

Counting Bicycling and Walking in Oregon

Krista Nordback, Ph.D., P.E.
University of North Carolina at Chapel Hill



Miguel Figliozzi, Ph.D.
Sirisha Kothuri, Ph.D.
Taylor Phillips
Andrew Schrope
Carson Gorecki
Portland State University



Project Purpose

Recommend technologies to increase bicycle and pedestrian count accuracy while integrating bicycle and pedestrian counting with existing ODOT traffic counting.

Bicycle counting technologies:

- Inductive loops
- Pneumatic tubes
- Thermal cameras

Pedestrian counting technologies:

- Passive infrared
- Pedestrian phase actuations

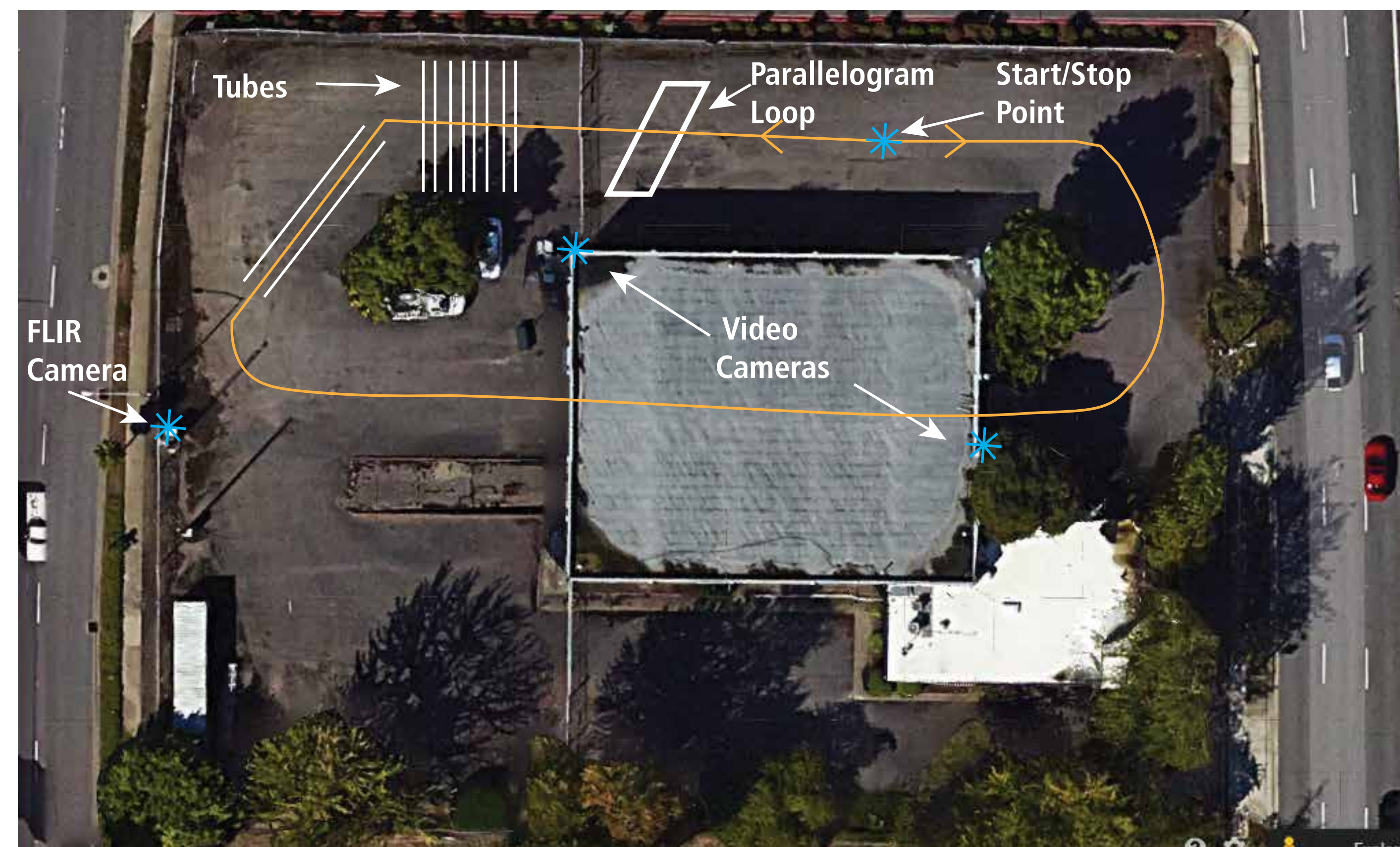
Methods

Ground Truth: Manual counts from video

Error Calculation: Overall Error = $\frac{c-m}{m}$
Mean Percent Error (MPE) = $\frac{1}{h} \sum_{i=1}^h \frac{c_i - m_i}{m_i}$

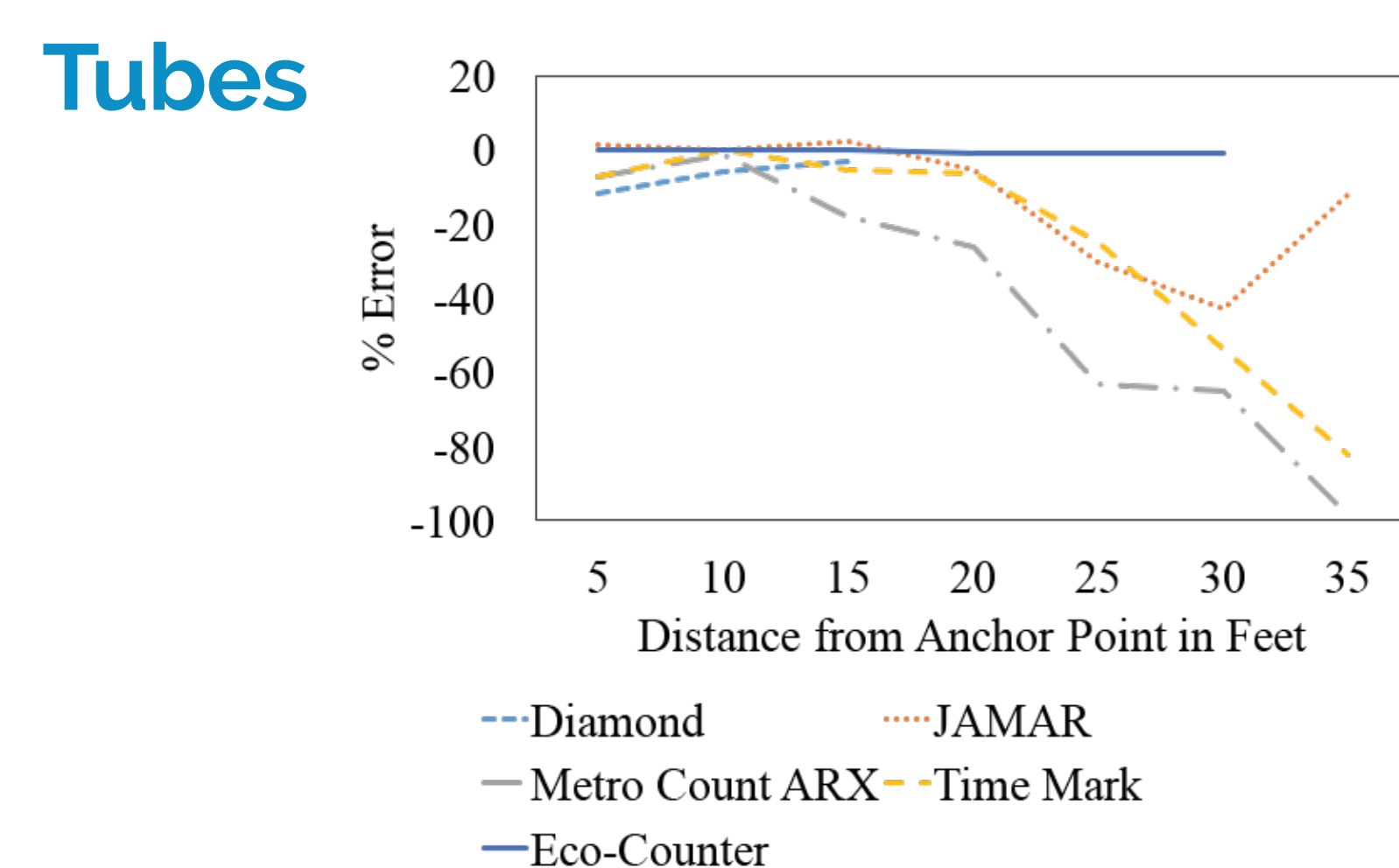
where m = ground truth count for study period
 c = tube count for study period
 h = total number of bins (hours)

Controlled Environment



Parallelogram Loop

EDI card > 50% error in center of loop
Reno A&E 1101B card - Low error in center of loop < 5% error



Thermal Camera

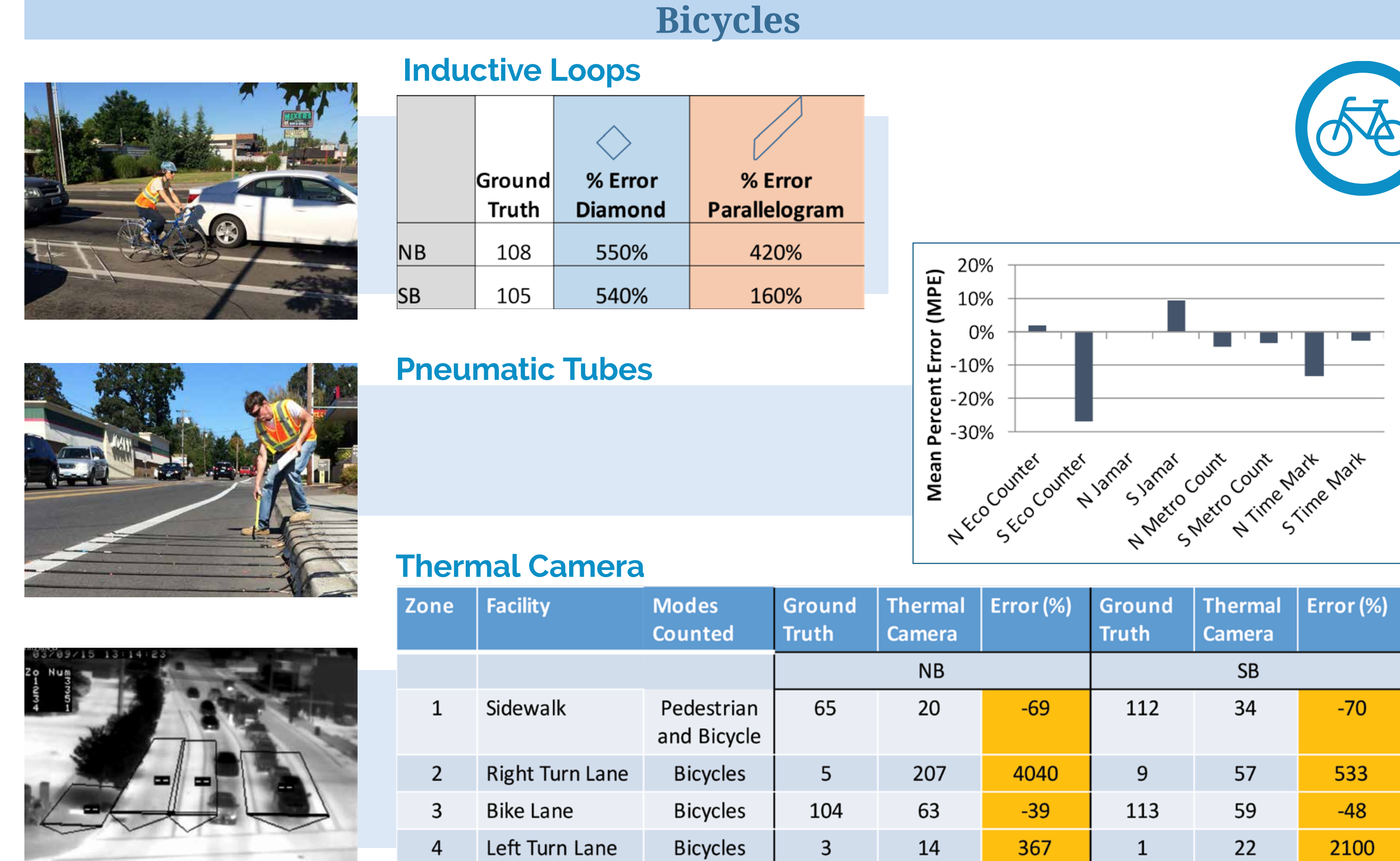
Thermal Camera: < 1% error for standard bikes approaching camera



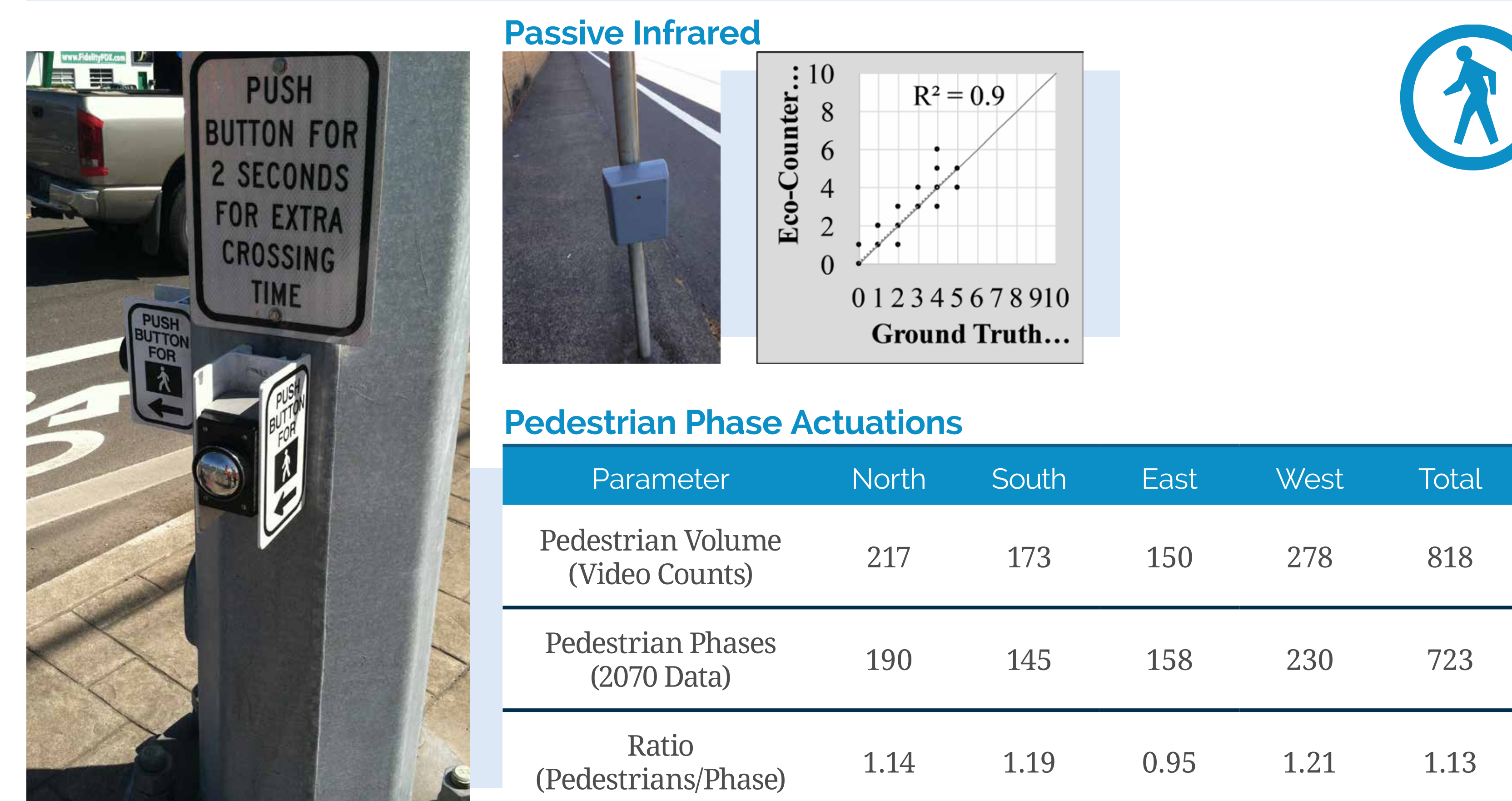
Mixed Traffic Rural Highway



Suburban Intersection



Pedestrians



Recommendations For Short Duration Counts

| Facility | Bicycles | Pedestrian |
|--|--|--|
| Pedestrian Only Facilities (sidewalks, trails) | N/A | Passive infrared (most accurate for low pedestrian traffic sites) |
| Bicycle Only Facilities (cycle tracks, separated bike lanes) | Tubes - all types | N/A |
| Bike-Ped Paths & Sidewalks | Tubes - bike specific and classification | Passive infrared (reference) Combine with tubes to distinguish bicycles. |
| Shoulders and Bike Lanes | Tubes - bike specific and classification | N/A |
| Roadways (mixed traffic) low volume | Tubes - classification counters low volume roads | N/A |
| Roadways (mixed traffic) medium to high volume | Manual counts | N/A |
| Intersections | Manual counts | Pushbutton for pedestrian activity |

Conclusions

All 3 bicycle counting technologies are adequate to count bicycles under controlled, favorable conditions.

In mixed traffic conditions only the pneumatic tubes were able to count bicycles with less than 20% error.

Bicycle counts in mixed traffic conditions with pneumatic tubes are more accurate when bicycle-specific vehicle classification schemes are used and when counting bicycle traffic within 10 foot tube length of the counting device.

Both pedestrians counting technologies - passive infrared and pedestrian phase actuations - were tested and attained satisfactory results.