

Voting with Your Dollars: Engineering for Public Safety and Health

How Civil Engineers Can Choose Safer, Smarter Projects in Texas

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A wide-angle photograph of the Southern Methodist University (SMU) building, a large, classical-style brick structure with a prominent green dome and a portico supported by columns. The building is set against a blue sky with scattered white clouds. In the foreground, a green lawn is populated with several people, some sitting on the grass and others walking. A paved walkway leads towards the building. The overall scene is bright and sunny, suggesting a clear day.

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Who am I?

- Undergraduate at Southern Methodist University
 - Civil Engineering B.S.C.E
 - Public Policy B.A.
 - Minors in Mechanical and Environmental Engineering
 - Expcted Grad. 2027
- Work Experience:
 - Current: Undergraduate Research Assistant (Infrastructure Equity Lab – Dr. Smith-Colin Research Group)
 - Summer 2025: Roadway Design Engineering Intern (Parsons Corp.)
 - Summer 2024: Public Works Engineering Intern (LAN Inc.)
 - Summer 2022: Geotech Engr. Assistant (Geoscience Engineers)
 - Summer 2021: Virtual Design & Construction Intern (CORE Construction)

The logo for Southern Methodist University (SMU) is displayed in white, bold, sans-serif capital letters. A registered trademark symbol (®) is located to the upper right of the 'U'. The background of the slide features a dark blue, textured pattern of overlapping, slightly offset rectangular shapes, creating a sense of depth and movement.

Why this matters?

Engineers shall hold paramount the safety, health, and welfare of the public. (TSPE Code of Ethics)

Engineers shall at all times strive to serve the public interest. (TSPE Code of Ethics)

Create safe, resilient, and sustainable infrastructure (ASCE Code of Ethics)

Consider the current and anticipated needs of society; and utilize their knowledge and skills to enhance the quality of life for humanity. (ASCE Code of Ethics)

First and foremost, protect the health, safety, and welfare of the public; enhance the quality of life for humanity; (ASCE Code of Ethics)

\$56,900,000,000 in Economic Loss Due to Motor Incidents in 2024

4,150 Deaths in 2024

Engineering Code of Ethics:

Facts:

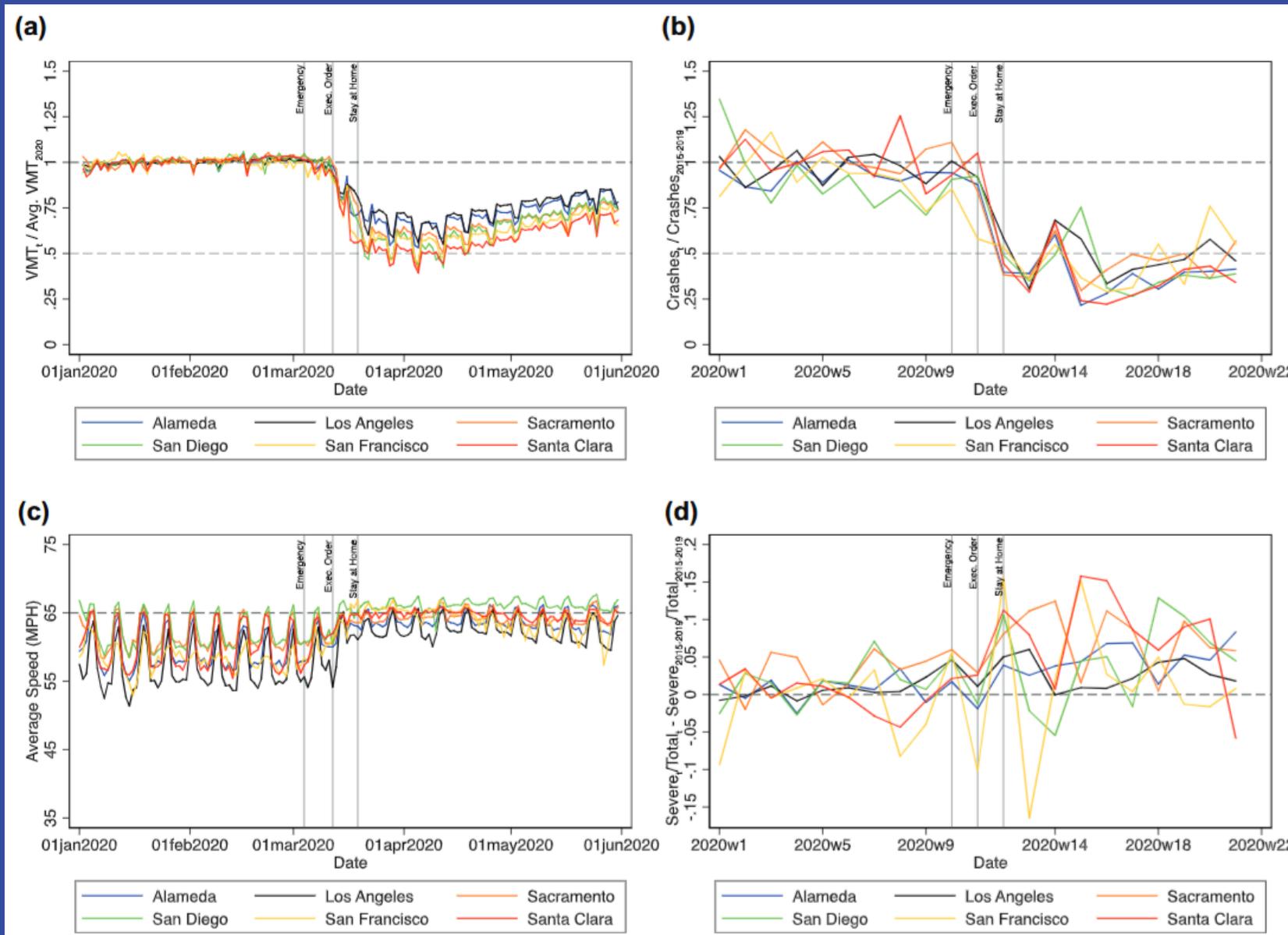
The logo for Southern Methodist University (SMU), consisting of the letters 'SMU' in a bold, white, sans-serif font with a registered trademark symbol.

Let's get one thing straight...
More Driving = More Harm



1% Decline in VMT = 1% Decline in Crashes

(Hughes., 2023)



How is Texas Doing?



Texas (2023):
4,291 traffic
deaths. That's
14.1 deaths
per 100,000
people and
1.43 per 100
million miles
driven
(VMT).

U.S.
overall
(2023):
12.2 per
100,000
people
and 1.26
per 100M
VMT.

Canada
(2023):
4.9 per
100,000

United
Kingdom
(2023): 2.6
per
100,000

Texas is
Worse
than the
National
Average

Texas is
Worse
Compared to
Other
Developed
Countries
(3x and 7x)

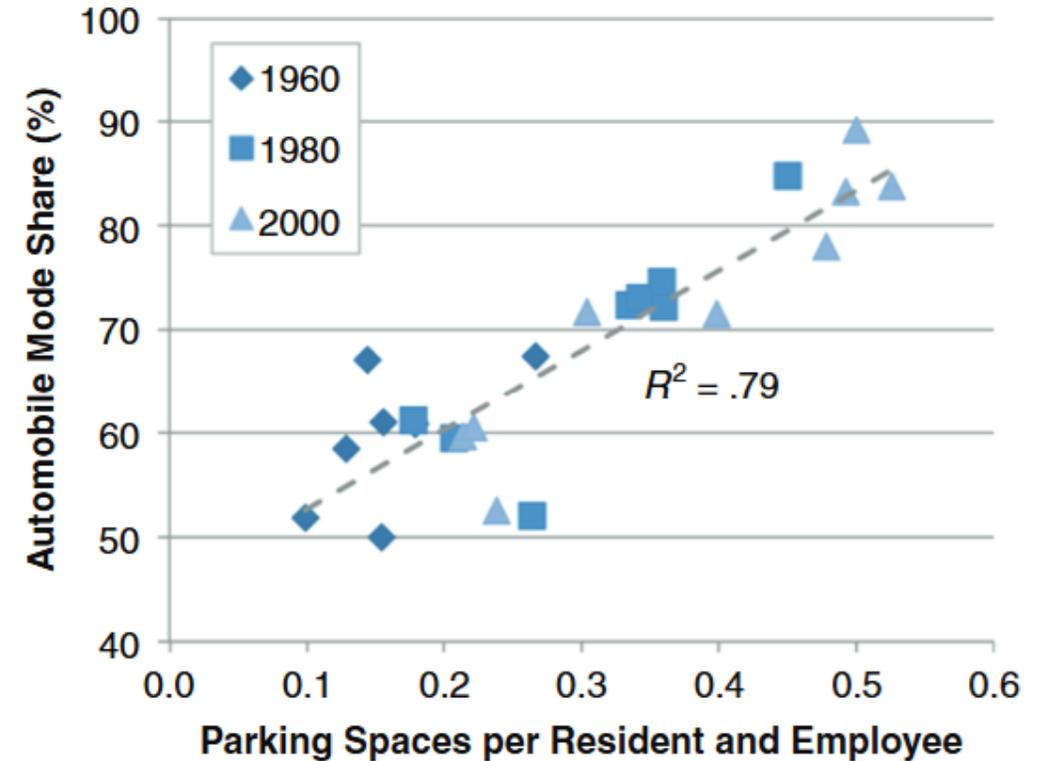
The Texas Transportation Triad of Harm



1. Minimum Parking Requirements

(McCahill, 2016)

- Texas suburbs mandate large parking lots — reinforcing large VMTs and shaping suburban form
 - Sugar Land – Restaurants: 1 space / 100 sq. ft.; Single-family homes: 2 spaces / unit
 - Round Rock – Offices: 1 space / 300 sq. ft.; Multi-family: 1.5 spaces / unit
 - The Woodlands – Retail: 1 space / 200 sq. ft.; Hotels: 1 space / room + extra for banquet areas
 - Garland – Churches: 1 space / 4 seats; Shopping centers: 5 spaces / 1,000 sq. ft.
 - Plano – Special districts allow reductions, but baseline is still high: e.g. 2 spaces / dwelling unit
- Due to these Rules, More and More People Are Choosing to Drive



Example:



2. Car Oriented Design



- Sugar Land – Design Standards (2011/2019 amendments): shows no mention of Bike Lanes, Pedestrian Beacons Absent from Standards
- Garland Technical Standards: Focus on vehicle flow rather than pedestrian safety, no pedestrian prioritization
- Adding a Pedestrian Beacon or Pedestrian Warning System could Reduce Crashes by 47% (Zeeger et. al., 2017)

3. Automated Enforcement Ban

Texas House Bill 1631: Prohibited From Using Any Sort of Red Light Cameras or Speed Cameras

		<u>Driver's Choice</u>	
		<u>Speed</u>	<u>Don't Speed</u>
<u>Authority's Choice</u>	<u>Use Camera</u>	$P_d = -9$ $P_a = 10$	$P_d = -1$ $P_a = 1$
	<u>Don't Use Camera</u>	$P_d = 5$ $P_a = -2$	$P_d = 0$ $P_a = 2$

This theory has been proven time and time again by peer reviewed studies

- Drivers weigh benefits vs. risk of penalty
- Cameras = high probability of being caught → Obey equilibrium
- No cameras = low probability → Speed equilibrium
- Like a Prisoner's Dilemma: everyone is safer if all obey, but each driver has incentive to defect (speed)

So what's the solution?

Answer: *Vision Zero*



Vision Zero Framework Development



The framework aims to **integrate Vision Zero's philosophy**—eliminating traffic fatalities and serious injuries—into a systematic evaluation tool.



It draws from global best practices, U.S. municipal case studies, and policy analysis methods.



Built through a **recursive literature review**, ensuring inclusion of both foundational Vision Zero research and newer thematic insights (e.g., infrastructure, enforcement, equity).

Framework

Political & Institutional Support

- Leadership endorsements, budgets, coalitions, stakeholder collaboration.

Policy & Planning

- Formal action plans, multi-sectoral coordination, measurable safety targets.

Data-Driven Decision Making

- Crash data use, predictive analytics, advanced data collection systems.

Infrastructure Improvements

- Roadway redesigns, speed management, ADA-compliant upgrades, safer intersections.

Vulnerable Road User Safety

- Protect pedestrians, cyclists, scooter users; systems designed to anticipate human error.

Public Communication & Education

- Campaigns, shaping perception, community engagement in planning.

Enforcement & Regulation

- Traffic law enforcement, speed cameras, impaired driving policies, helmet laws.

Equity & Social Justice

- Accessibility, health equity, inclusion of underserved and marginalized communities, equity analysis tools.

Political and Institutional Support

Findings from (Nauman et. al., 2019)

Government Agencies Were Always in Support

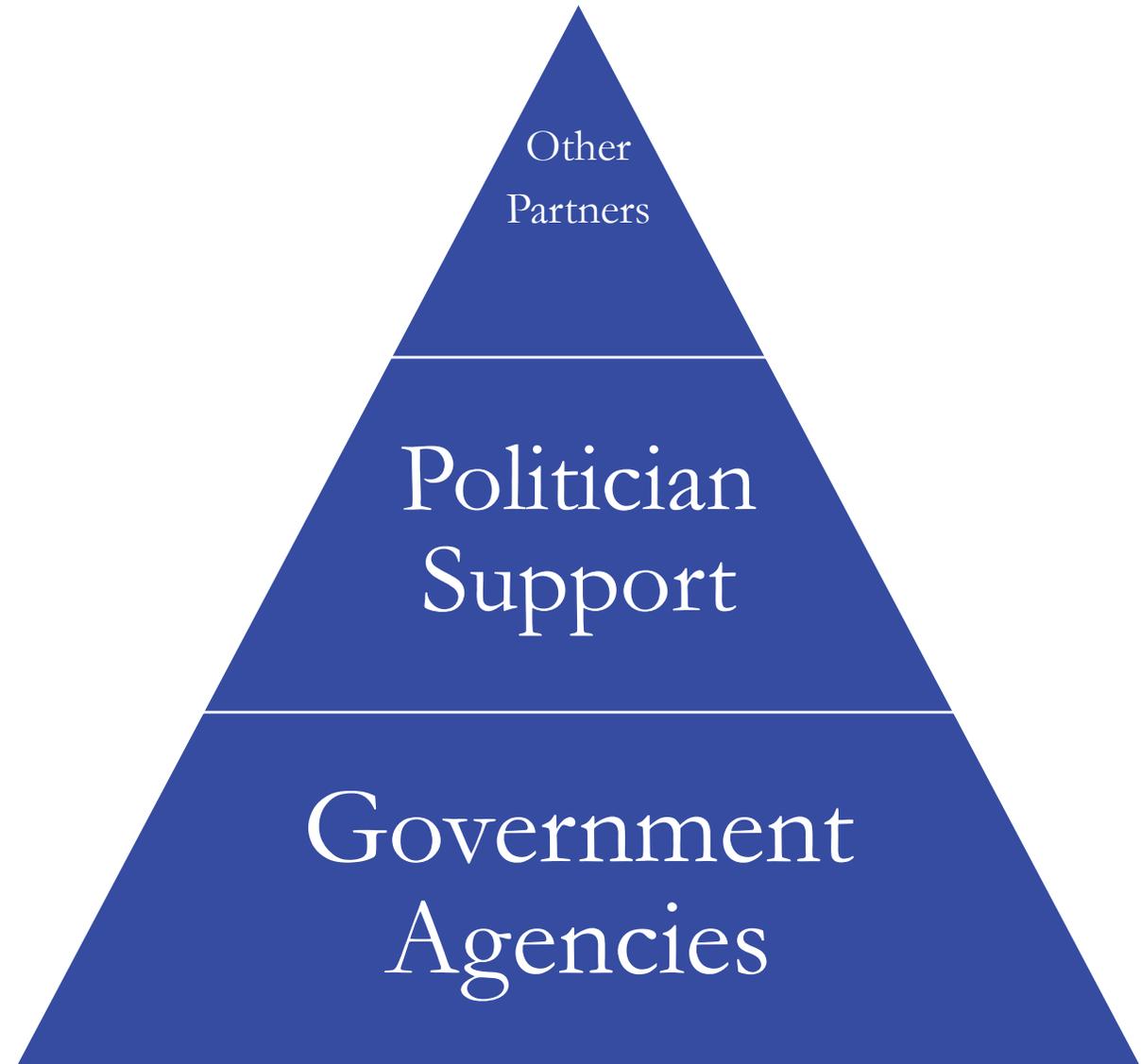
- DOTs, Health & Human Services Agencies, Schools

Political Support Proved to be “Make or Break” Metric

- Mayoral Support, City Council Support, State Senator & Rep Support

Successful Plans Added More and More Partners as Time Goes On

- Businesses, Non-Profits, HOAs, etc.



Policy and Planning

- Formal Plans Led to More Successful Plans
- What Does a Formal Plan Look Like?
 - Revised Municipal Design Standards
 - Revised Zoning Code
 - Adopting and Enforcing New Ordinances

<u>Location / Program</u>	<u>What They Did / What Makes It Radical</u>	<u>Results & Key Lessons</u>
Oslo, Norway	Pedestrianisation, removing ~1,000 parking spots, expanding bike lanes & footpaths, closing large zones (especially around primary schools) to cars. (WIRED)	In 2019 Oslo recorded zero pedestrian or cyclist deaths; overall traffic fatalities fell dramatically. It shows that big reallocation of road space + limiting car access can yield huge safety gains. (WIRED)
Zero Fatality Corridor (India)	Targeted extremely dangerous expressways (e.g. Mumbai-Pune Expressway) and apply a holistic “4 E’s” approach: Engineering, Enforcement, Emergency care, Engagement. (Indian Express)	On that expressway, fatalities dropped ~52% after the intervention. The model is being replicated in multiple states. (Indian Express)
Hoboken, New Jersey, USA	Removed parking near intersections (to improve visibility), lowered speed limits, daylighting intersections, strong Vision Zero commitment. (AP News)	No traffic death (pedestrian, bicyclist, or motorist) since January 2017 in Hoboken. A small city, yes — but shows what focused interventions can achieve. (AP News)
New York City (Vision Zero)	Lowered default speed limit, increased enforcement, speed cameras, leading pedestrian intervals at many intersections, etc. (NYC.Gov)	Significant reductions in certain kinds of fatalities, especially pedestrians; though still challenges remain with injury crashes. It’s a large-scale urban example of Vision Zero in action. (NYT)
Philadelphia	Multi-department collaboration, engineering safe streets, enacting policies, doing community engagement. (visionzerophl.com)	Ongoing effort; activeness in “Zero Traffic Deaths” mission, outcomes accumulating. (visionzerophl.com)

Data Driven Decision making

- **Brazil (MACs – São Paulo & Fortaleza)**

- Informs *decision-making* and *strategic planning*
- Promotes *integration & transparency* across sectors
- Enables *predictive analytics* for targeted interventions
- Supports *cultural shift* toward valuing safety

- **Sweden (Vision Zero)**

- Shifts focus from “accidents” → *serious injuries & deaths*
- Identifies *system causes* (e.g., road design, vehicles – 63% of deaths)
- Guides *infrastructure redesign* (e.g., roundabouts vs. signals)
- Provides *measurable targets* & scientific legitimacy

- **Brazil:**

- Crash data systems
- Central traffic control centers
- Enforcement tech (cameras, monitoring)
- Surveys & interviews on information flows

- **Sweden:**

- National fatality & injury statistics
- Accident investigation commissions
- Biomechanical tolerance studies
- Continuous monitoring & evaluation

Infrastructure Improvements



Physical Separation from Motor Vehicles



Traffic Calming on Neighborhood Streets



Improved Street Lighting & Visibility



Mid-block crossings

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Vulnerable Road User Safety

Who are Vulnerable Road Users?



Pedestrians



Cyclists



E-Scooter
Users



Slow
Vehicles



Elderly &
Children

Public Communication & Education



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Enforcement & Regulation

Efforts to Revoke Texas Automated Enforcement Ban

<u>Proposal / Bill</u>	<u>What It Would Do / Change</u>	<u>Status / Debate</u>
Senate Bill 744	Would allow school districts, cities, and counties to use stop-arm cameras on school buses (i.e. automated cameras to catch drivers who illegally pass a school bus while its arm is out). This is an attempt to carve out an exception to the broader ban on red-light cameras. (Dallas Express)	Proposed in 2025. It's being debated. Supporters focus on child safety. Opponents raise concerns about due process, fairness, and about the same issues that led to the 2019 ban. (Texas Scorecard)
HB 2810	Relates to “the power of a governmental entity to enforce compliance with posted speed limits by an automated traffic control system.” In other words, it would affect enforcement of speeding via automated cameras. (BillTrack50)	Proposed. It's not clear how far it has progressed, or whether it will pass. It likely faces legal, constitutional, and political scrutiny.
Local / County Level Camera Deployment	Some counties (for example, Bexar County Precinct 3) have tested or begun using automated cameras / lidar for speeding, even though state law essentially prohibits automated enforcement in many cases. These deployments are under dispute (legal and in terms of authority). (MySA)	Courts, county attorneys, and state opinions are being sought. For instance, the Bexar County DA has asked the Texas AG whether the speeding-camera systems used by Precinct 3 are legally authorized. (San Antonio Express-News)



Equity and Social Justice

Equity Value of Travel Time

- Standardizes time savings across income groups

Distributional Weights

- Higher weight for benefits to lower-income/vulnerable groups

Community Equity Indicator

- Compares accessibility gains between rich vs. poor communities

Household Equity Indicator

- Tracks travel time gaps between car-owning vs. car-less households

Winners & Losers Tables

- Visualize how benefits/risks are distributed across groups

Activity-Based Accessibility (ABA)

- Captures access to key activities across socio-economic profiles

Subjective Value of Accessibility Gains (SVOA)

- Combines accessibility + well-being impacts
- Central to **Equity Benefit Analysis (EBA)** framework

Cities That Responded (with documentation)

- Grapevine
- Richardson
- Mansfield
- Weatherford
- Pilot Point
- DeSoto
- Dallas
- Watauga (letters of support only)

Cities That Did Not Provide Documentation

- Fort Worth
- Alvarado
- Balch Springs
- Frisco
- Saginaw
- Terrell
- North Central Texas Council of Governments (NCTCOG)
- Denton
- Grand Prairie
- Dallas County

What does North Texas Care About?

- **Strengths** 
- Strong focus on **infrastructure improvements** (crosswalks, ADA upgrades, bike lanes).
- Equity and vulnerable road user safety often **acknowledged**.
- Many cities developing **Comprehensive Safety Action Plans**.
- **Gaps** 
- Limited **speed management** measures (few speed cameras, enforcement).
- Weak **public engagement & education campaigns**.
- Minimal **advanced data systems** (predictive analytics, real-time monitoring).
- Equity often mentioned but **rarely measured with frameworks**.

Your Time is a Vote

- “Vote with your dollars” = don’t design what kills
- Hourly billing = your time funds a project’s outcome
- What you work on becomes your legacy

ASCE Code of Ethics and TSPE Code of Ethics

When to Walk Away

Project Red Flag Checklist

- Widening high-speed roads without pedestrian or bike elements
- Parking-heavy zoning codes that prioritize cars over people
- No safety or equity goals — ignores public health impact
- Fails to reduce vehicle miles traveled (VMT) or emissions
- Displaces vulnerable communities and increases inequity

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Resources for Ethical Design



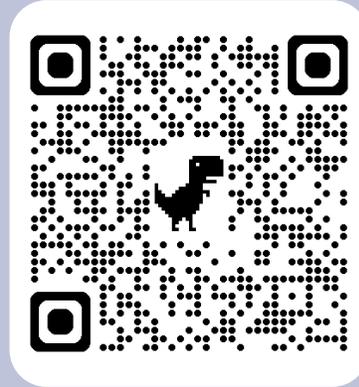
UNC CSCRS
Guide to
Developing a
Vision Zero
Plan



Vision Zero
Implementation
Toolkit
(ChangeLab
Solutions)



NACTO –
Vision Zero /
Urban Street
Design Guide



Complete
Streets /
Complete
Streets Policy
Resources



Systemic
Pedestrian
Safety Analysis
/ NCHRP
Report 893



Speed
management
guidelines &
tools

Steps to Take, Prof. Orgs., & Advocacy

- ASCE Government Affairs Committee:
- Parking Reform Network
- Congress for the New Urbanism
- Strong Towns
- League of American Bicyclists
- Smart Growth America
- American Public Transit Association

Thanks for Listening



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