

Tekasis

***The Definitive System for HOV
Enforcement***



The Problem

- 10% violation rate is common on HOV/HOT facilities
- 30, 50, 90% violation rates have been observed
- Patrol-based enforcement is limited by available resources
- Violators reduce capacity for HOV and HOT in Express Lane
- Results in loss of revenue

Concept 1: Lane Crossing Detection A

Problem

- Illegal crossing of double line is the prevalent violation on I-680
- Drivers with FasTrak bypass the toll collection gantry

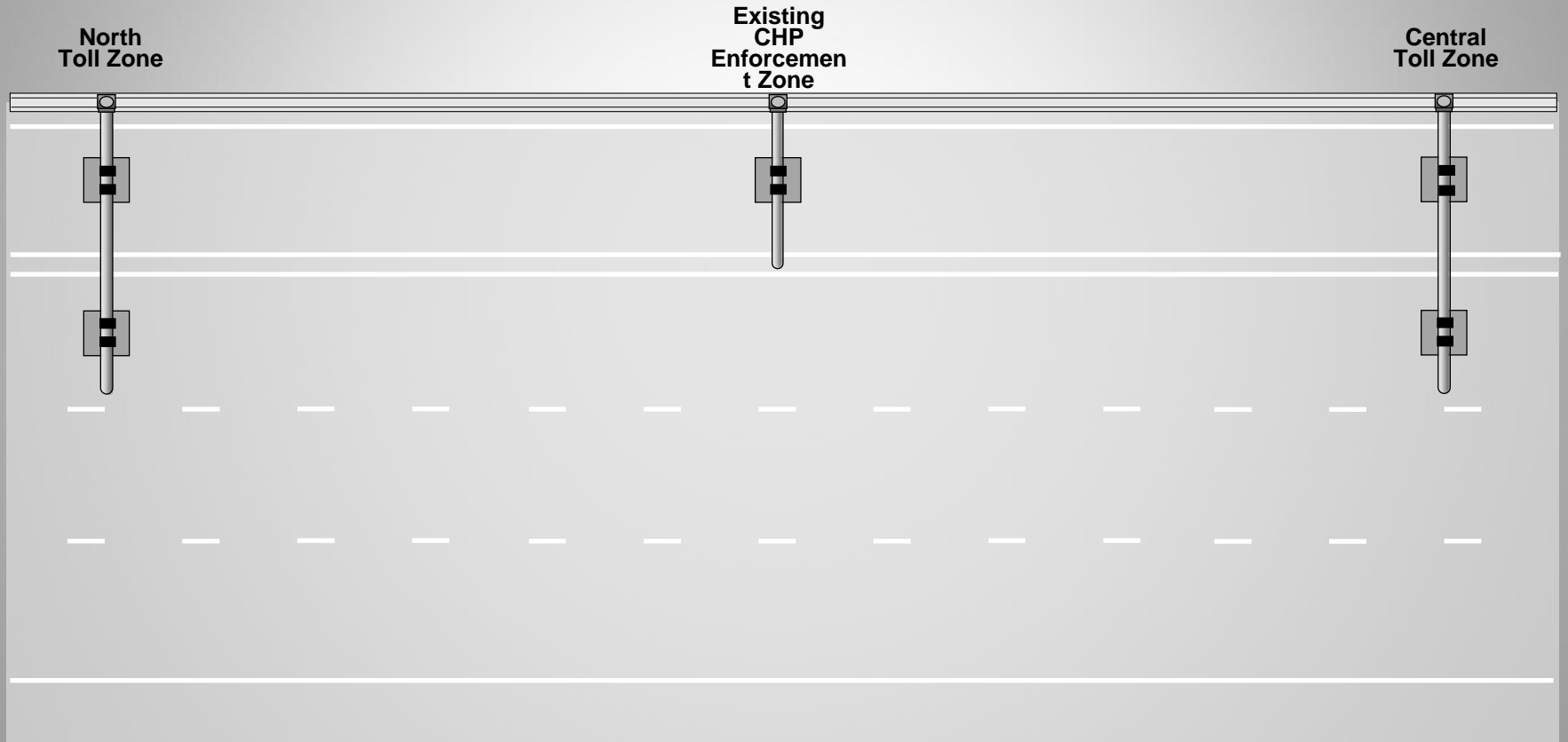
Technology

- Additional FasTrak readers along the lane

Enforcement

- Violators can get cited for toll evasion by JPA

Existing Gantries and Equipment



Additional Enforcement Equipment

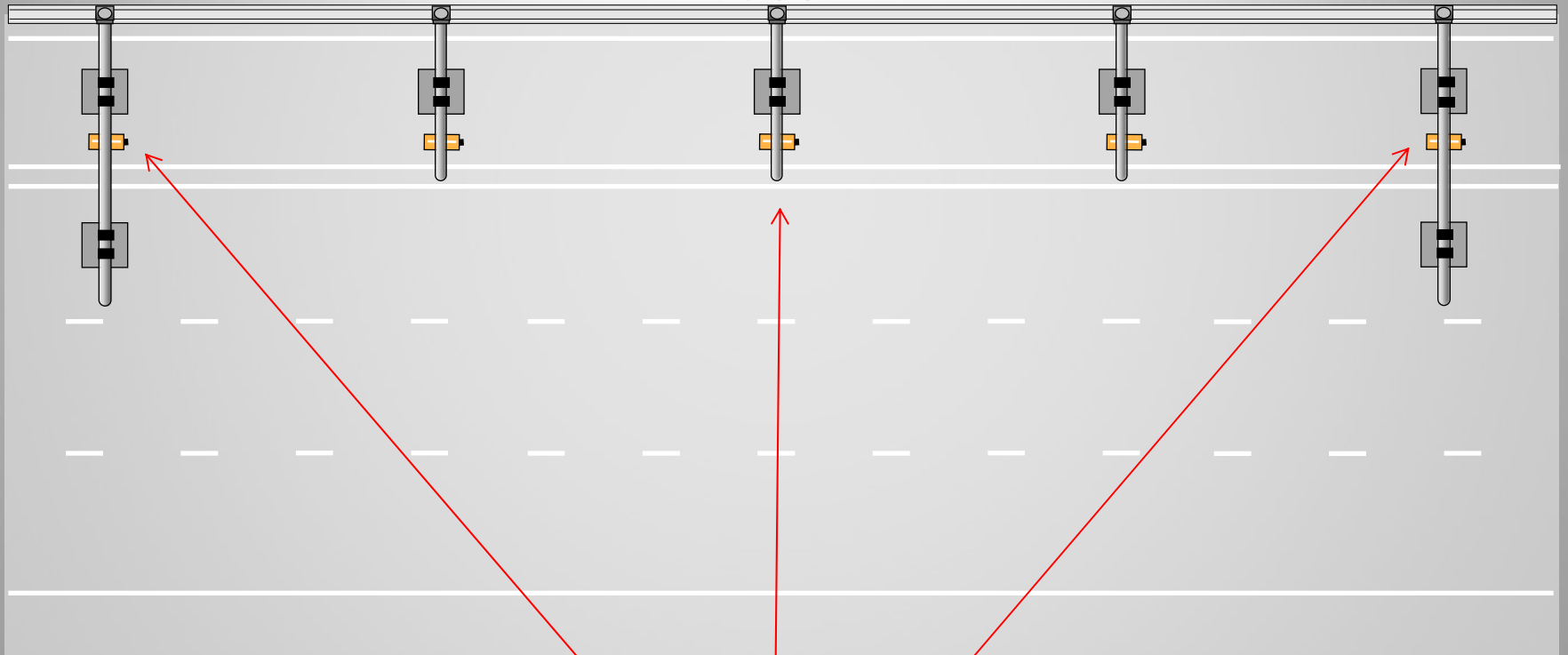
Install Additional
Enforcement Zones
with Readers and
Cameras

Existing
CHP
Enforcement
Zone

North
Toll Zone

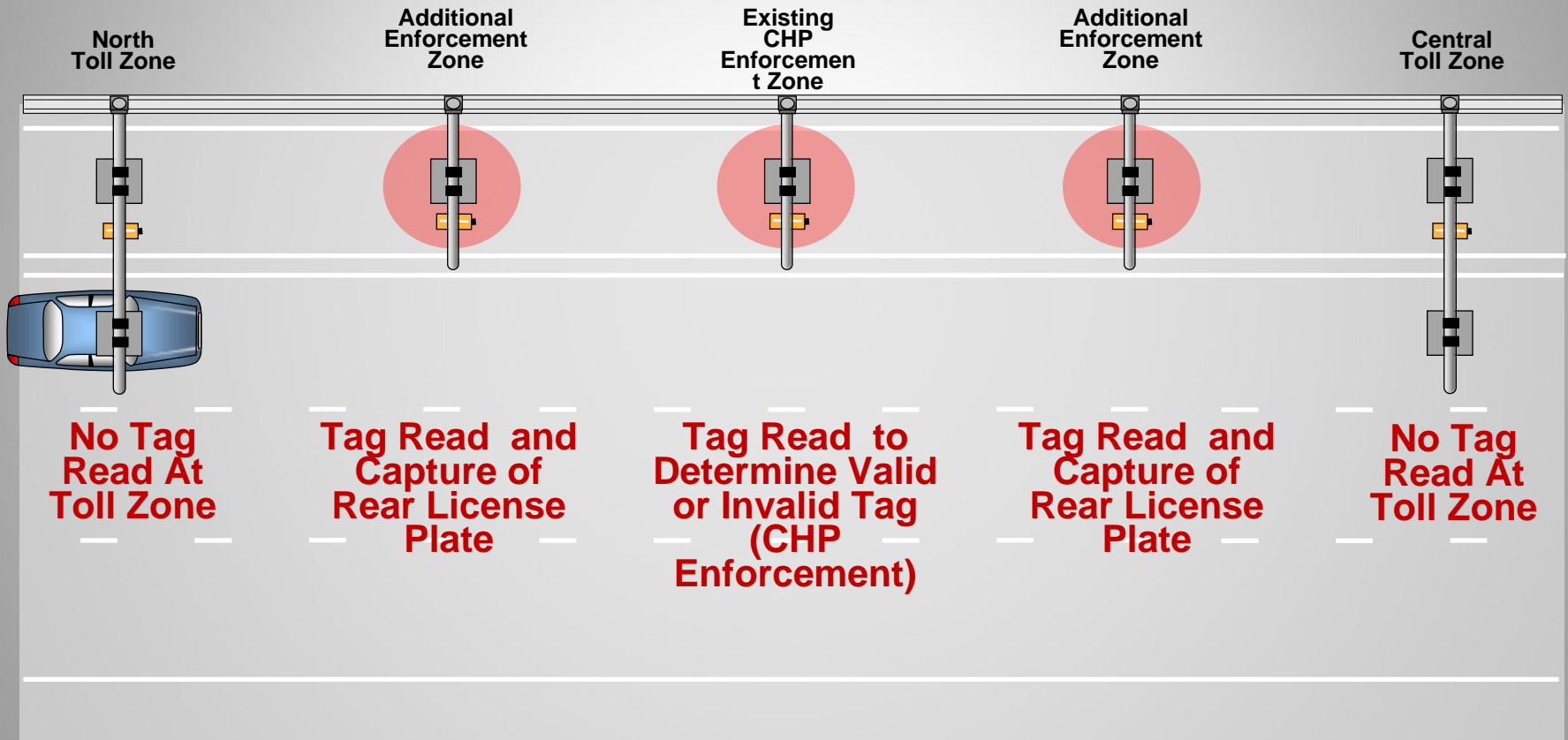
Central
Toll Zone

Also Install
Additional
Cameras at
Existing Zones



Possible Weaving Scenarios

Automated Violator Capture



A Valid Transaction is Created for Each Scenario
Without Traversing a Toll Zone

Concept 2: Lane Crossing Detection B

Problem

- Illegal crossing of double line is the prevalent violation on I-680
- Drivers with **or without** FasTrak bypass the toll collection gantry

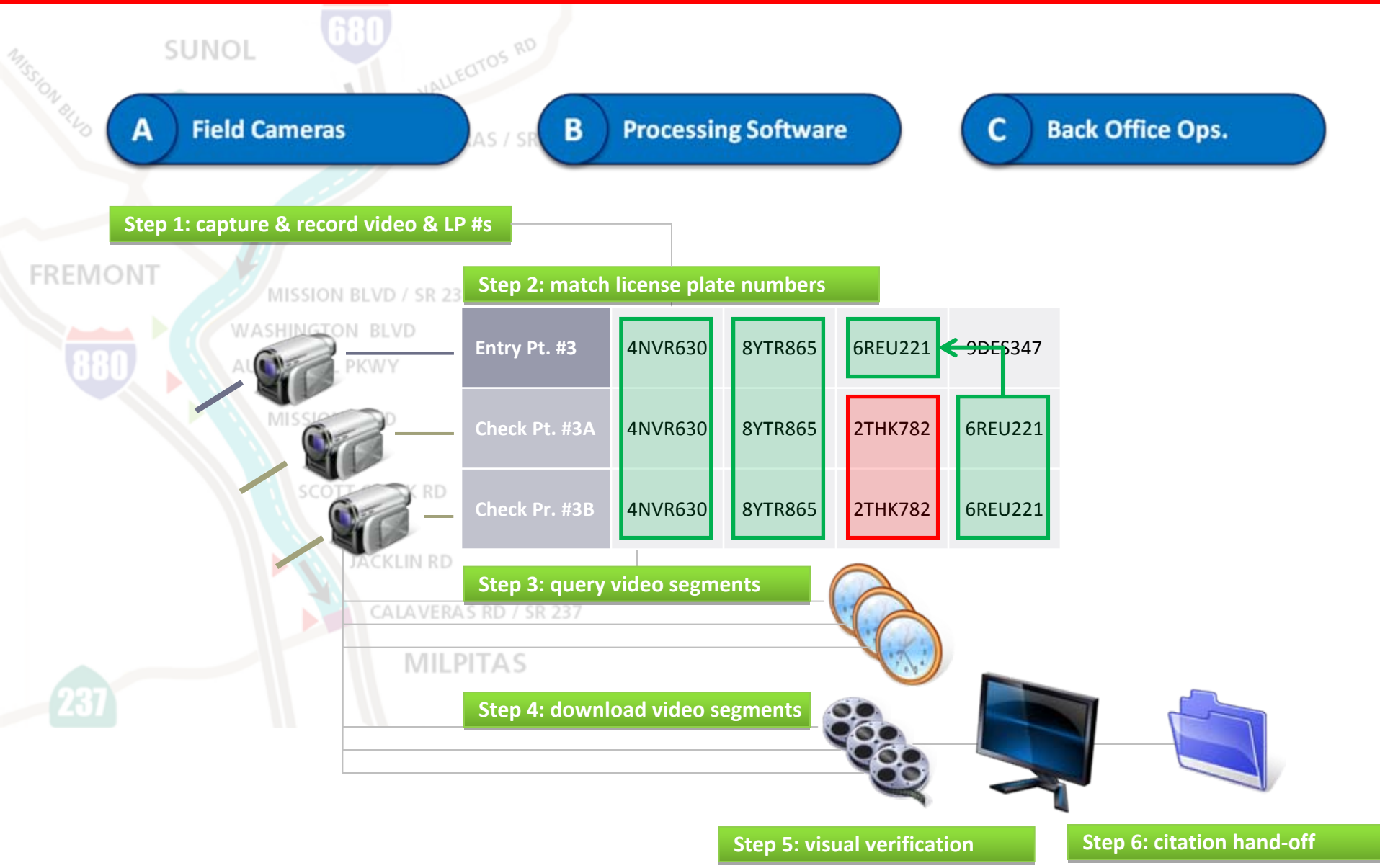
Technology

- **ALPR cameras** capture license plate numbers at multiple locations
- **Video footage** allows direct verification in back office

Enforcement

- Violators can get cited for toll evasion by JPA
- Repeat violators can be designated to CHP for direct intervention

Lane Crossing System Diagram



Concept 3: Occupancy Detection

Problem

- Short of direct apprehension by CHP, solo riders can still evade tolls

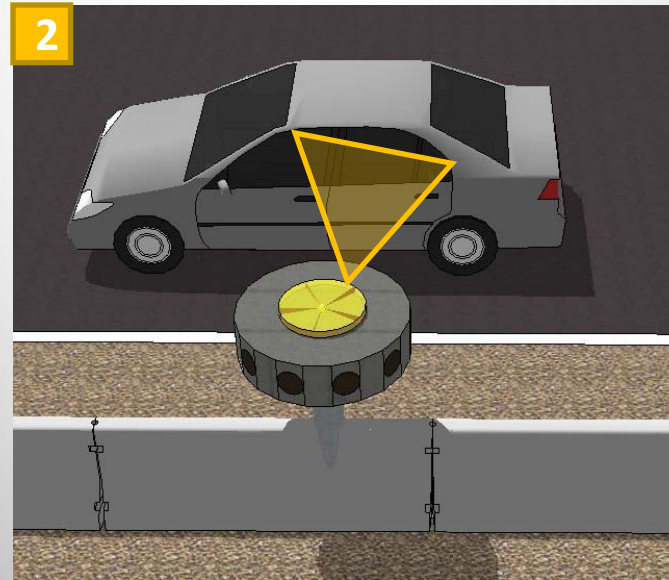
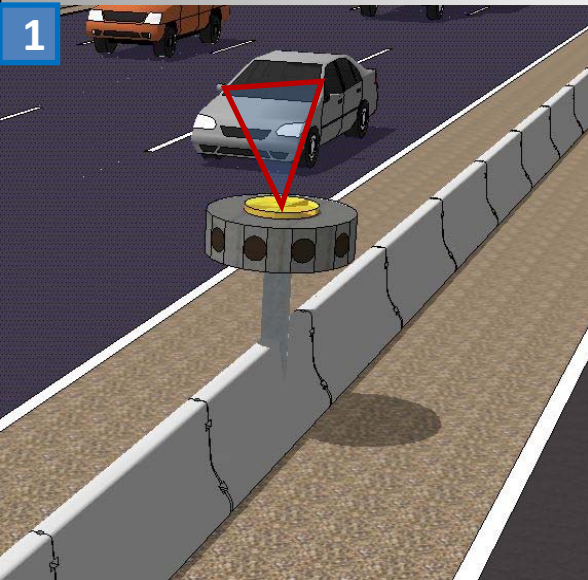
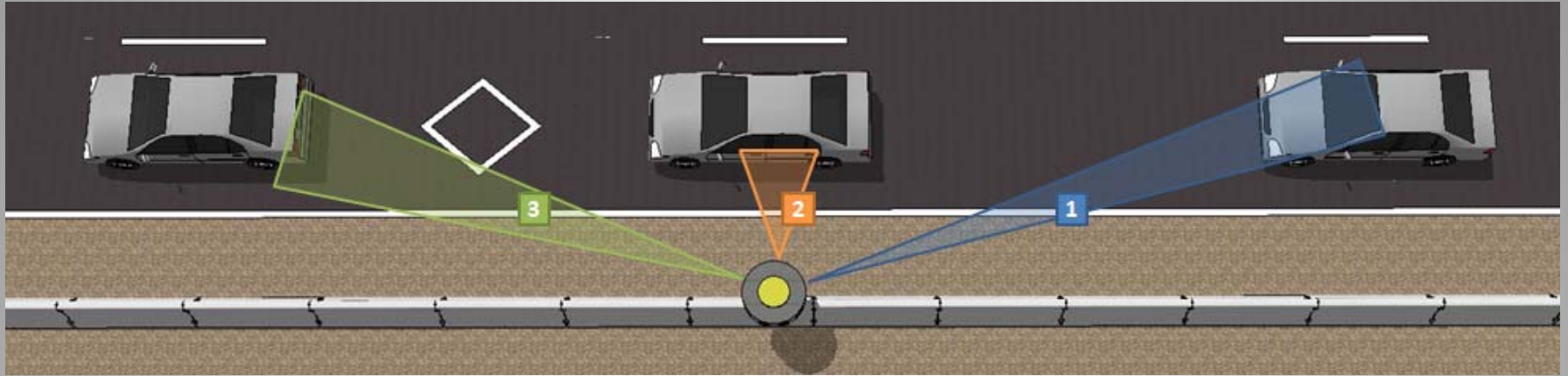
Technology

- 3-camera system installed at each toll entry point
- Can build off Concept 2 infrastructure
- System based on affordable off-the-shelf infrared cameras
- Combines automation and human-operated back office
- Aims for zero false positives and an acceptable miss rate

Enforcement

- Either toll evasion or carpool violation –depending on institutional feasibility
- Large, visible system and signage will act as additional deterrence

Camera System Setup



Second Camera: Key to the System

Test Case: Finding the Baby in the Back Seat

















Two Occupants Detected



One Occupant Detected



Comparison of HOT Enforcement Options

| Violation Scenario | Enforceable Citations | CHP | Concept 1 Toll Readers | Concept 2 ALPR | Concept 3 Occupancy Detection |
|---|--|---|--|--|--|
| 1. SOV Valid FasTrak Bypasses Entrance | Toll Violation Double line crossing |  |  |  |  |
| 2. SOV No FasTrak Bypasses Entrance | Toll Violation Double line crossing |  |  |  |  |
| 3. SOV No FasTrak | Toll violation |  |  |  |  |
| 4. HOV Bypasses Entrance or swerves in and out of lane | Double line crossing |  |  |  |  |

1. SOV, w/ FasTrak, Bypass Entrance: A single occupant with a visible tag evades the entry point, but crosses back over into the HOT lane to evade paying the toll
2. SOV, No FasTrak, Evade Reader: A single occupant without a tag crossing in and out of lanes
3. SOV, No FasTrak: A single occupant without a tag drives as if a MOV
4. MOV, Bypass Entrance: A multiple occupant crossing in and out of lanes



Thank You

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