



April 25, 2025

# Safety in Design

2025 Roadway Design & Bridge Conference

## Gabrielle Lott

- Engineer Assistant
- Design Support – Project Delivery Section
- Design Division





# Every Project is a Safety Project

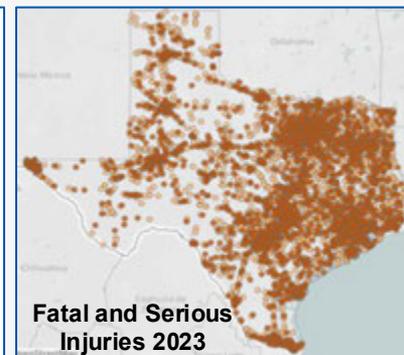
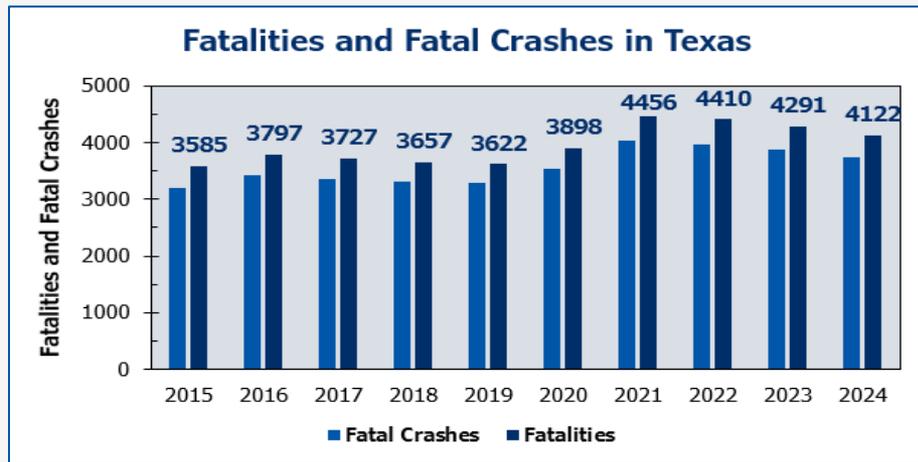
Gabrielle Lott, Engineering Assistant



April 25, 2025

## Crash Facts and Challenges:

- **More than 90,000 lives lost since November 7, 2000**, which was the last deathless day on Texas roadways.
- 4,122 fatalities and 251,928 injuries in vehicle crashes in 2024.
- The annual vehicle miles traveled in Texas during 2023 reached 295 billion, 1.34% higher than in 2022.
- The population in Texas during 2024 reached 31.2 million, 2.29% higher than in 2023.



## TxDOT's Policies and Commitments

- Texas Strategic Highway Safety Plan:
  - **Vision:** Texas envisions a future with **zero traffic fatalities and serious injuries.**
  - **Mission:** Texans will work together on the road to **zero traffic fatalities and serious injuries.**
- TxDOT Vision Zero (Road to Zero)
  - Commission adopted minute order in 2019
  - Goals to reduce fatalities:
    - By half by 2035
    - Zero by 2050
  - Created a new funding category for HSIP-funded projects, emphasizing areas with the greatest potential for reducing fatalities and injuries.



# Project Development Process



## Approach to Enhance Safety

To incorporate safety into project development, TxDOT has adopted various policies, programs, strategies, and guidelines:

- Safer by Design (SBD)
- Traffic and Safety Analysis Procedures (TSAP) Manual
- Highway Safety Manual (HSM) Implementation
- Intersection Control Evaluation (ICE) Process Implementation
- Roadway Safety Assessment (RSA)
- Performance-Based Practical Design (PBPD)
- Research Projects on Project Safety



## Safer by Design (SBD) Tools

### ✓ **Goals and Objectives:**

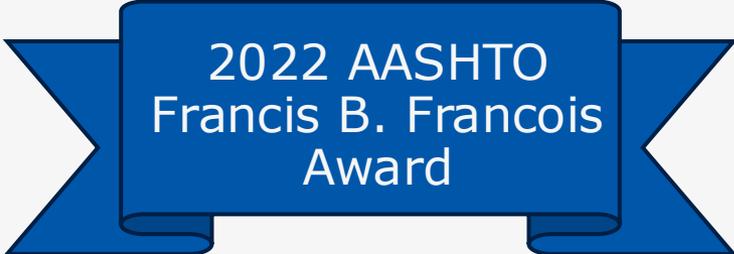
- Assistant safety-driven decisions during project development
- Understand the safety effects of design elements
- Optimize safety before the project is constructed
- Straightforward process

### ✓ **User-friendly Features:**

- User inputs existing & proposed design elements
- Presets standard & optimal values
- Immediate feedback
- Visual tools & representations



2021 National  
Roadway Safety  
Award



2022 AASHTO  
Francis B. Francois  
Award

# Traffic and Safety Analysis Procedures (TSAP) Manual

## Background

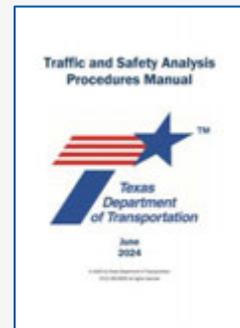
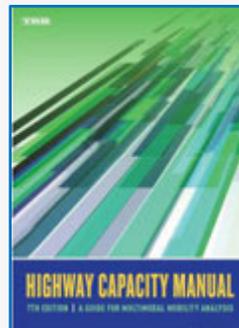
- Lack of statewide guidance
- Current practice

## Purpose

- Traffic and safety analysis guidance
- Consistent and uniform direction
- Simple and easy to use
- Improve quality and implementation

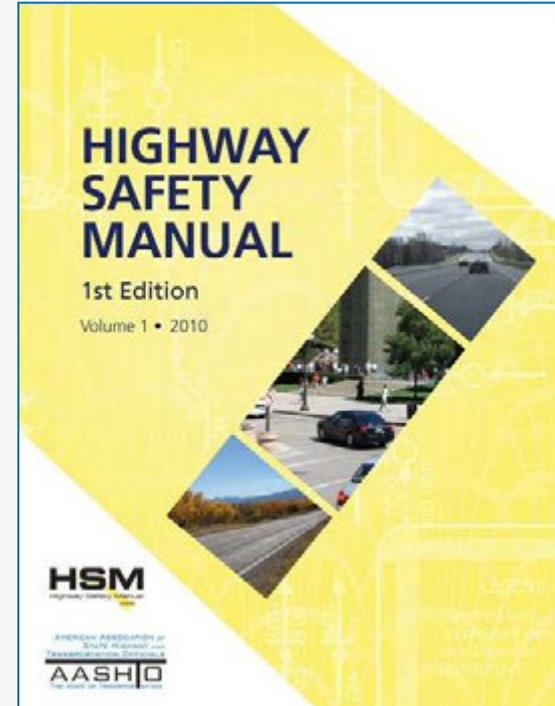
## Criteria

- ✓ Industry's Best Practice
- ✓ HCM and FHWA Toolboxes
- ✓ Supports RDM and other manuals
- ✓ Incorporate AASHTO HSM

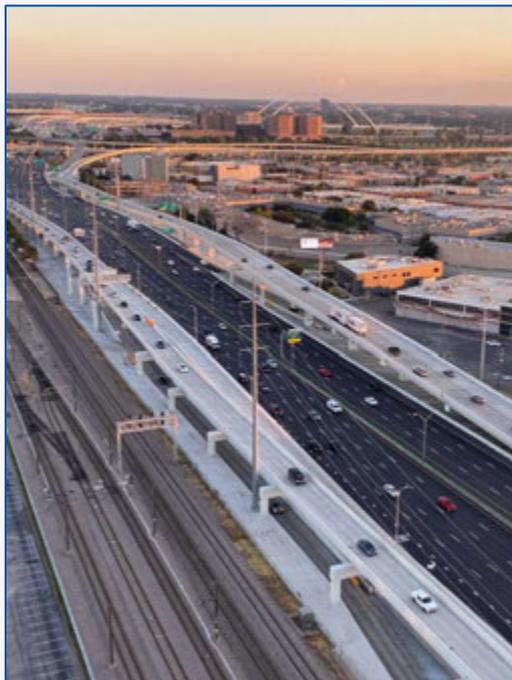


# Highway Safety Manual (HSM) Implementation

- Texas models/calibration factors
- Safety analysis training & guidance
- New models to address HSM limitations
- Simple easy-to-use safety analysis tools
  - Rural Highways
  - Intersections
  - Urban Arterials
  - Freeways and Interchanges
- These tools provide predicted and expected vehicle crash frequencies by severity level for facility elements



## Performance-Based Practical Design (PBPD) Approach



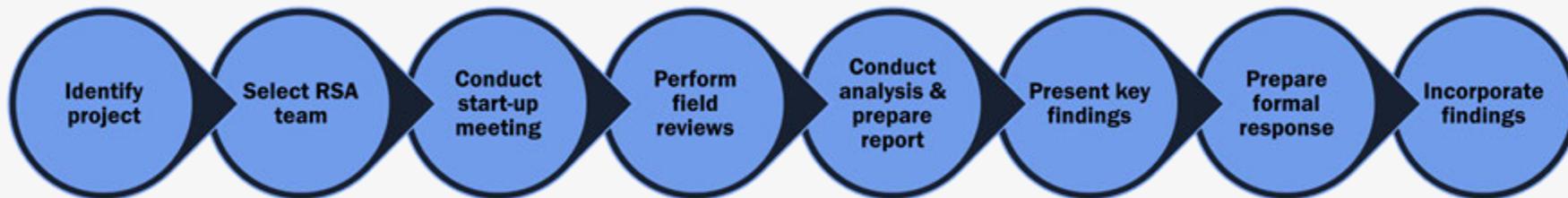
- A design approach that prioritizes system-level performance objectives when developing transportation projects, allowing engineers to “**design up**” from existing conditions to meet specific project and system needs
- A decision-making approach based on **quantitative analysis** for system performance
- TxDOT Roadway Design Manual (published in 2024) includes PBPD
- Goal: Maximize benefits while minimizing costs

# Intersection Control Evaluation (ICE) Implementation Process

- One third of fatal and serious injury crashes are intersection-related
- Transparent process for the intersection control type
- Process applies to all highway and street projects for any major intersection improvement
- Guidance in the TSAP Manual
- Training opportunities



## Road Safety Assessments (RSA) Strategy



- A formal safety performance examination by an independent, multidisciplinary team to identify safety risks
- Guidance, workshops, and pilot projects
- **Potential Benefits:**
  - Reduce the number and severity of crashes
  - Raise awareness of safe design practices
  - Incorporate human factors into all aspects of the design



## Other Initiatives



Interstate  
Access  
Justification  
Requests  
(IAJRs) SOP



Design  
Exception  
Requests for  
Interstate  
Highways  
SOP



Crash  
Modification  
Factors  
(CMFs)  
selection  
guidance



Guidance for  
selection of  
cross-section  
based on  
safety &  
operational  
benefits

## Current Research Projects & Activities



Safety scoring tools for wet surface crash reduction



Crash prediction methods for frontage roads



Crash Modification Factor for Super 2 highways



Guideline for Using Safety Tools



SBD Merger tools for combining SBD scores

## #EndTheStreakTX



**HELP**  
**#EndTheStreakTX**  
End the streak of daily deaths on Texas roadways.



# Questions?

Gabrielle Lott: [Gabrielle.Lott@txdot.gov](mailto:Gabrielle.Lott@txdot.gov)

Khalid Jamil: [Khalid.Jamil@txdot.gov](mailto:Khalid.Jamil@txdot.gov)