

Training Wheels:

Designing Traffic Playscapes into Seattle's Safe Routes to School Program

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ABSTRACT

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Safe Routes to School (SRTS) is the nation’s leading program for creating safe environments for children to walk and bike to school. Across federal, state, and local levels, the program focuses on the “6 E’s” (education, enforcement, encouragement, engineering, evaluation, and equity) as a multi-pronged framework to guide strategies within neighborhoods. Engineering values are expressed spatially through traffic safety infrastructure like bicycle lanes, sidewalks, and traffic signals. Meanwhile, the other five values are predominantly non-spatial and expressed through campaigns, workshops, and community events. What emerges from SRTS programs are comprehensive packages of infrastructure and programmatic strategies that vary for each participating school based on funding and need.

While SRTS initiatives address both infrastructural and behavioral challenges to safer walking and biking, these efforts are imbalanced. A larger percentage of funding is devoted to engineering projects that provide improved traffic safety infrastructure, while the quality of applications for funding non-spatial projects has declined. Major engineering improvements primarily take place on streets while other types of public and private neighborhood lands could also contribute to traffic safety. Because all “6 E’s” are critical to the program’s mission, this thesis proposes an evolution of the SRTS framework to redistribute program values more equally in future

efforts. Infrastructure projects can move beyond engineering safer streets, and place greater value toward education, encouragement, enforcement, evaluation, and equity being represented within the design process.

This thesis introduces traffic playscapes as a design strategy that supports the integration of values, approaches, and strategies within Seattle’s SRTS program. While these landscapes have not yet been implemented through SRTS, they appear in numerous cities around the world. Traffic playscapes are landscapes where children playfully engage with simulated road conditions to promote walking, biking, and safe commuting behaviors. Separated from city streets, they are designed to simulate characteristics of the local transportation network. By including newly implemented SRTS infrastructure and programming in their design, traffic playscapes help students build familiarity and reinforce safe commuting practices instilled through SRTS. This thesis provides a program-wide methodology for designing and implementing traffic playscapes through SRTS. A site design concept is prototyped at South Shore K-8, a school in Seattle’s Rainier Valley that completed a SRTS program in 2013-2015. The prototype utilizes a design approach that translates neighborhood characteristics and SRTS efforts into integrated design elements that reflect the commuting environment and youth needs.

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I would like to thank the many people who have supported my growth as a landscape architect and urban designer ever since I embarked on this journey seven years ago as a curious, yet apprehensive design student. This thesis reflects a longtime fascination with how people move through cities, and I am grateful to have discovered transportation planning and urban design as something I want to continue exploring for years to come.

I would especially like to thank Professor Rachel Berney and Professor Ken Yocom for their mentorship and curiosity as my thesis advisors; my parents who have tirelessly supported my pursuit of higher education; my friend Corina Velazco for her long-distance support from California; and numerous colleagues from the College of Built Environments who helped shape my thesis ideas during our coffee chats and brunchtime excursions. Of my fellow student peers, I would like to give a special shoutout to Annegret Nautsch for providing feedback on my thesis drafts over German and Filipino baked goods. It goes without saying: thesis is *always* better when carbohydrates and sugars are involved.

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LIST OF ABBREVIATIONS

BMP = Seattle Bicycle Master Plan

FHWA = Federal Highway Administration

GIS = Geographic Information Systems

MPH = Miles per Hour

PMP = Seattle Pedestrian Master Plan

SCL = Safe Routes to School

SDOT = Seattle Department of Transportation

SNG = Seattle Neighborhood Greenways

SPD = Seattle Police Department

SPS = Seattle Public Schools

SRTS = Safe Routes to School

WSDOT = Washington State Department of Transportation

The image features a teal background with a large, light-teal graphic of a wheel or gear on the left side. The wheel has a central hub and several spokes radiating outwards. In the center of the wheel, the word "CHAPTER" is written in a bold, white, sans-serif font, followed by a large, white, sans-serif number "1".

CHAPTER 1

CHAPTER ONE:

Introduction

State of Youth Commuting in Seattle

The prioritization of youth traffic safety has been a key component in Seattle transportation policy. The city focused on traffic safety efforts as early as the 1960s, developing grassroots initiatives such as safe walking route maps as a resource for guiding non-motorized commute trips. Today, a number of voter-approved levies have dedicated funding from federal, state, and local levels toward safety improvements (Seattle Department of Transportation, 2015). There has been a history of coordination between allied disciplines to advocate for improved infrastructure and traffic safety services. Representatives from Seattle Public Schools, Seattle Department of Transportation (SDOT), Seattle Police Department (SPD), King County Metro, and numerous advocacy organizations and families (Seattle Department of Transportation, 2015) are key players in these discussions. There is also a large amount of dedicated infrastructure for students who choose to commute on foot and bike. The Seattle Bicycle Master Plan (BMP) identifies over 600 miles of existing and future bicycle facility, and nearly half of Seattle's bicycle network is exclusively off-street and separated from vehicular traffic; while the Seattle Pedestrian Master Plan (PMP) establishes projects and policies for enhancing pedestrian safety and access.

Nonetheless, the perceived danger of walking and biking is a challenge for students commuting to school. A Safe Routes to School (SRTS) survey in 2004 reported that 30% of parents consider traffic-related dangers to be a barrier for kids walking to and from school (McDonald & Aalborg, 2009), and this concern is supported by literature highlighting the danger of motorized vehicle interactions with pedestrians and cyclists. Baseline surveys for schools initiating SRTS programs in Seattle show that these concerns continue to dominate as a majority of trips reported continue to be made by personal vehicle.

In terms of the safety implications of poor travel behaviors, SDOT (2015) reported that speeds of 30-40 miles per hour (MPH) result in less than 20% of drivers yielding to pedestrians and bicyclists. Additionally, drivers possess a limited field of vision, and pedestrians have a 50% survival rate when hit by a vehicle at 30 MPH and a 10% survival rate at 40 MPH (see **Figure 1.1**). For youth, the physical impact of a vehicle collision increases the likelihood of serious harm. Contributing factors to vehicular collisions are often outside of the pedestrian's or cyclist's control. According to Seattle Vision Zero (2016), between 10-20% of collisions involving fatalities and serious injuries were a result of a driver not granting right-of-way to a pedestrian or because of alcohol influence. Inattention has also been cited as a top contributing factor for cyclists, pedestrians, and drivers,

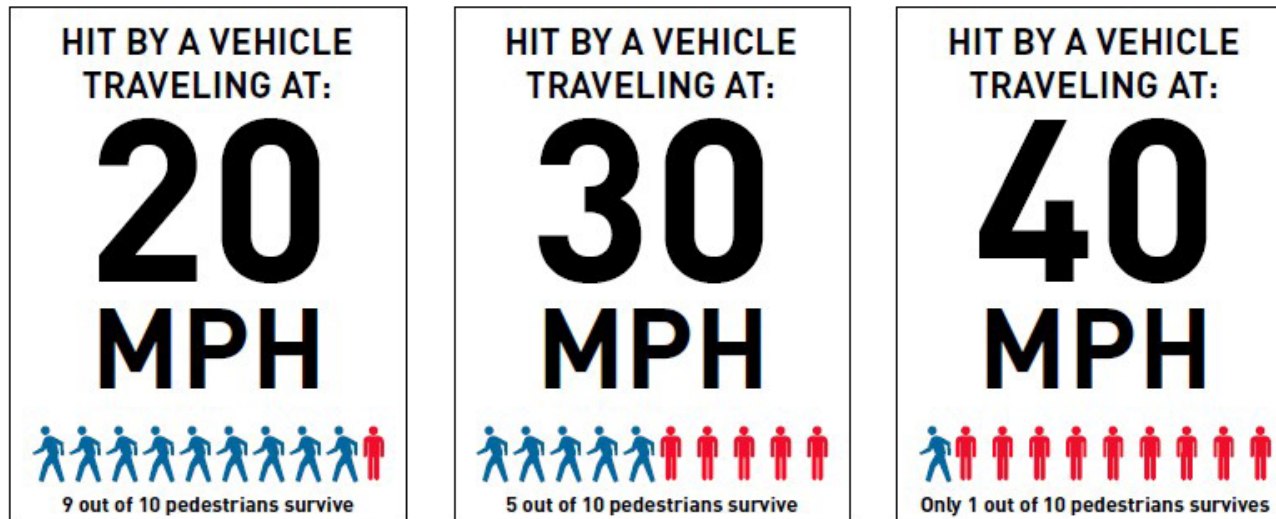


Figure 1.1: Odds of survival at different vehicular traveling speeds (Source: Seattle Department of Transportation, 2016)

attributing to nearly 30% of all collisions involving fatalities and serious injuries.

Youth are also at a developmental stage where they are subject to poor judgments when responding to their environment, including perception of direction and sound, use of traffic control devices, identification of safety gaps in traffic, etc. (Federal Highway Administration, 2008). These behaviors add to the body of concern regarding youth commuting.

Safe Routes to School (SRTS) as a Movement

Safe Routes to School (SRTS) was officially launched in 1997 as a pilot program in New York to spur federal legislation and dialogue regarding the safety of children walking and bicycling to school, and it launched as a national program impacting all states in 2005. SRTS proponents believe that supporting healthy and active communities starts with walking and biking to school. Progress is built through a network of organizations, government agencies, and professional groups that set goals, develop best practices, acquire funding, and disseminate

educational materials (see **Figure 1.2**). Federal SRTS funds from the Federal Highway Administration (FHWA) have been allocated to all fifty U.S. states for both infrastructure and non-infrastructure initiatives. Each state hires a Safe Routes to School coordinator to bridge local efforts with federal guidance and regulations. The program expanded in 2012 when the U.S. Congress passed the Moving Ahead for Progress in the 21st Century (MAP-21), allowing SRTS activities to compete for funding from other federal programs and organizations as well. With modern SRTS efforts supported by an expansive professional network and multiple funding streams, many states have centered efforts around the “6 E’s” as a multi-pronged framework to guide a comprehensive SRTS initiative that improves both the physical environment and commuting behaviors. These core tenets are defined by the Safe Routes to School National Partnership as:

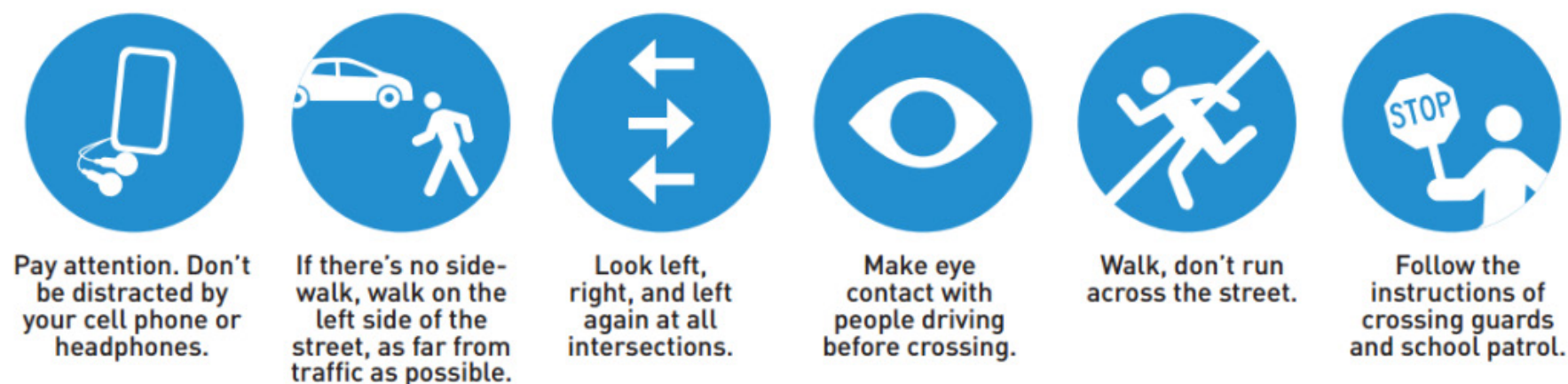


Figure 1.2: Safety recommendations for students and parents during school commutes (Source: Seattle Department of Transportation, 2015)

“Evaluation: Long-term Safe Routes to School programs should kick-off with a thorough evaluation of the situation at the school or district.

Engineering: Often, during the evaluation process, survey data will indicate that there are significant concerns about the designs of streets, intersections, lack of sidewalks/crosswalks/signage or poorly timed traffic lights.

Education: A focus on education is always an important component for programs that seek to alter cultural norms. As Safe Routes to School is multi-disciplinary in nature, there are vast opportunities for educational outreach to students, parents, school staff and the community.

Encouragement: Partner with local law enforcement to ensure that traffic laws are obeyed in the vicinity of schools (this includes enforcement of speeds, yielding to pedestrians in crosswalks and proper walking and bicycling behaviors) and initiating community enforcement such as crossing guard programs and student safety patrols.

Enforcement: Partner with local law enforcement to ensure that traffic laws are obeyed in the vicinity of schools (this includes enforcement of speeds, yielding to pedestrians in crosswalks and proper walking and bicycling behaviors) and initiating community enforcement such as crossing guard programs and student safety patrols.

Equity: Work to support safe, active, and healthy opportunities for children and adults in low-income communities, communities of color, and beyond. Incorporate equity concerns throughout the other E's to understand and address obstacles, create access, and ensure safe and equitable outcomes.”

Source: Safe Routes to School National Partnership, n.d.

Despite operating on a national model, each SRTS program is based on state and local policies and conditions. Some schools have very few or no students that make use of great walking and bicycle infrastructure while other schools have students that walk and bike to school on inadequate street conditions. These nuances are reflected in both state and local approaches to funding, prioritizing which schools and projects are selected to participate, and which stakeholders are involved in the implementation of different strategies.

Washington State Department of Transportation

The State of Washington has actively participated in its Safe Routes to School program (W-SRTS) since 2004. Between 2005 and 2013, the Washington State Department of Transportation

(WSDOT) made \$51 million in funds available to local agencies for 138 safety projects that include pedestrian/bicycle paths, sidewalks, and other street improvements (WSDOT, 2015). They allocate funding through a competitive application process that ensures that approved projects are comprehensive and address local need, with a two-year funding cycle for proposed projects.

In the ongoing 2015-2017 cycle, there has been approximately \$10 million in funding for projects (WSDOT, 2015). Meanwhile, with the completion of the 2013-2015 cycle, WSDOT has begun to evaluate the decade-long performance of the program by factoring in the latest cycle in its reporting. Statewide, WSDOT (2012) reported that there was an average increase of 20% in the number of children walking and biking to school, a completion of 75,000 additional feet of sidewalk near schools, a reduction in motorist travel speeds and traffic citations in school zones, an increased student compliance with safe crossing behaviors, and zero collisions at completed project locations.

Seattle Department of Transportation

Beginning with the voter-approved Bridging the Gap levy in 2006, local SRTS efforts have been institutionalized and managed under the Seattle Department of Transportation (SDOT). They use a similar framework as its national counterpart with a five-prong “5 E’s” approach: engineering, education, encouragement, enforcement, and evaluation. The 6th “E”, equity, is expected to be operationalized within all of Seattle’s traffic safety efforts. At this level, funding opportunities for projects in Seattle are diverse; they include SDOT mini-grants for safety encouragement activities (student patrols, crossing flags, bike rodeos, etc.), a Neighborhood Park and Street fund for physical infrastructure improvements, a Department of Neighborhoods matching fund that covers a variety of project scales, and Washington Traffic Safety Commission grants. Opportunities for funding and new project ideas have also emerged from

partnerships with other Seattle departments or Sound Transit to work within their right-of-way, as well as coordination with Seattle Public Schools for school capital project bonds that go toward neighborhood improvements around the school.

Seattle SRTS operates amongst other SDOT policy documents. It is closely tied into Vision Zero, an initiative which aims to reduce traffic deaths and serious injuries to zero by 2030, and a 5-year SRTS action plan has been developed in conjunction with Vision Zero. According to the action plan, 84% of K-12 students live inside a walk zone (SDOT, 2015), which makes targeted improvements near schools a key step in achieving both Vision Zero and SRTS goals simultaneously. These efforts are also integrated with SDOT’s broader policy frameworks; particularly the Bicycle Master Plan and Pedestrian Master Plan, both of which have been updated within the last few years. These two documents provide an overall vision and set of priorities and objectives for creating a safer and more connected active transportation network (see **Figure 1.3**).

Recent Grants

Supported by a grant from WSDOT, SDOT and Seattle Public Schools (SPS) partnered with multiple advocacy organizations and consultants between 2013-2015 to provide engineering improvements and education, encouragement, and evaluation services to four public schools: Greenwood Elementary, Mercer Middle School, South Shore K-8, and Wedgwood Elementary. With the completion of this project development cycle, an evaluation has been performed to measure the performance of these projects in relation to SRTS goals. For the ongoing 2015-2017 cycle, there is a mix of funded projects and contingency projects that will be considered upon available funding.

The Future of SRTS: A Critical Stance

Designing built environments has been a critical component of SRTS since its creation. Coordinated efforts between engineering firms, design firms, school districts, advocacy organizations, and city agencies help develop the infrastructure necessary to promote walking and biking to school. While SRTS operates within a “6 E’s” framework, different elements of this program framework are parsed out into packages that are made up of separate spatial and non-spatial initiatives. The engineering component focuses on transportation infrastructure to ensure that facilities create a safe experience on streets connecting schools and neighborhoods. All Seattle SRTS projects in the last two funding cycles proposed improvements to street and trail infrastructure: sidewalks, crosswalks, traffic management technology, lighting, storm water management, etc. Meanwhile, elements of education, encouragement, and enforcement are predominantly non-spatial and met through campaigns, workshops, and events.

Separating out strategies in this manner has been codified within SRTS, with federal law requiring that 70-90% of SRTS funds go toward infrastructure projects while the remaining 10-30% go toward non-infrastructure activities (Safe Routes Partnership, n.d.). The implications of this funding allocation are reflected in the poor quality of recent non-infrastructure funding applications, despite being a critical element of SRTS success. With less funds going toward education, enforcement, and encouragement efforts already, it reinforces that these values are becoming increasingly separated and secondary to engineering efforts (Safe Routes Partnership, n.d.).

This thesis offers an evolved SRTS framework that positions non-infrastructure values and practices equally with engineering values and practices (see **Figures 1.5 & 1.6**); recognizing that engineering interventions are more costly to

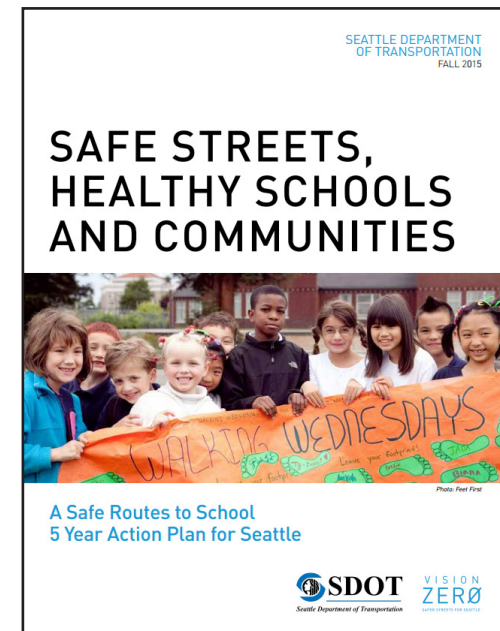
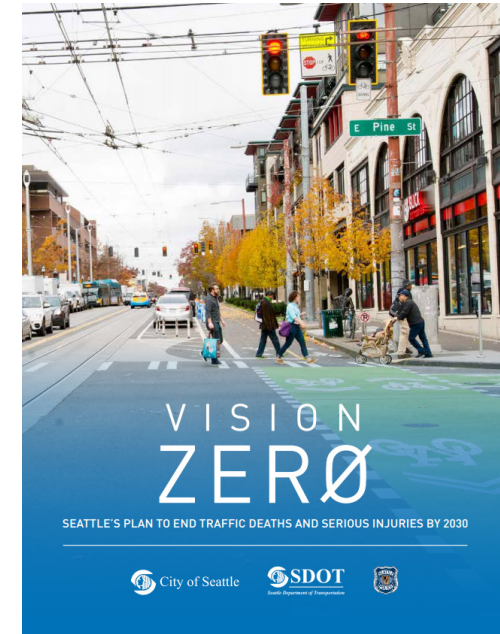
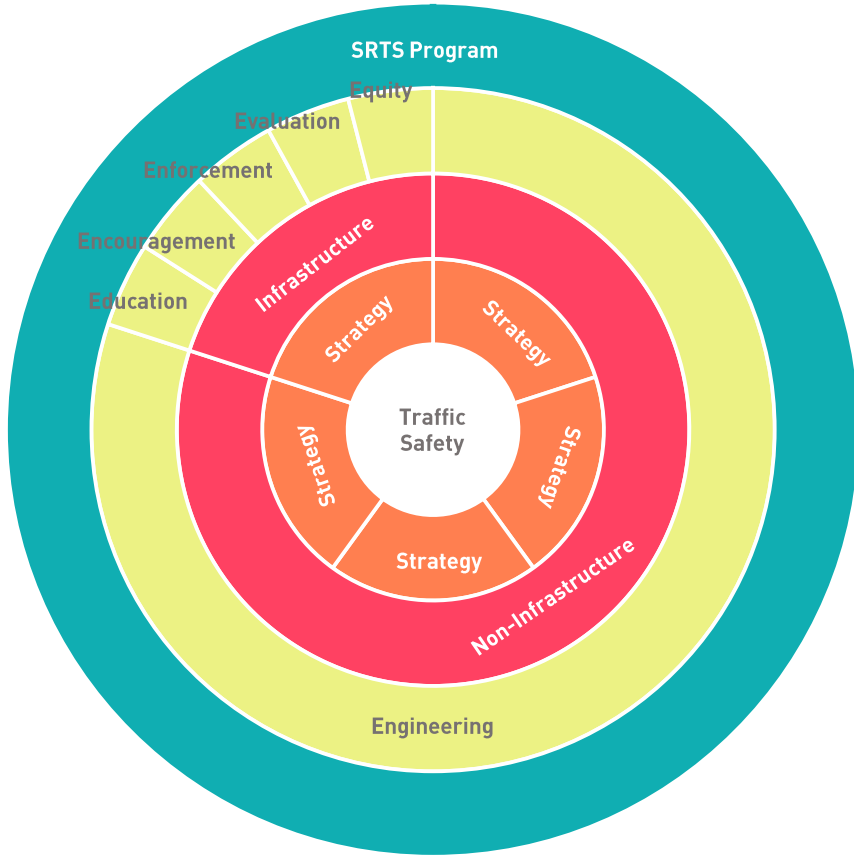


Figure 1.3: Existing traffic safety policy documents supporting SRTS efforts (Source: Seattle Department of Transportation, 2016)

Existing SRTS Framework



Package of Strategies Approach

Proposed SRTS Framework



Integrated Interventions Approach

Figure 1.4: Conceptual model (left) of how different parts of the SRTS program are weighted in terms of effort & funding. The proposed framework (right) shows equal representation of SRTS values, an integration of program components, and strategies helping inform a specific strategy -- the traffic playscape -- to achieve SRTS' mission of traffic safety. (Source: Author)

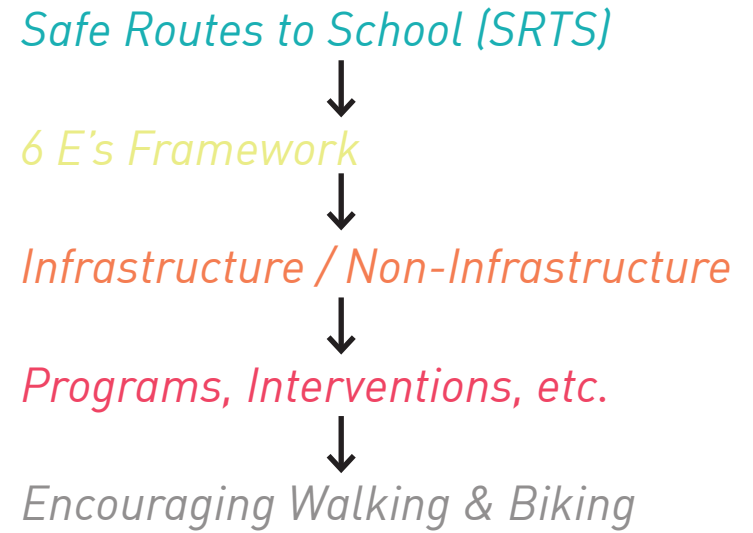


Figure 1.5: A key illustrating each ring of the framework model. The outermost ring represents the program (SRTS), the innermost ring represents its mission (promoting walking and biking to school through traffic safety), and the rings in between represent the steps for the program to fulfill its mission. Traffic playscapes represent a viable strategy when values and approaches are re-prioritized to place equal weight on the “6 E’s” and the types of projects pursued.

implement since they are physical and often large-scaled built objects. To this end, I propose opportunities for engineered interventions that contain education, encouragement, enforcement, evaluation, and equity embedded in its design, allowing for the integration of “6 E” values.

This framework additionally proposes for interventions that shift away from traffic safety being designed predominantly into streets, as seen in existing engineering strategies. SRTS goals can be accomplished on other types of land opportunities linked to school and commuting network, which adds greater flexibility to promote traffic safety strategies in different areas of the built environment. Aligned with family safety concerns, streets are perceived as unsafe places to apply traffic safety for inexperienced active transportation users, and opportunities can be made available to apply skills in a separated learning space.

Finally, this framework explores other contexts for increasing participation in active transportation modes that aren't traditionally identified in the current SRTS program. While there has been an increase in children walking and biking to school, there are still contributing factors for students choosing not to walk or bike. Many SRTS programs have excelled in engaging communities to identify concerns from an infrastructural and behavioral perspective. Yet, an expanded view of other factors that influence walking and biking choice can provide more creative approaches for promoting participation.

The Continued Role of Play in SRTS

SRTS strategies use play as an incentive to attract young students to walk and bike to school. Educational efforts are achieved with interactive games on the street or playground. Encouragement efforts are achieved with colorful promotional materials (stickers, buttons, etc.) that students can wear to show their participation. Engineering efforts reclaim

automobile-oriented streets as shared spaces, allowing walking, biking, and playing on a street to become safer acts. In addition, play serves as a community catalyst that promotes social interaction within public spaces in ways that cannot be achieved if a child is sitting in a car.

In 2012, Seattle Neighborhood Greenways (SNG) distributed a memo titled “Time for a Seattle Children’s Safety Garden”. In this document, they made the first recorded case for traffic playscapes in Seattle to teach children about traffic safety through play. They described “safety gardens” as playgrounds that simulate a variety of road conditions for cyclists, pedestrians, and automobile drivers by using miniature versions of streets, traffic lights, crosswalks, bikes and human-powered cars, and other streetscape elements. The social interactions, active movement, and sensory qualities within these landscapes mimic the interactive qualities of the quintessential playground. Instead of swings, ladders, and slides, children are provided with miniature transportation play elements. Yet, they serve an educational purpose of imitating real-life traffic scenarios and allowing for creative problem-solving and growth.

SNG cited European cities as exemplary educational models that prioritize traffic safety within childhood curricula by using these landscapes as outdoor classrooms (see **Figure 1.6**). As a relatively new concept in the United States, the memo provided a road map for how these safety gardens could be realized within Seattle. It listed public agencies, advocacy organizations, and educational partners that could be engaged in the process. Following this memo, they applied for the Seattle Parks Opportunity Fund to implement a \$1.5 million children’s safety garden in Southeast Seattle’s Genesee Park. In addition to traffic safety, the proposed garden would provide park activation, new programming for the nearby Rainier Community Center, and a stronger sense of community (Seattle Greenways, 2012). While



Figure 1.6: Utrecht Traffic Garden in Utrecht, The Netherlands (Source: STREETFILMS, 2011)

the proposal identified partners to support this project, this proposed safety garden did not come to fruition.

Dedicated playscapes for traffic safety remained under the radar compared to other small-scale transportation safety infrastructure projects. The Cascade Bicycle Club launched their Capital Campaign in 2015, resulting in the organization raising over \$2 million for expanding their facilities in Magnuson Park and furthering their mission of improving lives through bicycling. Part of this expansion included the “Cascade Traffic Gardens”, described as European-style community spaces for people to learn the rules of the road. This fundraising effort subsequently led to collaboration between King County Parks, White Center CDA, YES Foundation, and other community partners to build Washington State’s first traffic garden in Dick Thurnau Memorial Park in White Center. It is a newer strategy that is continuing to be operationalized within Seattle, yet embodies the spirit of combined play and learning seen across multiple SRTS strategies. The emergence of this particular intervention provides an opportunity to explore new frameworks for collaboration, implementation, and goal-setting within SRTS.



Research Questions

In the preceding sections, I presented four threads that impact both the current state and potential trajectories for SRTS programs in Seattle, and inform my own critical stance on the relationship between traffic safety and the built environment:

- **Integration of SRTS Values:** Comprehensive SRTS strategies need to integrate all tenets of the “6 E’s” framework to allow for non-infrastructural and infrastructural interventions to operate in tandem, and also strengthen the declining quality of non-infrastructural project applications.
- **Safe, Fulfilling Learning Environments:** Comprehensive SRTS strategies need to extend beyond the road network and see other land types as opportunities to promote traffic safety, especially since streets are perceived as unsettling environments for applying traffic safety skills.
- **Expanded Response to Context:** SRTS strategies need to continue striving toward understanding larger contextual factors that influence decisions to walk and bike to increase participation.
- **Places for Play:** Play needs to remain a critical element in future SRTS efforts as a major attractor for youth and a universal community catalyst.

Traffic playscapes (also referred to as “safety gardens” or “traffic playgrounds”) are globally implemented traffic safety interventions that can serve as a SRTS strategy that responds to different facets of traffic safety in Seattle. Traffic playscapes build off of decades of advocacy and collaboration by diverse stakeholder groups. The research questions posed in this thesis focus on how a traffic playscape may be designed and codified into an evolved SRTS framework as a catalyst project that is part of the suite of strategies the program currently funds. To build a case showing that such an intervention responds appropriately to SRTS needs and visions, this thesis asks four questions that corresponds to the threads stated above:

- 1) How does creating a traffic playscape augment existing SRTS efforts at participating schools, and reflect the integration of all tenets of the “6 E”s framework?
- 2) How can the design of traffic playscapes introduce new methods for understanding neighborhood and transportation contexts that influence traffic safety?
- 3) How can a traffic playscape take advantage of unique land development opportunities that allow traffic safety to occur in a comfortable environment?
- 4) How can a traffic playscape respond to the particular design and transportation needs of youth transportation users?

Case Study Approach

Based on the availability of data from the 2013-2015 round of SRTS program funding and comparable conditions Rainier Valley, these research questions are applied to two schools in Southeast Seattle: Asa Mercer Middle School in Beacon Hill and South Shore K-8 in Rainier Beach. Both schools are located adjacent to the City Light Utility Corridor, a 14-mile transmission line right-of-way owned and maintained by Seattle City Light (see **Figure 1.7**), where the traffic playscape framework will be

tested. Ultimately, the goal of this evolved SRTS framework is to provide a program-wide methodology for assessing different components of the school and neighborhood environment, and translating them into design strategies achieving SRTS goals and values. Likewise, it allows SRTS program administrators to test the possibility of including traffic playscapes as a project that supports SRTS’ existing strategies.

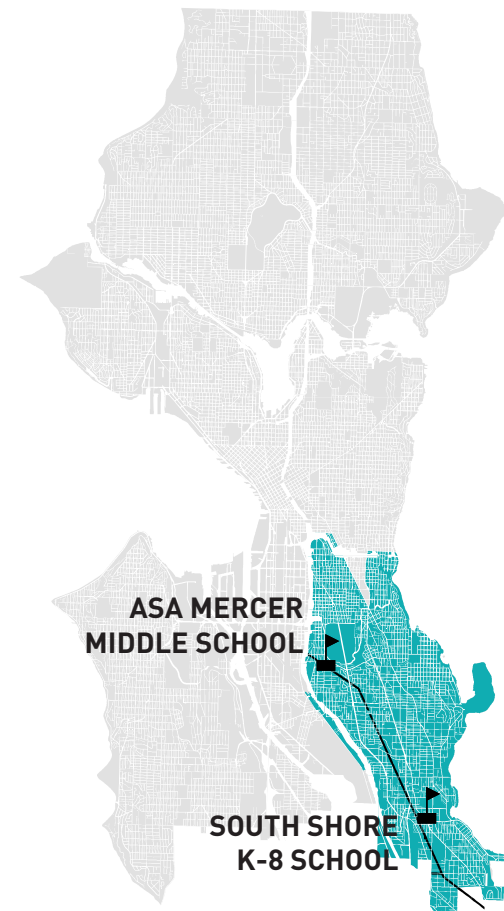


Figure 1.7: Neighborhoods in Southeast Seattle are highlighted in teal, with the two case study schools symbolized on the map. The City Light Utility Corridor is symbolized by a black line. (Source: Author)

Road Map

This thesis provides a set of tools to help guide a multi-faceted design approach for visioning traffic playscapes as a project within the SRTS program.

In **Chapter Two: Literature Review**, I review existing literature on best practices of Safe Routes to School. Strategies that have been implemented in other SRTS programs are distilled into foundational concepts that should continue to be reflected in future SRTS strategies. The literature review also provides a theoretical understanding of design considerations that define youth-based traffic safety movements.

In **Chapter Three: Design Case Studies**, I present a global set of design case studies where traffic playscapes are an integral component of local traffic safety. I describe how specific principles from the literature review are reflected in the design choices of these landscapes, as well as how these landscapes respond to the local transportation and network context. These global design case studies also provides best practices for evolving the current demonstration traffic playscapes in Seattle into more permanent fixtures within the built environment.

In **Chapter Four: Seattle SRTS: Assessment Tools**, I provide an overview of SRTS program outcomes at two Seattle Public Schools, Asa Mercer Middle School & South Shore K-8. Existing school conditions and attitudes toward walking and biking will provide one area of assessment for testing a traffic playscape design approach that synergizes with improvements identified in their SRTS programs.

In **Chapter Five: Existing Conditions Assessment**, I look at three additional areas of assessment within the neighborhood that shape my design approach for traffic playscapes within the SRTS program. I conduct a multimodal assessment of transportation

network characteristics to determine key relationships between school, site, and neighborhood. I conduct an assessment of viable land opportunities outside of the transportation network, and evaluate its design potential for a traffic playscape based on existing conditions. Lastly, I compile a visual inventory of transportation safety infrastructure and streetscape characteristics. The combination of these neighborhood assessments will provide insight into additional contextual factors that aren't explored in current SRTS frameworks.

In **Chapter Six: Design Prototyping I: Site Selection + Approach**, I test this expanded assessment methodology by prototyping a site design process for creating a traffic playscape that responds to SRTS efforts. I propose a design approach of neighborhood translation, which involves a sequential layering of roads, infrastructure, programming, wayfinding, and visual elements to replicate conditions in the surrounding neighborhood. This approach additionally separates the design of the site into two design components: 1) networks, which focuses on designing the system of roads that connect different destinations across the site, and 2) destinations, which focuses on determining land uses in the spaces that emerge between the roads.

In **Chapter Seven: Design Prototyping II: Implementing the Approach**, I offer a series of design recommendations for how this prototype can be designed on a vacant parcel west of South Shore K-8. Site plans and details are used to illustrate how these recommendations are laid out and work with site and neighborhood conditions. Design recommendations are separated into the design layers discussed in Chapter Six.

In **Chapter Eight: Conclusion**, I conclude with recommendations for how the visions, methodologies, and design approaches articulated within this thesis can be mobilized into a set of strategic actions moving forward.

CHAPTER TWO:

Literature Review

Best Practices in Safe Routes to School

As a program that has supported schools since the early 2000s, exemplary Safe Routes to School (SRTS) strategies are seen in schools and neighborhood across the nation. They continue to be replicated in different contexts because they are connected to positive changes in commuting behaviors for students and parents. In addition, these strategies model how other schools and communities can acquire resources to implement similar concepts. The intent of this literature review is to organize a number of education, enforcement, and engineering efforts into reoccurring foundational concepts that should be integrated within the traffic playscape framework to promote SRTS' most fundamental values; and highlight a representative project for each concept. By allowing more programmatic educational and encouragement values to be embedded in physical engineering interventions, multiple "6 E's" goals can be accomplished at once while addressing existing deficiencies in the funding and quality of non-infrastructure interventions.

Education

SRTS education efforts are mainly programmatic, and many of instructional efforts take place on existing school infrastructure (playgrounds, classrooms, etc.) that are transformed temporarily into learning spaces. However, there are no dedicated or permanent places devoted to traffic education

within a K-12 context that have been implemented through SRTS funding. Educational SRTS strategies thematically fall into one of three categories: 1) student learning, 2) parent learning, and 3) collaborative learning.

Core Concept: Student Learning

The core of SRTS educational efforts center around safety training that supports K-12 education, particularly for cycling. In Rockville, Maryland, safety education has been institutionalized within the core curriculum through the efforts of a supporting local advocacy group. Piloted in 2004, elementary schools in Rockville are guided through a bicycle and pedestrian education curriculum from Kindergarten to Grade 5. Students in earlier grades are involved with basic pedestrian concepts while students in later grades transition into bicycle safety fundamentals. The school playground is temporarily converted into a training ground for learning bicycle laws, how to ride a bicycle, and what to wear (see **Figure 2.1**) (National Center for Safe Routes to School, 2015).

Core Concept: Parent Learning

Parental educational efforts are key in promoting safer, sensible behaviors for adult drivers. In 2003, the Parent Safety Drive was piloted in Sherborne, England's Abbey Primary School. The program's goals are to improve parents' driving standards, reduce the number of parent vehicles within the immediate vicinity of the school, reduce child road casualties, and promote sensible use of vehicles as a commute mode choice. Driving instructors hold sessions with parents on defensive driving and hazard awareness techniques, giving them an opportunity to apply these skills on the road. (National Center for Safe Routes to School, 2015)



Figure 2.1: Students training on a school playground (Source: Schlabowske, 2014)



Figure 2.2: Walking School Bus program participants (Source: Feet First, 2016)

Core Concept: Collaborative Learning

A joint interactive effort between parents and students is the Walking School Bus program (see **Figure 2.2**), introduced in 2004 to Olive Chapel Elementary School in Apex, North Carolina. Parent volunteers are designated as neighborhood captains that guide participating parents and students from different departure points to the school. These captains use various techniques to communicate with students as to how to safely cross intersections they encounter on the way to school. Other variations of the Walking School Bus recognize the unique contributions of other community leaders to aid in traffic safety efforts. Some programs involve local business owners who sponsor the activity and gain training in first aid and pedestrian safety. Other programs ask neighbors to post signs on their frontages so that students who are late to the Walking School Bus can follow the route on their own or catch up with their colleagues. (National Center for Safe Routes to School, 2015)

Encouragement

Similar to education, encouragement efforts are implemented through programs that pair traffic safety with personal or family incentives for reducing traffic congestion, promoting healthier lifestyles, and exercising greater caution on the road. Like education, there are a lack of dedicated facilities funded through SRTS that provide permanent encouragement opportunities for students. This subsequently affects how encouragement resources are delivered to students. Encouragement strategies thematically fall into one of three categories: 1) provision of material incentives, 2) creation of a positive commuting culture, and 3) inclusive programming.

Core Concept: Material Incentives

A widely used encouragement strategy with multiple variations is the “passport program”, which gives students tangible rewards for good traffic safety behavior. In Buckinghamshire, UK, the “Go for Gold” initiative involved program administrators issuing a “passport” to participating students. Students who walked to school were given a sticker on their passport, and received additional ones for hitting milestones. Additional rewards were given based on the number of stickers collected. The use of stickers as a reward, while inexpensive and simple, resulted in a significant decrease in car use for Buckinghamshire

schools, with one school reducing car use from 62% in 2000 to 26% in 2001. A similar passport program, called “Passport to Health” was implemented in Lytchett Matravers Primary School in Dorset, England with a focus on the public health benefits of walking and biking. In addition to the collection of passport stickers for small prizes, students were given maps of their local area to designate walking routes. Other incentives that programs use are trophies, recognition at school functions, and friendly competition between different classes. (National Center for Safe Routes to School, 2015)

Core Concept: Creating a Pro-Walk, Pro-Bike Culture

Envisioned as an immersive program, the “Cycle Saturation Project” was implemented at St. John’s Catholic Primary School in Rotherhithe, UK. While more costly than the passport program due to a larger scale of programming, this project promoted encouragement through the “saturation” of biking services on a day-to-day basis. From training instructors to maintenance workshops to new bicycle racks, the program built a culture of biking by achieving a critical mass of student cyclists. (National Center for Safe Routes to School, 2015). A similar concept called “Kidical Mass” was developed in Rockville, Maryland, where parents and children are provided resources to support biking: free basic riding skill classes, free bicycle maintenance, equipment swaps, and educational talks (Washing Area Bicyclist Association, 2013).

Core Concept: Inclusive Programming

Several encouragement strategies are designed specifically toward youth with physical disabilities. This type of programming calls attention to the fact that children with disabilities are often at a greater risk for inactivity, which has implications toward childhood obesity, increased automobile use, and increased automobile pollution. The National Center for Physical Activity and Disability led “Sports Day” in Chicago, in which pedestrian and cyclist safety activities from SRTS programs were folded into a broader set of inclusive recreational physical activities; these included wheelchair sports, natural activities, and adaptive cycling. To provide a full range of expertise on promoting inclusive physical activity, SRTS specialists in walking/biking safety worked together with local partners in the education, advocacy, and public sectors. These efforts translated to engineering efforts that allow youth with physical disabilities to participate in other programs like the Walking School Bus, calling to attention sidewalks with significant tread issues or missing ADA accessible ramps. (National Center for Safe Routes to School, 2015)

Engineering

The engineering of streets varies jurisdictionally on the local and state level. The Seattle Department of Transportation (SDOT) developed its own toolkit of engineering strategies that respond to existing local traffic laws, traffic safety initiatives, and multimodal mobility plans. Engineering examples in other cities may have less applicability within Seattle due to different design or implementation standards, although many of these engineering treatments are seen universally. The Seattle program divides treatments between three realms of the street: intersections, along the street, and traffic calming (see **Figure 2.3**). Unlike the education and encouragement strategies discussed above, all engineering efforts are spatial, long-term if not permanent, and are reflected in different forms within the built environment: hardscape, vegetation, and signage. While many of these engineering elements are recognized as pivotal in promoting walking and biking safety, these interventions often lack community-building outcomes that emerge from SRTS’ educational and encouragement strategies.

Core Concept: Intersection Treatments

Intersections are an important area to address for traffic safety since they are where cyclists, pedestrians, and vehicles meet. Low attentiveness at these conflict points may cause collision, especially in intersections where there are multiple directions of traffic. The least expensive intersection treatments are signs. Treatments such as stop signs and 20 MPH limit signs prompt drivers to slow down as they approach the street from the intersection, or vice versa. They are also important indicators for cyclists and pedestrians to know if an intersection is protected from straight-through traffic. However, such intersections must be paired with strict enforcement. More expensive intersection treatment measures include crossing islands, curb ramps, crosswalks, and beacons. Crossing islands are raised areas along an intersection’s median to make pedestrians more visible and shorten cross times, and it requires the pouring of concrete on the median and optional added landscaping. Curb ramps, while a relatively small-sized intervention that smooths the transition from the street to the sidewalk, requires strict design guidance to be compliant with ADA. Intersection crosswalks provide

CROSSING TREATMENTS



ALONG THE STREET TREATMENTS



TRAFFIC CALMING



Figure 2.3: Catalogue of SRTS engineering interventions (Source: Seattle Department of Transportation, 2015)

greater awareness to drivers that there are people crossing and are scalable cost-wise. Painted crossings require less roadwork and money while raised crosswalks provide increased safety benefits by elevating pedestrians to a driver's eye level. The most expensive treatments for street safety are curb bulbs and traffic signals. Curb bulbs increase pedestrian visibility by extending the curb into the roadway, allowing for pedestrians to be seen before they cross. They are costly because they require the removal and replacement of existing sidewalk. Traffic signals control traffic flows in an automated manner and force greater compliance than stop signs, but take a long time to implement when there are cheaper and timely alternatives. Because of their high time and financial commitment, around three are built per year. (SDOT, 2015)

Core Concept: Along the Street Treatments

While there are arguably less conflict points along a street compared to an intersection, there are many ways of increasing safety along the street to separate active transportation modes from faster-moving drivers or increase driver awareness. Less expensive interventions include bikeways, which are on-street and off-street facilities that are dedicated to the movement of cyclists along the street. They can be drawn as stripes along the side of the road, buffered with striped paint and bollards, or completely separated by a raised curb. Other types of bikeways include bicycle boulevards where bicycles share the road with vehicles in the same lane, indicated by shared arrow markings on the pavement. Recommendations for bikeway treatments are based on Seattle's Bicycle Master Plan, and simple treatments like a non-buffered, non-protected, bike lane are less costly than the creation of an entirely vehicle-separated network.

On the sidewalk, radar speed signs are an effective way of alerting drivers of speed through a dynamic electronic display. Among the more expensive interventions are sidewalk improvements, since they require significant coordination with nearby property owners' driveways and property boundaries, and a long design process that can close off streets for pedestrian travel. Like bikeways, the location of sidewalk improvements are often guided by the city's Bicycle and Pedestrian Master Plans. Lane reductions narrow the width of travel lanes or removes one entirely, giving more space for pedestrians and cyclists while slowing down drivers that may speed when there are wide travel lanes. However, it is costly because it is typically embedded in a larger resurfacing or street reconstruction process, and disrupts existing traffic patterns. While not necessarily a personal safety-focused treatment,

streets can include bicycle parking in order to provide cyclists with greater options of where to securely lock their bikes. (SDOT, 2015)

Core Concept: Traffic Calming

Traffic calming is the act of slowing down drivers through physical obstructions that forcibly cause the car to slow down or psychological elements that make drivers consciously want to slow down. A fairly inexpensive option are speed humps, which are raised areas on the street that force people to slow down and allow only for the unimpeded travel of buses and emergency vehicles. Another option are traffic circles that reduce intersection collision points by forcing drivers to go around a central island. The most expensive option for traffic calming is a neighborhood greenway, in which a residential street is completely redesigned to accommodate slow speeds, traffic calming, and connections between key neighborhood facilities. It is costly because it is a package of many different engineering efforts listed above (intersection treatments and “along the street” treatments), and requires official designation as a “neighborhood greenway” by the City of Seattle. (SDOT, 2015)

Factors Influencing Active Transportation Mode Choice

Objective and subjective factors influence people’s decisions to bike and walk, and they play a role in the programs and physical interventions that have been pursued through SRTS. A number of researchers agree that existing literature does not test these factors consistently from study to study, making it difficult to ascertain what specific factors are most influential to one’s choice to walk or bike. A number of determining factors currently exist that may be assessed within any given study depending on the researcher’s interests, and shifting attitudes in transportation policy influence what factors are seen as relevant.

Munoz et al. (2016) describes a range of objective and subjective variables that were modeled in past studies. Most studies generally break up variables into either objective variables that are easily measured through primary and secondary data collection; or secondary variables that require further

operationalization as to how they are measured by the researcher. Objective variables may include socio-economic and household characteristics (gender, age, income), trip characteristics (time, cost), built environment factors (density, distance), natural environment factors (slope, weather, transfer), and transportation infrastructure (amount of built network, parking, sidewalk). Meanwhile, subjective variables may involve the use of perceptual indicators or psychological indicators (satisfaction, comfort, convenience, social norms, habits). Early studies controlled demographic, socioeconomic, and psychological factors since these variables were not of primary interest to transportation researchers despite having a strong influence on experimental results. An increasing number of studies have found that psychological factors may be more influential determinants than the standard, objective measures that were of primary research interest in earlier studies. These research trends establish the responsibility of SRTS strategies to address both infrastructural and behavioral traffic concerns, and some of the most significant variables are subsequently reflected in current SRTS interventions.

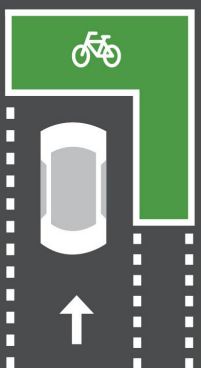
Bicycle Ownership

Bicycle ownership is one of the most significant variables for influencing biking as a commute mode choice on the household level. A respondent is twice as likely to bike when the bicycle is their own (Rebarczyk & Wu, 2013). With bicycle ownership as a key determinant in bicycle mode choice, providing youth access to temporary or permanent bicycles has been an objective of SRTS programming. Furthermore, the decision to own a bicycle is reinforced by desirable physical and social environment factors. These factors include promotional programming and investments toward an off-street bicycle network that encourages all types of bicycle trips, not just commuting trips (Handy, Xing & Buehler, 2010). Increasing active transportation usage for all users should be developed as integrated strategies

Q WHAT IS A BIKE BOX?

A It's a painted green space on the road with a white bicycle symbol inside.

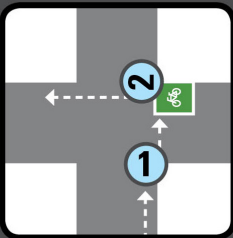

The bike box creates space before the intersection so that people on bikes can cross the intersection *ahead* of traffic. This makes bikes more visible and predictable to approaching drivers.



Q WHAT IS A TWO STAGE LEFT TURN BOX?

A A two stage left turn box offers bicyclists a safer way to turn at multi-lane signalized intersections and helps create predictability for drivers.

A green bike box designates a space in front of cars where a bicyclist can wait during a red light. Bicyclists can also make a left turn from the driving lane.

Q

A

WHAT DOES THE GREEN MEAN?

Green pavement highlights areas where bicycles and cars cross paths. The green pavement alerts both drivers and bicyclists to pay extra attention.

Figure 2.4: Information on new types of intersection and facility treatments on Seattle streets (Source: Seattle Department of Transportation, 2014)

consisting of infrastructural and behavioral elements to support bicycle ownership.

Visual Connectivity

Well-integrated built environments and visual connectivity are important neighborhood qualities for cyclists and pedestrians alike. People are thirteen times more likely to bike or walk when areas are well-connected and provide visual cues that orient them to other spaces (Rybarczyk and Wu, 2013). While a SRTS program may not change the configuration of a fully built out neighborhood, it can still help build familiarity and recognition of visual cues in the built environment through the use of engineering, educational, and encouragement strategies. However, what SRTS programs may have some control over at the neighborhood-level are the provision of walkable and bikable facilities that support comfortable, stress-free commuting and increase commuting safety.

Continuous and Separated Facilities

Riders reveal a preference for continuous, connected facilities – which include bicycle lanes, cycletracks, and bicyclepaths

– and that it is not enough to just have a high quantity of bicycle facilities for people to ride on (Buehler & Dill, 2016). In addition, cities with high biking levels in both Western Europe and North America demonstrate networks of bicycle facilities and traffic-calmed streets that are separated or have minimal shared use with automobiles. It is for this very reason that traffic calming measures, sidewalks, and bicycle lanes continue to be a pivotal part of the Seattle’s SRTS engineering toolkit. These interventions can incur higher financial and time costs than smaller-scale traffic safety interventions, but are proven to be effective measures that support increased walking and bicycling.

Intersection Treatments

Street intersections can have mixed effects on the biking experience depending on the intersection design treatment. Intersections inherently have negative effects on biking due to direct interaction with motorized traffic, but studies have also supported the presence of signals, traffic control devices, bicycle boxes, bicycle traffic signals, and bicycle signal activation devices as having a positive effect (Buehler & Puchler, 2012).

A challenge to understanding the role of facility types in mode choice is that few studies link ridership with newer (innovative) types of infrastructure, particularly the intersection treatments described in Seattle SRTS engineering toolkit (Buehler & Dill, 2016) (see **Figure 2.4**). How to navigate through newer road infrastructure is uncharted territory for both researchers and users alike. From a SRTS standpoint, the ability for these interventions to be recognized as part of safer street network needs to work in tandem with users gaining a sense of comfort and familiarity in using them properly.

Positive Attitudes from the Community

There is an increasing number of subjective indicators that are being attributed to greater use of active transportation modes. For example, changing one's perceptions of the overall safety and convenience of walking and biking may play a role in increasing active transportation mode share. Adequate bicycle storage and nearby public transit stops promote more positive attitudes toward biking by making it a more convenient and secure option. Biking can often be perceived as high-stress due to unpredictable bicycle parking availability and bicycle theft. Popularity and a pro-biking culture may also shift previously negative perceptions on active transportation. Being surrounded by people with a positive attitude toward biking, having people act as role models for biking, and having colleagues expect that an individual will bike also increases the likelihood of biking (Heinen et al., 2013). SRTS encouragement strategies have achieved this through creating a critical mass of cyclists and pedestrians, calling upon youth role models (parents, teachers) actively participating in efforts, and making biking a popular activity to participate in.

Designing for Youth

The discussion on mode choice is applied to a broader set of potential pedestrians and cyclists. The intent of this literature review is to demonstrate that designing for youth requires a careful and nuanced eye toward specific needs, spatial perceptions, developmental priorities, etc. Street interventions like safer sidewalks, lighting, and safe crossings are universally beneficial to any active transportation user, but a major area of concern is how design can respond to a specific and vulnerable demographic in design.

Designing For Age

One of the key considerations toward designing for youth is their rapidly changing physical and mental development in their first 18 years of life; a 10-year-old and a 12-year old are expected to demonstrate a widely different set of walking characteristics. Children generally have a poorly formulated comprehension of safety, traffic directionality, and human behavior that is attributed to the relatively high crash rate amongst them.

Yet, reactions vary between age group (see **Figure 2.5**). Young children in elementary school and early middle school, ranging from ages 5 to 12, tend to vary greatly in ability. Therefore, it is often up to the parent's discretion as to when their child is ready to take on commuting independently. Children in this age group are characterized as impulsive and unpredictable, with limited peripheral vision and visibility due to short stature and a susceptibility to dash into an intersection. However, at this age, they are also more likely to copy the behaviors of older people.

Preteens in middle school, ranging from ages 13 to 14, are more physically developed yet are more likely to take risks with little experience or training. At this age, they are more likely to walk and bike more, but often do so under risky traffic conditions and roadways, and perceive themselves as invulnerable.

Walking characteristics of different pedestrian age groups	
Infants and Toddlers (ages 0 to 4)	At this age, walking skills are just being developed and the children require constant parental supervision.
Young Children (ages 5 to 12)	At a young age, children have unique abilities and needs. Since children this age vary greatly in ability, it is important for parents to supervise and make decisions on when their child is ready for a new independent activity.
Preteens (ages 13 to 14)	By middle school years, children have many of their physical abilities but still lack experience and training. Now there is greater desire to take risk.
High School Aged (ages 15 to 18)	By high school and college age, exposure changes and new risks are assumed. Many walk and bicycle under low light conditions.

Figure 2.5: Walking characteristics and abilities of different pedestrian age groups (Source: Federal Highway Administration, 2006)

High school aged children from ages 15 to 18, are even more increasingly active with a greater willingness to travel greater distances and explore new places. With other modes of travel now made accessible to them such as personal vehicle, they are capable of traveling at higher speeds while continuing to overestimate their abilities due to lack of experience and training. They are also more willing to walk and bike in poorly lit conditions (Federal Highway Administration, 2006).

Imagination Stimulation

In addition to differences in how they react to the built environment, youth also differ from adults in what they look for in the built environment. While adults focus on how to use a space for a pre-defined purpose, children focus on what the space means and what it can offer. While adults work to achieve results, children work toward processing the world around them (Acar, 2013). Therefore, many researchers highlight the importance of the outdoors as a complex and dynamic realm for play that comes in multiple forms. Play can be grouped into three broad categories: functional play where youth are engaged in physical activities like running and climbing, constructive

play where youth are building and creating with materials, and symbolic play where youth are roleplaying (Fjortoft, 2004).

Contrast & Dynamism

There are specific experiential qualities of outdoor spaces which give meaning and complexity to the act of play. For example, youth prefer multifaceted forms like shapes and lines, as well as softened edges and curves created by landscaping. Other effective elements include the use of sound, smell, and touch to engage the senses, as well as the use of unpredictability, incongruity, and discovery (Fjortoft, 2004). These experiences are not just limited to natural environments. Any landscape that incorporates these elements can serve as a complex and diverse environment well-suited to children's outdoor play.

Acar (2013) advocates for the importance for outdoor spaces, but argues for it from the perspective of youth achievement, self-security, and respect through interaction with other children and their larger environment. Open spaces allow children to discover their environment through motor skills, and allow them to engage freely with noise and movement. The outdoors also

provide the ability to experiment with a wide range of provided and found materials, and to experience more variation in their environment due to temporal, seasonal, or climatic phenomena. Several designers indicate specific outdoor elements that children like to see in public outdoor spaces. Based on a study White & Stocklin, Acar (2013) lists water, vegetation, animals, natural colors, diversity and change in environment, places for shelter and hiding, and structures/materials/equipment that can be re-appropriated through imagination. Based on a prior study by Elizabeth Jones, Acar furthermore asserts that dualities of play elements influence how students play. These dichotomies include active versus passive, challenging versus secure, hard versus soft, natural versus built, open versus closed, private versus public, and simple versus complex. Francis and Lorenzo (2002) also list particular qualities of child-friendly environments they drew from past research; these include accessibility, diversity, control, mixed use, adventure, safety with some risk, meaning, autonomy, socialization, convivial, serendipity, and participation.

Participatory Design

Children's participation in the creation of design spaces results in spaces that are best suited for youth. Francis & Lorenzo (2002) describe three different "realms of participation" that could be particularly useful to traffic playscape design. The first is Advocacy, an approach where the needs of children are advocated by the adults, and adults represent the interests of children to citizen groups and public planning bodies. The main limitation of advocacy is that it is often separated from the plans and desires of other interests outside the "advocated" group. The second is Learning, an approach where children participate through environmental education and learning from teachers. While this approach has increased the designing of natural environments that are suitable for children, it doesn't place an emphasis on built projects since it mainly focuses on changing

perceptions of the environment rather the environment itself. The third is Proactivity, an approach where children are heavily involved in the design process alongside designers, planners, and community organizations. It is becoming a more common form of participation, but requires designers and planners with expertise in cross-cultural, multidisciplinary collaboration.



CHAPTER 3

CHAPTER THREE:

Design Case Studies

A number of cities have implemented traffic playscapes as an integral component of traffic safety and education. Beyond teaching youth how to navigate different traffic scenarios within a safe space separated from a more daunting transportation network, these sites are designed as places: playful and memorable destinations embedded into open spaces where people participate in non-transportation related recreation.

Each city in this chapter has a unique transportation context that influences the design of the traffic playscape. Different laws, infrastructure, and urban form govern how roadway users travel between destinations and interact with one another within the transportation network. Unique landmarks serve as identifiable elements that tourists and locals use to orient themselves within the city. Therefore, many of the cities covered in this chapter have traffic playscapes that incorporate universal elements of the transportation network (roads, intersections, vehicular modes); and city-specific elements, such as local transportation laws/signage, prioritization of different travel modes, and landmarks.

The following global design case studies highlight how memorable and useful traffic playscapes respond to the city's unique transportation infrastructure, laws, and recreational opportunities; how these places represent a significant

investment toward traffic education through high-quality design; and how a similar landscape in Seattle may draw inspiration from neighborhood and citywide conditions. They are also intended to highlight how these spaces address foundational concepts from the literature.

Within the last few years, several advocacy organizations have piloted temporary, easily reversible traffic gardens in Seattle to both test and promote the idea; using simple materials such as paint and movable objects. By building a case for the need and importance of these spaces in Seattle, future traffic playscapes may begin to incorporate more permanent, costlier features that are demonstrative of higher community and government investment in these strategies. The following global case studies are intended to provide best practices of more permanent design elements that can be built in these spaces. As such, the chapter concludes with four key design takeaways that are reoccurring themes across each case study.



Asia -- Tokyo: Sugunami Children's Traffic Park

The Sugunami Children's Traffic Park (see **Figure 3.1**) is located in Zenpukuji Gawa Green Park along the Zenpukuji River in Tokyo. The traffic park is designed as a miniature city with typical roadway treatments (road markings, traffic lights, road signs, on- and off- ramps, and railway crossings) and key built elements of Tokyo, including a Tokyo Station model and complex intersections encountered within the inner city. The integration of cultural elements into the traffic park promotes a sense of visual connectivity that allows students to recognize similar visual cues outside the traffic park. Vegetation and landscaping are used prominently to integrate the traffic park into the larger Zenpukuji Gawa Green Park, and also provides a soft quality that contrasts the rigidity of streets and traffic infrastructure. These dualities provide a diverse and complex play environment that stimulate the imagination.

A majority of the park is traversed on bicycles, which can either be rented for free or provided by families. For young riders learning how to navigate the road, a small circuit is located outside the main park area. Older and more confident riders are free to ride their bicycles throughout the circuit, or rent pedal powered carts that can be taken on a course that loops around the park. These carts can be rented for two laps at a time, but can be borrowed unlimitedly throughout the day (Kidd, 2009).

This setup creates a design that is cognizant of different age groups' needs and behaviors in built environment. The provision of play resources onsite, especially bicycles, helps to address issues of ownership that challenges many families' ability to consider bicycling in general.

The traffic park acts as a transition between educational facilities and the citywide cycling network, allowing for students to practice their skills in a safe space before using the larger transportation network. The garden is located near several schools, including three high schools, a middle school, and elementary school. Just immediately outside the park is the Zepukuji Cycle Route, a 2,400 meter circuit that follows the Zenpukuji River and is used for commuting by the public.

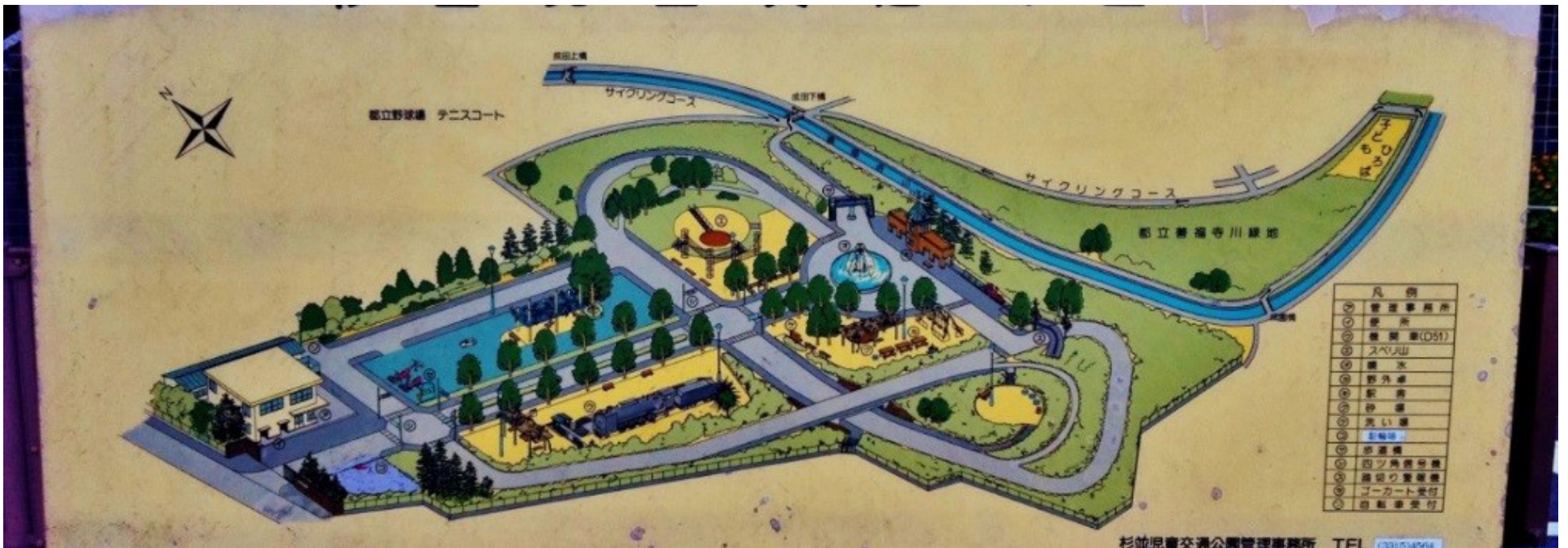


Figure 3.1: Sugunami Children's Traffic Park (Source: The Tokyo Files, 2012)



Australia -- Melbourne: Kew Traffic School

The Kew Traffic School (see **Figure 3.2**) was established in 1954 several miles east of Melbourne, one of Australia's most populous cities. While the school's traffic playscape is a private facility, it is a popular outdoor venue that can be booked for traffic education programs during extracurricular hours. The larger Kew Traffic School program runs daily safety education programs for children between the ages of 3 and 8, and the program meets the needs of Australia Department of Education's curriculum (City of Boroondara, n.d.). While the program's daily activities are partially spent indoors with classroom presentations, time is allocated for monitored practice time in the traffic garden. The outdoors provides an opportunity to experiment and experience environmental phenomena that cannot be obtained by learning solely in an indoor setting.

The road layout provides riders with a variety of intersection types contained within oval-shaped loop, including roundabouts, signalized and non-signalized crossings, and 3- and-4 way intersections. Automated traffic lights and road signs are placed in key locations along the road network to teach children how to navigate through the park in a safe and lawful manner. Decorated sheds double as both storage space for bicycles and traffic equipment, as well as placemaking

elements that simulate the neighborhood environment similar to one encountered outside the school. These elements create continuity and comfort as students transition from the educational landscape to the neighborhood streets.

Beyond the educational design components, the landscape shares many elements of a typical park or recreational greenspace, with places for rest and shade (pergolas, lawns shaded by trees), picnic tables for eating and socializing, and park amenities (water fountains, restrooms, changing stations, etc.); further simulating the experience of moving through destinations within the neighborhood.



Figure 3.2: Kew Traffic School (Source: City of Boroondara, 2014)



Northern Europe -- Copenhagen: Trafiklegepladsen

One of Copenhagen's most well-used and prominent traffic playgrounds (see **Figure 3.3**) is located in Faelledparken, the city's largest park. Opened in 1974 and renovated in the early 2010s with new and improved facilities (Colville-Andersen, 2015), the traffic playground fits in seamlessly amongst other types of play spaces inside the park. The traffic playground provides a traffic-free environment for teaching children of all ages how to use the road safely, an essential component of the educational curriculum in Danish schools. The central playground area is made up of a miniature driving park organized as a loose grid. Traffic components include automated traffic lights, pedestrian crossings, road markings, loading zones, parking spaces, and signs; all scaled down to match a child rider's dimensions.

Vegetation, lawn, and streetscape amenities help to create a miniature town similar to what children encounter in real life, and is designed to replicate both the traffic conditions of a city and suburban area. Children can provide their own bikes, or borrow carts, pedal vehicles, and small bikes from playground staff. However, they are also encouraged to switch between different traffic roles, experience different travel perspectives, and engage with symbolic roleplay. Since the park also allows for non-transportation recreation, children can leave their vehicles in designated parking areas to eat, socialize, etc.

An adjoining traffic themed playground simulates a neighborhood environment with car wash facilities and gas stations. Younger children not ready for traffic education can take their bikes to these locations and simulate activities such as car washes and gas filling. These two play environments, because they are designed to respond to the abilities of two different age groups, allows for traffic education to be comfortably experienced and appropriately engaged by children of all ages.

Another recent addition to the playground is the Traffic House, a 400 square meter indoor space constructed in 2014 that acts as a new entryway into the playground. The Traffic House provides storage and instructional space, while being designed to meet energy and accessibility building standards (ArchDaily, 2014). It's an addition that demonstrates a large financial commitment and architectural statement toward traffic education, while adding further capacity toward existing programming.



Figure 3.3: Trafiklegepladsen (Source: Jørgensen, 2013)



Central Europe -- Prague: Traffic Rule Playgrounds

In Prague, local councils set up “traffic rule playgrounds” (or “Dopravni Hriste” in Czech) (see **Figure 3.4**) within multiple districts to help children improve their skills on bicycles, scooters, or skates while learning key road signals and rules. Depending on the district, these playgrounds may have unique features like the ability to rent motorized cars or to learn how to use a gas station. Several of these playgrounds are designed to simulate both standard and neighborhood-specific roadway features in Prague, including roads, roundabouts, traffic lights, railways, and pedestrian crossings.

A unique takeaway from this case study is its operational model. Children purchase a bicycle passport and are charged monthly for the amount of time spent there. Having an object that tracks progress resembles the passport initiatives in SRTS educational programs that promote a tangible sense of accomplishment. On certain days, specific modes are especially emphasized for training and playing purposes, such as limiting the use of the park to rollerskates or skateboards. While the parks are open for use to the general public in the afternoons, the mornings are typically set aside for traffic education by local schools that integrate interactive lessons into the curriculum (Petryca, 2011).

The particular traffic rule playground site plan featured in this case study is located Prosek, in the municipal district of Prague 9. The purpose of featuring this particular playground is to contrast it to the different variations of the traffic rule playground. Prosek’s traffic rule playground emphasizes the role of place in experiential learning; using vegetation, neighborhood features, and traffic infrastructure simulates an environment a child is likely to encounter outside these safer spaces.

The development of traffic rule playgrounds in different Prague districts emphasizes the need for traffic playscapes to be distributed evenly across the city to provide greater coverage of biking and walking resources. While North Seattle and West Seattle are hubs of traffic safety education and encouragement programs through the efforts of Cascade Bicycle Club, Southeast Seattle is noticeably lacking in these types of permanent learning facilities.

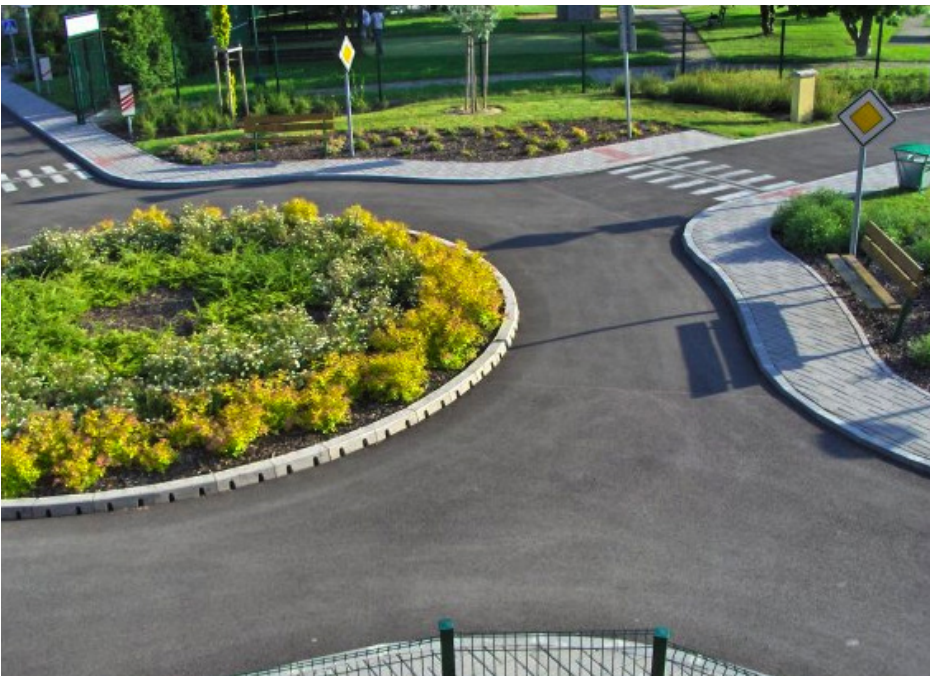


Figure 3.4: Traffic Rule Playgrounds (Source: Prague-Stay, n.d.)



The Rise of Local Projects

In comparison to the global case studies presented in the first part of this chapter, Seattle does not have a longstanding traffic playscape. Three smaller-scale projects have been constructed relatively quickly to show how this intervention may successfully fit within Seattle and proliferate with enough community support. While one project only lasted one day as a demonstration project, two of three projects (Cascade Traffic Gardens and White Center Traffic Playground) are more long-term facilities built primarily out of temporary materials.



Figure 3.5: Seattle Neighborhood Greenway's demonstration traffic garden (Source: Seattle Bike Blog, 2015)

Demonstration Project: PARK(ing) Day

The first photographed instance of traffic playscape prototyping occurred in 2014 during PARK(ing) Day Seattle, an international event described by the Seattle Department of Transportation as an “opportunity to temporarily turn on-street parking spots into public spaces. The program is intended to encourage creative placemaking while raising awareness of the importance of walkable, livable, and healthy communities” (Seattle Department of Transportation, 2016). PARK(ing) Day is a high-visibility event that takes place in neighborhoods across Seattle in September, with over fifty temporary parklets sponsored by organizations and businesses looking at creative ways to reclaim a public space typically set aside for cars. A one-day temporary traffic garden was constructed out of traffic cones and spray paint and implemented in Denny & Westlake Plaza (see **Figure 3.5**). Sponsored by Seattle Neighborhood Greenways, this intervention demonstrated how an interactive, educational traffic opportunity did not have to be on a standalone parcel and use many costly materials; all that was needed was open space and pavement.



Figure 3.6: Cascade Traffic Garden’s Ride Leader Welcome Pavilion (Source: Author, 2016)

Enhancing Education: Cascade Traffic Garden

One year later in 2015, the Cascade Bicycle Club launched their Capital Campaign on their 45th anniversary and raised over \$2 million dollars to expand their facilities and further their mission. The traffic garden funded through their campaign is sited in Cascade Bicycle Club’s main campus in Magnuson Park. This garden, like many of the projects covered by the global case studies, is designed to integrate into other recreational and educational amenities provided by the organization. These additions include a Ride Leader Welcome Pavilion (see **Figure 3.6**) that provides outdoor seating, planters, covered bike parking, repair stations, and space for gathering before/after group rides. Another addition is an educational “fix-it” garage intended to hold hundreds of classes annually on bicycle maintenance and provide shop space to maintain the organization’s 500+ fleet of bicycles for programs throughout the region (Cascade Bicycle Club, n.d.). As a result, the traffic garden is benefited by the presence of adequate, permanent indoor educational and storage spaces adjacent to the site.



Figure 3.7: Cascade Traffic Garden’s training area (Source: Author, 2016)

Officially unveiled in September 2016, the traffic garden is located within a narrow “alley-like” space between the back of the organization’s building and a retaining wall at the property’s edge (see **Figure 3.7**). Due to the dimensions of the lot, the traffic garden is set up as a series of five lanes that crosses through several painted crosswalks. The crosswalks connect the building entrances to a vegetated seating and bike parking area along a retaining wall, which helps to integrate active and passive uses into the garden’s design and overall function. Educational signage is posted on multiple facades with advice on how to use the facilities safely, how to lock bikes properly, etc. In contrast to the previous examples or the actual roadway network, this miniature roadway network and its accompanying signage is painted with bright colors and patterns rather than emulating details seen on the street. It caters more toward the sensation of play and visual contrast while still incorporating elements that promote education, encouragement, and enforcement.



Figure 3.8: White Center Traffic Playground (Source: Cascade Bicycle Club, 2016)

New Territory: White Center Traffic Playground

Inspired by these efforts on their main campus, members of Cascade Bicycle Club collaborated with the YES! Foundation of White Center to acquire \$75,000 in King County grant funding to build a traffic playscape in the White Center neighborhood's Dick Thurnau Park, called the White Center Traffic Playground (see **Figures 3.8 & 3.9**). The Foundation supports underserved youth through relationship-based programs promoting social awareness and education. The designers converted a swath of underutilized tennis courts within a disc golf course into a traffic playground through several low-cost interventions; primarily colorful paint, a shipping container shed for storing bicycles, and additional seating for families to observe activities. The decision to locate the traffic playground in Dick Thurnau Park was due to its proximity to several elementary schools, a middle school, and a high school; as well as the fact that many families used an existing basketball court to teach their kids how to bike (Fucoloro, 2015). Because this playground repurposes a former tennis court, there were less opportunities to play with vegetation and softscape as an integrated site element compared to the global case studies. However, the shade and greenery that makes the space feel comfortable is borrowed



from the landscape outside the tennis court, and the use of paint and interesting curves in the road layout provides dramatic visual contrast.

The playground was unveiled in October 2016. The playground was designed to set up many types of traffic scenarios, including stop signs, signals, one-way streets, roundabouts, and diverse intersection types. The park highlights the role of partnerships and community-building in making a space like this a success, which includes multiple public agencies, consulting firms, nonprofits, and advocacy organizations. Potential positive economic impacts were also described; bicycle-safe and bicycle-friendly businesses are likely to get more foot traffic and generated revenue. In addition to the aforementioned parties listed above, this space provides an additional incentive for business owners to join the traffic safety movement (Davis, 2016).



Figure 3.9: Aerial view of White Center Traffic Playground (Source: King County Parks, 2016)



Figure 3.10: A mix of younger students, older students, and adults sharing the roads in Trafiklegepladsen (Source: Københavns Kommune, n.d.)

Case Studies Takeaway 1: Designing for Age

The value of exercising positive traffic safety behaviors should be instilled as soon as a child is able to walk around their neighborhood. Yet, youth engage with traffic safety concepts differently depending on their age group. Many of the global case studies provide opportunities for students of all ages to participate in traffic safety education within both differentiated play areas and shared play areas (see **Figure 3.10**). Even if a child is not yet ready to apply their knowledge on a bicycle, they still benefit from watching other children and adults actively engage in the traffic safety playscape. At that age level, they are also more likely to copy the behaviors of older people. For older children, the presence of younger children participating in non-transportation recreation gives them more opportunities to exercise caution and become aware of the diversity in their surroundings.



Figure 3.11: Children using pedal vehicles that resemble cars and other motorized forms of transportation (Source: Source: City of Boroondara, 2014)

Case Studies Takeaway 2: Designing for All Travel Modes

The focus of traffic playscapes within this thesis is to promote walking and biking as safe commuting modes for youth. The global case studies additionally set up conditions for teaching youth below the legal driving age how to exercise safe driving behaviors. Sugunami Children's Traffic Park in Tokyo, Kew Traffic School in Melbourne, and Trafiklegepladsen in Copenhagen all allow students to rent and practice on simulated "vehicles", which come in the form of human-powered pedal carts (see **Figure 3.11**). However, the intent of introducing vehicles into traffic playscapes extends beyond enforcing laws for vehicular use. It allows students to roleplay as different roadway users in order to set up realistic scenarios where cyclists, drivers, and pedestrians must learn how to negotiate and share the road safely. It also allows students to understand a driver's perspective. As a result, students may display greater awareness and caution toward cyclists and pedestrians once they start drivers education. Meanwhile, cyclists and pedestrians are better equipped to anticipate driving behaviors.



Figure 3.12: Trafiklegepladsen (marked in pink) surrounded by the larger Fælledparken [Source: Wikimedia Commons, 2013]



Figure 3.13: A traffic rule playground in Prague that lacks recreational amenities or vegetative elements that can engage youth [Source: Vaclav Veverka, n.d.]

Case Studies Takeaway 3: Designing for Publicness

The global case studies span different ownership and land use models. Sugunami Children’s Traffic Park in Tokyo and Trafiklegepladsen in Copenhagen are located within large public parks (see **Figure 3.12**), and they provide bicycle rentals for visiting guests. Traffic Rule Playgrounds, while publicly owned by Prague’s local councils, are often standalone parcels within a neighborhood. Melbourne’s Kew Traffic School is a private traffic safety facility with its own educational programming, yet allows local schools and organizations to rent out the space for special events. Regardless, there is a sense of publicness because of how these spaces are integrated into the neighborhood fabric. They are either designed to aesthetically resemble surrounding community spaces, or they are designed directly into community spaces. These spaces also accommodate activities that are commonly seen in the public realm: eating and drinking, socializing, gardening, and playing. These visual cues let community members recognize these parks as shared local assets.

Case Studies Takeaway 4: Designing for Recreation First

Not all traffic safety landscapes are designed to prioritize play. Some are strictly utilitarian, with road layouts that are scaled to resemble the size of the transportation network and lack programming within the interstitial spaces (see **Figure 3.13**). Traffic playscapes are unique because recreation is an essential part of the traffic safety experience. First of all, the inclusion of play in traffic safety efforts creates a more enjoyable, dynamic experience for youth. This experience is further enhanced through aesthetics that provide color, contrast, and vegetative interest. Second, being surrounded by a robust mix of recreational activities and aesthetics closely resembles conditions seen outside the traffic playscape. Neighborhoods are teeming with diverse activities, land uses, and unpredictable behaviors that youth need to learn how to respond to. A strictly utilitarian traffic safety landscape may be simple to use instructionally and cheap to build, but ignores the inherent “messiness” of everyday experiences on the street.

A stylized white wheel with spokes is positioned on the left side of the page. The wheel's hub is on the far left edge, and its spokes radiate outwards to a thick white rim. The background is a solid, vibrant orange color.

CHAPTER 4

CHAPTER FOUR:

Seattle Safe Routes to School: Assessment Tools

In 2013-2015, four Seattle Public Schools were selected to receive funding for Safe Routes to School (SRTS) projects from the Washington State Department of Transportation and Seattle Department of Transportation: Greenwood Elementary in the Greenwood neighborhood, Wedgwood Elementary in the Wedgwood neighborhood, Asa Mercer Middle School in the Beacon Hill neighborhood, and South Shore K-8 in the Rainier Beach neighborhood. Two of these schools, Asa Mercer Middle School and South Shore K-8, are selected as potential case study sites to prototype a traffic playscape based on the availability of data from the 2013-2015 round of SRTS program funding and comparable land development opportunities within the Rainier Valley region.

A traditional tool for identifying and prioritizing SRTS projects was the Walk and Bike Audit. This audit is a participatory tool for gaining first-hand knowledge of the walking and biking environment, and developing joint improvement strategies between facilitators and participants. A predetermined walking and biking route is established prior to the audit. During the audit, participants photograph and write down opportunities and challenges they encounter at specific locations along the route. These observations are then summarized into several infrastructure and non-infrastructure recommendations. While some of these recommendations are pursued immediately,

the Walk and Bike Audit serves as reference documentation when funding becomes available for additional improvements (Feet First & Seattle Neighborhood Greenways, 2015). Another traditional assessment tool are travel surveys, which are administered to students and parents to understand the factors that influence decisions to commute by foot or bike to school. Across many SRTS programs, these two tools are used due to their validity, reliability, and ease of implementation (see **Figure 4.1**) (Mendoza et al., 2010).

Asa Mercer Middle School's and South Shore K-8's baseline data and program recommendations led to the prioritization of funded SRTS projects in the neighborhood. One of the goals of the traffic playscape framework is to synergize with the infrastructural challenges and opportunities identified from the audit, as well as with the SRTS improvements that have emerged from it. Interventions also have an opportunity to directly address the specific set of attitudes and perceptions toward walking and biking reported by families participating in these schools' SRTS programs.

Seattle SRTS Assessment Tools (2013-2015)

Identify and prioritize potential SRTS projects

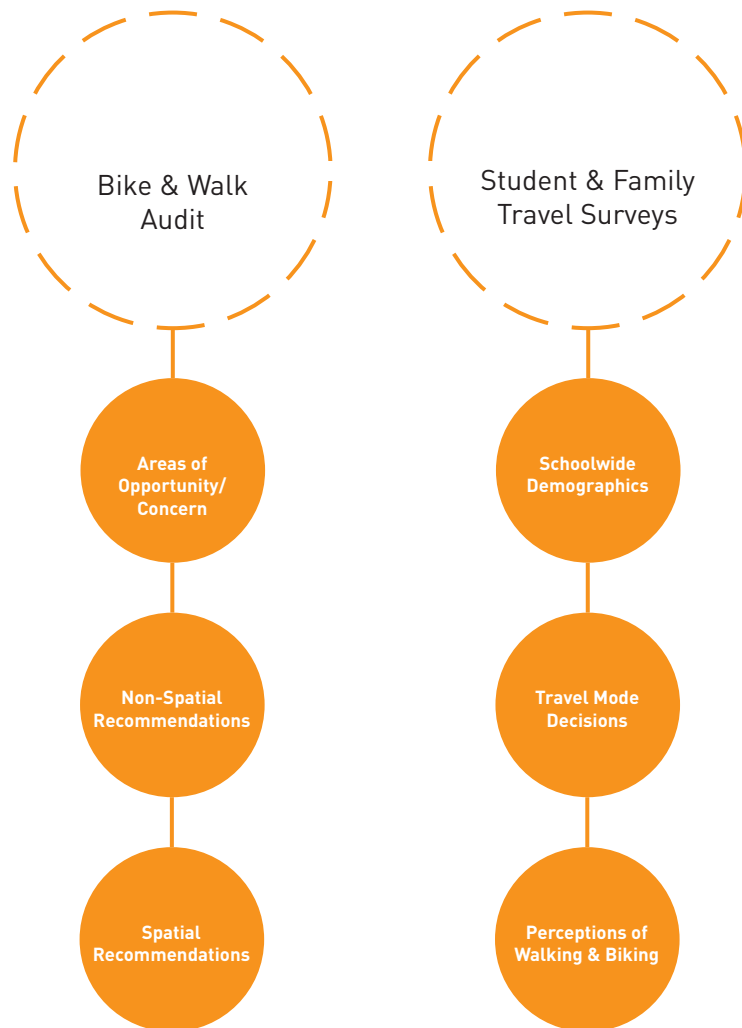


Figure 4.1: Evaluation tools for assessing existing traffic safety and commuting conditions at participating Safe Routes to School schools (Source: Author)

Asa Mercer Middle School

Asa Mercer Middle School is a Seattle Public School located on S Columbian Way in Beacon Hill (see **Figure 4.2**). It is located south of Jefferson Park, a 50 acre public park and golf course; west of the Seattle Veterans Affairs Hospital; and east of an Interstate-5 freeway entrance. The middle school's surrounding neighborhood is characterized largely by single family homes and businesses, and most families with students attending Mercer Middle School live within the school's walk zone. (First First & Seattle Neighborhood Greenways, 2015)

Asa Mercer Middle School operated its SRTS program from 2012 through 2015. The first part of the program involved a baseline travel survey taken by approximately 120 respondents. In terms of racial demographics of survey respondents, 28% were Asian, 23.64% were Black/African American, and over half of survey respondents were nonwhite. While surveys were distributed in Chinese, Somali, Spanish, and Vietnamese, only English-written forms were tabulated in the reported survey result due to limitations in translating information into chart form. According to the baseline survey, 46% never walked or biked to campus. About 20% of respondents saw walking and biking as completely unsafe, while another 20% of respondents saw these activities as unsafe. In comparison, only 6% of respondents saw these activities as safe. In terms of ability, 14% of students didn't know how to ride a bike while 14% of parents were not confident that their children knew enough about the rules of the road to use active modes of travel. In terms of school support, 31% of respondents did not know how much Mercer Middle School supported walking and biking, and 70% of parents never received any materials encouraging walking and biking. (Seattle Department of Transportation, 2013)

In the Walk/Bike Audit tool, a mix of both spatial and non-spatial recommendations were noted:

Spatial Recommendations:

- Improve crossing of S Columbian Way at the southwest corner of campus
- Improve 16th Ave. S between S Dakota St. and the school driveway
- Remove right turn from Beacon Ave. S to S Columbian Way

Non-Spatial Recommendations:

- Increase staff crossing help at VA Hospital entrance and increase school district support for staff during arrival and departure times
- Promote bike and safety education for students and families
- Improve circulation plan
- Continue encouragement campaigns

Source: Feet First & Seattle Neighborhood Greenways, 2015

South Shore K-8

South Shore K-8 is a Seattle Public School located within the ethnically and culturally diverse Rainier Beach neighborhood (see **Figure 4.4**). It is part of a larger academic cluster of public schools, which include Dunlap Elementary School, Rainier Beach High School, and South Lake High School. The school's surrounding neighborhood is characterized by a residential and business district in close proximity to Sound Transit's Rainier Beach LINK Light Rail Station. It is also located west of two lakeside outdoor spaces, Beer Sheva Park and Rainier Beach Urban Farm; as well as north of the Rainier Beach Public Library. Only 17% of students live within the walk zone set by Seattle Public Schools, which indicates the use of other modes of travel for students to access the school. (First First & Seattle Neighborhood Greenways, 2015)

South Shore K-8 operated its SRTS program from 2012 through 2015. The first part of the program involved a baseline travel survey taken by approximately 210 respondents. In terms of racial demographics of survey respondents, 29.47% were Asian, 28.99% were Black/African American, and over half of survey respondents were nonwhite. Similar to the Mercer Middle



Figure 4.2: Asa Mercer Middle School campus (Source: Todd, 2014)

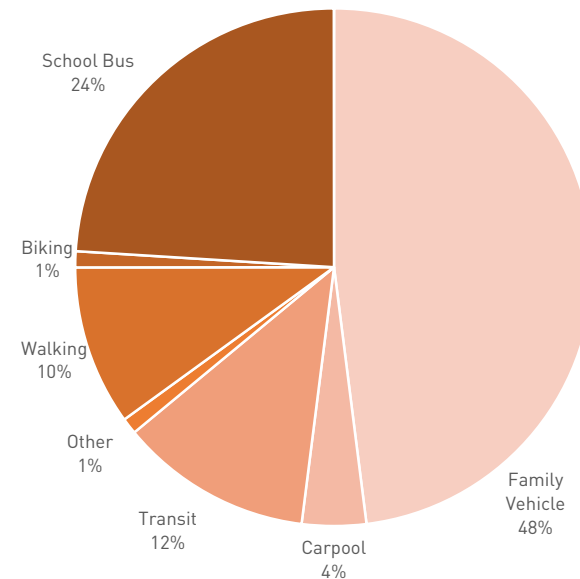


Figure 4.3: Student travel choice at Asa Mercer Middle School in 2012 (Source: Seattle Department of Transportation, 2012)

School baseline surveys, while surveys were distributed in Chinese, Somali, Spanish, and Vietnamese, only English-written forms were tabulated in the reported survey result due to limitations in translating information into chart form. According to the baseline survey, 69% never walked or biked to campus. Nearly half of respondents saw walking and biking as completely unsafe. In terms of ability, 20% of students didn't know how to ride a bike while 14% of parents were not confident that their children knew enough about the rules of the road to use active modes of travel. In terms of school support, 46% of respondents did not know how much South Shore K-8 supported walking and biking, and 87% of parents never received any materials encouraging walking and biking. (Seattle Department of Transportation, 2013)

In the Walk/Bike Audit tool, a mix of both spatial and non-spatial recommendations were noted:

Spatial Recommendations:

- Improve crossing safety for people walking and biking at S Henderson St. and 48th Ave. S & Rainier Ave. S & S 51st St.
- Tame traffic on segment of Rainier Ave. S closest to South Shore K-8
- Improve crossing safety at Rainier Ave. S and S Cloverdale St.
- Explore design possibilities for a living street on Henderson St. between Rainier Ave. S & Beer Sheva Park

Non-Spatial Recommendations

- Work with business and community leaders to activate public space
- Continue biking and walking safety education and encouragement for students and families
- Generate circulation plan for arrival and departure
- Retain crossing guards at critical locations along S Henderson St.

Source: Feet First & Seattle Neighborhood Greenways, 2015



Figure 4.4: South Shore K-8 campus (Source: Seattle Department of Transportation, n.d.)

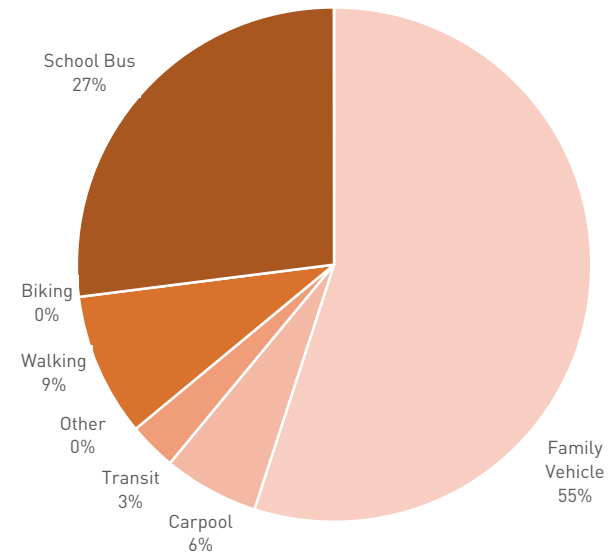


Figure 4.5: Student travel choice at South Shore K-8 in 2012 (Source: Seattle Department of Transportation, 2012)

School Comparisons

Both Mercer Middle School and South Shore K-8 share several locational and demographic characteristics, especially in terms of student body diversity (see **Figures 4.6 & 4.7**). However, baseline surveys indicate that families generally have different responses toward encouraging walking and biking to school. This affects the types of SRTS design strategies that may be most relevant for the communities to gain comfort and familiarity with walking and biking modes.

For example, South Shore K-8 reports a greater share of students who are taken to school by personal automobile (see **Figures 4.3 & 4.5**), which may be a result of fewer students living in the school's designated walk zone. South Shore K-8 also reports a higher percentage of students who have never walked or biked to campus before. This connects to how a greater share of families with students attending South Shore K-8 believe that walking and biking is completely unsafe, and that many of these families do not receive any material encouraging walking and biking from the school.

As indicated by the walk audit, there are also very different transportation assets in each neighborhood that affect which travel modes are generally accessed by students, which will be further assessed in Chapter Five. For example, South Shore K-8 has more direct linkages to mass transit options within proximity to the Rainier Beach Light Rail Station. Meanwhile, Mercer Middle School has a large, 50-acre greenspace that allows students to travel north without having to interact with the roadway network for a significant portion of the commute home. Mercer Middle School is also much closer to a highway, and is located near a major arterial that connects directly to a highway on-ramp.

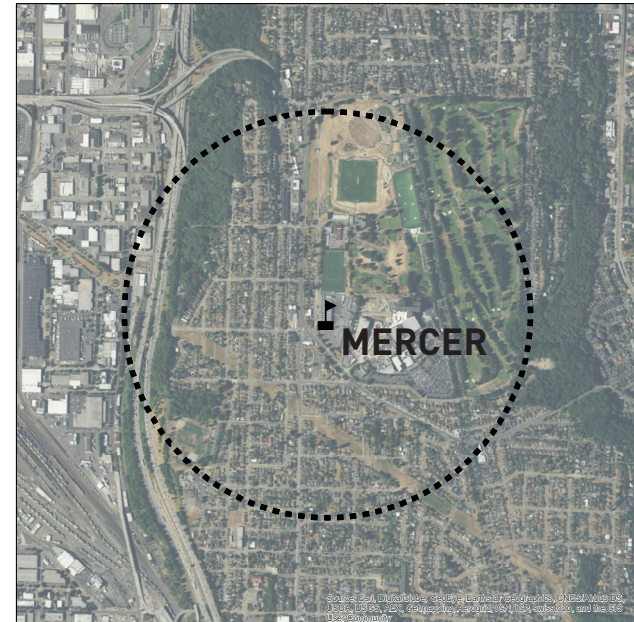


Figure 4.6: Aerial view of Mercer Middle School with 1-mile walkshed (Source: Google Earth, 2017)



Figure 4.7: Aerial view of South Shore K-8 with 1-mile walkshed (Source: Google Earth, 2017)



CHAPTER 5

CHAPTER FIVE:

Existing Conditions Assessment

Chapter Four described Seattle Safe Routes to Schools' (SRTS) use of audits and surveys to identify and prioritize potential projects. There are other neighborhood actors that shape how youth commuters respond to the larger traffic landscape that aren't specifically addressed in these schools' assessments. An expanded existing conditions assessment can include additional tools for understanding the relationship between school sites and the built environment, which can inform the design of a traffic playscape within SRTS (see **Figures 5.1 & 5.2**).

First, traffic playscapes are affected by the way that pedestrian, bicycling, and transit infrastructures are laid out within a neighborhood, influencing how students safely move through neighborhood spaces like parks, community centers, restaurants, etc. As indicated by literature on factors influencing walking and biking, traffic safety concerns emerge when pedestrians and bicyclists are limited to traveling on rights-of-way with high vehicular volumes and speeds, low visual or physical connectivity, or minimal signalized infrastructure to provide them visibility and priority. The first part of the existing conditions assessment focuses on multimodal transportation networks within a 1-mile-buffer, which represents a 15-20 minute walk or 10 minute bike ride. The 1-mile buffer is chosen because it is the distance that is frequently represented in Seattle SRTS school route maps as a walkable/bikeable

distance. The purpose of assessing transportation network characteristics is to determine the relationship between school, site, and neighborhood through multiple travel modes. This will affect decisions on external circulation patterns and access to the site.

Second, traffic playscapes are affected by the environmental, political, and social factors of the land it's built on. As highlighted by the design case studies, traffic playscapes can be built on a variety of land types that are connected to educational institutions. Riverbanks, major public parks, alleyways, tennis courts, and vacant residential parcels are all viable areas where traffic playscapes have been implemented; each with design approaches that respond to the parcel size and surrounding uses. In terms of viable developable lands adjacent to Asa Mercer Middle School and South Shore K-8, the City Light Utility Corridor is a landscape with unique yet highly regulated design parameters. The City Light Utility Corridor is largely undeveloped and within walking and biking distance from schools, yet its status as a transmission right-of-way affects what can be built on it. The second part of the existing conditions assessment identifies the physical characteristics and existing programming opportunities on the City Light Utility Corridor, and how existing conditions and programming may complement or conflict with the design development process. This will affect

decisions regarding site selection, site layout, vegetation, and potential user groups.

Third, the literature review emphasizes the role of built environments in influencing attitudes toward walking and biking. Authors highlight the importance of visual connectivity, visual cues, and an understanding of utilizing newer traffic safety infrastructure to increase familiarity and comfort. Additionally, the design case studies share a design approach that reflects neighborhood context: they incorporate cultural landmarks, unique road situations, recreational amenities, and neighborhood architecture as part of the learning experience. The third part of the existing conditions assessment develops a visual assessment and inventory of built environment elements that can be translated into design elements; with the intention that familiarizing students with these elements in an education setting builds cognitive memory. Forming the basis for providing design recommendations, the visual inventory will document and assess neighborhood character and building types, unique cultural and neighborhood streetscape elements, and regulatory and wayfinding signage.

A combination of Geographic Information Systems (GIS) and fieldwork methods were performed for these different components of the expanded existing conditions assessment. King County and the City of Seattle provide tax assessors, environmental, and transportation GIS datasets that have been updated within the last 1-2 years. Site visits to school neighborhoods utilize a protocol similar to the Walk and Bike Audits outlined in Chapter Four. The collection of written and visual data was based on a predetermined walk and bike route to capture representative neighborhood conditions surrounding the school, which I adapted for my assessment of neighborhood conditions.

Expanded Areas of Assessment	Purpose of Assessment	Data Source
Land Development Opportunities	Evaluate development potential of projects based on existing programming and physical conditions	<ul style="list-style-type: none"> •GIS •On-Site Field Visit
Transportation Network Characteristics	Determine relationship between school, project locations, and neighborhood from multiple travel modes	<ul style="list-style-type: none"> •GIS •Existing Maps •On-Site Field Visit
Visual Inventory and Assessment	Develop a toolkit of context-specific design elements that encompasses SRTS best practices and neighborhood features	<ul style="list-style-type: none"> •Design Case Studies •SRTS Engineering Toolkit •SRTS Program Evaluation •On-Site Field Visit

Figure 5.1: Table listing expanded assessment tools used to understand how to identify, prioritize, and design SRTS projects (Source: Author)

School Selection

Because Asa Mercer Middle School and South Shore K-8 are comparable schools within the same geographic region of Seattle, I will focus on one school to conduct an expanded existing conditions assessment for. Both schools present viable opportunities for designing traffic playscapes, and the proposed assessment methodology applies to both locations. This chapter focuses on South Shore K-8 due to the richness in environmental conditions identified in the 2013-2015 SRTS program assessment that makes it more challenging to work with. While this particular thesis focuses on the relationship between specific land use opportunities and schools in Southeast Seattle, the assessment methodology serves as a first pass at a potential framework that can be applied to different land opportunities and traffic safety programs beyond Seattle.

Seattle SRTS Assessment Tools (2013-2015)
Identify and prioritize potential SRTS projects

Proposed Expanded Assessment Tools
Understand how SRTS projects respond to larger built environment characteristics

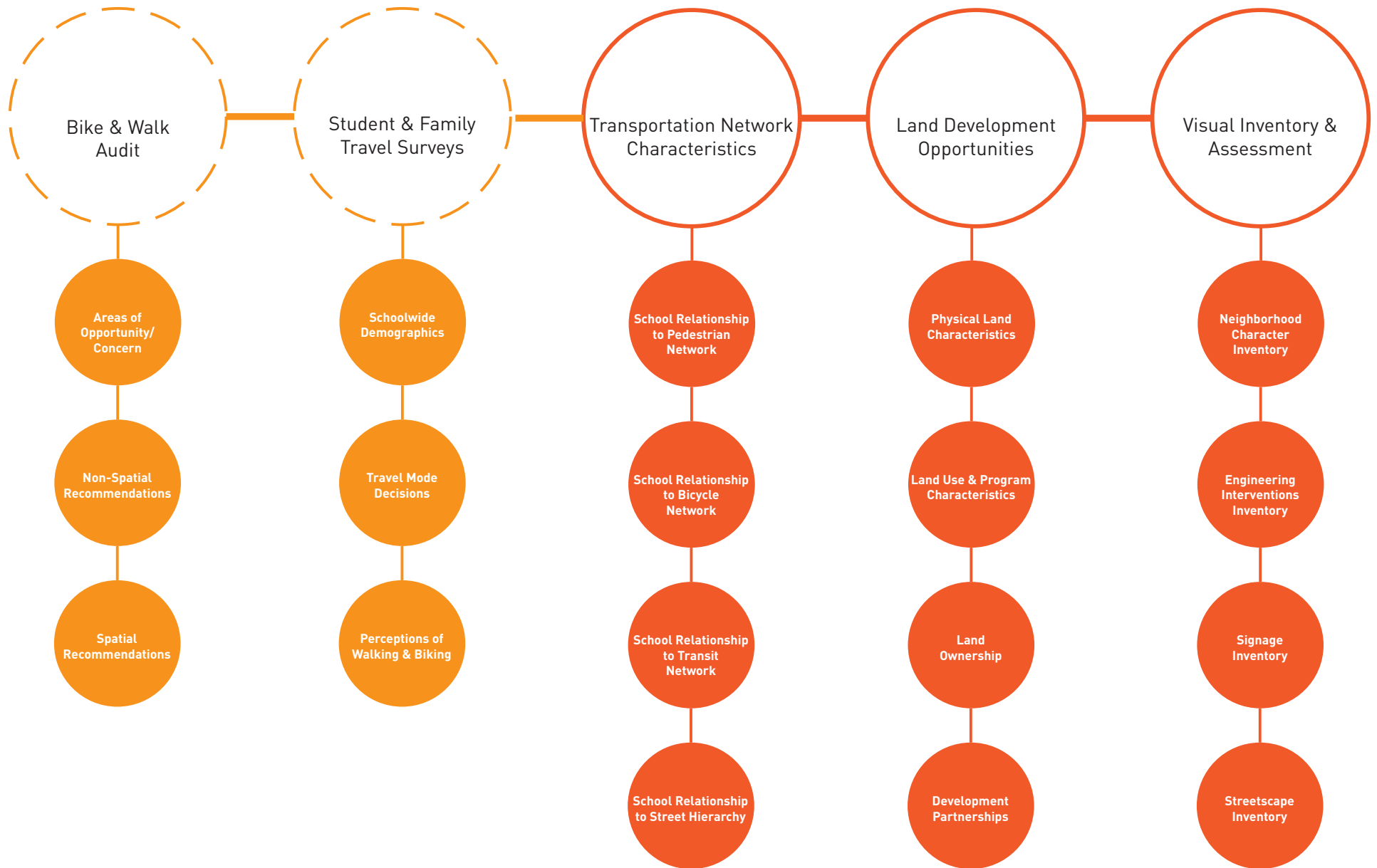


Figure 5.2: Expanded set of evaluation tools for assessing existing traffic safety and commuting conditions at participating Safe Routes to School schools
 (Source: Author)

Transportation Network Characteristics

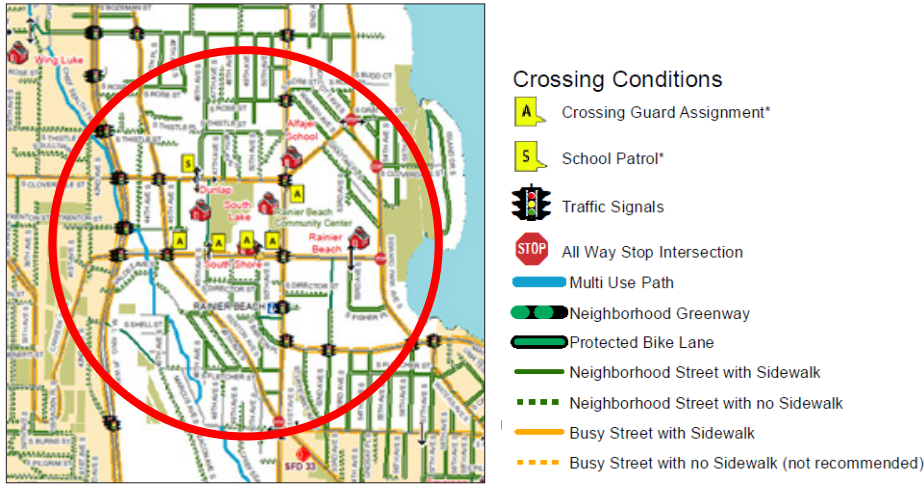


Figure 5.3: Comparison of traffic safety/pedestrian infrastructure within a 1-mile walkshed of South Shore K-8 (Source: Seattle Department of Transportation, 2012)

Traffic Safety/Pedestrian Infrastructure (see Figure 5.3)

Within 1-mile of the school, there are several traffic safety programs or infrastructure elements on the busy roads that surround all four sides of the school property. Crossing guard assignments and safety patrols are located on the north, east, and south sides of the school property, and intersections are built out with signals and/or marked crosswalks. However, in order to access separated pedestrian trail such as Chief Sealth Trail or the Rainier Beach LINK Light Rail Station, students must walk or bicycle more than a quarter-mile west of school along a busy road with few safe alternative routes. Local neighborhood streets have long block distances, often dead-end or loop, and are laid out in an inconsistent street grid system that is hard to navigate. This makes traveling along busier streets more convenient to access destinations for students both arriving and departing from school.

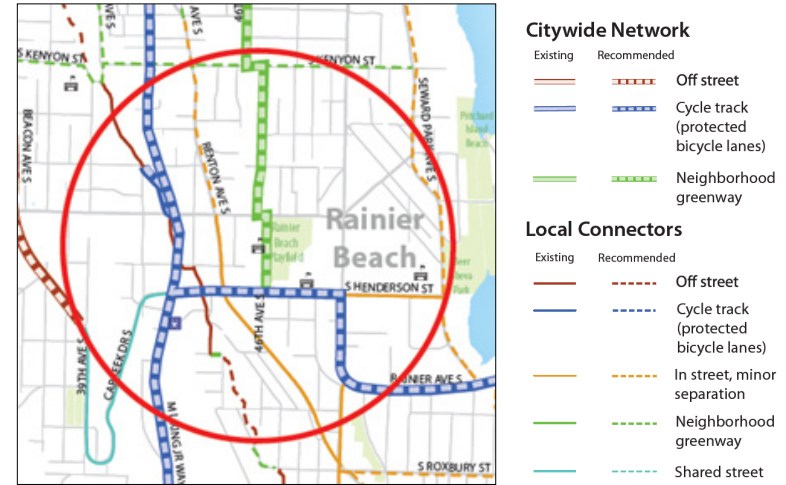


Figure 5.4: Comparison of bicycle network infrastructure within a 1-mile walkshed of South Shore K-8 (Source: Seattle Department of Transportation, 2015)

Bicycle Network Infrastructure (see Figure 5.4)

The only existing bicycle infrastructure around South Shore K-8 are on-street bicycle lanes that are located on “busy” major routes. These lanes are also not connected to major commuting destinations such as the Rainier Beach LINK Light Rail Station or Chief Sealth Trail, which results in a difficult network to navigate. To resolve these connectivity and protection issues, cycletracks are slated for Martin Luther King Jr. Way S, S Henderson St., and Rainier Ave. S to create a separated cycling experience. A traffic calmed neighborhood greenway is proposed on the west edge of the school, which will provide local connection to homes and businesses north of the school without the need for students to ride on a busy arterial. With these improvements, South Shore K-8 will also gain a diverse set of bicycle infrastructure throughout the neighborhood. Moreover, these new facilities may be conceptually unfamiliar to students since they currently do not exist in the neighborhood at all.

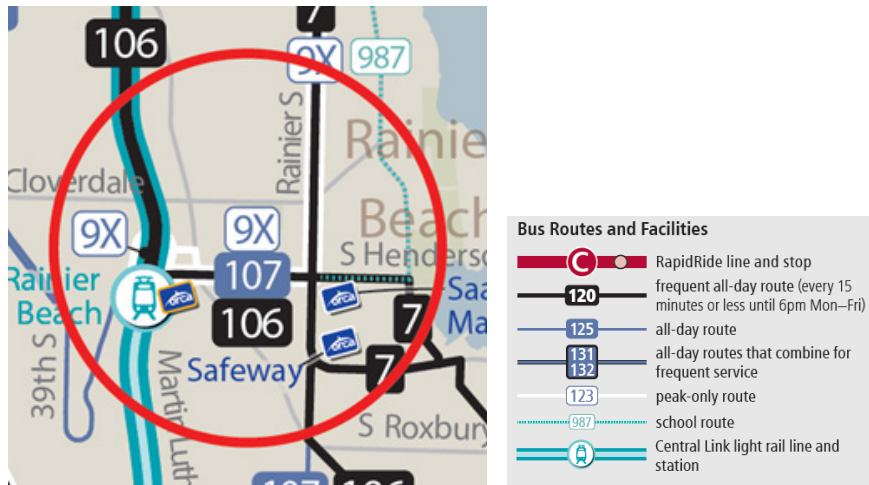


Figure 5.5: Comparison of public transit service within a 1-mile walkshed of South Shore K-8 (Source: King County Metro, 2016)

Transit Service (see Figure 5.5)

Bus service is present on streets that border the south and east side of the schools, with additional transit services to the west along Martin Luther King Way Jr. S. On the south edge of the school along S Henderson St., Metro Routes 107 and 106 connect transit users from Downtown Seattle and Beacon Hill to Renton. Additionally, Metro Route 9X provides north-south coverage from Capitol Hill to Rainier Beach with connections to Columbia City. On the east edge of the school along S Rainier Ave., Metro Route 7 also provides connection to Downtown Seattle and travels further southeast from the school to Seattle’s city limits. Compared to Mercer Middle School, there are no bus transit options that take people from South Shore K-8 to neighborhoods in West Seattle. However, Rainier Beach’s neighborhood LINK Light Rail Station is only several blocks away to the west, which provides access to stations as far south as Angle Lake to as far north as the University of Washington.



Figure 5.6: Comparison of road hierarchies within a 1-mile walkshed of South Shore K-8 (Source: Author)

Street Hierarchy (see Figure 5.6)

Principal arterials surround South Shore K-8 on the south and east edges of the campus, as well as several blocks to the west on Martin Luther King Way Jr. S where numerous public transit options are present. As with the case for Mercer Middle School, students must cross these corridors designed for high-volume, fast-moving traffic in order to access local roads to the south and east of the school. A network of local and collector streets are present to the north and allows students to avoid principal arterials. Based on SRTS walking maps, these issues are partially resolved with the presence of traffic control infrastructure and services on nearly all the streets that border the campus. The Seattle Bicycle Master Plan also outlines proposed cycletracks along principal arterials to protect cyclists from vehicular traffic with a sizable buffer.



Figure 5.7: City Light Utility Corridor, looking northwest toward Downtown Seattle (Source: Seattle City Light, 2015)

Land Development Opportunity: City Light Utility Corridor

The City Light Utility Corridor is a transmission right-of-way owned by Seattle City Light. Of the 14 miles of public right-of-way along the City Light Utility Corridor, approximately 4 miles run through Seattle before continuing southeast toward the City of Renton (see **Figure 5.7**). Seattle City Light power lines run overhead along 120-foot-tall electric towers, and the ground below is predominantly undeveloped to preserve ease of power line maintenance. Overgrown vegetation and other vertical obstructions can potentially block access or interfere with power lines, posing significant safety hazards for nearby homes and maintenance workers. The City Light Utility Corridor is classified as a higher voltage line, and between 75 to 200 feet in width is given to accommodate the transmission towers and wires of this nature. The width is maximized at 200 feet for most of the right-of-way. While vegetation may be planted within this right-of-way, allowable heights correspond with distance away from the centerline of the transmission tower (see **Figure 5.8**). Within the wire zone (typically 16.5 feet from edge of wires), there should be no tree canopies falling into it at all, with only grasses and shrubs permitted beneath the lines; under no circumstances

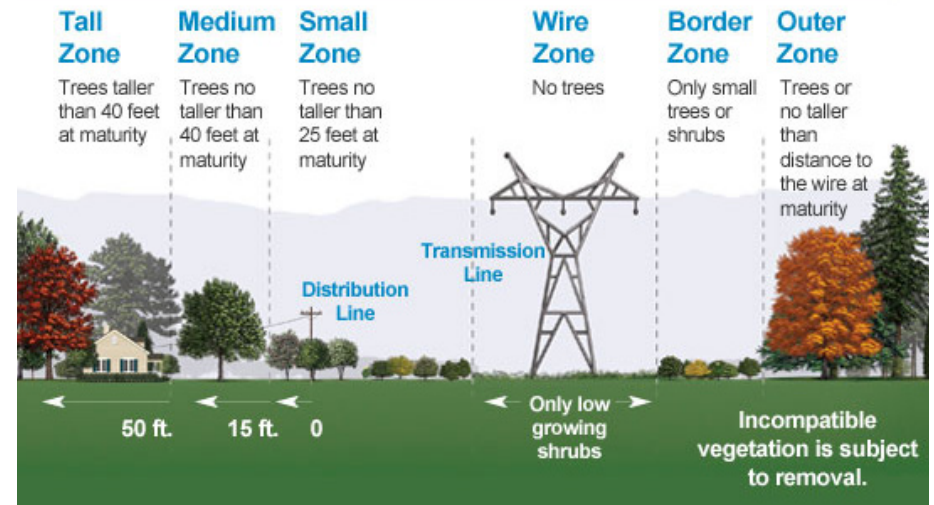


Figure 5.8: Vegetation height zones beneath and adjacent to transmission lines (Source: Pacific Gas and Electric, 2012)

should trees be planted underneath. On the border zones, taller-growing vegetation is not compatible since wires can strike the vegetation when swaying or trees may fall onto the wires during heavy winds. Therefore, only lower growing vegetation is permissible. Maximum vegetation heights on these border zones are ideally 25 feet or less (Seattle City Light, n.d.). Ultimately, maintaining vertical and horizontal clearances is necessary for minimizing risks and injuries, and other uses along this corridor must be strategically placed.

The extensive length and width of the City Light Utility Corridor provides a significant amount of public land. Parties have viewed this right-of-way as a key environmental, transportation, and cultural asset for neighborhoods that bisect it; and it is highlighted as an opportunity site in multiple neighborhood plans. Seattle City Light has partnered with other city agencies and community organizations to activate segments of the right-of-way with uses that support human and ecological health; these include Seattle Department of Transportation (SDOT) and the Department of Neighborhoods. These partnerships demonstrate that this type of land opportunity can serve as



Figure 5.9: Chief Sealth Trail sited along the City Light Utility Corridor (Source: SvR Design, n.d.)

a testing ground for a traffic playscape since other programs and partnerships have been formed on this corridor with considerable success.

Chief Sealth Trail

The Chief Sealth Trail is a 3.44 mile multi-use trail with trail end points on S Angeline St. in North Beacon Hill and S Gazelle St. in Rainier Beach (see **Figure 5.10**). It is the only trail in Southeast Seattle that is classified as a multi-use trail. With generous trail widths and complete separation from vehicular traffic, it “allows for two-way, off-street pedestrian and bicycle use. Wheelchair users, joggers, skaters and other non-motorized users are also welcome. These trails are frequently found in parks, along rivers, beaches and in greenbelts or utility corridors where there are few conflicts with motorized vehicles.” (Seattle Department of Transportation, n.d.) It is also a straightforward trail in terms of jurisdictional ownership; the trail itself is maintained by the Seattle Department of Transportation and is sited almost entirely on Seattle City Light’s transmission right-of-way.

The trail was developed in response to non-motorized transportation and neighborhood plans that stated the need for a trail in Southeast Seattle. These plans also identified the City Light Utility Corridor as a site that could benefit from increased safety. The trail was landscaped with excavated material left over from the LINK Light Rail project occurring along Martin Luther King Jr. Way, which reduced the amount of money and time needed to jumpstart the construction process. Since its construction, it has earned multiple awards as an exemplary case of public-private collaboration, sustainability in the design process, and the ability to accommodate smart growth through strategic transportation investments. Because Chief Sealth Trail was built on a utility corridor that extends past the trail end points, there is potential for future connections to Downtown Seattle and Renton. This would allow for a more comprehensive off-street bicycle and pedestrian network for Southeast Seattle residents. (Seattle Department of Transportation, n.d.)

Compared to other trails in Seattle’s multi-use trail system, it is not as frequently used as other trails in the system (Alki Trail, Burke-Gilman Trail, etc.). SDOT pedestrian counts reveal

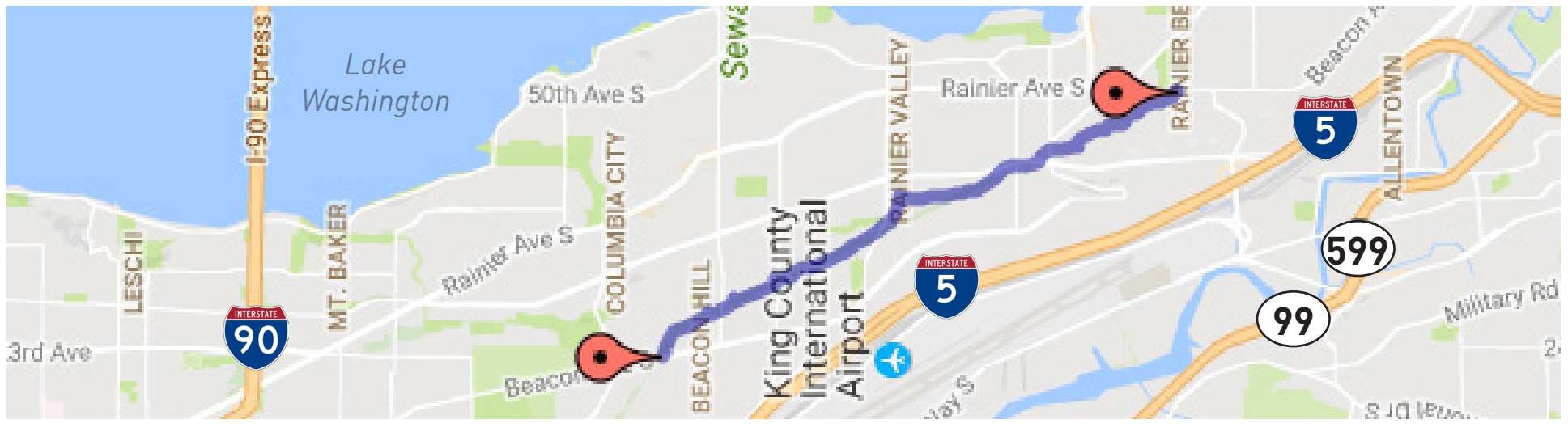


Figure 5.10: Map of full length of Chief Sealth Trail, which runs north-south from Beacon Hill to Rainier Beach (Source: Google Earth, 2017)

that the trail received only 23 walking users and 5 biking users per hour; both which are below the average number of walking/biking trail users. It is also quite different from other trails in terms of pavement quality and provision of public trail amenities. A SDOT trail inventory reports only 4 amenities along the entire segment of the trail (amenity defined as benches, trash cans, fountains, etc.), or approximately 1 amenity per mile; it has less amenities than the average multi-use trail. Meanwhile, this same inventory reports only 10 pavement issues, or approximately 3 issues with the pavement per mile; it is smoother than the average multi-use trail. Corresponding to the lack of vegetation and lack of amenities, trail users who were surveyed in the Seattle Trails Upgrade Plan noted the need for shade and rest. The final difference between this trail and other trails is its topography. Most popular trails in the Seattle system are comfortable because they are relatively flat and avoid any significant grade changes. Meanwhile, the Chief Sealth Trail is sited along a hilly transmission right-of-way and contains very steep inclines and declines that inexperienced cyclists and pedestrians may struggle with (see **Figure 5.9**) (Seattle Department of Transportation, 2015).

A few key lessons emerge from the Chief Sealth Trail that can be applied to the creation of a traffic playscape on this corridor. Despite the trail being promoted as a multi-user recreational amenity, it is not considered highly recreational because it lacks amenities that are associated with attractive recreational spaces: shade from vegetation, benches, trash cans, etc. There is an opportunity for interventions along the City Light Utility Corridor, such as a traffic playscape, to activate the area with more recreational amenities. It is also a well-maintained, smooth trail compared to others in Seattle's trail system. An opportunity exists to increase ridership and walkability by drawing attention to the fact that Chief Sealth is a high-quality transportation facility. Finally, it is a challenging trail to use because of its terrain. A traffic playscape, with the goal of increasing familiarity and comfort with using real-life transportation networks, can be coordinated with the trail since they sit within the same right-of-way. The playscape can be used as a training ground before students use the Chief Sealth Trail.



Figure 5.11: Community gardening and education through Seattle’s P-Patch Program (Source: Seattle Department of Neighborhoods, n.d.)

P-Patches

The P-Patch program is run by Seattle’s Department of Neighborhood. The department oversees 15 acres of community gardens. These gardens are envisioned as “gathering places that strengthen networks through cooperative ventures; a source of pride among residents; a visible product of land stewardship and a healthier urban environment. Traditionally, they involve individual gardening plots which community members pay an annual fee for while all shared spaces throughout the garden are cared for together.” (Seattle Department of Neighborhoods, n.d.) Within this broad framework of gardening and communal stewardship, different models of urban agriculture are explored, including market gardening, youth gardening, community food security, and food growing as recreation and physical exercise (see **Figure 5.11**). Each garden reflects the unique culture and diversity of P-Patch gardeners through the food they grow, and the ways in which they individualize their plots with artwork and other decorations. These P-Patches also strive for inclusivity through their focus on low-income, minority, and youth communities; 23% of gardeners are people of color and 71% are low income.

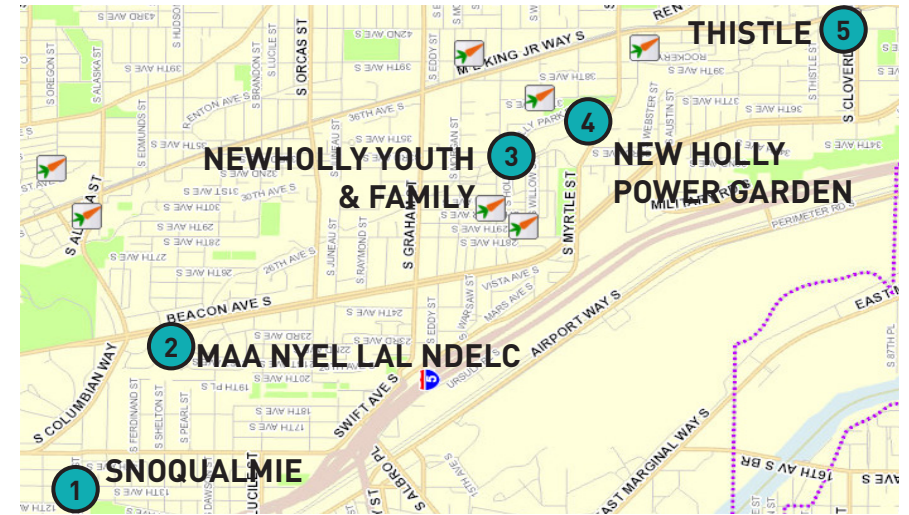


Figure 5.12: Locations and names of P-Patches sited along the City Light Utility Corridor (Source: Google Earth, 2017)

Of the 88 P-Patches within the City of Seattle, five of them are sited on Seattle City Light land along the City Light Utility Corridor (see **Figure 5.12**). Many are adjacent to the Chief Seattle Trail. These P-Patches were established through an exchange of land from Seattle City Light to the Department of Neighborhoods in order to serve historically disadvantaged communities that live near this corridor. Like Chief Seattle Trail, the P-Patches on the corridor exemplify a successful type of partnership across community organizations and public agencies, and addresses equity in the built environment through a more resilient network of food access. The P-Patches work in conjunction with the multi-use trail network to provide linkages between these gardens and the larger community. The traffic playscape may be designed to accommodate urban agriculture as a potential program, or support students commuting to nearby P-Patches.

Visual Inventory near South Shore K-8

Neighborhood Character

Neighborhood Character

The neighborhood surrounding South Shore K-8 is primarily low-density single family residential, with some standalone retail buildings along the principal arterials. Retail buildings are visually eclectic, with unique architectural styles and/or colors that serve as informal wayfinding markers. Some denser townhome and apartment communities also line the principal arterials surrounding the school. Most are either gated or lack front doors that face the public edge; resulting in segments of the pedestrian sidewalk with inactive frontages. However, most of the faster-moving arterials are lined with fully mature trees that create natural shade and traffic calming. Along the local streets, the pedestrian experience was noticeably poorer despite the lack of fast-moving vehicular traffic. Most residential streets lacked sidewalks and lack any sort of connectivity to any parallel-running streets, making it difficult to intuitively navigate.

Existing Engineering Interventions

Using the route outlined by the audit, 9 of the 16 engineering treatments from Seattle's SRTS Engineering Toolkit were encountered. Many of these interventions existed prior to schools receiving SRTS funding, while several others were constructed in response to community feedback. These included:

- Radar speed signs
- Bikeways: bicycle boulevards and bike lanes
- Bicycle parking
- Crossing beacons
- Marked crosswalks
- Curb ramps
- Traffic Signals
- Stop Signs
- 20 MPH zones



Existing Engineering Interventions

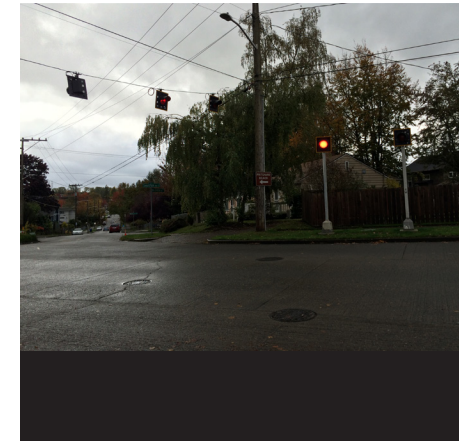
A majority of these interventions were constructed along the S Henderson St., a principal arterial to the south of the school. Many of these treatments were either new or well-maintained, with fresh coats of paint along most marked crosswalks and bicycle lanes; as well as curb ramps that were made ADA accessible with tactile warning strips. Mixing between vehicles, bicycles, pedestrians, and buses occurs most prevalently on the south side of the school as well. There are also two other schools on the same street as South Shore K-8 that equally benefit from traffic safety infrastructure, which likely accounts for the concentration of interventions there.

Cultural and Neighborhood Streetscape Elements

Various elements of the streetscape define the area as Rainier Beach. When approaching South shore K-8 from the west along S Henderson St, a large blue sign greets people into the Rainier Beach neighborhood, and this neighborhood identity is reinforced on street banners along each street pole. This motif is also repeated on the street east of the school. Several of the pedestrian paths and seating areas outside the school area are also adorned with various forms of community art, from murals to pavement art. There are also some standalone sculptures at the corner of major intersections.

Wayfinding Signage

There are three distinct styles of wayfinding signage in the school's walkshed. The first type of signage is standard SDOT green street signage indicating street names, with some more specific pedestrian/bicyclist signage indicating the distances of neighborhoods easily accessed by active transportation. There are also standalone signs confirming the locations of Chief Sealth Trail and Lake Washington Loop, two recreational bicycle routes. The second type of signage is red and blue signage that point out specific cultural destinations in the City Center. These signs were also designed by SDOT, but cater specifically for



Cultural and Neighborhood Streetscape Elements

pedestrians to travel to their desired destinations using public transit. The third type of signage is LINK Light Rail signage that point to the direction of the Rainier Beach Light Rail station located three blocks west of South Shore K-8. While these signs convey similar types of information, the users that are best served by each signage type will vary.

Regulatory Signage

Most regulatory signs stand alone on a signal pole, allowing for these signs to be easily legible by vehicles approaching from a distance. Within the immediate school area, there are numerous 20 MPH zone signs that remind vehicles to keep vehicle speeds low. While a majority of warning signs are bright yellow in order to stand out to drivers and bicyclists to alert them of pedestrian activity (such as pedestrian crossings or nearby play areas) or unusual road conditions (such as dead ends), some signs are also white; which might cause a lack of clarity in how these signs should be interpreted. A similar issue is encountered with parking enforcement signs, which range in color, size, and content.



Wayfinding Signage



Regulatory Signage



CHAPTER SIX:

Design Prototyping I: Site Selection + Approach

Site Selection

Chapter Five identifies the City Light Utility Corridor as an underutilized land opportunity for designing traffic playscapes. The corridor is a valuable land asset central to Rainier Valley's schools, cultural and community institutions, and the transportation network. With approximately 3.5 linear miles of vacant land spanning multiple neighborhoods in Southeast Seattle, individual parcels possess environmental and transportation characteristics that result in a design approach with varying responses.

While both the school and traffic playscape site are intended to work in tandem to reinforce Safe Routes to School (SRTS) efforts, this chapter shifts from assessing school and neighborhood conditions to understanding site design opportunities and approaches. Like the SRTS assessment tools used in Asa Mercer Middle School and South Shore K-8, there are varying site conditions at each of these locations that present a different set of strengths, weaknesses, opportunities, and constraints.

Several parameters drive the selection of sites along the City Light Utility Corridor. First, identified sites are located within a ¼ mile of participating SRTS schools and, which constitutes a 5-10 minute walk between the school and traffic playscape. Second,

identified sites are of comparable acreage to traffic playscapes in other cities. Third, identified sites face the same road as the school in order to simplify wayfinding between the school and site. Using these parameters, a viable site emerged for South Shore K-8. Additionally, the selected site is adjacent to public transit options and the bicycle network, contains electrical infrastructure within or near the parcel, and is close to local community assets (such as P-Patches and community centers) that reflect neighborhood character.

The traffic playscape site identified for South Shore K-8 is located within a ¼ mile walkshed of the school to the west, bounded by S Trenton St. to the north, Martin Luther King Jr. Way S to the west, and S Henderson St. to the south (see **Figure 6.1**). The site is a 1.25 acre lot sitting adjacent to the Chief Sealth Trail. It is adjacent to a mix of grocery stores, restaurants, and single-family homes. It is accessible on two sides by multiple bus lines, and is located across the street from the Rainier Beach LINK Light Rail Station. To provide room for amenities for light rail riders, a small plaza is located on the southwest edge of the site that is designed with bike racks and lockers, benches, about a dozen low-growing trees, and cultural signage welcoming people into the Rainier Beach neighborhood. Due to its location relative to multiple transit options and amenities, the traffic playscape would act as part of a larger mobility hub

for Rainier Beach. Two transmission towers and utility boxes are located on the south edge of the site with a short gravel road for maintenance vehicular access, which prevents a significant amount of design work to occur on the south side (see **Figure 6.2**). The north side is constructed of fill from the light rail excavation project, resulting in a manmade earthen mound that provides visual topographic interest.

This site represents one potential location for prototyping a traffic playscape site design within the South Shore K-8 neighborhood, based on conditions identified from current assessment tools described in Chapter Four and the expanded set of assessment tools proposed in Chapter Five. A different set of parameters may result in other viable land development opportunities, which emphasizes the flexibility of this framework to include other neighborhood assessment tools beyond the ones described in this thesis. Questions that are addressed specifically through the site design process include:

- 1) How will the design be affected by the presence of transmission towers and other types of on-site electrical infrastructure?
- 2) How will the site integrate with the Chief Sealth Trail to the east and light rail-oriented plaza to the southwest?
- 3) How will the design work with the existing fill resulted from the light rail excavation?
- 4) How will the site address issues of safety as a result of being bordered by fast-moving arterials?
- 5) How will the site respond and adapt to changing transportation and land use conditions in the neighborhood surrounding South Shore K-8?

Translating the Neighborhood: A Sequential, Layered Design Approach

The design of a traffic playscape is different from other site-based approaches to recreational landscapes and playgrounds. Whereas the function of playgrounds is to provide opportunities for experimental and creative play that cannot necessarily be obtained indoors (Wardle, 1992), traffic playscapes are additionally designed as a microcosm of the surrounding neighborhood, reflecting the social and physical encounters a student would experience outside the traffic playscape. It emulates neighborhood infrastructure at a scale that youth can meaningfully play with and learn from.

On one hand, the site design process resembles a larger subdivision or neighborhood development process where streets and infrastructure are laid out, and subsequently inform the placement of buildings and open spaces. At the same time, it is a landscape architecture process where specific materiality, vegetation, furnishings, and textures are intentionally chosen by the designer to create a sense of place. Ultimately, my approach for designing traffic playscapes is an adaptation of how community infrastructure is developed, which comes in sequential phases.

In new neighborhoods and subdivisions, roads are the fundamental building blocks that define where land uses are placed and how destinations are accessed. The street system sets the initial conditions for how people move and buildings function. The process is sequential because buildings and open spaces cannot be located until the infrastructure (roads and utilities) is put in place for those spaces to operate properly. Land uses within a neighborhood cannot be located until there are spaces for them to be housed. Creating a wayfinding system for navigating between and recognizing destinations only makes sense once buildings and uses are established.

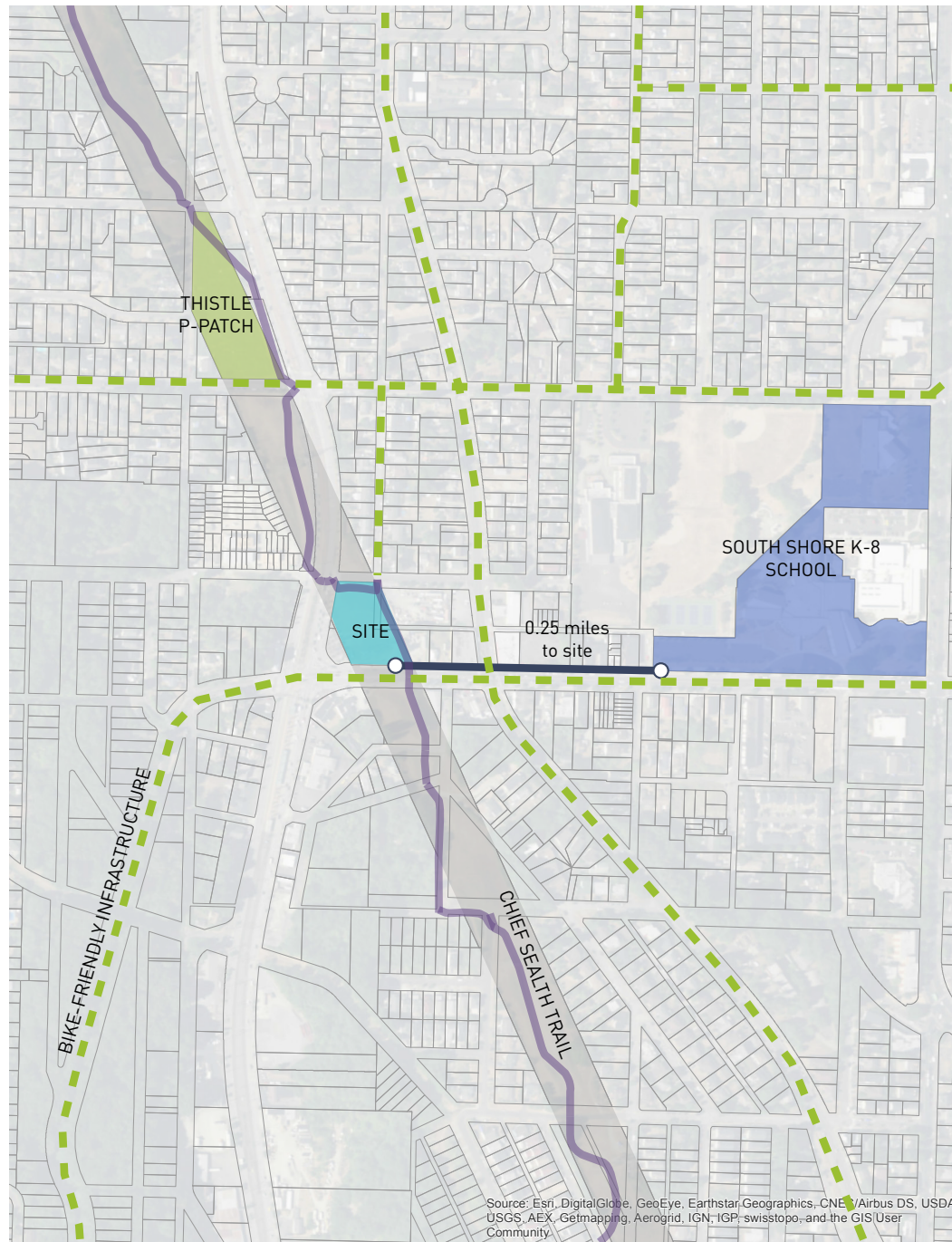


Figure 6.1: Comparison of site design conditions at a neighborhood scale (Source: Author)








Figure 6.1: Comparison of site design conditions at a parcel scale (Source: Author)

Because the traffic playscape acts as a miniature neighborhood, I approach the traffic playscape design process in a similar vein to the larger-scale neighborhood development process. It involves moving through several additive, sequential layers where each new layer of the site design is informed by design decisions made in the previous layer (see **Figure 6.3**). This chapter will describe the design considerations made at each layer, and how different aspects of the neighborhood are translated into design elements. The sum of these layers results in a traffic playscape resembling the physical, cultural, and traffic conditions of the larger neighborhood.

Each layer addresses how SRTS' "6 E's" framework is being integrated into the overall traffic playscape design approach. No single layer alone can address all of the "6 E's" at once. Education and equity, for example, are values that are tied to each design layer. Values of enforcement, encouragement, engineering, and evaluation are only addressed in one or two layers at most. As a result, layers need to be designed in relation with one another in order for all "6 E's" to be balanced and well-integrated into the project.

SAFE ROUTES TO SCHOOL "6 E'S"

 EDUCATION	 ENGINEERING
 ENFORCEMENT	 EQUITY
 ENCOURAGEMENT	 EVALUATION

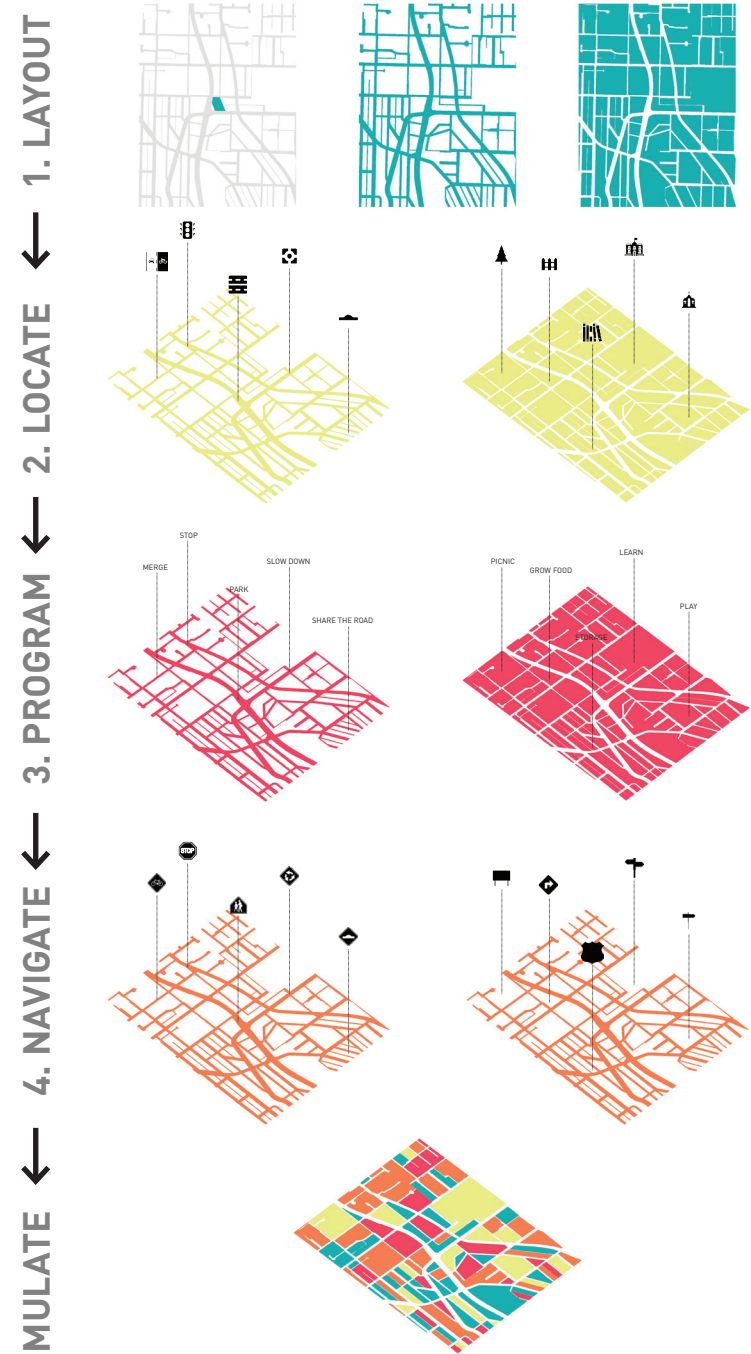
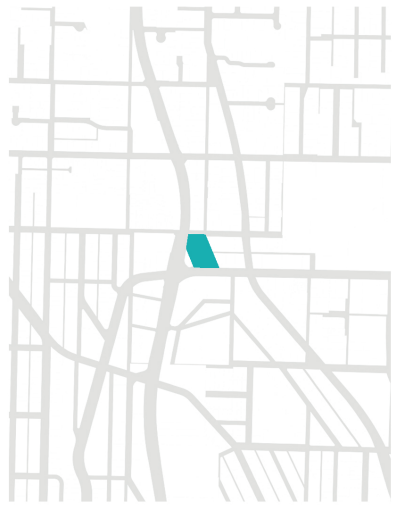


Figure 6.3: Sequence of "neighborhood translation" layers in the design approach (Source: Author)



	Gridiron (c. 1900)	Fragmented parallel (c. 1950)	Warped parallel (c. 1960)	Loops and lollipops (c. 1970)	Lollipops on a stick (c. 1980)
Street patterns					

Figure 6.4: Evolution of street patterns since 1900 [Source: Southworth, 2005, p. 247]

Layer 1: Layout

Urban neighborhoods contain a mix of street patterns that reflect particular attitudes and eras of urban mobility. They range from the walkable, pre-automobile gridiron patterns of the 1900s to the curvilinear warped and looping street patterns of post-World War II automobile-oriented suburbs (see **Figure 6.4**). The layout of roads influences the level of traffic service and safety that development will encounter (Listoken & Walker, 2013). It becomes the basis for how engineers design appropriately sized roads and how planners decide upon appropriately located uses. Similarly when designing a SRTS-based traffic playscape, an effective layout of miniature streets sets the set of conditions for how other elements of the site will be developed for students to practice different traffic safety scenarios.

One key design consideration is how the placement and layout of miniature streets resembles those seen in the neighborhood, especially roads that are within a nearby school's walkshed.

These are the streets that students interact with on a regular basis when traveling to and from school, and often receive new forms of traffic safety infrastructure as a result of SRTS efforts. Using the South Shore K-8 site as an example, the layout of streets surrounding the City Light Utility Corridor site and school indicates a fragmented parallel street pattern development, with many streets running in parallel for long distances before intersecting with another road. Cutting through the fragmented parallel pattern are including bending arterials roads that cut across the neighborhood, and offshooting cul-de-sacs that contain newer residential development.

A neighborhood-based layout must also be balanced or integrated with multiple learning scenarios for traffic safety. For example, a number of design case studies incorporate a loop around the perimeter of the site that defines the edges of the site while providing a track for doing laps. These case studies also create differentiated areas of faster, unrestricted movement reminiscent of higher-speed arterials; and slow movement

reminiscent of traffic calmed residential streets. Additionally, traffic playscapes set up a diverse set of intersection scenarios so that students can practice how to approach these conflict points between pedestrians, cyclists, and drivers.

In assessing the urban morphology of streets within a neighborhood, some key design questions emerge:

- 1) How are streets organized?
- 2) Do the layout of streets reflect certain eras of neighborhood development, and how do these different street patterns integrate with one another?
- 3) What are the different types of intersections present?
- 4) Are streets highly connected with one another or disjointed? (i.e. cul-de-sacs, loops, dead-end streets, long streets with long distances between intersecting streets)

The layout of a traffic playscape ultimately defines two different types of learning spaces. Both have their own design considerations that operate separately yet in parallel with each new design layer:

Network: The system of roads that connect to different destinations

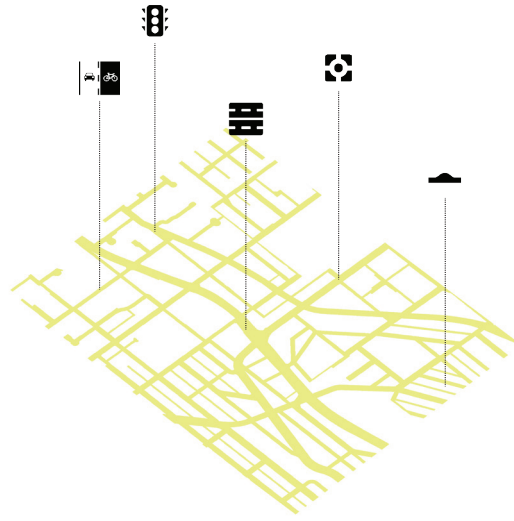
Destinations: The spaces between the roads in which land uses are determined



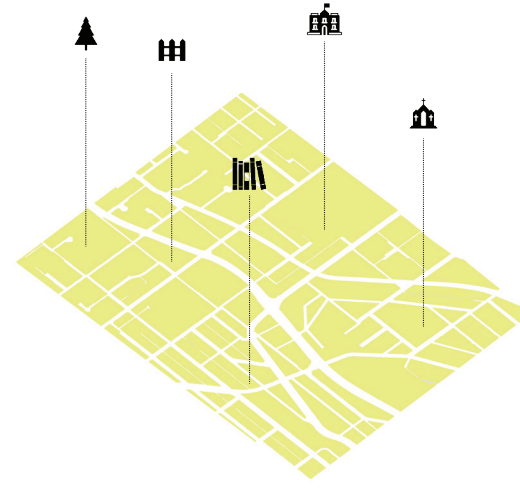
Network



Destination



Network
Locate: Infrastructure Types



Destination
Locate: Places

Layer 2: Locate

Network: Locating Infrastructure Types

While streets define layout and connectivity between different parts of a neighborhood, the design of street infrastructure determines the character, size, and function of the road. One design consideration is how a street right-of-way allocates width for different forms of mobility. Median roads, for example, have a wide strip (anywhere from 5 feet to 20+ feet) of pavement or grass separating traffic flowing in opposite directions. Roads with bicycle lanes can range anywhere from having a painted bicycle lane adjacent to the vehicular travel lane, or a protected bicycle lane (PBL) that provides several feet of separation between bicycle and vehicular travel (see **Figure 6.5**). Beyond considering the allocation of space within a street's width, road infrastructure elements are placed at various points along the length of the street, such as speed bumps and intersection crossings. As a learning and roleplaying opportunity, the traffic playscape should be designed to mix and match different infrastructure types that a student may encounter within the

neighborhood, particularly ones that have been implemented through SRTS efforts (such as crosswalks, traffic signals, and curb extensions). These different elements are described in Chapter Two, within Seattle's SRTS Engineering Toolkit.

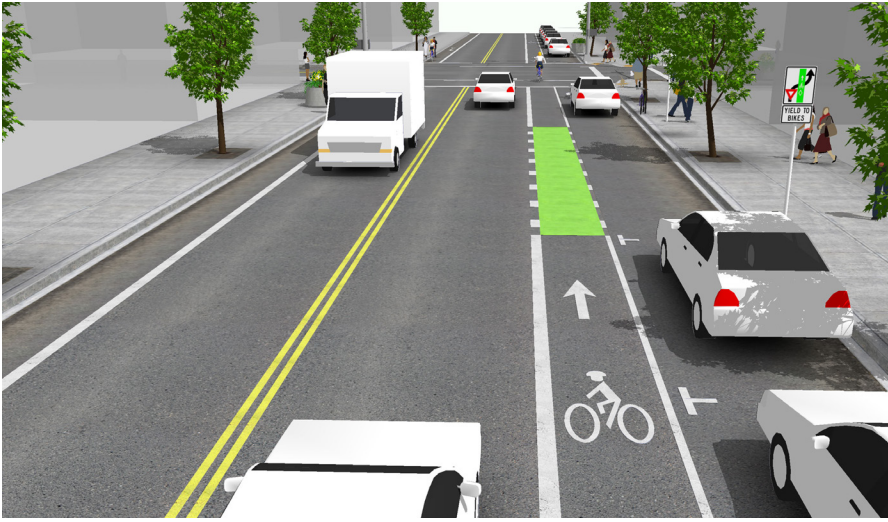






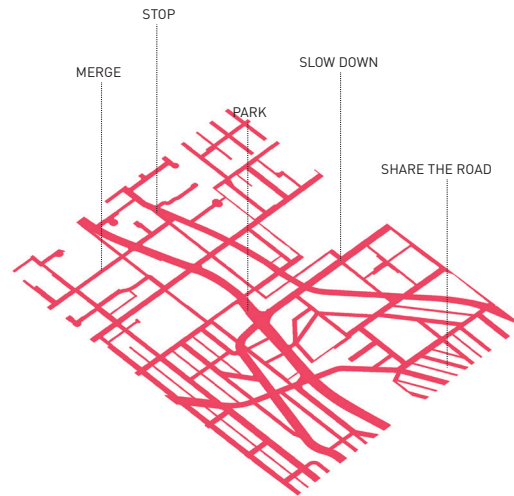
Figure 6.5: Different types of bicycle infrastructure create different visual and riding experiences for cyclists, pedestrians, and cars (Source: National Association of City Transportation Officials, 2015)

Destination: Locating Places

Neighborhoods have different buildings and open spaces with aesthetics and uses that make them memorable landmarks for the community. These memorable elements can be informally recognized by residents, like a house with a colorfully painted exterior or a small business with an interesting façade. Other elements are formally recognized by the city as community institutions like churches, parks, and libraries. By establishing similar replica destinations within a traffic playscape, users can relate learned traffic safety behaviors to elements of the neighborhood they see regularly. A variety of destinations should be introduced to create visual contrast, wayfinding opportunities, and diversity to the space. If possible, these destinations should also be designed to reflect how buildings and road infrastructure relate to one another in the neighborhood. For example, South Shore K-8 faces S Henderson St., which is a street with bicycle lanes and bus stops. A scenario should similarly be set up in the playscape where a replica “school” building faces a road with similar infrastructure.

Safe Routes to School Values Addressed

-  EDUCATION
-  ENGINEERING
-  EQUITY
-  EVALUATION



Network
Program: Travel Behavior



Destination
Program: Activities

Layer 3: Program

Network: Programming Travel Behaviors

Infrastructural characteristics influence a user's perception of safety and speed within a street. An engineer's or planner's choice of infrastructure is often associated with a set of expected traffic behaviors. Streets with traffic calming devices, narrow widths, and shared bicycle lanes/markings encourage drivers to slow down and be observant of their surroundings. Streets with generous widths encourage free-flowing travel and space for parking, switching lanes, etc. Therefore, infrastructure often dictates what types of travel behaviors are appropriate within a neighborhood; and when paired with enforcement, determines what behaviors are allowable by law. In the context of neighborhood development, infrastructure and appropriate traffic behaviors are guided by policy tools such as zoning and roadway design manuals, ensuring that road characteristics correspond to the uses of the area (residential, industrial, etc.). In a traffic playscape, the choice of infrastructure sets up different scenarios for reinforcing safe, compliant traffic

behaviors through practice, repetition, and play. Dedicated areas of a traffic playscape may be used as a training ground for learning how to merge, park, or share the road with other users (see **Figure 6.6**).



Figure 6.6: A temporary traffic skills training course programmed into a school playground (Source: Sonoma County Safe Routes to School)



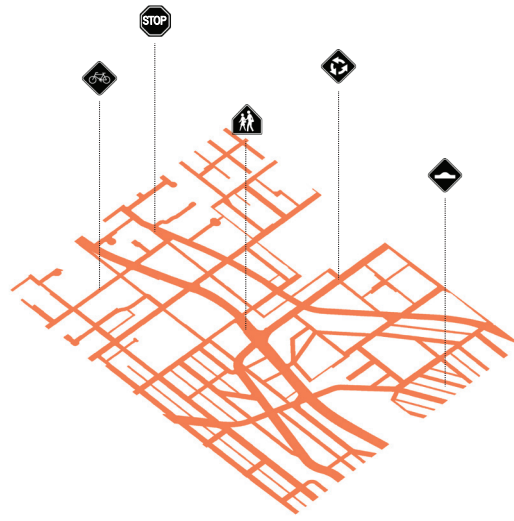
Figure 6.7: A playground in Trafiklegepladsen is modeled after a gas station that young kids can interact with (Source: Hyggefabrikken, 2014)

Destination: Programming Activities

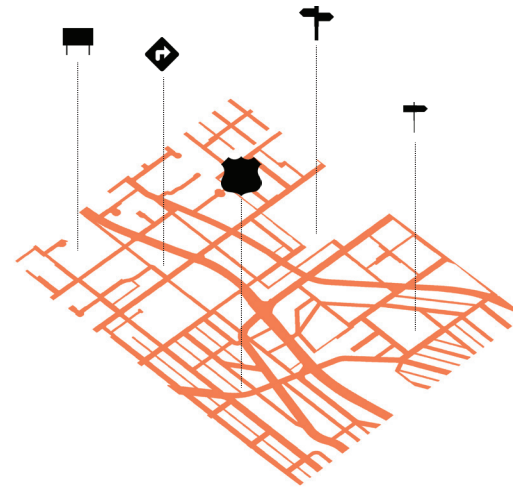
Miniature buildings and open spaces within a traffic playscape can have downscaled, playful versions of real-world uses (see **Figure 6.7**). For example, a replica community garden may be programmed with small planter boxes that allow youth to participate in urban agriculture, which adds to the educational value and aesthetic interest of the park. A replica greenspace may have areas for picnicking. A replica library may have places for storing books and other traffic safety literature. Additionally, these small structures can serve dual utility purposes, such as bike storage or event equipment storage. These elements can also work in tandem with teaching travel behaviors. Students can practice how to use different traffic maneuvers to access destinations of interest, or how to adjust their movement speed and technique when traveling through different surroundings.

Safe Routes to School Values Addressed

-  **EDUCATION**
-  **ENCOURAGEMENT**
-  **EQUITY**
-  **EVALUATION**



Network
Navigate: Regulatory



Destination
Navigate: Wayfinding

Layer 4: Navigate

Network: Navigating Regulatory Signage

Regulatory signs are placed in conjunction with traffic infrastructure to reinforce traffic laws or behaviors that support public safety. A municipal Department of Transportation designates universal shapes, colors and symbols that form a consistent signage system for all users; certain colors and shapes are associated with different types of traffic messaging (see **Figures 6.8 & 6.9**). Adapting common language and symbols for regulatory signage within the traffic playscape helps youth make associations between simulated and actual transportation conditions. For instructors and families, these elements also allow for enforcement; ensuring that students adhere to the “rules of play” in the playground. The variety of sign types within a transportation network can be confusing to interpret, especially when they are clustered together. Signs within a traffic playscape should therefore be distilled to the most essential shapes, symbols, etc. so that students can recognize the meaning of different colors, icons, shapes, etc.

-  REGULATORY
-  WARNING
-  GUIDE
-  SERVICES
-  CONSTRUCTION
-  RECREATION
-  SCHOOL ZONE
-  INCIDENT MANAGEMENT

Figure 6.8: Shapes and colors of a sign indicative of the type of traffic messaging a transportation agency wants to convey (Source: Federal Highway Administration, 2015)



Figure 6.9: Common regulatory signs (Source: Buyers Barricades, 2015)

Destination: Navigating Wayfinding/Interpretive Signage

Wayfinding and interpretive signage allows for residents to know where and how to get to their destinations, as well as recognize when they have arrived. They often come in the form of standardized elements with a similar visual language and symbology as regulatory signs maintained by a municipal DOT. Other times, they can be individualized as identifiable markers responding to cultural characteristics of a neighborhood, or of a particular destination (see **Figure 6.10**). Once destinations and programs have been established within the traffic playscape, the placement of wayfinding and interpretive signage along key stretches of road allows for students to learn how to navigate between different destinations and recognize some commonly used symbols within the transportation network. They can be designed to replicate the style of interpretive/cultural signage of the larger neighborhood, or correspond to the patterns, textures, and colors used throughout the traffic playscape.

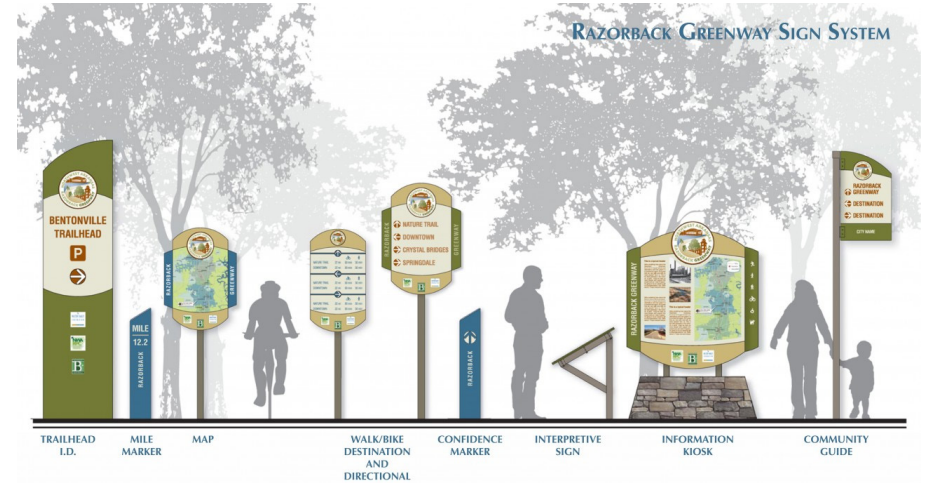






Figure 6.10: Conceptual drawings of wayfinding signage for Razorback Greenway that is designed to respond to cultural characteristics of the area (Source: Alta Planning & Design, n.d.)

Safe Routes to School Values Addressed

-  EDUCATION
-  ENFORCEMENT
-  ENGINEERING
-  EQUITY



Layer 5: Stimulate

What differentiates traffic playscapes from other youth traffic safety efforts is its engagement with creativity and imagination in an outdoor setting. Elements of the larger transportation network aren't necessarily designed to be engaging or visually appealing because they serve primarily a traffic safety purpose. Colors, symbols, and shapes are chosen to be easily and intuitively understood by road users. However, traffic playscapes provide an opportunity for inventive aesthetic modifications to the standardized street engineering palette. Utilizing color, contrast, dynamism, and vegetation described in Chapter Two's literature review can make the space a conducive environment for engaging youth. While previous layers have discussed separate design considerations for the network and the destination, elements of art, color, and texture can be used to tie different neighborhood spaces together into a cohesive whole.



Figure 6.11: Pavement art as part of Seattle Department of Transportation's Adaptive Streets Program (Source: Seattle Department of Transportation, 2016)

Painted Asphalt Roads

Paved asphalt use strips coats of white or yellow paint to separate traffic, create visual warnings, or serve as wayfinding. In recent years, municipal transportation agencies have explored more intensive, colorful applications for paint to enhance safety and create a sense of place in an inexpensive way. Seattle Department of Transportation's (SDOT) Adaptive Street program integrates painted asphalt projects into citywide street improvements as a short-term, low-cost, adaptable, and community-oriented way of enhancing functions on the street (see **Figure 6.11**). It is already a recognizable part of Seattle's contemporary traffic landscape. Using painted asphalt intermittently throughout a traffic playscape provides visual variation and incongruity that can enhance or create opportunities for play. Moreover, the painted asphalt can incorporate different types of shapes, lines, and patterns; this variety can serve as wayfinding elements throughout the site.

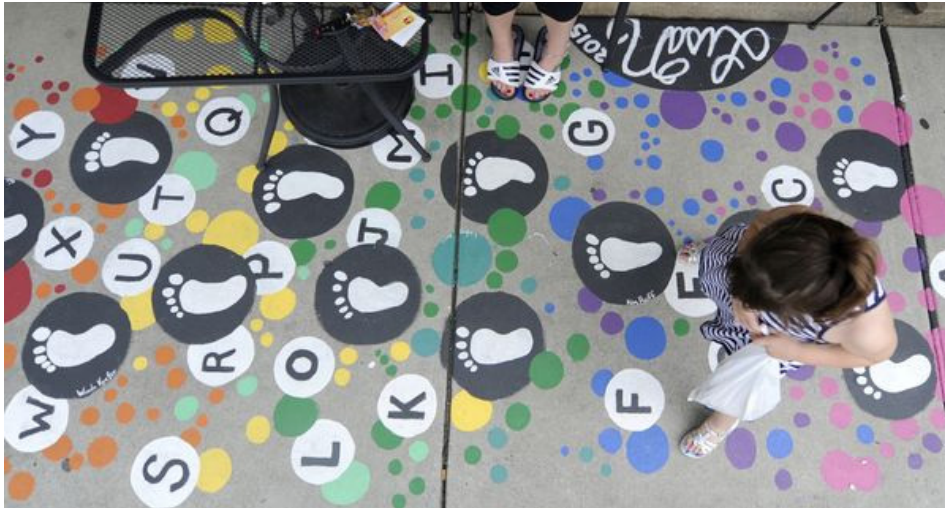


Figure 6.12: Sidewalk art in York as part of the “Play Everywhere Challenge” program (Source: Boeckel, 2016)

Patterned Sidewalks

Standard sidewalks are installed as concrete pavers, but their surfaces can integrate artistic elements that enhance the pedestrian experience (see **Figure 6.12**). Sidewalk treatments include colored paint, superhydrophobic spraypaint that causes patterns to emerge when surfaces are wet, and textured surface material (tile, brick, etc.). As with painted asphalt, sidewalk treatments can be a short-term and low-cost way of enhancing a street’s visual interest. When applied to a traffic playscape, playful sidewalk surfaces can serve as wayfinding, informational, and play elements for youth in the space. As a space in between roads and buildings, sidewalk art can also be used to visually bridge the indoor and outdoor realms.



Figure 6.13: Shipping containers reused as vending space in Toronto’s Market 707 pop-up intervention (Source: Gundu, 2014)

Building Structures

There are a variety of temporary building structures that are inexpensive and can be readapted for rotating functions or programs. Such structures have been used in a variety of traffic playscape settings to house traffic programs and services, while providing aesthetic opportunities for incorporating colors, textures, and shapes. Shipping containers are reusable, prefabricated structures that can be modified to accommodate flexible uses. Panels may be cut off of the container to create openings and windows for social interactions and viewing. Utility infrastructure can be run through the structure to provide lighting, water, and internet. As modular units, they can be stacked vertically or horizontally to increase the amount of habitable space. In terms of sizing, most standardized shipping containers have a consistent width of 8 feet and height of 8-10 feet. Lengths range from between 8 to 40 feet. Examples of shipping container functions seen in other landscapes include cafes, information kiosks, retail vendors, and storage (see **Figure 6.13**).



Figure 6.14: Custom decorative sheds for children’s play and storage
(Source: Barbara Butler Artist-BUILDER, Inc., 2013)

Decorative sheds provide even greater flexibility since they come in a wider variety of dimensions, construction methods, and architectural forms (see **Figure 6.14**). Sheds may be purchased pre-fabricated and modified further, or may be built from scratch. Traffic playscapes such as Kew Traffic School created different replica neighborhood buildings (cafes, cinemas, churches) by using sheds as a base structure. They were subsequently outfitted with furnishings or interactive elements so that they could serve as roleplaying spaces. Beyond supporting play, sheds can also be used as storage space for traffic education materials and bicycles.



Figure 6.15: Anigozanthos, or “Kangaroo paw”, a perennial plant that is often chosen for its playful shape and bright colors (Source: Sunset, n.d.)

Vegetation Palette

Height restrictions limit the types of vegetation that can be planted within a traffic playscape designed under powerlines. Depending on the agency maintaining the lines, trees under power lines are avoided when possible or prohibited completely; For Seattle, SDOT has approved certain trees to grow under power lines due to their lower maximum heights. In lieu of trees, there are a variety of low-growing shrubs, flowers, grasses, and groundcovers that can still provide visual interest within a traffic playscape. The landscape could potentially support local pollinators with native, habitat-friendly vegetation. Other approaches may focus on selecting vegetation more for ornamental qualities, like color (see **Figure 6.15**). Vegetation can also directly support diverse programming. A traffic playscape designed with areas for picnicking and outdoor games, for example, may involve selecting easily maintained grasses to create open lawns. Areas for urban agriculture education may involve selecting a colorful palette of edible fruits, vegetables, and herbs.



Figure 6.16: King County Metro bus shelter decorated with stained glass art (Source: 4Culture, 2012)



Figure 6.17: A transit-inspired bicycle rack located in Minneapolis (Source: Dero, n.d.)







Figure 6.18: One of thirteen painted signal boxes in South Lake Union, Seattle (Source: Dribbble, 2016)

Streetscape Structures

Bus stops, bicycle racks, light posts, signal boxes, and trash receptacles, which are common on many streets, can be modified with artwork (see **Figures 6.16, 6.17 & 6.18**). Such projects are supported by partnerships between municipal agencies, artists, and community volunteers. A commonly reoccurring example in Seattle is public artwork on bus stop shelters, which is a result of King County Metro’s Bus Shelter Mural Program. With over 900+ murals being installed at bus stop shelters across the city, the program allows youth and community members to initiate their own community artwork projects; in other cases, they may fund a local artist. SDOT supports a Signal Box Artwork program that allows arts organizations to add murals to utility boxes at the corners of signalized intersections. A traffic playscape with visually intriguing streetscape elements enhances the site’s ability to engage youth, as well as reinforces local efforts to make streetscapes an inviting and attractive part of the public realm.

Safe Routes to School Values Addressed

-  EDUCATION
-  ENCOURAGEMENT
-  ENGINEERING
-  EQUITY

A stylized white wheel with spokes is positioned on the left side of a solid red background. The wheel's hub is on the far left edge, and its spokes radiate outwards. The text 'CHAPTER 7' is centered within the wheel's structure.

CHAPTER 7

CHAPTER SEVEN:

Design Prototyping II: Implementing the Approach

The South Shore K-8 Traffic Playscape prototype acts as a gateway park into Rainier Beach and provides 1.25 acres of publicly accessible greenspace along the Chief Sealth Trail. From a public realm perspective, the site activates a vacant and infrequently monitored space with new lighting, infrastructure, and year-round community-oriented uses. From a traffic safety perspective, the prototype models existing and SRTS-based traffic safety interventions that surround South Shore K-8, and permanently houses a variety of accessible education and encouragement services for student commuters and their families. Design recommendations for the South Shore Traffic Playscape prototype is described in two parts. The first part looks at how the site responds to the specific site and neighborhood environmental conditions (see **Figure 7.1**), which influences the subsequent placement and arrangement of traffic safety and play interventions. The second part highlights how design elements and programs are decided upon and located using the sequential layering, or neighborhood translation, design approach that is introduced in Chapter Six.

Network-based callouts are ordered alphabetically while destination-based callouts are ordered numerically.

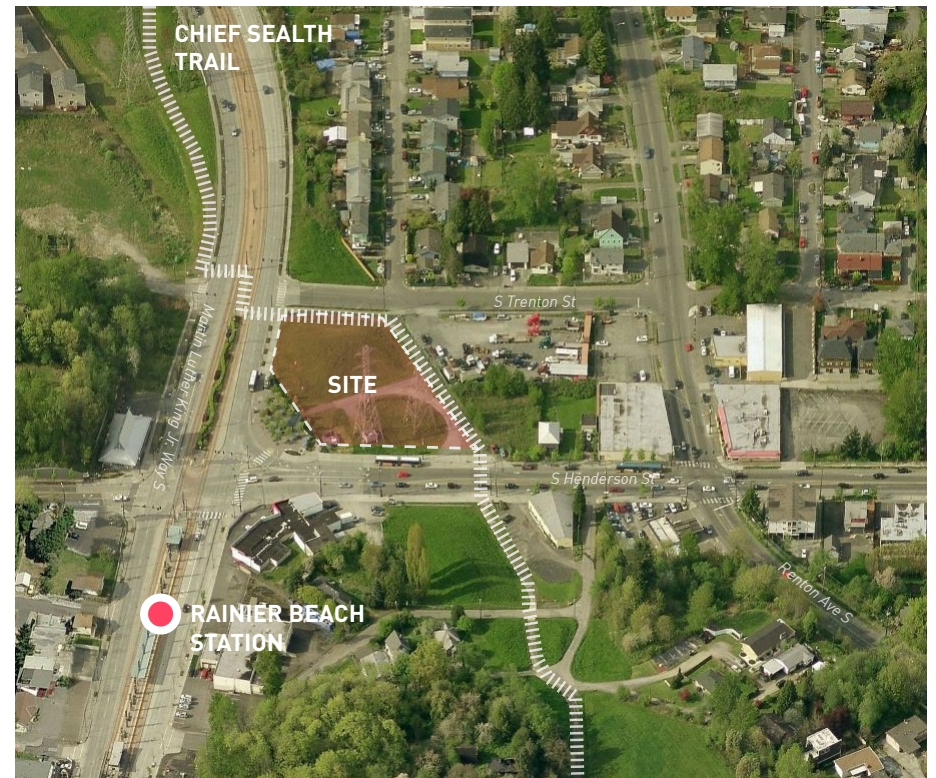
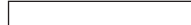


Figure 7.1: Bird's eye view of the traffic playscape site location and surrounding neighborhood context (Source: Bing Maps, 2017)





50 feet



S TRENTON ST

RENTON AVES

Chief Sealth Trail

S HENDERSON ST

MARTIN LUTHER KING JR. WAYS



Illustrative Site Plan



50 feet



**SOUTH
SHORE
K-8**

S HENDERSON ST

Connection Between Site & South Shore K-8

Design Responses to Environmental Conditions

Designing With Transmission Towers

Two transmission towers are located toward the south edge of the parcel (see **Figure 7.2**), which require ease of access for maintenance by Seattle City Light. The existing site has an informal gravel driveway starting from S Henderson St. that runs adjacent to the trail before curving toward the north side of the towers. To maximize the amount of playscape space on the parcel, access to the transmission towers is shifted to the south side of the towers, which will remain minimally vegetated and unpaved in order for maintenance vehicles to move flexibly in and out of the site. Meanwhile, 12 feet of distance separates the southern boundary of traffic playscape from the transmission tower base. A similar distance is maintained between Chief Sealth Trail and transmission towers along the City Light Utility Corridor (see **Figure 7.4**). Because of overhead wires and associated regulations on vegetation that grows beneath the wires, the vegetation palette cuts out trees altogether in favor of low-growing shrubs with a mature height of 10-15 feet. Because vegetation choice is limited, low hedges are used in favor of fencing around the perimeters of the site to maximize the amount of greenery the site can accommodate (see **Figure 7.3**).



Figure 7.3: Spiraea japonica makes an effective hedge due to its low height and spread, as well as seasonal flowering [Source: Puget Sound Plants, 2011]



Figure 7.2: Transmission towers along S Henderson St. (Source: Author)



Figure 7.4: A minimum of 12 feet is maintained between Chief Sealth Trail and the transmission towers (Source: Google Earth, 2017)

Connections to Adjacent Streets and Sites

The parcel is surrounded by multimodal networks. The multi-use Chief Sealth Trail runs along the north and east edges of the parcel. Two arterials with bus service, vehicular traffic, and bicycle traffic are located to the south and west of the parcel; which brings in students, residents, and visitors in and out of the Rainier Beach neighborhood. Finally, a plaza maintained by Sound Transit, with bicycle parking (lockers and racks) for their riders, is located on the southwest edge of the parcel. Entryways from all edges of the site stitch together these different areas, providing east-west access between Martin Luther King Jr. Way S and Chief Sealth Trail, as well as formalized southwest-northeast access between the Sound Transit plaza and Chief Sealth Trail. The traffic playscape has entryways from the plaza, and from the northwest, northeast, and east edges of the Chief Sealth Trail (see **Figures 7.5, 7.6 & 7.7**). To provide sufficient clearance for maintenance vehicles on the south edge of the site, the traffic playscape is accessed from the Chief Sealth Trail or Sound Transit plaza rather than directly on S Henderson St. A low-growing vegetated buffer creates definitive edges and access points into the site, and provides sight lines into the site.

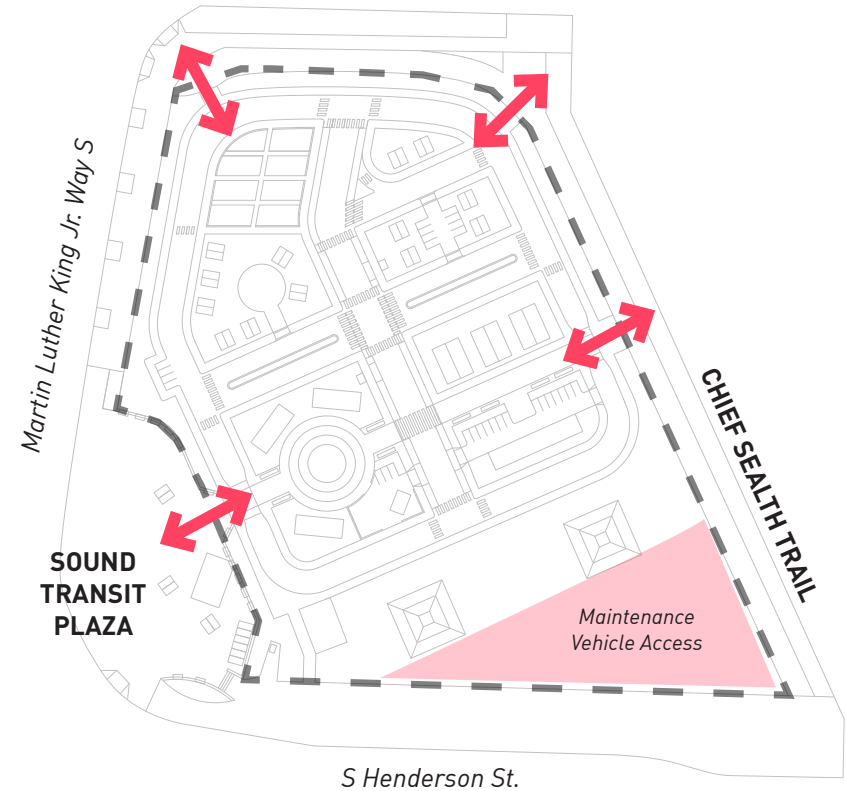


Figure 7.5: Entryways into the traffic playscape, dashed in grey, are marked by pink arrows (Source: Author)



Figure 7.6: A plaza with different pedestrian and cyclist amenities, and seasonal vegetation, is located on the southwest edge of the site (Source: Author)



Figure 7.7: Chief Sealth Trail runs along the east and north edges of the site (Source: Author)

Utilizing Existing Excavated Fill

When the Chief Sealth Trail was completed in 2008, excavated fill from the light rail extension through Rainier Valley was used toward a creating a pastoral, rolling landscape along the City Light Utility Corridor. This fill resulted in a mound of earth on the north portion of the site (see **Figure 7.8**). To create a simplified and intuitive learning environment for children to learn about traffic safety, clear sight lines should be maintained throughout the site. Therefore, the playscape is best served using minimal sloping to create a level surface for laying down roads and buildings. Existing fill on the site, as reflected on other parts of the City Light Utility Corridor, can be reused on other portions of the trail as new landscaping opportunities. If Chief Stealth Trail receives an extension toward Downtown Seattle and Renton in the future, this fill can also be utilized toward landscaping these newer segments and saving costs from importing fill from elsewhere.

Responding to Transportation Safety Conditions

While only a quarter-mile separates the traffic playscape from South Shore K-8, current infrastructure along S Henderson St remains insufficient for most active transportation commuters of all experience levels. The arterial continues to mix different types of heavy vehicles on an expansive 40-foot-wide right-of-way (see **Figure 7.9**). Cyclists must ride on unprotected bicycle lanes with zero separation from vehicle traffic lanes while pedestrian sidewalks narrow to as little as seven feet. Existing and future traffic safety interventions through SRTS efforts may help alleviate the safety concerns of youth commuters walking/biking arterial in the short-term, but the right-of-way afford some opportunity in the long-term to re-allocate space so that pedestrians and cyclists have greater separation from vehicular traffic, and so that vehicles are encouraged to travel slowly through school-adjacent roads.



Figure 7.8: Fill from the Rainier Valley light rail extension used for topographic interest on the site (Source: Author)



Figure 7.9: Current right-of-way allocation on S Henderson St. Pedestrians and bicyclists travel on narrow paths (Source: Author)

Reconfiguring S Henderson St. plays directly into the development of South Shore K-8's traffic playscape prototype, which is envisioned to model scenarios and infrastructure identified through the SRTS Walk/Bike Audit and the Seattle Bicycle Master Plan. Making S Henderson St. a safer commuting passage allows the traffic playscape and South Shore K-8 to be seen as linked learning spaces. Access to the traffic playscape from South Shore K-8, in the short-term, may involve directing students on residential streets and placing additional traffic guards at key crossings between the school and playscape. According to the Seattle Bicycle Master Plan, a potential project for S Henderson St is a protected cycletrack. Therefore, access in the long-term may involve constructing a 2-way cycletrack on the north side of S Henderson St. to completely separate cyclists and pedestrians from vehicular traffic (see **Figures 7.10 & 7.11**).

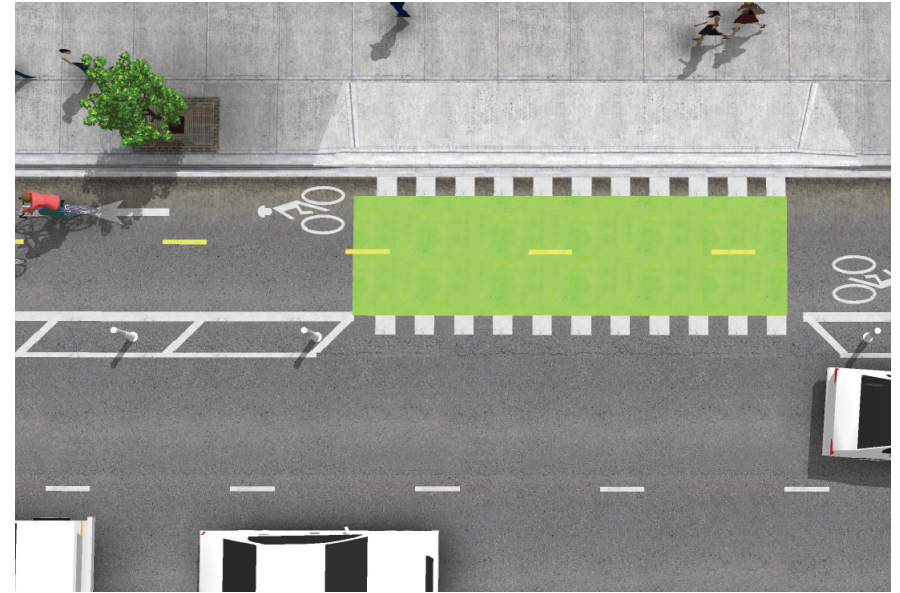


Figure 7.10: Example of a 2-way cycletrack
(Source: National Association of City Transportation Officials, 2015)

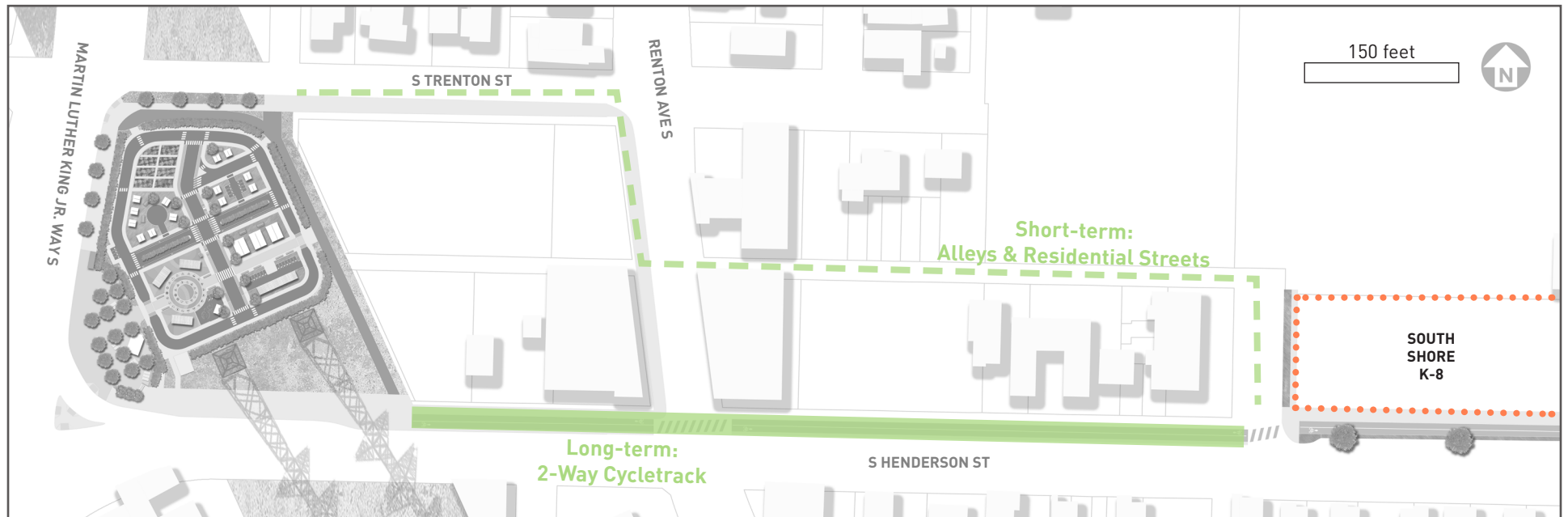


Figure 7.11: Different phases of access to the traffic playscape from South shore K-8 (Source: Author)

Layer 1: Layout

The layout of the South Shore Traffic Playscape captures the fragmented parallel grid layout of the Rainier Beach neighborhood (see **Figures 7.12 & 7.15**). Several morphological characteristics of suburban development are added, like cul-de-sacs and bending roads (see **Figure 7.14**). Intersection scenarios include 3-way intersections, 4-way intersections, and intersections with slip lanes (see **Figure 7.16**). These slip lanes form pedestrian islands that create a traffic scenario where pedestrians have to cross two roads to reach the other side of the street, as seen at the intersection of S Henderson St. and Martin Luther King Jr. Way S (see **Figure 7.13**). Most roads begin and end at a loop that defines the perimeter of the site.

Street Layout Elements

- Ⓐ Cul-de-sac
- Ⓑ 3-way intersection
- Ⓒ 4-way intersection
- Ⓓ Slip lane
- Ⓔ Perimeter loop

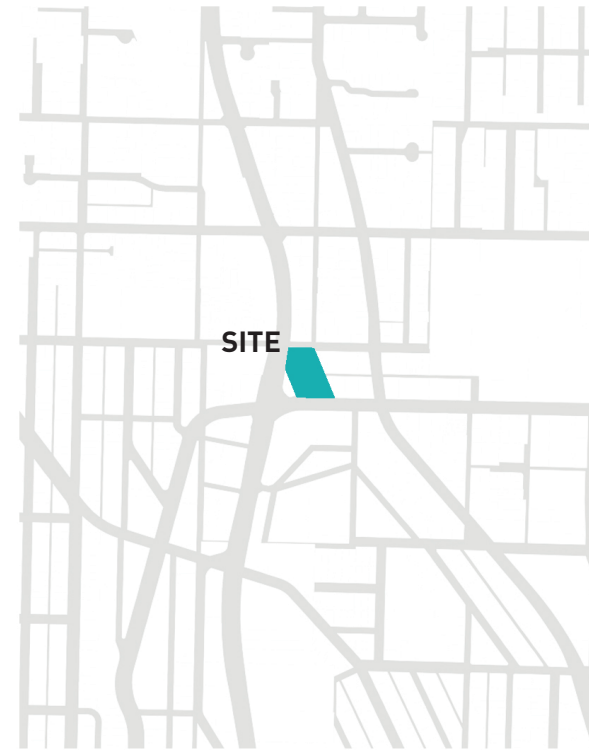


Figure 7.12: A figure-ground diagram of the Rainier Beach neighborhood, with the site highlighted in teal (Source: Author)



Figure 7.13: An example of a slip lane at the corner of S Henderson St. and Martin Luther King Jr. Way S (Source: Google Earth, 2017)



Figure 7.14: An example of a cul-de-sac connecting to Renton Ave. S (Source: Google Earth, 2017)

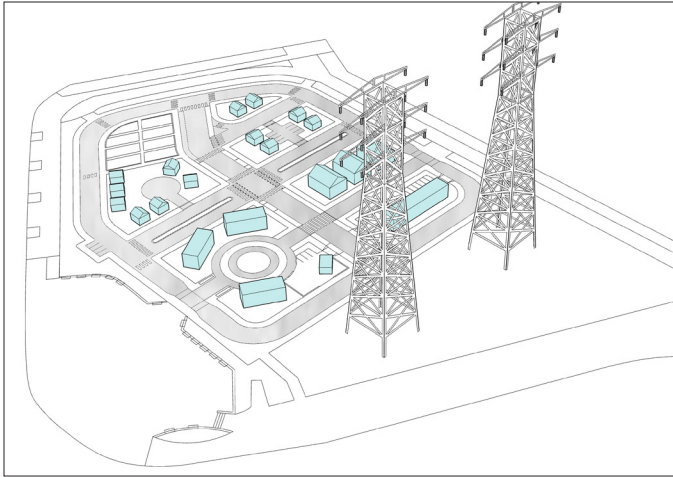


Figure 7.15: Bird's eye view of the traffic playscape, with the layout of site circulation highlighted in grey and building structures in teal (Source: Author)

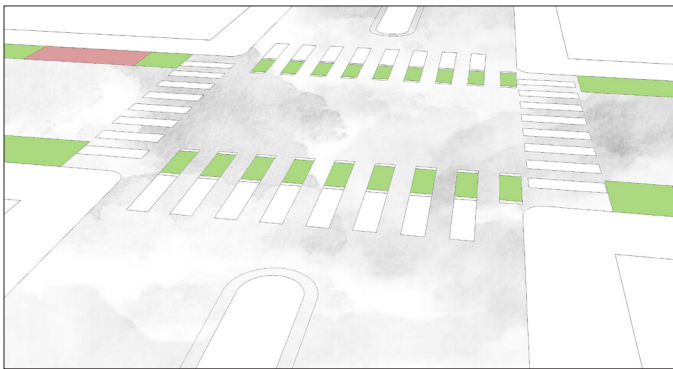
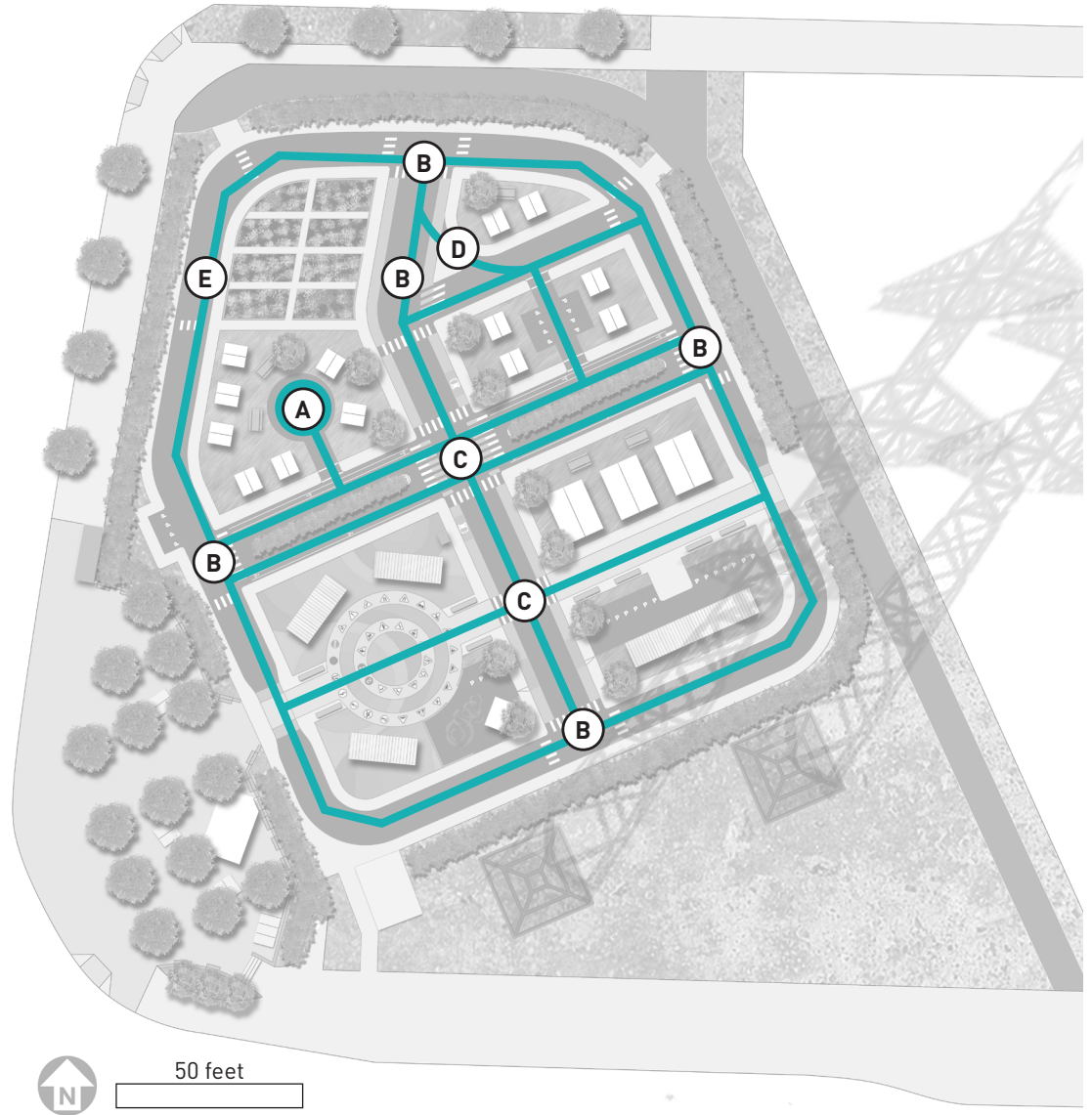


Figure 7.16: Example of a 4-way intersection scenario set up within the traffic playscape layout (Source: Author)



- Ⓐ Cul-de-sac
- Ⓑ 3-way intersection
- Ⓒ 4-way intersection
- Ⓓ Slip lane
- Ⓔ Perimeter loop

Layer 1: Layout

Layer 2: Locate

Network

- A** The east-west connection through the traffic playscape models a road with a central median, a condition that is seen on Martin Luther King Jr. Way S. This road also incorporates a basic striped bicycle lane on both sides of the street.
- B** The north-south connection through the traffic playscape models a principal arterial that receives a mix of bus, vehicle, and bicycle traffic, similar to S Henderson St. This road sets up a potential future project for S Henderson St., which is a cycletrack separating the bicycle lane and pedestrian thoroughfare from vehicular traffic. The cycletrack provides greater width and more visible coloring and texturing. Different coloring and texturing alerts users as to when they are crossing a driveway or bus loading zone (red paint), or an intersection (bicycle crosswalk markings).
- C** Several streets mimic low-density residential streets, many which lack sidewalks or a mix of land uses. These streets often have smaller widths and only one lane of travel in each direction.
- D** The perimeter loop introduces a mix of traffic calming measures, including traditional stop signs, mid-block crossings, raised crosswalks, and shared use markings (see **Figure 7.17**). Shared use markings indicate that vehicles and bicycles must both share the road.

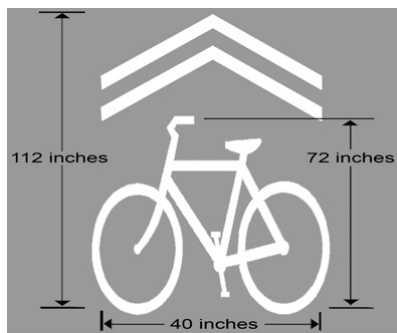


Figure 7.17: Shared use markings

(Source: Federal Highway Administration, 2009)

- E** Different parking scenarios are also set up throughout the traffic playscape, including dedicated parking lots, on-street parallel parking, and back-in parking.

Destination

- 1** A row of large sheds are designed to model the three different community institutions that are adjacent to one another on S Henderson St. (South Shore K-8, Rainier Beach Community Center, and Rainier Beach High School).
- 2** A large plaza provides a central, flexible gathering space and an array of potential services, programs, and amenities. It is designed to be seen and accessed from all of the site's entrances. The circular forms are reminiscent of a plaza in front of the Rainier Beach Community Center, one of few large outdoor gathering areas near South Shore K-8.
- 3** The area south of South Shore K-8 has several long commercial strips. These commercial strips are often fronted by a swath of parking. This condition is modeled in the traffic playscape with a parking lot and 8'x40' shipping container that can be partitioned and decorated to resemble neighborhood retail (see **Figure 7.19**).
- 4** A common learning feature of European traffic gardens, and a land use within the Rainier Beach, are miniature gas stations. They are often programmed as a place for children to pretend to fill up their carts with gas or as a place for children to re-inflate their bicycle tires.
- 5** On the northern half of the sites, smaller 6' x 7' sheds are modeled to look like single-family homes to reflect the low-density residential character of the area north of South Shore K-8 (see **Figure 7.18**).
- 6** A small gardening area with miniature plots, raised planting beds, and planted pots are designed to resemble the Thistle P-Patch northwest of South Shore K-8 and the Rainier Beach Farm & Wetlands to the east of South Shore K-8. Both these food hubs are significant to the Rainier Beach neighborhood by providing a source of gathering and sustenance for low-income, minority, non-English speaking residents in the area.
- 7** Smaller areas for picnicking and lawn games are scattered through the traffic playscape, allowing for recreational amenities and active uses to be seen across all areas of the site.

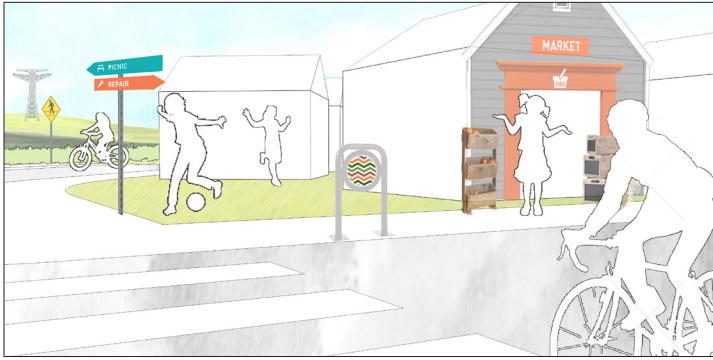


Figure 7.18: A small play shed modeled to resemble a corner produce store (Source: Author)

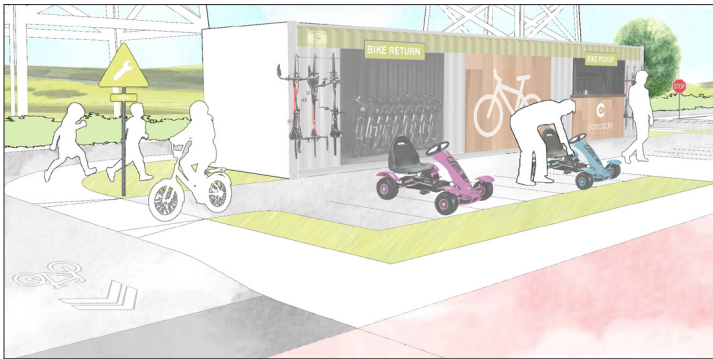
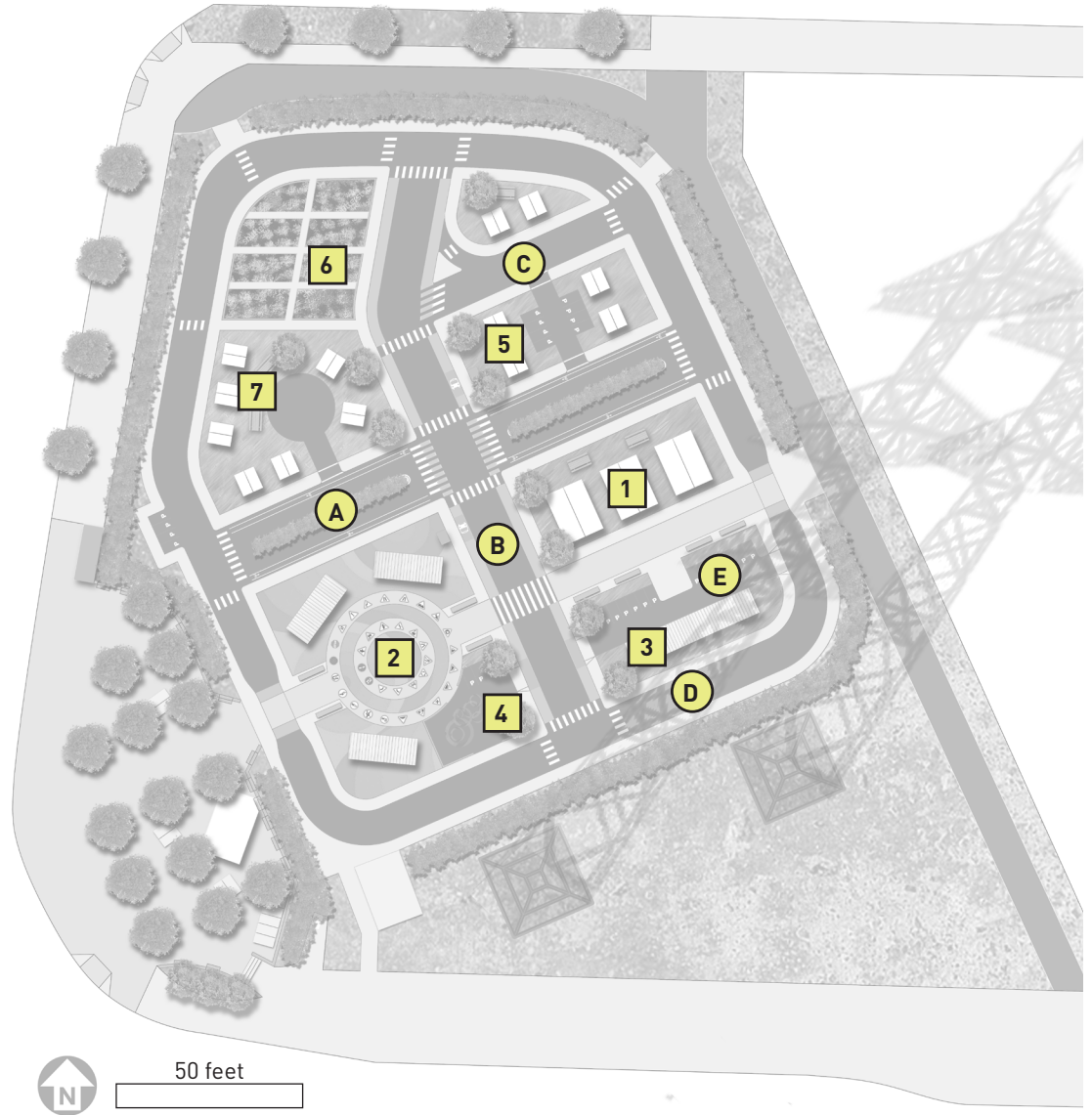


Figure 7.19: A parking lot set up in front of a shipping container housing a bike and pedal vehicle rental facility (Source: Author)



Layer 2: Locate

- A** Central Median Road
- B** Principal Arterial
- C** Residential Street

- D** Perimeter Loop
- E** Parking Area

- 1** Community Buildings
- 2** Central Plaza
- 3** Commercial Strip
- 4** Gas Station

- 5** Residential Homes
- 6** Community Garden
- 7** Picnic Area

Layer 3: Program

Network

Perimeter Loop

The loop is designed for repetition, creating transitions between traffic conditions so that students practice a variety of scenarios.

- A** Portions of the loop intersect with other roads. At non-signalized intersections, students learn to yield to other pedestrians, cyclists, and pedal vehicle users before proceeding through a non-signalized intersection. At signalized intersections, students learn to make a complete stop and scan their environment before proceeding through.
- B** Students learn how to monitor their speed as they proceed through the loop, rather than maintaining a single speed like other road segments. Areas with traffic calming devices, street parking, and mid-block crossings force students to proceed through these areas slowly.
- C** Students learn how to transition out of the loop and into other roads. For example, a cyclist may learn how to transition from a shared use road to a road with a dedicated bicycle lane or cycletrack.

Arterial Roads

- D** Multiple lanes are established on arterial roads in order for students to learn how to switch and merge lanes.
- E** Separated bicycle lanes teach pedal vehicle users to look out for cyclists when making turns into intersecting roads, while teaching cyclists how to enter, use, and exit them (see **Figure 7.20**).
- F** Like the perimeter loop, there are different intersection scenarios that students must respond accordingly to. One intersection has stop signs where students learn to give right-of-way to different users based on timing and priority. Another intersection has a traffic signal and/or flashing beacon where signalization dictates who gets priority to cross and when.

Residential Roads

- G** Back-in and parallel parking sets up an environment where students must watch out for other youth roleplaying as residents or recreational users.
- H** Compared to arterials, residential roads are designed so that users are forced to slow down.

Destination

- 1 Storage & Distribution Center:** Sheds offer diverse secured bike parking options to teach students how to use different types of racks. In addition to storage, organizations like Cascade Bicycle Club can utilize sheds to store and distribute rental bicycles and pedal vehicles for use in the playscape.
- 2 Indoor Play Areas:** Depending on the design of the storage sheds and what buildings they are intended to mimic, sheds function as roleplaying spaces like homes, libraries, and churches; and are outfitted with representative props and furnishings.
- 3 Education & Encouragement Services:** Seattle's SRTS program partners with non-profit and advocacy groups to develop educational and encouragement programs for youth. While these groups are headquartered in areas that are often distant from the neighborhoods they serve, having dedicated and permanent space allows them to expand their outreach range, store more materials onsite, and directly interface with the populations they hope to support. Programs from Cascade Bicycle Club, Feet First, and other advocacy organizations can be rotated or shared within the traffic playscape.
- 4 Café:** Active transportation supports physically healthy youth. While food vending is often an amenity within many parks, food vendors can be curated and rotated to specifically promote affordable, high-quality, nutritious options that provide youth with optimal energy for engaging in physical play (see **Figure 7.21**).
- 5 Repair Shop:** Bicycle fixing skills are often a form of empowerment for youth, allowing them to ride their bikes with confidence and help others fix an inoperable bicycle. The value of learning bicycle repair is emphasized by programs such as YouthCare's "Cycle Forward" program, which connects underserved youth with mentors give them a tools and techniques to fix up a bike in a safe space. Beyond the mentorship component, a repair shop can also provide general maintenance services and tutorials.
- 6 Mini Urban Agriculture Program:** In conjunction with other nearby P-Patches in the Rainier Beach neighborhood, agricultural programming for youth can act as an extension of the Seattle Department of Neighborhood's community gardening program. The site provides dedicated space for teaching youth the values of urban agriculture at an early age, and provides a way for students to steward the site in a fun, engaging, and productive way.

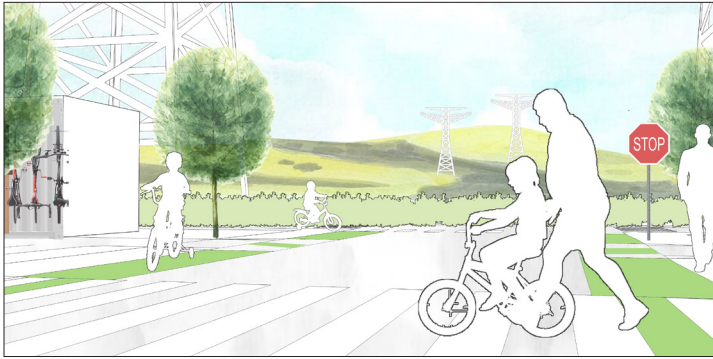


Figure 7.20: An example of the miniature street network teaching students how to safely ride on cycletracks, which is shown in green (Source: Author)

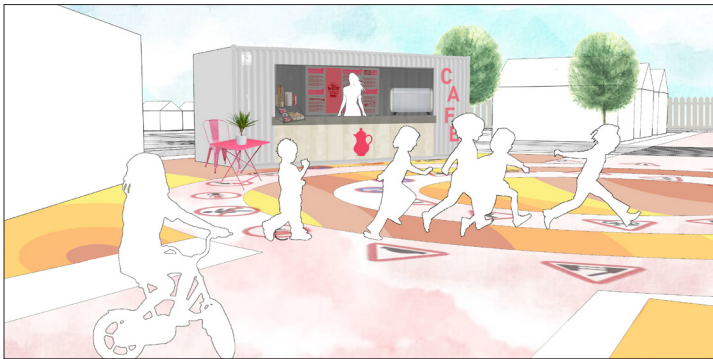
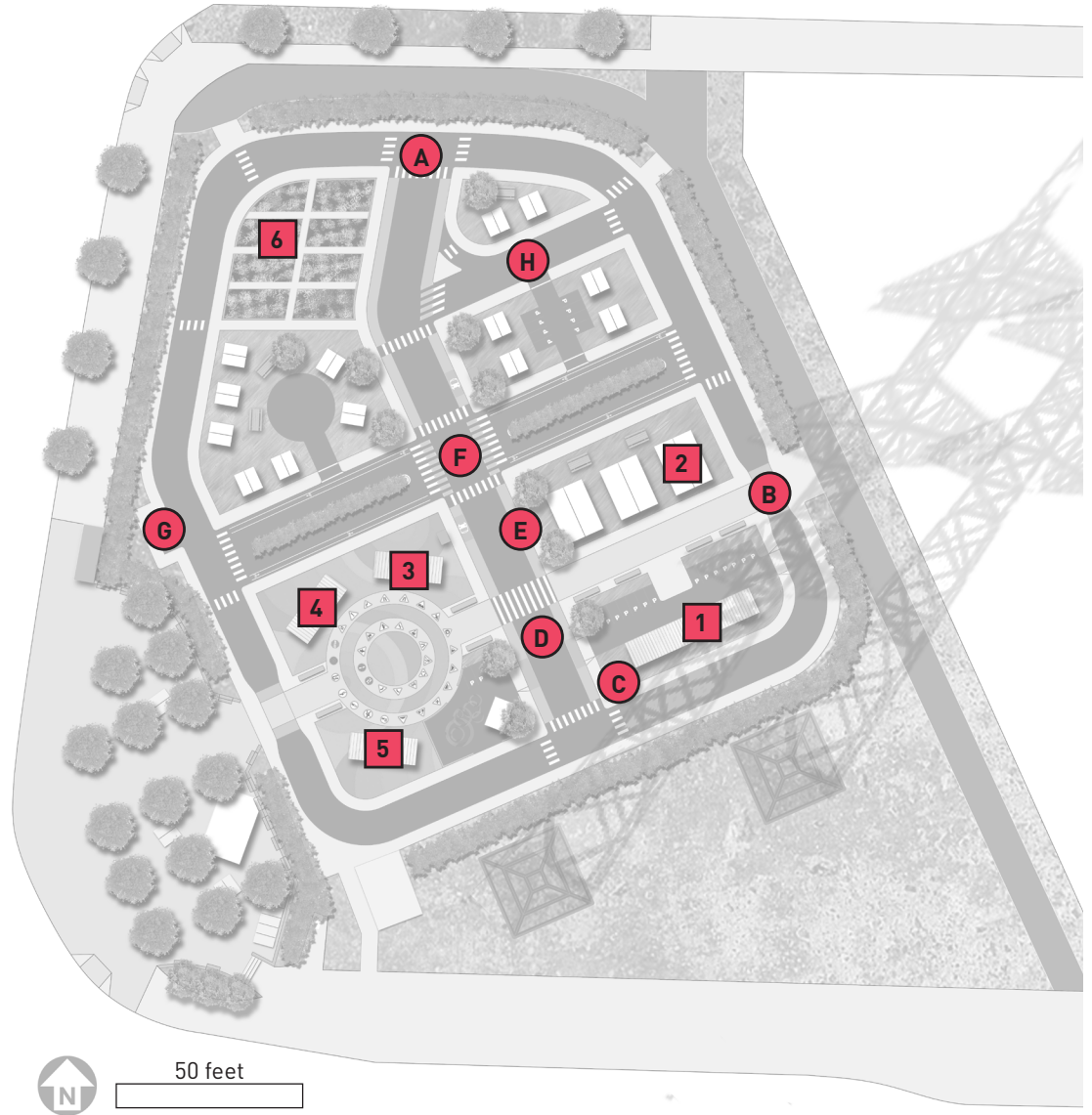


Figure 7.21: Students playing in the central plaza space, which is programmed with a community café housed inside a shipping container (Source: Author)



- | | | | |
|--------------------------------|--------------------------------|------------------------------------|---------------------------|
| A Intersection Approach | E Cyclist Awareness | 1 Storage | 5 Repair Shop |
| B Traffic Calming | F Intersection Approach | 2 Indoor Play Areas | 6 Mini Agriculture |
| C Turning Into Roads | G Parking | 3 Education & Encouragement | |
| D Switching Lanes | H Slowing Down | 4 Café | |

Layer 3: Program

Layer 4: Navigate

Network

The Visual Inventory from Chapter Four describes many types of regulatory signs across the South Shore K-8 neighborhood. The selection of signs for the traffic playscape is distilled to the most universal signs that describe fundamental functions of traffic safety and behavior: stopping, slowing down, etc. (see **Figure 7.26**) As fundamentals are taught and reinforced, more complicated signage can be added as part of the learning experience.







-  **Stop Signs:** Indicates users to stop at non-signalized intersections.
-  **Yield Signs:** Indicates users to stop if necessary so another vehicle or pedestrian to pass through. These signs are often placed at slip lanes.
-  **Speed Limit Signs:** Notifies users how slow or fast to travel. Because maximum speeds do not match the speeds seen in the transportation network, signs are instead adapted to read as “Slow” and “Fast”.
-  **No Parking Signs:** Indicates areas where users are not allowed to park.
-  **Warning Signs:** Indicates users to take caution of particular road situations (pedestrian crossings, driveways, etc.) and traffic safety infrastructure before they approach it (traffic signals, traffic circles, etc.)
-  **Painted Sign Glossary:** A glossary with different signs is painted into the central plaza as an aesthetic and educational feature (see **Figure 7.23**).



Figure 7.23: Traffic signs painted onto asphalt (Source: Malthe Sommerand, n.d.)

Destination

The Visual Inventory from Chapter Four describes many types of wayfinding signage across the South Shore K-8 neighborhood. To differentiate wayfinding signage from regulatory signage, a different signage style is used to help users locate destinations (see **Figure 7.24**). These signs use bright colors, basic shapes, and playful icons that allow flexible traffic instruction. Signage-based wayfinding can be oriented toward destinations (locating the plaza, garden, etc.), or the descriptive features of the sign itself (yellow triangle sign, blue rectangle sign, etc.). Using vibrant, yet simple color schemes and icons help to soften the environment from the more formal, rigid geometries of the road and regulatory signs, as well as defines a playful style palette for the overall traffic playscape (see **Figure 7.25**).

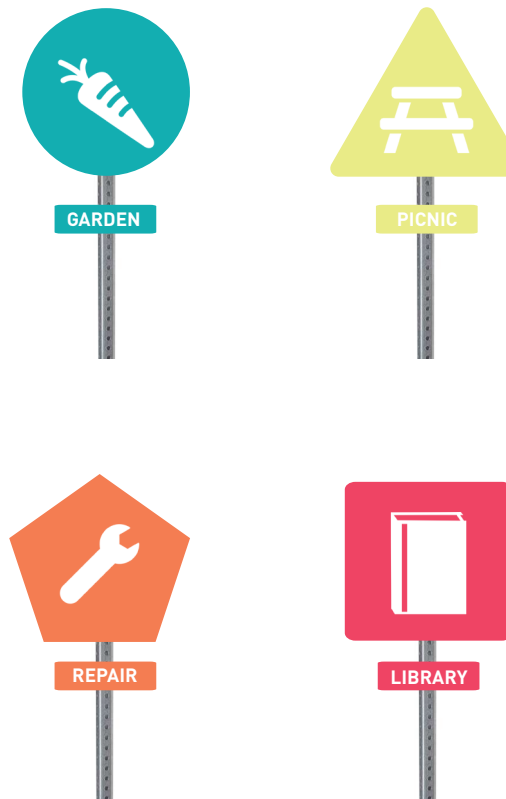


Figure 7.24: Sample style for wayfinding signs (Source: Author)

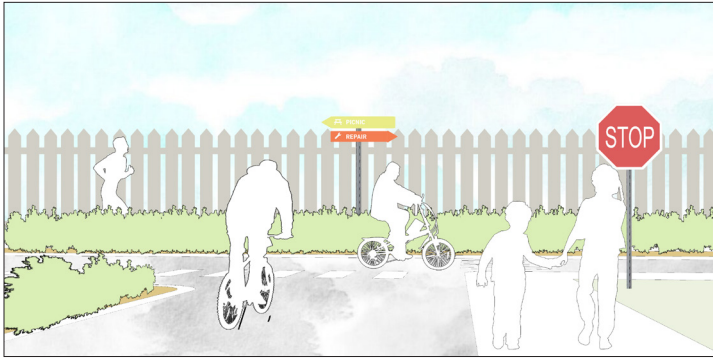


Figure 7.25: An example of the wayfinding signage system directing students to destinations around the traffic playscape (Source: Author)

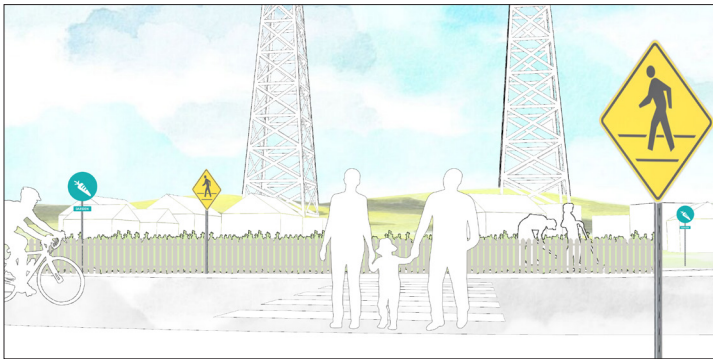
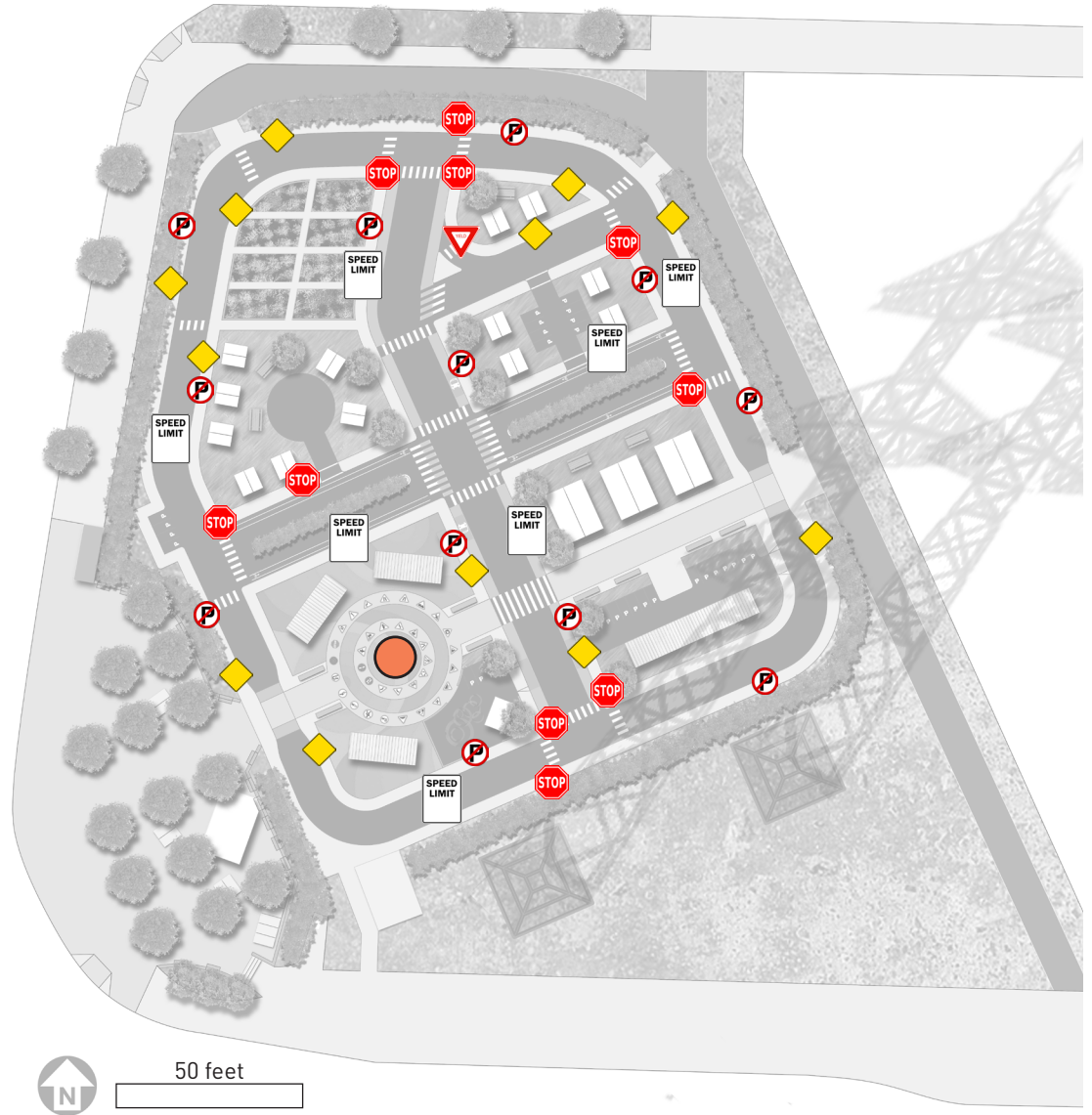








Figure 7.26: An example of regulatory signage being set up for people to safely cross the street to reach the site's mini community garden (Source: Author)



- | | |
|---|---|
|  Stop Signs |  No Parking Signs |
|  Yield Signs |  Warning Signs |
|  Speed Limit Signs |  Painted Sign Glossary |

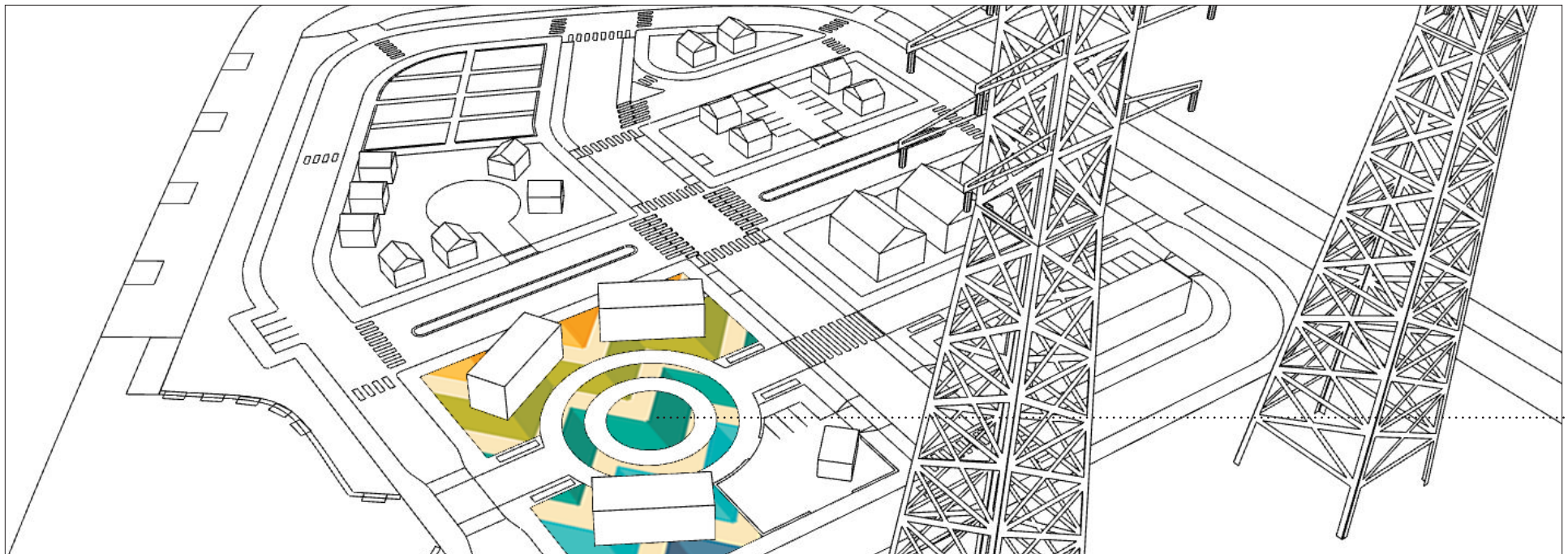
Layer 4: Navigate

Layer 5: Stimulate

Ⓐ **Painted Asphalt:** A local artist or team of artists will be selected on a biennial basis to paint a 4,000 square foot paved plaza where events and traffic safety services are held. The theme and colors of painted surfaces may be determined by traffic playscape operators or be left to the artists' discretion. To encourage youth participation and sense of ownership, it will be stipulated for artists to serve as mentors to young, rising artists and guide them through the public art implementation process (see **Figure 7.27**). Bright colors and intricate patterns will allow the plaza to be an inviting focal point for the overall site.



Figure 7.27: An example of artists providing mentorship to emerging youth artists (Source: New Urban Arts, 2014)



Bird's eye view of the mural in the central plaza

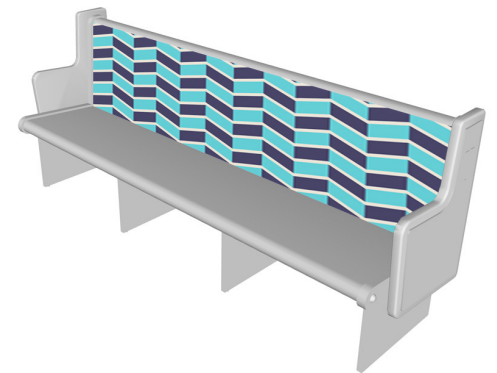
Ⓑ **Painted Street Furnishings:** To promote site cohesion, aesthetic treatments of streetscape elements work in tandem with an overarching art theme, such as one set up in the central plaza. In the example shown below, zigzag patterns from the central plaza may be replicated on bus stops, bicycle racks, and benches.



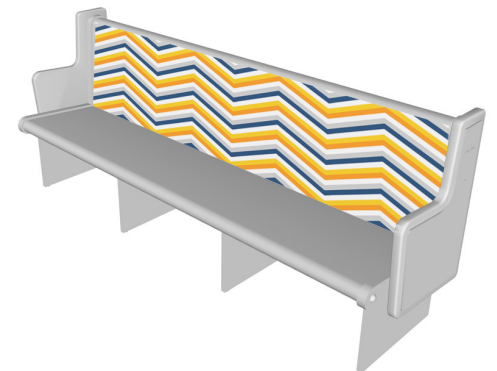
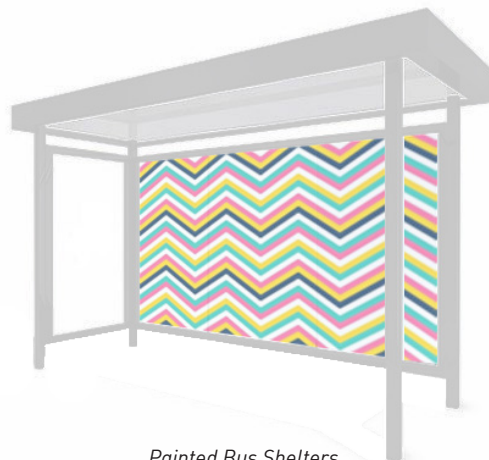
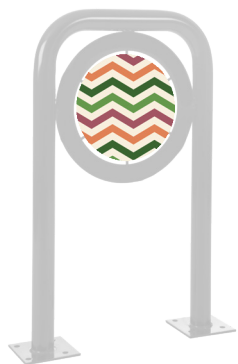
Painted Bicycle Racks



Painted Bus Shelters



Painted Benches



© **Sheds & Refurbished Shipping Containers:** Potential vendors and operators collaborate with traffic playscape operators to renovate shipping containers using bright colors, materials, and branding on the facades. The containers are designed to stand out as identifiable destinations with different services and amenities to support youth activities. The colors and symbols designed into these containers are synchronized with the colors and symbols of destination wayfinding signs. Shipping containers should be designed to be easily reused and refurbished as new vendors are cycled through these spaces. Meanwhile, play sheds are outfitted with various props and materials so that they resemble local destinations in Rainier Beach, like product markets and libraries.



© A bicycle rental and distribution center potentially operated by Cascade Bicycle Club



© A miniature play shed resembling a produce stand



© A cafe potentially operated by a local vendor of nutritious food and drink options

D Potential Plant Palette

Potential Perimeter and Median Hedges



Left to right: Boxleaf Honeysuckle, Heavenly Bamboo, Japanese Spiraea

Low Shrubs Lining Corridors



Left to right: Coffeeberry, Mexican Orange Blossom, Camellia

Perennials



Left to right: Lupines, Oenothera, Dahlia



Ⓐ Pavement Art

Ⓑ Painted Street Furnishings

Ⓒ Sheds & Refurbished Shipping Containers

Ⓓ Vegetation

Ⓒ Bicycle Rentals

Ⓒ Produce Market

Ⓒ Café

Layer 5: Stimulate

Traffic Playscapes as Responsive Landscapes

The design prototype represents a potential vision for how the site may function, based on the existing traffic safety landscape and local assets surrounding South Shore K-8. However, traffic playscapes should evolve in response to changing neighborhood conditions so that they continue to be relevant, productive, and engaging spaces for youth to learn about traffic safety.

For example, the prototype envisions organizations such as Cascade Bicycle Club, Feet First, and the Seattle Department of Neighborhoods renting out spaces within the traffic playscape. However, there are other advocacy organizations that may benefit from renting out space within the traffic playscape. Having dedicated operating can give organizations with fewer resources a powerful platform for strengthening their mission and membership through direct interaction with likeminded peers. The temporary nature of shipping containers also allows for different programs to rotate in and out of these structures. While venues like a repair shop and cafe are represented in this prototype, the traffic playscape may also rotate between summer camps, bicycle swaps, and ambassador programs.

The prototype is also envisioned to have rotating aesthetics. The design themes that are painted onto pavement and streetscape furnishings should change regularly so that new artists and arts-based organizations can contribute to the vibrancy of the traffic playscape, not just traffic safety organizations. Providing collaborative intersections between transportation and the arts can help establish new multi-disciplinary partnerships for projects outside the traffic playscape. Emerging artists, for example, will be able to build a portfolio of streetscape-related work that can lead to future public realm art projects. Meanwhile, transportation professionals and advocates are more likely to incorporate art as a pivotal investment for traffic calming and improving the visual appeal of streets.

The site is also situated within a constantly changing transportation landscape. Within both the long-term and short-term future, a number of transportation investments are expected to affect Southeast Seattle and add new transportation infrastructure or services that benefit all residents. As other schools in the Rainier Valley begin to participate in SRTS programs similar to South Shore K-8 and Asa Mercer Middle School, neighborhoods will likely see an influx of new traffic safety infrastructure designed specifically to improve youth commuting. The scenarios that are set up within this particular vision of the South Shore K-8 prototype may become less relevant when transportation conditions of the neighborhood shift significantly. Therefore, the traffic playscape should set up design elements that can be easily added, removed, or modified. Vertical structures, such as wayfinding/regulatory signs and traffic safety structures, can have their placement or functions modified. Asphalt surfaces can be repainted to reflect new types of road markings that are being implemented in the neighborhood.

The modification of design elements in the traffic playscape can also increase the difficulty level of scenarios for more experienced students. Because traffic playscapes are a highly complex and dynamic learning environment, signs and traffic safety infrastructure are generally simplified when teaching students fundamental rules and behaviors. However, this landscape can better serve a wide range of age groups if appropriate scenarios are created for students at all different grade levels.

Summary of Design Prototyping: Part I + Part II

1. LAYOUT
2. LOCATE
3. PROGRAM
4. NAVIGATE
5. STIMULATE

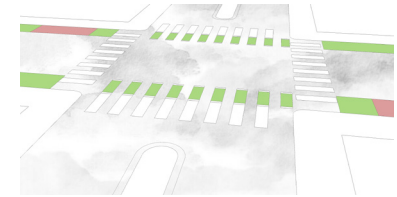


DESIGN CONSIDERATIONS

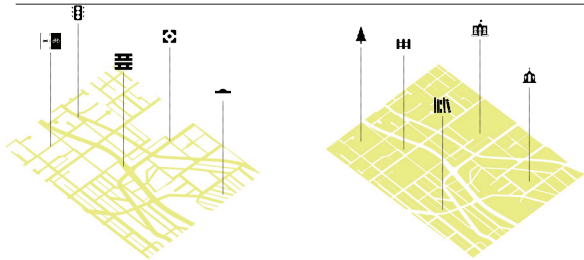
The placement and layout of miniature streets should resemble the street patterns of the neighborhood, especially roads that are within a nearby school's walkshed. These are the streets that students interact with on a regular basis while commuting to school.

SRTS E'S

DESIGN VIGNETTE

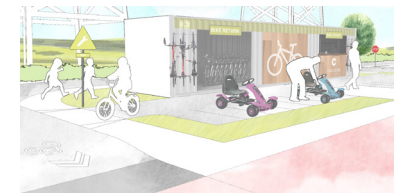


4-Way Intersection

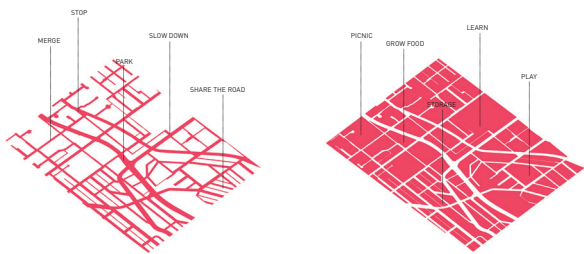


The traffic playscape should be designed to mix and match different street infrastructure types that a student may encounter within the neighborhood. A variety of destinations should be introduced that resemble the character of buildings in the neighborhood and that act as community nodes.

- EDUCATION
- ENGINEERING
- EQUITY
- EVALUATION



Parking Lot & "Commercial" Strip

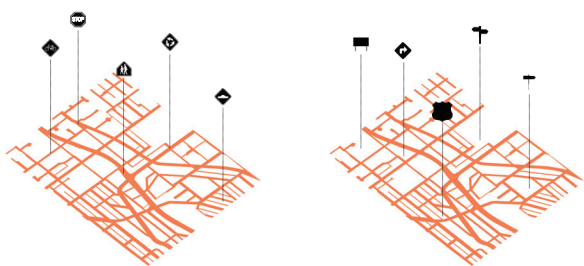


The choice of traffic infrastructure sets up different scenarios for reinforcing safe, compliant traffic behaviors through practice, repetition, and play. Structures in the traffic playscape are programmed with roleplay areas, traffic safety programs and services, and other recreational uses (cafe, garden, etc.)

- EDUCATION
- ENCOURAGEMENT
- EQUITY
- EVALUATION

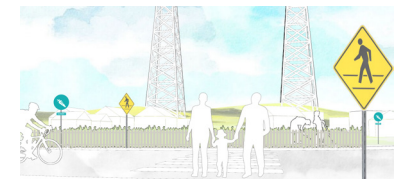


Intersection Approach & Switching Lanes



Regulatory signs are placed in conjunction with traffic infrastructure to reinforce traffic laws or behaviors. Wayfinding and interpretive signage allows for users to know where and how to get to their destinations, as well as recognize when they have arrived.

- EDUCATION
- ENFORCEMENT
- ENGINEERING
- EQUITY

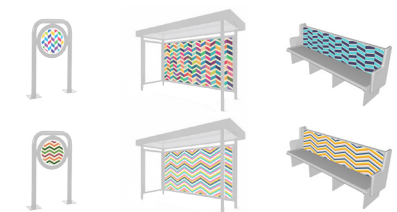


Warning Signs & Wayfinding Signs



What differentiates traffic playscapes from other youth traffic safety efforts is its engagement with creativity and imagination in an outdoor setting. Utilizing color, contrast, dynamism, and vegetation can make the traffic playscape a conducive environment for engaging youth as they practice.

- EDUCATION
- ENCOURAGEMENT
- ENGINEERING
- EQUITY



Painted Street Furnishings



CHAPTER 8

CHAPTER EIGHT:

Conclusion

Safe Routes to School (SRTS) continues to thrive as a nationwide program. It is a powerful vehicle for unifying different voices, traffic safety assets, and funding opportunities. This thesis provides an assessment methodology and multi-layered design approach for mobilizing untapped assets within Seattle toward a traffic safety intervention that has not been implemented through SRTS efforts: the traffic playscape. Efforts have progressed substantially in recent years through other channels, including several pilot projects operated under Cascade Bicycle Club. SRTS is an ideal medium for mobilizing financial and social capital toward permanent traffic playscapes on a state- and nation-wide level since SRTS possesses political leverage to affect long-range planning efforts toward transportation and open space improvements. Traffic playscapes also align with SRTS' mission of providing access to traffic safety resources for underserved school populations, understanding community needs through fieldwork, and making walking and biking an enjoyable experience. However, SRTS does not possess the capacity to implement traffic playscapes under its current framework and tools. An evolution of SRTS' framework must coincide with an evolution of political and social attitudes toward the value of walking and biking in healthy, safe communities.

This premise of this thesis calls for the re-allocation of funding and efforts toward values of education, encouragement,

evaluation, enforcement, and equity; which have been addressed primarily through programming rather than physical interventions. These interventions typically come as utilitarian traffic safety infrastructure engineered onto streets, and consequently are more greatly funded and weighted within SRTS. Traffic playscapes serve as a catalyst for SRTS' evolving framework because they allow traditionally non-infrastructure values to become embedded into engineering efforts. Specifically, engineering interventions within local neighborhoods are imagined as play elements used to 1) educate, encourage, and enforce students to exercise traffic safety behaviors through roleplay, 2) evaluate the performance of SRTS engineering interventions in the larger landscape, and 3) serve underrepresented student populations lacking access to traffic safety resources or areas for play.

Another evolution for the SRTS framework is the identification of underused parcels that can be activated to advance traffic safety efforts. Partnerships can be formed with private and public landowners that are not traditionally seen as pertinent to the traffic safety movement. This thesis makes the case for a utility provider such as Seattle City Light to become a key player, working with them to acquire lands they set aside for transmission towers and power lines. These lands could then be used toward traffic playscape development. This type of

partnership has local precedent; partnerships have been formed with other municipal agencies to transform underused lands owned by Seattle City Light into collective community spaces, such as community gardens and trails. The traffic playscape is also aligned with design parameters that Seattle City Light sets to ensure that their property can still be easily accessed.

One final evolution for the SRTS framework is the expansion of assessment tools that are used to understand neighborhood contexts. Current tools focus primarily on perceptions of traffic safety. The thesis reviews tools such as the Walk and Bike Audit and surveys to understand how families feel about their traffic safety environment, which helps to prioritize and act upon potential improvements. However, there are other opportunities to learn about neighborhood context, and to understand how they tie into promoting or deterring traffic safety. This thesis analyzes elements of neighborhood urban form, multimodal transportation characteristics, visual character of buildings and signs, and even community artwork. These analyses inform the design of elements within the traffic playscape that reflect conditions of the local neighborhood. Moreover, elements are intentionally designed with sensory qualities that can best engage youth within the landscape. The translation of neighborhood context into youth-friendly design interventions can help students translate their learning experience within the traffic playscape into safe traffic behaviors in the larger transportation.

Next Steps

This thesis is designed as a visioning document. It defines a potential trajectory for SRTS' evolution, and proposes a catalyst project that brings together new participants and opportunities to help achieve this vision. Visioning helps build consensus toward a common vision for traffic safety by showing what is possible with existing assets and addressing the needs of many

different stakeholders. It is also intended to spur dialogue, encourage new and creative avenues for identifying issues, and ultimately lead to concrete strategic actions.

Moving forward, this thesis may serve as the basis for an implementation plan to execute traffic playscapes within SRTS programs. There has not been extensive precedents within SRTS to take on large-scale site design projects, as most projects are spot improvements (such as the addition of a crosswalk) or corridor improvements (such as the renovation of a trail). In addition, this thesis proposes traffic safety programs and engineering interventions that have not yet been implemented through SRTS, but are becoming a more frequent element of the transportation network. Further research needs to be done on potential funding streams, partnerships, and maintenance-ownership models in order for the traffic playscape to move beyond the visioning phase.

In terms of funding, the pursuit of other funding sources is likely since particular elements may not be eligible for funding mechanisms that have been used in past projects. However, traffic playscapes also offer an opportunity to cast a wider net for grants that support open space development and community economic development, rather than looking strictly at grants for traffic safety improvements.

In terms of partnerships, this thesis identifies connections between advocacy organizations and neighborhood groups already working closely with SRTS, such as Feet First and Cascade Bicycle Club. There are opportunities to build mutual partnerships with groups that are concerned with youth traffic safety, but lack the capacity or visibility to have an active presence in SRTS. Shared resources between partnering organizations can provide the momentum to act upon implementation strategies.

Ownership and maintenance models would likely be a conversation between current landowners (City Seattle Light), tenants who would use the space (such as advocacy organizations or Seattle Public Schools), private investors who may oversee specific operations, and community volunteers.

Another next step would be to explore the materiality and construction detailing of different design elements, such as site furnishings, streets, and traffic safety infrastructure (signs, traffic calming, traffic lights, etc.). Many of these elements need further direction as to how they will be built and installed within the landscape. Technical documentation of the assembly and construction process was left outside the scope of this thesis in favor of a more conceptual approach to the overall site design and site furnishings. However, consideration toward technical performance is pivotal to the design implementation process.

While this thesis focuses on a particular set of local conditions and prototypes the traffic playscape on a single site, the lessons learned from this thesis will ideally apply to many different contexts. The conditions described within this thesis are not unique to Seattle. For example, many communities described in Chapter Two’s literature review on SRTS best practices have applied the program’s framework toward mobilizing local resources into comprehensive traffic safety changes. Likewise, they have an opportunity to combine existing SRTS efforts with untapped land development opportunities and stakeholder groups toward the creation of traffic playscapes.

The assessment methodology and design approach proposed in this thesis can be adapted toward creating a traffic playscape design for Asa Mercer Middle School, another school that fits the geographic and land use criteria discussed in this thesis. It could also be applied to other schools along the City Light Utility Corridor that may one day be eligible for SRTS funding and can

Schools Along the City Light Utility Corridor	Address
Campbell Hill School	6418 S 124th St.
St George School	5117 13th Ave. S
Amazing Grace School	10056 Renton Ave. S
Cleveland High School	5511 15th Ave. S
Lakeridge School-Skyway	7400 S 115th St.
Dunlap School	4525 S Cloverdale St.
Mercer, Asa Middle School	1600 S Columbian Way
South Lake High School	8825 Rainier Ave. S
Rainier View School-Skyway	11650 Beacon Ave. S
African American Academy	8311 Beacon Ave. S
Aki Kurose Middle School	3928 S Graham St.
Dearborn Park School	2820 S Orcas St.
Maple School	4925 Corson Ave. S
Van Asselt School	7201 Beacon Ave. S
Wing Luke School	3701 S Kenyon Way
St Paul School	10001 57th Ave. S

Figure 8.1: List of schools along the City Light Utility Corridor (Source: Author)

therefore pursue new projects (see **Figure 8.1**). These schools were not covered in this thesis since the traffic playscape design approach relies on incorporating new traffic safety infrastructure introduced by SRTS. The foundational knowledge established in this thesis may lead to a refined design methodology that works for communities outside of Southeast Seawttle, which may involve adapting or modifying the assessment tools that are proposed in Chapter Five: Existing Conditions Assessment. Regardless of how this framework is revised or improved upon, designing a meaningful traffic playscape requires nuanced tools for understanding contextual factors that affect a student’s decision to walk or bike, as well as community assets that can be leveraged into site-based, traffic-related learning opportunities.

Beyond SRTS: Embedding Play Within Traffic Safety Policymaking

It took over four years for the initial seeds of the traffic playscape concept to gain enough traction for advocacy groups to construct Seattle's first two sites in Magnuson Park and White Center. Until very recently, the traffic playscape movement has been unable to assert enough presence or legitimacy to become embedded within long-range transportation plans and to guide future infrastructure investments. Even within SRTS where play is codified into various program documents, strategies that promote play are often underfunded and underprioritized compared to traffic engineering efforts. This is a reflection of the larger transportation policy landscape, where traditional metrics such as infrastructure quality and number of deaths/injuries often dictate transportation investments. As such, it can be difficult to see play as a relevant criteria that warrants the same level of attention.

This thesis is a timely "call to action" to broaden the set of strategies typically used to promote traffic safety, and to prioritize youth as a vulnerable population within the transportation policy arena. SRTS represents only one avenue for affecting positive change upon Seattle's street network. While situating traffic playscapes within SRTS is a necessary first step due to the program's nationwide influence, these landscapes -- and the role of play at large -- need to move beyond their current status as demonstration or temporary projects. The evidence for making more permanent investments in traffic playscapes is present, with cities across the world embedding these landscapes into the neighborhood fabric and K-12 education with notable success.

Of all the current policy drivers operating in Seattle, Vision Zero sets the most ambitious and aggressive goal: ending all traffic deaths and serious injuries by 2030. Timely, creative



Figure 8.2: Vision Zero campaign materials (Source: Seattle Department of Transportation, 2015)

strategies and campaigns (see **Figure 8.2**) are urgently needed in order for Vision Zero to achieve its goals within the next decade. It is a vision that has actively shaped how other long-range transportation plans and programs such as SRTS are updating its goals, strategies, and actions to best contribute to these efforts. It is therefore a well-timed opportunity for traffic playscapes and the importance of play to be included as part of Vision Zero messaging (see **Figure 8.3**).

While the scale (in terms of physical size, project scope, and funding) of traffic playscapes is larger and non-traditional when compared to other approaches, there are champions in all sectors that can help build the case for this type of landscape intervention. Ultimately, my ambition for this thesis is to provide a set of visioning materials that can be used in conjunction with advocacy efforts, and to personally advocate for the attainability of these visions within all areas of Seattle transportation policy.

Make Seattle Safe to Walk, Bike, and Play



seattle.gov/visionzero

VISION
ZERO
SAFER STREETS FOR SEATTLE

 **SDOT**
Seattle Department of Transportation

Figure 8.3: A conceptual mockup of a Vision Zero sign that encourages play as part of the traffic safety movement (Source: Author)

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