Partial Automation for Truck Platooning Potential Application on I-710

Sponsored by FHWA, managed by Caltrans, led by UC Berkeley PATH, with support from Volvo and Cambridge Systematics

Presented to:
ITS Canada Webinar

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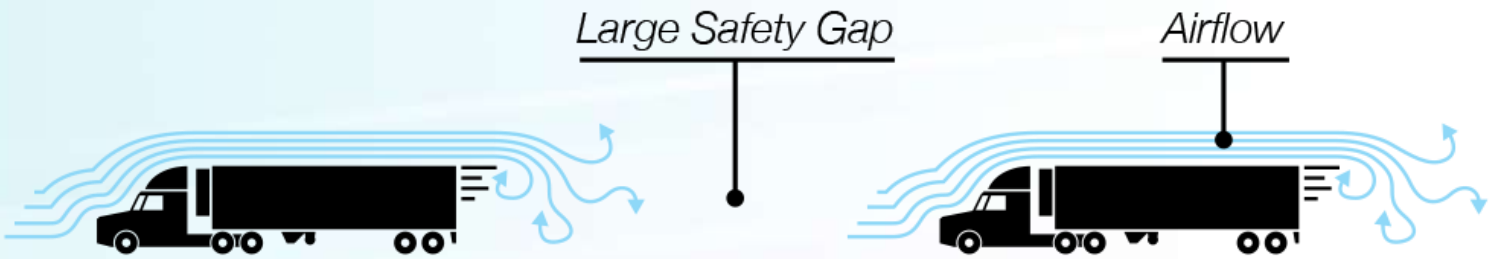
Think Forward

Objectives

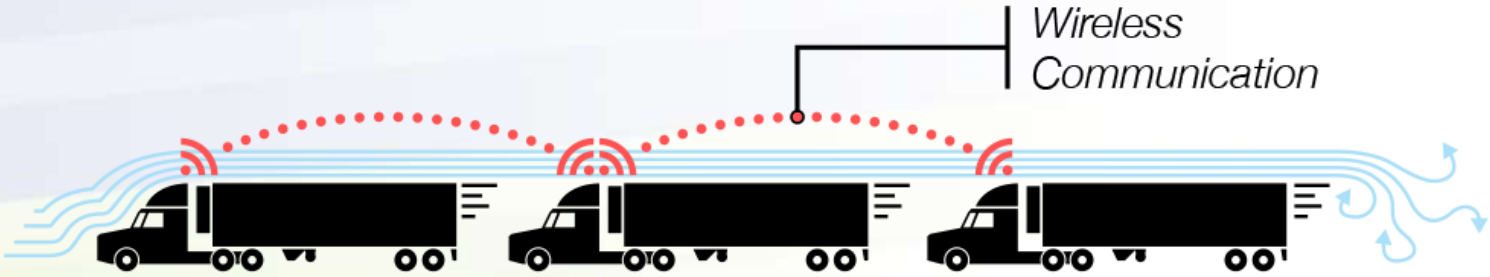
- Explore driver preferences regarding Cooperative Adaptive Cruise Control (CACC) headways.
- Evaluate energy savings for different headways.
- Estimate CACC capacity, energy, and emissions benefits.
- Perform public demonstration of truck platooning in mixed freeway traffic
- Eye towards future deployment on I-710 Dedicated Truck Lanes in Los Angeles in the 2020's

Truck Platooning Concept



Without Platooning

Large gaps are needed to ensure the following driver has enough time to react.



With Platooning

Automatic control means shorter gaps are possible without compromising safety.

Truck Platooning Benefits

Less Congestion

Capacity improvements result in less delays and better travel time reliability.

Cost Savings

Typical fuel savings average 5-10% for all trucks when platooning.

Improved Safety

Automated control of braking and accelerating reduces crash frequency and severity.

Enhanced Driver Comfort

Platooning technology takes much of the stress out of stop-and-go driving.

Capacity Outcomes

- 8% capacity increase with CHAUFFEUR.
- Simulated lane capacity of 3970 vph.

Environmental Outcomes

- 20%–25% reduction in emissions and fuel use from wind tunnel tests.
- 20% increase in fuel economy with CHAUFFEUR.
- 8%–15% fuel savings with five-vehicle platoons on high-speed test track.
- 8% improvement in fuel economy with three-truck platoons in Japan.
- 4.5%–18.4% improvement in fuel economy with three-truck platoons on Nevada highway.

Truck Survey

- **Purpose:** Identify selling points and barriers to adoption.
- **Method:** Online and printed surveys — 27 questions.
- **Audience:** Members of the Harbor Trucking Association.
- **Results:** 17 respondents (4 drivers, 13 fleet managers).

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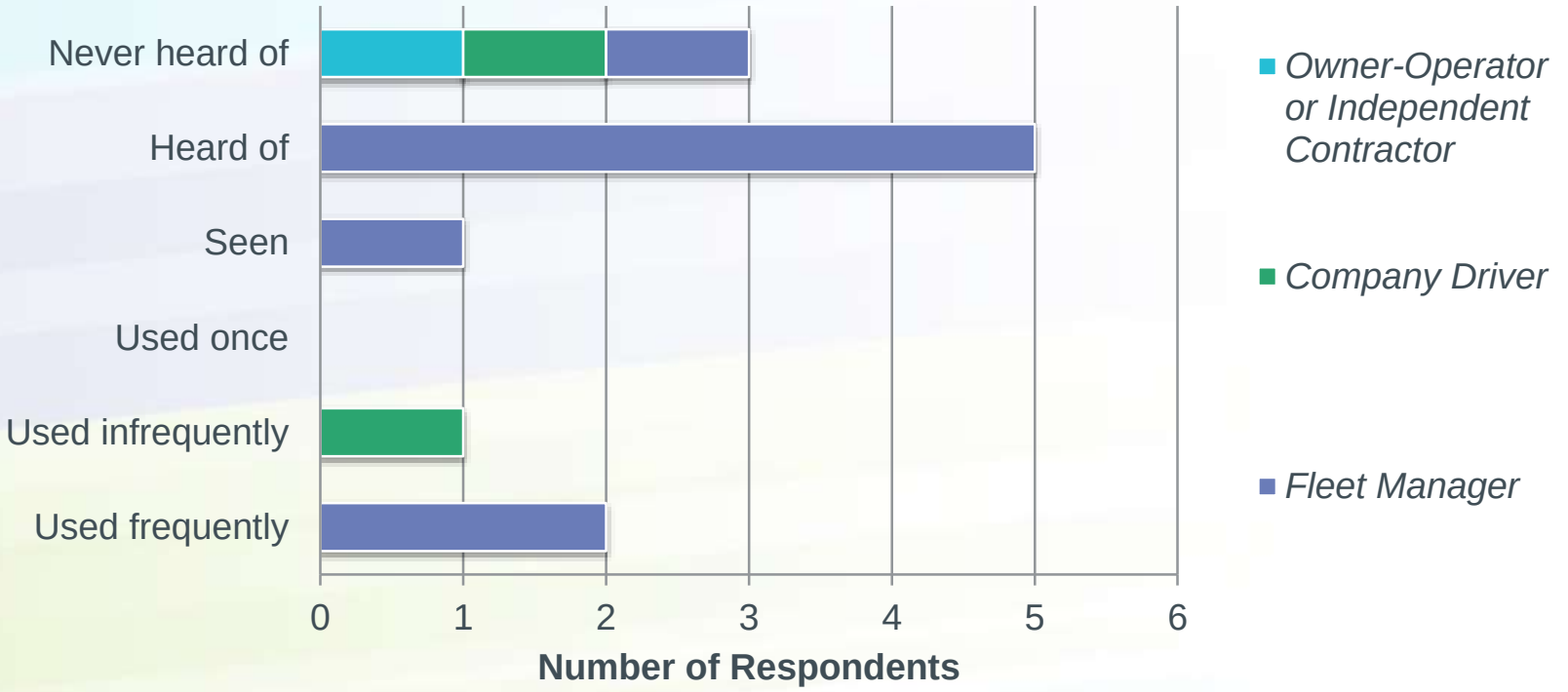
Truck Survey Highlights

How familiar are you with the use of truck adaptive cruise control?



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Truck Survey Highlights

What is the necessary payback or break-even time period you would need from this system?

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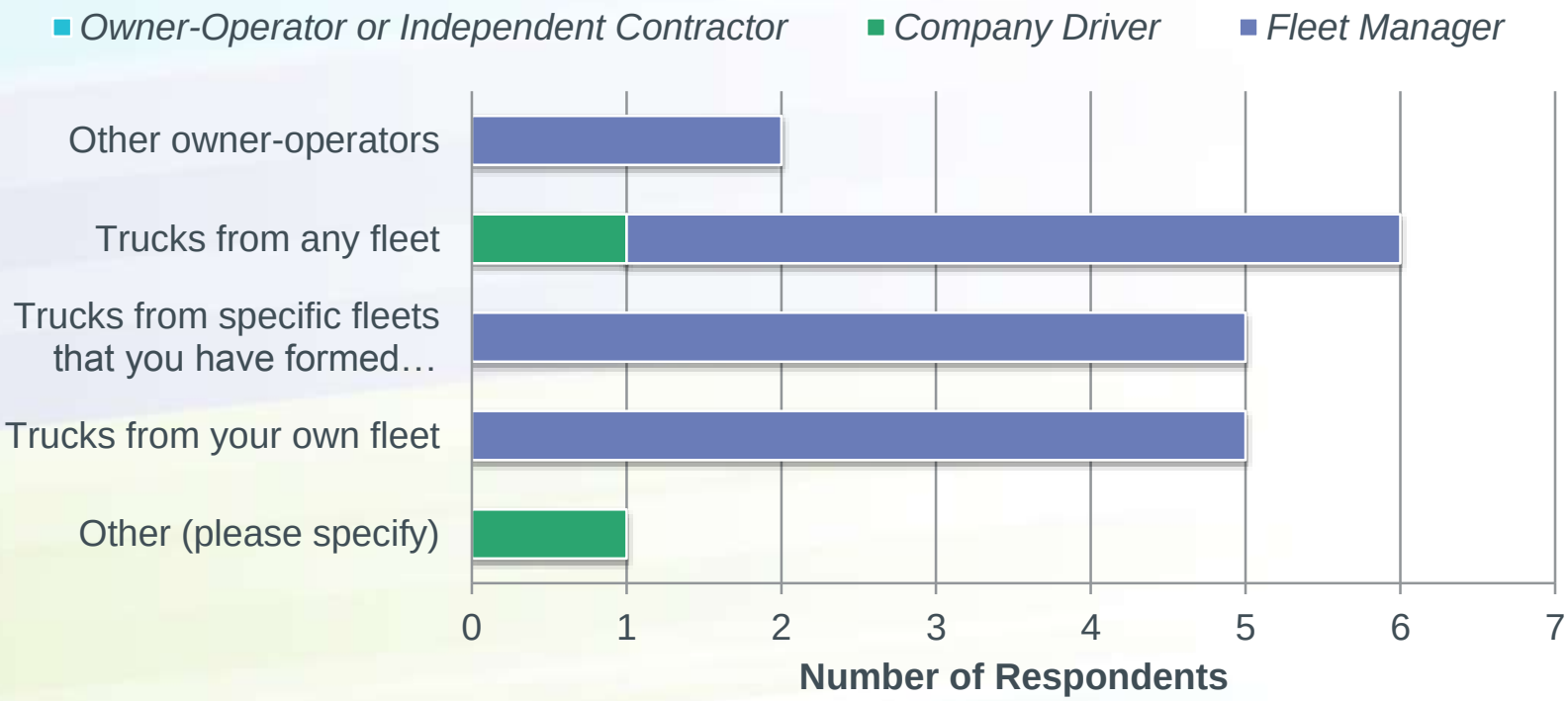
Truck Survey Highlights

When near other platoon-capable trucks, whom would you be willing to form platoons with? *(select all that apply)*



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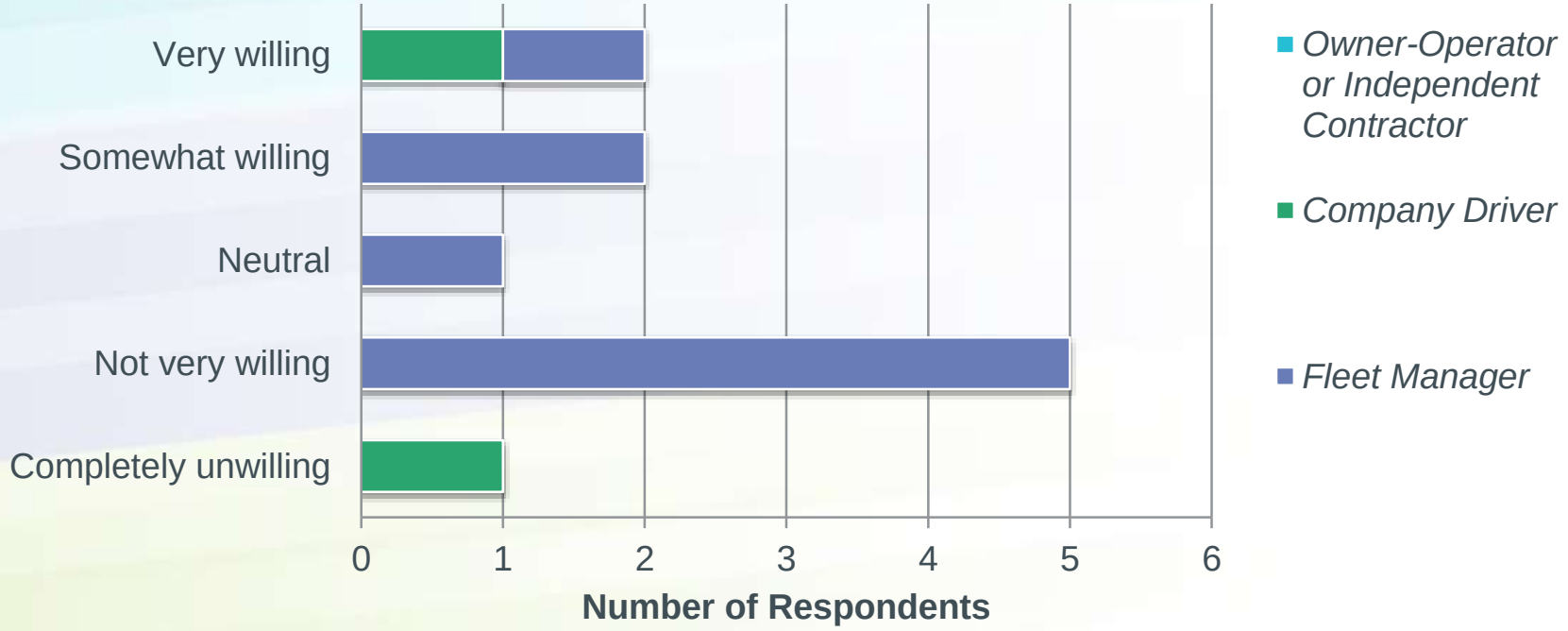
Truck Survey Highlights

How willing would you be to delay your departure time to facilitate platooning?



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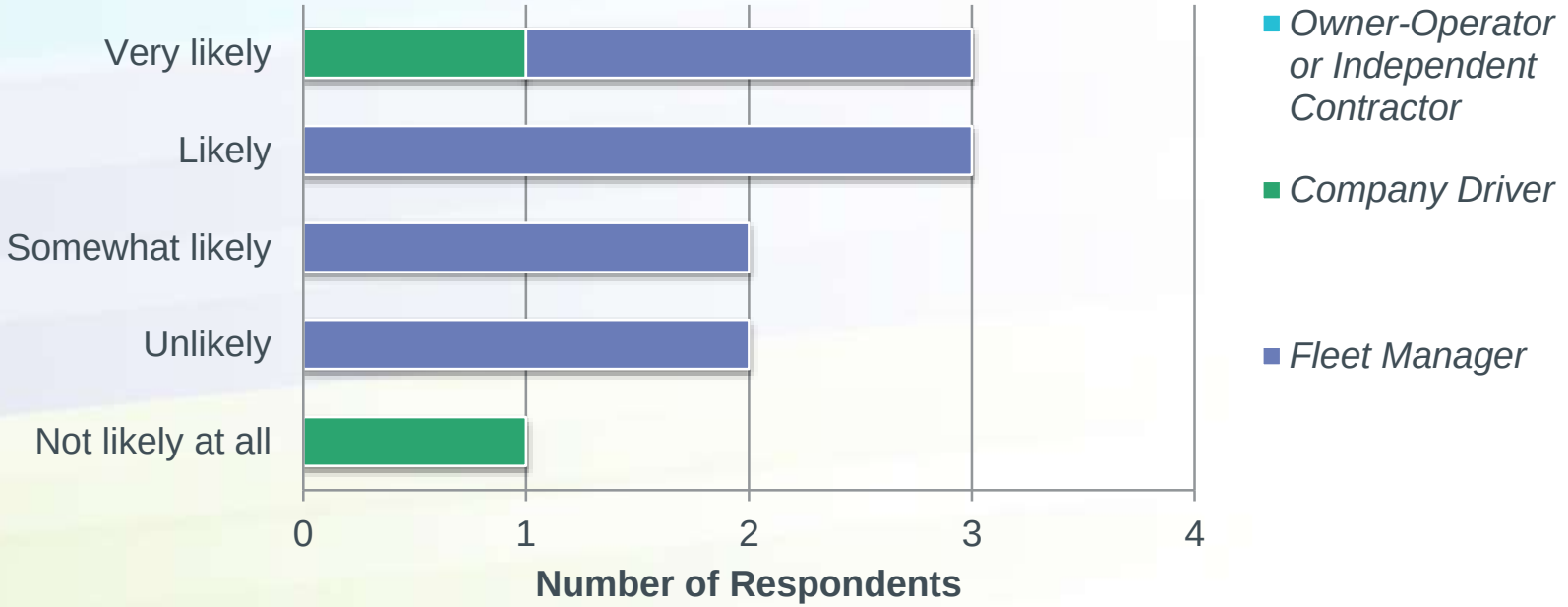
Truck Survey Highlights

How likely do you think drivers will be to use truck platooning technology?



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Trucking Co. Interview Highlights

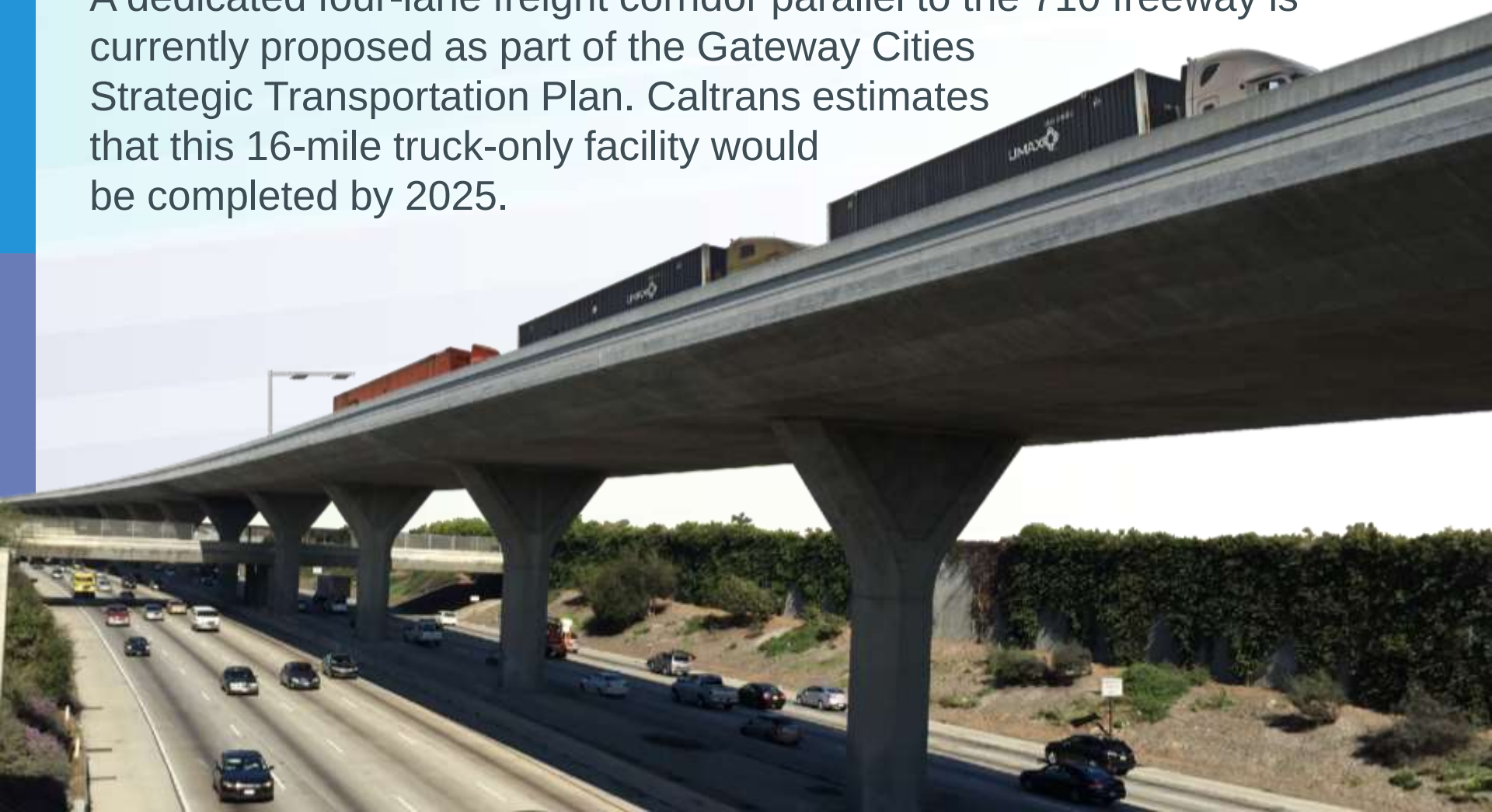
- How likely do you think drivers will be to use truck platooning technology?
  - A little over half of the respondents were either “very likely” or “likely” to use platooning technology
- When near other platoon-capable trucks, whom would you be willing to form platoons with?
  - Willingness to platoon within pre-established or known fleets
  - Less willingness to randomly platoon with independent owner-operated trucks
- What is the necessary payback or break-even time period you would need from this system?
  - Large majority indicated a 1-year time frame was appropriate

Testing Program Implementation

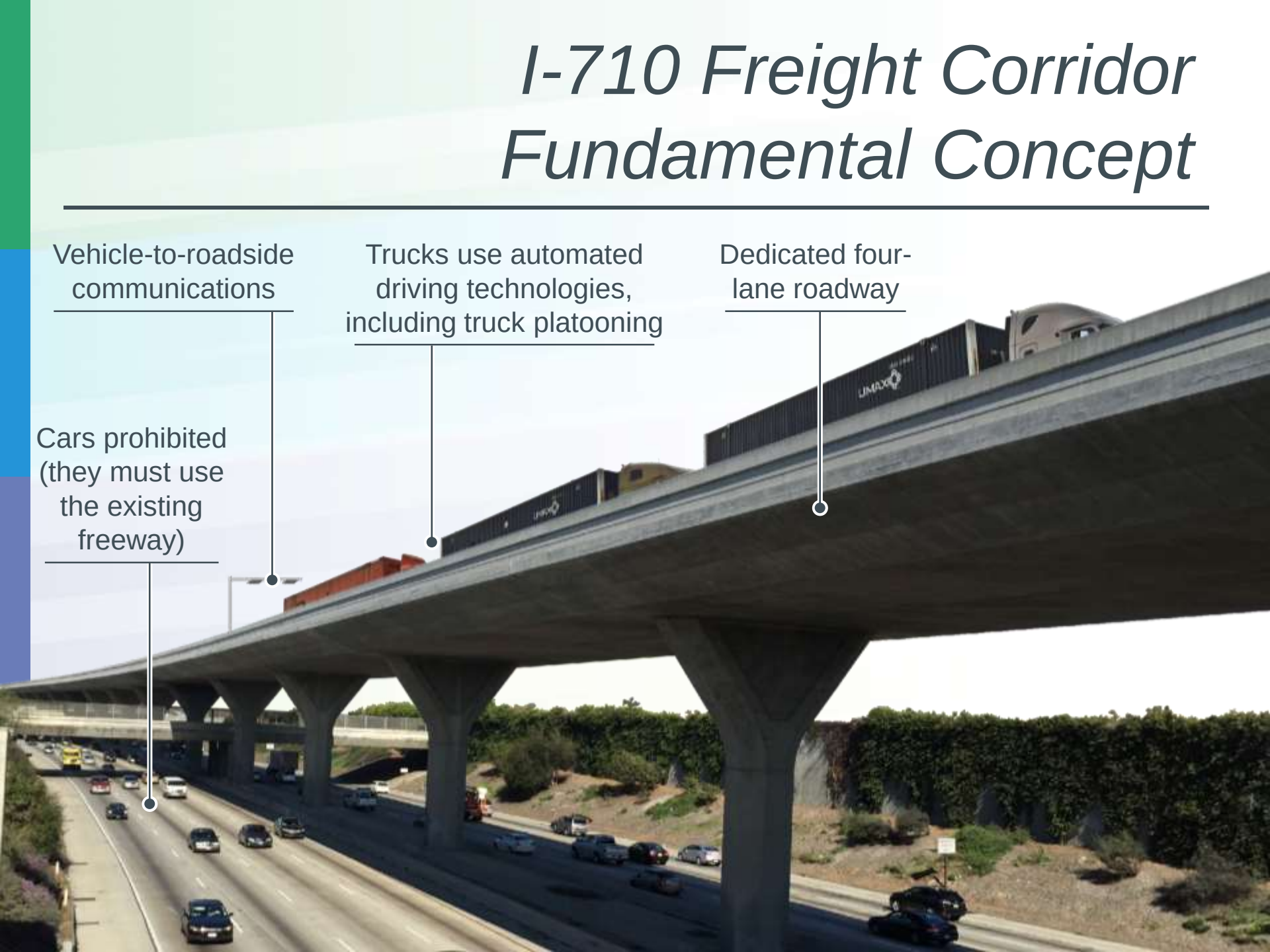
- Will use constant headways (not spacing)
- Acceleration and braking are wirelessly coordinated among three trucks in platoon formation.
- Steering is still manual.
- The key element of this program is testing in real/normal traffic environments.
- Companion FHWA testing program ongoing in Georgia

I-710 Freight Corridor Fundamental Concept

A dedicated four-lane freight corridor parallel to the 710 freeway is currently proposed as part of the Gateway Cities Strategic Transportation Plan. Caltrans estimates that this 16-mile truck-only facility would be completed by 2025.



I-710 Freight Corridor Fundamental Concept



I-710 Freight Corridor Route Description

- Truck-only lanes will run parallel to the existing freeway.
- Alignment will vary by location, as either: together on one side, split on both sides, or together in the center.
- Corridor length is 16 miles, between Ocean Blvd in Long Beach and Washington Blvd in Commerce
- Current design calls for nine freight corridor connections to/from local streets.

I-710 Freight Corridor
Freight Corridor Extents

LEGEND

- Freight Corridor
- Freight Ramps
- Corridor Exit
- Corridor Entrance

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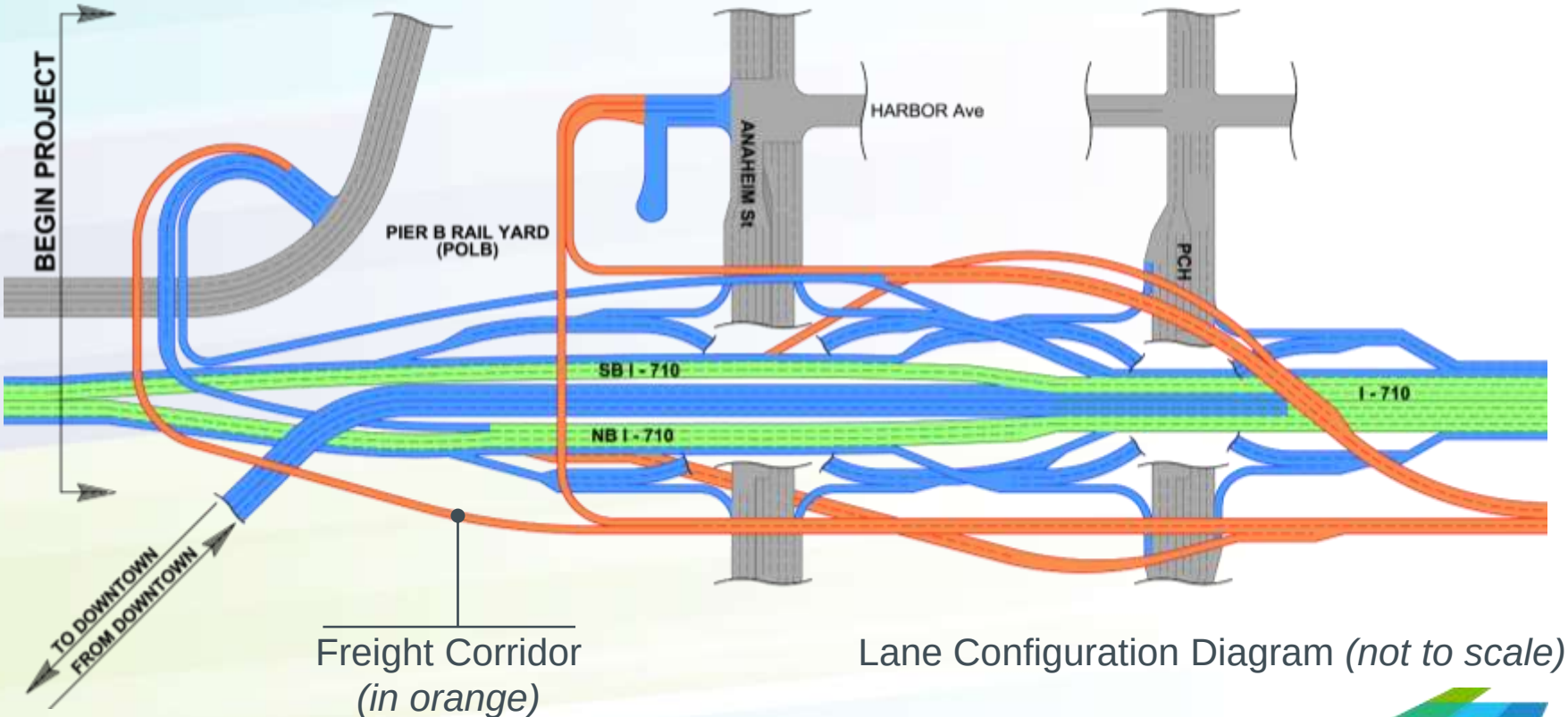
I-710 Freight Corridor
Freight Corridor Access

At the southern end, there is direct access to/from Anaheim St, the Port of Long Beach, and the freeway mainline.



Freight Corridor *(in orange)*

Lane Configuration Diagram *(not to scale)*

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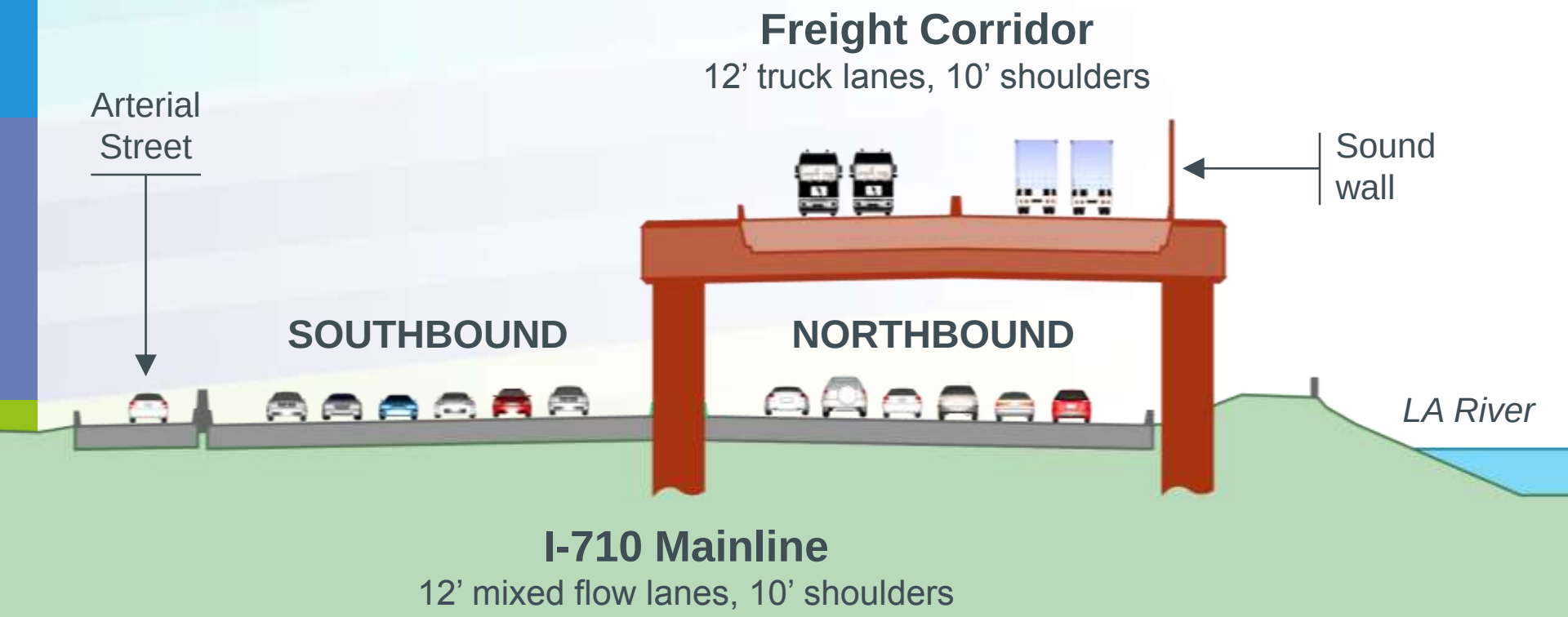
I-710 Freight Corridor Typical Cross-Sections

Between Interstate 105 and Imperial Hwy, the freight corridor exists as a second level above the northbound freeway mainline.



Questions?

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