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Title

Piloting the Future: Strategies for Short-Term Transportation Projects

Permalink

https://escholarship.org/uc/item/6d073173

Author

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Publication Date

2024-06-13

DOI

10.17610/T6NK63

UCLA **Lewis Center** for Regional Policy Studies

UCLA **Institute of Transportation Studies**

Piloting the Future

Strategies for Short-Term Transportation Projects

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Client: Southern California Association of Governments

June 2024

Technical Report Documentation Page

1. Report No. N/A	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A
4. Title and Subtitle Piloting the Future: Strategies for Short-Term Transportation Projects		5. Report Date June 13, 2024
		6. Performing Organization Code UCLA-ITS
7. Author(s) Jo Dine		8. Performing Organization Report No. LAS2412
9. Performing Organization Name and Address Institute of Transportation Studies, UCLA 3320 Public Affairs Building Los Angeles, CA 90095-1656		10. Work Unit No. N/A
		11. Contract or Grant No. N/A
12. Sponsoring Agency Name and Address UCLA Institute of Transportation Studies www.its.ucla.edu		13. Type of Report and Period Covered Final
		14. Sponsoring Agency Code UC ITS

16. Abstract
This research is intended to support the implementation of a program led by the Southern California Association of Governments (SCAG) to support new transportation-related pilot projects in the region through 2026. Although pilot projects have become popular in transportation planning and other policy sectors, often to test new technologies or ideas before fully committing to them, agencies are struggling to turn their successful pilots into permanent programs. To further analyze the use of transportation pilots in the U.S., 15 interviews with practitioners were conducted and seven case studies of specific projects were analyzed. Findings revealed many shared experiences across agencies, despite their unique circumstances. Identifying long-term funding and adequate staff capacity were some of the most commonly cited challenges, but pilots can also come up against unexpected external barriers. Pilot-operating staff must be adaptable and willing to make significant adjustments or give up on a project when necessary. Also crucial are the method and scale of pilot evaluation, communication strategies with the public before and during the pilot, and partnerships with local organizations or universities. The recommendations provided for SCAG and other agencies are organized into five categories: long-term planning, goals and evaluation, partnerships, community involvement, and decision-making. This research contributes to a growing interest in the use of pilot projects for streamlining government processes and promoting risk-taking and innovation in public agencies.

17. Key Words California, program evaluation, program design, transportation planning, transportation finance, transportation, performance, futures	18. Distribution Statement No restrictions.		
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 76	22. Price N/A

Form DOT F 1700.7 (8-72)   Reproduction of completed page authorized

Acknowledgments

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Piloting the Future: Strategies for Short-Term Transportation Projects

Josephine Dine

A comprehensive project submitted in partial satisfaction of the requirements for the degree
Master of Urban and Regional Planning.

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Executive Summary

Pilots are limited-term, small-scale projects led by government agencies to test out an innovative idea, policy, or technology before committing to its long-term implementation. They allow agencies and residents to see how a program works and the impacts it could have before — if ever — it is made permanent, while also promoting a culture of innovation and risk-taking in government settings.

This research is in support of the Regional Pilot Initiatives (RPI), a program led by the Southern California Association of Governments (SCAG) through 2026 to fund and manage transportation-related pilot projects throughout the SCAG region in partnership with its member agencies. Although pilot projects appear increasingly popular, agencies are facing uncertainty and challenges surrounding pilot evaluation and, if deemed feasible and desirable, the transition of pilots into permanent programs.

This report provides an overview of common uses of and motivations for pilots, pilot evaluation methods, decision-making norms, and other themes that could be significant for SCAG and its partnering agencies during and after the RPI program. In particular, I investigate past pilot projects with varying outcomes to inform agencies how best to treat and assess their pilots and potentially move forward with scaling them.

Based on an analysis of the literature on pilot projects, interviews with 15 practitioners, and seven case studies of specific projects, I conclude that while pilots must be tailored to each agency's unique context and community, there are certain broad recommendations that can help agencies manage, fund, and sustain successful transportation pilot projects.

These recommendations include:

- **Formulate and discuss with partners and stakeholders a long-term plan for funding, staff, responsibilities, and operations before the pilot begins, with consideration of multiple potential routes.**

- **Combine quantitative data collection with surveys, focus groups, public meetings, and other methods of soliciting feedback to identify unexpected outcomes and gain a more nuanced understanding of community members' experiences with the pilot.**

- **Prioritize partnerships with local community-based organizations, nonprofits, pilot accelerators, and universities to incorporate resources and relevant outside perspectives to the project.**

- **Communicate openly and honestly with affected communities throughout the pilot process, have plans in place for making the pilot understandable and visible, and share and explain observed results widely.**

- **If a pilot is facing external obstacles to being scaled, organize coalitions of support to advocate for it to continue. Even if it does not succeed, there could be another chance in the future to bring it (or something similar) back to the agency and apply the lessons learned from the initial pilot.**

- **If a pilot has not achieved its stated goals or performance indicators or has introduced new problems, make significant adjustments to it based on those findings or determine the root causes of the "failure" and use that information to inform a new and improved approach to the issue.**

Introduction

Pilot projects are a common tool in all areas of policy and planning, especially as agencies in California and elsewhere set ambitious goals to mitigate climate change that require urgent and transformative action. This is partly why pilots have gained popularity in transportation planning and other policy areas — along with the influx of new technologies and services for agencies to experiment with, pandemic-related funding sources and attempts to be adaptable to changing circumstances, and a renewed prioritization of community input and feedback on public sector projects. Because they are explicitly temporary experiments, pilots allow for an accelerated implementation timeline compared with traditionally slow and bureaucratic governmental project review and approval processes.

The goal of a pilot is usually to determine the feasibility and desirability of a large-scale, long-term version of a policy, project, service, or technology. Along with being implemented more quickly than a standard program, pilots are used worldwide as opportunities to take smaller-scale risks on innovative and unpredictable ideas, considering they can be reversed and discontinued as quickly as they began if their outcomes fail to meet expectations. However, whether or not pilots prove successful, they will almost always leave their agencies with important lessons for the future, making even "failed" pilots a success in some way (Zipper, 2020).

A recurring challenge for public transit agencies and city governments attempting to incorporate innovative processes, policies, and technologies into their operations comes from transitioning an apparently successful pilot into a long-term program. Agencies often use external grants to fund pilots, leading to the task of identifying long-term funding if they decide to scale the pilot. This might come from the agency's operating budget or additional external sources. Sometimes even more difficult can be finding staff capacity and willingness to work on new projects, especially if the pilot will be transitioned from one department (e.g., the innovation team or city manager's department) to another (e.g., transit operations, parking, public works). Because of these obstacles, pilots often end abruptly after their trial period, even when they have public support and promising outcomes.

This study investigates the competing factors, motivations, and decisions related to transportation-related pilot projects in Southern California and beyond. The Southern California Association of Governments (SCAG), the nation's largest metropolitan planning organization, is planning to promote and support the use of innovative transportation pilots by their member agencies, which span six counties and 191 cities over 38,000 square miles (Southern California Association of Governments, n.d.). Through their Regional Pilot Initiatives (RPI), a $15 billion program, they will be partnering with interested agencies, funding small-scale pilots related to one of RPI's four main focus areas (Big Data, Active Transportation, Mobility Hubs, and Mobility Wallets/Universal Basic Mobility), and assisting with pilot development and management (Southern California Association of Governments, 2023).

Along with supporting member agencies in testing new mobility technologies and ideas, RPI is intended to promote experimentation and innovation on a larger scale. Even pilots that are never scaled can still serve as a useful proof of concept for peer agencies to learn from. As such, this report examines the challenges and experiences of 15 practitioners who have worked on (or adjacent to) transportation pilots in Southern California and across the U.S. Seven specific pilots are studied closely with respect to their motivations, contexts, and outcomes. These findings, along with insights from previous research on pilots, inform recommendations for planning, evaluating, and scaling transportation pilots that SCAG, its member agencies, and other stakeholders could make use of during this innovative period of transportation planning.

What Do We Know About Pilot Projects?

I begin this review of research on planning-related pilot projects by framing pilots through the concept of loss aversion and the challenges associated with making changes in government settings. I provide an overview of other motivating factors for public agencies' use of pilots. I then turn to the methods that researchers and agencies have used to evaluate specific pilot projects, with a focus on lessons learned from pilot evaluations. Next, I provide an overview of past findings on designing an effective pilot, including insights on external partnerships. Finally, I close with a discussion of the actual performance of pilot projects in varying contexts.

I.   Use of Pilot Projects

Decades of research in social psychology, political science, and economics have pointed to a common bias, known as loss aversion, in how people — individually and as part of organizations — make decisions and engage in risk-taking. It describes how our perceptions of the potential gains from choices with uncertain outcomes are usually outweighed by the potential losses (Tversky & Kahneman, 1981). Government agencies are certainly influenced by loss aversion in their decision-making, which can prevent innovative ideas from being implemented.

Research has shown that organizations tend to weigh the possible benefits of an idea or initiative against an existing reference point (Deslatte et al., 2020). For instance, Nicholson-Crotty et al. (2017) found that public managers rely on perceptions of past performance when deciding whether to make risky decisions; they are less likely to take risks when performance appears to be meeting expectations, compared to when performance is falling short of or exceeding expectations (Nicholson-Crotty et al., 2017). In general, maintaining existing programs and activities is more appealing than starting entirely new ones for members of an organization with limited capacities (Deslatte et al., 2020; March & Simon, 1958). Loss aversion is one possible explanation for local governments' actions (or inactions) that favor preserving the status quo.

This tendency is relevant to pilot projects because they are usually framed as short-term, temporary experiments that could be easily reversed, in contrast with extensive, long-term programs that involve more cognitive, political, and financial risks for agencies, partner organizations, funders, and constituents. Turner (2005) argued that pilots are often used specifically to help reduce the risk and uncertainty of implementing new projects (Turner, 2005). Oldbury et al. (2022) explained that the recent emphasis on experimental governance within the sustainable transportation field has been a reaction to the slow-moving established structures in government that make necessary changes difficult to achieve (Oldbury et al., 2022, 15). This suggests that pilots have become popular partly to work around the bureaucratic, risk-averse nature of local governments and public transit agencies.

More generally, in an article laying out the behavioral factors behind resistance to change (both as individuals and larger societies), Watson (1971) argued that changes introduced "piecemeal" are more easily accepted than changes implemented suddenly and at a large scale. Further, changes introduced alongside a clear mechanism for being retracted or reversed, if necessary, will face less resistance than those that are not (Watson, 1971, 762). Even if an agency plans to scale a pilot, its introduction may be more palatable to internal and external stakeholders if introduced as small-scale and alterable.

Pilots have allowed public agencies to bypass traditional planning processes and critical community members to fast-track their innovative ideas. However, this aspect of pilot projects has not been deeply researched. Janette Sadik-Khan, the former commissioner of the New York City Department of Transportation, is known for transforming Times Square and other parts of the city through pilots. She has said: "I think we were able to push back against the cynicism and challenges by moving quickly and showing New Yorkers something they could touch and feel instead of just arguing about it… [the pilot projects] gave us something to measure, and that went a long way to convince some of our biggest skeptics that the program was working, turning them into our biggest supporters" (Bruntlett & Bruntlett, 2018). These kinds of anecdotal experiences point to the ability of pilots to convince skeptical stakeholders that a project is more beneficial (or harmless) than they expected, once they see it in action.

The literature points to numerous other possible motivations for public agencies to implement pilot projects, including a willingness to learn important lessons about internal processes and project management — even if through an ultimately "failed" pilot that ends after its specified period (Zipper, 2020, 9). Public officials may also be in favor of pilots meant to test out new technologies in particular as a way to demonstrate their support for innovative solutions to residents' everyday challenges or to gauge the public opinion of an idea before proposing it as a traditional program or policy (Zipper, 2020). In a discussion of micromobility pilot implementation, DuPuis et al. (2019) explained that pilots can be useful for introducing unfamiliar services to a city's landscape. Their structure allows for a gradual rollout of new services and the ability to regulate the companies or providers that are eager to deploy their products (DuPuis et al., 2019, 17).

Goals and motivations can depend heavily on the type of project; for instance, Steckler et al. (2020) found that the goals of automated vehicle pilot projects they studied were more likely to emphasize assessing the viability of the technology and gauging public interest, while the micromobility, microtransit, and transportation network company (i.e., ridehail services) pilots usually had more traditional transportation-related goals (Steckler et al., 2020).

Scaling pilot projects into permanent programs is not always the primary objective. Some pilots are implemented simply to offer inspiration to other cities or serve as a proof of concept for a solution that may not be fully viable or feasible (van Winden & van den Buuse, 2017).

II.   Pilot Evaluation

Most existing research on transportation pilots has focused on the estimated or actual observed impacts of individual projects, in the form of government reports or studies measuring project outcomes. Their findings may thus be deemed generalizable to other agencies hoping to implement a similar project. Characteristics of a "successful" pilot in these studies depend on the agency's goals; the data ranges from traditional transportation metrics like vehicle miles traveled or transit ridership to climate-related metrics, economic analyses, or measurements of public opinion through surveys or interviews, among others.

Using information from over 200 mobility pilot projects, researchers at the Urbanism Next Center at the University of Oregon found that some of the most common types of data collected for micromobility projects were systemwide usage data, trip data, route data, anonymized demographic data, availability and distribution of vehicles, trip revenue by day/week/month, and collision and safety data (Steckler et al., 2020, 102). For microtransit projects, agencies and their partners usually collected data on trip origin/destination and travel time. For transportation network company pilots, data varied in scale (either per trip or aggregated across time or space) and usually included trip origin/destination locations, trip length, trip time of day, and number of trips (Steckler et al., 2020, 102).

Some agencies with published evaluation reports focused on metrics demonstrating a significant change since the pilot began, which could be the basis for their argument to extend or scale it. These metrics can be based on quantitative data, survey or focus group results, or a combination of sources. For example, MacArthur et al. (2017) examined the results of an electric bicycle (e-bike) pilot project that provided participating employees at three Kaiser Permanente health services campuses in the Portland, Oregon region with an e-bike to use for any of their daily trips for 10 weeks. The researchers surveyed participants about their confidence as cyclists and personal barriers to using the e-bike. They also completed a geographic analysis of the bike trips to determine if the participants' e-bike use changed over time (in terms of distances traveled, variety of trips, and frequency of trips) (MacArthur et al., 2017).

Similarly, an independent evaluation of the 2019 City of Palo Alto and Bay Area Fair Value Commuting pilot incorporated both observed effects and survey data (Martin et al., 2021). The project involved an integrated trip planning platform and a cashout system for participants, intending to reduce single-occupant vehicle use by commuters in the Bay Area. The authors measured the number of single-occupant commuter trips, vehicle miles traveled, energy consumption and emissions, public transit ridership, and the accessibility and mobility of lower-income employees (Martin et al., 2021). They also used pre- and post-study surveys to study participants' willingness to change their commuting behaviors, attitudes toward public transit, use of commuter incentives and benefits, and perceptions of mobility and accessibility (Martin et al., 2021).

While a number of these pilot evaluation reports claim successes regarding their stated goals, others note that the short-term nature of pilots can lead to uncertain results, especially when it comes to entrenched and complex issues. McDonald et al. (2003) examined a 2002 demonstration project by AC Transit, which offered free bus passes to low-income middle and high school students and reduced the cost of the agency's monthly youth pass. One year after the program began, the authors collected metrics ranging from student attendance and achievement to after-school participation. They found that many of these metrics depended heavily on demographic and geographic factors and that a multi-year analysis would be needed to determine the effects of the transit pass on school attendance and performance (McDonald et al., 2003).

Researchers have occasionally used predictive methods to estimate future, long-term impacts of a pilot project. A Michigan Department of Transportation (MDOT) report described projects spurred by a state law directing MDOT to experiment with long-life pavements (Muslim et al., 2023). MDOT investigated the long-term benefits and savings of long-life pavements by collecting samples and conducting laboratory tests. They also used mechanistic-empirical design software to estimate the design life for each pavement. They found that the long-life pavements used in their pilot were likely more cost-effective than traditional pavements, especially for high-traffic locations, but again, more time was needed to be certain (Muslim et al., 2023).

Experts providing recommendations to agencies on pilots have sometimes focused more on whether an evaluation is being completed and the accessibility of the findings, rather than the specific evaluation method employed. In an assessment of ongoing mobility-related pilots in the U.S. and Canada, the Urbanism Next Center at the University of Oregon emphasized the importance of clearly laying out the goals of each pilot and using evaluation reports to assess them, noting that only 11 percent of the pilot projects they studied had public evaluation reports. Evaluation reports give staff and other stakeholders a chance to reflect on lessons learned, which can be helpful to that particular agency and other communities hoping to experiment with a similar idea (Steckler et al., 2020, 110). The Shared-Use Mobility Center has similarly recommended laying out the project's objectives and performance metrics ahead of time and determining the specific types of data required to measure progress toward those objectives (Shared-Use Mobility Center, 2020, 23).

Steckler et al. (2020) also discussed the important role of surveys for agencies to understand user demographics, preferences, and experiences (Steckler et al., 2020, 98). The Institute for Transportation & Development Policy (ITDP) recommended that agencies document and share the project impacts in the form of measurable quantitative data as well as residents' stories and experiences. These data can then be used as evidence when advocating for similar projects in other contexts or requesting additional funding (ITDP, 2020, 6). Torrens & von Wirth (2021) argued even further that evaluating experiments against predetermined performance indicators can be problematic, as it potentially overlooks "qualitative outcomes of experimentation, such as reflexive learning, the emergence of new narratives, or the settling of deeply rooted disputes" (Torrens & von Wirth, 2021, 13). Along with figuring out what type of and how much evaluation to

complete, extensive data collection is usually very costly and time-consuming for agencies (ITDP, 2020, 33).

III.   Pilot Design

Effective pilot design depends on the specific context of the project and agency. Planners and officials must make decisions about the scale, length, and geography; the funding and staff needed; the level of involvement of the local community; the type of evaluation that will be done; their strategy for communicating it to the public; and the existence of and terms with any external partners, to name a few. Even with all these elements to consider, the past literature points to general recommendations for designing a successful pilot and recent patterns in external partnerships that are relevant to transportation pilots.

Watson (1971) argued in the context of general resistance to change that any innovations intended to challenge the status quo must be easy for users to understand and operate. Innovations that appear complex or require new skills face more resistance (Watson, 1971, 762). Watson noted numerous conditions that tend to make innovations more likely to be accepted by the public: (1) if community leaders and other affected stakeholders feel a sense of personal pride and ownership of the project — not that it is being devised and led by outsiders; (2) if the project has strong support from top officials in the system; (3) if participants view the change as an improvement over their present conditions; (4) if the project aligns with participants' values and ideals; (5) if proponents can empathize with their opponents, take note of valid objections, and work to alleviate participants' fears; (6) if proponents can recognize that innovations are often misunderstood, accept feedback, and make clarifications when necessary; and (7) if the project is kept open to revision and reconsideration (Watson, 1971, 763-764). These insights are applicable to pilot-operating agencies, especially if the pilots involve unfamiliar technologies or strategies that may lead to public confusion or scrutiny.

Some existing research involves attempts to include future participants in the pilot planning and implementation stages. Pike (2020) examined a proposed pilot project meant to increase access to the Amtrak train station in Davis, California through rideshare, ridehail, or other on-demand alternatives. Through a survey of Davis residents, the authors discovered that many were likely to use a hypothetical free ridehail service to travel to the station, but less so if they had higher perceptions of risks associated with riding the train during the COVID-19 pandemic (Pike, 2020). This research was intended to provide the planners with additional information about specific needs and community members to consider during the eventual implementation of the pilot.

The Shared-Use Mobility Center recommended that a proposed project have a clear "why" that is backed by observations and data about the mobility challenges that users face; then, agencies should work directly with those users to understand their experiences and brainstorm potential solutions (Shared-Use Mobility Center, 2023).

Agencies may also be able to incorporate lessons learned from other agencies' projects. Haque & Brakewood (2020) used 19 ongoing or completed automated shuttle pilot projects from cities across the U.S. as case studies to analyze the state of the practice. They concluded that certain locations are better suited for automated shuttles (university campuses, stadiums, downtowns) and laid out common service characteristics (low speeds, 6-12 passenger vehicle capacities, short routes) to inform cities that may be considering these pilots for themselves (Haque & Brakewood, 2020).

Insights into introducing new mobility services (such as ridehail, bikeshare, electric scooters, etc.) and partnerships between private mobility providers and government agencies can also be relevant to pilot design. In a policy brief on urban mobility pilots, Zipper (2020) argued, "The critical element of a successful urban mobility pilot is the development and articulation of hypotheses that the public sector will test with data… Communicating both these hypotheses and the metrics used to evaluate them at the start of a pilot can build credibility with both the general public and the private mobility companies considering participation" (Zipper, 2020, 1).

This conclusion highlights the need for public transparency and communication when piloting new mobility technologies. The author also mentions the importance of considering long-term funding availability and other aspects of expanding a pilot before it initially launches, in preparation for turning it into a permanent program (Zipper, 2020, 8). At the same time, a pilot's design, schedule, team, and any external contracts should remain as flexible as possible to promote the project's resilience and allow for adaptation to unexpected outcomes (Shared-Use Mobility Center, 2023).

Depending on the scale or type of pilot, its funding may come directly from the agency's operating budget. However, funding is more likely to come from limited-term grants from the regional, state, or federal government (Zipper, 2020). Funding is often one of the largest barriers to innovative projects in government settings; depending on their situations, agencies may take advantage of flexible federal funding opportunities, creatively utilize their staff and equipment, bring on additional skill sets through internship or apprenticeship programs, or partner with other institutions (Shared-Use Mobility Center, 2023).

Public agencies often plan pilots with external partners representing nonprofit or community organizations, academic institutions, or private companies. Local organizations and universities can help agencies build consensus and sustain new projects within the community, and they might also provide technical or financial support (Shared-Use Mobility Center, 2023; Eckholm & Siegel, 2023). These partnerships can help build public trust in the agency and project while mitigating inequitable impacts of new technologies (Steckler et al., 2020, 110). Meanwhile, private companies often partner with government agencies to implement a pilot incorporating their software, technology, or service.

Lewis (2019) noted that partnerships between public transit agencies and private mobility-on-demand (MOD) service companies differ from traditional public-private partnerships because MOD companies tend to be startups, and transit agencies often have little experience contracting out their services. Along with the need to establish data-sharing agreements, the author explained that clear and robust contracts are necessary for any successful partnership, which should outline risk allocation, stipulate performance metrics, and attempt to align actions between the two parties (Lewis, 2019). The Shared-Use Mobility Center emphasized that agencies should understand and clarify their data needs before establishing an agreement with a mobility vendor so that all parties understand how the pilot will be evaluated (Shared-Use Mobility Center, 2023). Steckler et al. (2020) found that a lack of regulation of new mobility services can create a "messy transportation environment," from e-scooters obstructing pedestrian walkways to ridehail vehicles adding to congestion at the curb. Agencies may use the pilot period to experiment with different types and levels of regulation, which can be revised over time (Steckler et al., 2020, 99).

These considerations for transportation-related pilots reflect larger shifts in traditional governance and funding structures. Public agencies are increasingly contracting for service or issuing permits to new mobility providers as technology improves and interest grows in incorporating these services into residents' lives. Alongside the growth in pilots of new mobility services, there has also been a dramatic increase in the number of private mobility service providers, such as transportation network companies (TNC), which aim to connect customers with various mobility options through their online platforms.

Curtis et al. (2019) examined the recent trend of public transit agencies partnering with TNCs to test complementary operating models (i.e., finding ways to connect traditional fixed-route transit service with ridehail). These are most often intended to target first/last mile needs, times of day and areas with little transit service availability, and customers of ADA paratransit services, and they usually involve the transit agencies directly subsidizing TNC trips or the two collaborating on marketing efforts (Curtis et al., 2019). One of the biggest challenges in these partnerships is that private TNCs are often hesitant to share their data, which they attribute to privacy concerns. This can affect the ability of public agencies to accurately measure impacts and again highlights the need for thorough data agreements to avoid disputes (Curtis et al., 2019; Shared-Use Mobility Center, 2023).

IV.   Pilot Performance

Pilots have been more closely studied thus far regarding climate, water, and energy policy than transportation policy (Hatziargyriou et al., 2007; Bossink, 2017; Hughes et al., 2018; Blackburn et al., 2020; Vreugdenhil et al., 2009). Past studies in other fields have employed a wide variety of methods and reached conflicting conclusions on the overall effectiveness of pilots, depending on the criteria used and method of analysis. Pilots are largely assumed in the literature to be useful policy tools, especially for new technologies or controversial ideas. In theory, "the only 'failed' pilots are those that do not inform policy choices one way or the other. If a pilot helps local leaders to learn, it has done its job" (Zipper, 2020, 9).

However, some have questioned the growing role of experimentation in urban policy and the effectiveness of pilots for addressing entrenched issues. Oldbury et al. (2022) explored the general concept of experimentation in sustainable transportation, including its strengths and limitations and whether (or how) it can prompt transformative change. The authors noted that the impacts on communities of many of the new technologies being piloted remain uncertain, as does the extent to which experimentation may actually "shape, reshape or challenge established planning processes and power relations" (Oldbury et al., 2022, 16). In a similar vein, Torrens & von Wirth (2021) critiqued the phenomenon of "projectification," or the reliance on temporary and experimental interventions as a way to address persistent, large-scale challenges (Torrens & von Wirth, 2021). They argued that these kinds of urban experiments often fail to meet their learning promises, lack clear direction, and fail to scale — thus limiting their ability to induce real change (Torrens & von Wirth, 2021).

Through an assessment of automated vehicle (AV) pilots in the U.S., McAslan et al. (2021) found strong disconnects between cities' transportation goals and the goals of the AV pilot projects they conducted, even though their broader transportation goals were often used as justification for starting new pilots (McAslan et al., 2021, 8). Instead, many agencies used AV pilots to further goals unrelated to transportation, such as being an early adopter or "hot-spot" for AV innovation or promoting economic development (McAslan et al., 2021, 10).

While not necessarily problematic, these goals may be unaligned with an agency's previously stated service-oriented objectives. Additionally, the authors observed a general lack of long-term planning for AV services beyond the pilot stage, with funding availability as a major constraint. They determined that cities were failing to maximize their pilots' potential benefits and opportunities for policy learning (McAslan et al., 2021, 11). These results echoed concerns from other researchers about smart city solutions (through pilots or otherwise) that publicly aim to address long-standing transportation challenges through experimental projects and technologies but in reality do little to improve the lives of everyday residents (McAslan et al., 2021, 13).

On the other hand, there are many reasons that individual projects could be deemed successful — and thus worth making permanent — or not. Previously mentioned pilots that were evaluated by agencies or third-party researchers exhibited success on some level, broadly or narrowly defined as part of the original goals, objectives, or evaluation criteria (MacArthur et al., 2017; Martin et al., 2021; McDonald et al., 2003; Muslim et al., 2023). For example, the e-bike pilot in Portland, Oregon received positive survey responses from participants (MacArthur et al., 2017). The e-bikes allowed them to bike more often, become more confident cyclists, and overcome their previous barriers to cycling. The geographic analysis showed that they biked for longer distances and to a wider variety of places by the end of the study period (MacArthur et al., 2017).

Meanwhile, even though McDonald et al. (2003) could not conclusively determine yet that the 2002 AC Transit project offering free bus passes to low-income middle and high school students led to significant changes in attendance or achievement, it still involved the distribution of almost 25,000

free bus passes, presumably expanding at least some of those students' mobility options (McDonald et al., 2003). This result reflects the possibility of a pilot failing to prove its alignment with stated goals (or outright failing to reach those goals), yet still potentially being beneficial enough for the agency to attempt to make it permanent.

It also highlights the intricate decision-making process involved in determining whether certain projects are worth the funding, time, and staff capacity needed to continue and expand. The Shared-Use Mobility Center report on innovative mobility pilots highlighted the importance of being willing to reevaluate and revise the original plan for a pilot, potentially after analyzing metrics about its impact or at another crucial point (Shared-Use Mobility Center, 2023, 31). Rather than continuing a project that is not demonstrating the intended impacts, agencies should be willing to "cut losses and change course in a way that is most beneficial to the budget and the financial sustainability of the project" (Shared-Use Mobility Center, 2023, 31).

Even for clearly "successful" pilots, there remains the omnipresent challenge for public agencies worldwide of the extension and transition of pilots into permanent, large-scale programs, for which the existing literature does not offer clear solutions (McAslan et al., 2021; van Winden & van den Buuse, 2017). "Pilot purgatory" describes the phenomenon of even successful pilots failing to achieve the government procurement orders or policy changes needed for their large-scale adoption (Eckholm & Siegel, 2023, 7).

The Institute for Transportation & Development Policy analyzed tactical urbanism projects in cities in the Global South to determine what allowed them to transition from "pilot to permanent" (ITDP, 2020). Based on their case studies, they recommended that those involved with future projects (1) establish and communicate clear project goals, timelines, and expectations; (2) encourage collaboration between stakeholders and local government; (3) anticipate resistance and plan to engage with critical stakeholders; (4) generate long-term community acceptance and buy-in for the project; and (5) demonstrate project impacts through different types of data collection (ITDP, 2020, 31-33).

Meanwhile, a report focused on innovative projects in the City of New York found that most agencies are lacking the staff capacity to transition pilots effectively into long-term solutions. Further, many agencies work within outdated procurement processes (Eckholm & Siegel, 2023). The authors suggested that the City support innovation-focused personnel and collaborate directly with local universities; make use of a "challenge-based" procurement method that allows agencies to define the problem they want to solve and test various solutions; and convene a pilot network including accelerators and pilot sites that can serve as mediators between companies, the government, and the public (Eckholm & Siegel, 2023, 8-9).

V.   Conclusions & Gaps

It is generally agreed upon in the literature that pilots are limited-term projects, often funded through grants, that test hypotheses related to local policy goals before, if ever, fully committing to

them (Zipper, 2020). They have gained popularity in transportation planning in recent years as a response to slow-moving bureaucratic processes and the rapid growth of new technologies and services, including ridehail, microtransit, micromobility, and automated vehicles. However, researchers and public agencies have come to numerous conclusions about the best uses for and effectiveness of their and other agencies' transportation pilot projects. This highlights the importance of considering individual contexts in planning, implementing, and evaluating pilots, from the type of idea being tested to the project's scale, geographic location, funding availability, staff capacity, and more.

Whether from studies focused on individual pilot outcomes or aggregated lessons from many similar pilots, the literature points to general recommendations for agencies hoping to design, implement, and evaluate a successful pilot. For example, researchers have emphasized setting clear evaluation metrics (while remaining open to unexpected outcomes), making data and outcomes easily accessible to the public, collaborating with external partners (with thorough agreements when necessary), and working directly with community members who are or will be most impacted. Ideally, pilots would have the capacity and feasibility to be scaled into impactful, long-term programs, or at least inform the agency's future actions and improvements to their internal processes; external communications, engagement, and partnerships; evaluation strategies; and ability to address political and technical barriers.

The existing research on pilot projects primarily fits within the following categories: (1) more theoretical research on the role of experimentation and making change in government settings; (2) government reports and academic studies evaluating individual pilot projects after they are completed; and (3) reports by academic, private, or nonprofit organizations compiling findings from numerous pilots, particularly those related to new technologies and mobility services.

Reports that fit into the third category are the most similar and applicable to this research. However, even this relevant work tends to only briefly touch on the process, challenges, and experiences of scaling pilots — particularly transportation-related pilots — into permanent programs. The past research and its recommendations are also not always intended specifically for government agencies but for private companies or other organizations hoping to get involved with government-run pilots. This research is intended to fill this particular gap by examining the experiences of public sector staff who have implemented a wide range of transportation pilot projects and using the findings to provide agencies with practical recommendations for pilot evaluation, management, and future decision-making.

Research Questions

There are three primary questions guiding this research.

1. **What motivates the use of pilot projects by public agencies?**

2. **How do agencies evaluate their pilots and decide whether to discontinue or scale them?**

3. **What challenges are agencies facing during the pilot process and how can they overcome them?**

These questions arose out of the stated goals by SCAG staff to learn more about how transportation pilots are usually evaluated and transitioned into long-term programs. The first question concerns the overall use and goals of pilots, especially as they have grown in popularity in the transportation field in recent years. The past literature and anecdotal evidence indicate a wide variety of motivations for implementing pilot projects, which can lead to different kinds of project outcomes and lessons learned.

The second question concerns these outcomes and how agencies decide whether to scale a particular project given the data and information they have received throughout the pilot. Finally, the third question is intended to uncover common barriers encountered during the pilot process and, more specifically, some of the reasons behind failures to scale pilots that appeared to be successful or valuable. While the second and third questions are focused in part on the ways that many agencies are currently operating, they will also ideally point to strategies for improving and simplifying the evaluation and scaling processes.

Data & Methods

This research involves a combination of qualitative methods to uncover patterns in the use, management, and scaling of pilot projects in Southern California and the U.S. more broadly. Along with findings from the literature on pilots as previously summarized, this report utilizes insights from 15 interviews with practitioners and seven case studies of past pilot projects.

I. Interviews

Table 1. Interviewee Names, Organizations, and Departments

Interviewee(s)	Organization	Department
Zaccary Bradt & April DeJesus	San Diego Association of Governments (CA)	Mobility Planning
Russ Brooks	City of Minneapolis (MN)	Mobility Planning
Maxine Durand	City of Twin Falls (ID)	Transit Operations
John Firouzi	City of Arvada (CO)	Mobility & Innovation
Gregory Kajszo	City of Glendale (CA)	Innovation & Performance
Ryan Kurtzman	City of Long Beach (CA)	Smart Cities Initiative
Brandon Long	Hayden AI	Business Development
Nader Mirjamali	Metropolitan Transit Authority of Harris County (TX)	Operations Management
Steven Povich	Massachusetts Bay Transit Authority (MA)	Fare Policy & Analytics
Joshua Schank	Los Angeles Metro (CA)	Strategic Innovation
Rylan Seifert	City of Pittsburgh (PA)	Mobility & Infrastructure
Ryan Stevens	City of Phoenix (AZ)	Pavement Management
Gregory Suter	Partnership for New York City (NY)	Transit Tech Lab
Anonymous	Metropolitan Transportation Authority (NY)	Bus Service Planning
Anonymous	City of West Hollywood (CA)	City Manager

I conducted 15 interviews with practitioners who have been closely involved with one or more transportation-related pilots to learn about their experiences, evaluation methods, challenges, and lessons learned. Fourteen of the interviews were conducted over videoconference and one took place in person. Three interviews had more than one staff member present, but typically there was still a primary interviewee answering most of my questions. Thirteen interviewees were representatives of public agencies (five of which were in California). Eight of the 13 public agencies

were city governments, four were regional transit agencies, and one was a metropolitan planning organization.

I also interviewed one representative of a nonprofit organization, which specifically aims to connect private companies with public agencies to run innovative pilots, and one employee of a private technology company that often partners with agencies for pilots. Three of the interviewees no longer work at the organization they were speaking about. Two chose to remain anonymous; the others consented to having their names included.

I intended for the interviews to shed light on my research questions, as well as my overall recommendations for SCAG and other agencies. The interviews were loosely structured and the questions varied based on each participant's involvement with pilots. I asked some participants broader questions about their approach to working on and evaluating pilots, especially those who worked in innovation teams at city governments. Others I had contacted to discuss a specific pilot, so I asked them about the planning, management, evaluation, and transition (if applicable) processes for that particular project. I also usually asked about any important lessons learned, unexpected challenges, or general thoughts on the use of pilots.

I aimed to capture some diversity in terms of the organizations that the interviewees represented — the size and geography of their city or organization, the type of organization, the political climate of their region, and other factors.

However, these interviews are certainly not a representative sample and solely reflect the insights and opinions of the 15 people with whom I was able to speak. They discussed their experiences at a specific agency or organization, but their views are not necessarily those of the entire organization or other staff members.

II.   Case Studies

Table 2. Case Study Pilots and Current Status

Project	Type of Pilot	Agency	City	Status
Youth Opportunity Pass	Fare Program	San Diego Association of Governments	San Diego, CA	Ongoing
Mobility Hubs	Mobility Hubs	City of Minneapolis	Minneapolis, MN	Ongoing
Ride TFT	Microtransit	City of Twin Falls	Twin Falls, ID	Permanent
Cool Pavement	Streets, Infrastructure	City of Phoenix	Phoenix, AZ	Permanent
HOV/HOT Weekend Hours	Highways, Pricing	Houston METRO	Houston, TX	Permanent
Traffic Calming	Streets, Infrastructure	City of Arvada	Arvada, CO	Ended
Move PGH	Mobility Hubs	City of Pittsburgh	Pittsburgh, PA	Ended

Partly through insights gained during the interview process, I chose seven pilots to demonstrate some of the common experiences, challenges, processes, and outcomes of transportation pilots. The SCAG region is diverse in terms of jurisdiction size, infrastructure, land use, resources, political and cultural affiliations, and demographics. I aimed to reflect some of that variation through my chosen cases, while also capturing perspectives from different regions in the U.S.

While I attempted to incorporate different geographic regions and sizes, project types, project outcomes, and challenges faced, among other factors, there was not a standardized process for selecting the cases. I decided to dive deeper into projects that I found interesting, that I was already aware of, or that I had the chance to speak with a practitioner about in more detail.

I analyzed each of the seven case studies in terms of their motivations, historical contexts, planning and outcomes, evaluation methods, partnerships, funding, and challenges. This information came from the interviews, publicly available data or reports from the agency, news stories, press releases, academic journal articles, and blog posts. Certain findings from the case studies are inherently subjective given that they were based on the insights I gained from one person involved with that project.

Based on the past literature, my interviews with practitioners, and the case studies, I will identify recurring themes, patterns, challenges, and lessons related to transportation pilots. The main categories for these themes are (1) Uses and Motivations, (2) Funding, (3) Partnerships & Community Engagement, (4) Evaluation, and (5) Decision-Making. The general findings will serve as evidence and justification for my recommendations.

Case Studies

*See **Appendix** for a more detailed description of each case study.*

I. San Diego Association of Governments
Youth Opportunity Pass (See Appendix A)

Source: City Heights Community Development

- An ongoing pilot led by the metropolitan planning organization for San Diego County, SANDAG, in partnership with two transit agencies and six community organizations to provide fare-free transit passes for anyone under the age of 18.

- Community members had been advocating for this program for years prior, and SANDAG was able to fund it starting in 2022 through COVID-19 relief funds and the federal CMAQ program.

- SANDAG researchers completed an evaluation report with both quantitative (e.g., school attendance rates, youth transit ridership, estimated reductions in greenhouse gas emissions) and qualitative (through surveys and focus groups) measurements.

- SANDAG is working on identifying a long-term, sustainable funding source for the program to continue in the future beyond its current pilot period.

II.   City of Minneapolis, Minnesota
Mobility Hubs (See Appendix B)

Source: City of Minneapolis

- An ongoing (on-and-off) pilot that first began in 2019, introducing the mobility hub concept to Minneapolis with 12 sites that included bikeshare, e-scooters, wayfinding signage, and temporary infrastructure.[1]

- The City published two evaluation reports on the 2019 and 2020 pilots, which included mode use data, trip origins and destinations, transit ridership, and qualitative data from surveys, community partners, and an ambassador program. Ambassadors were in charge of maintaining the hubs, receiving feedback, and assisting users.

- The pilot has faced numerous barriers to continuing and becoming a permanent fixture: changes in transportation and general needs due to the pandemic, winter weather, grant logistics, and shifts in City leadership.

- There is now a plan in place for the first seven permanent mobility hubs starting in 2025 because the City received a five-year, $2 million grant.

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[1] Mobility hubs are specified locations where people can access multiple different modes of transportation, usually adjacent to a public transit stop or station. They are intended to facilitate first/last mile connections while also often serving as gathering spaces with seating and other infrastructure.

III. City of Twin Falls, Idaho
Ride TFT (See Appendix C)
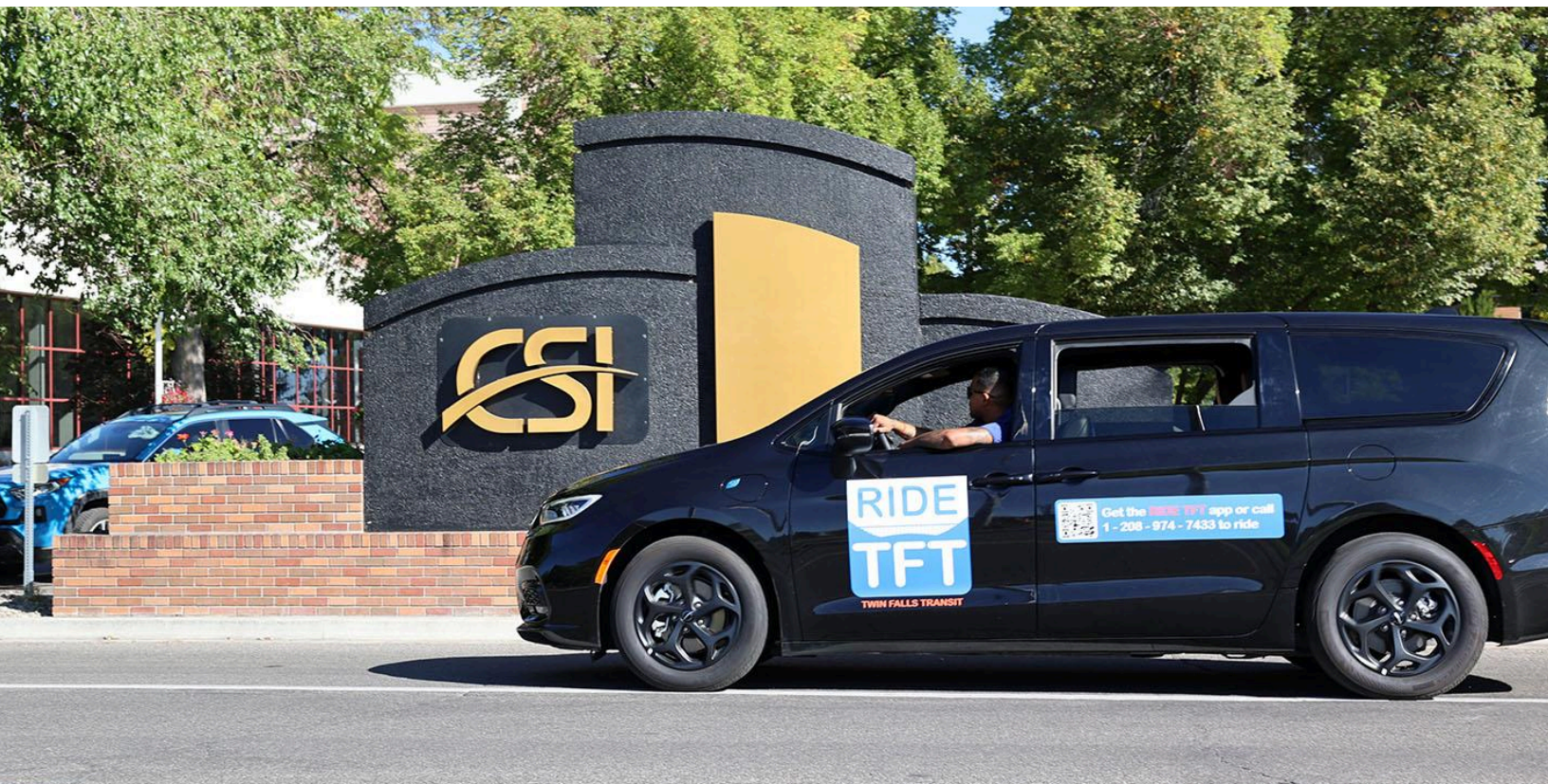
Source: Ride TFT

- A pilot that introduced the first public transit system (in the form of microtransit), called Ride TFT, to Twin Falls. It began in July 2023 and became permanent six months later because of the amount of demand for the service and its perceived success by that point.

- Ride TFT currently includes seven vans and 15 drivers, and rides cost $3 (or $1 for riders with disabilities or over 60 years old). The percentage of users that ride for the discounted rate has remained around 50%, emphasizing the need for this service in the community.

- Twin Falls partnered with a private software company, Downtowner, to plan and launch Ride TFT. The City has also worked with a nonprofit, a transportation company, and a local university for assistance with their operations.

- The City has been collecting data on wait times, popular destinations and times of day, number of wheelchair rides, rider experience (rating out of 5), and fares collected. Ride TFT staff hope to identify sustainable public and private funding sources by the time their current grant expires.

IV.   City of Phoenix, Arizona
Cool Pavement (See Appendix D)

Source: Scientific American

- A pilot experimenting with lighter-colored sealing treatments on asphalt streets in Phoenix to mitigate urban heat island effects. It began in 2020 and became permanent in 2021 after the initial pilot period ended.

- Since the pilot began, funding has come from the Street Transportation Department's operating budget, even though the cool pavement treatment is more expensive than the material that was used previously.

- Researchers from Arizona State University conducted a scientific study and survey to evaluate the pilot. They found that surface temperatures decreased, but mean radiant temperatures (humans' experiences of heat) increased during the day because of the reflectivity.

- The City has prioritized open communication with residents about the pilot and ongoing program. The ASU survey showed that even residents who were critical of the project generally felt that the City communicated their actions and motivations effectively.

V.   Houston METRO

HOV/HOT Lane Weekend Hours (See Appendix E)
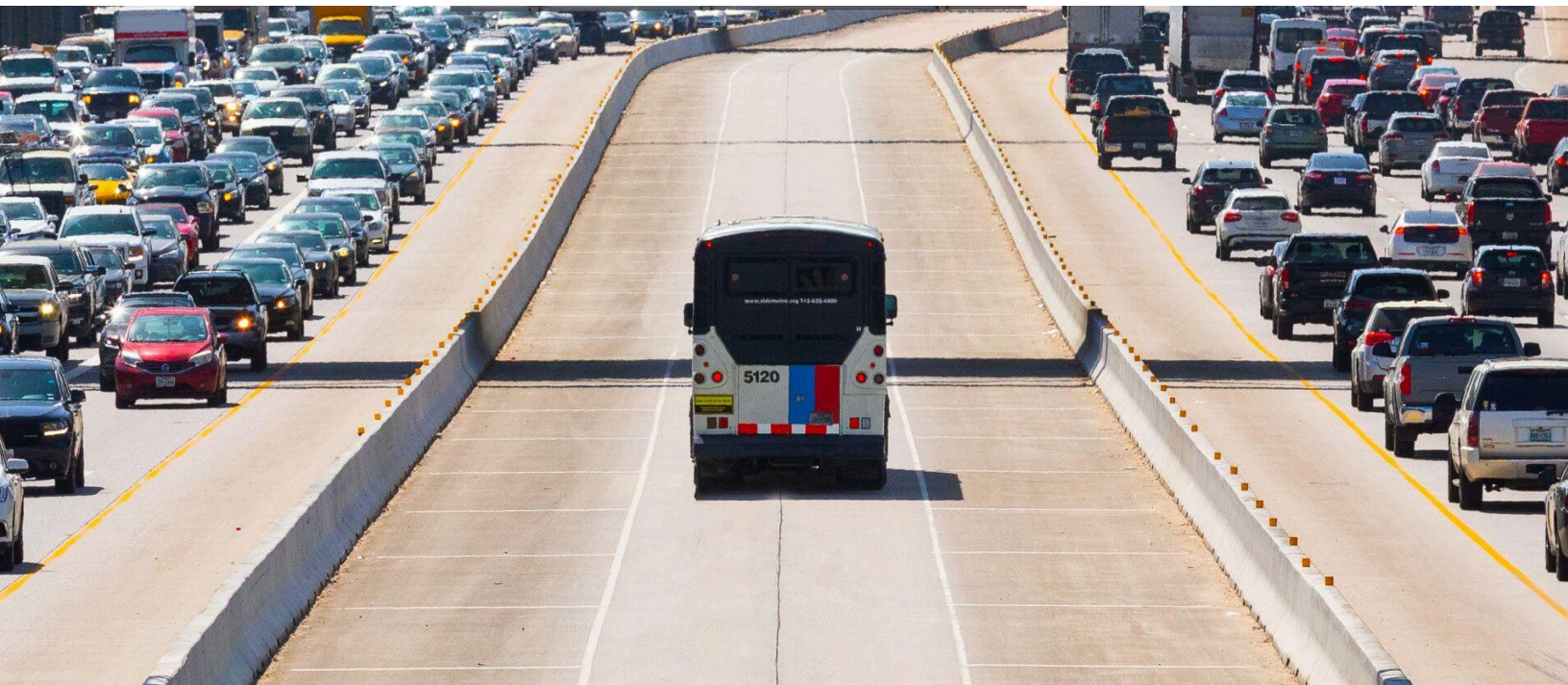
Source: METRO

-   A pilot that increased the operating hours for existing high-occupancy vehicle/high-occupancy toll lanes on Houston-area freeways to include weekends and became permanent after its three-month pilot period.

-   Although the idea had been rejected in the past because of the additional cost, METRO decided to try it again because the infrastructure was going unused over the weekends and the METRO Board wanted to prioritize service provision over cost-effectiveness.

-   To evaluate the pilot, METRO collected data on the volume of drivers per day on each of the HOV/HOT lane corridors, and found that although the numbers were much lower than during the week, they remained stable or increased over the course of the pilot.

-   The change involved a $380,000 addition from METRO's budget to its existing $30 million contract over five years with TransCore, an engineering company known for its electronic tolling services.

VI.   City of Arvada, Colorado
Traffic Calming (See Appendix F)

Source: City of Arvada

- A pilot that implemented temporary traffic calming measures (curb extensions, speed cushions, and traffic circles) to two main corridors after complaints from city residents about speeding. They were installed in 2022 and are now being removed gradually.

- The project was funded through a one-time increase in sales tax revenue. A traffic calming pilot was decided on in part because of its low costs, but the costs increased as time went on and it became challenging to maintain the infrastructure due to staff shortages.

- The City evaluated the pilot through quantitative speed and volume data. While speeds were found to have decreased at the study areas, near-misses and dangerous driving increased, partly because of drivers' confusion.

- Based on these results, the city decided to discontinue the pilot and shift their strategy for improving safety towards enforcement and education rather than infrastructure.

VII.   City of Pittsburgh, Pennsylvania
Move PGH (See Appendix G)

Source: Better Bike Share Partnership

- A pilot that brought together Pittsburgh's mobility operators (bikeshare, e-scooters, e-mopeds, and carshare) into one digital platform and encouraged their colocation.

- The State Legislature approved the use of e-scooters in Pittsburgh, only for the two-year Move PGH pilot, in 2021. Spin, a private e-scooter operator, provided 50 charging stations, which served as mobility hubs around the city.

- Along with funding from Spin, Move PGH was primarily funded through philanthropic grants. One prominent challenge was running the pilot with only half of one staff member's time dedicated to it.

- The City published a mid-pilot report that demonstrated high utilization of the mobility services. However, as the end of the pilot period approached, the State Legislature did not approve an extension of the e-scooter authorization and they have now all been removed. Department staff hope to bring back the program eventually.

Findings

I.   Uses & Motivations

a. Experimenting

The research literature, case studies, and interviews with practitioners have confirmed that there are a wide variety of motivations behind the use of pilots by public agencies. Most commonly and traditionally is the motivation of testing out an unfamiliar policy, technology, or idea before committing valuable resources to it in the long term. In recent years in the transportation field, these experiments have often involved micromobility, microtransit, ridehail, automated vehicles, software, and other new services.

Agencies usually have questions about projects' effectiveness, usage rates, and impacts for their specific contexts, which can only be answered by seeing and evaluating them in action. While similar types of evaluation may also be completed for traditional government projects, the pilot format gives agencies more flexibility to adjust their plans or re-evaluate the merit of the idea entirely. Pilots may also be intended to address a prominent issue or need within the community, especially one that residents directly request a remedy for (Bradt, interview, January 17, 2024; Kurtzman, interview, January 10, 2024; Firouzi, interview, March 11, 2024; Mirjamali, interview, March 21, 2024).

b. Public Perceptions

As expected, interviewees confirmed their familiarity with pilots that were at least partly meant to circumvent internal or external opposition to a particular project or idea. All involved stakeholders are likely to be more open to a project planned to last no more than a couple years (before potentially being scaled) than one that is introduced as a permanent fixture (DeJesus, interview, January 17, 2024).

There are specific types of projects which tend to be criticized when proposed but have been shown to become popular (or neutral) once they are implemented and people can see firsthand how they work — congestion pricing, for example (Schank, interview, February 5, 2024). Pilots can help pass certain controversial projects through these kinds of obstacles, and they may not be very controversial anymore when the pilot period is over.

In a similar vein, there are projects that are officially deemed "pilots" by their agencies but do not fully function that way. This could apply to innovative programs that the agency has decided to implement long-term but that they also want to emphasize as experimental and cutting-edge. Again, this could be due to actual or expected pushback of the idea from community members (with the hope that this will die down once the project is implemented), or it could be to generate excitement and press for the project by highlighting it as innovative. These kinds of pilots may not

be rigorously evaluated by the agency like traditional pilots would be, because there is already an expectation from the start that they will become permanent (Anonymous, interview, February 2, 2024; Schank, interview, February 5, 2024; Seifert, interview, February 21, 2024).

c. Internal Process Improvements

Most agencies run their pilots from the department in which the idea originated or which has jurisdiction over the type of intervention. Transportation pilots are usually led by public works, parking, transportation planning, mobility planning, active transportation, engineering, or operations departments. However, cities are also increasingly forming innovation departments, which might be in charge of proposing and managing innovative pilots for the entire agency. They would then likely transition the operations to another department for long-term management if the pilot were scaled (Kajszo, interview, January 8, 2024; Kurtzman, interview, January 10, 2024).

Innovation departments can propose transportation-related or other infrastructure pilots, but they tend to place a strong focus on improving internal processes agencywide. Ideas for internal improvements might come from the innovation team, especially when staff are too busy to reflect on how their procedures could be made more efficient or when considering citywide process improvements (e.g., a new software for submitting timesheets) (Kajszo, interview, January 8, 2024).

Some pilot ideas, however, come directly from the staff at the agency because of recurring challenges they are facing. For instance, the City of Long Beach started a pilot that provided staff with automated email templates to respond to frequent questions or requests from constituents, which ended up saving them time (Kurtzman, interview, January 10, 2024). These kinds of pilots usually involve the implementation of a new software, which tends to be much simpler and more financially feasible to scale than infrastructure or policy projects.

Some staff members and departments may be more open than others to collaborating with innovation teams on new pilots, depending on internal relationships, the culture of the agency or department, departmental duties, and staff capacity in general (Kurtzman, interview, January 10, 2024; Schank, interview, February 5, 2024).

d. Political Motivations & Justifications

Pilots are often motivated or justified by larger political dynamics or policy goals, but this has not been extensively studied. Given the growing urgency of climate change impacts, agencies have been tying their transportation pilot projects to their broader climate-related goals. For instance, the San Diego Association of Governments aligned its bus-on-shoulder pilot project with the goals in its long-term regional plan for reducing greenhouse gas emissions in the transportation sector. More people are expected to use buses as their operations improve, which ideally reduces single-occupant vehicle use and its associated air-polluting emissions (DeJesus, interview, January 17, 2024).

Those involved with the Move PGH pilot project in the City of Pittsburgh similarly expressed the goal of reducing emissions and improving local air quality indirectly through their micromobility and mobility hub project (City of Pittsburgh, 2022). These kinds of intentional connections to the agency's broader values can also help agencies advocate for a pilot to be funded and expanded.

Beyond agencies' own large-scale goals, pilots may also reflect the priorities of specific elected officials. Depending on the type of agency and its governance, these could be city council members, county supervisors, the mayor, the governor, or state lawmakers. It is not uncommon for elected officials to propose transportation-related pilot projects or discuss their ideas with staff (Anonymous, interview, February 2, 2024).

Because pilots only require committed funding for a short period of time and tend to be experimental and innovative, they are an appealing choice for elected officials wanting to demonstrate their ability to take action in a certain direction or act on their own campaign promises. These can certainly be valuable projects that may or may not become permanent afterwards, but they are differentiated by their origins in an elected official's personal vision.

For example, the City of Boston began a pilot alongside the Massachusetts Bay Transit Authority (MBTA) that made one bus route fare-free; it has since become three fare-free routes and has been extended to last until February 2026. This has been a popular initiative with the public and has successfully increased ridership and saved riders money. However, the impetus for this pilot was the previous and current mayors of Boston advocating for it publicly and using it as a major campaign platform, rather than the MBTA proposing the idea themselves from their own perspective of service provision (Povich, interview, March 6, 2024).

e. Demonstration Projects

Certain pilots are sometimes introduced with little to no intention or expectation of ever being scaled into long-term programs. There are situations where agencies uncover some extra funding in their budgets or receive a small grant that they can put towards an experimental pilot.

These projects, instead of testing the viability of the idea for the agency's long-term use, may be intended to contribute to the broader discourse around a relevant issue or address a short-term need for a limited group of people. Recent examples of this type of pilot have been in the areas of universal basic mobility or guaranteed income, automated vehicles, and other demonstrations that are likely not (yet) scalable but which can still result in valuable insights for that particular agency and others (Anonymous, interview, February 2, 2024).

f. Streamlining Government Processes

A small number of interviewees cited motivations for running transportation pilots of moving projects more quickly through traditionally slow bureaucratic processes, particularly in relation to

environmental impact assessments and procurement (DeJesus, interview, January 17, 2024; Kurtzman, interview, January 10, 2024; Schank, interview, February 5, 2024).

For example, the San Diego Association of Governments was involved in a quick-build transit-only lane pilot. After the community advocated for it to become permanent, the lanes were able to be re-striped as part of regular maintenance because of the existing pilot, relieving the agencies from having to go through environmental and permitting approval processes (DeJesus, interview, January 17, 2024).

Further, some agencies have started to adjust and modernize their procurement and contracting processes to allow for more innovative projects to enter the pipeline, often as pilots. Procurement processes are usually complex and tedious because they are intended to prevent corruption and ensure a competitive landscape for vendors. However, this can create challenges for smaller companies or operators hoping to have their services considered (Suter, interview, January 4, 2024; Kurtzman, interview, January 10, 2024; Eckholm & Siegel, 2023).

Pilot accelerators like the Transit Tech Lab (part of the nonprofit Partnership for New York City) help innovative transportation operators navigate this process and compete for opportunities to collaborate with agencies on new pilots meant to respond to "challenge-based" requests — rather than the traditional model of the agency requesting proposals for a specific product or service, they identify a prominent issue that vendors can find ways to creatively and innovatively address (Suter, interview, January 4. 2024).

Individual agencies, including Los Angeles Metro and the City of Long Beach, similarly started accepting unsolicited proposals for projects from technology vendors, nonprofits, and other stakeholders, which have successfully led to multiple pilot implementations (Kurtzman, interview, January 10, 2024; Schank, interview, February 5, 2024). The City of Long Beach also started using challenge-based requests for proposals, which provided them with their first clear process for starting pilots in partnership with private companies (Kurtzman, interview, January 10, 2024).

Private companies hoping to get involved with government-run pilots, on the other hand, must be flexible in adapting to each agency's specific procurement process and operate in good faith with the agency (Long, interview, March 19, 2024).

II.   Funding

a. Pilot Funding Sources

Typically, transportation pilots are funded through dedicated grants lasting up to three years, often allocated to the agency for the particular purpose of the pilot. Grants received before a pilot is planned can also encourage and justify the development of one. Agencies sometimes fund pilots — especially smaller-scale ones — through their operating budgets or one-time pots of funding

that become available internally. These could be related to budget surpluses or unexpected increases in sales tax revenue, for example (Firouzi, interview, March 11, 2024).

However, even agencies that have financed a pilot mostly or fully through their existing operating funds (or have already scaled a pilot) usually still try to identify new funding opportunities through grants (Stevens, interview, March 15, 2024). Grants could come from the state, county, or metropolitan planning organization, or non-governmental entities like nonprofits and foundations.

Depending on the type of project and agency, there are also often grants available through the U.S. Department of Transportation's Federal Highway Administration and Federal Transit Administration. Multiple interviewees also mentioned receiving federal pandemic-related stimulus or recovery funding since the COVID-19 pandemic started, which they used to fund their transportation pilots (Povich, interview, March 6, 2024; DeJesus, interview, January 17, 2024; Bradt, interview, January 17, 2024; Durand, interview, March 8, 2024).

However, even when agencies receive a grant needed for their pilot to be launched or expanded, some grants come with matching requirements, which makes them more challenging to use as the agency may be reluctant to put some of their existing funds towards the grant (Durand, interview, March 8, 2024; Schank, interview, February 5, 2024).

b. Budgeting & Staff Capacity

One of the primary recurring challenges in scaling pilots is the lack of readily available, sustainable, long-term funding for them to continue. Once the grant money or other type of short-term funding runs out, the agency must have a plan in place for the project to be able to expand and become permanent.

The default decision would be to find a way to absorb the project into the existing operations budget, but this may not be feasible for the many cities and other government agencies struggling to manage tight or contracting operating budgets. Adding projects can lead to cuts or eliminated services in other parts of the budget, so difficult trade-offs may have to be made.

Additionally, agencies often fail to recognize the staff capacity needed for adding new pilots, let alone new permanent programs, to their already heavy workloads (Anonymous, interview, February 2, 2024; Suter, interview, January 3, 2024). In discussing various types of pilots with different outcomes, interviewees consistently noted the burden on agency staff members of planning, managing, evaluating, and potentially scaling a pilot, especially within the stretched budget of a grant (Seifert, interview, February 21, 2024; Suter, interview, January 3, 2024; Firouzi, interview, March 11, 2024; Kajszo, interview, January 8, 2024).

c. External Support

Aside from standard grants, agencies may also receive financial, infrastructure, staffing, or other support from private companies, nonprofits, community-based organizations (CBO), and universities that they have partnered for a pilot.

Interviewees described experiences working with universities for formal evaluations, analyses, and student staff support; CBOs for conducting community engagement, outreach, and surveys; nonprofits for funding management, trainings, extra staff support, and other resources; and private companies for installing infrastructure, paying fees, and providing their new services and technologies (Durand, interview, March 8, 2024; Brooks, interview, February 26, 2024; Seifert, interview, February 21, 2024; Stevens, interview, March 15, 2024).

d. Revenue Generation

In addition to grants, operating funds, and resources gained through external partnerships, agencies are sometimes able to recover costs through pilots that have some sort of revenue-generating element. For example, automated bus lane enforcement introduces revenue through drivers receiving fines for violations, which makes these kinds of projects appealing to public agencies — especially considering numerous transit agencies are still facing potential budget shortfalls (Long, interview, March 19, 2024). These kinds of benefits, however, may only materialize once the pilot has been scaled.

Other possible revenue streams from transportation pilots include parking meters, advertisements on vehicles or infrastructure, charging users of loading zones based on the time they stay in the zone, and charging private mobility operators a fee per violation of their agreement with the agency (Seifert, interview, February 21, 2024; Durand, interview, March 8, 2024).

e. Learning & Advocacy

Funding remains one of the primary challenges for agencies during the pilot process, but it can also be one of the most important lessons learned during the pilot phase. Pilots can demonstrate how much certain projects and services will end up costing the agency in practice, potentially better informing their future plans than abstract cost estimates that usually accompany planned projects (Brooks, interview, February 26, 2024).

This financial information can also inform other cities hoping to implement a similar pilot in their own contexts. Further, agencies can use successful pilot outcomes and evaluation results to support their arguments for additional funding to be allocated from other sources towards the extension and scaling of the project when deemed necessary.

III.   Partnerships & Community Engagement

a. Interagency Partnerships

It is very common for agencies to form partnerships for their transportation pilots; every project chosen as a case study for this research had at least one partner entity with varying levels of support and involvement. These partnerships may be formed internally with other departments at the agency (e.g., engineering, maintenance, police, fire) or with other public agencies at different levels (e.g., transit agencies, city governments, metropolitan planning organizations, state departments of transportation, etc.).

Often, these collaborations are necessary for the pilot to run smoothly. Another department at the agency might be needed to maintain the pilot elements, enforce its rules, or manage its funding and procurement, for example. Additionally, a separate public agency in the region might have jurisdiction over the land or right-of-way that the pilot will be located on, necessitating coordination between the agencies (Mirjamali, interview, March 21, 2024; DeJesus, interview, January 17, 2024). Partnerships among public agencies can make clearer the benefits of the project for different stakeholders and demonstrate that there are multiple sources of funding to support its implementation (DeJesus, interview, January 17, 2024).

These partnerships are also crucial if the pilot must be transitioned from one department to another when it becomes permanent. Innovation departments may identify departments that can commit to funding a project if it does scale in the future and collaborate with them from the start of the pilot to ease the eventual transition (Schank, interview, February 5, 2024; Kurtzman, interview, January 10, 2024).

When it comes to partnering with external public agencies, it can be useful to have clear agreements in place before launching the pilot. For example, as an MPO, the San Diego Association of Governments (SANDAG) does not own or operate on much land in San Diego County, so they often partner with local cities and transit agencies to implement transportation pilots. Before a pilot begins, SANDAG staff outline a memorandum of understanding with the partnering agencies, which identifies the labor and financial responsibilities and commitments of each agency before, during, and after the pilot. These agreements allow SANDAG to turn over responsibility of the project to the agency that owns the property or right-of-way once the pilot is completed (DeJesus, interview, January 17, 2024).

b. Learning From Other Cities

Aside from directly partnering with different agencies, pilot-operating teams might look to the experiences of other cities to inform their own objectives and plans. Public agencies are often open to sharing their experiences and lessons learned with other agencies when it comes to piloting new services and technologies (Kajszo, interview, January 8, 2024).

Some regions of the U.S. have regular convenings for agencies' innovation teams to meet and share ideas. The City of Phoenix, for example, decided to experiment with a cool pavement pilot after attending a workshop led by the City of Los Angeles and the Federal Highway Administration (Stevens, interview, March 15, 2024). Further, agencies can learn from other agencies' published pilot evaluation reports and presentations and mold those findings to fit their own needs and contexts (Kajszo, interview, January 8, 2024).

c. Nonprofit Partnerships

Local or national nonprofit organizations and foundations are also often closely involved with transportation pilots. Their involvement can vary depending on the project and the type of nonprofit. For example, Bloomberg Philanthropies has led a program supporting innovation teams around the country and another providing resources to cities implementing innovative climate-related projects. Along with financial support, the Bloomberg programs involve staff trainings, data access, technical support, and other resources (Kajszo, interview, January 8, 2024; Rasp et al., 2021; Elkotbeid, 2022). Other transportation pilots may involve nonprofit partners in the form of bikeshare operators, local organizations providing staff and management support, or pilot accelerators.

Pilot accelerators have been appearing more in recent years — often from within coalitions of nonprofits, universities, and private entities — and specifically aim to match private companies with public agencies to run innovative pilots. This type of third-party involvement connects agencies with the innovations of smaller, more unknown companies and helps the companies navigate government procurement and budgeting processes as a middleman (Eckholm & Siegel, 2023; Suter, interview, January 3, 2024).

For example, in 2019, bus service planning staff at the MTA in New York City were interested in trying out a new software called Remix to modernize their bus route planning methods. However, because of concerns about the cost, they waited until an opportunity for a pilot was presented to them by a third-party pilot accelerator. The previously-mentioned Transit Tech Lab arranged for a grant from the New York State Energy Research and Development Authority, which allowed Remix to be compensated for the one-year pilot period at no cost to the MTA. Because the pilot aligned with their ongoing bus network redesign, and there were very few competitors to Remix on the market at the time, the MTA ended up entering into their own standard contract with Remix after the pilot ended (Anonymous, interview, April 2, 2024).

d. Academic Partnerships

Universities, especially specific departments or research institutes within them that are closely related to the project, have also become frequent partners for agencies completing transportation pilots (Brooks, interview, February 26, 2024; Durand, 2024; Stevens, interview, March 15, 2024; Mirjamali, interview, March 21, 2024). Their resources, expertise, and focus on research make them ideal for assisting with the data collection and evaluation of the pilot. Interviewees also mentioned

local university students assisting with projects as interns or completing analyses of specific elements as part of their coursework (Brooks, interview, February 26, 2024; Durand, 2024). Further, involving nearby universities can help build public trust in and awareness of an unfamiliar policy or service within the community.

e. Private Sector Partnerships

Partnerships between public agencies and private companies have become more prominent as interest in new technologies, softwares, and mobility services (e.g., bikeshare, e-scooters, automated vehicles, etc.) has grown. These collaborations can be mutually beneficial, as cities hope to demonstrate their willingness to implement innovative services and address residents' issues in new ways, while companies aim to deploy their products or services as widely as possible.

Throughout the pilot process, agencies can provide companies with practical feedback and criticism about their product or suggest new features based on their experiences or evaluation results. Agencies may be more likely to enter into long-term contracts with private companies that they have positive relationships with or that they feel are responsive to their needs (Anonymous, interview, April 2, 2024; Long, interview, March 19, 2024).

The pilot process can also help public agencies gradually introduce unfamiliar services under controlled conditions and figure out how best to regulate them (Long, interview, March 19, 2024; Seifert, interview, February 21, 2024). However, the two entities will also likely have conflicting priorities and approaches when it comes to implementing the project, and agencies have faced difficulties aligning all of their different stakeholder values (Seifert, interview, February 21, 2024).

Interviewees emphasized the importance of agencies setting their expectations for their private company partners upfront, discussing all possible outcomes of the pilot, and laying out which criteria will be used to figure out the next steps — which could include a potential long-term contract (Kurtzman, interview, January 10, 2024). These agreements could lay out the specific financial, infrastructure, or staffing commitments from the private company (Seifert, interview, February 21, 2024).

Agencies may also contract out some of the services related to the pilot, for which they do not have the staff capacity or expertise, to a consulting firm. Some interviewees mentioned doing this for a particular purpose — to determine the best locations for mobility hubs, for example — or for the pilot's entire evaluation and final report (Brooks, interview, February 26, 2024; Seifert, interview, February 21, 2024).

f. Community Involvement

Agencies frequently collaborate with community-based organizations for specific purposes, and community members themselves may also be involved in different aspects of the pilot process.

The form that many transportation pilots have taken can be attributed in part to local residents' complaints, concerns, feedback, needs, and desires for their communities (Bradt, interview, January 17, 2024; Kurtzman, interview, January 10, 2024; Firouzi, interview, March 11, 2024; Mirjamali, interview, March 21, 2024).

Even when pilot ideas have not come directly from community advocacy or stated needs, all interviewees mentioned some form of resident involvement: public meetings, surveys, focus groups, tabling at events, or other methods of soliciting feedback throughout the pilot process. Along with being a significant element of pilot evaluation, these insights are also commonly used to justify changes and adjustments to pilots as they are in progress or to discontinue the pilot altogether (Seifert, interview, February 21, 2024; Firouzi, interview, March 11, 2024; Brooks, interview, February 26, 2024).

Community-based organizations, specifically those with long-standing ties to the area and existing methods of communication with underserved communities in particular, have partnered with agencies to help them collect data and receive residents' feedback on planned or ongoing transportation pilots (Brooks, interview, February 26, 2024; Bradt, interview, January 17, 2024; Kurtzman, interview, January 10, 2024). Similar to partnerships with nonprofits and universities, involving community groups in the pilot process can help build public trust in the project and promote broader awareness of its offerings (Brooks, interview, February 26, 2024). Meanwhile, the agency is likely to receive more nuanced and detailed feedback from affected residents through this process.

g. Public Communication & Awareness

The lack of visibility and public awareness of a pilot was a common challenge cited by interviewees. Throughout the mobility hubs pilot in the City of Minneapolis, for example, staff learned over time which amenities make the most sense to residents, how to make them more visible in the right-of-way, and how best to communicate the mobility options to users unfamiliar with them. One of their attempts to remedy this was to add ambassadors to the hubs to answer questions, educate users, and receive feedback (Brooks, interview, February 26, 2024).

Effective forms of communication with residents about pilots will vary widely based on the type of pilot and its goals. For example, in contrast with the mobility hubs in Minneapolis, the City of Phoenix cool pavement pilot was less about encouraging residents to take advantage of new services and more about making them aware that an infrastructure change (in this case, the color of the asphalt seal coat) would be occurring in their area. With the knowledge that pilots require a high level of openness and honesty with the public, the City continuously communicated their activities and learned from a survey conducted midway through the pilot that the majority of participants, even those who did not support the project, believed the City had been effectively communicating the project's elements and motivations (Stevens, interview, March 15, 2024). Similarly, after deciding to test (and later make permanent) adding weekend operating hours to their HOV/HOT lanes, Houston METRO prioritized their marketing, social media, and press release

efforts to make sure drivers would be aware of the changes and know how to use the lanes (Mirjamali, interview, March 21, 2024).

IV. Evaluation

a. Scales of Evaluation

Evaluation is one of the most important aspects of completing pilots, considering they are usually intended to assess the impacts, feasibility, and potential success of the project before deciding its future. Along with measuring the effectiveness of the project, evaluation can uncover its benefits and hurdles and prove or disprove the validity of any initial concerns (DeJesus, interview, January 17, 2024).

However, there are many possible ways that agencies can and do conduct evaluation, depending on their goals and resources and the type of pilot being completed. One important consideration is if the agency is evaluating the general merits of the policy, infrastructure, or technology, or if they are already operating under the assumption that it is a valuable idea (because of prior experience with it or other reasons) and are instead measuring public feedback or observed impacts within their particular context.

For example, during Houston METRO's pilot adding weekend operating hours to their highways' HOV/HOT lanes, the only data they collected was of driver volumes on each lane per week throughout the three-month pilot period. The agency already understood the operating and maintenance costs of the lanes and the general public opinion of them because of the years prior that the lanes had been operating on weekdays. Seeing that drivers were using the lanes on weekends and that the numbers gradually increased during the pilot was enough for the METRO Board of Directors to make the change permanent (Mirjamali, interview, March 21, 2024).

b. Public Reports & Data

Some pilots never undergo a formal evaluation process or result in a published report. However, some grants, partnerships, or state legislation (e.g., the Pennsylvania law authorizing e-scooters in Pittsburgh for the two-year pilot period) come with the requirement that an extensive evaluation report be published in the aftermath of the pilot (Seifert, interview, February 21, 2024). Agencies may prioritize making the report and other data publicly accessible to maintain an open and transparent relationship with their constituents, while also making their experiences and lessons known to other interested agencies (Kajzso, interview, January 8, 2024; Bradt, interview, January 17, 2024).

Clearly laid out evaluation metrics and statistics indicating success in meeting goals or other important benchmarks can help residents understand the impacts of and justifications for the pilot and make it easier for community members, staff, and other stakeholders to advocate for the project to continue (or not) (Bradt, interview, January 17, 2024).

c. Evaluation Metrics

Multiple interviewees noted the importance of laying out clear metrics and performance indicators whenever possible. This can present a major challenge because pilot objectives and outcomes are often not easily quantifiable (Kajzso, interview, January 8, 2024; DeJesus, interview, January 17, 2024; Kurtzman, interview, January 10, 2024; Povich, interview, March 6, 2024). Additionally, there is usually data that the agency would want to use for evaluation that they cannot measure or access in practice (DeJesus, interview, January 17, 2024).

The general consensus surrounding evaluation metrics is to tailor them to each unique project, make them measurable, and refer back to them often during and after the pilot, adjusting if necessary. These metrics could then be examined alongside the data collected to make a decision about the future of the project (Kurtzman, interview, January 10, 2024). As projects with inherently unpredictable outcomes, pilots require agencies to be flexible and adaptable. Even attempting to define "success" in relation to a proposed pilot can be self-defeating, because agencies may not know what success looks like until they see it firsthand (Schank, interview, February 5, 2024). This is particularly true for larger-scale pilots meant to test entirely new services. Agencies' original objectives for a pilot may completely change as the pilot progresses as well (Kajszo, interview, January 8, 2024).

d. Public Feedback

Qualitative data are also usually crucial to the evaluation process for adding nuance and context to any quantitative data collected, but they are less likely to align with clearly-stated performance indicators or evaluation metrics. Halfway through the City of Pittsburgh's smart loading zone pilot, the City did a new round of public engagement and learned things that they would never have known just from looking at data, including concerns about the consistency and legibility of the program. They also adjusted the pricing of the loading zones after hearing from those residents (Seifert, interview, February 21, 2024).

Most interviewees discussed using a similar combination of evaluation methods — usually surveys, demographic data, spatial data, and a combination of quantitative measurements related to the goals of the pilot, such as ridership trends, shared mobility usage, driving speeds, traffic volume, and traffic safety data. These are usually then examined and summarized in concert to create an overall picture of the outcomes and impacts of the pilot.

e. Third-Party Evaluation

Data collection and evaluation are very costly and time-consuming for agencies with already low staff capacity and funding availability (Seifert, interview, February 21, 2024). This is partly why agencies might outsource their pilot evaluation to local university researchers or consultants, the former of which is likely to be more cost-effective (Seifert, interview, February 21, 2024; Stevens,

interview, March 15, 2024). Third-party evaluation could also prevent the potential incorporation of staff bias (one way or another) into the evaluation report.

V.   Decision-Making

a. External Barriers

All of the factors previously discussed that affect pilot planning, management, and evaluation are relevant to the decision-making process, during which agency staff or leadership decide whether to extend the pilot period (with or without adjustments or expansions), scale the pilot into a long-term permanent program, or discontinue the pilot altogether. There are certainly instances when this decision is made for the agency because of external barriers that cannot be overcome in the near future.

One example of this is Move PGH in Pittsburgh; it centered around the temporary introduction of e-scooters through state legislation, which was not renewed or expanded by the end of the pilot period, so the e-scooters were removed and the pilot officially ended (Seifert, interview, February 21, 2024). This could also be the case for agencies that run out of grant funding and do not receive authorization to absorb the pilot into existing budgets or use any other agency funds.

b. Overcoming Barriers

Sometimes in spite of any promising results or public benefits, certain pilots end abruptly after their specified period. These projects may be able to return eventually if staff continue to champion them and find ways to work around the particular barriers to continuation, be it funding availability, staff capacity, legislation, or administrative issues, to name a few (Brooks, interview, February 26, 2024).

Staff at the City of Minneapolis, for example, have been advocating for the mobility hubs pilot to continue despite facing numerous obstacles that have prevented them from keeping the hubs active consistently. Now, almost five years since the pilot started, it will finally reach its first permanent iteration, largely because the department continued supporting the idea and eventually received a significant grant for it (Brooks, interview, February 26, 2024).

Agency staff have to weigh all of the relevant factors and decide whether long-term internal or external advocacy efforts are worth continuing the pilot. While these efforts can surely be successful, there are also times that it might be best for staff to admit failure and give up on a project. In general, it can be difficult for people to let go of an idea that they have put so much time and effort into (Anonymous, interview, February 2, 2024; Schank, interview, February 5, 2024).

c. Weighing Conflicting Results

There are also pilots that may have met some of the performance indicators or objectives set by the agency, but which staff or leadership still decided not to scale into a permanent program. This could be due to some of the previously mentioned challenges related to funding, staff, and politics, but it may also reflect the failure of the metrics chosen to accurately reflect the resources of the agency and the concerns and needs of residents.

Further, there are situations in which a pilot "failed" because of the agency's specific approach or actions, which could theoretically be remedied in future iterations of the pilot. In other cases, there might be no clear way for the agency to adjust the project enough to achieve clearly successful outcomes.

Even a pilot that has received very positive public feedback or met certain performance indicators may not be feasible to scale or worth its long-term costs (Povich, interview, March 6, 2024). Many of these decisions have to be made without a standardized process in place. As previously mentioned, agencies may not know how to qualify their pilots' success or effectiveness until they see it in action (Durand, interview, March 8, 2024; Schank, interview, February 5, 2024).

There are also more clear-cut situations in which a pilot has been receiving mixed or negative feedback for its entire duration, and despite reaching some of its objectives or performance indicators, is determined to have introduced more issues than it solved (Firouzi, interview, March 11, 2024).

d. Flexibility

Generally, pilot-operating agencies should be prepared before the projects are launched to reevaluate their goals and priorities during and after the pilot and potentially move on from them if necessary. Pilots require adaptability and flexibility. Prioritizing pilots and innovation can create a culture within an agency that rewards risk-taking and openness; even when efforts fail, there will almost always still be valuable lessons to take from the experience (Schank, interview, February 5, 2024).

Interviewees who have worked on pilots that were not scaled highlighted the ways they would take or had already taken lessons from those pilots into their future projects, strategies, and approaches (Firouzi, interview, March 11, 2024; Seifert, interview, February 21, 2024). Even those whose pilots had been scaled mentioned the ways they adjusted and adapted their pilots in response to obstacles, challenges, new situations, and public feedback. Along with testing the viability of specific innovative ideas, pilots are also about testing the limits, values, and abilities of the agency and applying those lessons to future efforts.

Recommendations

The following general recommendations for SCAG, its member agencies, and other pilot-operating agencies in the U.S. are derived from the literature, 15 interviews, and seven transportation pilot case studies. One of the most significant recurring themes across all three data sources was the importance of considering each agency's own contexts, resources, and community needs. There is no clear roadmap that every agency and external partner should follow in trying to plan, manage, evaluate, and scale a successful transportation pilot.

I use the insights of practitioners involved with pilots to formulate recommendations reflecting the important considerations and lessons that they learned from their own pilot processes, many of which align with findings and recommendations in the existing literature on pilots. They are intended to reflect some of the best practices for operating pilots in regard to preparation, management, collaboration, communication, and evaluation. Challenges faced and decisions made at each stage can impact the ability of the agency to extend and scale a pilot.

I.   Long-Term Planning

Several interviewees mentioned regretting not having laid out adequate long-term funding or operational plans for their pilots before they were launched. Funding availability in particular posed a crucial barrier to keeping pilots active and impactful for their users, let alone potentially scaling them. Then again, some pilots launched without detailed plans can and do still achieve success and become permanent programs. Pilots often have unexpected results, and obstacles that cannot be planned for may emerge.

Even so, agencies should prioritize formulating even a very loosely-defined plan for different possible outcomes of the project: where could sustainable funding come from after the grant runs out? What kind of staff capacity will be needed if the pilot is expanded or scaled, and from which department(s)? Who could take over the role of an external partner if they have to back out at some point during the pilot?

- **Formulate and discuss with partners or stakeholders a long-term plan for funding, staff, responsibilities, and operations before the pilot begins, with consideration of multiple potential routes.**

- **Closely consider the scale and scope of the planned pilot in relation to the amount of funding available to make sure it adequately covers staff, evaluation, report writing, consultants, partnerships, and any other expected costs. If necessary, decrease the scope of the project to accommodate the cost of these other important elements.**

II.   Goals & Evaluation

The past literature on pilots emphasizes the importance of completing a thorough evaluation in order to make an informed decision about scaling or discontinuing a pilot. The type and amount of data collection and analysis will always depend on the individual pilot and its core objectives. Multiple interviewees noted that having more measurable goals and performance indicators was (or would have been) useful during the evaluation process. Others emphasized not knowing what success or positive results would have looked like until they saw them in practice during the pilot; they might have been limited by performance metrics that were too rigid.

- **When feasible, lay out clear and measurable performance indicators that can be referred to during and after the pilot to determine "success" and alignment with original goals. However, remain open to unforeseen impacts not captured by these indicators that may be crucial in deciding the future of the pilot — especially for pilots testing entirely new services or products.**

- **Combine quantitative data collection with surveys, focus groups, public meetings, and other methods of soliciting feedback to identify unexpected outcomes and gain a more nuanced understanding of community members' experiences with the pilot.**

III.   Partnerships

Collaboration with internal departments and other public agencies is crucial to the implementation and success of transportation pilots. Nonprofits, community-based organizations, and universities can add much-needed resources as well: financial and staff support, connections to private companies, research and expertise, and communication strategies. Their endorsement can at times improve the public perception of the project and build trust in it, especially if their involvement allows community perspectives to be brought to the forefront.

Finally, partnerships with private companies can be the primary basis of transportation pilots focused on testing a new technology, software, or mobility service, and these partnerships can help bring in sustainable financial resources for the agency to continue providing that service. However, managing the differing priorities of public and private entities can be challenging and may lead to conflicts regarding regulation and compliance.

- **After initiating a partnership with a private company, create legal agreements laying out responsibilities, commitments, data use, regulations, and other important considerations to avoid conflict. If necessary, tie violations by the company to additional fees or responsibilities.**

- **Discuss pilots and innovative methods with peer agencies to learn from their experiences and potentially apply their important lessons learned to a new context.**

- **Prioritize partnerships with local community-based organizations, nonprofits, pilot accelerators, and universities to incorporate resources and relevant outside perspectives to the project.**

IV.   Community Involvement

It is common for concerns, complaints, and needs from local communities to turn into pilots, as agencies work to address those issues or experiment with ideas that residents have consistently advocated for. These kinds of pilots are likely to experience more public buy-in and involvement because of residents' strong interests in their outcomes and status.

More generally, interviewees highly valued the (positive or negative) feedback they received from community members, which can lead to adjustments in pilot plans or strategies. Often, residents and advocacy groups end up fighting for pilots to receive more funding or be extended or scaled, if they feel that it addresses their needs and positively impacts their transportation-related experiences. This also means that agencies sometimes have to discontinue pilots that were popular with residents or that were providing a meaningful service.

- **Prioritize genuine community involvement at each step of the process, including before a pilot concept has been decided, and make adjustments to the plan or ongoing project based on feedback and survey findings.**

- **Communicate openly and honestly with affected communities throughout the pilot process, have plans in place for making the pilot understandable and visible, and share and explain observed results widely.**

V.   Decision-Making

Finding ways to smoothly transition pilots into large-scale, long-term programs is a consistent challenge for agencies. While sometimes decisions to scale or discontinue pilots are very straightforward because of the evaluation process, public feedback, or other external factors, most decisions are more nuanced and complex. Agencies have to weigh all of the conflicting information they have received throughout the pilot, along with any important external barriers (legal, political, financial) to make a decision that aligns the agency's resources and capacity with the needs and desires of impacted residents.

Past reports on pilots have highlighted the importance of being adaptable and willing to give up on a project when necessary, despite the time and resources invested. As with other types of projects, staff or agency leadership can also choose to continue advocating for a pilot if they believe it is worth the effort. Pilots are framed as low-risk experiments, but they do often impact real people's everyday lives, which should be a crucial consideration in determining whether to give up on a pilot or keep fighting for it to continue.

- **If a pilot is facing external obstacles to being scaled, organize coalitions of support to advocate for it to continue. Even if it does not succeed, there could be another chance in the future to bring it (or something similar) back to the agency and apply the lessons learned from the initial pilot.**

- **If a pilot has not achieved its stated goals or performance indicators or has introduced new problems, make significant adjustments to it based on those findings or determine the root causes of the "failure" and use that information to inform a new and improved approach to the issue.**

- **Keep track of broader lessons learned related to evaluation methods, partnerships, community engagement, procurement, project management, and other internal processes. These can be applied to future activities and projects and may also prove useful to peer agencies.**

Conclusions

Pilot projects by nature reject one-size-fits-all solutions. They are intended to examine how an innovative idea, policy, process, or technology might succeed or fail within an agency's unique context. Thus, the findings and recommendations presented may be relevant to some projects and agencies, but not to others; it is impossible to capture all of the important considerations for transportation pilots from the sample and methods used in this research.

However, there were numerous consistent themes and patterns across the interviews and case studies, which also aligned closely with the existing literature. This research presents some of the primary challenges that agencies are currently facing during their transportation pilot processes, as well as the opportunities and strategies they are using to overcome these challenges and turn their innovative pilots into long-term, transformative programs. Despite political, financial, and other obstacles, public agency staff members are consistently backing up their predictions and observations with data, closely involving community members and external partners, and advocating at multiple levels for their projects to continue.

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Appendix A

I.   San Diego Association of Governments
Youth Opportunity Pass

The San Diego Association of Governments (SANDAG), the metropolitan planning organization for the County of San Diego, launched its Youth Opportunity Pass pilot in May 2022. Originally planned as a one-year pilot, the Youth Opportunity Pass made public transportation fare-free for anyone under the age of 18. The pilot originated from recommendations by the SANDAG Regional Plan Social Equity Working Group, which is composed of 11 representatives from community organizations. Their recommendation that SANDAG work to ensure more accessible and inclusive opportunities throughout the region led to the formation of SANDAG's Transit Equity Pilot, which had three components: the implementation of the Youth Opportunity Pass program, collaboration with community-based organizations to educate youth and their families about local transit options, and a research study to evaluate the impacts of the pilot (SANDAG, n.d.). SANDAG staff had also hoped to increase transit frequency or implement other service improvements as part of the program but were unable to because of a bus and rail operator shortage at the time (Bradt, interview, January 17, 2024).

The Youth Opportunity Pass and the broader Transit Equity Pilot have both been in collaboration with the two transit agencies serving San Diego, the Metropolitan Transit System (MTS) and North County Transit District (NCTD). SANDAG also partnered with six community-based organizations on the design and implementation of the Youth Opportunity Pass: Mid-City Community Advocacy Network, City Heights Community Development Corporation, Environmental Health Coalition, Urban Collaborative Project, Casa Familiar, and Alliance for Regional Solutions (SANDAG, 2023b). Many of these organizations were critical to the launch of the pilot, as they had been consistently advocating for a similar program from SANDAG for over a decade (Bradt, interview, January 17, 2024; SANDAG, 2023b). Their involvement informed the program's main objectives, public communication strategies, and evaluation. When the pilot was being implemented, SANDAG provided a comprehensive toolkit of outreach materials for schools, community organizations, and other agencies to use when marketing the Youth Opportunity Pass in order to notify as many families as possible and maximize its impacts (SANDAG, 2023b).

The pilot has been financed through the federal Congestion Mitigation and Air Quality (CMAQ) program, which provides funding to state or local governments for projects intended to reduce traffic congestion and improve air quality. The initial pilot also utilized COVID-19 relief funds from the American Rescue Plan Act, and the San Diego County Board of Supervisors provided additional pandemic-related stimulus funding (SANDAG, n.d.; Bradt, interview, January 17, 2024). The CMAQ funding is allocated each month by SANDAG to the two local transit agencies to cover their lost fares and prevent budget shortfalls, with the remainder going towards relevant contracted

services or direct costs (SANDAG, n.d.). The Youth Opportunity Pass relies on approximately $6.5 million per year in temporary CMAQ funds. Since the pilot began in 2022, it has been extended multiple times by the SANDAG Board of Directors, with a current end date of June 2026. SANDAG and their community partners hope to continue the program and make it a permanent fixture for the transit operators. However, as of early 2024, SANDAG has not yet identified a sustainable, long-term funding source (SANDAG, 2023b).

The primary goals for the Youth Opportunity Pass pilot were to increase access to schools, jobs or internships, recreational activities, and resources, especially for youth in disadvantaged areas; and reduce regional vehicle miles traveled (Bradt, interview, January 17, 2024; SANDAG, 2023b). In the fall of 2022, SANDAG, MTS, NCTD, and the County of San Diego began the process of evaluating the impacts of the pilot, partly to inform future decisions to temporarily extend the program or identify long-term funding (SANDAG, 2023a). The evaluation involved both quantitative and quantitative data collection. SANDAG researchers examined changes in transit ridership, finding general increases in youth ridership overall. Before the program, about 16,000 individual young people rode transit monthly; since the pass was introduced, the busiest months have garnered over 50,000 youth riders. Certain routes experienced increases in typical weekday youth riders of over 150 percent (SANDAG, 2023b, 3-9).

SANDAG staff analyzed school attendance rates within the first year of the pilot, noting increases in chronic absenteeism since the pandemic, particularly for students from disadvantaged backgrounds (SANDAG, 2023b). There was an overall increase in attendance of 1.7 percent on average for schools in the San Diego Unified School District between the 2021-2022 and 2022-2023 academic years, with slightly larger increases in attendance at schools that were accessible via transit (SANDAG, 2023b, 10). Finally, SANDAG used transit ridership data to estimate reductions in air pollutants and emissions as a result of the program and found that the Youth Opportunity Pass could have encouraged annual savings of almost 250,000 gallons of gasoline and a reduction in annual carbon dioxide emissions of over 4 million pounds (SANDAG, 2023b). Some of these quantitative metrics demonstrate success in a clear and understandable way, which has made it easier for SANDAG staff and community members to advocate for the program to continue, while some metrics (e.g., ridership at specific schools and stops) have been more complicated to collect and examine (Bradt, interview, January 17, 2024). After it became clear how important it would be to collect data to evaluate the program, SANDAG staff decided that youth would use the same fare media as other riders but without providing payment. However, this introduced the challenge of distributing thousands of cards, which was mainly achieved through the help of local schools and organizations (SANDAG, 2023b).

SANDAG also conducted a three-month survey with over 1,000 responses and hosted three focus groups to assess the effectiveness of the Youth Opportunity Pass in improving quality of life and access to opportunities, encouraging mode shift, and marketing itself to a broad audience to encourage participation (SANDAG, 2023a). Some of the recurring themes from both methods were that the Youth Opportunity Pass saved young people and their families money, reduced their

stress and worry, helped them balance their responsibilities, enabled them to access more places, and gave them more independence (SANDAG, 2023b, 12). All of the findings from quantitative and qualitative data sources were compiled in two reports published in August and December 2023, and SANDAG's interactive Open Data Portal also outlines bus and rail youth ridership data by route, area, and month during the period of May 2022 to December 2023 (SANDAG, 2023b).

Partly because of these data and anecdotal evidence, the Youth Opportunity Pass is widely viewed as a successful and beneficial program in the region that many young people, community advocates, and decision makers hope will become permanent. The main barrier that SANDAG will have to overcome is, as previously stated, identifying a sustainable funding source to move past the temporary pilot timeframe. SANDAG is working with MTS and NCTD and meeting with other regional, state, and federal agencies to evaluate future funding scenarios, which will be outlined in a yet-to-be-published Transit Fare Discount Study. These may involve more reliance on state or federal funding, flexible transit operations funding, new streams of local funding (potentially through a ballot measure), or partnerships with schools and local jurisdictions (SANDAG, 2023b, 16; Bradt, interview, January 17, 2024).

Appendix B

II.   City of Minneapolis, Minnesota
Mobility Hubs

The City of Minneapolis began a three-month mobility hub pilot in September 2019, aiming to test different mobility hub elements, conduct public engagement around the concept, and inform their long-term approach and investments. The City staff also stated their goals of increasing public awareness of mobility hubs and the options they provided, as a relatively new concept (Minneapolis Public Works, 2020). The pilot was led by the Public Works department, with staff support from other divisions (Brooks, interview, February 26, 2024). Each hub was located near a public transit stop and included bikeshare, electric scooter parking, wayfinding signage, and temporary infrastructure. The project was launched with 12 initial mobility hub locations throughout the city, with a focus on siting them in areas with the greatest need (known as "equity areas") (Brooks, interview, February 26, 2024). The City worked with Transportation for America, a policy advocacy organization, and Arcadis, a consulting firm, to identify these sites by combining 32 different layers of data (Minneapolis Public Works, 2020).

The original pilot was financed partly through city funds and a grant received as part of the Bloomberg Philanthropies American Cities Challenge, an initiative that provided resources (e.g., data access, campaign and communications support, funding for community engagement, technical support, etc.) to 25 cities implementing innovative climate-related projects starting in 2019 (Elkotbeid, 2022). Along with the partners that helped the City staff identify the hub locations, the mobility hub project has also been in partnership with the local transit agency (Metro Transit), the Twin Cities Shared Mobility Collaborative (through the University of Minnesota Center for Transportation Studies), Hennepin County, Nice Ride (the local bikeshare operator), Lyft, Spin, Lime, the Minnesota Department of Transportation, and five community organizations (Brooks, interview, February 26, 2024; Rasp et al., 2021).

After the three-month pilot in 2019, City officials planned to restart and expand the pilot with additional hubs in the spring of 2020, partly to avoid most of the rigorous Minnesota winter season. The bikeshare operator had already been shutting down their operations each year because of the weather conditions (Brooks, interview, February 26, 2024). The City was able to roll out 25 total hub sites in 2020 with additional features, including a new ambassador program. The ambassadors activated and maintained the mobility hubs, educated residents about the services available, and attempted to make users feel welcome (Rasp et al., 2021). At the height of the pandemic, the hubs also became community collection points for food, clothing, and donations because of their central locations (Brooks, interview, February 26, 2024; Rasp et al., 2021).

While the City hoped to extend the pilot after 2020, there were no active hubs throughout 2021 because of difficulties getting grant paperwork finalized from the Minnesota Department of Transportation. Mid-way through 2022, these issues were resolved and mobility hubs were implemented again, with an increase to a total of 30 locations during the four- to five-month period they were active. The hubs disappeared again for all of 2023 because of a shift in leadership in the City, which led to the mobility hub project being put on pause in favor of other priorities (Brooks, interview, February 26, 2024). However, mobility hubs will be implemented once again in the spring of 2024, with an expansion to 55 sites. The project's return was motivated by internal advocacy within the department for it to continue, as well as the City receiving a $2 million grant over five years to start developing the first seven permanent mobility hubs in partnership with the local transit agency, which are planned to be installed starting in 2025 (Brooks, interview, February 26, 2024).

The future permanent mobility hubs are expected to include electric vehicle chargers, seating, lighting, bikeshare, and electric scootershare. Some of these permanent elements have not yet been tested by the City because of a lack of funding for them in the past. However, the previous versions of the mobility hubs allowed the City to test out specific hub locations, and all but one of the seven permanent locations are expected to be past temporary hub sites (Brooks, interview, February 26, 2024). Metro Transit will be installing three of the seven hubs on their property, while four of them will be on City of Minneapolis property. Three of the four sites that will be built by the City already have electric vehicle charging infrastructure on them, which was also an important consideration (Brooks, interview, February 26, 2024).

The City conducted both quantitative and qualitative evaluations of the mobility hubs and has published reports based on the 2019 and 2020 pilots. There is not yet a report on the 2022 version of the pilot, which will be completed by a consultant instead of City staff because the grant used to fund the hubs that year required a third-party evaluation (Brooks, interview, February 26, 2024). Much of the evaluation since the start of the project has been focused on the usage of shared mobility services and transit ridership before and after the installation of a mobility hub. These data included mode use data from Metro Transit, Nice Ride, and the City; Nice Ride trip origins and destinations; scooter trip origins and destinations; and Metro Transit boardings. Qualitative data came from online surveys, intercept surveys at mobility hubs, and participation and feedback from the City's partner organizations (Minneapolis Public Works, 2020). When the ambassadors were added in 2020, they also became a key aspect of data collection. Along with educating users and maintaining the mobility hub spaces, ambassadors were intended to receive feedback from the public and identify any recurring challenges or barriers (Brooks, interview, February 26, 2024). The City had not laid out specific performance measures for either type of data, instead naming three broad goals for the original 2019 pilot: "[1] Pilot strategies for co-locating mobility options in the public right-of-way... [2] Understand barriers to utilizing shared modes and other non-automobile transportation options... [3] Create a system of visual cues to identify hubs as cohesive, inclusive spaces and centers of mobility options" (Minneapolis Public Works, 2020). The quantitative data were meant to help the City determine which services were being used, where,

and how often; the qualitative data were meant to add more nuanced information about the hubs' use and impact on residents in different areas of the city.

After the 2019 pilot, the City found that some mobility hub locations saw increases in bike and scooter use after the hubs were implemented, while others saw decreases, pointing to the multitude of other relevant factors that likely affect micromobility usage, like transit availability, bike/scooter availability, and weather. The City also emphasized the findings of their surveys and community engagement activities, from which emerged three key themes that people seemed to value most: feelings of safety, access to more transportation options, and places to sit and gather (Minneapolis Public Works, 2020). The unique environment surrounding the 2020 pilot led the City to partner with three local organizations with existing community relationships and communication methods to engage with users about their mode choices, perceptions of safety and comfort, and feedback on the mobility hub elements (Rasp et al., 2021).

Although City staff have interpreted many of the findings from the evaluations to be very positive, the project's efficacy has been greatly affected by its on-and-off status through the years due to funding challenges, the pandemic, seasonal weather, and the change in leadership and priorities at the City (Brooks, interview, February 26, 2024). This has likely exacerbated a challenge that has been present since the start of the first pilot: increasing public awareness of the options provided by the hubs and their visibility overall. Through the feedback received and data collected, the City was able to learn more about where hubs and their various elements should be located, how to make the amenities more visible in the right-of-way, and how best to communicate with the public. Along with the City's own evaluation process, they received feedback from design students at the University of Minnesota, who analyzed the mobility hub signage, wayfinding, and legibility, and will be taking those findings into the upcoming 2024 version of the pilot and likely the future permanent hubs (Brooks, interview, February 26, 2024).

Another important challenge related to funding and department priorities involved the ambassador program that began in 2020. Because funding availability has gone up and down, the City has struggled to keep their ambassadors engaged with the program, especially because they could only offer part-time pay (Brooks, interview, February 26, 2024). Ambassador programs more generally have become popular in Minneapolis, but the City has not yet found a way to sustainably fund that aspect of the mobility hubs. Ambassadors are critical to the success of the program, given that mobility hubs are still a foreign concept to many residents. After they were introduced, analysis of ridership and shared mobility usage showed that both metrics increased more at locations with ambassadors. In the future, the City hopes that ambassadors can be stationed at hubs more consistently and that hub maintenance can become part of the facilities department instead so that ambassadors can focus on helping and educating users, providing a sense of security, and receiving feedback (Brooks, interview, February 26, 2024).

Appendix C

III. City of Twin Falls, Idaho
Ride TFT

The population of the City of Twin Falls in southern Idaho recently surpassed 50,000, which came with federal requirements for establishing a metropolitan planning organization (now the Magic Valley MPO, formed in December 2023) and some form of public transportation. Years of research and surveys led to the City's decision to implement a two-year microtransit pilot called Ride TFT in July 2023. Twin Falls is sprawling with low density, making it difficult to get around without a car. It is one of the main economic hubs in the region, with tens of thousands of people commuting in daily for work, school, medical services, and shopping — all of which are separated into five or more activity centers around the city (Durand, interview, March 8, 2024). The size and relative dispersion of development would have made fixed-route service very challenging to plan and implement, especially given the lack of existing transit infrastructure or staff expertise. The political atmosphere in Idaho added another barrier to implementing transit service; there are widespread sentiments that buses are a waste of taxpayer dollars without any significant return (Durand, interview, March 8, 2024). For these reasons, as well as unknown levels of demand for public transit, the City decided on microtransit service. As of March 2024, there are seven vans in the fleet — two of which are ADA-compliant — and 15 drivers. Rides are requested through the app or a phone call to the dispatcher, and they cost $3 (or $1 for riders with disabilities or over 60 years of age) (Durand, interview, March 8, 2024).

The City partnered with a private software company called Downtowner for assistance in planning and launching Ride TFT. Downtowner has years of experience working with cities to modernize microtransit and fixed-route transit service through their app for tracking rides and making payments. They have since branched into helping cities build transit systems from the ground up. Twin Falls can maintain their contractual relationship with Downtowner indefinitely or gradually take over elements of the service (e.g., starting to lease and maintain the vehicles through the City or making drivers City employees) (Durand, interview, March 8, 2024). For now, Downtowner staff oversees day-to-day operations and driver schedules, while the City's Transit Coordinator mostly focuses on managing and pursuing funding for the program, keeping track of evaluation metrics, and long-term strategic planning (Durand, interview, March 8, 2024). The City has also partnered with the Twin Falls Community Foundation (a local nonprofit), LK Transportation (a company providing transportation specifically for people on Medicaid and Medicare to reach their medical appointments), and the College of Southern Idaho, whose students have assisted with Ride TFT administrative tasks (Durand, 2024).

The Ride TFT pilot was originally planned to last two years because the City received a $3 million grant through the federal Coronavirus Aid, Relief, and Economic Security (CARES) Act for a

two-year transit pilot. In late 2023, only six months into the pilot, the City decided to make Ride TFT a permanent program because of the level of observed demand for it and the positive feedback received (Durand, interview, March 8, 2024). They will continue to use CARES Act funding for the program until it runs out around July 2025 and are also expecting funds from a 5307 Urbanized Area Formula Grant from the U.S. Department of Transportation to become available around February 2025. However, a significant percentage of the grant funding will have to be matched by the City if other sources are not identified. There are plans to place advertisements on the Ride TFT vans as a revenue source and establish or strengthen community partnerships, particularly with private employers in the area. Idaho cities have little public sector funding as all local tax dollars are reappropriated by the state; however, large private companies tend to be somewhat involved in giving back to their local communities. The City expects there to always be some level of private sector involvement because of these financial and political considerations (Durand, interview, March 8, 2024). Based on the demand for Ride TFT, the number of vans and drivers — and therefore overall costs — will continue to increase over time, with current plans to add one van to the fleet each fiscal year (Durand, 2024).

Along with complying with federal requirements for public transportation, the City also hoped to test the level of existing demand for transit service through the Ride TFT pilot. While most residents drive, there have always been members of the population (young people, seniors, people with disabilities, low-income people) without access to cars who have a much harder time navigating Twin Falls (Durand, interview, March 8, 2024). As the first transit pilot in the area, City staff and leadership had no idea what to expect when it came to ridership, impacts, effectiveness, and feedback. One of their only benchmarks for comparison was Greater Idaho Falls Transit (GIFT), a very similar microtransit program also in partnership with Downtowner that began in 2022. Based on the GIFT ridership numbers in its first month of operation, Downtowner's experiences with other cities, and the geography of Twin Falls, the City expected around 2,000 rides in the first month of Ride TFT. Instead, there were around 3,200. Despite setbacks and challenges, mostly due to the unexpectedly high demand for the service, ridership has gradually increased since the start of the pilot, with over 5,500 rides and 8,000 total passengers in February 2024. One of the City's biggest challenges has been adequately meeting the demand for rides. September 2023 had the lowest ridership thus far because of an illness-related driver shortage (Durand, interview, March 8, 2024).

Aside from the numbers of rides and passengers, the City has been collecting other evaluation metrics to examine Ride TFT's impact: wait times, popular destinations and times of day, number of wheelchair rides, percent of riders using the discounted $1 fare, rider experience (rating out of 5), and fares collected. Riders have rated their drivers 4.6 to 4.8 out of 5 on average, and the City has received positive feedback in general. Some of the most popular destinations have been St. Luke's hospital and other non-emergency medical services, grocery stores, and the College of Southern Idaho (Durand, 2024). One of the most important metrics for the City is the percentage of discounted-fare riders, which has remained consistently around 50% since the start of the pilot. This indicated the significant need for this service for riders with disabilities and those over the age

of 60. These and other data have been useful in advocating for the program and explaining where its demand is coming from (Durand, interview, March 8, 2024). Ride TFT's plans for the future have also been informed by these evaluation metrics. The pilot began with six vans, with a seventh one available to be added in May 2024. However, in October 2023, wait times were getting long enough that the van was added into the fleet seven months early (Durand, 2024). The average wait time for all rides is around 28 minutes, while for wheelchair rides it is closer to 40 minutes, partly because there are only two ADA-compliant vans. Thus, future additional vans are planned to be made accessible to help bring down these wait times (Durand, 2024). These data have not yet been compiled into a public report, but the Ride TFT Transit Coordinator has presented them to the Twin Falls City Council (Durand, 2024).

By December 2023, the City had enough compelling data to demonstrate the significant need and demand for the service as well as the amount of City resources needed to provide it, which led to the decision to make it permanent. There was not a long-term plan in place for making it permanent before the pilot began, as the City had not known what to expect from Ride TFT, who would be riding, and what these users would need until the pilot was already in progress (Durand, interview, March 8, 2024). Based on the observed effects and data, City staff were confidently past the point of just experimenting with Ride TFT, instead viewing it as a starting point for future transit plans and expansions in Twin Falls (Durand, interview, March 8, 2024). This is partly due to the unique position of the City of having no other existing public transportation services that Ride TFT may have just been supplementing. Since that decision was made, operations have stayed mostly the same, but longer-term plans are being formulated. The City needs to identify long-term public and private funding sources to keep up with the service's high demand and the area's growing population. They also hope to connect Ride TFT with other existing regional transportation services to expand coverage areas. City staff have been learning throughout the 9-month pilot period how to continuously re-evaluate the program and their plans in order to build the most effective and service-oriented system possible (Durand, 2024).

Appendix D

IV. City of Phoenix, Arizona
Cool Pavement

The City of Phoenix began a one-year cool pavement pilot project in the summer of 2020, which became a permanent part of their operations in October 2021. The pilot involved treating asphalt pavements with a water-based sealing treatment that is lighter in color than traditional asphalt. Because asphalt absorbs and retains heat during the day and releases it at night, cool pavement is intended to reflect more of the sunlight and therefore offset rising nighttime temperatures and mitigate urban heat island effects (City of Phoenix, n.d.). In 2019, the City's Chief Sustainability Officer and former Street Transportation Engineering Manager attended a workshop in Los Angeles with the Federal Highway Administration about cool pavements and learned about the pilots that the City of Los Angeles had been implementing. When they returned to Phoenix, they proposed the idea of a cool pavement pilot for Phoenix, which leadership in the City and Street Transportation Department were in favor of. However, the use of colorized sealing treatment for this particular purpose was still relatively new and the City was unsure if there would be different results in Phoenix because of their land uses and hot desert climate (Stevens, interview, March 15, 2024). Ultimately, it was decided that the pilot would last around a year and its impacts would simultaneously be studied by researchers at Arizona State University (ASU). The City chose roads in each of the eight City Council districts that already needed to be sealed, along with part of a parking lot, for the initial cool pavement treatment (Stevens, interview, March 15, 2024; City of Phoenix, n.d.). The pilot covered a total of 36 miles of residential neighborhood roads (ASU Urban Climate Research Center, 2021).

Since the pilot began, the funding for cool pavements has come from the Street Transportation Department's operating budget. It was initially budgeted around $3 million to accomplish the specific scope of the pilot. After the project had demonstrated some success, the City Council approved more funding for it, which has allowed the department to treat additional locations over subsequent years (Stevens, interview, March 15, 2024). The cool pavement material is more expensive than the seal coating materials the City was using previously, but other cities have found the treatment to be effective and longer lasting than traditional asphalt seal coats, which in part motivated the City to move ahead with the project despite the extra costs. Additionally, the City implemented an innovative spray method to coat the treatment more efficiently and with less hand labor, which saved some costs (City of Phoenix, n.d.). While the department has been looking for grant funding to help support this project, they have yet to find one that fits their particular needs and objectives (Stevens, interview, March 15, 2024).

The City of Phoenix staff enlisted researchers from ASU to conduct a scientific study and survey to evaluate the effectiveness of the cool pavement pilot. After determining how much they could

accomplish during the pilot given their budget and time constraints, the department decided on specific metrics, including direct temperature readings, solar reflective readings, durability, changes in temperature (using infrared cameras), mean radiant temperature, and outreach to residents (Stevens, interview, March 15, 2024). The ASU team had already done a mean radiant temperature study in relation to cool pavements in Los Angeles, and they had expertise in climatology and pavement materials. Additionally, the City already had master agreements in place with state universities, and it was more cost-effective to have a local university conduct field measurements rather than having researchers travel in from elsewhere (Stevens, interview, March 15, 2024).

The ASU researchers set out to measure heat surrounding the roads treated with the seal coat in comparison with roads that were untreated. They found that surface temperatures with the cool pavement treatment were lower (by 10 to 12 degrees Fahrenheit on average) than non-treated asphalt across all times of day. Air temperature at six feet height was lower above cool pavements than non-treated surfaces, but only by 0.2 to 0.9 degrees Fahrenheit. Meanwhile, mean radiant temperature (which represents humans' experiences of heat) increased by around five degrees Fahrenheit on average on the cool pavements because of their higher surface reflectivity (ASU Urban Climate Research Center, 2021).

ASU also conducted a survey of residents in 2021, which demonstrated high levels of satisfaction with the City's level and type of communication about the pilot, along with divergent opinions about the cool pavements' visual appeal and impact on property values. The researchers ended up recommending that the City complete longer-term testing of pavements to assess changes in reflectivity, traction, degradation, and subsurface temperature over time; examine air temperature changes more closely; and explore the use of pavement coatings with similar performance but a darker color to potentially improve public perception of the program (ASU Urban Climate Research Center, 2021). Their study was published in October 2021, at the same time that the City announced the program would be made permanent. ASU completed a second study in December 2023 to evaluate the program in its following years, which has not yet been published (Stevens, interview, March 15, 2024).

Although some of the study results exposed the limitations of cool pavement technology, specifically for improving pedestrians' daytime experiences of heat, City staff emphasized the promising findings, noting that cool pavements are just one tool that they are using for heat mitigation. However, it is one that can be implemented relatively easily and quickly compared to, for example, planting new trees for increased shade (Stevens, interview, March 15, 2024). There have been a wide variety of public opinions on the cool pavement project. Some residents resisted the aesthetics of the lighter pavements, but in general, staff has found that many are satisfied that the City is doing anything at all to address the issue of extreme heat (Stevens, interview, March 15, 2024). The department has strongly prioritized their communication with residents impacted by the cool pavement treatments. They send out informational flyers to areas before they receive the construction notice and update the City website with locations that will be and already have been

treated (Stevens, interview, March 15, 2024). The ASU survey results showed that even residents who were critical of the project generally felt that the City effectively communicated their actions and the motivations behind the project (Stevens, interview, March 15, 2024; ASU Urban Climate Research Center, 2021).

Based on the findings of the study, budget availability, and staff capacity, the department and City leadership decided that the pilot would become a permanent part of their operations. Since then, the department has been considering and evaluating different seal coat products. The treatment they have been using since the initial pilot is generally best for streets that are in good condition, while the City is testing one that can be applied to streets in fair condition instead (Stevens, interview, March 15, 2024). Further, the Street Transportation Department is hoping to eventually partner with other City divisions (e.g., library, police department, fire department) that currently manage their own parking lots to encourage cool pavement adoption on those surfaces. The City's cool pavement project is constantly being re-evaluated in response to construction challenges, public feedback, observed effects, and ASU's scientific studies. Staff learned important lessons from the pilot stage which were then incorporated into the full implementation; for example, the color of the sealing treatment was updated to be slightly darker for enhanced performance. The department will continue to make these kinds of tweaks to the program and hopes to expand to more streets in the future (Stevens, interview, March 15, 2024).

Appendix E

V.   Houston METRO
HOV/HOT Lane Weekend Hours

High-occupancy vehicle (HOV) lanes have been a fixture on highways in the Houston, Texas area since the 1980s. The first one opened to buses and registered vanpools in 1979 on the North Freeway (I-45 N). Because of its success, HOV lanes were constructed throughout the next decade on the Gulf Freeway (I-45 S), the Katy Freeway (I-10), U.S. Highway 59 (I-69), and the Northwest Freeway (U.S. Highway 290) (Burris & Stockton, 2004). They all involve barrier-separated lanes in the middle of the freeways that run in one direction but are reversed in the middle of the day to accommodate trips into and out of downtown Houston. In the years following their construction, the Metropolitan Transit Authority of Harris County (METRO) adjusted the restrictions on each HOV lane multiple times based on demand and congestion. Between 2012 and 2013, the HOV lanes on I-45, U.S. 59 and U.S. 290 were all converted into high-occupancy toll (HOT) lanes, meaning single-occupant drivers were permitted to use the lanes alongside vehicles with two or more occupants as long as they paid a toll, which varied depending on the time of day. Today, HOV/HOT lanes on all three freeways are open from 5 to 11 a.m. and 1 to 8 p.m., with only vehicles with two or more occupants allowed on them between 6:30 to 8 a.m. and 4:30 to 6 p.m. At all other times that the lanes are open, single-occupant drivers can pay the variable toll, which ranges from $1 to $7 throughout the day (METRO, n.d.). The lanes all close at 11 a.m. and operate in the reverse direction once they reopen at 1 p.m.

Prior to 2022, the lanes were only open for use on weekdays. Given that they have been effective for managing traffic since they were implemented and the infrastructure was already in place, METRO started a three-month pilot in July 2022 that added weekend operating hours to the lanes. METRO had previously tested weekend hours on one of the corridors (I-45 S) through other pilots but had never determined that enough drivers were using them to justify the extra operating costs (Mirjamali, interview, March 21, 2024). In 2022, however, the METRO Board of Directors decided to try it again across all the METRO-operated HOV/HOT lanes with the mindset that the lanes were an unused asset during weekends and that service provision could be prioritized over cost-effectiveness in this situation.

Traffic flows much more freely on weekends on all of the corridors, but METRO officials decided to see how many drivers would still elect to use the HOV/HOT lanes if given the option. The METRO Board Chair also noted that drivers could be incentivized to carpool during their weekend trips instead of just their work commutes, and operating the lanes seven days a week would create a more uniform system (Farmer, 2022). Additionally, there was a subset of the driving population that had been consistently pushing for the lanes to be open every day after seeing them unused two days out of the week (Mirjamali, interview, March 21, 2024). The pilot was planned to last from

early July 2022 until Labor Day, using the same hours of operation as the weekdays for simplicity (Mirjamali, interview, March 21, 2024). The change was made permanent one week after the pilot ended, and since then the lanes have all been open seven days a week.

For the operation and maintenance of the HOV/HOT lanes, METRO contracts with TransCore, a company that has long worked with transportation agencies on engineering solutions, specifically related to collecting and processing tolls. TransCore converted Houston's HOV lanes into HOT lanes over a decade ago and has their own staff in the field alongside METRO staff to conduct lane inspections and open and close the lanes four times a day (5 a.m., 11 a.m., 1 p.m., and 8 p.m.). METRO also has their own police department which is in charge of lane enforcement. Another closely involved entity is the Texas Department of Transportation (TxDOT), which has an operation and maintenance agreement with METRO because the lanes are in TxDOT's right-of-way (Mirjamali, interview, March 21, 2024). The weekend hours pilot and ongoing operations have been funded through the agency's budget instead of external sources. METRO already has an approximately $30 million contract over five years with TransCore, and they added around $380,000 to extend the lane operations into weekends (Farmer, 2022). Once the METRO Board decided they wanted to make this change, they found a way to fund the extra staff and operating costs (Mirjamali, interview, March 21, 2024).

To evaluate the impacts of the pilot, METRO collected data on the volume of drivers per day on each of the HOT/HOV lane corridors. The Texas A&M Transportation Institute assisted with this data collection, but neither organization conducted extensive analysis. Instead, METRO staff examined the number of drivers using the lanes on the weekends and noticed there was a general increase as the summer went on, which indicated the possibility that their use might continue to grow if the change became permanent (Mirjamali, interview, March 21, 2024). The total number of drivers using any of the five HOV/HOT corridors (I-45 S, I-45 N, U.S. 59 S, U.S. 59 N, and U.S. 290) over the course of one week reached its peak during the pilot in mid-August at over 6,000. The lowest total of any week was just over 2,000 (Mirjamali, interview, March 21, 2024). While these numbers are much lower than during weekdays, METRO was most interested in the lanes being open at all to offer them as an option to drivers and make use of the existing infrastructure. The METRO Board of Directors approved a plan to keep this change intact in September 2022. The Board Chair was quoted as saying, "Yes, our job is to connect people to jobs, but it is also to connect people to recreational opportunities, weekend trips, leisure trips, trips to schools and universities. Having a consistent seven-day operation is a significant benefit" (Trippett, 2022). Since the HOV/HOT weekend hours pilot became permanent, METRO has continued collecting data on the weekends as they do during the week to compare lane uses over time.

Beyond the group of people who were publicly advocating for the lanes to be open on the weekends, there has not been any significant public feedback to the department; staff assumes that most drivers either have no opinion or view the additional operating hours in a positive light (Mirjamali, interview, March 21, 2024). When the pilot was first launched, staff worried about drivers unfamiliar with the HOT/HOV lanes getting into them and moving in the wrong direction,

despite all of the gates, whistles, electronic signals, and signs that METRO uses to prevent that from happening. METRO prioritized marketing, social media, and press releases at the start and end of the pilot to inform as many people as possible that the lanes would be open on weekends and describe how they worked (Mirjamali, interview, March 21, 2024). Since the pilot began, the same toll structure used during the week has been in effect on weekends. In February 2024, however, METRO's acting CEO suggested reducing the toll on weekends to $1 across the board to encourage more drivers to use them even when there is not a significant delay on the route. METRO staff plans to again closely examine the data on the volume of drivers using each lane about six months after this change goes into effect (Mirjamali, interview, March 21, 2024).

Appendix F

VI.   City of Arvada, Colorado
Traffic Calming

The City of Arvada began a traffic calming pilot that was installed incrementally in 2022, motivated in part by residents' complaints to the Public Works Department about speeding and erratic driving in their neighborhoods. These residents wanted action from the City and were usually requesting that speed humps be installed. The department started to examine the Historic Olde Town area of the city, which had seen some recent changes in traffic patterns, and chose a major corridor (57th Avenue) that connects to Olde Town to test out temporary traffic calming infrastructure (Firouzi, interview, March 11, 2024). The City Council recommended that staff first develop a traffic calming plan for a parallel corridor (Grandview Avenue) and implement the changes along both corridors simultaneously to avoid negatively impacting residents along either street (City of Arvada, n.d.). Along with being important routes for connectivity in the City, the diverse land use patterns around both corridors would have allowed the City to test the effectiveness of different traffic calming interventions with applicability to both urban and suburban contexts (Firouzi, interview, March 11, 2024).

The City first collected speed and volume data at multiple locations along the corridors, which informed their plans for the pilot. On the 57th Avenue corridor, the City added five curb extensions, three speed cushions, and four traffic circles. On the Grandview Avenue corridor, they added speed cushions at four intersections. The curb extensions involved flexi-posts, white striping, and colored paint to reduce the crossing distance for pedestrians at crosswalks, improve sight lines for drivers, and reduce driving speeds. The speed cushions were similar to speed humps but had multiple raised areas with gaps between them to allow emergency vehicles to pass through at higher speeds. The traffic circles, involving paint and flexi-posts, were meant to direct drivers slowly around a center circle at small-scale intersections to reduce their speeds (City of Arvada, n.d.). The City ultimately decided to discontinue this pilot and is still incrementally removing the temporary infrastructure from the corridors.

In preparation for and during the pilot, the Public Works Department collaborated with the City's police department and maintenance and operations divisions, as well as the fire protection district. All of their feedback was critical for deciding on the infrastructure to be tested, especially because there is a fire station on 57th Avenue near Olde Town. Operators of fire trucks, police vehicles, and snowplows all gave their input into the traffic circle element. The fire department measured the potential additional delay in responding to emergency incidents, and the City used design software to demonstrate that even the largest fire trucks could navigate the proposed traffic circles. The City decided to use flexi-posts in the circles for situations where the trucks and emergency vehicles might have to drive over them (Firouzi, interview, March 11, 2024).

The traffic calming infrastructure was financed through a one-time fund that came from an increase in sales tax revenue, which was enough for a short-term project. This pilot idea was chosen partly because it involved relatively little funding for labor and materials. However, as the project went on, costs increased and maintaining the infrastructure became an issue due to staff shortages both in the City and the consulting firm that the City had hired (Firouzi, interview, March 11, 2024). The department was not prepared for these cost increases and did not have funding set aside for it. At one point, staff proposed adding a fee to traffic violations throughout the city, which would have helped fund an expansion of the project. There were around 7,000 violations per year, which would have generated $150,000 for traffic calming projects. However, the fee idea was not supported by a municipal judge and was abandoned. While funding presented an important challenge, it was not the only reason that the traffic calming pilot was discontinued (Firouzi, interview, March 11, 2024).

The main goals of the pilot were to address community concerns of speeding and dangerous driving and, in the process, avoid crashes, injuries, and fatalities. The department collected data throughout the duration of the pilot, which will be published in a forthcoming report. The data came primarily from speed studies, volume data, enforcement data, traffic crash analysis, public feedback, and video collection from cameras placed near the traffic calming infrastructure (Firouzi, interview, March 11, 2024). One of the main goals of reducing average speeds in the corridors was achieved — they dropped from around 42 miles per hour to 32 or lower. Between traffic circles, drivers slowed to around 15 to 20 miles per hour. However, while the interventions successfully controlled driving speeds, they did not achieve the goal of reducing near-misses. In fact, near-misses and dangerous driving behavior were found to have increased in the study areas since the infrastructure was installed (Firouzi, interview, March 11, 2024). The data indicated that there were no severe crashes during the pilot period, but there were very few in these areas before the pilot began and the resident complaints had more to do with their perceptions of safety based on observed driving behavior rather than significant safety issues backed by data (Firouzi, interview, March 11, 2024).

Despite meeting certain goals of the project, there was a general sense that the traffic calming pilot may have introduced more issues than it effectively solved. Although the City and fire district had tested response times before the pilot began, the new infrastructure still ended up presenting new challenges for fire trucks (Firouzi, interview, March 11, 2024). Even residents' perceptions of safety, which were critical to the original launch of the project, did not significantly improve because some of the interventions led to increased driver confusion, honking, and near-misses. Video collection showed that many drivers were unsure how to use the traffic circles in particular, with many driving over the flexi-posts or curbs, despite the department's efforts to educate people about rights-of-way (Firouzi, interview, March 11, 2024). Further, a nearby arterial road that had been undergoing construction reopened during this period, which shifted traffic patterns and took pressure off the pilot study corridors.

In the interest of spending the City's resources on the most warranted issues, the department realized they had to consider the difference between perceived safety and actual, correctable safety issues (Firouzi, interview, March 11, 2024). With that in mind, the City has shifted their strategy for traffic safety towards a more proactive approach. After reviewing the data, they found that many recent crashes were DUI-related, which are not likely to be mitigated solely through infrastructure changes. Instead, the department will focus more on major intersections that have had more severe crashes and place an emphasis on enforcement and education rather than infrastructure (Firouzi, interview, March 11, 2024).

As of March 2024, the department is still gradually removing the temporary traffic calming interventions. They have been putting their lessons learned from the pilot toward their new approach to speed management, in part by investigating residents' complaints within the context of their specific neighborhood and trying to find the root causes of the issues (Firouzi, interview, March 11, 2024). In a recent presentation to City Council about their new plans, the department named their primary known challenges in this area, based in part on residents' expressed concerns: inconsistent speed limit signs, perceived neighborhood speeding, congested regional corridors, and a lack of self-enforcing road geometry. The basic framework for addressing these issues will include speed data, safety analysis, technology application, enforcement, improving roadway geometry, and education and communications efforts (City of Arvada Public Works, 2024).

Appendix G

VII.   City of Pittsburgh, Pennsylvania
Move PGH

The Department of Mobility and Infrastructure (DOMI) at the City of Pittsburgh started planning their Move PGH pilot project in 2019. The pandemic strongly influenced the planning and goals of the project, which was not able to start until July 2021. The main idea of Move PGH was to bring together all of the city's transportation operators into one cohesive group to encourage the colocation of bikeshare, electric scooters (e-scooters), e-mopeds, and carshare through mobility hubs, while also integrating these services into one digital platform (Seifert, interview, February 21, 2024). The collective of mobility operators was formed through a request for proposals from DOMI, which led to the selection of one mobility provider for each mode. The group was named the Pittsburgh Mobility Collective (PMC), and the structure was intended to prevent some of the problems other cities have faced while working with private micromobility providers in regards to regulation, enforcement, coordination, and infrastructure. The City also decided to use the Transit app as the official digital platform for Move PGH and the PMC, through which residents could plan trips, navigate the city, and explore options for different mobility services (City of Pittsburgh, 2022).

Along with shifts in the pilot timeline due to COVID-19, DOMI was also relying on state legislation regarding e-scooters. They were previously not authorized at all in Pennsylvania, but after advocacy and lobbying from those involved with Move PGH and the PMC, the State Legislature approved e-scooters specifically for a two-year pilot period in Pittsburgh with the passage of Act 24 in 2021 (City of Pittsburgh, 2022; Seifert, interview, February 21, 2024). The two-year period made it feasible to introduce a brand-new service to city residents and get the private company involved, Spin, to fully invest in the program (Seifert, interview, February 21, 2024). In addition to providing e-scooters, Spin also committed in their RFP response to installing 50 e-scooter charging stations throughout the city at locations determined by DOMI with community input, which served as mobility hubs. As of the midpoint of the pilot in July 2022, there were 20 hubs installed (City of Pittsburgh, 2022).

Similar to the City's motivations for establishing the PMC, DOMI was intentional with their partnership with Spin because of other cities' experiences with e-scooters entering their markets with very little regulation. DOMI attempted to follow best practices at the time in terms of equitable e-scooter distribution. They were also receiving demands from the public to hold the company accountable, which at times complicated the City's role as both a partner and regulator of Spin (Seifert, interview, February 21, 2024). Within the first year of the pilot, Spin met 90 percent of their daily deployment requirements and accumulated violations whenever they failed to meet these requirements in certain zones, for which they had to pay fees that went towards Move PGH

infrastructure like scooter parking corrals and bike racks (City of Pittsburgh, 2022). The other mobility providers that were part of the PMC were POGOH, a bikeshare program; Pittsburgh Regional Transit, the local transit agency; Scoobi, an e-moped company that shut down in 2022; Waze Carpool; and Zipcar, a carsharing service (City of Pittsburgh, 2022).

DOMI prioritized community engagement efforts before launching Move PGH. They conducted interviews with public entities, advocacy groups, transportation experts, and community leaders before the PMC was formed to discuss the structure and role of a transportation coalition. They also used the Move PGH website and social media to bring awareness to the purpose of the program and receive feedback through an online survey, hosted public information sessions for community groups before finalizing the plan for the project, tabled at community events, and continued to hold public forums once the project had started to discuss potential mobility hub locations in different neighborhoods (City of Pittsburgh, 2022).

Move PGH was primarily funded by philanthropic grants from the Richard King Mellon Foundation and the World Resources Institute, which totaled around $700,000. The grants covered a program director position at InnovatePGH (a partnership of philanthropic institutions, local universities, and public agencies that provided staff support to Move PGH and served as its fiscal conduit), the installation of scooter parking corrals, marketing materials, and the integration of POGOH bikeshare into the Transit app. Aside from the two grants, the rest (around 15%) of Move PGH funding came from Spin. The company paid fees of $0.10 per scooter trip along with fees per violation accrued, both of which went toward program infrastructure (City of Pittsburgh, 2022). Overall, there was not much of a funding commitment from the City's side, but as a small team, only half of one DOMI staff member's time was allocated to Move PGH, which became a major challenge. This was partly why DOMI elected to outsource the final evaluation of the pilot and report (which has not yet been published) to a third-party consultant (Seifert, interview, February 21, 2024).

The City captured a wide variety of evaluation metrics throughout the pilot, some of which were published in 2022 in the mid-pilot report. The 2021 Pennsylvania legislation authorizing e-scooters required that a report evaluating the outcomes of the program be submitted to the State Legislature at the end of the pilot. Some of the collected data included results from a Spin user survey; Transit app usage; transit ridership and service; economic impacts; usage of bikeshare, e-scooters, e-mopeds, carpooling, and carshare; and reported complaints and injuries from e-scooters (City of Pittsburgh, 2022). As of July 2022, there had been over 570,000 total scooter trips spanning 735,000 miles; 82,000 bikeshare trips; 11,000 e-moped trips; and 8,000 careshare trips (City of Pittsburgh, 2022).

While the mid-pilot report focused mostly on quantitative and Spin survey data, the 10 goals that DOMI had laid out for the Move PGH pilot were more conceptual or difficult to measure in the short-term. These included, for example, "Demonstrate the potential of a public-private approach to operating a multimodal shared mobility platform" and "Reduce tailpipe emissions associated

with the transportation sector in order to improve local air quality and decrease rates of respiratory diseases associated with such emissions" (City of Pittsburgh, 2022). DOMI did not release any clear evaluation criteria ahead of time, which some community members criticized. DOMI had to come up with key performance indicators after the project had already begun, partly through consulting with other cities that had implemented similar projects. Through this process, DOMI staff learned that performance indicators should be as clear and measurable as possible (Seifert, interview, February 21, 2024).

Despite the metrics showing widespread adoption of the shared mobility services implemented as part of Move PGH, especially the e-scooters, and the desire of DOMI to continue and expand the program, they were unable to continue it beyond the end of the pilot in July 2023. The City had been communicating with the State Legislature leading up to that deadline about either extending the pilot period or deciding to allow e-scooters in the state long-term. Members of the legislature were unsure about permitting only Pittsburgh to operate e-scooters or applying their decision to the entire state (Seifert, interview, February 21, 2024). Ultimately, no authorization came up in time and the Spin e-scooters were removed from the right-of-way in the following weeks. As much as DOMI staff hoped that Move PGH would become a permanent program, they faced a large external barrier to scaling. If given another chance in the future to bring back e-scooters, there are certain aspects DOMI staff would do differently, which will appear in the final evaluation report. For example, fees per ride from the e-scooter operator might be increased to more adequately cover the staff time and capacity needed to manage the program (Seifert, interview, February 21, 2024).

Further, while the department attempted to prevent the e-scooters from taking up sidewalk space for pedestrians and people with disabilities (by establishing no-parking zones and requiring that scooters be parked at corrals or hubs), this was still a prominent issue raised by disability advocates throughout the pilot (Seifert, interview, February 21, 2024; Pittsburghers for Public Transit, 2021). While the e-scooters are gone and Move PGH no longer formally exists, the other mobility services and integrations are still in use in Pittsburgh, and there remains a culture of collaboration among the transit and mobility operators throughout the city that originated with the PMC (Seifert, interview, February 21, 2024).