

WE UNDERSTAND TRAFFIC.

NDS



National Data & Surveying Services



NDS Locations

WASHINGTON

- ❖ Seattle

GEORGIA

- ❖ Atlanta

NORTH CAROLINA

- ❖ Charlotte
- ❖ Raleigh

FLORIDA

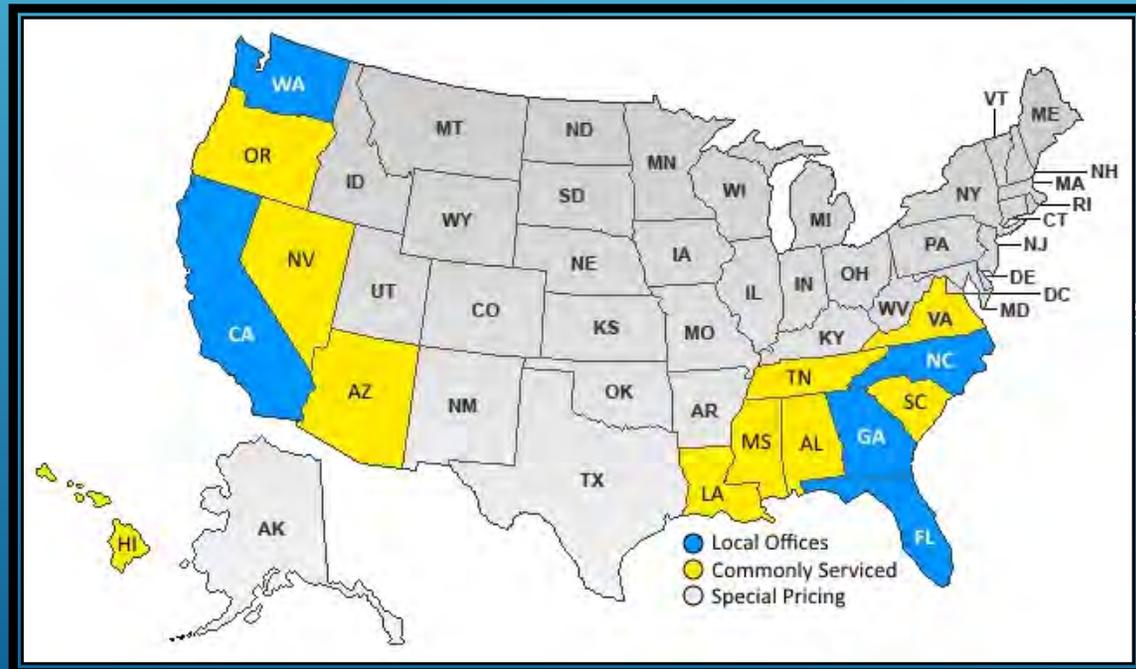
- ❖ Tampa
- ❖ Orlando
- ❖ Miami Metropolitan

TENNESSEE

- ❖ Nashville
- ❖ Knoxville

CALIFORNIA

- ❖ Los Angeles
- ❖ Orange
- ❖ San Diego
- ❖ Sacramento
- ❖ San Jose
- ❖ Riverside
- ❖ Bakersfield
- ❖ Fresno



Not all



National Data & Surveying Services

NDS DATA COLLECTION METHODOLOGIES AND TECHNOLOGIES

A comprehensive introduction into the data collection world from a nationwide firm.

CAPABILITIES

- ▶ Vehicle, pedestrian and bicycle volumes
- ▶ Detailed vehicle, pedestrian and bicycle classification
- ▶ Multi-Modal Studies
- ▶ Origin/Destination studies
- ▶ License Plate studies
- ▶ Pedestrian speed studies
- ▶ Screenline counts

LIMITATIONS

- ▶ Intersection Shape
- ▶ Intersection Size
- ▶ Camera Angle
- ▶ Visible Viewing Distance
- ▶ Lux Rating (Night Vision)
- ▶ Poor Manual Counting
- ▶ Algorithmic Video Review

VIDEO DATA COLLECTION

VOLUME/CLASSIFICATION

Not all data collection firms are the same

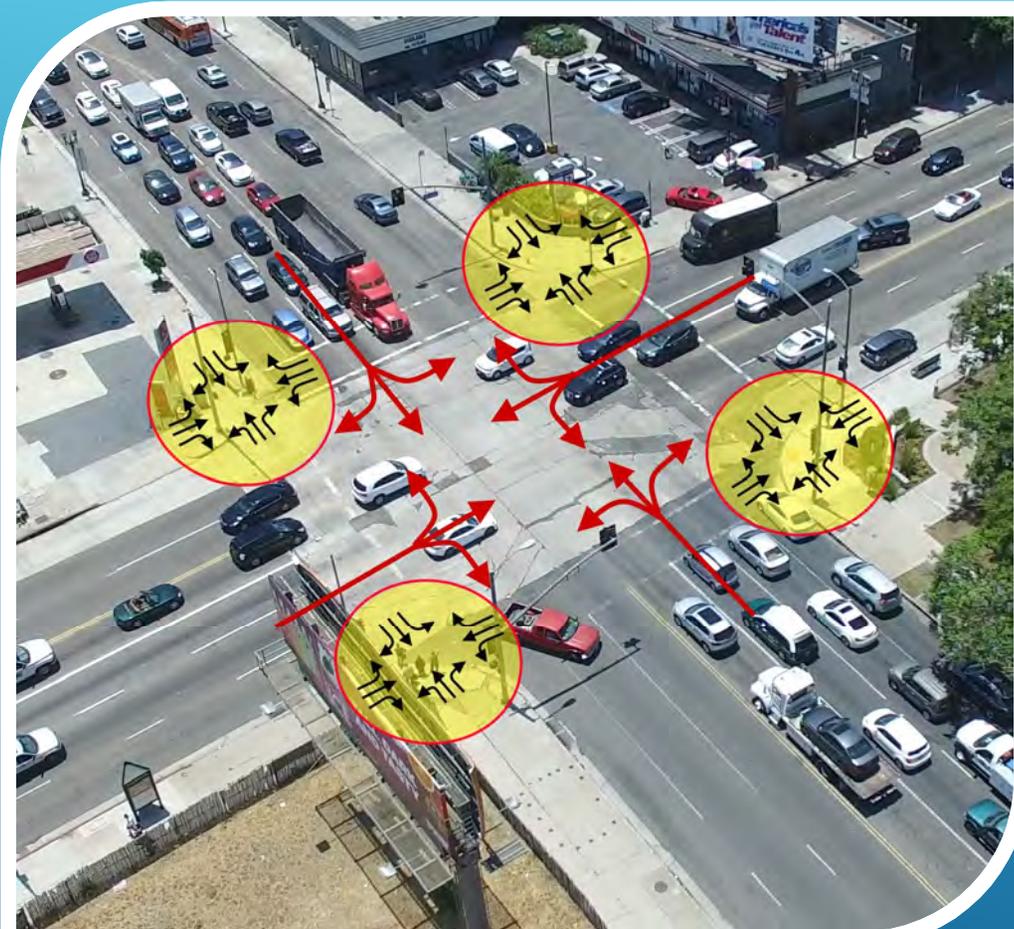
MULTI-MODAL DATA COLLECTION

Pedestrians, Bicycles and Buses

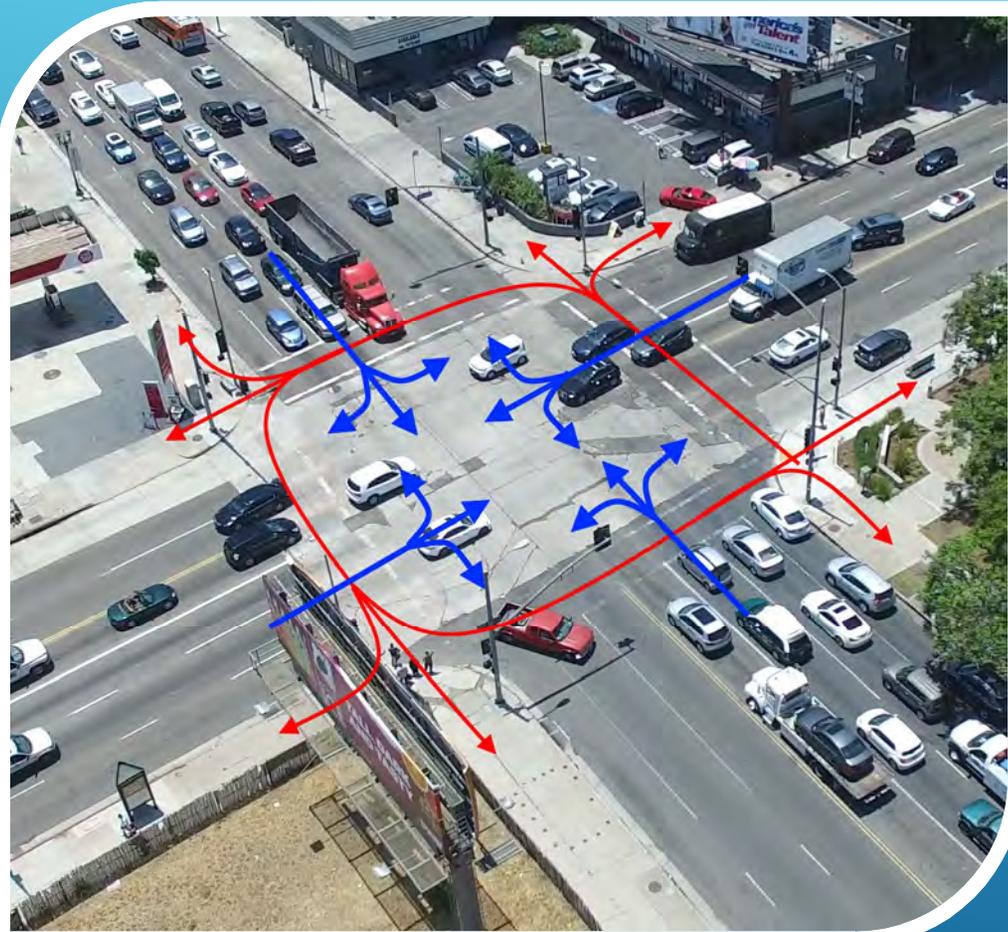
A decorative graphic consisting of several parallel white lines of varying lengths, slanted diagonally from the bottom-left towards the top-right, set against a blue gradient background.

MULTI-MODAL PEDESTRIAN & BICYCLE DATA COLLECTION V1

- Record pedestrian turning movement counts within each corner at the intersection
 - Pedestrians are not tracked around the intersection
- Record bicycle turning movement counts within the intersection



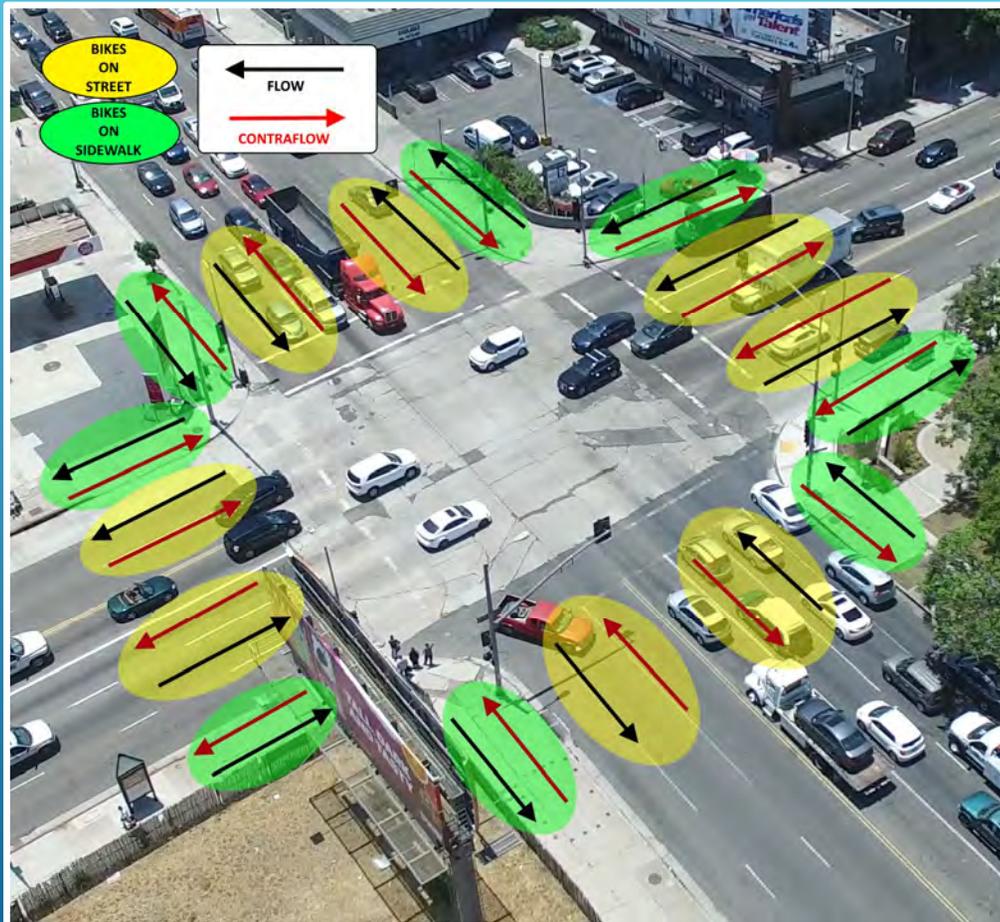
Not all data collection firms are the same



MULTI-MODAL PEDESTRIAN & BICYCLE DATA COLLECTION V2

- Record pedestrian turning movement counts throughout the intersection by identifying the unique origin and destination point of each pedestrian
 - Pedestrians are tracked around the intersection
- Record bicycle turning movement counts within the intersection

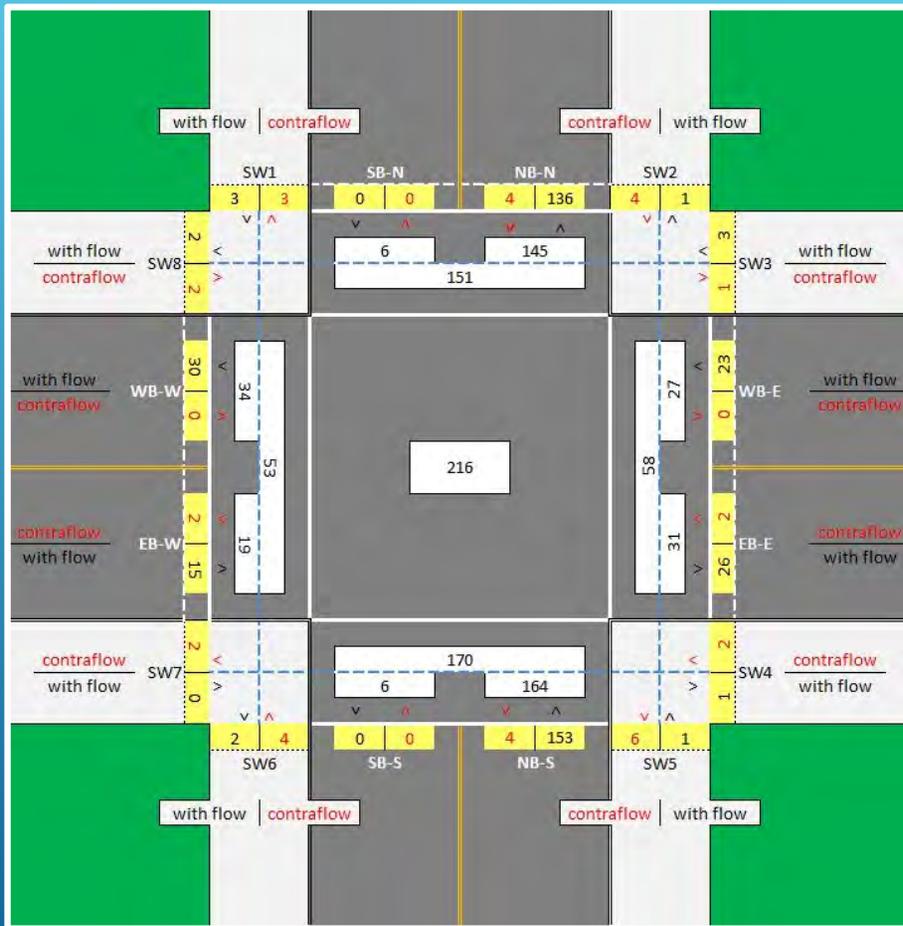
Not all data collection firms are the same



MULTI-MODAL BICYCLE DATA COLLECTION V3 FLOW VS CONTRAFLOW

- Record the entry and exit point for each bicycle as well as if the bicycle was riding with or against traffic.

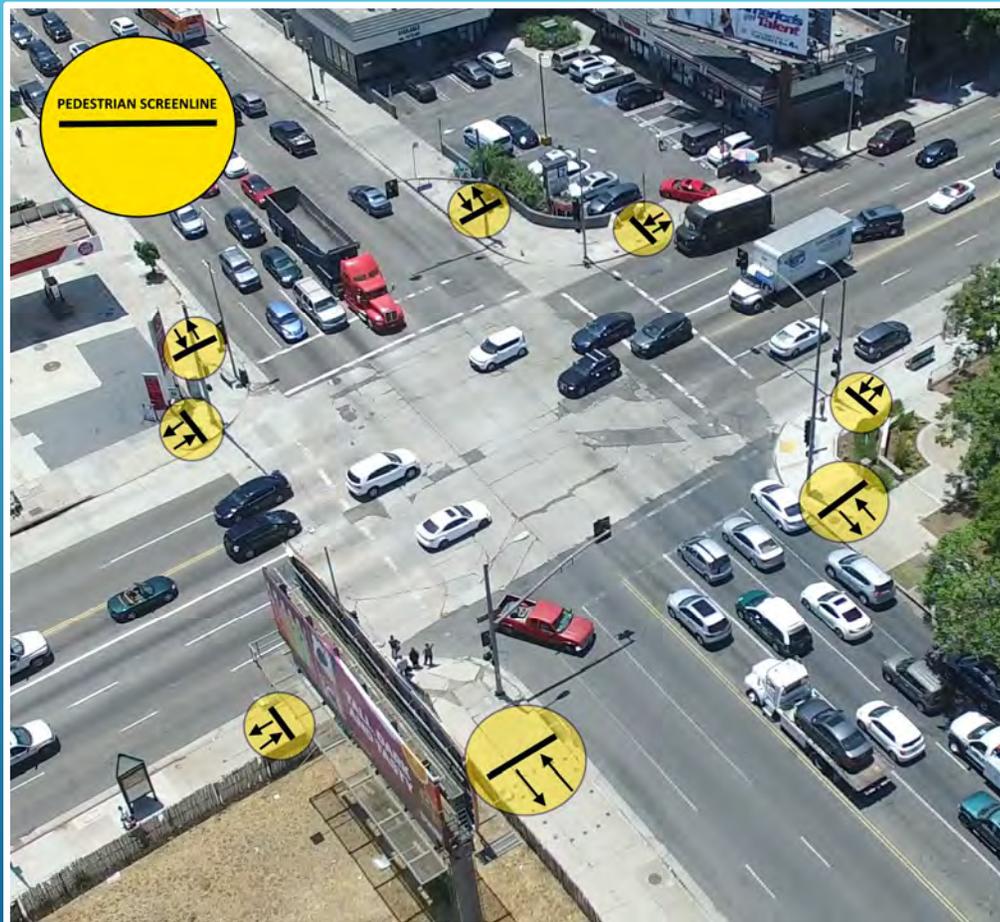
Not all data collection firms are the same



MULTI-MODAL BICYCLE DATA COLLECTION V3 FLOW VS CONTRAFLOW

- Bicycle summary sheet from SANDAG

Not all data collection firms are the same



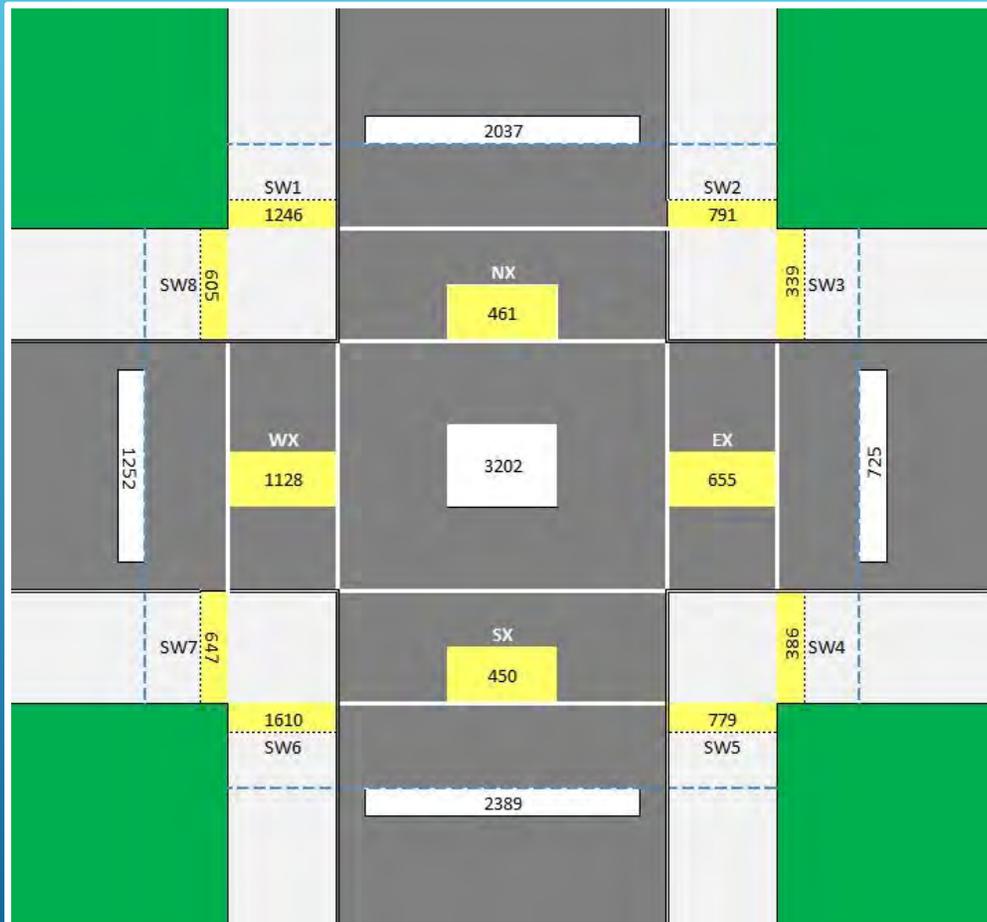
MULTI-MODAL PEDESTRIAN DATA COLLECTION V3

- Record the entry and exit point for each pedestrian
- This method is a more cost effective way to avoid pedestrian counting duplication but provides less route specific detail than V2

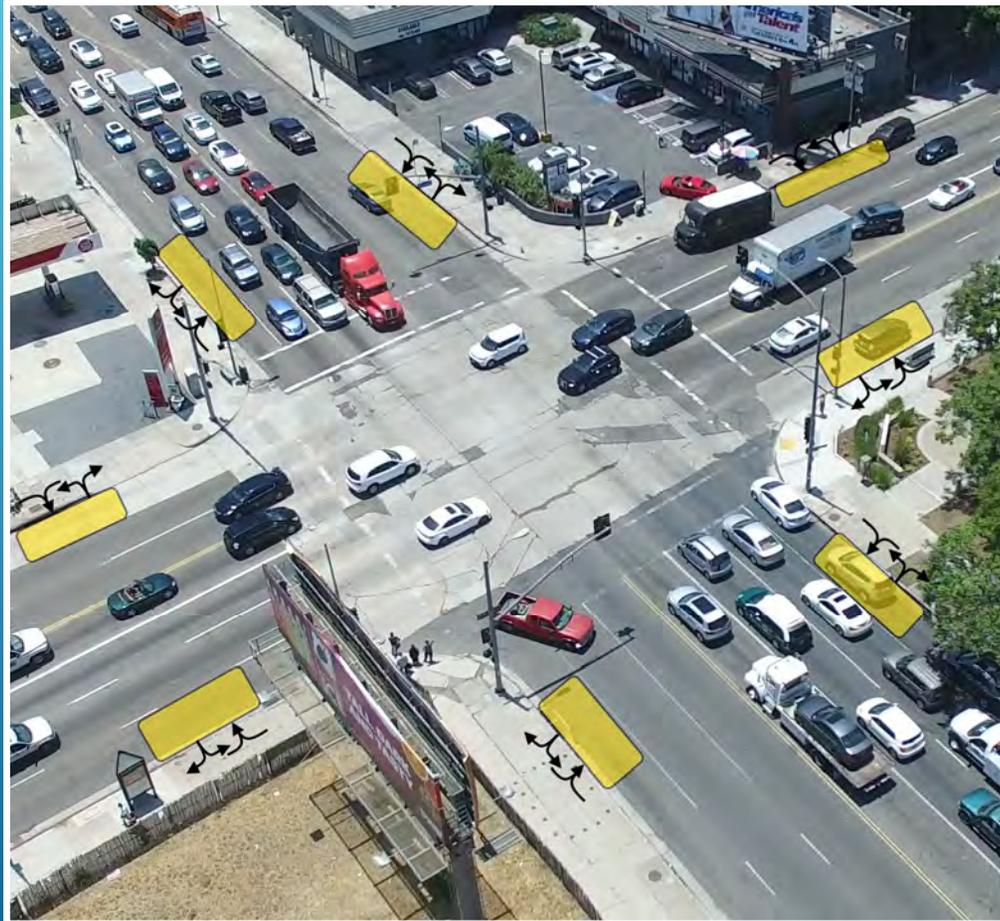
Not all data collection firms are the same

MULTI-MODAL PEDESTRIAN DATA COLLECTION V3

- Pedestrian summary sheet from SANDAG



Not all data collection firms are the same



MULTI-MODAL BUS DATA COLLECTION

- Record the number of buses at each bus stop
- Record the number of boarding and alighting passengers
- *Optional:* Record the number of bikes on the front of the bus

Not all data collection firms are the same

COMMON TECHNOLOGY DETECTION TYPES

- ▶ Pneumatic
- ▶ Magnetic
- ▶ Radar (Freeway dedicated vs. Street Segment dedicated)
- ▶ Video
- ▶ Bluetooth/Wifi Detection
- ▶ Drone

Not all data collection firms are the same

Capabilities	Pneumatic	Radar (Freeway)	Radar (Street)	Magnetic	Video	Drone	Bluetooth/Wifi
Volume	X	X	X	X	X	X	/
Speed	X	X	X	X			X
FHWA Classification	X				X	X	
Classification by length		X	X	X			
Data separated by lanes	/	X	X	X	X	X	

TECHNOLOGY CAPABILITIES COMPARISON

Not all data collection firms are the same

Limitations	Pneumatic	Radar (Freeway)	Radar (Street)	Magnetic	Video	Drone	Bluetooth/Wifi
Vehicles < 7mph	X	X	X	X			
Driveway Data	/	X	X	X			
Short Street Segments	X	X	X	X			
Congestion	X	X	X	X			
Poor Road Conditions	X			X			
Poor Weather Conditions	X					X	
Residential Streets/Alleys		X	X	X			

TECHNOLOGY LIMITATIONS COMPARISON

Not all data collection firms are the same

BENEFITS

- ▶ Cost effective
- ▶ Good for long term and short term data collection

RECOMMENDED APPLICATION

- ▶ Free flowing street segments

LIMITATIONS

- ▶ Driveways
- ▶ Short street segments
- ▶ 3+ lanes per direction classification & speed
- ▶ Congestion/speeds lower than 7mph
- ▶ Poor road conditions
- ▶ Poor weather conditions

PNEUMATIC DATA COLLECTION

VOLUME/CLASSIFICATION/SPEED

Not all data collection firms are the same

BENEFITS

- ▶ Higher speed accuracy than pneumatic data collection
- ▶ Individual lane volume, speed & class

LIMITATIONS

- ▶ Driveways
- ▶ Residential Streets
- ▶ Congestion/Speeds lower than 7mph
- ▶ Vehicles not driving in the center of the lane
- ▶ Classification by length, not FHWA

MAGNETIC DATA COLLECTION

VOLUME/CLASSIFICATION/SPEED

Not all data collection firms are the same

FREEWAY LIMITATIONS (Radar)

- ▶ Installation height
- ▶ Freeway divider height
- ▶ Bi-Directional lane detection
- ▶ Classification by length, not FHWA

FREEWAY BENEFITS (Radar)

- ▶ Lane separated class/speed/volume
- ▶ Accurate heavy volume and high speed detection

ROADWAY LIMITATIONS (Radar)

- ▶ Driveways
- ▶ Residential streets
- ▶ Congestion/speeds lower than 7mph
- ▶ 3 or more lanes
- ▶ Classification by length, not FHWA

ROADWAY BENEFITS (Radar)

- ▶ Alternative to pneumatic detection
- ▶ Less likely to encounter a problem than pneumatic detection
- ▶ Higher accuracy with speed detection

RADAR DATA COLLECTION

VOLUME/CLASSIFICATION/SPEED

Not all data collection firms are the same

BENEFITS

- ▶ Automated sampling detection to replace traditional collection methodologies
- ▶ Capture vehicle time spent in queue or pedestrian time spent in facility

LIMITATIONS

- ▶ Relatively low sample rate (5% – 25%)
- ▶ Results from extended collection efforts could be biased towards the local commuter base
- ▶ Wide range of detection makes detailed origin destination efforts in close proximity impossible

BLUETOOTH/WIFI DATA COLLECTION

TRAVEL TIME, ORIGIN DESTINATION & DELAY TIME

Not all data collection firms are the same

BENEFITS

- ▶ 4k aerial photography and videography
- ▶ Create a flight path to capture the same imagery over time
- ▶ At 400ft high, visibility is 1,400ft wide and at least 1,700ft long
- ▶ Cost effective surface parking occupancy and duration studies

LIMITATIONS

- ▶ FAA Regulations
 - ▶ The drone must be kept within line of sight
 - ▶ Airport control towers must be notified if flying within 5 miles of an airport
 - ▶ The drone cannot be flown over moving traffic or heavy pedestrian used areas
 - ▶ Can only fly in Class G airspace
- ▶ 20 – 25 minute battery life
- ▶ Cannot fly in inclement weather

DRONE DATA COLLECTION

THE ONLY LIMIT IS YOUR IMAGINATION

Not all data collection firms are the same



National Data & Surveying Services

THANK YOU

Any additional questions or comments should be emailed to kevd@ndsdata.com.

I can also be reached via phone at 323-782-0090.

Period	Street Screenlines																Sidewalk Screenlines																Total
	SB-N		NB-N		WB-E		EB-E		NB-S		SB-S		EB-W		WB-W		SW1		SW2		SW3		SW4		SW5		SW6		SW7		SW8		
	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	wf	cf	
1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
4:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
6:30	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
6:45	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
7:00	0	0	3	1	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
7:15	0	0	3	0	2	0	0	0	4	0	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	14
7:30	0	0	1	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
7:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MULTI-MODAL BICYCLE DATA COLLECTION V3 FLOW VS CONTRAFLOW

➤ Bicycle Sample Data Set

Not all data collection firms are the same

Period	Crosswalks				Sidewalk Screenlines								Total Peds
	NX	EX	SX	WX	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	
0:00	1	1	0	3	3	2	1	0	1	5	2	1	8
0:15	0	2	2	0	0	0	2	2	1	0	2	0	4
0:30	0	2	0	0	0	0	2	11	13	0	0	0	13
0:45	2	2	1	0	2	4	0	4	5	1	2	0	9
1:00	0	0	0	1	0	0	0	0	0	1	0	1	1
1:15	1	2	0	0	1	2	1	0	2	0	0	0	3
1:30	0	0	0	0	0	0	0	1	1	0	0	0	1
1:45	0	15	0	0	0	15	6	0	15	0	0	0	18
2:00	0	0	1	0	0	0	0	0	1	0	1	0	1
2:15	1	1	0	1	1	1	1	0	1	1	0	1	3
2:30	0	0	0	0	1	0	0	0	0	0	0	1	1
2:45	0	0	0	1	0	0	0	0	0	1	0	1	1
3:00	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15	0	0	0	1	1	0	0	0	0	0	1	0	1
3:30	0	1	0	1	1	2	1	0	1	1	0	0	3
3:45	0	0	0	1	2	0	0	0	0	1	0	1	2
4:00	0	1	0	1	1	1	0	0	1	2	1	0	3
4:15	1	2	0	2	2	1	2	1	3	2	0	1	6
4:30	0	1	0	0	0	1	0	0	1	0	0	0	1
4:45	0	3	0	2	2	4	1	0	3	2	0	0	6
5:00	0	0	0	2	2	0	0	0	0	2	0	0	2
5:15	0	1	0	0	0	0	1	0	1	0	0	0	1
5:30	1	1	1	1	2	1	1	0	0	2	1	0	4
5:45	0	1	1	1	3	1	0	1	1	3	3	2	7
6:00	2	1	0	4	3	0	3	1	2	5	1	1	8
6:15	0	1	2	4	4	2	1	3	2	8	6	0	13
6:30	2	6	0	4	4	6	0	1	5	6	2	2	13
6:45	1	2	0	6	6	2	1	0	2	8	3	1	12
7:00	2	3	4	6	10	3	2	4	5	9	0	6	20
7:15	4	1	1	12	11	4	2	1	1	11	6	1	19
7:30	3	9	3	1	2	7	2	2	10	3	4	4	17
7:45	6	5	5	10	10	9	8	5	5	9	5	6	29

MULTI-MODAL PEDESTRIAN DATA COLLECTION V3

➤ Pedestrian Sample Data Set

Not all data collection firms are the same