Everything You Wanted to Know About Bicyclist and Pedestrian Count Data

Module 1: COLLECT

Online Training Presented by:

TxDOT Bicycle and Pedestrian Program &

Texas A&M Transportation Institute (TTI)

July 23, 2020

WELCOME to Module #1: Collecting Pedestrian and Bicyclist Count Data

- Moderator: Shawn Turner, TTI

- TxDOT Program: Bonnie Sherman, TxDOT

- MODULE 1, COLLECTING THE DATA
  - Introduction & Overview
  - Collection Basics & Equipment
  - Site Selection
  - Equipment Installation
    - Infrared pedestrian counter
    - Pneumatic tube counter
  - On-Site Inventory

Shawn Turner

Bonnie Sherman

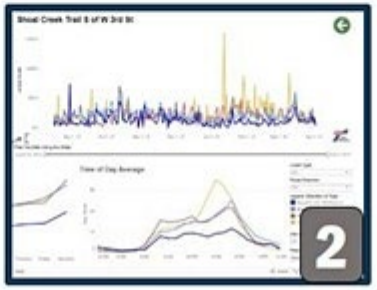
Robert Benz

Shawn Turner

Module #1: Collecting Pedestrian and Bicyclist Count Data

Everything You Wanted To Know About Bicyclist And Pedestrian Count Data

SUMMARIZE



USE

TODAY

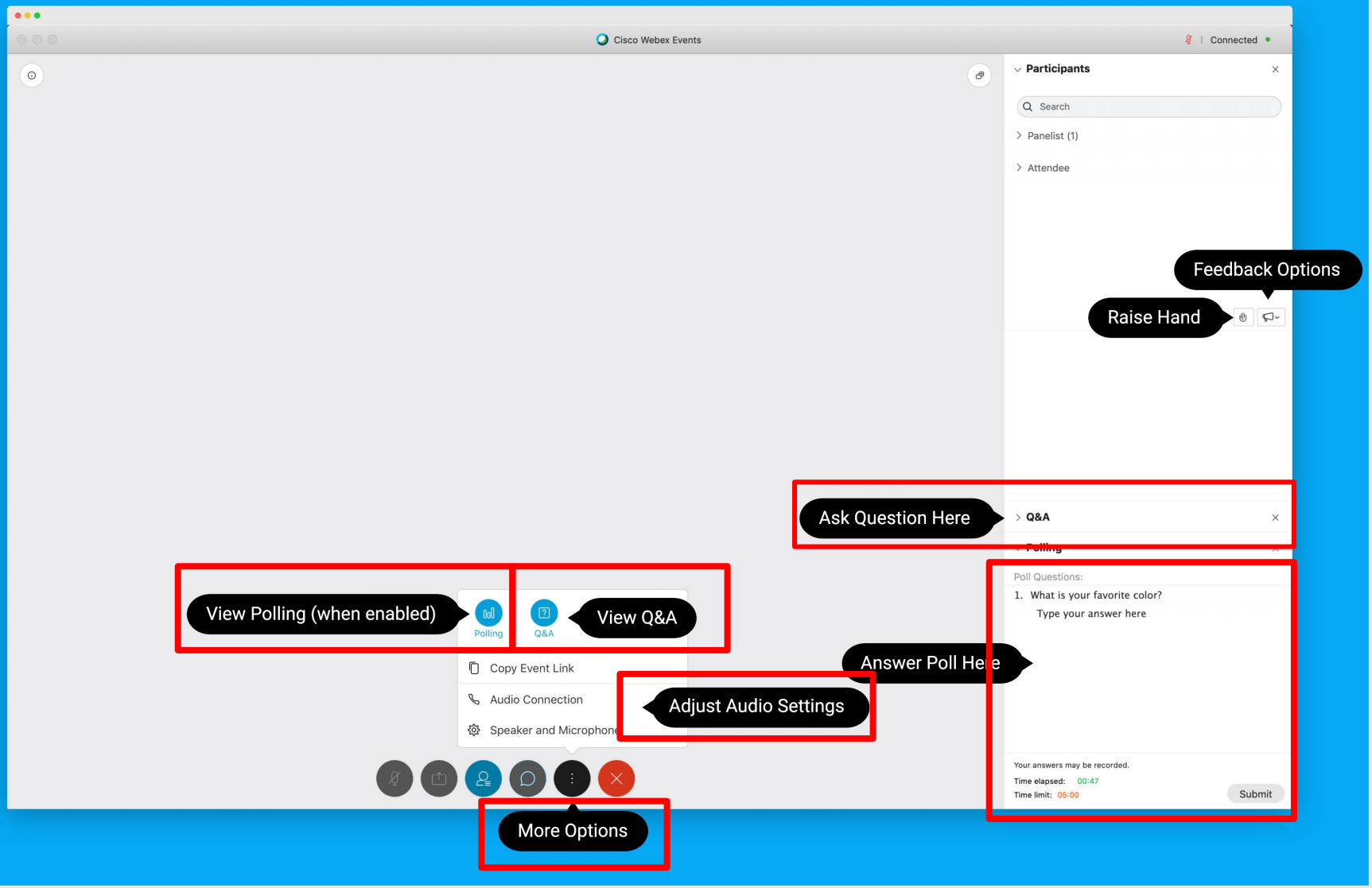
July 29
Registration

August 4
Registration

Best Practices for Virtual Meetings

- Please stay muted unless you are speaking
- Remove all other distractions (work email, instant messenger, etc.)
- Actively participate in training
  - Take notes on slide handouts
  - Use Q&A panel for questions or comments (not chat)
  - Respond to polls
- Webcam not necessary
  - Turn off outgoing video to conserve WiFi bandwidth

Webex Event Features



Introduction Poll

- Please respond to poll at this time

- Any questions before we get started?
  - Feel free to test question box now

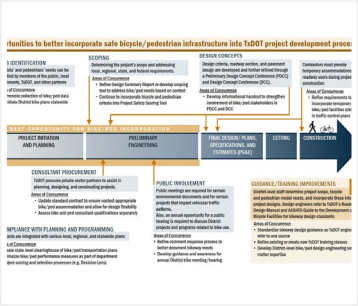
TxDOT Bicycle and Pedestrian Count Program

Bonnie Sherman, TxDOT

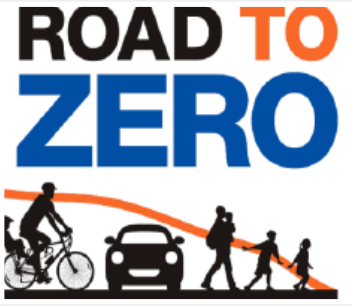
Statewide efforts addressing bicycle & pedestrian transportation

Texas Transportation Plan 2050

Bikeway Design Effort



Project Development Enhancements

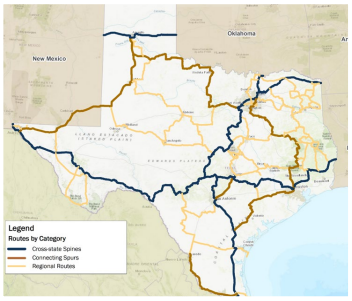


Road to Zero

Economic Impact of Bicycling in Texas

ADA Transition Plan Update

Pedestrian/Bicycle Facility Inventory



Bicycle Tourism Trails Study

Better decision-making requires good data

Safety
- Exposure for crash rates
- Behavior (contra-flow riding)

Planning
- Demand estimation
- Travel patterns

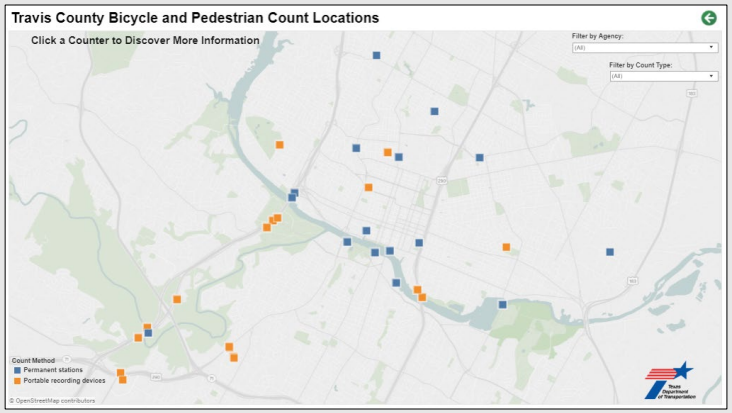
Design
- Facility type and design
- Barriers
- High activity areas

Performance Measurement
- Before and after studies
- Long-term trends from areawide improvements
- Mode shift

We need to know about bicycle and pedestrian usage on our roadways.

Working to resolve the data gap for bicyclists and pedestrians…

- Texas Bicycle and Pedestrian Count Exchange
- Crowdsourced bicycle data (StravaMetro)
- Counter equipment loan program
- Upcoming procurement of bike/ped counts
- Data collection and analysis guidance
- Virtual training in Summer 2020



Thank you!

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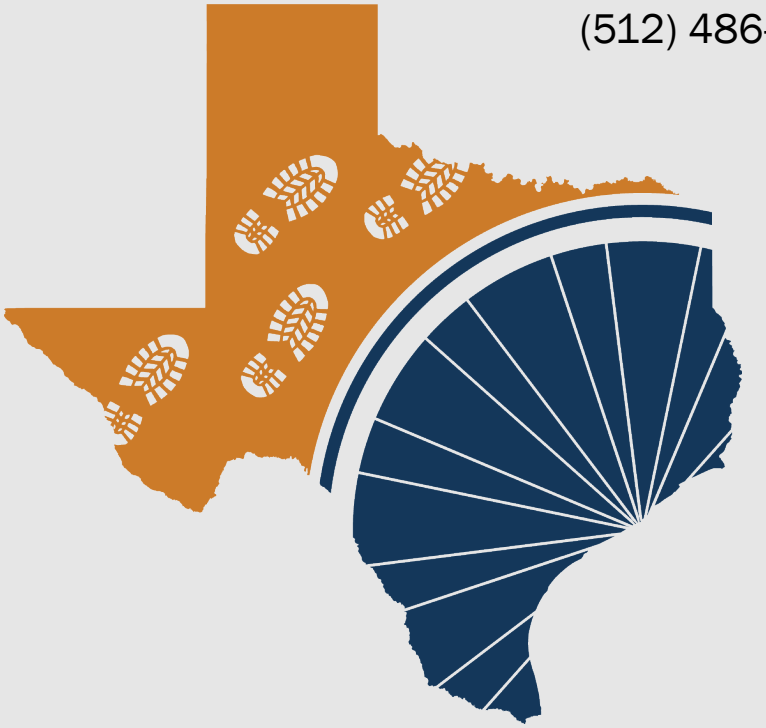


https://www.txdot.gov/inside-txdot/modes-of-travel/bicycle.html

Questions?

Why Am I Collecting Bicyclist and Pedestrian Counts?

Shawn Turner, TTI

Why are you collecting bicyclist and pedestrian counts?

- "…that's what our program plan lists…"
- "…that's what my boss said to do…"
- "…that's what others are doing…"
- Unless your job is ONLY data collection…
- …THESE ARE NOT VERY GOOD REASONS.

“Plan your destination before you start your trip”

Everything You Wanted To Know About Bicyclist And Pedestrian Count Data

COLLECT

SUMMARIZE

The uses (Module 3) inform many decisions made in these first 2 modules

How will you (and others) use count data?

- Most likely will have multiple uses
- Will have to balance the requirements for multiple uses
- Will be used for more things than what you planned

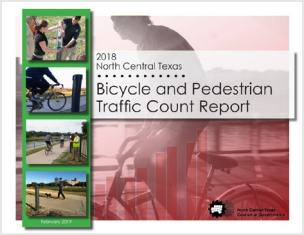
- Most common uses:
  1. Trend monitoring
  2. Before/after study or funding justification
  3. Identifying/prioritizing/selecting projects
  4. Safety analysis

- Let's look at a few examples
  - Will mention these during Module 1 and 2

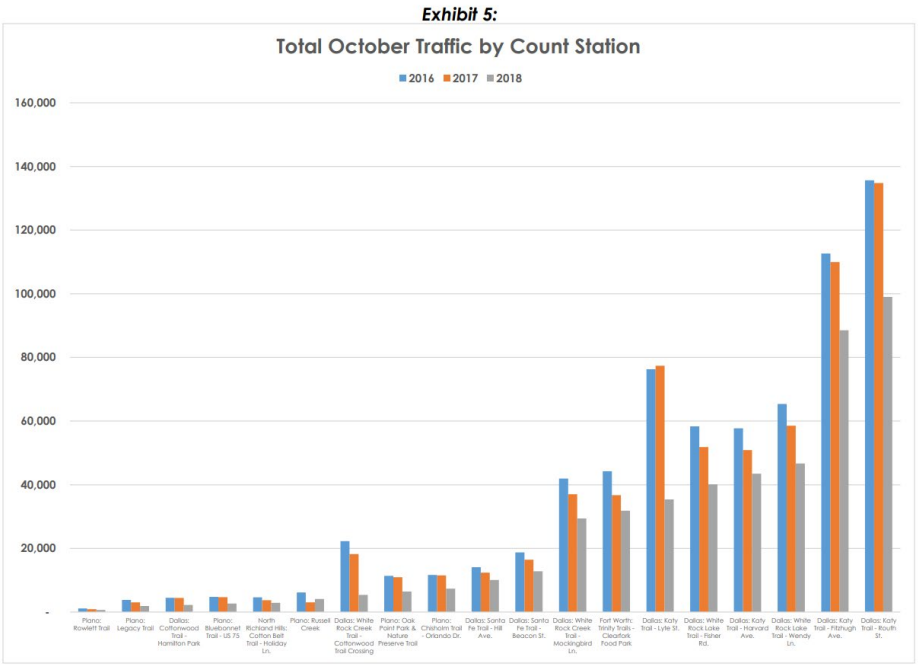
Trend monitoring

North Central Texas Council of Governments (NCTCOG)

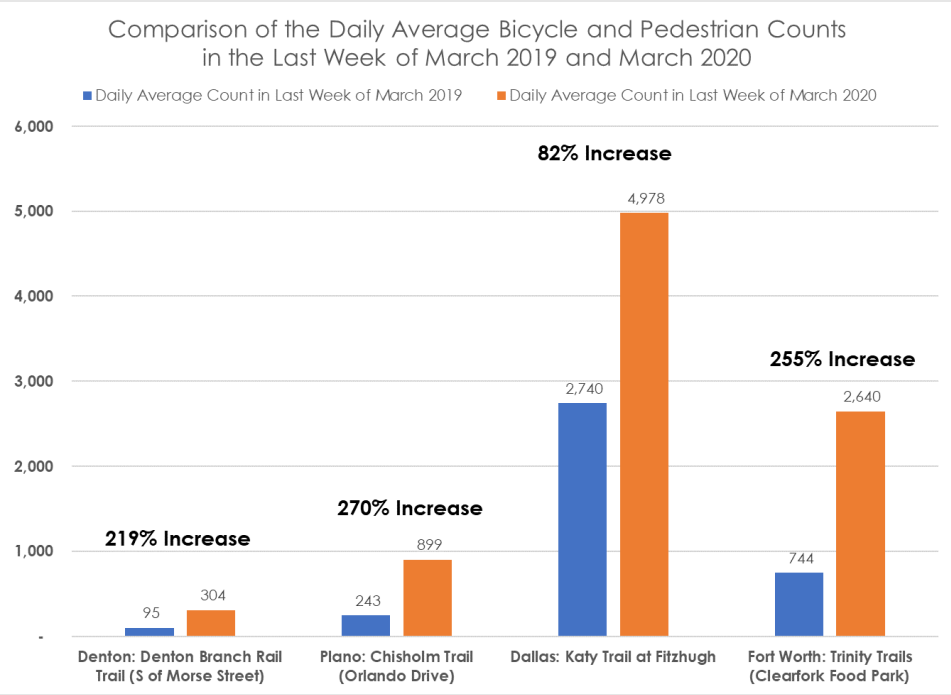
- Annual benchmarking report



Year-to-year Trends



Special Event Analysis

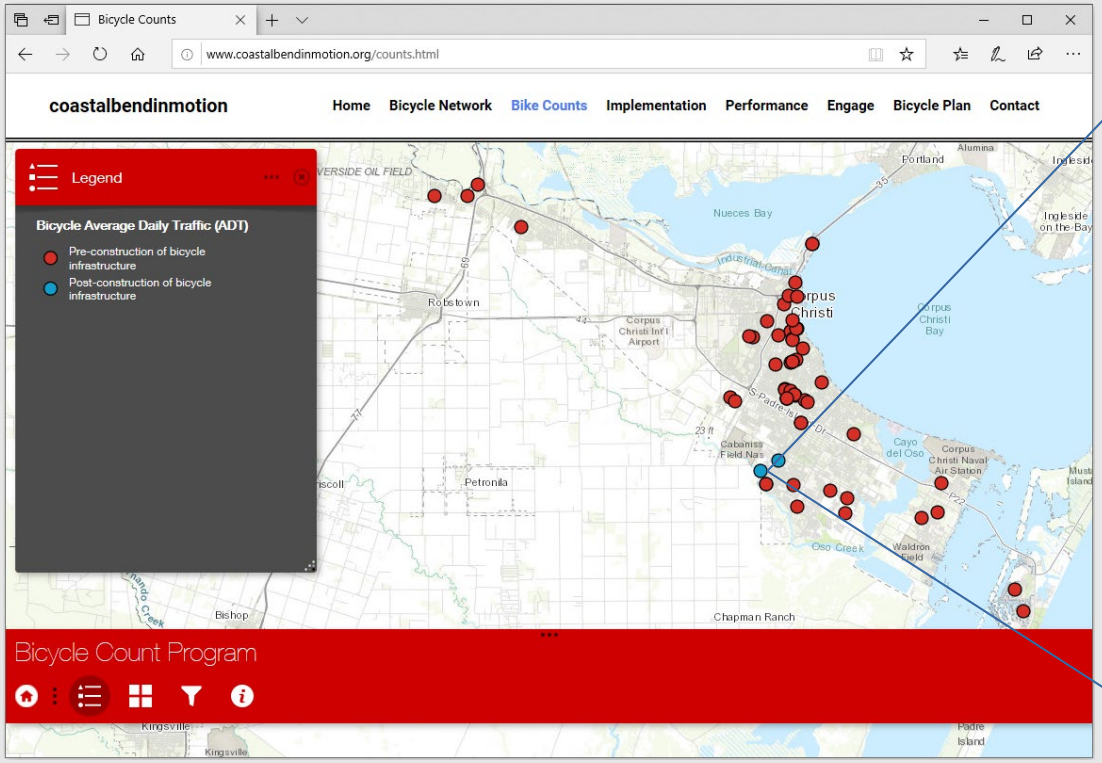


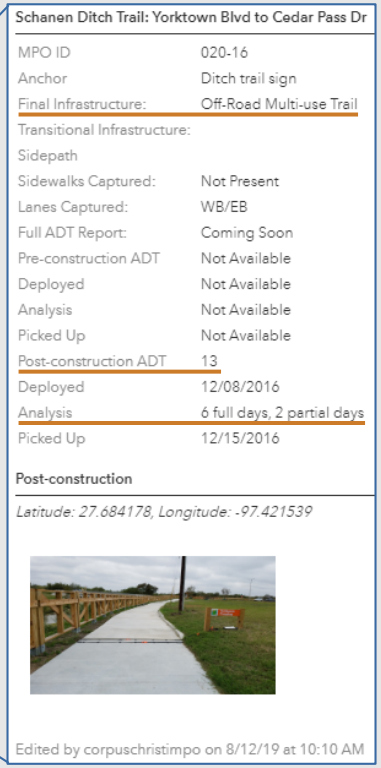
https://www.nctcog.org/trans/quality/bikeped/regional-bicycle-and-pedestrian-traffic-monitoring

Before/after study

Corpus Christi MPO

- Before and after-construction bike counts for projects around the area
- Data collection separates anecdotal information from the facts





http://www.coastalbendinmotion.org/counts.html

Identifying/Prioritizing/Selecting Projects

Houston-Galveston Area Council (HGAC)

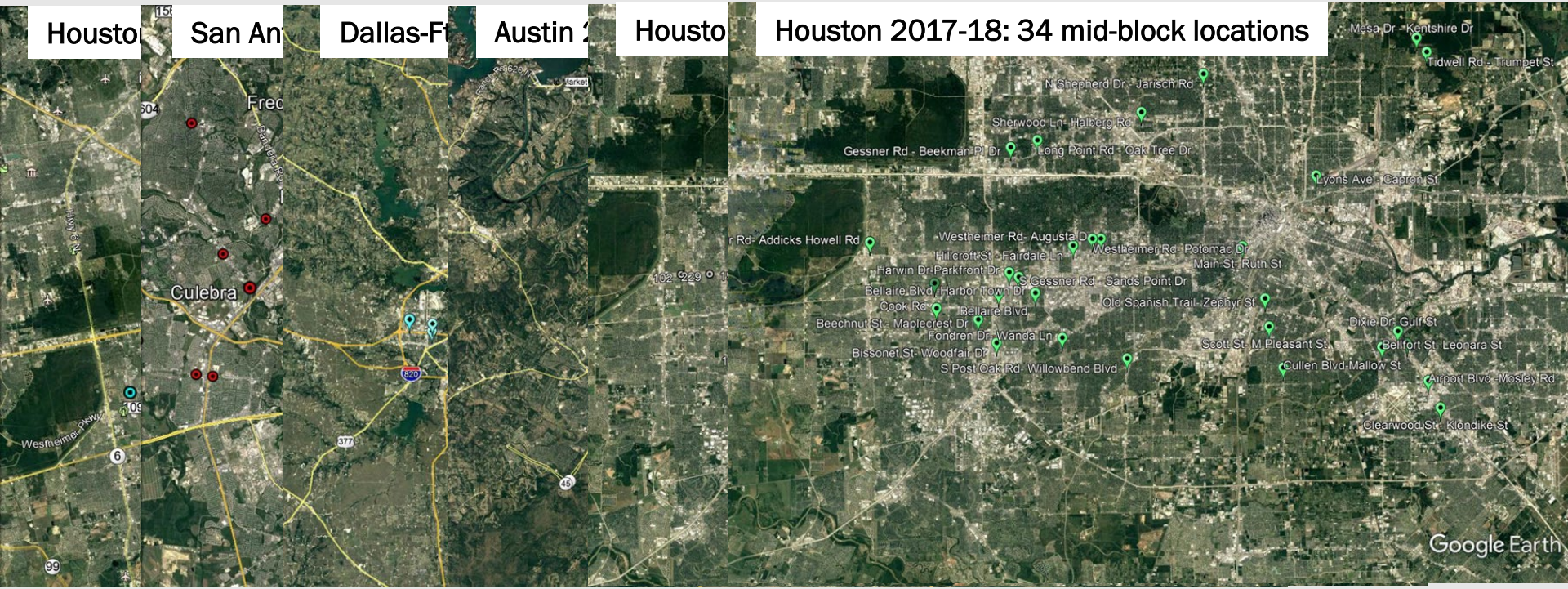
- TxDOT Houston District response to HGAC TIP call for projects
- Selection based on the benefit-cost ratio (safety and reduction of SOV)
- Estimate of non-motorized users per project required

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1					% increase per year		2%	1/2 mile walk							
2	TxDOT Non Motoized Project Volume Estimates				Number of years		20	0.5							
3															
4															
5	#	Project Name	Project Length	Stava Compnts	Strava Vol	Step increase	Step Vol	Distance Factor	2040 Vol	Existing Count Estimate	Distance Factor	2040 Vol	Conslt Est	Conslt 2025	Conslt 2045
6	1	US 290 FR to Post Oak Transit Center	0.933722	30	30	1.3	39	72.8	103	35	65.4	97			
7	2	Memorial Connection White Oak to IH 10	0.584328	135+175(.3)	187.5	1.2	225	262.9	391	150	175.3	260	2090		4,187
8	3	White Oak Bayou MKT Trail	0.791143	35+35	70	1.2	84	132.9	198	114	180.4	268	2521		3,009
9	4	US 59 Grausta Street to Wheeler Station	0.980035	125	125	1.2	150	294.0	437	94	184.2	274			
10	5	Hillcroft PNR Connector via Westpark	1.127908	50	50	1.2	60	135.3	201	32	72.2	107			
11	6	SH 6, SH249 to IH 45N	8.806099	55-95	75	1.2	90	1585.1	2,355	20	352.2	523	2210		2,604
12	7	SH3 @ Sims Bayou Bridge	0.05107	30	30	1.5	45	45.0	67	45	45.0	67	2237		2,234
13	8	West Belfort PNR to Kegans Bayou	0.108252	40	40	1.2	48	48.0	71	30	30.0	45			
14	9	NASA 1 (both sides of bridge)	2.079713	75	75	1	75	312.0	464	70	291.2	433	2339		2,347
15	11	FM 1876 both sides	2.203266	(35+25)	60	1.2	72	317.3	471	50	220.3	327	469		552

Safety Analysis

TxDOT/TTI 402 Safety Program

- Crash rate = crashes / EXPOSURE
- Pedestrian counts at high-crash locations
  - 625 signalized intersections, 64 midblock locations



Summary -

- Understand uses BEFORE collecting
- Balance requirements for multiple uses
- Most common uses:
  1. Trend monitoring
  2. Before/after study or funding justification
  3. Identifying/prioritizing/selecting projects
  4. Safety analysis

Collecting Bicyclist and Pedestrian Count Data

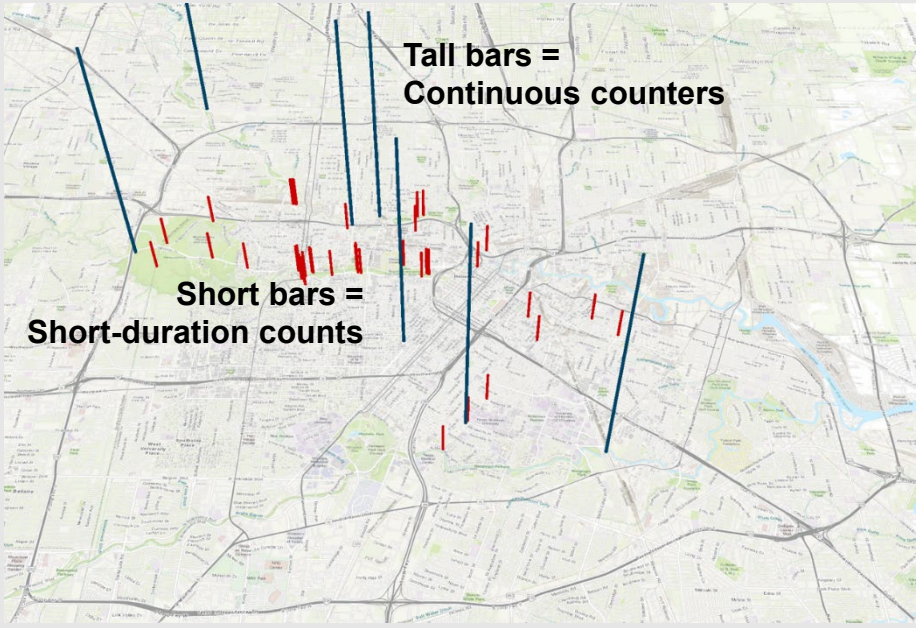
Robert Benz and Shawn Turner, TTI

Traffic Monitoring Fundamentals

- Can't count everywhere all the time, so we must sample

1. Continuous counts at permanent locations
   - Collect 365 days of data at representative locations
   - TEMPORAL COVERAGE
2. Short-duration counts with portable equipment
   - Collect 7-14 days of data at many more locations
   - SPATIAL COVERAGE

- Data uses affect approach
  - Citywide activity
  - Before-and-after at selected sites



Continuous counts at permanent locations

- Continuous counts at representative locations in 3 pattern groups:
  1. Commuting to work/school routes
  2. Recreational/utilitarian routes
  3. Hybrid/mix of commuting and recreation
- FHWA TMG recommends 3-5 permanent locations in each group
- Phased approach
  - Not all 9-15 permanent locations at once
- Use short-duration counts
  - Test/confirm ideal permanent site
- Plan for long-term maintenance
  - E.g., batteries, cleaning, modem fees

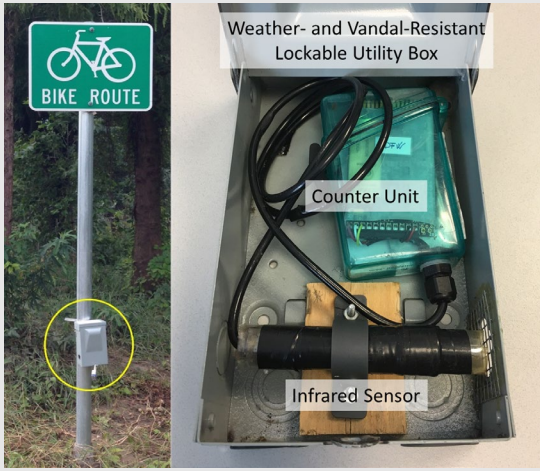
Short-duration counts with portable equipment

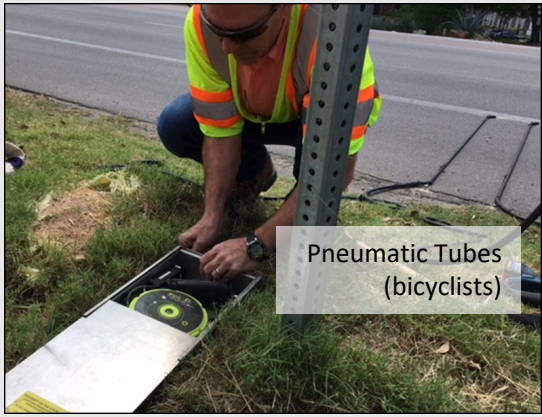
- Available resources usually determine how long and how many sites

- What is short-duration?
  - Automated equipment: min. 7 days, preferred 14 days
  - Manual counts: minimum 4 hours, preferred 12 hours

- How many sites?
  - Depends mostly on data uses
  - 30 locations per traffic pattern group, but often less

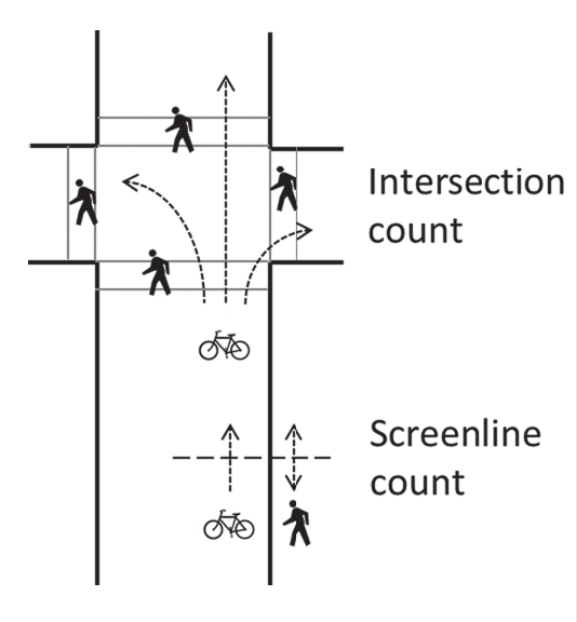
- Coordinate among multiple agencies, pool resources
  - Parks & recreation
  - Utility/waterway districts
  - Commercial/business districts
  - Ped/bike counts as part of motor vehicle special counts





Short-duration site selection

- First decision – intersection vs. screenline counts
- Intersection more complicated, different collection equipment
- Based on planned data uses



Source: NCHRP Report 797

- Intersection counts
  - Safety and conflicts
  - Detail of turning movements
- Screenline counts
  - Overall activity levels
  - Big picture corridor movement

Short-duration site selection

- Typically focused on certain types of locations, not random
  - Planned improvements
  - Moderate to high activity levels (also growth potential)
  - Area and land use types
    - Commercial
    - Residential
    - Mixed use
    - Recreational
  - Bicyclist/pedestrian facility types
- Typically “more art than science”

Short-duration site selection

- Not just the highest-volume locations (unless that is your goal)
- Interplay between sites and technology – one affects the other
- Counter positioning (especially automatic counters):
  - READ THE MANUAL!
  - Where flow always moving – no pacing or waiting areas
  - Where flow likely to be single file – prevent occlusion
  - Bicyclists on sidewalks or against traffic

Bicyclist and Pedestrian Counting Technology

1. What Are You Counting?

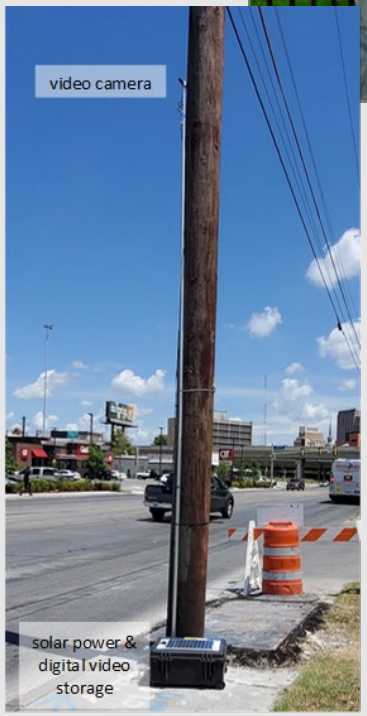
2. How Long? (Permanent ↑ / ↓ Temporary/Short Term)

Technology	Bicyclists Only	Pedestrians Only	Pedestrians & Bicyclist Combined	Pedestrians & Bicyclist Separately	Cost
Inductance Loops[1]	●			◐	$$
Magnetometer[2]	○				$-$$
Pressure Sensor[2]	○	○	○	○	$$
Radar Sensor	○	○	○		$-$$
Seismic Sensor	○	○	○		$$
Video Imaging: Automated	○	○	○	○	$-$$
Infrared Sensor (Active or Passive)	○[3]	●	●	◐	$-$$
Pneumatic Tubes	●			◐	$-$$
Video Imaging: Manual	○	○	○	●	$-$$$
Manual Observers	●	●	●	●	$$-$$$

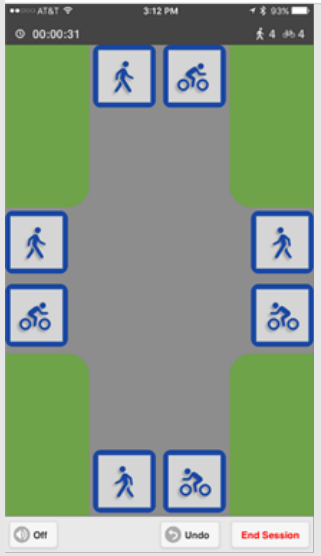
○ Indicates what is technologically possible.
● Indicates a common practice.
◐ Indicates a common practice, but must be combined with another technology to classify pedestrians and bicyclists separately.
$, $$, $$$: Indicates relative cost per data point.
[1] Typically requires a unique loop configuration separate from motor vehicle loops, especially in a traffic lane shared by bicyclists and motor vehicles.
[2] Permanent installation is typical for asphalt or concrete pavements; temporary installation is possible for unpaved, natural surface trails.
[3] Requires specific mounting configuration to avoid counting cars in main traffic lanes or counting pedestrians on the sidewalk.

Common pedestrian counting technology

- Infrared
  - Most common automated tech
  - Several vendors
  - Passive vs. active infrared
  - Occlusion (blocking) a problem, overcome with overhead mount
- Video
  - Also common, several vendors
  - Manual vs. automatic reduction
  - Capture pedestrian behavior and demographics
- Manual (human observer)
  - Clipboard or tablet computer
  - Simple and low-tech
  - Limited to short time intervals

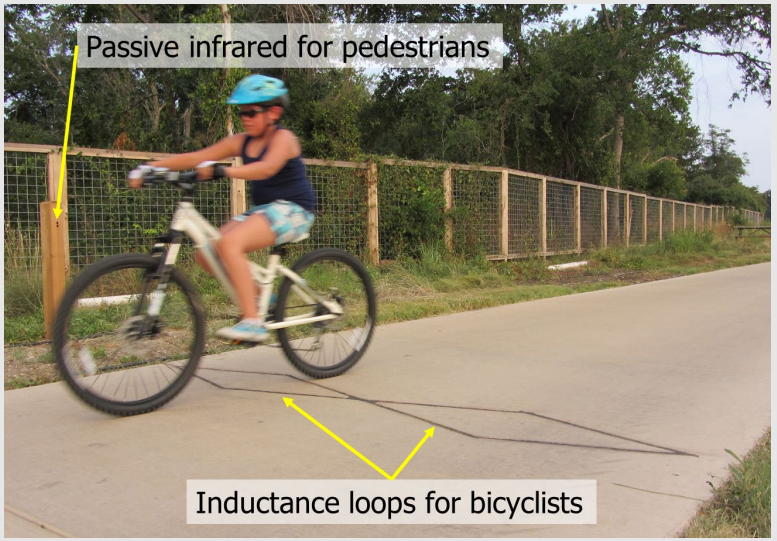


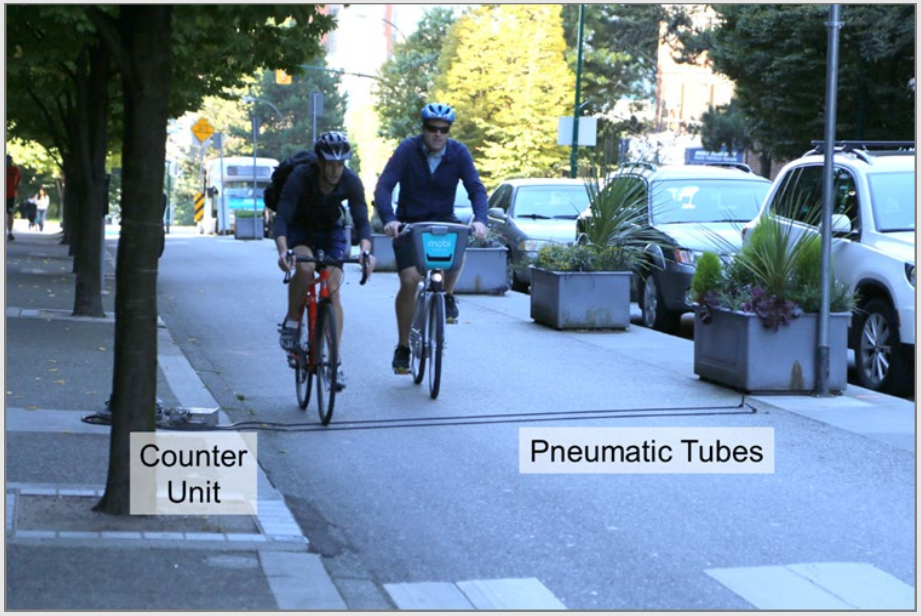
Go-Counter App
(Source: Rails-to-Trails Conservancy)



Common bicyclist counting technology

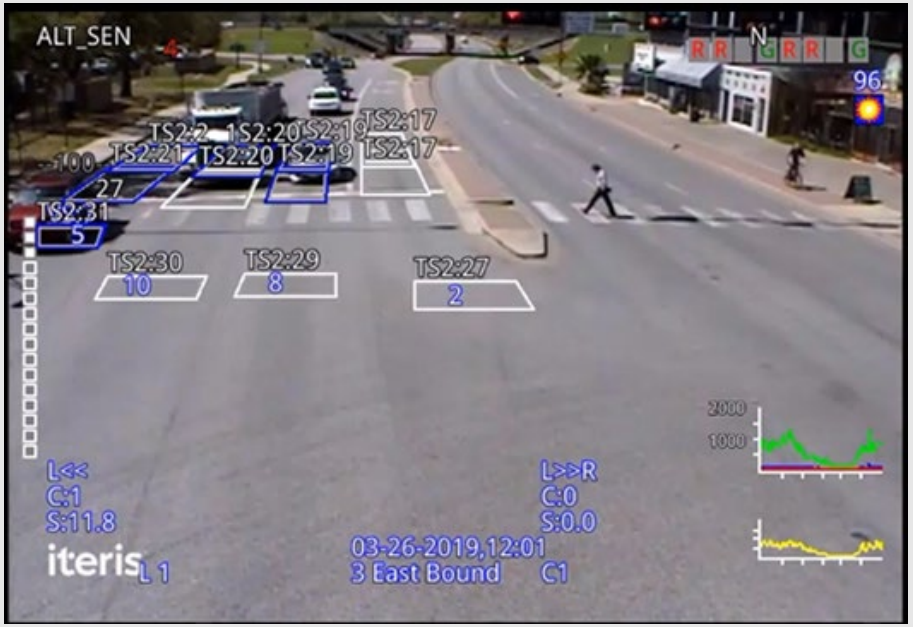
- Inductance loops
  - Most common (permanent)
  - Specific loop shapes
  - Requires pavement cuts
- Pneumatic tubes
  - Most common (portable)
  - Specific tube size
  - Hazard issues
- Video
  - Common (esp. intersections)
  - Capture behavior
- Manual
  - Use in complex situations
  - Limited to short time intervals





Emerging video analytics

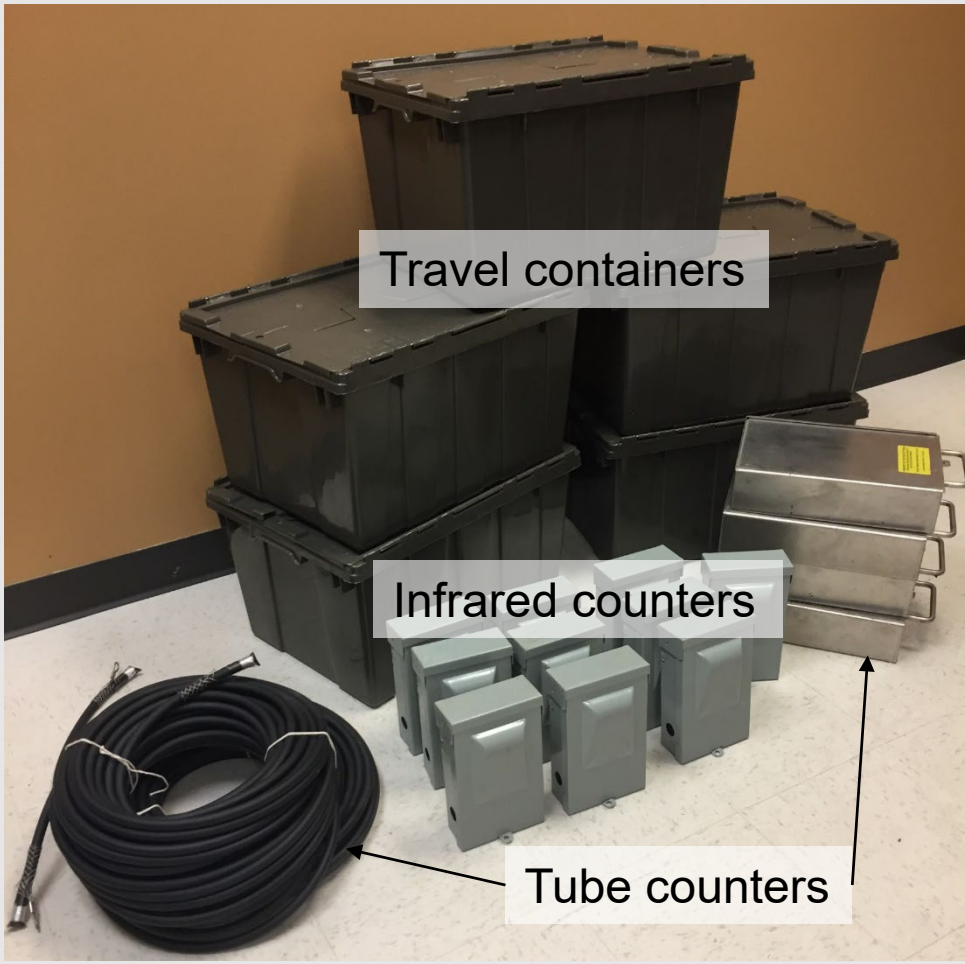
Intersection signal system analytics



Other video system analytics

TxDOT counter equipment loan program

- Portable equipment for loan
  - 10 infrared counters
  - 8 pneumatic tube counters (bikes)
- Available for use by:
  - TxDOT districts
  - Local agencies
  - Others as available
- Contact TxDOT
  - BikePed@txdot.gov



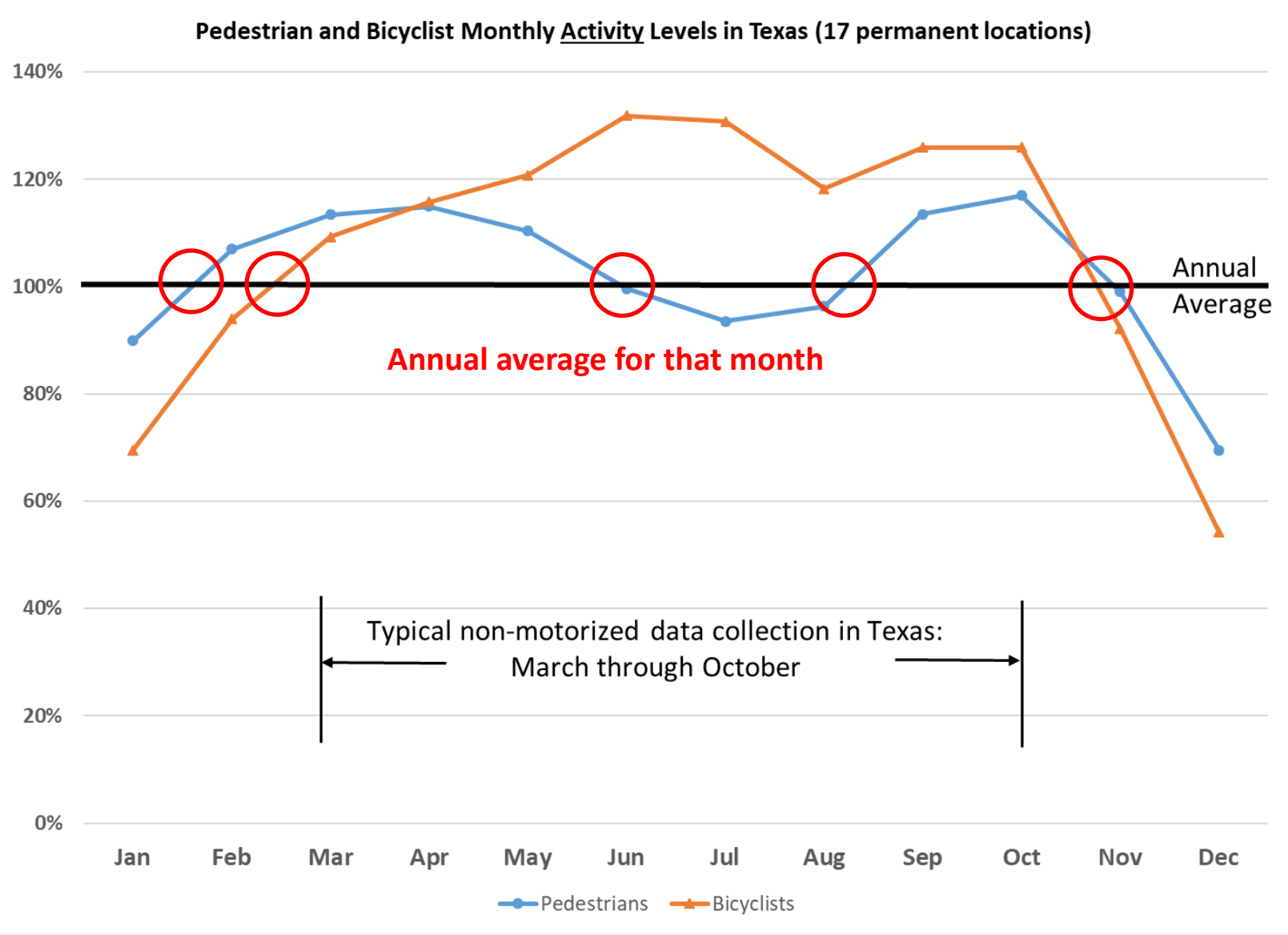
NCTCOG mobile counter loan program

- Off-Street Counters (trails)
  - Two Sets of Off-Street Counters
  - Each set contains one tube counter and one infrared sensor
- On-Street Counters
  - Two Sets of On-Street Counters
  - Each set contains two tube counters
- Available to agencies located in the 12-county North Central Texas Region (Dallas-Fort Worth)
- If interested, contact Daniel Snyder at dsnyder@nctcog.org.

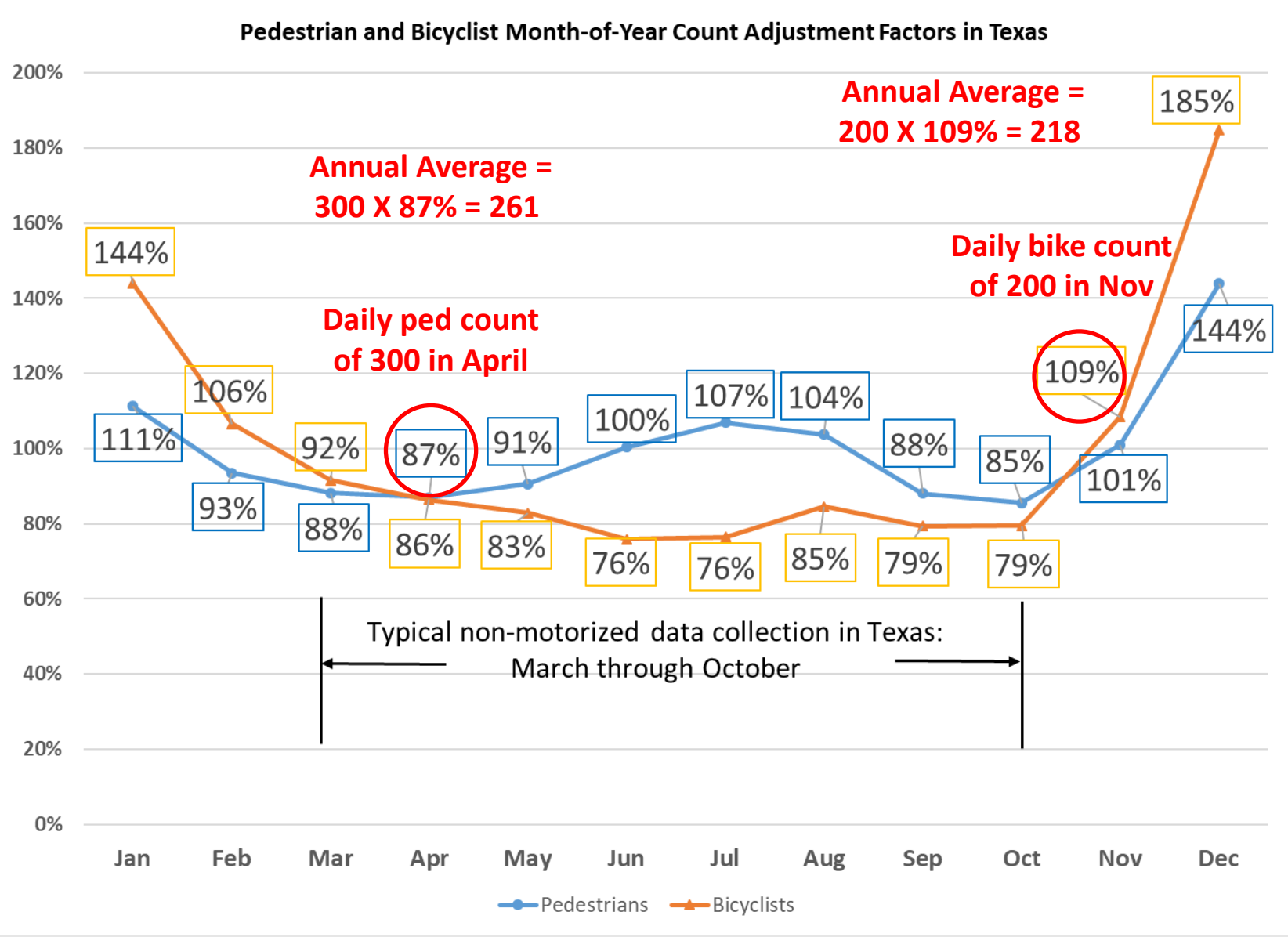
HGAC counter loan program

- Houston-Galveston Area Council (HGAC)
  - 4 infrared counters
  - Susan Jaworski
  - Susan.Jaworski@h-gac.com

Seasonal variation and adjustment



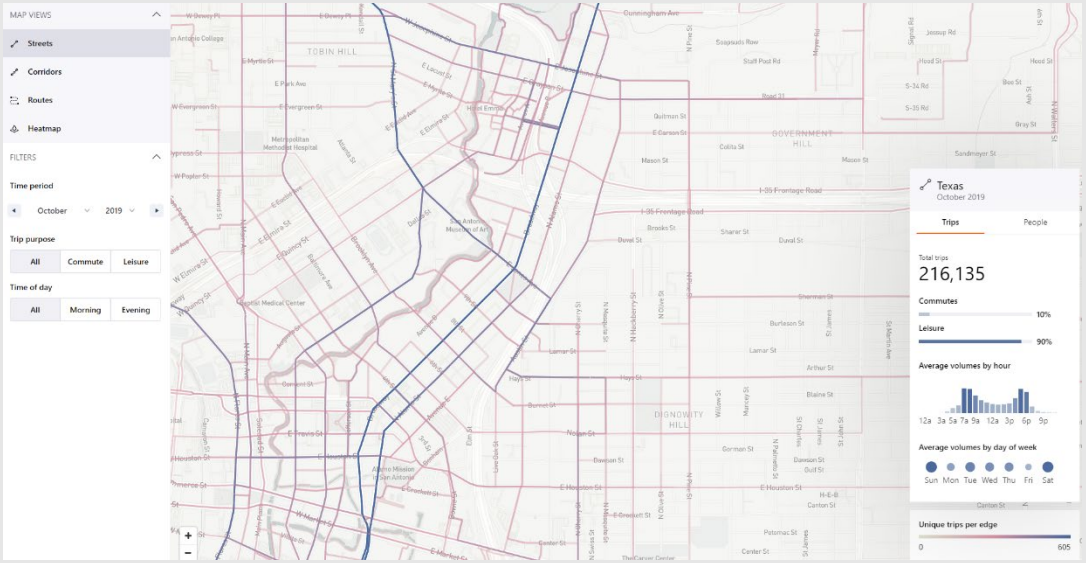
Monthly adjustment factors



Crowdsourced data

- Crowdsourced = location of a person walking or biking
- Strava Metro – user-prompted data collection (active)
- StreetLight Data and others – background data collection (passive)

- TxDOT licensed 4 years of statewide Strava Metro
  - 2016-2019
- Local entities have free access through sublicense
- New online analytic interface!



https://metroview.strava.com/application

Expanding Strava samples to estimate total bicyclists

- Different Strava sample rates on different types of routes
  - Non-recreational routes: <1% of all bicyclists
  - Highly recreational routes: 50%+ of all bicyclists

- Estimate total bicyclists based on readily-available and most influential prediction variables:
  - Open Street map (OSM) functional road class
  - High-income households
  - 30% mean absolute error, R^2=70%

Functional Classification (CLAZZ in Strava Metro's network data from Open Street Map)	
Highway, primary (15)	$AADB_i = 63 \times (\exp(AADB\ Strava_i))^{0.038} (\exp(\text{Household} > 200K_i))^{0.002}$
Highway, secondary (21)	$AADB_i = 13 \times (\exp(AADB\ Strava_i))^{0.038} (\exp(\text{Household} > 200K_i))^{0.002}$
Highway, tertiary (31)	$AADB_i = 22 \times (\exp(AADB\ Strava_i))^{0.038} (\exp(\text{Household} > 200K_i))^{0.002}$
Highway, residential (32)	$AADB_i = 17 \times (\exp(AADB\ Strava_i))^{0.038} (\exp(\text{Household} > 200K_i))^{0.002}$
Highway, path (72)	$AADB_i = 72 \times (\exp(AADB\ Strava_i))^{0.038} (\exp(\text{Household} > 200K_i))^{0.002}$
Cycleway (81)	$AADB_i = 62 \times (\exp(AADB\ Strava_i))^{0.038} (\exp(\text{Household} > 200K_i))^{0.002}$
Footway (91)	$AADB_i = 28 \times (\exp(AADB\ Strava_i))^{0.038} (\exp(\text{Household} > 200K_i))^{0.002}$

Texas A&M Transportation Institute

Guide for Seasonal Adjustment and Crowdsourced Data Scaling

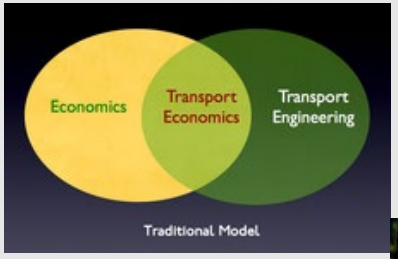
Report 6927-P6

For more information

- TxDOT 6927 Reports, 2018-2019
  - Final Project Report: https://tti.tamu.edu/documents/0-6927-R1.pdf
  - Guide for Seasonal Adjustment and Crowdsourced Data: https://tti.tamu.edu/documents/0-6927-P6.pdf
- PBIC Infobrief, 2018
  - http://www.pedbikeinfo.org/cms/downloads/PBIC_Infobrief_Counting.pdf
- FHWA Traffic Monitoring Guide, 2016
  - https://www.fhwa.dot.gov/policyinformation/tmguide/
- NCHRP Report 797, 2014
  - http://www.trb.org/Main/Blurbs/171973.aspx

Robert J. Benz, P.E.

- Research Interest:
  - Transportation Data Analysis
  - Transportation Data Collection
  - HOV and HOT
  - Bicycle and Pedestrian
  - The Economics of Transportation
- Using data to improve decisions and understanding (data geek!)
- Research for TxDOT, FHWA, MPOs, and other agencies
- 28 years at TTI 30+ years of experience



Texas A&M Transportation Institute

Overview

- Site Selection
- Equipment Preparation
- Deployment Preparation
- Inventory
- Installation
- Supplemental Mounting
- Pedestrian Counter Installation
- Road tube Installation

Site Selection

Site Selection

- What is the objective of your data collection?
  - Before and after study
  - Corridor study
  - Trend analysis (year over year, facility types, seasonal patterns)
  - Project
    - Project Identification (OD patterns, exiting path, other)
    - Project Selection and Prioritization
    - New non-motorized facility?
    - New roadway project – Identify potential connections with NM Network
    - CMP – Congestion Management Process

Site Selection Cont.

- Work with agency partners (parks department, MPO, development district)
- Local advocacy groups (AARP, pedestrian & cycling)
- Identify the origins & destinations
  - Places of interest
  - Employment, Living (single & multi-family), Entertainment
- Identify existing and proposed routes
  - Sidewalks
  - Trails
  - Bike facilities
  - Training routes
  - Low volume roads

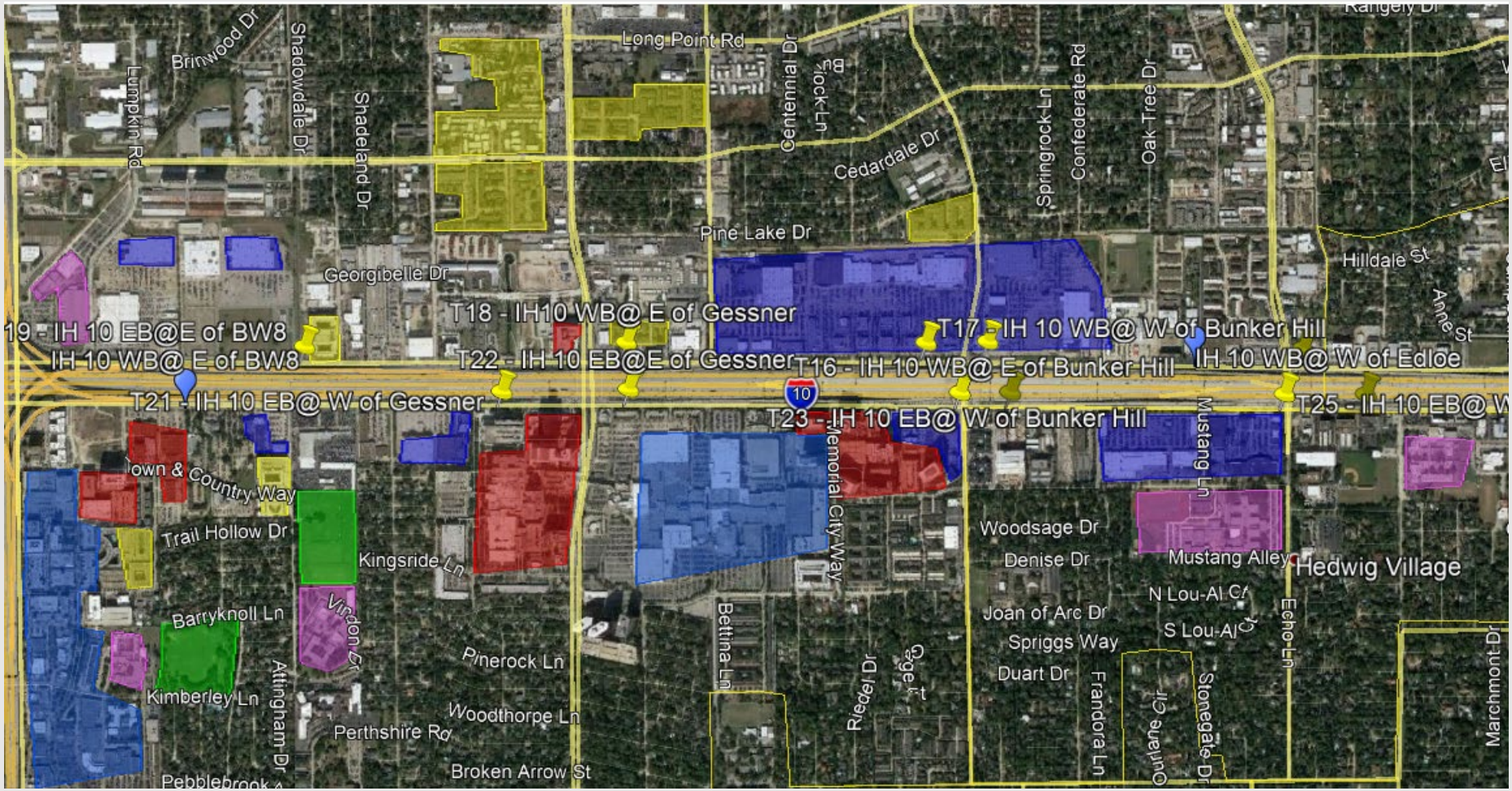
Locate Site(s)

- Identify target area(s)
  - Employment Centers (Downtown, Hospital complex, Retail areas, Etc.)
  - Schools and Universities
  - Housing areas (Single-family, Multi-family, Mixed-use)
  - Recreational (Parks, Sports fields,
- Identify corridors of non motorized activity (Bayous, Rails to Trails, Utility)
- Determine logical paths to destinations
- Use Google Earth and Street view to identify exact deployment locations
  - Need something to mount equipment on
  - Point away from vehicle traffic or other visual noise

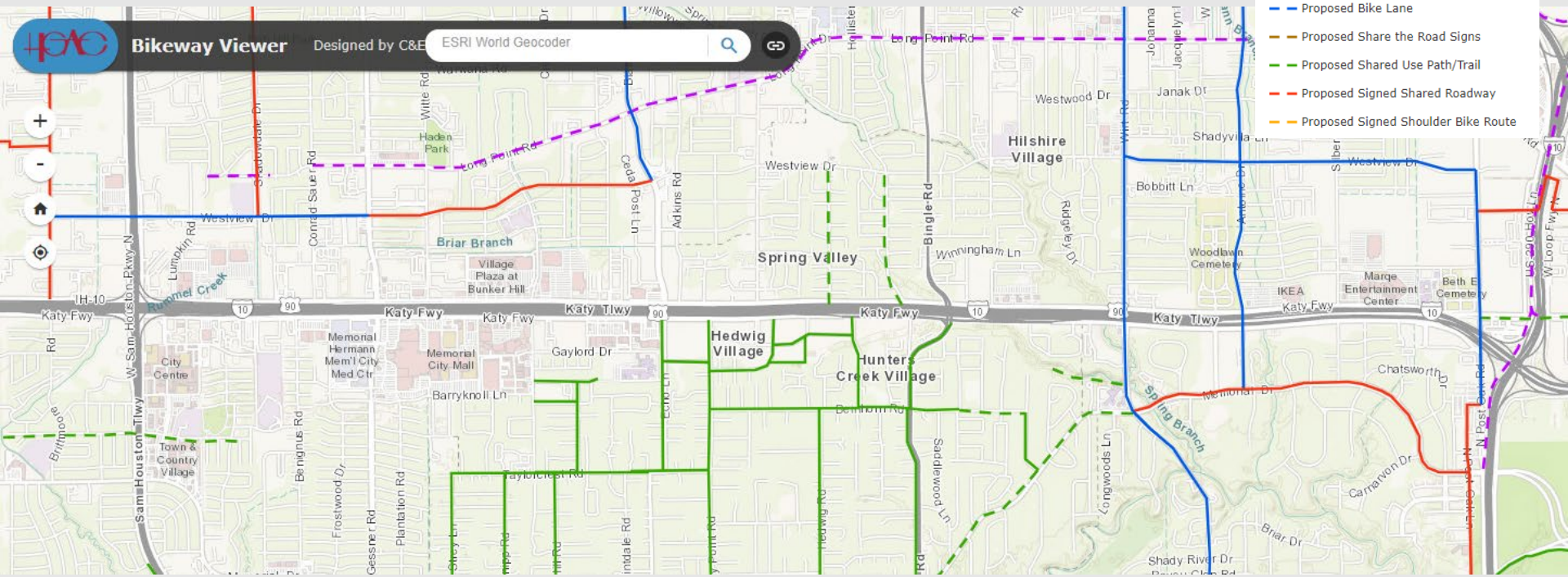
Locate Site(s)

- What is the focus (pedestrian, cyclists, both?)
- Site size – 1 to 5 square miles
- Corridor length 5 to 15+ miles
- Typical pedestrian travelshed ¼ to ½ mile
- Typical cyclist travelshed ¼ to 5 miles
- Corridors ¼ to ½ mile from either side (pedestrian)
- Corridors ¼ to 1 ½ mile from either side (cyclist)

Identify Land Use



Facility Identification



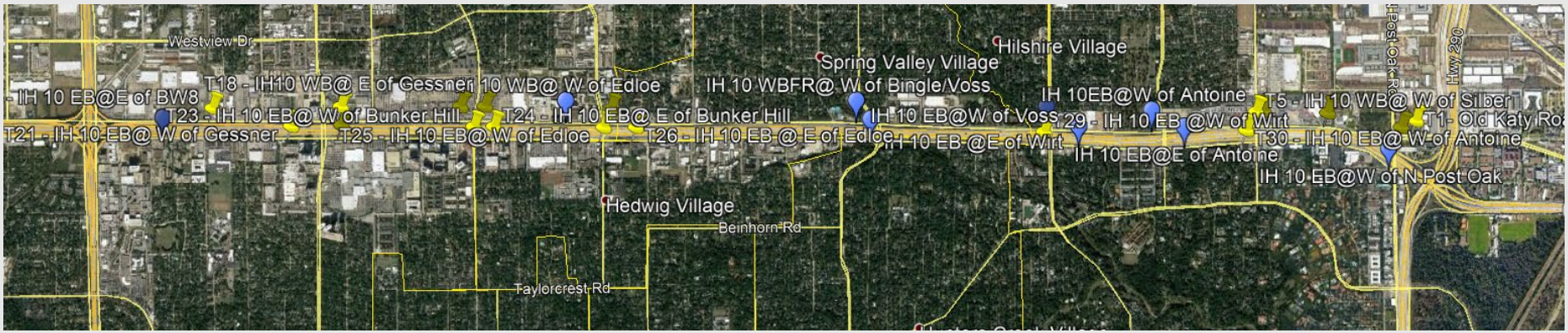
Count Location Guidance

- Typically do screen line counts
  - Both sidewalks
  - Both bike lanes
- Repeat the site selection along the corridor or area
- Zoom out and review the count sites
  - Overall coverage
  - Coverage of land use; facility types; or direction
- Consistency
- Do you need to split the corridor or area for better coverage?

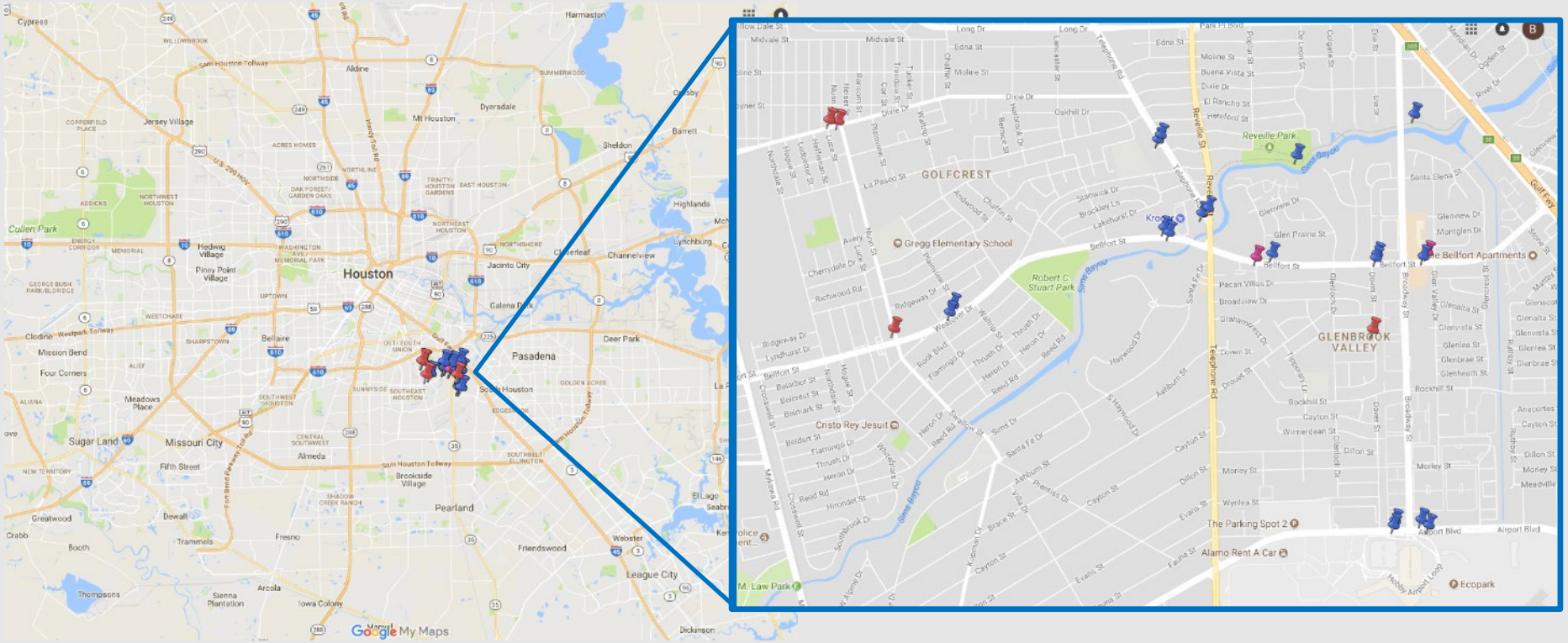
Count Location Example

- What are the objectives?
  - Corridor? Area? Facility type?
- Through routine safety monitoring TxDOT identified an area with a high number pedestrian crashes.
- Identify the vehicle and pedestrian exposure rates of crashes to determine if the area is higher than the regional average.
- Site selection was limited to TxDOT facilities.
  - Distribution of counters along the corridor.
  - EB and WB travel or north and south of IH 10

Corridor Map Example



Area Map Example



Count Location Guidance

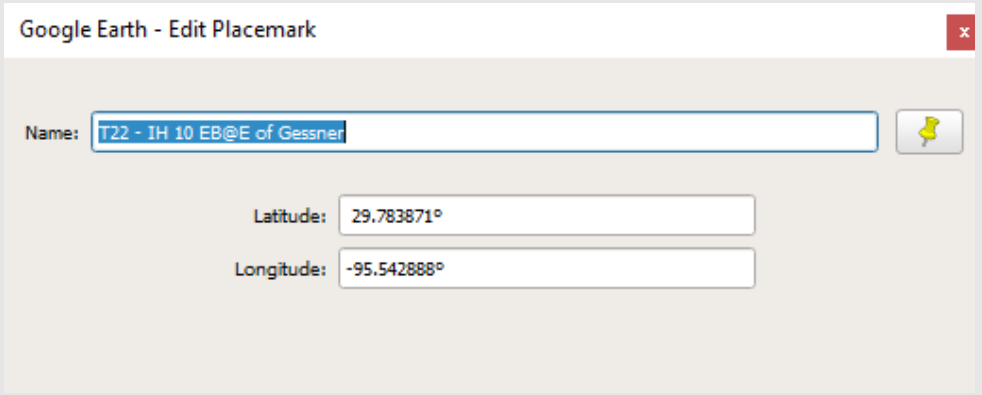
- Identify locations along routes where people are walking or cycling to and from destinations (home to work; work to lunch; etc.)
- Along the path (people moving in a straight path)
- Not an open area (courtyard, plaza, etc.)
- Not near entrance/exit OR path to parking
- Static background
- Mounting location (dependent on technology)

Mounting Location Detail

- Mounting location
  - Sign post, tree, railing, utility pole, etc.
- Static background
  - Preferred
    - Wall, fence, open field
  - Avoid
    - Roadways, bus stops, parking lots, trashcans, etc.
    - Things that move – bushes, trees, advertising signs
    - Construction site, playground,

Google Earth (GE) Example

- This could be done in a GIS system
- Set **Google Earth Pins** - label the location and counter number
- Examples
  - T21 – IH-10 EBFR@W of Gessner
  - T22 – IH-10 EBFR@E of Gessner



Count Preparations Equipment

Safe and Efficient Deployment

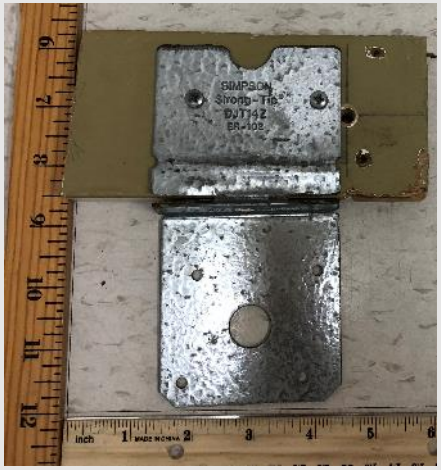
- Organize the deployment taking into account where to park, mounting location, etc.
- The **Efficient** route is the **Safe** route.
  - Least amount of time in the ROW – lowers exposure rate
  - Avoids having to double back
  - Goal – In and out of the vehicle in less than 5 minutes
- Organize counters and equipment in the vehicle before you leave the office
  - Quick access to counters, chains, and locks
- Divide the work
  - Driver/Installer
  - Navigator/Spotter/Inventory
- Develop Rhythm

Equipment Preparation

- Bins
- Label Clamps
- Mounting Assistance
- Tools

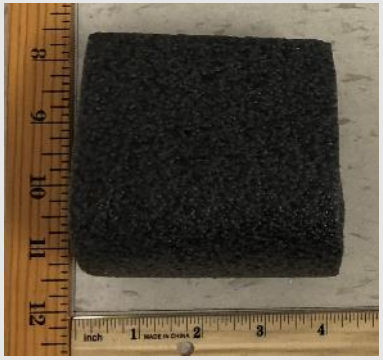
Equipment Preparation

- Survey nails
- Fasteners for tubes
- Offset bracket for pedestrian counters



Equipment Preparation

- Pool noodles for pedestrian counters
- Center traffic barrier mount for pedestrian counter



Equipment Preparation

- Had tools
- Urban pedestrian boxes
- Insecticide
- Cordless drill
- Band clamps
- Locks (keyed the same)
- Chains

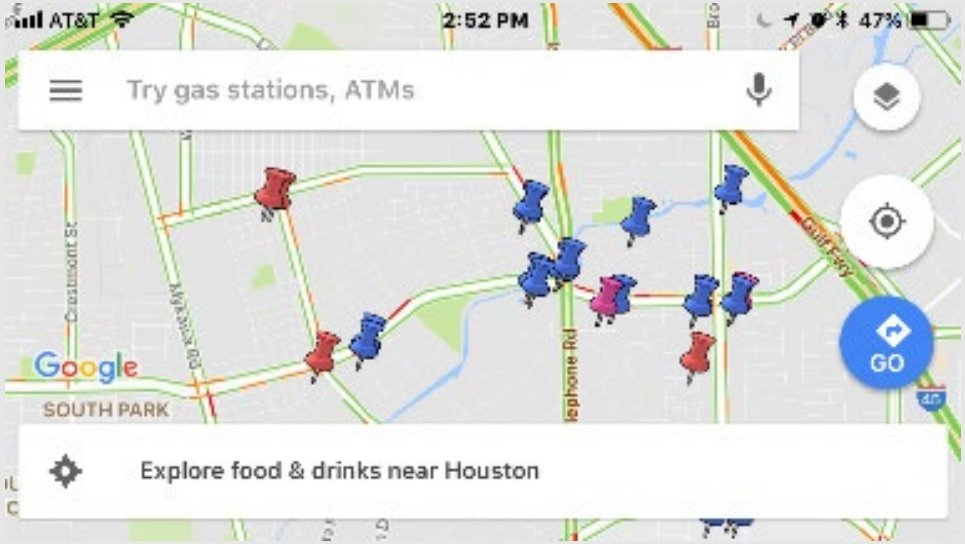
Equipment Preparation

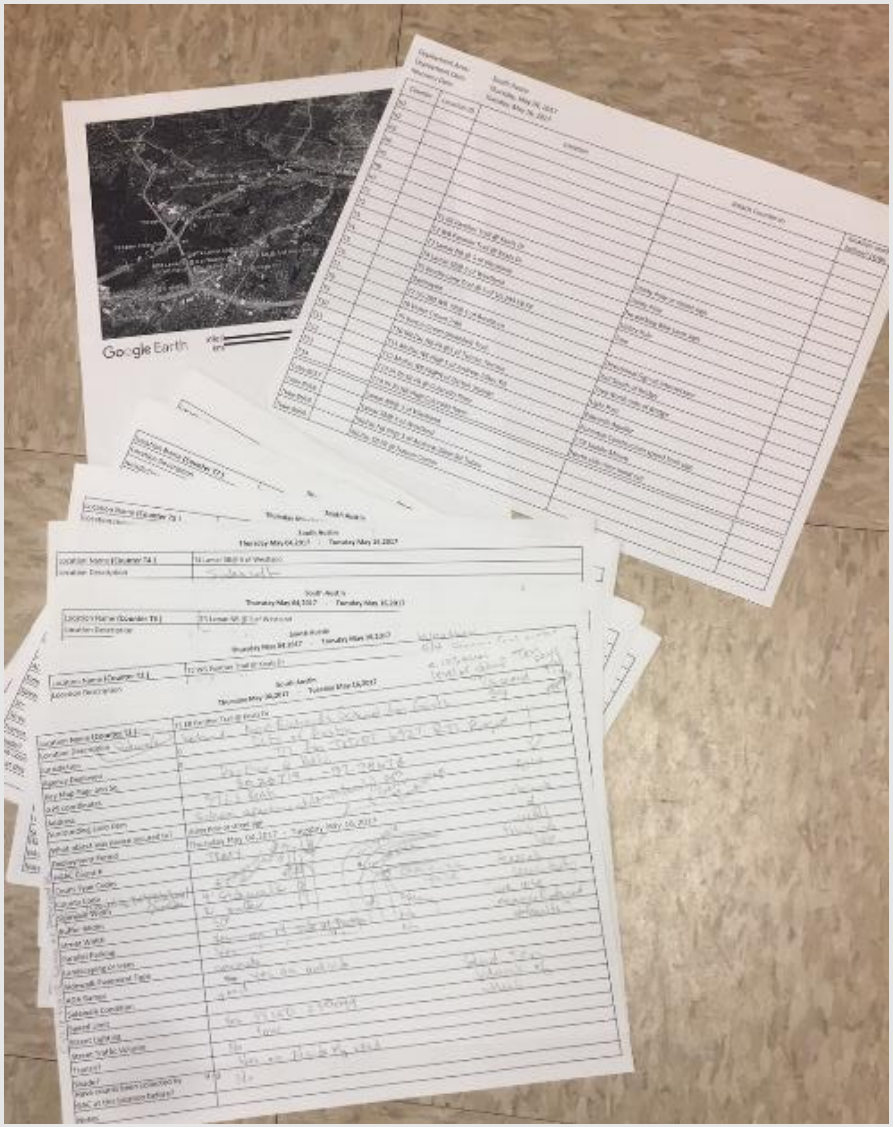
- Label Clamps
- Consistent width size
- Quick release
- Continuous teeth for infinite adjustment

Band Clamp Color Codes		
Color	Length	Diameter
Black	16.5	5.3
Green	27.5	8.8
Blue	32.5	10.3
Yellow	39	12.4
Red	63	20.1

Deployment Preparation

- Check List
- Locks keyed alike
- Put Google Earth Pins on Phone
- Retriever Sheet and Inventory Sheets
- Program Counters





Count Site/Location Documentation

Required Count Site/Location Documentation

- Need General Information About the Location
  - Non-Motorized Facility Type
  - Functional Class of Adjacent Roadway
  - Roadway Speed Limit
  - Land Use
- Excel Counter Deployment Template
  - Instructions
  - Definitions
  - Retriever Sheet
  - Station Data Entry
    - (Agency, Jurisdiction, Etc.)
  - Individual Location Sheets

Retriever Sheet Example

	A	B	C	D	E	F	G
1	Deployment Area:		IH10 FR 610 to BW8				
2	Deployment Date:		Monday, January 14, 2019				
3	Recovery Date:		Monday, January 28, 2019				
4							
5	Counter	Location ID	Location Name	Attach Counter to	location used before? (#)	LAT	LONG
6	T1		Old Katy Road WB@ W of N Post Oak	Tree S of Driveway	N	29.784204	-95.45533
7	T2		Old Katy Road EB@W of N Post Oak	Yiled Sign	N	29.783731	-95.456498
8	T3		IH 10 WB@ W of N Post Oak	Bus Stop or Post	N	29.78475	-95.462519
9	T4		IH 10 WB@E of Silber	No Right Turn	N	29.784895	-95.467743
10	T5		IH 10 WB@ W of Silber	One Way	N	29.784843	-95.468345
11	T6		Destroyed				
12	T15		T15 - IH 10 WB@ E of Edloe	Double Right Sign	N	29.785022	-95.520946
13	T16		T16 - IH 10 WB@ E of Bunker Hill	Sign by Chase bank East Drive	N	29.785219	-95.531202
14	T17		T17 - IH 10 WB@ W of Bunker Hill	IH 10 sign	N	29.785184	-95.533208
15	T18		T18 - IH10 WB@ E of Gessner	Duane Bohac sign	N	29.785191	-95.542955
16	T19		T19 - IH 10 EB@E of BW8	Guardrail over ditich	N	29.785077	-95.55341
17	T20		Destroyed 5-21-18 Odessa Texas				
18	T21		T21 - IH 10 EB@ W of Gessner	Stop Ahead sign	N	29.78381	-95.547002
19	T22		T22 - IH 10 EB@E of Gessner	45mph sign	N	29.783871	-95.542888
20	T23		T23 - IH 10 EB@ W of Bunker Hill	Do Not Enter Sign	N	29.783779	-95.53211
21	T24		T24 - IH 10 EB@ E of Bunker Hill	45 mph opr Hedwig Village sign	N	29.783788	-95.530476
22	T25		T25 - IH 10 EB@ W of Edloe	Do Not Enter Sign	N	29.783733	-95.521545
23	T26		T26 - IH 10 EB @ E of Edloe	One way Sign by office building driveway	N	29.783731	-95.518908
24	T29		T29 - IH 10 EB @W of Wirt	Right Lane must turn right sign	N	29.783412	-95.485643
25	T30		T30 - IH 10 EB@ W of Antoine	T30 - IH 10 EB@ W of Antoine	N	29.783527	-95.46915
26					N		
28	Tube 8657						
29	Tube 8658						

Station Data Example

#	ATTRIBUTE NAME	TXDOT REQUIRED?	FHWA REQUIRED?	DATA TYPE / FORMAT	Data Location	Enter Data Here	STATIC
1	State	Yes	Yes	Select from list	SD	Texas	Texas
2	TxDOT District	Yes	N.A.	Select from list	SD	Houston	
3	County	Yes	Yes	Select from list	SD	Harris	
4	City/Area	Yes	N.A.	Text	LD		
5	Station ID TMG	Yes	Yes	6 alphanumeric characters	LD		
6	Station Name	Yes	N.A.	Text	RS		
7	Flow ID TxDOT	Yes	N.A.	14 alphanumeric characters	LD		
8	Station ID Agency	No	N.A.	Text	RS		
9	Strava Edge/Segment Identifier	No	N.A.	7 numeric characters	LD		
10	Travel Direction	Yes	N.A.	Select from list	LD		
11	Functional Classification	Yes	Yes	Select from list	LD		
12	Direction of Route	Yes	Yes	Select from list	LD		
13	Location of Count Relative to Roadway	Yes	Yes	Select from list	LD		
14	Direction of Movement	Yes	Yes	Select from list	LD		
15	Facility Type	Yes	Yes	Select from list	LD		
16	Intersection	No	No	Select from list	LD		
17	Type of Count	Yes	Yes	Select from list	SD	Pedestrians only (1)	
18	Method of Counting	Yes	Yes	Select from list	SD	Portable recording device (2)	
19	Type of Sensor	Yes	No	Select from list	SD	Passive infrared (I)	
20	Year of Data	Yes	Yes	4 numeric characters, YYYY	SD	2019	
21	Factor Group 1	No	No	1 alphanumeric character	LD		
22	Factor Group 2	No	No	1 alphanumeric character	LD		
23	Factor Group 3	No	No	1 alphanumeric character	LD		
24	Factor Group 4	No	No	1 alphanumeric character	LD		
25	Factor Group 5	No	No	1 alphanumeric character	LD		
26	Primary Count Purpose	No	No	Select from list	SD	Planning or reporting (P)	
27	Posted Speed Limit	No	No	2 numeric characters	LD		
28	Year Station Established	Yes	Yes	4 numeric characters, YYYY	LD		
29	Year Station Discontinued	No	No	4 numeric characters, YYYY	LD		
30	National Highway System	No	No	Select from list	RS		
31	Latitude	Yes	Yes	Decimal degrees: YY.YYYYYY	RS		
32	Longitude	Yes	Yes	Decimal degrees: XX.XXXXXX	RS		
33	Posted Route Signing	No	No	Select from list	LD		
34	Posted Signed Route Number	No	No	8 characters	LD		
35	LRS Route ID	No	No	60 characters	LD		
36	LRS Location Point	No	No	8 characters	LD		
37	Station Location	No	No	50 characters	LD		

Counter Tab

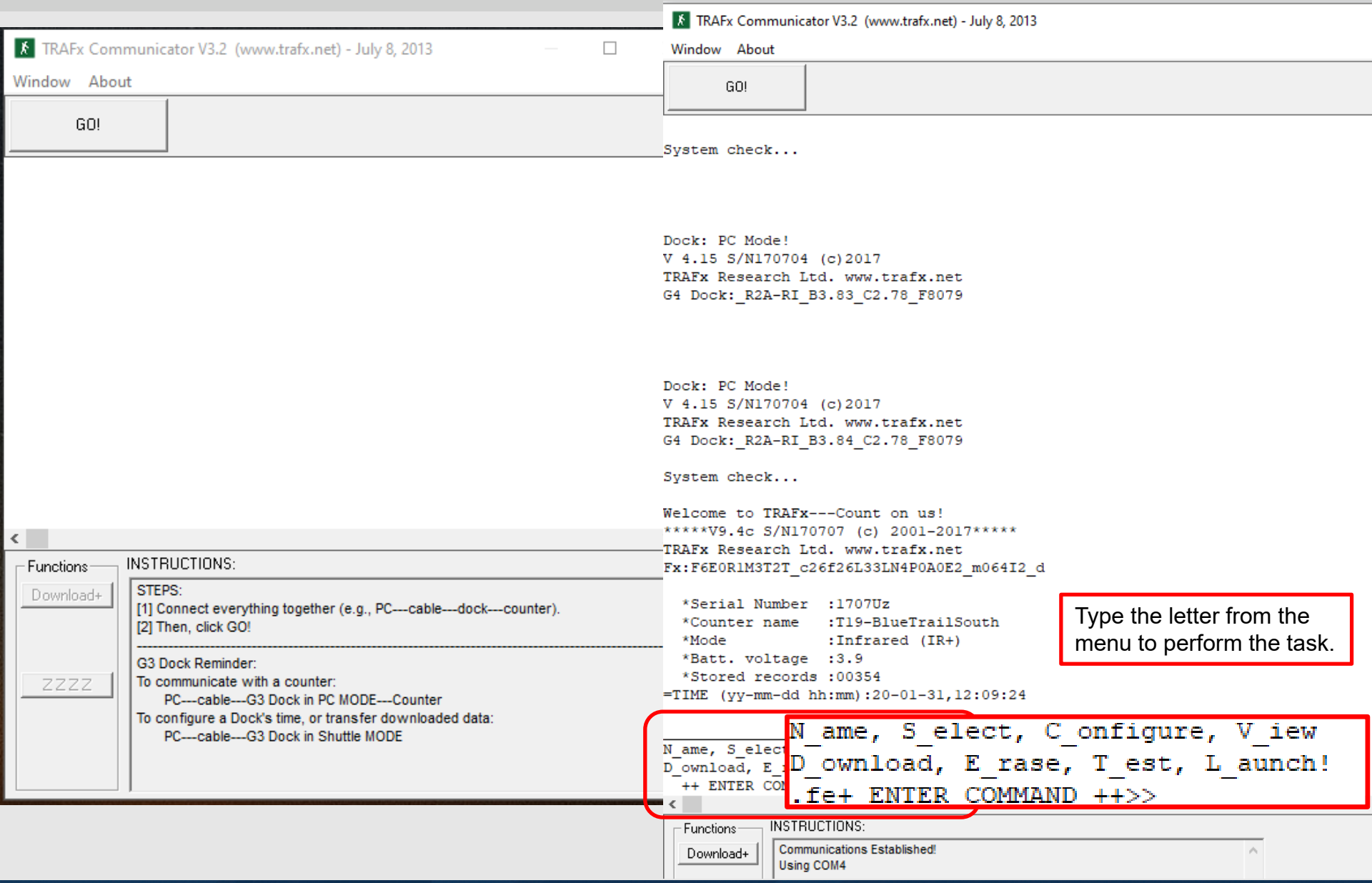
Data calculated or transferred from other sheet Monday January 14,2019 - Monday January 28,2019	
Station Name	T21 - IH 10 EB@ W of Gessner
Station ID TMG	
Mounting Object	Stop Ahead sign
Latitude	29.78381
Longitude	-95.547002
County	Harris
City/Area	IH10 FR 610 to BW8
Flow ID TxDOT	
Posted Speed Limit	45 mph
Posted Route Signing	Not signed (1)
Posted Signed Route Number	
LRS Route ID	
LRS Location Point	
Surrounding Land Uses	Commercial
Nonmotorized Facility Width	6 (ft)
Nonmotorized Facility Buffer Width	5 (ft)
Street Width	4 Lanes
Parking	No on-street parking
Pavement Type	Concrete
Pavement Condition	Good
ADA Ramps	Yes
Street Lighting	None
Street Traffic Volume (ADT)	
Transit	No
Shade	None
Have counts been collected by H-GAC at this location before?	N
Other Notes	
Strava Edge/Segment Identifier	
Travel Direction	EB
Functional Classification	Urban: Major Collector (5U)
Direction of Route	East-West or Southeast-Northwest combined (0)
Location of Count Relative to Roadway	On the side listed for Direction of Route (1)
Direction of Movement	Both directions (3)
Facility Type	Sidewalk (3)

- Data pulled from Retriever sheet
- Information obtained from station data entry sheet
- Information to be obtain from the office
- information to be filled out on the field

Traf-X Connection to the “Dock” for Programing and Downloading

Can insert either side of the board into the Dock

Program Counters Traf-X Communicator



Type the letter from the menu to perform the task.

Programing Traf-X Counter Cont.

```
N_ame, S_elect, C_onfigure, V_iew
D_ownload, E_rase, T_est, L_aunch!
  ++ ENTER COMMAND ++>> N
  *Counter name    :T19-BlueTrailSouth
   ---enter value-->   T21-I10EB@WofGessner
```

```
N_ame, S_elect, C_onfigure, V_iew
D_ownload, E_rase, T_est, L_aunch!
  ++ ENTER COMMAND ++>> C

=TIME (yy-mm-dd hh:mm):20-01-31,15:11
   ---enter value-->   20-01-31 14:06
```

Enter start time be sure if is in the future also notice the date format YY-MM-DD

Typically replace if less than 4.0 Volts

```
=TIME (yy-mm-dd hh:mm):20-01-31,15:11
   ---enter value-->   20-01-31 14:06
=START(yy-mm-dd hh:mm):19-08-09,15:00
   ---enter value-->   20-02-03 15:00
  *Counter name    :T21-I10EB@WofGessner
  *Mode            :Infrared (IR+)
  *Batt. voltage   :3.8
  *Stored records  :00354

=TIME (yy-mm-dd hh:mm):20-01-31,14:06:38
=START(yy-mm-dd hh:mm):20-02-03,15:00
PERIOD (1/24/0=Timestamps) :000
DELAY     (see manual)     :025

!Stored records in memory!

  Are settings above OK? (Yes/No):
```

Period
001= Hourly Totals
024 = Daily Totals
000 = Timestamp 14000 max

Delay
020 = 1.0 sec
025 = 1.0 sec

Programing Traf-X Counter Cont.

```
N_ame, S_elect, C_onfigure, V_iew
D_ownload, E_rase, T_est, L_aunch!
  ++ ENTER COMMAND ++>> L


  *Serial Number   :1707Uz
  *Counter name    :T21-I10EB@WofGessner
  *Mode            :Infrared (IR+)
  *Batt. voltage   :3.8
  *Stored records  :00354

=TIME (yy-mm-dd hh:mm):20-01-31,15:03:48
=START(yy-mm-dd hh:mm):20-02-03,15:00
PERIOD (1/24/0=Timestamps) :000
DELAY     (see manual)     :025

  Are settings above OK? (Yes/No):
```

Review all setting times and start times

```
N_ame, S_elect, C_onfigure, V_iew
D_ownload, E_rase, T_est, L_aunch!
  ++ ENTER COMMAND ++>> L


  *Serial Number   :1707Uz
  *Counter name    :T21-I10EB@WofGessner
  *Mode            :Infrared (IR+)
  *Batt. voltage   :3.8
  *Stored records  :00354

=TIME (yy-mm-dd hh:mm):20-01-31,15:03:48
=START(yy-mm-dd hh:mm):20-02-03,15:00
PERIOD (1/24/0=Timestamps) :000
DELAY     (see manual)     :025

  Are settings above OK? (Yes/No):
  Confirm erase records (Yes/No):
Erasing records ..

Check TIME and START. Correct? (Yes/No)

...5,4,3,2,1. .BLAST OFF!!!

1-remove counter from dock
2-Status LED still blinking rapidly?
3-IR scope shaded from direct sun?
4-three dots pointing skywards?
5-vegetation cleared?
6-lid seal clean?
7-see manual for details
```

Make sure start time is after current time. Check the date format

```
N_ame, S_elect, C_onfigure, V_iew
D_ownload, E_rase, T_est, L_aunch!
  ++ ENTER COMMAND ++>> L


  *Serial Number   :1707Uz
  *Counter name    :T21-I10EB@WofGessner
  *Mode            :Infrared (IR+)
  *Batt. voltage   :3.8
  *Stored records  :00354

=TIME (yy-mm-dd hh:mm):20-01-31,15:03:48
=START(yy-mm-dd hh:mm):20-02-03,15:00
PERIOD (1/24/0=Timestamps) :000
DELAY     (see manual)     :025

  Are settings above OK? (Yes/No):
  Confirm erase records (Yes/No):
```

Erases records to free up memory for new study.

Load Google Pins to Phone

- Include the mounting location in the description if you want it to show up on your phone
- File should contain the H# (H-GAC) or T# (TTI) so that it is easy to deploy counters
- Save the KMZ file as a KML in **Google Earth**
- Open **Google Maps** on your desktop and click “My Places” at the top of the left column.
- Create a new map, select the “Import” option at the top, and then import the KMZ file into that map (you can drag it into the website).
- NAME THE MAP
- After you have saved it you can open **Google Maps** on your device (phone) and choose the “Layers” or “Your Places” button (top left).

Google Earth = downloaded version

Google Maps = Internet web browser format (usually have a gmail account to access features)

Personal Protection Equipment (PPE)

- Hard hat
- Vest (Type III preferred or night)
- Steel toe shoes
- Other
  - Sun glasses
  - Sunscreen
  - Insect repellent
- Hydration

Vehicle Organization Video

https://youtu.be/ZgF2_UsaBDs

Field Installation Tips

- Bins for Counters
- Bins for band clamps
- Color code band clamps
- Bag to carry to individual sites
  - Drill
  - Band clamp one of each size
  - Chain (estimate size) and lock
  - Insecticide (granules)
  - WD 40 for locks (can also be used to kill ants

Field Installation Tips

- Prepare Equipment in Office
  - Tubes Rigged
  - Counters in Numeric Order
- Have Vehicle Organized
  - Bins Open and Accessible
  - Easy Access to Most Used Items
- Park Off-Street if Possible
- Don’t overtighten band clamps
- Set drill chuck to 1
- Sprinkle ant bait on visible ant hills

Installation

- Safety and Efficiency
- Two Person Team
- Density of Count Area (limit to a couple of square miles)
- Equipment / Checklists
- Inventory Each Site
- Supplemental Mounting Equipment

Pedestrian Counter Installation Video

https://youtu.be/M6fnEmbffdM

Supplemental Mounting Equipment

- Pool noodles for angled or T-posts
- Offset bracket for bridge mounts
- CTB mount
- Bridge Column

Pool Noodles

Bridge Rail Offset

CTB Mount and Bridge Column

Eco Counter Pyro (Pedestrian) Installation

- Use hex extension or flex shaft to mount back plate
- Use hex security bit to secure
- Band clamps and chain

Pyro Installation

Facility Inventory Video

https://youtu.be/UcZfMmqrzzI

Inventory

- Field sheets with clipboard
- Know stride and foot size
- Know standard lane widths
- Written define and pictures of area type (consistency)
- Pictures of counter location (get the background)

Inventory Sheet

South Austin

Thursday May 04,2017 - Tuesday May 16,2017

Location Name **(Counter T13)**	T13 IH 35 SB FR @ Colarado River
Location Description	Separated sidewalk/bridge 10½' wide
Jurisdiction	0 TxDOT
Agency Deployed	0 TTI/TxDOT
Key Map Page and Sq	
GPS coordinates	
Address	@ Holiday Inn 9/16" bolts
Surrounding Land Uses	hotel, CBD, lake
What object was device secured to?	CTB Saddle Mount
Deployment Period	Thursday May 04,2017 - Tuesday May 16,2017
HGAC Count #	
Count Type Codes	
County Code	
Sidewalk Width	≠ 10½'
Buffer Width	Continuous Traffic Barrier 8" wide
Street Width	38' wide 3 lanes
Parallel Parking	No
Landscaping or trees	No
Sidewalk Pavement Type	exposed aggregate
ADA Ramps	Yes
Sidewalk Condition	good
Speed Limit	55 MPH ?
Street Lighting	Yes
Street Traffic Volume	High
Transit?	~~No~~ No bus stops but on Yes transit Route
Shade?	No?
Have counts been collected by HGAC at this location before?	H-0 ~75' S of One Way Sign
Notes	

Site Photos from Each Direction

Tube Counter Installation Video

https://youtu.be/qyk-up1gNOc

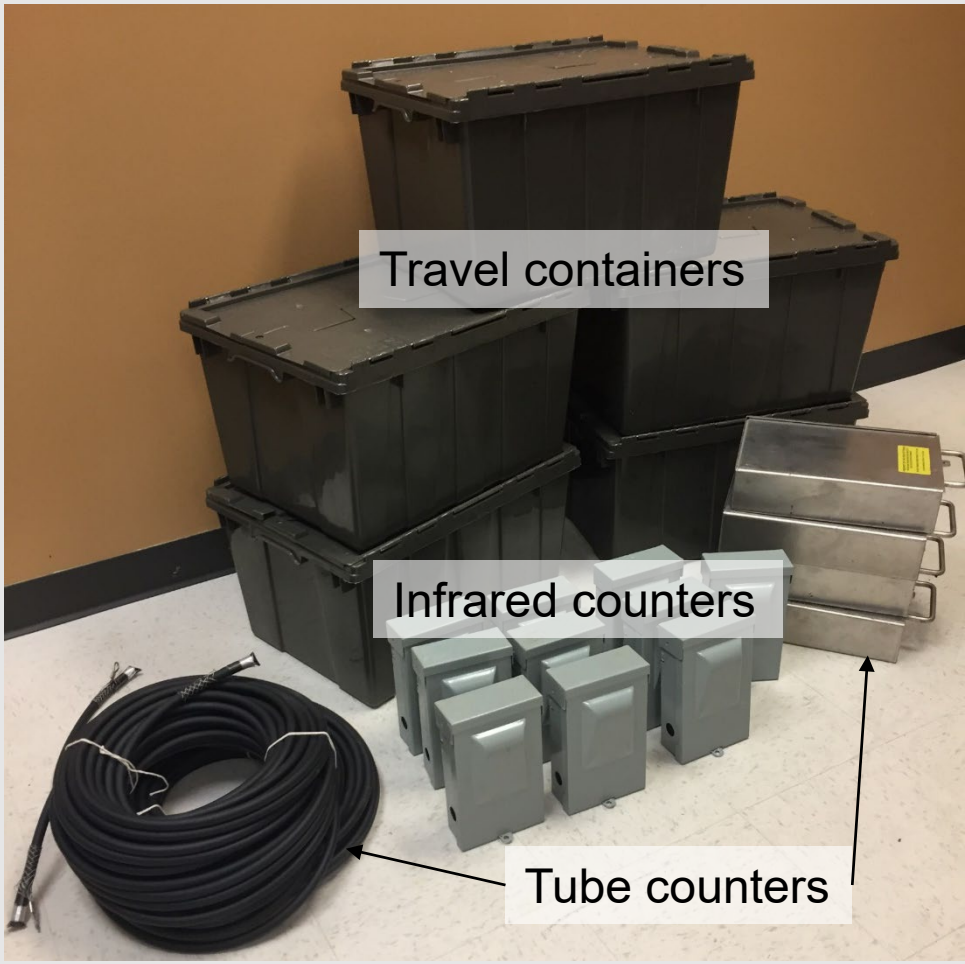
Road Tube Installation

- Hammer Drill –Concrete Survey Nails
- Use a Premeasured Wire or Rope to Get Fast Consistent Spacing
- Figure 8 and Chinese Fingers
- Shorter Tubes 12 to 25 Feet (same length)
- Change Out Drill Bit Periodically (sharp bit can drill a hole much quicker)
- One Person Drill the Other Person Hooks the Tube
- Both Watch for Traffic

Tube Drill and Mount

TxDOT counter equipment loan program

- Portable equipment for loan
  - 10 infrared counters
  - 8 pneumatic tube counters (bikes)
- Available for use by:
  - TxDOT districts
  - Local agencies
  - Others as available
- Contact TxDOT
  - BikePed@txdot.gov



NCTCOG Mobile Counter Loan Program

- Off-Street Counters (trails)
  - Two Sets of Off-Street Counters
  - Each set contains one tube counter and one infrared sensor
- On-Street Counters
  - Two Sets of On-Street Counters
  - Each set contains two tube counters
- Available to agencies located in the 12-county North Central Texas Region (Dallas-Fort Worth)
- If interested, contact Daniel Snyder at dsnyder@nctcog.org.

HGAC Count Loan Program

- Houston-Galveston Area Council (HGAC)
  - 4 infrared counters
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For More Info or Questions

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Pedestrian and Bicycle Installation Videos

1. Video 1 - Vehicle Organization
   - https://youtu.be/ZgF2_UsaBDs
2. Video 2 – Pedestrian Counter Installation
   - https://youtu.be/M6fnEmbffdM
3. Video 3 – Tube Counter Installation
   - https://youtu.be/qyk-up1gNOc
4. Video 4 – Inventory
   - https://youtu.be/ZgF2_UsaBDs