Conceptual Safety-Focused AV Permitting Framework

Toward an incremental, performance-based, and transparent permitting approach

San Francisco County Transportation Authority

Background

- California began autonomous vehicle (AV) regulations with Senate Bill 1298 (2012), and subsequent rules from the DMV (2014, 2018) and the CPUC (2018–2021).

- AV operations are growing: 9.1M autonomous *testing* miles (2023); 31 operators test with safety drivers, 6 test driverless, 3 deploy AVs (2025).

- San Francisco has been the epicenter of AV operations in CA, adding a new mobility option while introducing new safety and operational impacts to the city's transportation system
  - AV trips: 3,576 in March 2022 / 400,731 in December 2024
  - AV collisions: 681 between July 2021 and May 2025

- In November 2023, former Chair Peskin requested SFCTA staff study solutions to address ongoing operational concerns and regulatory needs

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Purpose and need

- Key safety management areas not currently addressed in existing regulations:
  - Reliance on self-certification, without established road-competency tests or operational performance standards
  - No defined pathway from testing to deployment, leaving rollout decisions largely to providers and without structured consideration of local impacts
  - Lack of baseline data for local agencies to monitor AV operations and their impacts

- This study proposes a conceptual safety-focused permitting framework that:
  - Aims to mitigate public exposure to risk
  - Supports incremental, performance-based AV deployments
  - Strengthens transparency and accountability

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Conceptual AV Safety Framework

Operating constraints by deployment stage

	TESTING (WITH DRIVER)	DRIVERLESS PILOT	DRIVERLESS COMMERCIAL		
			1	2	3
Fleet size (per 250k population)	100	50	100	500	1000
Hours of operation	24/7	Evening	Evening	Midday/ Evening	24/7
Geography	Few or no limitations	Low density residential	Low density residential	All but downtown core	Few or no limitations
Speeds (mph)	< 65	< 25	< 25	< 35	< 65
Road types	freeways, arterials, locals	arterials, locals	arterials, locals	arterials, locals	freeways, arterials, locals
Weather	All	fair, up to minor rain/fog	fair, up to minor rain/fog	fair, up to minor rain/fog	All

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Example performance standards

	TESTING (WITH DRIVER)	DRIVERLESS PILOT	DRIVERLESS COMMERCIAL			NOTES/ JUSTIFICATION
			1	2	3	
Minimum VMT (cumulative)		2 million	1 million	2 million	5 million	
Property damage only (PDO) collisions rate	132	132	132	132	132	2022 PDO collision rate
Injury rate	75	75	75	75	75	2022 injury rate
Fatality rate	1.33	1.33	1.33	1.33	1.33	2022 fatality rate
1st Responder obstruction rate	0	7,000	3,000	400	200	Equivalent to ~1 event per week
Disengagement rate	No limit	500,000	n/a	n/a	n/a	Equivalent to ~10 events per day
Unplanned stops > 2 minutes rate	n/a	500,000	167,000	25,000	12,500	Equivalent to ~10 events per day
Unplanned stops > 15 minutes rate	n/a	50,000	17,000	2,500	1,300	Equivalent to ~1 event per day
Vehicle retrieval rate	n/a	7,000	3,000	400	200	Equivalent to ~1 event per week

*Rates are per 100M VMT
*PDO, injury, and fatality rates are national averages from NHTSA
*Column values are thresholds for entering and maintaining a phase
*Rates are evaluated cumulatively including all VMT and all events
*Disengagements only used to graduate from testing with driver to driverless pilot

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Conclusions

This paper proposes a conceptual AV permitting framework, consisting of:

- Incrementally expanding operational environment
- Measurable performance standards
- Mandatory public reporting

The proposed framework delivers:

- Manages public exposure to safety risks
- Strengthens public trust towards regulators and AV providers
- Better informs the public and local officials about AV operations in their area

We welcome further collaboration with regulators, industry and researchers.

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Thank you.

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