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# Changing beliefs in the bayou city

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Vision Zero has been changing traffic safety culture internationally since the 1990s, but in Houston, Texas it did not kick off until the 2010s. Houston presents challenges in scale and development patterns, which make for a slow, deliberate process when furthering a transportation paradigm shift towards zero traffic deaths. Bringing in leaders who champion and own Vision Zero has been key, and a traffic safety culture shift is happening at necessary places inside the City of Houston organization. However, transforming community-wide beliefs in a city like Houston requires meaningful engagement, clear strategies and sustained political will. City of Houston officials, stakeholders and residents are working to meet these challenges. This article will delve into the effort that has been made to change Houston's transportation culture and the dire need for street safety improvements.

KEYWORDS

**houston, safe streets, paradigm shift, vision zero, traffic safety culture, safe systems**

## Introduction

Houston is amid a transportation paradigm shift. For a long time, transportation in Houston has prioritized one mode: cars. Like many cities, widening roadways to solve congestion has been common practice even though mounting evidence shows this only adds more drivers and therefore more traffic (Duranton & Turner, 2011). Multi-lane roads that reinforce sprawling urban growth are also linked to higher rates of traffic-related deaths for people walking and traffic deaths overall (National Complete Streets Coalition and Smart Growth America, 2019). In Houston, the impacts of these findings are slowly filtering into public opinion. Over the last 4 decades, the Kinder Institute Area Survey, an open-ended survey assessing attitudes and experiences of Houstonians each year, revealed that traffic congestion was one of the biggest problems facing Houston. In 2003, when the survey first added a question about long-term solutions to traffic problems, 63% of respondents indicated building bigger and better roads and highways. In 2015, this dropped to 26%. At the same time, Houstonians taking the survey expressed the desire for more walkable neighborhoods and complete streets to accommodate transit and biking. While traffic congestion continues to be a major concern, more recently the conversation around solutions is shifting to improve streets for other modes of transportation rather than solely build wider roadways.

In other cities in the U.S. and internationally, Vision Zero has been catalyzing a shift in traffic safety (Ngo et al., 2022). Vision Zero transforms the traditional traffic safety approach to rethink "accidents" as preventable crashes, establish a clear goal of zero traffic deaths, and shift responsibility from the individual road user to those who design the transportation system (Vision Zero Network, 2018). Whereas a traditional traffic safety

approach expects humans to perform perfectly and relies primarily on behavioral changes, Vision Zero uses a Safe Systems approach which means that the responsibility is on the transportation system to anticipate human error and accommodate human injury tolerance (Abel et al., 2020). It recognizes that humans make mistakes and requires a network of safe streets which ensure the consequences of those errors will not be fatal. Advancing the Safe Systems approach requires a traffic safety culture where the shared values, actions, and behaviors demonstrate a commitment to safety over competing goals and demands (Federal Highway Administration, 2020). This means dismantling the status quo and so Vision Zero is a long-term commitment. For example, Swedish parliament adopted Vision Zero policy in 1997 and, after halving the number of traffic fatalities by 2010, renewed their commitment to Vision Zero in 2016 (Government Office of Sweden, 2016). Evidence abroad and nationally shows a slow, deliberate process is part of, and necessary in, shifting transportation paradigms and reducing traffic deaths (Ecola et al., 2018).

Vision Zero is not the first plan for improving street safety in Houston, but it is the first to demonstrate a commitment to saving lives over prioritizing cars. This commitment is formalized with the Vision Zero Action Plan which sets clearly defined goals to end traffic deaths and serious injuries by 2030 and improve street safety for all road users. According to the Federal Highway Administration, "a zero deaths vision requires a change – a shift in culture both within transportation agencies, other organizations, and by the public" (Federal Highway Administration, 2020). The Vision Zero Action Plan was released by the City of Houston in December 2020 and attempts to shift the organization towards a more strategic approach grounded in the safety conscious mindset that no loss of life by traffic crash is acceptable. It is bolstered by resiliency and climate action plans, released around the same time, which identify multimodal transportation as a key element to strengthening communities. New leadership amplify the mayor's call for a transportation paradigm shift and ensure resilience, climate action, and safe streets priorities coexist rather than compete. Houston's future as a resilient city relies on multipurpose infrastructure that keeps people safe. This is a change from traditional thinking that streets are for cars and towards a Vision Zero framework that streets are for people.

## Challenges for a paradigm shift in houston

The scale of Houston, with a Metropolitan Statistical Area larger than New Jersey, presents challenges to a paradigm shift including sprawling development patterns, engagement with people across varying places and cultures, and a lack of dedicated funding for Vision Zero.

In Houston, low housing costs have been partially enabled by building an expansive network of freeways intended to facilitate short commutes from suburban and rural areas. Unfortunately, freeway congestion and an increasing affordable housing crisis have not been abated by these development patterns. These development patterns have not resulted in safe streets either. Developed as part of the commitment to Vision Zero, Houston's High Injury Network (Figure 1) contains the 6% of Houston streets that account for 60% of crashes resulting in serious injury or death (City of Houston, 2020b). Dedicated, safe infrastructure for transit riders, cyclists, and pedestrians remains rare. Of the approximately 9,200 miles of Houston streets that are not limited access highways, there are a total of 5,600 miles of sidewalks (Houston Public Works, 2015). If every street had a sidewalk on both sides, there would be 18,400 miles of sidewalks. When present, sidewalks are often narrow, poorly maintained, or impassable for those with mobility impairments (Malek, 2018). The Houston Bike Plan has increased bike facility construction, and as of the January 2022 there are 436 miles of high-comfort bikeways[1]. However, only 29 of those miles are high-comfort, on-street facilities (Houston Planning & Development Department, 2022). The remaining 407 miles of high-comfort bikeways are largely off-street trails through natural areas. The transit system in Houston is well-used and provides access to much of the city (Metropolitan Transit Authority of Harris County, 2020) (Schmitt, 2016). However, almost all transit vehicles operate in mixed traffic which slows service (National Association of City Transportation Officials, 2016), thus giving little incentive for choice riders and degrading the service for captive riders. There is continued difficulty reallocating vehicle space to safely accommodate other modes of transportation.

Houston is considered the most diverse city in the nation (McCann, 2021). For example, in Harris County, where Houston is seated, 45% of households speak a language other than English at home (U.S. Census Bureau, 2020). Its eighty-eight neighborhoods require unique outreach and knowledge sharing due to varying language, culture, and experiences. Residents in socially vulnerable neighborhoods have memories and recent experiences of top-down implementation of projects instead of community-driven planning. Socially vulnerable neighborhoods are those defined by the Center for Disease Control's Social Vulnerability Index where residents have limited access to resources such as quality housing and transportation. There are a disproportionate number of severe crashes in these neighborhoods (City of Houston, 2020b). Historic underinvestment led to more dangerous streets as evidenced by socially vulnerable communities containing over 52% of the High Injury Network streets (Figure 1). Meeting the community where they are is integral to connecting their vision

1 High-comfort bikeways are those that meet the National Association of Transportation Official's (NACTO) 'All Ages and Abilities' criteria for in safety, comfort and equity.

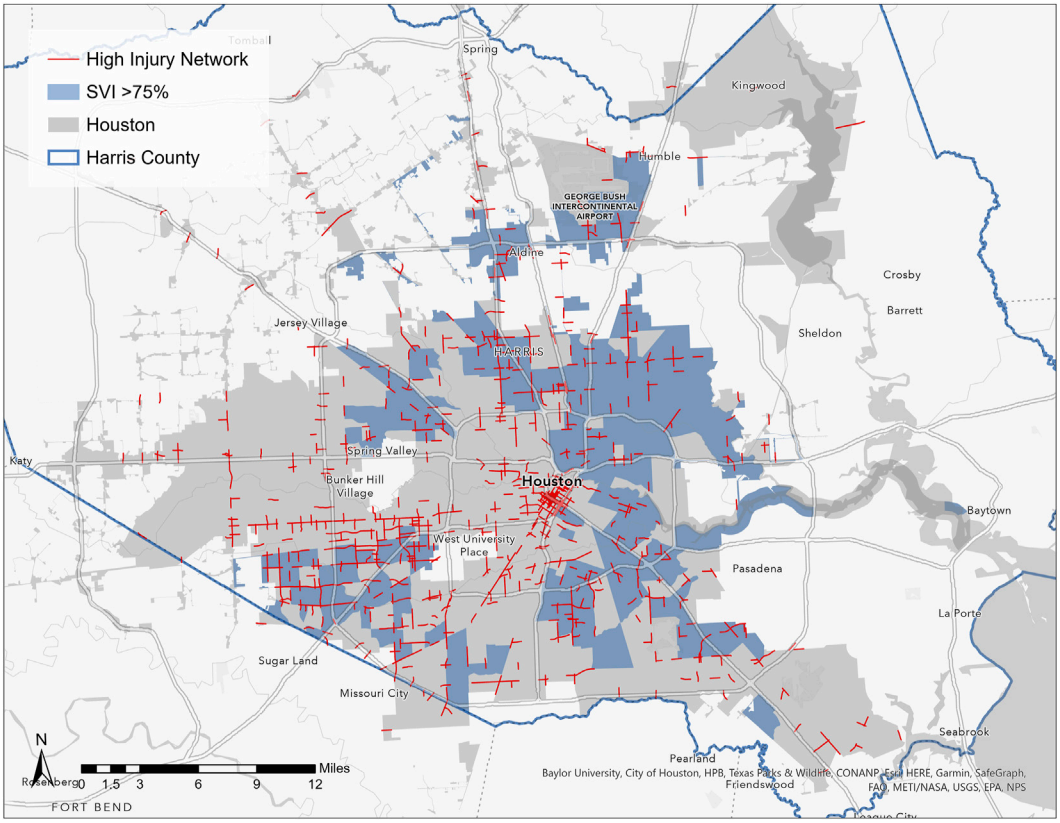


FIGURE 1
Houston High Injury Network, which is the 6% of streets that account for 60% of traffic deaths and serious injuries, 2014–2018 (City of Houston, 2020b).

for safe streets to proven safety countermeasures. During recent Vision Zero engagement, vehicular speeding was the number one traffic safety concern expressed by community members. At the same time, measures to slow speeds are judged by some residents based on the level of perceived inconvenience for drivers rather than the effect of slow speeds which save lives, prevent injuries, and increase accessibility (Jordan, 2022). Bridging the outreach and engagement gap between reported concerns and proven safety countermeasures remains a key challenge.

While the commitment to Vision Zero has been made, there is no direct funding stream to implement the Vision Zero Action Plan. After six major flooding events with federal disaster declarations in 5 years, funding in the Build Houston Forward program is geared toward paving and drainage. The focus is on standard repairs, like cleaning storm lines and patching potholes, and rehabilitation including repaving streets and regrading ditches. There are opportunities to include street safety improvements, but it is not the goal of the program. Other current mechanisms include Capital Improvement Program funding, which directed $5.5 million over 5 years to improve safety for people biking. Significant funding to improve street safety for all road users does not yet exist.

## The dangerous roadway design problem

Houston has a documented street safety problem. The overall number of traffic deaths across all road users in Houston continues to increase. Since 2012, traffic fatalities have risen by an average of 6% each year for the last 9 years (Figure 2). Vulnerable road users are disproportionately impacted by traffic crashes. Pedestrians represent 2% of commute-to-work patterns yet over 30% of traffic deaths (U.S. Census Bureau, 2020) (Texas Department of Transportation, 2021). City streets, where different modes of travel frequently mix, account for 53% of traffic deaths and serious injuries in Houston over the last decade, which suggests that these streets have not been designed to protect all road users (Texas Department of Transportation, 2021). Dangerous roadway design is leading to unsafe conditions for everyone.

Wide, multi-lane roadways are dangerous because they induce heavy, high-speed use of roadways and result in high

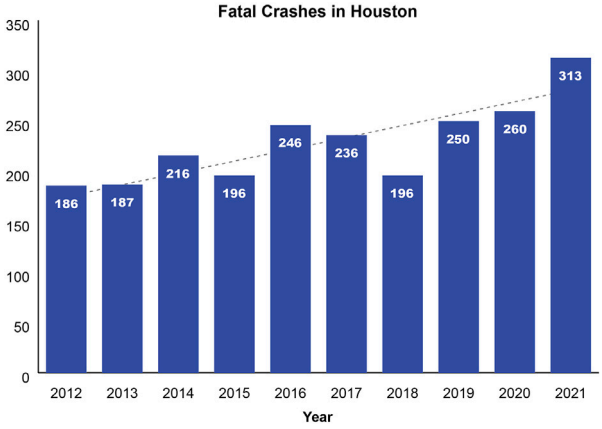


FIGURE 2
Fatal crashes in houston, demonstrating that traffic fatalities have increased an average 6% every year for the last 10 years (Texas Department of Transportation, 2021).

rates of traffic deaths and serious injuries (National Complete Streets Coalition and Smart Growth America, 2019). In Houston, these wide, multi-lane roadways seem to overtake the city. The pavement area of Houston roads could bury Paris and Barcelona combined[2]. Priority streets in the High Injury Network are an average 80 feet wide with six lanes from curb to curb[3]. Posted speed limits are 35 mph and average speeds traveled (85th percentile) are 43 mph. These wide, multi-lane major streets have been designed to move vehicles quickly. They have been built to accommodate assumed future car traffic without acknowledging induced demand, multimodal access, or transportation demand management, and have been sized for the few peak hours of the day when there are the most vehicles on the road (Sisson, 2019). While this traditional methodology is not unique to Houston, the outcomes are more widespread. Major streets, streets with many lanes and high traffic volumes, including all non-limited access highways (Houston-Galveston Area Council, 2021), make up only 16% of roadway miles in Houston yet 77% of the High Injury Network. Wide, multi-lane major streets account for an alarming number of traffic deaths and serious injuries and likely contribute to the car culture that Houston is attempting to shift[4]. Adding more vehicle lanes invites more drivers (Milam et al., 2017). Census data shows that 86% of employed Houstonians report using a car to travel and from work. In 2019, Harris County had a Daily Vehicle Miles Traveled ("DVMT") of 117 million, or 25 miles per capita (TxDOT Data Management, Transportation Planning & Programming, 2020). By comparison, Los Angeles County had a per capita DVMT of 21 miles (California Department of Transportation, 2020). Meanwhile, only 6% of people report walking, biking, or taking transit to work in Houston whereas the reported value doubles to 12% in Los Angeles. Houstonians drive more and use alternative modes of transportation less. The distribution of those using alternative modes of transportation varies. For example, in Houston census tracts, the percentage of people taking public transit to work ranges from 0% to as much as 28%. Anyone walking, biking or using a mobility aid in Houston knows they are in the minority through their experience with the infrastructure available and the roadway users they encounter.

Due to limited multimodal infrastructure and the significant number of vehicles on the road, people on the streets are emotionally and literally up against machines with drivers who speed, swerve, run red lights, and infamously "roll coal" (Begley, 2021). And while not specific to car culture, the saying that "everything is bigger in Texas" can explain some of the reason drivers in Houston feel emboldened to take to the streets in such dangerous fashion. This saying reflects the immeasurable confidence, pride, and ownership that many Texans share. It aligns with a belief that bigger is better – bigger trucks, bigger roads, bigger gas stations, and bigger convictions about transportation options (Republican Party of Texas, 2022, p. 10). There is a lot of space for cars and very little for the people outside of them. Only 56 miles of Houston roadways include safe, dedicated space for transit (Metropolitan Transit Authority of Harris County, 2022) or biking (Kinder Institute for Urban Research, 2021). Houston built out so wide and fast that it missed out on a key element of strong communities: Texas-sized commitment to streets for people.

People in Houston are suffering the deadly consequences of overbuilt roadways. In 2021, five people were seriously injured and someone lost their life nearly every day in vehicle crashes. Speeding is the main contributing factor in 27% of fatal crashes (City of Houston, 2020a). Drivers use roadways as designed and wide, multi-lane roadways enable higher speeds. High speeds result in more severe crashes. Reprioritizing streets for safety of all road users is the start to shifting the culture and creating safe, accessible ways for people to traverse the many miles and neighborhoods in Houston.

## Evidence of a changing paradigm

New leadership, implementation of plans and policies focused on street safety, and community engagement with the goal of sharing the stories of vulnerable road users are evidence that Houston is experiencing a paradigm shift.

2 Houston pavement area was calculated using street centerlines lengths and average road type widths.

3 Priority streets in the High Injury Network are defined as half-mile segments with two or more traffic deaths, five severe crashes (serious injury or fatality), and at least one severe crash involving a pedestrian.

4 The term "car culture" is in reference to the social acceptance of a car-only transportation system in Houston. It is not a reference to the vibrant Slab Culture that was created in Houston and continues to thrive.

Expectations are changing within the City of Houston because new leadership is prioritizing Vision Zero. Beyond those who developed the action plan, staff across City departments are incorporating Vision Zero policy into their work. The City's first Chief Resilience Officer was hired in February 2019. The Resilient Houston strategy was released a year later, establishing a goal to implement Vision Zero. In March 2020, the City hired its first Chief Transportation Planner, and the Vision Zero Action Plan was released in December 2020. Within the plan Mayor Turner states "in Houston, we can prioritize safety over convenience." This call from the top is how cultures can start to change in places like Houston with a strong mayor-council form of government. In February 2021, Houston Public Works appointed a new director of Transportation and Drainage Operations with previous experiencing leading Vision Zero Action Plans. Key roles are filled by Vision Zero champions who are providing critical support and commitment to shifting Houston's traffic safety culture.

The implementation of major multimodal plans and policy in the last 2 years is another piece of evidence that Houston's priorities are changing. Within the plans are new ways to approach street safety and equity. Houston's Vision Zero Action Plan steps away from the traditional "5 E's"[5] towards an equity-based Safe Systems approach to end traffic deaths. The Action Plan contains 50 total actions and progress has been made on many, including all 13 designated priority actions. The High Injury Network is now a standard part of the design concept review for right-of-way modifications, prompting further investigation of opportunities to improve street safety with every project, big or small. The High Injury Network is used and referenced across City departments, by interagency partners, and by the private sector as a key piece of evidence in justifying safety improvements. The City is also working to change the process for improving streets from request-based to data-based. Streets are prioritized for safety improvements based on crash patterns and demographic data. City staff push for that prioritization to dictate how the limited street safety funding is spent. The Resilient Houston strategy establishes a goal to increase transportation choice and make Houston's streets 100% safe for everyone so that "Families everywhere will be able to … easily access transportation choices that are affordable [and] safely walk to parks, trails, and bayous..." The Houston Climate Action Plan states "We, as a community, must ensure that mobility options are safe and accessible for all Houstonians regardless of age, ability, or ZIP code." City Council approved the Walkable Places and Transit Oriented Development ordinance in August of 2020. These ordinances are currently geographically limited, but the intent is to expand the regions in the future. In 2022, the City will update its Infrastructure Design Manual with standards and requirements that will improve the safety for those using City of Houston streets. These updates will codify the expectation of a paradigm shift for the development community by deprioritizing focus on vehicular throughput (otherwise known as Level of Service) and prioritizing enhanced safety treatments and higher standards for bicycle facilities, the pedestrian realm and transit.

In the Houston region, there are actions and policies that show a shift in mindset on safety. H-GAC, the regional Metropolitan Planning Organization (MPO), is the first Texas MPO to commit to Vision Zero. Harris County has included a Vision Zero commitment in its 2040 Harris County Transportation Plan. Additionally, Harris County elected officials are allocating significant funding to plans that are improving street safety. In November 2019, Houston METRO, the regional transit authority, succeeded in passing a referendum to fund a $3.4 billion program to improve and expand transit in the Houston region. Design and implementation is underway, which will improve the accessibility and safety of the pedestrian realm, the bike network and the transit network. The state Department of Transportation, TxDOT, adopted the goal to end traffic deaths by 2050.

In community engagement, the City reiterates its commitment to zero deaths on Houston streets and celebrates the reality that people use different modes of transportation to get where they need to go. When pushed for faster speeds or given concerns about vehicle congestion, City representatives lean heavily on the foundation of the goals of Vision Zero and communicate the necessity of trading speed for safety. On social media, the City is sharing stories about Houston residents who use all modes to travel or who have experienced traffic violence[6]. The message of the posts is clear—all people deserve travel that is free from serious injury and death. In community engagement, and all other aspects where measurable progress of a paradigm shift has been made, there is much more to be done.

## Discussion

For a safety culture change, where the shared values, actions, and behaviors demonstrate a commitment to safety over competing goals and demands, the City of Houston is beginning to shift to one that is less about cars and more about accommodating people of all ages and abilities who use many modes of transportation. This is evidenced through leadership who champion multimodal transportation, creation and implementation of the Vision Zero Action plan, and commitments from regional partners to end traffic deaths. However, a traffic safety culture shift cannot come from government offices alone. We need the public to:

- earnestly consider what the purpose of a street is. Streets have many uses. They are active and passive. They move and hold water. They accommodate a quick jog and a long conversation. They get you where you need to go and bring you deliveries. They allow you to rest and take you on new

5 Engineering, enforcement, education, engagement, and evaluation.

6 The term "traffic violence" is used to describe the epidemic of death and serious injuries on roadways caused by vehicle crashes.

adventures. The use of a street changes every moment and it must be safe for all its uses.
- shift its mindset. A safe, resilient Houston cannot be achieved by continuing to build for cars alone. Wide, multi-lane roads have not improved our safety and they do not reduce congestion long-term. Walking, biking, and taking transit are solutions to traffic violence and traffic congestion, and it is possible to design our streets for these solutions and accommodate driving.
- see Houston streets with new eyes. Wide, overbuilt roadways are an untapped asset. We need you to demand that excess street space be reimagined to allow for uses that are safe and enjoyable for everyone. We need community members who support safe streets for all road users to be just as outspoken as residents who fear changing priorities.

We believe streets are places for people of all ages and abilities to travel, play, shop, build community, and live. Loss of life due to traffic violence is unacceptable. Organizations like LINK Houston, Bike Houston, and Air Alliance Houston are pushing the City to end traffic deaths and improve street safety for everyone so that transportation contributes to a more healthy and resilient Houston. To achieve this, the City needs to be supported with appropriate funding and held accountable by the community. Community members deserve to see data-based evidence of improvements and experience safe streets through the Vision Zero strategy. The City will continue to change its traffic safety culture to achieve Vision Zero by designing streets for people, not just for cars. Now we just need the community to believe this is possible; this is how paradigms shift.

## Data availability statement

The original contributions presented in the study are included in the article/supplementary materials, further inquiries can be directed to the corresponding author.

## Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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