New Mobility Street Design

A Case Study of Autonomous Vehicles in San Francisco

July 2017

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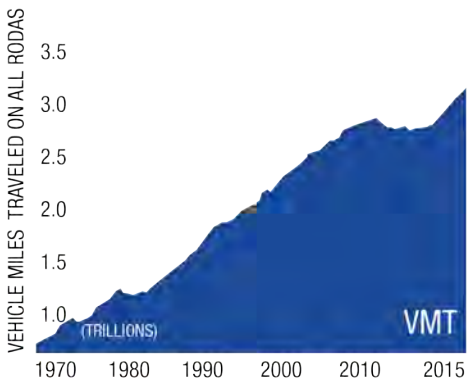
Autonomous vehicles bring uncertain opportunities.

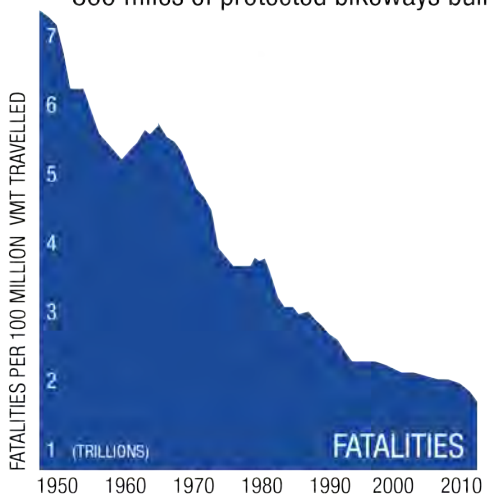
AUTO-ORIENTED STREETS

- Our primary objective used to be: faster, more streamlined driving
- Architecture for cars
- Decline in walking, biking, and riding transit



MULTIMODAL RETROFIT

- Walkability movement
- 2014 transit ridership since 1950s
- 300 miles of protected bikeways built



NEW MOBILITY

- Autonomous vehicles could introduce:
  - Ubiquitous shared mobility
  - Walkable, bikeable streets
  - Abundant capacity to redesign
- AVs raise many questions:
  - Will they catalyze sprawl?
  - Will transit ridership fall?
  - How will we manage streets?

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How can we design more multimodal streets with AVs?

Autonomous vehicles have the potential to introduce transformative change to city streets.

Using real data, real plans, and real projections for a street in San Francisco, we use a quantitative approach to visualize future street designs.

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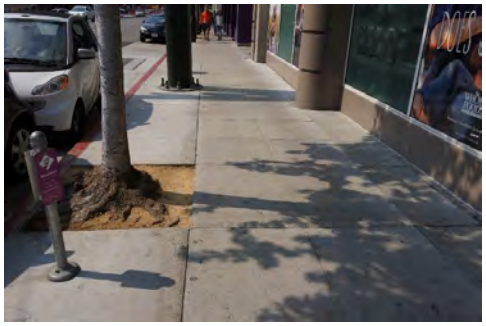
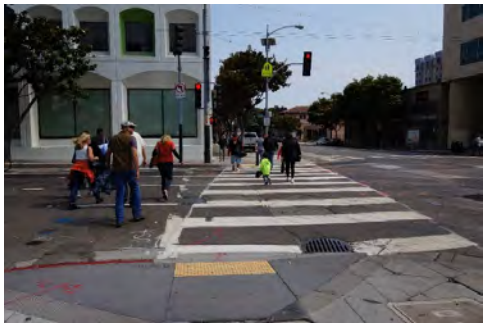
Study Method: Data, Scenarios, Calculations, Designs





1. Gather **data** on existing and future development type and density, traffic volumes, parking demand, and curb demand.
2. Develop reasonable future mode share **scenarios**.
3. Apply scenarios to traffic, parking, and curb data to **calculate** traffic lanes and curb programming needs.
4. Create a walkable, bikeable, green street **design**.

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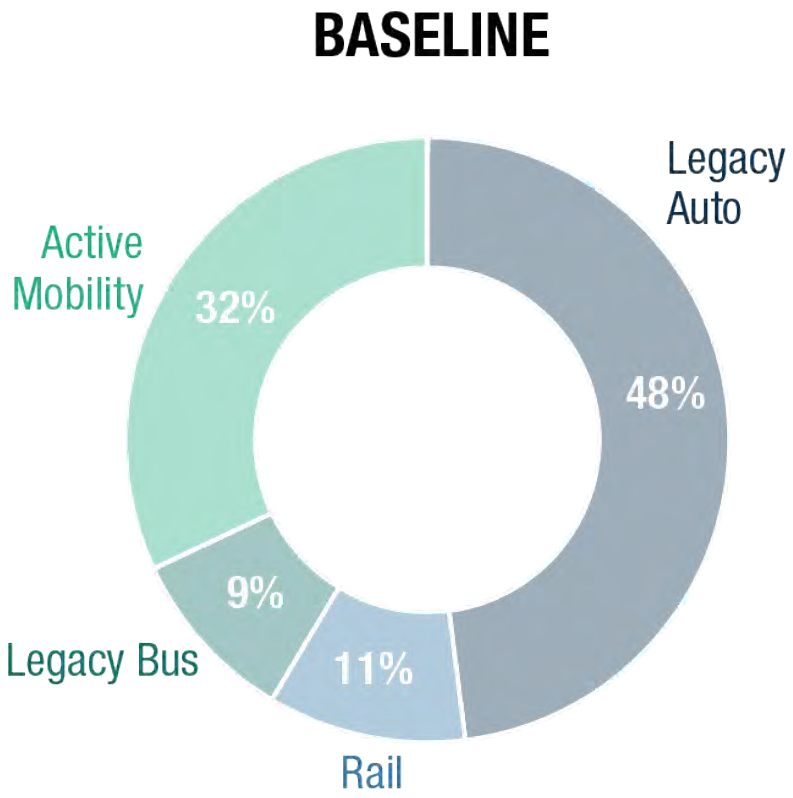
Baseline: Driving, walking, and transit



Key Elements

- **Low vehicle ownership**, compared to US, but still driving is dominant.
- **Transit** is common.
- **Biking**, however, is uncommon.

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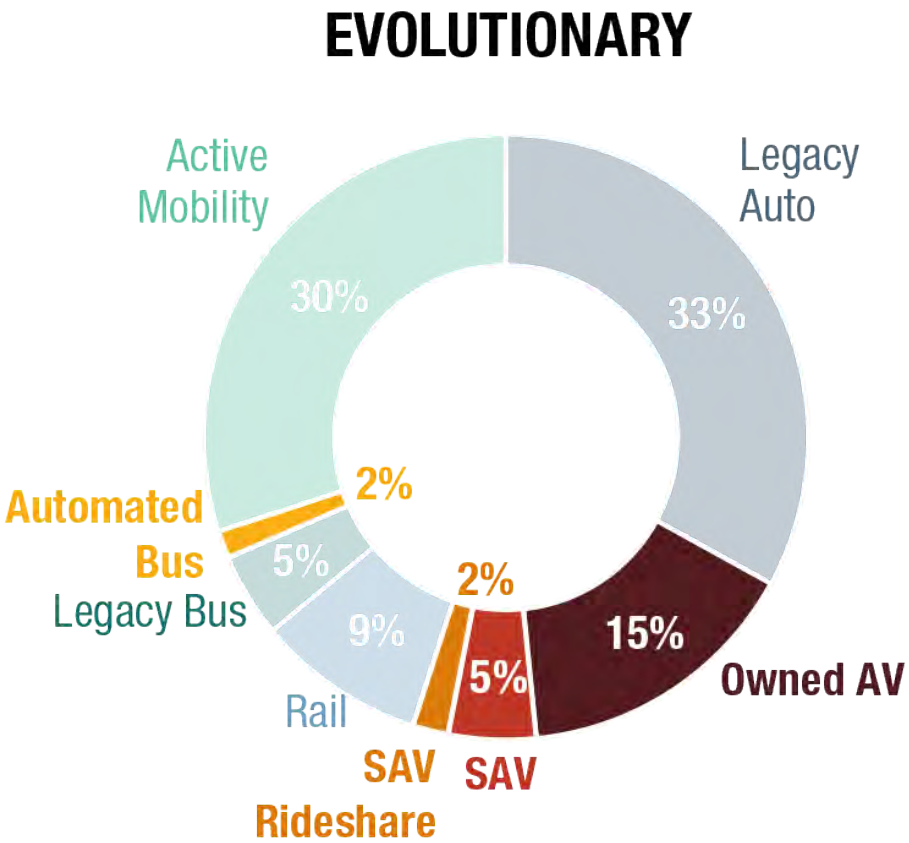
Evolutionary: More driving, less sharing



Key Elements

- **Incremental automation** makes driving more appealing.
- **Human-operated transit** remains the norm.
- **Legacy vehicles** are still prevalent.
- **Shared mobility** services draw from transit.

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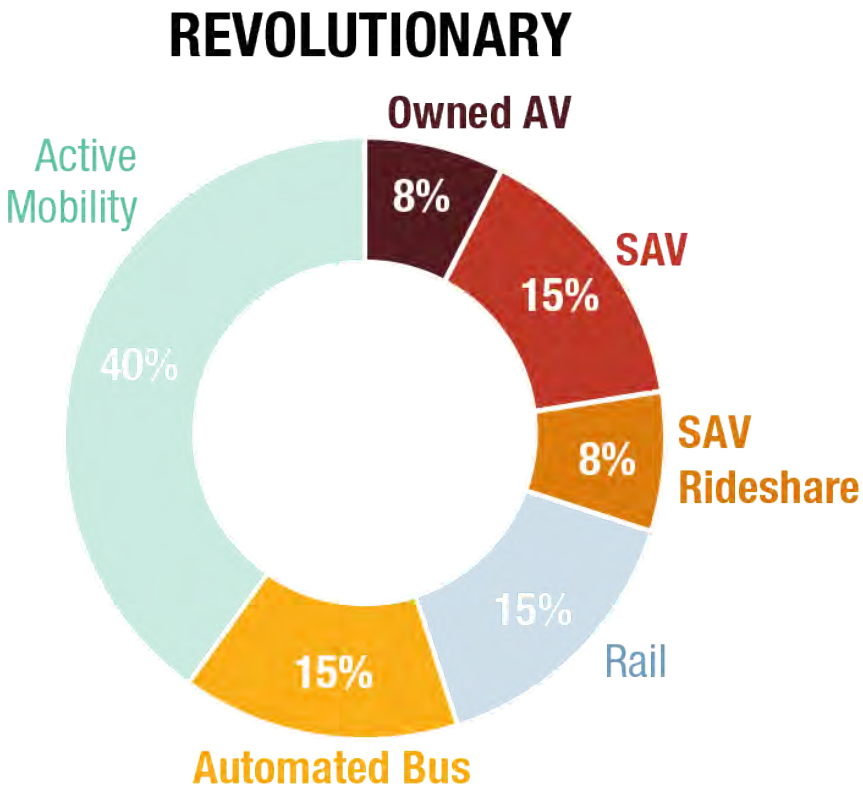
Revolutionary: Sharing mobility and biking renaissance



Key Elements

- **Autonomous services** make vehicle ownership unappealing.
- **Major bus routes** are automated, allowing agencies to increase frequencies.
- **First/last mile services** flourish.
- **Public-private partnerships** make on-demand autonomous shuttles common.
- With **few legacy vehicles** on the streets, biking booms.

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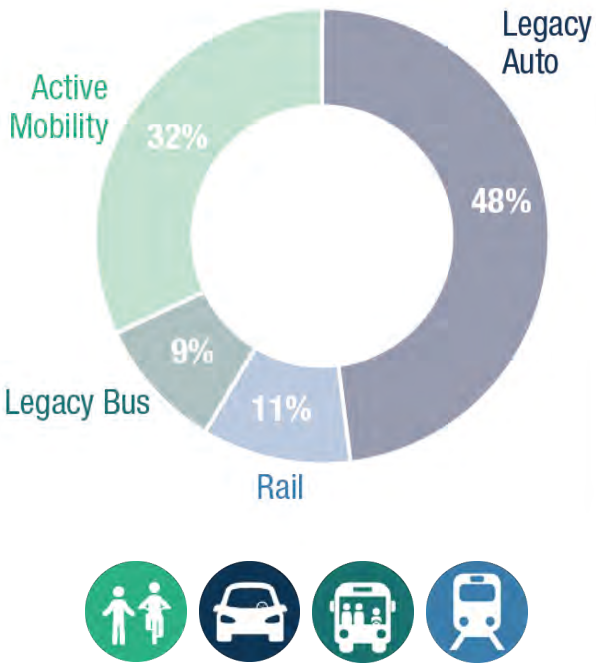
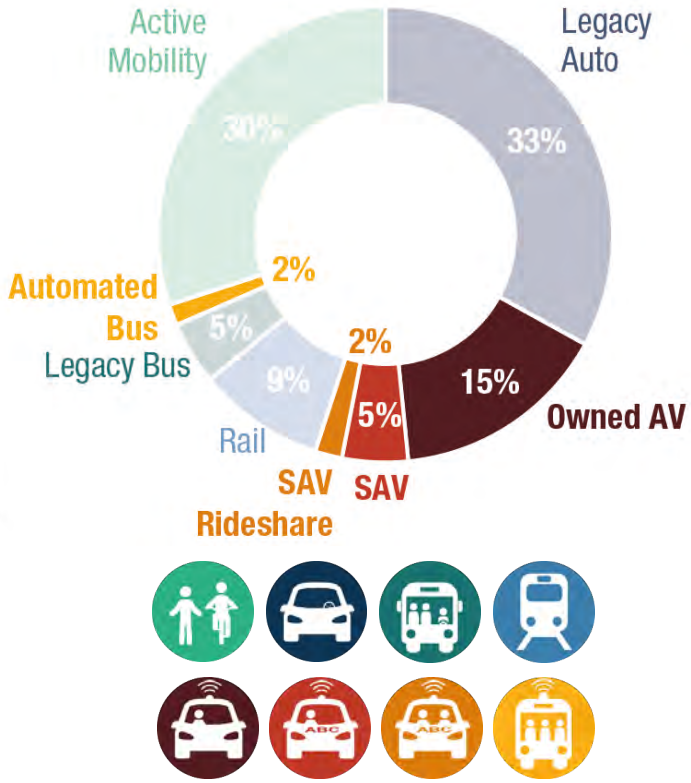
Scenarios compared

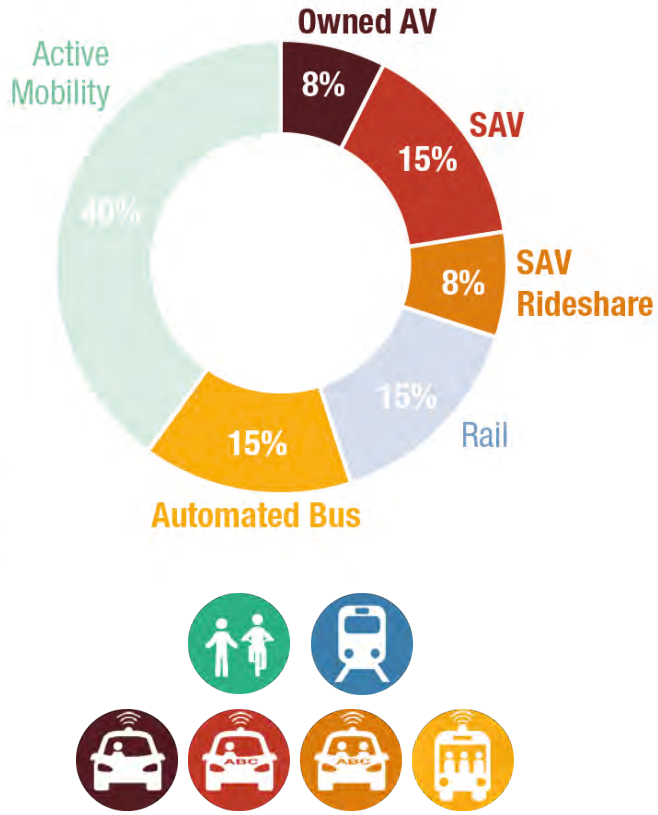
BASELINE



EVOLUTIONARY



REVOLUTIONARY



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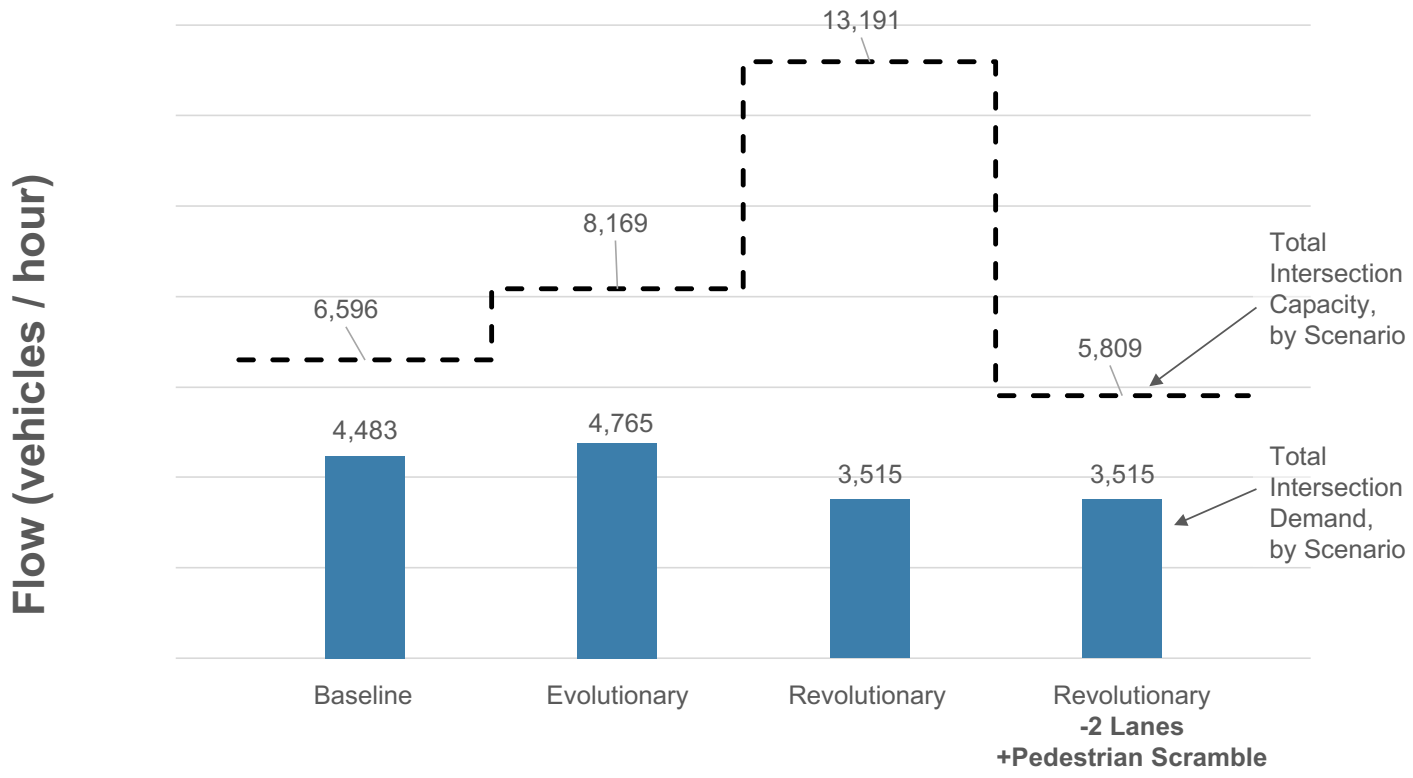
Traffic: Ample capacity with ped scramble, 2 lanes less



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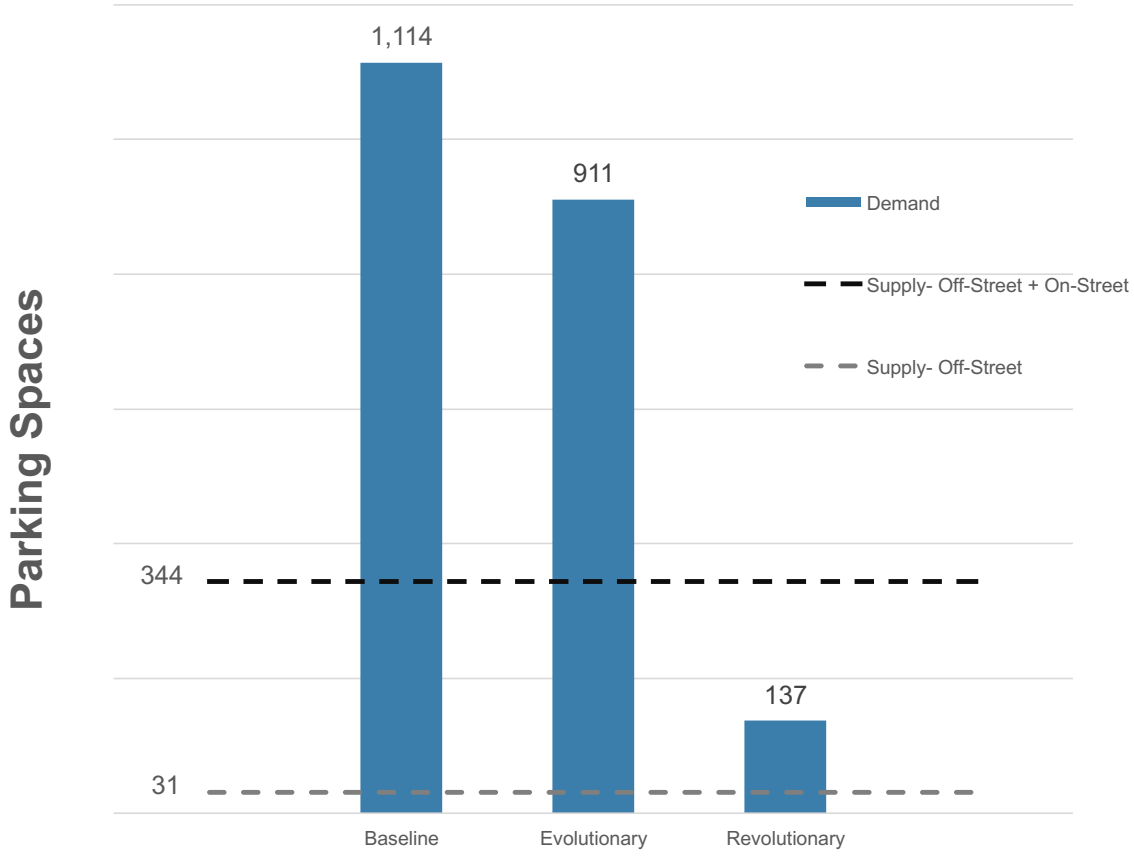
Parking: Parking demand fades with legacy vehicles.



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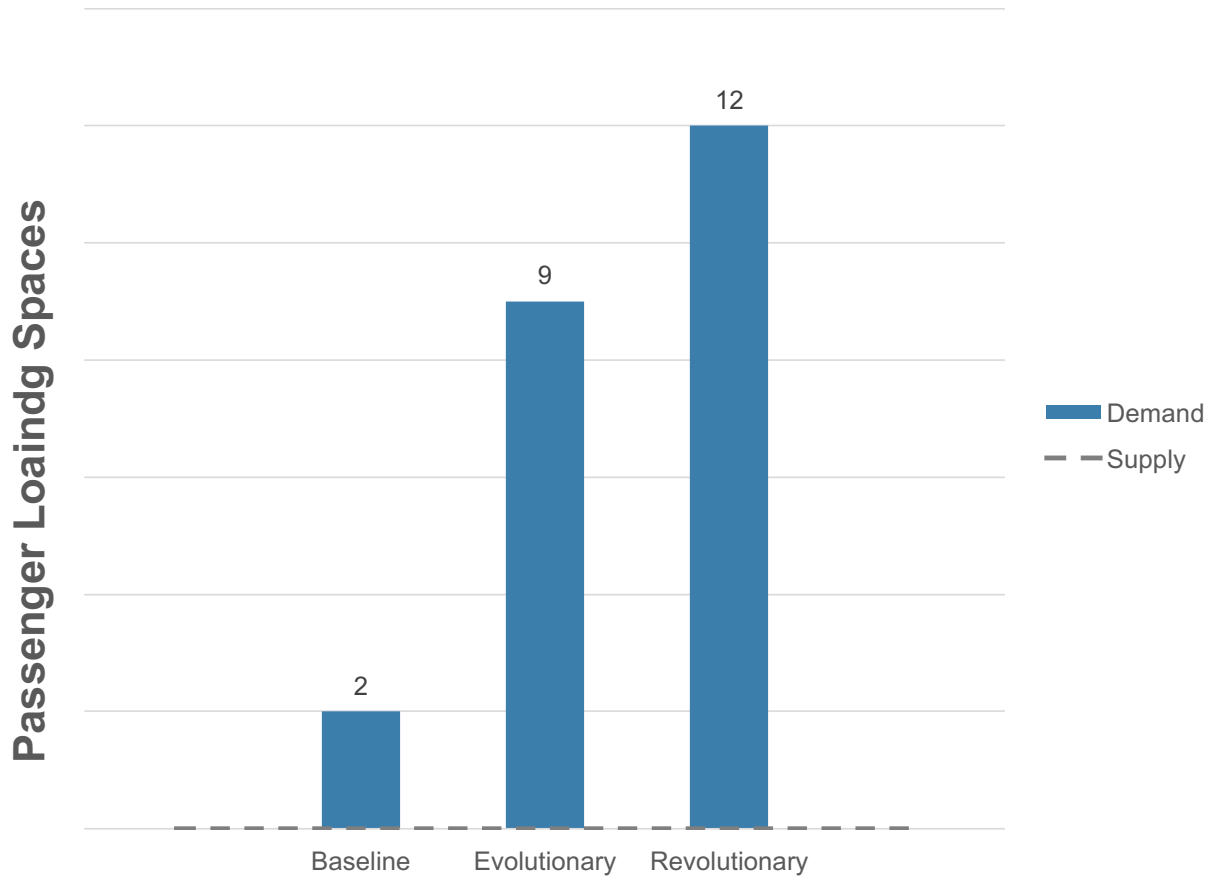
Curb: Demand for curb service will skyrocket.



We assumed 30 vehicles per hour per space with an average dwell time of one minute.

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Design Parameters for Revolutionary Scenario

Two-way bicycle facility

Wide sidewalks

Passenger loading zones

Greenery and space for people

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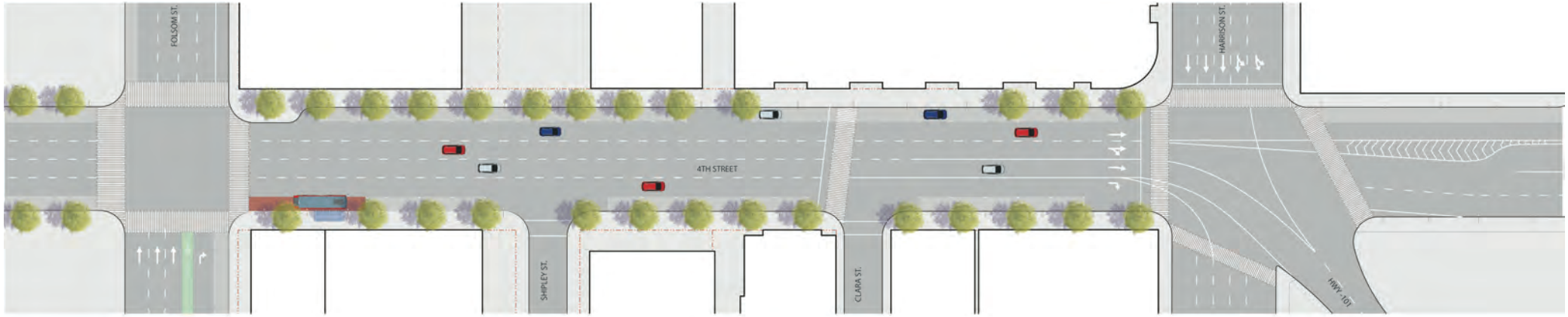
Street Design – Existing Plan View



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4TH STREET EXISTING - PLAN

4th Street Today: An auto-oriented arterial

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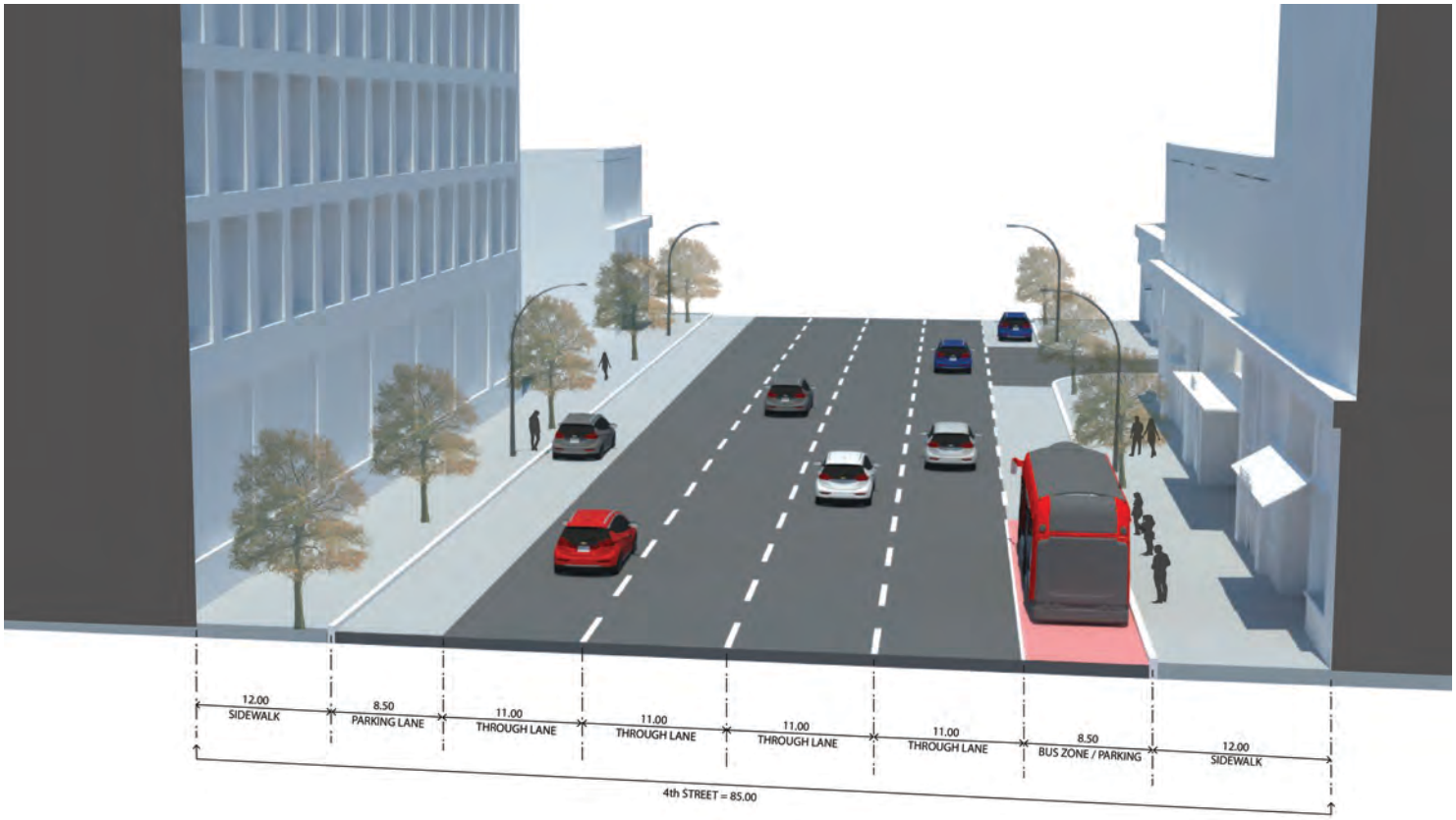
Street Design – Existing Cross Section



4TH STREET EXISTING - SECTION

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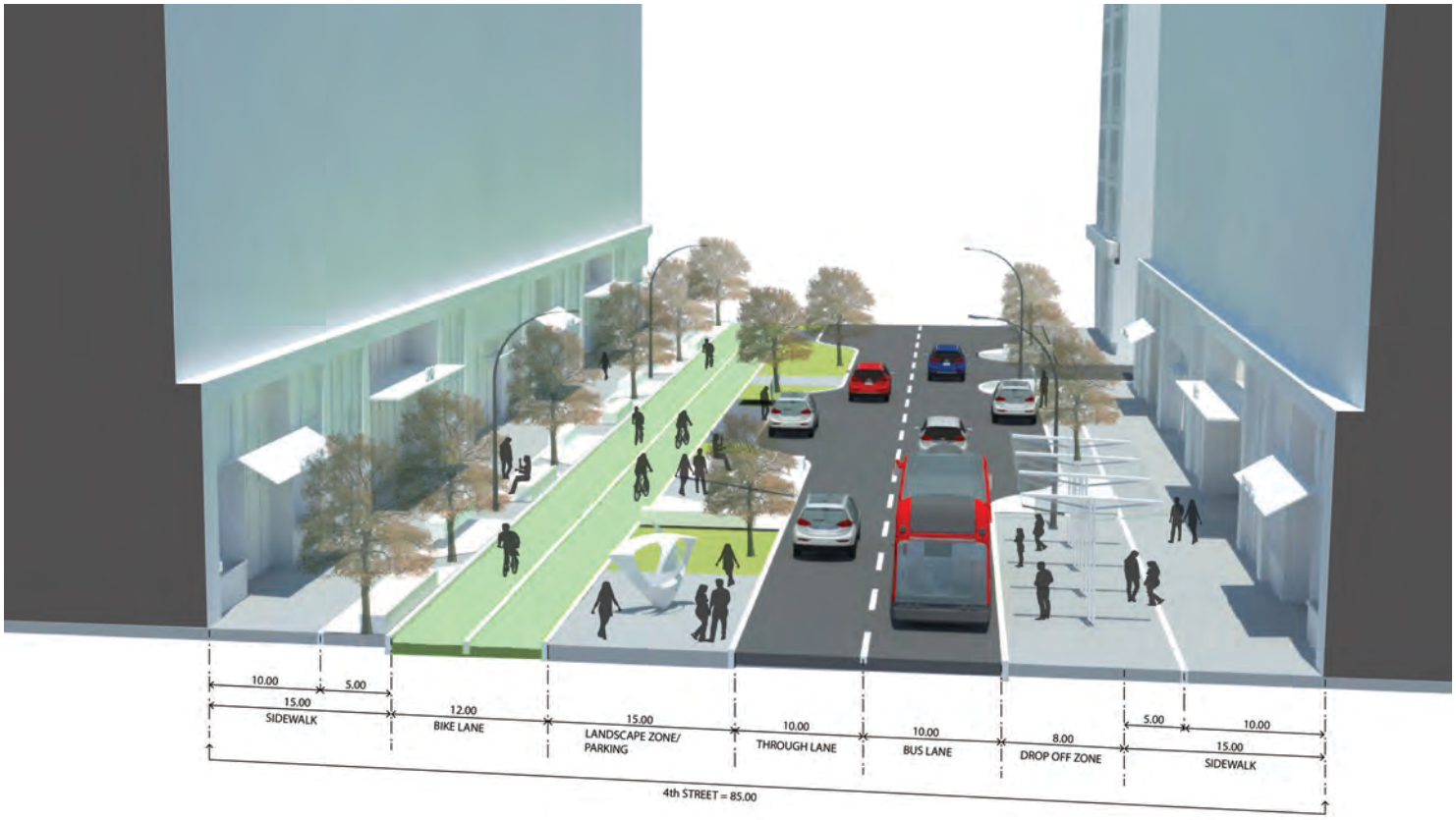
Street Design – Future Cross Section



4TH STREET PROPOSED DESIGN - SECTION

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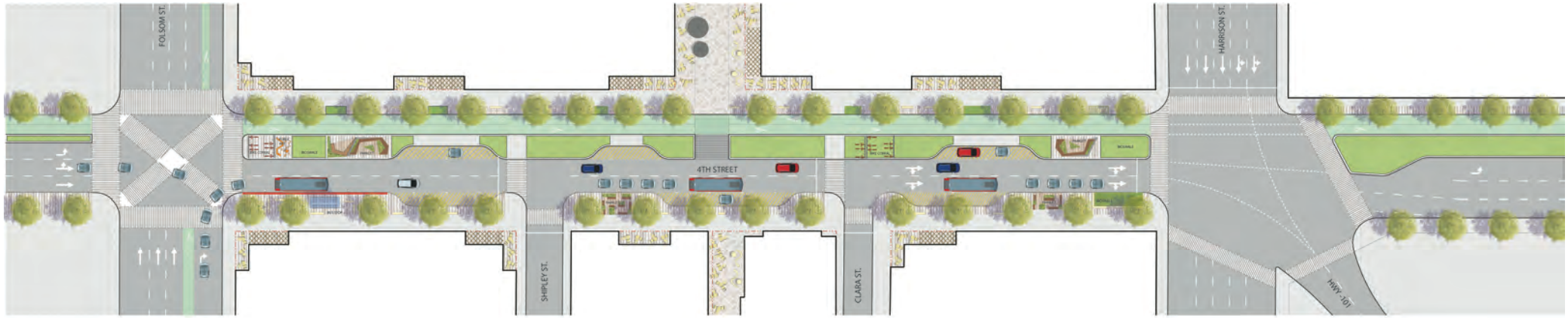
Street Design – Future Plan View



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4TH STREET PROPOSED DESIGN - PLAN

4th Street Tomorrow: A multimodal public space

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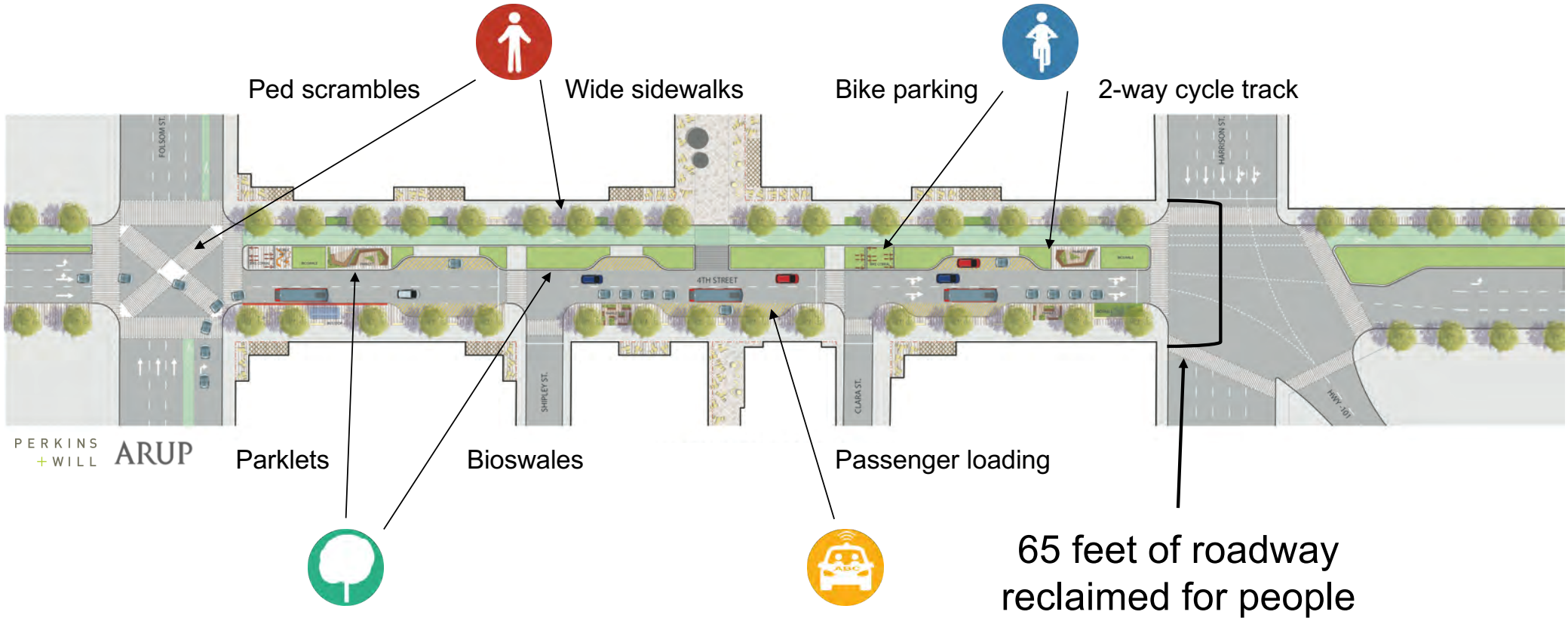
New Mobility Street Design: Results



65 feet of roadway reclaimed for people

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Thank you!

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