

# THE BASICS OF OPEN ROAD TOLLING

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# Introduction



Actual ORT/Cash Plaza on  
I-88 in DeKalb Illinois



# Introduction

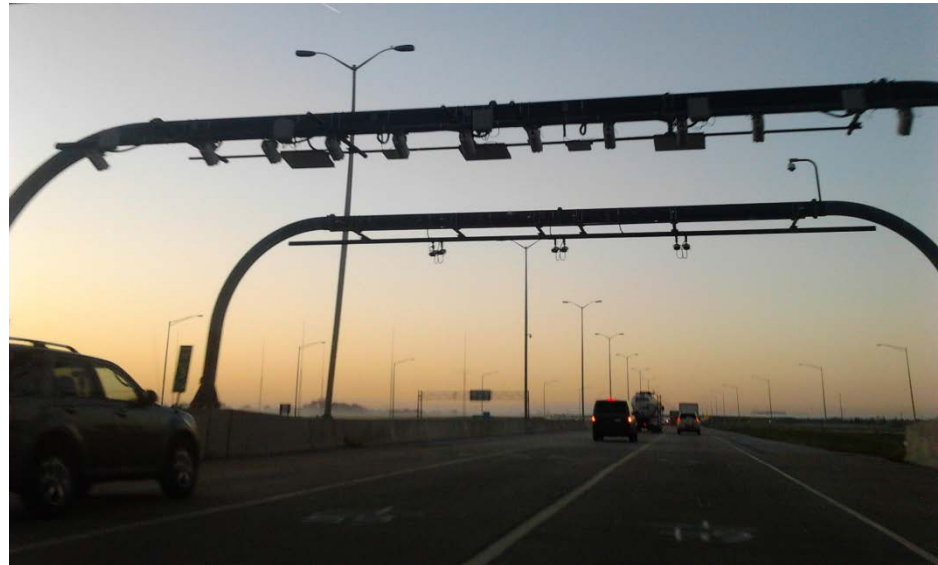
- Acronyms, Abbreviations, and Terminology
  - ETC – Electronic Toll Collection
  - Gantry – Structure mounted over the roadway on which the toll collection equipment is mounted (can be one or two)
  - IAG – Interagency Group ([www.e-zpassiag.com/about-us/overview](http://www.e-zpassiag.com/about-us/overview))
  - Idris – A system of software, loop sensors, and vehicle loops embedded in the pavement that sense and classify vehicles
  - Induction Loops – Precision loop sensors embedded in the pavement, similar to, but different than standard traffic loops
  - IR – Infrared: A low light vision technology
  - ORT – Open Road Tolling: The collection of tolls electronically at highway speed through a barrier free plaza
  - RFID – Radio Frequency Identification

# Introduction

- Acronyms, Abbreviations, and Terminology
  - Tag – Another term for transponder
  - Transponder – The device in the vehicle that contains the vehicle identification information that is interrogated by the plaza toll collection system
  - VES – Violation Enforcement System: The system used to identify vehicles that have not paid a toll
  - VPC – Violation Processing Center

# Introduction

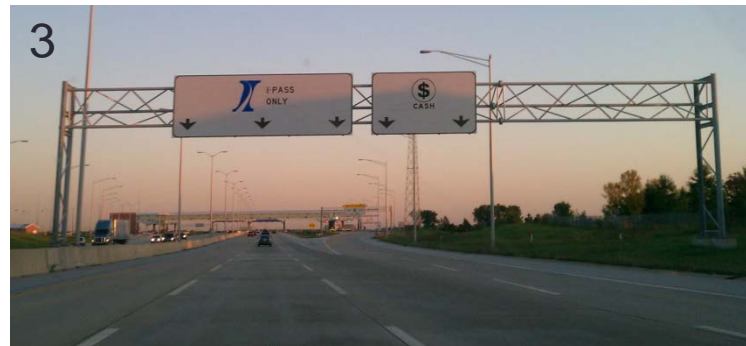
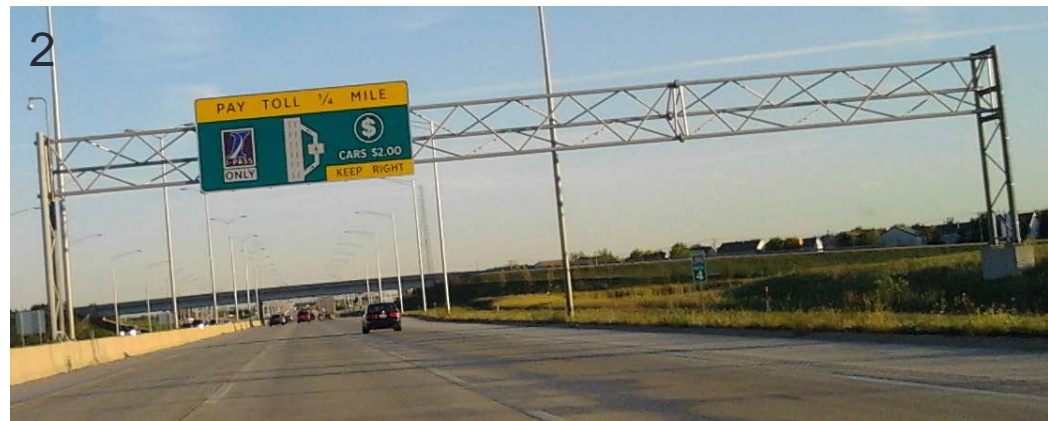
- ORT has many technical details, but there are some basic simple topics that can help us understand it
  - The Driver
  - The Vehicle
  - The Zone
  - The Unseen
  - The Labor



# The Driver

- Signage is important
  - Approach
    - Identify approaching toll plaza
    - Identify which lanes are ORT and which are cash

(1 is furthest from the Plaza, 4 is the closest)



# The Driver

- Signage is important
  - Departure
    - Identify what to do if you missed a toll

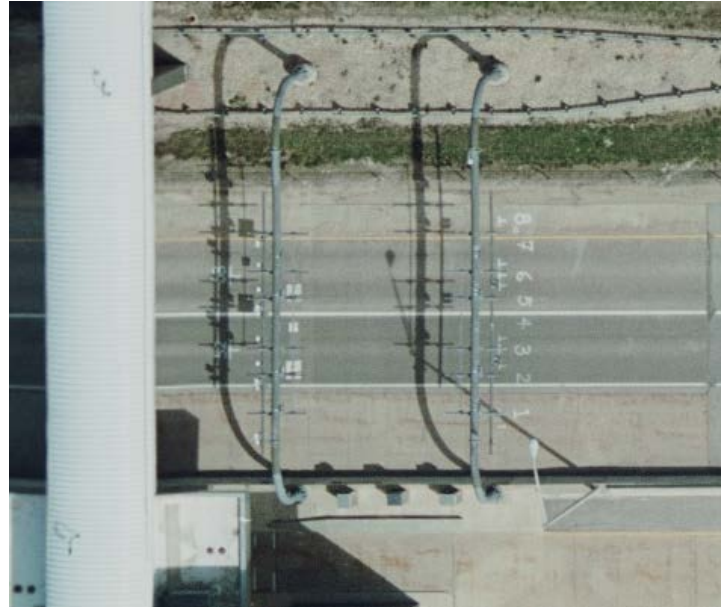


# The Vehicle

- Vehicle Identification
  - Contains unique identification information
  - Tag/Transponder
    - Active
      - Responds to query from antenna at plaza
    - Passive/Backscatter
      - System reads information on sticker
  - Typically mounted on windshield
  - Some vehicles require special tag/transponder mounting locations
    - If outside, need to be suited for exposure to road hazards, salt spray, driven rain, etc.



# The Zone



Overhead view of 2 Lane ORT Zone



View from Vehicle Approaching a 3 Lane ORT Zone

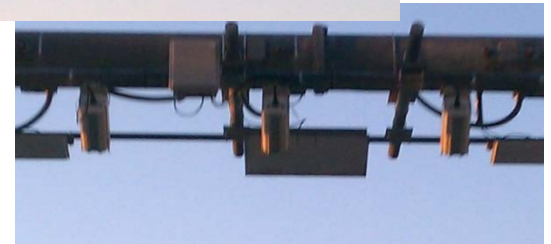
# The Zone

- Equipment
  - Antenna
    - Transmits/receives signals to/from tag/transponder in vehicle
  - Reader
    - Takes information from antenna, coordinates it with a database and provides the information to the Lane Controller
  - Loops
    - Entrance, Mid, Exit, and Axle
      - Senses presence of vehicle
      - Provides information to lane controller for vehicle classification
  - Lane Controller
    - Coordinates information from loops and reader
    - Determines if vehicle is violating and makes it known to the violation processing system

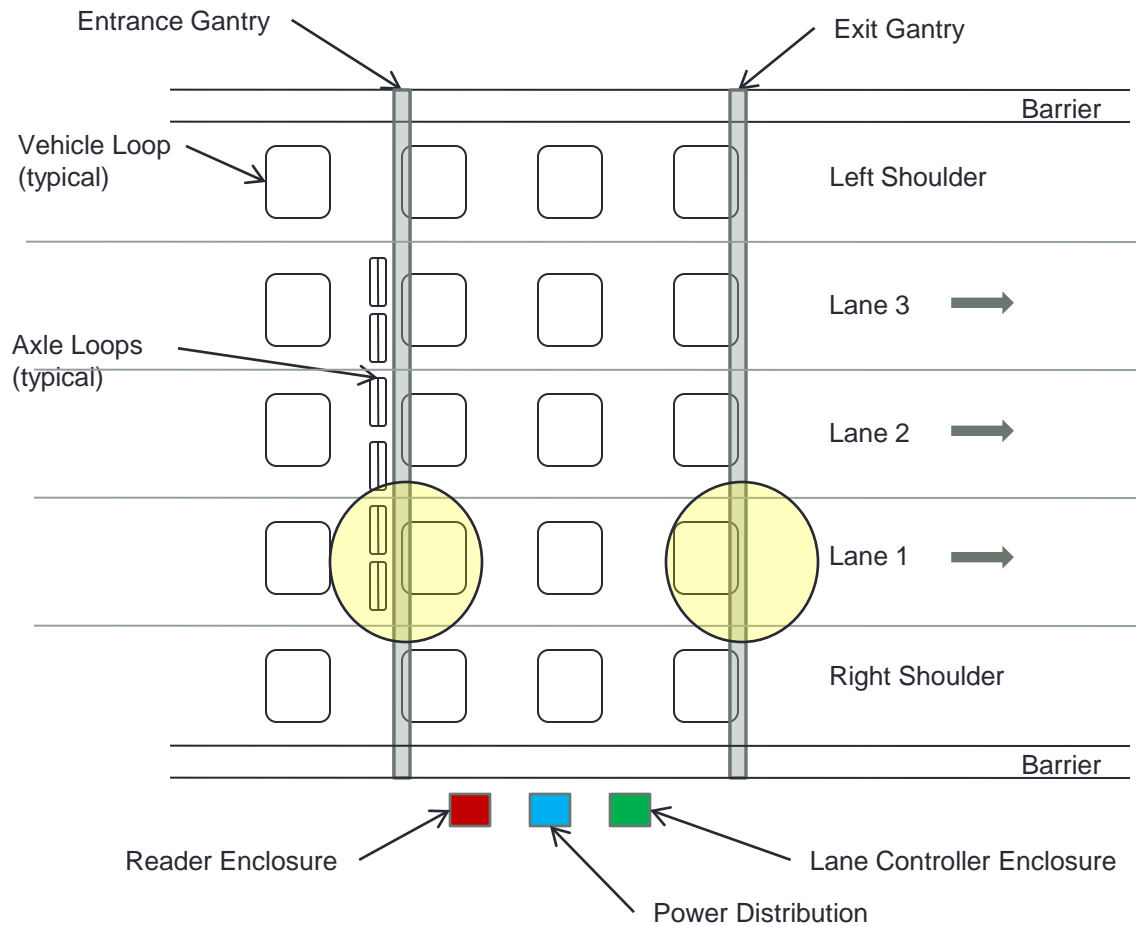


# The Zone

- Equipment (cont.)
  - Camera and Illumination
    - Front Plate
      - Important for Commercial Vehicles
    - Rear Plate
      - Generally adequate for non-commercial vehicles
    - Take multiple pictures of every front and rear plate
      - Only keep the ones for violators
  - Driver Feedback
    - Lets driver know toll has been successfully collected
    - Lets driver know account balance is low
  - Audit Camera
    - Images used to validate toll collection accuracy

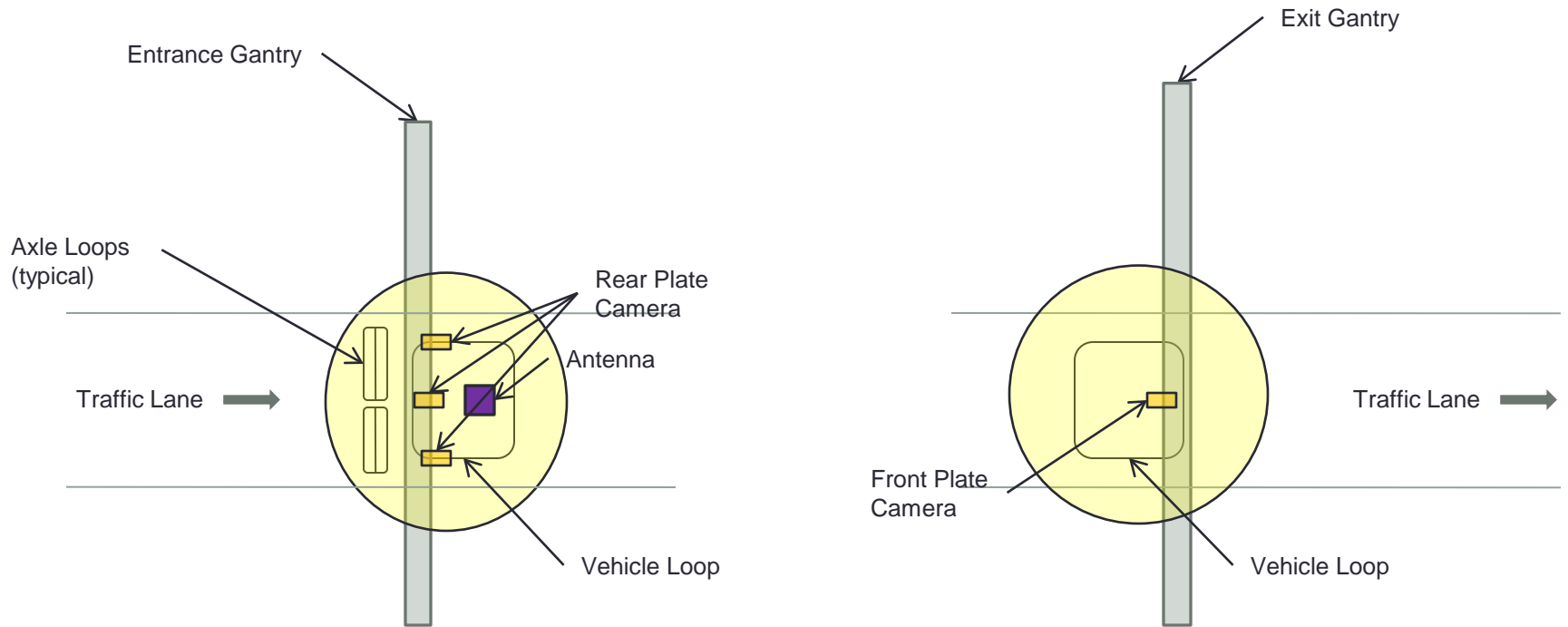


# The Zone



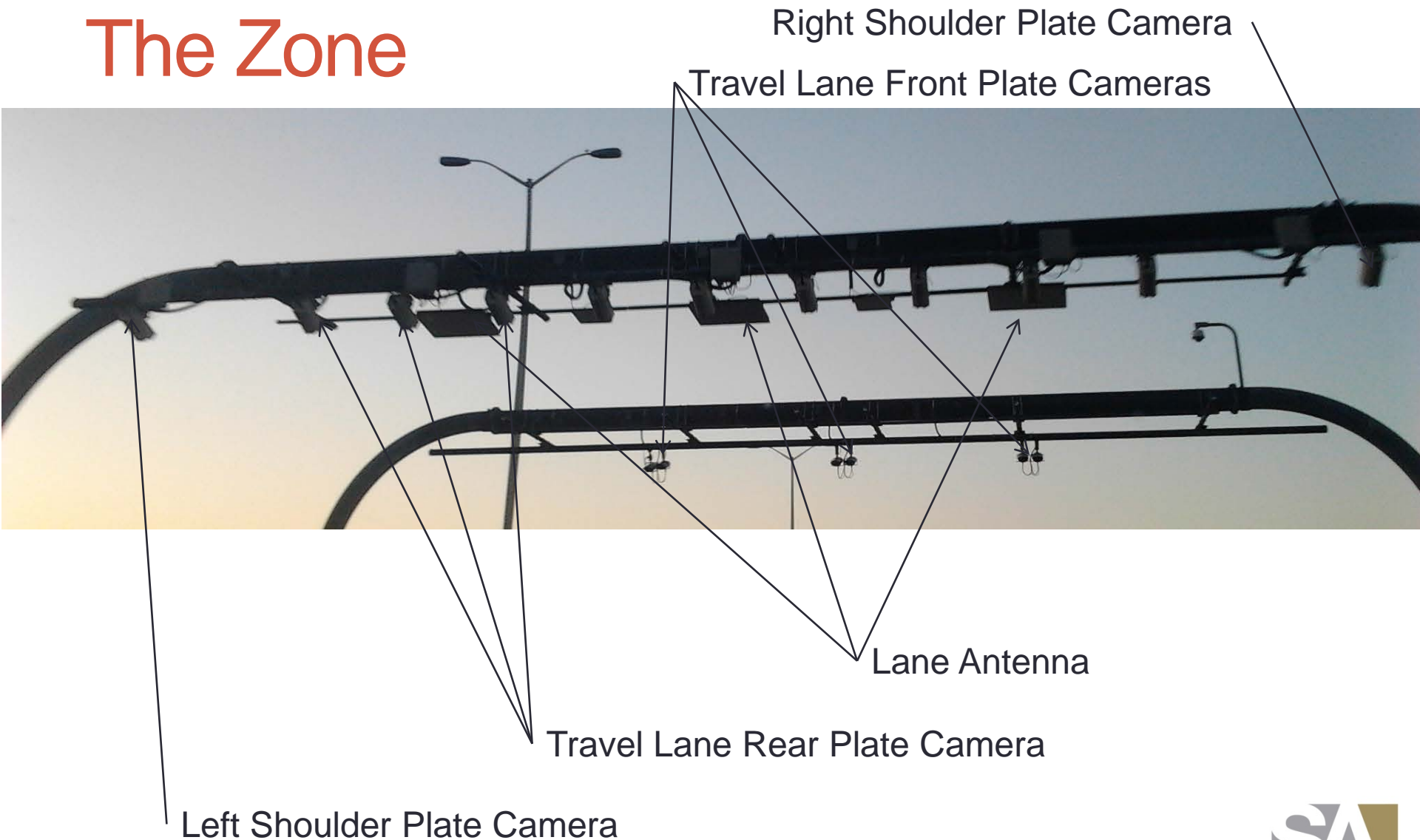
**3 Lane ORT Pavement Level Plan**

# The Zone



## Gantry Level Plans

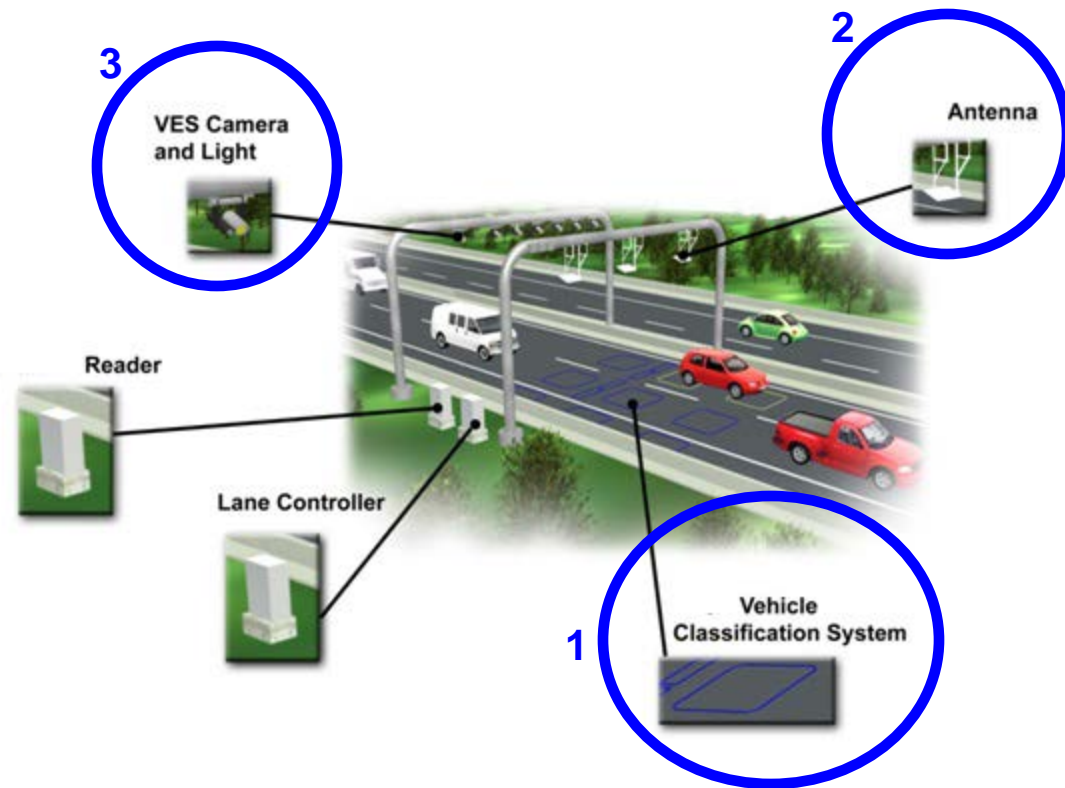
# The Zone



# The Zone

- How it Works  
(Getting the Data)

1. **Pavement Loops** – loops in pavement confirm a vehicle is present and trigger cameras. Loops also determine number of axles and send that data to the lane controller
2. **Antenna** – recognizes transponder and sends data to Reader
3. **Camera and Lights** – ensure license plate images of each vehicle are taken

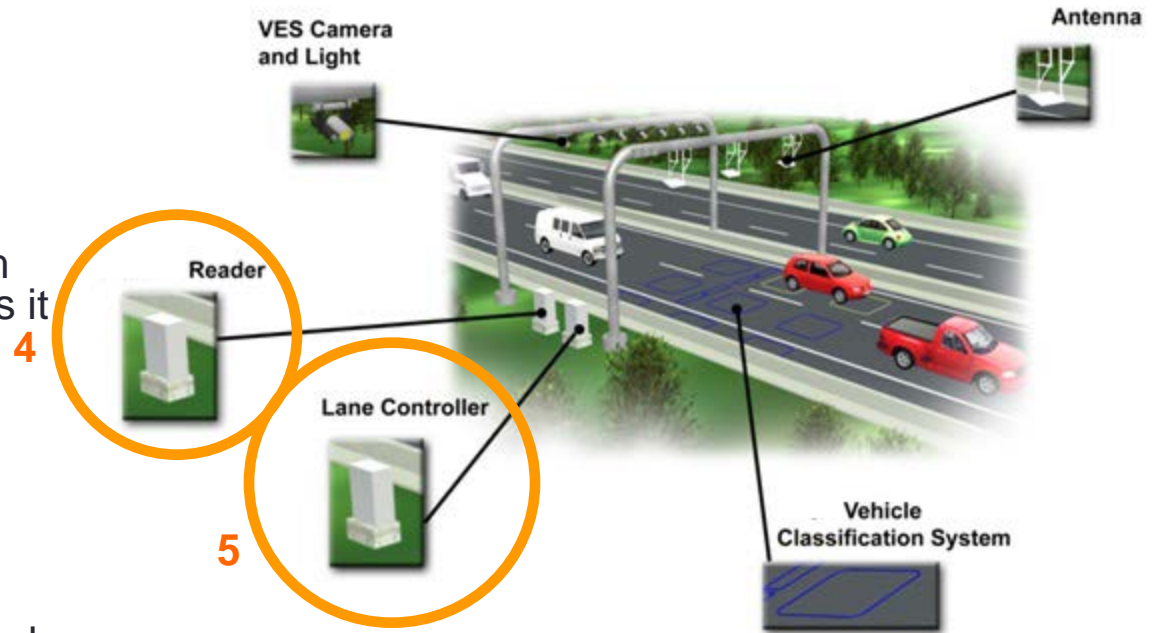


# The Zone

## • How it Works (Utilizing the Data)

4. **Reader** – interprets data from tag/transponder and sends it to the lane controller
- Classification of tag
  - Status of tag
  - Balance on tag

5. **Lane Controller** – “big brain” that collects all the data and makes decisions
- Do you have a transponder?
  - How much should you be charged (axles)?
  - Do you have a toll balance?



**YES** – toll processed and images discarded

**NO** – license plate images / information stored and forwarded for violation processing

# The Unseen

- Communication Network
  - Typically tag/transponder data is stored in database on servers in controlled environment in a secure location
  - Violation processing confirmed off-line at secure site with high computer processing capability
  - High speed network communication network to connect databases with reader and lane controller
- Violation Processing
  - Computer Review
    - Software can read license plate images and generate violation notices
  - Manual Review
    - Software can be fooled by poor license condition or material on plate
    - Manual review required to verify review some images



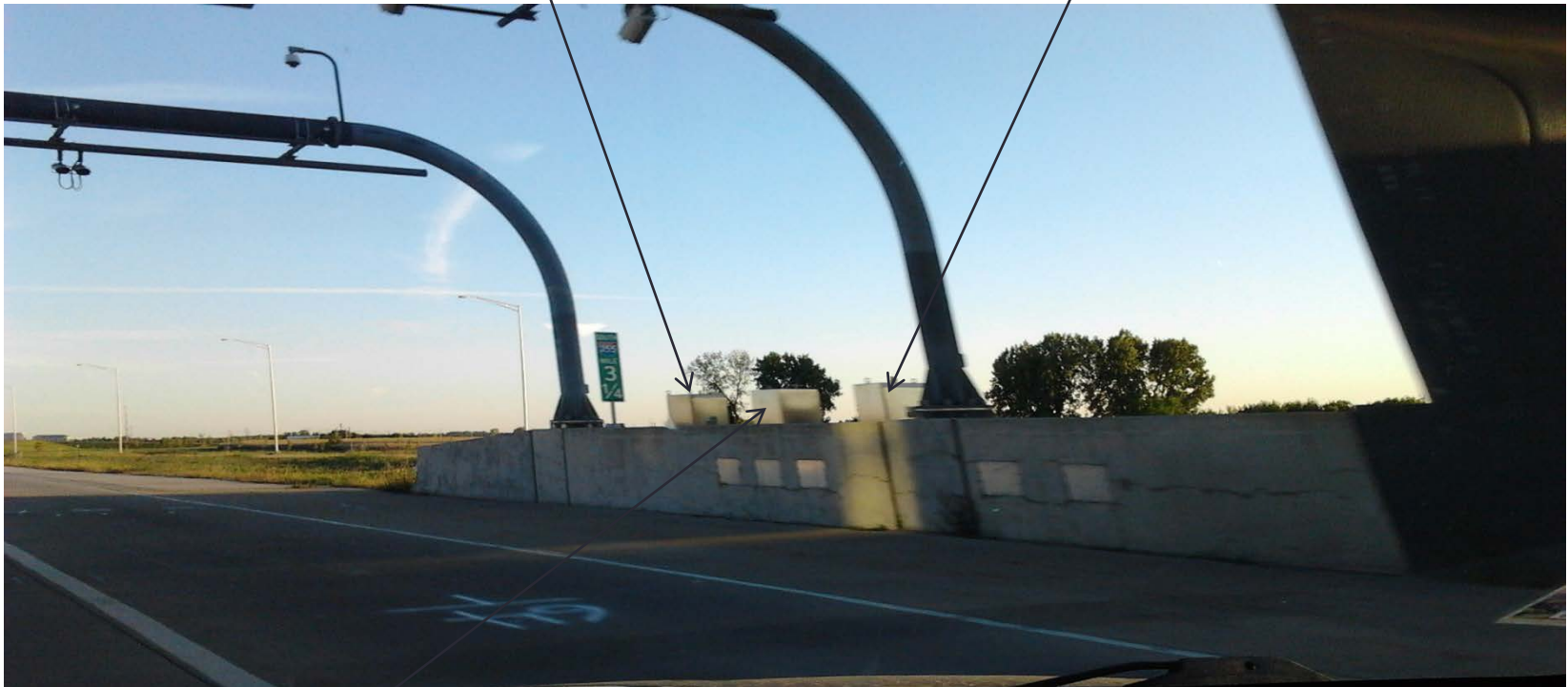
# The Labor

- Equipment Maintenance
  - Equipment is designed for conditions, but is still affected by it and must be maintained
- Transponder Sales and Distribution
  - Someone has to make the transponders available
  - Even for systems that utilize on-line registration, a list of valid transponders needs to be generated
- Customer Support
  - Despite specific instructions, people don't always follow directions with their transponders and will need to talk to someone about how to resolve their problem

# The Labor

Lane Controller Enclosure

Reader Enclosure



Power Enclosure

**Roadside Enclosures at 3 Lane ORT Zone**

# The Labor

- Violation Collection and Interface
  - Automatic violation notice generation works, but some people still don't pay

# Questions?

