Neighborhood Street Painting as a Traffic Calming Strategy: A Case Study of the Neighborway Project in Somerville, Massachusetts

A thesis submitted by

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Abstract

Traffic calming has been used to achieve municipal and regional transportation safety goals in cities throughout the world. As the result of public process, it is subject to input from diverse stakeholder parties, professional review, potential delay, and suboptimal levels of citizen participation. Simultaneously, trends in tactical urbanism have allowed citizens to become active participants in urban renewal and placemaking projects. These participatory planning initiatives have not yet found a foothold in the field of traffic calming, they are utilized primarily for participatory programming. Streets, it seems are only nominally public spaces, and are in reality still the domain of agencies comprised of engineers, planners, and elected officials. This research aims to explore the aspects of a participatory street painting project known as the Neighborway. Specifically, the research aims to measure if the participatory nature of these projects yields better outcomes with respect to adoption, safety, and community engagement. The Neighborway combines effective elements from traffic calming, community engagement, placemaking and tactical urbanism. Reduced speeds were observed on streets with more robust street painting installments and on streets that had more social connections. Recommendations include elements from not only this project, but from other street painting programs form across the country.

Acknowledgements

This report would not have been possible without the incredible support of the staff and faculty at Tufts University, especially my thesis advisors who have shaped my conception and theory of public space, transportation, and community over the past several years. Julian Agyeman, without whom I would have never embarked on the learning experience of a lifetime that took me across the globe; Mary Davis who showed me how to blend science with passion whether through poetry or statistical analysis; and Mark Chase who has been at the forefront of the Neighborway project as well as many of the other endeavors that make Somerville the progressive, vibrant, successful place it is today.

Of course I also wish to thanks all of the resident participants that I met over the course of the past several months during my participation in the Neighborway street paintings, all the residents who responded to my survey, and all the children of Somerville who made the observation portion of my analysis more enjoyable through the simple joy of play.

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Glossary of Terms and Abbreviations

MUTCD – Manual of Uniform Traffic Control Devices
AASHTO – American Association of State Highway and Transportation Officials
FHWA – Federal Highway Administration
NACTO – National Association of City Transportation Officials
CROW - Centrum voor Regelgeving en Onderzoek in de Grond-, Water- en Wegenbouw en de Verkeerstechniek
SRTS – Safe Routes to School
ITE – Institute of Traffic Engineers
GLX – Green Line Extension
CPX – Community Path Extension
LQC – Lighter, Quicker, Cheaper style of pop up urbanism
Bumpout – A traffic calming device that moves a curb horizontally into the road
Choker – A traffic calming device that restricts the entrance to a street through two adjacent bumpouts
Car Filtering – a curb design that allows bicycles to pass through but ton cars

Introduction

The paradigm of urban streets acting primarily as traffic conduits is waning. The United Nations reports that streets had progressively lost their multi-functionality as public spaces, and streets are now being planned to recover their full use by the communities, and as means of social engagement (Clos, 2013). People have a strong desire for streets that reflect the values of safety, community, livability, and prosperity. Many city planning departments are beginning to program community street painting projects as a means to achieve these goals, but no research has yet examined a street painting project's effect on street use. This research examines a specific street painting project known as the Neighborway, in Somerville MA in the context of several aspects of active transportation including: traffic calming, event programming, social capital, psychological, and environmental context of urban residential streets. This is not meant to be an exhaustive review of traditional traffic calming techniques, or more contemporary theories on Complete Streets. Rather, the aspects of traditional traffic calming implementation that community street painting can improve upon are highlighted. Of notable relevance are the differences in perception of the use and ownership of streets, the interactions of people sharing the street using different modes of transportation, and the physical use of the street by its residents.

Research Question and Intent

The primary inquiry of this research is: do the community engagement aspects of participatory street painting projects improve active transportation outcomes? To determine the answer to this question, it will be important to first determine what exactly the desired outcomes are. Generally speaking, the outcomes to be measured are: adoption and use, street safety, and community connectedness.

The intent of the research is to observe the degree to which the resident-driven volunteer nature of these street painting events differentiate then in a meaningful way from top-down implementation, which can often lead to backlash, aggression, divisiveness among road users and residents. An important aspect of these projects is that they are equal parts process and outcome. By utilizing observation, survey, and expert interview in a case study of a local street painting project, this research hopes to measure the degree to which these projects can both foster community and improve street safety during, prior to, and after these street painting events.

Research Location

The location of this research is a neighborhood in Somerville, Massachusetts. Somerville has an outstanding rating as a livable city and boasted the number one ranking on the east coast for cycling cities by the League of American Bicyclists in 2015. Somerville has been rapidly increasing the number of bicycle markings in the past 3-5 years, focusing primarily on heavily trafficked

streets, as well as those with significant retail or mixed used development. Somerville has a stated goal in its comprehensive plan of increasing open space, as it has the least amount of open space per capita of any municipality in Massachusetts (SomerVision, 2013). The Somerville neighborhood is in a unique position of being located at the current terminus of the Somerville Community Path, a primary route for active transportation, which ends only a block away. This makes the nearby streets a critical location for the active transportation network for Somerville, and provides an ideal case study location for this research.

The Neighborway project case study will observe the details of the implementation process, the opinions of the residents and participants as changes to their streets are implemented, and their overall behavior on the streets. The Neighborway involves the painting of street murals at mid-block locations on two streets in Somerville, and painted versions of traditional traffic calming elements at the intersection of these streets with the collector streets they abut. The murals are completely designed and painted by residents during an informal series of events including outdoor meetings, block parties, and finally a painting day that closes the street to through traffic and provides a car free street for a day.

The case study will focus primarily on four residential streets located between Highland and Medford Streets, two main thoroughfares in Somerville with steep elevations. These topographical elements make this project location

especially effective for active transporters and the relatively secluded neighborhoods make them appealing to residents, especially families.

The non-profit organization Friends of the Somerville Community Path is currently attempting to influence the design of the continuation of this path, but the future of active transportation through this neighborhood currently remains unclear. They would like to integrate the path extension with the long awaited Green Line Extension. This extension is a mitigation measure that has been delayed many times, and the neighborhoods that will be affected are designated by the state as Environmental Justice Neighborhoods (Friends of the Community Path, 2016)[1]. These neighborhoods can be seen in Figure 1. The Neighborway streets are west of the Gilman Street Station.

The Community Path Extension would continue the current Somerville Community Path all the way to North Point Park and create a continuous separated path into downtown Boston. This neighborhood would be well served by the eventual path extension, but delays and funding problems have left this neighborhood without a low stress pedestrian and bicycle environment.

[1] Environmental Justice Neighborhood is in which either childhood cancer, lead poisoning, or asthma rates are statistically significantly higher than the statewide averages (Commonwealth of Massachusetts).

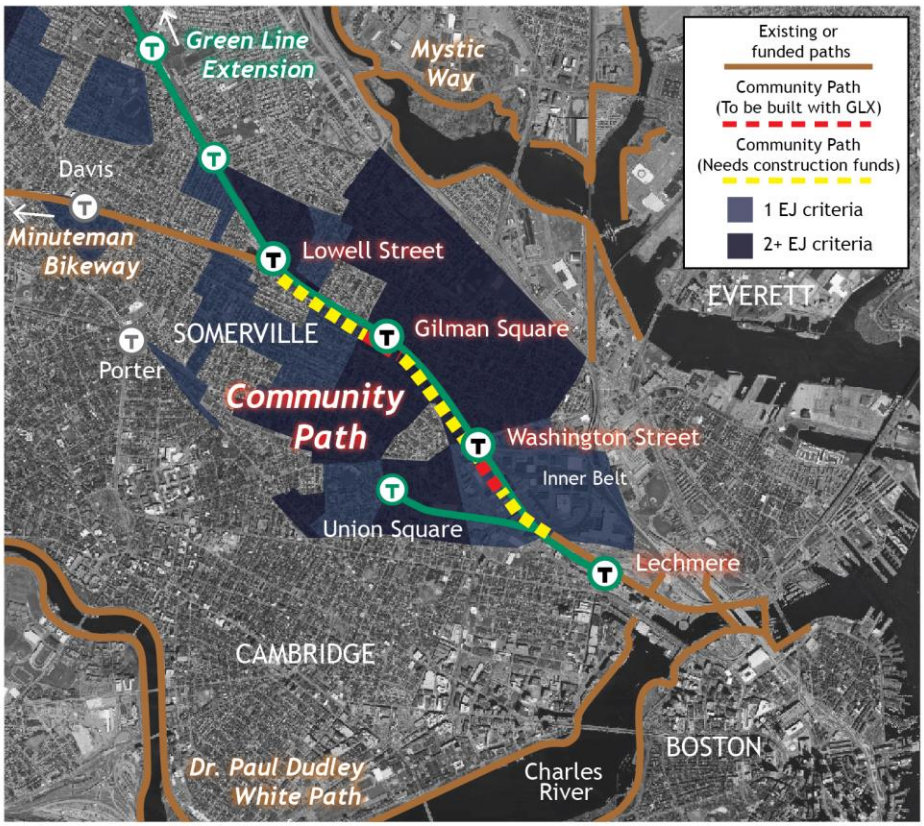

Figure 1 Our Environmental justice communities in Somerville are awaiting active transportation projects. Credit: Friends of the Community Path, from www.pathfriends.org

Residents of the streets in our case study were not specifically asked about the Green Line Extension or Community Path Extension projects. However, the proactive approach of neighborhood street painting speaks volumes about their desire take ownership of timely transportation improvements to their neighborhood.

Literature Review

Introduction

This review seeks to examine scholarship on multiple aspects of the case study in question. The project in question deliberately utilizes expertise from various established planning disciplines and the literature reviewed here reflects this diversity. The relevant literature reviewed includes public documents that make design recommendations for traditional forms of traffic calming, as well as academic papers about how to best measure an installations impact. The origins of traffic calming and its measurement will be reviewed as well as scholarship on the behavioral science of road use, especially by children. Of most direct relevance is the work of Donald Appleyard in his seminal book, Livable Streets, which was among the first studies to examine how street design and automobile traffic affected social capital in residential neighborhoods. This research was the impetus for much of the scholarship on urban community, walkability, complete streets, and placemaking. These topics have branched into various applications, and programs that reflect citizens' desire to affect streets quickly, effectively, and socially.

Origins of Safer Streets

To understand the evolution of the political process of residential street safety initiatives, it is important to examine their origins. In the Netherlands the design and policy guidelines for streets, including woonerfs, are adapted from grassroots community efforts by CROW (Centrum voor Regelgeving en Onderzoek in de Grond-, Water- en Wegenbouw en de Verkeerstechniek), which is a non-profit policy platform organization. Woonerfs (or woonerven) are shared residential streets developed by the Dutch. Automobiles are allowed on the streets but are limited to a walking pace. The word woonerf means "residential yard" and the initial intent of woonerf creation was to increase the living space for residents. The original strategies for woonerfs involved extensive use of street furniture such as tables and benches. Once adopted as official policy, woonerven went from an extension of private lawns to the formal traffic calming we see there today. The process of slowing traffic became increasingly driven initially by financial efficiency. These grassroots methods ended up being up to 50% costlier than modern street reconstructions utilizing speed humps and chicanes (Collarte, 2012). After the initial grassroots efforts by residents, official traffic calming measures were implemented at lower cost. The Dutch found that hard infrastructure installations were more cost-effective than "soft" measures such as diversion schemes, street closures, and one-way streets (Institute of Traffic Engineers, 1999).

Germany was one of the first nations to implement and measure the effects of the formal traffic calming measures that are common today and found

that speeds and accident severity were reduced, though traffic volumes and accident frequency remained unchanged. According to the Institute of Traffic Engineers (ITE), The German Green Party initially concluded that while the ad hoc traffic calming treatments were effective where they were implemented, a citywide tactic would be necessary to reduce traffic. The prevailing wisdom at the time was that diverted traffic simply ended up elsewhere in the city, and that citywide policies would garner better results (Ibid).

In more recent years, woonerf style residential streets have gained popularity in other countries such as England where they are referred to as Home Zones, Australia where they are referred to as Shared Zones and Russia, where they are known as Residential Zones. All of these conceptions share the common theme of serving the residents primarily by deliberately mixing space and reducing delineation such that people have free reign to more of the street. In the United States however, these types of traffic calmed streets are few and far between, with most streets conforming to the engineering based design standards put forth by the institutions mentioned in the following section.

American Implementation and Measurement

In contrast to the community led efforts in Europe, traffic calming in the United States has historically been conceived and implemented by traffic engineers (Ewing, 2005) in a more top-down approach. The ITE and the Federal Highway Safety Administration (FHWA), as the foremost agencies on road design, have taken the lead on designing and standardizing traffic calming

techniques for the past 40 years. In 1996 the formation of the National Association of City Transportation Officials (NACTO) brought a more urban, less highway oriented focus to the design of streets, reapportioning their conception and design away from traffic engineers to municipal transportation planners. Despite this shift in both purview and policy, the majority of traffic calming projects have been designed and implemented by professionals identified as traffic engineers. NACTO's Bikeway Design Manual cites heavily from 41 different resources that ultimately derive their design standards from a few primary sources including the FHWA Manual of Uniform Traffic Control Devices (MUTCD), the American Association of State Highway and Transportation Officials' (AASHTO) Bicycle Facility Design Guidelines, and A Policy on Geometric Design of Streets.

In the United States, there is a disconnect between the stated goals of traffic calming and the things that are measured to determine its success. A historical view of the traffic calming literature from the 1990s found that studies operationally defined its economic impact in terms of vehicle emissions (Boulter & Webster, 1997). The discussion in this research implied that economic benefit and increased emissions are inextricably linked through fuel consumption. Even as the purpose of traffic calming research shifted and the goals of traffic calming became broadened, measurement techniques were still primarily focused on the effect of traffic calming on automobiles themselves. The following goals and

measurements are cited by the Institute of Traffic Engineers as the primary purposes of traffic calming

- Reduced Speeds
- Reduced Car volume
- Increase walking (number and frequency)
- Decrease incidents [crashes]
- Improve Safety

Measures of success also continued to focus on automobiles, with traffic counts and 85th percentile speed being the primary data collected at the federal level for traffic calming projects (Institute of Traffic Engineers, 1999). Table 1 shows a traffic calming dataset from Boulder Colorado that includes these measures, and little else. These measurements are standard for most traffic calming projects.

Table 1 Measures of success for standard traffic calming elements in Boulder, Credit Institute of Traffic Engineers, Traffic Calming: State of the Practice

Boulder, CO								
Mapleton Ave	12' humps	28	25	-11	1,710	1,490	-13	
North St	12' humps	33	25	-24	1,050	760	-28	
Floral Dr	12' humps	31	25	-19	900	670	-26	
Moorhead Ave (3100 blk)	46' tables	34	31	-9	4,590	4,460	-3	Five tables removed due to emergency response concerns
Moorhead Ave (4300 blk)	46' tables	34	31	-9	2,810	2,620	-7	
Edgewood Dr	46' tables	36	28	-22	11,140	9,690	-13	Modest diversion to neighboring streets - two tables removed due to emergency concerns
55th St	46' tables and raised intersection	42	37	-12	12,400	9,400	-24	September 1995 before - September 1997 after
N 9th St	Circle	33	23	-30	3,360	1,970	-41	Midblock speeds
Arapahoe Ave	Circle	33	28	-15	2,010	1,940	-3	
Balsam Ave	Circle	38	25	-34	10,910	8,280	-24	Significant diversion to neighboring streets but no increase in speeds
Pine St	Circle	33	31	-6	8,660	7,280	-16	

The implementation process of traffic calming devices is representative of typical municipal processes of making changes in street designs. Residents have fomented changes through community requests to an elected municipal official, followed by a public input process, design, and finally implementation by a professionally contracted company or municipal agency. The process begins with collection of signatures and the formation of a steering committee. This is the most citizen-oriented portion of the traditional implementation process. Criteria must then be met regarding the volume and speed of vehicles on the street. Meetings and a 66% approval rate by affected citizens must be obtained,

followed by formal meetings and contractor selection. This process is typical of the US traffic calming requirements.

Since decisions about what type of traffic calming measures are made based on these metrics, traffic calming literature typically rates vertical elements as the most effective interventions for improving street safety. Speed humps boast the most effectiveness, as they have the greatest speed reducing effect on motor vehicles (Daniel, 2005). These measurements often neglect the experiences of other transportation modes. They also act primarily as a restrictive mechanism, rather than enhancing the overall context indicating the appropriate use of the road.

Traffic calming schemes that treat an entire neighborhood are still favored over those that treat a single street. This scope helps assuage concerns that traffic is simply being redirected and raises overall acceptance level of the project. These area wide interventions are often more politically onerous to implement because such a broad constituency must be built before any changes are made. As a result, these implementation times are much longer; however, projects tend to have relatively little pushback once they are in the implementation phase, because so many people have already voiced their concerns during the preliminary processes.

The Institute of Traffic Engineers notes Portland Oregon as an example of this process oriented implementation. The biggest three issues surrounding project approval are: how it should be assessed (by petition, ballot, or survey),

what area should be asked (street, neighborhood, or town), and what margin of approval is required. Participatory traffic calming schemes address several of the implementation shortcomings of traditional traffic calming. The community street painting model circumvents problems of both scope and pushback in Somerville because a) it is temporary and b) it is classified as street art and thus is subject to less bureaucracy.

Behavior Change

Rather than calming traffic through physical obstruction, the behavior of motorists is changed through context clues. These clues communicate to the driver that the street is intended for more than the swift throughput of cars. There is growing evidence that context clues are a more effective means of calming traffic than direct instruction through approved MUTCD elements (Kennedy et.al. 2005). Nearby collector streets that abut The Neighborway in Somerville have aggressive forms of traditional MUTCD signage designed to reduce speed, including flashing speed display signs and a school zone sign that contains text saying “20MPH when children are present”. This approach reflects context that is not designed to cue safe driving behavior.

Meanwhile in the UK, a minimalist, or “naked” streets approach is emerging as an alternative to signalized enforcement based traffic management (Ibid). The “20 is plenty” campaign, alongside traffic calmed Home Zones have shown that the most effective measures were those with a physical as well as a psychological effect. In the example below, the ‘Red brick narrowing’ design was

both continuous along the length of the road, and created a narrowing effect both physically and visually. This design created ambiguity, as it was not clear to motorists whether it was a footway or part of the road (Ibid). This context based approach represents a strength of the community street painting concept.

Figure 2 Simple striping patterns that blur the line between car and pedestrian space. Credit Kennedy et al. from "Psychological Traffic Calming (2013)

Another set of behaviors that street painting projects aim to change is that of the non-motorized street user. Children especially stand to benefit from these street painting projects. The organization that has devoted the most attention to changing the active transportation behavior of children is Safe

Routes to School (SRTS) program. The SRTS program acknowledges the difficulty in obtaining reliable data from children, so they primarily collect data through parent surveys (McDonald, 2014). This method, of course has problems since it is a self-report measure on the behavior of others.

When studying the SRTS program, Sirard and Slater (2008) reviewed beliefs and attitudes, inter-individual variables (social support), community level variables, and aspects of the built environment that may or may not promote walking to school. They found that parents perceptions of having places to walk to (in addition to the school) and having the proper infrastructure are key elements associated with active commuting to school—even more so than the objectively measured walkability index. They also noted decreased odds of active commuting to school (younger, 0.3 [0.1-0.8]; older, 0.6 [0.4-0.99]) if parents perceived few other children around to play with. Similar to aesthetics, this lack of other children may decrease parents' overall perception of safety (Sirard & Slater, 2008).

Parents may be less aware of their children's use of their neighborhood streets and transportation patterns than they believe, but their perceptions of the neighborhood affect not only how their children "commute", but how they utilize their neighborhood and their community for play. McDonald found that parent's belief that their child needed to cross several roads to reach play areas was associated with a lower likelihood of walking or cycling. Children's social capital and the effects on neighborhood perception and use are similarly difficult

to measure, but Weller & Bruegel (2009) found in a study of children's social capital that children's local connections exceeded those of their parents and social capital provides a useful theoretical framework for exploring the implications of children's differing spatial freedoms. In a research context, parents are simultaneously in charge of and ignorant of their children's utilization of the street as a play space. The same study found that indeed, in some situations, young participants concealed their local network (Weller & Bruegel, 2009).

The use of streets by non-motorized users, especially by children for play is an important aspect of changing the behavior of drivers, as increasingly, research is showing that the "safety in numbers" effect is among the most potent methods for increasing road safety. However the use of streets by children is not a means to an end, but a goal of the community street painting.

Citizen Participation

The literature on citizen participation is critical of the top-down processes surrounding transportation issues. This is likely because the level of expertise necessary in these projects is often quite high. As a result, transportation projects undergo a good deal of scrutiny with regard to their public input and feedback processes. A report by Corridors of Opportunity states that, by definition, public participation includes the promise that the public's contribution will influence the decision (Montesano, 2012). This is often difficult to obtain. Even when participation is seemingly representative, Zavestoski and

Agyeman (2015) have pointed out that the systems that are meant to garner public input often fall victim to the same mechanisms of exclusion that have disenfranchised vulnerable populations for years. This is especially relevant to community street painting projects as they are uniquely positioned to resist being coopted by municipal governments and robbed of their grassroots nature (Zavestoski & Agyeman, 2015).

Participants in these painting projects often act with the capacity of a traditional neighborhood group. Neighborhood groups are seen as very representative and effective in transportation projects, their normal role is acting as the go-between between large numbers of residents and other constituents, and city officials (Ibid). McAndrews and Marcus (2015) point out the tokenism of the transportation planning public input process:

> *"Participants often write comments on cards, respond to questions using audience response technologies (e.g., "clickers"), co-create maps, participate in charrettes, fill in surveys, or talk one-on-one with a project representative at an open-house meeting. These participation techniques seem diverse in form, but they are homogeneous in their function…* the professionals who are responsible for the processes are ambivalent about them; decisions are not truly open to the influence of a lay public;*"*

They also cite the need for citizens to seek out "vertical" connections with elected officials and experts. This language harkens to the idea of Arnstein's ladder of citizen participation (Arnstein, 1969) and the difficulty citizens face when trying to ascend this ladder in transportation projects specifically.

Complexity and representation affect the scalability of traditional traffic calming schemes. With every added meeting and layer of expertise required, the

potency of citizen participation is diluted and with a larger project, there are more layers than usual. Historically, this process has been lengthening and formal processes for citizen involvement are ill equipped to fully utilize the community's collective capacity (McAndrews & Marcus, 2015). Area wide traffic calming schemes especially involve more levels of bureaucracy and dilution of citizen participation, and permanent infrastructure is often cost prohibitive not because they actual material is expensive, but because of the sheer number of professional planners involved and the intergovernmental nature of transportation planning (Ibid).

Participation in the painting events by children is especially important in these projects. They stand to gain the most by improving the visual aesthetic of streets and by calming traffic. In studying road safety, Kimberlee (2008) found that children's enjoyment during participation was an important aide to learning, and a recommended strategy for those children who believe that road safety is boring. The planning process itself could benefit from the inclusion of children as well. The same study found that active participatory approaches can also yield deeper insights into children's perspectives of the built environment and their local community and participatory projects can bring broader benefits to local people by helping young people to develop a sense of ownership for the policies that affect their lives (Kimberlee, 2008).

Lighter, Quicker, Cheaper

The NACTO website includes a robust section on interim interventions for planners who wish to change the orientation of their city streets at www.nacto.org. These interim strategies often seek to mimic the form of the eventual hard infrastructure treatments. In addition to being politically palatable due to their incrementalism, these interim treatments often provide, rather quickly, the improvements in livability that their projects intend. It seems that improving the livability of a street is more affordable and scalable than slowing down cars. The growing success of “Lighter, Quicker, Cheaper” (LQC) projects all over the world is proof that expensive and labor-intensive initiatives are not the only, or even the most effective, ways to bring energy and life into a community’s public space” (Bravo, 2013).

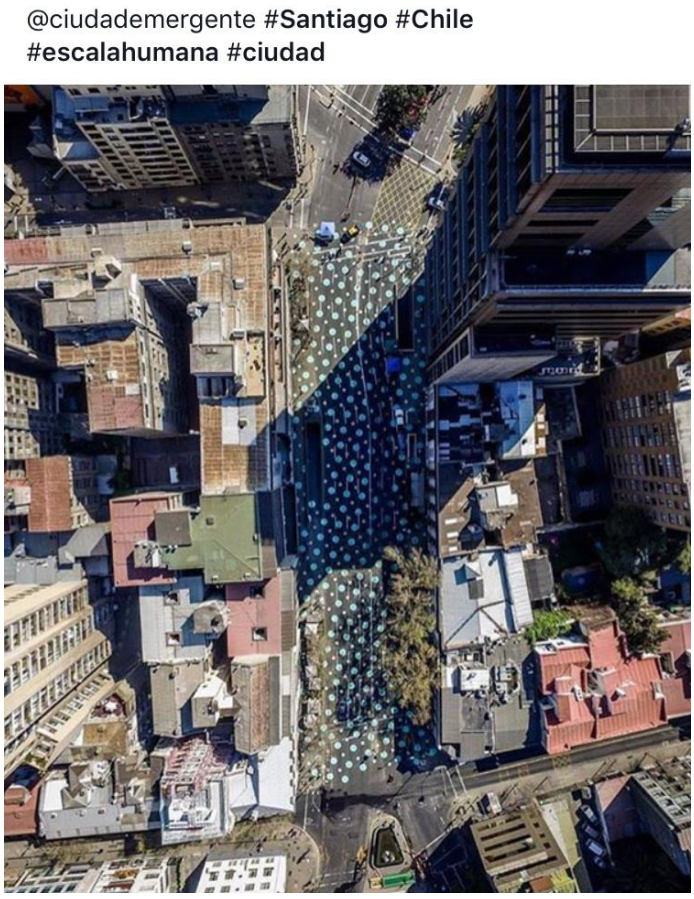

Figure 3 Lighter Quicker Cheaper in action in Santiago Chile, an intersection becomes a plaza with pained dots. Credit: Ciudad Emergente

Indeed, in cities the world over, pop up, temporary and tactical reuse of urban space is changing the conversation about how space itself is designed. Figure 8 shows an exceedingly simple intervention in Santiago Chile that was utilized to pedestrianize a large area. From massive projects like this one seen in Santiago to smaller projects of painted lines and flexposts being installed in rural towns at problem corners, these projects may have gained popularity because of their low cost. Their effectiveness acts as proof of concept for traffic calming, rebuking decades of automobile-oriented planning philosophy. This thesis is not

intended to be an in depth discussion of temporary or pop-up installations themselves.

The ITE State of The Practice report on traffic calming has been revisited in the past few decades and two distinct trends are emerging in this analysis. One is towards more flexible, temporary, and inexpensive solutions, and the other is towards a more proactive approach to traffic calming (rather than reactive). In 2004 Ewing et al. completed a survey of traffic calming professionals in an attempt to update the best practices in a rapidly maturing and diversifying field. This report highlighted changes that were not taking place at the pace than ITE had predicted in 1999, citing funding as a major barrier. The aim of the Neighborway Project is to integrate the implementation and the community outreach processes. Suffice it to say that softer infrastructure installations garner a lot of the benefits relative to their capital investments. While vertical and horizontal treatments (hard infrastructure) were and are still very much considered the gold standard in most traffic calming projects, advances in road striping techniques alone have proven to be effective in slowing cars from between two and seven miles per hour (Kahn, 2011).

The LQC paradigm shows a shift towards a more proactive approach has emerged even more recently than the review of best practices by Ewing et al. 2004 Even though many of the traffic calming predictions from the original State of the Practice had been slow to take place in 2004, especially those with regard to implementation and participation, the past decade has seen an increase in

participatory strategies. These effects are likely related. As techniques become more accessible and affordable, participation in the process of changing one's street becomes a more feasible activity for a citizen.

Greco writes in the APA Journal that in major cities with deep pockets, these temporary installations have ballooned into permanent plazas and parklet development programs (Greco, 2012). This has taken place slowly over the course of a decade, and has suffered from all the typically seen types of resistance to change that top-down planning typically faces. Community street painting again addresses these shortcomings in the neighborhood context.

Murals as Community Engagement Tools

There is a robust literature dedicated to the effect of murals on community and participation. The American Institute for the Conservation of Historic and Artistic Works notes that if community members have been involved in planning the mural and celebrated its completion, it increases the likelihood that they will be good stewards of it (2011). Although preservation is not a primary concern for street painting as an outcome, it is part of the process. The wear and tear on a street mural requires frequent repainting, which means that these projects can involve ongoing, potentially annual events. The ongoing nature of this engagement is actually a feature, rather than a drawback, since the events themselves are such an important aspect of the project. Drescher (2003) coined the term "sociocreative" to describe the ongoing process of mural preservation by the community, noting that if the mural's meaning is not

discussed and debated in the community, then the mural is not really public; it is done to or for its audience, not with or by it. Weber (2003) notes additionally that community murals assert moral claims to public space.

Studies of community mural creation in Boston note that the community mural presents itself as a particularly powerful medium of grassroots neighborhood representation, as it requires little capital and is subject to considerable local control. This research is largely concerned with content heavy and culturally significant murals in socioeconomically challenged neighborhoods. These theories are applicable to street murals in that they assert the values of safety and prioritizing children and sustainable road users.

These exact values are the same ones routinely touted by cities with community street painting programs. These benefits are in line with those most commonly sought after from open streets or block party style events. Many municipalities use temporary street closures and events such as street fairs, PARKing Day, or a Ciclovia to re-appropriate urban land for alternative uses, but these programs are often too large in scale to be made permanent or to foster community on the neighborhood scale. Community street paintings solve both of these problems by not only fomenting community more effectively, but giving the community immediate agency through a more permanent re-appropriation of their public spaces.

Livability from Community

As Donald Appleyard stated in Livable Streets "Unlike other urban transportation problems, massive engineering efforts aren't required for immediate concrete results" in a street's livability (Appleyard, 1981, p12). While it is a resounding endorsement of livability improvements, Appleyard (1981) noted typical concerns from residents including:

- resentment from drivers
- surprise or resistance to change from residents
- merchants fearing loss of business
- nearby street residents fearing diversion
- emergency vehicle services

Community street painting projects specifically addresses many of these concerns through a model which involves increased participation and temporary installations. Livability is typically improved with temporary installations, even if traffic calming benefits are more pronounced after full installation of permanent infrastructure.

The streets included this case study would best fit into the "Lightly Trafficked Street" category as defined by Appleyard (1981). These are the least trafficked streets with the most social capital and community. According to Appleyard's survey research, feelings of responsibility for what happens on the street correlate inversely with traffic volumes (r=.12) Friendships declined with traffic volumes (r=.11) especially with people who lived on the opposite side of heavily trafficked streets, pointing to traffic as a major barrier to community. A more participatory approach to implementing traffic calming seeks to improve

feelings of responsibility and number of friendships in order to foster a sense of community and calm traffic. The intent is to begin the feedback loop of livability by focusing on the number of neighbors known (Appleyard's dependent variable) since relationships will be easier to build than speed bumps or chicanes.

Case Study

Project Summary and Context

As was mentioned in the Introduction, the Somerville Neighborway is a residential street painting program in which residents volunteer their time to paint street murals and other designs on their streets. The Neighborway project has the following stated goals:

Figure 4 Willoughby Street Residents painting a street mural. Photo Credit Pat Kelsey

- Promote active, unstructured play for youth

- Reduce car speed and discourage cut through traffic

- Alert faster-moving traffic to presence of children playing, pedestrians and bicyclists along streets and intersections

- Give priority to non-motorized users

- Create as direct and continuous route as possible between schools, parks and squares in Somerville

As of this writing, five streets have been painted. These include Willoughby, Hudson, Spencer, Madison and Montrose Streets. Two street paintings have included murals, two have included painted curb bumpouts and basic icon symbols, as seen in figure 3, and one street has been treated solely with painted bumpouts. Some attempts have been made to implement planters at the corners of various streets on the bumpouts, but the primary mechanism thus far has been paint.

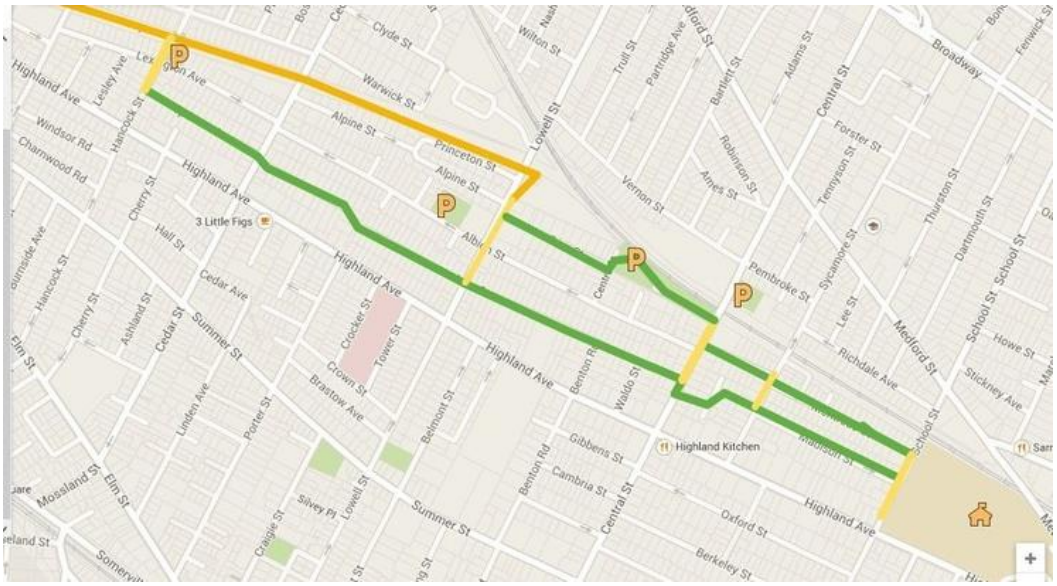

Figure 2 The Neighborway project map, from www.somervillestreets.com. Green = street painting

The Neighborway concept contains aspects of both traditional traffic calming elements exemplified in Neighborhood Greenways (commonly referred to as "Bike Boulevards") and traditional artistic street mural painting projects.

The Neighborway seeks to combine the most effective design elements from the former with the community engagement and participatory benefits of the latter.

Figure 3 Icons used on Neighborway Streets. Photo Credit Pat Kelsey

This case study consists of three methodological devices. A survey containing open ended and quantitative feedback questions was distributed. Traditional traffic calming measures such as traffic counts and 85th percentile automobile speeds were roughly calculated using a speed detecting smartphone application, in addition to qualitative measures of automobile behaviors. Non-motorized behavior was monitored separately with more quantitative and qualitative measures. Finally, expert interviews were conducted with relevant experts in civil engineering, street painting programing, and traffic calming consultation. The Neighborway is scalable because it uses the lighter, cheaper, quicker philosophy with regard to its physical implementation and it also enjoys a less bureaucratic citizen participation process. In order to implement street art in Somerville, it only requires 9 residents, or 1/3 of the residents to sign a

petition. This is a critical component in the scalability of a street painting project and what allows it to more closely mimic an area wide traffic calming installation. This process is a departure from the typical process of citizen approval, which typically requires fully two-thirds of a street's residents to implement traditional traffic calming.

Methodology

This case study used a diverse methodology of participant self-report survey, observation diary, and expert interview in order to gain a broad appreciation of organizer, participant and, resident experience in community street painting in Somerville. Researching a project of this nature required a balance between participation, observation, and outreach. A case study approach was selected due to the qualitative nature of the project and the quantitative measure of the behaviors to be observed. As noted by Yin (2013) a case study format is especially pertinent when the research question is regarding "how" or "why" a phenomenon occurs, when the researcher has little control over the process, and when the focus is on a contemporary phenomenon within a real life context. Case studies are also appropriate to observe small group behavior, organizational processes, and neighborhood change, all of which are aspects of this project. Additionally, since street painting event strategies, designs, goals and outcomes vary across cities, collecting data from other projects of this nature would not have been appropriate for the time allotted. A case study, to a large degree allowed a deeper dive into the local project details and utilize the publicly observable nature of the results.

Resident Survey

A self-report survey (Appendix A) of neighborhood residents was distributed primarily through email to participants who volunteered their emails at planning and painting events, as well as through door to door canvassing in

order to reach residents who did not participate. The surveys were completed closely after the completion of street painting events in the cases of Madison and Hudson Streets (two weeks) and one month after the repainting event on Willoughby Street, roughly one year after its original painting. These differing timelines offered perspectives on both immediate and lasting effects. The email survey was designed on Qualtrics and contained open-ended questions about the project participant's experience and belief in the viability of the project. The survey also contained self-report questions about the perception, use and behavior of participants themselves, and observed quantity and behaviors of other road users, designated by transportation mode. Specifically, participants were asked if they had noticed an increase in the number of pedestrians, cyclists, or automobile drivers, and if they had observed a change in the behavior of these types of road users. The final questions in the survey sought to gauge the degree to which the project had created awareness and acceptability of further, more permanent intervention. The desire to implement four different traditional traffic calming elements was quantified on a scale from one to 10. These treatments included turn restrictions, reducing parking, restricting automobiles entirely and restricting automobiles except for residents.

Observational Diary

This aspect of the research in large part was an outgrowth of a NACTO white paper by former Tufts student Natalia Collarte which illustrated the possibility of a woonerf style street on Hudson Street (Collarte, 2012). The

street's participation in the Neighborway project was noted in the discussion section of that paper. Today, Hudson Street has a mural painted by its residents and livability improvements are underway in accordance with the paper's recommendations.

Two distinct observation protocols were utilized over a total of 18 hours for all streets. Nine hours were devoted to observing non-motorized users, and nine hours were devoted to motorized users. Both protocols included scoring for interactions between motorized and non-motorized users. The scoresheet for these observations are in (Appendix B).

Observational Diary - Non-motorized users

Non-motorized users were observed using an observational diary created from principles outlined in Jan Gehl's "How to Study Public Life" (2013). These included qualitative observation of non-motorized users of the streets observed from a location that would be unlikely to interfere with the observed results. Activities were separated into those performed by people using motorized vehicles and those using non-motorized vehicles. Those that used both, as in the case of residents parking their vehicles then continuing on foot, were recorded in both number counts, and unique aspects and differences in their behaviors were noted. The observation of non-motorized users took place in 30 minute increments from 8:00-8:30am on Wednesdays between May and July as well as 3:00-3:30 on Sundays. These times were selected to obtain a variety of uses of

the street during both rush hour and non-rush hour scenarios. The desire was to observe both residential and non-residential automobiles using the streets.

Table 2. Activities quantified during observation.

Non-motorized users	Motorized users
- Walking (on sidewalk only)	- Speed
- Jogging	- Conflicts
- Walking dogs	- Yielding to pedestrian
- Kids playing	- Yielding to cyclist
- Short Conversations	- Bumpout success
- Long Conversations	- Bumpout Fail
- Crossing street (away from crosswalk)	- Departing/arriving at parking space
- Interaction with street painting	
- Bikes	
- Interacting with cars	
- Interacting with pedestrians	

Joggers and dog walkers were given their own category due to the unique nature of their trip. Their decision to use the street is meaningful because they have a greater degree of freedom when choosing their route. Keseru (2015) asserted that these road users' trips defy the norm in that they are trips taken for their own sake their decision to utilize a painted street is meaningful.

The category of 'children playing' of course was included since it represents the target user and behavior for the Neighborway. A conversation was operationally defined as discussion without walking. Greetings, nods, and waves, for example, were not considered conversations. Short conversations were defined as less than 60 seconds and long conversations over 60 seconds. Crossing the street was designated as a distinct act if it was done away from an

intersection, and interaction with the street painting included mentioning the mural or playing with (not just on) painted elements. Bikes were observed in terms of their interactions with other road users. Typically they would be expected to ride as far right as possible, allowing vehicles to pass. The 26-28 ft. road widths on many of our streets combined with curb parking makes this an uncomfortable experience for the cyclist, but essentially a non-incident for drivers, and ultimately an interaction that the motorized user controls. As such, the interaction between cyclists and automobiles was recorded in the motorized user section. Interaction with pedestrians was defined as diverting the path of the bicycle significantly since coming to a complete stop was not observed.

Observational Diary - Motorized users

Motorized users' behaviors differed from the traditional observations of speed and count that are typically utilized in traffic calming projects. The unique nature of the Neighborway meant that unique types of behaviors were possible. Painted traffic calming elements encourage safe behaviors, but do not mandate them the same way infrastructure does, so adherence was operationally defined and measured. Failure to adhere was defined as driving over green painted bumpout paint (bumpout fail). Adherence was defined as turning onto or off of a street without driving over green paint (bumpout success). This metric draws largely from the phenomenon of desire lines[2] in pedestrian planning, which are

[2] Desire lines are a paths created as a consequence of erosion caused by foot-fall or traffic, often used to reveal failure to anticipate the needs of pedestrians

observed lines of wear in the ground that mark the desired path of pedestrians, which often ignore a built or prescribed path designated by infrastructure. It should be noted that two different designs were used for bumpouts, one of which extended onto the intersecting street, and three of which did not. Three of the four observed streets are pictured in Figure 10 below, two of which have bumpouts painted onto the perpendicular street.

Figure 4 Two different types of bumpouts. Photo credit Pat Kelsey

Speeds were measured on Montrose Street and a nearby comparison street (Richdale). These streets have similar lengths and widths, and are separated by only one block. Both streets are one-way. Residents on Richdale were canvassed door to door in order to determine how many neighbors the average resident was acquainted with. These statistics would be compared with those obtained from the participant survey from residents on Montrose Street only.

Professional Interviews

Three key interviews were conducted with experts in the field of active transportation planning. The first interview was with Peter Furth of Northeastern University. Furth developed the level of comfort scale for bicycle routes which takes into account the context, comfort and inviting nature active transportation routes (Mekuria & Furth, 2012). Previous ratings scales focused on more quantitative measures such as level of service. The new paradigm of level of comfort brings a more meaningful and qualitative measure to route evaluation. The second interview was with Greg Raisman, the coordinator for Portland Oregon's City Repair Project, one of the most developed and robust community street painting projects. Raisman's experience coordinating and evaluating street mural programming exceeds that of most program coordinators both in tenure and scale. Finally, in order to act as a comparative case study to the process of traffic calming in a local context, Tom Bertulis was interviewed regarding the installation of chicanes on Cedar Street in Somerville. This project represents traditional traffic calming measures both in design and process. The information gleaned from these interviews will help guide the discussion and recommendations for both future research and programming of participatory street painting projects.

Results

These results seek to demonstrate the qualitative features of the research process, illustrating not only the types of behaviors observed but the attitudes of the residents about their street. The survey results will reveal the priorities and opinions of participants. The observations are meant to intersect between traditional traffic calming measures for automobiles and livability and public life study for all others in a more quantitative way, and the expert interviews will delve deeper into the reasons for various strategies and inform future recommendations.

Resident Survey

A total of forty responses were collected from participants and residents of Neighborway streets. Thirty-five of the responses were received through Qualtrics and five were collected through canvassing. Qualtrics responses had varying degrees of completion, with twenty six full survey completions. All five surveys conducted in person were fully completed. Streets with more extensive installations tended to have more responses to the survey. Table 3 below shows the street of residence and intervention type of the survey respondents.

Table 3 Street of residence of survey respondents

Street Name & Type	*Online Respondents*	*Canvassed Respondents*
Mural Streets		
Hudson St.	11	0
Willoughby St.	4	2
Bumpout Streets		
Madison St.	3	2
Montrose St.	3	1
Spencer St.	1	0
Other Streets		
Central St.	3	0
Did not specify	10	0

The open-ended survey questions asked participants what their primary reason for participating in the Neighborway project was. A variety of answers were given but the project's effect on traffic was the most heavily cited reason for participating, appearing in one out of three responses to that question. Safety, aesthetics, and neighborliness were also among the most popular reasons for participation. Qualtrics produced the word cloud below based on the frequency words in the answer to this question (Figure 10).

Figure 8 Word cloud based on survey responses. Created with Qualtrics

Questions regarding the experience of the actual event were far from uniform. Only three responses cited negative experiences, one participant responding that “there were too many kids”, another stating that it “went too fast” and they didn’t have much of an opportunity to paint, and a third describing a design meeting as “painful”. Three times as many people reported positive experiences as negative experiences (some respondents had not participated in a painting event at the time they completed the survey).

The median number of neighbors that respondents reported meeting for the first time was four with a standard deviation of 3.68 (n=19). Only three respondents reported not meeting any new neighbors and three reported meeting more than 10 new neighbors. The median total number of neighbors known was 17.5, demonstrating a 29% increase in the number of neighbors known. Increases in pedestrian volumes were reported on Willoughby Street by four respondents, one noting

> "We see lots of pedestrians, and sometimes parents will point out the birds or the painting to their kids. (This is especially true right after painting happens.) We've always had lots of pedestrians, but I might say a 10% uptick."

Only one respondent noted perceived changes in volume (fewer cars) on other streets, though six respondents noted that their street had not yet been painted.

Two respondents noted an increase in cyclist volumes. Behavior changes for each mode were noted by seven respondents. Notably, reduced car speeds were reported by three respondents, one noting: "I do believe that people drive more slowly. Or rather, the average person may drive the same speed, but we see fewer people zooming down the street at high speeds." Another respondent noted "During 'tests' the planters slow drivers speed approximately by half." Increased pedestrian behavior were noted by four respondents, including one respondent who noted that the street was "rowdier in the summer" indicating the presence of playing children. An increase in dog walking specifically was noted and another respondent noted a change in their own behavior and perception of the street, stating "Many who pass thru our neighborhood make a point to admire and even thank Willoughby Street residents for the Neighborway. I also feel more entitled to my street which in turn influences driver, pedestrian and cyclist behavior." This is the desired effect of the Neighborway project Anther respondent noted that "I think we look at sharing our street rather than ceding it entirely to vehicles. Willoughby Street is more than a street. It's a neighborhood."

Several questions on the survey assessed the project's ability to change perceptions of one's connectedness to the street, neighborhood and city, and the satisfaction with the project in general. The degree to which participants felt connected to their street is summarized in the table below (Table 4). The survey only asked about Willoughby Street, because it was the only street that had been painted at the time of the survey creation. As the table shows, participants who lived on Willoughby Street and thus had participated in a robust street painting event, felt more connected to their street.

Table 4 Degree to which participants feel socially connected to their street

Participants residing *on* Willoughby street			
Mean	Std Deviation	Variance	Count
5.14	3.08	9.46	6
Participants residing *near* Willoughby street			
Mean	Std Deviation	Variance	Count
2.33	3.35	11.22	21

Participants were largely satisfied with the project, 13 of 21 respondents noted that the project had improved their street. The biggest change that respondents noticed was atmosphere and overall friendliness of the people on their street, specifically noting that the process itself had improved relationships: "The event built a better sense of community, and most everyone seems to feel the street painting seems to tie us together more." Others noted the aesthetic improvements and that their street was now more useful as a geographic reference point for the neighborhood, one stating: "It's been 'beautified'."

People know "the street with the painting and the bird houses," even if they don't know our street name.” Other changes noted were better crosswalk visibility, slower speeds, civic pride and more time spent outside. One respondent noted “Every visitor comments on the atmosphere. People smile. People stop and ask questions and engage in conversation.”

Since projects such as this can act as pilots for permanent traffic calming implementation, some survey questions were designed to assess the degree to which the project has changed thinking about the possibility for future changes. All respondents expressed the desire for continued programming or infrastructure of some kind, and no respondents stated a desire for the removal of the elements that had been painted. Several respondents noted that they desired more robust traffic calming measures and enforcement including one-way streets, speed limit signs, bends in the street, bicycle signage, speed bumps, and bumpouts. Respondents also recommended a gardening program, potluck events, traffic studies, and slow traffic advocacy. One respondent requested that the street paintings be done by professionals instead of kids even though “it was exciting for them.” When asked whether the neighborhood would be able to sustain the Neighborway project, 19 of 22 respondents replied affirmatively, only three expressed doubt. Those three respondents cited an apparent lack of formal support from the city, the high number of renters in the neighborhood, and a need for more robust information distribution as barriers to continued implementation.

A rank order question asked respondents to rate their level of support for various forms of traffic calming devices being installed in the future. Four potential interventions were presented, and all had potential rankings between 0-100 on a sliding scale instrument where 0 meant that the measure was unacceptable and 100 meant that the measure had the respondents' full support.

Table 5 Attitudes towards traditional permanent traffic calming

Rate acceptability of the following:	Mean	Std Deviation	Variance
Reduced Parking	38.57	36.90	1361.67
Car filtering	61.71	32.81	1076.20
Restricting Cars Entirely	30.60	37.75	1424.84
Restricting Cars - except residents	62.82	35.60	1267.09

The results of this questions showed that restricting cars entirely was the least popular potential intervention, with reduced parking only slightly more popular. Car filtering and restricting cut through traffic by only allowing cars of residents was rated as twice as acceptable as restricting cars entirely. After the first three survey completions, open ended feedback showed that additional clarity was needed for these questions, as residents were unfamiliar with these traffic calming strategies. The image (Figure 9) below was added to demonstrate car filtering. This is the process through which cars are prevented from entering a neighborhood, but bicycle and pedestrian traffic is allowed through. It typically

takes a form similar to a common median, it is simply placed at an intersection and contains three foot gaps for cyclists to pass through.

Figure 5 Example of car filtering added to survey

Observation of Non-motorized Users

Table 5 shows the hourly rates of various behaviors exhibited by non-motorized road users, including the total number of hours the street in question was observed. Streets with murals hosted a more diverse set of behaviors. Users were only observed interacting with the paintings on streets with murals, especially on Hudson Street. The interaction with the mural was likely higher on Hudson due to the novelty of the mural and the shape of the street (the mural exists at a slight bend in the road which had previously been used solely for parking). Short conversations were observed on all streets, but long conversations were far more prevalent on streets with murals, specifically Willoughby Street.

Table 2 Observational Diary Rates of Street Users

	Willoughby	Hudson	Montrose	Madison
Total Hours observed	10h	1h	2h	5h
Median Hourly Rates				
- Walking (on sidewalk only)	44	30	22	24
- Jogging	3	1	1	2
- Walking dogs	4	1	1	3
- Kids playing	6	3	2	2
- Short Conversations	4	2	0	2
- Long Conversations	2	1	0	0
- Crossing street (away from crosswalk)	5	3	0	1
- Interaction with street painting	1	3	0	0
- Bikes	8	3	0	1

The observation of interaction between bicycles and pedestrians showed that virtually no conflicts arose. Conflicts were defined as the need for a pedestrian to vacate the street to the sidewalk, or for the bicycle to change course by more than six feet laterally. Only one instance of all three modes attempting to use the street at once occurred, and the motorized user came to a complete stop to allow the bicycle to pass the pedestrian before proceeding.

Observation of Motorized Users

The degree to which motor vehicles adhered to the painted bumpouts was the primary behavior observed at the entrance to each street from the collector streets that abut the project streets. A vehicle path that did not go over the painted section was defined as a “bumpout success” and occurred roughly half as often as a “bumpout failure,” wherein the driver drove over some portion of the paint. Willoughby Street, which had bumpouts that did not extend onto the abutting collector street, saw a much higher rate of success, even though the

turn radii were likely the same. Possible differences in turning speed may have been produced by varying topographical conditions as the collector streets were also very steep, wide, and are one-way.

Conflict avoidance between motorized and non-motorized users was the primary qualitative measure observed at mid-block. In the case of a bicycle and motor vehicle, conflict avoidance was operationally defined as a motor vehicle declining to pass until the end of the street. While in the case of a pedestrians and motor vehicles, conflict avoidance was defined by the presence of brake lights. Only four conflicts were observed between automobiles and bicycles and the automobile declined to pass in all four situations. Interactions with pedestrians were observed 19 times, and in all cases but one, the appearance of brake lights on the automobile was observed as well as significant reductions in speed.

Vehicle Speeds and Neighborliness

As mentioned in the literature review, standard traffic calming assessment looks primarily at the volume and speed of motor vehicles to gauge success, using the 85th percentile as a standard measure of vehicle speed (Solomon, 1964). This measure was used to in combination with the data regarding average number of neighbors known, and the number of neighbors met at the Neighborway event. This comparison was meant to act as a complement to Appleyard's research which illustrated that heavier traffic leads to fewer relationships (1981), here we seek to show that relationships (forged in

the street painting process) will conversely correlate with calmer traffic. The chart below shows data between speeds, the number of neighbors that are known, and the percent increase in number of neighbors met at a Neighborway event relative to 85th percentile speeds.

Table 3 Neighbors known and met at Neighborway relative to 85th percentile speeds

Street	*# Neighbors known*	*% increase in Neighbors known from N'way event*	*85th percentile speed*
Madison	10.3	0.56	24 mph
Montrose	12	0.225	25 mph
Richdale	7	n/a	31 mph

The table shows that vehicle speeds increase inversely to the number of neighbors known. An increase in the number of neighbors met at a street painting event was also correlated with a one mile per hour reduction in speed. Decreases in speed are critical in this range, since increased speed exponentially reduces the likelihood of survival for pedestrians. We do not theorize that vehicle speed reduces neighborliness, rather that neighborliness can indeed reduce vehicle speed. Insufficient time was available to adequately measure vehicle volumes on each street, and these residential streets have more of a problem of occasional speeders than constant traffic flow. Sample size was also small and while the data is compelling, it is difficult to assess whether the number of neighbors known, or met at a street painting event had a significant effect on the 85th percentile speed on a given street.

Expert Interviews

A Phone interview with Greg Raisman, director of the City Repair program in Portland was conducted in order to assess the social capital and traffic calming effects of their intersection painting program. According to Raisman, "these murals are completely traffic neutral." He went on to state that intersection murals would "have an initial effect on the way people drive, but that effect would wear off over time." With regard to building community, Raisman did say that intersection painting created relationships; "measuring relationships is difficult –almost everyone will build relationships they didn't have before and in ways that other projects have not, Including traffic calming projects, safe routes to school programs, plazas, etc." Raisman corrected his initial response to the question as to whether the project had received any pushback from the community: "Always… well, not with street paintings. They are like hot apple pie. We're doing 3 more this year". Finally when asked about their ability to create social capital he noted "Street painting can become an organizing tool for an eventual neighborhood greenway." This confirms the results from the survey that showed acceptability of further traffic calming interventions.

Peter Furth offered a perspective on shared streets as play spaces for children, noting that: "the target audience for this type of project should be a 7 year old kid" and that given the current traffic environment in the US, "Kids cannot share space with cars." This echoes Appleyard's (1981) assertions about

the many challenges cars present to children. When asked about the Neighborway project (with which he had some familiarity), he noted that street selection would be important both for acceptance and from a design perspective. “Right now real estate developers want every street to be quiet and residential. Right now we have a lot of streets that don’t know what they are, such as Highland Street and Summer Street” both of which connect to the Neighborway streets.

Discussion with Tom Bertulis shed a comparative light on a traditional traffic calming project that is taking place on Cedar Street, which abuts two Neighborway project streets (Spencer and Hudson). Bertulis noted that there had been one meeting regarding the Chicanes to his knowledge, and the attendance was in the dozens (he estimated between 50 and 100, though Ward 5 online stated “30+”). Residents appeared to be well informed about design considerations, asking questions about “timeline, steepness of the street,

deflection angle of the chicanes, drainage, sightlines, and the total number of bumpouts to be installed."

Figure 10 Renderings from presentation on nearby Cedar Street traffic calming project. This was one slide of over 15 that Bertulis presented to the public about the installation of chicanes on a collector street

Bertulis is familiar with the Neighborway project and has attended street painting events himself, and also noted that while there had not been significant pushback to the chicanes, "there were questions to the tune of 'why are you doing this?' and 'how does this help me get to work faster?'" The Neighborway project, "being resident activated, has 90% support rates." By comparison, "support for the Cedar Street chicanes is hard to measure, because we haven't done a survey, but in general there's lots of distrust of government." Bertulis also noted differences between the ongoing care of traditional traffic calming

projects in Seattle that involved planters was delegated to residents. When asked whether he believed the participatory nature of the Neighborway project could help calm traffic or (as Raisman states) be “traffic neutral,” Bertulis stated”

> “‘Traffic neutral’ is a bit of a loose term, you usually see a 1-2 mile per hour decrease, but nothing near the 5-6 mile per hour decrease you see from normal traffic calming, especially vertical elements like speed humps. Planters also make a big difference and that is a key feature of the Neighborway”

Discussion

This case study sought to delve into the details of a highly variable and culturally driven form of participatory programming. For such a nascent and variable program, a novel approach to measuring success was required. This thesis has attempted to present traditional traffic calming as scientific, though potentially overcomplicated, and instead apply the measurement techniques recommended by the world's foremost experts in livability and public space. These methods reflect the idea that each community street painting project will be deliberately unique, in direct contrast to the uniformity of traffic engineering. In this way, these projects call into question deeply held assumptions about transportation planning and safety.

Survey

The results from the survey reinforced the expert opinion that street painting events can be an excellent way to democratize streets and build a community. Responses reflected a strengthened community more concerned with street safety. Creating a culture of safety among a street's most common users (its residents) could potentially make a profound difference in the use of streets, including vehicle speeds. As stated in the results section, many respondents noted safety as a primary reason for participation and implementation of the project.

When solicited for open-ended feedback one participant noted the critical aspect for Neighborway's rapid installation could draw the ire of participants who felt excluded or didn't agree with the project:

> "There's some need to address the schism between neighbors who are involved and those who aren't… I'm uncomfortable doing something which may be a negative, or feel exclusionary, to some people on the street. … We needed a better way to get the approval or blessing or at least acquiescence of everyone on the street, not just the enthusiastic ones."

The ideal scope of approval, whether street, neighborhood, or town should balance this citizen's concerns for highly local approval against the difficulty of obtaining the blessing of 33% of an entire municipality, is endemic of a difficult problem.

The survey also showed that participants were open to further traffic calming implementation, though they remained wary of more aggressive tactics that limited automobiles. Survey respondents were unlikely to favor completely restricting vehicles from the street, but were twice as likely to favor restricting *only* non-resident vehicles.

Observations

Many of the cars that entered the street were residents of the street, and thus stopped as a destination or performed a turn that affected their speed. The speeds collected were exclusively cars that drove the entire length of the street. These tended to be faster than those stopping to park, potentially because they intended to cut through quickly and had no reason to slow, and because they

didn't feel a need to make a street where they did not live and did not know anyone safer through slower speeds. This gave a clearer picture of the behavior of cars most likely to cause a problem, but not necessarily of those that lived on the street. In future research these categories should be separated for speed measurements into cars that cut through entirely and cars that stop and park (this designation was drawn in the behavioral observations, done separately from the pure speed measurements). The use of permanently installed traffic monitoring devices that can measure not only traffic speeds and counts, but other types of street users as well.

Children were seen playing under parental supervision, and independently. In all cases where parents were absent, children stayed on sidewalks and in yards/driveways. Only when parents were present was play in the street allowed. Parents tended to use this time to socialize with each other, occasionally standing in the street and deliberately turning towards motorized traffic when it appeared on the street, other times sitting in driveways and passively socializing while reading, gardening, or washing cars. Observing children's behavior was difficult to do in an inconspicuous manner, especially on a short street where the presence of the researcher could be viewed as obtrusive. In "How to Study Public Life" Jan Gehl (2013) promotes using picture diaries to create narratives about places. Such a technique likely would have proven too intrusive, especially with regard to parents who do not want their children to be photographed.

Another group of street users that was not observed during the designated observation times (which were held relatively constant week over week) were people working in the street. Trash collectors, construction workers, and employees of nearby businesses frequent the sidewalks. At planning meetings, some participants commented on the potential for damage to the project. They noted that they did not want their efforts to be in vain after the mural they painted "was simply dug up by the city", referring to ongoing utility work on their street.

Dissenters made themselves known at the street painting events. Though not formally documented, this researcher did participate in several of the street painting events and planning meetings. In one instance, a woman returning home from the market voiced her disapproval of the aesthetic quality of the bumpout paint. As she tried to get home, she noted that she had no idea this would be happening and that she hoped the painting would be temporary. Several positive interactions between neighbors participating and those that were not participating were noted; however, one interaction between a resident preparing a truck and a participant questioned the necessity of the project. The resident who was not participating drove away saying painting was "dumb" and was politely told by someone who knew him well enough to address him by name that "this is being done to improve safety for my kids" to which he had no response. Regardless of the opinion of residents as to the aesthetics, these conversations are important so that community can be strengthened even in the

face of disagreement. The non-participating resident drove away deliberately carefully.

Expert Interviews

The expert interviews for the traffic calming potential of street murals yielded little potential. Metcalfe (2015) asks this question directly and offers a similarly doubtful perspective, due to the short term nature of these murals. He notes that the fact that murals that have faded away don't bode well for the long term effectiveness of this strategy. However, this may not be a bad thing for traffic calming purposes. If robust programming and fading paint lead to an annual repainting event and renewal of the values of the project, then there may be an ongoing conversation about the intersection that makes it safer.

Raisman reiterated his position that murals are traffic neutral in a forum presentation to the Association of Pedestrian and Bicycle Professionals. It seems that in Portland, OR simply involving the community was not enough to significantly change behavior. The stated purpose of intersection paintings in Portland was to foster community and build neighborhood relationships. Traffic calming seemed to be a foregone conclusion of intersection panting that never materialized. Now dozens of other cities have community street painting projects and several, make reference to the traffic calming effects as a primary reason tom implement them, though few offer data in support of this assertion.

There are several aspects to the intersection repair project that are distinct from the Neighborway project. Notably, the idea of an intersection mural

doesn't seek to create a place where pedestrians can retake priority in the street. An intersection is a more dangerous place for a pedestrian to be and would not be an appropriate place to encourage children's play. In fact, though intersections are typically the site of more automobile, pedestrian, and bicycle accidents in general, more children are injured by cars mid-block than at intersections because they are so strongly discouraged from playing there and because vehicle speeds are lower at intersections. Additionally, low sight lines are generally better at intersections because parking is restricted close to the curb, whereas at mid-block, parked cars can obstruct small children (Appleyard, 1981).

It would be difficult to create a meaningful difference in traffic speeds at an intersection through painting, or striping of any kind for that matter. The Neighborway project, as noted by Tom Bertulis, sees its most robust traffic calming effects when planters are used at the entrance to streets, forcing cars to turn with a larger radius at slower speeds. The ability of striping to calm traffic has been noted by some researchers (Kahn, 2011) and it would be a mistake to dismiss community painting as definitively traffic neutral because it has been utilized primarily at intersections. Peter Furth's interview did shed light on who the intended target audience should be for the Neighborway, but failed to address how a transition from shared street to play street could maintain safety in the context of a typically car oriented neighborhood.

Methodology improvements

The email survey received a much more robust response than canvassing, but canvassing was still included to help offset self-selection bias, though few selected to participate (n=4). Future research into the efficacy of these projects should take a longitudinal approach to assess the ongoing change in behaviors over the long term and during other times of year. Most of the research for this project was taken during summer when non-motorized activity is naturally higher and kids are out of school. Observations and speed measurements were the most time consuming and labor intensive data collection method, and the amount of data gathered reflected that. Speed data was highly objective, but low traffic frequency made its collection rather tedious.

Knowing your neighbors mattered to Appleyard (1981). It was briefly addressed in this research, but future research should measure how safely residents drive on their own street, and number of neighbors known versus speed (at the individual street and neighborhood level). Before and after differences could be more robustly assessed with a longer timeline and a more deliberate observation schedule. Only brief observations of the "before" condition were collected for this research, so a true before and after effect on streets was difficult to assess.

One aspect of Gehl's methodology in *How to Study Public Life* (2013) is "looking for traces" which was only utilized in one instance. Traces typically include desire lines, which are tracks left by pedestrians that typically illustrate the shortest distance travelled between points, and expose the inability of

prescribed paths to effectively contain and control human movement. Fading was observed on one of the murals, but it was only worn where vehicle tire tracks would typically run, so little information about desired paths was gleaned. In one instance, traces revealed evidence of children playing in spaces typically designated for cars. Figure 9 below shows chalk designs from a young artist. While traces were not explicitly sought, this one was specific enough to the project goal of creating safe space for play to include.

Figure 11 Traces of play. Photo credit Pat Kelsey

The presence of a researcher at street painting events was an undeniable confounding factor since introductions were often followed by inquiry as to which house one lived in. This was deemed acceptable since the painting itself was not the subject of observation. It was however, noted conspicuously by a child participant, who seemed appalled that an outsider was allowed to participate. Relationship building was observed forming at various events, but documenting them was not a deliberate part of the observation protocol. Future

research could include study of community connectedness through the use of a social web visualization or house/facial recognition matching activity. This would provide more robust information about the strength of neighborhood connectivity and also reinforce the social capital purposes of the project to its participants. Based on the responses from the survey instrument, the Neighborway project streets tended to beat the national average, but even so the project had a positive effect on the number of Neighbors known.

Conclusion

Design Recommendations

Immediate design recommendations include the implementation of two to three additional murals on already completed “icon only” streets and the addition of planters at all bumpouts. Icon images, such as those found on the less extensive Neighborway installations, should be added to streets throughout any Somerville neighborhoods where sufficient signatures are collected so that more residents can be exposed to the project and its immediate impact potential. These icons are minimal in spatial and financial need, and have significantly less design consideration than a full mural.

Customized sawhorses (which are currently rented from the municipal police department) could be purchased and stored in the home of project leaders who reside on the project streets and used for more frequent street closures. Sawhorses, and other physical assets could act as painting practice canvasses that could be used to teach kids to handle paint.

Figure 12 Kids desperately want to participate in street painting, and should be allowed to. Photo Credit Pat Kelsey

Wider acceptance of alternative striping presents a unique opportunity for images that can appear both artistic and more deliberately calm traffic. As mentioned in the literature review, aesthetically appealing striping patterns that give the impression of narrower streets or those that mimic three dimensional traffic calming devices were rated as more appropriate for slower speeds when presented as images (Kennedy et al, 2005). However, these have not yet been studied and may appear less artistic than desired for a project with the dual aim of slowing traffic and creating a vibrant streetscape appropriate for non-motorized users. A dramatic example of this is pictured below in Figure 14 using elongated images to create the illusion of a child playing in the street to an

approaching vehicle. While these may be dramatic and effective from a traffic calming perspective, they fail to invite pedestrians, bikes and children into the space.

Figure 13 An optical illusion that may focus too much on drivers and not enough of actual children. Photo from Chicago Tribune

Programming Recommendations

The primary programming recommendation is collaboration with an established community resource such as the Somerville Arts Council. Their network of artists and high visibility could provide a more formal outreach process for mural artists and a more robust promotion of the project outside the neighborhood itself.

If the program continues to see success over the next three to four years, the programming policy should move from raising awareness about street safety issues to more concrete actions toward permanent infrastructure and traffic calming. Even though the outcome might look similar to the formal traffic calming process, the process would be more representative due to increased

citizen participation, awareness, and social capital derived from the implementation process.

Painting multiple streets in one Neighborhood on a designated day could mimic a larger area wide street closure, such as a Ciclovia. Somerville has several open streets events, but they are all on main thoroughfares. This would allow children to roam free throughout their neighborhood and could build social connections beyond the street level to the neighborhood and city level as more experienced street painters helped neighbors on streets that were painting for the first time. “NeighborDay”, could showcase the potential atmosphere of a car free or car light district, and also makes semi-permanent design changes towards that end. Integrating this event with the Highland street closure during the city of Somerville’s SomerStreets event is a natural pairing. Temporary street playgrounds have had success in South American cities such as Bogota, as seen in Figure 14.

It is at this point in the evolution of the Neighborway concept that care should be taken to keep control and participation in the hands of the street residents. With more formal programming and resources, there is risk of foregoing citizen participation for the sake of expertise and experience.

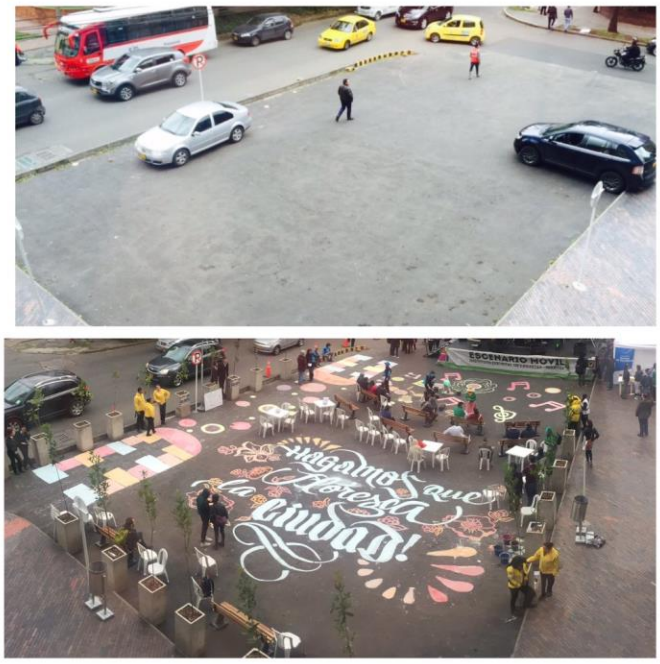

Figure 14 temporary play street in Bogota. Photo Credit: Project for Public Spaces

The five to ten year timeline should include plans for a fully traffic calmed neighborhood greenway. Neighbors in other cities, including Portland are stewards of their greenways, performing the maintenance of plant life and reaping the rewards. In this way, the Neighborway lays the groundwork for a successful traffic calmed neighborhood. The interview with Raisman did reveal that calling these routes “Bike Boulevards” doesn’t do justice to the numerous benefits they bestow upon all road users, and using this name might be less politically inclusive than the Neighborway branding. If this level of intervention is achieved in Somerville it will show that a community driven, scalable model is capable of affecting real change both in the short and long term.

Learning from Existing Street Painting Programs

Several community street painting programs have now been implemented nationwide, and though they differ considerably in scope and design, they share the primary functions of building community, giving ownership of public space to citizens, and raising awareness about traffic safety. The table below (Table 7) details different programs from across the country and give examples of their unique features. The Project for Public Spaces has partnered with UN-Habitat to highlight the Montclair Community Street Quilt project in New Jersey. This street painting project, like the Neighborway, utilizes community assets, gives access to input to residents, and improves the aesthetic and safety of their neighborhood and community. Other projects are also highlighted to represent the diverse array of strategies available to future projects.

Table 7. Street painting projects from around the country. All images from project websites

Program	City	Program Feature	Image
City Repair Project	Portland	Original Street Painting concept, over 150 intersections completed	
Paint the Pavement	Minneapolis	Most robust outreach and easily available application process	
Neighborhood Street Quilt	Montclair	Lowest Cost of implementation	
Paint the Pavement	Boulder	Pilot Program, early stages	
Intersection Painting Project	Fort Lauderdale	Robust grant and business partnership program	
Intersection Painting Program	Seattle	Funding available through Neighborhood Matching Fund	

The Minneapolis Paint the Pavement program showcases a robust outreach and implementation materials which are available online. Appendix C contains their instructions for implementing a street painting in one's own neighborhood. Clear instructions such as this can be used to empower citizens to become leaders in future Neighborway events.

Conclusion

The Neighborway combines effective elements from traffic calming, community engagement, placemaking and tactical urbanism. Through a truly participatory approach, the model gives agency to groups that stand to benefit directly, and the project design has an incredible cost to benefit ratio. This project is profoundly scalable, and is unlike other street design processes in multiple meaningful ways. The primary actors, increased creative freedom, and a focus on process and outcome as equal parts give this model immense potential.

This research has sought to analyze the Neighborway's effectiveness as well create realistic recommendations for achieving the project's goals. The methodology and project participation itself were highly rewarding both intrinsically and academically. The future of street design and allocation of space is only going to become more competitive, and as the nature of transportation changes drastically in the near future, the need for devoting space to automobiles should be deprioritized. When the future threatens to separate people further into smaller, more automated, and more private transportation, a

project that deliberately connects the community and improves public safety across modes is worthy of note.

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Appendix A – Survey Instrument

Help Neighborways Research!

You are being asked to participate in a research study for the UEP (urban and Environmental Policy and Planning) Program at Tufts University. Your responses will be recorded and aggregated. Any questions you do not feel comfortable answering can be omitted from the survey. There will be questions about travel behavior, neighborhood street use and the relationships with your neighborhood.

There are no foreseeable risks to participating in this research and your participation is completely voluntary. Potential benefits of this research are the development of a more robust neighborhood network, the formation of relationships, neighborhood safety and community engagement. The results of this study may be published in a journal or book, but your name and identity will be omitted.

SIGNATURE: I confirm that I understand the purpose of the research and the study procedures. I understand that I may ask questions at any time and can withdraw my participation without prejudice. I have read this consent form. My signature below indicates my willingness to participate in this study.

_____
_____
Signature
Date

1 of 3: About you…

Are you 18 years of age or older?

How many Neighborways events have you attended?

_____

What do you think the goal(s) of Neighborways are?

_____
_____
_____

What is your primary interest in participating in the Neighborway project?

_____
_____
_____

How was your experience on painting day?

_____
_____
_____

Did you meet new neighbors? If yes, how many?
_____

About how many friends or neighbors did you know on the street prior to painting?
_____

2 of 3: About the Project…

Do you feel the street is better than it was before?
_____

Are you aware of any differences in:
Driver behavior/volume?_____
Cyclist behavior/volume?_____
Pedestrian behavior/volume?_____
Explain:_____
_____
_____

What has been the biggest change on the street?
_____
_____
_____

What changes would you like to see in the future?
_____
_____
_____

Do you think the neighborhood can sustain a project like the Neighborway?_____
(with things like repainting and planter maintenance)

Would you be willing to provide or organize ongoing support for a project like this?
_____
(this is completely non-committal)

Do you have any other feedback for the Neighborways project?
(100% open response)

_____
_____
_____
_____

3 of 3: About the Neighborhood…

If you live NEARBY:
On a scale of 1 (not more connected) to 10 very much more connected. How much more connected are you to your City/ Neighborhood?

If you live ON Willoughby answer these:
On a scale of 1 (not more connected) to 10 very much more connected. How much more connected are you to your street?
1 2 3 4 5 6 7 8 9 10

Does your street feel any different now? How so?
_____
_____
_____
_____

Does the neighborhood/ City overall feel any different now? How so?
_____
_____
_____

Do you or your family members use the Neighborhood streets differently now? How so?
_____
_____
_____
_____

Rate your level of support for further changes to the streets that limit automobile access such as

Reduced parking?

1 2 3 4 5 6 7 8 9 10

Turning restrictions?

1 2 3 4 5 6 7 8 9 10

Restricting automobiles entirely from your street?

1 2 3 4 5 6 7 8 9 10

Restricting automobiles except for residents?

1 2 3 4 5 6 7 8 9 10

Appendix B

Neighborway Behavioral Observation Diary (Non-Motorized Users)

Street:_____ Date:_____
Time:_____

Weather:_____

Pedestrians (sidewalk only)	**Dog walkers**

Joggers	**Kids Playing**	
Interaction with Mural	**Crossed Street (away from crosswalk)**	
Bikes **Conflict avoided**	**Conversations** **Short** **(>1:00m)**	**Conversation** **Long** **(>1:00m)**

Neighborway Behavioral Observation Diary (Motorized Users)

Street:_____ Date:_____
Time:_____

Weather:_____

Total Count	**Conflict** **Avoidance**

Bumpout Fail	Bumpout Success
Cut Through Traffic	Arrival/Departure From Parking Space

PAINT THE PAVEMENT APPLICATION FORM

Date Submitted _____

Title of Project _____

_____

Applicant Name _____

_____

Address _____

City/State/Zip _____

Phone (day) _____

Phone (eve) _____

Email address _____

Short Description of Project

A. **Proposed Intersection:** Which intersections are you proposing to paint? (Include streets that form the intersection, (s) and/or adjacent address(es).) Why were these intersections chosen?

B. **Artist Selection:** How was/were the artist/artists selected for your project? What criteria did you use for this selection? Who was the selection panel for the project?

C. **Design Development:** What was the process for developing the design(s)? Was the community involved? If the process involves youth working with the artist(s) to develop the design, how have they been trained or educated? What are the themes and ideas represented in the design(s)? How do these themes relate to the site, design of adjacent sites and the community? (Note: if you have approval to submit this application prior to having a complete design, please submit information on how you plan to do the above.)

D. **Community Involvement:** What was the process for notifying and engaging the community, both in planning the project and, if appropriate, creating the artwork

E. **Who will be doing the painting?** Include information on who will be working with the artist to paint the project (e.g., youth—including ages, neighborhood residents, etc.). How are these participants being identified and selected? What materials will you be using? Include information about why these materials were selected, safety precautions that will be taken and method(s) of safely deposing of materials.

F. **Materials:** What materials will you be using? (Note: only latex paint is allowed for intersection painting.) Include information about why these materials were selected, safety precautions that will be taken and method of safely deposing of materials.

G. **Timeline:** What is your timeline? Include milestones for artist selection, design, fabrication, community engagement, publicity, approvals, installation and celebration.

H. **Maintenance:** What are your plans for ongoing maintenance and final removal? What is needed for maintenance? Who have you consulted in estimating these needs (i.e. art conservator, fabricator, artist)? Who will be conducting maintenance and graffiti removal? How often do you estimate that maintenance will need to occur? How quickly can you respond to requests for graffiti removal? (If you have a maintenance plan, please attach it. The City does not fund ongoing maintenance or removal for such projects).

I. **Copyright:** What is your copyright agreement with the artist? (If you do not have a copyright agreement with the artist, an example is attached.)

J. **Traffic Management:** What are your detailed plans for staffing and logistics for managing traffic during installation? Who is responsible for traffic management during the activity? How will this ensure the safety of the participants?

K. **Public Education**: How will the public be informed about the project? Will there be a plaque-like acknowledgement near the site? Is their information on your website?

Project Budget: What is your project budget? (Note: Although the City does not fund such projects, the City does require a budget submittal as a demonstration that the applicant has the capacity to implement the project, has

raised the necessary funds and has budgeted for artist fees, insurance and ongoing maintenance.) Include the following information, and include in-kind contributions for key required items.

Artist Fees: _____

Materials/Fabrication: _____

Installation: _____

Liability Insurance: _____

Maintenance: _____

Other: _____

L. **Attachments:** Do not forget to include the other required forms and attachments with your application, and to combine them in one PDF document.
   - Images of the final design
   - Resumes of participating artists
   - Letter of support from neighborhood organization(s) or Special Service District.
   - For applicants with previous permits: Photos documenting current condition of the artwork(s)
   - VARA Waiver signed by each artist

I/We understand that the materials we submit are public information under the Minnesota Government Data Practices Act and may be shared by the City of Minneapolis with members of the public or the media for informational purposes or as otherwise required by the Data Practices Act. Accordingly, I/we hereby grant a non-exclusive license to the City of Minneapolis to make and distribute a limited number of copies of the submitted materials for the purposes of information and/or evaluation of the Project, or as required by the Data Practices Act.

_____

_____

Signature of Applicant

Date

WAIVER OF RIGHTS PURSUANT TO THE VISUAL ARTISTS RIGHTS ACT

I, _____, have prepared designs for the following art work:

(specifically identify the work)

The above-described work may be considered to be a "work of visual art" subject to the provisions of the federal Visual Artists Rights Act of 1990, specifically the rights of certain authors to attribution and integrity, as codified at 17 U.S.C. §106A(a). I am an author of the work(s) described herein, and am authorized to waive the rights conferred by §106A(a), in accordance with the waiver provision of 17 U.S.C. §106A(e)(1).

STATUTORY PROVISIONS

17 U.S.C. §106A - Rights of certain authors to attribution and integrity.

(a) Rights of Attribution and Integrity. -

Subject to section 107 and independent of the exclusive rights provided in section 106, the author of a work of visual art –

(1) shall have the right -

(A) to claim authorship of that work, and

(B) to prevent the use of his or her name as the author of any work of visual art which he or she did not create;

(2) shall have the right to prevent the use of his or her name as the author of the work of visual art in the event of a distortion, mutilation, or other modification of the work which would be prejudicial to his or her honor or reputation; and

(3) subject to the limitations set forth in section 113(d), shall have the right -

(A) to prevent any intentional distortion, mutilation, or other modification of that work which would be prejudicial to his or her honor or reputation, and any intentional distortion, mutilation, or modification of that work is a violation of that right, and

(B) to prevent any destruction of a work of recognized stature, and any intentional or grossly negligent destruction of that work is a violation of that right.

17 U.S.C. §106A(e)(1) – Transfer and waiver.

The rights conferred by subsection (a) may not be transferred, but those rights may be waived if the author expressly agrees to such waiver in a written instrument signed by the author. Such instrument shall specifically identify the work, and uses of that work, to which the waiver applies, and the waiver shall apply only to the work and uses so identified. In the case of a joint work prepared by two or more authors, a waiver of rights under this paragraph made by one such author waives such rights for all such authors.

WAIVER

As author of the above-described work, I hereby permanently waive my rights pursuant to 17 U.S.C. §106A(a)(3) to prevent any distortion, mutilation, modification or destruction of that work, for whatever reason and for whatever use of the work such distortion, mutilation, modification or destruction of the work is undertaken. This waiver does not extend to the rights of attribution conferred by 17.U.S.C. §106A(a)(1) or §106A(a)(2).

Date _____ _____

Artist

_____

ART CONSENT FOR PUBLIC ART ON SIDEWALK OR STREET

The following Organization has requested that the City of Minneapolis approve a Public Art Project and be subsequently issued a City Encroachment Permit. The Organization has requested that the Public Art be installed on the street that is adjacent to your property.

Name of Organization: _____

Address: __

Telephone No: _____

Contact Person: _____

By signing in the space provided below, the property owner agrees and consents to allow the Organization to apply artwork to the street adjacent to their property.

Property Owner (print): _____

Property Address:_____

Signature: _

Date:_____

Property Owner (print):_____

Property Address: _____

Signature: _