
- Use autonomous vehicles (currently in the testing phase) to reduce exposure.
- Provide frequent service that aligns with hospital/member institution capacity.
- Screen communities of color and agency workforce.

- Provide education, training and COVID-19 testing partnership opportunities.
- Create a seal of commitment to safety.
- Engage employees, riders and patients at METRO locations.
- Push medical content through the various METRO assets including physical and electronic media platforms.
- Provide real-time statistics.
- Create instructional videos on topics like the right way to wear a mask.

2.4.5.5 Next steps

The next steps could include reaching out to leadership of entities equipped to impact the COVID-19 crisis in Houston to gauge interest in developing partnerships. Possible immediate next steps:

- Meet with the transit agency leadership and discuss partnership opportunities with the TMC.
- In coordination with the transit agency, reach out to TMC leadership to discuss partnership opportunities.
- In coordination with the transit agency, reach out to select TMC members to discuss partnership opportunities.

2.5 Public-private partnerships

A public-private partnership (P3) is a cooperative agreement between organizations in the private and public sectors to collaborate and have a larger impact than each organization individually. P3 partnerships that enhance the reach of public transit and ensure a safe transit system will be an effective way of retaining ridership and quality of service during the COVID-19 pandemic. Establishing P3 partnerships with non-transit major organizations or corporations, as well as advocacy groups such as mayoral organizations and local municipalities, will serve as the key to success.

P3s are the cooperative agreements that bring public and private sectors together, to a point of collaborative transformation within the communities transit serves, and it is in this nature that public transit would find itself creating an image of resilience. Resilience, in this context, speaks to more than continued progression in the face of adversity. It also hinges upon the industry's drive to exemplify preparedness.

By cultivating new P3 opportunities, the transit industry can cover ground that has been left unexplored for generations, tearing down separatism and the negative narratives of capitalism. It partners the small business with the Fortune 100. It engages the relationship between the community pharmacy and the regional bank. It forges an intermingling of hope and reality, which presents the image of stable advancements that do not alienate the community.

The journey to accomplishing this is to create a mutual agreement that feeds beneficial relationships for consumers and the larger community. To measure and gauge these works, the industry will use private capital and innovations to implement safety practices in a structural manner that will allow it to design, build, finance and maintain the brand of safety for consumers.

When engaging in these partnerships, it's important to establish procurement programs that safeguard against malfeasance and to ensure diversified engagement. This matters to consumers, as transit attempts to present a new narrative of partnership that may seem to infringe upon certain established principles and patterns. The branding of partnership will carry with it a great deal of respect and cohesiveness from those whose ears are attuned to the happenings of revolution and to those who might lean upon social awareness.

2.5.1 Types of P3s

A successful P3 creates a common charter that provides benefits to all entities involved. These may be in the form of collaborative use of resources, ability to reach out to a greater number of users, brand recognition, etc. In a P3, shared interests are considered, which is a win for all entities involved, and the end result is a project that helps provide improved service to users.

Typically, each partner shares in the income resulting from the partnership. These types of projects, although a contractual arrangement, differ from typical service contracting in that the private-sector partner usually makes an equity investment in the project, and the public sector gains access to new revenue or service delivery capacity without having to pay the private-sector partner.

P3s can come in many forms, and each partner shares in both the risks and rewards of the arrangement.

- **Operation and maintenance contract:** A private operator, under contract, operates a publicly owned asset (e.g., water/wastewater treatment plant) for a specified term. Ownership of the asset remains with the public entity.
- **Build-finance:** The private sector constructs an asset and finances the capital cost only during the construction period.
- **Design-build-finance-maintain (DBFM):** The private sector designs, builds and finances an asset and provides hard facility management or maintenance services under a long-term agreement.
- **Design-build-finance-maintain-operate (DBFMO):** The private sector designs, builds, finances and provides hard facility management or maintenance services under a long-term agreement. Operation of the asset is also included in projects such as bridges, roads and water treatment plants.
- **Concession:** A private sector concessionaire undertakes investments and operates the facility for a fixed period of time, after which the ownership reverts back to the public sector.

This concept of a P3 is unique in that neither of the firms is receiving direct monetary benefit. For example, the transit agency receives PPE as a donation, and the private sector partner receives brand exposure. Additionally, there is no out-of-pocket expense for the transit agency, and the out-of-pocket capital investment for the private sector partner is simply the cost of the PPE and delivery of it.

Where opportunity for this model could be most promising is when federal funding for PPE is no longer available as a sustainable new source. It is a unique model that achieves a win/win/win, with the transit agency receiving needed PPE, the private enterprise receiving advertising, and the public having safer transportation.

2.5.2 Approach to P3

One approach to developing a roadmap for a P3 agreement is to create a mutually beneficial relationship that benefits transit users in particular and the community at large. A successful P3 involves some of these elements:

- Use private capital and innovations for safety practices such as implementing social distancing, implementing contactless features, providing sanitizers and face masks to transit users, and disinfecting transit facilities and assets.
- Use the brand value of an established safety brand such as hospitals or other healthcare facilities or providers to assure users of the safety of transit facilities.
- Transfer the risk of implementing the processes to the provider while the private partner gains from wider outreach and use of established transit assets or facilities.

The benefit to the public sector in this case comes in the form of advertising and distribution of branded PPE equipment to users, as well as additional branded healthcare services to the community. Brand recognition can most easily be improved by keeping logos and names of products in front of potential consumers as frequently as possible. To provide greater value to the private partner, the PPE with advertising would need to be worn by public-facing staff.

2.5.3 Methodology

The focus for establishing a P3 should be to create a brand of safety for transit users. Here's how a DBFM would work:

- **Design:** The public agency and private enterprise design the PPE to be included in the program together. This could include hand sanitizer pumps, face masks, protective sleeves, gloves and promotional media advertising the cleanliness of the service. The parties also need to agree on the branding elements that will be included, such as how large the logo will be, what color scheme will be used and whether multiple brands are included. The transit agency can also allow for the use of its assets and facilities to provide services and care to the community to be managed by the private entity. Transit facilities such as stations and transit centers can be a destination for additional services, such as testing or vaccination. This partnership should extend beyond the current pandemic so the agency is better prepared in the future to reach the communities that need these services most, as well as provide better value for the private partners.
- **Build:** The private sector partners manufacture and supply all PPE and hand sanitizers and provide healthcare services to transit users. Depending on the arrangement and what is provided, there may be installation services required.
- **Finance:** The private sector partner finances the creation, delivery and potentially the installation of the equipment. Some of the transit assets will be used to promote the private brand as well as to allow for the use of the transit assets by the private party.
- **Maintain:** Maintenance in this case would include supply of refills of stock for PPE and other supplies such as hand sanitizer, cleaning supplies, testing equipment and vaccination kits.

Since the focus is on safety and public health, the following partnerships should be considered:

- **Hospitals:** Agencies should partner only with hospitals or hospital chains known for providing quality healthcare services. The transit agency could provide some of its assets, such as transit centers, for use by the hospital to provide for COVID-19 testing. If the transit agency has excess vehicles in its fleet, these could be converted to mobile testing and/or outpatient treatment facilities used for servicing areas needing additional medical resources. This would also help free up hospital capacity.
- **Telemedicine providers:** With the COVID-19 pandemic, the usage of telemedicine has grown significantly. Transit agencies could partner with them to provide their facilities for use by the telemedicine providers in exchange for use of their brand name and fees. Testing sites and routine medical services that telemedicine providers may need to provide could be at transit centers.
- **Pharmaceutical companies:** Pharmaceutical brands already convey a message of safety. This could be leveraged in developing a partnership to use these brand names in exchange for advertisements and/or branded face masks or sanitizers to be provided by the pharmaceutical company.
- **Pharmacies:** The transit agency could provide assets for use by pharmacy chains to operate clinics and provide for testing facilities.

2.5.4 Agency procurement program

In a traditional procurement setup, government bears almost all of the risks, from engineering failures and major cost overruns to traffic delays and irate taxpayers. Choosing a P3 model for a project boils down to a

strategic decision to shift some of those risks to the private sector. Regardless of this, it's important to adopt standardized procurement practices that include a process that includes a competitive public and transparent request for proposal process. This process would follow these steps:

- Build a scope of work for the selection of a P3 partner.
- Advertise a request for proposal for public submissions.
- Develop evaluation criteria based on the goals and values of the transit agency.
- Select one or more bidders as P3 partners.
- Finalize scope of work.
- Build the contract to ensure that each party gains from the partnership.

There are a number of APTA member organizations that could benefit from having advertising exposure to the general public. These firms would be ideal candidates to approach while looking to build the scope of work and gauge initial interest in the program. It would be good to develop partnerships with APTA members with experience in providing healthcare services or a commitment to provide similar services to the transit community.

2.5.4.1 DBE/MBE supplier program

It is always a good idea to include requirements for disadvantaged business enterprises and minority business enterprises to encourage local economic development. In this case, DBE/MBE firms could play a number of roles:

- supply of PPE
- installation of sanitization stations
- delivery services for PPE
- media creation to promote the cleanliness of the vehicles

Other considerations:

- What is the liability for the sponsor? What happens if the mask fails? What happens if the sanitizer burns someone?
- Different markets might need different types of marketing.
- Various agencies may require different forms of PPE.

2.6 Campaign formats

2.6.1 Messaging and communications campaigns

Developing and implementing effective communication strategies with communities is critical for the transit industry as it moves forward in dealing with the pandemic. To that end, there are a wide range of options that can be effective and tailored to specific audiences based on local community needs and issues. The following concepts are by no means comprehensive but are intended to highlight some ideas that can be effective.

2.6.2 Earned media/social media campaigns

There are a wide variety of additional options, including working with local media to highlight what the agency is doing to keep its employees and riders safe and healthy while riding the bus. For example, C-TRAN in Vancouver, Washington, updates and distributes a weekly media fact sheet that provides relevant ridership and safety information that has resulted in a number of positive stories in the press.

Regarding social media, agencies should prioritize developing strategies to push out critical information that reinforces the role of transit in safely meeting the needs of the community as everyone does his or her part to

recover from the pandemic. Using brief but strategic messaging through sites like Twitter is one avenue most transit agencies already use. Incorporating safety-specific messaging can be done within existing resources. Another strategy that many agencies also use is producing their own videos that show how their buses, trains, etc. are cleaned and maintained on a regular basis. Videos can also be developed to highlight community partnerships, new rules or really anything that can help reinforce key messaging.

Following are some links to videos produced by C-TRAN:

- Social distancing on the bus: https://www.youtube.com/watch?v=b2ufaaTWRfA (March 17, 2020)
- How buses are cleaned: https://www.youtube.com/watch?v=4mEcH1Dm7AE (March 31, 2020)
- Essential worker tributes: https://www.youtube.com/watch?v=uKlLOhV8G58&t (May 7, 2020)

Looking to the near future, C-TRAN plans to produce videos that will be focused on rider testimonials that will reinforce that many people remain dedicated transit riders. Those who may be questioning whether to come back may be reassured as they see that people are in fact still riding.

2.6.3 Community partnerships

One of the unique opportunities the pandemic has provided is the ability to develop new partnerships with a number of organizations. From healthcare providers, social service agencies and first responders to many "essential" businesses, these partnerships provide a great opportunity to promote how these partnerships are better serving communities. Partnerships can also allow transit agencies to leverage a significant amount of earned media while reaching the broader public about the importance transit has in supporting overall community needs.

2.6.4 Surveys

Depending on the level of various messaging and communications campaigns, establishing a baseline rider satisfaction survey is beneficial to not only measure the effectiveness of specific activities, but also to help identify potential changes in messaging to better align with local rider/community needs. Onboard rider surveys are undoubtedly difficult given the current social distancing requirements, but once those are lifted, implementing the surveys will become more practical. In order to save money, many agencies have established their own surveying program with computer tablets and are using existing staff for the surveys.

The cost of the messaging and communications campaigns should be minimal, provided that agencies have existing staff resources dedicated to those tasks.

3. Conclusion

As the transit industry moves toward recovery and restoration, agencies can reinvent and reimagine the services they provide. The recommendations presented in this white paper highlight the opportunities that exist for transit agencies to implement technologies and behaviors that improve public health and welfare, as well as provide solutions and ideas to brand and message these new innovations and behaviors.

When we think of long-term solutions, the technical element of this paper (Part One) provided practical and readily deployable technical solutions that can be implemented to increase safety and health. Part One emphasized architectural and ventilation measures that can be effective in decreasing and neutralizing the spread of pathogens. These safety measures should be considered when designing future transit facilities and vehicles as a preparedness measure for any potential future health crises we may face.

With the recommendation of new technologies, there is a need to address the associated behaviors of transit riders and the public, as well as transit agency messaging and branding, which were the focus of Part Two.

The behavioral section of this paper (Section 1) spoke to the emotional response that the transit workforce and patrons will have when being faced with new technology and being asked to behave in a new way. The messaging and branding section (Section 2) addressed how to effectively message these new behaviors and technologies through showcasing that transportation must embody a normalcy that engages society's sense of adaptability.

These recommendations are rooted in a foundation of equity. Transportation can and should be safely accessible to all. Through innovation, engagement of our workforce and customers, and establishing and developing key partnerships, access is not only possible but attainable.

If we can continue to apply technical and adaptive solutions to our challenges, we can readily lead the recovery of the industry. We can continue to move from the dance floor to the balcony and back again to ensure that we have the perspectives to build our ideal future—one that builds a safe, equitable and inclusive system for all.

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Abbreviations and acronyms

ADA	Americans with Disabilities Act
COVID	coronavirus disease
DBE	disadvantaged business enterprise
DBFM	design-build-finance-maintain
DBFMO	design-build-finance-maintain-operate
FHWA	Federal Highway Administration

FDA	Food and Drug Administration
FTA	Federal Transit Administration
HIPAA	Health Insurance Portability and Accountability Act
HOT	high-occupancy toll
HOV	high-occupancy vehicle
HVAC	heating, ventilation and air conditioning
MaaS	mobility-as-a-service
MBE	minority business enterprise
NATSA	North American Transportation Services Association
NIAID	National Institute of Allergy and Infectious Diseases
NIH	National Institutes of Health
P3	public-private partnership
PPE	personal protective equipment
PSA	public service announcement
RTD	Regional Transportation District
SARS	severe acute respiratory syndrome
TMC	Texas Medical Center

Appendix A: Houston Metro's bus HVAC analysis

INFINITY MEP CONSULTANTS

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HEATING, VENTILATING, AND AIR CONDITIONING

1.1 GENERAL

A. Mechanical systems will be designed in accordance with all applicable Codes, Standards and Authorities having jurisdiction and in accordance with current engineering practices.
Taking the initiative to upgrade Metro bus air systems, will help to alleviate the presence of pollutants, allergens, microorganisms, and viral particles in the air circulated through the buses.

1.2 DESIGN CRITERIA

A. Outdoor Design Conditions: Houston, Texas

1. Summer: 96°F Dry Bulb/80°F Wet Bulb, (ASHRAE 0.4%).
2. Winter: 28°F Dry Bulb, (ASHRAE 99.6%).

B. Indoor Design Conditions:

1. Interior of Bus:
   a. Driver regulated temperature.
   b. Interior conditions/performance is based on the "Metro Pull Down Standard".

C. Occupancy

1. 1 driver, Passenger seating varies based on bus type.

D. Outside Air (Ventilation)

1. Based on ASHRAE 62.1–2016: 7.5 CFM per person + .06 CFM/SF.

1.3 HVAC SYSTEMS

A. Existing HVAC system and current operating conditions:
Existing HVAC systems are proprietary systems and were visually inspected only. Based on our visual inspection and conversations with METRO maintenance personnel, we have made the following observations.

1. Articulated buses utilize one compressor with two rooftop evaporator systems regulated by thermal expansion type refrigeration regulation devices.
   Air distribution is supplied via ceiling diffusers and the internal bus temperature is regulated by the driver.
2. 45' buses utilize a multiple compressor and evaporator refrigerant systems supplying overhead vents, window venting and driver conditioned air.
   Window venting and driver conditioned air is driver regulated.
3. 40' buses utilize a 6-cylinder belt driven compressor which supplies multiple evaporators.
   Air is distributed via ceiling vents that are specially designed to provide a balanced air flow

distribution which is then returned down the walk isle to provide a uniform temperature of 2 °F +/-.

B. Proposed changes/ additions to existing HVAC system and current operating conditions:

1. Increase outside air:
   a. Existing outside air ductwork is currently set to 0 CFM. Increasing the outside air to a minimum of 0.06 CFM/ SF and 7.5 CFM per person, in compliance with ASHRAE 62.1 is suggested.
   The addition of more outside air will allow for an increased indoor air quality (IAQ) as well as allow for a higher air change rate within the bus. Spaces with a higher ventilation air change rate are more effective in removing airborne contaminants. The introduction of air from outside of the bus allows for more circulation and provides a new volume of air on the bus every 10 minutes, lessening driver and rider exposure to stagnate and recycled air.

2. UV Lighting:
   a. The addition of UV-C lights to the existing return air ductwork, upstream of cooling coil, has been shown to inactivate viral, bacterial, and fungal organisms after a minimum exposure of 0.25 seconds. One study has shown that implementing UV-C lighting into the sterilization process has reported a 99.9% sterilization rate of COVID-19 like strains in 30 seconds.
   The addition UV-C lights, as a sterilization method, can contribute to curbing the spread of airborne contaminates through the bus air system.

3. Increase air filtration:
   a. While HEPA filters are effective in filtering small particulate larger than 0.3-micron particles, the increase static pressure that these filters bring is not feasible to install within the existing HVAC system.
   b. Replacing the existing filters with a high efficiency rated polarized media electronic air cleaner style system allows for a significantly higher filtration effectiveness. When activated (charged) these systems have been found to achieve a MERV rating in excess of a MERV 15.
   MERV stands for the Minimum Efficiency Reporting Value and is used as a measurement scale to represent the size of a particle that a filter can catch. A filter with a MERV 15 rating is capable of capturing larger pollen and mold spore particles as well as some of the smallest bacteria and nuclei droplet (sneeze) particles. Since the suggested metal filter rack is the same size as the current filter and the media is easily replaceable, this upgrade could be implemented as a normal part of ongoing maintenance.
   c. MERV-15 filters have at least a 20% greater minimum initial efficiency than a standard MERV-8 filter.

4. Bi-polar Ionization:
   a. Adding a bi-polar ionization to each air handler allows for the reduction in airborne particles through agglomeration, reduces odor and reduces the airborne viruses, mold spores and bacteria in the airstream. Bi-polar ionization systems that create/ emit zero (0) ozone are recommended.

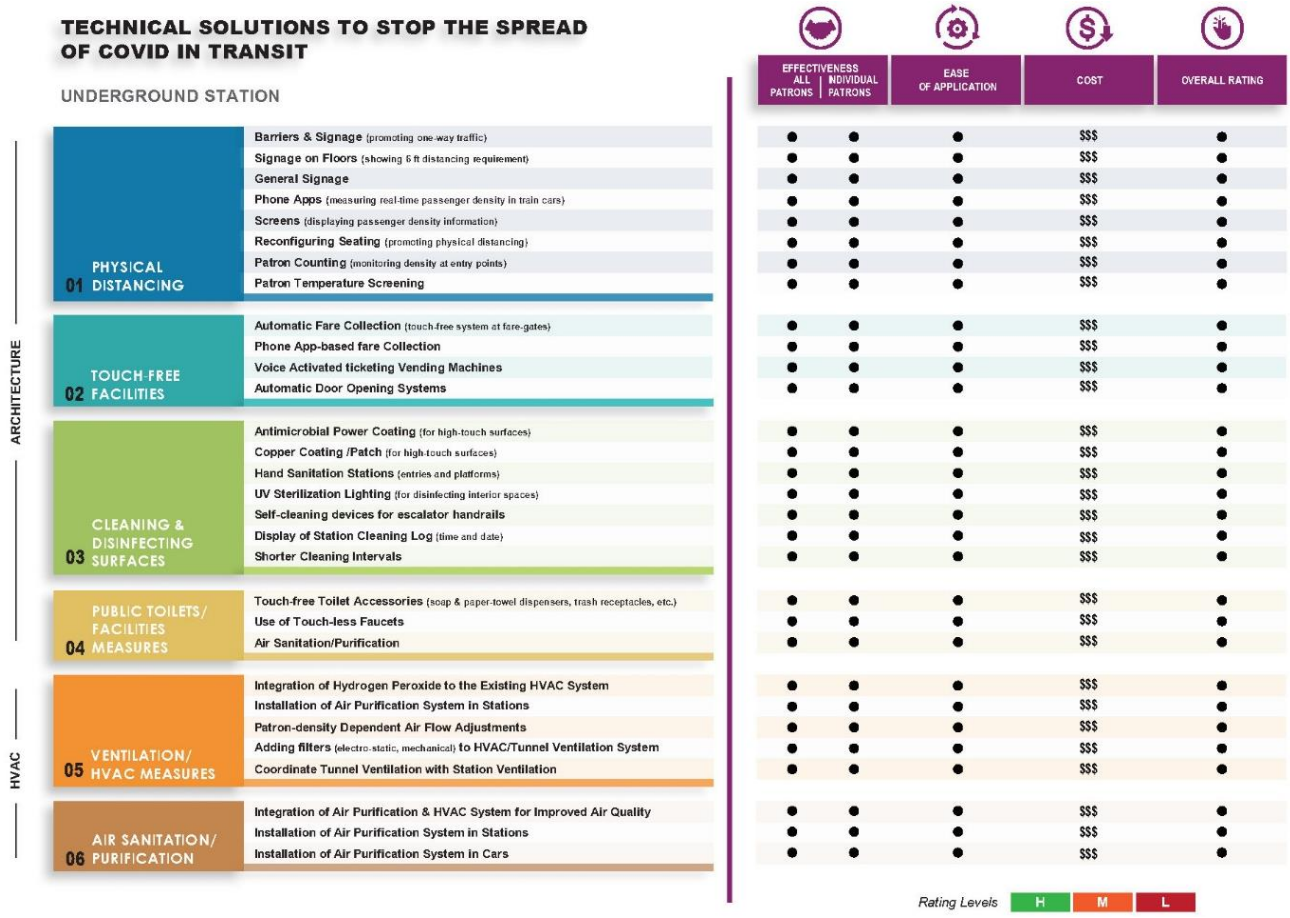
Bi-polar ionization systems charge the particles moving through the filter so that when they bond with the oxygen ions, the bacteria or other pollutants are neutralized.

b. Published laboratory results from one industry leading manufacturer has shown a 90% reduction in COVID-19 like strains after a 60-minute exposure using a bi-polar ionization air purification system.

5. Increase spacing of riders:
   a. Continuing to maintain the CDC recommended 6'-0" spacing between individuals will allow for continued compliance with social distancing recommendations.
   b. The spacing between riders can be achieved by seat removal or by inhibiting the ability of an occupant to sit in a seat. This can be accomplished by signage or other means.

C. Summary:
   1. The upgrade methods suggested above, particularly when used simultaneously, will help to improve air circulation and air quality, and to impede the spread of harmful airborne particles so that Metro bus occupants can ride more safely.

Appendix B: Technical solutions matrix



TECHNICAL SOLUTIONS TO STOP THE SPREAD OF COVID IN TRANSIT

UNDERGROUND STATION

		EFFECTIVENESS ALL PATRONS	EFFECTIVENESS INDIVIDUAL PATRONS	EASE OF APPLICATION	COST	OVERALL RATING
ARCHITECTURE	01 PHYSICAL DISTANCING					
	Barriers & Signage (promoting one-way traffic)	●	●	●	$$$	●
	Signage on Floors (showing 6 ft distancing requirement)	●	●	●	$$$	●
	General Signage	●	●	●	$$$	●
	Phone Apps (measuring real-time passenger density in train cars)	●	●	●	$$$	●
	Screens (displaying passenger density information)	●	●	●	$$$	●
	Reconfiguring Seating (promoting physical distancing)	●	●	●	$$$	●
	Patron Counting (monitoring density at entry points)	●	●	●	$$$	●
	Patron Temperature Screening	●	●	●	$$$	●
	02 TOUCH-FREE FACILITIES					
	Automatic Fare Collection (touch-free system at fare-gates)	●	●	●	$$$	●
	Phone App-based fare Collection	●	●	●	$$$	●
	Voice Activated ticketing Vending Machines	●	●	●	$$$	●
	Automatic Door Opening Systems	●	●	●	$$$	●
	03 CLEANING & DISINFECTING SURFACES					
	Antimicrobial Power Coating (for high-touch surfaces)	●	●	●	$$$	●
	Copper Coating /Patch (for high-touch surfaces)	●	●	●	$$$	●
	Hand Sanitation Stations (entries and platforms)	●	●	●	$$$	●
	UV Sterilization Lighting (for disinfecting interior spaces)	●	●	●	$$$	●
	Self-cleaning devices for escalator handrails	●	●	●	$$$	●
	Display of Station Cleaning Log (time and date)	●	●	●	$$$	●
	Shorter Cleaning Intervals	●	●	●	$$$	●
	04 PUBLIC TOILETS/ FACILITIES MEASURES					
	Touch-free Toilet Accessories (soap & paper-towel dispensers, trash receptacles, etc.)	●	●	●	$$$	●
	Use of Touch-less Faucets	●	●	●	$$$	●
	Air Sanitation/Purification	●	●	●	$$$	●
HVAC	05 VENTILATION/ HVAC MEASURES					
	Integration of Hydrogen Peroxide to the Existing HVAC System	●	●	●	$$$	●
	Installation of Air Purification System in Stations	●	●	●	$$$	●
	Patron-density Dependent Air Flow Adjustments	●	●	●	$$$	●
	Adding filters (electro-static, mechanical) to HVAC/Tunnel Ventilation System	●	●	●	$$$	●
	Coordinate Tunnel Ventilation with Station Ventilation	●	●	●	$$$	●
	06 AIR SANITATION/ PURIFICATION					
	Integration of Air Purification & HVAC System for Improved Air Quality	●	●	●	$$$	●
	Installation of Air Purification System in Stations	●	●	●	$$$	●
	Installation of Air Purification System in Cars	●	●	●	$$$	●

Rating Levels H M L

Appendix C: Ridership survey at RTD

NEWS RELEASE

Regional Transportation District

1660 Blake Street
Denver, CO
80202

720.326.7311
Media Line

Public cautious about using transit, RTD survey shows

Respondents share what would make them feel safer on the agency's system

DENVER (May 21, 2020) – A Regional Transportation District (RTD) survey of nearly 2,700 people earlier this month showed that the public remains apprehensive about engaging in social activities amid the spread of the coronavirus, including riding RTD services. The majority of those who had not used transit in the past 30 days said they will take a wait-and-see approach to the pandemic before riding again.

These are some of the key findings from the survey, conducted online for a weeklong period beginning May 4. RTD collected feedback from customers to assess their attitudes surrounding the virus, including their thoughts about using transit services. A total of 2,662 people participated in the survey, which was made available on the RTD website in English and Spanish and through various social media channels. The agency will use the findings to inform its recovery efforts moving forward.

"The results align with those emerging in surveys of other industries. During this uncertain time, people naturally want to feel as safe as possible, and they want to know that RTD is doing all we can on their behalf," said interim RTD General Manager and CEO Paul Ballard. "We respect that certain factors the public noted are beyond our control, and that they will feel comfortable returning to transit at different times, depending upon factors that are unique to their lives."

Respondents were asked to rate six activities according to their perceived level of safeness. Riding RTD was deemed the least safe of the activities people might participate in during the pandemic, relative to the other choices provided in the survey. These were grocery shopping, visiting a drugstore or pharmacy, visiting friends, visiting family and exercising outside.

The survey also sought feedback from respondents about what will need to happen for them to feel safer riding RTD services. More than 2,400 open-ended responses to this question were submitted, all of which were reviewed and categorized by RTD's market research team.

The most prominent themes expressed in response to this question include:

- requiring personal protective equipment (PPE) such as face coverings for operators and passengers
- assurance that RTD vehicles are cleaned and sanitized frequently and thoroughly
- observance of social distancing on vehicles
- a significant decline in the number of new COVID-19 cases
- the creation of a vaccine
- a limit on the number of passengers on vehicles
- increasing or restoring service levels to minimize the risk of crowding
- widespread availability of testing
- providing sanitizer for passengers
- addressing homelessness on vehicles

rtd-denver.com

RTD has enacted many of the measures the public identified. All of the agency's bus and rail operators are required to wear face coverings, and RTD has called on its riders to take responsibility for the safety of themselves and others by doing the same. The agency is cleaning and sanitizing all vehicles each day using an EPA-approved emerging-virus disinfectant. To maintain proper social distancing between operators and riders, RTD last month suspended fare collection and switched to rear-door boarding and exiting on most buses. The agency's staff has been monitoring passenger loads across the system and working to minimize the number of passengers on vehicles. RTD staff are in regular communications with health officials and are closely following the latest health care guidance to ensure an appropriate response to the coronavirus.

To read the entire feedback summary, including a detailed breakdown of the findings, click here.

RTD continues to provide 110,000 trips each weekday, compared with 350,000 weekday trips through the end of last year. The agency estimates that ridership on its system has dropped about 70% as a result of the COVID-19 pandemic, based upon informal counts by staff. For comparison, transit agencies across the United States have reported that they are experiencing a drop in ridership ranging from 45-80%. RTD is working to quantify the ongoing effects the pandemic is having on its ridership, to determine when and how to increase service levels.

ABOUT RTD
The Regional Transportation District develops, operates and maintains a public transportation system that meets the transit needs of close to 3 million people within an eight-county service area in the Denver Metro region. RTD's buses, rail lines, shuttles and additional services provide approximately 100 million annual passenger trips. For more information, visit rtd-denver.com, call 303-299-6000 and follow along on social media: www.facebook.com/RideRTD, @RideRTD on Twitter, @ridertd on Instagram and rideRTDco on YouTube. For the most current RTD news, visit the News Stop, at rtd-denver.com/news-stop.

# # #

rtd-denver.com

Appendix D: LA Metro's Rapid Equity Assessment tool

This Rapid Equity Assessment tool was adapted from the one used by LA Metro staff in identifying and prioritizing equity opportunities. All questions should be answered to the best extent possible before a decision is made. The questions should be answered by a diverse group within the project team, including staff with a variety of experiences, knowledge, backgrounds and skillsets.

Proposed Action:	
Team Members:	

1. Will the decision made impact any of the following groups? (If no, skip to 2.)

- ☐ Historically marginalized communities (communities of color, limited English proficiency, incomes < $35K)
- ☐ Equity focused communities (see map on page 2)
- ☐ Older adults (over 62 years old)
- ☐ People with disabilities
- ☐ Individuals with chronic medical conditions
- ☐ Disadvantaged business enterprise or veteran business enterprise

2. Could this present an equity opportunity? (☐ Yes or ☐ No)

An "equity opportunity" is a decision that is designed to enhance positive impacts or reduce negative impacts for historically marginalized communities or others most likely to be impacted by COVID-19.

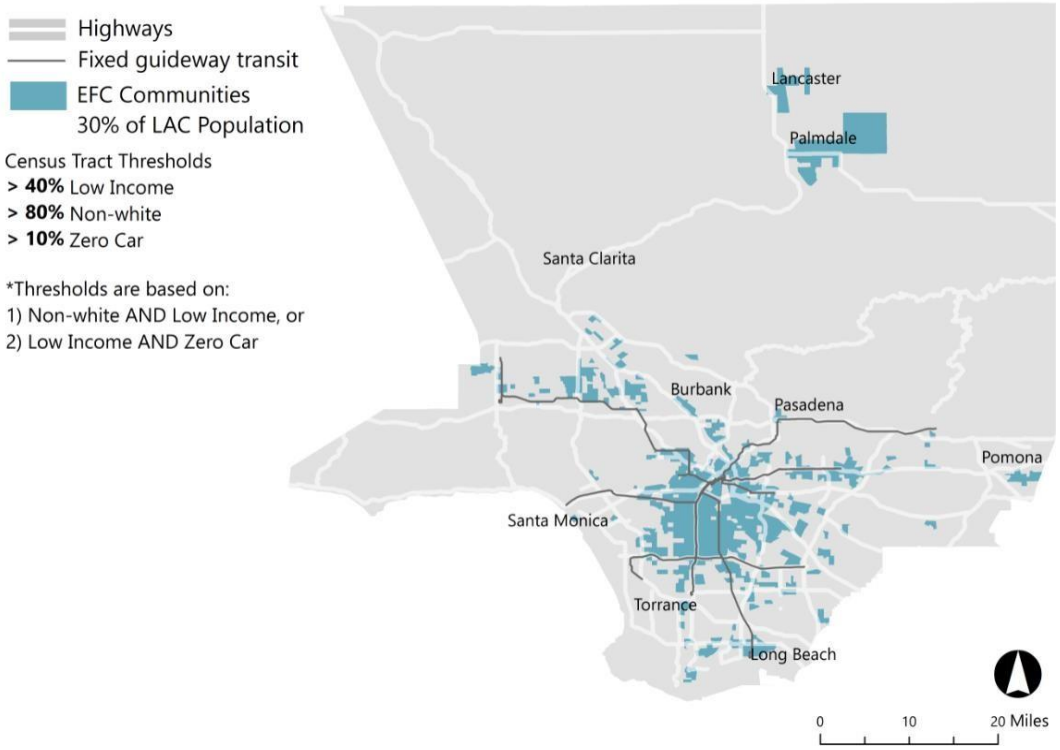
3. Who will benefit from and/or be burdened by this decision? Will the benefits be accessible regardless of ability?

4. How will the decision prioritize the needs of historically marginalized communities and others most likely impacted by the COVID-19 crisis?

5. What are the strategies to mitigate any potential negative consequences of this decision? Please include specific examples related to community engagement, messaging, outreach, etc. If unknown now, revisit this tool if unintended negative consequences occur.

6. Summarize any adjustments or changes made to the decision due to the utilization of the rapid equity assessment.

Equity Focused Communities Map



Appendix E: Healthcare partners work plan

This appendix contains a suggested approach and framework for working with healthcare partners, including the following five goals:

1. Determine the overall goals and objectives of the healthcare partner (what do we want to achieve?)
2. Determine implementation strategies (what are the mutual benefits of the partnership?)
3. Determine resource and legislative limitations or constraints (what are potential laws and regulations that may limit the flexibility with the partnership?)
4. Identify potential funding partners and funding strategies.
5. Establish milestones and schedules.

Goal 1: Determine the overall goals and objectives of the healthcare partner (what do we want to achieve?).

Objectives	Key Action Steps	Expected Outcomes	Data Evaluation and Measurement	Person/Area Responsible
1. Identify the most appropriate healthcare sector to partner with. 2. Establish an internal team of knowledgeable staff to oversee the process within the first month. 3. Reach out to identified healthcare partners and begin dialogue. 4. Integrate the candidate partners and assess the social determinants of health to see if there are alignment opportunities. 5. Complete partner assessments within three months.	1. Assess opportunities and limitations with each identified partner. 2. Discuss social determinants of health opportunities with identified partners. 3. Convene regularly scheduled meetings with the internal team.	1. Reduce the number of candidate partners and start to focus on those who are best aligned with project objectives. 2. Complete a needs assessment.	1. Identified healthcare partners, ranked by alignment 2. Secured agreement with healthcare partners 3. Established high-level objectives with designated healthcare partners	1. Planning staff 2. Management/CEO 3. Board of directors 4. Consultant, if needed

Goal 2: Determine implementation strategies (what are the mutual benefits of the partnership?).

Objectives	Key Action Steps	Expected Outcomes	Data Evaluation and Measurement	Person/Area Responsible
1. Develop implementation strategies within first three months. 2. Identify internal team members responsible for specific tasks and assignments.	1. Define roles and responsibilities of planning staff and for the project. 2. Assign tasks as appropriate.	1. Create tangible targeted assessment protocols and tools for identified partners. 2. Convene and participate in monthly coordination meeting.	1. Tangible results on strategies (i.e., draft framework between agency and healthcare providers) 2. Meeting success criteria objectives 3. Results from attitudinal surveys for before and after project implementation 4. Progress against established timeline for implementation of project(s)	1. Planning staff 2. CEO 3. Consultant, if needed

Goal 3: Determine resource and legislative limitations or constraints (what are potential laws and regulations that may limit the flexibility with the partnership?).

Objective	Key Action Steps	Expected Outcome	Data Evaluation and Measurement	Person/Area Responsible
1. Review relevant legislative limitations or constraints.	1. Identify local, state, and federal legislation that may play a role in the ability of the agency to partner with the healthcare partner. 2. Work with healthcare legal experts to assess.	1. Matrix of relevant local, state and federal legislation.	1. Identify relevant local, state and federal legislation. 2. Evaluate limitations/ constraints of each legislation. 3. Redirect implementation strategies as appropriate.	1. Planning staff 2. CEO 3. Consultant, if needed

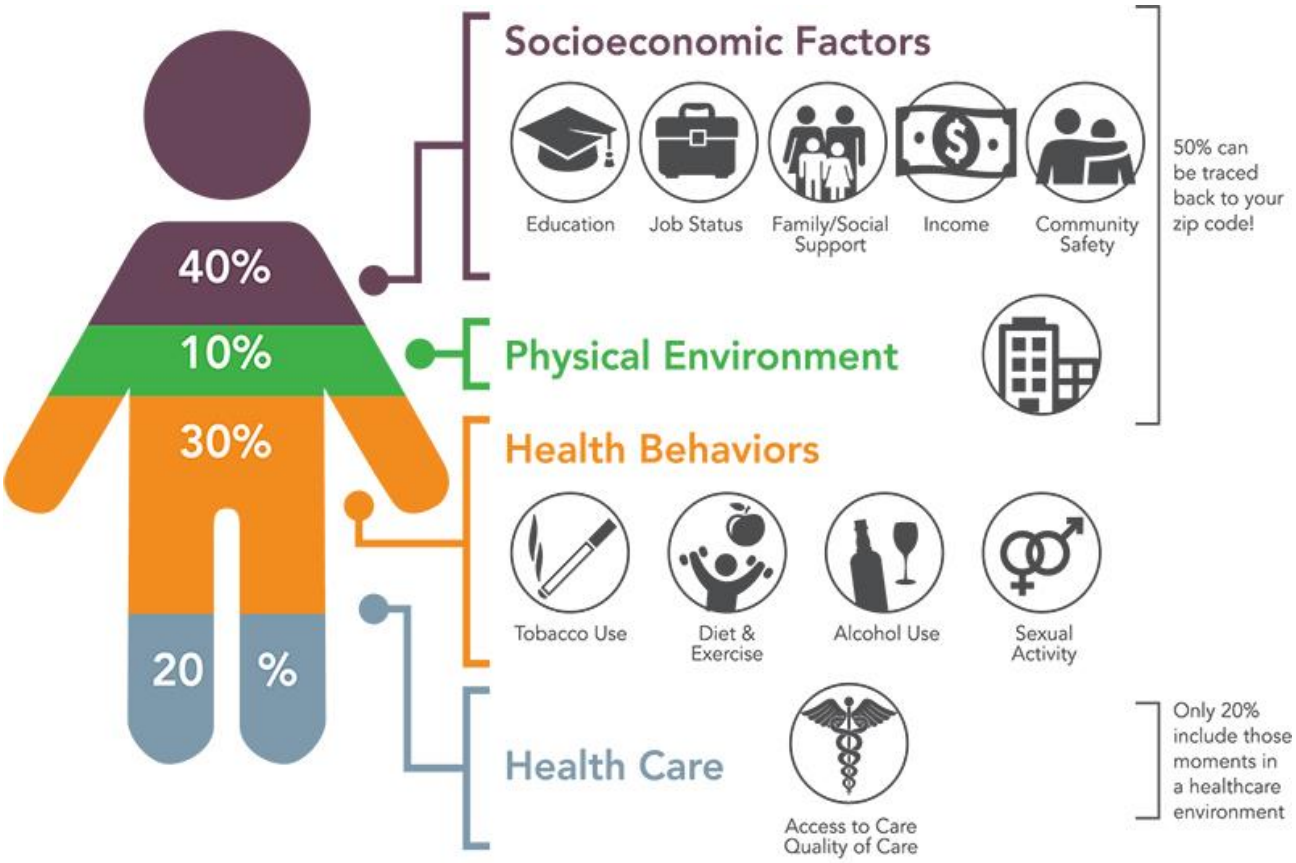
Goal 4: Identify potential funding partners and funding strategies.

Objective	Key Action Step	Expected Outcome	Data Evaluation and Measurement	Person/Area Responsible
1. Identify available funding partners and sources.	1. Determine if there are limitations with the use of the various funding sources.	1. List of funding partners and sources	1. Identify funding sources and potential funding cycle. 2. Rank funding opportunities from most likely to least likely.	1. Planning staff 2. CEO 3. Consultant, if needed

Goal 5: Establish milestones and schedules.

Objective	Key Action Steps	Expected Outcomes	Data Evaluation and Measurement	Person/Area Responsible
1. Identify key milestones (partners, agreements, funding, etc.).	1. Determine if milestones are dependent on one another. 2. Create checks and balances process to confirm if implementation approach is still relevant.	1. Key milestones and schedule	1. Milestones	1. Planning staff 2. CEO 3. Consultant, if needed

Appendix F: Nonclinical factors in health



Source: Institute for Clinical Systems Improvement, Going Beyond Clinical Walls: Solving Complex Problems (October 2014)