



Texas Resilient Streets and Greenways Asset Mapping and Community Engagement Synthesis Project

Dr. Billy Fields



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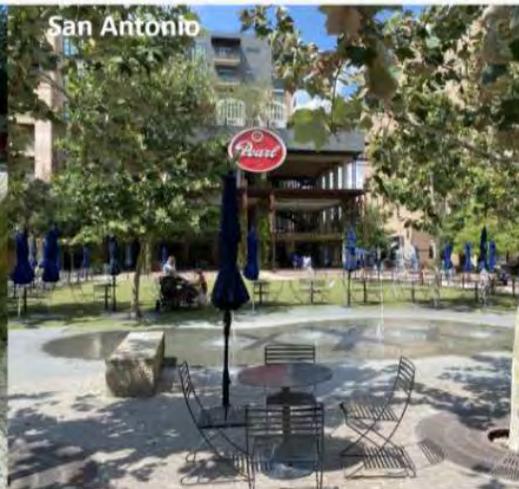
Austin



San Marcos



San Antonio



Austin



San Antonio



Introduction

The Healthy Streets, Resilient Communities Working Group met during the fall of 2022 and the spring of 2023 to understand how to foster safe resilient streets for San Marcos. Convened by Dr. Billy Fields through a grant from the Texas State Center of Excellence for Community Health and Economic Resilience Research (CHERR), the working group was comprised of residents of San Marcos, city staff, and members of the Texas State community. The working group met monthly to discuss how to incorporate best practice concepts in resilient streets in San Marcos.

The working group drew inspiration from a series of emerging resilient street projects developing around Texas. These green and blue infrastructure systems are being piloted in Texas communities and increasingly point to a new pathway forward for managing flooding, heat, and community livability. A representative sample of these innovative projects was captured in The Texas Resilient Streets and Greenways Asset Mapping StoryMap which provides examples of key green and blue infrastructure projects in Houston, Dallas, Austin, San Marcos, and San Antonio.

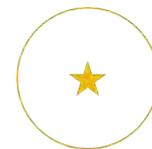
These projects formed a solid base of examples to draw from as the Working Group began envisioning key resilient assets in San Marcos. In April 2023, the Working Group conducted an asset mapping exercise to uncover the key resilient streets assets that could form the base for a larger resilient streets system in San Marcos. The approach focused on defining key resilient street assets within the downtown and downtown adjacent core of the city. Working Group members visited two representative areas of the downtown area of San Marcos (N. C. M. Allen at Hutchison and Hopkins at Edward Gary) and surveyed conditions using a set of resilient street audit tools created by Dr. Billy Fields. The San Marcos Resilient Streets StoryMap is the result of this exercise.

The Working Group identified a series of streets, squares, parks, and active transportation assets within the core area of San Marcos that show strong resilient street characteristics. Three key projects emerged from the discussion that can act to help catalyze future resilient street discussions. These are:

- The potential extension of the green infrastructure along N. C.M. Allen towards I-35
- The use of the Cultural Trail concept as a planning framework for connecting downtown with adjacent neighborhoods
- The potential of utilizing the Kissing Alley project as a pilot to help create a connected network of green alleys throughout downtown San Marcos.

These projects show the potential of San Marcos to build on existing and emerging resilient street typologies that can act as a base to connect a full resilient street system throughout the core of the city. Extending these types of projects both within the core of the city and connecting to the east side of I-35 is critical to maintaining and enhancing the resilience of San Marcos.

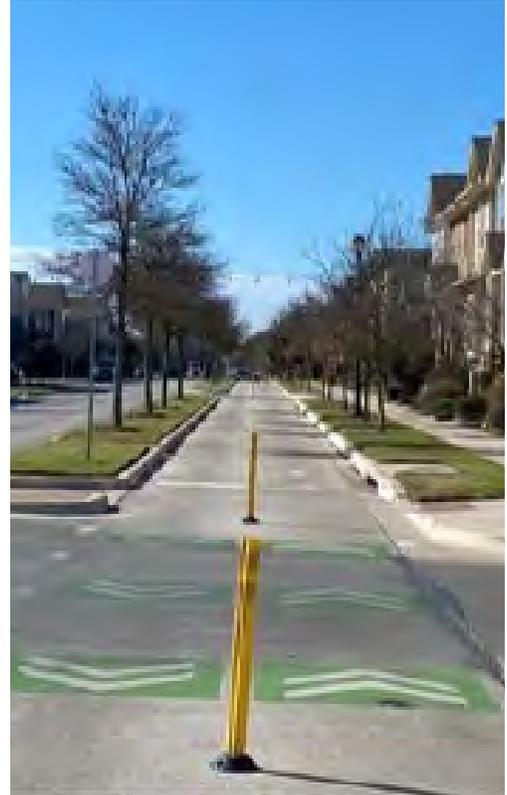
This document is organized as follows. First, the overall project framework is laid out. This is followed by discussions of key findings from the Texas Resilient Streets and Greenways analysis. The San Marcos Healthy Streets, Resilient Communities Working Group is discussed next. Finally, key action steps identified by the working group are analyzed.



Background

Resilience planning concepts are increasingly being utilized to help frame and shape transportation policy implementation. These approaches range in scale from broad, regional efforts to more targeted efforts at the community level to help define the scope, meaning, and technical characteristics of successful transportation resilience projects. The goal of the project was to identify working models for these efforts at both the state/regional and community levels in Texas.

The approach for the project was two-fold. At the state/regional level, a resilience asset mapping project identified key trail-oriented development and green infrastructure projects from around the state. Trail-oriented development approaches that focus on using the amenity values of trails to enhance community livability and spur development are increasingly being used as key resilience planning tools (Fields and Renne 2022). The Texas Resilience Asset Mapping Project StoryMap created a GIS-based base map of key projects from around the Texas Triangle area and linked those locations with images and targeted project descriptions in the ESRI StoryMap function. The project included a “story” component where the key planning and project characteristics could be tracked by city. This provided both a visual database of emerging examples of local green resilience projects and provided key policy insights into the development of these emerging resilience projects.



Muller Cycle Track (source: Billy Fields)

The Texas Resilience Asset Mapping Project Storymap provides important examples of transportation resilience projects to provide inspiration for the second component of the project, the creation of a community engagement working group in the San Marcos area. A resilient street creates safe, accessible routes for reaching community destinations while enhancing the place making potential of surrounding land uses. Successful transportation resilience planning requires building strong, multi-sectoral partnerships to address transportation, community development, and health and livability challenges.

The goal of the Healthy Streets, Resilient Communities Working Group was to help break down planning silos and begin a process of community engagement that helps to build a long-term framework for resilience in the fast-growing San Marcos region. A multi-sectoral transportation resilience working group was formed in the fall of 2022 to help build working relationships among key community groups. Monthly meetings continued in the fall 2022 and spring 2023. These meetings featured presentations from peer communities and active transportation experts from around the world. These presentations of best practices in resilient streets provided a platform for collaborative learning among the working group participants. The following sections describe these efforts in more detail.

Texas Resilient Streets and Greenways: The Beginnings of a Movement

Increasingly, cities around Texas are being designed to work with nature to solve complex environmental challenges. Community leaders are discovering that the most cost effective and impactful solutions to problems like flooding, heat stress, and community livability often involve efforts to maintain, enhance, and extend natural systems like green space and the rivers, creeks, and ponds through our communities. These green and blue infrastructure systems are being piloted in Texas communities and point to a new pathway forward for managing flooding, heat, and community livability.

The Texas Resilient Streets and Greenways Asset Mapping StoryMap was created to highlight examples of key green and blue infrastructure projects within the emerging Texas Triangle megaregion of Houston, Dallas, Austin, and San Antonio. These diverse cities are challenged by increasing patterns of both flooding and drought and the intense summer heat of Texas. Emerging examples show how our streets, parks, and green spaces can be reimaged to serve the multiple goals of improved water management, enhanced community connectivity, and greater livability. Key projects for each city are highlighted below. This is not designed to be an exhaustive set of examples, but rather provide examples of innovative models that show how Texas cities are bouncing forward to meet difficult environmental challenges.

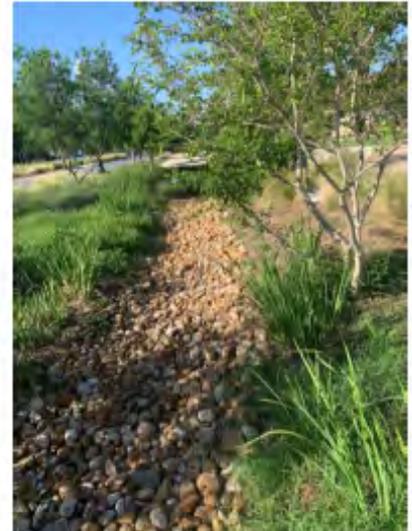
Austin

Austin has begun to experiment with green streets designed to improve safety, water management, and community livability. While a new set of projects shows the potential of these new designs, these projects have not yet been widely implemented on the vast street network of the city. Austin does, however, have a strong network of greenways that are increasingly being linked into the broader transportation system through an emerging bikeway network.

The examples in the StoryMap show how these new systems are developing with examples from the Muller neighborhood, the adjacent EM Franklin Green Street and JJ Seabrook Trail, and the Shoal Creek neighborhood bikeway and green infrastructure projects. This is not a complete list of projects but shows how the new green, resilient street system is beginning to develop.

San Marcos

San Marcos' downtown streets are increasingly being planned as multimodal corridors designed to both move people and manage water flows into the adjacent spring-fed San Marcos River. The street changes help to support a vibrant downtown business core centered on the historic Courthouse Square with connections to Texas State University and its 40,000 students. The new street projects include the N. C.M. Allen redesign which includes a network of bioswales designed to manage water flow and pollution, the new two-way cycle track system on Guadalupe Street, and the proposed Green Alley network along downtown streets.



N.C.M Allen San Marcos (source: Billy Fields)

Houston

Houston is seeking to reclaim its heritage as the Bayou City with an expanding network of bayou trails and an emerging set of green infrastructure projects designed to better manage water. After the intense flooding of Hurricane Harvey, Houston began to reconsider its relationship with water and how to expand its green infrastructure networks. This rethinking has focused on the many bayous that form a hub and spoke system connecting to downtown. Houston has almost 200 miles of trails along its parks and connecting to the bayous. These greenway corridors are seen as amenities which are designed to provide access to active transportation and also act as potential economic redevelopment locations.

This type of emerging trail-oriented development acts as an important focus of redevelopment with the Houston-Galveston Area Council producing a Trail-Oriented Development Primer and new projects beginning to emerge in the region. In a Metro region as large as Houston, there are many projects moving forward. Example projects include Buffalo Bayou and the emerging Buffalo Bayou East project, the MKT mixed-use development, and the Bagby Street Greenroads design.



Houston M-K-Trail (source: Billy Fields)

Dallas

Dallas has piloted green streets that improve water management and begun to build a network of parks around its downtown to create more livable communities. Green streets that incorporate a series of targeted rain gardens into the streetscape have been piloted on Elm Street in the city's Deep Ellum neighborhood. This approach has improved water management and also acts as traffic calming to make the neighborhood more attractive and safer.



Klyde Warren Park Dallas (source: Billy Fields)

Dallas's downtown parks are showing how green infrastructure can be incorporated as livability enhancements. Dallas has created a network of parks that ring the downtown creating green oases within the downtown core. The Klyde Warren Park, for example, creates park space above a highway showing how automotive landscapes can be reclaimed to create livability and better manage water. Another example of this is Pacific Plaza which converted a surface parking lot into a new green amenity. These types of development can be expanded into multiple neighborhoods to increase the resiliency of Dallas.

San Antonio

San Antonio is creating a network of greenways designed to link communities together, spur appropriate development, and better manage water resources. The greenway network just passed its 100th mile and is being planned as a loop around the city. These greenways are also being designed around trail-oriented development principles established in the City's Comprehensive Plan. The greenways are also increasingly being conceived as parts of a green infrastructure system designed to better manage water. The San Antonio River Authority produced its Green Infrastructure Master Plan as a way to better integrate green infrastructure resources. The projects pushed forward through planning processes range from interventions designed to decrease runoff from current developments to larger scale green infrastructure like Confluence Park. Linking these multiple projects together into an integrated system still poses challenges, but also shows much potential for San Antonio to begin to transition to towards a more resilient community.

San Marcos: Healthy Streets, Resilient Communities Working Group

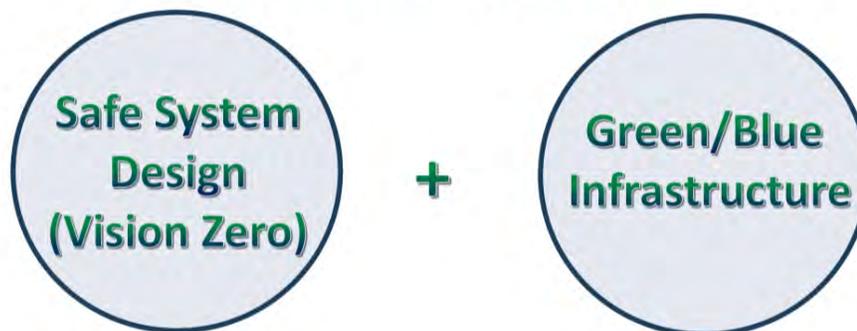
The projects described above provide a type of proof of concept for resilient streets in Texas. They help to form a Texas lexicon of best practices for resilient streets and greenways. Not only are these types of projects possible in Texas, but they are showing the pathway forward for creating broader systems that can help cities achieve multiple goals simultaneously. These projects are increasingly being seen as key community amenities that simultaneously help to better address water management and create safer streets for all. While most streets in Texas are still being designed primarily to move auto traffic at high speeds with limited regard for other community goals, these new resilient street models show how new design can be used to meet multiple community goals simultaneously to create more resilient cities.

This base of best practice examples was highlighted in the Healthy Streets, Resilient Communities Working Group. The working group, comprised of representatives from the City of San Marcos, Texas State University, and broader San Marcos community, met in the fall of 2022 and spring of 2023 to examine the potential to better understand the potential of expanding resilient street system for San Marcos.

The monthly meetings of the Working Group featured presentations by leaders in active transportation (Jennifer Ruley Mobility and Safety Lead Engineer for the for the City of New Orleans), the intersection of transportation and public health (John Simmerman of Active Towns and Dr. Angie Cradock the Deputy Director of the Prevention Research Center on Nutrition and Physical Activity at the Harvard T.H. Chan School of Public Health), and green infrastructure (Jordan Clarke and Associate at TBG Partners). The Working Group engaged in discussions with each of the speakers to help better understand the challenges and potential opportunities of advancing more resilient street designs.

After the series of monthly resilient street discussions, the Working Group came together to identify key resilient street assets in the downtown core of San Marcos. This process was led by Dr. Billy Fields of Texas State University drawing from his international review of best practices in resilient streets outlined in his book *Adaptation Urbanism and Resilient Communities* (Fields and Renne 2021).

Resilient streets =



Pathway to bouncing forward: resilient streets

According to the research by Dr. Fields, two key components form the backbone of resilient streets. These are Vision Zero designs focused on creating safe streets for users of all ages and abilities and the addition of green infrastructure to enhance water management, safety and overall livability of street corridors. These street designs are emerging in communities around the world and point the pathway towards greater safety, enhanced economic development, and improved resilience overall. This approach to roadway design helps cities use each road reconstruction project as an opportunity to bounce forward to achieve multiple community goals simultaneously.

The core resilient street concepts were distilled into a set of tools used by the Working Group to evaluate San Marcos streets (see Appendix). Rather than focusing on potential deficiencies of the streets, the approach focused on identifying key resilience assets that could then be used as a base for creating a more holistic resilient street network. The Green Resilient Streets Audit provides a list of the key elements of Vision Zero and Green Infrastructure designs identified from best practice leaders to provide a comprehensive list of potential resilient street assets within the community.

Working Group members examined two locations in the asset mapping exercise: N. C. M. Allen at Hutchison and Hopkins at Edward Gary. After the asset mapping session, results from the members' worksheets were compiled and then presented back to the Working Group in a final meeting for feedback.



Asset Mapping Exercise (source: Billy Fields)

The Working Group identified 3 key assets that could act as important templates for a broader resilient street network in San Marcos. These 3 key resilient street assets are:

- The potential extension of the green infrastructure along N. C.M. Allen towards I-35
- The use of the Cultural Trail concept as a planning framework for connecting downtown with adjacent neighborhoods
- The potential of utilizing the Kissing Alley project as a pilot to help create a connected network of green alleys throughout downtown San Marcos.

The recently completed redesign of N. C. M. Allen provides an important local example of how green infrastructure can be incorporated into the street ROW to accomplish multiple goals. The redesign includes bioswales to help manage water flow and pollution into the adjacent San Marcos River, a water square to allow for larger water retention and pollution mitigation, a green median to allow water infiltration and slow traffic, a wide paved trail for bicycle and pedestrian access, and large continental crosswalks to improve safety. These features combine together to create an important local template for a green resilient street. Extending this type of design across Hutchison towards I-35 would link the downtown and Texas State campus to important recreational assets at Rio Vista Park and multiple neighborhoods just outside of the downtown core. The Working Group identified this project as an important potential project to consider for funding and inclusion in area plans. It should also be noted that the N. C. M. Allen redesign could act as a template for other street designs throughout the city. The City may want to consider incorporating key design elements of N.C.M. Allen in future street design guidance documents.

The Cultural Trail planning approach incorporates a wide paved trail with green infrastructure to connect key cultural destinations. The approach was pioneered by the City of Indianapolis and has proven very successful at improving safety, managing water, and increasing local business. This concept has gained traction in San Marcos and is linked to several key planning documents focusing on improving connections along Purgatory Creek. In addition, the Stelos Scholars program of Texas State is planning to use the cultural trails concept as a key planning project during the summer of 2023. The Working Group felt that there was potential to use these planning processes to evaluate a potential San Marcos Cultural Trail that would link key downtown cultural resources with those in adjacent neighborhoods.

San Marcos is embarking on a redesign of Kissing Alley, a key alley way that connects to Courthouse Square. The redesign is focused on activating the space and enhancing the green infrastructure potential of the space. This type of design is discussed forms of the foundation of the larger vision of the Green Alley Initiative which envisions connecting the many alleys in the core of San Marcos together into a green grid of new public spaces. The Working Group sees the Kissing Alley project as a potential pilot program to show how the green alleys can function. As Kissing Alley project moves forward, key avenues for extending the green alley network should be considered.

The Working Group felt that these projects show how resilient streets can successfully be incorporated into San Marcos' street network. They act as design templates that can be extended to link the community together. These are home grown projects that show signs of success. The administrative knowledge gained from these projects can be applied to other projects to help build a broader network of resilient streets.

There are still many barriers like cost and inertial status quo practices. The new templates have not yet been translated into a new daily design expectation. The three resilient street projects, however, point to a pathway forward, to a new normal where safe street designs are combined with green infrastructure to make more resilient streets.

The Working Group is just another step in the process of advancing these resilient street concepts. Many thanks are owed to the Working Group members for the time and passion for making San Marcos a healthier, safer, and more livable city.

Appendix: Safe and Resilient Streets Asset Mapping Tools

Tool 1: Safe Resilient Streets Asset Evaluation

Resilient streets have two overarching goals. First, they are designed to facilitate safe and convenient access for people for all ages and abilities to community destinations. Safety is the foundation for resilient streets and safety in an urban setting means managing vehicle speeds within Vision Zero tolerances. The second overarching component of a resilient street is the addition of green and blue corridor elements. These are designed to manage increasingly important water management and heat stress impacts of the transportation system while creating community amenities that can make streets safer, more attractive, and more productive assets.

The audit tool below helps to translate these core concepts into an evaluation matrix. The tool is simple, essentially asking how safe and how green the street is. It seeks to identify the presence of key vision zero and green street designs that help to create resilient streets. The elements listed in the tool come out of an extensive literature review by Fields and Renne (2021). These are assets that the community can build upon to create networks of resilient streets linked to greenways.

Green/Blue Street Corridor Elements	Yes/No	Vision Zero/Safe System Street Elements	Yes/No
Green Medians		Sidewalk	
Street trees		Traffic calming (speed table, chicanes, traffic diverter, etc.)	
Bioswales		Continental crosswalk / Mid-block crossing treatment	
Street planter boxes		Brick pavement	
Permeable Pavement		Pedestrian street	
Parklet/Adjacent parks		Curb bulb-out	
Green/water squares		Bike lane	
Adjacent rivers		Cycle track	
Adjacent canals		Protected intersection	
Adjacent ponds		Round-about	
Blue medians (center of street canal/stream)		Trail / Greenway	
Other:		Other:	
Other:		Other:	
Other:		Other:	
Notes:			

Tool 2: Vision Zero Design Audit

Vision Zero policies are designed around the basic physics of crashes. Crash analysis has shown that as vehicle mass and speeds increase the likelihood of fatalities increases. For example, pedestrians have an 8% fatality risk in crashes at 20 mph, a 20% fatality risk at 30 mph, and a 46% fatality risk at 40 mph (AAA Foundation 2011). For walkable downtown locations, this translates to managing speed of vehicles who may come into contact with vulnerable roads users like pedestrians or bicyclists.

To truly reach Vision Zero levels of risk, streets should either be kept at speeds below 20 mph if there is mixing of vulnerable roads users with vehicles or, if speeds are higher, dedicated protected spaces like sidewalks, cycle tracks, and protected intersections should be provided. We translate this into physical design below to assess whether streets segments meet Vision Zero design guidance for vulnerable road users.

Street Segment Posted Speed Limit:

Above 20 mph?

If no, is there traffic calming to slow speeds to make it safe for people on bikes to mix with vehicles?

Type of traffic calming present if present: _____

If yes, is there a dedicated protected place for people to walk? _____

Facility type if yes: _____

If yes, is there a dedicated protected place for people to ride a bike? _____

Facility type if yes: _____

If yes, is there a protected intersection design (curb bulb out, median island, etc)? _____

Facility type if yes: _____

Tool 3: Safe Resilient Streets and Greenways Asset Mapping Exercise

Concept

Looking at the downtown and downtown-adjacent areas of San Marcos, there is a great wealth of resilient street types and connecting green corridors. These could be green and blue infrastructure, alleys that could be repurposed, bicycle and pedestrian infrastructure, complete street examples, street tree corridors, public spaces, etc. There seem to be many elements that could be linked together to create a safe resilient street system linked with greenways. What do you see?

The answers that you provide below will be turned into a GIS StoryMap that shows the potential base elements of an asset map outlining the potential for resilient streets and greenways in the downtown San Marcos area.

Asset Mapping

- What are key resilient streets and greenway assets in and adjacent to downtown San Marcos? Try to be specific with a street intersection if possible.
- Describe the existing key elements that could form a resilient street and greenway system connecting downtown and downtown adjacent areas of San Marcos.
- How would you prioritize space on your street to make it more welcoming?
- Finally, are there a couple of potential catalytic projects that could help to connect these elements? Please identify.
- Other ideas or comments on mapping potential resilient street and greenways assets?