APPENDIX D: Health Impact Assessment

GUADALUPE CORRIDOR HEALTH IMPACT ASSESSMENT

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Introduction

What is a Health Impact Assessment?

A Health Impact Assessment (HIA) analyzes the effects on human health of a current condition or a proposed plan, policy or project. An HIA is intended to be part of other actions that increase a population's physical health and well-being through injury prevention, increased physical activity, and reduced risk of personal mental and physical health issues from the built environment. Said another way, an HIA is "a multidisciplinary process within which a range of evidence about the health effects of a proposal is considered in a structured framework."[1]

HIAs draw from a number of tools to determine health concerns including census data, community participation, observations, and data specific to the specific *sector of concern*, i.e., transportation, air quality, land-use planning, mining, etc., as well as the specific *pathway of concern*, i.e., common ways through which policies and projects may affect human health.

HIA recommendations aim at making the healthy choice the easy choice. For transportation, this means building a transportation system that includes active transportation infrastructure so people will choose to walk, bike or use public transit.

Health impact assessments are broadly applicable and can be tailored to fit the circumstances at hand. HIA assessment and planning tools are similar to those used by transportation planners and engineers, in that they identify existing conditions, highlight areas of concern, and recommend mitigations to result in better health outcomes based upon the past experience.

The five basic steps of a HIA are:

1. *Screening* to determine whether an HIA is warranted and feasible.

3. *Scoping* to identify key public health issues, population(s) affected, and methods that will be used for the assessment and recommendations.

3. *Assessment* of existing conditions related to key health issues/factors, estimates of potential health-related outcomes of proposed improvements, and strategies to evaluate outcomes.

4. *Recommendations* that provide practical, specific strategies and priorities to maximize positive health impacts.

5. *Reporting* of findings and recommendations to decision-makers, the public, and other stakeholders in a form that can be integrated with other decision-making factors.

Health impact assessments performed as part of a transportation planning process should provide information that is used to identify potential recommendations and evaluate options along with other analyses such as traffic level of service, economic impact, and transit propensity, and level of stress. As such, this report evaluates the proposed transportation scenarios for the Guadalupe Corridor Study.

[1] http://www.hiaguide.org/glossary#definition-health-impact-assessment

Screening: Is an HIA Warranted?

There is sufficient and ongoing research showing active lifestyles result in healthier people. The U.S. Surgeon General's Call to Action, Step It Up!, launched in 2015 and is predicated on the connection that transportation, land use, and community design have a significant impact on public health:

> Transportation, Land Use, and Community Design
> Decisions and plans made by the transportation, land use, and community design sector can affect whether communities and streets are designed to support walking. This sector can change the design of communities and streets through roadway design standards, zoning regulations, and building codes and improve the pedestrian experience through landscaping, street furniture, and building design. This sector is also integral in the planning and implementation of public transit systems.[2]

Research also shows that communities designed and built to support an active lifestyle benefit economically, as well.

The Austin Transportation Department initiated the Guadalupe Corridor Improvement Program in 2014 to identify and recommend short- to long-term transportation improvements to enhance mobility, safety, and quality of life along the Guadalupe Street Corridor. The program area is composed of Guadalupe Street near the UT Austin campus, with approximate boundaries of Martin Luther King Jr. Boulevard to the south, West 29th Street to the north, Rio Grande Street to the west, and a block into the UT Austin campus to the east.

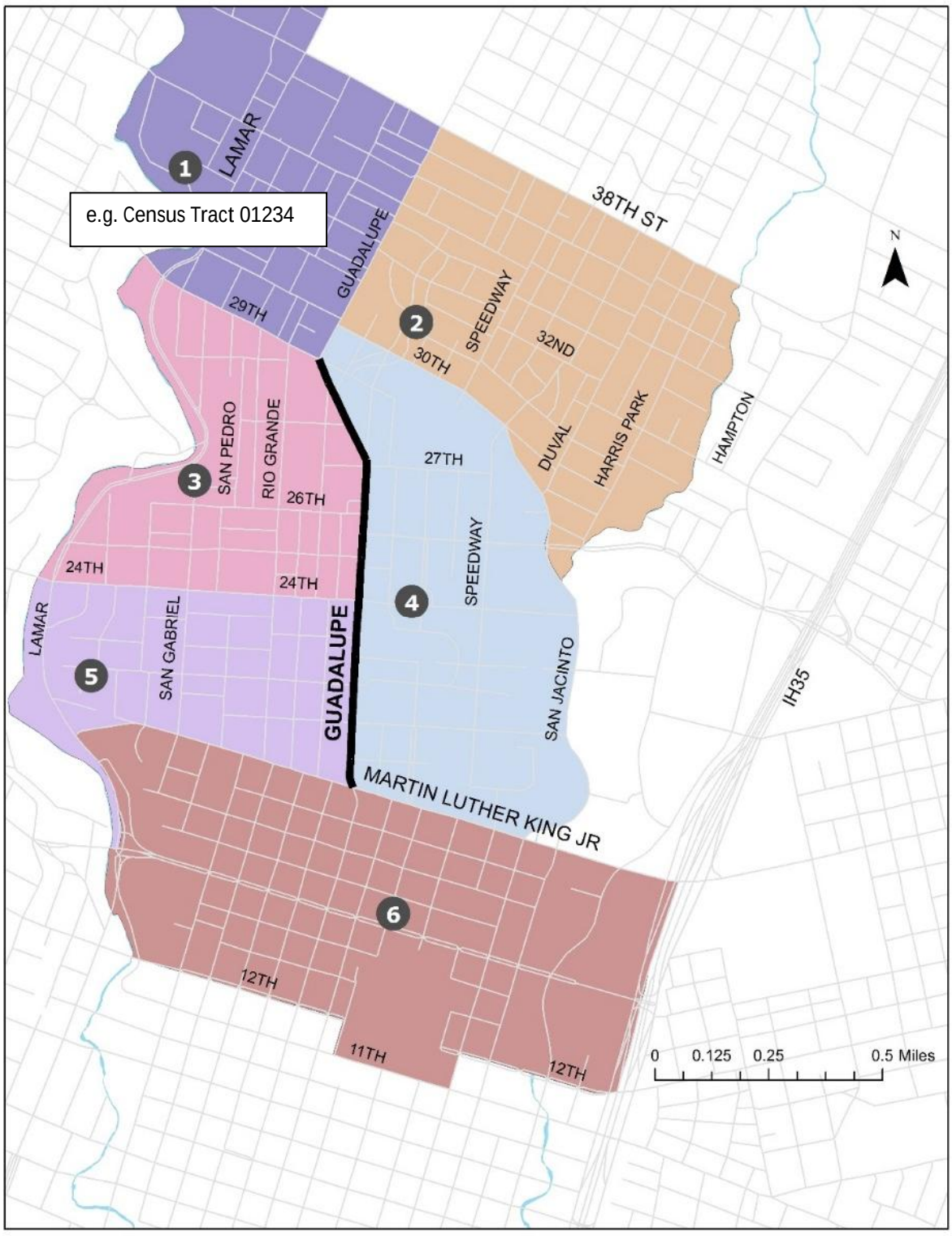
The potential for increasing walking, bicycling and transit ridership along Guadalupe Street requires a change in the priority for its use. The four travel lanes available for motor vehicle travel accommodates 24,000 daily trips, but the corridor does not function efficiently for through (or regional trips). The already high number of pedestrian, bicycle and transit trips suggest the corridor is more appropriately built for local trips, which offers three higher level health benefits:

- Increased level of physical activity
- Social cohesion
- Multi-modal traffic safety

Understanding the health concerns to be addressed so that these three high level health benefits can be realized is the first step. An essential task of the HIA process is to understand the identified pathways to health in the context of the populations who will be most affected by any changes. Those living in neighborhoods in the immediate vicinity of the corridor are most likely to be impacted by corridor improvements. Therefore, the study area designated for the HIA consists of the U.S. census tracts and block groups located within a one-half mile Euclidian (straight-line, or "as the crow flies") buffer of the corridor. The study area census tracts are shown in Figure 1.

[2] http://www.surgeongeneral.gov/library/calls/walking-and-walkable-communities/exec-summary.html

Figure 1. Guadalupe Street Corridor HIA study area



U.S. Census tracts within ½ mile Euclidian ("as the crow flies" buffer) of the Guadalupe Corridor Study Area

Scoping: Health Concerns

Typical health concerns examined as part of a Health Impact Assessment include risk of injury, chronic disease, lack of physical activity, and lack of social cohesion. Three primary methods were used to identify which of these health concerns were present for people present along the corridor: review of existing data, field assessment, and a public survey, which assessed active travel behaviors along the corridor and perceptions of the environment related to active travel.

Existing Data

Existing data included geospatial information, traffic collisions, public transit ridership, and commute mode splits. Sources are given in Table 1.

Table 1: Secondary (existing) data sources

Data	Source
Bicycle and pedestrian injury locations, 2009-2013	Texas Department of Transportation
Demographic information, commute distance, commute mode splits	U.S. Census, American Community Survey
Public transit ridership (2014)	Capital Metro
Physical condition of pedestrian, bicycle and transit stop facilities	Field Assessment
Community health priorities and concerns	Public community survey

Population demographics

According to the 2009-2013 U.S. Census American Community Survey, the census tracts of the study area (shown in Figure 1 and called 'areas') are home to nearly 32,000 people. Three out of four are between the ages of 18-24, compared to 14% in the City of Austin (Table 2). The proportion aged 18-24 varies greatly by census tract. Those tracts flanking the corridor (Areas 3-5 in Figure 1) range from 89-94%, compared to 25-39% for those to the north and south (Table 3). Detailed demographic characteristics of the study area are provided in Tables 2 and 3.

Table 2. Population Demographics: Guadalupe HIA Study Area and City of Austin

Variables	Study area		Austin, Texas	
	n	%	n	%
Total population	31,884		836,800	
Total households	9,383		337,791	
White (non-Hispanic)	20,288	63.6%	410,982	49.1%
Black/African American	1,295	4.1%	64,544	7.7%
Hispanic/Latino	5,113	16.0%	289,449	34.6%
Asian	4,328	13.6%	51,766	6.2%
Other race/ethnicity	860	2.7%	20,059	2.4%
Ages in groups				
Under 5	298	0.9%	58,623	7.0%
5-17	658	2.1%	182,841	21.9%
18-24	24,061	75.5%	112,722	13.5%
25-44	4,837	15.2%	303,794	36.3%
45-64	1,581	5.0%	177,460	21.2%
65 and older	449	1.4%	59,983	7.2%
% Households below federal poverty level	5,104	54.4%	53,630	15.9%
% Population with disabilities[a]	1,450	4.6%	73,130	8.8%

Source: U.S. Census American Community Survey 5-year estimates (2009-2013)
[a]At least one household member with hearing, vision, cognitive, mobility, self-care or independent living disability.

Table 3: Age of study area residents, by census area (see Figure 1)

Census area	Total population	Under 5 years		5-17		18-24		25-44		45-64		65+	
		n	%	n	%	n	%	n	%	n	%	n	%
1	2,955	126	4.3%	228	7.7%	733	24.8%	1135	38.4%	558	18.9%	175	5.9%
2	4,606	160	3.5%	148	3.2%	1798	39.0%	1896	41.2%	490	10.6%	114	2.5%
3	7,957	0	0.0%	66	0.8%	7178	90.2%	608	7.6%	105	1.3%	0	0.0%
4	9,342	0	0.0%	145	1.6%	8798	94.2%	295	3.2%	94	1.0%	10	0.1%
5	5,888	0	0.0%	18	0.3%	5222	88.7%	490	8.3%	133	2.3%	25	0.4%
6	1,136	12	1.1%	53	4.7%	332	29.2%	413	36.4%	201	17.7%	125	11.0%
sum	31,884	298	0.9%	658	2.1%	24,061	75.5%	4,837	15.2%	1,581	5.0%	449	1.4%

Commute distances and modes

According to the U.S. Census American Community Survey, 24% of commuters in the study population census blocks commute less than 10 minutes, and another 50% commute less than 20 minutes. Over one-quarter (27%) of study area commuters regularly commute by walking, and an additional 8% bicycle, and 5% use transit (Figure 3). These figures differ substantially by census tract (Table 4). The highest levels of walking in Areas 4 and 5 (43% and 47%, respectively), and highest levels of bicycling are seen in Areas 2 (17%) and 6 (14%), located to the northeast and south of the corridor, respectively. Area 1 (illustrated in Figure 1), northwest of the corridor, has the lowest proportion of pedestrian commuters and the highest proportion of commuters who drive alone (72%).

Figure 2: Commute times: study area residents

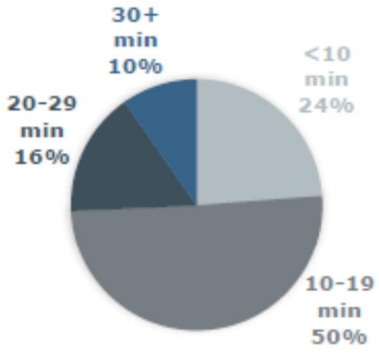
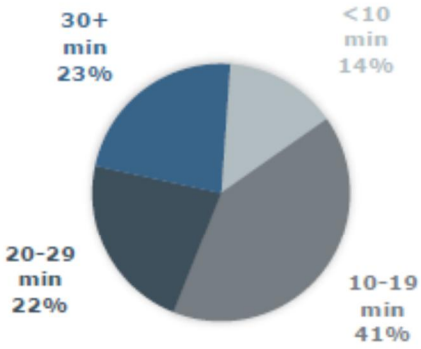
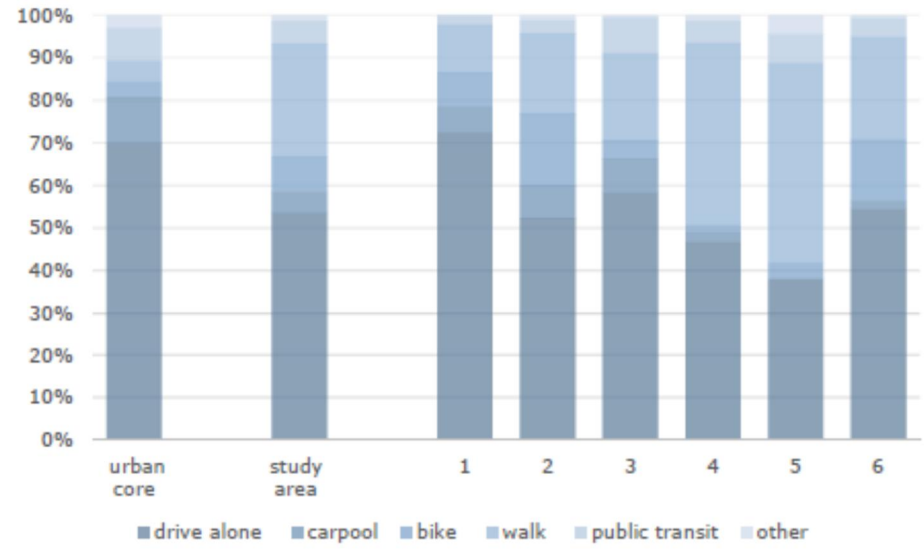


Figure 3: Commute times: Austin urban core[a]



Data source (Figures 2 & 3): U.S. Census American Community Survey, 2009-2013
[a]For map of Austin urban core, see Appendix

Figure 4: Commute modes: study area and Austin urban core

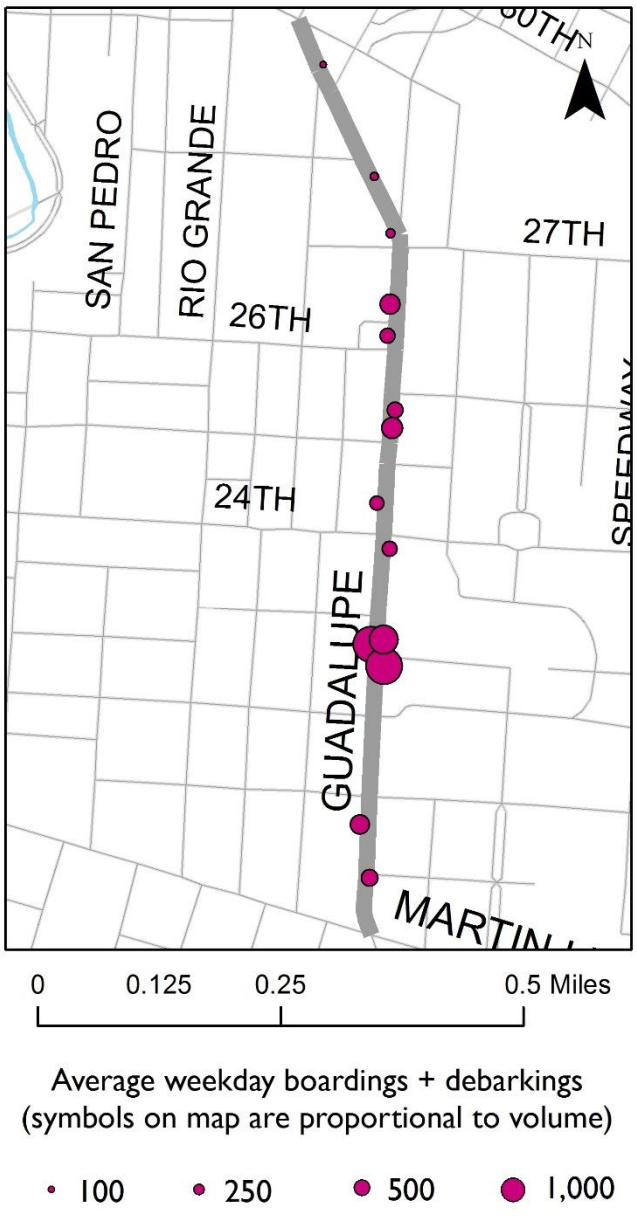


Numbers 1-6 on x-axis refer to census tracts in study area; see fig. 1. See appendix for data in tabular form.

Transit stops and usage

High-usage transit stops are areas of high pedestrian activity. On a typical day, over 10,000 boardings and alightings occur along the ten block stretch of the Guadalupe study corridor. The locations and relative usage of transit stops on Guadalupe Street between 29th and MLK Jr Blvd. are shown in Figure 5. The stops at the West Mall area, between 23rd and 22nd Street, experience the greatest usage.

Figure 5. Locations and relative usage of transit stops on the Guadalupe Street corridor



Pedestrian and bicyclist injury

Locations of pedestrian/vehicle and bicyclist/vehicle injury are important to consider not only because the crash locations may indicate a need for safety improvements, but also because they likely reflect locations with the highest volume of walking and bicyclist activity in an area. Counts and locations of bicyclist and pedestrian injury events that occurred in the study area from 2009 to August 2015 are shown in Figure 2and Figure 1 below.

The map of bicycle crashes shows a concentration of events along 24th street and at the intersection of Guadalupe and MLK. The number of bicycle crashes along length of Guadalupe Street north and south of the study area suggests that this an important corridor for north-south bicycle travel. Pedestrian crash events are scattered along the corridor and neighborhood, and do not suggest any specific locations of highest injury risk for pedestrians.

Figure 2. Pedestrian-Motor Vehicle Crash Locations, 2009-August 2015

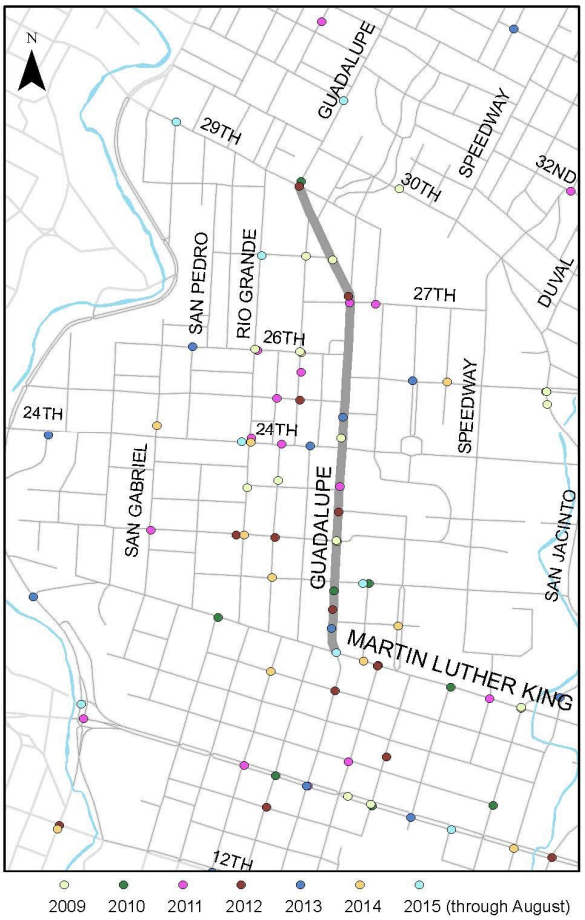
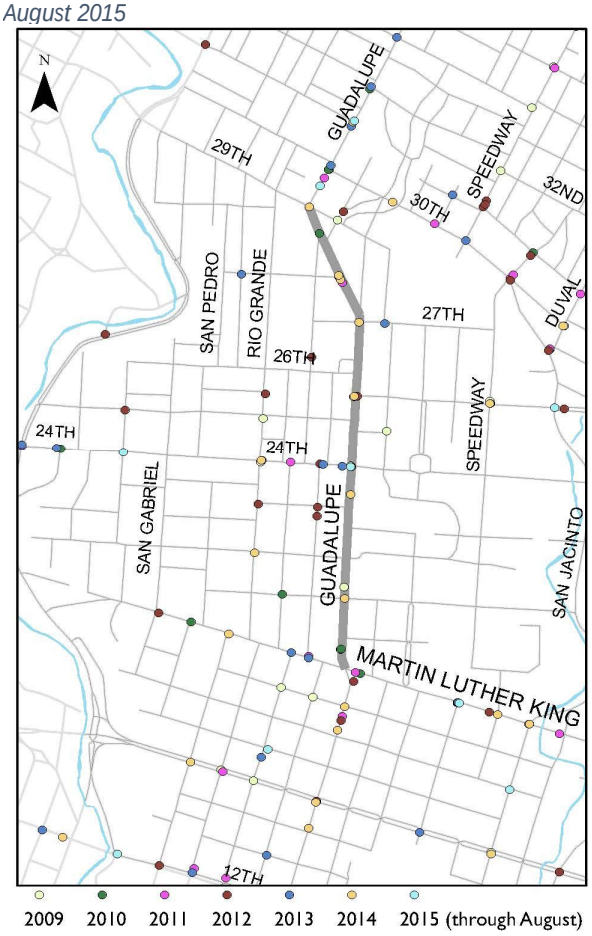


Figure 1. Bicyclist-Motor Vehicle Crash Locations, 2009-August 2015



Data source: Texas Department of Transportation (TXDOT)
Notes: Crashes that do not result in a police report or do not involve a motor vehicle are not collected by TXDOT

Field Assessment

An evaluation of the physical environment was conducted during a walk audit of the corridor and subsequent site visits. Project team members walked the length of the corridor to observe walking and bicycling conditions; transit stop placement, conditions, and usage; and to observe movements at intersections for all modes. One team member pushed an umbrella stroller a proxy for the experience of a person with a mobility impairment.

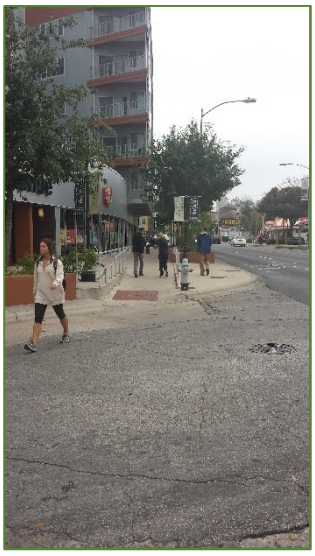
The chart below summarizes conditions that may have a health impact identified in the field assessment. An explanation of each condition follows.

Type of traveler	Condition	Potential health impact
Pedestrians and transit riders	• Poor pedestrian network along the roadway, including poor ADA compliance for curb ramps and sidewalk conditions • Not enough places to cross the street	• Disincentive for walking (reduced physical activity) • Lack of social cohesion (low levels of social interaction, social support, collective monitoring, social trust, sense of community, shared cultural identity)[3] • Risk of injury
Bicyclists	Mix of high and low stress facilities	Risk of injury, especially when transitioning between the two
Pedestrians and bicyclists	Debris at base of some curb ramps; debris in bicycle lanes	Fall risk and reduced mobility for pedestrians; crash risk for bicyclists

[3] Transit riders (and especially bus riders) often gain a sense of community, especially for regular riders who regularly see and talk to the same people, including the bus operator. The bus offers a kid of 'front porch' for riders.

Pedestrians and Transit Riders

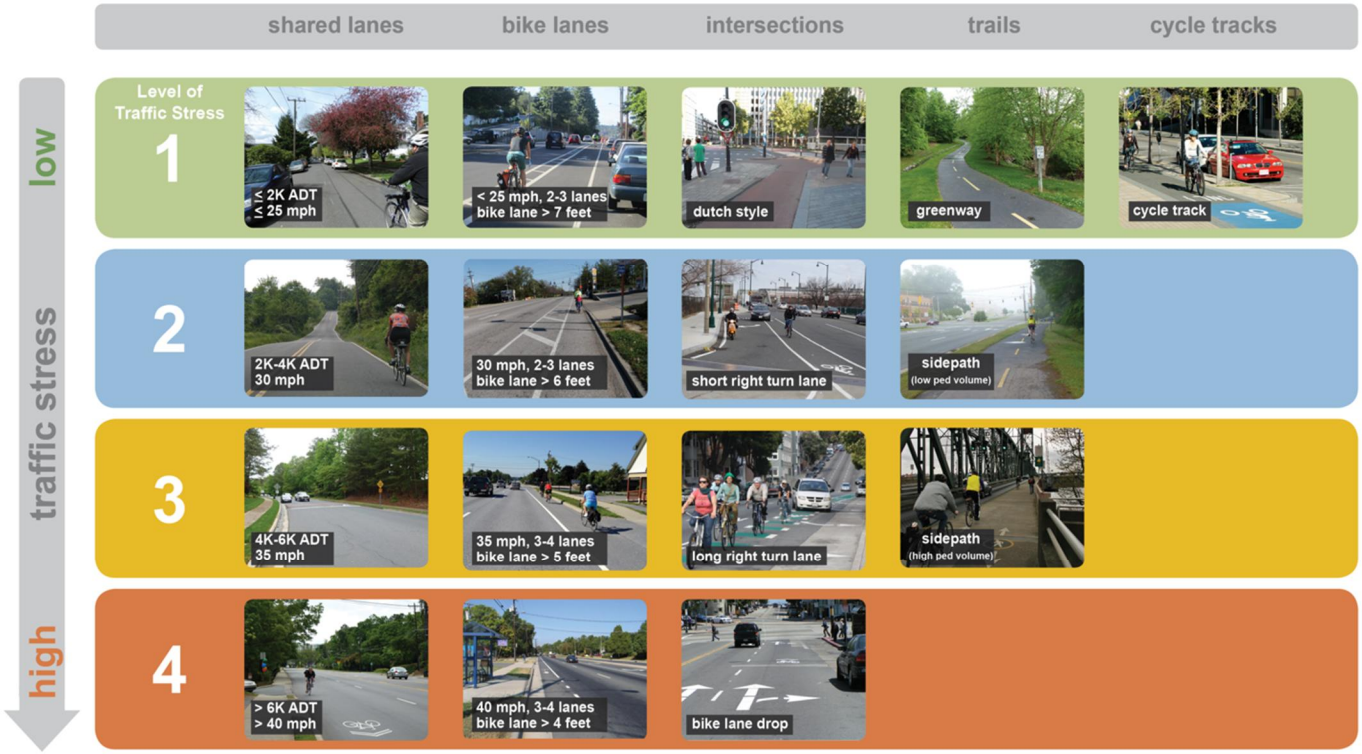
While much of the sidewalk along Guadalupe meets or exceeds ADA minimums, sidewalk conditions are poor, with cracks or crumbling surfaces, and there are some portions with pinch points from utility poles and limited right-of-way. Some curb ramps include detectable warning strips while others do not. Crossing distances at intersections such as Guadalupe and Nueces Street are long due to the angle at which the streets meet. One section of the pedestrian pathway on the east side of Guadalupe in the 2800 block parking in front of small retail shops blocks the pathway and creates conflicts for pedestrians with motorists pulling in and backing out of parking spaces. Some trees along the corridor, especially where the UT campus is adjacent, provide shade and a more attractive streetscape. However, people walking along much of the sidewalks are subject to full effects of the sun's heat.



Bicyclists

Due to the proximity of the UT Austin campus and off-campus student housing, bicycling is very popular throughout the Guadalupe corridor and surrounding area. In response, the City has installed a combination of bicycle facilities ranging from separated bike lanes (including green lanes), striped bike lanes, and shared lane markings.

Depending on the degree to which these facilities are separated from moving vehicle traffic, the result is a mix of comfortable and less comfortable conditions for bicyclists. Referred to as the level of stress (or traffic stress), high stress bicycle facilities are those where bicyclists are riding immediately adjacent to or with volumes of motor vehicle traffic traveling at speeds greater than 35 MPH. The graphic matrix below illustrates how bicycle level of traffic stress changes depending on the type of facility and characteristics of adjacent or nearby motor vehicle traffic.



The Austin Bike Map color codes bicycle facilities with their level of comfort. These conditions along Guadalupe Street range in comfort, as shown by photos.


Legend
Riding Conditions
see descriptions below, under "Using the Map"
Paved Trails
Unpaved Trails
High-Comfort Roads
Medium-Comfort Roads
Low-Comfort Roads
Extremely Low Comfort
Restricted Sidewalks
Helpful Sidewalks
Minor Trails (may require walking)
Major Streets
Points of Interest
to add a missing bike shop, email bicycleprogram@austintexas.gov
Elementary Schools
Middle Schools
High Schools
Libraries
Metrorail Stops
Metrobike Shelters
Bike Shops
Swimming Pools
Bike Share Stations (as of 06/04/14)
Street Grade
(arrows point up)
Steep
Medium
Mild
Bike Share is here! For more info, visit austin.bcycle.com.
0 1/8 1/4 1/2 mi
10-20 min
5-10 min
University of Texas at Austin (sidewalk riding prohibited)
Bull Creek
Shoal Creek
Lamar
Medical
Jefferson
West
Speedway
East
Guadalupe
Grande
Nueces
Windsor
Griswold
Bridle
Enfield
Hartford
Indian
Miles
Plaza
Shoal Creek Trail
Peace Park
Central Park
Baley Park
Adams Park
Lions Municipal Golf Course
49th
38th
34th
31st
29th
24th
21st
18th
14th
35th
39th

Community Survey

An online community survey was open to the public from December 2014 through January 2015. Nearly 800 people partially or fully completed the survey. Descriptive characteristics of respondents are given in Table 4. Nearly three out of four respondents either lived, worked, or attended school in the study area. Over half (54%) reported using the corridor at least five times a week, and another 39% used the corridor 1-4 times per week.

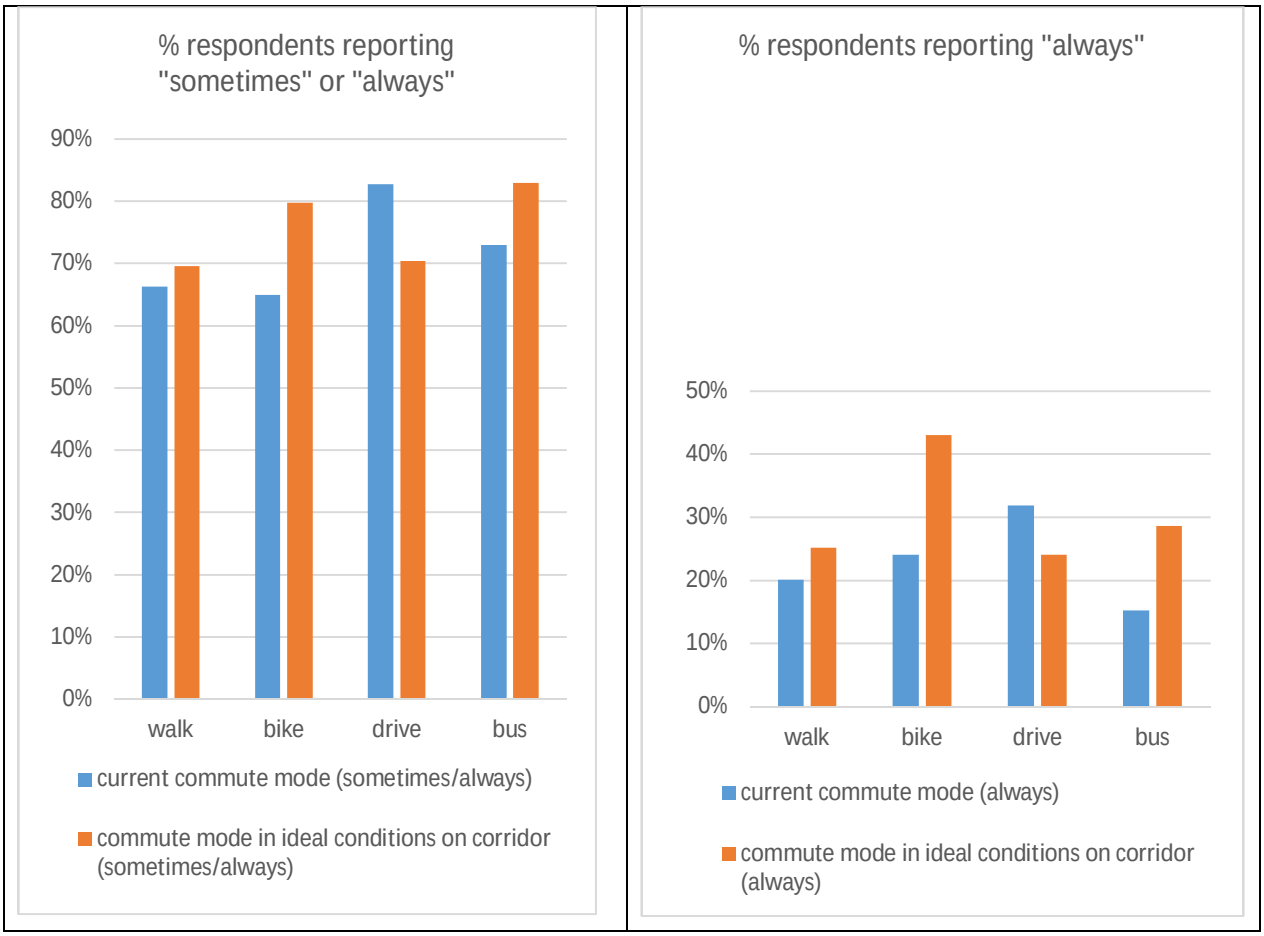
Table 4: Corridor uses and travel modes of survey respondents

	n	%
Use of corridor		
Work/live/attend school in corridor area	574	73.3%
Visit corridor area (retail, dining, etc)	115	14.7%
Travel through corridor	94	12.0%
Travel modes used on corridor		
Car	76.1%	593
Motorcycle	3.5%	27
Bus	51.1%	398
Bike	43.1%	336
Walking	65.6%	511

Nearly 80% reported using more than one travel mode in the corridor area. About half reported using transit in the corridor, (capital metro or UT shuttle), 43% reported biking, and 66% reported walking in the corridor. Over three-quarters reported driving.

Survey participants were asked about their commuting practices. The respondents were multimodal, with over 60% reporting that they at least sometimes walk, bike drive, or take the bus to work. Participants were asked what mode they would use under ideal conditions for all travel modes. The difference between reported current and ideal conditions commute behaviors suggests that corridor improvements have the potential to not only decrease injury risk, but also increase physical activity through active transportation, despite current high levels of active commuting. See Figure 6.

Figure 6: Commute modes – current and ideal conditions



Questions:

1. How often do you get to your regular commute destination (work or school) by: walk, bike, drive, bus
2. How often would you get to your regular commute destination (work or school) under ideal travel conditions for all modes by: walk, bike, drive, bus

Response options: never, sometimes, always

Identified health concerns

The survey included questions and opportunities for comments that provide a picture of health concerns for respondents. Survey respondents noted health concerns such as crash risk for bicyclists (due to the lack of separated bicycle lanes and clear pathways at some intersections), a crash risk for pedestrians (due to insufficient pedestrian crossing locations and time to cross the street), along with other health concerns:

- lack of shade from the heat, especially for waiting transit passengers
- insufficient lighting (personal security) and benches at transit stops
- the presence of trash on sidewalks and overflowing bins
- confusion for travelers regarding shared travel lanes (bicyclists and vehicles), prohibited and permitted left turns, way-finding to on-campus destinations

Assessment and Recommendations

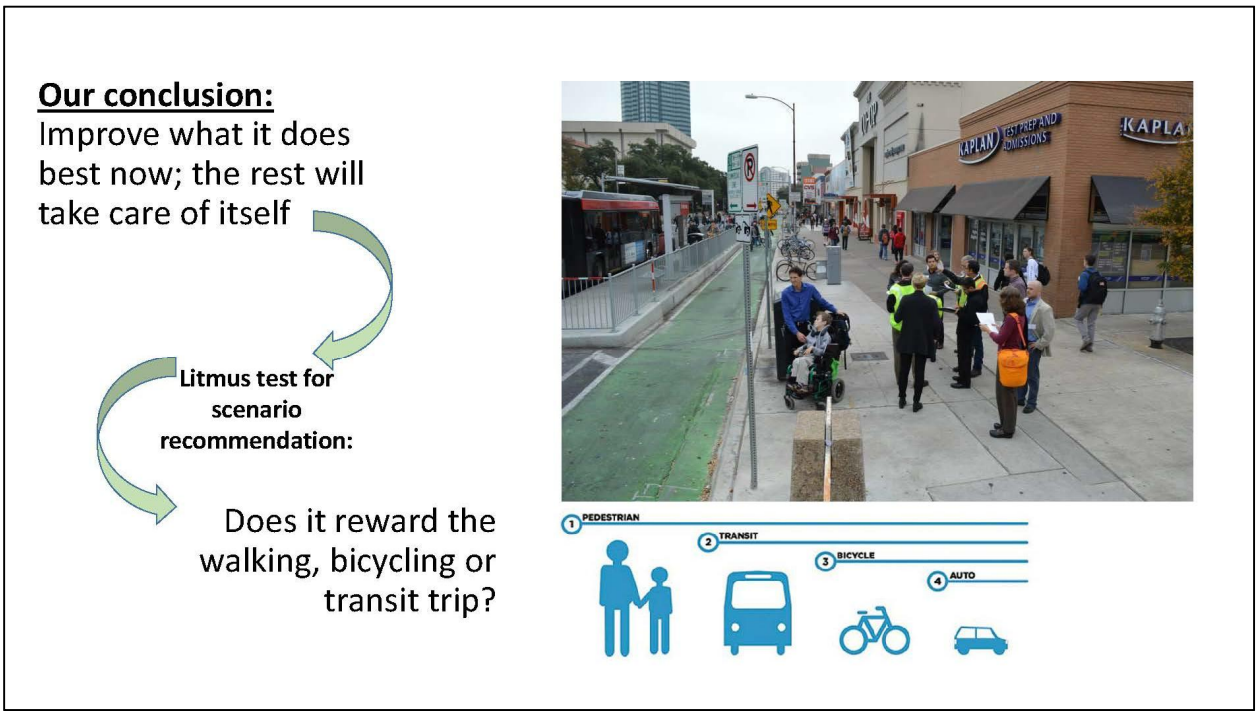
How can the HIA affect transportation decisions along the Guadalupe corridor?

Today, there is an overall high level of physical activity via walking and bicycling in the study area, especially when compared to motor vehicle volumes.

- Each day, about 3 times more people walk across the street than drive along it
- It is one of the highest bicycle traffic corridors in the city
- It has the highest number of buses each day in the city, with 20 routes serving 14,000 riders on 1,000 bus trips

There is also potential to further increase active transportation along Guadalupe Street with appropriate improvements. The corridor study estimates the potential to double the number of transit users and bicyclists traveling within the corridor and increase the number of walking trips by 50%. The primary health concern is risk of injury for pedestrians crossing Guadalupe and bicyclists traveling along and across the street.

The easiest test of whether transportation planning decisions contribute to or detract from health benefits is: does it reward the walking, bicycling or transit trip?



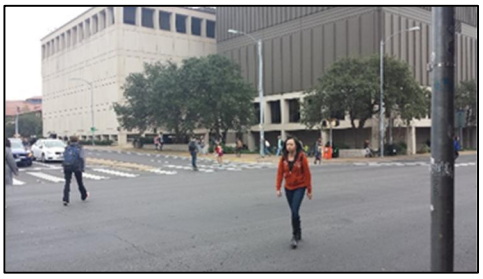
Using the health impacts determined during the scoping task, the project team identified desired outcomes and infrastructure recommendations to factor into the scenarios developed for the corridor are provided in Table 5.

Table 5: Recommended Infrastructure Improvements

Desired outcomes	Infrastructure recommendations
Maintain and increase active transportation and lifestyle	• Extend the length of physically separated bike lanes or establish lower stress alternative • Dedicated bus lane to improve transit travel times • ADA-compliant sidewalks, curb ramps and crosswalks • Improve east-west travel options with longer crossing times for pedestrians, bicycle signals for key intersections (such as Guadalupe and 24th), and additional crossing locations to serve transit riders and other locations (such as marked mid-block crossings) • More attractive streetscape, including shade and better trash management
Reduce risk of injury	• Separated bike lanes or lower stress alternative such as along Nueces Street and Hemphill Park • ADA-compliant sidewalks, curb ramps and crosswalks • Regular maintenance to keep curb ramps and bikeways clear of debris
Increase pedestrian safety and ease of travel	• Reduce conflict points with right- and left- turning vehicles • Improve east-west travel with longer pedestrian crossing times and improved crossings at unsignalized locations • Install more pedestrian scale lighting to increase personal security • Reduce motor vehicle travel speeds
Improve comfort along the corridor	• Provide more locations with shade for both transit riders and others with a streetscape plan and more bus shelters • Reduce the amount of trash at certain locations by working with adjacent property owners to establish a program to keep the sidewalks clean
Ensure coherence for all travelers	• Install operational and way-finding signage • Install bicycle signals • Clear paths of travel

General Recommendations

The project team quickly understood that a series of general infrastructure improvements were needed. With one exception as noted below, each of these general recommendations would address health concerns, especially related to safety.

General recommendation	Impact on health concerns and health benefits
Pedestrian Scramble Phases	General benefit: Reduces potential conflicts between pedestrians and turning vehicles Health benefit: Reduces risk of injury; increases comfort  Pedestrian scramble at Guadalupe and Dean Keaton
Crosswalk, ADA and Pedestrian Curb Ramp Improvements	General benefit: Provides accessible street crossings for people with disabilities; increases the capacity of crossings for all users Health benefit: Maintain and increase active transportation and lifestyle  Example of a non ADA-compliant curb ramp (curb ramp does not align with crossing)
Corridor Aesthetics/Streetscape Improvements	General benefit: Creates a more attractive, welcoming corridor, which can support economic vitality Health benefit: Maintain and increase active transportation and lifestyle; Establish comfort along the corridor  East side (UT) currently with an upgraded street scape.

General recommendation	Impact on health concerns and health benefits
Restripe Crosswalks with High Visibility Markings	General benefit: Clearly establishes pedestrian network facility Health benefit: Increase pedestrian safety and ease of travel; Ensure coherence for all travelers[4]  Example of existing faded parallel (transverse) bar marking
Curb extensions to shorten crosswalks	General benefit: Shortened crossing distance reduces pedestrian and bicyclist exposure; makes both more visible to drivers Health benefit: Reduce risk of injury; increase pedestrian safety and ease of travel  Example of a curb extension in Tacoma, WA
Bike Boxes	General benefit: Provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase; increases predictable behavior for bicyclists[5] Health benefit: Reduce risk of injury; increase ease of travel; maintain and increase active transportation and lifestyle  Bike Box at Speedway and 38th Street[6]
Enhanced bus stops	General benefit: Increases on-time performance; supports ridership growth Health benefit: Maintain and increase active transportation and lifestyle

[4] http://www.fhwa.dot.gov/publications/research/safety/pedbike/10067/
[5] http://nacto.org/publication/urban-bikeway-design-guide/intersection-treatments/bike-boxes/
[6] http://nacto.org/case-study/bike-box-at-speedway-and-38th-st-austin-tx/

General recommendation	Impact on health concerns and health benefits
	 Enhanced stop serving MetroRapid bus passengers includes shelters, benches, and real-time arrival information
Install permissive/protected left turns with a green or yellow flashing turn arrow Recommend signage alerting motorists to yield to pedestrians and bicyclists when turning left on a green or yellow flashing arrow	General benefit: Reduced vehicular crashes[7] Health concern: Increased risk of injury for pedestrians and bicyclists[8]  Example of left turn flashing yellow arrow

[7] https://edocs.publicworks.houstontx.gov/documents/divisions/traffic/info_guide_flashing_yellow_left_turn.pdf
[8] http://www.citylab.com/commute/2013/05/flashing-yellow-turn-signal-good-drivers-bad-fo-pedestrians/5450/

Tested Scenario

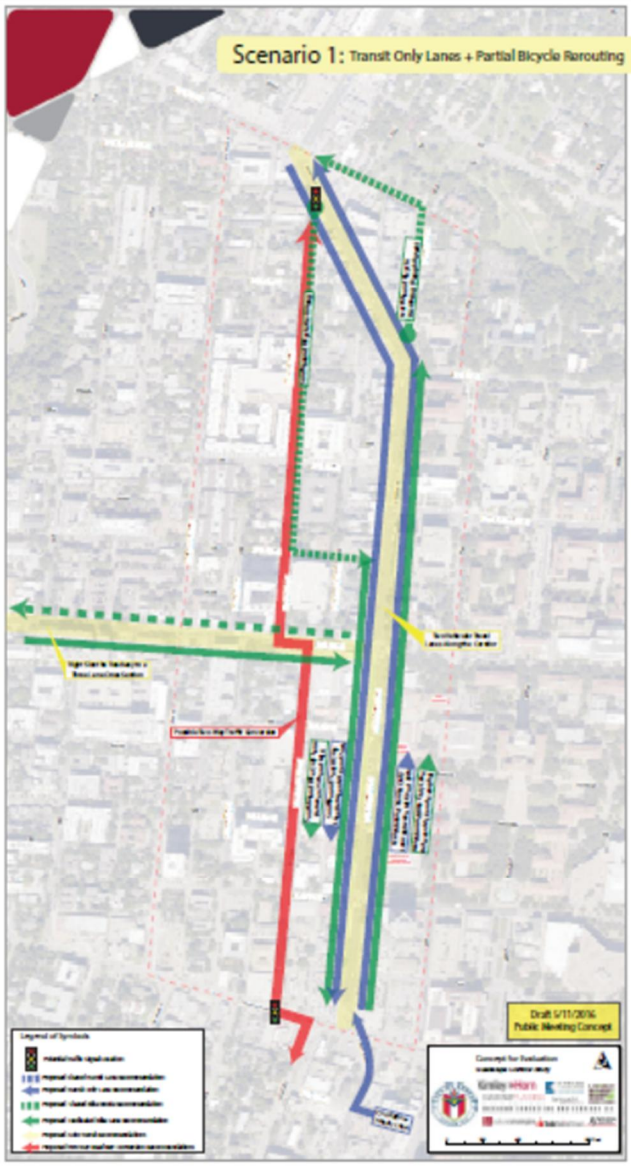
The project team developed a series of corridor-wide scenarios based on multimodal transportation analysis, a review of related development plans, and transit use.[9] These scenarios used either active transportation or motor vehicle travel as the primary guide for the scenarios and focused how to provide for three primary paths of travel:

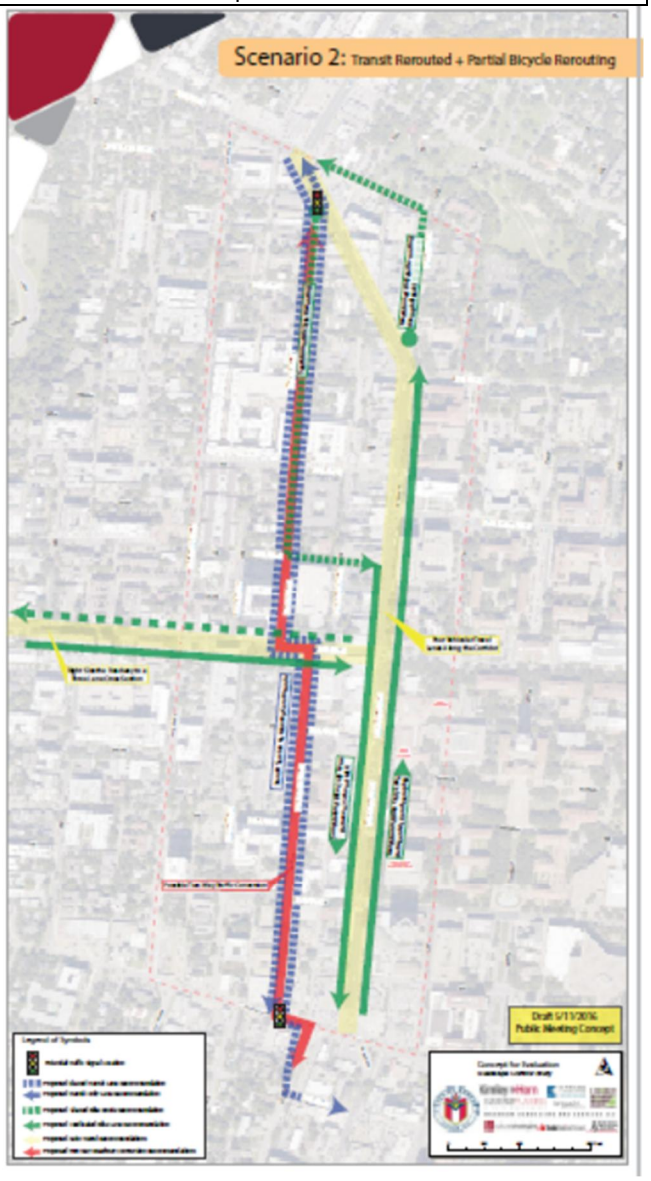
- A relatively stable level of through motor vehicle travel
- Growing local and regional bicycle travel
- Existing and increasing transit use

Pedestrian network improvements described above under General Recommendations are assumed for all scenarios. Details of these scenarios are included in the full report. Concept plans for the scenarios are below.

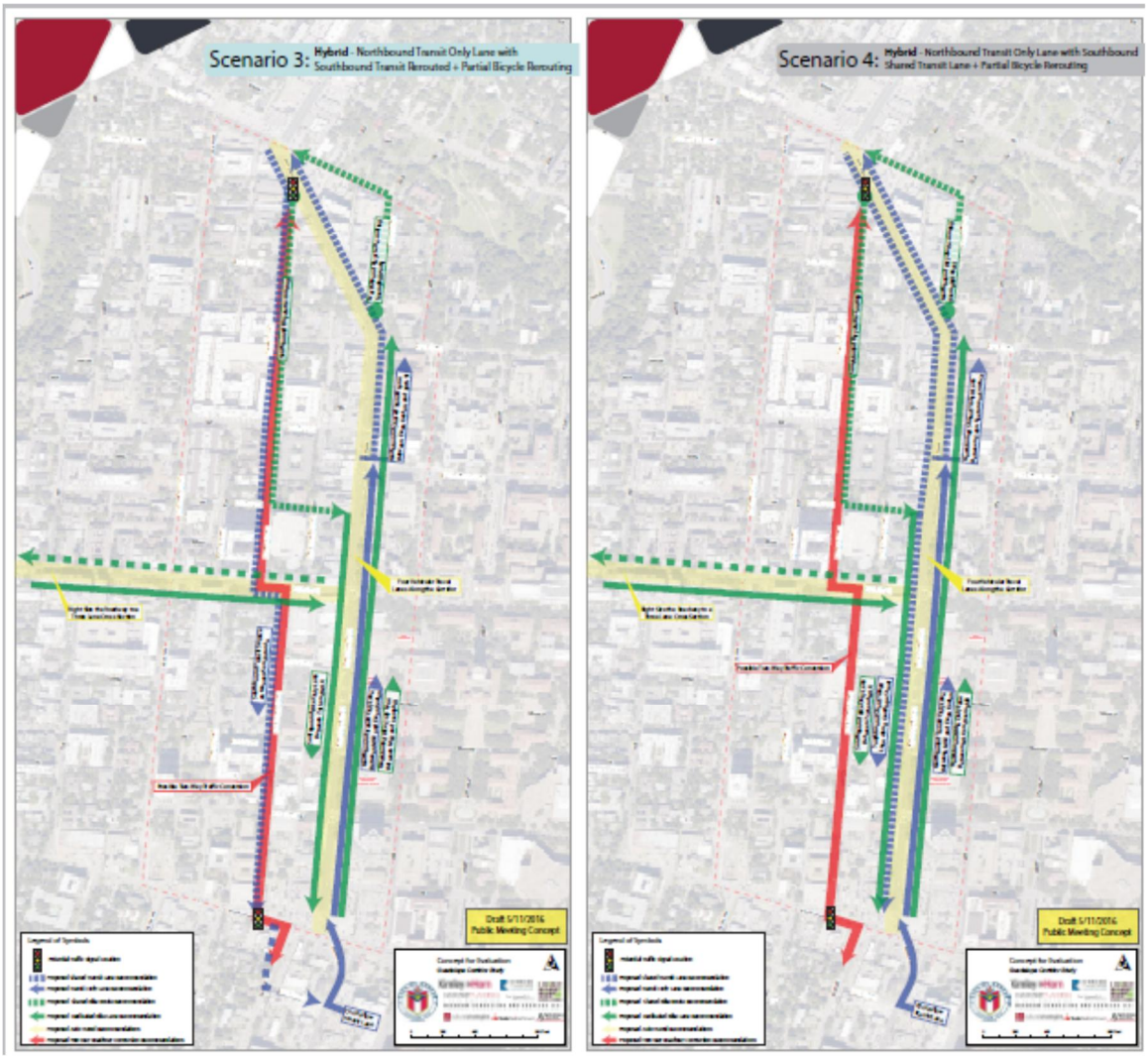
[9] See main report sections, *Purpose* and *Existing Conditions*

Scenario 1:	Scenario 2:
Transit only lanes along Guadalupe Street Partial re-routing of bicycle facilities Pedestrian network improvements	Transit routes to West Campus Partial re-routing of bicycle facilities Pedestrian network improvements





Scenario 3:	Scenario 4:
Hybrid -- NB Transit on Guadalupe; SB transit on Nueces/San Antoni Partial re-routing of bicycle facilities Pedestrian network improvements	Hybrid – NB transit only lane on Guadalupe; SB shared transit lane Partial re-routing of bicycle facilities Pedestrian network improvements



The impact of these scenarios on identified health concerns was evaluated along with other factors such as multi-modal level of service, synchro intersection analysis, complete streets policy goals, and other benefits and opportunities for West Campus. Key questions addressed for determining the impact of each scenario were:

- Does the scenario increase the likelihood that people will continue to be physically active or increase opportunities for physical activities?
- Does the scenario reduce the injury risk, especially for pedestrians and bicyclists?
- Does the scenario increase ADA compliance?
- Does the scenario increase opportunities for shade for pedestrians walking along the corridor?
- Does the scenario reduce congestion, especially near campus?
- Does the scenario reduce confusion among travelers?

A summary of the impact on identified heaths concerns is provided below, with more details and photo examples following.

	Scenario 1:	Scenario 2:	Scenario 3:	Scenario 4:
	Transit only lanes on Guadalupe; partial bicycle re-routing; pedestrian network improvements	Transit routes to West Campus; partial bicycle re-routing; pedestrian network improvements	Hybrid -- NB Transit on Guadalupe; SB transit on Nueces/San Antonio; partial bicycle re-routing; pedestrian network improvements	Hybrid – NB transit only lane on Guadalupe; SB shared transit lane; partial bicycle re-routing; pedestrian network improvements
	Impact on identified health concerns			
	High benefit (better than existing)	Degrades current conditions (worse than existing)	Neutral benefit (approximately equal to existing)	Modest benefit (slightly better than existing)
Does the scenario increase the likelihood that people will continue to be physically active or increase opportunities for physical activities?	Priority on transit supports transit use by UT Austin community and surrounding neighborhoods.	Shifiting transit west to Nueces and San Antonio requires all transit riders to cross Guadalupe Street to get to bus stops which are two or three blocks further. This additional distance may disincentivize people from taking transit.	Splitting transit between Guadlupe and Nueces/San Antonio may be a disincentive for some passengers. Shared transit lanes may limit reliablity of transit travel time.	Shared transit lanes may limit reliablity of transit vehile travel time.
Does the scenario reduce the injury risk, especially for pedestrians and bicyclists?	Shifting motor vehicle through –trips to Nueces and San Antonio (and dispursed to other north-south streets such as LaMar) opens up roadway space to extend separated bike lanes along Guadalupe Street. Re-routing designated bike facility to neighborhood streets (Nueces and Hempbill)allows for higher quality facility. Overall pedestrian improvememts increase safety and comfort for pedestrians.		Shifting motor vehicle through –trips to Nueces and San Antonio (and dispursed to other north-south streets such as LaMar) opens up roadway space to extend separated bike lanes along Guadalupe Street. Re-routing designated bike facility to neighborhood streets allows for higher quality facility. Overall pedestrian improvememts increase safety and comfort for pedestrians.	Shifting motor vehicle through –trips to Nueces and San Antonio (and dispursed to other north-south streets such as LaMar) opens up roadway space to extend separated bike lanes along Guadalupe Street. Re-routing designated bike facility to neighborhood streets allows for higher quality facility. Overall pedestrian improvememts increase safety and comfort for pedestrians.
Does the scenario increase ADA compliance?	Yes, included in general recommendations	Yes, included in general recommendations	Yes, included in general recommendations	Yes, included in general recommendations
Does the scenario increase opportunities for shade for pedestrians walking along the corridor?	Yes, included in general recommendations	Yes, included in general recommendations	Yes, included in general recommendations	Yes, included in general recommendations

Does the scenario reduce vehicle congestion and volumes, especially near campus?	Active transportation improvements may increase bicycle and pedestrian activity and as a result, possibly discourage driving trips. General recommendations includes way-finding and signage may improve operational efficiency for all modes.	May increase number of motor vehicles on Guadalupe Street due to ease of travel without transit vehicles.	Active transportation improvements may increase bicycle and pedestrian activity and as a result, possibly discourage driving trips. General recommendations includes way-finding and signage may improve operational efficiency for all modes.	Active transportation improvements may increase bicycle and pedestrian activity and as a result, possibly discourage driving trips. General recommendations includes way-finding and signage may improve operational efficiency for all modes.
Does the scenario improve communication and legibility among travelers?	Dedicated bike lanes reduces confusion between bicyclists and motorists.	Uncertain	Uncertain	Uncertain
	Scenario 1:	Scenario 2:	Scenario 3:	Scenario 4:
	Transit only lanes on Guadalupe; partial bicycle re-routing; pedestrian network improvements	Transit routes to West Campus; partial bicycle re-routing; pedestrian network improvements	Hybrid -- NB Transit on Guadalupe; SB transit on Nueces/San Antonio; partial bicycle re-routing; pedestrian network improvements	Hybrid – NB transit only lane on Guadalupe; SB shared transit lane; partial bicycle re-routing; pedestrian network improvements
	Impact on identified health concerns			
	High benefit (better than existing) 	Degrades current conditions (worse than existing) 	Neutral benefit (approximately equal to existing) 	Modest benefit (slightly better than existing)

Economic benefits of realizing fewer injuries

The Context

Austin's Vision Zero Action Plan charts a path to creating safer streets in the city through various methods, including engineering changes such as those recommended in this plan.[10] The report speaks to the economic cost of crashes and offers a comparison of how the $500,000 annual cost of crashes in Austin could be better spent, including 800 miles of new sidewalks or 6,600 new Pedestrian Hybrid Beacons.[11]

As noted earlier in this HIA, survey respondents identified health concerns such as crash risk for bicyclists (due to the lack of separated bicycle lanes and clear pathways at some intersections), a crash risk for pedestrians (due to insufficient pedestrian crossing locations and time to cross the street). Evidence of these concerns are represented in part in Figure 2 and Figure 1 which show crash locations involving a motorist and pedestrians, and motorists and bicyclists between 2009 and August 2015.

Depending on the crash severity and severity of injury, the effect of a crash on a person's life ranges from a minor inconvenience to a major life change due to a disabling injury, and to a loss of life. In addition to the impact of a crash on a person's quality of life, crashes have an economic value and a societal value. These costs could be better spent building safer streets.

Recommendations in this report are aimed at several objectives, all of which may reduce the likelihood of a crash occurring. For example, the recommended protected left turns have a crash reduction factor of 99%;[12] and recommended intersection lighting has a crash reduction factor of 27% (for crashes resulting in injuries).[13]

What is the potential cost avoidance from fewer crashes?

The Pedestrian and Bicycle Information Center's (PBIC) website cites the following costs from an analysis done by the National Safety Council for 2012:[14]

Category	Cost per Event	2012 Events	Total 2012 Cost
Bicycle fatalities	$4,538,000	726	$3,294,588,000
Bicycle injuries	$58,000	49,000	$2,876,300,000
Pedestrian Fatalities	$4,538,000	4.743	$21,523,734,000
Pedestrian Injuries	$58,000	76,000	$4,461,200,000

The National Highway Traffic Safety Administration provides a thorough analysis of the cost of motor vehicle crashes in its report, The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised).[15]

[10] https://austintexas.gov/sites/default/files/files/Imagine_Austin/VisionZero/ActionPlan_5.19.16adoption.pdf
[11] IBID, page 21.
[12] http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepc/ped_tctpepc.pdf, Table 1.
[13] IBID, Table 3.
[14] http://www.pedbikeinfo.org/data/faq_details.cfm?id=42
[15] National Highway Traffic Safety Administration, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812013

When considering the crash reduction benefits of recommendations in this plan, the economic value of fewer crashes may be inferred, but not necessarily directly calculated because the type of injury is not known. Because research supports the economic value of crashes, this HIA supports recommendations in this report aimed at reducing crashes and the risk of injury.

Next steps

In anticipation of funding and implementing recommendations in this plan, a system for measuring their effect on key indicators such as safety, mobility, and comfort for those traveling along and within the Guadalupe Corridor. The Vision Zero Action Plan includes a comprehensive set of metrics to measure the City's progress on creating safer streets. These metrics can also provide a way to measure progress on addressing the health concerns along the Guadalupe corridor with respect to safety. Other health concerns such as protection from summer heat and overall cleanliness should be measured, too, along with regular counts of the number of people walking, bicycling, and using transit.

Conclusions

Guadalupe Street is a solid multi-modal street with potential for increasing its share of pedestrians, bicyclists, and transit riders, while still serving motorists traveling within the corridor. Determining the health concerns of existing conditions and health impacts of recommended changes to the corridor as part of the project helped ensure a better health outcome for pedestrians, bicyclists, and transit riders.

Initial recommendations for infrastructure changes identified by the HIA process have been included in the final recommendations, such as establishing separated bicycle lanes on Guadalupe, improving facilities for transit riders at West Mall (between 23rd and 22nd Streets, and improving pedestrian crossing conditions.

While the plan includes a significant improvement for bicyclist conditions within the Guadalupe corridor, additional safety improvements at intersections should be considered, in particular, protected intersections for bicyclists, especially where there are more than two motor vehicle travel lanes in each direction.