



Goal 2: Well-designed, well-maintained transportation infrastructure that is safe for all users

Safety is a primary concern for any community, and the City of Sugar Land has built a reputation for being a safe place to live, work, and raise a family. Sugar Land continues to be a desirable community in part because its residents feel safe in their home and on the road. As an indication of the importance of safety to residents of Sugar Land, the Sugar Land Mobility Survey found that “improving safety” tied with “reduced traffic congestion” for the highest rated goal of the mobility plan among respondents.

With regards to transportation in Sugar Land, residents generally feel safe – as long as they are in their cars. Among respondents to the survey, 93% felt at least somewhat safe driving a vehicle in the City of Sugar Land. On the other hand, only 43% of respondents agreed or strongly agreed that they “feel safe walking to destinations in the City of Sugar Land.” Respondents were even more concerned about bicycling: only 16% felt safe riding a bicycle in the City.

These concerns for safety while walking or biking mirror studies of the safety of these modes in the Houston region. *Dangerous by Design*, a publication by Transportation 4

America released in 2010, found the region to be the 8th most dangerous in the United States for pedestrians and other non-motorized transportation modes. The report concluded that the physical design of roadways in the region contributes to a higher ratio of roadway collisions involving pedestrians and cyclists.

To continue the tradition of providing top-notch safety to residents of Sugar Land, it will be important to keep searching for ways to further improve safety for all transportation modes. Residents of Sugar Land have indicated that they value biking and walking transportation options in addition to their cars. These desires mirror goals established in the City of Sugar Land Comprehensive Plan, including *Goal 1: Safe and Beautiful City*, which establishes the general importance of safety within the city, and *Goal 5: Transportation and Mobility*, which emphasizes the need for “an integrated mobility system that is seamless [and] inclusive of pedestrian traffic, bicycle traffic, vehicular traffic, airport users, mass transit, and any other forms of transportation.” The following strategies are presented to accomplish the goal of increasing the safety of transportation infrastructure in Sugar Land for all users.



Strategies for Providing Well-Designed, Well-Maintained Transportation Infrastructure that is Safe for All Users

Strategy #1: Develop systematic approach to address safety issues across all modes

The first step towards providing a safe transportation system is to have a thorough understanding of safety issues on existing transportation facilities. Particularly in the case of bicycle and pedestrian modes of

transportation, new infrastructure such as sidewalks and hike and bike trails will never reach their full potential for utilization if they connect to other facilities that users judge to be unsafe. In these cases, the most cost-effective way of achieving the City’s mobility goals may be to “fix it first” – address existing safety issues before pursuing new capital expenditures.

Initiative 1A - Institute program to identify high crash locations, or potential high crash locations (automobiles, bicycles, pedestrians), and implement mitigation measures



Fig 5.1 - A crash map can help identify high-accident locations and suggest causes and mitigation options.

An ongoing program to identify and address safety “hot spots” is critical to ensuring the safety of roadway users. These hot spots may, in some cases, be the only obstacle keeping a corridor from being a safe route. Addressing such hot spots is often the most cost-effective method for improving transportation safety.

It is recommended that the City of Sugar Land institute a program to identify high crash locations, or potential high crash locations, across all transportation modes (including automobiles, bicycles, and pedestrians) and implement mitigation measures. A GIS database and map that shows crash locations based on police reports could assist with identification of crash hot spots. **Figure 5.1** shows an example of a crash hot spot map. Such a map should be regularly updated as police reports are created for roadway crashes.

The same database or an additional database could be used to track roadway safety problems. Such a database would be helpful for identifying locations with a high potential for crashes before a crash occurs. Identification of issues could be handled by city workers and complaints from citizens. A number of cities are beginning to invest in “crowd-mapping” programs to supplement these traditional sources of feedback. For example, SeeClickFix enables every road user with an internet connection to easily report problems such as potholes and traffic signal malfunctions by locating them on a Google Map interface. The data is then linked into city databases for analysis by city staff.



Fig 5.2 - Boston’s Citizens Connect program

In 2009, the City of Boston implemented a crowd-mapping initiative call Citizens Connect. The program allows users to use the camera and GPS features of their cell phones to take pictures of problems around the city and report them directly to public works. San Jose has a similar system, and many other cities nationwide have begun looking into crowd-mapping as a cost-effective way of compiling a database of safety concerns from the very people expressing those concerns. It is recommended that Sugar Land assess the feasibility of implementing a similar system to compile a database of safety concerns.



Strategy #2: Improve balance in transportation network to include all travel modes

Roads in Sugar Land typically have a focus on a single mode of transportation: the private automobile. Some provide sidewalks, but in general bicycle and pedestrian traffic is encouraged to use local streets and off-road facilities. This arrangement can create challenges for bicyclists and pedestrians attempting to access the jobs, stores, restaurants, schools, and myriad other important destinations located on major thoroughfares. To truly enable these modes of transportation, it is important that balance in the entire transportation network be achieved for all travel modes.

Initiative 2A - Adopt Complete Streets policies and design standards that will improve bicycle, pedestrian and transit safety and functionality

Building a well-designed transportation system that is safe for all users is the central tenet of the philosophy of **complete streets**. According to the National Complete Streets Coalition, *complete streets* are those designed and operated to enable safe access and travel for all users, including pedestrians, bicyclists, motorists, transit users, and travelers of all ages and abilities. Complete streets can have a variety of features including sidewalks, bike lanes, street trees, sidewalk lighting, and pedestrian signals at crosswalks (see **Figure 5.3**). Ultimately, the chosen set of roadway features varies depending on the context of the situation. Many of these infrastructure features are the exact analogues for what are routinely provided for motor vehicle traffic. Though there may not be many pedestrians or cyclists currently using a road, the same would likely be the case for motor traffic if roadway pavement wasn't provided. Constructing sidewalks and bike lanes and providing pedestrian signals and sidewalk lighting encourages pedestrian and cyclist traffic.

The premise of *completing the street* by no means intends to marginalize the motor vehicle-driving population, which will remain the majority in Sugar Land for the foreseeable future. Instead, it strives to design roads in such a way that maintains a high level of service for motor vehicles while improving safety for more vulnerable users. Furthermore, many of the features of complete streets directly benefit motorists as well by also increasing their safety. These features also tend to increase the aesthetic appeal of the road, which can create a sense of pride in the community. A high-speed arterial road designed to move as many cars into and out of Sugar Land neighborhoods as possible has a completely different feel to it than one lined with street trees and a well-designed pedestrian realm where residents and visitors chat and children play. The former is merely a pipeline; the latter contributes to the fabric of the community.

Communities around the nation have begun embracing complete streets as a way to provide for a more equitable and safe transportation system for all residents. They have recognized that building streets that do more for communities than just provide pipelines for traffic flow improves the quality of life of the entire area, making it more attractive to those families that have the ability to choose where they want to live.



Fig 5.3 - Types of Complete Street Improvements



To retain and build on the competitiveness of Sugar Land with other top-ranked places to live and work, it is recommended that Sugar Land adopt a Complete Streets policy to ensure that no matter how people in the City choose to move about, they can do so safely and conveniently. This policy would guide the design and construction of new roadways as well as the rehabilitation of old roadways. The policy should be framed as an “opt-out” instead of “opt-in” requirement for complying with the standards to ensure that all new streets are “complete” by default.

According to the National Complete Streets Coalition, complete streets policies can be successfully implemented in several ways: “ordinances and resolutions; rewrites of design manuals; inclusion in comprehensive plans; internal memos from directors of transportation agencies; and executive orders from elected officials, like Mayors or Governors.” Those techniques most relevant to Sugar Land are summarized below:

- **Ordinances** – Ordinances can be written to mandate specified elements of complete streets on public rights-of-way. In 2007, Seattle adopted a Complete Streets ordinance that required the city to “design and construct all new City transportation improvement projects to provide appropriate accommodation for pedestrians, bicyclists, transit riders, and persons of all abilities while promoting safe operation of all users.” The ordinance also specifies precisely where Complete Streets principles are to be implemented, including the City’s Transportation plan, transit plan, and pedestrian and bicycle plans.
- **Design Manuals** – A design manual describes the design requirements for structures constructed within a jurisdiction. These manuals, including the City of Sugar Land’s *Design Standards*, typically include requirements related to roadway facility design. *Design Standards* includes a requirement for sidewalks and crosswalks. However, it also includes a stipulation that “construction of a sidewalk will be deferred until a lot is improved.” This stipulation inherently leads to the potential for gaps in infrastructure for pedestrians and bicyclists. Recommendations on the consideration for bicycle and transit facilities along roadways should also be incorporated in the *Design Standards* to support more Complete Streets.



A range of “completeness.” Complete streets can improve safety, increase aesthetic appeal, and inspire civic pride.

- **Comprehensive Plans** – According to the City of Sugar Land, the City’s Comprehensive Plan is “used to guide development and land-use” and is regularly used by the City “to make policy decisions affecting the future of the City – whether it is related to land-use, economic development, or mobility.” A Comprehensive Plans can be an effective way to implement a vision for complete streets serving all modes of transportation. The National Policy and Legal Analysis Network to Prevent Childhood Obesity (NPLAN) offers model language on complete streets for comprehensive plans. According to NPLAN, “[by] including ‘complete streets’ language in a comprehensive plan, a community can promote street design and land use policies that allow people to get around safely on foot, bicycle, or public transportation. Integrating complete streets practices into planning and policy decisions can help encourage safe and active transportation, decrease pollution, and reduce the incidence of childhood obesity, social isolation, diabetes, and heart disease.”

Figure 5.4 provides a sampling of the complete streets policies adopted in cities across the United States.



Fig 5.4 – Examples of Complete Streets policies in the United States

<p>an Boulevard: 4-Lane Divided <small>A Divided with Raised Median, Bike Lanes, Sidewalks, Landscaping</small></p> <p>Key Features: - Raised Median - Sidewalks - Landscaping - Bike Lanes - 4-Lane Divided</p> <p>Reference Capacity: 100 to 15,000 vehicles per day</p>	Ordinance	<p>"All streets shall be designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street."</p>
North Myrtle Beach, SC		
	Ordinance	<p>"The inclusion of complete streets...is a response to a public interest. Local citizens, business owners, and officials recognize the importance of a shift from an automobile dominated roadway to a balanced, multi-modal transportation system that respects all users of the roadway and the rights of adjacent land owners."</p>
Hendersonville, TN		
	Internal Policy	<p>"Like many suburbs, some areas in Rockville were designed for automobile transportation, and lack facilities such as sidewalks, bus shelters, and bicycle lanes. . . As demand for walking, bicycling, and transit facilities grows, safe and accessible transportation accommodations for all modes becomes even more necessary. Additional modal choices can also help in improving air quality and reducing greenhouse gas emissions by reducing private motor vehicle trips. . ."</p>
Rockville, MD		
	Internal Policy	<p>"The new Complete Streets approach puts pedestrians, bicyclists and transit users on equal footing with motor-vehicle drivers. The initiative aims to improve the quality of life in Boston by creating streets that are both great public spaces and sustainable transportation networks. It embraces innovation to address climate change and promote healthy living."</p>
Boston, MA		



Initiative 2B - Require multimodal connections in site plans, general plans and Traffic Impact Analyses

Just as it is important that a safe bicycle and pedestrian facility connect to other safe facilities in the public realm, it is equally important that public infrastructure connect to safe facilities on private properties. For example, if the front door of a business is inaccessible from the sidewalks along an adjacent complete street because of a large parking lot or a lack of clearly-defined walkways, most patrons will still choose to drive to the business regardless of their mode preference. Chapter 7 discusses strategies for partnering with the private sector and utilizing the site plan review process to ensure the provision of pedestrian and bicycle amenities, and Chapter 11 further explores partnerships with the private sector and other governmental agencies.

Strategy #3: Develop a maintenance strategy that addresses an aging infrastructure and City mobility goals

As the City of Sugar Land reaches maturity, many of the roads in the city will begin reaching the end of their design lives and will need to be reconstructed. Each reconstruction of a road presents an opportunity to leverage the capital investment to achieve multiple City mobility goals. Adopting a process and strategy for dealing with system maintenance will ensure that the most is made of every maintenance project.

Initiative 3B: Incorporate a context sensitive evaluation in plan preparation for City reconstruction/maintenance projects

A practical and popular method of balancing multiple mobility goals in a maintenance plan is to utilize a **context-sensitive approach** that treats every transportation project as unique in terms of function, environment, and community. According to the Context Sensitive Solutions Clearinghouse, *context sensitive solutions* is “an approach [to transportation planning] that involves all stakeholders in providing a transportation facility that fits its setting.” The Clearinghouse presents the following principles of the process:

1. Strive towards a **shared stakeholder vision** to provide a basis for decisions;
2. Demonstrate a comprehensive **understanding of contexts**;
3. Foster continuing **communication and collaboration** to achieve consensus;
4. Exercise **flexibility and creativity** to shape effective transportation solutions, while preserving and enhancing **community and natural environments**.

The needs, desires, and characteristics of the community play a central role in context-sensitive projects. As a result, public involvement in these projects must come early and often – starting at the preliminary steps of identifying project purpose and need, and lasting at least through construction and frequently long into the life of the project. Transportation projects that utilize context-sensitive solutions often employ much more public involvement than standard projects and can ultimately look much different – a reflection of the various mobility goals and values particular to any community. In addition to the benefits to the community of such an approach, such as public pride in the project, a context-sensitive approach can have quantifiable benefits as well. These include lower overall project costs and more reliable project schedules which can result from addressing community and environmental concerns and minimizing controversy from the very outset of the project.

In 2009, the Texas Department of Transportation (TxDOT) became the first state transportation department in the country to adopt context-sensitive solutions in its project planning process by adopting the policies contained in *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*, a document written jointly by the Institute of Transportation Engineers and the Congress for the New Urbanism



(see **Figure 5.5**). According to a Houston Chronicle article covering the adoption, previously “TxDOT would design a road project, bring it to the local community stakeholders and defend it at public hearings that could get contentious” (Houston Chronicle, Carolyn Feibel, December 7, 2009). The new process encourages transportation planners to engage the public from the start to build consensus and build a project with many champions and supporters. It is recommended that Sugar Land follow the lead of TxDOT and consider context sensitive solutions as the preferred approach for infrastructure planning and implementation. Some of this is being considered in the City’s updated Thoroughfare Plan.

Analysis of roadway conditions and projections of future maintenance expenditures could be assisted by the creation of a database of roadway segment age and condition. This data could then be plotted on a graph to show the number of roadway segments that will likely need reconstruction in any given year. This will support planning for maintenance funds budgeted for resurfacings and rebuilds.

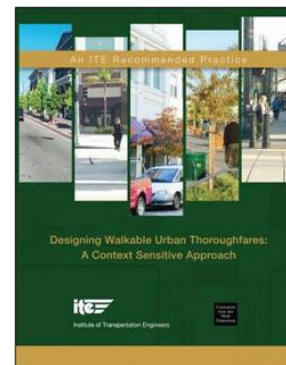


Fig 5.5 – The Context Sensitive Solutions document adopted by TxDOT

Metrics:

The following metrics are proposed for tracking the progress towards achieving the goal of providing well-designed, well-maintained transportation infrastructure that is safe for all users:

- **Vehicle Crash Frequency:** This metric would provide the total number of crashes involving automobiles in Sugar Land over a set time period. While many incidents are due to driver error, crash trends may be identified that will support improved roadway safety.
- **Ped/Bike Crash Frequency:** This metric would provide the total number of crashes involving bicyclists and pedestrians over a set time period. The metric would indicate the level of success of bicycle and pedestrian facilities at safely accommodating both modes. This metric may rise as more pedestrian and bicyclist facilities are built and will support analysis of potential safety issues with those facilities.
- **Serious Incidents:** This metric would provide the total number of serious incidents on roadways involving automobiles, pedestrians, and/or bicycles over a set time period. All crash information would require partnership with local police who are typically first responders to an incident.
- **Roadways in Good Condition:** This metric would compute the percentage of roadway miles rated to be in good condition by a field survey. It would provide a measure of the condition of roadway infrastructure in Sugar Land because even the most extensive infrastructure network can grow ineffective at providing mobility as it ages and deteriorates.
- **Citizen Survey - Satisfaction with Mobility Safety:** The Sugar Land Citizen Survey should track citizen satisfaction with mobility safety across all modes. Trends and correlations could be derived from the data to compare with implementation of safety-improving initiatives.
- **Citizen Survey - Satisfaction with Street Maintenance and Repair.** The Sugar Land Citizen Survey should track citizen satisfaction with street maintenance and repair. Trends and correlations could be derived from the data to compare with implementation of maintenance-related initiatives.
- **Complete Street Projects.** This metric would provide the total number or miles of roadway projects that explicitly provide complete streets elements. It could be compared to the total number of miles of roadway projects to provide trends in the proportion of projects that contain complete streets elements.