



Post-COVID-19 Transportation Trends

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As spring 2021 arrives, the United States and its transportation systems have suffered through a full year of the impacts of COVID-19. It is unprecedented and destined to be remembered as a historic and transformational event impacting all elements of society both domestically and internationally. Transportation is among the most affected sectors, where the long-term impacts are expected to play out over several years. COVID-19 has produced changes in behaviors of individuals, businesses, and governments that impact transportation. Some of these changes are expected to be retained long after COVID-19 has diminished as an overwhelming public health threat. The depth and duration of the pandemic are among the factors that influence the magnitude of changes and the ultimate new normal for travel.

Changes in roadway travel give perspective to the impact of COVID-19. Roadway travel is the least impacted because it allows persons to socially distance and control exposure to contagion risk, yet this mode suffered dramatically, with volumes for 2020 anticipated to post final numbers approximately 13 percent below 2019 levels. By March of this year, when a full year of COVID-19-impacted vehicle miles of travel (VMT) will have accrued, rolling 12-month totals will be approximately 15 percent below prior year levels. This decline compares with the approximately 2 percent decline during the great recession and puts VMT at levels not seen since 2003. The impact on many other modes is far more significant.

This article provides a brief descriptive portrait of the pandemic's transportation impacts and shares a scenario for recovery trends. Associated changes that are and will continue to influence travel are previewed. Most of the attention focuses on roadway and public transit travel, as they are a large focus of transportation planning and engineering. The balance of the paper focuses on the implications on how planning and delivering transportation might change going forward. COVID-19 enhanced and revealed a need for review of how transportation is planned, designed, funded, delivered, operated, and governed. The unprecedented changes in travel merit an unprecedented reconsideration of how transportation professionals carryout their responsibilities going forward.

The Transportation Impacts of COVID-19

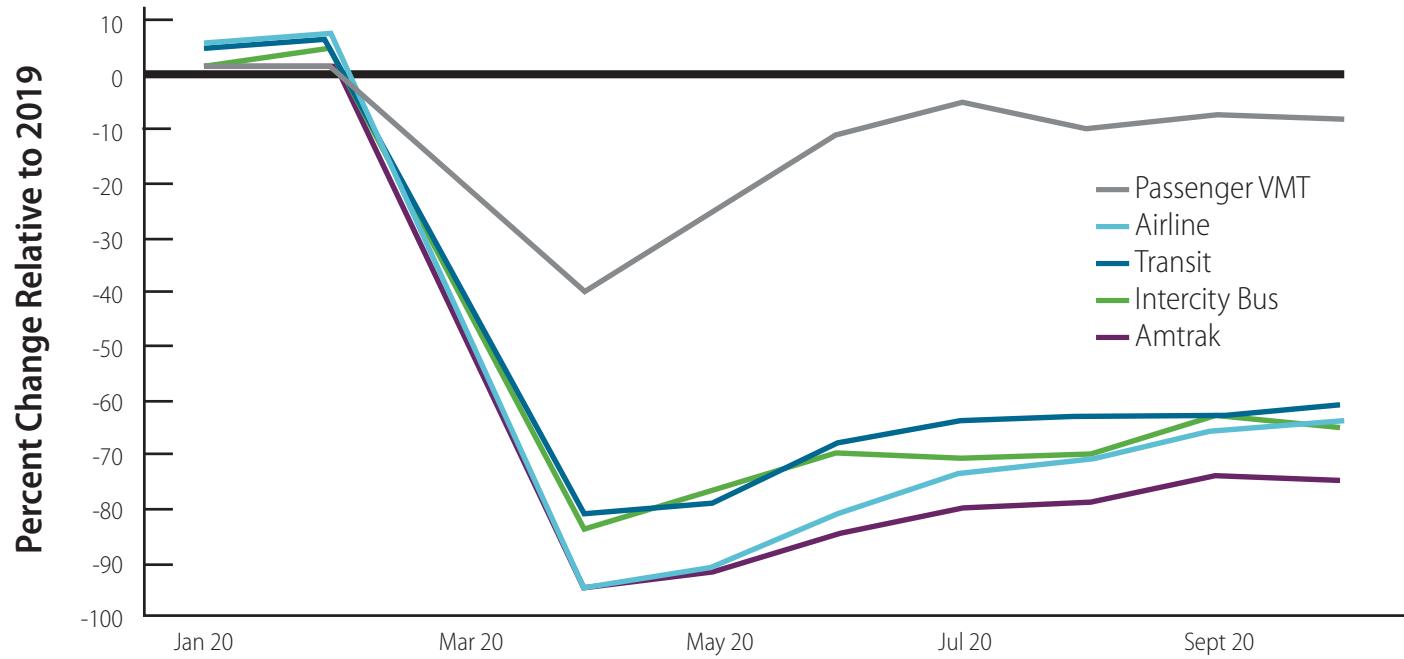
Figure 1 shows the trend of travel volumes in the first 10 months of 2020 for passenger travel modes. The magnitude of the impact is readily apparent by the dramatic percent declines in travel

volumes. These were most pronounced during the time when shutdowns dramatically impacted activity levels. Volumes increased as activity levels ramped up in parts of the country. The second clear observation is the disparate impact of COVID-19 on personal vehicle travel versus modes with group travel. For personal vehicle travel, the traveler can control their exposure risk by controlling who is in the vehicle and the extent of exposures and interactions getting to and from the vehicle. Personal vehicle travel was dramatically less impacted than airlines, public transportation, intercity bus, and Amtrak travel. In these modes, the traveler has exposure risk to other parties in the vehicles and higher probabilities of exposure at terminals and stations as they interact with fellow travelers, pay fares, handle luggage, and have other interactions, in addition to exposure to high-touch surfaces. Use of these modes is also impacted by the level of service provided. The dramatic initial declines in ridership resulted in diminished service levels in many instances—which further diminished attractiveness as a travel choice.

Figure 1 does not include several modes such as bike, pedestrian, taxi, transportation network services, rental cars, cruise, ferry services or freight, or commercial travel. Each of these travel modes has been influenced by COVID-19 and merits analysis by transportation professionals but are beyond the space available to discuss here.

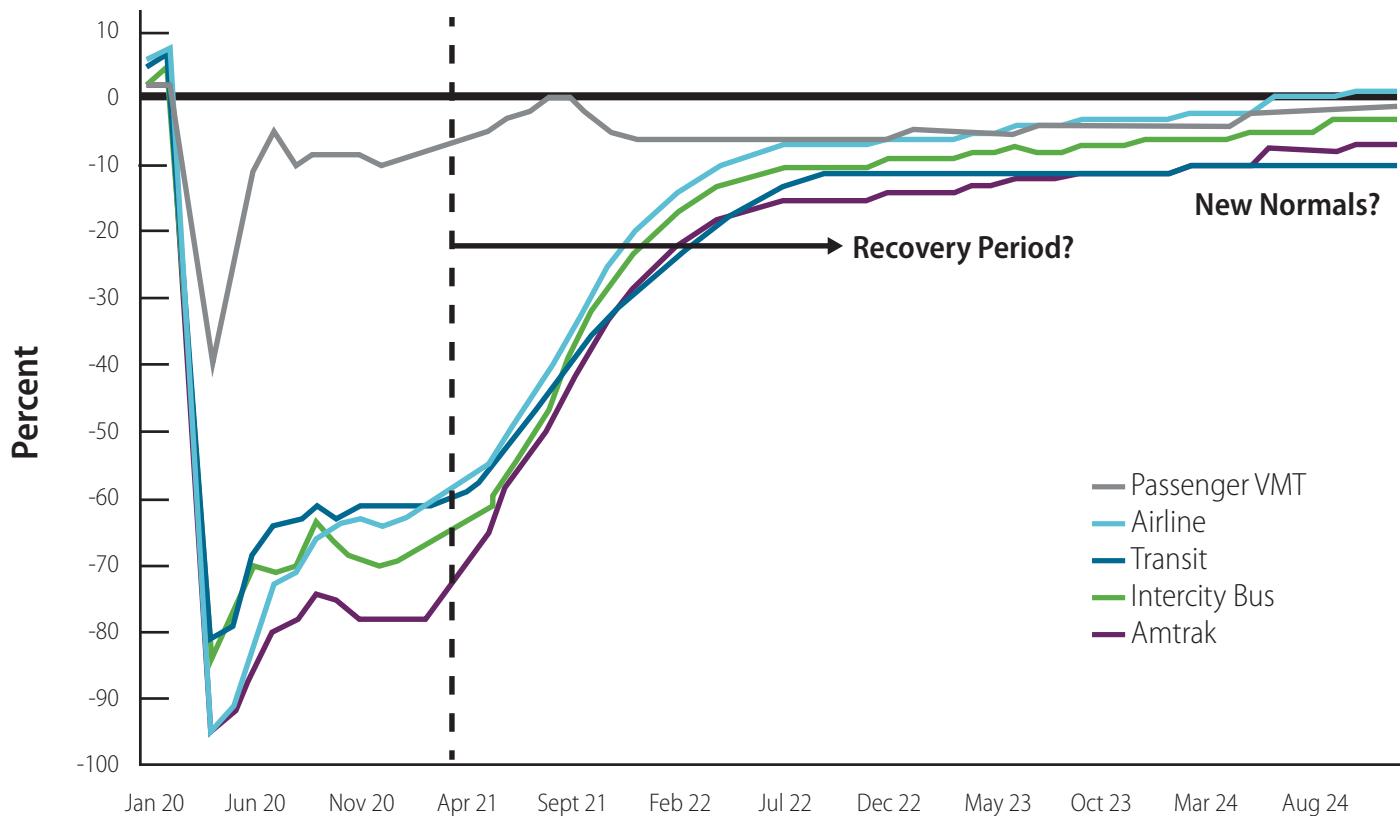
Figure 2 portrays scenarios of potential travel recovery for the modes referenced in Figure 1. The pace and extent of recovery is highly uncertain. It is expected that travel volumes will increase as the fear of exposure diminishes. The pace of recovery is likely to be influenced by the extent to which fear of activity participation

Figure 1. Change in Demand for Person Travel by Mode



SOURCE: DATA FROM VARIOUS SOURCES COMPILED BY USDOT BUREAU OF TRANSPORTATION STATISTICS (POLZIN, 2021)³

Figure 2. Travel Recovery Scenarios, Comparison with 2019



SOURCE: POLZIN, 2021³

and shared travel diminishes based on progress in mitigating the COVID-19 health challenges. Expectations fluctuate regularly. Vaccine rollout, development of more effective standards of care and protective therapeutics, and the unknown extent to which new variants of the virus influence health risks are among the factors that will influence the extent of recovery. Similarly, the acceptance levels of vaccination and compliance with other safety protocols can influence the levels of activity engagement and even the relative acceptability of utilizing different means of travel.

The recovery scenarios are not modeled numbers or mathematically derived trends, but judgement-based recovery scenarios informed by reviewing various industry and stakeholder perspectives of how recovery may occur. Early in the pandemic, analysts reviewed historic weather, natural disaster, and man-made events such as energy crises, 9-11, and hosting Olympics to garner insight on recovery after travel disruptions. More recently, analysts have recognized the unique nature of this pandemic. Both its duration which enabled the adaption of behavior changes, and the ability to substitute communications for travel, are unprecedented. What is widely shared is a recognition that there will be an extended recovery period and the new normal is likely to be different than the pre-COVID-19 travel conditions.

Travel volumes will be affected by several considerations:

1. The cancellation or discontinuation of activities that one would travel to such as work, sports events, school, shopping, worship, medical visits, business meetings and conferences, and related activities.
2. Individuals' decisions to forego or postpone travel for activities that are available but where the traveler decides not to incur the risk of exposure by participating in the activity.
3. Individuals' decisions to forego or postpone travel due to the perceived risk of exposure during travel to and from the activity.
4. Activities foregone due to secondary impacts of COVID-19 that affect the economy and activity levels. For example, persons losing employment and can no longer afford going out to dinner, shopping, or accessing other goods and services.
5. Travel foregone due to the COVID-19 induced availability and awareness of virtual and digital means of carrying out activities that previously required travel. This includes dramatic improvements in web-portal availability and user-friendliness and improved access to and user knowledge of communications options.
6. Changes in travel mode due to changes in the competitive attributes of the choices. For example, lessened congestion and more available parking favor greater auto use. Promotional discount fares may favor use of alternative modes—conditions potentially offset by diminished levels of service.

Progress in combating the pandemic should mitigate the first two factors, but one might anticipate some residual health risk fears, perhaps even fear of new health risks. Residual safety concerns may favor additional demand for individual vehicles, as airlines, public transit, and other shared use modes might be perceived as having higher health risks.

The third factor, economic impacts of a disrupted economy, will inevitably impede travel demand. While recovery and stimulus appropriations may dampen the magnitude and timing of the economic drag, multiple trillions of dollars in additional deficits risk an extended period of slowed economic activity with travel dampening impacts. There may be a stimulus effect and a surge in demand for "catch-up" travel initially before more stable, true post-COVID-19 trends emerge.

Perhaps the most significant consideration in the recovery is the prospect that communications in lieu of travel will have a meaningful impact on future travel demand. As noted in factor 5, the availability of virtual and digital communications and the exposure and experience with using them have proven their functionality and are expected to result in continued use after the pandemic. Most visible of these changes have been the dramatic increase in telecommuting and use of e-commerce, but numerous other substitutions are occurring for all trip purposes. The prospect of more telecommuting is significant in several respects. Commuting defines the peak travel periods, which drives the design capacity of infrastructure and peak supply levels for services. Commuting demand also tends to be clustered around central business districts and other job centers. As telecommuting is most likely to occur for office workers, its impact will be more pronounced for central business districts and other office employment clusters. A modest 5 percent shift to work-at-home for the overall workforce could mean a 10-20 percent change in travel to office employment centers, where workers that are most likely to be in a position to shift to work-at-home are concentrated. This could produce potentially important changes in congestion levels, transit ridership, and the geographic locations of traffic.



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Factor 6 refers to other COVID-19 encouraged or caused changes that influence travel. This includes the prospect for changes in auto availability based on anecdotal data on household vehicle additions that enable personal vehicle travel during COVID-19, and changes in the geographic and temporal travel patterns. These changes include residential moves, often to suburban or other areas perceived to provide greater safety or more affordable space to enable work-at-home activities. Other changes include different destination choices as office space, retail space, and other activities relocate, often in response to market adjustments influenced by COVID-19. The pandemic has resulted in a flattening of peak-period travel. The ability to carry out activities via communications has led to greater flexibility in work engagement including less peak travel as a result of full-time telecommuters, as well as flexible work hours as individuals mix at-home and in-office work during the day and across the days of the week.

The collective consequences of the COVID-19 pandemic and the transition to a new normal for transportation will leave the transportation profession with numerous challenges in the months and years ahead. Four of those challenges are touched on in remainder of this paper.

Transportation Planning after COVID-19

COVID-19 provides a strong argument for updating transportation planning processes and methods. Virtually every step in the planning process—the identification of goals to the assessment of needs, collection of data and information, generation of ideas and options, etc.—will all benefit from a review. For example, post-pandemic planning goals may add integrating flexibility and adaptability, increasing resilience, enhancing accessibility, and supporting equity aspirations. Planners and policymakers will have a host of challenging questions and tasks to address as they rethink transportation planning post-COVID-19.

- Planning data needs to be updated to include 2019 base year data, new data that reflects post-COVID-19 conditions and trends, and embraces new considerations reflective of post-COVID-19 priorities. COVID-19 reinforces the desire to have data collected more frequently, delivered more expeditiously, and provided with more geographic precision/specifity.
- Forecasting models need to be recalibrated to reflect the emerging importance of communication as a substitute for travel and altered travel behaviors resulting from the pandemic.



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- Planners have leaned on scenario planning as a tool to accommodate uncertainty. Scenario planning is not enough. It is necessary to integrate flexibility and adaptability of investments and operations into decision-making. It may merit postponing major irreversible decisions until some uncertainties have passed. For example, expansion projects highly dependent on work trip commuters for justification might best be postponed until post-COVID-19 commuting patterns reveal themselves.
- Methodologies for planning for stable or declining travel need to be developed. Future per capita vehicle travel growth is not anticipated to be robust and may even decline in some geographies. Thus, some geographies will be challenged to maintain current infrastructure and services in the face of declining demand and weakening economies. Planning practices need to address this challenge.
- Performance metrics for transportation need to be updated post-COVID-19 (capital and operating costs, capacity, productivity, energy/emissions efficiency, etc.) to reflect actual conditions. Many existing perceptions as to attributes of various investment and service options are dramatically out of date and reflect historic conditions that no longer exist.
- The evolution to far more complex funding strategies with reduced dependence on user fees has increased uncertainty regarding future resource availability. This ad hoc funding of transportation and/or dependence on reoccurring general fund appropriations undermines historic programming strategies which may need review.

A comprehensive rethinking of transportation planning is in order. While this change may be incremental and vary across geography, COVID-19 should serve as a trigger for an updating of transportation planning. This does not imply abandoning the decades of progress, but rather building on that knowledge and adapting transportation planning to a post-COVID-19 world. If planning is not significantly updated and redesigned, it will lose its credibility and relevance to decision making.



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COVID-19 and Safety

Transportation safety has historically been the top priority for transportation stakeholders at the federal, state, and local levels inclusive of operating entities and private sector partners. The COVID-19 pandemic has raised new safety concerns and may influence consideration of travel safety going forward. While roadway fatalities historically correlate with roadway volumes, the nature of that relationship has changed during the pandemic. Early evidence indicates that fatality rates, the single most widely observed safety metric, increased significantly from 1.17 fatalities to approximately 1.48 fatalities per 100,000,000 vehicle miles during the third quarter of 2020. Exploratory research by the U.S. Department of Transportation (USDOT) National Highway Traffic Safety Administration attributes fatality rate changes during COVID-19 to a myriad of factors:

Of the drivers who remained on the roads, some engaged in riskier behavior, including speeding, failing to wear seat belts, and driving under the influence of alcohol or other drugs. Traffic data indicated average speeds increased during the second quarter, and extreme speeds became more common. Other data suggested fewer people involved in crashes used their seat belts.¹

Over time, researchers will gain a richer understanding of the myriad of safety influencing factors that impact emerging trends and their persistence after COVID-19. Reduced congestion enables higher speed travel and more variability of speeds within the traffic flow. Higher speed crashes increase the probability of fatalities. Younger, more risk-taking drivers may have been a larger share of the traveling population. Lockdowns and diminished activity levels may have motivated careless driving behavior as travelers “escaped” being confined.

Strategic implications relating to safety may emerge. As more is learned about post COVID-19 travel conditions and behaviors, safety strategies and priorities may shift. Critical locations for safety investment, design features, regulation, education, enforcement, and other elements in the arsenal of tools to improve travel safety may merit changes.

Transportation and Equity

COVID-19 has affected different population groups in different ways, and new and existing inequities have been emphasized by social unrest. Lower income household members, often inclusive of disproportional shares of racial and ethnic minorities, are more likely to have been hurt by job layoffs or engaged in high exposure service or production employment not conducive to telework. They are also more likely to depend on shared modes of travel with higher exposure risk. This differential effect of COVID-19 has sensitized the public to disparities in transportation and a rethinking of the role of transportation in the welfare of low-income population segments.

Similarly, the availability of robust transportation options and contingency transportation capabilities for persons with disabilities were reinforced by the COVID-19 pandemic. Part of the equity challenge is ensuring access to transportation for all segments of the population, especially in times of crisis and when travel options, features, and delivery methods are changing.

The sensitivity to equity stands in contrast to a market-driven delivery of transportation capacity and services. Measuring, modeling, and forecasting demand have been critical elements of transportation planning and decision making. The ability to scale services and infrastructure to demand, and the subsequent effects on the productivity of transportation, contribute to the affordability of mobility. To the extent that equity considerations diminish the sensitivity to demand in the allocation of resources, it could affect the productivity and benefits of transportation investments and the willingness of the private sector to accept market risks as a participant in providing mobility.

Understanding and analyzing equity issues will be an important but challenging consideration in decisions on providing transportation in a post-COVID-19 era. If not executed carefully and governed by clear objectives, consideration of equity could become a contentious process that delays and disrupts transportation progress.

Future Challenges for Public Transportation

The COVID-19 pandemic exacerbates an already challenging environment for public transportation. Ridership had declined over several years despite a robust economy and growing levels of service. Record auto ownership, burgeoning travel choices such as transportation network company services, e-scooters and bikes, growing telecommuting and e-commerce, and changing demographics had been challenging public transportation. The competitive advantages of mass transit's space, energy, and emissions efficiencies were already being diminished, as personal vehicles have become more efficient and evolve toward electric propulsion.

The future risk to demand is compounded by the possibility that automated vehicle services could render uncompetitive traditional public transit services in all but high-volume corridors. The emergence of COVID-19 and its substantial reduction in public transit ridership results in a perfect storm of challenges for public transportation as we know it today.

Social distancing undermines the fundamental advantage of "mass" transportation, namely the ability to carry large numbers of passengers on larger shared vehicles. Until progress on the medical front enables public transportation safety risk to return to near normal, public transit is unsustainable. However, transit's role in providing mobility for those without alternatives remains a serious public concern and require strategies for meeting this mobility need. The gravity of this concern will be among the most pressing challenges for transportation policy makers.



Transit data show that the effect of the public health emergency is pronounced and unprecedented. There is growing evidence that post-COVID-19 travel behavior will be different in ways that challenge many current public transportation services. The magnitude of the COVID-induced changes in travel means that a swift return to normal is unlikely. Rather, transportation professionals need to monitor emerging trends and plan accordingly for public transportation.

Closing Thoughts

Transportation has not been without its challenges, and the COVID-19 pandemic has both highlighted some of those challenges and added others. We are in a particularly challenging and exciting time. Transportation is changing at a far faster pace than in prior decades as demographic, economic, technological, governance, and public behaviors, values, and priorities are shifting. We face—hopefully—transitioning to a post COVID-19 world, one with new transportation needs. We also are on the verge of reauthorization of federal transportation legislation, seeing the prospect for infrastructure initiatives, facing the persistent transportation funding challenges, addressing the troubling transportation safety trends, confronting challenges associated with defining the role of transportation in addressing equity and opportunity, sorting through a path forward for automated vehicles, and finding ways to mitigate the environmental consequences of transportation without diminishing its role in supporting the economy and quality of life.

We are armed with a more diverse and multi-disciplinary workforce strong private sector engagement, and investment in the future of mobility, including a plethora of technologies to assist us in addressing the various problems including everything from virtual participation in public meetings to logistics and operations enhanced with artificial intelligence and powerful computing. But we are burdened with a highly polarized and contentious

decision-making environment, an incomprehensible governance structure, and perhaps the lack of discipline and shared values that would make this task easier.

The immediate challenge of transportation professionals is to understand the impacts of COVID-19 in the context of transportation and then revisit everything we do, and how we do it, to best accommodate the post COVID-19 transportation reality. [itej](#)

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