Collaborative Sciences Center for ROAD SAFETY

FINAL REPORT

COVID-19 Streets: evaluating the impacts of rapid rollouts of pedestrian and bicycle facilities

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16. Abstract

This study analyzed the impacts of rapid-rollout shared streets programs implemented in response to changes in travel demand brought on by the COVID-19 pandemic. Shared streets are those that have been converted to pedestrian- and bicycle-priority zones using temporary materials, typically involving some sort of traffic calming or diversion. The research sought to understand the impacts of these shared streets on pedestrians and cyclists, with respect to safety, equity, and mobility by (1) comparing pedestrian and bicycle traffic volumes in nine treatment cities—cities that implemented robust shared streets programs during and because of the pandemic—and seven peer control cities, and (2) exploring the motivations, planning processes, and outcomes of shared streets in the treatment cities.

Pedestrian and bicycle traffic volume data analysis did not support the hypothesis that shared streets were associated with increased pedestrian and bicycle traffic compared to pre-pandemic patterns. Travel patterns shifted from commute-oriented to recreation-oriented, but effects were stronger in control cities more than treatment cities. Volumes increased near pre-pandemic recreation sites and decreased near commute sites, but again with stronger effects in control cities. Sites near shared streets saw greater decreases, suggesting contextual factors influenced volumes more than shared streets. The lack of evidence that shared streets influenced pedestrian and bicycle traffic may also reflect limitations of existing count programs for rapid interventions during crises.

Qualitative analysis of planning processes and outcomes revealed that shared streets programs aimed to provide safe outdoor space for physical distancing as well as opportunities to demonstrate new approaches to traffic calming. Locations for interventions were based on existing plans, ease of implementation, equity, and traffic conditions. Public engagement was limited at first but increased over time in most cases. Impacts of shared streets programs included new perspectives on street space and uses, an increased appetite for experimentation, public demands for faster implementation of pedestrian and bicycle facilities, and new public engagement approaches based on *in situ* trials.

Recommendations: With increasing likelihood of massive disruptions in transportation systems in the future, cities should work now to ensure transportation plans are adapted to rapidly changing conditions and to develop more intentional data collection approaches to accurately assess impacts of crisis-related interventions.

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Contents

Executive Summary

This project aimed to explore relationships between the planning processes behind COVID-related shared streets programs and the impacts of those programs on walking and bicycling. COVID-related shared streets, as defined by the Pedestrian and Bicycle Information Center's Shifting Streets Glossary, are streets that have been converted, using temporary materials, into pedestrian- and bicycle-priority zones. Motor vehicle traffic is either slowed via traffic calming devices or reduced in volume via 'local access only' signage or physical diverters meant to filter out through traffic.

We conducted an integrated analysis of pedestrian and bicycle traffic count data and in-depth interviews focused on rapid-rollout shared streets planning processes in a sample of US cities. Through this analysis, we sought to understand whether COVID-related, rapid-rollout shared streets programs developed through equitable, plan-based processes led to greater use of those programs, as measured via pedestrian and bicycle traffic volumes.

We learned, however, that the "success" of a rapid-rollout shared streets program is hard to define and harder to measure. The 'covid-streets' era is defined by chaos; we may never sort out the extent of its impacts on transportation, on safety, or on planning practices given the wide variety of approaches and the ephemerality of most of these efforts. But a deep dive into individual cities' efforts reveals that transportation professionals took deliberate, if uncertain, steps. These steps were often unprecedented and based more on gut instinct than hard data, but they were taken with intent and with clear motivations, even in the face of chaos. Despite these carefully motivated and intentional actions, most cities were not in a position to gather robust, valid data on the immediate impacts of those actions. For cities that did have count programs in place, those count data do not make substantial contributions to our understanding of the impacts of those cities' shared streets program. However, we have gained a rich understanding of the lessons that cities and their transportation professionals learned during their shared streets experiences, and how those lessons are being converted into new, post-pandemic attitudes and practices.

Study design

We identified a sample of nine US cities that implemented robust shared streets programs because of the pandemic, kept those programs in place at least six months, published data on the exact locations of those shared streets, and had continuous multimodal counters in place before and during the pandemic. We also identified a set of seven peer control cities that matched the treatment sample except that they implemented only very limited COVID-streets responses.

The research was conducted in two parts: a quantitative analysis of pedestrian and bicycle volume data across the treatment and control cities and a qualitative analysis of—based on hour-long structured interviews—of the planning processes, motivations, constraints, and outcomes of shared streets programs in the treatment cities.

Summary of findings

Quantitative analysis

The 16 cities collectively had 195 continuous count sites with valid, reliable data over our study timeline. We identified an overall increase in walking and bicycling volumes from before to during the pandemic at count sites in our control cities, but not in the treatment cities. We also found that pedestrian and bicycle travel patterns shifted overall from commute-oriented travel patterns to recreation-oriented travel patterns during the pandemic. Like with overall volumes, this shift was more pronounced in control cities. Finally, we found that pedestrian and bicycle volumes increased in locations that had had more recreational-oriented pedestrian and bicycle patterns before the pandemic, and decreased in locations

with commute-oriented pre-pandemic travel patterns; again this shift was more pronounced in control cities. However, none of the differences in pedestrian and bicycle activity in cities with and without shared streets programs was noteworthy.

We adjusted our methods, redefining 'treatment' sites in terms of distance to an actual shared street installation. This approach revealed that count sites located within two miles of a shared street had subtantially lower pedestrian and bicycle volumes, relative to pre-pandemic levels, than count sites farther away from a shared street. This unexpected finding could be due to the attractiveness of shared streets, pulling pedestrian and bicycle traffic away from established count sites, but we were not able to test this hypothesis. The relative decrease in pedestrian and bicycle traffic at count sites also raised questions about the contexts of the shared streets themselves. For example, were shared streets located in areas in which people were disinclined to visit during the pandemic?

Following the latter question, we speculated that land use might have a role in whether shared streets were measurably attracting pedestrians and bicyclists. We found that both walking and cycling increased slightly in suburban and rural settings and decreased in more urban settings—particularly in downtown locations. This suggested that context was probably an important predictor of pedestrian and bicycle traffic during the pandemic, and raised yet another question: How did cities decide where to implement shared streets? Were they set up to increase walking and bicycling and simply did not deliver the expected count numbers? Or are there other ways we should be framing shared streets' impacts?

Qualitative analysis

In a series of hour-long interviews, we asked city staff members who had played substantial roles in their city's shared streets program about how they decided to undertake the program, who was involved in decisions around planning, siting, designing, and implementing the program, and what role the public played in this effort. We also asked questions on impacts of the program, including how well it was received by the public and whether it became permanent or was allowed to expire. Finally, we asked interviewees what they and their teams learned from their shared streets experiences, whether they would do things differently if they had the opportunity to start over, and what new practices they saw emerging at the local level based on the shared streets experience.

Interview analysis revealed that COVID-related shared streets programs originated from a variety of departments and frequently involved interdepartmental collaboration. None of the cities in our study involved law enforcement in planning, implementation, or enforcing their shared streets programs. This was an intentional choice, as program planners recognized that a shared street scheme that relied on policing to function would be neither well received nor sustainable.

The primary motivation for implementing shared streets was the perceived need to reduce transmission of the SARS-CoV2 virus by providing outdoor space for physical distancing. Other common motivations included restarting local economies by connecting people to jobs and essential activities and using the reduction of motor vehicle traffic, along with public demands for safer streets, as an opportunity to demonstrate and fast-track previously planned actions. This latter motivation was directly reflected in the criteria most cities in the study used in determining locations for shared streets: in almost every case, shared streets were, at least initially, co-located with yet-to-be implemented actions laid out in existing transportation plans. Ease of implementation, concerns over traffic conditions, and desire to generate equitable distribution of benefits were other common criteria for locating shared streets.

The role of the public varied widely across shared streets programs, with a few cities explaining that the urgency of the moment called for faster action than a public process would accommodate, and others describing how they established entire new public processes. Still others began their programs with no public input but evolved substantially during subsequent phases.

Outcomes: Shared streets programs were permanentized in just over half of our treatment cities. Staff attributed this outcome to initial positive feedback. In every city, including those that decommissioned their shared streets programs, the experience generated new ways of thinking about street space. This includes new philosophies about street space, a concept that affected staff, elected leaders, and the public alike. Some version of the recognition that streets are for more than just moving cars came up in nearly every city, and in most cases was a primary driver of the development of new practices. We also heard of a growing appetite for experimentation, creativity, and sped-up implementation timelines. People recognized they didn't have to put up with years' long waits for new infrastructure. One interviewee encapsulated this notion, explaining: "it is no longer acceptable to make our residents wait years for safer, calmer, lower-stress streets."

The pandemic presented many challenges for public engagement, while the differentiated impacts of the pandemic—differences that were strongly linked to race and income—underscored the importance of robust and meaningful public engagement. Many cities prioritized urgency over engagement, though nearly all interviewees felt their shared streets experience strengthened their connections with community members, improved their communication pathways, and led them to develop new approaches to engaging with and learning from the public. In turn, the public showed staff an unprecedented level of tolerance for experimentation, including when those experiments did not pan out.

Stronger connections between staff and community opened the door for one of the most important new practices emerging from shared streets is the use of in situ trials of new designs. Cities took advantage of in situ trial opportunities in several ways: trial as analysis, trial as education, and trial as engagement. Covid-streets responses were wildly unpopular in many instances, in situ trials allowed for real-time feedback on what communities wanted and needed from their streets.

Other lessons emerging from shared streets experiences included the importance of context, the importance of equipment choices, and the importance of plans that can not only withstand disruptions, but guide cities through disruptions.

Finally, we heard frustration with the lack of data to analyze, document, and communicate the impacts of rapid-rollout infrastructure projects. Staff recognized that more structured and intentional evaluation programs, laid out in advance in well-crafted plans, sufficiently funded, and managed by trained staff, are essential to understanding the impacts of rapid-rollout infrastructure projects.

Conclusions

The treatment cities—all of which had robust shared streets programs introduced because of the COVID19 pandemic—had relevant plans in place and consulted them heavily during their shared streets planning processes.

Public engagement was limited early on, but increased and expanded in ways that are likely to outlast the pandemic.

Data from pedestrian and bicycle counters failed to support the hypothesis that robust, well-planned shared streets programs increased walking and bicycling during the COVID19 pandemic. However, this finding is likely explained, at least in part, by counter location and contextual factors surrounding the shared streets. Existing count programs are unlikely to adequately capture the true impacts of rapid-rollout interventions, particularly during crisis situations. Cities should be proactive, developing a deliberate and responsive approach to data collection that can be deployed on short notice. For example, a city might install a set of 12-15 permanent pedestrian and bicycle continuous count locations and supplements these with week-long short duration counts using automated count equipment rotated through specific sites around the city. This approach would ensure the city is better prepared to deploy

mobile equipment to capture the impacts of rapid rollout projects, such as shared streets, while also maintaining their ability to monitor long-term trends via the permanent counters.

And finally, there is knowledge to support new best practices for transportation planning and street design in a post-pandemic world, but that knowledge is embedded in the experiences of the professionals who were on the ground doing the work. In our haste to find a new normal, we must ensure this knowledge is not lost.

Introduction and background

A primary function of planning for walking, cycling, and other vulnerable transportation modes is to provide safe, equitable, appropriate, and useful infrastructure in a timely manner. Efforts to provide such infrastructure have traditionally been time consuming and costly, which means lifesaving benefits from such interventions are delayed and sometimes never realized. Cities across the country have found ways to reduce both costs and timelines for walking and biking infrastructure in response to the COVID19 pandemic. Yet many of these actions have been criticized for being arbitrary and out of touch with the communities they are meant to serve. Furthermore, the speed with which many of these interventions were deployed raises questions about their safety, equitability, and sustainability.

This research explores the relationships between the planning processes behind "COVID-streets" and the impacts of these programs on walking and cycling in a sample of US cities. We have a particular focus on the role equity and public engagement played in cities' COVID-streets planning processes and on the programs' impacts. We define impacts broadly, considering both the quantifiable impacts of COVID-streets on pedestrian and bicycle traffic volume and the less tangible, but no less important, impacts of COVID-streets programs on the people who planned, designed, implemented, and used them.

This study is focused on a specific kind of COVID-street: partial street closures, or as they are more colloquially known, shared streets.

The rise of COVID-streets

"COVID-streets" is an umbrella term for the myriad ways in which local and state governments modified the allocation and use of public street space in direct response to the changing needs brought on by the COVID19 pandemic. COVID-streets first emerged in the spring of 2020. Following the World Health Organization's declaration of COVID-19 as a pandemic, communities began implementing changes to public space to keep pace with the rapidly evolving understanding of the SARS-CoV2 virus and its impacts on society.

As the concept of "pandemic-adapted" streets spread around the world, transportation professionals were pushed to find new ways to meet a heightened demand for safe places to walk, bike, socialize, and engage in outdoor commerce (Abdullah et al., 2020; De Vos, 2020). Efforts to document these actions followed quickly, including the Shifting Streets COVID19 Mobility Database (Combs et al., 2020). This open-access database cataloged and verified crowd-sourced information about public sector responses to changing demands for mobility and public space brought on by the pandemic. As of the database's final update in May 2023, it contained over 1500 distinct responses, including actions in more than 250 US cities (Combs & Pardo, 2021).

The rapid response by city transportation departments stands in stark contrast to traditional pedestrian and bicycle infrastructure projects that frequently take years, if not decades, to plan, fund, design, and implement. During the first six months of the pandemic, transportation professionals were able to roll out novel, temporary facilities in a matter of weeks, and sometimes days. Preliminary data suggested these efforts had measurable impacts: bike traffic volumes in the US jumped ten percent in September, 2020, compared to one year earlier (Haubold, 2020).

The shift in approach—from slow and methodical to rapid and experimental—was widely praised by advocates for active, low-carbon mobility and led to the immediate publication of dozens of articles, guides, and webinars focused on propagating these responses (Pardo & Escovar, 2020). The popularity of COVID-streets measures suggested that transportation planning and engineering were entering an era that welcomes rapid advancement in understanding how to create walking and cycling facilities through experimentation rather than strict adherence to standardized processes and conventional designs.

However, the rapid changes to how street space is allocated, designed, and in some cases funded, was not without controversy. Observers pointed out that transport planning's long history of poor public engagement was deepened by the pandemic and the 'crisis planning' mentality it engendered (Agyeman, 2020; Butler, 2020; Thomas, 2020). A straw poll of North American walking and cycling advocates in May, 2020 revealed that over half of respondents felt their city's COVID-related street changes involved little or no public consultation (AmericaWalks, 2020). Shifting Streets data indicated that the vast majority of COVID-streets projects were neither called for in relevant adopted plans nor closely aligned with on-going planning efforts (Combs & Pardo, 2021).

Concomitantly, 2020 witnessed a growing recognition of injustices in how transport system benefits are distributed, underscored by high profile incidences of violence against racial minorities playing out in the streets. This recognition forced the transport profession to examine how the field has systematically discounted equity in planning and engineering decisions.

Motivation

Recent research from around the globe has examined the beneficial effects of cities adapting street space to meet the need for safe areas for walking, biking, and outdoor commerce during the pandemic (Buehler & Pucher, 2021; Conrow et al., 2021; Kim, 2021; Lin et al., 2021). The newly found acceptance of quick, responsive implementation of flexible, cost-effective, temporary infrastructure, together with the growing acknowledgement of the positive contribution of non-automotive transportation modes in promoting social and economic resilience during disruptive events, suggests we may be on the verge of a pivotal shift in the transportation field (Combs & Pardo, 2021).

With the US declaration of the official end of the COVID19 pandemic emergency, local governments are looking for guidance on how to solidify the gains in accommodations for pedestrians and bicyclists made during the pandemic, and to ensure they are adequately prepared for inevitable disruptions in the future. This research project helps build this guidance by exploring relationships between the planning processes behind COVID-related shared streets programs in a sample of US cities and the impacts of those programs on the people who planned, designed, implemented, and used them.

Theoretical framework

Impacts of COVID-streets responses

There is a growing body of research into the impacts of COVID-streets responses. A study of European cities found extensive implementation of pop-up bike lanes during the pandemic, with over 11 km added on average across 106 cities. These infrastructural changes corresponded with increased cycling rates of 11-48% (Kraus & Koch, 2021). As noted by Evenson and colleagues (2023), local officials in the US have also observed increased rates of walking and cycling. The closure of entire streets or reallocation and separation of individual lanes for active transportation played an important safety role as well. Despite increases in highway-related traffic fatalities, local planners noted a decrease in pedestrian and bicycle-related fatalities during the pandemic, attributed in part to the physical changes taking place on local streets (Evenson, Naumann, et al., 2023).

Along with physical changes, pandemic conditions shaped mode choices. Travelers prioritized health factors like masks, distancing, cleanliness, and infection risk over traditional considerations like time, comfort, and cost (Abdullah et al., 2020). Prioritization of health over comfort and time may help explain a shift from public transit to walking and cycling. Transportation professionals in the US have expressed hope that the increases in opportunities to walk and cycle have helped reshape public expectations for how streets should function (Evenson, Naumann, et al., 2023).

Public engagement in COVID-streets responses

Despite the apparent positive impacts of COVID-streets responses on mode choices and safety, a consistent and worrisome pattern emerged in US cities during the early pandemic: severely limited public involvement in the planning, design, or placement of interventions. In US Vision Zero cities, Evenson and colleagues (2023) observed a decrease in community engagement practices in 2020 over prior years. Similarly, few of the street changes documented in the Shifting Streets database were clearly linked to pre-pandemic public engagement initiatives (Combs et al., 2020). Beyond a few examples, there appeared to be a widespread lack of understanding regarding how to meaningfully engage with community members and stakeholders within the compressed timelines necessitated by the urgency of the pandemic (Firth et al., 2021). The lack of engagement with impacted communities has important implications for safety, as previous research has shown that a lack of meaningful public involvement has reduced potential safety benefits of pedestrian and bicycle infrastructure investments (Guo et al., 2020; Guthrie et al., 2019; Karner & Niemeier, 2013; Karner et al., 2020; Macmillan et al., 2014).

COVID-streets planning processes

A few studies have examined the processes cities used to select and implement mobility responses to COVID-19. Like with public involvement, the rushed timeline to effectively address the changing demands brought on by the pandemic meant communities frequently appeared to implement street space changes on the fly, with minimal connection to pre-pandemic plans or initiatives (Combs & Pardo, 2021). The disconnect between COVID-streets efforts and long-term transportation planning initiatives is surprising given the potential synergies between the two. It also raises some important questions:

1. What can communities do to ensure that the planning efforts in which they have already invested are relevant to future disruptions, and are set up to guide the community's actions through those disruptions?
2. What guardrails, supports, or regulations should be established now to ensure communities' responses to future disruptions are aligned with the needs and desires of their residents?

Evenson and colleagues (2023) discuss the importance of pre-disruption planning:

> "As municipalities reflect on the environmental and policy changes made as a result of the pandemic that might impact walking or bicycling, both successful and unsuccessful, preparations for future disruptions, such as through the integration of potential actions that might be taken during similar emergencies, are critical considerations for future routine planning processes." (Evenson, Naumann, et al., 2023)

Research needs

Despite the attention in the research, there is still little guidance for transportation agencies on how to ensure an equitable distribution of benefits from rapid-rollout street reallocations. The "COVID Streets" movement may be an indicator of evolution in the transport field, but questions remain over whether this change supports more equitable planning processes that are necessary to achieve safer outcomes for all users. This research will explore the ways in which cities approached equity and public engagement in the process of planning and implementing rapid rollout pedestrian and bicycle facilities, and the impacts of those facilities. Our primary objective is to identify, describe, and disseminate lessons from rapid rollouts that may lead to the development of more timely, equitable, and ultimately safer deployments of pedestrian and bicycle infrastructure in a post-pandemic future.

Specifically, this research achieves the following aims:

- Describes rapid-rollout shared streets interventions that occurred in a sample of US cities beginning in the spring and summer of 2020,
- Characterizes the decision-making process behind those interventions, focusing on public engagement processes, consistency of interventions with locally adopted plans, and lessons learned by program staff during the planning, implementation, and evaluation of shared streets programs,
- Evaluates the impacts of shared streets in terms of changes in pedestrian and bicycle traffic volumes, public receptivity, circumstances surrounding adaptation, termination, or permanentization of the shared streets program, and emergence of new plans, policies, or practices based on the shared streets program,
- Summarizes links between planning processes and program impacts and outcomes, and
- Makes recommendations for capturing the knowledge and new practices generated during the COVID-streets era and for ensuring US cities are better positioned to respond quickly and equitably to future disruptive events.

We achieve these objectives by addressing the following research questions:

1. Were the processes shaping the rapid rollouts equitable and/or consistent with prior planning initiatives?

We address this question through content analysis of structured interviews with staff members who played key roles in the planning, design, implementation, and evaluation of COVID-related shared streets programs in the a sample of US cities.

2. How are factors shaping rapid rollouts associated with 'success' of those rollouts, in terms of changes in walking and bicycling activity, public acceptance, and ultimate resolution of the rollout?

This question is addressed from multiple angles, including quantitative analysis of changes in pedestrian and bicycle count data in the sample cities from 2018 to 2020, relative to a set of peer 'control' cities

(cities with minor or no rapid rollout mobility responses), coupled with information gleaned from the interviews.

Research approach

City selection

We identified a sample of US cities that implemented robust shared streets programs because of the pandemic, kept those programs in place at least 6 months, published data on the exact locations of those shared streets, and happened to have continuous multimodal counters in place before and during the pandemic. We also identified a set of control cities that were similar in size and to the treatment group and also had the necessary multimodal count data available during the study's time period. The control cities also had active pedestrian and bicycle planning programs but had implemented only very limited COVID-streets responses.

Data sources

Data used to identify treatment and control cities came from a variety of sources. The main source was the Shifting Streets COVID-19 Mobility Database, hosted through the Pedestrian and Bicycle Information Center, which we consulted to identify cities that had implemented both robust (potential treatment) and limited (potential control) cities. Count data availability was ascertained from online data sources cataloged in resources such as the National Pedestrian and Bicycle Safety Data Clearinghouse, jurisdiction specific websites, or documentation in previous published research. Cities with at least one permanent continuous bicycle and/or pedestrian counter were considered potential study cities in place during our study timeframe (2018-2019) were included in this list. Not all count locations had data for all four study years, so locations with data from one of the before years (2018 or 2019) and one of the after years (2020 or 2021) were sought.

Selection criteria: treatment cities

We combed the Shifting Streets data, looking for cities in the US that had at least one explicit COVID-streets program that affected the use and/or allocation of space on public roadways (i.e., coded partial street closure in the Application field of the Shifting Streets data; N=73), and whose program had begun before July 1, 2020 (N=66)

We cross-checked the list of 66 cities that met these criteria with a list of cities that had permanent continuous pedestrian and bicycle counters in place during the 2018 to 2021 time period, eliminating cities where counters either did not exist or data were not available from the time period in question. This brought our pool of 65 cities down to 18.

Next, we looked for official (city-provided) maps showing the exact locations of the interventions, intending to eliminate cities without publicly available maps or downloadable spatial data on their COVID-streets programs, though maps were available in all remaining cities. We used those maps to select from the 18 cities those with relevant interventions that totaled at least one mile in length, reducing our sample to 16.

We then tracked down additional information about the remaining 16 cities' COVID-streets programs through official program websites, press releases, and news media to determine whether the programs in question (a) involved more than one corridor or area (15 cities) and (b) had been in effect for at least six months (13 cities), and to verify the accuracy of the information provided about the programs in the Shifting Streets database.

Finally, we reached the city employees who were listed as the points of contact for each of the remaining 13 cities, and were able to schedule interviews with ten of them: Bend OR, Cambridge MA, Charlotte NC, Eugene OR, Milwaukee WI, New Orleans LA, Portland OR, San Francisco CA, Seattle WA, and Tucson AZ.

Washington, DC was also included in the pedestrian and bicycle volume analysis, although, likely due to the popularity of their COVID-streets program among other researchers, we were unable to schedule an interview with the program's lead planners.

During the course of the interviews, we realized that two of the ten cities, Charlotte and New Orleans, did not meet our criteria for treatment cities. Based on information uncovered in the interviews, New Orleans was reclassified as a control and Charlotte was dropped from the study, as it was neither clearly treatment nor control. This left us with a final sample of eight treatment cities.

Selection criteria: control cities

For the control cities, we started with the list of cities for which we were able to obtain continuous multimodal count data starting at least as far back as 2018 but were not already in our 8-city treatment group. We cross-referenced these cities with the Shifting Streets database, looking for cities that were similar in size to our treatment cities, but with markedly less robust COVID-streets programs, either in scale or temporality. We then conducted a detailed internet search to verify that the Shifting Streets data had not simply missed COVID-streets programs in these cities that would disqualify them as controls (this was not the case). We identified seven control cities through this process: Alexandria VA, Arlington VA, Boulder CO, Chapel Hill NC, New Orleans LA, San Diego CA, and Springfield OR.

Pedestrian and Bicycle Volume Analysis

Methods

Data preparation

Pedestrian and bicycle count data were obtained for the treatment and control cities by either accessing it directly on-line when such data were posted, or more typically obtaining permission from the jurisdiction to access their data through the vendor's proprietary data portal (such as the Eco-Visio online data portal provided by Eco-Counter), or obtaining data from a jurisdiction via email from the data owner or .ftp site.

Once the raw data were obtained they were cleaned. This process is detailed below and involved manual inspection for data gaps, long runs of zeros, and suspiciously high volumes. Suspect data were not used in the computation of the key metrics described below.

Bicycle and pedestrian count data was provided in either 15-minute or one-hour bins, depending on the city. This data was then aggregated into daily counts using Microsoft Excel Pivot Tables and then was checked for potential errors. Possible errors include fewer than 23 hours in a day (23 hours is used to account for Daylight Savings Time) and very low or very high counts that are not explained by external factors, i.e. weather. Error checking was done by filtering the daily count total and removing the anomalous data.

The count data were then summarized using a second Pivot Table and average volume for each month with sufficient data (at least two counts for each day of the week provided) was calculated using the 'average' formula in Excel.

MADT:

For each day of the week for each month in each year for each location for each mode, compute MADT (from FHWA-PL-015-008, 201)

$$MADTm,y = \frac{1}{7}\sum_{j=7}^{1}\left[\frac{1}{n}\sum_{i=1}^{n} Vijmy\right]$$

where V = total traffic volume for the i^{th} occurrence of the j^{th} day of the week within the m^{th} month, for year y.

n = the count of the j^{th} day of the week during the m^{th} month for which traffic volume is available (a number between 1 and 5)

AADT:

$$AADTy = \frac{1}{12}\sum_{m=1}^{12} MADT_{m,y}$$

Where m is the month of the year, y

WWI (Weekend-Weekday Index, calculated by dividing the average weekend volume by the average weekday volume; (Miranda-Moreno et al., 2013):

$WWI = V_{we}/V_{wd}$

where:

V_{we} = average weekend daily traffic

V_{wd} = average weekday daily traffic

Findings

Data summary

We looked at 215 continuous count sites in 16 cities (7 Control and 9 Treatment Cities). Of these, 20 sites did not have enough reliable data from before and after the pandemic to be used in the analysis. This left 195 count sites in the 16 cities of which 126 were bicycle-only or bicyclists-separated-from-pedestrians sites, 65 pedestrian-only count sites or pedestrian-separated-from-bicyclists and 4 sites that counted bicycle and pedestrians together where the modes were not differentiated. There are 94 count sites in control cities and 101 in treatment cities. This is summarized below in Table 1.

Table 1- Summary of number of count sites

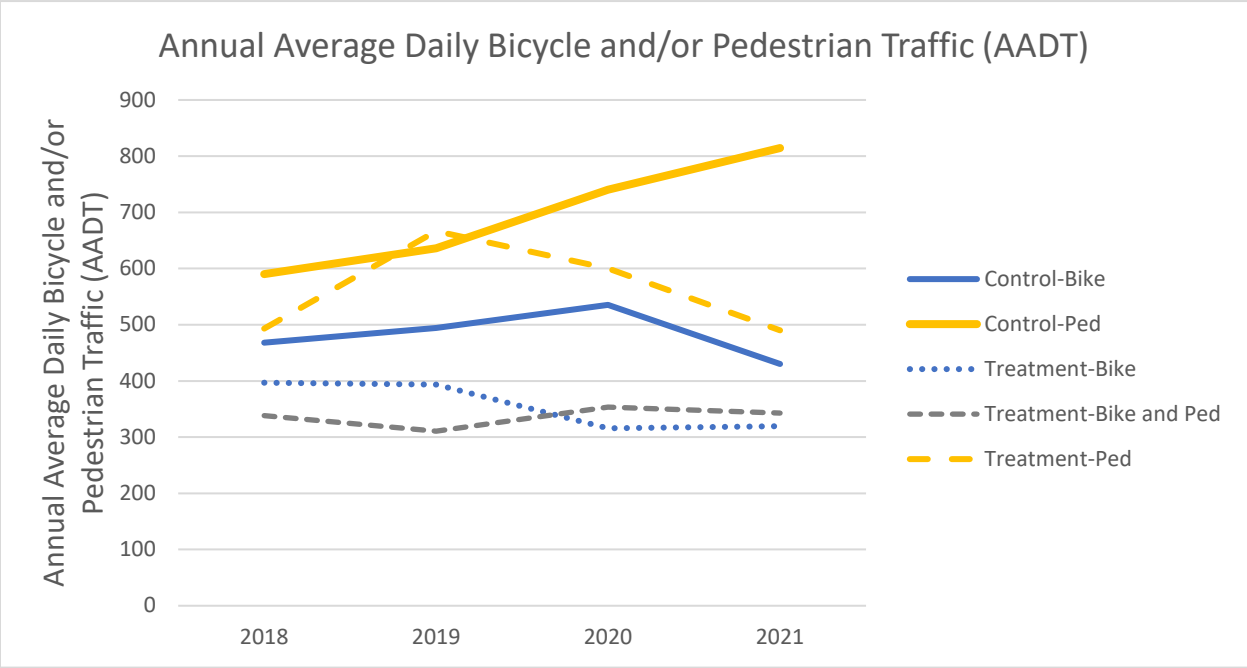
Treatment or Control	City	Number of Count Sites			
		Bike	Both bike and ped	Ped	Total Counters
Control	Alexandria	4		2	6
Control	Arlington	26		18	44
Control	Boulder	11		3	14
Control	Chapel Hill	5		4	9
Control	New Orleans	1			1
Control	San Diego	6		6	12
Control	Springfield	4		4	8
Treatment	Bend	6		7	13
Treatment	Cambridge	1			1
Treatment	DC	12		4	16
Treatment	Eugene	10		6	16
Treatment	Milwaukee		4	2	6
Treatment	Portland	11			11
Treatment	San Francisco	15			15
Treatment	Seattle	11		9	20
Treatment	Tucson	3			3
Total		126	4	65	195

Volume Changes

To study volume changes, we looked at the Annual Average Daily Bicycle or Pedestrian Traffic (AADT) for each mode for each site for 2018-2021 as available. Table 2 shows summary average data for the 61 locations where we have AADT for all 4 years. Overall, there appears to be an increase in volumes for cycling and walking during 2020 in the control cities, but in the treatment cities, there was a general decrease. However, the high values of the standard deviation given in the table also indicate the wide variation in volumes.

Table 2 - Bicycle and Pedestrian Traffic Volumes by Year

Treatment or Control	Mode	Number of Sites	Average of AADT 2018	Average of AADT 2019	Average of AADT 2020	Average of AADT 2021	StdDev of AADT 2018	StdDev of AADT 2019	StdDev of AADT 2020	StdDev of AADT 2021
Control	Bike	25	468	494	535	430	425	476	565	415
Control	Ped	17	590	636	740	814	477	526	523	825
Treatment	Bike	11	397	394	316	319	305	309	281	381
Treatment	Both	2	338	311	353	343	429	393	429	418
Treatment	Ped	6	493	667	600	490	886	1,339	1,131	882
Total or Weighted Average		61	488	527	553	520	471	586	588	615



Weekend/Weekday Index

We looked at the pattern over the week using the Weekend/Weekday Index (WWI) and found that the average index indicates that prior to the start of the pandemic most sites (56%) have lower weekend than weekday volumes, indicating more commute travel than recreational travel. However, after the start of the pandemic there is a general increase in WWI indicating that weekend travel was more prominent after the start of the pandemic than before. This was more pronounced in the control count sites, indicating that there may have been a greater shift to recreational travel in the count sites in the control cities with 69% of sites having higher weekend travel after the start of the pandemic.

WWI= (Weekend Average Traffic Volume)/(Weekday Average Traffic Volume)

Table 3 Change in Travel Patterns

Treatment or Control	Mode	Number of count sites	Average of WWI Pre-COVID Average	Average of WWI Post-COVID Average
Control	Bike	57	1.0	1.3
Control	Ped	37	1.2	1.2
Treatment	Bike	69	0.9	1.1
Treatment	Bike and Ped	4	1.2	1.3
Treatment	Ped	28	1.1	1.2
Total or Weighted Average		195	1.0	1.2

Prior to the pandemic (2018 and/or 2019) 45% of sites had a high weekend travel pattern. After the start of the pandemic (2020 and/or 2021) 69% of sites had high weekend travel pattern. While most sites (73%) did not change their general travel pattern and only two sites changed from higher weekends to lower weekends, 26% of sites changed from lower weekend to higher weekend travel patterns, indicating a general shift toward recreational travel at the count sites.

We speculate that WWI might be a proxy for travel uses where commute type patterns would be represented by WWI <1 (Weekday highs) and more recreational patterns might be represented by WWI >1 (Weekend highs). If this is the case, one might expect locations with recreational patterns prior to COVID19 to have greater increases during the pandemic as more people recreate during lockdown, and sites with more commute patterns to have lower volumes after during the pandemic as more people work from home. Looking at the sites for which we have sufficient data including estimates of AADT before and after the start of the pandemic (120 sites), we studied the increase or decrease in volumes for sites with these two travel patterns as shown in Table 4 below.

The volumes of bicyclists do match this hypothesis for control sites and for commute treatment sites, but not for recreational sites which had an unexpected decrease in volume. For pedestrians, the volumes only match this expected pattern for the treatment sites. For the control sites, the volumes also match this hypothesis except for control sites with commute patterns, which see a marked increase in volume. However, overall irrespective of mode and treatment/control status, sites with pre-COVID weekend highs (recreational patterns) on average saw increased volumes while sites with pre-COVID lows on the weekend (commute type patterns) on average saw volumes decrease.

Since these results are somewhat inconclusive, we look next and distance from COVID-Street treatments to count sites for potential explanations for why some sites increased, while others decreased.

Table 4 - AADT before and after COVID by WWI

Treatment or Control	Mode	WWI Pre-COVID Weekend High	Number of Count Sites	Average of Pre-COVID Average AADT	Average of AADT 2021 (Post Treatment)	% Increase
Control	Bike	Commute	25	442	338	-23%
Control	Bike	Recreational	9	496	525	6%
Control	Ped	Commute	7	489	815	67%
Control	Ped	Recreational	18	539	627	16%
Treatment	Bike	Commute	32	919	541	-41%
Treatment	Bike	Recreational	11	533	398	-25%
Treatment	Bike and Ped	Commute	1	34	47	39%
Treatment	Bike and Ped	Recreational	3	446	486	9%
Treatment	Ped	Commute	5	988	431	-56%
Treatment	Ped	Recreational	9	458	426	-7%
Total or Weighted Average			120	619	495	

Distance from Treatment Site

Some sites are closer to treatments than others. Table 5 below shows the number of counters with sufficient data within different distances from a treatment. Most control sites are not near a treatment, but control city Springfield, Oregon, is immediately adjacent to treatment city Eugene. For this reason, some of the count sites in Springfield are within 2 miles of a count site. It is also useful to note that some counters in treatment cities are all farther than 2 miles from treatment sites. For this reason, it may be more useful to consider distance of the count site from the treatment site than to consider "control" vs. "treatment" cities. However, Table 5 below also shows that for some categories, there are few counters within a half-mile buffer, even for treatment cities.

Table 5 -Distance of count sites from treatments

		Number of counters within a given distance from any treatment					Number of Counters
Treatment or Control	Mode	0.25 miles	0.5 miles	1.0 miles	1.5 miles	2.0 miles	Over 2.0 miles
Control	Bike	1	1	1	1	9	48
Control	Ped	1	1	1	1	8	29
Treatment	Bike	7	19	36	40	47	22
Treatment	Bike and Ped	0	0	3	4	4	0
Treatment	Ped	1	2	12	15	19	9
Total		10	23	53	61	87	108

Table 6 below shows that even when we combine treatment and control cities, and just categorize count sites with sufficient data by distance from a treatment, we still have few sites within a half-mile (only three pedestrian-only sites) and even fewer within a quarter mile. Would a treatment have an impact on pedestrian traffic over one mile from a treatment? Would it even have an impact on pedestrians half-a-mile or a quarter mile from the treatment? Due to lack of data, we're unlikely to be able to answer these questions, but our expectation is that pedestrian travel over 0.25 miles from the treatment wouldn't likely be impacted by a treatment (based on research on walksheds to transit, e.g., (Chia et al., 2016)).

For bicycle travel the expected radius of impact of the treatment may be larger. Areas of influence for cyclists are much more variable than for pedestrians (Flamm & Rivasplata, 2014), with geography, sociodemographics, and facility type all affecting the catchment size for bicycle amenities. We examined

both half-mile and one-mile radii. And as shown in Table 6 below, there are more bicycle count sites within the one-mile radius of a treatment, so we will investigate bicycle travel specifically.

Table 6- Distance of count sites from treatments by mode

	Number of counters within a given distance from any treatment					Number of counters over 2.0 miles	Total number of count sites
Mode	0.25 miles	0.5 miles	1.0 miles	1.5 miles	2.0 miles		
Bike	8	20	37	41	56	70	126
Bike and Ped	0	0	3	4	4	0	4
Ped	2	3	13	16	27	38	65
Total	10	23	53	61	87	108	195

Looking at bicycle average volumes before and after the start of the pandemic, AADT volumes for all sites with enough data decreased in the after period and the decrease is greater for sites within two miles of a treatment. This could be due to cyclists near a treatment diverting to the treatment site rather than using the facility where the counter is located. Alternatively, this could be due to treatments being closer to central business districts, which are known to have seen reductions in traffic due to people working from home instead of coming into downtown areas.

Table 7 - Decrease in Bicyclist Traffic For different distances between Treatment and Count site

Distance from Treatment	Number of bicycle counters	Average of AADT Average Pre-COVID	Average of AADT Average Post-Treatment*	% Decrease
Less than 0.5 mile	18	852	501	41%
Over 0.5 mile	61	516	398	23%
Less than 1.0 mile	26	694	427	39%
Over 1.0 mile	53	543	419	23%
Less than 1.5 miles	30	725	450	38%
Over 1.5 miles	49	512	404	21%
Less than 2.0 mile	40	654	429	34%
Over 2.0 mile	39	530	413	22%
Total	79			

*Note that here AADT in the post-treatment time period (September 2020 through January 2022) included interpolated data when only one month was absent. This interpolation was as simple average between the MADT for the month before and after.

While there were not enough sites in a commonly accepted pedestrian walk shed of less than half or a quarter mile from the treatment, there were enough sites to look at the situation of where the treatments were less than 2.0 miles from the count site. As show in Table 8 and Figure 1 the pedestrian volumes decreased for sites less than 2.0 miles from the treatments but increased for sites farther away.

Table 8 -Pedestrian Traffic Increase with Distance from Treatment

Distance from Treatment	Number of Sites with sufficient data	AADT Average Pre-COVID	AADT Average Post-treatment*	% Increase
Less than 2.0 miles	19	531	337	-37%
Over 2.0 miles	24	442	638	44%
Total or Weighted Average	43	481	505	5%

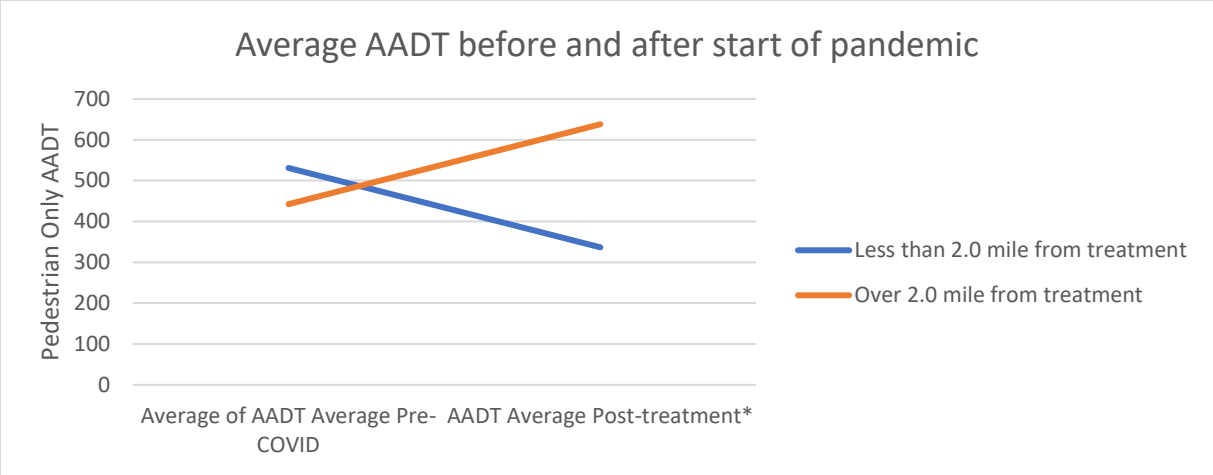


Figure 1 - Pedestrian Traffic Increase with distance from Treatment before and after Treatment

Table 9- Distances from Treatments to Count Sites by City with Bicyclist AADT before and after Treatment

City	Number of Count Sites	Average Distance between Treatment and Count sites (miles)	Min Distance between Treatment and Count sites (miles)	Average AADT Pre-COVID	Average AADT Post-Treatment*
Alexandria	1	3.6	4	272	200
Arlington	23	3.0	2	598	539
Bend	2	0.6	1	89	67
Boulder	5	none	0	414	232
Cambridge	1	0.4	0	1,147	780
Chapel Hill	4	none	0	51	69
DC	9	0.9	0	261	270
Eugene	5	1.9	1	391	322
Portland	4	4.6	4	1,314	681
San Diego	1	none	0	12	11
San Francisco	15	0.3	0	1,166	653
Seattle	5	1.4	0	285	220
Springfield	4	1.3	0	175	168
Grand Total	79	2	Weighted Ave:	593	421

*Note that here AADT in the post-treatment time period (September 2020 through January 2022) included interpolated data when only one month was absent. This interpolation was as simple average between the MADT for the month before and after.

Land Use

We speculate that land use might be associated with increasing cycling and walking after the pandemic in areas that are either rural or suburban. To investigate this, we categorized count sites qualitatively into six groups: Rural, Suburban, Central Business District (CBD), University, Urban Bridge and Urban General. Our speculation was that walking and cycling in urban areas and university land uses would be more likely to decline as more people work or study from home, while rural and suburban areas might see an increase as more people recreated near their homes or sought out less crowded areas to exercise. In the aggregate, this appears to be the case as shown in the table below.

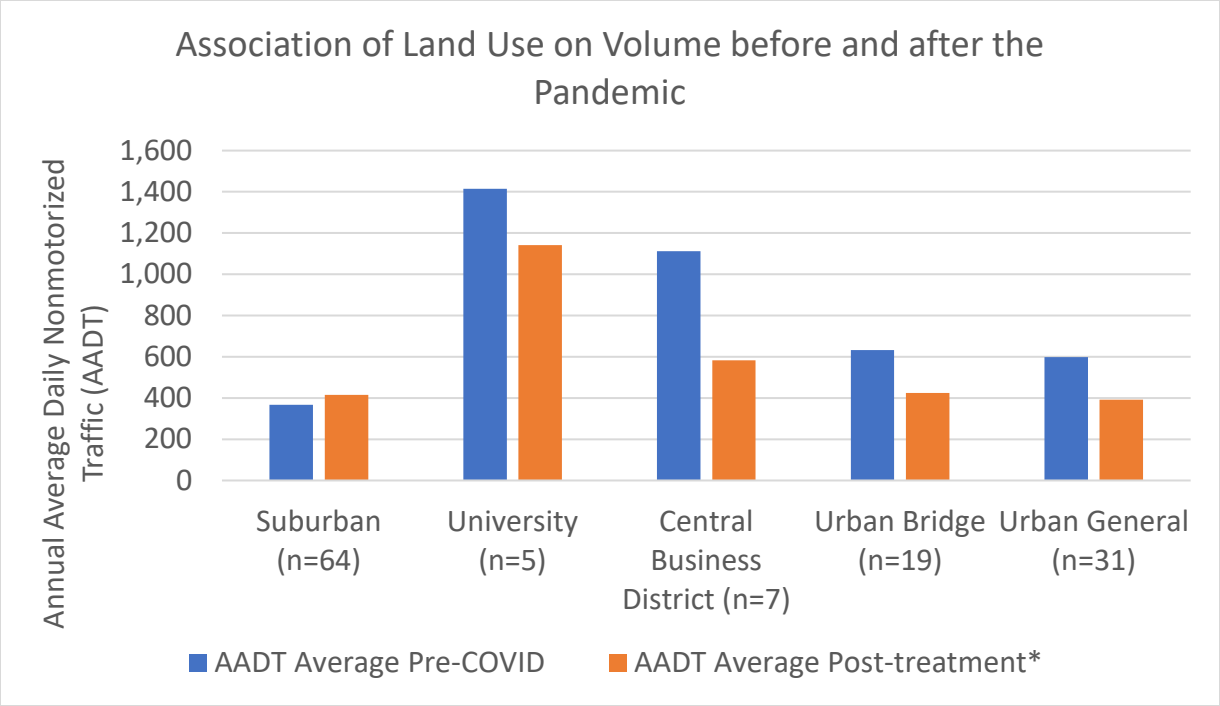


Figure 2- Association of Land Use and Nonmotorized Traffic Volume before and after the Pandemic

We grouped Rural and Suburban together (though most sites in this combined category were suburban) and CBD, University, Urban Bridge and Urban general together. We found that by mode, bicyclist travel was roughly the same in suburban areas prior to and after treatment but decreased in urban areas (see Figure 3). For pedestrians, a similar pattern is visible as shown in Figure 4, where pedestrian volumes for rural and suburban pedestrian traffic was generally higher in the post-treatment period, while for pedestrian traffic in urban and university areas it was lower in after the treatment period. This shows how important land use may be as a predictor of pandemic-era traffic and this strong predictor may be masking any impact we might see from the treatment.

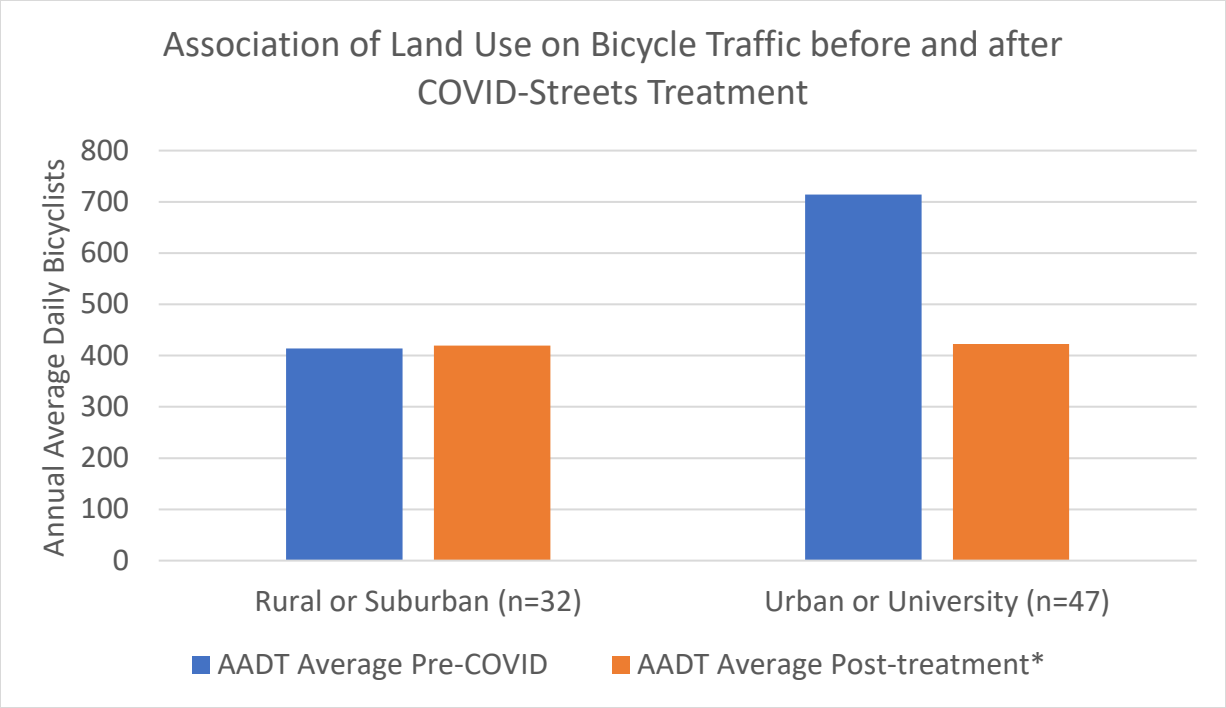


Figure 3- Association of Land Use on Bicycle Traffic before and after COVID-Streets Treatment

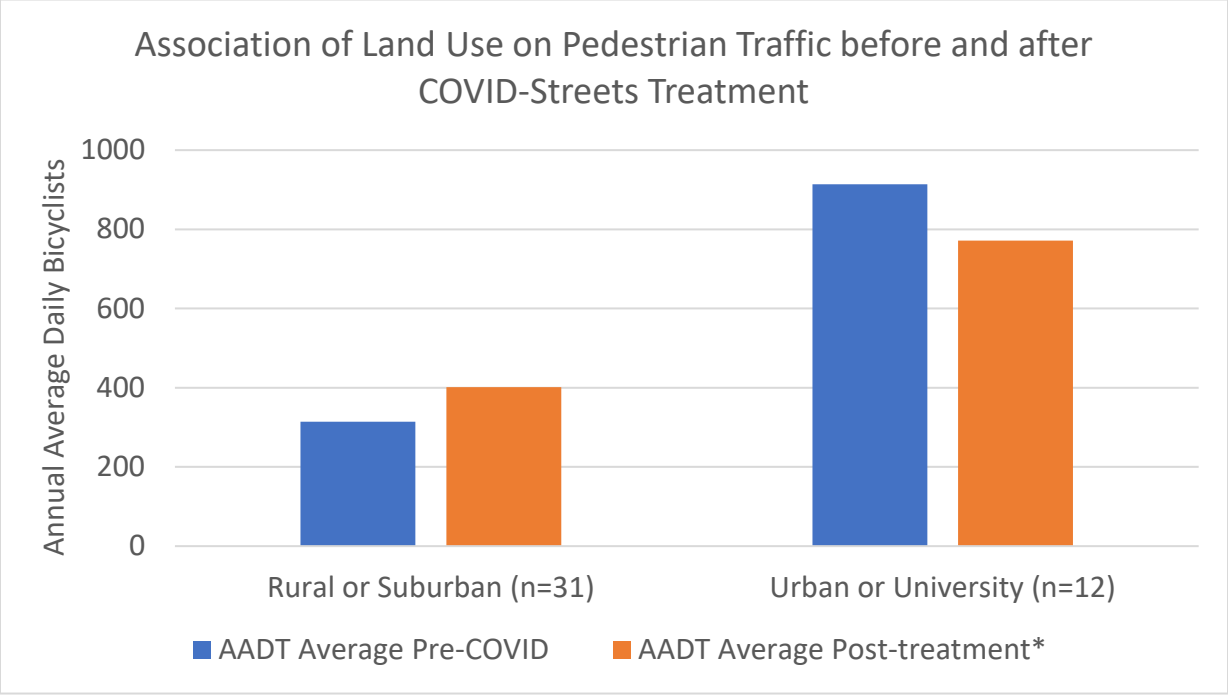


Figure 4- Association of Land Use on Pedestrian Traffic before and after COVID-Streets Treatment

We also considered the facility type and found that for cycling post treatment volumes decreased the most for road, sidepath and bikelane riders and least for cycletrack and path riders as shown in Table 10 below. For pedestrians, there was an increase for pedestrians on the sidewalk, but since we only have two

sites in this category the finding may not be representative. Post treatment pedestrian volumes decreased less than for bicyclists and the highest decrease was on side paths as shown in Table 11.

Table 10- Bicycle Traffic Volume Changes Post-Treatment by Infrastructure Type

Infrastructure Type	Number of Sites with sufficient data	AADT Average Pre-COVID	AADT Average Post-treatment*	% Increase
Bike Lane	26	651	374	-43%
Cycletrack	4	249	215	-14%
Path	37	624	525	-16%
Road	1	567	286	-49%
Side Path	9	563	318	-43%
Sidewalk	2	92	72	-22%
Total or Weighted Average	79	593	421	-29%

Table 11 - Pedestrian Traffic Volume Changes Post-Treatment by Infrastructure Type

Infrastructure Type	Number of Sites with sufficient data	AADT Average Pre-COVID	AADT Average Post-treatment*	% Increase
Path	35	512	474	-7%
Side Path	6	149	130	-13%
Sidewalk	2	945	2173	130%
Total or Weighted Average	43	481	505	5%

Summary of findings

The data from the count sites did not show an increase in use near treatment sites as was first expected. This may be due to count sites being close but not on the treatment and thus recording people diverting from the counted site to the treatment site. However, we do see an increase in pedestrian traffic in the post treatment time period for suburban areas (bicycle traffic stayed the same in these areas. Otherwise, walking and cycling traffic often decreased in the post-treatment time period.

Overall, irrespective of mode and treatment/control status, sites with pre-COVID weekend highs (recreational patterns) on average saw increased volumes while sites with pre-COVID lows on the weekend (commute type patterns) on average saw volumes decrease.

COVID-streets program analysis

Methods

Participant identification and recruitment

Interview participants were identified through contact information on the official shared streets web pages of the thirteen pre-screened study cities. We reached out to these points of contacts via email with a brief description of the study and a request to interview either them, or someone else who was played a decision-making role in their city's shared streets program. We received positive responses in 10 cases, and scheduled interviews during the winter of 2021/2022.

Interviews were conducted via zoom by a graduate research assistant trained in structured interview methods. Interviews were recorded, with audio tracks transcribed for further analysis.

Interview process

In a series of hourlong interviews, we asked city staff members who led or played significant roles in their city's shared streets program about:

- Planning process: how and why they decided to start a shared streets program; who was involved in decisions about planning, siting, designing the program; and the extent of the public's involvement in the planning process;
- Constraints to the program: physical, political, financial, or other factors that shaped the program's location, design, implementation, or longevity;
- Physical design: what sorts of equipment was used to establish and maintain the program; changes in equipment or design over time;
- Outcomes: how the shared streets was received by the public; how impacts were measured; and whether the program evolved, was dismantled, or permanentized; and
- Takeaways: what the program staff learned from their experiences; how they would do things differently if they had a do-over; and what new practices are emerging at the local level because of the shared streets program.

The interview instrument is available in Appendix 2 of this report.

Data preparation and analysis

Interviews were transcribed using the Otter.ai transcription service, then reviewed and edited for accuracy by the research team. They were then loaded into Dedoose for coding and content analysis. Initial content areas were established based on the interview instrument. During the process of reviewing and correcting transcripts, emergent concepts were noted and organized into content areas to create a preliminary data structure.

We used a recursive inductive/deductive approach following protocols advanced by Hayes and Heit ((2018), with an iterative process of identifying themes and codes, and then revising or adding more codes through free coding, based on close re-reading of the transcripts. This process identified 100 codes falling into 19 code groups. We followed a manifest coding approach, meaning that the interviewees' words were taken at face value rather than analyzed and interpreted for deeper meaning.

Findings

The interview instrument suggested seven content areas; these were confirmed through the initial transcript review: Physical, Institutional, Process, Public Involvement, Outcomes and Impacts, Barriers and Opportunities, and Takeways. The tables below show the 19 code groups and 100 codes that

emerged within each content area; the sections that follow show the application of codes and subcodes across cities and shared streets programs. Nuanced discussions about the themes identified in the analysis, their connections to program outcomes, and their implications for post-pandemic practices and programs are presented in the Discussion section.

Table 12. Content area: Physical delineation of shared streets

Code Groups	Codes	# of cities
Equipment	Signage	6
	Barricades	6
	Flex posts	2
	Rubber curbs	2
	Traffic barrels	2
	Traffic cones	2
	Concrete planters	1

Table 13. Content area: Institutional aspects of shared streets planning

Code Groups	Codes	# of cities
KI Role	Senior/executive level	3
	Planner/transportation planner	3
	Transportation engineer	2
	Communications	1
	Emergency operations	1
Departments/entities involved in shared streets planning	Transportation	6
	Public Works	3
	Planning	2
	Emergency Operations	1
	Public Safety/Fire	1
	Parks and Recreation	1
	Senior/Executive level	1
Departments/entities involved shared streets implementation	Transportation	6
	Community groups	4
	Contractors	2
	Public works	2
	Planning	1
Law enforcement's role	Not involved in any way	5
	Asked about enforceability	1
	Asked about hindrances to public safety	1
	Informed but not involved	1
	Asked to be involved by private residents	1

Table 14. Content area: Planning processes surrounding shared streets

Code Groups	Codes (subcodes)	# of cities
Motivations for shared streets	Provide space (physical distancing, recreation)	7
	Provide connections (destinations, open space)	5
	Opportunity (fast-track existing plans, reclaim space, demonstrate ideas, improve existing shared streets)	4
	Public pressure	3
	Address equity concerns	1
	Provide alternative to transit	1
Linkages with pre-pandemic plans	Closely linked	3
	Informed by but not necessarily aligned with	2
	Linked to but expanded beyond	2
	Tried to link, but pre-pandemic plans weren't suited to shared streets	1
Criteria for selection	According to existing plan	7
	Connectivity	7
	Ease of implementation	4
	Traffic conditions	4
	Geography (underserved neighborhoods, near multifamily housing, balanced distribution)	5
	Lack of facilities or services (ped/bike, transit)	4
	Political preference	3
	public input	3
	Where ped/bike funds not already identified	1

Table 15. Content area: Role of the public

Code Groups	Codes (subcodes)	# of cities
Engagement in planning process	None/limited (due to urgency, due to concerns about virus transmission)	4
	Actions based on prior engagement	4
	One-way flow of information	2
	Conducted via 'known entities'	2
	Site visits	2
	Planning was community led (city facilitated)	1
	Pre-planning questionnaires	1
Input after initial deployment	Targeted outreach	5
	Site visits/in situ evaluations	5
	Community meetings	4
	No formal effort	2
	Hired community ambassadors	1

Table 16. Content area: Outcomes and Impacts

Code Groups	Codes	# of cities
Initial feedback	Mixed	4
	This is great	4
	It's good, but we have other problems	1
Assessment of impacts	Survey	6
	Traffic counts/speed study	4
	Anecdotal	3
	No formal assessment	2
	Public meetings	2
	Online/phone info portal	1
	Site visits/walk & talks	1
Ultimate resolution	Converted to permanent	5
	Allowed to expire	4
	Intended as permanent from the start	1
Reason for removal	Not popular enough to continue	1
	Not winter-hardy	1
	Removed to prepare for permanent infrastructure	1
	Removed to focus on other programs	1

Table 17. Content area: Barriers and opportunities

Code Groups	Codes	# of cities
Funding sources	Internal	5
	CARES Act	4
	People for Bikes	2
	NACTO	1
Barriers to planning or implementation	Lack of personnel	3
	Regulations and/or lack of legal basis	3
	Lack of equipment	1
	No barriers	1
	Public hesitation	1
Elected officials	Support or pressure from electeds	6

Table 18. Content area: Takeaways from Shared Streets experience

Code Groups	Codes (subcodes)	# of cities
Lessons	Communication matters	6
	Learning by doing (trial as analysis, trial as engagement, trial as education)	6
	New philosophies about road space	6
	Equipment and design matters	6
	Context matters	4
	New confidence with rapid rollouts	3
	Shared streets aren't always the answer	3
	Prior planning matters	2
New practices	New engagement practices	5
	Internalization of new philosophies	5
	New codes and standards for design and materials	4
	New funding streams	2
	New costing strategies	2

Physical delineation

While many of the cities in our study implemented multiple responses to the changes in demand for public space during the COVID19 pandemic, we focused our research on their partial street closures. These programs are typically referred to colloquially as shared streets, slow streets, or neighborhood greenways, and generally include traffic calming measures aimed to reduce motor vehicle traffic speeds and/or volumes and prioritize walking, cycling, and other non-driving uses of street space. Some of the partial street closures also designated streets for local traffic only.

Nearly every city studied used dedicated signage and some sort of physical, if temporary, barricades to create their shared streets. A few cities also used traffic cones (Bend, Tucson) or barrels (Cambridge, Portland) to demarcate space. Some cities also upgraded their installations over time to include flex posts (Milwaukee, San Francisco) and/or rubber curbs (Milwaukee, Portland).

Institutional involvement

We asked our interviewees what individuals and agencies were involved in the planning, design, implementation, and management of their shared streets program. In most cases (except Cambridge), the person/s with whom we spoke were directly involved in the planning of their cities' shared streets programs, and they represented a range of backgrounds and professional roles. In three of our study cities (San Francisco, Seattle, Tucson) the programs were led by people employed as planners. Transportation engineers led the efforts in two cities (Bend, Cambridge), while three other cities' programs came from senior and/or executive roles (Eugene, Milwaukee, San Francisco). Other leadership roles included communications (San Francisco, again) and emergency operations (Seattle).

In most cases, the planning and design behind shared streets programs fell primarily to departments of transportation (Eugene, Cambridge, Milwaukee, Portland, San Francisco, Seattle). Public works was involved in planning in three cities (Cambridge, Milwaukee, Seattle); three cities involved their planning departments (Bend, Cambridge, Eugene). Senior leadership participated in the planning and design process in Portland. Other agencies involved in planning and design included emergency operations and fire (Seattle) and parks and recreation (Milwaukee).

Implementation and management of shared streets fell mainly to departments of transportation Eugene, Cambridge, Milwaukee, Portland, San Francisco, Seattle). Public works departments were also involved in Cambridge, Milwaukee, and Seattle. Neighborhood groups took on some of this responsibility in three cities (Bend, Milwaukee, Seattle). In Portland, implementation and management was a joint effort between the DOT and contractors. In Tucson, implementation and management was outsourced to contractors; hired neighborhood ambassadors also played a critical role in managing that city's shared streets.

We specifically asked whether law enforcement played a role in any aspect of these programs. Three cities (Bend, Eugene, and Cambridge) did consult with law enforcement—and public safety more generally—in their planning processes, but none involved police in their programs' implementation or management. In a few cities the lack of police involvement was explicitly linked to concerns over equity and over-policing of lower income and/or Black and Brown communities; but in nearly every case it was also due to a recognition that 'local traffic only' was largely unenforceable, and that any scheme that relied on enforcement was fundamentally unsustainable anyway. In Bend, the interviewee noted that community members generally complied with the program on their own, thanks to the 'we're all in this together' spirit of the pandemic's early days.

Planning processes

We also asked a few questions about the planning processes behind their cities' shared streets programs, specifically regarding the motivations for implementing shared streets, the extent to which the

shared streets programs were connected to or aligned with pre-pandemic planning efforts, and the criteria used to select shared street locations and designs.

The most commonly reported factor driving shared streets programs was the recognition of an urgent need to create space for physical distancing. This motivation was explicitly mentioned in 7 cities (Bend, Cambridge, Eugene, Milwaukee, Portland, San Francisco, and Seattle). Seven cities' interviewees expressed a need to connect people to destinations (Cambridge, Eugene, New San Francisco, and Tucson) or open space (Bend, Milwaukee, Seattle). The pandemic was seen as an opportunity to fast-track previously planned actions in five cities (Bend, Portland, San Francisco, Seattle, and Tucson). Less common motivations included public pressure (Eugene, Portland, Tucson), desire to capitalize on the reduction in VMT (Milwaukee), and an opportunity to demonstrate what shared streets might look like (Bend).

The opportunity to demonstrate and fast-track previously planned actions was directly reflected in how cities planned their shared streets. In almost every case, they were—at least initially—aligned with what had been called for in existing transportation plans, either directly linked to those plans (Bend, Cambridge, Portland, San Francisco, Seattle) or heavily informed by them (Milwaukee, Tucson). In Portland and San Francisco, shared streets programs started out in alignment with existing plans, but quickly expanded beyond them. And in Eugene, program planners initially intended to align their shared streets program with existing plans but realized that the designs and locations called for in pre-pandemic plans were not well suited to quick-build crisis responses.

We identified quite a range of criteria used to guide site selection and design of shared streets, aside from two key factors: in every case, interviewees told us their selections were informed by existing plans, programs, or goals, even when those programs were not directly linked to those plans. And in 7 of 8 cities (Bend, Cambridge, Eugene, Milwaukee, Portland, San Francisco, and Tucson), connectivity with existing pedestrian and bicycle networks was a criterion is both site selection and design. The next most common criteria guiding site selection and design were ease of implementation (Bend, Cambridge, Eugene, San Francisco, Seattle), locations of underserved neighborhoods (Bend, Eugene, Portland, Seattle, Tucson), and traffic speeds that could be reduced via traffic calming (Cambridge, Eugene, Portland, Tucson; San Francisco also considered traffic speed and volume, but as a condition to avoid rather than address). Other site selection and design criteria included political preference (Eugene, Milwaukee, San Francisco, Seattle), public requests (ad hoc or via survey; Milwaukee, Portland, San Francisco, Tucson), and a desire to mitigate the impacts of COVID-related transit service cuts.

The role of the public

We asked our informants about how the public was engaged in their shared streets' planning processes and during and after deployment. The role of the public varied greatly across the cities in our study, with no single approach to public engagement or feedback dominating.

Four cities (Bend, Milwaukee, San Francisco, Seattle) leaned heavily on pre-pandemic public engagement efforts during their planning processes, while another set of four (Bend, Cambridge, Milwaukee, Tucson) conducted site visits and public meetings. Three cities (Portland, San Francisco, Seattle) sent out public notices seeking input on their proposed shared streets plans. Two cities (Bend, Milwaukee) sought input from specific community groups with which they already had relationships. Only one city—Eugene—made no formal effort to engage the public in the planning process, noting the urgency of the pandemic meant staff felt compelled to act too quickly for a typical public process (urgency as a limitation on public engagement was also mentioned in Cambridge, Portland, and Seattle).

Cities also used a variety of approaches to engage the public in the design and implementation of their shared streets, ranging from working with established community groups (Eugene, Milwaukee, Portland, Seattle, Tucson), conducting site visits and specifically soliciting input from residents and users

(Milwaukee, San Francisco, Tucson; the latter specifically seeking input from members of underrepresented communities), holding formal community meetings (Milwaukee, Portland, San Francisco, Tucson), and in situ observations (Bend, Portland). Only Cambridge reported no formal effort at public engagement during design and deployment.

Some cities ramped up their engagement efforts after their initial rollouts, frequently citing a renewed recognition of the importance of engagement as well as increasing comfort with new, pandemic-adapted forms of engagement. This was specifically discussed in Milwaukee, Portland, San Francisco, and Seattle.

Barriers and opportunities

We briefly discussed the factors that supported and/or served as barriers to each city's shared streets program. Lack of funds is frequently, if not always, listed as a reason not to create or improve pedestrian and bicycle facilities. The variety of new pandemic-related funding opportunities definitely seemed to alleviate this issue. The primary funding sources for shared streets programs were CARES, NACTO, People for Bikes, and internal funds. Four cities (Bend, Milwaukee, Portland, Tucson) used CARES. Milwaukee and Tucson also received funds from People for Bikes, and supplemented both with internal budgets. Seattle relied on a combination of internal funds and a grant from NACTO. Funding sources were not discussed in Eugene and Cambridge.

While lack of funds was not mentioned as a barrier to shared streets in any of our conversations, other barriers were present, and many were novel, linked explicitly to the pandemic. These included staff shortages in Seattle, Portland, and Tucson (which were overcome by combinations of contractors and neighborhood groups). Seattle also struggled to get the right equipment in the right places (anecdotally, we heard this in other cities not included in the final analysis as well). Administrative barriers and/or lack of legal precedents had to be worked around in three cities (Cambridge, Eugene, and Seattle). Only Bend reported no barriers.

Overall, elected officials seemed generally supportive of shared streets, though a handful of interviewees did note pushback from some quarters; this pushback ended up shaping their rollouts somewhat. In four cities (Cambridge, Portland, Seattle, Tucson) elected officials were described as playing key roles in pushing shared streets programs forward.

Outcomes and impacts

We asked informants to describe the outcomes and impacts of their cities' shared streets programs in three ways: initial public feedback, presence and type of formal assessment programs, and long-term resolution.

Cities undertook a variety of formal assessment programs to measure the impacts of their shared streets programs. The most popular form of assessment was via survey or feedback forms (Eugene, Milwaukee, Portland, San Francisco, Seattle, Tucson). Tucson supplemented their surveys with on-site meetings and walk-and-talks. Four cities (Eugene, Portland, San Francisco, Seattle) conducted before and after traffic counts; Portland, San Francisco, and Seattle also conducted speed studies. Only Bend and Cambridge reported having no formal strategy for assessing the impacts of their interventions; Cambridge did receive anecdotal feedback, however.

All respondents reported that initial feedback on their shared streets programs was generally positive. Half of the cities (Eugene, Cambridge, Portland, and San Francisco) noted some differing perspectives, with requests for removal (Cambridge), questioning of whether shared streets continued to be necessary after the pandemic's initial peaks (San Francisco), and a sense that the shared streets were fine by not addressing the most important problems residents faced (Portland).

Cities were split on the long-term resolution of their shared streets programs. Shared streets are now a permanent feature in five cities (Milwaukee, Portland, San Francisco, Seattle, Tucson), having been converted from temporary to permanent during the pandemic (or, in the case of Seattle, designed to be permanent from the start). This is not to say that every draft of every shared street is still in place; most cities employed phased roll-outs, with early phases being treated as temporary test runs to inform the design and implementation of later phases. Shared streets programs were allowed to expire altogether in three cities (Bend, Cambridge, Eugene). Notably, two of those cities—Bend and Cambridge—had no formal public engagement strategies supporting the shared streets program, though it's unclear whether the lack of public engagement contributed to the programs' ultimate demise.

Takeaways

Finally, we asked the interviewees what they or their agencies learned from their shared streets, and whether any new practices emerged from the experience. Interviewees had a great deal to share on both topics.

All cities reported multiple lessons learned. They were varied, but three general categories of lessons stood out: 'good communication with the public,' 'learning by doing,' and 'equipment matters.' Six of the cities (Bend, Cambridge, Milwaukee, Portland, San Francisco, Tucson) discussed a newfound (or newly rekindled) appreciation for early, clear, upfront communication and engagement with the public. Six cities (Bend, Eugene, Milwaukee, Portland, San Francisco, Tucson) reported at least one lesson learned about 'learning by doing,' including a recognition of the potential usefulness of in situ testing (Bend, Milwaukee, Portland, San Francisco, Tucson) and using temporary deployments as a form of public engagement or outreach (Bend, Eugene, Milwaukee, Tucson). Another common lesson learned was that the choice of equipment used for shared streets can make or break a program, as was discussed in six cities (Cambridge, Milwaukee, Portland, San Francisco, Seattle, Tucson). Similarly, four cities (Eugene, Milwaukee, San Francisco, Tucson) noted that 'context matters,' and that important contextual features mean some streets are better suited for slow streets than others.

Less concretely, four cities (Bend, Cambridge, San Francisco, Seattle) reported that they developed and/or disseminated new ideas about the allocation of road space, and three (Bend, Eugene, Milwaukee) mentioned an improved awareness of the potential benefits and uses of shared streets. Another three (San Francisco, Seattle, Tucson) shared that their experiences planning, designing, and deploying shared streets helped them gain confidence with rapid rollouts and quick builds.

When asked what changes they might make if they had to do it over, two cities (Cambridge, Portland) noted that 'local traffic only' signage is confusing, counterproductive, and unenforceable, and that future interventions should rely not on traffic filtering but on traffic calming. Interviewees in San Francisco and Tucson felt that better linking and aligning their emergency response programs to existing community priorities would lead to better community buy-in and ultimately more positive outcomes.

While not common, we heard three important insights about how cities might better prepare for future disruptions. One interviewee (Cambridge) discussed the need for regulatory changes that would facilitate more timely, robust, effective responses to unanticipated crises. Another (Milwaukee) talked about establishing a more structured, deliberate approach to measuring impacts for future rapid roll-out projects. Interviewees in Milwaukee and San Francisco also shared thoughts on the importance and utility of prior planning efforts, and the need to learn how to create plans that can adapt to rapidly changing conditions and better inform future crisis responses.

The COVID shared streets experience prompted adoption of new practices, plans, or approaches to providing active mobility infrastructure in seven of our eight cities. One of the most common of these is the development of new practices for public engagement (5 cities: Bend, Eugene, Milwaukee, San Francisco, Tucson), including the use of in situ demonstration projects that allow users to trial and

provide real-time feedback on proposed street design changes. Other common changes include new philosophies and attitudes about street design (5 cities: Bend, Milwaukee, Portland, San Francisco, Tucson); new standards for the design of shared or slow streets (4 cities: Bend, Eugene, Milwaukee, Portland); and new funding streams to support further creation of shared streets (2 cities: Milwaukee, Seattle).

Themes on planning processes, connections to outcomes, and implications for practice

Leadership and decision-making

Shared streets programs originated and were led by planning departments, transportation departments, and public works departments in roughly equal measure, and frequently involved cross-departmental collaboration. There were two strong common themes running through the planning processes:

1. Regardless of where, why, and how the program arose, there appeared to have been an enormous amount of thought and mental energy poured into them.
2. None of the cities we studied involved law enforcement in their planning processes, implementation, maintenance, or enforcement. Most of the interviewees were quite clear that this was an intentional choice: they did not want to see these shared streets become policed spaces, and they recognized that any sort of shared street scheme that relied on policing to function would be neither well received nor sustainable. We know that law enforcement did play a role in many US cities' COVID streets programs. We did not set out to avoid those cities, though we acknowledge that the fact that law enforcement was universally not involved in the programs of the cities that made it through our screening process is intriguing.

Motivations

The most commonly reported factors driving shared streets programs were the recognition of an urgent need to create space for physical distancing and to connect people to destinations. One or both of these motivations was present in all of our treatment cities. Slightly less commonly (in six of the eight cities), the pandemic was seen as an opportunity to fast-track previously planned actions. Less frequent motivations included public pressure and a realization of an opportunity—thanks to reduced VMT and increased interest in safe outdoor recreation—to demonstrate new ways of using street space.

Links with pre-existing planning efforts

In most cases, shared streets programs were either directly linked to pre-pandemic plans—which called variously for traffic calming, low stress routes, and neighborhood greenways—or heavily informed by them. We did note two instances in which the COVID response started out in alignment with pre-existing plans, but quickly outgrew them, and another in which program staff consulted with a pre-existing plan but ultimately decided the actions described in the plan did not translate well to a quick-build crisis response.

Location criteria

Given the alignment of the shared streets programs with existing plans, it is not surprising that the dominant location criteria interviewees shared with us was "what the plan calls for." Ease of implementation was another common criteria; also not surprising given the crisis mentality surrounding the pandemic's onset. There were other crisis-informed location criteria as well: cities were concerned about traffic, and whether temporary traffic calming materials would suffice in high traffic areas. Cities were also concerned about equity and justice, and whether the communities they felt stood to benefit the most from shared streets were actually gaining access to those shared streets. As many interviewees

noted, this latter concern did not necessarily translate to equitable distribution of shared streets, nor did it translate into a universal appreciation of the programs, but it did, at least, play a role in planning decisions in many of the cites we studied.

Location criteria evolved across phases in some cities. In one case, staff's experience in their first phase allowed them to relax some of their more rigid initial location criteria, and rely on more qualitative attributes to identify good candidates for shared streets.

Role of the public

The public's role in planning, implementing, and maintaining shared streets varied widely across our sample. In a few cities, interviewees explained that the urgency of the moment called for faster action that public processes would accommodate, while others described how they established entire new public processes—including an example of hiring community leaders to help run the program. In other cases, cities started with no public input but evolved substantially as the program continued, frequently citing a renewed recognition of the importance of engagement as well as increasing comfort with new, pandemic-adapted forms of engagement.

Takeaways

The lessons and experiences gained during the COVID-induced shared streets era have led directly to new practices, policies, and approaches to implementing pedestrian and bicycle facilities on public streets. They have also had less tangible, but no less important impacts, including stronger relationships with residents and community organizations, new ways of thinking about street space, and new attitudes among staff members about how they approach their work. In some cases, the lessons were the takeaways: as shared streets opened up possibilities for staff and elected leaders about the use of street space, those possibilities were internalized as new attitudes and approaches to their professional practice or political ethos.

This section discusses connections among lessons and new practices, policies, or approaches emerging from the COVID shared streets experiences among our study cities, when possible, drawing out the pathways from action to lesson to new practice. This discussion is organized loosely around lessons learned, but with recognition specific actions often 'taught' multiple lessons, and that one city's shared streets action may be another city's lesson, which may be another city's new post-pandemic practice.

Communication matters…and it's a two-way street

The pandemic presented new challenges for public engagement, but the differentiated impacts of the pandemic—differences strongly linked to race and income—underscored just how important robust and meaningful public engagement is. While lots of cities prioritized urgency over engagement, nearly every person we spoke with told us that they felt their shared streets experiences strengthened their connections with community members, improved their communication pathways, and led them to develop new approaches to engaging with and learning from the public. This was clearly evident in Milwaukee, both in terms of easing concerns over shared streets and using the shared streets program to build trust:

> "We had a meeting, a community meeting, where we heard from some residents, it really was like one resident, who wasn't, wasn't sure about things. But then we held a community walk after we put it in place at the meeting, everyone decided, like, Yeah, we really want to try this. And the great thing about it is it's super easy to take out, super easy to modify."

> "It's also been really good for us to work with community organizations, we don't, we haven't in the past really partnered with community organizations in this way. It's been a good way for us to build trust with residents through those partnerships. And we're giving them

> money. So that's just a really great partnership to have with community organizations and to like, just interact with them in different ways. And it's helped us create more connections for other projects that we might be doing."

Through engagement efforts in Tucson, shared streets staff found that traffic calming was not a priority for all communities. Through formal and informal feedback mechanisms staff learned that there was quite a bit of variability in what neighborhood members wanted out of their streets, and what needs they had that weren't being met. They used walk and talks to start trying to understand these wants and needs, and were able to be much more responsive to the community that way. Particularly in under-resourced communities, they realized residents were more concerned about public safety, livability, and access to jobs. This experience built trust, and enhanced staff's ability to test out new ideas and implement changes more quickly. Staff understood though this process that shared streets are not going to solve the problems many of their residents faced, and so felt that they needed ways to better tie these interventions to other programs that better align with community priorities. In this situation, good communication through 'learning by doing' led to a better understanding of context, which in turn led to new approaches to engagement and more realistic expectations for contexts in which shared streets are appropriate.

The importance of good communication also came through strongly in Bend, where pop-up 'open houses' on shared streets installations as an alternative to traditional public meetings greatly expanded the number of people who were able to be involved in the program. This involvement in turn allowed residents to feel ownership over the program, and encouraged them to assist with its upkeep and advocate for it to their neighbors, thus enabling the city to expand and extend the program. These pop-up open houses represented a substantial change in the way the city had been engaging with the public, particularly in lower income areas.

In Eugene, staff consulted with neighborhood associations when planning their first shared street installation, but recognized biases introduced by this approach. In the second phase, they used the shared streets program to introduce residents to new ways of navigating their neighborhoods through a sort of Bingo game, and received positive feedback from people about their experiences and new knowledge. They also sent postcards to residents of affected neighborhoods, explaining the program and providing a phone number for questions or comments, and reported that both approaches were effective as outreach tools and were looking for ways to replicate their success for future projects. They also recognized a need to establish more representative neighborhood associations who can be called upon to weigh in on rapid responses to future disruptions.

The positive impacts of community engagement in Milwaukee has led to discussions about the possibility of continuing that city's neighborhood grant program, which was established during the pandemic, to hire community groups to lead engagement and street design demonstration projects after the pandemic.

In some cases, public engagement led directly to practice change. For example, Portland Bureau of Transportation's design manual included "local access only" signage, which staff used for their shared streets. But through feedback—submitted through contact information on the shared streets signage—staff realized that wording was not effective, inclusive, or instructive. In particular, the intended users of the shared streets did not intuitively know whether they should consider themselves local, as exemplified by one resident's confusion:

> "I was talking to somebody who…feels very comfortable navigating through the city, and he was riding his bike, and…he went through one of the slow streets, and he paused as he saw the sign. He was like, 'I wonder if I'm allowed to bike through here.' [And] I think all of us in transportation, or who deal in engineering, or who were advocates knew exactly what it

> meant. But, you know, I think, especially if you're somebody who doesn't feel comfortable being out on the street, which is, you know, we're talking about beyond traffic safety, but like, kind of personal safety of like being in the street and feeling like you're somebody who can be in the street and be safe in your body, that's not a very welcoming sign unless you live on that street. And you know, that you can be there. That it essentially seems exclusive."

The city decided that when the shared streets installations became permanent, they would dispense with the 'local traffic only' approach and instead use advisory speed signs that indicate the streets are shared and no one should travel more than 15mph.

In San Francisco—a city with a robust feedback process that garnered over 10,000 survey responses during the first phase of their shared streets program—staff realized there were segments of the city from whom they were not hearing. So, for the fourth phase of their program they went out to streets that met their initial screening criteria and held site visits with neighbors to discuss shared streets possibilities. They felt strongly that they were battling a stereotype that slow streets were for more affluent neighborhoods, and they worked hard to counter that notion through their site visit engagement process. Staff reported that while they felt the engagement effort itself was successful, it only led to 4 shared street installations, since, in most of the neighborhoods they heard concerns that shared streets would actually exacerbate existing issues. In retrospect, they recognized that they came into the process with a solution already in mind, rather than working with the community to develop a shared understanding of challenges they might have been facing. In this case, it was an example of communication leading to reflection rather than a clearly defined practice change.

Learning by doing

A common theme that emerged from the study cities' shared streets experience involved the possibilities of learning by doing, or in situ testing: do something, then see how it works. Cities simultaneously learned how to implement untested ideas, learn by analyzing those implementations in real time, and integrate in situ testing as part of their planning toolbox for the future.

Cities took advantage of in situ testing opportunities in several ways: as an end-run around analysis paralysis (trial as analysis); as a way to demonstrate—to elected leaders and community members—what shared streets can look like (trial as education); and through on-site meetings, walk & talks, and signage linking to online feedback forms, as a way to engage the public and receive real-time, experience-based feedback (trial as engagement).

Staff in Milwaukee came to view the interventions as demonstration projects that helped residents and leaders start thinking differently about streets and street space (trial as education) and to get real-time feedback on various designs and materials (trial as analysis, trial as engagement). The interviewee expressed optimism that the city would continue using temporary materials to create demonstration projects as a means of public engagement and education in the future:

> "…thinking more about temporary closures of streets, demonstrations on streets, just using the materials we have to show people what different changes could be. We're working with some of our long range planners on an area plan for a neighborhood and people are interested in seeing, like, this one sidewalk widened. But that would mean we would have to lose parking. And I'm like, well, let's just show people for a week. What does that look like? Let's let people decide if it's worth it. So just thinking more about how we can show people things in a non-permanent way."

Milwaukee's shared streets planner also felt that the shared streets-as-demonstration process strengthened relationships between the city and community organizations, which will lead to more fruitful engagement in future planning efforts. The interviewee discussed the possibility of continuing a

neighborhood grant program, established during the pandemic, to essentially hire community groups to lead community engagement and implementation of demonstration projects after the pandemic. They also expressed hope that the chance to see different possibilities for street space will lead both leaders and the public to put more energy into the city's Bike Boulevard project.

In Portland, staff appreciated the ability to test and tweak installations in situ and get real-time feedback from people who use the streets daily through the contact channels provided on the traffic calming infrastructure:

> "…it is really nice to have these temporary materials and be the one that's kind of both managing them and taking that feedback. It's like almost like a real time experiment on traffic calming for our neighborhood greenways."

Bend used a shared street as an opportunity for a demonstration project in a location in which a Neighborhood Greenway was planned but not yet built, allowing the city to test different designs before permanent installation. The interviewee indicated that Bend is more willing to use temporary materials experimentally now, which has helped them make decisions to implement changes more quickly than they did in the past.

And in Tucson, city staff were able to conduct informal intercept surveys on the shared streets, in which they sought feedback on the current installations and suggestions for future programs. Traffic calming interventions in Tucson typically require approval (via petition) from 60% of residents, which is often tough to get especially in neighborhoods that aren't familiar with traffic calming. So staff used the quick build process to demonstrate the concept in these neighborhoods, showing the possibilities, costs, and benefits. In the end, they felt like this trial as engagement approach would improve their ability to achieve that 60% target, and were optimistic this approach would continue beyond the pandemic.

New attitudes about flexibility, creativity, speed

The speed at which cities were able to roll out new facilities, and the creativity with which they did so, had clear implications for shifts in attitudes about traditional barriers to pedestrian and bicycle infrastructure projects. Cities—including their residents—recognized they didn't have to put up with years' long waits for new infrastructure. They had the equipment, skills, and experience to act quickly, evaluate as they went along, and modify or roll back their actions if they didn't work out. We heard variations of this repeatedly: "it is not acceptable to make our residents wait years for safer, calmer, lower-stress streets." In Milwaukee, staff learned that they can, in fact, enact changes quickly, flexibly, and creatively:

> "I think one big thing this has demonstrated to us is we actually can do things quickly when needed, which is not something…we have been good at doing in the past. [Shared streets] has shown we can be flexible and creative when we need to be."

The interviewee expressed optimism that this recognition will lead directly to new practices that will allow them to accelerate planning processes.

In Portland and Seattle, shared streets' experiences whet the public's appetite for faster, more experimental approaches to providing safe walking and cycling facilities, even if those facilities were not made from traditional, poured-concrete sidewalks and painted bike lanes. In both cases, it seemed now that community members saw how quickly projects could be installed, they were less likely to tolerate conventional (slow) approaches. Both cities have used this shift in attitudes as part of their rationale to extend the shared streets programs and to incorporate elements of them into more conventional pedestrian and bicycle planning efforts. For example, Portland has adapted their neighborhood greenway design standards by adding to the traffic calming toolkit, including new ways to address speed at

intersections and increase awareness that people are entering neighborhood greenways. They have also adopted new signage indicating that streets are shared spaces with advisory speed limits of 15mph.

New tolerance for experimentation

Related to the emergence of in situ analysis and the shift in attitudes about flexibility, creativity, and the pace of installation of pedestrian and bicycle facilities is a new tolerance for experimentation. The 'this is an emergency and we need to do something' attitude that was so common early in the pandemic provided unprecedented opportunities for cities to make—and then correct—mistakes. While it's true that covid-streets responses were wildly unpopular in many instances, it's also true that by implementing them, staff received feedback on what communities actually did want that they likely never would have received otherwise. In Portland, this new tolerance gave staff confidence to pursue more robust multimodal planning projects than before the pandemic.

New philosophies about street space

Another common takeaway from the shared streets experiences—serving both as a lesson and a new approach to practice—was that the shared streets experience helped foster new philosophies about street space. This concept affected staff, elected leaders, and the public alike. Some version of the recognition that streets are for more than just moving cars came up in nearly every city, and was an important driver of the development of new practices.

In Bend, the shared streets experience led to public conversations about the use of public street space, with concomitant increases in support for future investments in pedestrian and bicycle facilities. The collective recognition of the benefits of shared streets in that city prompted an effort to institutionalize and codify the new philosophies through changes in the city's development code, focusing on street design specifications that include wider sidewalks and protected bike lanes. They have also added an implementation timeline to their Neighborhood Greenway Plan and are pushing vernacular changes in their plans and documents that promote concepts such as shared streets and low stress routes.

In San Francisco, the pre-COVID neighborhood greenways program helped calm traffic, but did not encourage people to treat streets as recreational space. This changed with shared streets, when community members expressed excitement over possibilities for repurposing street space for non-driving uses. This excitement was nurtured by the shared streets staff, who, as the urgency of the pandemic waned, recognized the need to evolve the program's messaging to away from a focus on mobility, and toward showcasing the potential of streets as a long-needed public gathering space. The interviewees viewed the receptivity of this evolution—manifest through public feedback as well as the organization of new neighborhood groups and community events on the streets themselves—as both a call and opportunity to shore up the neighborhood greenways program, using principles of shared streets to create more recreational and social opportunities along the neighborhood greenways corridors.

And in Seattle, the shared streets experience led staff to realize that the demand for pedestrian and bicycle investment in underserved neighborhoods was greater than they had realized before the pandemic.

Equipment, design, and context matter (to each other and to program outcomes)

Some of the shared streets' planners observations, along with feedback they received from the public, about the suitability of the signage, materials, and other equipment they used in deploying the shared streets has fed directly into new codes and new standards for designs and materials.

Several cities, including Bend, Eugene, Portland, and San Francisco reported they were working toward or already had codified new standards for shared streets and traffic calming, taking into account the ability to trial designs with temporary materials. Some of these new standards have grown from the successes

of shared streets and feature specifics on how to deploy materials such as rubber curbs and planters; others are the response to constructive criticism.

Portland also adapted their neighborhood greenway design standards by adding to their traffic calming toolkit, including new ways to address speeds at intersections and increase awareness that people are entering neighborhood greenways. They have also adopted new signage indicating that streets are shared spaces with advisory speed limits of 15 mph.

Eugene staff are also considering new low stress street design standards that include the use of physical traffic diverters, curb extensions, and planters to reduce traffic volumes and speeds on neighborhood streets. Eugene is also reducing speed limits on neighborhood streets to 20mph, with the intent to reduce actual speeds even further through design changes.

In San Francisco, the interviewees explained that no two shared streets are the same, so it was important to engage with community members to understand what each shared street should look like and how it should be designed and managed. They gave an example of one particular street in which neighbors were focused on traffic calming and robust physical traffic controls, vs another street in which neighbors were more interested in community programming and activities to offset some of the negative externalities that came from shared streets. Prior to the pandemic, the city had what the interviewees described as a "cookie cutter approach" to traffic calming, with a limited variety of designs and materials. But they recognized through feedback and experience that they have to shape everything based on communities' preferences, traffic patterns, land use, and other contextual features. This led them to open up their planning and design processes to new, more creative and context-sensitive approaches. As a result, they are working to incorporate flexibility and context sensitivity into neighborhood greenways and other shared streets programs after the pandemic (communication matters, context matters → more flexible approaches):

> "You know, before we had a very uniform kind of cookie cutter approach, because, you know, we only had so many materials to use, but as we evolved and kind of, you know, progress the program forward, there's just a lot more possibility and through these processes, we're finding out, you know, what works, what doesn't work and how you have to shape everything based on communities and just the overall surrounding neighborhood, because not only is it the difference of community needs but also traffic patterns are different, land use is different. So, kind of having that ability now and the time how to account for all that, I think only will improve slow streets in the future and make them more, you know, work for the communities they serve."

We also learned that not all temporary materials are up to the job—some could not handle the conditions, but others just did not make people feel safe. This lesson was an obvious candidate for practice change, and directly translated as such in many cities.

Shared streets aren't always the answer

Quite a few of the lessons from shared streets were learned through mistakes, failures, or lack of experience. In many cases, implementation challenges, lackluster outcomes, and negative feedback gave program staff a new appreciation for the importance of context for rapid implementation of shared streets. Not every street turned out to be a good candidate for sharing, and not every neighborhood felt that shared streets would address the challenges they were facing. These experiences allowed planners to set more realistic expectations for what shared streets can accomplish, and often led directly to adoption of more flexible and context-sensitive approaches to street space.

In Eugune, this lesson came through a recognition that the streets marked for that city's neighborhood greenway network were not necessarily good candidates for rapid rollout, temporary interventions. The

problems they hoped to address through the neighborhood greenways, namely, high volumes of speedy motor vehicle traffic, could not be solved with rapid, temporary interventions. Staff concluded that, while the shared streets program was successful in its own right, if they wanted to have a substantial impact on behaviors—especially promoting increased walking and bicycling—they needed to focus on locations with higher densities and greater numbers of destinations. This lesson played strongly into the city's decision to decommission the shared streets project and refocus their efforts on neighborhood greenways.

Shared streets planners in Milwaukee noted that different neighborhoods and communities respond to shared street interventions differently, with people in wealthier and/or whiter neighborhoods showing greater levels of comfort with taking over the street than people in lower income or minority neighborhoods. The takeaway, which staff are hoping to carry beyond the pandemic, was to use traffic calming to create shared spaces more privileged neighborhoods, but elsewhere focus on investing in and improving conventional infrastructure (e.g., widening sidewalks).

In Tucson, the observation that shared streets was not effective in addressing speeds on streets with moderate or heavy traffic volumes led the city to restrict the program to low volume streets, since the quick-build shared street model really wasn't up to the task of calming higher speed traffic on busier roads.

New thinking about implementation costs

Cities also realized that pre-pandemic costing approaches were outdated. In Bend and Seattle, the shared streets experience led to new approaches to costing street design change projects. In Bend, this came through the realization that rapid, temporary installations are quite cheap—they rolled one of their shared streets out for less than $50, using materials they had on hand—which changed their perceptions about what can actually be accomplished. This change in perceptions opened up doors to new conversations about street space with other staff members, city council, and community leaders.

The impacts of cost flowed the other direction in Seattle, where, shortly after that city's shared streets rollout, the mayor directed staff to figure out how to make them permanent. That directive forced staff to rethink how they calculate costs for such installations, and develop designs that were cheaper than pre-pandemic estimates for neighborhood greenways, but robust enough to last. This lesson spilled over into other programs: Seattle's pre-pandemic neighborhood greenway program used conventional concrete traffic diverters to push through-traffic off some neighborhood streets, but due to the costs and outreach processes associated with such interventions, were not able to roll them out as comprehensively as staff (and some members of the public) would have liked. After becoming comfortable with temporary materials for shared streets, staff realized they could use them to divert traffic on many more streets. And since they were substantially cheaper—and removable—temporary materials needed much less outreach and engagement before installation, allowing the city to address concerns over the neighborhood greenways program's slow timeline.

> "Our new permanent design is going to have bulb out areas at each entrance on both ends of a street, essentially creating only one lane of traffic in and out of each block. There will be signposts on both ends, and within the leftover space will be room for different community amenities. So far, we're working on seating, bicycle parking, and planters as options for these spaces, in addition to lower cost things like public art."

This approach was well-received, with staff recounting feedback that this was how neighborhood greenways should have been designed from the start.

And in Tucson, changed understanding about costs of infrastructure, in concert with favorable public interest, led the city to allocate $1.4 million in CARES Act funding toward expanding and permanentizing

the shared streets program. The funds will be used to design shared streets with more robust, but lower-cost infrastructure, and to implement them in-house rather than contracting the program out.

Pre-existing plans and programs matter

In Milwaukee and San Francisco, we heard very explicitly that an essential key to their shared streets programs—and their COVID19 responses in general—was having a relevant plan in place to guide their planning and engagement processes. In Milwaukee, staff explained how they were able to lean on their existing Bike Plan to inform responses to the disruption of COVID19, and simultaneously leverage the conditions brought about by those disruptions to move forward with other planned, but not yet implemented, interventions. In San Francisco, staff noted a substantial reduction in traffic crashes and concomitant increase in perceptions of safety as an unexpected impact of the shared streets program, a result they felt both stemmed from and feeds the city's commitment to its Vision Zero plan.

In both cities, there was a recognition that plans that can not only withstand disruptions, but guide cities through them, will be increasingly important as disruptions become more and more a fact of life, rather than once-in-a-generation events. This was not a common lesson, but an important one for its clear implications for planning practices in general.

Data collection matters

Finally, something we heard only in one city, but is worth discussion because of its relevance to this study's count data analysis, is that it is extremely difficult to get valid, reliable, and robust data to support evaluation of interventions when you are relying on volunteers and community organizations to gather that data. More structured and intentional evaluation programs, laid out in advance in well-crafted plans, funded, and managed by trained staff, are essential to understanding the impacts of rapid rollout projects. City staff in Milwaukee are considering what more structured evaluation programs might look like in the future.

Discussion and Conclusions

Pedestrian and bicycle volume data tell part of the story

The rapid rollout shared streets programs explored in this study were robust, having been implemented in multiple locations across the study cities during the first few months of the COVID19 pandemic, in response to changing demands for street space brought on by the pandemic. These programs were all linked to pre-existing planning efforts, and program planning teams leaned heavily on those plans while developing the shared streets.

However, data from permanent, continuous multimodal counters failed to support the hypothesis that these robust, plan-informed shared streets programs increased walking and cycling during the pandemic. We believe this unexpected finding is partially explained by contextual factors surrounding the shared streets. While we did not test this hypothesis empirically, data from the interviews lends support to it. The count data suggest that, after the start of the pandemic, walking and cycling increased slightly in suburban and rural areas and locations that had recreational use patterns pre-pandemic, and decreased in urban areas and locations with commute-oriented use patterns pre-pandemic. Based on the location criteria discussed in the interviews, a majority of the shared street locations in our study were in more urban areas, often situated specifically to improve connectivity to urban and/or essential work locations. Thus, shared streets tended to be placed in locations that were predisposed to see declining rates of walking and cycling during the pandemic.

The lack of evidence of positive impact on walking and cycling rates on shared streets may also be due mismatches in the counter sites and shared street locations. While the shared streets locations in this study were chosen based on carefully selected criteria, proximity to a counter does not appear to be among those criteria. There are no standard, systematic criteria for cities to use when choosing count sites (Schoner et al., 2021). The National Highway Cooperative Research Program (NCHRP) suggests placing counters in areas that are suspected to attract walking or cycling traffic (Ryus et al., 2014). We are not aware of the count site location criteria used in our study cities. However, should they have been placed in accordance with that guidance, their relevance to the shared street locations—which tended to be lower volume residential streets—likely would have been diminished. It possible that the shared streets even pulled pedestrian and bicycle traffic away from pre-existing facilities with counters, potentially helping explain the relatively lower counts in treatment cities compared to controls, although this was not explored and would require specialized data to do so.

Regardless, existing pedestrian and bicycle count programs likely will not capture the true impacts of rapid rollout and pilot projects, especially during crisis situations. This was apparent in our count data and echoed by shared streets program planners. Other researchers have noted this need as well, calling for purpose-built monitoring programs to capture valuable data on walking and cycling trends under changing conditions (Lindsey et al., 2022). In order to truly understand the impacts of street space interventions during disruptive events, cities need to be proactive, working today to develop a deliberate and flexible approach to data collection that can be deployed on short notice. For example, a city could install 12-15 permanent pedestrian and bicycle continuous count locations (Nordback et al., 2019) and supplement them with week-long short duration cunts using mobile, automated count equipment rotated through specific sites around the city. This approach would ensure the city is better prepared to deploy the mobile count equipment to capture the impacts of rapid rollout projects, such as shared streets, while maintaining the ability to monitor long-term trends with the permanent counters.

Interviews suggest other ways of evaluating success

Shared streets programs emerged in study cities in a variety of ways and for a variety of reasons. In most cases, public engagement did not play a substantial role in initial decisions surrounding shared streets, but as the pandemic wore on and staff gained experience, they expanded and improved public engagement strategies in ways that are likely to outlast the pandemic. This may be a critical factor in determining the 'success' or impacts of shared streets, extending beyond what can be discerned from the count data. While our sample size is too small to allow generalizations from the interview data, it does appear that those programs that benefitted from expanded public engagement efforts were made permanent more frequently than those with limited public engagement.

If permanentization of the shared streets programs themselves can be taken as a measure of success, so too should the remarkable increase and expansion of demand—literal, vocal demand—for shared streets and other pedestrian and bicycle facilities by the public, and the willingness to accommodate that demand by city leaders. In this study and myriad others following COVID-streets programs around the world, one common theme has emerged: a new and growing appetite for experimentation, creativity, and sped-up implementation timelines for safer, more walking- and cycling-friendly streets. Cities—staff, elected leaders, and residents—recognized that they do not have to tolerate years' long waits for new facilities. Transportation professionals already had the equipment, skills, and experience to act quickly, evaluate impacts as they went along, and modify or roll back their actions if they did not work out. In our interviews, we often heard a variation on this theme: "It is no longer acceptable to make our residents wait years for safer, calmer, lower-stress streets."

Finally, there is an argument for measuring success in terms of knowledge gained, and—critically—leveraging that knowledge to create new best practices for transportation, street design, and pedestrian and bicycle infrastructure in a post-pandemic world is already here. Our interviews with professionals who led shared streets programs revealed enormous leaps in knowledge from before to during and after the pandemic. However, that knowledge is embedded in the experiences of the professionals who were on the ground planning, implementing, maintaining, and evaluating COVID-streets programs across the US and around the world. Unless captured through intentional opportunities for story-telling and sharing data among communities and researchers, this knowledge is likely to be lost in the haste to put the pandemic in the rear-view. Much more work is needed to document the forces driving COVID-streets programs, their impacts, and their implications for practice in the future.

Recommendations

This research informs efforts to shorten timelines for planning, design, and implementation of potentially life-saving pedestrian and bicycle infrastructure while promoting a more equitable public process and just distribution of benefits. The research builds knowledge on the relationships among planning process, design, and implementation of pedestrian and bicycle facilities. It also highlights some of the lessons gained during COVID-induced shared streets experience and traces the pathways through which those lessons lead to new, hopefully better transportation and street design practices.

We understand the limitations inherent in focusing on the observations of planners and other city officials and the use of conventional measures of impacts (pedestrian and cyclist counts) to evaluate the impacts of rapid rollout interventions. Thus, we view this research not as a definitive solution to the systemic safety and equity challenges in US transportation systems, but rather as a substantial contribution toward capturing the knowledge needed to sustain momentum for faster, for responsive, and more context sensitive investments in safer street design.

Based on the lessons uncovered in this research, we put forth the following recommendations:

- Establish flexible, responsive data collection systems ahead of the next disruption: Much more research is needed to understand how to evaluate the impacts of rapid-rollout interventions, as the future is likely to be characterized by disruption. The infrastructure and support for this research, however, needs to be put in place ahead of time, as data collection protocols designed for business-as-usual scenarios may not be useful in extreme events.
- Build innovation and flexibility into transportation plans: Most cities in the US have transportation plans that address bicycle and pedestrian infrastructure. In our study, many of these plans called for some sort of neighborhood greenway system. While shared streets often ended up looking quite different from what neighborhood greenway plans called for, the presence of those plans suggested that cities had already cleared the mental hurdles surrounding the notion of sharing street space among pedestrians, bicyclists, and motorists. In that sense, these cities were already primed to take unconventional action during the crisis of the early pandemic…and they had plans in place to guide that action. In an increasingly uncertain future, cities need plans that are resilient enough to not just withstand disruptions, but guide cities through them.
- Continue documenting shared streets experiences: The people who planned, designed, implemented, and used shared streets across the country are the newest experts in flexible, resilient, demand-responsive street design. We must capitalize on this expertise by continuing to document these individuals' experiences and the knowledge gained through them, or else much of the knowledge will be lost in our haste to put the pandemic behind us.

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Appendices

Appendix 1: Treatment city selection process

City	Full/partial street closure program	Program began before 7/1/2020	Had count data	1+ miles	Involved multiple corridors/ areas	In effect 6+ months	Willing to participate
Alameda, CA	✓	✓					
Arlington, MA	✓						
Aspen Hill, MD	✓	✓					
Austin, TX	✓	✓					
Baltimore, MD	✓	✓					
Bellevue, WA	✓	✓					
Bend, OR	✓	✓	✓	✓	✓	✓	✓
Birmingham, AL	✓						
Boston, MA	✓	✓					
Brookline, MA	✓	✓					
Burlingame, CA	✓	✓					
Burlington, VT	✓	✓	✓	✓	✓	✓	
Cambridge, MA	✓	✓	✓	✓	✓	✓	✓
Carrboro, NC	✓	✓					
Charlotte, NC	✓	✓	✓	✓	✓	✓	✓
Chicago, IL	✓	✓					
Cincinnati, OH	✓	✓					
Cleveland, OH	✓	✓					
Corning, NY	✓	✓					
Dallas, TX	✓	✓					
Denver, CO	✓	✓					
Des Moines, IA	✓	✓					
Duluth, MN	✓						
Durham, NC	✓	✓					
Edmonds, WA	✓	✓					
Eugene, OR	✓	✓	✓	✓	✓	✓	✓
Exeter, NH	✓	✓					
Fayetteville, AR	✓	✓					
Greensboro, NC	✓	✓					
Greenville, SC	✓	✓					
Hampton, VA	✓	✓					
Hampton Beach, NH	✓	✓					
Houston, TX	✓	✓					
Kansas City, MO	✓	✓					
Los Angeles, CA	✓						
Louisville, KY	✓	✓					
Madison, WI	✓	✓	✓				
Malden, MA	✓						
Miami Beach, FL	✓	✓					
Milwaukee, WI	✓	✓	✓	✓	✓	✓	✓

Minneapolis, MN	✓	✓	✓	✓	✓		
Montgomery, MD	✓	✓					
Morgantown, WV	✓						
Nashville, TN	✓	✓					
New Haven, CT	✓	✓					
New Orleans, LA	✓	✓	✓	✓	✓	✓	
New York, NY	✓	✓					
North Hollywood, CA	✓	✓					
Oakland, CA	✓	✓					
Palo Alto, CA	✓	✓					
Pasadena, CA	✓	✓					
Philadelphia, PA	✓	✓	✓	✓	✓	✓	
Pittsburgh, PA	✓	✓					
Port Townsend, WA	✓	✓					
Portland, OR	✓	✓	✓	✓	✓	✓	✓
Poughkeepsie, NY	✓						
Providence, RT	✓	✓					
Raleigh, NC	✓	✓					
Redwood City, CA	✓	✓					
Sacramento, CA	✓	✓					
Saint Paul, MN	✓	✓					
Salt Lake City, UT	✓	✓					
San Antonio, TX	✓	✓					
San Diego, CA	✓	✓	✓	✓			
San Francisco, CA	✓	✓	✓	✓	✓	✓	✓
San Mateo, CA	✓	✓					
Seattle, WA	✓	✓	✓	✓	✓	✓	✓
Somerville, MA	✓	✓					
St. Louis, MO	✓	✓					
Tucson, AZ	✓	✓	✓	✓	✓	✓	✓
Tysons Corner, VA	✓	✓					
Ventura, CA	✓	✓					
Washington, DC	✓	✓	✓	✓	✓	✓	

Appendix 2: Interview instrument

INTERVIEW GUIDE

As I mentioned in my email, we are interested in understanding the planning processes shaping how cities changed the allocation of street space during the COVID19 pandemic. In this interview, we hope to learn from you about [city's] planning process for [insert name of intervention], based on your role in planning or implementing the project. All of these questions are optional, and you may end the interview at any time.

Are you ready to proceed?

1. For our records, please say your name, role with [city], and role with COVID Streets intervention.

2. Please describe the planning process that led to this project.

Prompts:

- Was the project aligned with on-going or previous planning efforts?
- Who was involved in decisions around the project (include city agencies and members of the public/community groups as appropriate)?
- How were community members involved in identifying, planning, or managing this project?

3. Please describe [city's] goals and justification for the project.

Prompts:

- What criteria were used to determine what actions would be taken, and where?
- How were the types of actions and locations selected?
- Was the decision to act based on observations of how demand for mobility changed due to the pandemic, or something else?
- Was the response consistent with pre-pandemic plans, planning efforts, or conversations (formal or informal) about mobility?

4. How did public input, existing plans, existing regulations, resource limitations, spatial or fiscal constraints, and/or politics shape the city's planning process?

5. Please explain how the project was deployed, and by whom.

Prompts:

- What agencies or organizations are/were responsible for implementing and managing the project?
- Is/was law enforcement involved in implementing or managing the project?

6. How has the project evolved since installation?

7. What did [your department/team] learn from the experience?

Prompts:

- This could include lessons learned through planning, implementing, or evaluating the project.
- Would they do things differently if they had a do-over?
- Will policies or practices change based on their experience with the project? If so, why and how?
- How has the experience informed how the city will plan for future shocks?

8. How has [city] evaluated the impacts of the project?

9. What are [city's] long term plans for this project?

Prompts:

- Will it be converted to a permanent installation?
- Will it be adapted in some way? Has it been dismantled?

10. Do you have any additional insights you wish to share about the project and/or the lessons [city] has taken away from the project?

Appendix 3: Interview summaries

Bend, OR

Program: Stay Healthy Streets

Interview Date: January 2022

This summary is based on information provided by a transportation engineer for the city of Bend. Prior to the pandemic, the engineer worked with the city's Growth Management Department, but they switched to the Streets and Operations Department at the start of the pandemic.

Program overview

Bend's Stay Health Streets program involved using cones and 'no through traffic' signage to designate a selection of streets in the city's planned (but not constructed) neighborhood greenway network as shared spaces. The program began in the spring of 2020 and remained in place for approximately one year before being dismantled as pandemic restrictions eased.

Motivation

Stay Healthy Streets arose in response to overcrowding on trails during the early days of the pandemic, but it was also used as a way to demonstrate the thinking behind the city's Neighborhood Greenway plan.

Criteria and planning process

The planning process for Stay Healthy Streets began six years prior to the pandemic. Transportation professionals working with the city's Growth Management Department, which was in charge of long range transportation planning, had identified significant safety concerns for pedestrians and cyclists in 2012. In response to these concerns, the city launched a stakeholders' advisory group in 2014, comprising developers, healthcare industry representatives, pedestrian and bicycle advocates, ADA advocates, city staff, and parks district staff. Through a process that included community workshops and pop-up facilities, the group developed a tactical urbanism program meant to speed up timelines for addressing safety concerns, which they branded, "Safer by Design." However, the program was never implemented, as a change in elected leadership in 2016 led to a shift in the city's priorities. The city's priorities shifted back just before the start of the pandemic, opening the door to revisit the Safer by Design program as a way to address the increase in demands for safe spaces to walk and bike brought on by the pandemic.

Locations for the Stay Healthy Streets were based off Bend's adopted Neighborhood Greenway plan. Within the network of streets designated as future neighborhood greenways, the program's planners looked for street segments that would connect existing facilities, extend the city's trail network, and improve geographic equity in the distribution of walking and cycling facilities. They also considered ease of implementation as a selection criteria.

Stay Healthy Streets was implemented by staff members of the city's Streets and Operations Department. Community members also assisted with placement of signage. Law enforcement was consulted intially regarding the enforceability of 'no through traffic' signage (it was determined to be not enforceable) but had no further role in planning or management of Stay Healthy Streets. The cooperative spirit that characterized many communities' responses to the pandemic was mentioned as a key to residents' willingness to comply with the program.

Community involvement

Stay Healthy Streets relied heavily on pre-pandemic community engagement efforts, but staff also sought public feedback while planning and implementing the program. They consulted with the initial stakeholder group, created a website, and conducted a door-knock campaign--physically distanced--to educate community members about the program. The program representative felt this process helped build stronger relationships with individuals and neighborhood associations.

Physical design, implementation, and evolution

The Stay Healthy Streets program was deployed using a “Safer by Design” branded sign and cone kit the city had developed prior to the pandemic. The cones were initially placed on the side of the street, but this placement was quickly found to be ineffective, so the program team got permission to shift them to the street itself and add "No Through Traffic" signage. They then used the cones to create temporary curb extensions, chicanes, and traffic islands, which functioned as gateway treatments.

The program team also produced custom yard signs, which residents were able to place in their yards along the Stay Healthy Streets routes.

Other considerations

Equity factored into the site selection process, with the program team consciously seeking streets that would connect lower income and middle income neighborhoods to trails and parks. Staff were cognizant of the disproportionate impacts the closures of parks and playgrounds had in these areas of town, as well as the increased use of streets for cut-through traffic, and endeavored to mitigate those impacts somewhat with the Stay Healthy Streets.

The program operated on internal funds, using materials at hand, and with broad political support thanks to the prior planning efforts of Safer By Design and the neighborhood greenways plan.

Outcomes and evaluation

There was a heavy emphasis on using the Stay Healthy Streets was a way to demonstrate different approaches to traffic calming, as many Bend residents had expressed trepidation about the concept prior to the pandemic. While they did not conduct formal assessments of the program, anecdotal and informal feedback was strongly positive. The program was generally felt to be a success due to its influence on post-pandemic planning processes and regulations.

Lessons and takeaways

The city's experience with Stay Healthy Streets has led to more conversations about how public space is used, with noted shifts in perspectives about prioritizing walking and bicycling over the default prioritization of space for cars. Even in business districts, staff is finding increasing support for removing parking and travel lanes in order to accommodate more pedestrian and bicycle traffic.

The program team noted a push to institutionalize this shift in thinking, through permanent changes in development codes and street design specifications, including wider sidewalks and buffered/protected bike lanes. They have expanded and accelerated implementation of the neighborhood greenways plan, and added vernacular such as 'low stress routes' to their city standards. Some these ideas had been present pre-pandemic, but the city's experience with Stay Healthy Streets served as a springboard for formalizing them.

The Stay Healthy Streets experience also highlighted the importance of good communication with residents. Program planners worked to make sure neighbors had a sense of ownership of their shared streets, that it wasn't "just some wonky thing coming into their neighborhood." The in situ community engagement that occurred through staff's interactions with residents in their own neighbor hoods also

helped build trust necessary for successful interventions. It also helped established relationships between the city and neighborhoods in which there had not been formal engagement efforts in the past.

Plans for the future

Stay Healthy Streets was decommissioned in 2021, but many of the experiences gained through the program, which city leaders generally deem to have been a success, have been institutionalized into development and road design standards.

Cambridge, MA

Program: Shared Streets

Interview Date: December, 2021

This summary is based on information shared in an interview with the Engineering Manager for the City of Cambridge. They were heavily involved in management and analysis of Cambridge's Shared Streets program.

Program Overview

The Shared Streets program was implemented in Cambridge, Massachusetts in the summer of 2020 in response to the COVID-19 pandemic. It designated certain low-traffic residential streets along three corridors as shared spaces for walking, biking, driving, and rolling at slow speeds. The shared spaces were created by placing small barricades (followed by traffic barrels) in the middle of the roadway, and using signage to set an 'advisory speed limit' of ten miles per hour. The program was spearheaded by the city's Traffic Department, with input from the Community Development Department and Public Works. Selected streets provided longer distance connections between neighborhoods and commercial districts. The Shared Streets were maintained through early December 2020 before being discontinued due to weather and mixed community feedback.

Motivation

Shared Streets emerged from a desire to address public health and transportation needs during the COVID-19 pandemic. Many Cambridge sidewalks are narrow, making compliance with physical distancing guidelines difficult. In addition to creating space for physical distancing, Shared Streets also created low-stress corridors for walking, cycling, and recreation and provided connections between residential and commercial areas. Examples of successful Shared Streets in peer cities also served as a motivation for Cambridge's program.

Criteria and planning process

Though novel in approach, Shared Streets was heavily informed by Cambridge's Bicycle Master Plan, which called for development of low-speed, low-volume bicycle priority routes. Cambridge's Traffic Department worked with the Community Development Department to identify candidate Shared Streets that had relatively low traffic speeds and volumes but provided longer distance connections across land uses. The city implemented three primary corridors, each half a mile to a mile in length. They paralleled a busier street, which was intended to absorb motor vehicle traffic diverted away from the Shared Street. As Cambridge lacks a grid street network, meeting this last criteria was a challenge and limited the scale of the program somewhat.

The Traffic and Community Development Departments initiated Shared Streets design and planning jointly. Public Works provided input to ensure the selected streets did not conflict with ongoing maintenance needs. The program team solicited public feedback via virtual community meetings, but there was no other formal public engagement in the Shared Streets planning process.

Law enforcement was advised about the Shared Streets program, but they played no role in planning, managing, or enforcing it.

Community involvement

The Shared Streets program team held a series of virtual meetings during the Shared Streets planning process, but these were mostly aimed at informing the public. There was no formal community engagement or community involvement in the program.

Physical Design, implementation, and evolution

Shared Streets were demarcated using signs placed in the middle of roadways announcing the 10mph advisory speed limit. Early designs secured signs to A-frame barricades, but these proved inadequate against wind gusts, which blew many of the signs over. The Traffic Department shifted to using sturdier traffic barrels to hold signs in place. They also used barrels and cones to create traffic islands and reinforce the "shared" nature of the streets. Cambridge did not use any sort of physical diverter to prevent through-traffic, nor was that an explicit goal of the program.

The Traffic Department handled all implementation using existing staff capacity. Public Works was minimally involved since their maintenance regimes already accommodated Shared Streets locations. Ongoing management required daily patrols to reposition damaged or displaced signs and barricades. The Traffic Department corrected issues as needed to maintain visibility and functionality.

Outcomes and evaluation

The community offered mixed feedback on Shared Streets. Many residents felt the program was a success and requested for it to be expanded and/or permanentized. Others liked the idea but felt the implementation was not effective in calming or slowing traffic, and asked for more robust speed reduction measures. Still others felt the traffic calming equipment—and the fact that some drivers followed the advisory speed limit while others did not—was too much of an inconvenience.

Overall, public sentiment on Shared Streets in Cambridge trended negative, which led to the program being discontinued in December 2020. Critics fell into two camps: those opposing any infringement on driving routes, and those wanting more aggressive speed and volume mitigation. Challenges with non-compliance and maintaining materials in the roadway added to the program team's frustrations.

There was not a formal evaluation of the program's impacts. The program team would have liked to have data on traffic volumes, but felt that the effects of the pandemic would have overshadowed any effects of the Shared Streets program.

Lessons and takeaways

Cambridge's Shared Streets program did not attempt to divert traffic or reduce traffic volumes; they tried to reduce traffic speeds with traffic calming equipment and a reduced advisory speed limit. Staff were not comfortable with the notion of attempting to filter out through traffic through signage; they felt it was not enforceable without constitutional overreach and thus would be ineffective. However, without reduced traffic volumes, the low-stress conditions they hoped to create with Shared Streets were not feasible. If they were to attempt a program like this again, they would look for ways to reduce traffic volumes with physical diverters. They also learned that advisory speed limits, likewise unenforceable, were similarly ineffective. Their biggest takeaway, then, was to implement programs that were supported by existing regulations, rather than to simply hope that people would comply with the intent of the program.

Plans for the future

The Shared Streets program was removed in December, 2020, with no plans to renew it. Some of the streets that were designated as Shared Streets are being considered for more robust, permanent traffic calming measures in the future, however.

Eugene, OR

Program: Open Streets

Interview Date: December 2021

This summary is derived from information provided by the Senior Transportation Operations Coordinator for the city of Eugene, Oregon. In this role, they are responsible for planning and implementing transportation programs and infrastructure. The coordinator was the central staff person who planned, designed, and executed the Open Streets program across its two phases.

Program overview

This case study describes Eugene, Oregon's "Open Streets" program, implemented as part of the town's response to COVID19. Open Streets occurred over two phases, one in 2020 and the other in 2021. The program implemented partial street closures on neighborhood streets, prioritizing walking and cycling over vehicle traffic. The first phase, in 2020, focused on streets connecting a park, a major bypass, and a shopping center. In 2020, the program focused on connecting two shopping centers and a school via residential streets. In both cases, the city linked a set of neighborhood streets together to form a low-stress corridor connecting the identified destinations. The second phase also provided connections within neighborhoods via 'accessways' that functioned like shortcuts for pedestrians and bicycles.

The Open Streets program was decommissioned at the end of the second phase, in late 2021. The program's planning team felt the approach did not work well in Eugene's car-centric environment, compared to other more dense cities. The city decided instead to refocus their efforts on developing the city's permanent "neighborhood greenways" program. Although it was discontinued, the Open Streets program did serve an on-going purpose of helping staff identify potential connections for future neighborhood greenways.

Motivation

The Open Streets program was chosen in response to increased pedestrian activity during the COVID-19 pandemic. With more people walking for exercise and needing to physical distance, sidewalks were becoming overcrowded, especially in denser parts of Eugene, and many people were walking in the street in order to follow physical distancing guidelines. The city was also spurred to act by peer pressure, with city leaders taking note of similar responses taking place in other cities, most of which appeared to be popular among residents.

The goals of the program were to provide residents with more space to walk, bike, and roll while maintaining physical distancing. It aimed to create low-stress environments for active transportation by limiting vehicular traffic on certain streets.

Open Streets was partially consistent with pre-existing plans. Eugene has a neighborhood greenways program, but it was still in its infancy during the pandemic, and city leaders initially wanted the Open Streets to take place on future neighborhood greenways to help kickstart the program. However, staff determined that the planned neighborhood greenway corridors tended to have higher traffic volumes than would work for the partial street closures, so they instead focused on connecting locations in underserved neighborhoods per direction from city leadership. So, while the goals of Open Streets were consistent with those of the neighborhood greenway program—to provide spaces that prioritize active transportation over driving—the locations and designs differed in the end.

Criteria and planning process

The Open Streets program was initiated and managed by Eugene's planning department, with some insights provided by the recreation department as well. Sites were selected based on two key criteria: 1)

bringing safe walking and cycling infrastructure to historically underserved neighborhoods outside the city's core, with limited transportation options, and 2) linking residences to destinations like parks, schools, and shopping centers.

In the first phase, the team included streets with higher traffic volumes and speeds, hopeful that the Open Streets program would help calm the busy traffic. However, they realized that the equipment and approach they were using was not robust enough to achieve that goal, so in the second phase, they chose streets with already low traffic volumes and speeds.

Law enforcement's role was limited to reviewing the locations and designs for Open Streets to ensure they would not interfere with emergency responses.

Community involvement

Community engagement was limited due to the urgency of the pandemic timeline. The city consulted neighborhood associations for input but acknowledged this approach was not inclusive of all residents, and had to weigh the benefits of a more robust public process with a timely response.

In the first phase, the Open Streets team presented options to neighborhood associations in areas the city had identified for Open Streets, seeking feedback on specific routes. Feedback was also solicited in situ via a dedicated phone number posted on signs along the Open Streets route.

The team used a similar approach in phase 2, engaging with neighborhood associations to refine route selection in areas identified for Open Streets. In situ involvement was expanded through the use of a bingo game, in which residents submitted photos of themselves at designated locations along the route. The submission process encouraged residents to provide feedback on the Open Streets program.

After each phase was dismantled, the Open Streets team surveyed residents along the Open Streets corridors to evaluate the program's impacts.

Physical design, implementation, and evolution

The Open Streets program used signs and moveable barricades to close off the route to through traffic. Some of the streets in the first phase route were known for substantial cut-through traffic, and while the residents living on those streets appreciated the effort, motorists were not happy, and the barricades were frequently moved and/or damaged. Rather than changing the design or equipment, the Open Streets planning team adapted their site selection criteria for the second phase, opting for calmer streets that the barricades were better suited to.

Other considerations

Safety for pedestrians and cyclists was a primary motivation behind the Open Streets program. Sidewalks in the dense urban core were quickly overwhelmed by the number of people walking, and pedestrian traffic spilled out into the streets as people tried to maintain appropriate physical distancing. However, none of the Open Streets were located in this sort of environment, as the planning team recognized the challenges in using a rapid-rollout approach to create partial street closures on busy streets. Instead—and under directives from city leadership—the Open Streets team opted to prioritize equity in the implementation of the program, installing Open Streets in less dense peripheral neighborhoods that lacked safe walking and cycling infrastructure and were underserved by other transportation options.

The Open Streets planning team reported a few factors that affected the timeline of the Open Streets implementation. First was legal: the planning team needed to work through a process to get an administrative order in place to allow changes to existing roadways, and because of the program's novelty, there were no existing processes to model this after. The second factor was the need to rent

traffic control equipment, as the city did not have enough barriers on hand to fully implement the Open Streets program.

The planning team also noted, specifically, the choice of materials as a factor in the decision to dismantle the Open Streets program: in order to meet their original expectations for the program, they realized they would have needed much more robust equipment.

Outcomes and evaluation

The Open Streets program in Eugene was considered experimental, with mixed results across its two phases. The city evaluated impacts through resident surveys, usage data collection, and community feedback.

Surveys of residents living on the Open Streets before and after each phase provided quantitative data. In the second phase, an interactive bingo game that incentivized usage helped track participation while generating qualitative feedback. Photos and comments submitted through the game gave insights into navigation and experiences.

The program aimed to increase walking, biking, and rolling by providing low-stress corridors. While traffic counts showed that the interventions in the first phase did help reduce traffic volumes on the designated Open Streets, they interventions were not well received outside the immediate neighborhood, which was demonstrated through public feedback and vandalization of the temporary traffic barricades. Pedestrian and bicycle impacts were also limited in phase 1 by the fact that the destinations the route connected were closed due to the pandemic, limiting the Open Streets' utility as a transportation corridor. The second phase showed more promise for influencing active transportation with more informed site selection, improved connections, and expanded avenues for outreach, and by virtue of more destinations being open for business.

Equity impacts centered on geographic distribution to underserved neighborhoods, although narrowed demographic diversity from limited engagement was a noted weakness.

Lessons and takeaways

When asked what they would change if they were to do the program over again, the interviewee responded that they would have liked to have done at least one Open Street in the dense downtown area, where the greatest pedestrian and bicycle traffic increases were occurring due to the pandemic's impacts, with concomitant increases in conflicts among modes. An Open Street intervention in this setting, the interviewee explained, could have helped address urgent safety concerns presented by these conflicts.

Despite the decommissioning of the Open Streets program after the second year in order to focus on neighborhood greenways, the planning team did share a list of lessons through their experience with Open Streets. Many of these lessons will inform their neighborhood greenways program going forward.

The temporary traffic calming measures they used had major limitations in effectiveness and durability, particularly in high stress, car-centric environments. The team found greater success with their materials in the second year, when they shifted the program onto much lower stress streets.

Outreach through neighborhood associations was expeditious, but also introduced bias into their public engagement and data collection processes, due to the non-representative nature of the neighborhood associations. The planning team recognized this limitation but felt the urgency of the pandemic did not allow time for a broader, more inclusive outreach effort. They also noted that the neighborhood associations' endorsement of the Open Streets program seemed to carry weight with residents.

In the second phase of the program, the planning team identified and marked connections—or "accessways"—between neighborhoods and commercial areas. Many residents remarked that they had not known those connections existed previously, and were happy to learn about them. The planning team plans to formalize accessways into the neighborhood greenways program. They also identified neighborhood streets likely to be good candidates either for the neighborhood greenways themselves, or as connectors to the neighborhood greenway system—with permanent traffic calming equipment.

Finally, the Open Streets program presented city staff and residents alike with a new perspective on how streets can be used to better serve those who live and travel along them. The planning team expressed hope that this experience leads to a shift in philosophy and policies about street design and use beyond the pandemic.

Plans for the future

The city of Eugene ended the Open Streets program after two phases, opting to redirect their resources toward building out the city's neighborhood greenway network.

Milwaukee, WI

Program: Active Streets

Interview Date: December 2021

This summary is derived from information provided by a senior transportation planner in Milwaukee's Department of Public Works. She was the program manager for the Active Streets program in Milwaukee. The program began as a group effort, but she took over management of the program in 2021.

Program overview

This case study describes Milwaukee's "Active Streets" program, which was initiated in response to changing travel behaviors and the need for physically distanced space during COVID. The program created shared streets by filtering out non-local motor vehicle traffic on neighborhood streets and in county parks using signage and simple barricades. Active Streets was implemented in three phases, starting with a 4-segment pilot (phase 1) in May, 2020. The program was still in effect as of the end of 2021 with plans to keep it going beyond the pandemic, albeit with considerable evolution.

Motivation

Active Streets was part of the city's response to mobility and public space needs that became heightened during the COVID-19 pandemic. With residents spending more time in their neighborhoods due to lockdowns and remote work arrangements, demand rose for convenient access to spaces for walking, rolling, and other forms of socially-distanced outdoor recreation and activity. However, many Milwaukee neighborhoods lacked adequate parks and greenspace within a short distance from residential areas. In addition, sidewalks tended to be narrow and sandwiched between busy roads in these communities, limiting their appeal for family strolls or as bike routes. Thus, the primary initial goal was to provide safe spaces for people to be physically active, at an appropriate distance from one another in order to avoid virus transmission. The planning team also noted the overall declines in traffic volumes early in the pandemic, and recognized this period as a unique opportunity to experiment with reallocating street space to uses other than driving.

The planning team got the idea for Active Streets from other cities, but it was heavily informed by existing plans—in particular, the city's bike plan, which the planning team used to help identify streets to be used in the program. While the approach—temporary shared streets—was novel, the designs and locations were not: most of the streets chosen for the Active Streets program were either planned already or in the process of being planned to be converted to Bicycle Boulevards.

Criteria and planning process

When the city first began thinking about Active Streets, the planning team reached out to the county parks department. The city has some parks, but they are all small—not even a full city block, typically. They had seen other cities that were using streets that went through parks as part of their COVID-streets programs, so the team reached out to the county parks department to see whether they were interested in partnering on a parks-based Active Streets program in Milwaukee. The county parks department was interested, so they began working together in 2020 to identify streets to shut down. With a goal of getting good geographic distribution across the city, they narrowed their list down to four street segments to convert into Active Streets. The city's planning team then reached out to community organizations working in the areas of those street segments for feedback, and then launched the program.

Three of those street segments were on pre-identified bike boulevards; the fourth had characteristics that were typical of bike boulevards—it was a longer street connecting three county parks—even though it had not been previously identified as such. One of planned bike boulevards chosen as an Active Street was in pre-construction at that time, and another was in design, but none had yet been built.

The other main criterion behind site selection was distribution: the city wanted to ensure that Active Streets were spread throughout the city, and that they connected people to parks or green space.

Community involvement

Community engagement was, at least initially, focused on communications. The planning team asked for feedback on the appropriateness of the streets they had selected, though they did not receive any feedback from community organizations that caused us to change our minds about where the streets would be located. But they did get feedback about one segment: they had planned for this particular segment to be longer, but received negative feedback from the alderperson representing one of the districts the street went through. The alderperson reported that her constituents were hesitant about the idea, so the route was shortened to keep the Active Street out of that district.

After the program launched, one of the community organizations the city had consulted with took ownership over the Active Street route in their neighborhood, and provided the planning team with ideas for future implementations. This was the route that was in the design phase of becoming a bike boulevard when Active Streets began; this design process history meant the community organization already had some connections and was already familiar with the concepts and planning processes. So, they became involved in the Active Street as well, including starting a weekly walking club on the Active Street.

At the end of the first phase (in 2020), the planning team conducted a survey to understand how residents felt about the Active Streets. Many people felt the streets needed to involve programming to encourage more use. Survey responses also pointed out differences in how streets were used. In the one route that was located in a predominantly white, more affluent neighborhood, respondents felt comfortable taking the street over completely for walking space. Respondents were less comfortable with this sort of behavior in other neighborhoods, which the planning staff believed community-based programming might help ameliorate. So, they switched to a more community-led program for 2021, in which community groups could propose routes and receive funding to devise and implement their own programming activities and public art installations. Four organizations' proposals were selected, including two organizations that had proposed to re-instate the previous years' Active Streets routes. The organizations were also expected to assist with monitoring the equipment and alerting city staff if any repairs or adjustments were needed, although the interviewee noted this process did not always work as well as they had hoped.

Physical design and implementation

Implementation and management was done mostly through the Department of Public Works. Deployment was fairly simple, relying on barricades and signage denoting that through traffic was not allowed. DPW's field staff has been responsible for putting out and managing the equipment, along with assistance from volunteers and community organizations (although the interviewee noted that they still need to send interns out on a regular basis to check for problems with the equipment).

Evolution

Milwaukee's Active Streets program has evolved to include three phases. Phase I ended in 2021, and planning for phase II was underway at the time of the interview. Phase I was limited to low-cost infrastructure—signs and barricades—plus the funding distributed to community groups for programming in 2021. Phase II, which is supported by funds from the American Rescue Plan, will focus on installing more robust traffic calming infrastructure. However, the interviewee noted that the city had been able to start installing such equipment during Phase I thanks to a grant from People for Bikes. This included using delineators to create temporary curb extensions, using rubber curbs to create a traffic circle, and installing rubber speed humps. The city will expand on this effort in Phase II, as well as continuing to

provide funding for community-led programming. Phase III will be installation of semi-permanent traffic calming infrastructure.

Other considerations

Milwaukee's Active Streets program met few hurdles, save one: The program began in 2020 with four Active Streets routes. Three of them were launched by May, 2020, but the fourth—which crossed into the district with the hesitant alderperson—called for a slower, more deliberate planning process. The planning team held a community walk and talk, explaining how the Active Street would work, and more importantly, explaining that if it did not work, or the community was unhappy with it, it could be modified or removed quickly and easily. This seemed to mollify some of the concerns, and the city was able to proceed with implementation of the shorter route.

Outcomes and evaluation

The planning team conducted a survey after the first year's deployment of the Active Streets program, in 2020. It was a city-wide survey covering both the city's and the county's Active Streets. Staff did not conduct a full evaluation of the survey data, however, although as described above they did explore and identify some points of interest in that survey data. They used this information to help with planning of subsequent iterations of the Active Streets program.

The program also used volunteers to help monitor the barricades, and the planning team asked those volunteers to keep track of how many people they saw using the Active Streets at the same time. They noted that the data collected that way was not robust enough for analysis, since there were too many inconsistencies in when, how, and how frequently the volunteers went out and counted users. The planning team attempted a more systematic approach in 2021, asking each of the organizations receiving funds to collect usage data and prepare an evaluation or report on the impacts of the Active Street. As of late 2021, only one of four reports had been submitted, however. The interviewee noted reliance on volunteers and community groups for data collection was not ideal, and that the city would probably undertake more rigorous, formal data collection efforts for future projects.

Lessons and takeaways

The Active Streets program proved to be a good way to get people thinking differently about streets, and to demonstrate changes that could be possible within existing street space. Like a lot of cities, Milwaukee saw an increase in speeding and reckless driving during the pandemic, with the public calling for the installation of more speed humps. Planning staff recognized this as an opportunity to show other, potentially more effective tools for calming and slowing traffic. They also noted that in the future, they might be able to use the same approach to demonstrate how the planned Bike Boulevards will work in neighborhoods that have not had experience with Active Streets.

The close collaboration with community organizations was seen as a benefit, and a change from previous practices. The interviewee noted that this collaboration—and the funding that went along with it—was a good way to build trust with residents, and to build connections for better engagement practices in advance of future projects.

Barricades, the planning team learned, were not a good way to demarcate Active Streets. They were frequently blown or knocked over, and monitoring and replacing them required too much staff time. The planning team has looked to other cities for examples of more robust delineators and hope to have better equipment in place for future implementations. However, the team also noticed that many residents liked the barricades, in one neighborhood even saying that they felt safer walking in the street with the barricades than with the semi-permanent infrastructure the town replaced them with once they converted the Active Street to a bike boulevard. This has led the staff to look for potential ways to create the visual effect of barricades as part of their semi-permanent infrastructure installation.

Different communities, neighborhoods, and community groups approached Active Streets in different ways. One street, which has now been converted to a bike boulevard, had people walking in the street from the beginning. In other locations, the program seemed to be treated more like traffic calming, with residents preferring to stick to the sidewalks even though the barricades were in place. These differences have prompted the planning team to think about the contexts of the Active Streets they are planning, and look for ways to create a sense of 'this is a special street' rather than just installing a standard set of traffic calming equipment.

As of late 2021 the city had not seen any formalized practice changes based on their Active Streets experience, but they were incorporating some of the lessons learned into their more informal practices. For example, they recognized that there was greater flexibility with how they could use local funding compared to state or federal funding, and they were looking for more local sources to help support hiring community groups for future projects. They are also thinking more strategically about how to use the materials they have on hand to conduct demonstration projects, using them to showcase the potential impacts of various ideas—the interviewee gave the example of demonstrating the impacts of a removing parking to create a wider sidewalk—to stakeholders before making those ideas permanent.

Finally, the Active Streets experience demonstrated to staff that they could do things quickly when the need arises, which was not something they felt they had been good at in the past. Furthermore, they realized they could be flexible and creative, and—critically—that they could turn to existing plans and programs to help guide their decisions, like they used the bike plan to inform the selection of Active Streets locations. This increased comfort with working quickly and creatively, and the confidence they gained in their ability to use existing plans to guide new actions, was noted as potentially helping to accelerate decision-making and planning processes in the future.

Plans for the future

Of the four Active Streets installed initially, in 2020, two of them were also in effect as Active Streets this 2021. The two that were not in effect included the one that had been in pre-construction for a bike boulevard at the start of the pandemic—it's since been converted to a bike boulevard—and another one that did not have a community organization interested in bringing it back. Thus, 2021 saw two existing and two new Active Streets. The city will continue working with the community organizations involved in the Active Streets, in the hopes of moving them all into some sort of permanent status. They plan to continue issuing requests for proposals for community groups interested in new Active Streets programs elsewhere in the city.

Portland, OR

Program: Slow Streets

Interview Date: December, 2021

This summary is derived from information provided by the manager of Portland, Oregon's Neighborhood Greenway network. They work within the policy, planning, and projects division of the Portland Bureau of Transportation and were the primary force behind the city's Slow Streets program.

Program overview

This case study describes Portland's "Slow Streets" program, which was one of three elements in the city's "Safe Streets" initiative, enacted in response to COVID. The primary purpose of Slow Streets was to reduce through-traffic on streets identified in the city's Neighborhood Greenway network. The Slow Streets program was launched on May 7, 2020. The city began making Slow Streets permanent in phase III of the program, which began in the summer of 2021.

Motivation

Portland's political leadership felt external pressure to 'do something' during COVID. The neighborhood greenway program manager saw this 'do something' as an impetus to add protections to the neighborhood greenways. It is a vast network—over 100 miles—which meant it could provide a lot of outdoor space for people to use while maintaining necessary physical distancing.

The neighborhood greenway system had a lot of protections built into it before the pandemic, including traffic calming and traffic diverters, and the program manager initially felt that it was already sufficient as a means to accommodate covid-related demands. However, they were pushed by the city's leadership to do even more.

By initially aligning Slow Streets with the neighborhood greenway system, the program was consistent with pre-pandemic planning efforts. It eventually expanded beyond those efforts, but maintained connections to them through design and location criteria.

Criteria and planning process

Portland's Slow Streets were initially located on streets that were already a part of the city's neighborhood greenway system, creating 100 segments of that network that were designated for local traffic only. Shortly after launching the program, however, staff noticed it was missing big portions of the city; these areas had also been identified previously by the city as underserved and thus were the focus of equity initiatives. Accordingly, staff decided to expand the Slow Streets program beyond the established neighborhood greenways, to include both planned neighborhood greenways and other local streets where community organizations requested them. This expansion doubled the number of slow street installations, from 100 to 200.

The city created a website where people could submit requests for new Slow Streets. These requests were evaluated according to a set of criteria (listed on the website) that prioritized designated neighborhood greenways, future neighborhood greenways, and streets in underserved areas that lacked safe walking facilities, had poor access to parks, and/or had high density housing.

The Slow Streets program was initiated by the city's elected leadership, but also championed by the city's bicycle advocacy community. The decision to act was swift and came from the top, with the directive to create a Slow Streets program coming on April 20, a public announcement made on April 28, and and the first segments installed by May 7, 2020. This timeline left no opportunity for public engagement before rollout. Subsequent phases, however, did involve input from established community organizations, neighborhood associations, and a variety of stakeholder groups.

Law enforcement was not involved in any aspect of Slow Streets.

Community involvement

Given the rapid pace of implementation at the start of the program, community involvement was limited to providing feedback after the fact. Subsequent phases incorporated community input from the start, through intensive public consultation. Neighborhood associations were able to request that streets within their neighborhood be considered for the Slow Streets program; the program manager met with each neighborhood association from which they had received such a request. They also held meetings with over 100 stakeholder groups.

Physical design, implementation, and evolution

Slow Streets rolled out in three phases, although this was not a deliberate choice at the outset. In the first phase, which began in May of 2020, the city created 100 Slow Streets along the neighborhood greenway network by installing temporary traffic calming devices, which included 'local access only' signs attached to traffic barrels, at intersections. The signs—written in English and four other languages—included a brief description of the project explaining that travelers were entering a shared space, plus reminders to go slow and maintain proper public health protocols. The signs also included a phone number to provide feedback. Since the neighborhood greenways already had quite a bit of traffic calming infrastructure in place, the main purpose of the signage was to raise awareness of the fact that the streets were meant to be shared spaces with limited, slow motor vehicle traffic.

The second phase began in August of 2020 and expanded the Slow Streets program beyond the established neighborhood greenways. Staff expressed concerns that this would introduced the need for more elaborate traffic controls, but public support gave them confidence that the signage and barrels alone would be sufficient for the purposes of Slow Streets, so they proceeded, albeit carefully.

Phase III, which began in July of 2021, involves upgrading the Slow Streets to semi-permanent installations across the city, using more resilient equipment plastic curbs, flex-posts, and concrete planters (the temporary materials used in the first two phases were not holding up well to Portland winters).

Installation of the temporary Slow Streets was conducted primarily by contractors who had been retained by the city to implement their customary Open Streets events, Sunday Parkways. However, the onset of COVID led the city to cancel the Sunday Parkways, and the contractors were pivoted to the Slow Streets program (along with other COVID-related infrastructure chages) instead. The availability of these contractors was noted as critical to the city's ability to implement its COVID-streets initiatives. The semi-permanent installations of phase III are being conducted by the city's traffic maintenance group.

Other considerations

Slow Streets was funded largely through local funds and federal COVID relief money, and received strong public and political support.

Outcomes and evaluation

Portland evaluated the impacts of the Slow Streets program in a couple of ways. The Slow Streets signage includes a phone number on the signs that residents could use to provide verbal feedback; this had yielded about 1000 responses as of the end of 2021. The city also rolled out a brief text-based survey. The feedback through these mechanisms allowed the city to make adjustments on the fly, functioning, as the interviewee put it, "like a real time experiment on traffic calming." The city has also been doing automated monitoring of traffic volumes and speeds and bicycle volumes across the city throughout the Slow Streets period. They have not been monitoring pedestrian volumes due to a lack of automated

counters. Their focus, however, has been on the more qualitative feedback, particularly in underserved areas of the city.

The program was generally deemed a success, which helped provide the motivation to make it permanent in 2021. It has been very popular among political leadership, who heard overwhelmingly positive feedback from the public. But they also heard from some community groups—in particular from one group representing members of the immigrant and refugee community—that the program was not what they needed at that time; they were more concerned about keeping food on the table and accessing healthcare in case they got sick.

In the fall of 2021, staff began hearing a new kind of negative feedback—from school bus drivers who felt the traffic barriers were challenging to navigate around. This feedback had not come up earlier because schools were closed locally during the 2020-2021 school year.

Lessons and takeaways

The Slow Streets program manager quickly learned that "local access only" signage is not inclusive or instructive. They used it for the first round of Slow Streets because it was an approved sign in the city's traffic control manual, but its meaning was not intuitive to residents. The interviewee recounted a story in which a long-time resident and seasoned cyclist called the phone number on a sign, confused as to whether he was allowed to ride down a slow street. The confusion stemmed from a lack of clarification on the sign as to what modes it pertained to and to how 'local' was defined. The wording used on the sign would be obvious to transportation professionals, but not necessarily to the average user, and may result in those who were expected to benefit from the intervention feeling intentionally excluded from it. So, staff stopped using that sign and replaced it with one that shows an advisory speed limit (15mph) with graphics showing that the street is shared with multiple modes.

Another lesson learned was that drivers seemed to latch on to the rule-oriented nature of the 'local traffic only' sign, frequently getting upset that non-local drivers were using "their" street. Staff realized they could dispel some of this frustration by referring to the traffic control devices not as 'diversions,' which was the terminology they used initially, but as "traffic operational changes."

The temporary equipment used in the first two phases of Slow Streets was not able to withstand the wetness of Portland winters, and staff noted that as they became more and more dilapidated, community support for the program waned. This was part of the rationale for moving to more resilient materials in the third phase of the program.

In addition to the lessons learned about signage and wording, Portland's traffic calming toolkit is expanding based on the Slow Streets experience. Prior to the pandemic, speed humps were their primary tool for slowing traffic; now, they are working to create permanent traffic calming infrastructure in the intersections along the neighborhood greenways.

The city is seeing a greater appetite among residents for traffic calming infrastructure, even beyond the Slow Streets, which staff attribute to the public's generally positive experience with Slow Streets. A similar observation was noted in response to the city's streatery program, with support building in the business community to create permanent Open Streets and plazas in business districts.

Plans for the future

Portland is continuing the Slow Streets program beyond the pandemic. Members of the public can submit requests for Slow Streets—installed using semi-permanent materials—on a city website.

San Francisco

Program: Slow Streets

Interview Date: December 2021

This summary is derived from information provided by the program manager for San Francisco's Slow Streets, the city's lead transportation planner, and the city's lead communications staff member. All three were substantially involved in planning, implementing, and evaluating the Slow Streets program.

Program overview

San Francisco's Slow Streets program began in April of 2020 with 12 streets. As of the end of 2021, there were 40 miles of Slow Streets in place across the city. Slow Streets began following routes identified in the city's Neighborways program, which was a planned but not yet implemented network of bicycle boulevards and neighborhood greenways. The Slow Streets program used signage and barricades to designate streets along the chosen routes as shared spaces, intended for local vehicular traffic only. Many of the original Slow Streets corridors have been removed, but others have been upgraded to permanent installations. The program itself will exist beyond the pandemic as a mechanism for working with residents to identify streets for targeted traffic calming interventions.

Motivation

Slow Streets was directly aligned with a pre-pandemic program called Neighborways. Neighborways were envisioned as low volume, low stress residential roadways that serve as shared spaces. When the pandemic hit, the neighborways program was just kicking off. Staff had just begun a citywide analysis to identify suitable locations for neighborways. The urgency of the pandemic jump-started this process—as well as peer pressure from neighborhood Oakland—and staff recognized the need to drastically speed up their planning efforts. And speed up they did: the program was announced on a Monday and installation began later that week.

As the program evolved, however, the planning team solicited input from community organizations, advocacy groups, and many other entities as to where to locate additional Slow Streets corridors. It also departed from the objectives of the neighborways program, as Slow Streets had more of a focus on ensuring streets could be used as social and recreational spaces, whereas the neighborways program was intended to create safe travel corridors for bicyclists, and to a lesser extent, pedestrians.

Being one of the first cities in the US to issue a shelter-in-place order, the goal for the Slow Streets program was to accommodate the increased demand for safe places to walk and bicycle, and to ensure that people using those spaces were able to follow physical distancing guidelines.

Criteria and planning process

The Slow Streets program began in April of 2020 with 12 corridors that had already been targeted for the neighborways program. Initially, this was all the city expected to implement, optimistic that the pandemic would be short-lived. These 12 corridors happened to be in neighborhoods facing drastic COVID-related transit service cuts, but, being identified as neighborways, they were also well-connected to existing bicycle facilities, open spaces, or commercial centers.

Since then, the Slow Streets program has gone through three additional phases, each with about a dozen corridors. As of late 2021, the program's planning team was beginning to plan for the conversion of some of those corridors into permanent installations.

The initial location criteria were: low volume streets in residential areas with mostly stop-controlled intersections, and without steep slopes, loading zones, or conflicts with transit service. The planning

team gradually shifted, however, to a less restrictive approach to site selection as they gained experience with what characteristics worked well for Slow Streets.

The program was initiated by MTA staff, who planned the design and location for the first 12 corridors without external input. They coordinated with Public Works to help put out sandbags to hold equipment in place in the beginning, but when the planning switched to more resilient materials, they no longer needed help from DPW. Community involvement has been incorporated into subsequent phases, but planning, implementation, and management have remained largely within MTA.

The second and third phases, also rolled out during the summer of 2020, were heavily informed by public input. Residents would suggest streets for the program, either via an online form or email, and staff would evaluate those suggestions against their selection criteria. The program paused somewhat after the third phase, at which point there were about three dozen Slow Streets in effect. Staff noted that while they had received copious amounts of input about the program, there were very specific areas that were not represented in that input. So, they identified seven neighborhoods, most of which were communities of concern, pre-screened streets within those communities against the Slow Streets location criteria, and then began a targeted outreach effort within those neighborhoods. This process resulted in the creation of four additional Slow Streets corridors.

Law enforcement was not involved in planning, implementing, or managing the program. The planning team specifically designed the Slow Streets to be self-enforcing, noting that none of the changes they were putting in place involved legally enforceable behaviors. The police department did field requests from some residents who wanted to see the Slow Streets signage enforced, and they found a provision in the California vehicle code that allowed for enforcement of locally-posted regulations, but all Slow Streets-related citations written under that code were dropped.

Community involvement

There was no community involvement in the first phase of the program, but subsequent phases have included efforts to integrate local knowledge to identify candidates for Slow Streets. Specifically, the city posted a questionnaire on the program's web page that enabled people to make suggestions for candidate corridors for Slow Streets. Suggestions were also received via email.

As noted above, staff realized that several communities of concern were underrepresented in their public input process, so going into the fall of 2020 (phase 4) they changed tactics, reaching out directly to neighborhood groups in those areas to gauge their interest in Slow Streets. They slowed their pace down quite a bit, opting for a more expansive and deliberate public process, including multiple community meetings within each neighborhood. Ultimately, this process resulted in four new Slow Streets corridors—whittled down from an original twenty the program's team had suggested.

Physical design, implementation, and evolution

MTA rolled out the Slow Streets program with equipment they had on hand: barricades (which they quickly learned needed to be held in place with sandbags) on which they mounted 'road closed to through traffic' signs and bike/ped advisory signs. The equipment choices evolved over time as the team gained experience about what kinds of materials work best.

The program rolled out over four phases, all of which were planned and implemented by MTA staff. The first three phases were intended as temporary; with phase four the city began using more permanent materials.

Other considerations

The city had a good amount of funding allocated to the neighborways program, which they were able to use to support Slow Streets in the beginning. As the program expanded, the staff were able to identify additional internal funding sources. No major obstacles were reported by the program team.

Outcomes and evaluation

Despite questions from some residents about the continued relevance of the program as the pandemic wanes, San Francisco's Slow Streets program seems to have been considered very successful. The program's planning team noted a drop in collisions along the corridors, increased numbers of people walking and cycling, and multiple stories of children (and adults) learning how to ride bikes in the Slow Streets.

San Francisco employed a range of structured and non-structured approaches to collecting data on the impacts of Slow Streets. In addition to their standard, on-going traffic data collection, the program's planners distributed surveys after the first phase that yielded upwards of 10,000 responses. They also measured traffic volumes and speeds and conducted perception surveys, starting small at first but expanding into a program-wide evaluation as the program continued to grow and receive additional funding. All of the data and analyses from these evaluation programs are available on the program's website.

Less quantifiably, the program created gathering spaces that had not previously existed in many parts of the city; this has provided opportunities for interaction among neighbors which, in many situations, has led to formation of new community groups and supported development of neighborhood social programming.

Lessons and takeaways

Given the chance for a do-over—and the prescience to know the pandemic would not simply blow over—the program's planners would opt to use different materials from the get-go. The barricades they had on hand were not robust enough for the length of time they were deployed, they had to be held down with unsightly sandbags so they would not blow over, and they were easy to move—either out of the way, by residents who did not want the Slow Streets, or further in the way, by residents who wanted to block all motor vehicle traffic. The inadequacy of the barricades was noted as among the biggest sources of stress among the program's planning team.

Slow Streets' planning team learned quite a few additional lessons through this experience; many of which were incorporated back into the program as it evolved. For starters, the pandemic forced staff to recognize that they could—and should—speed up their planning and implementation processes. The public's apparent acceptance—or insistence—on a speedy pandemic response bolstered staff's confidence in their ability to move at a quicker pace, to test new ideas, and to adjust based on in situ feedback. Resistance that staff expected regarding restricting residents' ability to drive was not as strong as expected, which encouraged staff to look for ways to continue the program beyond the pandemic. Relatedly, the public appetite for reallocation of street space toward non-driving uses grew during the pandemic, with Slow Streets attributed for helping people reimagine streets as public space and further encouraging experimentation and quicker action by staff.

Initially, there was confusion as to expected behaviors and activities on Slow Streets, particularly surrounding questions of what constitutes 'local traffic.' Staff responded to this confusion by clarifying language on the signs as well as through an up-to-date FAQ and list of dos and don'ts on the program's website. They have also been exploring ways to set appropriate expectations for inclusive behavior on and around the Slow Streets as the program transitions into its permanent form.

As the urgency of the pandemic waned and emergency orders began to life, the city received questions about the continued justification for Slow Streets. Staff recognized that, in order to ensure Slow Streets survived the transition from a crisis response to an ongoing program, they needed to adapt and expand their messaging about its purposes and benefits to align with the observed positive outcomes (e.g., Slow Streets provide gathering spaces, thus meeting a need that predated the pandemic).

While the support for the continuation of Slow Streets has not been universal, those who have supported it have pushed for more robust traffic calming measures to go along with the signage and traffic diversions. Staff are developing designs and processes for making that happen as part of the post-pandemic plan for the Slow Streets program.

Finally, while community stewardship of Slow Streets was not an explicit element of the program, the program did seem to help shift perspectives of neighborhood streets from places to drive to places to socialize, to meet neighbors, to enjoy, thus fostering a new spirit of community ownership of the street in a way that was not present before the pandemic.

Plans for the future

Slow Streets have been removed in some locations, but the temporary installations on four of the corridors have been made permanent. The program itself has also been transitioned into a permanent effort, with public engagement efforts underway as of the end of 2021 to determine what the city's residents want out of post-pandemic Slow Streets.

Seattle, WA

Program: Stay Healthy Streets

Interview Date: March 2022

This summary is based on information provided by a transportation planner in SDOT's Project Development Group. During the pandemic, they served as the deputy program director for Seattle's Stay Healthy Streets program.

Program overview

Seattle's COVID-related shared streets program was called Stay Healthy Streets. It was part of a multi-component transportation response to the demands imposed by the pandemic, and began in April of 2020. The Stay Healthy Streets were largely implemented by converting existing neighborhood greenways into shared streets signed for local access only. The city installed 20 miles of Stay Healthy Streets in 2020, mostly during the first few months of the pandemic. In 2021, the emphasis shifted to installing upgrades to make the temporary installations permanent.

Motivation

Seattle was aware of COVID-related street changes taking place in other cities in the early days of the pandemic, but were a bit reluctant to start their own program until mid-April, when it public health officials' concern over potential outdoor virus transmission abated. When they did begin planning what would be known as Stay Healthy Streets, the main goal was to provide the city's residents improved access to open space. The program's planners placed an emphasis on higher density neighborhoods where residents tended not to have yards and park space was limited.

The Stay Healthy Streets were initially created by enacting partial street closures on segments of the city's neighborhood greenways system. This was a 50-mile network of streets that were open to all modes, but with numerous traffic calming elements to slow car traffic and encourage walking and cycling. Stay Healthy Streets added signage indicating that street segments were closed to through traffic.

Criteria and planning process

In the beginning, Stay Healthy Streets were collocated with the neighborhood greenways system, with SDOT staff choosing locations within the greenway system to convert to Stay Healthy Streets. Following advocacy from the public, the program team expanded beyond the neighborhood greenway system, and began soliciting public input for suggestions for new locations.

A Washington state law governing the use of public roadways substantially shaped the design of Stay Healthy Streets. Seattle's traffic engineer and the city's legal team felt that, in order to legally allow people to walk in the street—necessary to maintain recommended physical distancing—the streets must be closed to motor vehicle traffic. The Stay Healthy Street team followed this interpretation of the law by placing 'road closed' signs at the entrance to each street segment, although local traffic was still permitted to use the street to access destinations not otherwise accessible. They also included signage explaining the program and describing how the street was intended to be used.

The Stay Healthy Streets program began within Seattle's Emergency Operations Center (EOC) but was shifted into the Department of Transportation (SDOT) shortly thereafter. This shift was necessitated because the staff person running the program was normally housed in SDOT but was working temporarily with EOC during the early pandemic, so when they returned to SDOT the Stay Healthy Streets program migrated with them. The two agencies worked together on the program as the public progressed. Public Works and the fire department also weighed in on the design, as they needed to ensure their vehicles would not be hindered.

SDOT has its own maintenance and operations division, which ordinarily would be working on roadway construction and maintenance. However, the state of Washington ordered a pause in all construction work at the start of the pandemic, which meant the maintenance and operations crew was able to be reassigned to implementation of the Stay Healthy Streets. Once the construction pause was lifted, the city turned to various contractors to deploy and maintain the signage and other equipment for Stay Healthy Streets. In some situations, the maintenance effort was aided by neighborhood and advocacy organizations; these entities also took on substantial outreach roles on behalf of the Stay Healthy Streets program.

Law enforcement did not play a major role in the Stay Healthy Streets program. The program team felt that compliance with the signage and behavioral expectations was high, and any police involvement beyond typical traffic and parking enforcement was neither necessary nor desirable.

Community involvement

The public played a fairly limited role in the Stay Healthy Streets planning process in the beginning. The neighborhood greenway system, which had begun nearly ten years before the pandemic, had included a robust public outreach process, which the Stay Healthy Streets team was able to use to inform their decisions. Contact lists from that neighborhood greenway planning effort were used to communicate the Stay Healthy Streets changes to the public. Staff also used the knowledge gained during that prior outreach effort to identify parts of the city in which the Stay Healthy Streets program might be received more reluctantly than others.

As the Stay Healthy Streets program eventually expanded beyond the neighborhood greenway system, community members were able to suggest potential sites for staff to consider for new Stay Healthy Streets installations.

Physical design, implementation, and evolution

Because of the traffic calming already in place thanks to the neighborhood greenway system, the earliest installations of Stay Healthy Streets were implemented through simple signage. For later iterations outside the neighborhood greenway system, Stay Healthy Streets included all the infrastructure that was involved with neighborhood greenways, essentially making them both neighborhood and greenways and Stay Healthy Streets at the same time.

By and large, the streets on the neighborhood greenway network were well-suited to be Stay Healthy Streets. There were a few instances, however, in which there were no suitable alternative corridors to absorb the car traffic being diverted from the greenways, so those sections were accordingly excluded from the Stay Healthy Streets program.

Other considerations

Seattle's Stay Healthy Streets was somewhat shaped—or at least slowed—by resource constraints. The state construction pause was lifted in June 2020, meaning SDOT's construction and maintenance crews were transitioned back into their normal work. The program team thus had to take on the task of deploying and maintaining equipment on their own. This shift prompted the program team to bolt the Stay Healthy Streets signs to the pavement, rather than using moveable sign frames that had been blowing over or getting moved by residents, thus dramatically reducing the resources needed to maintain the installations.

Funding was not an issue, although staff were cognizant of a need to keep costs down. The program seems to have enjoyed public and political support, with the city's mayor announcing early on—in summer of 2020—that at least some of the installations would be permanentized. With this shift to permanent

installations, the city has looked to external entities, including NACTO, for support both for Stay Healthy Streets and its sister program of full street closures, “Keep Moving” streets.

Outcomes and evaluation

Staff report positive outcomes from the program overall, both in terms of public perception and quantifiable impacts. Notably, the Stay Healthy Streets have seen reductions in traffic volume and speed; the latter being somewhat surprising to the planning team given that none of the traffic calming elements initially present on the street segments was new.

The program has received some criticism, however, due to the exclusion of the city’s densest neighborhoods. This is a function of the program’s location criteria, which matches the location criteria for the neighborhood greenway program: low volume residential streets, which do not exist in the city’s densest neighborhoods.

Seattle was already conducting routine traffic counts on the neighborhood greenways before the pandemic; they continued these counts after the conversion to Stay Healthy Streets, using automated counters in at least 50 locations across the network. They also conducted pedestrian counts at large intersections adjacent to the Stay Healthy Streets, tracked traffic speeds, and manually monitored pedestrian and bicyclist usage along the segments. The team distributed two citywide surveys to gauge public sentiments regarding the Stay Healthy Streets, with roughly 8000 and 5000 responses, respectively. Given demographic gaps in the responses, the team also conducted targeted focus groups. The Stay Healthy Streets team has put together quite a bit of information about the various corridors, including evaluations of individual streets’ impacts and planning processes for permanentization.

Lessons and takeaways

Stay Healthy Streets demonstrated the potential of rapid rollout interventions. Many residents want to see things change, see investment into neighborhoods. This was especially the case in neighborhoods that had been annexed by the city, but never been upgraded with urban infrastructure such as sidewalks and proper street drainage. Residents in many of these neighborhoods were strong advocates for the Stay Healthy Streets program, seeing it as a way to get pedestrian infrastructure far sooner than the city would have ordinarily provided it.

Stay Healthy Streets also improved the neighborhood greenways program. Some of the feedback staff received after rolling out the Stay Healthy Streets program was that the neighborhood greenways should have been limited to local traffic all along. Staff had tried to divert through traffic away from the neighborhood greenways with concrete diverters, but deemed them too costly to implement on a widespread basis. The experience with Stay Healthy Streets showed that sufficient diversion could be achieved through simple signage. The fact that the program was deployed and maintained using in-house resources—which ordinary infrastructure projects could not do—saved the city substantial time and money. This demonstrated the potential for using low-tech, low-cost materials to create much-needed facilities at a far faster pace than normal.

While the Stay Healthy Streets planners did not mention any specific policy changes as a result of their experience with the program, the solidification of the program itself does represent a substantial addition to their pedestrian and bicycle planning toolbox.

Plans for the future

When the mayor announced that Stay Healthy Streets would become permanent, staff ran a variety of costing options, settling on a mid-range approach where every street segment will have concrete bulbouts at both ends. The bulbouts, along with permanent signage, will indicate to drivers that the street segments are intended for local traffic only. There will also be space designated for community

amenities, such as bicycle parking, planters, and public art. The process of permanentizing each Stay Healthy Street will also include an extensive public outreach effort.

Tucson, AZ

Program: Slow Streets

Interview Date: December 2021

This summary is based on information provided by a livability planner working Tucson's Department of Transportation and Mobility. They are the program manager for Slow Streets and was involved with the program since its inception in the summer of 2020.

Program overview

The Slow Streets program began in the summer of 2020 as temporary (thirty-day) partial closures of certain streets, filtering out non-local traffic with signage and movable barriers, with a stated purpose of slowing traffic and encouraging people to think about different ways to use street space. The pilots were deployed using barricades and cones, with signage that indicated it was a Slow Street and a QR code linking to the program's website. Synergistic programs included mobile bike repairs and neighborhood organizing initiatives. As Slow Streets gained popularity with the public, the city expanded the program and shifted toward more robust installations. By late 2021, the city was exploring mechanisms to convert successful Slow Streets into permanent installations and to continue to Slow Streets program beyond the pandemic.

Motivation

Tucson's Slow Streets program began as a temporary pilot in response to the changing demands of COVID, but its rollout was heavily informed by existing plans and data. Tucson got the idea for the program after watching a NACTO webinar featuring similar responses in other cities. The primary objectives of the program were to slow vehicle traffic and prompt public conversations about street space.

Criteria and planning process

Tucson has a Bicycle Boulevard master plan which was intended to create a substantial bike network. The plan includes a mix of projects that are funded and unfunded. One of the planning team's early dilemmas was whether to focus on the streets that had been identified as in need of infrastructure in the bike plan, but funding had not been secured, or to enhance projects that were already in existence. The team ultimately decided to focus on the unfunded portions of the bike plan, seeing Slow Streets as an opportunity to fill in gaps in city's bike network.

They then distributed a Google form to solicit community input on potential candidates for Slow Streets. This yielded 121 responses, which the staff analyzed with respect to a range of criteria. The team was particularly focused on bringing Slow Streets toward locations that seemed to have the greatest need for them, or the greatest potential to benefit from them. So, they looked for locations that lacked good walking and cycling infrastructure, lacked safe connections to parks, schools, and transit, and had been hardest hit by the pandemic—both in terms of the virus itself and its follow-on impact. The team then went out to the identified locations and spoke with community members, exploring the extent to which this sort of program would be welcome and beneficial.

Initially, each installation was intended to be in place for 30 days. In addition to barricades and signage, the Slow Streets team posted QR codes to a city website where the public could provide feedback about the Slow Streets' future—what else it should involve, how long it should last, whether is should be made permanent. They also conducted walk-and-talk events while the installation was in place, which provided opportunities both to conduct a walkability assessment and gather additional, firsthand feedback from residents. Some of that feedback revealed that in order to take advantage of Slow Streets, many residents needed help repairing bicycles. They also learned that there was a need for income, and so, using funds

from People for Bikes, the program fed two birds with one scone by hiring and training bike mechanics to provide free bike repairs in each of the Slow Streets.

Slow Streets was planned and implemented within Tucson's Department of Transportation and Mobility, although city staff in other departments were asked to weigh in on proposed locations. This included Housing and Community Development, who had ongoing activities in an under-resourced part of the city that the Slow Streets team was interested in building on, as well as the city's transit agency, in order to ensure Slow Streets would be a complement rather than a hindrance to transit service.

The planning team did not include law enforcement in the planning or implementation of Slow Streets. Neighborhood organizations were welcome to invite members of the city's police force to participate in individual Slow Streets planning initiatives, but as stakeholders rather than to play an enforcement role.

Community involvement

Tucson's Slow Streets program stands out nationally in terms of its community involvement. Community involvement was baked into Slow Streets from the start. The project team sought suggestions for candidate streets via a public input form, met with community members before installing the pilots, and conducted intensive outreach through one-on-one interactions during each of the pilot installations. The project team was very clear that they intended Slow Streets to be a mechanism to provide—through financial support and technical assistance—community members with agency to identify and address problems they identified within their neighborhoods.

The initial outreach efforts included the site nomination form, communications with neighborhood associations, and reaching out directly to known community leaders. Once the installations were in place, the team employed a Block Leader model to ensure community members' voices were heard. This model, which they had used successfully in previous planning efforts, involved recruiting community members to serve as ambassadors for each Slow Street. The Block Leaders would help get the word out to their neighbors that the Slow Street was coming, and would then assist with collecting data and evaluating the program's impacts. The city eventually recruited around 50 block leaders in 15 neighborhoods across the city, ranging in age from 16 to 85. Block Leaders received stipends in exchange for their efforts, thanks to funds from People For Bikes.

Finally, community involvement has helped shape the ongoing, post-pandemic Slow Streets planning. Through formal and informal public feedback channels the program's planning team has identified community priorities that differed from the programs' own initial traffic calming objectives. Rather, residents of Slow Streets communities put more emphasis on public safety, livability, access to jobs, and safe mobility.

Physical design, implementation, and evolution

Tucson's Slow Streets program was been rolled out in three phases. It began as an unfunded pilot, with three segments of Slow Streets rolled out in-house by internal staff during the summer of 2020 (Phase I). The initial three Slow Streets were demarcated with signs mounted on barricades and traffic cones. As the city moved towards reopening after the initial pandemic waves, they received a good bit of interest by the public in permanentizing the program. At that point, the city's elected leadership dedicated $1.4 million in CARES funding toward expanding Slow Streets and adding more robust, permanent infrastructure. This included hiring contractors to install bike lane striping, speed humps, bulb outs, and traffic circles along the Slow Streets. The team set a goal of implementing 15 more Slow Streets in four months (Phase II). After the $1.4 million was spent (the city used part of it to purchase equipment that would be needed to sustain the Slow Streets program), the Slow Streets program was moved back in-house, and staff began looking for mechanisms to sustain the it with internal funds and resources, setting a post-pandemic goal of implementing three permanent Slow Streets per year.

Other considerations

Equity: Equity was one of the planning team's main priorities, both in selecting locations and designs for Slow Streets and in directing Slow Streets-linked funding and programming to communities.

Support: Tucson's Slow Streets program enjoyed strong support from the city's elected leadership. The program also received external funding through the CARES Act and a grant from People For Bikes.

Outcomes and evaluation

The Slow Streets program in Tucson appears to have been successful, having received early and sustained support from the public and elected leadership. The city has been assessing the program's impacts from a variety of perspectives, but evaluation is ongoing.

The city relied heavily on in situ feedback to provide information about the impacts of the Slow Streets program through walk-and-talks and intercept surveys. The program team has also been gathering data on traffic volumes and speeds as well as walking and cycling rates, both through counts and web surveys.

Lessons and Takeaways

One of the main lessons the program team learned related to what makes a good Slow Street. They had started with the assumption that all residential streets were candidates for Slow Streets, but after evaluating traffic volume and speeds, they discovered that streets that had very high traffic volumes and speeds before getting the Slow Street treatment continued to have high traffic volumes and speeds while the Slow Street was in effect. Furthermore, the equipment used to delineate the Slow Streets did not hold up as well on high volume roads, even in residential areas—they were more likely to be run over, vandalized, or simply moved out of the way. In other words, the traffic calming benefits of Slow Streets seemed to only accrue to streets with lower pre-Slow Streets traffic volumes and speeds.

They also learned that Slow Streets must be context-specific, taking into account not only the environmental and traffic conditions of the street, but also ensuring that the intervention is grounded in the community's needs and wants. The program team leveraged walk-and-talk opportunities to get a much better understanding of these community factors, and have been able to provide community members information about a range of other city programs. This, according to the interviewee, has gone a long way towards building trust between the community members and the city government.

Finally, the program team learned that when it comes to planning and implementation timelines, quick delivery is good, but not if it's too quick. When they made their '15 Slow Streets in 4 months' push, they realized that it was a challenge to get the word out to community members, and even more of a challenge to be able to incorporate their input into the final Slow Streets designs. This set back the trust-building somewhat, as many community members were unfamiliar with the materials and designs being installed. The interview stressed the importance of being able to slow down enough to ensure that community members knew what to expect.

The most obvious new practice emerging from Tucson's Slow Streets experience is the establishment of the post-pandemic Slow Streets program. Slow Streets was on hold at the end of 2021 as staff were trying to figure out the best way to sustain the program, but the intent to continue it in the future was clear. The Block Leader program may also be continued after the pandemic, applied to other opportunities and programs that may arise in the future.

Plans for the future

Tucson intends to continue creating permanent Slow Streets after the pandemic. The program was on hold as of the end of 2021 as the city worked through some staffing shortage, but they recognize the

value the program brought and hope to start it back up again as soon as they are able. Post-pandemic, the emphasis will be on slower, more deliberate planning processes that also provide opportunities to better understand community needs and build relationships.