

North Houston Transit Boulevard

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Our neighborhoods deserve a healthy, affordable, walkable environment designed with community input.

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Executive Summary

Interstate 45 (I-45) from Downtown Houston to North Beltway 8 is harmful for the people who use it and live nearby. Now there is an opportunity for us to imagine a new project that prioritizes quality of life factors:

- Air quality
- Walkability
- Economy
- Safety
- Housing affordability
- Flooding

We propose a transit boulevard to replace I-45. The proposed boulevard features:

- Sidewalks
- Protected bike lanes
- General-purpose lanes at surface grade
- Elevated bus rapid transit
- Elevated high-speed rail
- Safe and frequent crossings

Terms

- **General-purpose lane** - A lane meant primarily for cars and trucks.
- **Rapid transit** - A bus or train with a dedicated lane to avoid traffic.
- **Transit boulevard** - A wide street that includes both general-purpose lanes and rapid transit lanes.

Background

In the 1950s and early 1960s, the Texas Department of Highways (now called the Texas Department of Transportation, or TxDOT) built the first generation of Interstate 45 (I-45) the “North Freeway” from Downtown Houston to Spring, TX. To make room for the freeway, TxDOT demolished dozens of blocks of homes and businesses. For the people that remained, the freeway impeded local travel and harmed their health. TxDOT planned the freeway without input from the communities that it divided.

In February 2021, TxDOT issued a Record of Decision for the North Houston Highway Improvement Project (NHHIP), which will widen the North Freeway from Downtown to Beltway 8. TxDOT also planned the NHHIP without community input.

In March 2021, Harris County sued TxDOT over alleged civil rights violations and the Federal Highway Administration (FHWA) instructed TxDOT to pause the project. This backlash is an opportunity for TxDOT to imagine a new project.

Purpose

This report explores a multi-modal boulevard design to replace I-45. It is intended as the starting point for a new TxDOT public engagement process around the I-45 corridor. It starts with the idea that any urban highway project must prioritize the well-being of all people who live, work, shop and play nearby. We believe that access and mobility are human rights.

Air Quality

Traffic-related air pollution (TRAP) causes childhood asthma and is linked to other diseases of the heart and lungs. TRAP includes tailpipe emissions like volatile organic chemicals, nitrous oxides, ozone, and fine particulate matter. Fine particulate matter comes from tiny rubber fragments shed by tire wear, metal shavings produced by brake wear, and road dust.¹

Houston has bad air quality compared to the nation at large. The Houston region is in “serious nonattainment” with the National Ambient Air Quality standards for ozone.² And the neighborhoods along the North Freeway are in the 95th percentile for air toxics cancer risk and the 80th percentile for air toxics hazard index.³ The Houston Health Department recommends environmental justice to reduce our asthma burden.⁴

Two great ways to improve our air quality are to reduce the number of lanes available to motor vehicles and to lower the design speed of the lanes that remain. Cities around the world are removing general-purpose lanes to improve air quality, including Cairo, Oslo, London, Beijing, and Paris.⁵ In 2017, the city of Berlin lowered the speed limit on five of its arterial streets to 30 kph (19 mph) and found improved air quality compared to nearby streets that were left at 50 kph (31 mph). The lower speed limit was able to improve the flow of traffic and reduce the amount of time that cars sat idling and emitting air pollutants.⁶

¹ Health Effects Institute: Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects. <https://www.healtheffects.org/publication/traffic-related-air-pollution-critical-review-literature-emissions-exposure-and-health>

² Texas Commission on Environmental Quality: Houston-Galveston-Brazoria: Current Attainment Status. <https://www.tceq.texas.gov/airquality/sip/hgb/hgb-status>

³ EPA: EJScreen. <https://www.epa.gov/ejscreen>

⁴ Houston Health Department: Houston Strategic Asthma Plan 2019-2024. <https://www.houstontx.gov/health/asthma/documents/houston-strategic-asthma-plan-2019-2024.pdf>

⁵ Fast Company: 8 cities are taking bold steps to get rid of cars. <https://www.fastcompany.com/90321627/these-8-cities-are-taking-bold-steps-to-get-rid-of-cars>

⁶ Eltis: Berlin low speed zones successfully improve air quality. <https://www.eltis.org/in-brief/news/berlin-low-speed-zones-successfully-improve-air-quality>

Walkability

Planners assume that people are willing to walk about half a mile to reach a destination like a train station.⁷ I-45 today is a significant barrier to local access because crossings are typically spaced one mile apart. A boulevard with traffic lights can have safe crossings every ¼ mile, or closer in denser areas, to enable more walking and biking trips.

Walkability is also important for both physical health and social connection. Walking has been shown to improve cholesterol and blood pressure levels, slow osteoporosis and cognitive decline, and reduce inflammation and the risk of developing certain chronic health conditions.⁸ Walkable places improve social connection by creating “spontaneous encounters” with friends and strangers, which reduce loneliness.⁹

Economy

A transit boulevard creates affordable transportation options for individuals and families. Car ownership is a significant financial burden. If we offer affordable transportation options, people will have more disposable income, and they will spend it at local businesses.

According to transportation nonprofit LINK Houston, “Improving affordable transportation will help the [Houston] region pursue inclusive economic growth that further advances equity in housing, income, education and health.”¹⁰

Walkable places tend to subsidize car-dependent places. The city of Lafayette, LA is struggling financially because car-dependent places cost more to maintain than they produce in tax revenue. Just to maintain Lafayette’s existing roads, ditches and pipes, city taxes on the median household would need to increase from \$1,500 per year to \$9,200 per year.¹¹ As Houston’s car-dependent places age, the cost to maintain them is increasing.

We can improve Houston’s economy by building transportation systems that support walkable development. In 2002, Milwaukee, Wisconsin replaced its Park East Freeway with a boulevard and re-connected the street grid. That kicked off a frenzy of urban infill development. Park East

⁷ Metropolitan Washington Council of Governments: Walksheds show planners how easily people can walk to transit.

<https://www.mwcog.org/newsroom/2019/07/16/walksheds-show-planners-how-easily-people-can-walk-to-transit/>

⁸ Houston Methodist: 5 Questions About the Health Benefits of Walking, Answered.

<https://www.houstonmethodist.org/blog/articles/2022/jan/5-questions-about-the-health-benefits-of-walking-answered/>

⁹ Vox: Too many Americans live in places built for cars — not for human connection.

<https://www.vox.com/features/23191527/urban-planning-friendship-houston-cars-loneliness>

¹⁰ LINK Houston: Where Affordable Housing and Transportation Meet in Houston.

<https://linkhouston.org/reports-briefings/houston-housing-transportation-affordability-2020/>

¹¹ Strong Towns: The Real Reason Your City Has No Money.

<https://www.strongtowns.org/journal/2017/1/9/the-real-reason-your-city-has-no-money>

became a magnet for corporate headquarters. Land in the Park East Freeway's footprint saw a 180% increase in value, while land nearby saw a 45% increase in value.¹² In 2019, the County of Milwaukee boasted that removing the 0.8 mile Park East Freeway has brought more than \$2 billion in new economic activity.¹³

Safety

Houston is the most deadly major metro area in the nation for drivers, passengers and people in their path. In the Houston region, over 640 people a year die in traffic crashes, and 2,850 more are seriously injured.¹⁴ Fortunately, we can reverse this trend by changing the way that we design roads.

The boulevard should support the commitments to end road fatalities made by Houston, Harris County, and TxDOT. The boulevard will be safe if we implement a *road diet* by reducing the number of general-purpose lanes and adding curb-protected bike lanes.¹⁵ The boulevard is also safe because it uses *pedestrian safety islands* to shorten crossing distances, which improves walkability. At intersections, pedestrians only have to cross two lanes of traffic at a time, which limits their exposure to car traffic.¹⁶

The boulevard has less space for cars, which means there will be fewer vehicle-miles traveled (VMT) along the project. Low VMT is strongly correlated with low rates of traffic death.¹⁷

Housing Affordability

The boulevard will make housing more affordable because it will create the conditions for a transit-oriented development boom. Our limited supply of inner-city housing has caused housing prices to spike. If we build rapid transit with walkable streets, it's likely that developers will build lots of new affordable housing that is oriented towards transit use instead of car use.

The Houston region does not have enough walkable, affordable housing to meet demand. Housing costs went up for most Houstonians from 2010-2018, with median- and lower-income

¹² Project for Public Spaces: Conversion of Park East Freeway Sparks Economic Revitalization. <https://www.pps.org/article/conversion-of-park-east-freeway-sparks-economic-revitalization>

¹³ CNU: Freeway teardown restores the grid. <https://www.cnu.org/publicsquare/2020/01/22/park-east-transformative>

¹⁴ Houston Chronicle: Out of Control. <https://www.houstonchronicle.com/local/investigations/out-of-control/>

¹⁵ Federal Highway Administration: Road Diet Policies. https://safety.fhwa.dot.gov/road_diets/resources/fhwas16072/

¹⁶ NACTO: Pedestrian Safety Islands. <https://nacto.org/publication/urban-street-design-guide/intersection-design-elements/crosswalks-and-crossings/pedestrian-safety-islands/>

¹⁷ State Smart Transportation Initiative: The incompatibility of Vision Zero and VMT growth. <https://ssti.us/2020/02/24/the-incompatibility-of-vision-zero-and-vmt-growth/>

renters seeing the greatest cost increases.¹⁸ Most Houstonians would choose a smaller house if it meant they could live in a walkable place, but opportunities for new walkable development have been stifled by car-dependent policies.¹⁹

Off-street parking is a significant factor in housing cost because each parking space takes up about 400 square feet including a short driveway.²⁰ 400 square feet is enough floor space for an entire efficiency apartment. The City of Houston imposes off-street parking requirements on almost all of its land. We all pay for parking because the City requires 1.25 parking spaces for each efficiency apartment, and more parking for larger units.²¹

Fortunately, the City of Houston recently slashed parking requirements near rapid transit. The 2020 *transit-oriented development* ordinance requires:²²

- No off-street parking requirement for properties within 1000 feet of a rapid transit station
- Parking requirements cut in half for properties within ½ mile of a rapid transit station

Under favorable conditions, building new rapid transit will spur new transit-oriented development. A study of three new transit lines in Minneapolis, Denver, and Charlotte found that good predictors of transit-oriented development are: proximity to downtown, proximity to employment centers, vacant and under-utilized land, block size (walkability), and transit connectivity.²³ We believe that our proposal is aligned with those predictors so developers will build a bounty of affordable housing.

Flooding

Freeways tend to induce suburban sprawl, which makes flooding worse. If we replace the freeway with a boulevard, Houston will be more resilient against future floods.

Freeways are toxic to urban neighborhoods and a tonic to suburban sprawl. When freeways come to inner-city neighborhoods, the nearby population declines. In the inner city, freeways undermine urban vitality by displacing people, adding car traffic, and spacing buildings apart with parking lots. By contrast, when freeways come to the edge of the region, the nearby

¹⁸ Houston Chronicle: Houston is often touted as one of the most affordable cities. But is it really? <https://www.houstonchronicle.com/business/article/The-majority-of-Houston-renters-are-now-cost-16265423.php>

¹⁹ Kinder Institute: Less space for parking is a crucial step toward walkability in Houston.

<https://kinder.rice.edu/urbanedge/less-space-parking-crucial-step-toward-walkability-houston>

²⁰ Streetsblog: Parking Takes Up More Space Than You Think.

<https://usa.streetsblog.org/2016/07/05/parking-takes-up-more-space-than-you-think/>

²¹ Houston Code of Ordinances: Sec. 26-492. - Parking spaces for certain types of use classifications.

https://library.municode.com/tx/houston/codes/code_of_ordinances?nodeId=COOR_CH26PA_ARTVIIIOR_EPALO_DIV2REPASPBISP_S26-492PASPCTYUSCL

²² City of Houston Users' Guide for Walkable Places and Transit-Oriented Development.

https://houstontx.gov/planning/docs_pdfs/User's%20Guide%20for%20WP%20and%20TOD%20report_20-10-01.pdf

²³ Center for Transit-Oriented Development: Rails to Real Estate.

<https://todresources.org/wp-content/uploads/2016/06/ctodr2rfinal2.pdf>

population increases. At the edge of the region, freeways incentivize developers to pave over farms and forests with low-density suburban sprawl.²⁴

Suburban sprawl makes flooding worse because wetlands absorb rain, but hard surfaces can't absorb rain. The Houston metro area has thousands of square miles of paved streets, parking lots and other hard surfaces covering the ground. All this concrete makes it harder for stormwater to be absorbed naturally into the ground. If we build dense, walkable neighborhoods and protect our wetlands, we will have less flooding.²⁵

²⁴ City Observatory: How freeways kill cities. <https://cityobservatory.org/how-freeways-kill-cities/>

²⁵ CNN: How Houston's layout may have made its flooding worse. <https://www.cnn.com/2017/08/31/us/houston-harvey-flooding-urban-planning/index.html>

Proposal Features

- I-45 from Scott St to Greenspoint Mall (15.9 miles) is replaced by a boulevard featuring:
 - a. Sidewalks
 - b. Protected bike lanes
 - c. General-purpose lanes at surface grade
 - d. Elevated bus rapid transit (B2 Blue Line)
 - e. Elevated high-speed rail along the I-45 corridor shared by:
 - i. Amtrak with service to Dallas
 - ii. Gulf Coast Rail District with service to Conroe
- I-10 from Houston Ave to Gregg St (2.6 miles) is replaced by a boulevard featuring:
 - a. Sidewalks
 - b. Protected bike lanes
 - c. General-purpose lanes at surface grade
 - d. Elevated bus rapid transit (B4 Brown Line)
- US-59/I-69 from Main St to Lyons Ave (4.3 miles) is replaced by a boulevard featuring:
 - a. Sidewalks
 - b. Protected bike lanes
 - c. General-purpose lanes at surface grade
 - d. Elevated bus rapid transit (B6 Pink Line)
- Four new East-West bus rapid transit lines with transfers to the new bus and train lines along I-45.

| ID | Proposed Route | West limit | East limit |
|----|---|---------------------------------|-------------------------|
| B1 | Along 18th St to 20th St to Cavalcade St | Northwest Mall | Cavalcade @ Lockwood |
| B7 | Along Pinemont Dr to N Shepherd Dr to Crosstimbers St | Bingle | Lockwood @ Crosstimbers |
| B8 | Along W Little York Rd to Victory Dr to Little York Rd to I-69 | West Little York Transit Center | Tidwell Transit Center |
| B9 | Along Tomball Pkwy to Mt Houston Rd to Aldine Mail Route Rd to I-69 | Willowbrook | Tidwell Transit Center |

- The Purple Line light rail (L2) is extended from the Theater District to Heights Blvd.
- The Green Line light rail (L3) is extended from the Theater District to Waugh Dr.
- Safe crossings for people walking and biking at least every ¼ mile along the boulevards.
- Land not needed for transportation is used for parks and land trust affordable housing.

Overview map

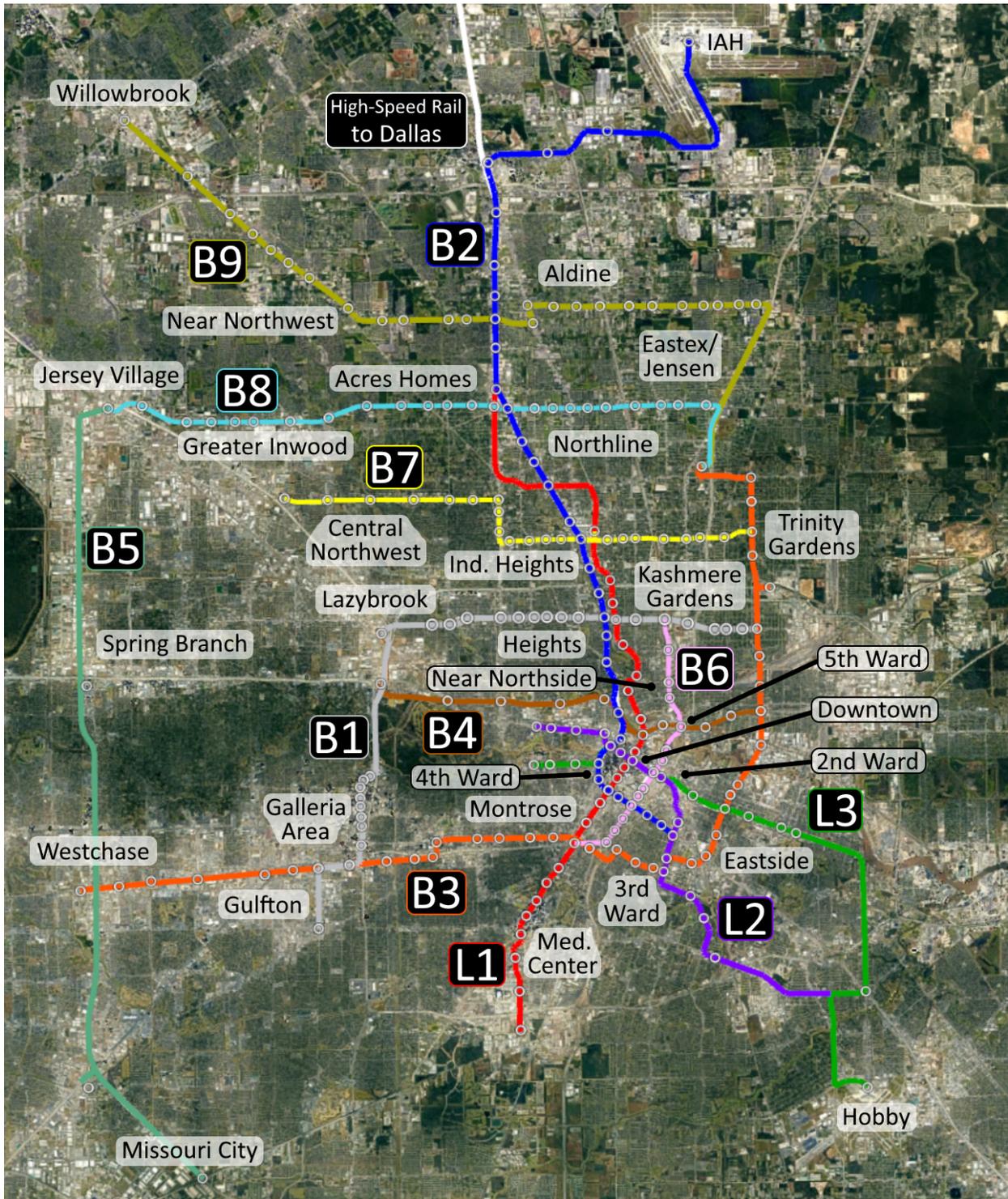


Figure 1: Neighborhoods and rapid transit lines. A rapid transit network connects the neighborhoods on Houston's north side to each other and to major destinations across the city. Nine bus rapid transit lines are labeled B1-B9. Three light rail lines are labeled L1-L3. High speed rail is at the top where it splits off from B2 and continues along I-45 to Conroe and Dallas.

Section Drawings

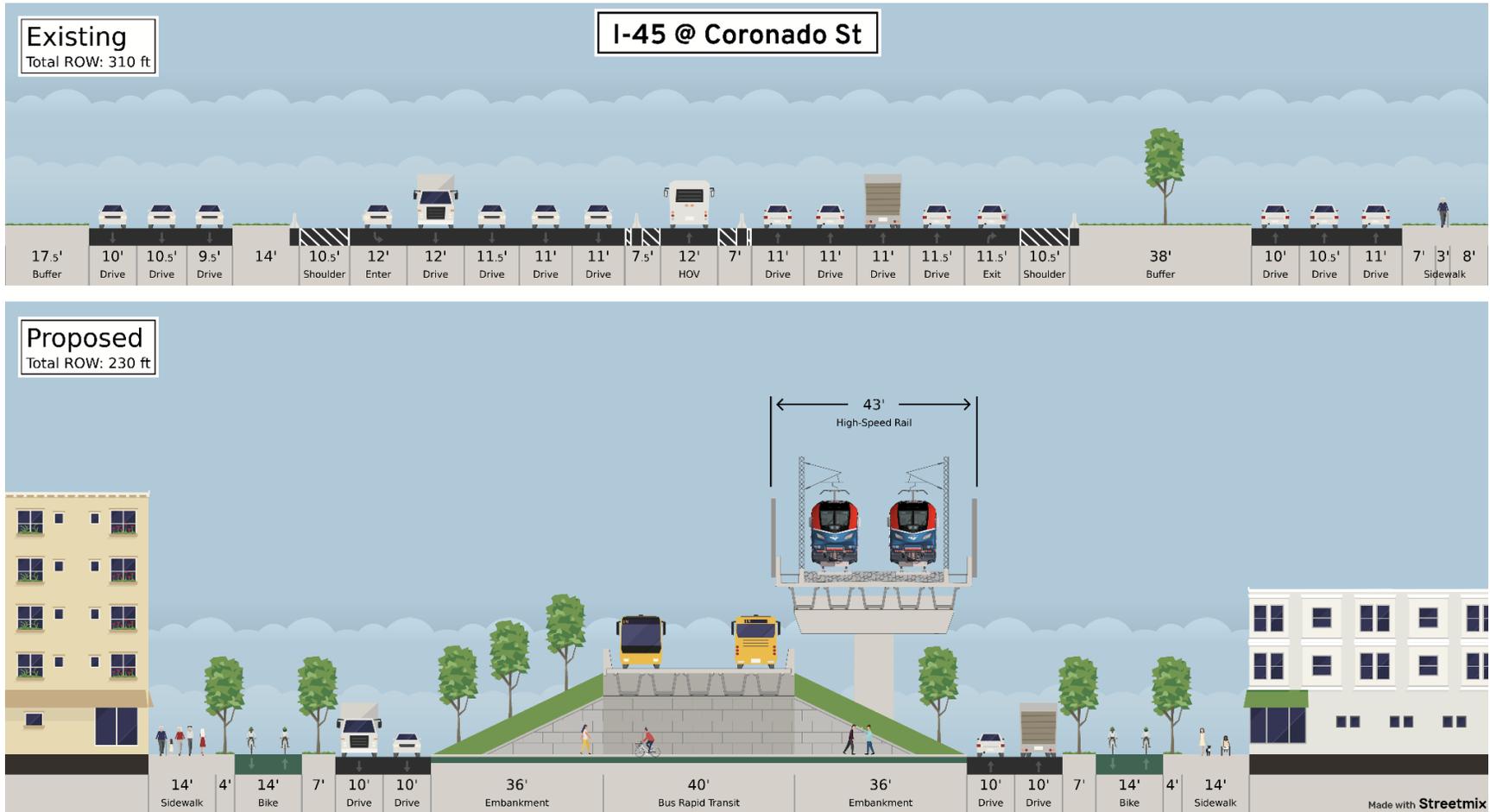


Figure 2: I-45 at Coronado St, between the Heights and Near Northside. Above: the existing 17-lane highway has a narrow sidewalk on one side. Below: our proposed boulevard has sidewalks, bike lanes, four general-purpose lanes, elevated buses, elevated rail, and spare land used for parks and homes above businesses.

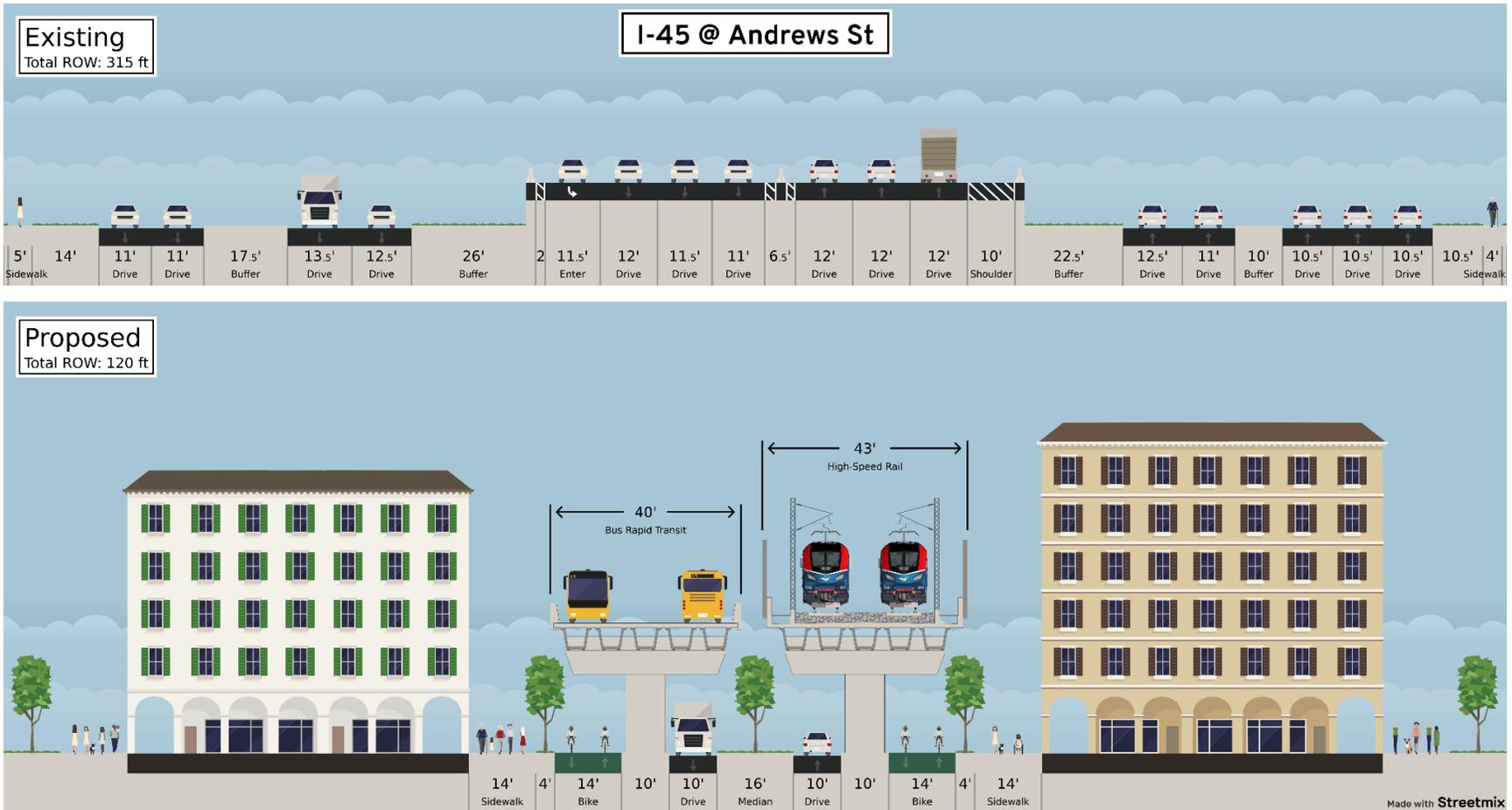


Figure 3: I-45 at Andrews St, between Fourth Ward and Downtown. Above: the existing highway has 16 lanes and narrow sidewalks. Below: our proposed boulevard has sidewalks, bike lanes, two general-purpose lanes, elevated buses, elevated rail, and spare land used for parks and homes above businesses.

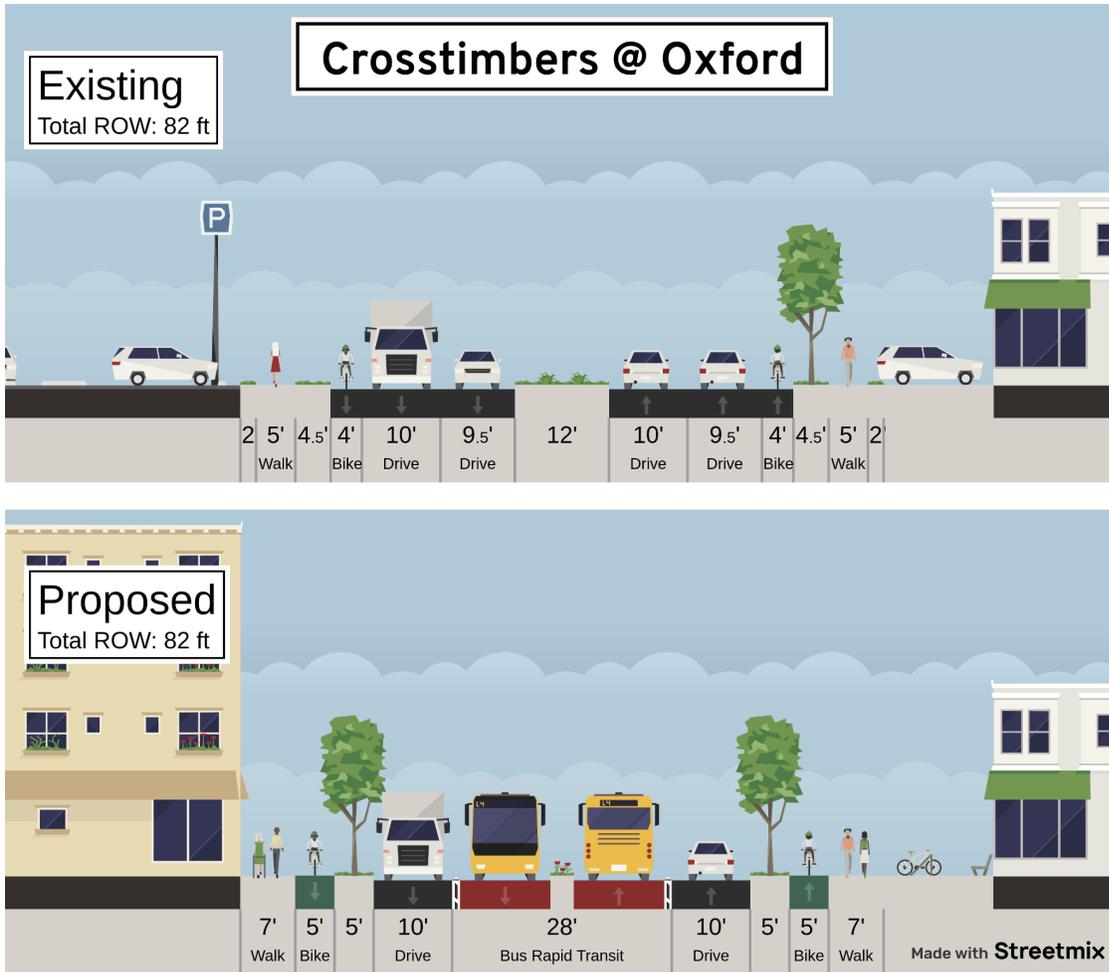


Figure 4: Crosstimbers St at Oxford St in Independence Heights. Above: the existing street has sidewalks, low-comfort bike lanes, and four general-purpose lanes. Below: our proposed street has sidewalks, high-comfort bike lanes, two general-purpose lanes, and bi-directional bus rapid transit.

High-Speed Rail

We propose high-speed rail (HSR) on the I-45 corridor for fast passenger travel within Houston and neighboring regions. HSR is built on an elevated bridge, which ensures a high quality of walkability and safety on the streets below (as the train reaches speeds over 125 mph).

The track will be shared by Amtrak and the Gulf Coast Rail District (GCRD). Amtrak is the USA's intercity rail provider; and GCRD was established to provide regional rail for greater Houston. Amtrak will operate long-distance passenger rail service to Dallas, TX, while GCRD will operate regional rail service to Conroe, TX. This is modeled on the Northeast Corridor, where Amtrak shares track with independent regional rail providers around Boston, New York, Philadelphia, and Washington DC.²⁶ See [Appendix A: Lines and Stations](#) for a full list of train stations.

A report by the Texas Transportation Institute explores connecting the Texas Triangle (Houston, Dallas, and San Antonio) with HSR and concludes, "in general it is physically possible to construct and operate HSR service within the existing Interstate right-of-way."²⁷ In fact, TxDOT sponsored a group of universities to write a guidebook to help TxDOT build intercity HSR in existing highway rights-of-way.²⁸

Bus Rapid Transit

We propose a significant build-out of bus rapid transit (BRT) in north Houston and near downtown. This network is designed to provide access and mobility to the communities that depend on I-45 today, many of which are under-served by transit.

BRT is fast because the bus gets a dedicated lane and the bus gets priority at traffic lights. The city of Bogotá, Colombia built TransMilenio, a 70-mile BRT network that carries 1.5 million riders per day. Since TransMilenio was introduced in 2000, Bogotá's air pollution fell by 40%, and traffic deaths in BRT corridors fell by 92%.²⁹

Our proposal builds on top of METRONext, a plan by METRO that features four new BRT lines (referenced in this report as B1, B2, B3, and B4). In 2019, voters in METRO's service area overwhelmingly approved bonding authority of \$3.5 billion to be used to partially implement METRONext.³⁰

²⁶ Amtrak Northeast Corridor: Projects & Stations. <https://nec.amtrak.com/nec-projects-stations/>

²⁷ Texas Transportation Institute: Use of Existing Highway Right-of-Way for High Speed Rail Transportation. <https://static.tti.tamu.edu/tti.tamu.edu/documents/418-1F.pdf>

²⁸ Center for Transportation Research: Use of Highway ROW for High-Speed Intercity Passenger Rail and Dedicated Freight Transportation Systems. <https://library.ctr.utexas.edu/ctr-publications/0-6698-p3.pdf>

²⁹ Centre for Public Impact: TransMilenio: renewing Bogotá's transport system. <https://www.centreforpublicimpact.org/case-study/transmilenio>

³⁰ METRONext. <https://www.metronext.org/>

We propose a mix of elevated and surface-grade BRT lines. Three elevated lines, with top speeds of 60 mph, will follow I-45 (B2), I-10 (B4), and US-59/I-69 (B6). Four surface-grade lines, with top speeds of 35 MPH, will follow 20th/Cavalcade (B1), Crosstimbers/Pinemont (B7), Little York/Victory (B8), and Mt Houston/Aldine Mail Rte (B9). See [Appendix A: Lines and Stations](#) for a full list of bus stations.

Our buses should run every at least every 10 minutes during peak hours so people can use the system on demand without needing to follow a schedule. Buses should run around the clock so people don't get stranded. Fares should be as low as possible so that access and mobility are available to everyone.

Light Rail

We propose two light rail extensions from the Theater District to the west. The Purple Line (L2) should extend along Washington Ave to Heights Blvd. The Green Line should extend along W Dallas St to Waugh Dr. These light rail extensions will connect these rapidly densifying neighborhoods to the rapid transit network. The Central Houston group requested light rail along Washington in 2019.³¹

Crossings

We propose safe crossings for people walking and biking at least every ¼ mile along the boulevards that replace I-45, I-10, and US-59/I-69. Crossings should be deeply connected to the existing street grid to ensure good walkability in these locations that are very car-oriented today. Frequent crossings are also a safety feature because without them, people will often cross in places that were not designed for crossing.

In total, we propose 103 new crossings to supplement 96 existing crossings. 75 of those new crossings will be along I-45. See [Appendix B: Pedestrian & Bicycle Crossings](#) for a full list of existing and proposed crossings.

Capacity

Fig. 5 is a capacity analysis that compares the existing North Freeway and our boulevard concept. One statistic dominates the analysis: a transit lane can carry 16 times more people per hour than a general-purpose lane can.³² So the boulevard has nearly 4 times as much capacity for people as the existing highway does.

³¹ Community Impact: METRO board puts brakes on Washington corridor rail idea. <https://communityimpact.com/heights-river-oaks-montrose/top-stories/2019/06/27/metro-board-puts-brake-s-on-washington-corridor-rail-idea/>

³² NACTO: Designing to Move People. <https://nacto.org/publication/transit-street-design-guide/introduction/why/designing-move-people/>

| Lane Type | Capacity (people/hour) | | Existing Lane Count | Existing Capacity (people/hour) | | Boulevard Lane Count | Boulevard Capacity (people/hour) | |
|--------------------------------------|------------------------|--------|---------------------|---------------------------------|---------------|----------------------|----------------------------------|----------------|
| | Low | High | | Low | High | | Low | High |
| Car lane | 600 | 1,600 | 16 | 9,600 | 25,600 | 4 | 2,400 | 6,400 |
| HOV lane | 1,000 | 2,800 | 1 | 1,000 | 2,800 | 0 | 0 | 0 |
| BRT lane | 10,000 | 25,000 | 0 | 0 | 0 | 2 | 20,000 | 50,000 |
| HSR lane | 10,000 | 25,000 | 0 | 0 | 0 | 2 | 20,000 | 50,000 |
| 2-way bike lane | 7,500 | 7,500 | 0 | 0 | 0 | 2 | 15,000 | 15,000 |
| Sidewalk | 9,000 | 9,000 | 1 | 9,000 | 9,000 | 2 | 18,000 | 18,000 |
| Total Capacity | | | | 19,600 | 37,400 | | 75,400 | 139,400 |
| Capacity relative to Existing | | | | 100% | 100% | | 385% | 373% |

Figure 5: Capacity in people per hour of the existing highway vs our proposed boulevard. This location is I-45 at Coronado St, as shown in Fig. 2.

Through Traffic

Traffic that's not coming into Houston's urban core can bypass it using Beltway 8 or SH 99 the Grand Parkway. Fortunately, only a small amount of long-haul freight will be impacted. TxDOT's Houston District Truck Mobility Study did a survey of heavy trucks that passed through a point on I-45 just north of Beltway 8 and found that 88% of those trucks had their origin or destination within the region. That is, only 12% of heavy truck trips completely traversed the region, without stopping, in-route to another location outside the region.³³

Displacement

We believe that demolishing homes and businesses to make way for infrastructure should be a last resort measure. In the rare event that displacement must occur, occupants should be compensated generously to ensure that they can relocate nearby and thrive.

The boulevard minimizes displacement because it's narrower than the existing right-of-way. However, the added pedestrian & bicycle crossings will require some displacement to re-connect the street network. We expect to displace some yards and parking lots, but we don't expect to displace any structures.

Excess right-of-way

The proposed transit boulevard calls for a narrower right-of-way than what's currently used by the freeway. The excess right-of-way is valuable land because of its urban location, and this land will become even more valuable when it's tied to a growing rapid transit network.

³³ TxDOT: Houston District Truck Mobility Study.
<https://www.txdot.gov/inside-txdot/projects/studies/houston/092320.html>

We recommend using the excess right-of-way for parks and affordable housing. Parks improve health and fitness, make communities more sociable, and reduce crime rates - and the City of Houston has committed to making sure every resident has a park within a 10-minute walking distance.³⁴

A community land trust (CLT) can ensure long-term housing affordability by allowing homes to be bought separately from land. CLTs also ensure affordability by limiting the profit that homeowners can earn upon selling. In addition to housing, CLTs can provide affordable commercial and retail space. New York City has at least 16 community land trusts that offer affordability in the face of predatory real estate practices, and New York's mayor has pledged to increase funding for CLTs.³⁵

Another tool for creating affordable housing is the Public Facility Corporation (PFC) which can offer a 100% property tax exemption for developments that include affordable housing units. We need to be extremely careful with PFCs because in practice, many PFCs generate enormous public subsidies for private businesses while offering comparatively little public benefit.³⁶ However, with a carefully considered partnership agreement between government and PFC, it may be possible to create an arrangement where the public benefits exceed the public subsidy.

Street trees

A boulevard lined with live oaks is a part of Houston's architectural vernacular. Street trees reduce nearby indoor air pollution by more than 50%; they provide a habitat for wildlife; and they make hot summer days pleasant with their shade and evaporative cooling.³⁷ With proper care, live oaks can live well over 100 years.

If we line the boulevard with trees as shown in Fig. 6, it can become a walkable place where people linger and shop.

³⁴ Kinder Institute: Can city-owned vacant lots fill the need for park equity in Houston?

<https://kinder.rice.edu/urbanedge/can-city-owned-vacant-lots-fill-need-park-equity-houston>

³⁵ BK Reader: Putting Land in the Hands of Locals, East NY Group Fights for Fairer Future of Housing.

<https://bkreader.com/2021/04/19/putting-land-in-the-hands-of-locals-east-ny-group-fights-for-fairer-future-of-housing/>

³⁶ UT School of Law: Public Facility Corporations and the Section 303.042(f) Tax Break for Apartment Developments. <https://law.utexas.edu/clinics/2020/09/14/pfc-apartment-tax-breaks/>

³⁷ Arbor Day Foundation: Tree Facts. <https://www.arborday.org/trees/treefacts/>



Figure 6: The live oaks along South Boulevard in Houston's Boulevard Oaks neighborhood make it a nice place to walk on a hot day.

Congestion

When road capacity is reduced, would-be drivers may choose to travel by a different mode, travel at a different time of day, or not travel at all as they telework.³⁸ This phenomenon was observed when I-65/I-70 in downtown Indianapolis was closed for three months. The state budgeted overtime for police to ensure smooth traffic flow but after three days, determined it was no longer necessary because people adjusted their travel patterns.³⁹

³⁸ The City Fix: Traffic Evaporation. <https://thecityfix.com/blog/traffic-evaporation-what-really-happens-when-road-space-is-reallocated-from-cars/>

³⁹ Aaron M. Renn: If You Can Repeatedly Close a Freeway For Months At a Time, Do You Really Need It At All?.

Community Engagement

We intend to follow this report with a community engagement process to educate community members about the North Houston Transit Boulevard proposal, and to evaluate the quality of our work by soliciting their feedback. We intend to educate people about the issues of the existing and proposed projects, to expand imagination, and to give community members the background info they need to come up with their own proposal.

We will create pamphlets and distribute them at places where people gather in neighborhoods along the I-45 corridor. We will create a slideshow and present it to neighborhood associations, civic clubs, and environmental justice organizations. We will provide Spanish translation because that's the preferred language for much of the population.

We will follow an iterative process to achieve community consensus. We will ask people to give the project an overall rating between 1 and 5. If the median rating is at least 4, we will recommend this proposal for adoption by TxDOT and other government agencies. But if the median rating is less than 4, we will start over with a new design.

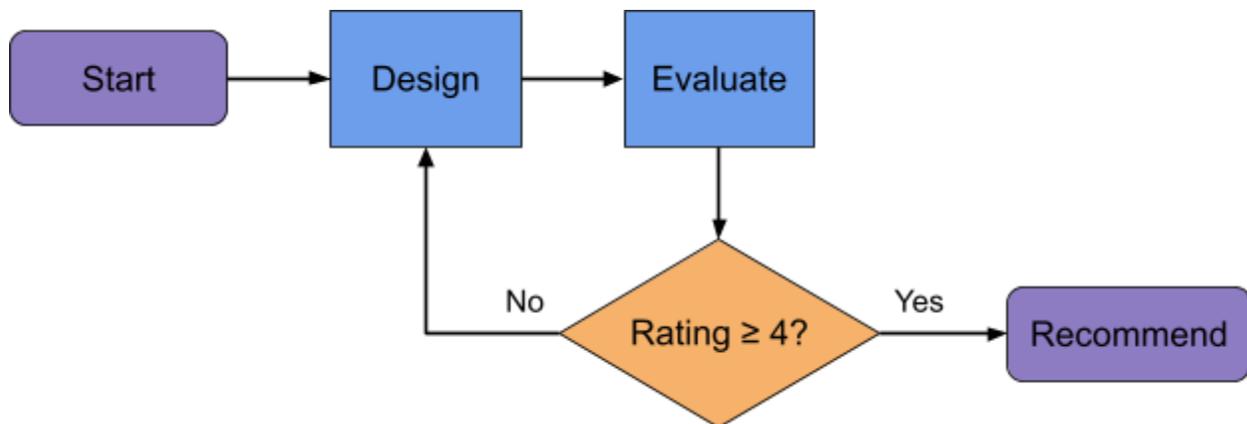


Figure 7: Community engagement process. We will only recommend this proposal after reaching community consensus.

Future Work

This proposal is a starting point. TxDOT must engage the communities along the I-45 corridor.

We hope that this work can serve as a template for bringing environmental justice and prosperity to other communities impacted by freeways, both in Houston and around the world.

<https://www.aaronrenn.com/2013/06/30/if-you-can-repeatedly-close-a-freeway-for-months-at-a-time-do-you-really-need-it-at-all/>

Appendix A: Lines and Stations

We propose this list of rapid transit lines and stations. It layers our **proposed** rapid transit over **existing** rapid transit and **voter-approved** METRONext rapid transit.

Amtrak High-Speed Rail (from Houston to Dallas)

Follows I-45.

All proposed by us. Shares tracks with the GCRD North Line but doesn't service all GCRD stations.

Stations:

- Houston Downtown Transit Center
- North @ Crosstimbers
- Greenspoint Mall
- The Woodlands
- Conroe
- Huntsville
- Madisonville
- Centerville
- Buffalo
- Fairfield
- Richland
- Corsicana
- Rice
- Ennis
- Hutchins
- Dallas Convention Center

Gulf Coast Rail District (GCRD) North Line Regional Rail

Follows I-45.

All proposed by us. Shares track with Amtrak.

Stations:

- Houston Downtown Transit Center (xfer to B2 Blue and L1 Red Lines)
- North @ Cavalcade (xfer to B2 Blue and B1 Silver Lines)
- North @ Crosstimbers (xfer to B2 Blue and B7 Yellow Lines)
- North @ Little York (xfer to B2 Blue and B8 Teal Lines)
- North @ Mt Houston (xfer to B2 Blue and B9 Gold Lines)
- Greenspoint Mall (xfer to B2 Blue Line)
- Cypress Station
- Spring
- The Woodlands Mall
- Conroe

B1 Silver Line BRT

Follows Chimney Rock Rd to Westpark Dr to Post Oak Blvd to the West Loop to 18th St to 20th St to Cavalcade St.

Funded/existing from **Gulfton** to **Northwest Mall**. Proposed by us from **Northwest Mall** to **Cavalcade @ Lockwood**.

Stations:

- Gulfton
- Chimney Rock (xfer to B3 Orange Line)
- Westpark/Lower Uptown Transit Center (xfer to B3 Orange Line)
- Richmond
- West Alabama/Galleria
- Westheimer/Galleria
- Guilford
- Ambassador
- San Felipe
- Four Oaks
- Uptown Park
- Northwest Transit Center (xfer to B4 Brown Line)
- Northwest Mall (xfer to B4 Brown Line)
- Seaspray
- TC Jester
- Bevis
- Shepherd
- Ashland
- Heights
- Columbia
- North Main
- Airline
- North @ Cavalcade (xfer to B2 Blue and GCRD North Lines)
- Cavalcade @ Fulton (xfer to L1 Red Line)
- Irvington
- Maury @ Cavalcade (xfer to B6 Pink Line)
- Jensen
- Russell
- Hirsch
- Wipprecht
- Cavalcade @ Lockwood (xfer to B3 Orange Line)

B2 Blue Line BRT

Follows I-45 to Greens Rd to Hardy Airport Connector.

Funded/existing from **Franklin/Bagby** to **George Bush Intercontinental Airport**. Proposed by us from **Gulf @ Scott** to **Franklin/Bagby**.

Stations:

- Gulf @ Scott (xfer to L2 Purple Line)
- Live Oak
- Pierce & Hamilton (xfer to B6 Pink Line)
- Austin

- Downtown Transit Center (xfer to L1 Red and GCRD North Lines)
- Brazos
- Gulf @ West Dallas (xfer to L3 Green Line)
- Gulf @ Capitol (xfer to L2 Purple and L3 Green Lines)
- Franklin @ Bagby
- Crockett (xfer to B4 Brown Line)
- North Main
- Patton
- North @ Cavalcade (xfer to B1 Silver and GCRD North Lines)
- Sylverster
- Stokes
- North @ Crosstimbers (xfer to B7 Yellow and GCRD North Lines)
- Victoria
- North @ Tidwell (xfer to L1 Red Line)
- Red Ripple
- Parker
- North @ Little York (xfer to B3 Orange and GCRD North Lines)
- North @ North Shepherd (xfer to L1 Red Line)
- Gulf Bank
- North @ Mt Houston (xfer to B9 Gold and GCRD North Lines)
- Blue Bell
- West Road
- Fallbrook
- Greenspoint Mall (xfer to GCRD North Line)
- Wayforest
- Air Center
- George Bush Intercontinental Airport

B3 Orange Line BRT

Follows Westpark Tollway to Edloe St to Richmond Ave to Wheeler Ave to Emancipation Ave to Alabama St to Scott St to Elgin St to Lockwood Dr to Tidwell Rd to Edell St.

All funded/existing.

Stations:

- Westchase Park and Ride (xfer to B5 Emerald Line)
- Ranchester
- Gessner Park and Ride
- Fondren
- Hillcroft Park and Ride
- Renwick
- Chimney Rock (xfer to B1 Silver Line)
- Westpark/Lower Uptown Transit Center (xfer to B1 Silver Line)
- Newcastle
- Wesleyan
- Edloe @ Westpark
- Edloe @ Richmond
- Kirby
- Shepherd
- Mandell
- Montrose

- Wheeler Transit Center (xfer to L1 Red & B6 Pink Lines)
- Crawford
- Emancipation
- Columbia Tap
- Sampson
- TSU/UH Athletics District (xfer to L2 Purple Line)
- Elgin/Third Ward (xfer to L2 Purple Line)
- University of Houston
- Eastwood Transit Center
- Leeland
- Lockwood/Eastwood (xfer to L3 Green Line)
- Canal
- Navigation
- Clinton
- Fifth Ward Transit Center (xfer to B4 Brown Line)
- Lee
- Salina
- Cavalcade @ Lockwood (xfer to B1 Silver Line)
- Lyndon B Johnson Hospital
- Bennington
- Lockwood @ Crosstimbers (xfer to B7 Yellow Line)
- Laura Koppe
- Tidwell @ Lockwood
- Tidwell Transit Center (xfer to B8 Teal and B9 Gold Lines)

B4 Brown Line BRT

Follows the West Loop to I-10.

Funded/existing from **Northwest Mall** to **Crockett**. Proposed by us from **Crockett** to **Fifth Ward Transit Center**.

Stations:

- Northwest Mall (xfer to B1 Silver Line)
- Northwest Transit Center (xfer to B1 Silver Line)
- Memorial Park
- Shepherd/Durham
- Studemont
- Houston Ave
- Crockett (xfer to B2 Blue Line)
- UH Downtown (xfer to L1 Red Line)
- Hardy
- Jensen @ Nance (xfer to B6 Pink Line)
- Gregg
- Waco
- Fifth Ward Transit Center (xfer to B3 Orange Line)

B5 Emerald Line BRT

Follows West Beltway 8.

All funded/existing.

Stations:

- West Little York Transit Center (xfer to B8 Teal Line)
- CityCentre
- Westchase Park and Ride (xfer to B3 Orange Line)
- West Belfort Park and Ride
- Missouri City / BW8

B6 Pink Line BRT

Follows US-59/I-69 to the Hardy Downtown Connector right-of-way.

All proposed by us.

Stations:

- Wheeler Transit Center (xfer to L1 Red and B3 Orange Lines)
- Alabama
- Elgin
- McGowen
- Pierce @ Hamilton (xfer to B2 Blue Line)
- Leeland
- Polk
- Convention District (xfer to L2 Purple and L3 Green Lines)
- Commerce
- Runnels
- Jensen @ Nance (xfer to B4 Brown Line)
- Lorraine
- Quitman
- Collingsworth
- Maury @ Cavalcade (xfer to B1 Silver Line)

B7 Yellow Line BRT

Follows Pinemont Dr to Shepherd Dr to Crosstimbers St.

All proposed by us.

Stations:

- Bingle
- Antoine
- TC Jester
- Rosslyn
- Ella
- Alba
- Shepherd @ Pinemont
- Janisch
- Hendrich
- West Cross
- Yale
- Haygood
- Castor
- North @ Crosstimbers (xfer to B2 Blue and GCRD North Lines)
- Northline Transit Center (xfer to L1 Red Line)
- Bauman

- Helmers
- Irvington
- Schneider
- Jensen
- Curry
- Hirsch
- Lockwood @ Crosstimbers (xfer to B3 Orange Line)

B8 Teal Line BRT

Follows Little York Rd to Victory Dr to Little York Rd to US-59/I-69.

All proposed by us.

Stations:

- West Little York Transit Center (xfer to B5 Emerald Line)
- Gessner
- Fairbanks North Houston
- Guhn
- Hollister
- Langfield
- Antoine
- TC Jester
- Carver
- Montgomery
- Wheatley
- DePriest
- Victory @ North Shepherd (xfer to L1 Red Line)
- North @ Little York (xfer to B2 Blue and GCRD North Lines)
- Northline
- Nordling
- Airline
- Biscayne
- Bauman
- Little York Plaza
- Aldine Westfield
- Somerset
- Bentley
- Tidwell Transit Center (xfer to B3 Orange and B9 Gold Lines)

B9 Gold Line BRT

Follows Tomball Pkwy to Mt Houston Rd to Airline Dr to Aldine Mail Rte to US-59/I-69.

All proposed by us.

Stations:

- Willowbrook
- High Life
- Hollister
- Fallbrook
- North Houston Rosslyn
- Smiling Woods

- Antoine
- Upland Willow
- Royal Village
- Old Hickory
- Veterans Memorial
- Deer Trail
- North @ Mt Houston (xfer to B2 Blue and GCRD North Lines)
- Airline @ Mt Houston
- Airline @ Aldine Mail Route
- Lillja
- Henry
- Hardy
- Chrisman
- Aldine Westfield
- Deergrove
- Fern Meadow
- Gloger
- Vickery
- Tidwell Transit Center (xfer to B3 Orange and B8 Teal Lines)

L1 Red Line Light Rail

All funded/existing. Stations:

- Fannin South Transit Center
- Stadium Park/Astrodome
- Smith Lands
- Texas Medical Center Transit Center
- Dryden/Texas Medical Center
- Memorial Hermann Hospital/Houston Zoo
- Hermann Park/Rice University
- Museum District
- Wheeler Transit Center (xfer to B3 Orange and B6 Pink Lines)
- Ensemble/HCC
- McGowen
- Downtown Transit Center (xfer to B2 Blue and GCRD North Lines)
- Bell
- Main Street Square
- Central Station (xfer to L2 Purple and L3 Green Lines)
- Preston
- UH Downtown (xfer to B4 Brown Line)
- Burnett Transit Center/Casa de Amigos
- Quitman/Near Northside
- Fulton/North Central
- Moody Park
- Cavalcade @ Fulton (xfer to B1 Silver Line)
- Lindale Park
- Melbourne/North Lindale
- Northline Transit Center (xfer to B7 Yellow Line)
- North @ Tidwell (xfer to B2 Blue Line)
- Victory @ North Shepherd (xfer to B3 Orange Line)

- North @ North Shepherd (xfer to B2 Blue Line)

L2 Purple Line Light Rail

Funded/existing from **Hobby Airport** to **Theater District**. Proposed by us from **Theater District** to **Heights**. Stations:

- Heights
- Studemont
- Sawyer
- Houston @ Washington
- Gulf @ Capitol (xfer to B2 Blue and L3 Green Lines)
- Theater District (xfer to L3 Green Line)
- Central Station (xfer to L3 Green Line)
- Convention District (xfer to B6 Pink and L3 Green Lines)
- Leeland/Third Ward
- Gulf @ Scott (xfer to B2 Blue Line)
- Elgin/Third Ward (xfer to B3 Orange Line)
- TSU/UH Athletics District (xfer to B3 Orange Line)
- UH South/University Oaks
- MacGregor Park/Martin Luther King, Jr.
- Palm Center Transit Center
- Hobby Airport (xfer to L3 Green Line)

L3 Green Line Light Rail

Funded/existing from **Hobby Airport** to **Theater District**. Proposed by us from **Theater District** to **Heights**. Stations:

- Waugh
- Montrose
- Gillette
- Gulf @ West Dallas (xfer to B2 Blue)
- Gulf @ Capitol (xfer to B2 Blue and L2 Purple Lines)
- Theater District (xfer to L2 Purple Line)
- Central Station (xfer to L2 Purple Line)
- Convention District (xfer to B6 Pink and L2 Purple Lines)
- Coffee Plant/Second Ward
- Lockwood/Eastwood (xfer to B3 Orange Line)
- Altic/Howard Hughes
- Cesar Chavez/67th St
- Magnolia Park Transit Center
- Park Place
- Hobby Airport (xfer to L2 Purple Line)

Appendix B: Pedestrian & Bicycle Crossings

We propose safe crossings for people walking and biking at least every ¼ mile along the new boulevards. We propose to maintain all existing freeway crossings and add new crossings.

Counting all three boulevards, we propose **103 new crossings** to supplement *96 existing crossings*.

We list **proposed new crossings in bold** and *existing crossings in italics*.

I-45 crossings, listed from north to south

We propose **75 new crossings** of I-45 to supplement *50 existing crossings*.

- **Beltway 8 Feeder**
- **Northpoint Dr**
- **Plaza Verde Dr / Esplanade Blvd**
- *Fallbrook Dr / Aldine Bender Rd*
- **Unnamed near Northgate Mall**
- **Gillespie Rd**
- **W Goodson Dr**
- **Greens Landing Dr / W Dyna Dr**
- **Unnamed near Aldine Ninth Grade School**
- *West Road*
- **Unnamed near Berean Baptist Church**
- **Northville St**
- **Blue Bell Rd**
- **Shane St**
- **Turney Dr**
- *W Mt Houston Rd*
- **Beaver Bend Rd**
- **Hidden Valley Rd**
- **Saddle Rock Dr**
- *W Gulf Bank Rd*
- **W Bertrand St**
- **Dewalt St / Mitchell Rd**
- **Hacker St**
- **Veterans Memorial Dr / Camino Rd**
- **Stuebner Airline Rd**
- *W Little York Rd*
- **Unnamed near Houston Pediatric Clinic**
- **Rittenhouse St**
- **W Twickenham Trail**
- *W Parker Rd*
- **Pickering St / Brenda St**
- **Obion Rd**
- **Troy Rd**
- **Rosamond St**
- **Red Ripple Rd / New Haven Dr**

- **Witcher Ln**
- **Werner St**
- **Hamilton St**
- *E Tidwell Rd*
- **Rogers St**
- **E Burress St**
- **Glenburnie Dr / Wellford St**
- **Spell St / Berry Rd**
- **Victoria Dr**
- *Airline Dr*
- **Unnamed near Whataburger**
- **Unnamed near Pappas Bar-B-Q**
- *Crosstimbers St*
- **Neyland St**
- **Riggs Rd**
- **Clayton St**
- *Stokes St*
- **33rd St / Amasa St**
- **32nd 1/2 St / Melbourne St**
- **North Loop West Feeder**
- **North Loop East Feeder**
- **Sylvester Rd**
- **Eichwurzel Ln**
- **Robert Lee Rd**
- *Link Rd*
- **Tarver St**
- *Cavalcade St*
- **Mathis St / Frawley St**
- **Coronado St**
- *Patton St*
- **Gardner St / Baden St**
- **Melwood St / Calendar St**
- *Cottage St*
- **Dell Ct**
- *N Main St*
- **Norma St**
- **Oleander St**
- **Woodland St**
- *North St*
- **Parkview St / Embry St**
- **Wrightwood St / Carl St**
- *White Oak Dr / Quitman St*
- *White Oak Bayou Trail*
- **Spring St / James St**
- *MKT Trail*
- *Crockett St / Hogan St*
- **Edwards St / Burnett St**
- *Dart St*
- **Elder St / Girard St**

- *Washington Ave*
- *Franklin St*
- *Preston St*
- *Buffalo Bayou North*
- **McKinney St / Houston Ave**
- *Buffalo Bayou South*
- **Allen Pkwy**
- *W Dallas St*
- **Andrews St**
- **Ruthven St / Pease St**
- **Cleveland St / Jefferson St**
- **St Joseph Pkwy**
- *Brazos St*
- *Smith St*
- *Pierce St*
- *Louisiana St*
- *Milam St*
- *Travis St*
- *Main St*
- *Fannin St*
- *San Jacinto St*
- *Caroline St*
- *Austin St*
- *La Branch St*
- *Crawford St*
- *Jackson St*
- *Chenevert St*
- *Hamilton St*
- *Chartres St*
- *St Emanuel St*
- *Hutchins St*
- *Bastrop St*
- *Emancipation Ave*
- **St Charles St**
- **Live Oak St**
- **Nagle St**
- **Sauer St / Delano St**
- **Briley St / Ennis St**
- *Columbia Tap Trail*
- **Sampson St**
- *Scott St*

I-10 crossings, listed from west to east

We propose **10 new crossings** of I-10 to supplement *10 existing crossings*.*

- *Houston Ave*
- **I-45 / Goliad St**
- **Spring St / James St ***

- *MKT Trail* *
- *Crockett St / Hogan St* *
- **Edwards St / Burnett St** *
- **I-45 / Burnett St**
- **Louisiana St**
- **Milam St**
- *Main St*
- *Vine St*
- *San Jacinto St / Jackson St*
- **Walnut St**
- **Chapman St / William St**
- *McKee St*
- *Hardy St*
- *Elysian St*
- **Semmes St**
- **West St**
- *Jensen Dr*
- **Schwartz St / I-69**
- *Meadow St*
- **Bayou St**
- *Gregg St*

* To avoid double-counting, the four crossings where I-45 and I-10 run together are excluded from the count for I-10. They are only counted for I-45.

US-59/I-69 crossings, listed from west to east

We propose **18 new crossings** of US-59/I-69 to supplement *36 existing crossings*.

- *Main St*
- *Blodgett St*
- *Fannin St*
- *San Jacinto St*
- *Caroline St*
- *Wheeler Ave*
- *Austin St*
- *Eagle St*
- *La Branch St*
- *Cleburne St*
- *Crawford St*
- *Almeda St*
- **Chenevert St**
- *Alabama St*
- **Winbern St**
- **Berry St**
- **Holman St**
- **Francis St**
- **Stuart St**
- *Elgin St*

- *Tuam St*
- **Drew St**
- **Dennis St**
- *McGowen St*
- **McIlhenny St**
- **Hadley St**
- **Webster St**
- *Gray St*
- *Pierce St*
- *St Joseph Pkwy*
- *Jefferson St*
- *Pease St*
- *Leeland St*
- **Bell St**
- **Clay St**
- *Polk St*
- **Lamar St**
- *Rusk St*
- *Capitol St*
- *Texas Ave*
- *Preston St*
- *Congress St*
- *Franklin St*
- *Commerce St*
- *Ruiz St*
- *Runnels St*
- **Race St**
- *Buffalo Bayou Trail North*
- *Buffalo Bayou Trail South*
- *Jensen Dr*
- **Buck St**
- **Conti St / Green St**
- **Stonewall St**
- *Lyons Ave*