Webinar

ESTIMATING TRAFFIC VOLUMES WHEN THERE'S NO TRAFFIC

May 21, 2020

KITTELSON & ASSOCIATES

Presented by:
Chris Tiesler, Chris Brehmer, Alex Garbier, and Wayne Kittelson

1

QUESTIONS & DISCUSSION

Use the chat box to post your questions throughout the presentation – we'll field them at the end.

"SIGN-IN" SHEET AND PDH CREDITS

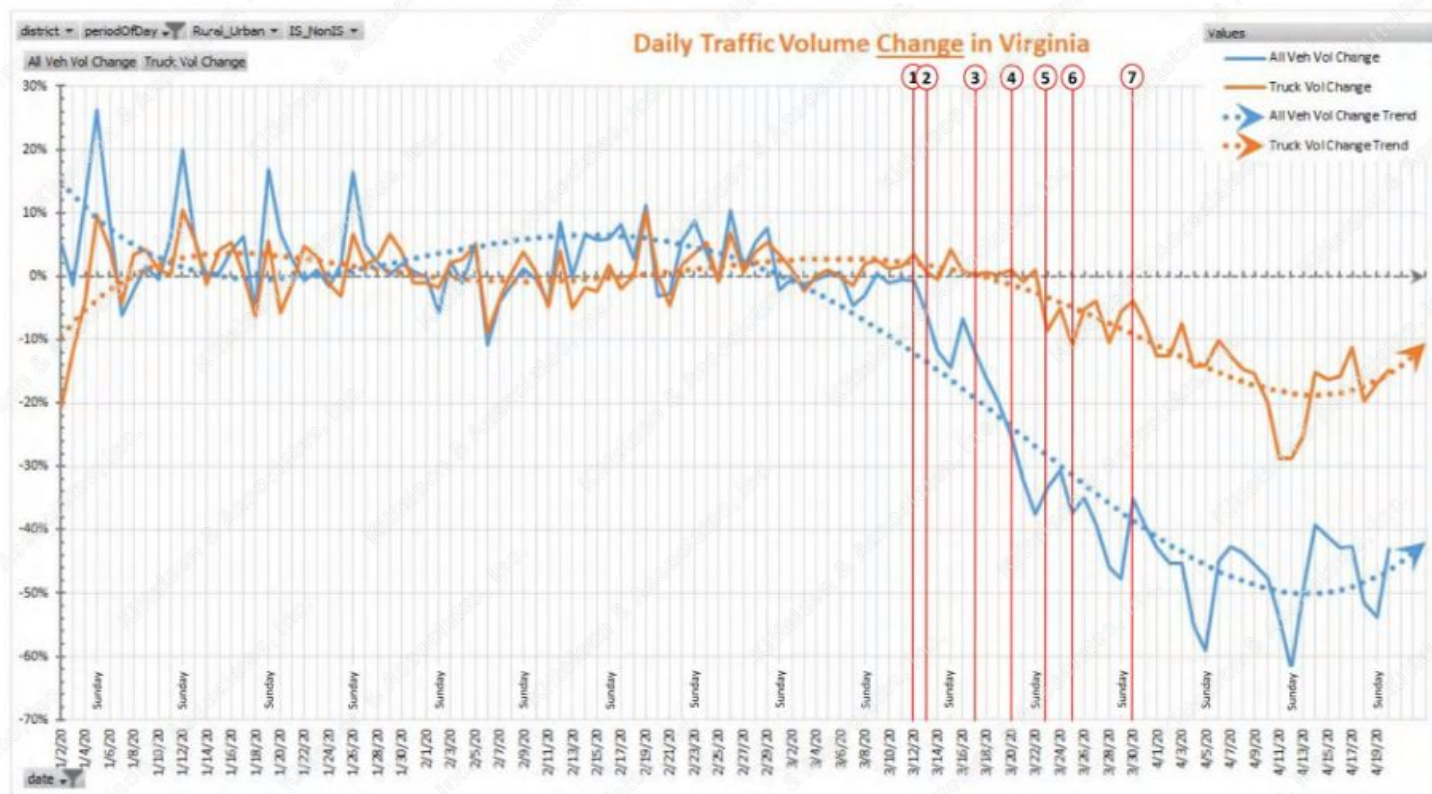Please post your name and email in the chat box.

Indicate if you'd like to receive a form for PDH credit.

If you are unable to access the chat box but need a form, send Amy Donald an email: adonald@kittelson.com

KITTELSON & ASSOCIATES

TRANSPORTATION IMPACTS OF COVID-19

Daily Traffic Volume Change in Virginia

Highway Traffic Volumes Are Down......

But Demand Is Beginning To Creep Back Up......

#	Date	Governor Action
1	3/12/2020	Declares state of emergency
2	3/13/2020	Closes schools for two weeks, beginning 3/16
3	3/17/2020	Advises to avoid non-essential gatherings of more than 10, Self-quarantine if 65+ with chronic health conditions, Directs restaurants, fitness centers and theaters to reduce capacity to 10
4	3/20/2020	State agencies begin process of implementing telework where possible/applicable
5	3/23/2020	Closes schools for remainder of school year, Orders non-essential businesses to close, Bans gatherings of more than 10, Closes restaurant dining rooms
6	3/25/2020	Directs hospitals to stop elective surgeries
7	3/30/2020	Issues statewide stay-at-home order until June 10

Source: VDOT

5

KITTELSON & ASSOCIATES

TRANSPORTATION IMPACTS OF COVID-19

And This Trend Is National......

Daily Traffic Volume Trends

Legend: State Traffic, State Truck, National Traffic, National Truck
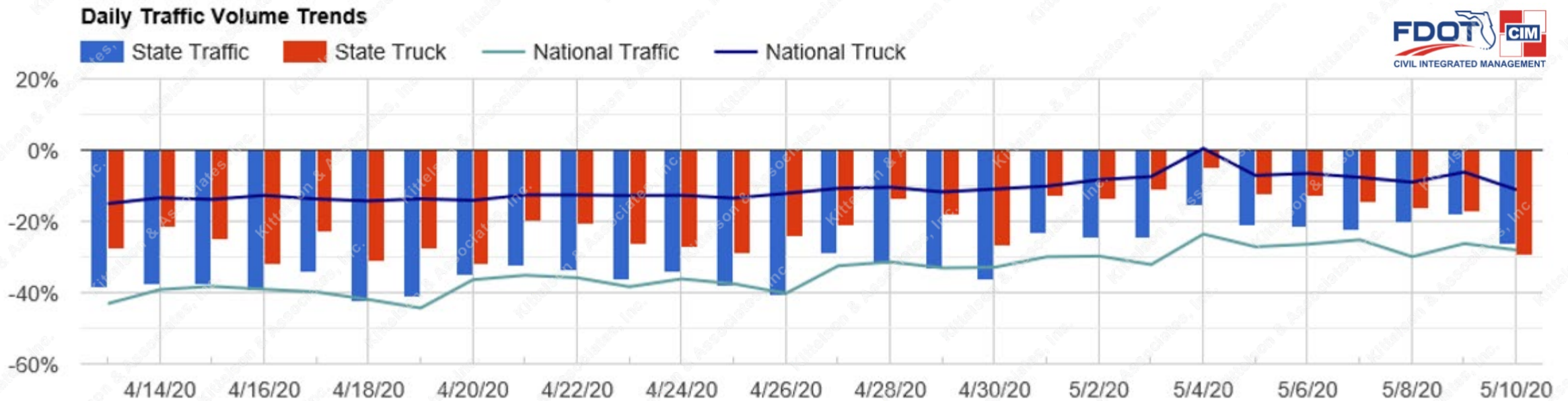
TRANSPORTATION IMPACTS OF COVID-19

All Transportation Modes Are Affected

Airport Ridership: Down 94%

Transit Ridership in US: Down 60-80%

Data by moovit

May 12, 2020

- SF, San Francisco - San Jose: **-78.3%**
- Chicago, IL: **-68.6%**
- NYC, New York - New Jersey: **-72.3%**
- Boston, MA: **-74.8%**
- Washington, D.C. - Baltimore, MD: **-70.7%**
- Philadelphia, PA: **-58.9%**
- Los Angeles, CA: **-66.8%**
- Seattle - Tacoma, WA: **-79.1%**
- Miami, FL: **-68.4%**
- others: **-63.73%**

Photograph by Dave Killen

Photograph by Lee Rodegerdts

Lyft/Uber Ridership: Down 75-80%

KITTELSON & ASSOCIATES

WHAT CAN WE EXPECT IN THE COMING MONTHS?

State & County Plans for Re-Opening

- Some lockdowns have ended (Georgia)

- While others are being extended (Los Angeles County)

- Many states are moving to ease lockdowns in phases (Virginia)

Companies Are Extending Work-From-Home Policies (Source: The New York Times, 5/8/2020)

- Google & Facebook employees invited to stay home until next year

- Capital One: 40,000 employees out through Labor Day, possibly longer

- Amazon indicating work-from-home until October

- Nationwide Insurance is shuttering 5 offices and having its 4,000 employees telecommute permanently

KITTELSON & ASSOCIATES

INTRODUCTION

Today's presentation focuses on a key challenge facing our industry:

- **How can important transportation projects that rely on field-collected volume data continue to move forward?**

KITTELSON & ASSOCIATES

AGENDA

1   Highlights of White Paper

2   Case Studies

3   Perspective on Future Challenges

4   Questions & Discussion

KITTELSON & ASSOCIATES

HIGHLIGHTS OF APRIL 2ND WHITE PAPER

"Estimating Traffic Volumes Under COVID-19 Pandemic Conditions"

- Identifies 4-step process to developing proxy volume estimates

STEP 1: Establish project context & data needs

STEP 2: Coordinate with appropriate agencies

STEP 3: Identify available data resources

STEP 4: Develop proxy volume estimates

Method 1 Adjust observed data

Method 2 Adjust user-generated data
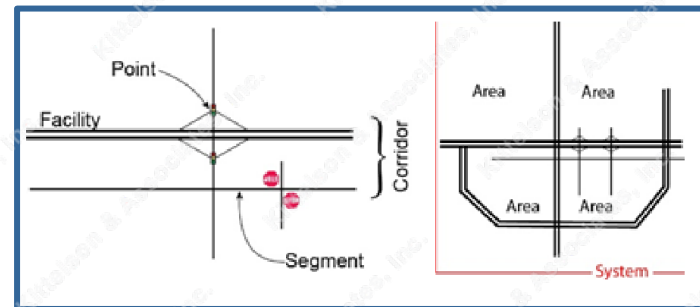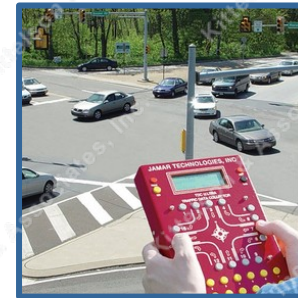
KITTELSON & ASSOCIATES

HIGHLIGHTS OF APRIL 2ND WHITE PAPER

Establish project context and data needs

- What type of facility being analyzed?

- What are modal considerations?

- What type of data is needed?

- What are critical analysis periods?

STEP 2:
Coordinate with appropriate agencies

Coordinate with appropriate agencies

- Develop scope-of-work
  - Getting traction with public agencies to accept new data

- Identify example case studies/validation efforts
  - Finding early success using historical data 2-5 years old

- Explore available agency data
  - Agency data not always centralized

- Data collection policy changes due to COVID-19
  - Clark County, Washington
  - Montgomery County, Maryland

CLARK COUNTY WASHINGTON   www.clark.wa.gov

PUBLIC WORKS   1300 Franklin Street
TRANSPORTATION   Vancouver, WA 98666-9810
                                          564-397-2446

MANAGEMENT DECISION

DATE: March 20, 2020
FROM: Ahmad Qayoumi, PE, Public Works Director, County Engineer
Via: David Jardin, Concurrency Engineer
CC: File
RE: Guidance – Required Traffic Count Data, Collection and Processing

MONTGOMERY COUNTY PLANNING DEPARTMENT
THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

MCPB
Item No. 8
Date: 05/07/20

Item Name: Briefing on Temporary Policy for Traffic Counts Collection and Transportation Impact Study Submission During COVID-19 Pandemic

KITTELSON & ASSOCIATES

STEP 3:
Identify available data resources

Identify available data resources

I. Externally-observed data (i.e. counts)

- Traffic data collection companies

- Public agency count programs

- Opportunity for more data within agency-based programs?
(many programs are ADT-based, can be expanded)

KITTELSON & ASSOCIATES
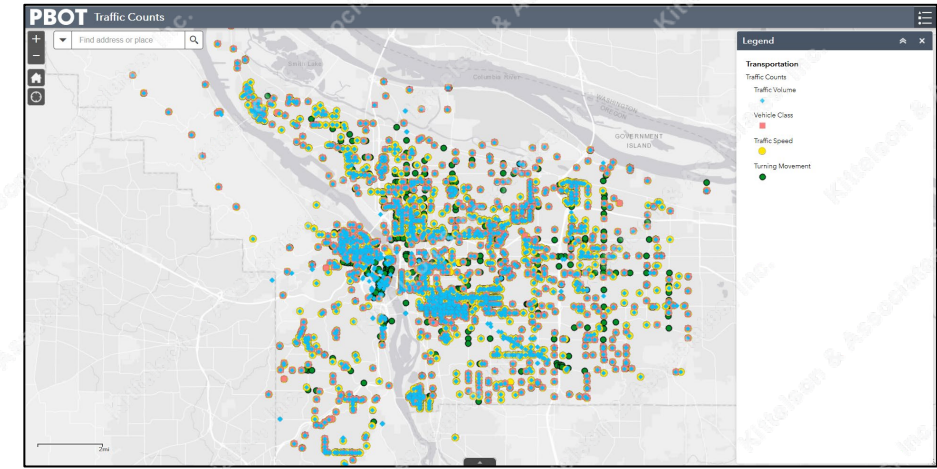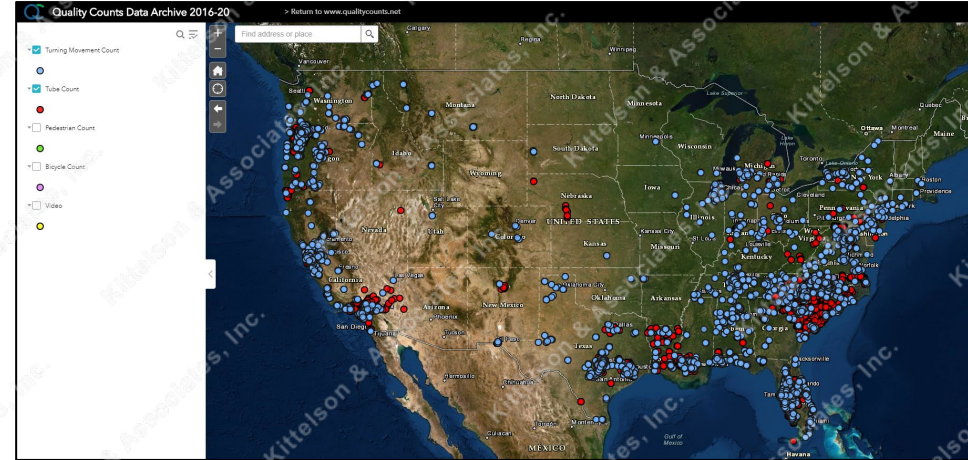
HIGHLIGHTS OF APRIL 2ND WHITE PAPER

Identify available data resources

I. Externally-observed data (contd.)

- Published studies
  - Long range system plans
  - Corridor plans
  - Capital improvement plans
  - Traffic impact studies

- Advanced Traffic Controllers (ATC's)
  - Some signals can provide vehicle detection data

Time of Day Analysis

OR224 at 82nd Dr
Tue, Wed, Thu
Feb 01, 2020 – Feb 29, 2020
Value: Median (veh/hr)
Analyst: Ali Razmpa

AM Peak
EBTR=514
EBT=752
EBL=329
WBTR=235
WBT=620
WBL=85
NBR=104
NBT=200
NBL=143
SBR=251
SBT=105
SBL=103
Total=3434

Mid Peak
EBTR=422
EBT=581
EBL=312
WBTR=315
WBT=562
WBL=128
NBR=219
NBT=248
NBL=227
SWBTR9
SBT=203
SBL=149
Total=3695

PM Peak
EBTR=450
EBT=606
EBL=247
WBTR=371
WBT=766
WBL=101
NBR=183
NBT=228
NBL=245
SBR=439
SBT=217
SBL=125
Total=3978

KITTELSON & ASSOCIATES

STEP 3:
Identify available data resources

Identify available data resources

II. User-generated data (i.e. "Big Data")

- Emerging technologies using probe data
  - Location-based (GPS/freight navigation)
  - Communication-based (Cell phone/Bluetooth/Wi-Fi)
  - Connected vehicles

- Traffic Data Aggregators & Vendors
  - INRIX
  - Wejo
  - StreetLight
  - Moonshadow
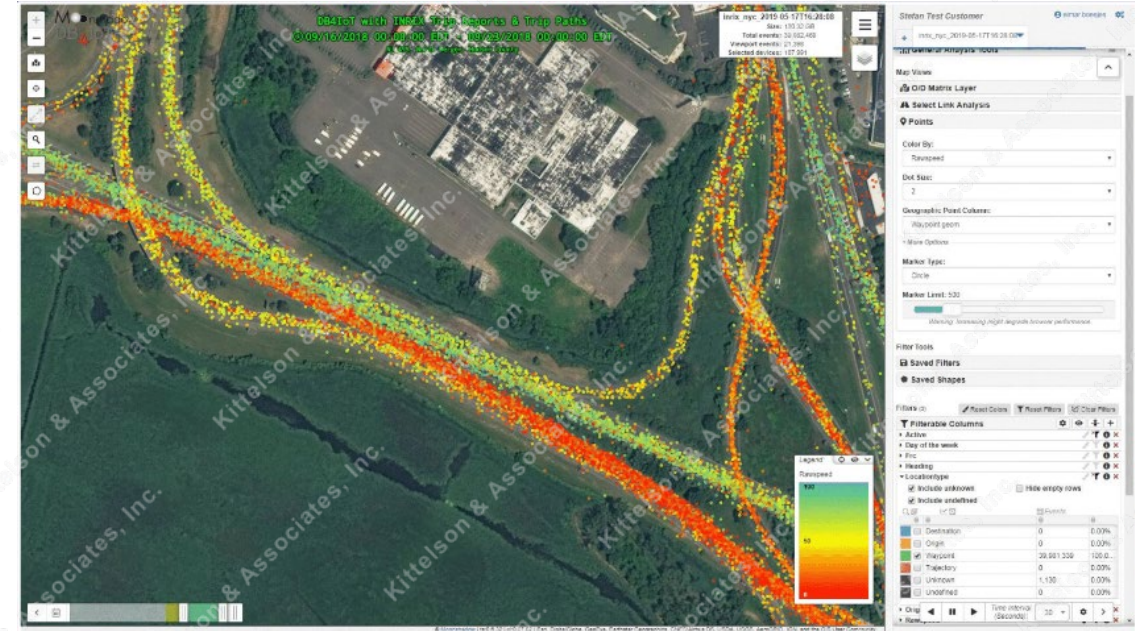
Source: Moonshadow
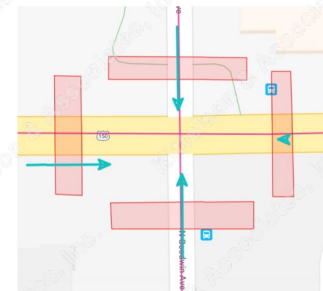
Source: StreetLight

KITTELSON & ASSOCIATES

HIGHLIGHTS OF APRIL 2ND WHITE PAPER
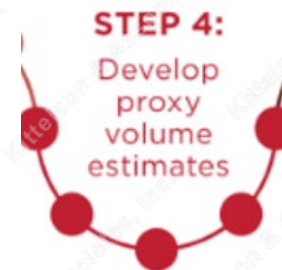
Develop proxy volume estimates

Method 1: Adjustments to externally-observed data

Method 2: Adjustments to user-generated data

New Method: Adjustments based on land use data

KITTELSON & ASSOCIATES

CASE STUDY

#1

PRIVATE DEVELOPMENT TRAFFIC IMPACT ANALYSIS
FAUQUIER COUNTY, VA

New Method: Adjustments based on land use data

18

PROJECT CONTEXT (STEPS 1-3)

Legend:
- 🟢 **Historical Traffic Count**
- 🔵 **Segment-Level AADT Data**
- 🔴 **Land Use Data**
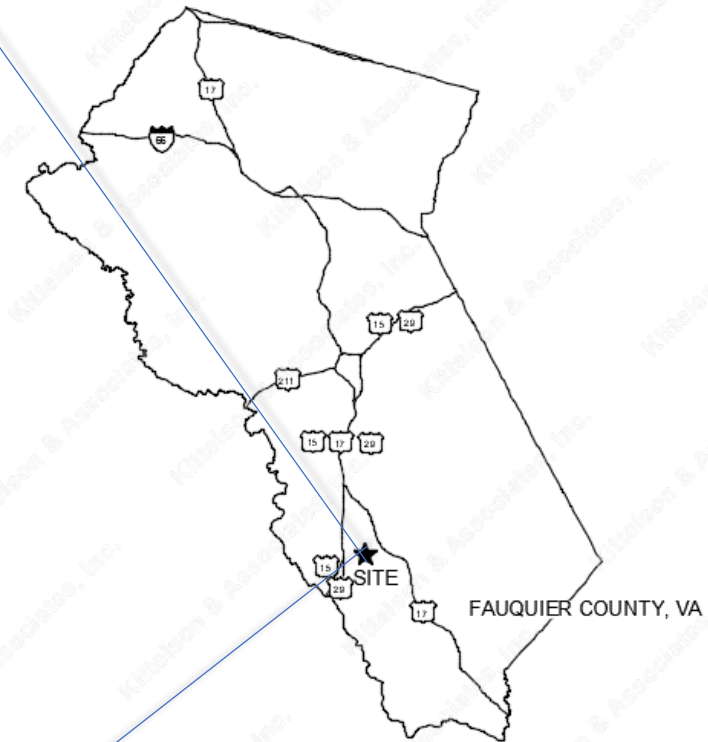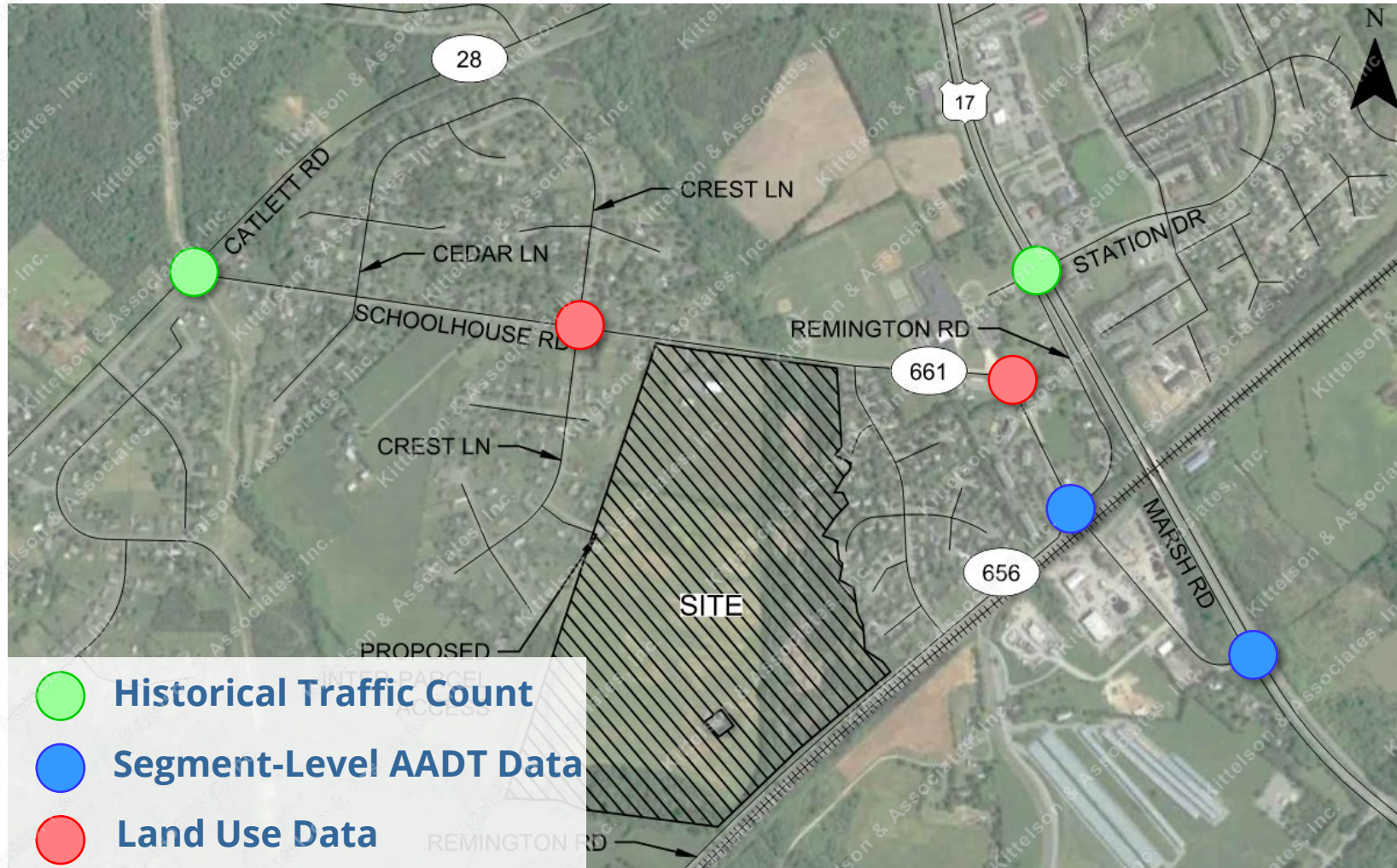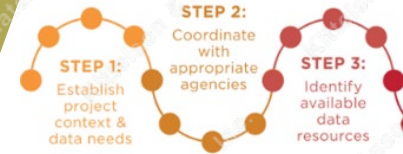
DEVELOPING PROXY COUNTS

May 2014 counts conducted as part of TIA for separate private development

April 2019 GRIDSMART counts

Image sources: Google Earth 2019 Aerial Photography

STEP 4:
Develop proxy volume estimates

Method 1:
Adjust historical traffic counts

Growing volumes:

- 1% annual growth rate applied to turning movement counts to estimate 2020 (existing) volumes
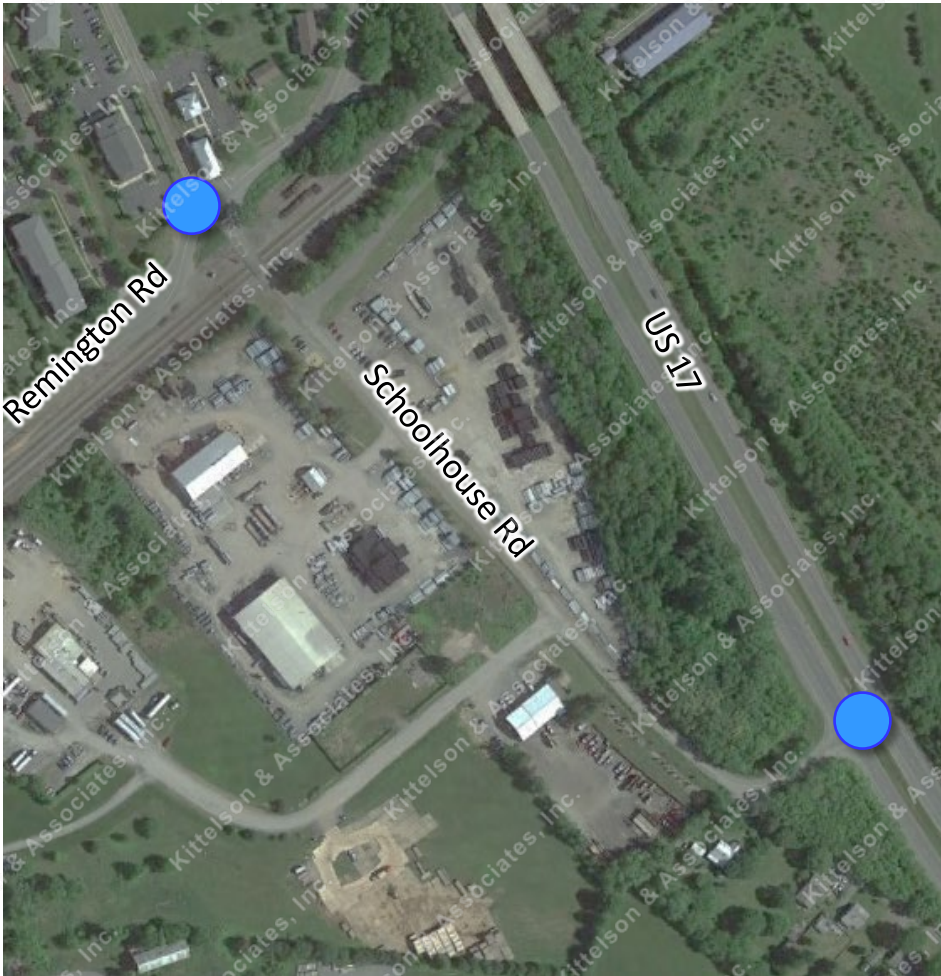
KITTELSON & ASSOCIATES

DEVELOPING PROXY COUNTS

Image source: Google Earth 2019 Aerial Photography

Develop 2020 estimate using publicly available traffic data

- VDOT publishes annual data including:
  - *Average Daily Traffic (AADT)*
  - *K-factor*
  - *Directional Factor*

STEP 4:
Develop proxy volume estimates

Method 2:
Estimate using Segment-Level Data

KITTELSON & ASSOCIATES

DEVELOPING PROXY COUNTS
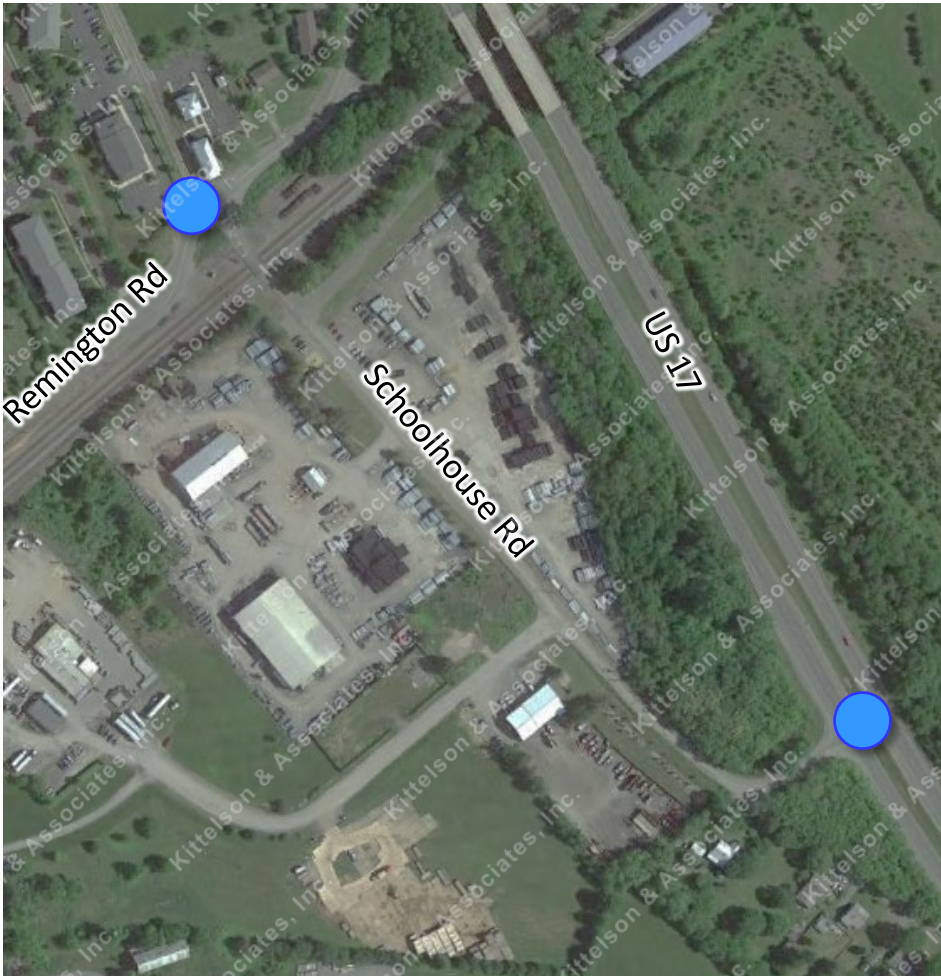
Image source: Google Earth 2019 Aerial Photography

Develop 2020 estimate using publicly available traffic data

- VDOT publishes annual data including:
  - *Average Daily Traffic (AADT)*
  - *K-factor*
  - *Directional Factor*

- *Estimate individual movements by applying this information:*

$$Volume_{Individual\ Movement} = AADT(K)(Dir.Factor) * \left(\frac{AADT_{recieving\ leg\ for\ movement}}{AADT_{all\ receiving\ legs\ for\ approach}} \right)$$

STEP 4:
Develop proxy volume estimates

Method 2:
Estimate using Segment-Level Data ⟵

KITTELSON & ASSOCIATES

DEVELOPING PROXY COUNTS

Example:

Estimating eastbound left-turns at Schoolhouse Rd/Remington Rd

STEP 4:
Develop proxy volume estimates

Method 2:
Estimate using Segment-Level Data

Image source: Google Earth 2019 Aerial Photography

KITTELSON & ASSOCIATES

DEVELOPING PROXY COUNTS

AADT = 2,300
AADT = 820
AADT = 1,700
AADT = 2,200
K = 0.13
Dir. Fact. = 0.631

Remington Rd
Schoolhouse Rd

Image source: Google Earth 2019 Aerial Photography

Example:

Estimating eastbound left-turns at Schoolhouse Rd/Remington Rd

STEP 4:
Develop proxy volume estimates

Method 2:
Estimate using Segment-Level Data

$$Volume_{Individual\ Movement} = AADT(K)(Dir.Factor) * \left(\frac{AADT_{recieving\ leg\ for\ movement}}{AADT_{all\ receiving\ legs\ for\ approach}} \right)$$

KITTELSON & ASSOCIATES

DEVELOPING PROXY COUNTS

Example:

Estimating eastbound left-turns at Schoolhouse Rd/Remington Rd

AADT = 2,300
AADT = 820
AADT = 1,700
AADT = 2,200
K = 0.13
Dir. Fact. = 0.631

Remington Rd
Schoolhouse Rd

Image source: Google Earth 2019 Aerial Photography

STEP 4:
Develop proxy volume estimates

Method 2:
Estimate using Segment-Level Data

$$Volume_{\text{Individual Movement}} = AADT(K)(Dir.Factor) * \left(\frac{AADT_{recieving\ leg\ for\ movement}}{AADT_{all\ receiving\ legs\ for\ approach}} \right)$$

$$Volume_{\text{EBLT}} = 2,200(0.13)(0.631) * \left(\frac{820}{820 + 2,300 + 1,700} \right) = 31\ veh.$$

KITTELSON & ASSOCIATES

DEVELOPING PROXY COUNTS

Image source: Google Earth 2019 Aerial Photography

Where historical counts or segment-level data not available, land use data can help estimate volumes:

1. Break adjacent land uses into analysis zones

2. Develop trip generation estimates for each analysis zone using ITE *Trip Generation Manual* data

3. Assign trips from each zone to the roadway network

4. Finesse as appropriate and balance with adjacent intersections where Method 1 and Method 2 were used

STEP 4:
Develop proxy volume estimates

Method 3: ←
Estimating trips using adjacent land uses

KITTELSON & ASSOCIATES

DEVELOPING PROXY COUNTS

1.) Break adjacent land uses into analysis zones

ZONE A
ZONE B
ZONE A
ZONE C
ZONE D
ZONE D
ZONE D
ZONE E
ZONE F
ZONE G

Bealeton
CEDAR LEE

STEP 4:
Develop proxy volume estimates

Method 3: ←
Estimating trips using adjacent land uses

Zone	Land Uses
A	102 Single-Family Detached Homes
B	51 Single-Family Detached Homes
C	60 Single-Family Detached Homes
D	45 Single-Family Detached Homes
	2,873 SF Church
E	63 Single-Family Detached Homes
	48 Apartments
F	48 Apartments
	3,248 SF of Office
	1,336 SF Convenience Market
G	Middle School (654 Students)

KITTELSON & ASSOCIATES
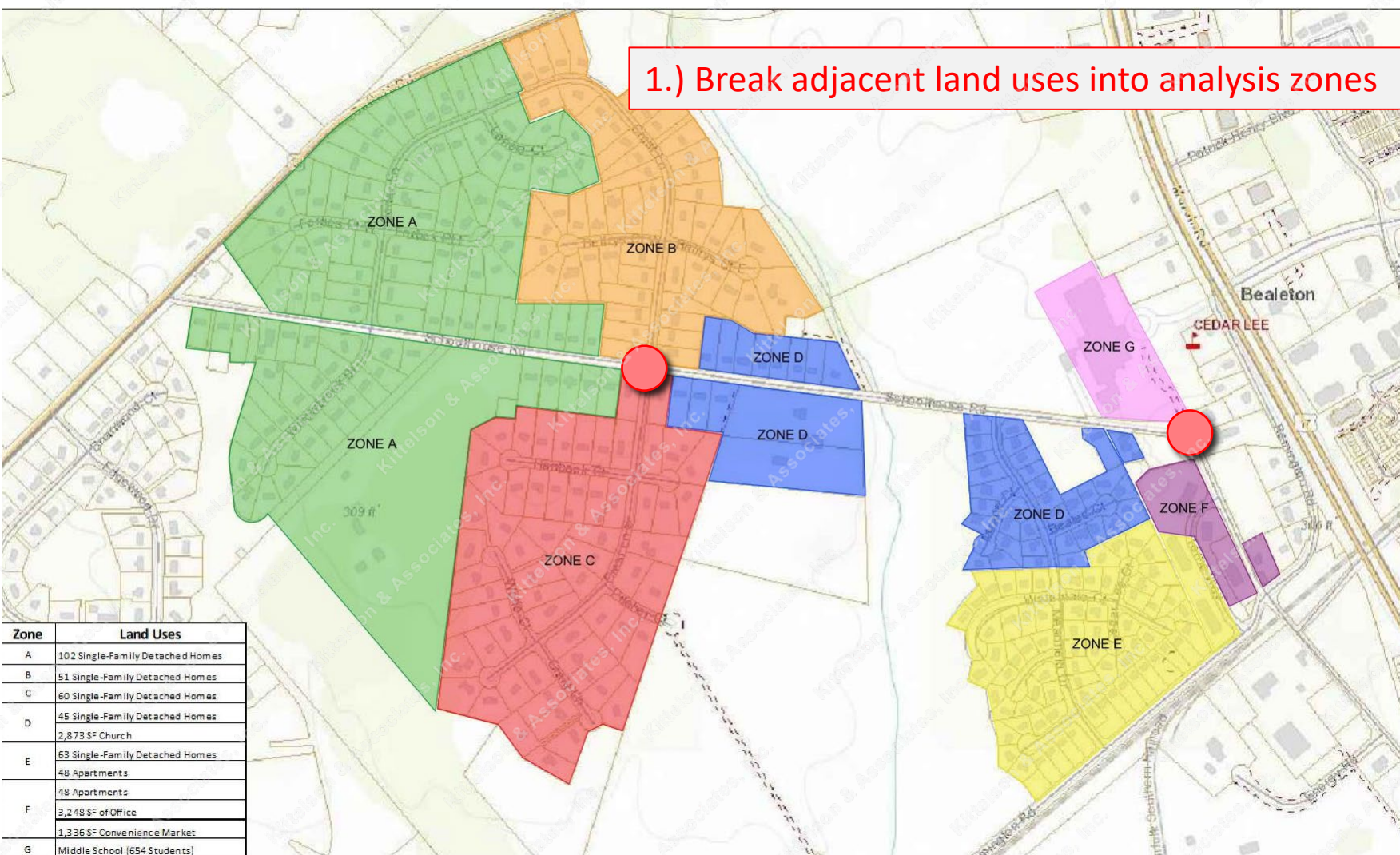
DEVELOPING PROXY COUNTS

Zone B

Land Use	ITE Code		Units	Weekday Daily	Peak Hour Adjacent Street					
					Weekday AM Peak Hour			Weekday PM Peak Hour		
					Total	In	Out	Total	In	Out
Single-Family Detached Housing	210	51	Dwelling Units	560	41	10	31	53	33	20
			Net New Trips	560	41	10	31	53	33	20

2.) Develop trip generation estimates for each analysis zone

Zone	Land Uses
A	102 Single-Family Detached Homes
B	51 Single-Family Detached Homes
C	60 Single-Family Detached Homes
D	45 Single-Family Detached Homes
	2,873 SF Church
E	63 Single-Family Detached Homes
	48 Apartments
F	48 Apartments
	3,248 SF of Office
	1,336 SF Convenience Market
G	Middle School (654 Students)

STEP 4:
Develop proxy volume estimates

Method 3: Estimating trips using adjacent land uses

KITTELSON & ASSOCIATES

DEVELOPING PROXY COUNTS

					Peak Hour Adjacent Street					
Zone B										
				Weekday	Weekday AM Peak Hour			Weekday PM Peak Hour		
Land Use	ITE Code		Units	Daily	Total	In	Out	Total	In	Out
Single-Family Detached Housing	210	51	Dwelling Units	560	41	10	31	53	33	20
			Net New Trips	560	41	10	31	53	33	20

3.) Assign trips from each zone to study intersections as appropriate

STEP 4:
Develop proxy volume estimates

Method 3:
Estimating trips using adjacent land uses

Zone	Land Uses
A	102 Single-Family Detached Homes
B	51 Single-Family Detached Homes
C	60 Single-Family Detached Homes
D	45 Single-Family Detached Homes
	2,873 SF Church
E	63 Single-Family Detached Homes
	48 Apartments
F	48 Apartments
	3,248 SF of Office
	1,336 SF Convenience Market
G	Middle School (654 Students)

KITTELSON & ASSOCIATES

DEVELOPING PROXY COUNTS

4.) Finesse as appropriate and balance with adjacent intersections where Method 1 and Method 2 were used

STEP 4:
Develop proxy volume estimates

Method 3:
Estimating trips using adjacent land uses

Zone	Land Uses
A	102 Single-Family Detached Homes
B	51 Single-Family Detached Homes
C	60 Single-Family Detached Homes
D	45 Single-Family Detached Homes
	2,873 SF Church
E	63 Single-Family Detached Homes
	48 Apartments
	48 Apartments
F	3,248 SF of Office
	1,336 SF Convenience Market
G	Middle School (654 Students)

30

KITTELSON & ASSOCIATES

CASE STUDY #2

PRIVATE DEVELOPMENT TRAFFIC IMPACT ANALYSIS
CLACKAMAS, OR

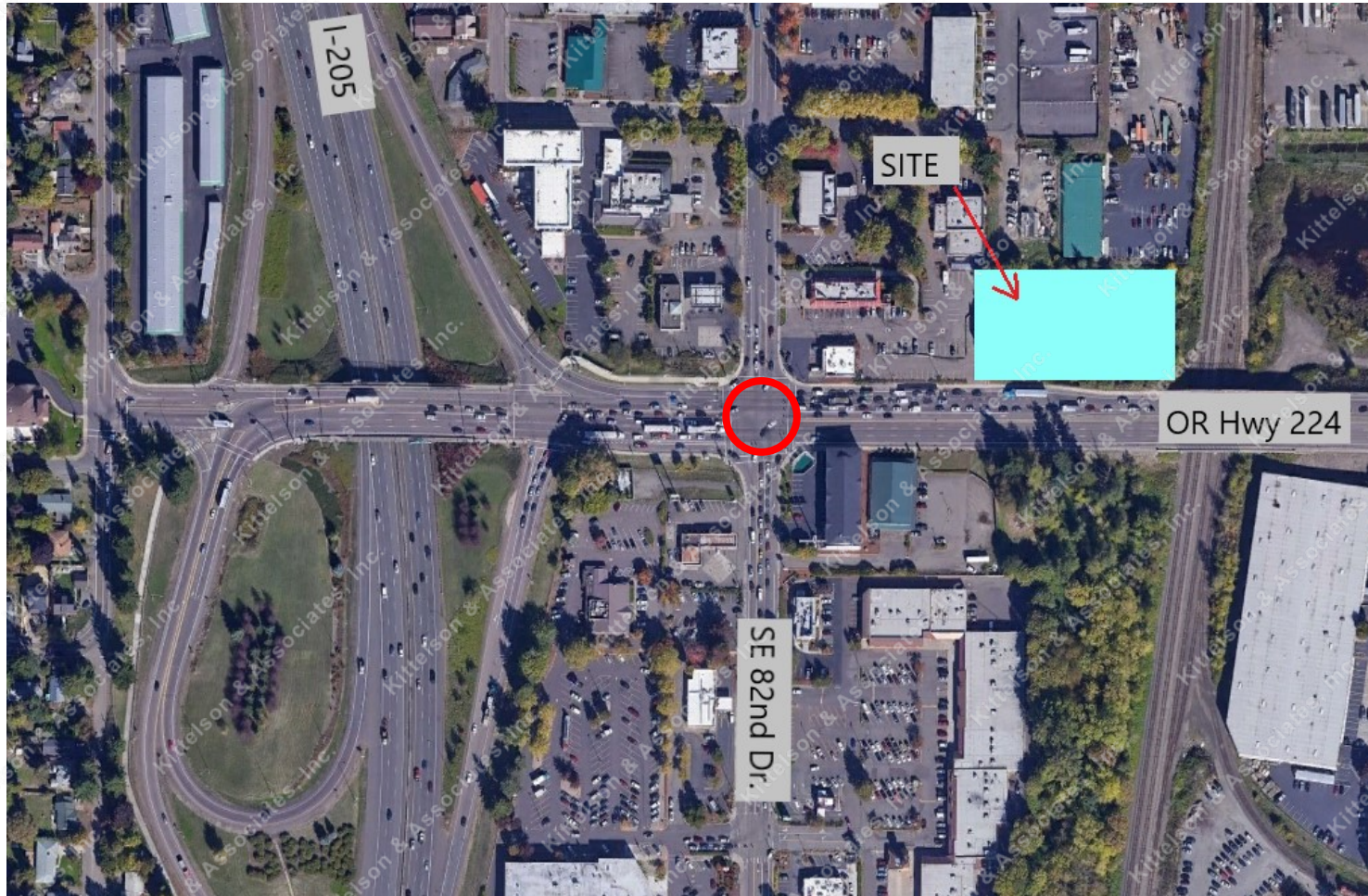Method 1: Adjustments to externally-observed data

DEVELOPMENT SITE

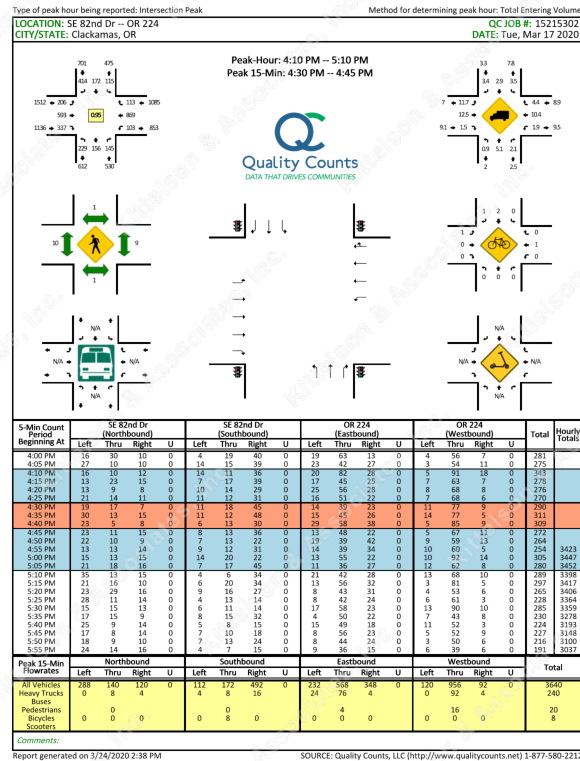
Image source: Google Earth Aerial Photography

STEP 1:
Establish
project
context &
data needs

STEP 2:
Coordinate
with
appropriate
agencies

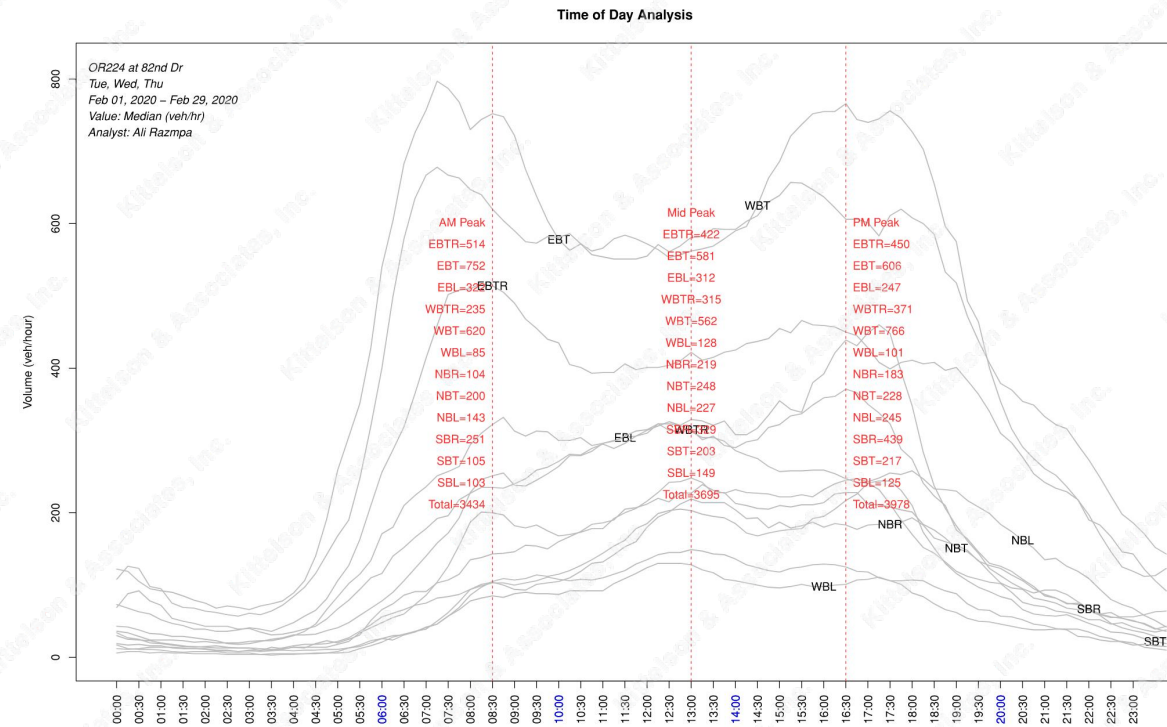**Study Intersection**
- OR Highway 224/SE 82nd Drive

DATA AVAILABLE

- **Weekday PM Turn Movement Count (March 17, 2020)**

- **ODOT Advanced Traffic Controller Data (All of February 2020)**

DEVELOPING PROXY VOLUMES

ATC Data at OR 224/SE 82nd Drive Intersection (Weekday PM Peak Hour)

Date / Movement	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBTR	WBL	WBT	WBTR	Total Entering
Day of March 17 Count	248	171	168	110	174	405	201	524	375	108	689	303	3,476
Average of All Midweek Days in February	248	211	184	111	244	460	232	583	408	111	745	338	3,875
% Change	1.00	1.23	1.10	1.01	1.40	1.14	1.15	1.11	1.09	1.03	1.08	1.12	1.11

Proxy Volume Estimates at OR 224/SE 82nd Drive Intersection (Weekday PM Peak Hour)

Date / Movement	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBTR	WBL	WBT	WBTR	Total Entering
Actual March 17 Count	229	156	145	115	172	414	206	593	337	103	869	113	3,452
Growth Factor	1.00	1.23	1.10	1.01	1.40	1.14	1.15	1.11	1.09	1.03	1.08	1.12	1.11
Adjusted Proxy Volumes	229	192	159	116	241	470	238	645	367	106	940	126	3,829

KITTELSON & ASSOCIATES

CASE STUDY
#3

"BIG DATA"
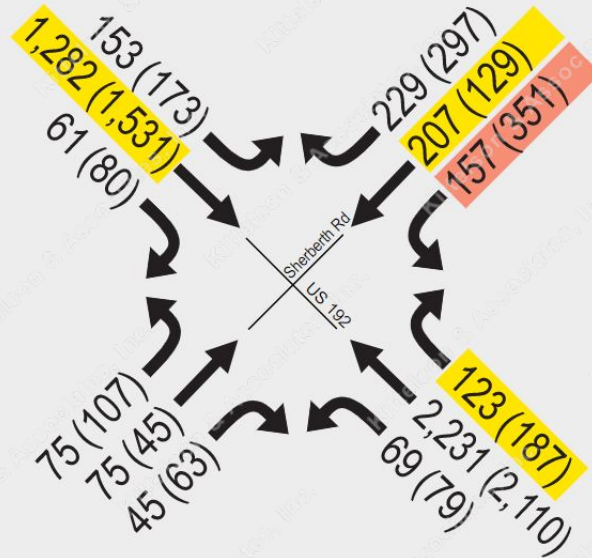
Method 2: Adjustments to user-generated data
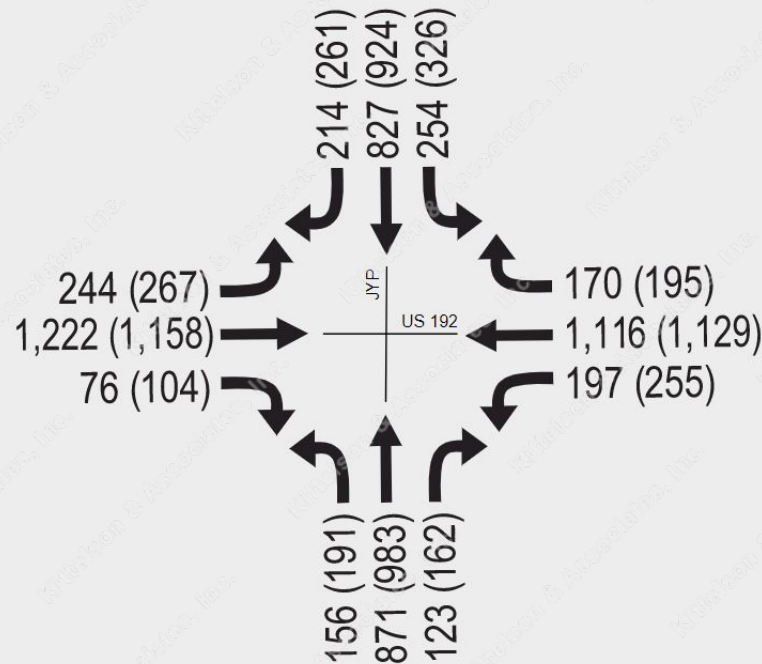
US 192 IN CENTRAL FLORIDA

FIELD-COLLECTED AND PROBE DATA COMPARISON
WEEKDAY 4-6 PM TURNING MOVEMENTS

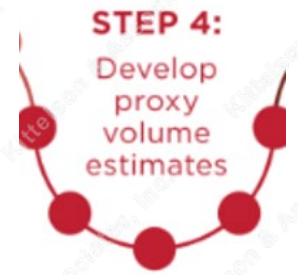Small Intersection

Large Intersection

LEGEND (Probe data estimates shown in parantheses) | Moderate error (GEH >5) | High error (GEH >10)

INITIAL EXPERIENCE: "BIG DATA" REFLECTIONS

Advantages

- Easily scalable across large areas without field deployments

- Estimates can be obtained using many months of data, not just a day or two

- Can be used to easily produce weekend or off-peak estimates

- Data can be obtained quickly and retroactively

Disadvantages

- May lack heavy vehicle percentages, pedestrian and bicycle volumes

- May cost more than field data collection, especially for small projects

- May require recent daily counts in the project vicinity for calibration purposes

- Not yet a widely accepted practice

KITTELSON & ASSOCIATES

FUTURE CHALLENGES IN PREDICTING TRAVEL DEMAND

Near-Term Projections (1-5 years)

- Future background conditions <> pre-COVID conditions:
  - Fundamental trip making characteristics that may change permanently:
    - Trip generation
    - Trip distribution
    - Mode split
- Possible approach:
  - Rely on available tools and fundamental trip-making variables that will remain the same
    - Population and employment will remain the same in scale and distribution
    - Existing travel demand models may be the best available predictive tool
    - Apply a scenario-based planning approach ("reasonable worst case", "most likely case", and "reasonable best case")

38

FUTURE CHALLENGES IN PREDICTING TRAVEL DEMAND

Mid-Term Projections (5-15 years)

- Expected status of key trip-making characteristics:
  - Some behavioral changes will have dissipated and others will remain
  - Recession effects will have been incorporated into ambient demand levels
  - Technology-driven changes will have been accelerated
- Possible approach:
  - Apply travel demand models to an updated "most likely" scenario
  - Ignore current near-term economic forecasts
  - Apply current 20-year forecasts of technology-driven trip-making changes

KITTELSON & ASSOCIATES

FUTURE CHALLENGES IN PREDICTING TRAVEL DEMAND

Long-Term Projections (15-25 years)

- Expected status of key trip-making characteristics:
  - Currently unknown factors and future events are likely to affect these projections as much or more than the permanent behavioral, locational, and trip making effects of the COVID crisis
- Possible approach:
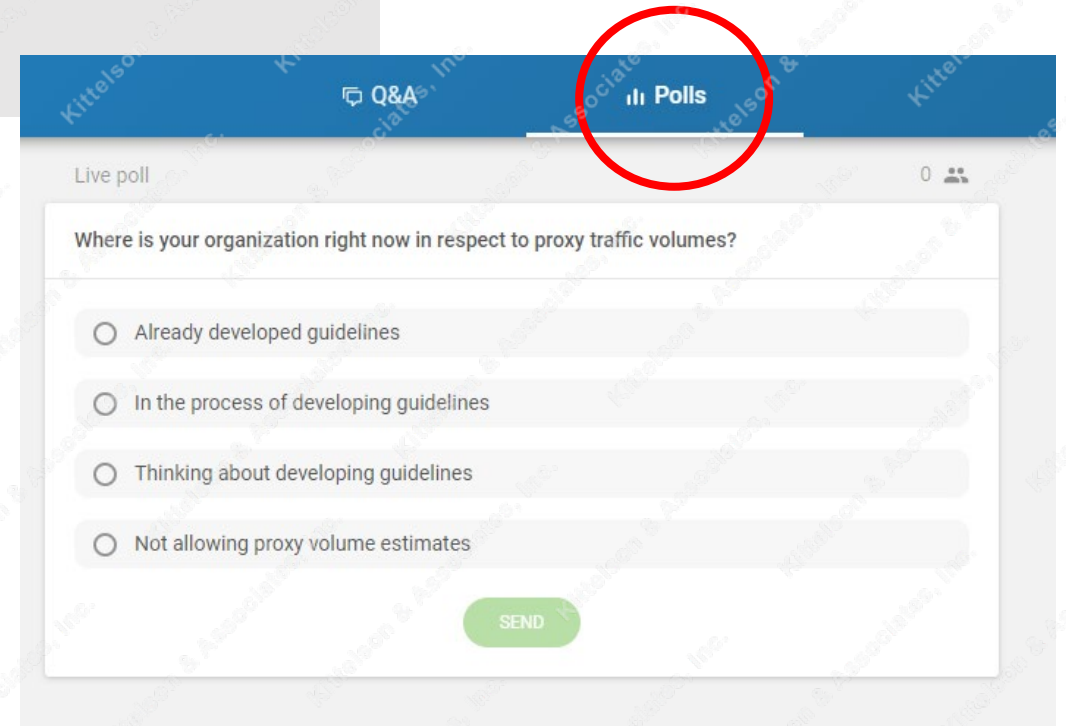 - Extrapolate mid-term assumptions cited earlier regarding technology-driven changes

KITTELSON & ASSOCIATES

PARTICIPANT SURVEY

Go to **Slido.com** and access survey with
Event Code: **#EstimatingVolumes**

1.

2.

QUESTIONS & DISCUSSION

**Ideas?
Current Challenges?
Alternative Solutions?**

PDH CREDIT

If you haven't already, post your name and email address in the chat box.

Indicate if you'd like to receive a form for PDH credit.

If you are unable to access the chat box but need a form, send Amy Donald an email: adonald@kittelson.com

KITTELSON & ASSOCIATES