



BICYCLE COUNTS WITH PNEUMATIC TUBE COUNTERS

Alex Hyde-Wright

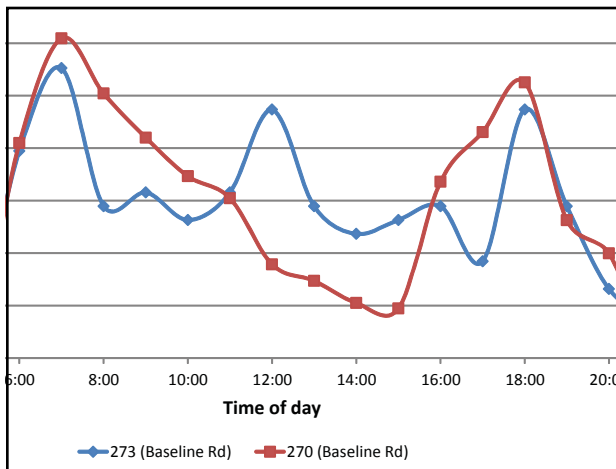




1. Boulder County's research study

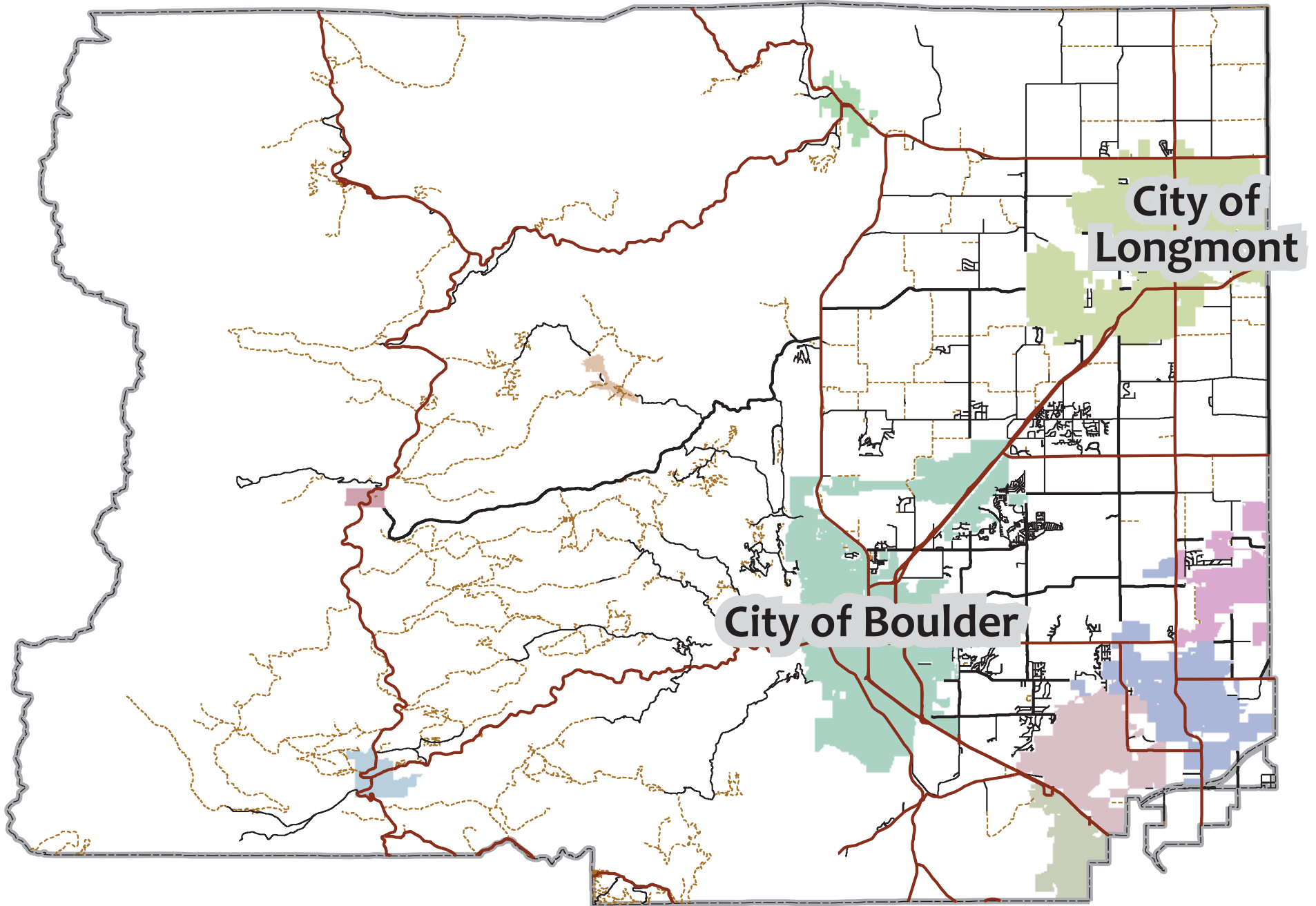


2. How to count bikes



3. Data Possibilities

BOULDER COUNTY



Typical Boulder County Roads

Gravel Roads



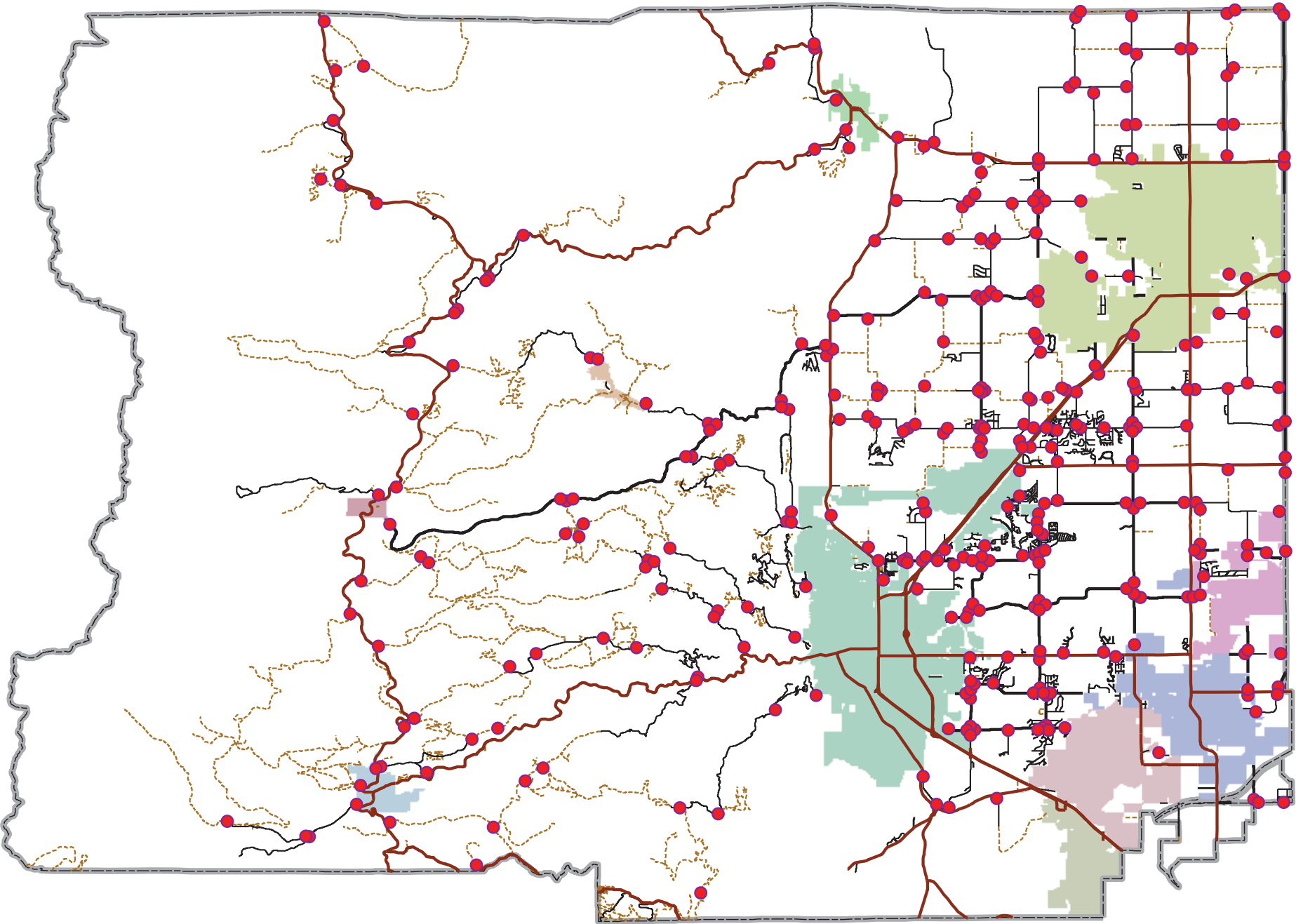
Roads w/out shoulders



Roads with bikeable shoulders



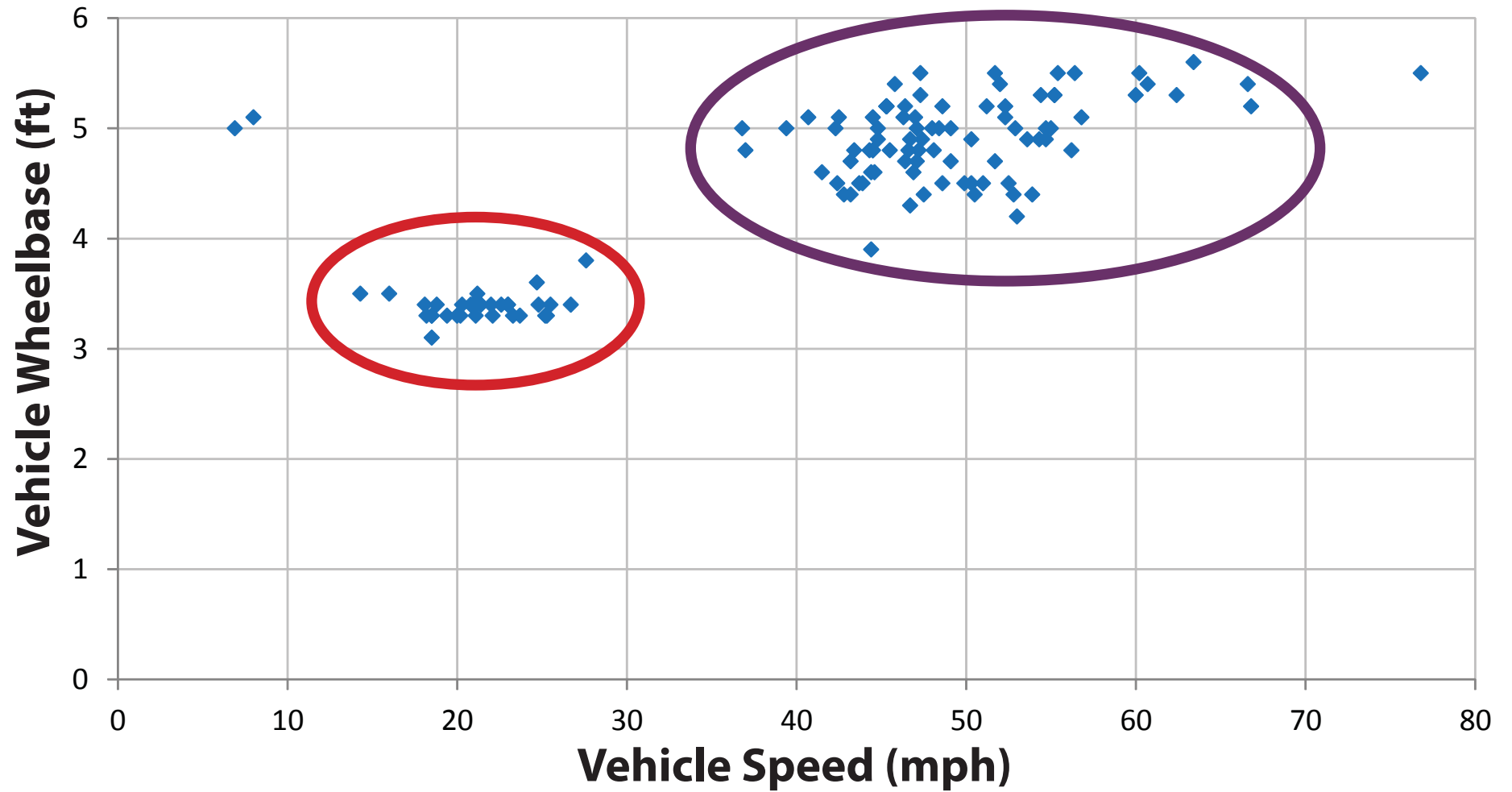
Boulder County Traffic Stations



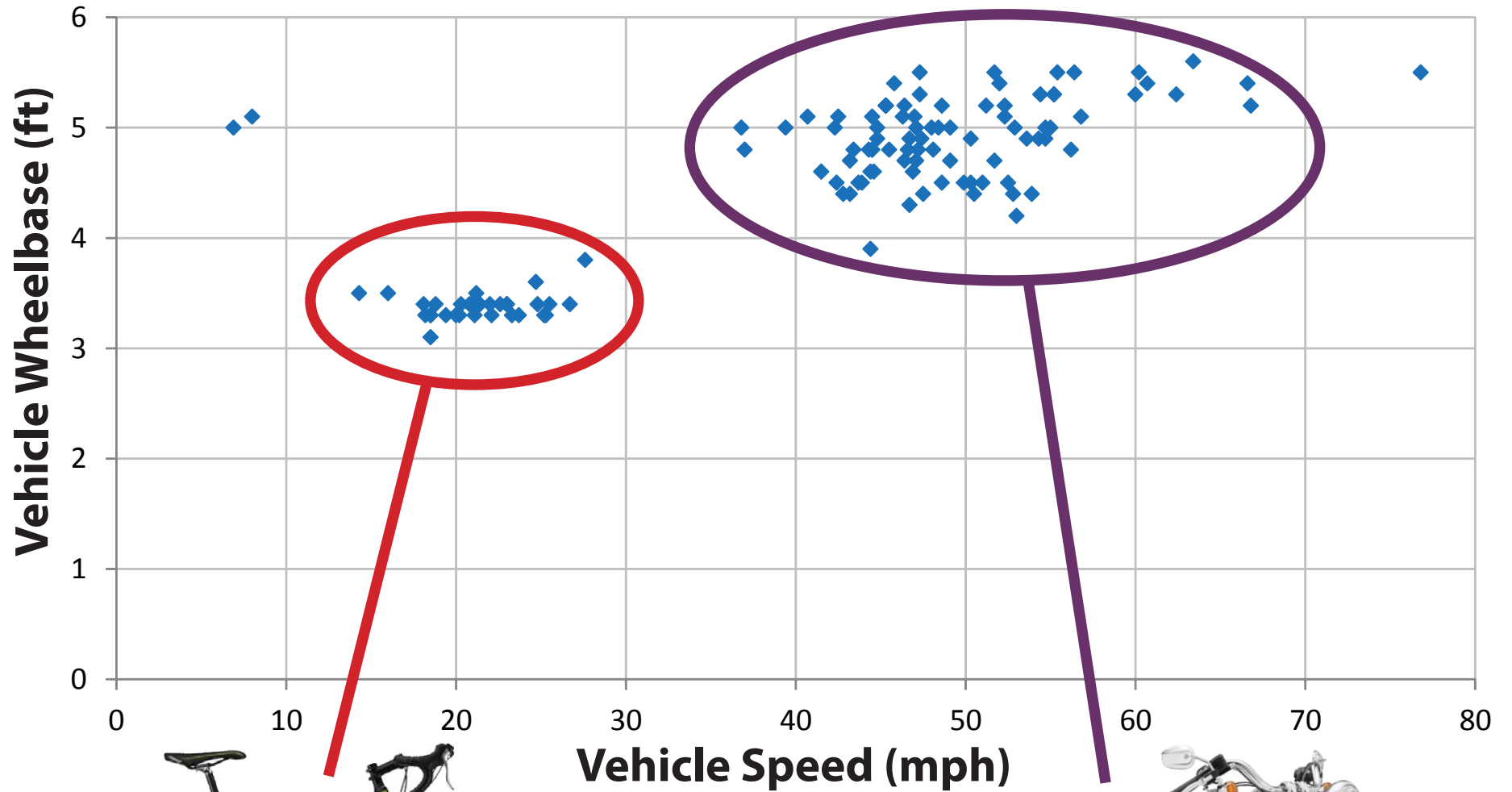
Typical Traffic Station



Speed vs Wheelbase- Motorcycle Class



Speed vs Wheelbase- Motorcycle Class



3-4'



4-6'



Selected for "Beta Test"



beta Test- Attachment Methods and Counters Studied



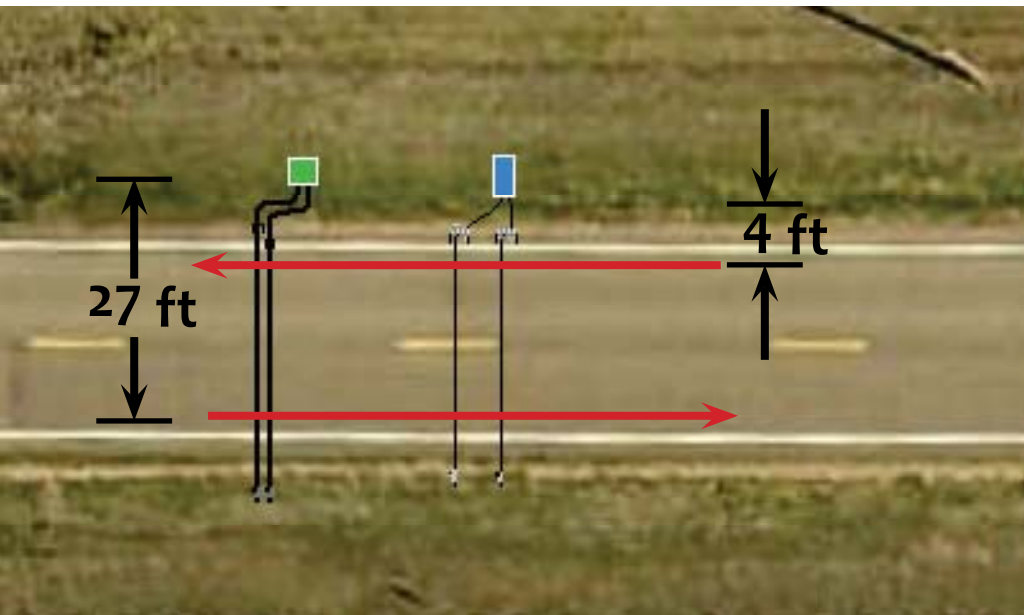
**MetroCount:
clear vinyl
sleeve**



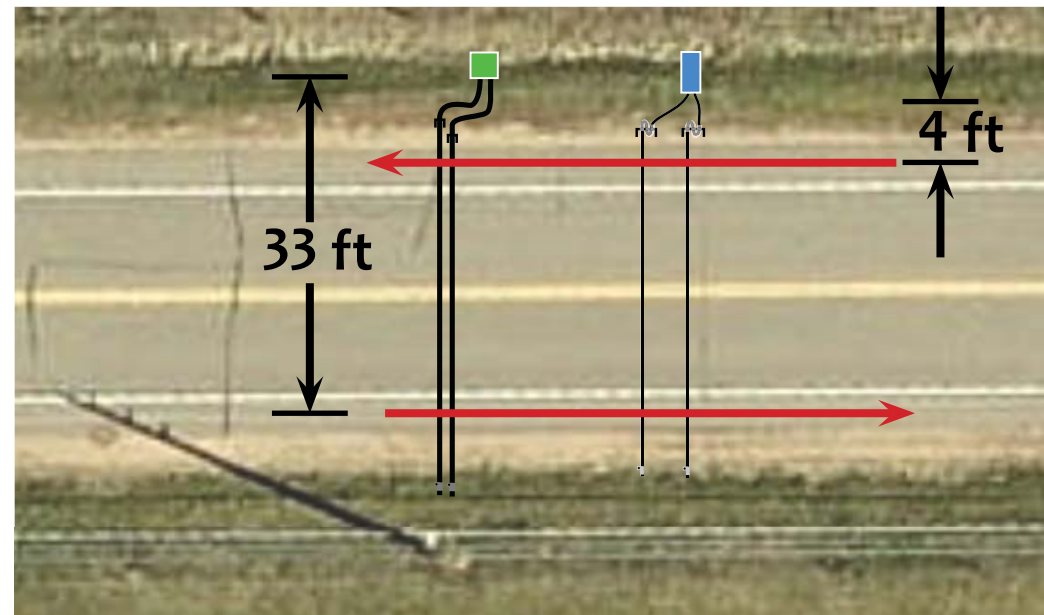
**Eco-Counter:
metal bracket**

Station Set-Ups

Roads without Shoulders



Roads with Shoulders



Three Distance Groups:

- 4' Group
- 27' Group
- 33' Group

Riding in Laps to Increase Quantity of Data



Riding in Laps to Increase Quantity of Data





08/22/2012 11:41



ARX Cycle Vehicle Classes



1: Cycle

(Bicycle)



2: MC

(Motorcycle)



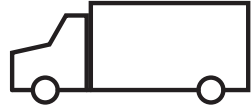
3: SV

(Passenger Car)



4: SVT

(Car with Trailer)



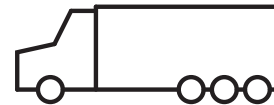
5: TB2

(Rigid-body 2 Axle Truck)



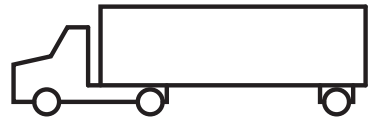
6: TB3

(Rigid-body 3 Axle Truck)



7: T4

(Rigid-body 4 Axle Truck)



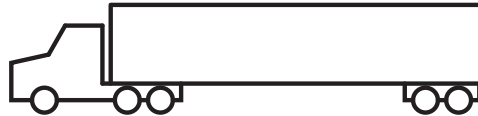
8: ART3

(3 Axle Articulated Truck)



9: ART4

(4 Axle Articulated Truck)



10: ART5

(5 Axle Articulated Truck)



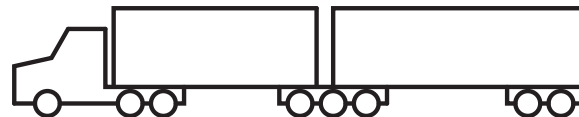
11: ART6

(6 Axle Articulated Truck)



12: BD

(B-Double)



13: DRT

(Double/ Road Train)

Class Bin Report

Count Sheet

Class	Name	Description	Count
1	CYCLE	Bicycle	59
2	MC	Motorcycle	2
3	SV	Car	99
4	SVT	Car + trailer	1
5	TB2	2 Axle Rigid Body Truck	16
6	TB3	3 Axle Rigid Body Truck	0
7	T4	4 Axle Rigid Body Truck	18
8	ART3	3 Axle Articulated	3
9	ART4	4 Axle Articulated	5
10	ART5	5 Axle Articulated	0
11	ART6	6 Axle Articulated	0
12	BD	B-Double	0
13	DRT	Double/ Road Train	0

Location: Station 144
Niwot Rd, W of N 73rd

Date: 6/29/12

Time Range	9:15-9:30	9:30-9:45	9:45-10:00	10:00-10:15	Total Count
Bikes	 	 	 	 	101
4 Axle Rigid Body Truck			1		1
3 Axle Artic. Truck		1			3
4 Axle Artic. Truck	1		1	1	5

AB Tube is EB

Class Bin Report

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AB Tube is EB



Individual Vehicle Report for T4 Trucks

<u>Speed</u>	<u>Wb</u>	<u>Ax</u>	<u>Cl</u>	<u>Vehicle</u>		
15.5	44.6	4	7	T4 00		00
15.0	39.6	4	7	T4 00		00
14.6	42.7	4	7	T4 00		00
15.1	44.0	4	7	T4 00		00
14.3	28.4	4	7	T4 00	00	
14.0	30.9	4	7	T4 00	00	
15.5	43.7	4	7	T4 00		00
42.2	23.8	5	7	T4 0 000		
14.3	26.1	4	7	T4 00	00	
15.3	34.7	4	7	T4 00		00

Individual Vehicle Report for T4 Trucks

<u>Speed</u>	<u>Wb</u>	<u>Ax</u>	<u>Cl</u>	<u>Vehicle</u>
15.5	44.6	4	7	T4 00

←————→ 00

















Individual Vehicle Report for T4 Trucks

<u>Speed</u>	<u>Wb</u>	<u>Ax</u>	<u>Cl</u>	<u>Vehicle</u>
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Individual Vehicle Report for T4 Trucks

Speed	Wb	Ax	Cl	Vehicle
15.5	44.6	4	7	T4  
15.0	39.6	4	7	T4  
14.6	42.7	4	7	T4  
15.1	44.0	4	7	T4  
14.3	28.4	4	7	T4  
14.0	30.9	4	7	T4  
15.5	43.7	4	7	T4  



Bicycle Combinations



Bicycle Combinations

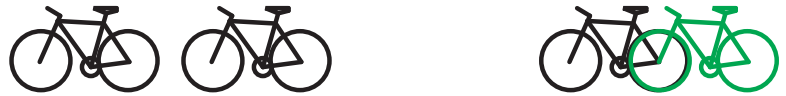


Bicycle Combinations



Bicycle Combinations





ARX Cycle Vehicle Classes



1: Cycle

(Bicycle)



2: MC

(Motorcycle)



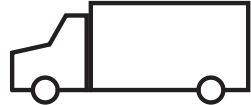
3: SV

(Passenger Car)



4: SVT

(Car with Trailer)



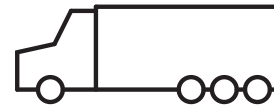
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(Rigid-body 2 Axle Truck)



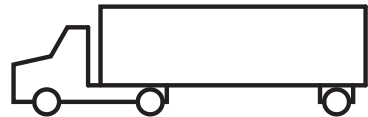
6: TB3

(Rigid-body 3 Axle Truck)



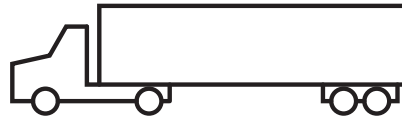
7: T4

(Rigid-body 4 Axle Truck)



8: ART3

(3 Axle Articulated Truck)



9: ART4

(4 Axle Articulated Truck)



10: ART5

(5 Axle Articulated Truck)



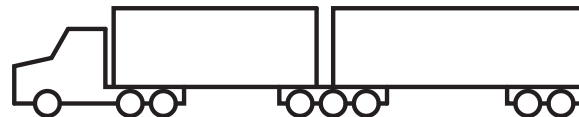
11: ART6

(6 Axle Articulated Truck)



12: BD

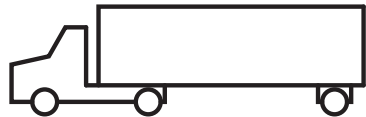
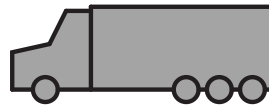
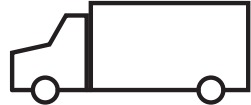
(B-Double)



13: DRT

(Double/ Road Train)

ARX Cycle Vehicle Classes

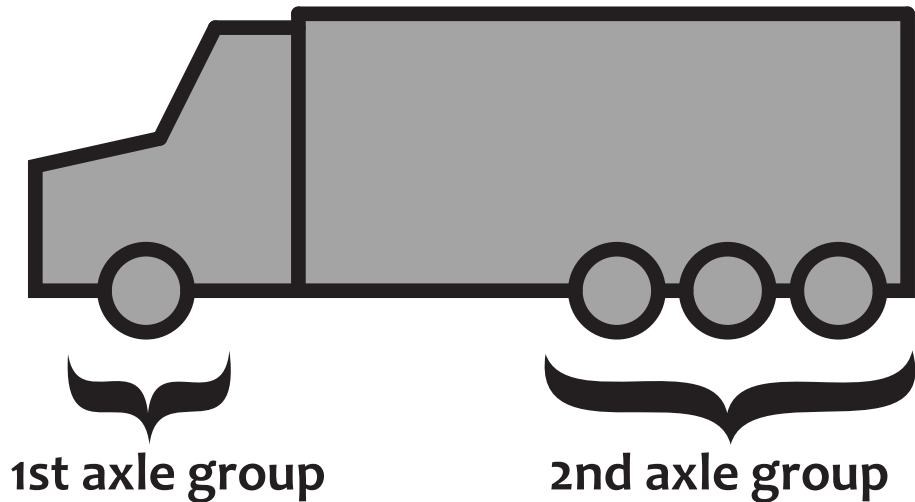


Let's look at
the T4 Class.



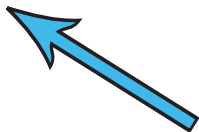
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2: MC	(Motorcycle)
3: SV	(Passenger Car)
4: SVT	(Car with Trailer)
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T4 Class (Rigid-body 4 Axle Trucks)



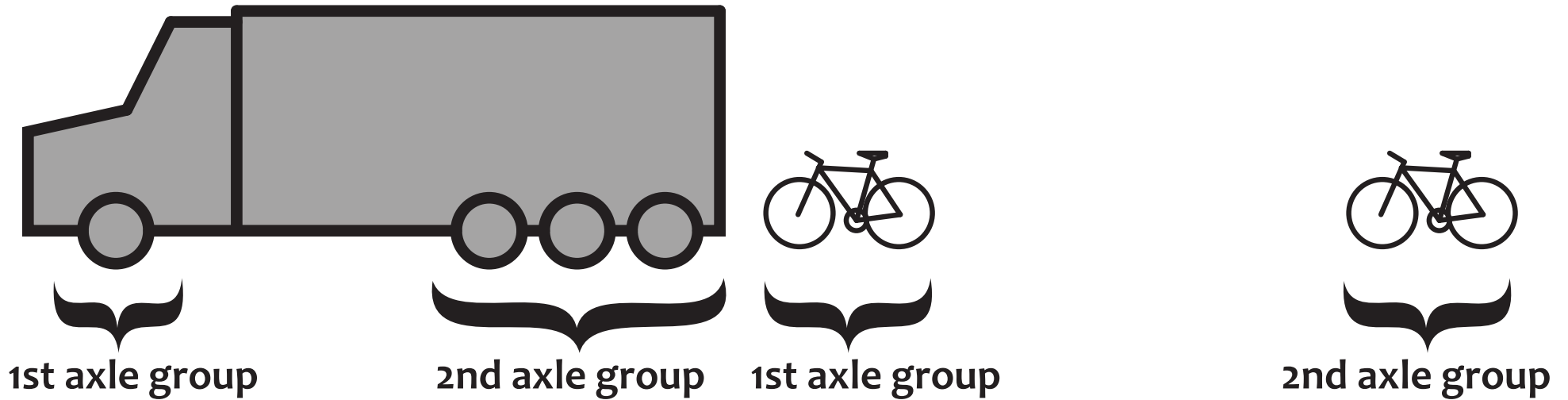
ARX Cycle Rules for T4:

4 or more axles
2 axle groups



Axles are in the same axle group if they are less than 5.4 ft apart from their neighbor

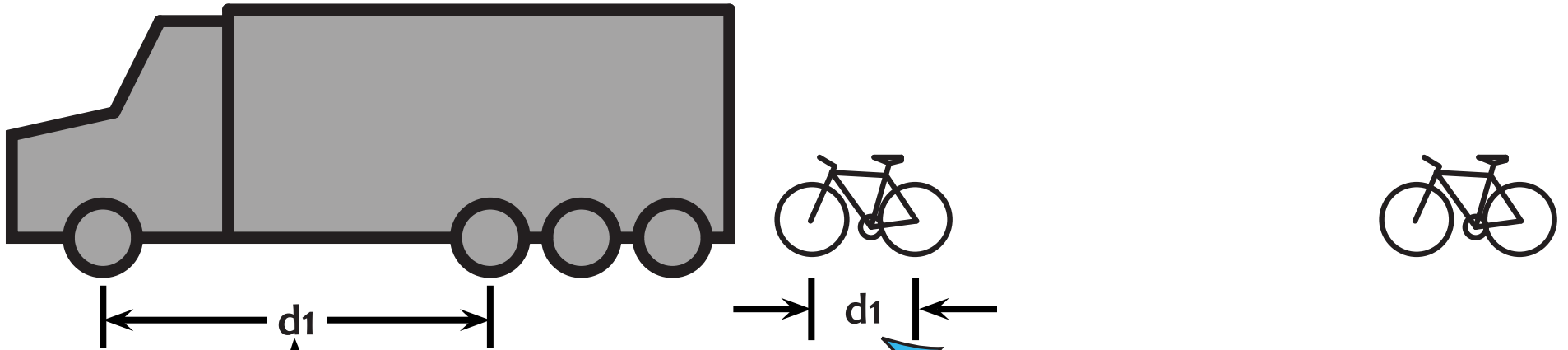
Looking at the T4 Class



ARX Cycle Rules for T4:

4 or more axles
2 axle groups

Editing the T4 Class



ARX Cycle Rules for T4:

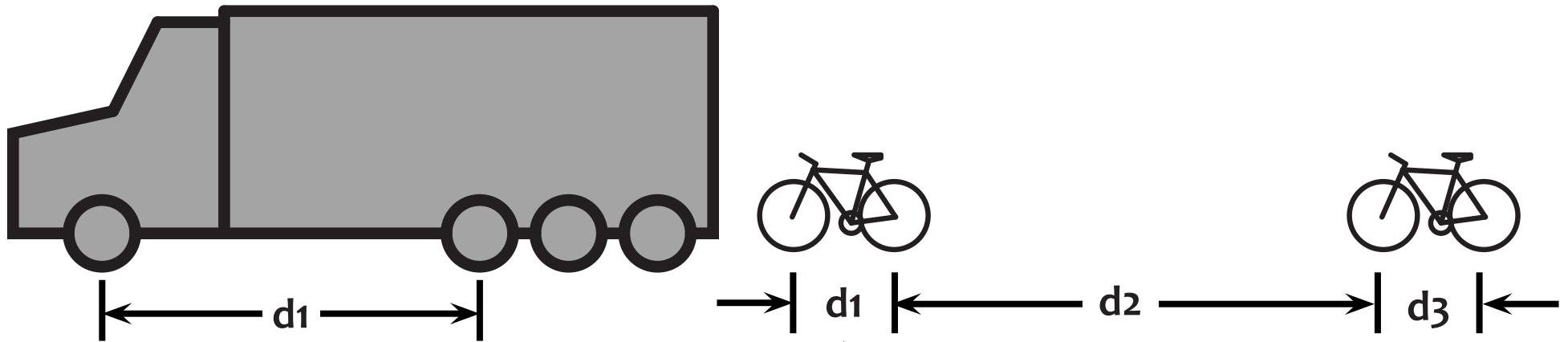
4 or more axles
2 axle groups

BOCO Rules for T4:

4 or more axles
2 axle groups
d1 > 4 ft

d1 for a bike almost never exceeds 4 ft.

Editing the T4 Class



ARX Cycle Rules for T4:

4 or more axles
2 axle groups

BOCO Rules for T4:

4 or more axles
2 axle groups
 $d_1 > 4 \text{ ft}$

BOCO Rules for 2Bikes:

4 axles
2 axle groups
 $2.9 \text{ ft} < d_1 < 4 \text{ ft}$
 $2.9 \text{ ft} < d_3 < 4 \text{ ft}$

4 or more axles & 2 axle groups



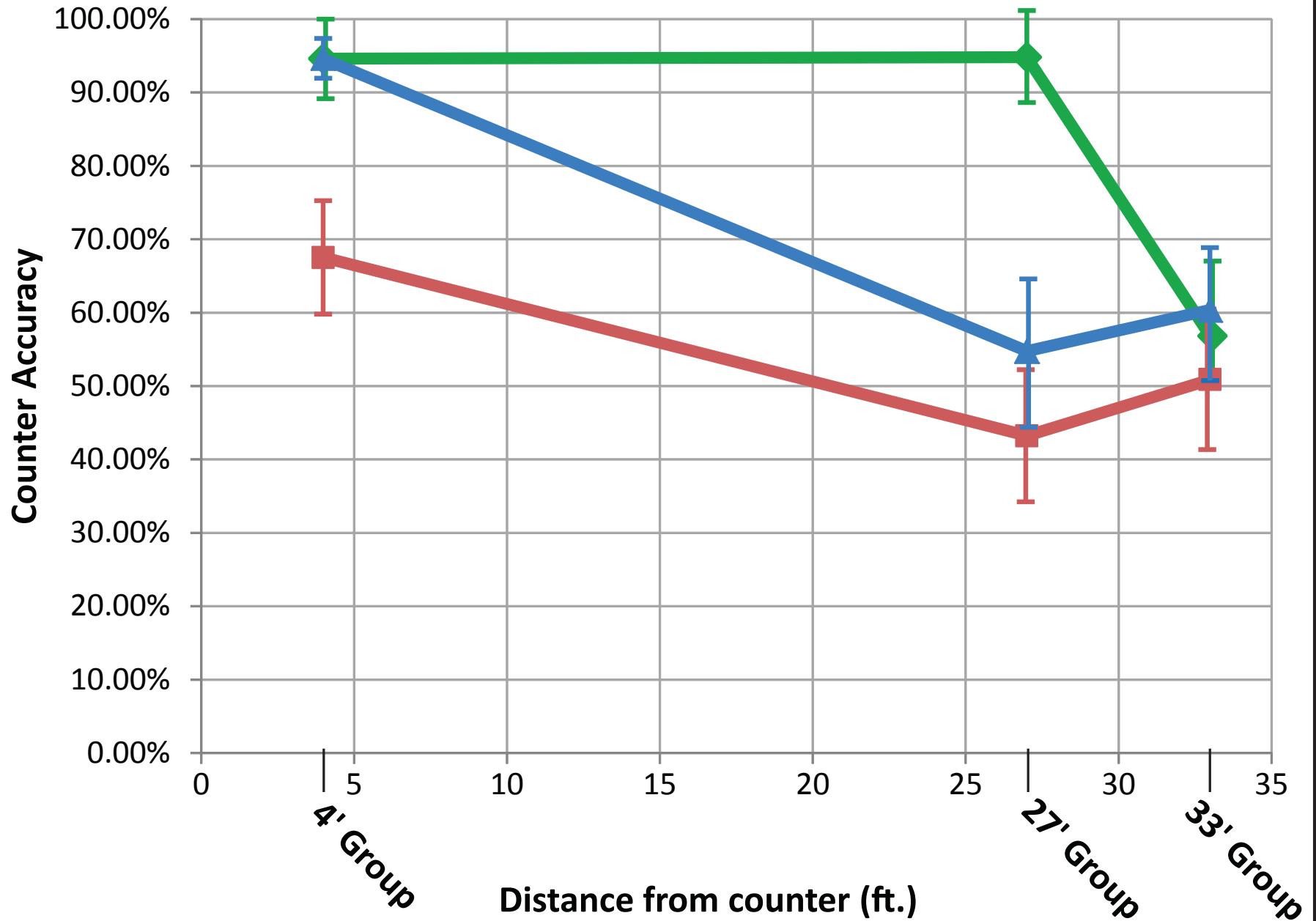
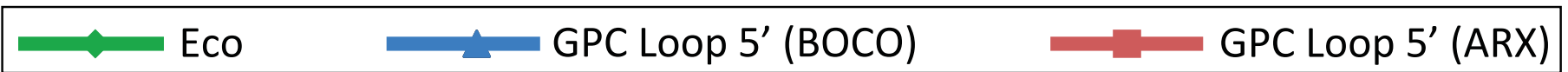
ARX Cycle Vehicle Classes

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10: ART5	(5 Axle Articulated Truck)
11: ART6	(6 Axle Articulated Truck)
12: BD	(B-Double)
13: DRT	(Double/ Road Train)

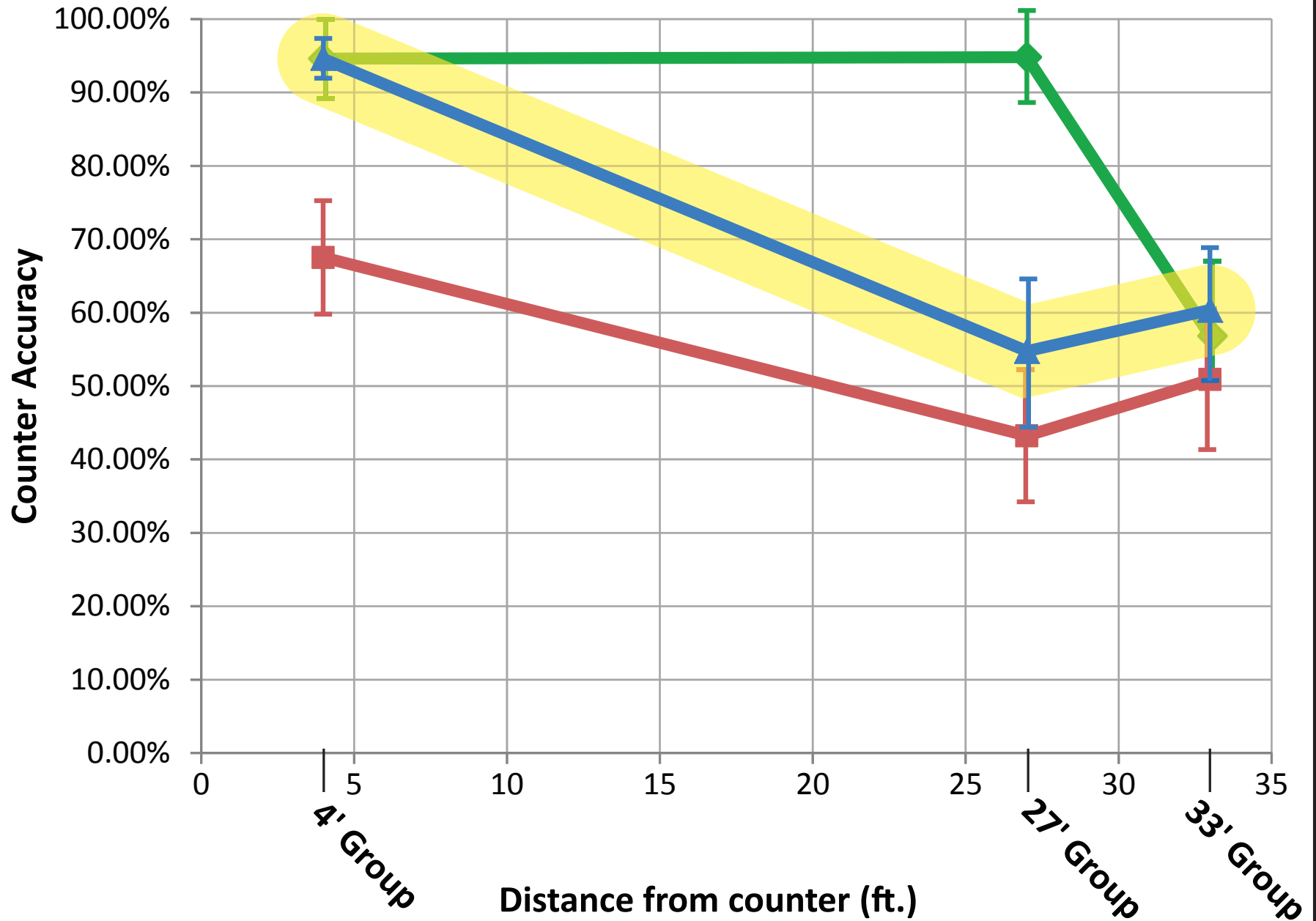
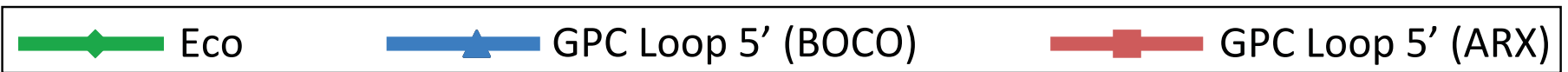
BOCO Vehicle Classes

1: 1Bike	(1 Bicycle)
2: 2Bikes	(2 Bicycles)
3: 3Bikes	(3 Bicycles)
4: 4Bikes	(4 Bicycles)
5: MC	(Motorcycle)
6: SV	(Passenger Car)
7: SVT	(Car with Trailer)
8: TB2	(Rigid-body 2 Axle Truck)
9: TB3	(Rigid-body 3 Axle Truck)
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15: BD	(B-Double)
16: DRT	(Double/ Road Train)

Counter Accuracy vs. Distance from Counter

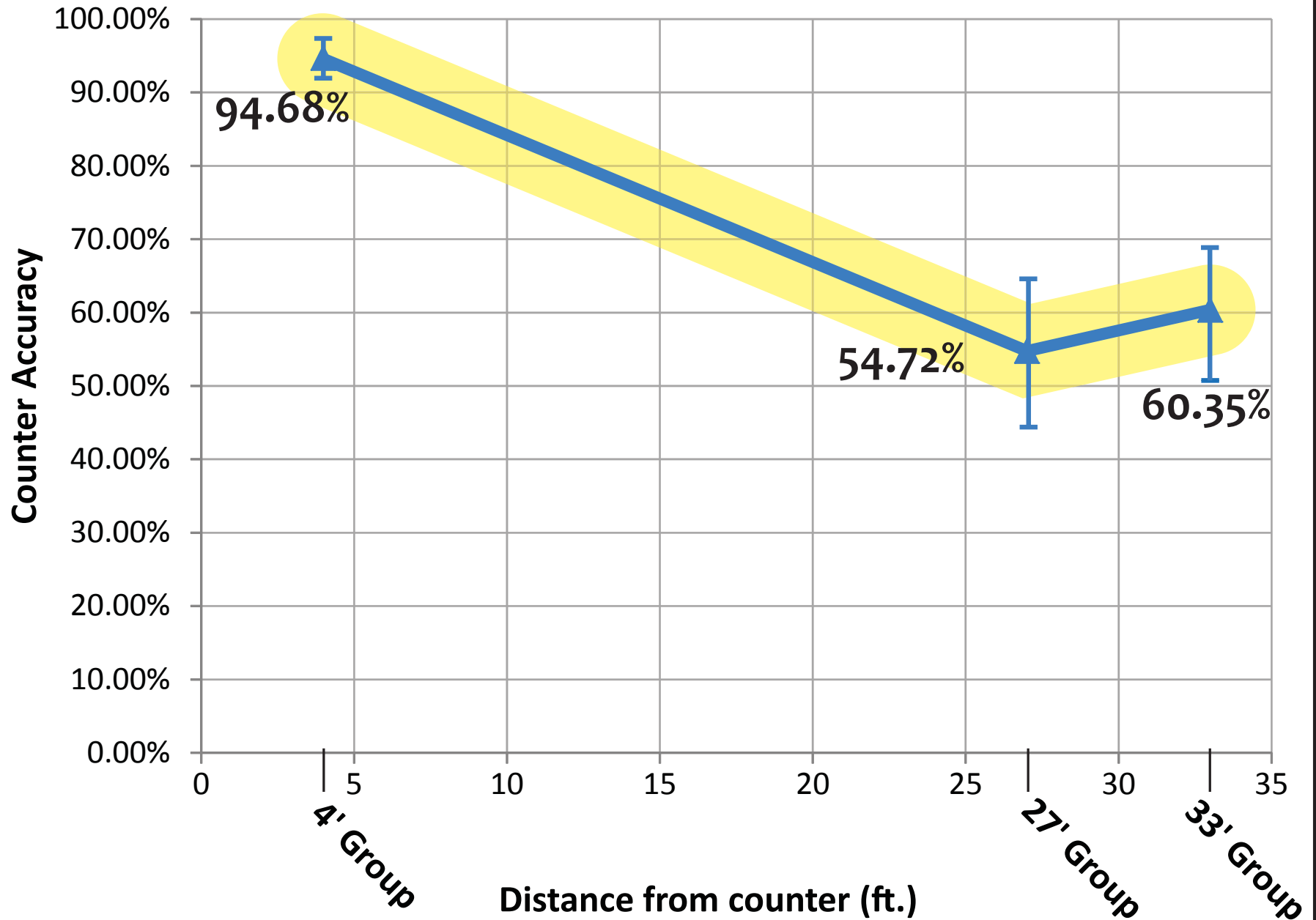


Counter Accuracy vs. Distance from Counter



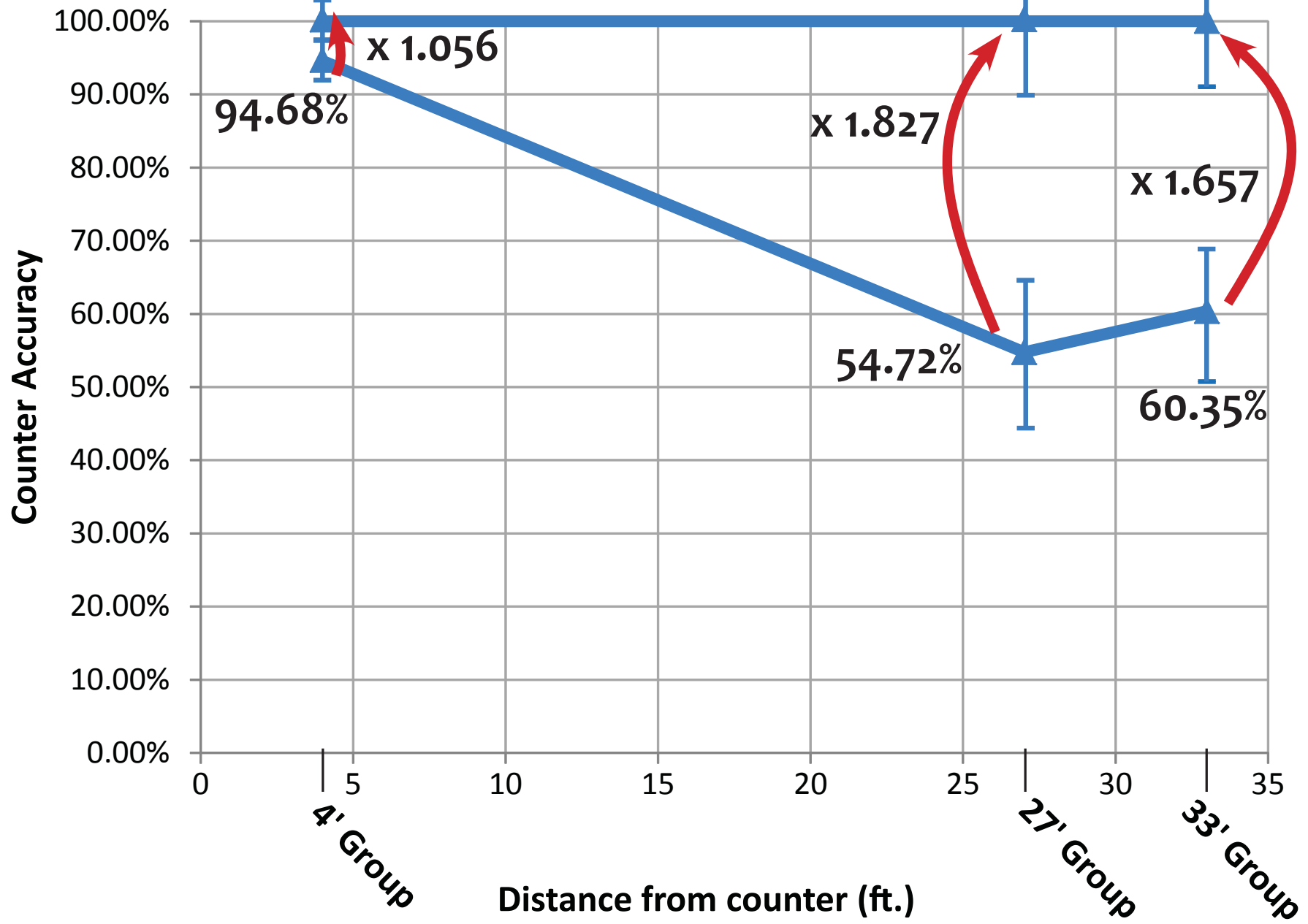
Counter Accuracy vs. Distance from Counter

GPC Loop 5' (BOCO)



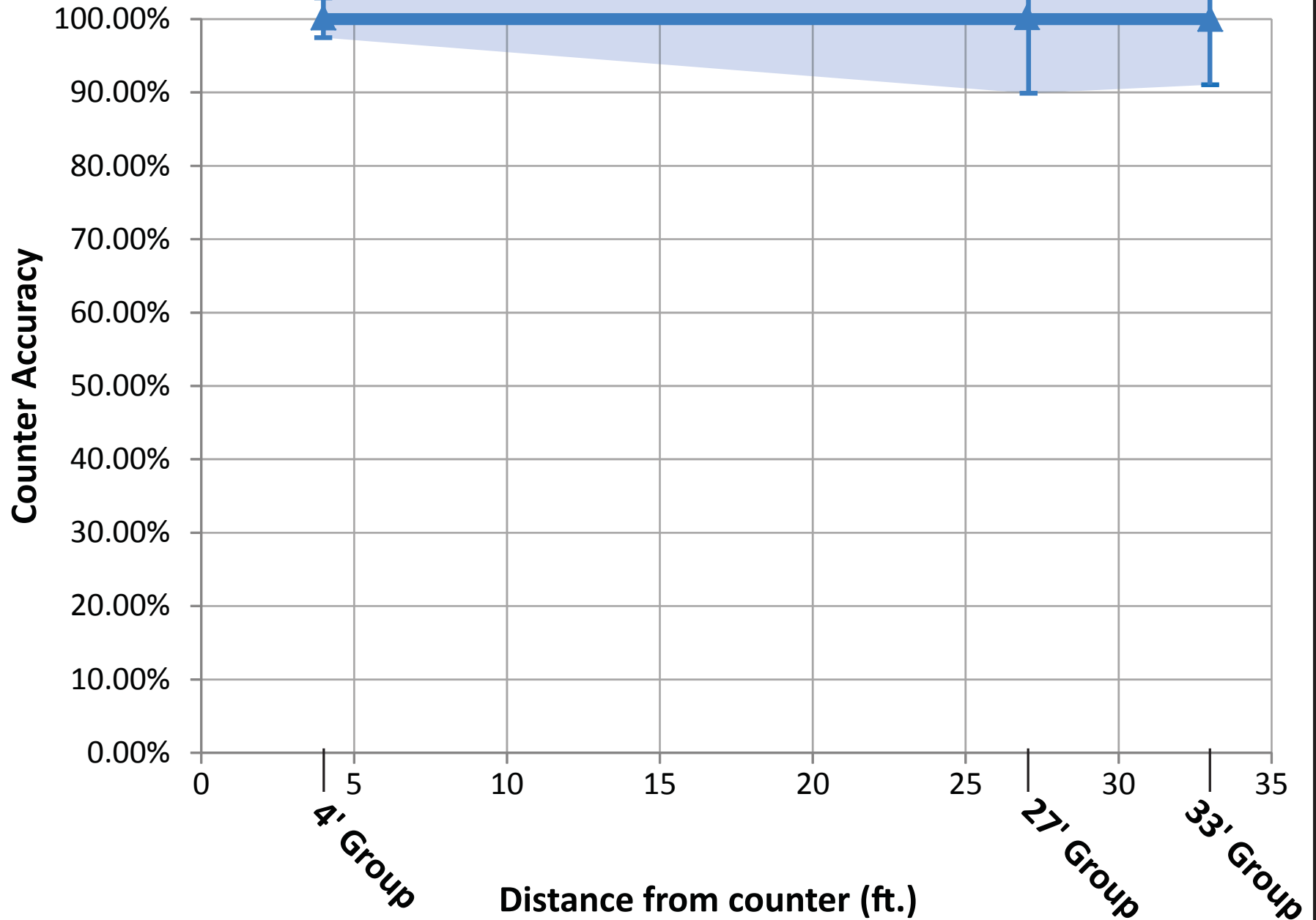
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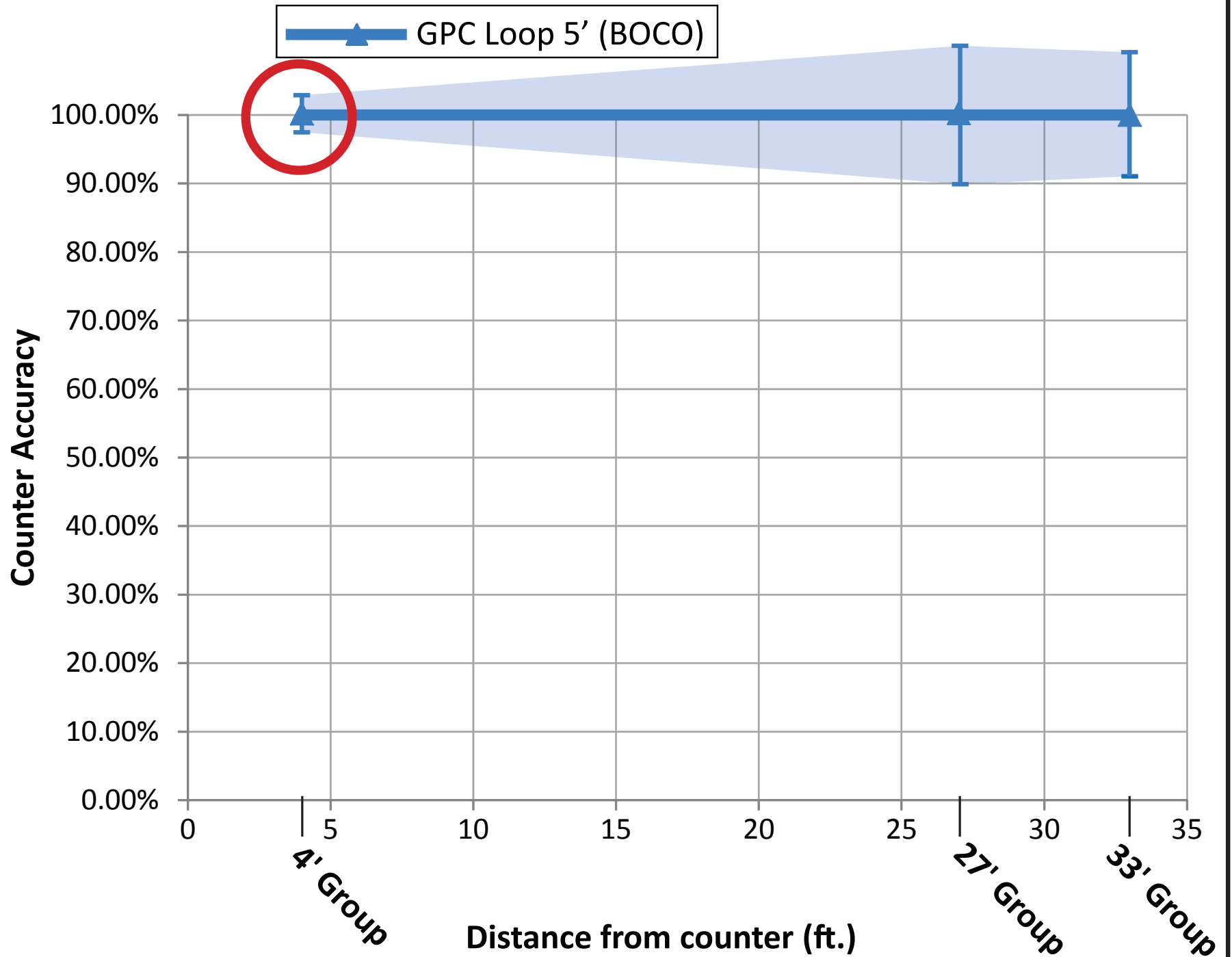


Counter Accuracy vs. Distance from Counter

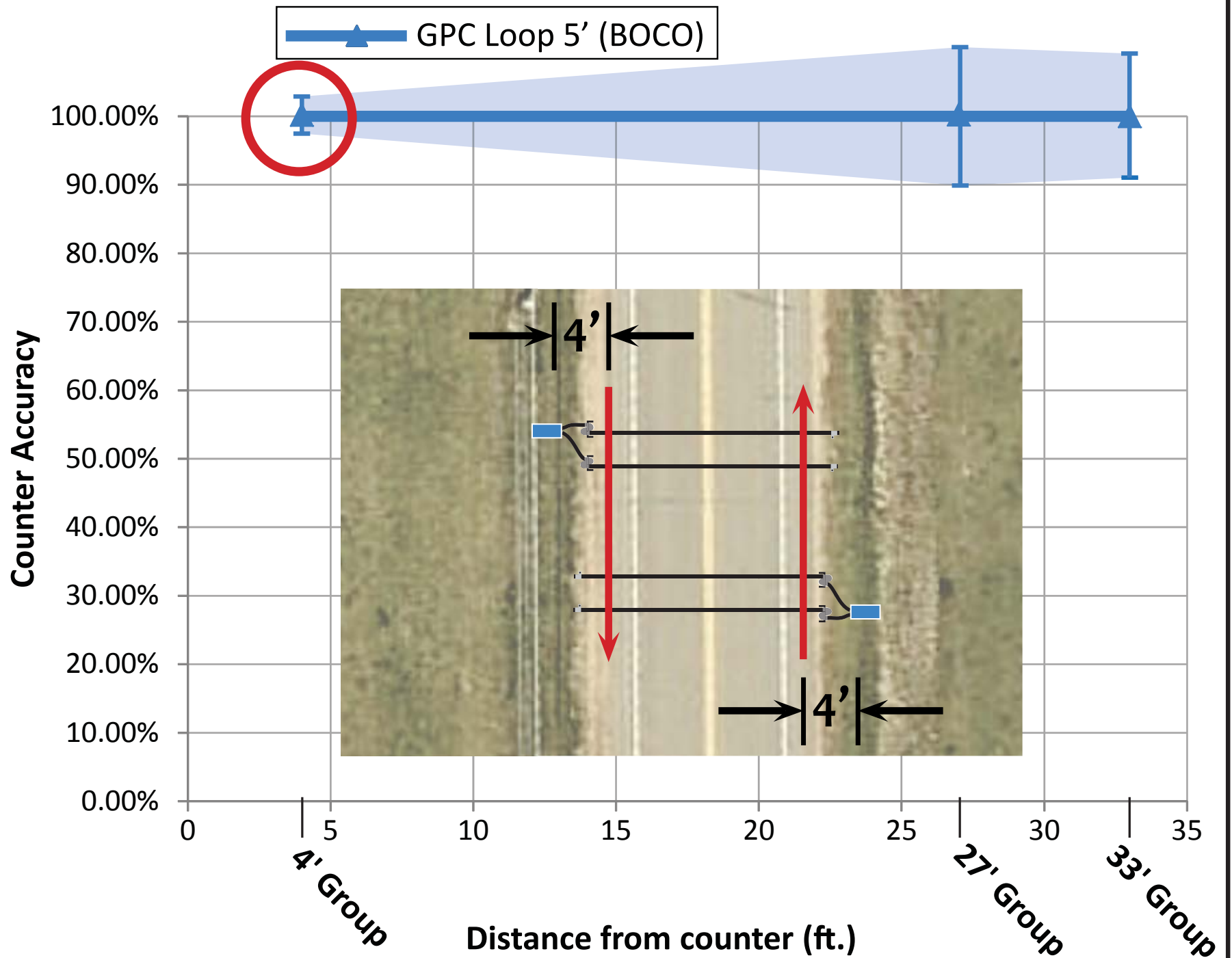
GPC Loop 5' (BOCO)



Counter Accuracy vs. Distance from Counter



Counter Accuracy vs. Distance from Counter



Ingredients for Success

1. Thinner walled “bicycle” tubes; they still count cars just as well



Ingredients for Success

1. Thinner walled “bicycle” tubes; they still count cars just as well
2. A secure tube attachment method that avoids pinching or kinking



Ingredients for Success

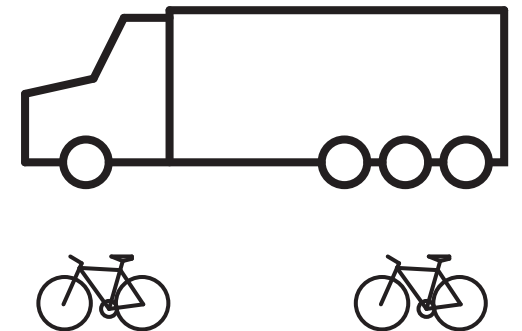
1. Thinner walled “bicycle” tubes; they still count cars just as well



2. A secure tube attachment method that avoids pinching or kinking



3. A copy of our “BOCO Classification Scheme” to use with your traffic analysis software





Capital Costs



**converting
existing program
(per counter)**

Tubes\$51
+ Brackets \$50
+ Sleeves \$4
+ Other hardware\$10
<hr/>	
= Subtotal \$115

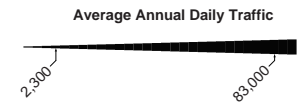
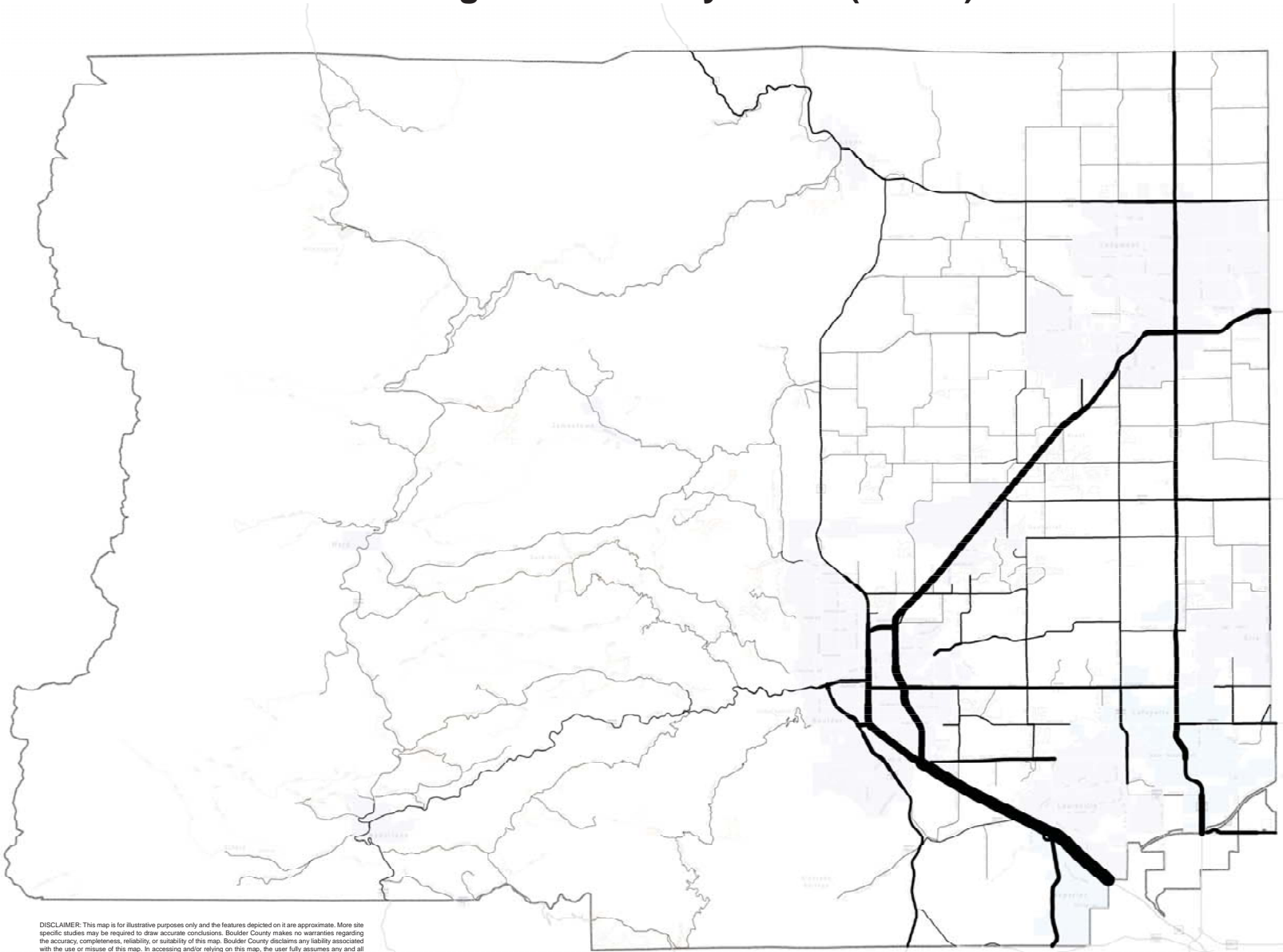
**new program
from scratch
(per counter)**

+ Counter \$1,145
<hr/>	
= Total \$1,260

MOTOR VEHICLE TRAFFIC VOLUME MAP 2011

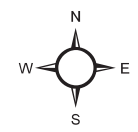
Current as of Jan. 1, 2012
BOULDER COUNTY, CO

Average Annual Daily Traffic (24 hrs)

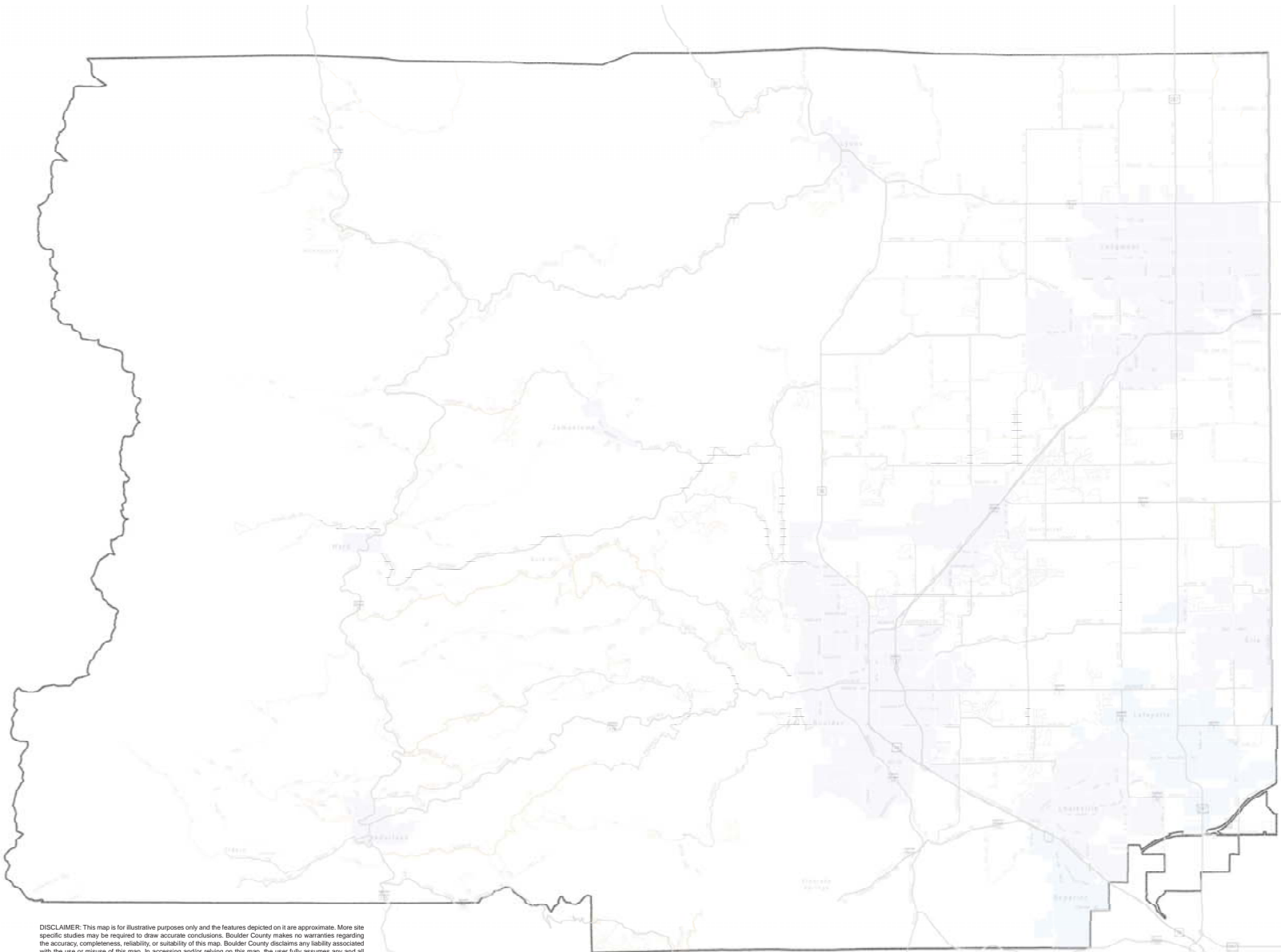
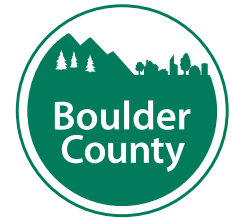


- Roads**
- State or Federal
 - Principal Arterial
 - Minor Arterial
 - Collector
 - Residential Collector
 - Local
 - Local Secondary
 - Jeep
 - Municipal

- Other Features**
- MUNICIPALITIES
 - FEDERAL LANDS
 - TRAFFIC STATIONS



DISCLAIMER: This map is for illustrative purposes only and the features depicted on it are approximate. More site specific studies may be required to draw accurate conclusions. Boulder County makes no warranties regarding the accuracy, completeness, reliability, or suitability of this map. Boulder County disclaims any liability associated with the use or misuse of this map. In accessing and/or relying on this map, the user fully assumes any and all

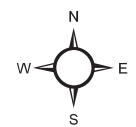


Roads

- State or Federal
- Principal Arterial
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BICYCLE TRAFFIC VOLUME MAP 2013

Current as of Jan. 1, 2014
BOULDER COUNTY, CO

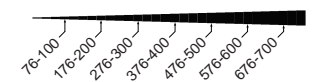
Average Annual Weekday Bicyclists (24 hrs)



YEAR OF COUNT*

2013 →

Average Annual Weekday Bicycle Traffic



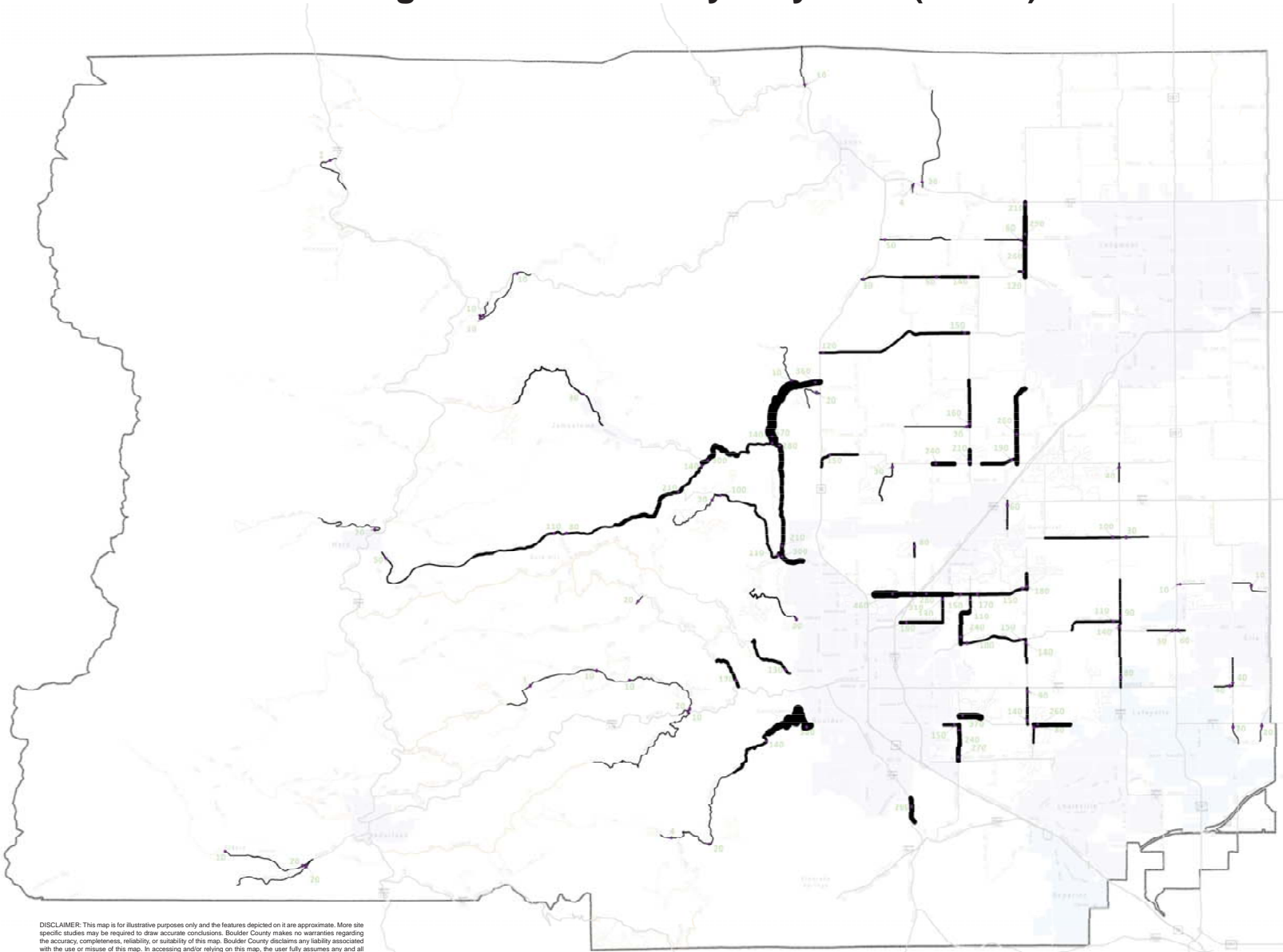
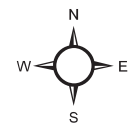
*2013 was the first year Boulder County conducted bicycle counts; additional stations will be shown in future years as more locations are counted.

Roads

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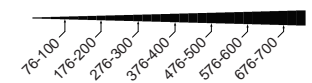
Average Annual Weekend Bicyclists (24 hrs)



YEAR OF COUNT*

2013 →

Average Annual Weekday Bicycle Traffic



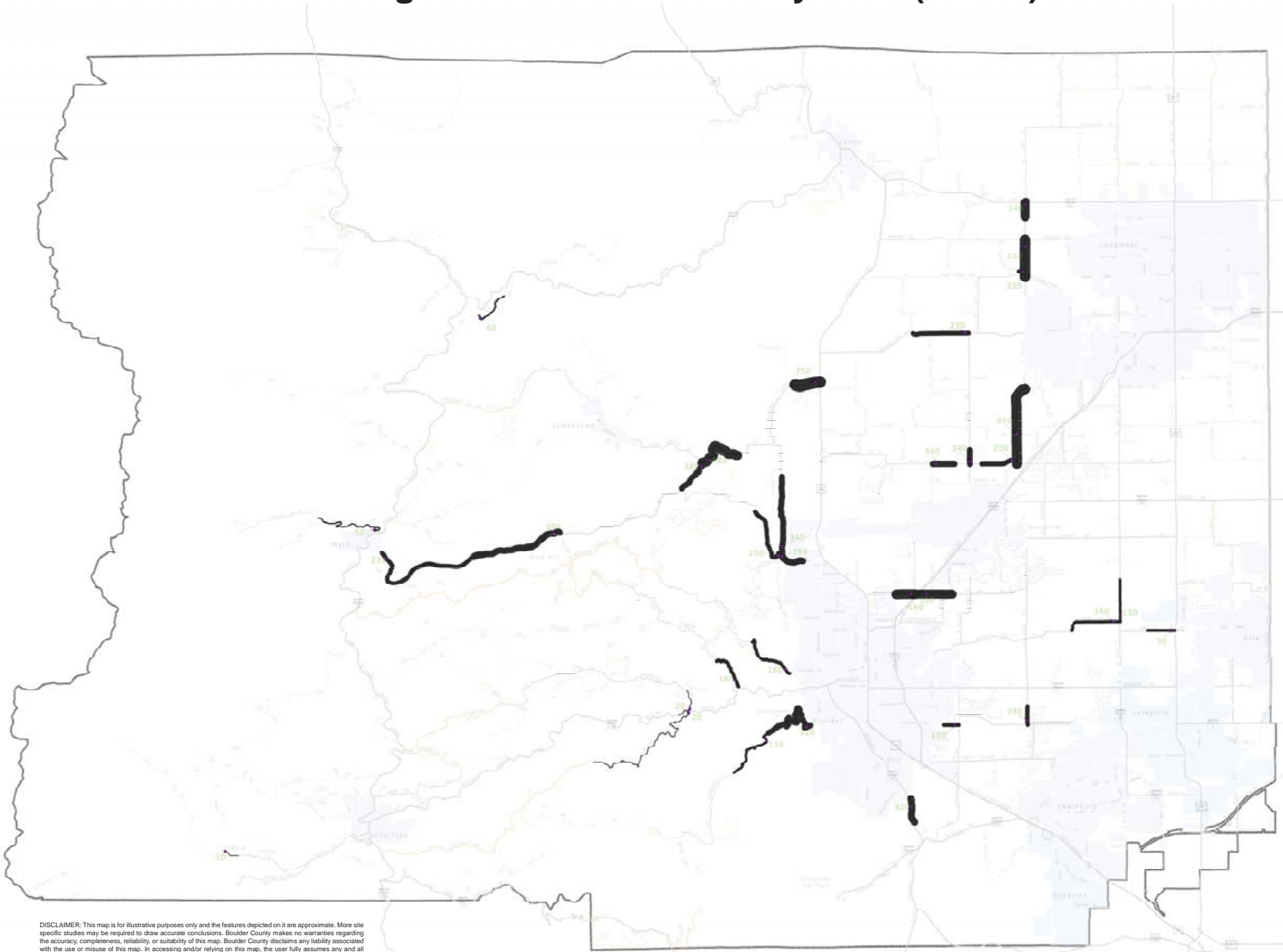
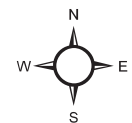
*2013 was the first year Boulder County conducted bicycle counts; additional stations will be shown in future years as more locations are counted.

Roads

- State or Federal
- Principal Arterial
- Minor Arterial
- Collector
- Residential Collector
- Local
- Local Secondary
- Jeep
- Municipal

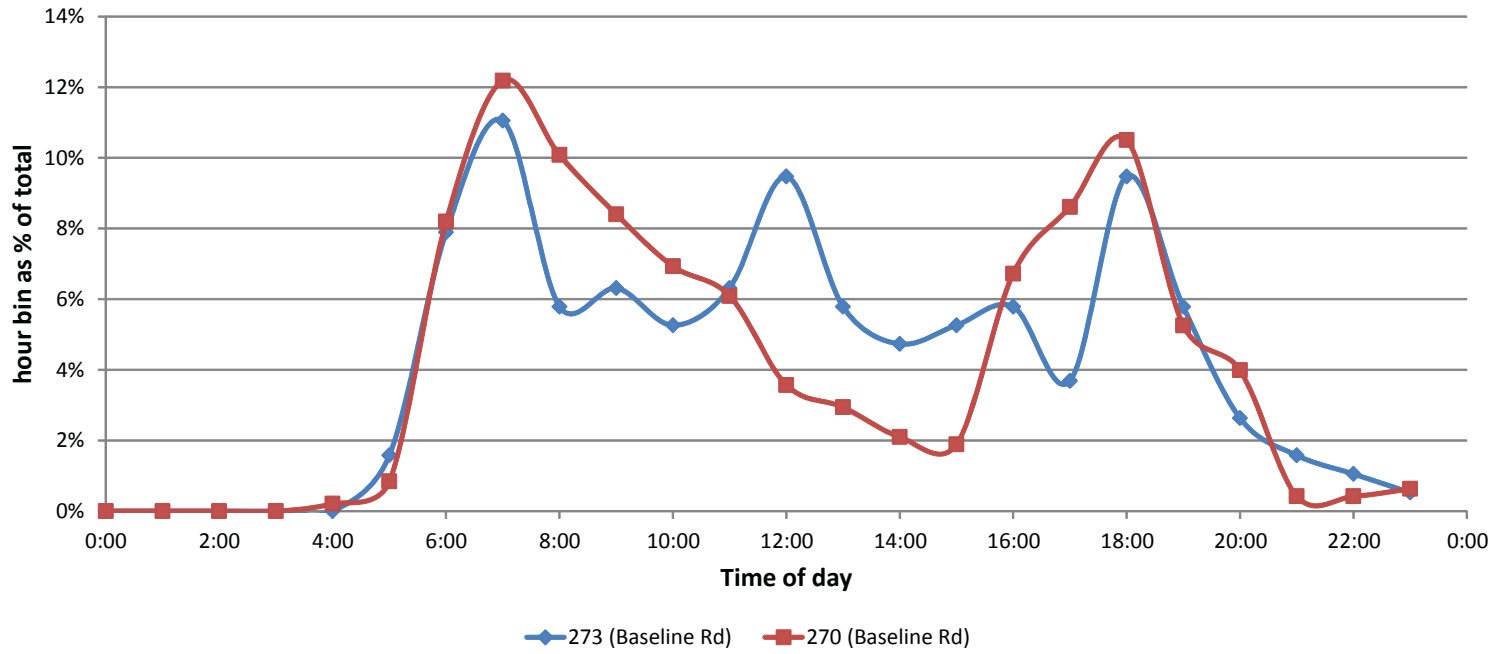
Other Features

- MUNICIPALITIES
- FEDERAL LANDS
- TRAFFIC STATIONS

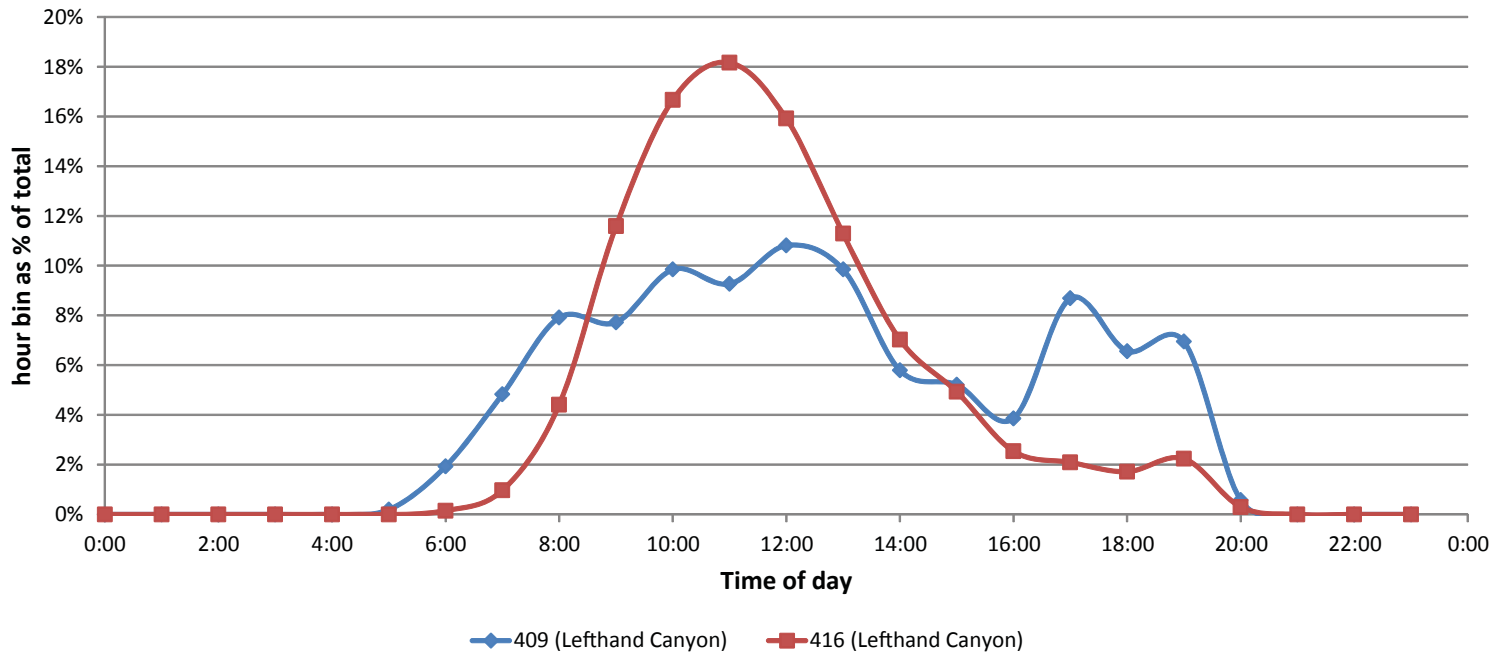


DISCLAIMER: This map is for illustrative purposes only and the features depicted on it are approximate. More site specific studies may be required to draw accurate conclusions. Boulder County makes no warranties regarding the accuracy, completeness, reliability, or suitability of this map. Boulder County disclaims any liability associated with the use or misuse of this map. In accessing and/or relying on this map, the user fully assumes any and all

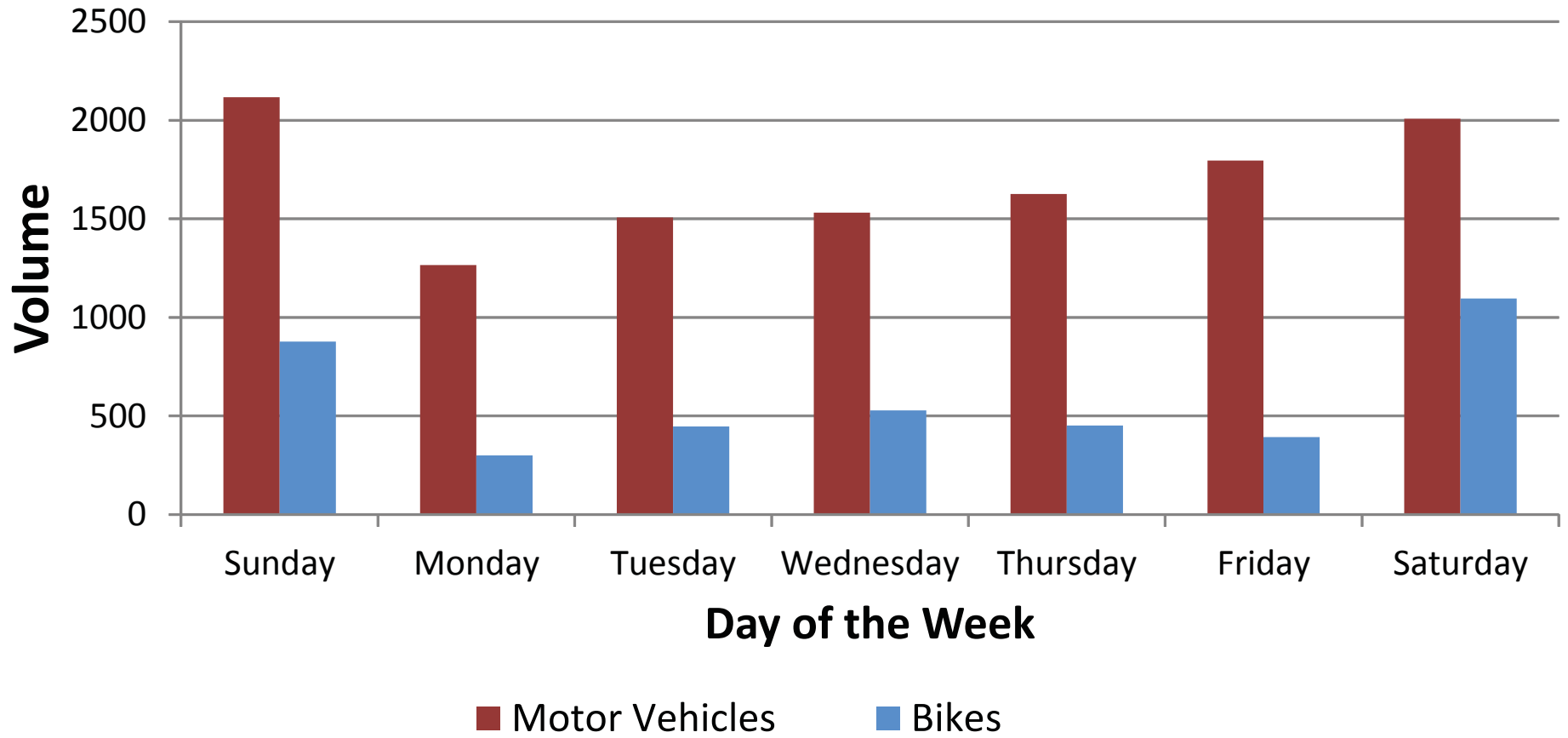
Commute (24 hour count, midweek)



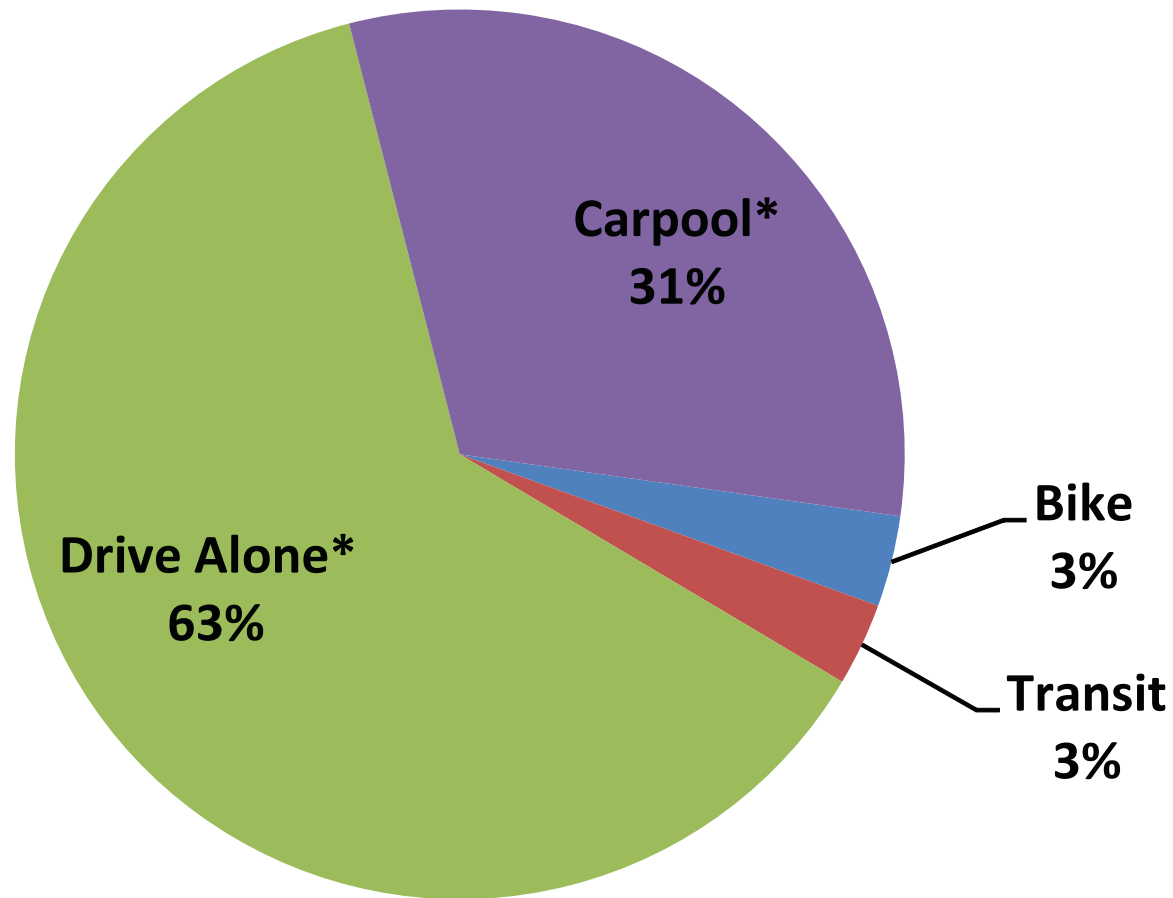
Non-Commute (24 hour count, midweek)



Motor Vehicle and Bike Volumes by Day of Week



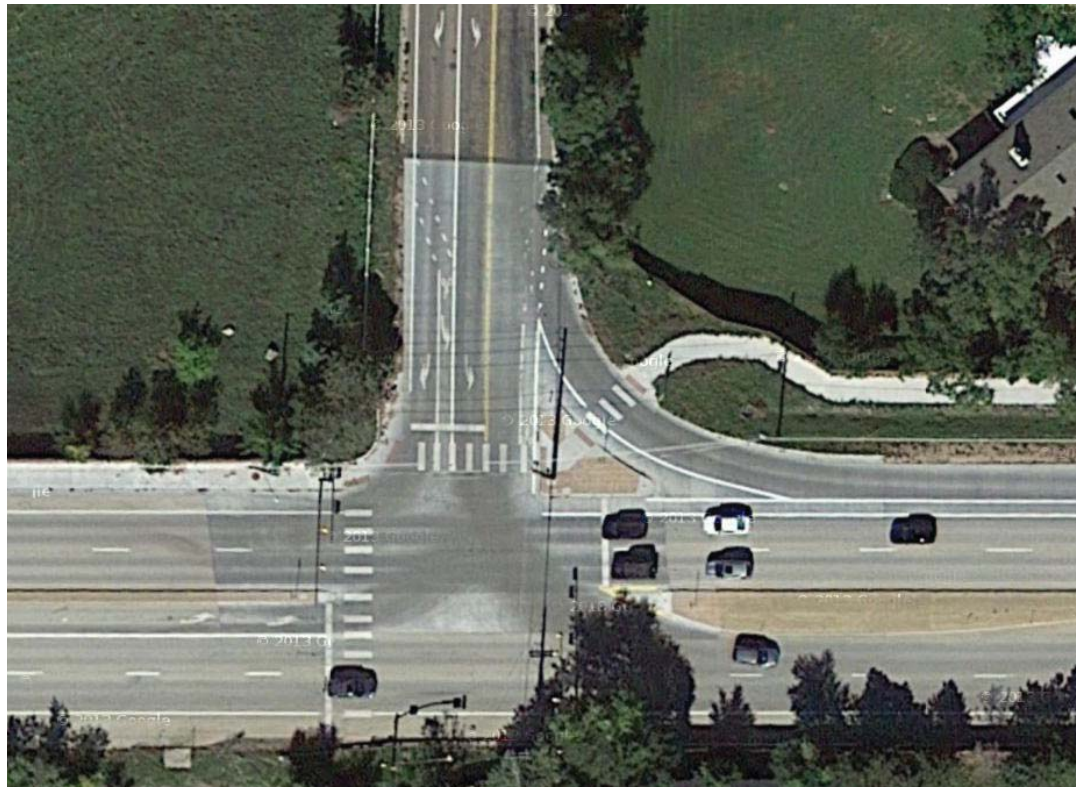
Mode Share on Baseline Rd (East of Cherryvale)



*assuming average vehicle occupancy of 1.2

Future Possibilities

- Better prioritization of investments. (Shoulder widths; intersection treatments)
- Ability to evaluate the impact, use and safety of new investments.
- Tracking long term trends of bicycling rates.



Bicycle Counts with Pneumatic Tube Counters

“what isn’t counted doesn’t count”

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