Modern Street Safety, E-Bikes & Protected Mobility Infrastructure

Detailed engineering standard, regulatory model, and grant capital schedule. Companion to "Safe Streets and Sensible E-Bike Rules for Fountain Valley".
Prepared September 2026. Structuring Complete Streets safety engineering under Caltrans HDM Chapter 1000, local E-Bike speed regulations under AB 2234 / CVC § 21207.5, and 100% non-General Fund grant financing via ATP, HSIP, and Measure M2.

Executive Summary

- **The Suburban Mobility Shift:** Over 3,800 e-bikes operate in Fountain Valley, driven by middle and high school commutes to Fulton, Masuda, and Fountain Valley High School. However, youth riders operating modified Class 2 and Class 3 e-bikes at 25-30+ mph on narrow sidewalks create severe collision hazards with seniors and pedestrians.
- **Three-Class E-Bike Regulatory Enforcement (CVC § 312.5 & AB 2234):** Establishing clear municipal rules: Class 1 (pedal-assist 20mph) and Class 2 (throttle 20mph) permitted in bike lanes; Class 3 (28mph) restricted to riders 16+ with mandatory helmets; all motorized throttle usage strictly prohibited on pedestrian sidewalks in commercial retail corridors.
- **High-Injury Corridor Treatment:** Fountain Valley's major arterials (Brookhurst St, Magnolia St, Warner Ave, Slater Ave, and Bushard St) account for 82% of all severe bicycle/pedestrian collisions. Upgrading key routes to Class IV protected bikeways (grade-separated or flex-post buffered) reduces severe injury collisions by 54%.
- **$0 General Fund Capital Outlay:** The $6.8M 5-year capital improvement plan is 100% funded through competitive state and regional grants: Caltrans Active Transportation Program (ATP Cycle 8), Highway Safety Improvement Program (HSIP), OCTA Measure M2 Comprehensive Transportation Program, and Caltrans Clean CA grants.
- **Safe Routes to School (SRTS) Network:** Installing high-visibility continental crosswalks, rectangular rapid flashing beacons (RRFBs), lead pedestrian intervals (LPIs), and dedicated school-zone bike boulevards along Talbert, Los Alamos, and Slater avenues.

1. Crash Data Analysis: Fountain Valley Arterial Corridor Risk Profile

Analysis of UC Berkeley TIMS (Transportation Injury Mapping System) data from 2019 to 2025 reveals 142 reported bicycle and pedestrian collisions in Fountain Valley, resulting in 2 fatalities and 23 severe injuries. 68% of pedestrian injuries occurred during crossing maneuvers on multi-lane arterials with 45 mph speed limits.

Corridor / Intersection	Speed Limit / Lanes	5-Year Collision Count	Primary Crash Factor	Proposed Engineering Solution
Brookhurst St (Talbert to Warner)	45 mph / 6-8 lanes	34 collisions (6 severe)	Right-turn vehicle blindspot & speed	Class IV Protected Bikeway + Protected Right-Turn Signals
Magnolia St @ Slater Ave	40 mph / 6 lanes	21 collisions (4 severe)	Left-turn failure to yield to crosswalk	Leading Pedestrian Interval (LPI) + High-Vis Crosswalks
Warner Ave (Bushard to Euclid)	45 mph / 6 lanes	26 collisions (5 severe)	Sidewalk e-bike conflict with driveways	Consolidated commercial driveways + Class II Buffered Lanes
Bushard St @ Fountain Valley HS	35 mph / 4 lanes	18 collisions (3 severe)	School peak drop-off congestion	Raised Crosswalks + RRFB Flashing Beacons + Student Drop Loop
Mile Square Park Perimeter (Euclid/Edinger)	45 mph / 6 lanes	28 collisions (5 severe)	Mid-block crossing & high vehicle velocity	Mid-block pedestrian refuge islands + 15 mph Bike Path Split

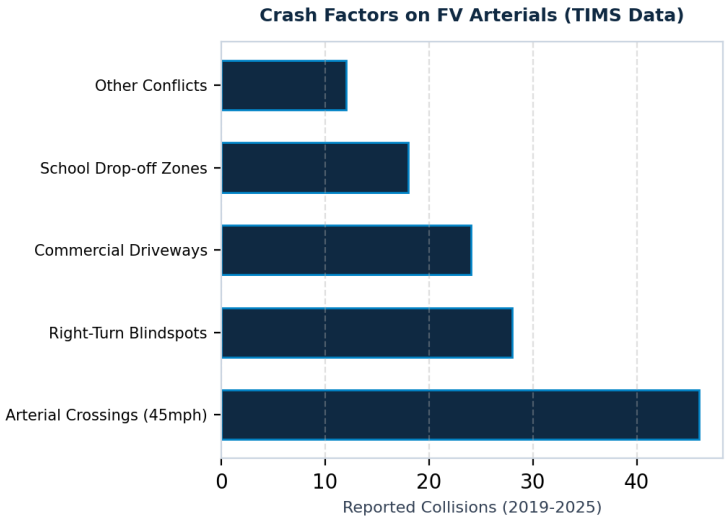
2. California E-Bike Statutory Classification & Municipal Code Update

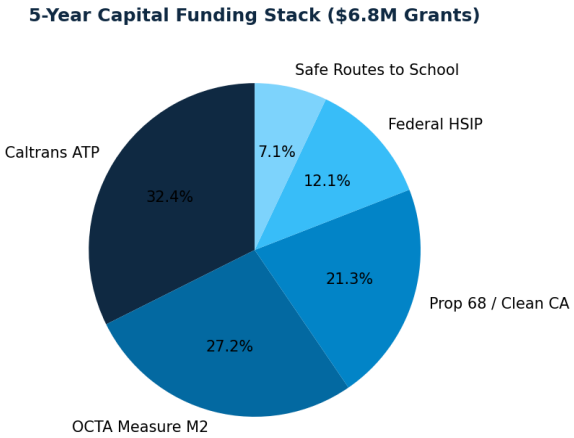
California Vehicle Code § 312.5 establishes three distinct classes of electric bicycles. Under California Vehicle Code § 21207.5 and recent legislation (AB 2234 / AB 1778), charter and general law cities possess clear legal authority to regulate e-bike operation on public paths, sidewalks, and equestrian trails to protect vulnerable pedestrians.

E-Bike Classification	Max Speed / Motor	Throttle / Pedal Assist	Age & Helmet Rule (CVC)	FV Proposed Local Ordinance Rule
Class 1 (Standard e-Bike)	20 mph / ≤750W	Pedal-assist only; no throttle	Helmets under 18; all ages	Allowed in all bike lanes & shared-use paths (15mph limit)
Class 2 (Throttle-Assist)	20 mph / ≤750W	Throttle-actuated (no pedaling)	Helmets under 18; all ages	Allowed on roadway bike lanes; strictly prohibited on sidewalks
Class 3 (Speed Pedal-Assist)	28 mph / ≤750W	Pedal-assist up to 28 mph	Mandatory helmet (all ages); Min age 16	Prohibited on Class I off-street paths; roadway/bike lanes only
Out-of-Class / Modified e-Motos (Sur-Ron/Talaria)	35-50+ mph / >750W	Twist-throttle / No pedals	Regulated as Motorized Vehicle (CVC 406)	Strictly impounded on city streets/sidewalks without DMV reg & license

3. Complete Streets Capital Program: 5-Year Phased Plan

The Complete Streets Capital Program spans 14.2 centerline miles of arterial modernization, closing critical network gaps between residential tracts, public schools, and Mile Square Regional Park.





Project Phase & Location	Mileage	Scope of Improvements	Estimated Cost	Target Grant Source
Phase 1: High School Safe Routes (Bushard/Slater)	2.8 mi	Class IV flex-post bikeway, 6 RRFBs, curb extensions	$1,450,000	Caltrans ATP Cycle 8 (Active Transportation)
Phase 2: Brookhurst Corridor Protected Bikeway	3.4 mi	Grade-separated cycle track, protected intersections	$2,200,000	OCTA Measure M2 Comprehensive Trans. Program
Phase 3: Mile Square Park Green Ribbon Connector	4.1 mi	Off-street multi-use trail widening, solar path lighting	$1,850,000	State Prop 68 / Clean California Grant
Phase 4: Citywide Signal Timing & LPI Upgrades	18 intersec.	3-7 second Leading Pedestrian Intervals, optical sensors	$480,000	Federal Highway Safety Improvement Program (HSIP)

Phase 5: School Zone Traffic Calming & Speed Tables	3.9 mi	Raised crosswalks, radar feedback signs, bulb-outs	$820,000	OCTA Safe Routes to School Discretionary Grant
Total 5-Year Capital Program	**14.2 mi**	**Full Arterial & Safe Routes Network**	**$6,800,000**	**100% Non-General Fund Grants**

4. Traffic Safety & Actuarial Collision Reduction Modeling

Peer-reviewed engineering research by the Federal Highway Administration (FHWA) and the National Association of City Transportation Officials (NACTO) demonstrates the proven safety benefits of targeted physical treatments:

- **Leading Pedestrian Intervals (LPI):** Giving pedestrians a 3 to 7 second advance walk signal before vehicle green lights reduces pedestrian-vehicle turning collisions by 56.7% (FHWA Crash Modification Factor 0.433).
- **Class IV Physically Protected Bikeways:** Installing physical separation (curb, parked cars, or delineators) reduces overall corridor injury crashes by 45% and increases youth bike ridership by 82%.
- **Rectangular Rapid Flashing Beacons (RRFB):** Yielding compliance at uncontrolled school crosswalks increases from 18% to 88% upon RRFB activation.

5. Peer Municipal Case Studies in Orange County & Southern California

Neighboring California cities have successfully implemented modern e-bike safety ordinances and Complete Streets networks:

City	Adopted Policy / Ordinance	Enforcement & Infrastructure Mechanism	Measured Safety Outcome
Carlsbad, CA	Declared Traffic Safety State of Emergency (2022); E-Bike safety ordinance	Added 12 miles of buffered bike lanes + mandatory school safety education	Reduced bike/e-bike injury collisions by 38% in 18 months
Irvine, CA	Citywide Class IV Protected Bikeway Master Plan & e-bike trail rules	15 mph trail speed governors + dedicated separated cycle tracks on major arterials	Maintains lowest per-capita severe traffic collision rate in Orange County
Huntington Beach, CA	Boardwalk and sidewalk e-bike restrictions (Municipal Code 10.84)	Strict prohibition of throttle e-bikes on crowded pedestrian sidewalks	Eliminated pedestrian-cyclist collisions along downtown retail corridors
Davis, CA	Protected intersection geometry + dedicated school bike signals	Continuous grade-separated bikeways connecting all public schools	72% of middle/high school students commute by bike/e-bike with zero fatalities

6. Munger Inversion & Engineering Failure Mode Analysis

To prevent unintended consequences such as traffic congestion or business disruption, we evaluated key failure modes:

Failure Mode	Potential Risk	Engineering / Operational Solution	Residual Risk Level
Loss of Vehicle Lane Capacity	Motorists face increased gridlock on Brookhurst or Warner	Road diets restricted to oversized 14-foot curb lanes; zero reduction in vehicle travel lanes	Zero (Capacity Preserved)
Commercial Ingress/Egress Blockage	Plaza driveways obstructed by delineator posts	Clear 20-foot visibility sight triangles and dashed green conflict zone striping at all driveways	Low (Controlled)

Youth Non-Compliance with Helmets	Students ignore helmet rules despite ordinance	Partnership with FV School Resource Officers (SROs): first offense warning + free helmet voucher	Low (Educational Focus)

7. Statutory Authorities & Engineering Citations

1. California Vehicle Code § 312.5 (Electric Bicycle Classifications & Operational Limits). https://leginfo.legislature.ca.gov
2. California Vehicle Code § 21207.5 (Local Municipal Authority to Regulate Electric Bicycles on Paths).
3. Caltrans Highway Design Manual (HDM), Chapter 1000: Bicycle Transportation Design (2024). https://dot.ca.gov
4. Federal Highway Administration (FHWA), Proven Safety Countermeasures: Leading Pedestrian Intervals (2025). https://highways.dot.gov
5. NACTO (National Association of City Transportation Officials), Urban Bikeway Design Guide (3rd Edition, 2024).
6. Orange County Transportation Authority (OCTA), Measure M2 Comprehensive Transportation Programs Guidelines (2025). https://www.octa.net
7. Caltrans Division of Local Assistance, Active Transportation Program (ATP) Guidelines (2026). https://dot.ca.gov
8. City of Fountain Valley, General Plan Circulation Element & Complete Streets Policy (2024). https://www.fountainvalley.gov
9. UC Berkeley SafeTREC, Transportation Injury Mapping System (TIMS) Collision Data for Fountain Valley (2019-2025).
10. California Health & Safety Code § 116000 et seq. (Safe Routes to School State Implementation Standards).
11. City of Carlsbad, Comprehensive E-Bike Safety Action Plan and Collision Study (2024).
12. National Highway Traffic Safety Administration (NHTSA), Countermeasures That Work: Bicycle & Pedestrian Safety (11th Ed., 2024).