

POSITION PAPER

Federal Preemption of State Authorization for Flashing Auxiliary Vehicle Warning Lamps: *The Steady-Burning Requirement of FMVSS No. 108*

by Mark Baker, President, Soft Lights Foundation — August 31, 2026

I. Summary

The National Highway Traffic Safety Administration (NHTSA) has a documented history that shows it has never wavered from its philosophy that flashing lights create a safety hazard, and that the use of flashing lights on vehicles must be limited to a narrow set of conditions when they may be used.

Despite NHTSA's scientifically grounded philosophy that flashing lights pose a safety hazard, auxiliary flashing warning lamps are now ubiquitous on police, fire, ambulance, and utility vehicles. The cause of this situation traces back to the development of state standards a century ago, with California's own motor vehicle code tracing back to at least 1923. NHTSA introduced its steady-burning requirement in 1967. However, the States never updated those standards to integrate the federal steady-burning requirement once it existed, creating an illusion that flashing lights are legally permitted. NHTSA defers most enforcement of vehicle equipment to the states, and because states have continued relying on their own, unintegrated standards rather than the federal steady-burning requirement, there has been little enforcement of that federal requirement at the state or local level.

This paper details that history and its consequences: the historical development of NHTSA's steady-burning requirement; the federal preemption framework that controls when state authorizations conflict with it; California's own statutory framework and why it offers no exception; the parallel commercial-vehicle rules the Federal Motor Carrier Safety Association (FMCSA) administers; the case-by-case impairment standard NHTSA's own letters describe; the regulatory gap Light Emitting Diode (LED) technology has created on both the federal and state side; the Food and Drug Administration's (FDA) separate biological-safety mandate; the Americans with Disabilities Act (ADA) Title II accommodation duty under *Duvall v. County of Kitsap*; and the practical mechanisms available to enforce the steady-burning requirement today.

II. What the Steady-Burning Requirement Covers

Federal Motor Vehicle Safety Standard No. 108 (FMVSS 108), 49 C.F.R. § 571.108, is NHTSA's regulation governing vehicle lamps, reflective devices, and associated equipment. In its December 13, 2024 Letter of Interpretation, NHTSA stated the rule at the heart of this paper in plain terms:

*"NHTSA has long interpreted FMVSS No. 108 to require that all auxiliary lamps be 'steady burning,' with the sole exception of auxiliary lamps that supplement required lamps that flash, such as turn signals."*¹

NHTSA has defined the operative term directly. In a February 9, 1982 interpretation letter (Interpretation 1982-1.11), responding to an inquiry from the United Sidecar Association, Inc., NHTSA's Chief Counsel stated: "By 'steady burning,' the standard means a light that is essentially unvarying in intensity." Applied to auxiliary warning lamps such as those at issue in this paper, the rule is straightforward: the lamp must remain continuously illuminated while activated, at a constant, unvarying intensity, rather than flashing, strobing, or pulsing.

"Sole exception" and "supplement" are precise, limiting words, and they deserve to be read as such. The exception NHTSA recognizes is not for any lamp that happens to flash on a vehicle that also carries required lamps — it is for an auxiliary lamp that supplements a required lamp that itself flashes. NHTSA's own example is a turn signal: an auxiliary turn-signal repeater flashes in synchrony with, and communicates the identical directional message as, the required turn signal lamp it is wired to. That relationship — reinforcing an existing, required, momentary signal — is what "supplement" means in this sentence.

A police light bar operated while a vehicle is in motion, or a fire apparatus' warning system engaged en route to an emergency, does not supplement anything in that sense. Each required lamp permitted or required to flash signals one discrete, specific condition: a turn signal signals an intended turn; hazard lamps (turn signal lamps flashing together) signal that a vehicle is stopped or disabled; a school bus lamp signals that the bus is stopped for loading. None of them functions as a general, continuously operating announcement of a vehicle's category or purpose. A light bar or warning system that runs independently of any required lamp, and that communicates something none of those required lamps convey — the general presence of law enforcement or an emergency vehicle, rather than a specific, momentary condition — is not reinforcing a required lamp's signal. It is a freestanding signaling system of its own, which is precisely the category S6.2.1's impairment rule exists to address.

NHTSA's December 13, 2024 letter grounds the entire steady-burning requirement in drivers' "familiarity with established lighting schemes, which enables them to instantly recognize the meaning the lamps convey and respond accordingly" — and the May 22,

¹ <https://www.nhtsa.gov/interpretations/ncc-241023-001tsei-tima-letter-interpretation-571108-flashing-amber-lights-12-13>

2003 Krugh letter found that a flashing lamp impairs required signal lamps precisely “by diverting other drivers’ attention and causing confusion.” A signaling system that does not reinforce a required lamp’s established meaning, but instead competes with it for a driver’s attention, is not a supplement to that meaning — it is the confusion that NHTSA’s December 13, 2024 letter, addressing flashing amber warning lights specifically, has consistently found impairing.

III. Historical Development of the Steady-Burning Requirement

The steady burning rule has a documented history spanning nearly sixty years, told through a sequence of Federal Register rulemakings and NHTSA interpretation letters. Read together and in order, they tell a consistent story: the enumerated exceptions to the steady-burning requirement have expanded a small, fixed number of times, and every expansion has been defined by lamp function — turn signals, hazard warning lamps, school bus warning lamps, and the flash-for-signaling allowance for headlamps and side markers. In that same sixty years, NHTSA has shown that it knows exactly how to create a vehicle-purpose exception when it wants one — but only by writing one explicitly, as it later did for a single, narrow application discussed in Part VII. It has never done so for police, fire, ambulance, or utility vehicles, and on the occasions it has been asked directly about such vehicles, it has confirmed the opposite. The remainder of this Part traces that record in chronological order.

A. 1926-1968: The Scientific Basis and the Original Standard

The steady-burning requirement did not originate as an arbitrary threshold-setting exercise. It rests on a scientific understanding of disability glare that predates FMVSS 108 by more than four decades. In 1926, L.L. Holladay published "The Fundamentals of Glare and Visibility," J. Opt. Soc. Am. 12, 271-319 (1926), providing what remains a foundational, frequently-cited mathematical treatment of disability glare — the phenomenon by which a bright light source scatters light within the eye, creating a veiling luminance that reduces the visibility of other objects in the field of view, independent of any subjective discomfort the light source may also cause. Holladay's work, and the extensive line of vision-science research it initiated, establishes that the safety concern underlying the steady-burning requirement — that certain light patterns and intensities physically degrade a viewer's ability to see — has been empirically documented for approximately a century.

The federal steady-burning requirement itself has governed vehicle lighting since the standard's inception. The Initial Federal Motor Vehicle Safety Standard No. 108 was published February 3, 1967, 32 Fed. Reg. 2408, codified at the time at 23 C.F.R. § 255.21, and became effective January 1, 1968, with a broader revision published December 16, 1967, 32 Fed. Reg. 18033, effective January 1, 1969. The original 1967 text, at 32 Fed. Reg. 2412, stated the rule in categorical terms:

S3.5 Lighting Display. When energized, each lamp specified in Table I shall be steady-burning except turn signal lamps, which shall flash.²

Days after the standard was published, the Fire Apparatus Manufacturers Association wrote to NHTSA asking whether it would apply to fire apparatus. NHTSA's May 15, 1967 answer was unambiguous: the lighting requirements would apply to fire apparatus. Thus, from the inception of FMVSS 108, NHTSA established the steady burning requirement as an equipment regulation, not by category of vehicle purpose.

B. 1969-1972: Expansion, Then Consolidation into S4.6

The standard's coverage and its enumerated exceptions both expanded soon after 1967. The December 16, 1967 revision extended the standard beyond 80-inch-and-wider vehicles to cover passenger cars and the full range of vehicle types, and incorporated by reference the hazard warning signal standards (SAE J910, January 1966, and SAE J945, February 1966) and the school bus warning lamp standard (SAE J887, July 1964). A June 27, 1968 NHTSA letter to a state Department of Education confirms school bus warning lamp requirements were already in force under the standard by that date, requiring four or eight lamps flashing at 60-120 cycles per minute. By 1969, three lamp categories — turn signal, hazard warning, and school bus warning — were expressly required to flash. No category defined by vehicle purpose was added.

The rule's flash-for-signaling allowance did not arrive in its current, narrow form immediately, and its path there is itself instructive. NHTSA's Chief Counsel later recounted this history directly, in an April 1984 letter to the Virginia State Police responding to a request for "a history relative to the inclusion of such function of headlamps and marker lamps." As NHTSA explained, the standard's own text had by 1970 grown broader than the 1967 original:

S3.5 [N]ormally steady-burning lamps may be capable of being flashed for signaling purposes.³

That is a considerably wider allowance than the 1967 text's turn-signal-only exception. For a period, any normally steady-burning lamp could be wired to flash for signaling purposes, not just turn signals. NHTSA proposed to narrow this on January 3, 1970 (35 Fed. Reg. 106), and adopted the narrower paragraph S4.6 on October 31, 1970 (35 Fed. Reg. 16840), effective January 1, 1972:

S4.6. Where activated: (a) Turn signal lamps, hazard warning signal lamps, and school bus warning lamps shall flash. (b) All other lamps shall be steady-burning except that means may be provided to flash headlamps and side marker lamps for signalling purposes.⁴

Nothing in this transition added a vehicle-purpose exception to the standard; the exceptions adopted in 1970, like those in 1967, were defined only by lamp function. A

² <https://www.govinfo.gov/content/pkg/FR-1967-02-03/pdf/FR-1967-02-03.pdf>

³ <https://www.nhtsa.gov/interpretations/1984-150>

⁴ <https://www.nhtsa.gov/interpretations/aiam0481>

November 16, 1971 NHTSA letter confirms the transition's practical effect: the broader, pre-1970 version of S3.5 remained available only for vehicles manufactured before January 1, 1972, after which S4.6, quoted above, governed going forward.

C. 1972-2007: Consistent Application to Police, Fire, and School Vehicles

By the time of the letters discussed in this Part, S4.6 had been renumbered S5.5.10 — a renumbering this paper has not traced to a single confirmed rulemaking, but which coincides with NHTSA's January 11, 1993 final rule first establishing daytime running lamp requirements, immediately adjacent to the steady-burning default in the standard's later structure. The substance carried forward unchanged, at 49 C.F.R. § 571.108 (2004 ed.):

S5.5.10. The wiring requirements for lighting equipment in use are: (a) Turn signal lamps, hazard warning signal lamps, and school bus warning lamps shall be wired to flash; (b) Headlamps and side marker lamps may be wired to flash for signaling purposes; (c) A motorcycle headlamp may be wired to allow either its upper beam or its lower beam, but not both, to modulate from a higher intensity to a lower intensity in accordance with section S5.6; (d) All other lamps shall be wired to be steady-burning.⁵

Across both the S4.6 and S5.5.10 eras, NHTSA was asked directly, on multiple occasions, whether flashing warning equipment on police, fire, and school vehicles was exempt from the steady-burning requirement simply because of the vehicle's purpose — and in each instance confirmed that no such categorical exemption exists, beyond whatever specific exception the equipment independently qualifies for. Each letter is discussed below.

A February 9, 1982 letter to the United Sidecar Association, Inc. (Interpretation 1982-1.11), responding to a September 9, 1981 inquiry from H.A. Kendall about motorcycle lighting devices, is revealing for what it shows about public understanding versus the agency's actual position. Kendall's inquiry itself asserted a belief that FMVSS 108 permitted an exception for "various lamps used by police and emergency vehicles" — but that assertion was the questioner's own, unconfirmed understanding, not a statement NHTSA adopted. NHTSA's response addressed only the headlamp and side-marker flash-for-signaling exception under S4.6(b), and the stop-lamp prohibition under the same provision; it did not confirm, endorse, or even discuss a police or emergency vehicle exception. Kendall's own letter separately noted that "several Departments of Public Safety" had expressed concern that variable-intensity lights might be confused with emergency vehicles — evidence that flashing emergency lights were already a familiar real-world practice by 1982 — but familiarity is not the same as a codified exception, and NHTSA's response does not treat it as one.

NHTSA has addressed strobe and flashing warning lamps on police and fire vehicles directly, in a pair of letters to the Virginia State Police two decades later. In a July 3, 2001 letter (the "Massengill letter"), NHTSA found that strobe-equipped unmarked patrol

⁵ <https://www.govinfo.gov/app/details/CFR-2004-title49-vol5/CFR-2004-title49-vol5-sec571-108>

vehicles would be out of compliance with FMVSS 108: "[w]ith respect to new vehicles, Standard No. 108 requires parking lamps, side marker lamps, and optional lighting to be steady burning in use (S5.5.10(d)). When parking lamps and side marker lamps are flashed by the strobe device, a noncompliance with Standard No. 108 would occur."

NHTSA extended this reasoning to fire apparatus in a May 2, 2003 letter to Lt. Col. Steve Flaherty (the "Flaherty letter"), addressing pre-filed Virginia legislation that would permit strobe warning lights on fire fighting apparatus. NHTSA's Chief Counsel wrote:

*"The question is not really whether such vehicles equipped with the strobe light system would still conform to Standard No. 108; clearly they would not because they are causing lamps to flash that Standard No. 108 requires to be steady burning."*⁶

NHTSA's finding of noncompliance in both letters is unequivocal, and is not qualified by any exception for emergency vehicles.

Twenty days after the Flaherty letter, a May 22, 2003 letter to J. Adam Krugh IV applied the identical analysis to a different government-owned vehicle: a flashing or strobing lamp mounted atop a school bus. NHTSA found that such a lamp would impair the effectiveness of required signal lamps "by diverting other drivers' attention and causing confusion" — the same impairment and confusion rationale NHTSA applied to police and fire vehicles, reaching the same conclusion. The Krugh letter did not treat government ownership generally, or a school setting specifically, as grounds for a different result.

D. 2007: Administrative Renumbering, No Substantive Change

On December 4, 2007, NHTSA published a final rule (72 Fed. Reg. 68234) comprehensively reorganizing FMVSS 108 into its current structure — S1 through S14, together with Tables I through IV — effective September 1, 2008. NHTSA described the rewrite as "administrative in nature," intended to make the standard easier to navigate rather than to change what it substantively required. Under this current structure, the activation requirements for required lamps are set out in Table I, referenced through S6.1.5, rather than in a standalone lettered paragraph as before. The separate prohibition on auxiliary equipment impairing required lighting — the provision most directly relevant to auxiliary warning lamps on emergency and utility vehicles — was carried forward, currently at 49 C.F.R. § 571.108, S6.2.1:

*S6.2 Impairment. S6.2.1 No additional lamp, reflective device, or other motor vehicle equipment is permitted to be installed that impairs the effectiveness of lighting equipment required by this standard.*⁷

This history matters directly to the subject of this paper. Auxiliary warning lamps on police, fire, ambulance, and utility vehicles are not enumerated, required lamps under Table I — they are auxiliary equipment, and always have been, governed not by the required-lamp activation table but by the impairment prohibition quoted above. It is that

⁶ <https://www.nhtsa.gov/interpretations/flaherty>

⁷ <https://www.ecfr.gov/current/title-49/subtitle-B/chapter-V/part-571/subpart-B/section-571.108>

provision, and NHTSA's consistent interpretation of it, that this paper relies on throughout; citations elsewhere in this paper to "S4.6" or "S5.5.10" refer to the pre-2008 numbering used in the historical letters discussed above, and are identified as such.

The Complete Picture: Every Required Lamp in Table I

The “sole exception” language quoted at the outset of this Part is not a general statement - it is a description of Table I's actual content, in full. The following tables reproduce, in summary form, every required lamp's activation requirement across the three vehicle categories Table I addresses -- passenger cars, multipurpose passenger vehicles, trucks, and buses (Table I-a); trailers (Table I-b); and motorcycles (Table I-c) -- including every category of additional lamp Table I requires based on a vehicle's width, length, or weight.

Table I-a — Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses

Lamp	Activation Requirement
Lower/Upper Beam Headlamps	Steady burning, except may flash for signaling (flash-to-pass) or vary intensity for adaptive driving beam
Turn Signal Lamps	Must flash
Taillamps	Steady burning
Stop Lamps	Steady burning
Side Marker Lamps	Steady burning, except may flash for signaling
Reflex Reflectors	Not applicable (passive device)
Backup Lamp	Steady burning
License Plate Lamp	Steady burning
Parking Lamps (vehicles less than 2032 mm wide)	Steady burning
High-Mounted Stop Lamp (vehicles less than 2032 mm wide, GVWR 10,000 lbs or less)	Steady burning
Intermediate Side Marker Lamps (vehicles 30 ft or longer)	Steady burning, except may flash for signaling
Clearance Lamps (vehicles 2032 mm or more wide)	Steady burning
Identification Lamps (vehicles 2032 mm or more wide)	Steady burning
School Bus Signal Lamps (school buses, except multifunction school activity buses)	Must flash, 60–120 cycles/minute
Daytime Running Lamps (permitted, not required)	Steady burning

Table I-b — All Trailers

Lamp	Activation Requirement
Turn Signal Lamps	Must flash
Taillamps	Steady burning

Stop Lamps	Steady burning
Side Marker Lamps	Steady burning, except may flash for signaling
Reflex Reflectors	Not applicable (passive device)
License Plate Lamp	Steady burning
Intermediate Side Marker Lamps (trailers 30 ft or longer)	Steady burning, except may flash for signaling
Intermediate Side Reflex Reflectors (trailers 30 ft or longer)	Not applicable (passive device)
Clearance Lamps (trailers 2032 mm or more wide)	Steady burning
Identification Lamps (trailers 2032 mm or more wide)	Steady burning

Table I-c — All Motorcycles

Lamp	Activation Requirement
Lower Beam Headlamps	Steady burning, except may flash for signaling, or modulate under the separate S10.17.5 provision
Upper Beam Headlamps	Steady burning; the upper or lower beam (not both) may be wired to modulate under S10.17.5
Turn Signal Lamps	Must flash (none required on a motor-driven cycle with a top speed of 30 mph or less)
Taillamps	Steady burning
Stop Lamps	Steady burning
Reflex Reflectors	Not applicable (passive device)
License Plate Lamp	Steady burning

Across every vehicle category FMVSS 108 covers -- including every additional lamp a vehicle's width, length, or weight can trigger -- exactly two lamp types are ever required or permitted to flash for a stated function: turn signal lamps, for directional intent, and school bus signal lamps, for a stopped-to-load condition. Every other required lamp, in every table and every additional-lamp category the standard specifies, is steady-burning. No row in any of these tables authorizes flashing for a general warning, alert, or presence purpose, and none is keyed to a vehicle's ownership or law enforcement, fire, or utility purpose. This is not an inference from the "sole exception" language quoted above -- it is that language's complete, exhaustive application. There is no exception beyond what appears in these tables. It is now worth repeating NHTSA's interpretation regarding auxiliary warning lamps:

*"NHTSA has long interpreted FMVSS No. 108 to require that all auxiliary lamps be 'steady burning,' with the sole exception of auxiliary lamps that supplement required lamps that flash, such as turn signals."*⁸

⁸ <https://www.nhtsa.gov/interpretations/ncc-241023-001tsei-tima-letter-interpretation-571108-flashing-amber-lights-12-13>

The category of lamps an auxiliary lamp may “supplement” under this exception is limited to what Table I actually specifies: turn signal lamps, headlamps flashed for signaling, side marker lamps flashed for signaling, and school bus signal lamps. Light bars — such as those mounted atop police cars, fire trucks, and utility vehicles — and other auxiliary lamps used to signal general urgency or presence do not supplement any of these four categories, and so do not qualify for any exception to NHTSA's steady-burning requirement.

E. 2019-2026: Modern Reaffirmation and Litigation

A September 9, 2019 letter to Paul Schaye, addressing a programmable automotive lighting product, reaffirmed the categorical rule — “NHTSA interprets FMVSS No. 108 to require that all auxiliary lamps be ‘steady burning,’ with the sole exception being auxiliary lamps that supplement required lamps that flash, such as turn signals” — while clarifying a point of technical nuance: a steady-burning requirement does not forbid a lamp from being automatically activated or deactivated by a triggering event, so long as the lamp is steady while it is on. That clarification refined how the rule applies to newer, programmable lighting technology; it did not add a new exception.

A June 27, 2024 letter to Richard Seoane, cited in NHTSA's December 13, 2024 letter for the same categorical proposition, is referenced in this paper by that citation; this paper has not independently reviewed its full text and does not rely on it beyond what the December 13, 2024 letter attributes to it.

NHTSA's December 13, 2024 Letter of Interpretation (NCC-241023-001TSEI-TIMA), addressing flashing amber warning lights, is the fullest and most recent reaffirmation. It restates the categorical rule quoted at the outset of this Part; rejects the argument that the 2007 rewrite loosened it, stating plainly that “NHTSA had no such intention”; explains that impairment is assessed case-by-case based on “brightness, color, location, and activation pattern,” grounded in the agency's longstanding view that “highway traffic safety is enhanced by the drivers' familiarity with established lighting schemes, which enables them to instantly recognize the meaning the lamps convey and respond accordingly”; and — notably — rejects the specific argument that widespread real-world use of flashing amber lights establishes any kind of exception, stating that prior interpretation letters on the subject “do not endorse the installation of flashing or strobe lamps by individuals or declare that the lights do not impair the effectiveness of required lamps,” and that the agency “made, and continues to make, no determination as to whether the flashing amber lights are ‘widespread.’” That rejection matters for the same reason the Kendall letter's silence mattered in 1982: NHTSA has had repeated opportunities to convert widespread practice into a codified exception, for amber warning lights and, by the same logic, for police and fire vehicles, and has not done so. The letter also confirms how the Flaherty letter should be read, stating in its own footnotes that “[n]othing in this letter is intended to conflict with our interpretation, stated in our May 2, 2003, Letter to Lt. Col. Steve Flaherty, that deference to states applies to ‘the installation and use of emergency lighting devices on [the state's] vehicles.’” NHTSA's own 2024

characterization of Flaherty describes it as an installation-and-use deference, not a compliance finding or a preemption ruling.

Brake Plus NWA, Inc. v. U.S. Department of Transportation, discussed in Part IV and Part X below, is not a letter of interpretation, but it belongs at the end of this chronology because it shows the same position tested outside the letter-writing process, in adversarial federal litigation, where NHTSA had every incentive to qualify or narrow its position if it believed qualification were warranted. It did not. Instead, NHTSA vigorously defended its steady burning position.

Viewed as a whole, the chronology supports a narrow but firm conclusion: over nearly sixty years of Federal Register rulemakings and interpretation letters, NHTSA has expanded the steady-burning requirement's exceptions a small, fixed number of times, always by lamp function, and has never added police, fire, ambulance, or utility vehicles to that list — despite direct questions bearing on exactly those vehicles in 1967, 1982, 2001, 2003, and 2024.

IV. The Federal Preemption Framework

A. 49 U.S.C. § 30103(b)

Section 30103(b)(1) provides the operative federal preemption rule:

*"When a motor vehicle safety standard is in effect under this chapter, a State or a political subdivision of a State may prescribe or continue in effect a standard applicable to the same aspect of performance of a motor vehicle or motor vehicle equipment only if the standard is identical to the standard prescribed under this chapter. However, the United States Government, a State, or a political subdivision of a State may prescribe a standard for a motor vehicle or motor vehicle equipment obtained for its own use that imposes a higher performance requirement than that required by the otherwise applicable standard under this chapter."*⁹

NHTSA's own interpretation letters confirm the operative test: a state standard is preempted by federal standards if (1) the standard applies to the 'same aspect of performance' as an applicable FMVSS, and (2) it is not identical to that FMVSS. NHTSA Interpretation 07-000135as. Whether a lamp is steady-burning or flashing is squarely 'an aspect of performance' — indeed, it is the precise dimension S6.2.1 regulates for auxiliary lamps. And it is not a neutral dimension on which a lamp can simply differ. NHTSA has consistently characterized flashing and strobing as impairing, not enhancing, the safety performance a steady-burning lamp provides — a characterization grounded in the disability-glare science discussed in Part III.A and confirmed directly by NHTSA's own case-by-case impairment analysis in Part VIII. Flashing is not a different aspect of performance from steady-burning; it is a lower level of the same aspect of performance, a distinction that matters directly to the “own use” exception addressed in Part IV.B below.

⁹ <https://www.law.cornell.edu/uscode/text/49/30103>

B. The "Own Use" Exception Does Not Rescue CVC's Authorization

Section 30103(b)(1)'s second sentence permits a state or political subdivision to depart from an otherwise-applicable federal standard for vehicles "obtained for its own use," but only where the state standard "imposes a higher performance requirement." NHTSA has applied this exception to sustain state-imposed equipment requirements that exceed the federal floor — for example, additional safety equipment mandated for school buses procured for a state's own use. NHTSA Interpretation 24258.drn.

That is not the posture here. California Vehicle Code (CVC) §§ 25252, 25252.5, 25253, 25258, and 25259 do not impose a requirement more protective than FMVSS 108's steady-burning default — they authorize a departure from it. Under NHTSA's own, repeated characterization, that departure is not a "higher performance requirement" in the direction the exception contemplates: the December 13, 2024 letter describes flashing auxiliary lamps as lamps that "impair the effectiveness of required lamps," and the Krugh letter describes the same phenomenon as "diverting other drivers' attention and causing confusion." A standard NHTSA repeatedly characterizes as degrading the safety performance FMVSS 108 protects cannot, consistent with the plain text of § 30103(b)(1), be described as imposing a "higher performance requirement" than the standard it departs from. On the text of the exception and NHTSA's own characterization of the practice, the "own use" exception does not appear available to rescue CVC's authorization for government-owned emergency and utility vehicles.

C. The Constitutional Backdrop: The Supremacy Clause

Section 30103(b) is a statutory implementation of the Supremacy Clause, U.S. Const. art. VI, cl. 2, which provides that federal law is "the supreme Law of the Land," state law to the contrary notwithstanding. Where Congress has enacted an express preemption clause, as it has in § 30103(b), courts look to the text of that clause to determine preemptive scope. California has separately acknowledged this framework in its own code: CVC § 26103(c) provides that "[a] federal motor vehicle safety standard adopted pursuant to Chapter 301 ... of Title 49 of the United States Code that covers the same aspect of performance of a device shall prevail over provisions of this code or regulations adopted pursuant to this code." Whatever the precise scope of § 26103(c) — a question addressed in Part VI below — its existence confirms that California's own Legislature has recognized that FMVSS provisions covering the same aspect of performance as a Vehicle Code provision control over that provision.

V. The Enforcement/Validity Distinction, and Its Limits

NHTSA's practical tolerance of flashing warning lamps on government-owned emergency vehicles rests on a separate statute: 49 U.S.C. § 30122, which restricts the "make inoperative" prohibition to manufacturers, distributors, dealers, and motor vehicle repair businesses, expressly excluding vehicle owners. A state or municipality that modifies its own, already-delivered fleet falls outside § 30122's reach as an owner — meaning NHTSA has no statutory enforcement mechanism against the government owner itself for that

post-purchase modification. Where a government entity instead specifies noncompliant equipment through its procurement process, the manufacturer or upfitter that performs the actual installation remains fully subject to § 30122's render-inoperative prohibition, and, if the installation occurs before the vehicle's first sale, to § 30112's new-vehicle certification requirement — neither of which the government customer's specification displaces.

This is an enforcement-authority limitation, not a validity determination. Section 30122 answers who NHTSA may pursue; § 30103(b) answers whether a state standard survives preemption. NHTSA has never treated the two as equivalent, and neither letter discussed in Part III purports to conduct a § 30103(b) analysis. The absence of enforcement against a category of owner does not establish that the state authorization those owners rely on is constitutionally or statutorily valid — it establishes only that no enforcement has occurred.

This distinction has a practical corollary worth stating plainly: NHTSA's own choice not to enforce FMVSS 108 against government fleet owners is itself very likely unreviewable. *Heckler v. Chaney*, 470 U.S. 821 (1985), holds that an agency's decision not to institute enforcement proceedings is presumptively committed to agency discretion by law, and therefore unreviewable under 5 U.S.C. § 701(a)(2), because there is no judicially manageable standard by which a court could second-guess the agency's allocation of enforcement resources. A claim that NHTSA's non-enforcement against government vehicle owners is itself "arbitrary and capricious" would need to overcome *Chaney*'s presumption, and this paper does not attempt to make that claim. The preemption argument advanced here does not require it: it is directed at the validity of the state statute, not at compelling federal enforcement, and does not depend on NHTSA ever bringing or being made to bring an enforcement action.

VI. California's Statutory Framework

A. Why These Provisions Exist: Two Regulatory Tracks That Never Met

California Vehicle Code Article 7 is not a response to FMVSS 108. It predates it by decades. California's vehicle lighting law traces through the California Vehicle Act of 1923, superseding a patchwork of acts dating to 1905–1919; a 1935 recodification built in part on the 1934 draft of the national Uniform Vehicle Code; and a comprehensive 1959 recodification that produced the numbering scheme still in use today. All of this predates FMVSS 108's original 1967 publication, discussed in Part III.A, by at least eight years -- the 1959 recodification alone.

That timeline matters because California's framework was never developed in isolation. It grew alongside a parallel, voluntary, non-governmental effort: the Uniform Vehicle Code, first drafted beginning in 1923 under the National Conference of Commissioners on Uniform State Laws and formalized through National Conference on Street and Highway Safety meetings starting in 1924–26, continuously revised through 1934, 1946, 1954,

1956, and 1962. California participated continuously through its own Advisory Committee on Motor Vehicle Legislation, active since approximately 1917. Lighting equipment was one of the subject areas both the California Vehicle Code and the Uniform Vehicle Code addressed. Neither code was written with reference to, or anticipation of, a federal motor vehicle equipment standard, because none existed until the National Traffic and Motor Vehicle Safety Act of 1966.

This history was already producing exactly the confusion this paper addresses before FMVSS 108 ever existed. J. Allen Davis, the attorney who served as legislative draftsman for California's own 1935 recodification and for the Uniform Vehicle Code drafting committees from 1924 to 1954, wrote in 1963 -- four years before FMVSS 108's first publication -- that California's 1959 recodification had been "drafted by a technical lawyer as a thoroughly technical document not readily intelligible to the motorist, the administrative or enforcement officer, and difficult for lawyers long conversant with motor vehicle legislation." By his count, 274 sections of the Vehicle Code were amended, added, or repealed in 1959 alone, and 412 in 1961, a pace he described as "conducive to greater confusion on the part of those who use our streets and highways." That assessment came from the law's own principal draftsman, writing before the federal question this paper addresses existed at all.

When FMVSS 108 arrived in 1967, and tightened through the amendments traced in Part III, neither regulatory track adjusted to the other. NHTSA's interpretation letters, discussed at length in Part III, repeatedly answered the question of whether its own steady-burning requirement reached police, fire, and school vehicles -- and repeatedly answered yes. They did not address, because no one asked NHTSA to address, whether California's older, independently-developed authorization of flashing lights on those same vehicles survived that requirement. California, for its part, kept amending Article 7 on its own terms: § 25252 was amended in 1974, two years after NHTSA's S4.6 rule took full national effect; § 25251 was amended as recently as 1997. Neither amendment's text engages the federal steady-burning requirement or the preemption question this paper addresses. This paper has not located the underlying legislative committee analyses for those amendments and does not claim to know what, if anything, was considered and set aside; what the record does show is that the amendments themselves reflect no such engagement.

The resulting picture is neither a state legislature ignorant of a federal rule nor one that considered and defied it. It is two regulatory tracks, each with its own decades-long institutional history, that developed in parallel and were never reconciled with each other -- not by California's Legislature and not by NHTSA. That is precisely why CVC Article 7 creates the confusion it does: not because anyone built it to mislead, but because no one has gone back to resolve what happens where the two tracks conflict. Identifying that gap, and what it means for a public entity relying on Article 7 today, is the task the remainder of this Part undertakes.

B. The Authorizations

California Vehicle Code (CVC) § 25250 prohibits flashing lights on vehicles "except as otherwise permitted." That exception is supplied by subsequent sections of the same article (Article 7, "Flashing and Colored Lights"): § 25252 authorizes flashing or steady red warning lights on authorized emergency vehicles; § 25252.5 authorizes alternating flashing upper-beam headlamps on emergency vehicles operating under § 21055; § 25253 requires flashing amber warning lamps on tow trucks; § 25258(b) permits flashing or steady blue lights on specified police vehicles; and § 25259 permits flashing amber and white lamps on authorized emergency vehicles in additional circumstances.

With one exception, every one of these authorizations is discretionary, not mandatory — "may," not "shall." § 25252.5 says an emergency vehicle "may be equipped" with alternating upper-beam flashing; § 25258(b) says a covered peace officer's vehicle "may, in addition, display" a blue warning light; § 25259 says an authorized emergency vehicle "may display" flashing amber or white lamps; and even § 25252's flashing-light clause, layered onto its separate mandatory steady-lamp requirement, is phrased as something a vehicle "may display." A public entity that equips its vehicles with steady-burning lamps only, declining every one of these permissions, violates none of them. What CVC Article 7 actually supplies, for these vehicles, is not a conflicting legal command but an available-looking option that, on the preemption analysis in Parts IV through VI, may not survive contact with FMVSS 108 — an option whose exercise does not confer the protection a public entity relying on it might assume it does.

The concept of a steady-burning warning lamp is not something FMVSS 108 introduced to California law from outside. CVC § 25252 itself requires, as its one truly mandatory element: "Every authorized emergency vehicle shall be equipped with at least one steady burning red warning lamp visible from at least 1,000 feet to the front of the vehicle." Everything else the section permits -- revolving, flashing, or additional steady lights -- is discretionary, as the preceding paragraph establishes; the steady-burning lamp is not. That asymmetry is itself meaningful. California's own Legislature required a steady-burning lamp to accomplish the core signaling function this statute exists for -- alerting an approaching driver that an emergency vehicle is present -- and left flashing lights as an optional addition, never a substitute. A legislature that doubted a steady light could reliably accomplish that signaling function would not have made it the one mandatory element of the statute while leaving flashing entirely discretionary. The premise that a steady-burning light can be used safely and effectively for vehicle signaling is not an idea NHTSA imported into California law; California's own mandatory baseline requirement reaches the identical conclusion independently, without citing FMVSS 108 or, so far as the record shows, any awareness that a materially identical federal requirement existed.

§ 25253 reads differently on its face: "Tow trucks used to tow disabled vehicles shall be equipped with flashing amber warning lamps." But the mandate is to equip, not to activate. Modern LED amber warning lamps marketed for tow trucks are typically configurable rather than flash-only, commonly including a genuine steady-burn setting

alongside numerous flash patterns, selected through an onboard controller rather than fixed by the hardware. A tow truck operator who installs such a lamp and operates it in steady-burn mode satisfies § 25253's equip mandate and FMVSS 108's S6.2.1 simultaneously; nothing in § 25253 requires the lamp ever be switched to flash. Where a tow truck's amber lamp is in fact operated in flash mode, that is an unconstrained configuration choice, not something California law compelled.

C. CVC § 26103(c) and the Scope Question

CVC § 26103(c), discussed in Part IV.C, confirms what federal law already requires on its own force: a federal standard covering the same aspect of performance as a Vehicle Code provision “shall prevail” over that provision. This is not California extending a courtesy to federal law — it is California's own Legislature acknowledging the Supremacy Clause's operation, written directly into the Vehicle Code. § 26103(c)'s own text confirms its reach is not confined to Article 16, the equipment-testing article where the section itself sits: it supersedes conflicting provisions of “this code” — the Vehicle Code as a whole, expressly including Article 7's authorizations — not merely “this article” or “this chapter.” The Legislature had the obvious language available to confine § 26103(c) to the article housing it and did not use it. § 26103(c) matters here as independent confirmation, from California's own Legislature, of the same conclusion § 30103(b) already compels on its own force by direct operation of the Supremacy Clause.

D. CVC § 21 and Local Authority

A separate, state-level preemption doctrine is worth distinguishing from the federal question addressed above. CVC § 21 provides that Vehicle Code provisions are “applicable and uniform throughout the state,” and that a “local authority shall not enact or enforce any ordinance or resolution on the matters covered by this code ... unless expressly authorized.” The California Attorney General has described this as establishing “the state's plenary power and its preemption of the entire field of traffic control.” 14-307 Cal. Op. Att'y Gen. This doctrine governs the City's authority to act as a local regulator; it does not govern, and is analytically distinct from, the City's capacity as an owner-operator of its own vehicle fleet — the capacity implicated by § 30103(b)'s “own use” exception. This distinction matters directly: § 21's field-preemption doctrine cannot supply what the “own use” exception itself does not, as addressed in Part V.B. § 21 answers a question about regulatory authority — whether the City may enact rules different from the state's. § 30103(b)'s “own use” exception answers a different question — whether a government standard for vehicles procured for the government's own use imposes a higher performance requirement than FMVSS 108. Uniform and exclusive statewide application does not make CVC's authorizations higher-performance standards; they remain the same permissive, non-identical departures from the federal default that Part V.B already forecloses. § 21 determines who within California may authorize a departure from FMVSS 108 — it has no bearing on whether that departure survives § 30103(b).

E. CVC §§ 26100-26101: A Second State-Law Route, Reaching Owners Directly

A separate pair of Vehicle Code provisions closes a gap the federal analysis in Part V leaves open. 49 U.S.C. § 30122 reaches only manufacturers, distributors, dealers, and repair businesses -- not the vehicle owner who installs or continues operating noncompliant equipment. CVC §§ 26100 and 26101 are not limited that way:

CVC § 26100(b). A person shall not use upon a vehicle, and a person shall not drive a vehicle upon a highway that is equipped with, any lighting equipment... that is not in compliance with Section 26104.¹⁰

CVC § 26101(a)-(b). A person shall not sell or offer for sale... any device that is intended to modify the original design or performance of any lighting equipment... unless the modifying device meets the provisions of Section 26104. A person shall not use upon a vehicle, and a person shall not drive a vehicle upon a highway that has installed a device that is intended to modify the original design or performance of a lighting... device, unless the modifying device complies with Section 26104.¹¹

“A person” in both provisions reaches vehicle owners and operators directly -- a city driving its own fleet, or a private company operating its own trucks, not merely the entity that manufactured or installed the equipment. Compliance under § 26104 is measured against requirements the Department (California Highway Patrol (CHP)) has adopted in Title 13 of the California Code of Regulations -- but CVC § 26103(c), discussed in Part IV.C, and its implementing regulation, 13 C.C.R. § 1240, both provide that a Federal Motor Vehicle Safety Standard covering the same aspect of performance supersedes that state regulation. The practical result: §§ 26100 and 26101 make FMVSS 108 compliance a state-law obligation running directly against the owner or operator of the vehicle, independent of whatever gap exists in federal enforcement.

13 C.C.R. § 1240 deserves attention in its own right, separate from § 26103(c). It is not a statute the Legislature enacted; it is CHP’s own regulation, adopted by the agency responsible for administering Title 13’s equipment requirements, and it states the supersession principle in stronger and more specific terms than the statute does:

13 C.C.R. § 1240. A Federal Motor Vehicle Safety Standard that conflicts with an equipment provision of this title as to the same aspect of performance shall supersede that specific provision of this title with respect to vehicles manufactured and maintained in compliance with applicable federal standards.¹²

The “manufactured and maintained” language is notable: it contemplates ongoing compliance, not merely a vehicle’s condition at the point of sale, which is precisely the continuing obligation §§ 26100 and 26101 impose on an owner or operator. § 1240’s own text confirms its reach is not limited to the Motor Carrier Safety chapter where it happens

¹⁰ <https://law.justia.com/codes/california/code-veh/division-12/chapter-2/article-16/section-26100/>

¹¹ <https://law.justia.com/codes/california/code-veh/division-12/chapter-2/article-16/section-26101/>

¹² <https://regulations.justia.com/states/california/title-13/division-2/chapter-6-5/article-8/section-1240>

to sit: it supersedes conflicting provisions of “this title” -- Title 13 as a whole, spanning multiple divisions including the Department of Motor Vehicles' own regulations -- not merely “this chapter” or “this article.” CHP had the obvious language available to write a narrower scope and did not. What § 1240 adds is independent confirmation, from CHP's own regulatory text rather than only the Legislature's, that California's own regulatory apparatus already recognizes the supersession principle this paper's federal preemption analysis rests on.

CVC § 26101 requires that aftermarket lighting devices comply with state and federal regulations, which -- through the § 26104, § 26103(c), and 13 C.C.R. § 1240 chain already discussed -- includes FMVSS 108's steady-burning requirement wherever it covers the same aspect of performance. The only exception to that obligation is § 26101(c): “This section does not apply to... lamps installed on authorized emergency vehicles.” § 26100, which governs original equipment rather than aftermarket modification, contains no comparable exception at all.

This makes § 26101 restrictive in a different way than 49 U.S.C. § 30122, the federal make-inoperative provision discussed in Part V. § 30122 restricts by function: it reaches whoever performs the installation -- a manufacturer, distributor, dealer, or repair business -- regardless of what kind of vehicle receives the equipment and regardless of who owns it. CVC § 26101(c)'s exception, by contrast, is defined by vehicle category: whether the vehicle receiving the lamp is an “authorized emergency vehicle” at all, regardless of who installed the lamp or who owns the vehicle. The two statutes cut along entirely different axes, and neither exception automatically tracks the other -- a vehicle outside § 30122's reach because its owner, rather than a covered business, did the installing is not thereby inside § 26101(c)'s exception, and vice versa.

Whether § 26101(c)'s vehicle-category exception reaches a given vehicle depends entirely on how narrowly § 165 defines the term the exception uses. CVC § 165 defines “authorized emergency vehicle” as a closed, enumerated list: ambulances; publicly owned vehicles operated by peace-officer-employing agencies or fire departments; vehicles owned by the state (or a bridge and highway district) and used for firefighting, towing or servicing other vehicles, or repairing damaged lighting or electrical equipment; certain tribal and federal emergency vehicles; and vehicles individually permitted by the CHP. Ownership matters throughout this list -- the towing and utility-service category in § 165(c) is expressly limited to vehicles the state itself owns.

That closed list has a direct, practical consequence. A private waste hauler or a private utility operating its own trucks under contract or franchise rather than as a state-owned fleet, does not fall within any category § 165 enumerates. Neither company's vehicles are ambulances, peace-officer or fire-department vehicles, or state-owned service vehicles, and neither operates under a blanket CHP-issued emergency vehicle permit for its fleet. CVC § 26101(c)'s exception accordingly does not reach them. If such a company equips its trucks with auxiliary flashing warning lamps that do not meet FMVSS 108's steady-

burning requirement, § 26101 -- read together with §§ 26103(c), 26104, and 13 C.C.R. § 1240 -- already prohibits that equipment under California law, independent of the federal preemption analysis this paper otherwise develops.

Taken together, the California Vehicle Code provides no shelter from the NHTSA steady-burning requirement. CVC's Article 7 authorizations do not survive 49 U.S.C. § 30103(b), regardless of whether a given authorization is discretionary or mandatory. CVC § 26103(c)'s precise scope does not need to be resolved, because 49 U.S.C. § 30103(b) preempts those authorizations on its own force either way. CVC § 21's field-preemption doctrine governs a different question entirely and supplies no independent basis for departing from FMVSS 108. And where a public entity or private operator declines to rely on Article 7 at all, CVC §§ 26100 and 26101 supply a second, independent state-law obligation to the same effect — one that, unlike 49 U.S.C. § 30122, reaches the owner and operator directly, not merely the manufacturer or installer. Read as a whole, California law does not create an exception to the NHTSA steady-burning requirement; its own equipment-compliance statutes reinforce it.

VII. The FMCSA Regulatory Framework for Commercial Motor Vehicles

A. FMCSA's Steady-Burning Rule and Its Broader Exception List

A separate federal agency, the Federal Motor Carrier Safety Administration ("FMCSA"), regulates commercial motor vehicle equipment under 49 C.F.R. Part 393. Its own steady-burning rule, at 49 C.F.R. § 393.25(e), starts from the same default FMVSS 108 does:

All exterior lamps on a commercial motor vehicle... shall be steady-burning, with the exception of: (1) Turn signal lamps; (2) Hazard warning signal lamps; (3) School bus warning lamps; (4) Amber warning lamps or flashing warning lamps on tow trucks and commercial motor vehicles transporting oversized loads; and (5) Warning lamps on emergency and service vehicles authorized by Federal, State, or local authorities.¹³

Two categories on this list have no counterpart in FMVSS 108's own enumerated exceptions: flashing amber lamps on tow trucks and oversized-load vehicles, and warning lamps on emergency and service vehicles authorized by government authorities. Both were added by a January 24, 1996 amendment, 61 Fed. Reg. 1843.

B. The Commercial Motor Vehicle Threshold

Part 393, including § 393.25(e), applies only to "commercial motor vehicles." Under 49 C.F.R. § 390.5, that term means a vehicle with a gross vehicle weight rating or gross combination weight rating of 10,001 pounds or more (or that meets certain passenger or hazardous-materials thresholds), operated in interstate commerce. This threshold sorts the vehicles this paper addresses into two very different positions. A typical police

¹³ <https://www.ecfr.gov/current/title-49/subtitle-B/chapter-III/subchapter-B/part-393/subpart-B/section-393.25>

package vehicle — a Ford Police Interceptor, Chevrolet Tahoe PPV, or Dodge Charger Pursuit — carries a GVWR in the range of 5,500 to 6,500 pounds, well under the threshold; § 393.25(e) does not apply to it, and FMVSS 108 and state law remain the entire governing framework for its warning lamps. A fire engine or aerial apparatus, by contrast, typically carries a GVWR well above 26,000 pounds — squarely a commercial motor vehicle, squarely within FMCSA's reach. For a public entity's fire apparatus specifically, § 393.25(e)'s broader exception list is not merely academic; it is the provision that entity is most likely to raise in response to the analysis in this paper.

C. Why § 393.25(e) Does Not Override FMVSS 108

§ 393.25(e)'s emergency-vehicle clause does not resolve the question this paper addresses, for three independent reasons.

First, FMCSA's rule and FMVSS 108 answer different questions under different statutes, enforced by different agencies against different actors. FMVSS 108 is a manufacturing standard under 49 U.S.C. Chapter 301, asking whether equipment was built and maintained in conformity with the standard, enforced against manufacturers, distributors, dealers, and repair businesses through 49 U.S.C. § 30122. § 393.25(e) is an operating standard under FMCSA's general safety authority, 49 U.S.C. § 31136, asking only whether a motor carrier may operate a vehicle on the road without being cited at a roadside inspection. A vehicle can fail the first question while passing the second; nothing in § 393.25(e) purports to define compliance with FMVSS 108, and NHTSA has never treated FMCSA's carrier-side relief as bearing on its own impairment analysis.

Second, § 393.25(e)'s emergency-vehicle clause does not independently authorize anything — it defers to "Federal, State, or local authorities." For a public entity relying on state authorization, that clause is parasitic on the same California statutes — CVC §§ 25252, 25253, 25258, and 25259 — this paper's preemption analysis in Parts III through V addresses directly. If that state authorization does not survive 49 U.S.C. § 30103(b) preemption, 49 C.F.R. § 393.25(e)'s clause has nothing left to point to; it does not supply independent federal permission of its own.

Third, and held in reserve rather than argued to a conclusion here: 49 C.F.R. § 1.95(c) delegates to NHTSA, coordinating with FMCSA, the authority to promulgate post-manufacture commercial vehicle equipment standards "based upon and similar to" an existing FMVSS. § 393.25(e)'s steady-burning rule is, by its own cross-references, built on FMVSS 108 — arguably placing it within the category § 1.95(c) reserves to NHTSA's coordinated rulemaking. The current authority citation for § 393.25 invokes only FMCSA's general § 31136 safety authority, not that coordinated pathway. Whether that supports an argument that § 393.25(e)'s exceptions exceed FMCSA's properly delegated authority is a genuine open question this paper has not resolved and does not need to resolve, given the first two points above.

D. What an Explicit NHTSA Vehicle-Purpose Exception Actually Looks Like

NHTSA has, on one occasion, written a genuine vehicle-purpose exception into a companion standard — and comparing it to § 393.25(e) shows exactly what such an exception requires, and exactly what § 393.25(e) does not provide. Federal Motor Vehicle Safety Standard No. 131, School Bus Pedestrian Safety Devices, 49 C.F.R. § 571.131, governs the stop signal arm a school bus extends when stopped to load or discharge passengers. That standard permits the arm's conspicuity requirement to be satisfied by flashing red lamps, subject to specific, mandatory engineering parameters NHTSA itself wrote:

S5.3.2. Each side of the stop signal arm shall have at least two red lamps that meet the requirements of S6.2... S6.2.2. Flash rate. The lamps on each side of the stop signal arm, when operated at the manufacturer's design load, shall flash alternately at a rate of 60 to 120 flashes per minute.¹⁴

This is what an actual vehicle-purpose exception looks like: a standard NHTSA wrote itself, specifying the lamp count, color, position, and flash rate a compliant device must meet, tied to a single, narrowly defined application. It is mandatory, not discretionary — a manufacturer either meets S6.2.2's flash rate or it does not.

49 C.F.R. § 393.25(e) has none of these features. It specifies no flash rate, no lamp count, no color, and no other engineering parameter. It requires nothing; it is a negative statement about FMCSA's own enforcement scope — that FMCSA will not cite a carrier under § 393.25(e) itself for using such lamps. As explained above, that is not the same as the equipment complying with FMVSS 108, and it is not the same kind of exception S5.3.2 represents. If NHTSA wished to create a genuine vehicle-purpose exception for police, fire, or utility vehicle warning lamps, the stop signal arm shows precisely what that would require: specific, mandatory, engineered parameters, written by NHTSA into a standard of its own. NHTSA has never done so.

VIII. The Self-Executing, Case-by-Case Nature of the Impairment Standard

The analysis in this paper does not depend on NHTSA's interpretation letters existing at all. S6.2.1's text — "[n]o additional lamp, reflective device, or other motor vehicle equipment is permitted to be installed that impairs the effectiveness of lighting equipment required by this standard" — is a self-executing regulatory prohibition. NHTSA's letters explain how the agency has applied that text to particular facts; they do not create the underlying requirement, and its force does not depend on a letter having addressed any particular vehicle or agency.

NHTSA's own consistent practice confirms that impairment is a fact-specific question, not a category-wide one. In its September 9, 2019 letter to Paul Schaye, NHTSA stated directly:

¹⁴ <https://www.ecfr.gov/current/title-49/subtitle-B/chapter-V/part-571/subpart-B/section-571.131>

*"Because the existence of impairment is, in part, a function of the context in which an auxiliary lamp is used, impairment must be determined on a case-by-case basis. If a business subject to the 'make inoperative' provision installs an aftermarket auxiliary lamp, that entity is responsible for determining whether doing so causes impairment."*¹⁵

The December 13, 2024 letter applies the same case-by-case framework, considering the brightness, color, location, and activation pattern of the specific lamp at issue. This has a direct practical consequence: a general legal authorization to use flashing lights — whether CVC's statutory exceptions or 49 C.F.R. § 393.25(e)'s emergency-vehicle clause — answers a category-level question (is this kind of vehicle permitted to use this kind of lamp), not the equipment-specific question S6.2.1 actually asks (does this lamp, as installed and operated, impair the effectiveness of this vehicle's required lighting). Pointing to a general authorization does not answer the second question, and NHTSA's own framework does not treat it as an answer. A public entity that has adopted or continued using flashing auxiliary warning lamps without ever conducting the brightness/color/location/activation-pattern assessment NHTSA's letters describe has likely not performed the analysis S6.2.1 requires.

The available evidence bears directly on that assessment's outcome, particularly the brightness factor. This paper's Part III.A traced the steady-burning requirement's scientific basis to Holladay's 1926 disability-glare research — the finding that sufficiently bright, poorly-controlled light sources degrade a viewer's ability to see, independent of subjective discomfort. The Soft Lights Foundation's own commissioned photometric analysis of a comparable LED strobe warning lamp provides concrete, measured support for that concern. Ken Walczak of Night/Light Consulting, LLC — a board member of DarkSky International and a member of the Illuminating Engineering Society — measured an Abrams Manufacturing TG-300-B blue LED strobe lamp deployed on mobile surveillance units in Chicago, Illinois and in Woodland, California. The manufacturer classifies the TG-300-B as an SAE Class-1 warning light under SAE J595, the standard governing directional flashing optical warning devices intended for use on authorized emergency vehicles — the same product category as a warning lamp mounted on a police or fire vehicle, even though the units surveyed were mounted on private surveillance equipment rather than emergency vehicles themselves. The measured results are precisely the brightness data NHTSA's framework calls for: peak luminance of 700,000 candela per square meter — the same unit, nits, NHTSA's own February 2024 letter identifies as the metric FMVSS 108 does not directly regulate — and Unified Glare Rating values of 29.8 at 90 meters, 41.8 at 50 meters, 45.8 at 9 meters, and 51.5 at 4 meters, all calculated from that same measured source luminance under the CIE/IES-standard UGR methodology. Every one of these values exceeds 19, the threshold the UGR scale itself defines as the boundary of unacceptable glare; several exceed 31, the top of the scale's own defined range. That evidence does not, by itself, resolve the case-by-case inquiry NHTSA's letters describe — that inquiry has to be conducted for the specific lamp

¹⁵ <https://www.nhtsa.gov/interpretations/571108-ama-schaye-front-color-changing-light>

at issue — but it strongly supports a finding of impairment for LED warning lamps of the kind this paper addresses, and it underscores why a general authorization to use flashing lights cannot substitute for the assessment itself.

NHTSA's own reasoning in the Krugh letter confirms why “impairs the effectiveness” reaches distraction, not only glare. NHTSA found that a school bus rooftop strobe impaired the required signal lamps “by diverting other drivers' attention and causing confusion” -- a mechanism distinct from, though related to, the disability-glare science traced in Part III.A. A required lamp's signal is only as effective as a driver's ability to notice and correctly interpret it, and that ability depends on the driver's available attention. A lamp that reinforces a required signal -- synchronized to it, conveying the same meaning -- adds nothing a driver must separately process; a lamp that operates independently, on its own pattern, competes for the same limited attention the required signal depends on. That is the distinction the “sole exception” analysis in Part II turns on, restated here in cognitive rather than optical terms: a signaling system that does not reinforce a required lamp's established meaning, but instead competes with it for a driver's attention, impairs that lamp's effectiveness within the meaning of S6.2.1, regardless of whether it is also bright enough to cause glare. The effect compounds rather than merely adding: each additional, independently-patterned lamp is a separate attentional event, not an increment of brightness, which is why a light bar with multiple strobes running different patterns produces more distraction, not just more light, than a single flashing lamp would. NHTSA's activation-pattern factor, identified in the December 2024 letter alongside brightness, color, and location, is the textual hook for exactly this inquiry.

IX. LED Technology and the Regulatory Gap

The steady-burning requirement traced through this paper predates the light source responsible for its present-day breach. High-intensity LED technology sufficient for vehicle warning applications became commercially practical only in the 2000s and 2010s, following advances in semiconductor materials -- the blue and white LED innovations that won their inventors the 2014 Nobel Prize in Physics -- and in driver electronics that replaced mechanical thermal relays with programmable firmware. That shift changed more than the light source; it changed the economics of flashing itself. A flasher once required dedicated hardware, reserved by cost and complexity for applications that justified it. The same driver board that now runs an LED steady can run it through dozens of selectable flash patterns for the marginal cost of a few lines of code -- exactly what the commercial light-bar products discussed in Part VIII demonstrate, with 16, 25, and 39 selectable patterns standard on inexpensive, widely available equipment. Neither FMVSS 108 nor its California implementing regulations were written with this technology in view, and neither has been substantively updated to address it.

A. NHTSA's Own Acknowledged Gap

NHTSA has stated directly, in the same February 2024 letter to the Soft Lights Foundation discussed in Part VIII, that “FMVSS No. 108 does not directly regulate what you describe as peak luminance as measured in nits or the spectral power distribution of the headlamp light source,” relying instead on photometric and chromaticity requirements built around what the letter itself calls “spherical emitters such as tungsten-filament and gas-discharge” sources -- not the “non-uniform luminance flat-source emitters such as LED chips” that now dominate the market. The letter addresses headlamps specifically, not auxiliary warning lamps, and this paper does not attribute to NHTSA any statement about auxiliary lamps the letter does not make. But the letter's description of the standard's own regulatory architecture is not headlamp-specific: FMVSS 108 governs auxiliary lamps, including the steady-burning requirement at the center of this paper, through the same photometric and chromaticity framework, built around the same “spherical emitter” assumptions, that the letter describes. NHTSA's letter states that flicker is addressed “through the requirement that lower beam headlamps be steady burning” -- but that mechanism cannot reach the lamp category this paper addresses. A requirement that a lamp be steady-burning has nothing to say about internal pulse-width modulation within a lamp already authorized to flash, such as a turn signal or an auxiliary warning lamp. NHTSA's own stated anti-flicker theory is structurally unavailable for precisely the lamps this paper is about.

B. California's Title 13 Gap

California's implementing regulations show the same age. Title 13, Article 22 defines exactly five warning-lamp classes -- concentrated-beam, wide-beam, motorcycle, and revolving, oscillating, or gaseous discharge -- categories built entirely around incandescent bulbs, sealed-beam optics, and mechanical rotation. 13 C.C.R. § 812. No LED category exists. § 811(d) defines a “warning lamp unit” by reference to SAE J571d (1976), SAE J572a (1972), and SAE J760a (1974); § 816's color requirements reference SAE J578d from 1978. These are not stale citations inferred from context -- they are the literal current text of regulations in force today.

CHP has itself acknowledged the resulting problem, in writing. An April 8, 2021 Information Bulletin states that “the widespread use of light-emitting diode technology has made it possible to install lighting of any color and operation virtually anywhere on a vehicle,” and that “many special hazard vehicles, such as construction vehicles and tow trucks, are being equipped with different types and colors of flashing lights, some of which are not permitted.” CHP's response was a bulletin directing field enforcement, not an amendment to Title 13 itself. The underlying regulation, with its half-century-old technical references, remains unchanged.

C. What This Means for the Analysis Above

None of this weakens the steady-burning requirement or the impairment prohibition this paper is built on; S6.2.1's text does not depend on any particular light-source technology, and the case-by-case framework described in Part VIII applies to LED auxiliary lamps exactly as it would to any other. What this history explains is why so many noncompliant installations exist unexamined: the technical standards that might have flagged them automatically -- a peak-luminance limit, a flicker specification suited to solid-state dimming, an LED-specific lamp classification -- were never written, on either the federal or the state side. The steady-burning requirement itself is not new and has not gone anywhere. The technology now most likely to violate it arrived after the regulatory apparatus stopped updating.

X. Application

Applying the framework above: California Vehicle Code §§ 25252, 25252.5, 25253, 25258, and 25259 authorize flashing warning lamps, an aspect of performance FMVSS 108 directly regulates for auxiliary lamps through S6.2.1's impairment prohibition, as NHTSA has consistently interpreted it. That authorization is not identical to the federal standard. The narrow exception in 49 U.S.C. § 30103(b)(1) for standards imposing a "higher performance requirement" for government-owned vehicles does not appear to apply, because NHTSA has consistently and repeatedly characterized flashing auxiliary lamps as impairing rather than enhancing the safety performance FMVSS 108 protects — a characterization reinforced by the *Brake Plus* litigation, in which NHTSA defended the steady-burning requirement extensively in briefing before the Eighth Circuit, without exception or qualification for emergency or utility vehicles, though that litigation did not itself involve or address such vehicles. On this analysis, California's statutory authorization of flashing warning lamps on emergency and utility vehicles is preempted to the extent it purports to permit what FMVSS 108 does not. For any public entity whose fleet includes vehicles meeting the commercial motor vehicle threshold, § 393.25(e) does not change this result, for the reasons set out in Part VII. And independent of the preemption analysis entirely, S6.2.1's impairment prohibition applies of its own force, case-by-case, to any specific lamp a public entity operates, as set out in Part VIII — a question no general authorization, state or federal, answers for it.

XI. Beyond Motor Vehicle Safety: The FDA's Biological Safety Mandate

Everything discussed so far concerns motor vehicle equipment law — whether flashing auxiliary lamps comply with FMVSS 108, and whether any state or sister-federal authorization changes that answer. That is not the only federal framework bearing on high-intensity flashing light. The Food and Drug Administration administers a separate statutory program, at 21 U.S.C. § 360ii(a), addressing the biological safety of electronic products that emit radiation, including light.

The Secretary shall establish and carry out an electronic product radiation control program designed to protect the public health and safety from electronic product radiation. As a part of such program, he shall — ... (6) consult and maintain liaison with the Secretary of Commerce, the Secretary of Defense, the Secretary of Labor, the Atomic Energy Commission, and other appropriate Federal departments and agencies on (A) techniques, equipment, and programs for testing and evaluating electronic product radiation, and (B) the development of performance standards ... to control such radiation emissions.¹⁶

Section 360ii does not name NHTSA specifically; its liaison requirement runs to several named agencies and, by its own terms, "other appropriate Federal departments and agencies." Whether NHTSA falls within that catch-all for LED vehicle lighting specifically is a substantive question this paper does not resolve. What the statute does establish, on its face, is a congressional judgment that reviewing the biological safety of electronic products that emit radiation — including, on a straightforward reading, high-intensity LED light sources — is a distinct regulatory function from setting motor vehicle equipment standards, assigned to a different agency, under a different statute, answering a different question: not whether a lamp is steady-burning, but whether the radiation it emits is safe for public exposure.

This matters to the analysis in this paper for a narrow but important reason: a public entity's demonstration that its warning lamps satisfy (or are not held to) FMVSS 108 and state vehicle-code requirements says nothing about whether those same lamps have been evaluated for the biological safety question § 360ii contemplates. The two inquiries can point in different directions, because they measure different things — FMVSS 108 asks whether a lamp is steady-burning as installed equipment; 21 U.S.C. § 360ii's program concerns the radiation the lamp emits and its effects on the public exposed to it. A jurisdiction that has never had occasion to consider the biological-safety question is not thereby excused from it merely because it has an answer, right or wrong, to the equipment-compliance question.

NHTSA has itself drawn this same line, in a February 13, 2024 letter responding directly to the Soft Lights Foundation's own questions about the health effects of LED headlamp technology. Addressing concerns about peak luminance, high-color-temperature blue light, and flicker, NHTSA's Acting Chief Counsel wrote:

"NHTSA's focus is on automotive safety, but the agency recognizes that separate expertise resides in sister agencies that are health-focused, such as the Food and Drug Administration."¹⁷

That is NHTSA's own acknowledgment, in its own words, that the biological-safety question this Part addresses is not one its automotive-safety mandate is designed to answer — confirming, from the agency most directly positioned to know the limits of its own expertise, exactly the division of regulatory labor this Part describes.

¹⁶ <https://www.law.cornell.edu/uscode/text/21/360ii>

¹⁷ <https://www.nhtsa.gov/interpretations/571108-ncc-230201-001-led-headlights-m-baker>

XII. Beyond Motor Vehicle Safety: ADA Title II Self-Evaluation and *Duvall v. County of Kitsap*

A third, independent framework applies regardless of how the motor-vehicle-safety and biological-safety questions above are resolved: Title II of the Americans with Disabilities Act. Two obligations are directly relevant.

First, 28 C.F.R. § 35.105 requires a public entity to conduct a self-evaluation of its current policies and practices to identify and correct any that are not consistent with Title II's requirements. A self-evaluation of a public entity's use of high-intensity flashing warning equipment — on emergency vehicles, at pedestrian crossings, or elsewhere — is squarely the kind of practice this provision contemplates reviewing, particularly where the entity has received individualized accommodation requests or complaints concerning that equipment's effects on people with disabilities.

Second, *Duvall v. County of Kitsap*, 260 F.3d 1124 (9th Cir. 2001), holds that when a public entity receives a request for disability accommodation, it must undertake an individualized, fact-specific investigation into what accommodation is reasonable for that individual. A conclusory assertion that the entity is already in compliance with some other body of law — including an assertion that its equipment complies with FMVSS 108, or that state law authorizes its practice — does not substitute for that investigation. *Duvall's* duty runs to the individual who made the request, under Title II, independent of whatever the motor vehicle safety analysis in Parts II through VIII of this paper concludes.

The disability-related harm flashing lights can cause is not speculative. A sudden flash of light is a well-established trigger of the involuntary sympathetic startle response -- the same physiological alarm reaction underlying fight-or-flight. Photosensitive seizures and migraine triggering by rapid, high-contrast flashes are separately documented in the peer-reviewed literature underlying the photometric evidence discussed in Part VIII. The Soft Lights Foundation collects and forwards firsthand incident reports from individuals with epilepsy, migraine disorders, autism, and related conditions describing their own reactions to LED flashing lights, and submits these reports to the FDA; the resulting record, cited in the Appendix, documents this pattern directly, in the words of the people experiencing it, and -- once submitted to a federal agency -- becomes a public record obtainable via a Freedom of Information Act request to FDA or NHTSA, available to any individual seeking to document this pattern for an individualized accommodation request or a *Duvall* investigation of their own. NHTSA has itself acknowledged awareness of these concerns directly: its February 2024 letter to the Soft Lights Foundation, discussed in Part IX, responds to concerns Soft Lights Foundation raised about “adverse health impacts due to the performance characteristics of LEDs” and states that NHTSA is “aware of concerns raised about possible adverse effects of certain LED devices.” These are precisely the categories of harm Congress assigned to FDA's electronic product radiation control program under 21 U.S.C. § 360ii, discussed in Part XI -- a biological-safety question distinct from, but squarely relevant to, the individualized accommodation inquiry *Duvall* requires.

The relationship among all three frameworks discussed in this paper is additive, not substitutive. A public entity cannot answer a Title II accommodation request by pointing only to FMVSS 108 compliance, cannot answer the FMVSS 108 question by pointing only to CVC or § 393.25(e) authorization, and cannot answer any of the above by pointing to the mere fact that no agency has yet completed the biological-safety liaison § 360ii contemplates. Each framework asks a different question, assigned to a different body of law, and an entity's compliance, or non-compliance, with one does not resolve its obligations under the others.

XIII. Enforcement: What a Reader Can Actually Do

The steady-burning requirement traced through this paper has been in force, in substantially its current form, for decades -- yet LED-equipped light bars and strobes have proliferated across police, fire, utility, and tow-truck fleets with little apparent regard for it. That is not because the requirement lacks force; Parts II through VIII establish that it does. It is because the mechanisms available to enforce it are narrow, indirect, or dependent on someone with standing choosing to use them, and few have. NHTSA's own enforcement authority, discussed in Part V, does not reach the vehicle owners installing and operating this equipment at all. That gap, more than any doubt about the underlying legal rule, is the practical reason LED auxiliary flashing lights have spread as widely and unexamined as the history in Part IX describes. The remainder of this Part sets out what mechanisms do exist, for readers in different positions.

A. Notifying NHTSA of Third-Party Installation

49 U.S.C. § 30122, discussed in Part V, reaches manufacturers, distributors, dealers, and repair businesses -- the third-party upfitters who typically install light bars and strobes on police, fire, and utility vehicles are not exempt from it, even though the vehicle's owner is. A reader who can identify -- for example, via a public records request to the vehicle's government owner -- the specific business responsible for equipping a vehicle with noncompliant auxiliary lighting may file a complaint with NHTSA's Office of Vehicle Safety Compliance, which handles FMVSS compliance matters, at ovscpublic@dot.gov. This does not reach the owner directly, but it creates real federal exposure for the installer -- and an installer facing that exposure has a direct incentive not to install noncompliant equipment in the first place, independent of whatever the vehicle's owner does or does not do.

B. Petitioning for Updated Regulations

A reader may also submit a formal regulatory petition -- to NHTSA under 49 C.F.R. Part 552, to the California Highway Patrol under the California Administrative Procedure Act, or to another state's equivalent agency -- requesting that the applicable lighting-equipment regulations be updated to address the LED-specific gaps described in Part IX.

C. Personal Injury Litigation After a Crash

Any crash victim -- with or without a disability -- may have a viable negligence claim where auxiliary flashing equipment contributed to the crash, for example by obscuring or distracting from a vehicle's required signal lamps. The analysis in this paper, particularly the S6.2.1 impairment framework in Part VIII, supplies a documented federal standard of care a personal injury attorney could use to support such a claim. Where a third party was paid to install the equipment, that installer's own § 30122 exposure reinforces the underlying compliance failure as an established federal violation, not merely an allegation first raised in litigation.

D. ADA Title II Litigation for Individuals With Disabilities

For an individual with a qualifying disability, *Duvall v. County of Kitsap*, discussed in Part XII, supplies the clearest and most direct route: a request for individualized accommodation triggers a public entity's duty to investigate, and a failure to conduct that investigation is independently actionable, regardless of how the underlying steady-burning question is ultimately resolved. 28 C.F.R. § 35.105's self-evaluation requirement, by contrast, is a structural planning obligation, not one a private individual can typically enforce directly through litigation the way *Duvall's* individualized duty can be enforced. However, the failure of a public entity to comply with 28 C.F.R. § 35.105 for vehicle signaling using light is evidence that can be used to support an ADA discrimination claim.

E. For Everyone Else: Referral to Public Enforcement

An individual without a qualifying disability, who has not been in a crash, has narrower options, but not none. California's Unfair Competition Law, Bus. & Prof. Code § 17200, treats a violation of another statute as an independently actionable “unlawful business practice” -- and CVC §§ 26100 and 26101, discussed in Part VI.E, already reach any person operating noncompliant lighting equipment, private companies included. A private plaintiff bringing a UCL claim directly must show under Proposition 64 that they personally lost money or property because of the violation, which limits this as a mechanism for an uninjured bystander to pursue on their own. Public prosecutors face no such limitation: a City Attorney, District Attorney, or the state Attorney General may bring a UCL enforcement action without the personal-injury showing an individual plaintiff would need. A private citizen cannot compel this directly, but can request that a public prosecutor's office open such an action, or can request that CHP itself cite noncompliant equipment under the Vehicle Code provisions directly. A writ of mandate compelling any of these offices to act is unlikely to succeed for the same reason NHTSA's own enforcement authority is not judicially compellable, discussed in Part V: the decision whether to enforce is discretionary, not ministerial.

None of these mechanisms depends on every particular of this paper's preemption analysis being correct. CVC § 30122 exposure for installers, negligence liability after a crash, and *Duvall*'s individualized-investigation duty for individuals with disabilities are each freestanding, and each becomes considerably stronger once the underlying compliance question -- addressed at length in the Parts above -- is squarely on the table rather than assumed away.

XIV. Conclusion

NHTSA has never, in any letter or brief identified in this research, stated that flashing auxiliary warning lamps on emergency or utility vehicles comply with FMVSS 108's steady-burning requirement. Its consistent position — from its May 1967 confirmation that the original standard covered fire apparatus, through the 2003 Flaherty letter, the December 2024 Letter of Interpretation, and its 2026 briefing in *Brake Plus* — is that they do not. California's statutory authorization of such lamps is not identical to the federal standard, and the narrow exception that might otherwise permit a state to depart from that standard for its own vehicles does not, on the current record, appear to apply. A parallel federal exception, FMCSA's § 393.25(e), does not change this conclusion for the commercial vehicles it reaches, because it answers a different question than FMVSS 108 does and does not independently authorize anything beyond the same state law this paper's preemption analysis addresses. And beneath both federal and state authorization questions sits a simpler, self-executing one: S6.2.1 prohibits impairment case-by-case, for the specific lamp in question, regardless of what any general authorization permits — a question this paper's research did not find evidence that any public entity addressed before adopting flashing auxiliary warning lamps.

None of this is the end of the inquiry, and it should not be treated as though motor vehicle safety law were the whole of it. This paper has identified three independent legal frameworks bearing on a public entity's use of high-intensity flashing warning lamps — motor vehicle equipment law (Parts II through VIII), the biological safety review Congress assigned to a different agency under a different statute (Part XI), and the disability-rights self-evaluation and individualized-accommodation duties ADA Title II imposes regardless of the other two (Part XII). A public entity's compliance, or asserted compliance, with any one of these does not answer for the others. This is a substantial, well-grounded set of legal questions that a public entity operating flashing warning lamps on its emergency and utility vehicles has not previously had occasion to confront together, and this paper submits that all three are appropriate for such an entity to investigate directly, including in the context of an individualized disability-accommodation request under Title II of the Americans with Disabilities Act and *Duvall v. County of Kitsap*, 260 F.3d 1124 (9th Cir. 2001).

The use of LED auxiliary vehicle flashing lights is already well-entrenched. State laws which authorized auxiliary vehicle flashing lights existed before the federal NHTSA steady burning requirement came into effect, and legislatures have not properly updated state laws to reflect the federal steady burning requirement, even after almost 60 years. Public

entity officials may consider it difficult to change course. However, there are good reasons to make the course correction. First, the evidence in Parts III and VIII shows that auxiliary flashing lamps of the kind addressed in this paper impair the effectiveness of required signal lamps and, for LED units of the brightness this paper documents, likely cause disability glare -- a safety concern this paper's analysis, not merely its conclusion, establishes. Second, it is well documented that flashing lights can trigger significant adverse neurological reactions, including for individuals with ADA disabilities, as discussed in Part XII. Compliance with the steady-burning requirement can resolve the civil rights issues associated with flashing lights, not merely the equipment-compliance question this paper otherwise addresses. Third, the compliance fix carries no equipment cost: the LED hardware already installed on most fleets is configurable and typically capable of steady-burning operation. What it requires is a policy decision -- directing personnel not to activate the flash function -- not new procurement. That is a real institutional change, not a costless one, but it is a change within a department's own control, not one requiring new capital investment, new technology, or new regulations.

Appendix: Primary Source Documents

The following primary sources underlie this paper's analysis. Where a stable public link is available, it is provided; each source was accessed and verified as of the date of this paper.

1. 32 Fed. Reg. 2408 (Feb. 3, 1967) — the Initial Federal Motor Vehicle Safety Standards, including the original text of Standard No. 108 (S3.5, "Lighting Display").
<https://www.govinfo.gov/content/pkg/FR-1967-02-03/pdf/FR-1967-02-03.pdf>
2. Letter to Fire Apparatus Manufacturers Association (May 15, 1967), NHTSA Interpretation nht67-1.21. <https://www.nhtsa.gov/node/62196>
3. Letter to The Flxible Company (Nov. 16, 1971), NHTSA Interpretation nht71-4.49, confirming the transition from paragraph S3.5 to paragraph S4.6 effective January 1, 1972. <https://www.nhtsa.gov/node/65151>
4. Letter to Capt. B.R. Belsches, Virginia State Police (Apr. 1984), NHTSA Interpretation "1984-150," recounting the rulemaking history of paragraph S4.6, including 35 Fed. Reg. 106 (Jan. 3, 1970) and 35 Fed. Reg. 16840 (Oct. 31, 1970).
<https://www.nhtsa.gov/interpretations/1984-150>
5. NHTSA Interpretation aiam0481, quoting the full text of paragraph S4.6 as adopted.
<https://www.nhtsa.gov/interpretations/aiam0481>
6. Interpretation 1982-1.11, Letter to United Sidecar Association, Inc. (Feb. 9, 1982).
<https://www.nhtsa.gov/interpretations/1982-111>
7. Letter to Col. W. Gerald Massengill, Virginia State Police (July 3, 2001), NHTSA Interpretation "vastatepat.ztv." <https://www.nhtsa.gov/node/95126>
8. Letter to Lt. Col. Steve Flaherty, Virginia State Police (May 2, 2003), NHTSA Interpretation "flaherty." <https://www.nhtsa.gov/interpretations/flaherty>

9. Letter to J. Adam Krugh IV (May 22, 2003), NHTSA Interpretation "002769drn." <https://www.nhtsa.gov/interpretations/002769drn>
10. Letter to Paul Schaye, 571.108 -- AMA -- front color-changing light (Sept. 9, 2019). <https://www.nhtsa.gov/interpretations/571108-ama-schaye-front-color-changing-light>
11. Federal Motor Vehicle Safety Standards; Lamps, Reflective Devices, and Associated Equipment, 72 Fed. Reg. 68234 (Dec. 4, 2007) (the administrative rewrite discussed in Part III.D).
12. 49 C.F.R. § 571.108, current text, Electronic Code of Federal Regulations. <https://www.ecfr.gov/current/title-49/subtitle-B/chapter-V/part-571/subpart-B/section-571.108>
13. NCC-241023-001TSEI-TIMA, Letter of Interpretation, 571.108 Flashing Amber Lights (Dec. 13, 2024). <https://www.nhtsa.gov/interpretations/ncc-241023-001tsei-tima-letter-interpretation-571108-flashing-amber-lights-12-13>
14. Brake Plus NWA, Inc. v. U.S. Department of Transportation, No. 24-2951 (8th Cir. May 18, 2026). <https://law.justia.com/cases/federal/appellate-courts/ca8/24-2951/24-2951-2026-05-18.html>
15. L.L. Holladay, "The Fundamentals of Glare and Visibility," J. Opt. Soc. Am. 12, 271-319 (1926). <https://opg.optica.org/josa/abstract.cfm?uri=josa-12-4-271>
16. 49 C.F.R. § 393.25(e), current text, Electronic Code of Federal Regulations. <https://www.ecfr.gov/current/title-49/subtitle-B/chapter-III/subchapter-B/part-393/subpart-B/section-393.25>
17. 49 C.F.R. § 390.5, definition of "commercial motor vehicle," Electronic Code of Federal Regulations. <https://www.ecfr.gov/current/title-49/subtitle-B/chapter-III/subchapter-A/part-390/subpart-A/section-390.5>
18. 49 C.F.R. § 1.95(c), delegation to the National Highway Traffic Safety Administrator. <https://www.ecfr.gov/current/title-49/subtitle-A/part-1/subject-group-ECFR3boe08a5a08c6f5/section-1.95>
19. 21 U.S.C. § 360ii, Program of control (FDA electronic product radiation control program). <https://www.law.cornell.edu/uscode/text/21/360ii>
20. 28 C.F.R. § 35.105, self-evaluation requirement under ADA Title II. <https://www.ecfr.gov/current/title-28/chapter-I/part-35/subpart-A/section-35.105>
21. Duvall v. County of Kitsap, 260 F.3d 1124 (9th Cir. 2001). <https://www.courtlistener.com/opinion/7097562/duvall-v-county-of-kitsap/>
22. NHTSA Interpretation "571.108--NCC-230201-001 LED Headlights_ M. Baker" (Feb. 13, 2024). <https://www.nhtsa.gov/interpretations/571108-ncc-230201-001-led-headlights-m-baker>

23. CVC § 165, definition of "authorized emergency vehicle."
https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=VEH§ionNum=165.
24. CVC §§ 26100, 26101, 26104, requiring compliance with department lighting-equipment requirements.
https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=VEH§ionNum=26100.
25. NHTSA Interpretation 07-000135as, addressing California motorcycle standards and stating the § 30103(b) preemption test. <https://www.nhtsa.gov/interpretations/07-000135as>
26. NHTSA Interpretation 24258.drn, addressing a state school bus mirror and parking brake requirement under the § 30103(b) "own use"/"higher performance requirement" exception. <https://www.nhtsa.gov/interpretations/24258drn>
27. 49 C.F.R. § 571.131, School Bus Pedestrian Safety Devices, current text.
<https://www.ecfr.gov/current/title-49/subtitle-B/chapter-V/part-571/subpart-B/section-571.131>
28. 49 U.S.C. § 30103(b), the operative preemption provision.
<https://www.law.cornell.edu/uscode/text/49/30103>
29. 49 U.S.C. § 30122, the "make inoperative" provision.
<https://www.law.cornell.edu/uscode/text/49/30122>
30. 49 U.S.C. § 31136, FMCSA's general commercial motor vehicle safety authority.
<https://www.law.cornell.edu/uscode/text/49/31136>
31. Heckler v. Chaney, 470 U.S. 821 (1985).
<https://www.courtlistener.com/opinion/111383/heckler-v-chaney/>
32. CVC § 21, statewide uniformity of Vehicle Code provisions.
https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=VEH§ionNum=21.
33. CVC § 25250 and CVC §§ 25252, 25252.5, 25253, 25258, 25259, the Article 7 flashing-light authorizations.
https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=VEH§ionNum=25250.
34. CVC § 26103(c), federal standards prevailing over Vehicle Code provisions.
https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=VEH§ionNum=26103.
35. California Highway Patrol, Information Bulletin, "Warning Lights and Flashing Lights" (Apr. 8, 2021).
<https://www.chp.ca.gov/CommercialVehicleSectionSite/Documents/IB%20Warning%20Lights%20and%20Flashing%20Lights.pdf>

36. Ken Walczak, Night/Light Consulting, LLC, "The Assessment of LVT Mobile Surveillance Units Regarding Potential Lighting Issues" (Aug. 21, 2026), commissioned by the Soft Lights Foundation. <https://www.softlights.org/wp-content/uploads/2026/08/LVT-Lighting-Report.pdf>
37. Soft Lights Foundation, "LED Incident Reports" (accessed 2026), a running public log of firsthand incident reports submitted to the Soft Lights Foundation and forwarded to the U.S. Food and Drug Administration. <https://www.softlights.org/led-incident-reports/>
38. 13 C.C.R. § 1240, Federal Motor Vehicle Safety Standards. <https://regulations.justia.com/states/california/title-13/division-2/chapter-6-5/article-8/section-1240>

About the Soft Lights Foundation

The Soft Lights Foundation is a nonprofit organization focused on the health, safety, and accessibility impacts of high-intensity lighting. The Foundation researches and advocates on the effects of LED lighting, strobe and flashing signal devices, and related technologies on individuals with photosensitivity, seizure disorders, autism spectrum disorder, and related conditions, and engages with government agencies and public entities on regulatory and accommodation matters arising from these effects.