TUBE LENGTH & TUBE SPACING WHY IT MATTERS

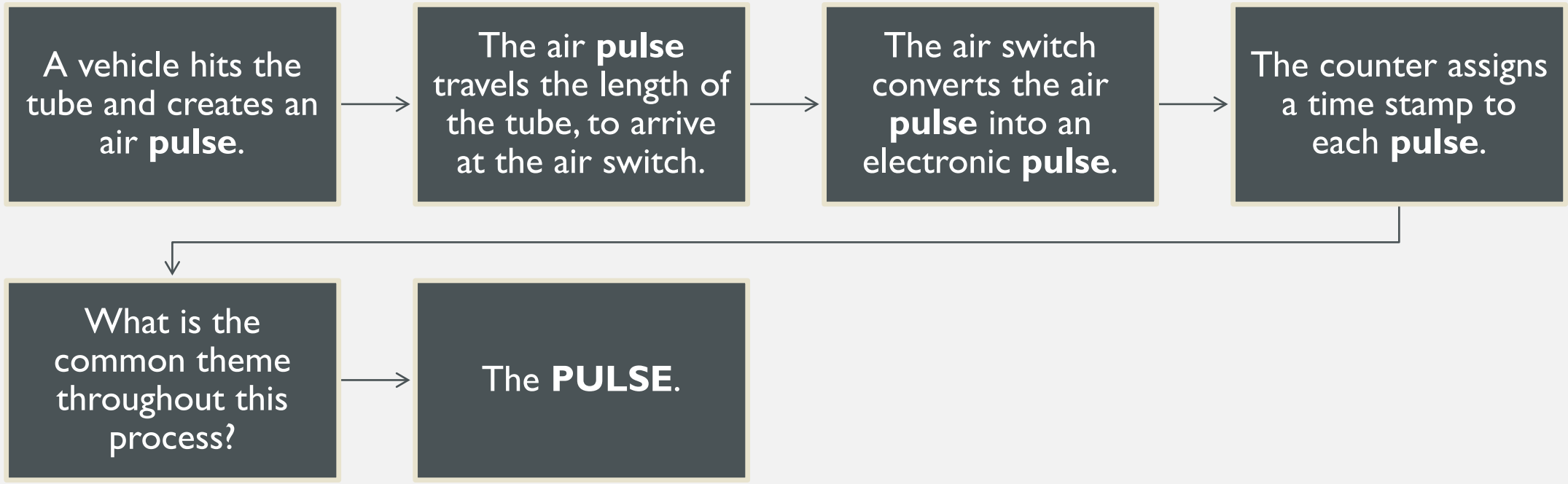
May-01-2019

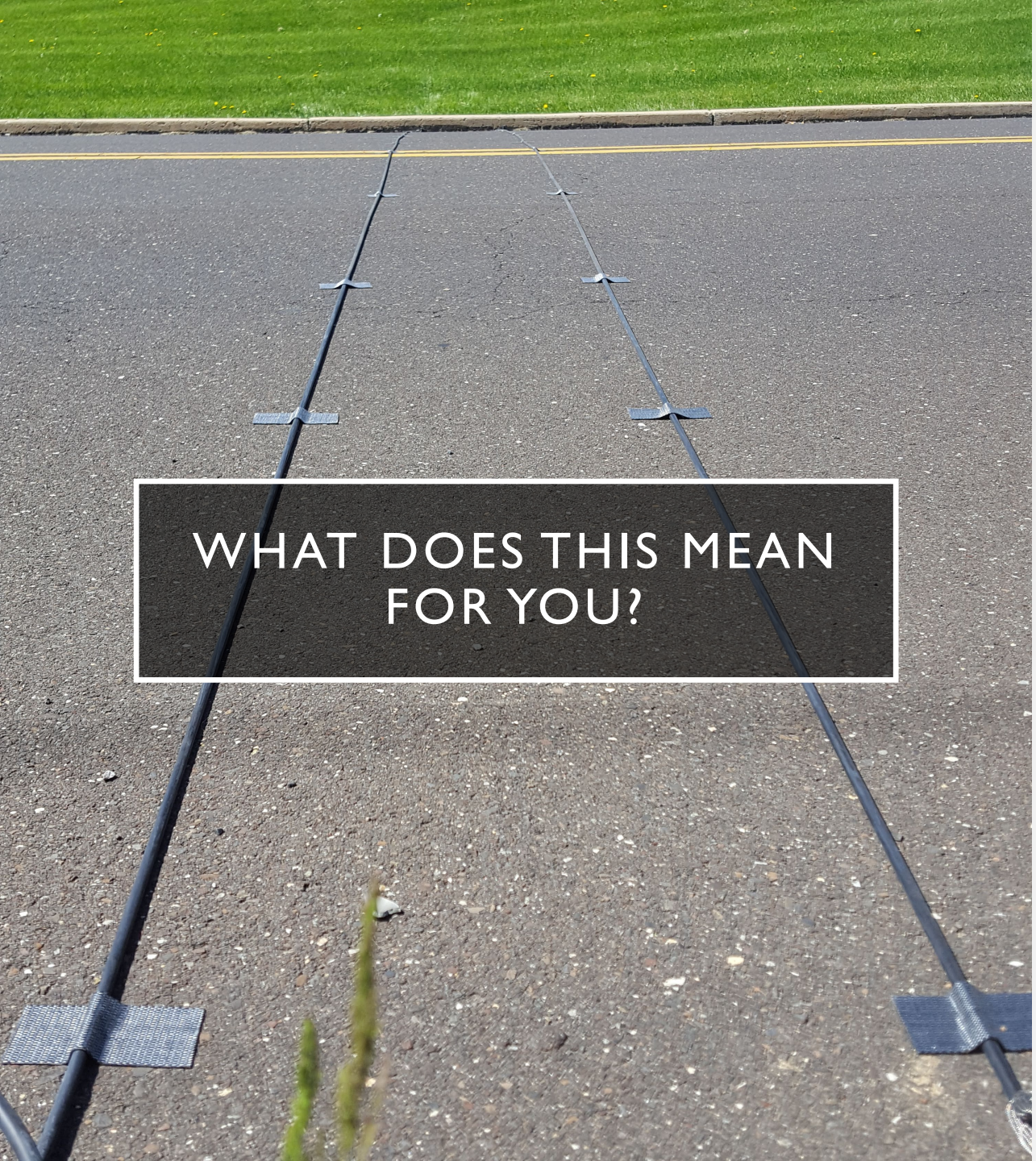
JAMAR Technologies, Inc.

GOALS OF THIS PRESENTATION

1. Understand the air pulse process flow.
2. Understand the hardware and software roles.
3. Two critical factors: Tube Length & Tube Spacing
4. Other things to remember.

THE AIR PULSE PROCESS FLOW





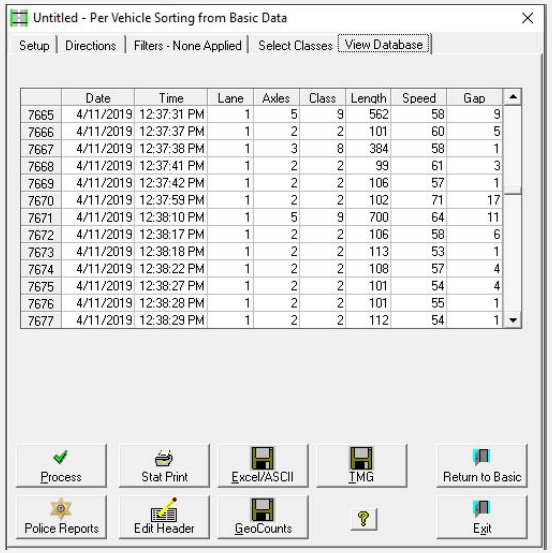
WHAT DOES THIS MEAN FOR YOU?

- Accurate data depends on accurate pulses.
- The count will only be as good as the pulses coming into the counter.
- Visualize how the pulse will behave in your set up.

DIFFERENT FUNCTIONS FOR HARDWARE & SOFTWARE

HARDWARE COLLECTS AND STORES AIR PULSES

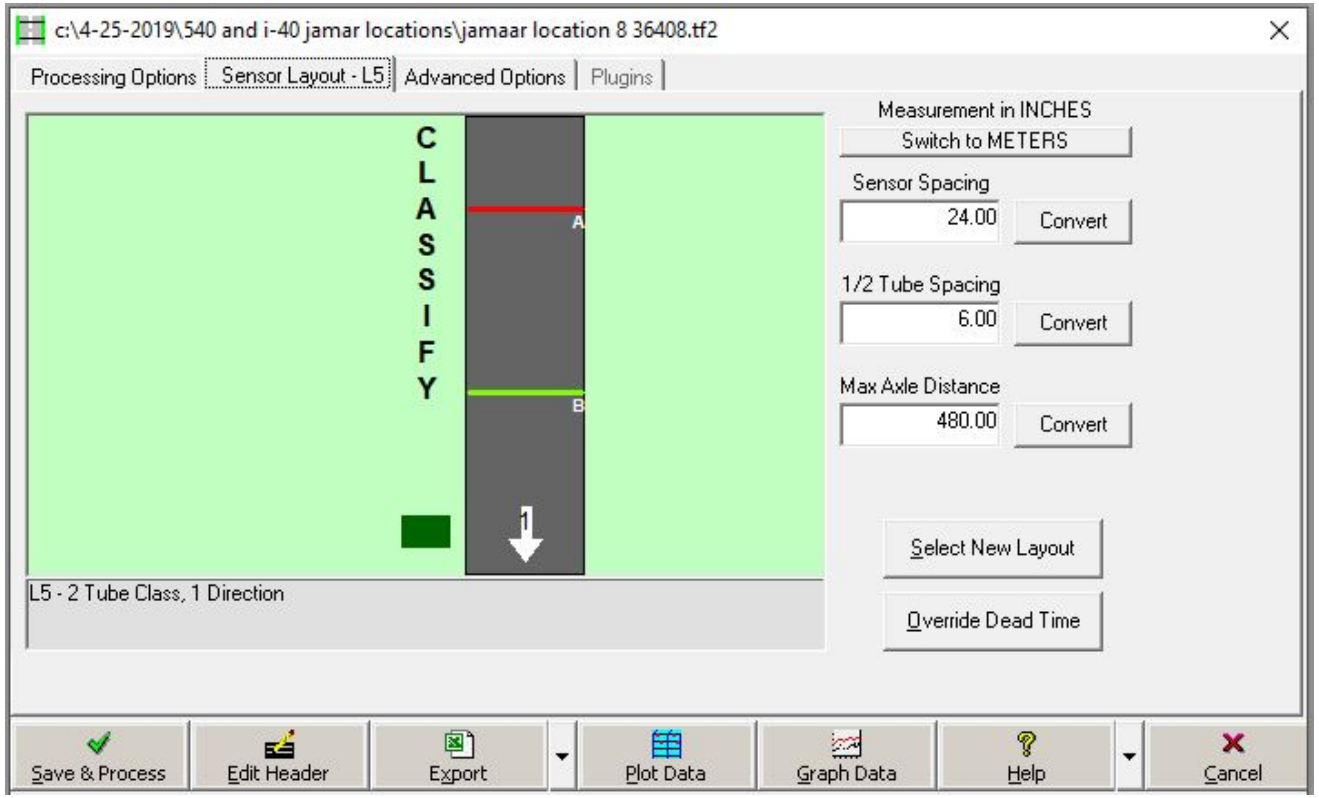
SOFTWARE TURNS AIR PULSES INTO VEHICLES



	Date	Time	Lane	Axles	Class	Length	Speed	Gap
7665	4/11/2019	12:37:31 PM	1	5	9	562	58	9
7666	4/11/2019	12:37:37 PM	1	2	2	101	60	5
7667	4/11/2019	12:37:38 PM	1	3	8	384	58	1
7668	4/11/2019	12:37:41 PM	1	2	2	99	61	3
7669	4/11/2019	12:37:42 PM	1	2	2	106	57	1
7670	4/11/2019	12:37:59 PM	1	2	2	102	71	17
7671	4/11/2019	12:38:10 PM	1	5	9	700	64	11
7672	4/11/2019	12:38:17 PM	1	2	2	106	58	6
7673	4/11/2019	12:38:18 PM	1	2	2	113	53	1
7674	4/11/2019	12:38:22 PM	1	2	2	108	57	4
7675	4/11/2019	12:38:27 PM	1	2	2	101	54	4
7676	4/11/2019	12:38:28 PM	1	2	2	101	55	1
7677	4/11/2019	12:38:29 PM	1	2	2	112	54	1

REMEMBER WHAT YOU DO

- When the counter is downloaded into the software, the software pulls in the settings that are saved in the counter.
- Many of these settings can be changed in the software, after the count is finished.
- It is best to remember what settings you used in the field, in case you need to make adjustments later.



TWO CRITICAL FACTORS

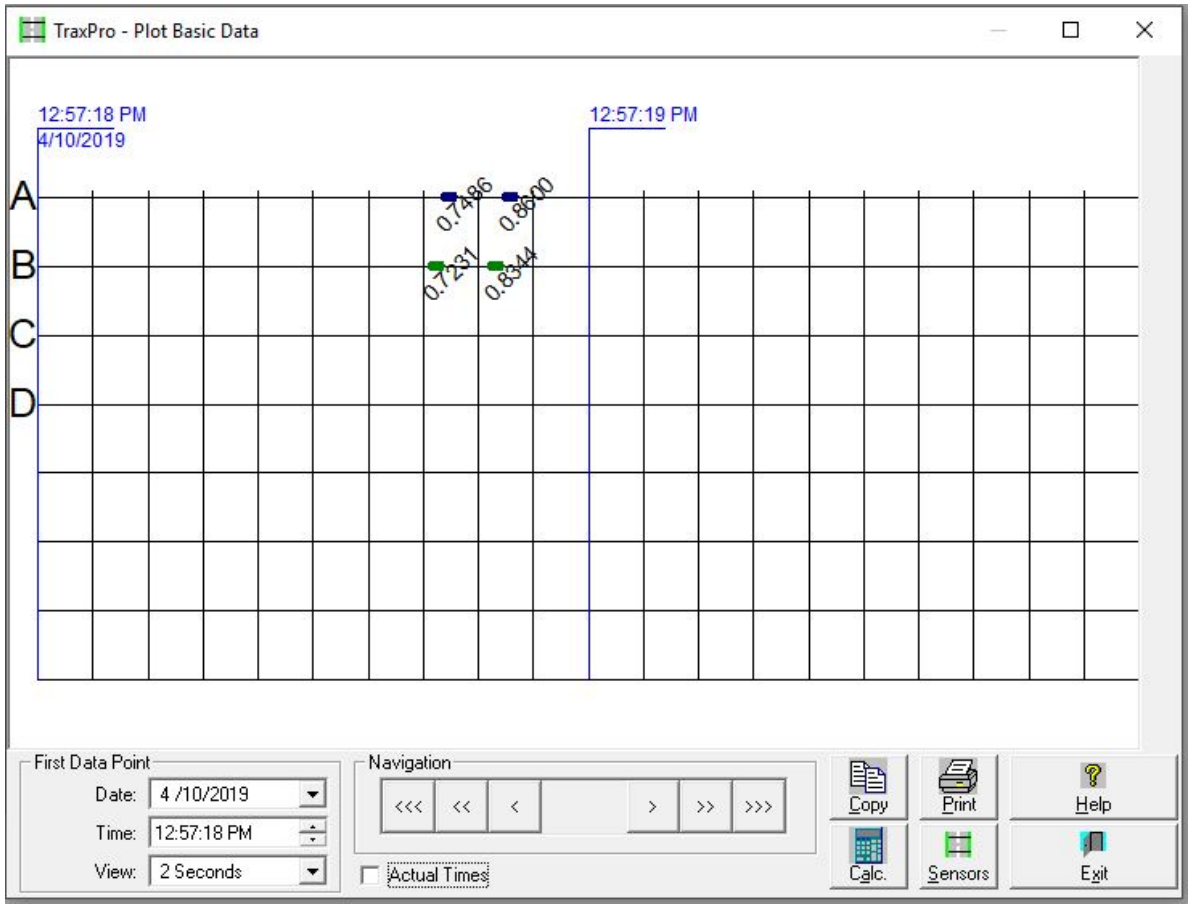
Tube Length

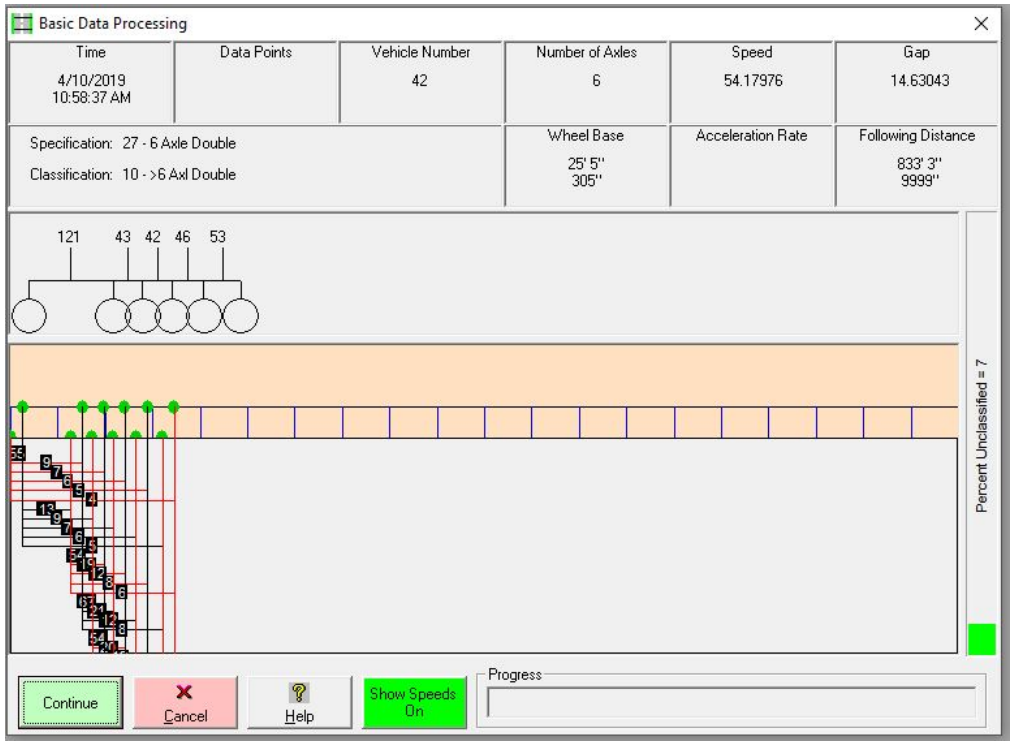
Tube Spacing

WHY SO CRITICAL?

ULTRA-FAST PROCESSING

- One vehicle is counted in less than one second of real time!
- Imagine high volume, various speeds, various classes, multiple lanes, all at the same time.
- When calculations depend on fractions of a second, the accuracy of the data being input is critical.





COMPLEX CALCULATIONS

- A lot of calculations take place behind the scenes when the software is processing pulses into vehicles.
- When calculations depend on fractions of a second, the accuracy of the data being input is critical.

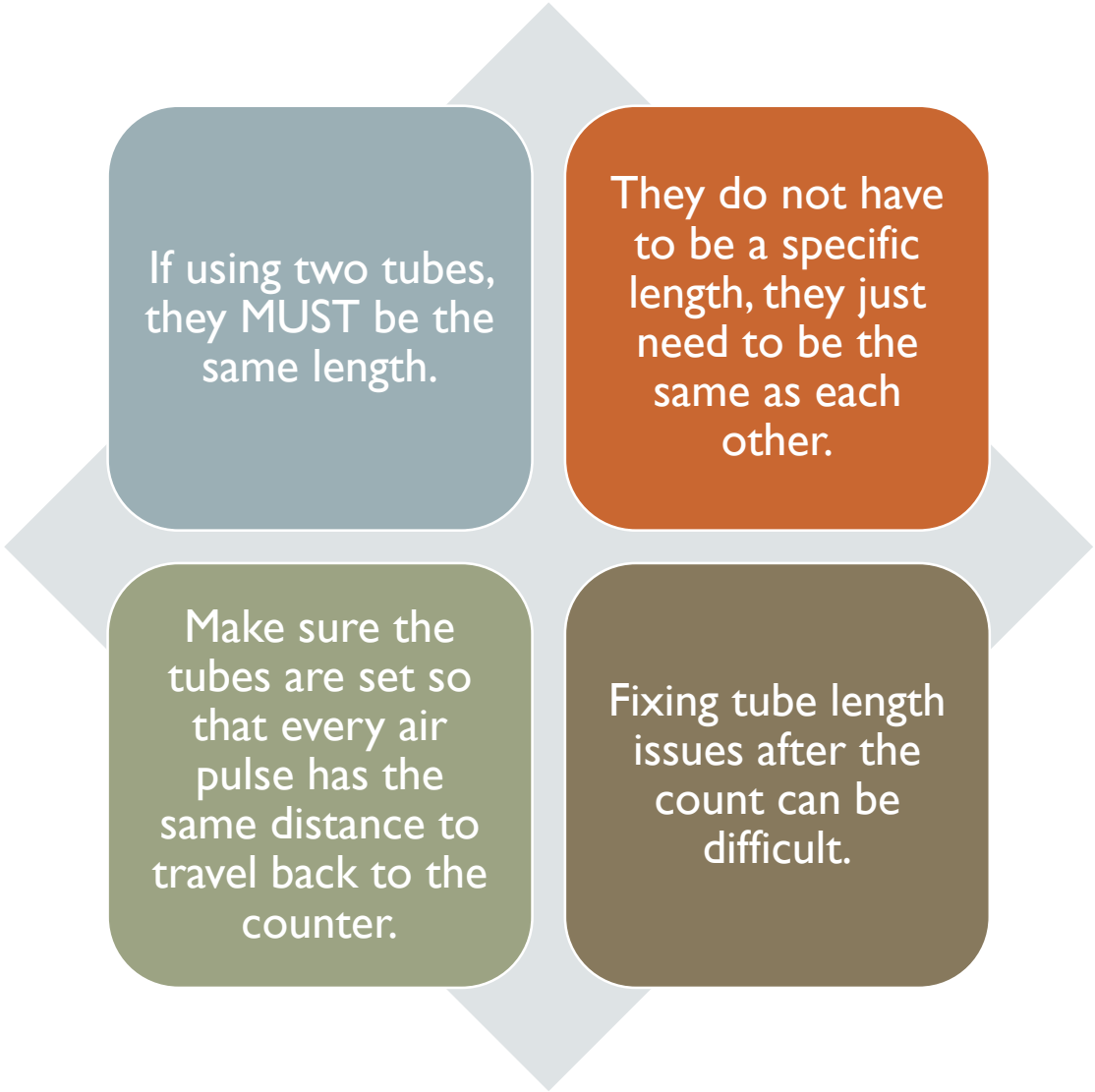
TUBE LENGTH

IT'S AN UNFAIR RACE…

…BUT THAT'S HOW WE LIKE IT!

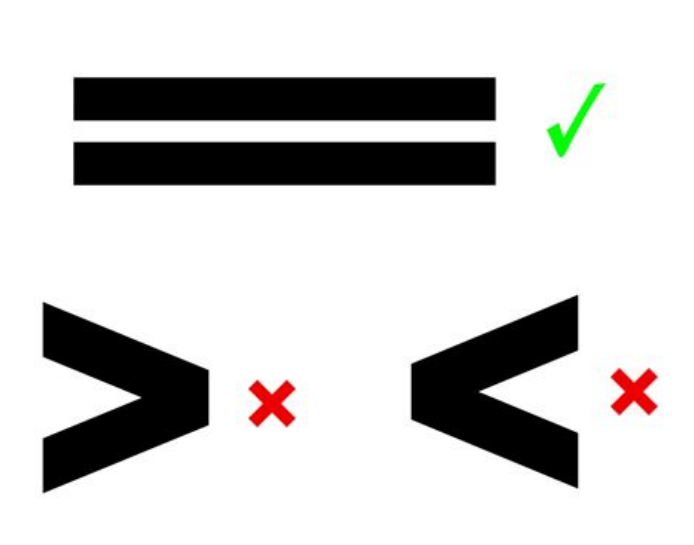
- The first pulse to start should be the first pulse to finish.
- Visualize what is happening inside the tubes.
- What if the 'A' tube was hit first, but the pulse from the 'B' tube had a shorter distance to travel?

TUBE LENGTH REMINDERS



TUBE SPACING

WHY DOES IT MATTER?



…BECAUSE SCIENCE.

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

TUBE SPACING REMINDERS

- Keep the spacing consistent across all lanes.
- Keep tubes perfectly perpendicular to the roadway.
- Always note the spacing you are using.
- Even if your spacing isn't correct, as long as you know what it was, it is easy to make adjustments in the software.

HOW CAN INCORRECT TUBE SPACING AFFECT MY DATA?

INCORRECT: HIGH NUMBER OF BIKES & NOT CLASSED

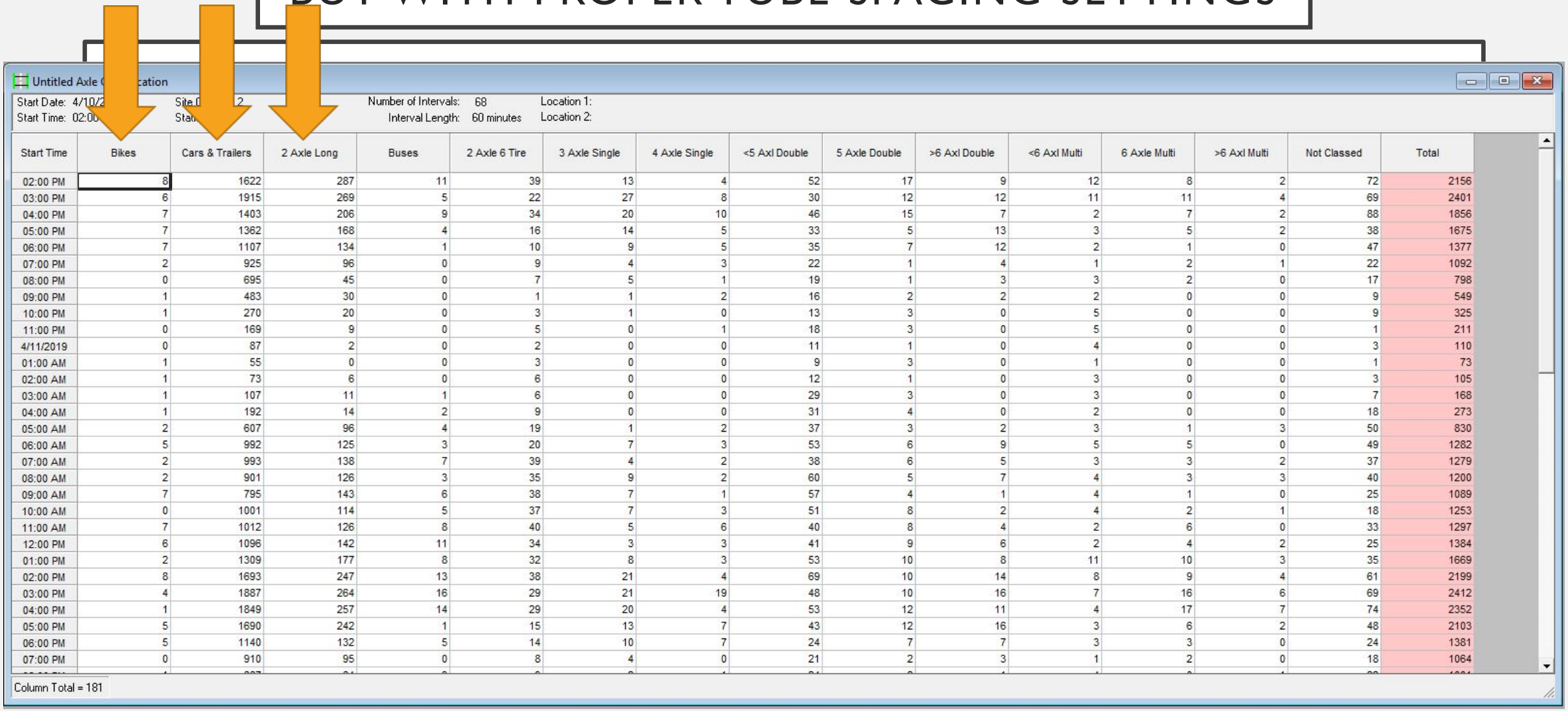
Untitled Axle C ation

Start Date: 4/10/2 Site 2 Number of Intervals: 68 Location 1:
Start Time: 02:0 Sta Interval Length: 60 minutes Location 2:

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
02:00 PM	1842	70	10	62	38	4	0	1	1	0	0	0	0	121	2149
03:00 PM	2164	65	6	79	15	8	0	1	1	0	0	0	0	88	2427
04:00 PM	1447	45	8	46	13	8	0	0	1	0	0	0	0	106	1674
05:00 PM	1528	31	3	17	10	5	0	0	0	0	0	0	0	57	1651
06:00 PM	1235	26	0	11	13	1	1	0	0	0	0	0	0	69	1356
07:00 PM	976	24	2	10	3	2	0	0	0	0	0	0	0	34	1051
08:00 PM	761	18	0	1	4	0	0	0	1	0	0	0	0	29	814
09:00 PM	528	10	1	2	2	2	0	0	1	0	0	0	0	14	560
10:00 PM	287	16	3	0	0	0	0	0	1	0	0	0	0	25	332
11:00 PM	181	19	2	0	2	1	0	0	1	0	0	0	0	13	219
4/11/2019	88	10	0	0	0	0	0	0	3	1	0	0	0	10	112
01:00 AM	55	11	0	0	0	0	0	0	1	0	0	0	0	9	76
02:00 AM	79	12	1	0	1	0	0	0	1	0	0	0	0	14	108
03:00 AM	122	26	3	1	0	0	0	0	1	0	0	0	0	23	176
04:00 AM	208	30	2	0	0	1	0	0	2	0	0	0	0	31	274
05:00 AM	606	37	1	6	10	2	0	0	0	0	0	0	0	79	741
06:00 AM	1126	53	3	8	5	3	0	0	0	0	0	0	0	71	1269
07:00 AM	1123	74	4	17	12	1	0	0	0	0	0	0	0	66	1297
08:00 AM	1000	87	2	26	18	1	0	1	1	0	0	0	1	66	1203
09:00 AM	890	70	5	6	8	4	1	0	0	1	0	0	0	59	1044
10:00 AM	1159	71	4	7	10	7	0	0	0	0	0	0	0	40	1298
11:00 AM	1140	71	8	12	13	3	0	0	0	0	0	0	0	53	1300
12:00 PM	1216	63	6	6	9	3	0	0	1	0	0	0	1	50	1355
01:00 PM	1538	71	7	24	17	4	2	0	0	0	0	0	0	66	1729
02:00 PM	1842	79	5	63	37	3	0	0	0	0	0	0	0	104	2133
03:00 PM	2232	69	10	62	30	6	0	0	0	0	0	0	1	98	2508
04:00 PM	2062	55	10	70	32	6	0	0	0	2	0	0	2	119	2358
05:00 PM	1927	44	2	42	16	6	0	0	0	0	0	0	0	88	2125
06:00 PM	1274	27	1	8	6	4	0	0	2	0	0	0	0	45	1367
07:00 PM	1002	25	0	6	3	1	0	0	1	0	0	0	0	34	1072
08:00 PM	909	27	1	7	6	1	0	0	1	0	0	0	0	30	982
09:00 PM	599	14	1	3	2	0	0	0	0	0	0	0	0	22	641

Column Total = 60674

CORRECTED: THIS IS THE SAME COUNT FILE, BUT WITH PROPER TUBE SPACING SETTINGS



Untitled Axle C…cation

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Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Not Classed	Total
02:00 PM	8	1622	287	11	39	13	4	52	17	9	12	8	2	72	2156
03:00 PM	6	1915	269	5	22	27	8	30	12	12	11	11	4	69	2401
04:00 PM	7	1403	206	9	34	20	10	46	15	7	2	7	2	88	1856
05:00 PM	7	1362	168	4	16	14	5	33	5	13	3	5	2	38	1675
06:00 PM	7	1107	134	1	10	9	5	35	7	12	2	1	0	47	1377
07:00 PM	2	925	96	0	9	4	3	22	1	4	1	2	1	22	1092
08:00 PM	0	695	45	0	7	5	1	19	1	3	3	2	0	17	798
09:00 PM	1	483	30	0	1	1	2	16	2	2	2	0	0	9	549
10:00 PM	1	270	20	0	3	1	0	13	3	0	5	0	0	9	325
11:00 PM	0	169	9	0	5	0	1	18	3	0	5	0	0	1	211
4/11/2019	0	87	2	0	2	0	0	11	1	0	4	0	0	3	110
01:00 AM	1	55	0	0	3	0	0	9	3	0	1	0	0	1	73
02:00 AM	1	73	6	0	6	0	0	12	1	0	3	0	0	3	105
03:00 AM	1	107	11	1	6	0	0	29	3	0	3	0	0	7	168
04:00 AM	1	192	14	2	9	0	0	31	4	0	2	0	0	18	273
05:00 AM	2	607	96	4	19	1	2	37	3	2	3	1	3	50	830
06:00 AM	5	992	125	3	20	7	3	53	6	9	5	5	0	49	1282
07:00 AM	2	993	138	7	39	4	2	38	6	5	3	3	2	37	1279
08:00 AM	2	901	126	3	35	9	2	60	5	7	4	3	3	40	1200
09:00 AM	7	795	143	6	38	7	1	57	4	1	4	1	0	25	1089
10:00 AM	0	1001	114	5	37	7	3	51	8	2	4	2	1	18	1253
11:00 AM	7	1012	126	8	40	5	6	40	8	4	2	6	0	33	1297
12:00 PM	6	1096	142	11	34	3	3	41	9	6	2	4	2	25	1384
01:00 PM	2	1309	177	8	32	8	3	53	10	8	11	10	3	35	1669
02:00 PM	8	1693	247	13	38	21	4	69	10	14	8	9	4	61	2199
03:00 PM	4	1887	264	16	29	21	19	48	10	16	7	16	6	69	2412
04:00 PM	1	1849	257	14	29	20	4	53	12	11	4	17	7	74	2352
05:00 PM	5	1690	242	1	15	13	7	43	12	16	3	6	2	48	2103
06:00 PM	5	1140	132	5	14	10	7	24	7	7	3	3	0	24	1381
07:00 PM	0	910	95	0	8	4	0	21	2	3	1	2	0	18	1064

Column Total = 181

OTHER THINGS TO REMEMBER

TUBES SHOULD BE INSTALLED…

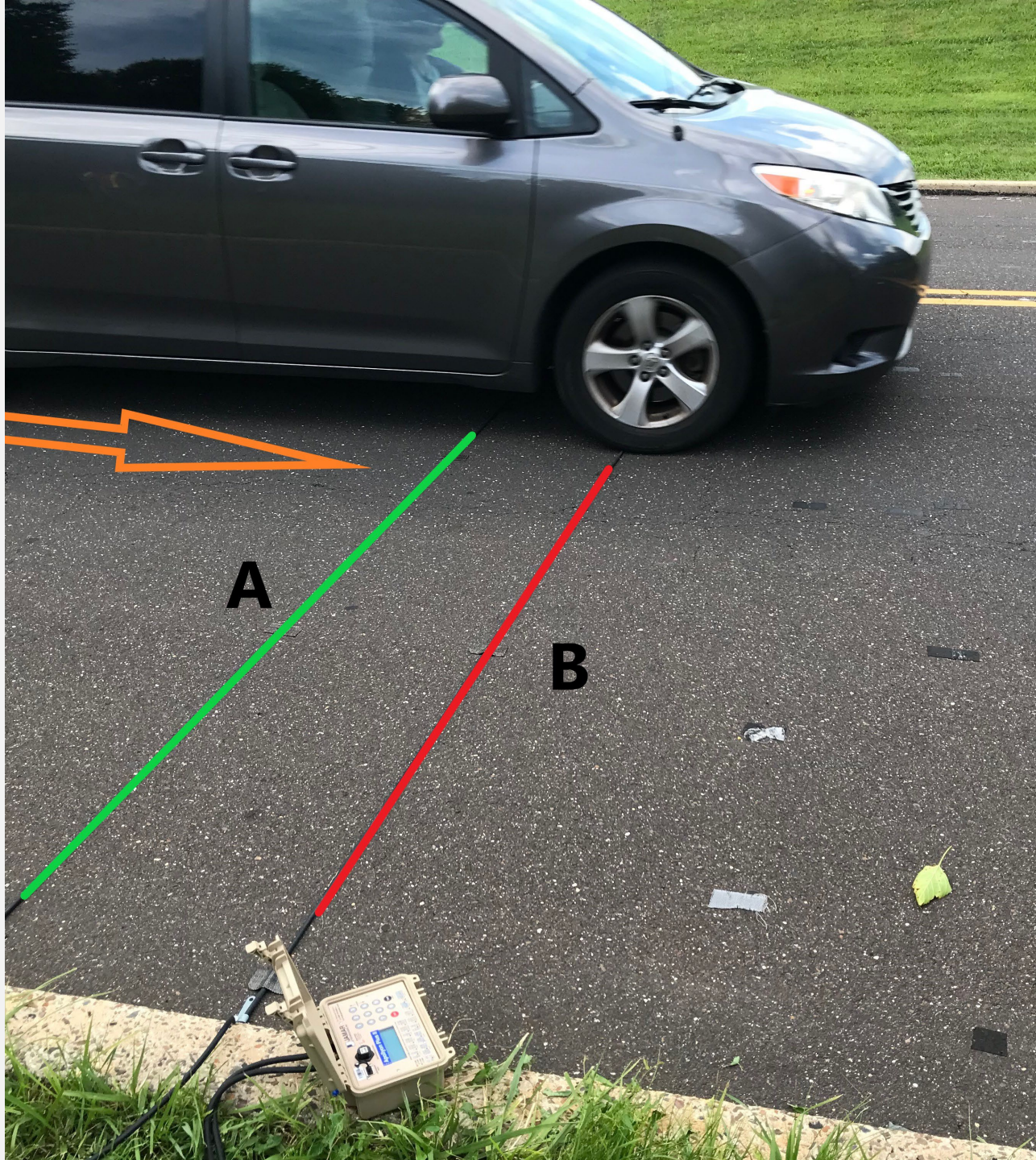
- On a stretch of road that is straight.
- Where vehicles will not hit tubes on an angle.
- Where there are no obstructions.
- Where traffic is free flowing.

TUBES SHOULD **NOT** BE INSTALLED…

- At an intersection.
- In areas where vehicles are likely to park/stop.
- On a curve where tubes would be at an angle to the roadway.

TUBE ORDER

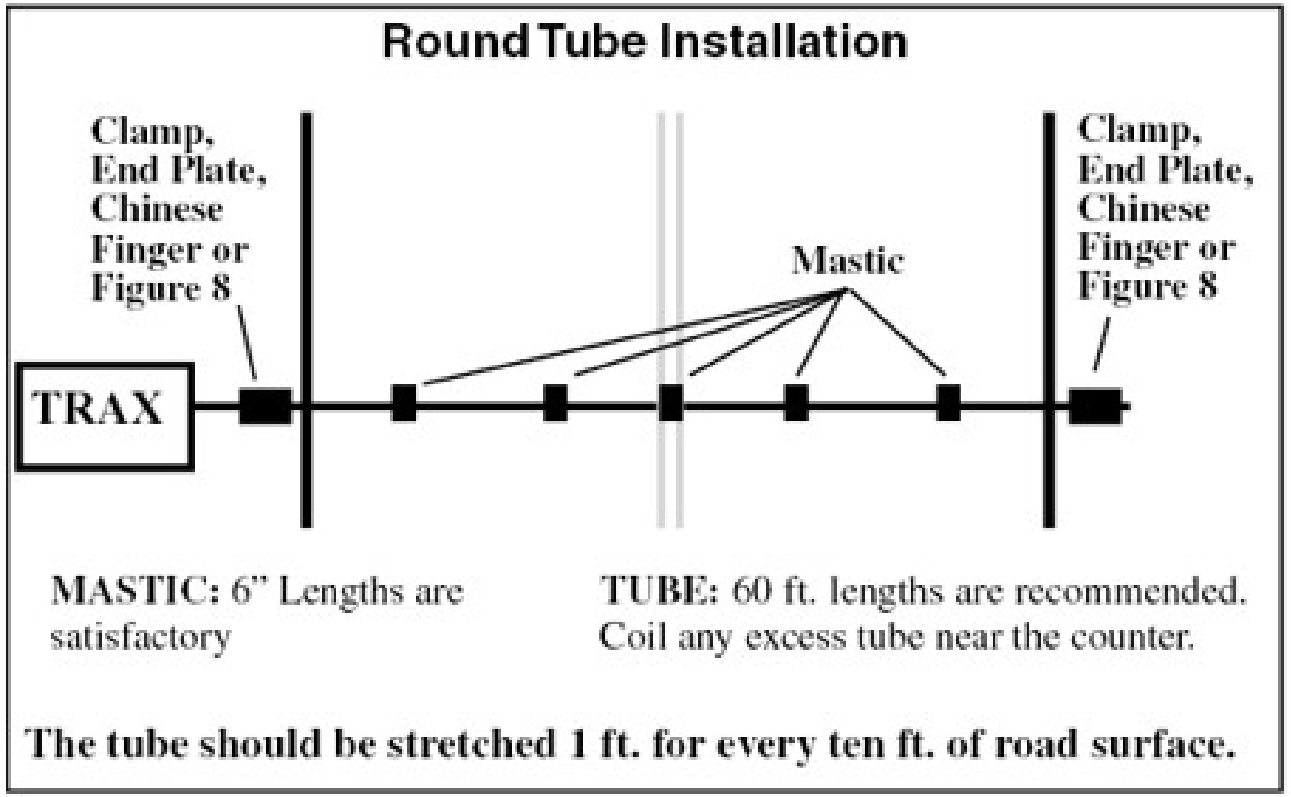
- In a two tube set up, the lane closest to the counter is Lane One.
- The vehicles in Lane One should hit the ‘A’ tube first.
- In most cases, correcting tube input mistakes is an easy fix in the software.
- But it is best to be mindful of your set up and avoid issues ahead of time.



MAKE SURE TO…

- …use end plugs.
- …use mastic tape.
- …secure the tubes to the roadway.
- …use good quality/condition tubes.
- …view pulse hits/strengths on the counter screen.

EXAMPLE SETUP (STANDARD TUBE)



CHECK PULSE HITS

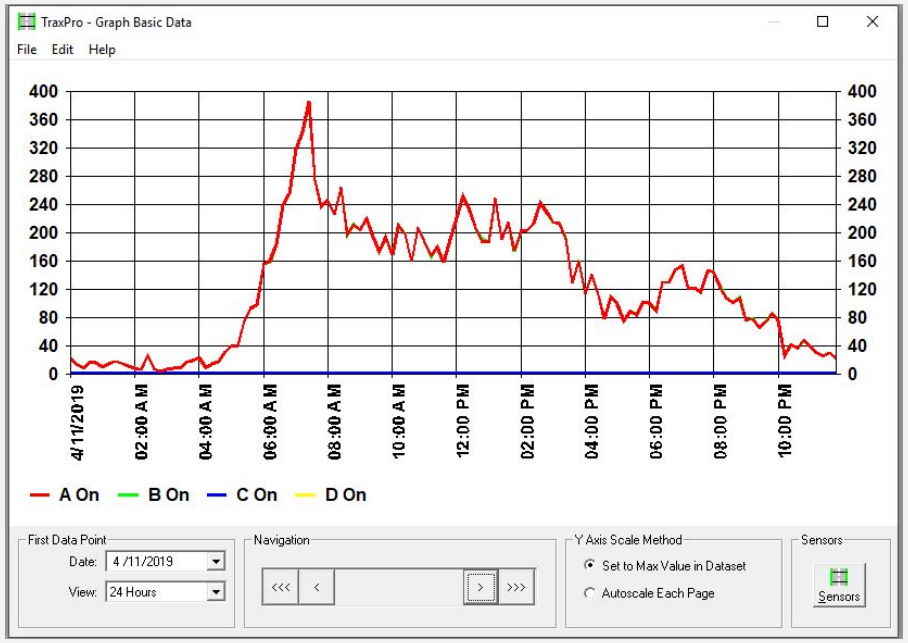
LOOKING GOOD!

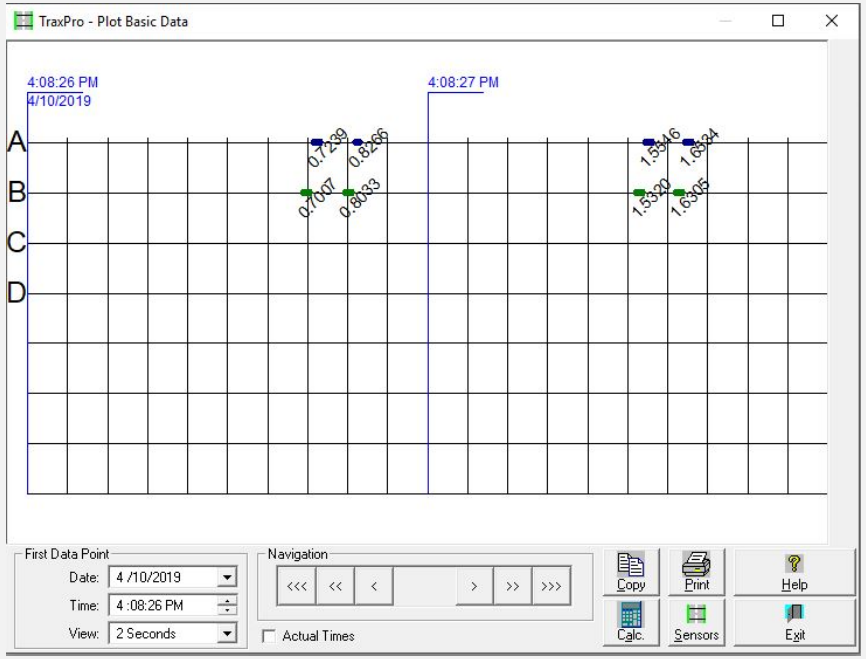
```
L06 BASIC-DATA
 A: **********
 B: **********
 CNT: 01 MEM: 100% 3.8V
```

SOMETHING IS WRONG!

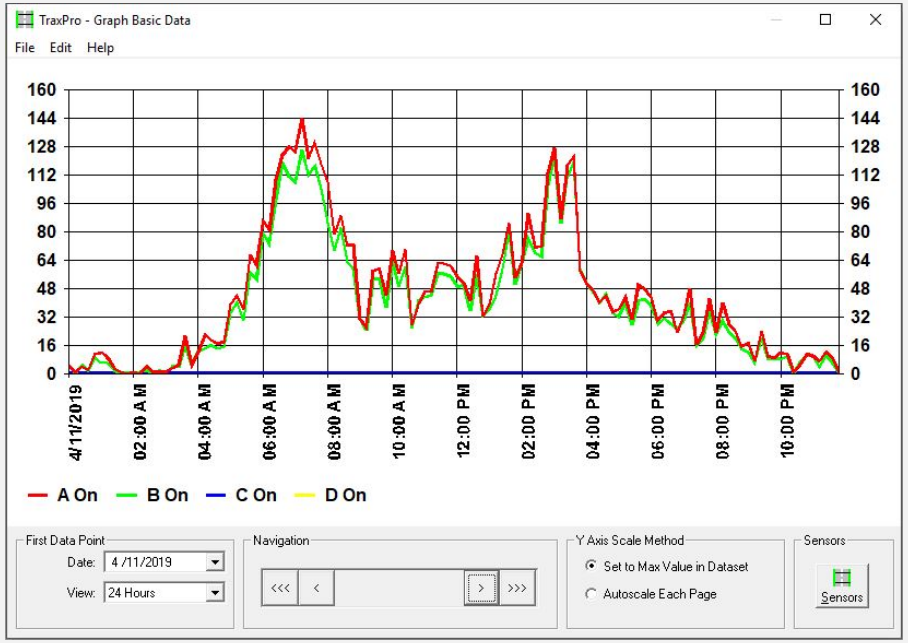
```
L06 BASIC-DATA
 A: ***
 B: **********
 CNT: 01 MEM: 100% 3.8V
```

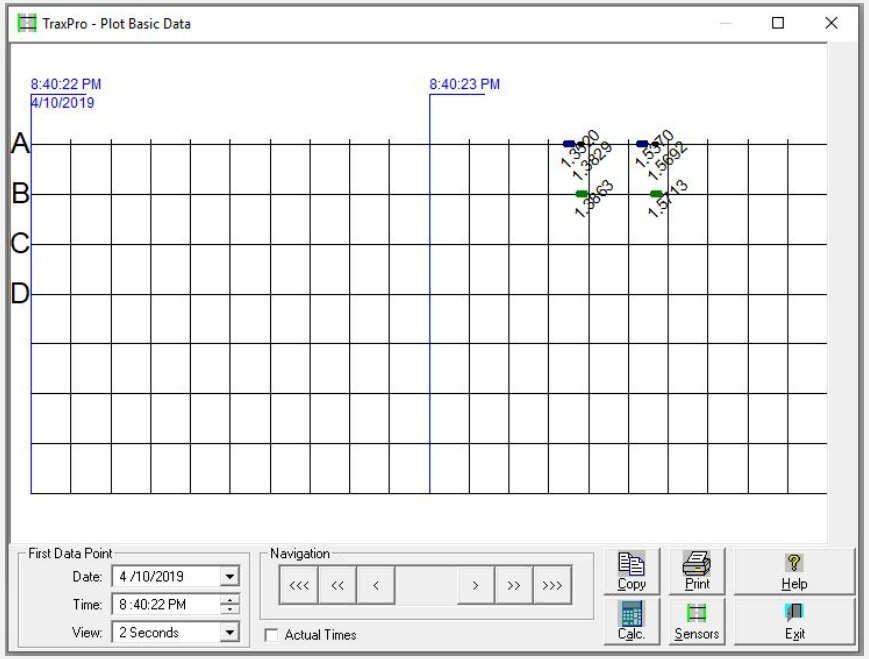
DATA GRAPHS & PLOTS SHOULD LOOK LIKE THIS.





DATA GRAPHS & PLOTS SHOULD **NOT** LOOK LIKE THIS





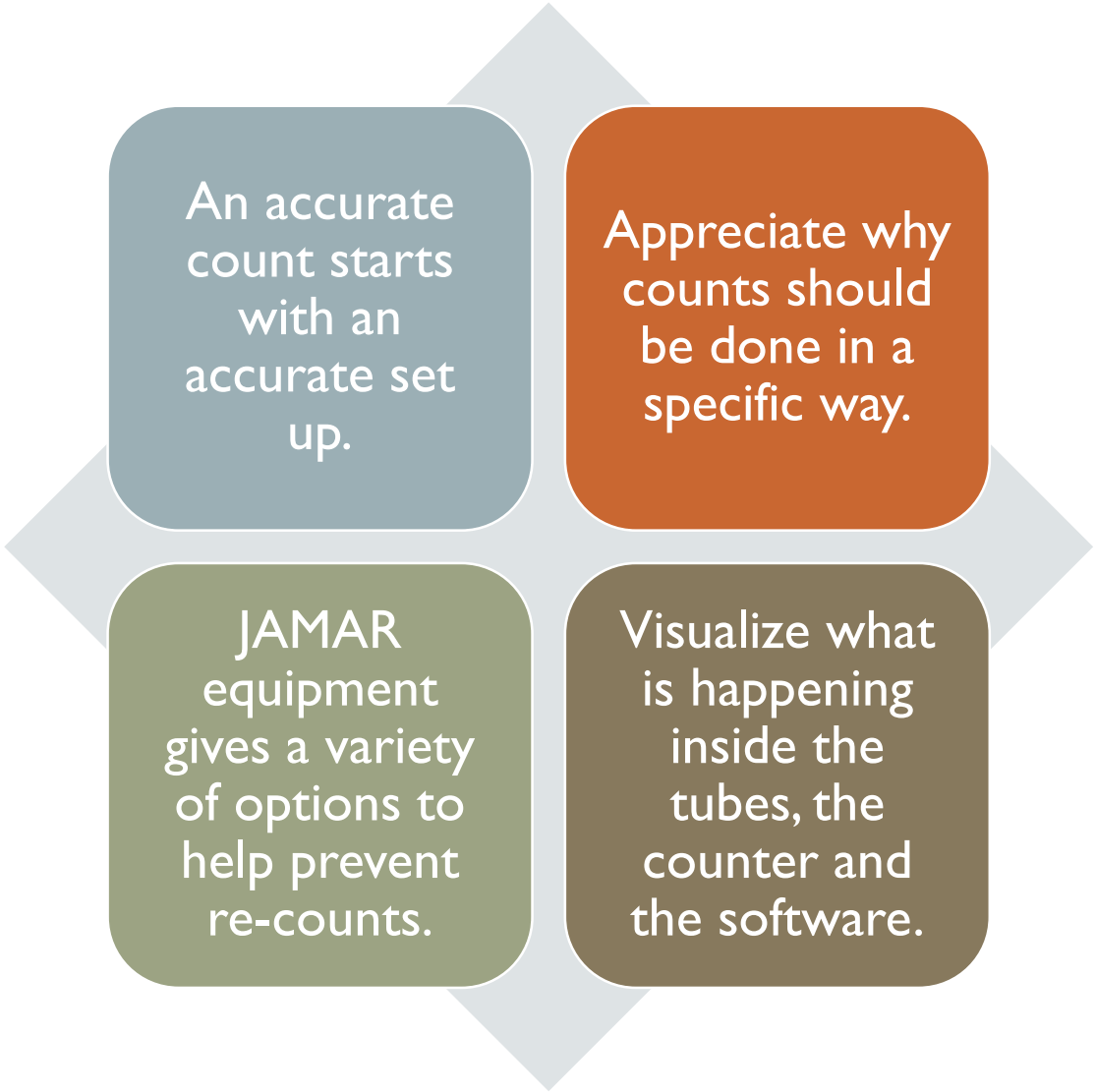
TUBE MAINTENANCE

- Rated for 1 million axle hits.
- Use only newer, flexible tubes.
- Keep matched pairs together.
- Flip tubes after each count.
- Check for tears, rips, etc.
- Tube breaks down from inside out.
- Resetting a bad tube is always cheaper and easier than doing a re-count.

EVERY COUNT IS DIFFERENT

- Take time to evaluate the area.
- Air temp. vs. surface temp.
- Road materials.
- Road quality.
- Expected traffic.
- Weather forecast.

TAKE AWAYS


An accurate count starts with an accurate set up.
Appreciate why counts should be done in a specific way.
JAMAR equipment gives a variety of options to help prevent re-counts.
Visualize what is happening inside the tubes, the counter and the software.

JAMAR CONTACT

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