



Tiny Transit™: The Tipping Point

Introducing LEAN Mobility as a Transportation Alternative

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There are times when we need a convenient shortcut, a way to make a lot out of a little, and that is what Tipping Points, in the end, are all about.

— Malcolm Gladwell, *The Tipping Point: How Little Things Can Make a Big Difference*

Contact: Susan Engelking, Executive Director and Founder, 512/413-7750
Don Young, Strategic Advisor don@pecanstreetmedia.com

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EXECUTIVE SUMMARY

This white paper is written for Austin’s Mayor and City Council Members.

Austin has an extraordinary opportunity to develop a mobility alternative that is safe, low-cost, low stress, low speed, and low emission, making our city more livable and resilient. The solution is right in front of us if we will open our minds and *think small*.

Picture the micromobility you now see all around Austin. Bicycles and electric bikes. Standing scooters and Vespa-style scooters. Low Speed Vehicles (LSVs) on campuses. Golf carts in Kyle. We collectively call these modes “Tiny Transit.” The problem is if they are not protected, they are not safe. In a crash with a two-ton car, the car will always win.

Now think of the construction happening everywhere in Austin, on every arterial, filling in empty lots and teardowns, replacing parking lots, extending skyward, and the billions of dollars being spent.

What if we took this massive building boom and used it to incorporate a protected infrastructure for low-cost, low speed Tiny Transit into our transportation system—not just in Austin, but the Central Texas region. We call this *Low Emission Alternative Network (LEAN) mobility*.

Small U.S. cities from coast to coast are proving variations of this concept. [See the mayor of Peachtree City, Georgia](#) touring a visitor in a golf cart. Its 175-word ordinance requiring Multi-Use Paths in new developments is a reminder this does not have to be overly complicated.

Austinites take nearly 300,000 trips/month on dockless modes, demonstrating many people will choose low-cost, low speed modes if given the chance—even if they are unsafe. With a Vision Zero infrastructure to make them safe, we estimate 15% to 20% of Austinites might use LEAN mobility to get around town, possibly in combination with conventional cars and public transit, enabling a household to reduce its transportation costs by \$5,000+/year. Imagine what this could mean for a struggling family.

Imagine LEAN *Parallel Pathways* along light rail lines—*Light Trails*, we call them. The first/last mile problem of getting to transit stations becomes simpler. We must think differently about housing and mobility, and how they work together. A home that requires owning a car is increasingly unaffordable. With Parallel Parkways offering many access points, transit-oriented housing development would not be limited to areas near transit centers.

Everyone benefits when there are fewer cars on the road, teenagers have a safe mobility alternative, government costs less, our city is more livable, and our economy is more resilient.

Austin is at a precipice. If we start now, we can develop a *protected LEAN infrastructure valued at \$1 Billion by 2030* without government having to spend \$1 Billion, using Disruptive Financing: leveraging investments; redeploying assets; collaborating with neighborhoods, stakeholders, developers, employers, and Capital Metro; incentivizing change, and thinking small.

We’re at a tipping point. The economic case is so compelling that *we can’t afford not to do this*. In so doing, we can *also cut 500,000 metric tons of carbon emissions* by 2030.

The world of the Tipping Point is a place where the unexpected becomes expected, where radical change is more than a possibility. It is—contrary to all our expectations—a certainty.

— Malcolm Gladwell, *The Tipping Point:
How Little Things Can Make a Big Difference*

PROTECTED NETWORKS FOR LOW-COST, LOW SPEED MOBILITY

Austin, like most American cities is car-centric and struggling with our dependence on conventional cars. The latest spike in gas prices is extracting a painful toll on ordinary people just trying to get to work and back with enough left over for essentials. Add to that the fatalities and vehicle emissions sickening people and our planet. And all for what?

There is a safer, cheaper, more efficient alternative. You can witness it popping up in cities across the country—low-cost, low speed, low emission, low stress vehicles of all kinds that make up *micromobility*. We call these modes *Tiny Transit*, and young people are responding in droves. Here are a few Tiny Transit modes.



Golf Carts



Bicycles & E-Bikes



Low Speed Vehicles



Wheelchair LSVs



Tricycles & E-Trikes



Pedicabs



Scooters,
Seated & Standing



The many surprises you
see around Austin

As more people use micromobility, this helps *everyone who lives or works in Austin*—by relieving traffic congestion, reducing wastelands of parking lots, improving lives, reducing emissions, and helping to keep City government on a strong financial footing. For employers, it means employees can get to work easier, cheaper, and get home sooner to spend time with their families.

The problem is these modes are *dangerous when they conflict with full-size cars*. That's why a protected infrastructure we call a *Low Emission Alternative Network (LEAN)* is necessary. Only 10 to 20 percent of people feel comfortable enough to cycle in bike lanes, says City Beautiful in "Bike Lanes are Not Good Enough." Most people will not use micromobility of any kind or let their teenagers use it *unless it is made safe*. The next two pages show various kinds of barriers that can be installed to protect micromobility users from conventional-size vehicles.

Dockless Scooters

Dockless scooters are especially popular, with almost 300,000 trips/month in Austin. They are also exceptionally dangerous. From late April to May 2022, three people died in Austin in separate scooter crashes, including local graffiti artist, Adam Gaconnet, 32, struck by a drunk driver. Several more scooter users were hospitalized with serious injuries. Dr. Nicholas Steinour, Division Chief of Emergency Medicine at the University of Texas Dell Medical School, recently delivered a presentation titled, “Abolish E-Scooters. These Things are Dangerous!” at the 2022 Austin Trauma & Critical Care Conference. His emergency room alone sees six to ten patients a day with injuries from scooters, with the majority appearing at night and on weekends. One quarter of these injuries require surgical procedures. Nationally, over one quarter of scooter injuries are to the head and neck.

Still, Dr. Steinour believes scooters can be deployed responsibly, and we do too. The Institute recommends the City of Austin place a moratorium on their use until they can be made safe with improved design, helmets, rules of the road established and enforced, maximum speed of 10 mph, helmets required, training, and a City-wide plan to protect scooter riders from injury and death. We can take a page from the City of Seattle and its new comprehensive safety approach that includes sturdier scooter design, helmet distribution, and proven safety tactics. During a moratorium, we can also learn from scooter companies themselves about the measures they are taking. ⁽¹⁾

Protected Infrastructure

For scooters to be truly safe, they also need the protection of LEAN infrastructure, as do all micromobility modes. Public health demands it. From grade separation to movable low-cost water- or sand-filled barriers, there are a number of ways to protect vulnerable micromobility users.



Planters



Metal guard rails



Place making



Contiguous to public transit routes



Small tunnels



New and existing bridges



Beautiful bridges



Barrier arms



You might wonder, what if LEAN infrastructure is incorporated in a development but it is isolated and doesn't connect to a micromobility network? What do you really have? *An opportunity*. Consider the "fax machine effect." As Malcolm Gladwell writes in *The Tipping Point*, the first fax machine was expensive and worthless—until there was a second fax machine. And, then a third, and so on. It was the *network* that made the first fax machine valuable.

"We need to prepare ourselves for the possibility that sometimes big changes follow from small events," writes Malcolm Gladwell, "and sometimes these changes can happen very quickly."

AUSTIN'S OPPORTUNITY

Austin was America's fastest growing city for the period 2010 to 2020. Our city is now bursting at its seams, spilling out into sprawling suburbs in every direction—the entire region almost entirely dependent on conventional-size cars, SUVs, and pickup trucks.

Meantime, Austin's roads are nearly back to pre-pandemic traffic congestion. Pedestrians and bicyclists who dare to brave traffic are routinely struck and killed on Austin's roads. Altogether 122 people were killed and 500+ suffered life-altering injuries in 2022, the deadliest year in Austin's history.

Austin is a comfortable city for people who are comfortable. Not so much for the hundreds of thousands struggling to get a foothold, or just to get by, week to week, year to year. The working poor who cannot afford to own a car can spend four hours getting to and from a job *every day*. Or they may live anxiously, fearing the next car breakdown. Life is hard, and escalating costs are making it harder.

In Austin, there isn't a shared vision that includes physically protecting micromobility. There are more bicycle lanes, but a painted stripe on asphalt and flex posts do not physically protect cyclists from the average 4,000-pound vehicle. *Movability*, an employer-led organization working to reduce single occupancy car trips, knows it needs a better toolkit and it has to include *micromobility-made-safe*. But how exactly?

Limitations, even with billions to spend

Austin is poised to spend \$13.4 Billion on its freeway expansions and public transit systems—and it won't be enough to do the job. The two light rail starter lines, bus rapid transit line, and commuter rail line may come online sometime after 2030, a year when Austin is projected to have a population of more than 2.8 million people, with the projected addition of 600,000 more people. That's like adding a city the size of Baltimore City or Louisville to Austin. Growth is outstripping our plans.

How can we make these billions of dollars work most effectively to benefit more people?

The solution is right in front of us

The solution to Austin's mobility morass is right in front of us, in terms that a child can understand because a child's mind is open.



Young People
voting with their wheels, 300,000+ trips/month on dockless modes in Austin

Massive Spending
in all categories:
office, residential, mixed use, retail, corporate campuses, manufacturing, trails, highways, public transit, public works

Opportunity
to seize this moment to create a more resilient city, with livability and mobility for all

If Austin is to live up to its reputation for innovation, *then Austin transportation must change to offer a safe, low-cost, efficient alternative*. We believe Austin can achieve a remarkable transformation by 2030—not with massive additional debt, but with strategic decisions to seize this opportunity and enable LEAN mobility as a safe, viable alternative.

While this is a disruptive idea, it's not a strange idea. It has probably occurred in the back of the mind of almost anyone who has ever driven a golf cart, which helps explain its broad appeal.

Nothing so persuades a man to accept a novel idea as the sense that he already knew it to be true.

— Timothy Ferris, *Coming of Age in the Milky Way*

\$1 BILLION LEAN INFRASTRUCTURE BY 2030

What is possible for Austin by 2030?

- A \$1+ Billion protected infrastructure for micromobility.
- Broad public support for including a protected micromobility infrastructure in *all new construction and developments* including new subdivisions, office/commercial/retail/mixed use, public transit, highways, roads, bridges, and public works.
- 500,000+ metric tons of carbon emissions eliminated.

Disruptive Financing makes a \$1 Billion Infrastructure For Micromobility Possible By 2030

Year	Disruptive Financial Scenario		Conventional Bond Scenario	
	Value of Infrastructure	CO2 Cut (Metric Tons)	Value of infrastructure	CO2 Cut (Metric Tons)
2023	\$100 M	11,500	0	0
2024	\$200 M	35,000	0	0
2025	\$350 M	80,000	0	0
2026	\$500 M	150,000	Infrastructure could begin to come on line, depending on a number of factors	
2027	\$700 M	240,000		
2028	\$900 M	356,000		
2029	\$1 Billion	506,000		

The table presents our pro forma calculation. You will find our assumptions attached. We found that Austin can develop a Low Emission Alternative Network (LEAN) infrastructure *valued* at \$1 Billion, without actually spending \$1 Billion.

DISRUPTIVE FINANCING

You might be thinking, “How can Austin afford something like this?” It might surprise you to learn LEAN infrastructure can be built at a fraction of the cost of major transportation projects. Consider these costs:

- \$71 Million/mile for a new elevated four-lane highway
- \$70 Million for a flyover
- \$19 Million/mile for a new four-lane interstate highway with a two-lane underpass
- \$6 Million/mile for a new two-lane road with a wide shoulder
- \$3 Million/mile to widen a road from two to three lanes
- \$200,000 to \$500,000+ to install a new traffic signal

It’s staggeringly expensive, and aside from advances here and there, the U.S. has been doing it the same way for over sixty years. Transportation professionals are used to these costs. The people who manage these projects have the job of staying within the budget. And the budgets are gargantuan.

In comparison, rough cost estimates for elements of protected infrastructure are as follows:

- \$3.1 million/mile for 10-foot wide concrete sidewalk-quality path with guardrail (\$2.5 million concrete path plus \$600,000 for metal guardrail)
- \$780,000/mile up to \$4,300,000/mile for wide paved multi-use trail
- \$250,000/mile up to \$825,000/mile for wide unpaved multi-use trail
- \$240,000/mile to \$260,000/mile for adding new water-filled or sand-filled barriers to separate an existing road lane; used barriers cost even less
- A rounding error for incorporating LEAN infrastructure into a roadway corridor being redeveloped
- A rounding error for incorporating LEAN infrastructure into a highway project ⁽²⁾

If we approach LEAN infrastructure in the same way as conventional-size transportation infrastructure projects, it will never happen. But *Disruptive Financing* not only starts at lower price points, it flies in the face of how Austin usually plans and pays for infrastructure. Before long, you’ll realize, “We can’t afford *not* to do this!”

Municipal Finance at a Snail's Pace

First, a quick refresher on how Austin typically pays for transportation infrastructure. Like many Sunbelt cities, Austin can spend years working with the community, boards, and commissions to develop a bond proposal, and placing it on the ballot. Often, the business community raises money to pay for a campaign to sway voters to win the bond election. Sometimes opponents will fight it. If voters approve it, the City builds it, right? Not yet. The City must plan, budget, contract, and oversee the bond projects in phases. If costs have risen, it must scale back and reprioritize or go back to voters for more money. The City borrows money by issuing bonds and repaying the loan often over many years. There is an entire financial sector devoted to this kind of municipal finance that’s scarcely changed in sixty years.

The problem is, this process is lengthy. We don't have the time.

Disruptive Financing is a different way of thinking about paying for transportation infrastructure. Instead of working at a snail's pace with massive budgets. *Disruptive Financing* requires being willing to try *new ideas to speed things up and spend less*.

Austin needs a midcourse correction. *Disruptive Financing* makes this possible.

Proposed Game Plan

Disruptive Financing is bold. It recognizes opportunities. It values ingenuity and thrift. It learns from innovators, like Peachtree City, Georgia. It leverages investments and redeploys assets.

- Modify the **\$6.2 Billion in freeway expansion** to include LEAN infrastructure.
- **Create “Parallel Parkways”** with *Light Trails* running along all planned light rail lines and rapid bus lines. Develop the **Red Line Parkway** as a demonstration project.
- Inventory, intercept and **embed LEAN infrastructure in all developments**, public and private sector. Involve the **real estate industry** with **valuable incentives** that cost taxpayers next to nothing.
- Develop the **12-mile median along Loop 360** as a LEAN Parkway.
- Rethink **affordable housing** to mean it might not require owning a car.
- Take a page from Kyle to promote a **Central Texas LEAN metropolitan network**.
- **At the national level**, work with the U.S. Conference of Mayors to tell Washington, *We need a safe golf cart*, and *We need a safe, protected LEAN Infrastructure* to create a true Vision Zero alternative.

1. Modify the \$6.2 Billion in freeway expansions to include LEAN infrastructure.

The Texas Department of Transportation (TxDOT) plans to spend \$6.2 Billion to expand two Austin freeways. It is just common sense to incorporate LEAN infrastructure on these routes. Here is what is presently planned by TxDOT.

\$5.5 Billion to expand IH-35

\$4.9 Billion	Capital Express Central, expanding IH-35 to 20 lanes — 7.2 miles at a cost of \$680 Million/Mile , including a \$1 Billion tunnel under Lady Bird Lake
\$375 Million	Expanding IH-35 to the North
\$250 Million	Expanding IH-35 to the South

\$694 Million to build the Oak Hill Parkway Project

- This project widens six miles of Highway 290 to twelve lanes, at a cost of **\$115 Million/mile**.
- Expanding the bike lanes and sidewalk accommodations (already in the plans), to create LEAN networks would make these routes a *viable transportation alternative*.

Disruptive Financing

- Course-correct by seizing the opportunity to develop more than *twenty miles of LEAN infrastructure along well-traveled routes at no additional cost to taxpayers.*
- With construction underway on the **Oak Hill Parkway Project**, Austin must *pivot now*. It would be shortsighted to let this opportunity slip away. Once the freeway is built, it will be too costly to make the changes we need. Even as we watch the cement trucks, do not let anyone convince you it is too late. It is just in time.

2. Create Parallel Parkways with *Light Trails* along light rail and rapid bus lines.

There is a tremendous opportunity to create *LEAN Parallel Parkways* along transit lines. Capital Metro could acquire the land needed for *all* the planned light rail corridors ahead of schedule and transform them into *LEAN Parallel Parkways* with *Light Trails* for active modes and low-speed electric modes. This is a variation supporting the theme of the [Rails-to-Trails Conservancy](#): a nation connected by trails.

- Imagine people walking, cycling, riding electric bicycles, pedicabs, driving Low Speed Vehicles.
- This could quickly become popular, helping thousands of Austinites shift toward low cost, modes, relieving traffic for *everyone*. And what could be more *Austin* than free, safe, open air, choose-your-mode mobility in glorious weather?
- Parallel Parkways can become an *ideal platform for new low cost autonomous (self-driving) technologies* being developed and tested by companies in Austin.
- The cost of acquiring additional land would be a rounding error on an \$11.6 Billion Project Connect.

As currently planned, the distance between one Light Rail transit station and another is a sort of inaccessible zone. "Living on the Orange Line" may mean you can wave at it as it passes you by. You still must get to the light rail station, which could be a mile or more away.

- Imagine how easily people could reach a LEAN Parkway anywhere along a light rail route, and from there walk or use Tiny Transit to get to the station.
- With *Light Trails* in place, denser, transit-oriented housing developments can be built not only at transit stations, but all along the LEAN Parkways.

Disruptive Financing

- Acquire the right-of-way for light rail lines with sufficient width for LEAN Parallel Parkways.
- Develop and introduce *Light Trails* years before the first light rail lines are completed.
- Ask, how could Parallel Parkways be developed along Rapid Bus lines?

3. Support the Red Line Parkway Initiative.

Neighborhood organizers shouldn't have to dig deep into their own pockets to scrape together enough funds to advance this healthy, sustainable, replicable, low-cost, community-based initiative—the first Parallel Parkway. Capital Metro and the City of Austin could support this grassroots initiative so that it is fully developed and extended with spurs to more neighborhoods.

Disruptive Financing

- Capital Metro can leverage its investment in the Red Line to create a replicable model for *Parallel Parkways* and *Light Trails*.

4. Embed LEAN infrastructure in all developments planned or underway—public and private sector.

Every space or structure *that is not yet built* is an opportunity for Austin to develop a stretch of LEAN infrastructure at *no cost to taxpayers*. Once the "built environment" is completely built, that very low-cost opportunity is gone for at least a generation.

Consider the South Central Waterfront District, the Bergstrom Spur Trail Network, Colony Park, or any roadway corridor project. How much smarter it is to incorporate LEAN infrastructure.

The safest position for a project manager may be not to make waves, e.g., "The project is designed, we've held public hearings, no one asked for this, plans are finalized, we've solicited bids, contracts have been let. It's too late!" But it's *not* too late. "No one asked for this" is what greets virtually every paradigm shift. No one was asking for the iPhone, either. As Steve Jobs said, "Our job is to figure out what customers are going to want before they do."

Disruptive Financing

- Adopt an ordinance like that of Peachtree City, Georgia, which has 100+ miles of low-cost multi-use paths serving the 10,000 households that own golf carts.
- Inventory, intercept and embed LEAN infrastructure into the many planned private and public sector projects, developments, and districts.
- No parking space requirement should be lifted without requiring a corresponding investment in LEAN infrastructure.
- Connect all public projects to LEAN networks for easy access.
- Make the *RethinkX Transportation Report* required reading. Skeptics might think the brilliant minds of Tony Seba and James Arbib are wrong about the future—but what if they're *right*? [RethinkX on the future of transportation](#)

5. Develop the 12-mile Loop 360 median as a LEAN Corridor.

Years ago, the Texas Department of Transportation considered this median as a possible bicycle corridor because of the number of bicyclists killed along Loop 360. The idea was dropped. But the corridor remains, primed to be developed for bicyclists and micromobility users.

Disruptive financing

- This is a case of redeploying an existing high value, low-cost asset to expand capacity along a well-traveled corridor.

6. Rethink the meaning of affordable housing to include low-cost mobility.

A home that requires owning a car is increasingly unaffordable. We must think differently about housing and mobility and how they work together. What if we decide to *incorporate protected LEAN infrastructure into all new housing designs*—subdivisions, condominiums, apartments, senior housing, mixed use developments—so that going to work, school, or shopping doesn't automatically

call for a conventional-size car? Housing that *incorporates LEAN infrastructure in its design* makes that housing less expensive by eliminating the requirement of owning a car and the amount of space needed to park them.

Increased traffic is the biggest objection to accommodating denser housing. But LEAN mobility shrinks transportation's footprint, allowing denser, more affordable development with *less traffic*, safer speeds, and more green space.

Imagine Austin's talented architects and urban designers rethinking housing in this way.

Disruptive Financing

- It costs nothing to adjust our thinking. If for all practical purposes, new housing requires people to own a conventional-size car, no matter how cheap the housing is, it is not so affordable.

7. Involve the real estate industry with incentives that cost taxpayers next to nothing.

You cannot drive around Austin without being struck by the massive amount of construction underway and may wonder, "What about all the traffic this will generate?"

Forward-thinking real estate developers and property owners will understand how LEAN as a mobility alternative will make their developments more marketable and valuable.

What is needed are *incentives* to support LEAN development, like fast-tracking and variances that can *cost taxpayers next to nothing* yet make all the difference in a developer's calculus.

Disruptive financing

- Assemble a six-days/week multidisciplinary team to work with developers and property owners to negotiate incentives for incorporating LEAN infrastructure or right-of-way in each project.
- Provide developers with the specifications for LEAN infrastructure because *they* will be building and paying for it on their properties.

8. Take a page from Kyle for a Central Texas LEAN Metropolitan Network.

What if the growing cities and towns in Central Texas had the chance to connect with Austin and with one another via LEAN networks?

If the ride were autonomous and connected via Tiny Transit cars, at 20 to 25 mph, commuters could go places without the expense of a car, high gas prices, or traffic. They could work, teleconference, read, play games, or relax on the way to work on their own schedule.

Small cities can lead the way. The City of Kyle conducted a micromobility study, and it already allows residents to drive golf carts on city streets, made possible by legislation sponsored by former Mayor of Austin and State Senator Kirk Watson. Kyle is planning a pedestrian tunnel wide enough for golf carts under I-35. Kyle's City Manager said, "I wish we'd started this fifteen years ago."

Disruptive Financing

- Approach the cities of Kyle and San Marcos to participate.
- With CAMPO (the six-county metropolitan Planning Organization for Central Texas), connect our cities and towns via LEAN networks. CAMPO could invite proposals from cities and towns.

9. Enlist employers, large and small.

"Austin is a global epicenter for creativity and innovation."

— Hugh Forrest, Chief Programming Officer for SXSW.

We can tap our world-class employers to develop LEAN networks on and around their campuses.

Corporations and Number of Employees in Austin Metro Area

Dell	13,000	Tesla	5,000
Amazon	11,000	NXP Semiconductors	4,000
Samsung	8,900	General Motors	2,800
Apple	7,000	Indeed	2,600
IBM	6,000	National Instruments	2,600

These employers are primed to become *early adopters* of LEAN mobility. All of them struggle with the inadequacies of Austin's transportation system. All have employees who struggle with Austin's skyrocketing cost of living.

Disruptive Financing

- Working closely with *Movability, the employer-led mobility solution problem-solver*, encourage employers to incorporate LEAN infrastructure on their campuses, offering variances to encourage creativity at *no cost to taxpayers*.

10. Working with the U.S. Conference of Mayors, tell Washington, ***'We need a protected infrastructure, a safe golf cart, and incentives for Low Speed Vehicles.'***

We need a protected infrastructure designed for Vision Zero safety. The infrastructure needs specifications for size so that it can accommodate Low Speed Vehicles (LSVs), which are the maximum size on the micromobility spectrum.

The infrastructure needs to anticipate technologies like self-driving, geofencing, and charging.

Golf carts have risen in popularity, but they aren't safe. There are 15,000 golf cart-related injuries each year in the U.S. The U.S. Department of Transportation must make it a priority to issue standards for a new, safe golf cart.

- Lightweight, narrow, with a low center of gravity to prevent tipping over,
- Safety features not currently required of golf carts including visible headlights and taillights, three-point seat belts with shoulder harnesses
- Exterior colors limited to OSHA palette, reflective (to understand the importance, try your skill with this exercise: [test of selective attention](#))
- Hands-on class training required to obtain a permit

Imagine new safe technology applications:

- Autonomous (self-driving) technology

- Geofencing that stops a vehicle from leaving a designated route
- Connected technologies; think *chain of Tiny Transit cars*

Think innovation. With U.S. Mayors behind this, the U.S. government could expedite regulations as never before, issuing them in months, not years.

Austin-based Electric Cab North America with founder/CEO Chris Nielsen operates the largest fleet of LSV cabs in the U.S. With serious incentives and improved battery technology, Americans could discover what we already know about LSVs. The experience is most similar to a conventional-size car, but roomier than many cars. People who never thought they would drive Tiny Transit will learn how comfortable, ergonomic, and *inexpensive* sustainable transportation can be.

Disruptive Financing

- Reach out to the U.S. Conference of Mayors as a champion and change agent.
- Austin and Movability could host a "Pop Up Think Tank" to advance this initiative.

ECONOMIC CASE FOR LEAN MOBILITY

The economic effects of Tiny Transit and LEAN mobility can be quantified. Here, we consider fourteen qualities of cities with resilient economies and how they might improve.

- | | |
|--|--------------------------------------|
| 1. Affordable living | 8. Sense of community for seniors |
| 2. Public health for struggling families | 9. Public safety |
| 3. Connecting people and jobs | 10. Homelessness |
| 4. Health impacts of air quality | 11. Fiscal health of city government |
| 5. Affordable housing | 12. Keeping money in the community |
| 6. Small business opportunities | 13. A sustainable future |
| 7. Independent mobility for wheelchair users | 14. Reduced carbon emissions |

1) Affordable living. In Austin, families must spend 20+ percent of their income on transportation. It's reasonable to estimate that a family making \$60,000 a year could reduce its transportation expense by \$5,000 a year or more.⁽³⁾ Imagine what that \$5,000 in savings can mean for that struggling family—books, athletics, tutors, braces, healthier food, bountiful holidays, savings, college tuition, and the ability to rest their minds as financial stress eases.

2) Public health for struggling families. Struggling families do not spend \$9,600/year; they scrape by on far less. You can reasonably estimate that 10 percent of a city's households will be able to save around \$4,000 a year. This is equivalent to a pay raise of \$2.00 an hour for a forty-hour/week job. Assume 40,000 of Austin's 400,000 households are struggling, and 25 percent of those take advantage of this mobility alternative. That amounts to a collective *savings of \$40 Million/year* for those 10,000 households. Over ten years, their savings total is *\$400 Million*.

What does this mean for public health? Consider this analysis by Matthew Desmond, the Pulitzer Prize winning author of *Evicted: Poverty and Profit in the American City*. He explores the question, “When low-wage workers receive a pay increase, how does that affect their lives?”

They have fewer unmet health needs.	They sleep better.
They smoke less.	They eat healthier.
Child-neglect reports are reduced by 10 percent.	They are less likely to be evicted.
There is a decrease in low-birth-weight babies.	They are happier.
Teen alcohol consumption declines.	Their mental health improves.
Teen birth rates decline.	They exercise more.
There are fewer adverse health conditions.	There are fewer premature deaths.
They are more likely to have a means of transportation to get to work.	

Desmond looked specifically at the impact of an increase in the minimum wage. He found that an increase of even \$1 in the minimum wage can have an impact on public health.

Poverty can be unrelenting, shame-inducing, and exhausting. When people live so close to the bone, a small setback can quickly spiral into a major trauma. Being a few days behind on the rent can trigger a hefty late fee, which can lead to an eviction and homelessness. An unpaid traffic ticket can lead to a suspended license, which can cause people to lose their only means of transportation to work. In the same way, modest wage increases have a profound impact on people’s well-being and happiness.

— Matthew Desmond, “Dollars on the Margin,”
The New York Times, February 21, 2019

Safe, low-cost mobility allows many more people who lack the most basic resources to gain access to education, better jobs, and economic opportunities. Instead of being marginalized, low income families can more fully participate in our city's economy, improving public health and benefiting everyone.⁽⁴⁾

3) Connecting jobs and people. People need good jobs, and employers need good employees. The problem is, a low-to-modest income employee in Austin has difficulty living without a car.

What about public transit, you may ask. For three months, Institute founder Susan Engelking did not drive in Austin, Texas, living the life of a low-to-modest income worker.

It was more punishing, arduous, and time-consuming than I had imagined. By car, I could drive the twelve miles to my job in 30 minutes each way. But using public transit required two or more transfers, two hours each way, each day. Four hours total. It required walking over three miles and spending over two hours in the cold, rain, and wind—all to average six mph. I woke up at 5:15 a.m. for a job that started at 8:30 a.m. When a bus ran late, I was late to work. When my work ran late past the last light rail train, I would call one of my friends to pick me up, or I took Lyft or Uber to a bus stop nearer to home. I came to know wonderful people on the bus, drivers and especially riders. Most couldn't afford to drive a car or be late to work or take Lyft or Uber if they missed their connection, like I could. At the end of three months, I weighed ten pounds

less and was physically exhausted, but I had experienced and witnessed so much. Never have I felt more committed to safe, protected networks for micromobility users as a universally available mobility alternative. It is *needed*.

— Susan Engelking, Executive Director and Founder
Institute for Community MicroMobility

Some have questioned whether people will use micromobility at a maximum of 20 mph when they could be driving 45 to 60 mph. A lot of people will never drive Tiny Transit, and we understand that. But for people living on no-frills budgets, *20 mph with independent mobility* could mean dramatic improvements in their lives and help keep more middle and low-income residents in Austin. The ability to eliminate a bus transfer.... to stop driving a gas-guzzling clunker.... to leave for work *after* dawn and get home *before* dark... to greatly reduce the expense of a second family car.... to know that family members are safe from bad drivers. When employees can get to work on time, they make better, more dependable, more optimistic employees.

4) Health impacts of air quality. Poor air quality aggravates asthma, lung damage, cardiopulmonary function, and other health conditions. Shifting even ten percent of within-city driving toward LEAN mobility can help cut our region's harmful emissions. After all, who wants dirty air?

5) Affordable housing. A house that requires owning a car is increasingly unaffordable for low and middle income families. Imagine the relief of having enough money to meet basic needs without worrying about \$4.50/gallon gas. *That* is affordable housing.

6) Small business opportunities. A Low Speed Vehicle (LSV) can make it possible to start or grow a small business like landscaping, pet care, ice cream truck, or handyman services. A pedal-assist pedicab can allow a person to make money driving her neighbors to the grocery store and back. A parent can drive a tiny shuttle along a protected path to the elementary school on a route that lacks enough riders to justify a bus.

There will be more opportunities downtown to enhance place-making with mini-food trucks, to enrich the visitor experience with pedicabs and e-cabs. Micromobility-made-safe can make downtown livelier, friendlier, safer, less expensive, and easier to get around, with earning opportunities for locals.

7) Independent mobility for wheelchair users. Micromobility can revolutionize access for people with disabilities. Austin attorney and entrepreneur Stacy Zoern Goad developed Kenguru, a Low Speed Vehicle (LSV) that a wheelchair user can roll into from an automated rear ramp. The wheelchair becomes the driver's seat.

Not only can a vehicle of this type improve the quality of life for wheelchair users, it can save taxpayers money. Consider that Capital Metro can spend as much as \$75,000 a year to serve a wheelchair user with van service. What if that cost could be cut in half by providing wheelchair users with adapted LSVs while using a van service for other trips? Capital Metro could *give* wheelchair users a Kenguru-style vehicle and still come out ahead since the car could pay for itself within the first year. Imagine what this could mean for veterans who use wheelchairs.⁽⁵⁾

8) Sense of community for seniors. Marion, a nurse in her 60s, can't wait for LEAN mobility, declaring, "My children can never take away the keys to my self-driving tiny car!" Aging drivers can be a danger to themselves and others. Quitting driving can lead to isolation, loneliness, and deteriorating health. But people like Marion are looking forward to Tiny Transit. The American Association of Retired Persons (AARP) is now promoting protected networks.

Want to cycle in the city but traffic freaks you out? A trend toward protected bike lanes—separated by concrete barriers, planters or parked cars—may calm your fears. Wes Marshall, a University of Colorado civil engineering professor who led a study on protected lanes, says, "Bicycling goes from being a mode of transportation for the brave and nimble to one that almost anyone between 8 and 80 can use.

— "A Lane of Your Own: Protected Lanes Make Riding a Bike Safer," *AARP Magazine*, February 2022

9) Public safety. We interviewed a former chief executive at Amtrak who told us about a meeting with his senior staff following a deadly crash. He listened as they tried to process what Amtrak's position should be. Finally he spoke. "Our position is: *We do not kill our customers.*"

Shouldn't we ask the same of Austin's transportation system? *We do not kill our constituents.*

2021 was the deadliest year ever on Austin roads, with 116 people killed and 518 people suffering life-altering injuries. 2022 is turning out to be just as deadly. Where is the outrage? LEAN mobility must be Vision Zero—zero fatalities and life-altering injuries. Anything less is unacceptable.

What is the economic benefit of providing a *Vision Zero* alternative that saves lives? Professionals who calculate such things tell us that the value of a life saved is at least \$1 Million.

10) Homelessness. We cannot solve homelessness without also solving mobility. Low-cost mobility goes straight to the roots of homelessness. "The number one cause of homelessness in the U.S. is the catastrophic loss of family," says Mobile Loaves & Fishes founder Alan Graham. Loss of family often means loss of transportation, leading to a downward spiral. Low-cost, low speed, safe mobility combined with public transit can help restore dignity and independence.

11) Financial health of City government. "Transportation is getting worse and costing more. We are trading short-term growth for long-term liabilities that are slowly bankrupting us. We deserve better," says Strong Towns founder Charles L. Marohn Jr., author of *Confessions of a Recovering Engineer: Transportation for a Strong Town*. LEAN infrastructure costs a fraction of conventional roads and highways. We must be more mindful of whether future generations can afford the debt and the world we are passing on to them.

12) Keeping money in the community. When people buy gasoline, that money leaves the community. Whether they are spending \$1,000/year or \$5,000/year on gas, that money is exported to oil companies and countries that produce oil. The money is just gone. And the gas it bought is gone.

So much money has recently moved into Austin that it might not seem important to keep money here. But it is, especially for those people who earn their livings in the service economy.

If LEAN mobility cuts gas use in half, how much more money potentially stays in the community?

Consider these examples of typical drivers

10,000 miles at 25 mpg = 400 gallons at \$4/gallon = \$1,600/year on gas	\$800/year
15,000 miles at 20 mpg = 750 gallons at \$4/gallon = \$3,000/year on gas	\$1,500/year

In a healthy economy, money recirculates. When 5,000 households each retain \$1,000/year, that is potentially \$5 Million each year toward a more vibrant economy.

13) A sustainable future. To be sustainable, a city must offer affordable, climate-conscious lifestyle possibilities that do not require owning a car. Tiny Transit supports this. It also reduces waste, energy consumption, and transportation’s impact on the environment.

14) Reduced carbon emissions. A conventional-size gas-powered car emits about *4.5 metric tons of carbon each year*. In contrast, electric micromobility uses less energy than your refrigerator. Substituting micromobility for conventional vehicles dramatically cuts carbon emissions.

The Resilience Questionnaire

We developed this tool to predict the positive economic impacts of a LEAN mobility alternative in Austin. Here's how it works. *First*, plot your thinking on how your city would rate on each quality *today*. Mark that number. *Next*, plot your thinking on how your city would rate *once LEAN mobility becomes a viable alternative for people*. Mark that number. Do this for all fourteen qualities. *The difference is our city's gain*.

We like this approach because it’s easy to understand and anyone can participate. It’s designed to spark thoughts and conversations. Below is an example of the questionnaire filled out by an Austin resident.

Qualities of Cities with Resilient Economies	worst best									
1. Affordability living	1	2	3	4	5	6	7	8	9	10
2. Public health for struggling families	1	2	3	4	5	6	7	8	9	10
3. Connecting people and jobs	1	2	3	4	5	6	7	8	9	10
4. Health impacts of air quality	1	2	3	4	5	6	7	8	9	10
5. Affordable housing	1	2	3	4	5	6	7	8	9	10
6. Small business opportunities	1	2	3	4	5	6	7	8	9	10
7. Independent mobility for wheelchair users	1	2	3	4	5	6	7	8	9	10
8. Sense of community for seniors	1	2	3	4	5	6	7	8	9	10
9. Public safety	1	2	3	4	5	6	7	8	9	10
10. Homelessness	1	2	3	4	5	6	7	8	9	10
11. Fiscal health of city government	1	2	3	4	5	6	7	8	9	10
12. Keeping money in the community	1	2	3	4	5	6	7	8	9	10

13. A sustainable future	1	2	3	4	5	6	7	8	9	10
14. Reduced carbon emissions	1	2	3	4	5	6	7	8	9	10

Notice the difference between each of the two numbers. That difference suggests a positive economic effect. Ask others to fill it out, and you may begin to see points of agreement. Here is how it works if several people are taking the survey.

Characteristics	Alicia	Bianca	Carlos	Darius	Total	Average
1. Affordability for all	+2	+4	+3	+4	+13	+3.25
2. Public health for struggling families	+2	+6	+4	+3	+15	+3.75
3. Connecting people and jobs	+4	+6	+5	+4	+19	+4.25
3. Health impacts of air quality	+2	+6	+5	+4	+17	+4.25
4. Affordable housing	+2	+3	+2	+5	+12	+3
5. Small business opportunities	+1	+2	+3	+2	+8	+2
6. Independent mobility for wheelchair users	+6	+5	+7	+4	+22	+5.5
7. Sense of community for seniors	+2	+2	+4	+3	+11	+2.75
8. Public safety	+2	+3	+3	+4	+12	+3
9. Homelessness	+2	+3	+3	+2	+10	+2.5
10. Fiscal health of city government	+3	+5	+4	+4	+16	+4
11. Keeping money in the community	+1	+2	+2	+3	+8	+2
12. A sustainable future	+3	+2	+3	+4	+12	+3
13. Reduced carbon emissions	+3	+3	+4	+6	+16	+4

If you want to know more about this survey tool, please feel free to contact us.

OUR MAYOR & COUNCIL CAN SPARK THIS CHANGE

We've been told, "You can't change the geometry of transportation."

Of course you can.

Think back to when the automobile disrupted the horse-and-buggy. The barriers to adoption were enormous. There wasn't a single gas station in America. There were few surfaced roads anywhere. There were no mechanics. No one knew how to drive. Our forebearers started from nothing and had to build everything in a world that moved much more slowly than our world today. And yet with all of these obstacles to overcome, in the twenty years between 1905 and 1925, cars increased to 95 percent of all vehicles on the road.⁽⁶⁾

When someone says this can't be done and the obstacles are too great, remind them what America achieved just over a century ago. We've done more difficult things than this.⁽⁷⁾

1. Declare a mobility opportunity.

We can shift 15 to 20 percent of within-city trips to a LEAN network by making it truly safe, enticing, easy to access, low-cost, and quick to implement. Take it to the people with a traveling pop-up showcase where people can go to learn about the opportunity. Develop demonstration routes complete with LSVs, golf carts, pedicabs, seated scooters, bicycles, and more, so people can experience what is possible.

2. Support the growing grassroots movement.

Evidence of this grassroots movement is popping up all around us. Encouraging it can do a tremendous amount to advance the cause.

- **Develop the Red Line Parkway as a priority demonstration project.**
- **Invite neighborhoods to apply** to be among the first in the city to be served by LEAN infrastructure.
- **Offer education and opportunities for the public to have a voice.** The *Resilience Questionnaire* is a first step. After all, *everyone* has experience with our transportation system. **Post downloadable maps** for all sections of the city so people have a common visual way to share their ideas. **Invite children and teenagers** to participate, for who has more at stake?
- **Learn from the City of Kyle** in its determination to get ahead of growth with a micromobility infrastructure.

3. Require LEAN infrastructure to be incorporated in all new construction and development, public and private.

Using the Peachtree City, Georgia, Multi-Use Paths ordinance as a starting point, require all new developments incorporate LEAN infrastructure. (See attached draft.) Remember, an imperfect ordinance can be a stopgap or interim measure to be modified later. The point is to get an ordinance in place before more time and opportunities slip away.

A standard LEAN lane should be enough for Low Speed Vehicles and active modes to pass without conflict. Where the terrain does not allow, it can be narrower and consequently slower.

Who will welcome this? Employers, large and small. Innovative developers. Safety-minded and sustainability-minded transportation professionals. Citizens concerned about climate change, including the vast majority of young people. Public transit and Project Connect supporters. Wheelchair users. Affordable housing proponents. The working poor and those who care about them. Parents of preteen soon-to-be drivers, who are right to be worried. Anyone concerned about the deadly danger of driving, cycling, scootering, or walking along Austin roads. Any taxpayer concerned about rising property taxes and bonded indebtedness. Any taxpayer who is skeptical or has lost faith in the ability of government to get it right. Anyone worried about the potential of large stranded investments to burden the next generation. Basically, everyone who cares about their own future and the future of our community.

4. Intercept all developments, planned or underway, public and private, to incorporate LEAN infrastructure.

Identify all developments—public sector projects (including parks, roads and trails), private sector projects including office, retail, mixed-use development, master-planned developments, corporate campuses, infill developments. This inventory is your call list for reaching out to communicate directly with the decision-makers on each project to present the opportunity to participate in developing Austin’s LEAN network by incorporating LEAN infrastructure into these projects. Provide early adopter incentives for all project decision-makers that get the attention of everyone else. It is through this process that Austin will develop sensible, practical ways to incorporate LEAN networks into developments that make them more marketable.

No parking space requirement should be lifted without requiring a corresponding investment in the protected infrastructure for this safe, low-cost mobility alternative.

A warning that the kneejerk reaction will be to say it is “too late.” It’s understandable; no developer wants to give up certainty for uncertainty with the City of Austin. That is why the City’s negotiation team must be highly experienced and authorized to act and conclude deals quickly.

5. Connect with the U.S. Conference of Mayors.

If anyone can turn the mega-ton barge that is the transportation industry's commitment to the status quo, it is our nation's mayors. If anyone can get the U.S. Secretary of Transportation and the U.S. Climate Envoy to accelerate specifications for a safe golf cart, and to develop universal standards for LEAN infrastructure, it is our nation’s mayors. If anyone can surmount complex obstacles like exposure of engineers to liability, it is our nation's mayors. U.S. mayors are America's best hope because they've demonstrated they can work together, support one another, bond across parties, and get things done.

Helen Keller perhaps said it best. "Alone we can do so little. Together we can do so much."

CONTACT

Susan Engelking, Executive Director and Founder
Institute for Community MicroMobility, a 501(c)(3), based in Austin, Texas
engelkingsusan@gmail.com – 512/413-7750

Don Young, Strategic Advisor
don@pecanstreetmedia.com – 512/431-0883

ATTACHMENTS

- A. About the Institute for Community MicroMobility
- B. Draft Ordinance to Incorporate LEAN Mobility Infrastructure in All Future Developments
- C. Example of Simplicity: LEAN Network Can Connect MetroRail Station on 4th Street
- D. Climate Change: With Tiny Transit, Austin can help the world shift to a low carbon emissions future.
- E. Pro Forma Calculations
- F. Endnotes

Institute for Community MicroMobility

Our world is reeling, and there is a way forward. The Institute is a nonprofit 501(c)(3) focused on helping cities improve livability and economic resilience by *thinking small*. We promote *protected networks for low-cost, low speed, low emission, low stress modes of transportation*. This shift can improve mobility while cutting the average household's transportation budget by 25 to 75 percent or more, essentially a pay raise that costs nothing. For many people, this can be a lifeline.

The prime directive is safety. Small, efficient, vulnerable modes must be protected from conventional cars. A **Vision Zero** infrastructure is the key to rapid, widespread adoption. We promote LEAN infrastructure for cities, which can be developed quickly and at a fraction of the cost of major transportation projects, by redeploying existing assets and incorporating the infrastructure into roadway and transportation plans and new developments. We have developed a tool for cities to *make the economic case for LEAN mobility*. The economic benefit is so compelling that *cities may realize they can't afford not to do this*.

The Institute's board members are Nan McRaven, EdD, Marie Crane, PhD, and Catherine Crago. Author Pamela Ryan, PhD, attorney Gail Papermaster, and consultant Don Young are strategic advisors. The Institute is based in Austin, Texas.

Our vision is a world in which all people can get everywhere they need to go within their communities using a low cost, low emission, low speed Vision Zero mobility alternative. We envision a protected infrastructure, free like sidewalks, that becomes a city-wide platform for low-cost autonomous technology innovation.

Susan Engelking, Executive Director and Founder

Early in Susan's career, she was project manager for the **SRI Report**, "Creating an Opportunity Economy," developed by the Austin Chamber of Commerce. This blueprint broke through the common practice among cities of *recruiting* companies, to focus instead on creating a livable environment to *attract* companies, technology innovators, and entrepreneurial talent. Susan has the distinction of having served as senior editor for each of the next two consecutive long-range economic development plans for Austin spanning twenty years. She directed Austin's first Target Market Program and first National Public Relations Program. In 2000, she was retained by Austin 2010, an organization of business leaders, to imagine and describe Austin a decade into the future.

Susan is the executive director and founder of the **Institute for Community MicroMobility**, a nonprofit 501(c)(3) created to help cities become more livable and resilient by creating safe networks for low cost micromobility—like electric bikes, scooters, golf carts, and Low Speed Vehicles (LSVs). She is the author of *Tiny Transit: Cut Carbon Emissions In Your City* and the forthcoming *Resilience: The New Livability Playbook for Mayors*.

Susan's background is economic development. She was one of the first women in Texas to become a nationally Certified Economic Developer. As principal of Engelking Communications LLC since

1998, Susan has performed hundreds of projects for a wide range of demanding clients. An annual report she produced was named one of the top ten U.S. annual reports that year by the Stevie Awards®. For seven years, she was a senior account executive for public relations and public affairs with Staats Falkenberg & Partners.

Straight out of graduate school, Susan was Council Aide to Austin City Council Member Lee Cooke, who later was elected mayor. That is where she discovered Jane Jacobs and the field of economic development.

Because friends had lost children on Austin roads, Susan developed an expertise in roadway safety. This led to her founding Tiny Transit Strategies, where she began the work on LEAN mobility that led her to found the Institute.

As a community leader, Susan served three terms as President of the Austin Children's Museum and was instrumental in its evolution to become the Thinkery. She developed an expertise in capital campaigns that led her to advise several nonprofits. She was mentored by the late Ralph Frede, a legendary Texas fundraiser. She is an associate of M. Crane & Associates consulting firm, which assists nonprofits on strategic issues. Susan served as treasurer for Dr. Nan McRaven's four successful campaigns for election to the Board of Trustees of Austin Community College District (ACC) during a period of rapid growth for both ACC and Austin. As a mobility disruptor, she organized a panel selected for SXSW 2020, *Six Ways Micromobility Revolutionizes Design*.

Susan was named Austin Communicator of the Year by Women Communicators of Austin. In 2023 she was named to Austin's list of 50 Women We Admire.

She has a Master's degree from the LBJ School of Public Affairs at the University of Texas at Austin and B.S. in Education, also from UT Austin, magna cum laude. She was named one of the 25 Most Outstanding Student Teachers in Texas, and today she continues to tutor young students. Since 2021, Susan is the office director for an Executive Vice Chancellor at ACC.

Susan has two teenagers, Tyler and Jack. In 2018, Tyler survived being struck by a car while he was walking his bicycle in a crosswalk across Barton Springs Road. Susan is happiest as a change agent.

Draft Ordinance to Incorporate LEAN Infrastructure in All Future Developments

The goal is to incorporate LEAN infrastructure in all new developments and subdivision at no cost to existing taxpayers. This draft ordinance amending the Land Development Code is modeled on that of Peachtree City, Georgia. This doesn't need to be complicated. It doesn't need to be 50 pages, or even 10 pages.

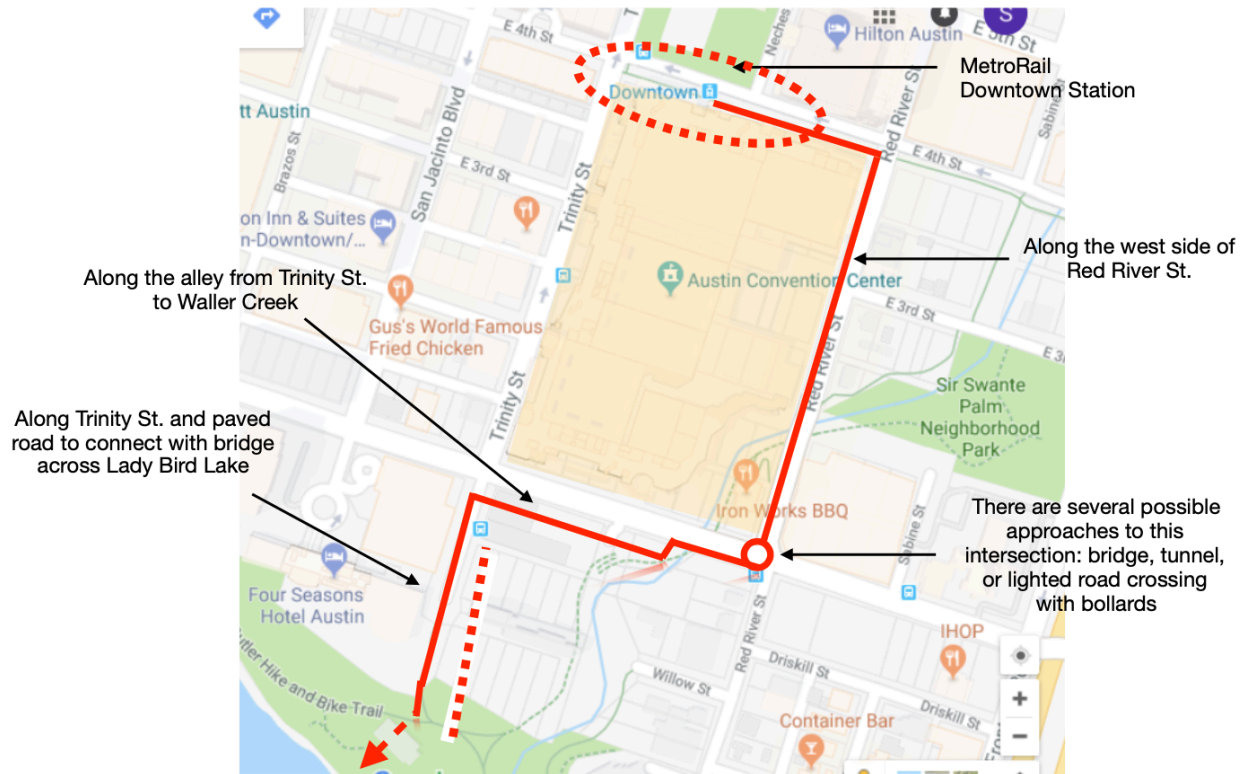
LEAN Multi-Use Micromobility Paths

The planning commission shall require Low Emission Alternative Network (LEAN) Mobility Multi-Use Paths, in order to facilitate pedestrian, Low Speed Vehicle, golf cart, pedicab, bicycle, scooter, and other micromobility modes, access from residential and commercial developments to schools, parks, playgrounds and other city amenities via these Paths. If, at the time of conceptual approval, there are no completed LEAN Mobility Multi-Use Paths to which the paths of the proposed developer can be linked, the planning commission shall require that the developer, in lieu of installing the LEAN Mobility Multi-Use paths, dedicate the easements and deposit a cash payment with the City equal to the cost of installing the LEAN Mobility Multi-Use Paths. This cost shall be determined by the City engineer. Such deposit shall be placed in a LEAN Mobility Construction Fund to be established by the city council. When the LEAN Mobility Multi-Use Paths are extended to the boundary of the development, the city council will use the deposit to construct the LEAN Mobility Multi-Use Paths in the development. (175 words)

With this language, In one stroke, you have incorporated LEAN mobility into your city's land development code, benefiting everyone in your city long into the future. You have created a requirement that new developments include LEAN Mobility Multi-Use Paths, and you have created a LEAN Mobility Construction Fund.

Example of *Intentional Simplicity*: LEAN Network Can Connect MetroRail Station on 4th Street

Here you see a LEAN Lanes extending from Lady Bird Lake to the MetroRail Downtown Station. There is adequate road capacity and only barriers are needed for all but the Red River/Cesar Chavez intersection.



Climate Change: **With Tiny Transit, Austin Can Help the World Shift to a Low Carbon Emissions Future.**

Whatever is new and cool in the U.S. has a way of spreading across the world. Nowhere is this more evident than in transportation. Other countries have copied our roads, highways and bridges. They've adopted our "geometry of transportation." In developing countries, owning a car is prestigious. The more prosperous these countries become, the more they double down on the U.S. model for ground transportation.

Yes, there are bicycles capitals like Copenhagen and [Amsterdam](#), with its microcars. What makes the European bicycle cultures possible is *infrastructure*—just as infrastructure makes Tiny Transit viable. But by and large, even as they experience the advantages of bicycles, pedicabs, and jitneys, developing countries continue to emulate U.S. car-centric transportation.

Why is U.S. leadership so important? Here's what is happening in the world right now. ***Every month, a new city surpasses the size of Manhattan.*** The rate of growth of these cities—thirty-six new "Manhattans" in just three years — is accelerating as people move from rural areas to cities in search of jobs and opportunities. Imagine the many challenges these burgeoning cities are facing.

We in the U.S. have a moral obligation to develop new, sustainable *micromobility alternatives* so cities around the world can cost less, pave less, and emit less carbon—and in so doing become more resilient, healthier, and livable for all. With this one action—developing a replicable Tiny Transit mobility alternative—Austin can add momentum to a budding movement that can help lead the *world's* "new Manhattans" toward a sustainable, prosperous, low carbon emission future.

A French disruptor has developed the Gazelle, a lightweight fiberglass conventional-size solar-powered electric car with a chassis so simple, it has ten parts. The car can be shipped in boxes and assembled like Lego bricks in developing countries with a mobile micro-factory made of shipping containers and costing \$300,000. Designer Gael Lavaud calls the approach "intentional simplicity," and we can learn from it.⁽⁸⁾

We believe there cannot be timely, dramatic improvements in cutting carbon emissions from ground transportation worldwide *without* the U.S. offering a low emission mobility alternative that conserves land, preserves natural habitats, and allows us to rethink land use.

There is a secondary global impact as well. Going LEAN will reduce the world's future demand for steel, cement and asphalt to build roadways. Making steel, cement and asphalt accounts for *10 percent* of the world's carbon emissions.

If now is not the time to act, with our world imperiled, then when?

Pro Forma Calculations

Below are the assumptions behind this pro forma. Reasonable people may have very different assumptions. There are many variables. But we believe that the table is well within an order of magnitude of what is possible. To err on the conservative side, we have judged our numbers down.

Disruptive Financing Makes a \$1 Billion Infrastructure For Micromobility Possible By 2030

Year	Disruptive Financial Scenario		Conventional Bond Scenario	
	Value of Infrastructure	CO2 Cut (Metric Tons)	Value of infrastructure	CO2 Cut (Metric Tons)
2023	\$100 M	11,500	0	0
2024	\$200 M	35,000	0	0
2025	\$350 M	80,000	0	0
2026	\$500 M	150,000	Infrastructure could	
2027	\$700 M	240,000	begin to come on line,	
2028	\$900 M	356,000	depending on a	
2029	\$1 Billion	506,000	number of factors	

Value of Infrastructure under Disruptive Financial Scenario (Assumptions and Breakdown by Year)

	Constant Ave. Value	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7	
		2023		2024		2025		2026		2027		2028		2029	
		#	Total	#	Total	#	Total	#	Total	#	Total	\$	Total	#	Total
Project ave. \$50,000 value	\$50,000	20	\$1,000,000	40	\$2,000,000	40	\$2,000,000	40	\$2,000,000	40	\$2,000,000	40	\$2,000,000	40	\$2,000,000
Projects ave. \$1M value	\$1,000,000	5	\$5,000,000	10	\$10,000,000	20	\$20,000,000	20	\$20,000,000	20	\$20,000,000	20	\$20,000,000	20	\$20,000,000
Corp. campus/mx use @\$15M	\$15,000,000	4	\$60,000,000	4	\$60,000,000	5	\$75,000,000	5	\$75,000,000	6	\$90,000,000	6	\$90,000,000	6	\$90,000,000
Subdivisions ave. \$10M	\$10,000,000	2	\$20,000,000	3	\$30,000,000	3	\$30,000,000	3	\$30,000,000	4	\$40,000,000	4	\$40,000,000	4	\$40,000,000
Major highways/roads	n/a		\$20,000,000		\$30,000,000		\$50,000,000		\$50,000,000		\$50,000,000		\$50,000,000		\$50,000,000
Total			\$106,000,000		\$132,000,000		\$177,000,000		\$177,000,000		\$202,000,000		\$202,000,000		\$202,000,000
Cumulative Total			\$106,000,000		\$238,000,000		\$415,000,000		\$592,000,000		\$794,000,000		\$996,000,000		\$1,198,000,000
Cumulative Total rounded down			\$100,000,000		\$200,000,000		\$350,000,000		\$500,000,000		\$700,000,000		\$900,000,000		\$1,000,000,000

CO2 Cut (Metric Tons) and Reduction in Conventional Cars on the Road under Disruptive Financial Scenario (Assumptions and Breakdown of Reductions by Year)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
	2023	2024	2025	2026	2027	2028	2029
	CO2 cut	CO2 cut	CO2 cut	CO2 cut	CO2 cut	CO2 cut	CO2 cut
Carbon Emissions reduced (metric tons)	11,500	23,500	45,000	70,000	90,000	116,000	150,000
Cumulative reduction in carbon emissions	11,500	35,000	80,000	150,000	240,000	356,000	506,000
Reduction in conventional cars on road/year	2,555	5,222	10,000	15,555	20,000	25,777	33,333
Cumulative reduction in conventional cars	2,555	7,777	17,777	33,332	53,332	79,109	112,442

*A conventional car emits on average 4.6 metric tons of carbon dioxide CO2/year. This assumes that it has a fuel economy of about 22 miles per gallon and drives around 11, 500 miles/year. To err on the conservative side, we use 4.5 metric tons.

Endnotes

- (1) “With its test period wrapped and parking ‘improved,’ Seattle hands out new scooter share permits,” [Capitol Hill Seattle Blog](#), May 13, 2022.
- (2) Sources: Pedestrian and Bicycle Information Center University of North Carolina at Chapel Hill’s Highway Safety Research Center (HSRC); Florida Department of Transportation, Cost per Mile Models Long Range Estimating; CTAM Cable Ties and More (CTAM); other vendor price lists; extrapolating cost from 4-foot wide sidewalks and paths to 10-foot wide paths.
- (3) To validate this number, you could come at the question in a different way. Take the average cost to own, operate, insure, repair, and maintain a conventional-size car, \$9,600/year according to AAA, and comparing it with the annual cost of using micromobility combined with other modes (public transit, carpooling, shared ride services) in the range of \$1,200 to \$5,000 a year. That’s a savings of \$4,600 to \$8,400 a year.
- (4) The Institute mentored two yearlong public health class projects at the University of Texas at Austin, taught by Veronica Young, PharmD, MPH, and founding director of the Center for Health IPE in the College of Pharmacy. Student teams researched the potential impact of a LEAN mobility alternative on public health. They found a multitude of potential benefits revolving around its stigma-free low-cost and easy, hop-in availability. The teams found the potential to improve lives especially for low-income seniors, people with mobility impairments, and people experiencing loneliness. These two projects were the first the teams could find anywhere that researched public health impacts of a protected infrastructure for micromobility.
- (5) There are *85,000 U.S. veterans* in wheelchairs across America. Imagine how dramatically their lives could improve with low-cost, independent mobility. Austin could demonstrate its viability. [Wounded Warrior Project](#)
- (6) James Arbib from London in an interview in May 2020. James Arbib and Tony Seba cofounded [RethinkX](#), an independent think tank focused on the future. [RethinkX Transportation Report](#) begins, “We are on the cusp of the fastest, deepest, most consequential disruption of transportation in history.”
- (7) Visionary change-makers are often laughed at by industry insiders. [The Power of the Outsider](#) (2:37) tells the story of a man whose idea for container shipping revolutionized global transportation.
- (8) “French company hopes its low-tech, easily assembled EV will revolutionize carmaking,” National Public Radio Marketplace, June 22, 2022.

