



FRAME FOR MOBILITY · TITLE VI – INNOVATION AND FUTURE-READY
INFRASTRUCTURE

AUTOMATED AND CONNECTED VEHICLES

AV-Ready Infrastructure Standards and the National V2X Deployment Strategy

A FRAME Policy Paper · Title VI, Subtitle B of the FRAME Act · Sections 606–608

For more information and full legislation, go to frameformobility.org

CONTENTS

I	The Problem	II	The Proposed Solution	III	The Legislative Proposal
IV	The Data Case	V	Sources		

PART I

THE PROBLEM

Automated vehicles are entering service on roads that were designed, marked, and signalled for the human eye. The deployment is measured, not projected: by the autumn of 2026 the largest operator, Waymo, was running a fleet of **more than 4,000 vehicles** providing **more than 500,000 paid rides a week**, with **271.3 million rider-only (driverless) miles** accumulated through June 2026; in July 2026 federal regulators granted Zoox the first exemption for a purpose-built robotaxi with no steering wheel or pedals. The infrastructure they must read is still specified for human perception — and no standard, at any level of government, defines what a machine-readable road is.

The mismatch is built into the ordinary machinery of road maintenance. Pavement markings vary in width, contrast, and condition; traffic control devices speak visually, to a driver looking at them; and both are renewed on state and local cycles measured in decades, each renewal re-laying a human-only specification. Every such renewal is a future retrofit purchased at full price. Meanwhile states are settling the vehicle side of the law without the road side — Texas’s SB 2807 (2025) authorizes commercial automated-vehicle operations statewide and preempts cities from regulating them — while the condition of the roads those vehicles operate on remains nobody’s standard.

Connected infrastructure shows the same gap in institutional form. The Department of Transportation’s 2024 plan, *Saving Lives with Connectivity*, sets the nation’s nominal trajectory — vehicle-to-everything communication on **20 percent of the National Highway System by 2028, 50 percent by 2031, and full deployment by 2036** — but it is a non-binding roadmap: no dedicated funding stream, no eligibility hooks into federal grants, no statutory strategy behind it. What deployment exists is a scatter of local pilots, each tuning its own equipment and parameters, with no common standard to converge on: a sequencing failure — a national fleet arriving on a local, human-only road system, against a federal plan with targets but **neither mandate nor money**.

THE PROPOSED SOLUTION

The proposal prepares the road, not the car. It does two things, and it does them by incentive rather than by command.

First, a standard. Within two years, the federal transportation department — working with state road agencies, the automotive industry, automated-driving developers, and national safety organizations — would publish a voluntary national standard for “AV-ready” infrastructure: pavement markings that machines can read uniformly, traffic control devices that are digitally readable, and a digital twin — a complete, shared digital model — of the national highway network. No state would be required to adopt any of it. Instead, work that brings a road up to the standard would qualify for funding under the bill’s principal state block grant for repair and resilience, so states and cities could fold machine-readability into the resurfacing, restriping, and signal replacement they already perform, at the marginal cost of doing the planned work differently rather than the full cost of a separate retrofit programme.

Second, a strategy. Within one year, the department would write a national strategy for vehicle-to-everything communication — vehicles exchanging safety messages with signals, roadside equipment, and each other — to guide public and private investment in the technology. Work that follows the strategy would qualify under two of the bill’s other block grants, expressly including the installation of roadside communication units and the integration of the resulting data into traffic management centers. The strategy the department has already sketched as guidance would become a strategy the funding system can actually execute against.

The limits of the proposal are part of its design. It regulates no vehicle, no operator, and no driver; it sets no mandate on any state; and it spends no new money — funding moves only by making the right work eligible under grants the bill creates elsewhere. Vehicle regulation stays where it is actively being written, in state law. What the proposal adds is the missing half of the system: a definition of the road the vehicles are coming to, and a funded path to build it.

THE LEGISLATIVE PROPOSAL

Subtitle B addresses the half of the automated-vehicle system that no vehicle manufacturer can build: the road. Its purpose, in the bill’s own line, is “to facilitate the safe and efficient deployment of automated and connected vehicle technologies by creating a national framework for ‘AV-Ready’ infrastructure” (**Section 606**). It works through two instruments — a standard and a strategy — carried into practice through funding eligibility inside the Act’s Title II block grants.

SECTION 607 – “AV-READY” INFRASTRUCTURE STANDARDS

Not later than two years after enactment, the Secretary — in consultation with State departments of transportation, the automotive industry, automated driving system developers, and national safety organizations — shall establish **voluntary minimum standards** for “AV-Ready” infrastructure. The Act specifies what the standards must cover:

THE LEGISLATIVE PROPOSAL

SECTION 607(B) – CONTENTS OF THE STANDARDS

- (1) uniform, machine-readable pavement markings;
- (2) digitally readable traffic control devices; and
- (3) the development of a digital twin of the National Highway System.

The standard is given force through money rather than mandate: an activity to bring a facility into compliance with the AV-Ready standards is an eligible activity under the State of Good Repair & Resiliency Block Grant (**Section 607(c)**) — Title II, Subtitle A.

SECTION 608 – THE NATIONAL V2X DEPLOYMENT STRATEGY

Not later than one year after enactment, the Secretary shall develop a **National Vehicle-to-Everything (V2X) Deployment Strategy** “to guide the public and private investment in V2X communications technology” (**Section 608(a)**). An activity consistent with the Strategy is an eligible use of funds under two Title II block grants — the National Commerce & Freight Block Grant and the Community Access & Mobility Block Grant — including, expressly, (1) the installation of roadside units and (2) the integration of V2X data into traffic management centers (**Section 608(b)**).

WHAT CHANGES, AND WHAT DOES NOT

What changes against current law is the existence of the framework itself. Federal law today contains no AV-Ready infrastructure standard and no statutory V2X deployment strategy; the Department of Transportation’s 2024 V2X plan is voluntary guidance, addressed in Part IV. The subtitle regulates no vehicle, no operator, and no state: the standards are voluntary minimums, and on financing the bill is explicit by construction — **the subtitle contains no appropriation**; funding moves only through eligibility within grants the Act creates elsewhere.

PART IV

THE DATA CASE

Why would the proposal work? Its premise is sequencing: the vehicles are arriving on a deployment schedule set by industry, while the infrastructure they must read is still specified for the human eye. The data case is therefore in three parts — deployment is measured, not projected; the safety record of the technology is now large enough to be evidence; and the one completed national field test of connected infrastructure shows both the benefit, and the cost of deploying it without common standards.

THE DATA CASE

DEPLOYMENT IS NO LONGER PROSPECTIVE

The scale figures in Part I bear repeating as the case's foundation: more than 4,000 vehicles, more than 500,000 paid rides a week, 14 markets, 271.3 million rider-only miles through June 2026 — and, in July 2026, the first federal exemption for a purpose-built robotaxi, Zoox's, covering up to 2,500 vehicles a year. States are settling the vehicle side of the law on their own timelines: Texas's SB 2807 (2025) created a state authorization regime for commercial AV operations, treats the automated driving system as the legal operator, and preempts cities from regulating AV operations, with enforcement live from May 2026. What no level of government has standardized is the physical and digital condition of the roads these vehicles operate on. That is the gap Sections 607 and 608 occupy.

THE MEASURED SAFETY RECORD

The safety case for getting the infrastructure right is that the vehicle technology, measured at scale, already performs. Across Waymo's 271.3 million rider-only miles, compared with human-driver benchmarks over the same distances in the same cities, the record shows **95 percent fewer serious-injury-or-worse crashes** (0.01 against 0.21 per million miles), **82 percent fewer injury-reported crashes** (0.67 against 3.77 per million miles), and **93 percent fewer pedestrian crashes with injuries**. These are operator-reported figures published on Waymo's Safety Impact Hub, and they are the strongest large-sample evidence available; they are also, by construction, results achieved on today's roads, by vehicles compensating for infrastructure that was never designed for them. The policy question Subtitle B answers is what happens to that record as deployment scales from thousands of vehicles in 14 markets to a national fleet operating everywhere, including on markings and signals no machine can reliably read.

CONNECTIVITY: THE TAMPA MEASUREMENT

Connected-vehicle infrastructure has been field-tested at city scale exactly once under federal evaluation: the Tampa Connected Vehicle Pilot, run by the Tampa Hillsborough Expressway Authority under USDOT's Connected Vehicle Pilot Deployment Program and evaluated by the University of South Florida's Center for Urban Transportation Research. With **49 roadside units** and more than **1,000 equipped vehicles**, under a randomized treatment-and-control design, the evaluation found a **9 percent decrease in the rate of forward-collision conflicts** and a **reduction in corridor travel times of nearly 30 percent**; the Authority's own accounting credits the deployment with **17 potential vehicle crashes and 21 potential pedestrian crashes avoided** and more than 22,000 safety warnings issued. NHTSA's modelling indicates the ceiling is far higher — safety applications enabled by vehicle-to-vehicle and vehicle-to-infrastructure communication could eliminate or mitigate up to **80 percent of non-impaired crashes** — but that figure is a modelled potential at full deployment, not an observed result, and the distance between Tampa's measured 9 percent and the modelled ceiling is, in large part, a deployment and standards problem.

Evidence check. Tampa also documents the failure mode of deployment without standards: in the evaluation record, 36 of 51 red-light-violation warnings issued (70.6 percent) were classified as false positives, a parameter and consistency problem the evaluators flag for refinement. A warning drivers learn to ignore is worse than no warning. This is the practical argument for Section 607: common, machine-readable standards for markings, signals, and data are what separate a national system from a patchwork of local pilots each tuning its own parameters.

A PLAN WITH TARGETS BUT NO MANDATE

USDOT’s *Saving Lives with Connectivity* plan (August 2024) sets the deployment trajectory the nation has nominally adopted — V2X on **20 percent of the National Highway System by 2028, 50 percent by 2031, and full deployment by 2036** — but it is an explicitly non-binding roadmap with no dedicated funding stream and no eligibility hooks into federal grant programs. Section 608 supplies exactly the two missing elements: a statutory strategy, the Secretary’s own product under law rather than a departmental initiative, and eligibility for roadside units and traffic-management integration under two standing block grants. The strategy the Department has already written becomes, under the Act, a strategy the funding system can actually execute.

The same logic governs Section 607. Markings and signals are renewed on state and local cycles measured in decades; every renewal to a human-only specification is a future retrofit purchased at full price. A voluntary national standard, published within two years and attached to the Act’s largest block grant, lets the ordinary renewal cycle do the work — each restriping, each signal replacement, each resurfacing moving the network toward machine-readability at marginal rather than standalone cost, and a digital twin of the National Highway System giving operators and agencies one shared model of the asset they are jointly preparing.

THE NUMBERS BEHIND SUBTITLE B

271.3M

Rider-only driverless miles accumulated by Waymo through June 2026

–95%

Serious-injury crashes vs. human benchmark over those miles (Waymo Safety Impact Hub)

–9%

Forward-collision conflict rate, Tampa CV Pilot randomized evaluation (USDOT / USF CUTR)

2036

USDOT target year for full V2X deployment on the National Highway System — currently unfunded

SOURCES

Legislative source. Framework for Rebuilding America’s Mobility Economy (FRAME) Act, Official Draft, December 15, 2025 — Title VI, Subtitle B, Sections 606–608. All section references, quotations, and descriptions of the proposal are taken from the bill text. Cross-referenced provisions: Title II, Subtitle A (State of Good Repair & Resiliency Block Grant, cited at Section 607(c)); Title II, Subtitles B and C (National Commerce & Freight and Community Access & Mobility Block Grants, cited at Section 608(b)). The subtitle contains no appropriation; funding operates through eligibility under those grants, as the paper states.

Data sources. (1) Waymo LLC — fleet of more than 4,000 vehicles, more than 500,000 paid rides per week, 14 U.S. markets (reported by CNBC, September 1, 2026); 271.3 million rider-only miles through June 2026 and comparative crash rates (95 percent fewer serious-injury-or-worse crashes; 82 percent fewer injury-reported crashes; 93 percent fewer pedestrian crashes with injuries, against human benchmarks for the same distances), Waymo Safety Impact Hub, accessed October 2026. (2) National Highway Traffic Safety Administration — Part 555 exemption granted to Zoox, July 30, 2026 (Federal Register, July 31, 2026), up to 2,500 purpose-built vehicles per year for two years; and NHTSA estimate that V2V/V2I safety applications could eliminate or mitigate the severity of up to 80 percent of non-impaired crashes (U.S. Department of Transportation, December 2016). (3) U.S. Department of Transportation, Connected Vehicle Pilot Deployment Program — Tampa (THEA) CV Pilot Phase 3 Evaluation Report (University of South Florida, Center for Urban Transportation Research, for the ITS Joint Program Office), and ITS Knowledge Resources records 2021-B01583 and 2026-B02022: 49 roadside units, more than 1,000 equipped vehicles, 9 percent decrease in forward-collision conflict rate, travel-time reduction of nearly 30 percent; THEA pilot accounting of 17 potential vehicle crashes and 21 potential pedestrian crashes avoided; red-light-violation warning false-positive finding (36 of 51 warnings, 70.6 percent). (4) U.S. Department of Transportation, *Saving Lives with Connectivity: A Plan to Accelerate V2X Deployment* (August 2024) — deployment goals of 20 percent of the National Highway System by 2028, 50 percent by 2031, full deployment by 2036; non-binding, with no dedicated funding stream. (5) Texas SB 2807 (2025) and Texas Department of Motor Vehicles releases (April–June 2026) — state AV authorization, automated driving system as legal operator (Transp. Code §545.454), city preemption (§545.452), enforcement live May 28, 2026.

Colophon: Set in Manrope and TeX Gyre Heros in the FRAME Policy Paper design family (Deep Navy #0B1D33 / Steel #5E6E7E / Grid #DFE9F4). © 2026 Institute for Civic Service · FRAME for Mobility.