



Utilizing BIG DATA in the Transportation Planning Process

*Georgia Planning Association – Fall Conference
Jekyll Island, Georgia*

September 5, 2018

RS&H

Introduction

» Presenting Today



Steve
Cote



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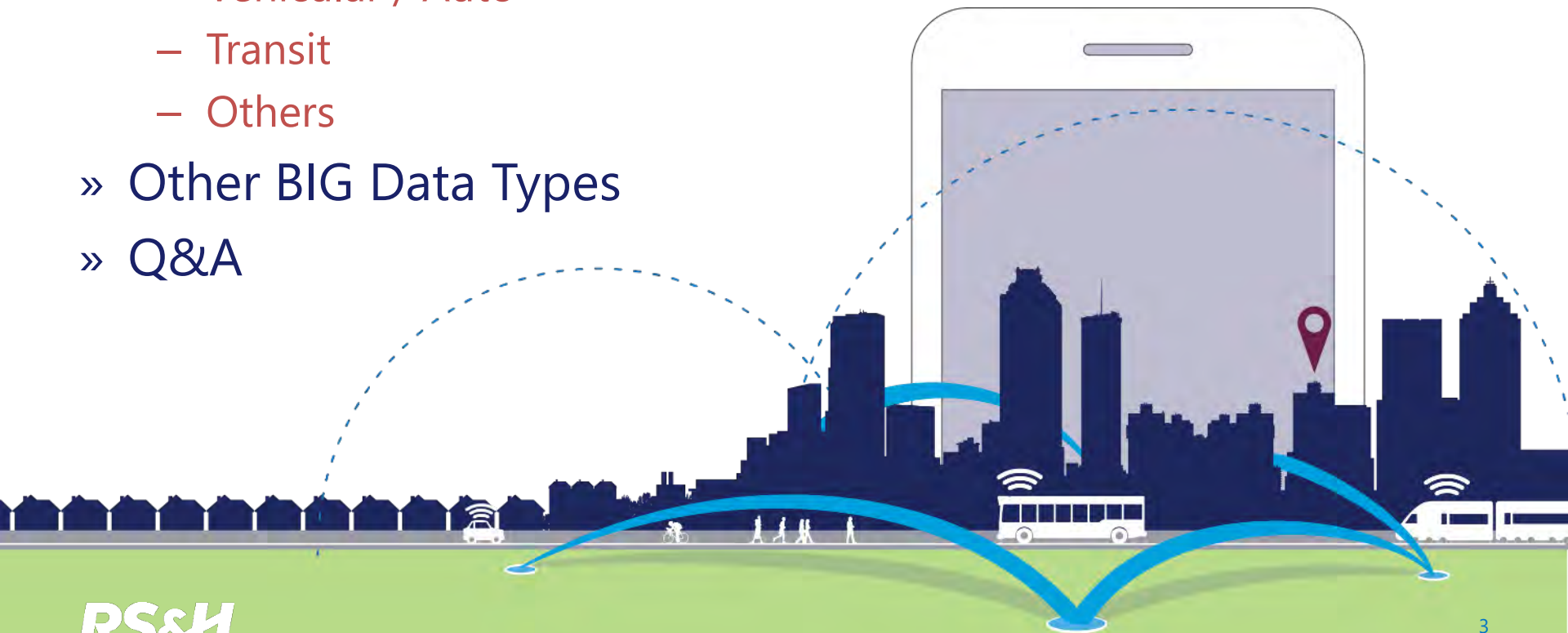


Grant
Sparks



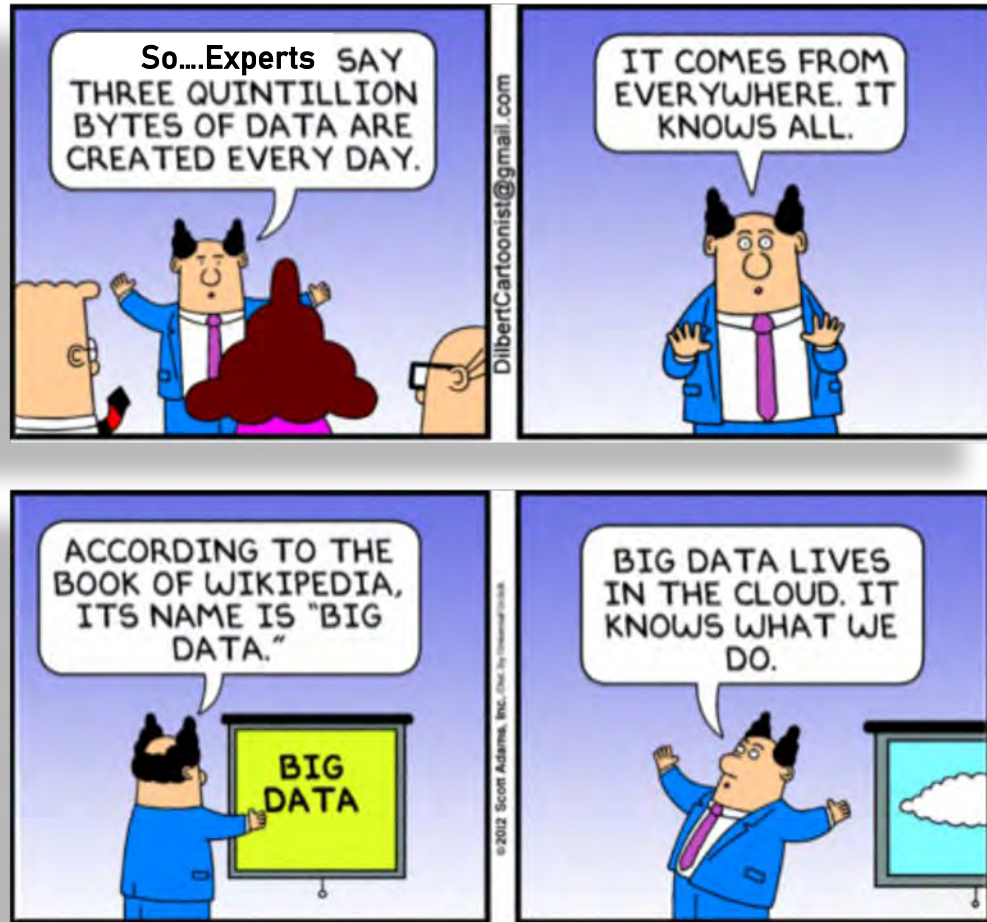
Session Agenda

- » Introduction
- » BIG DATA Overview
- » O&D Applications
 - Vehicular / Auto
 - Transit
 - Others
- » Other BIG Data Types
- » Q&A



BIG DATA in Transportation

Overview



BIG DATA in Transportation

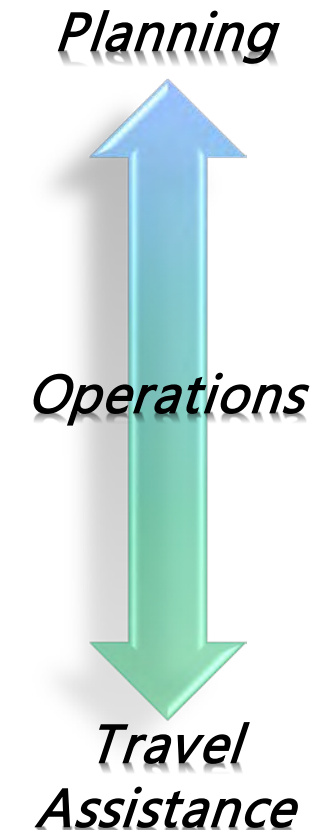
- » Technology Changes = Opportunities
- » Many Applications in Transportation Planning
- » Volume of Data is Not Critical, but **HOW IT USED** is!



BIG DATA

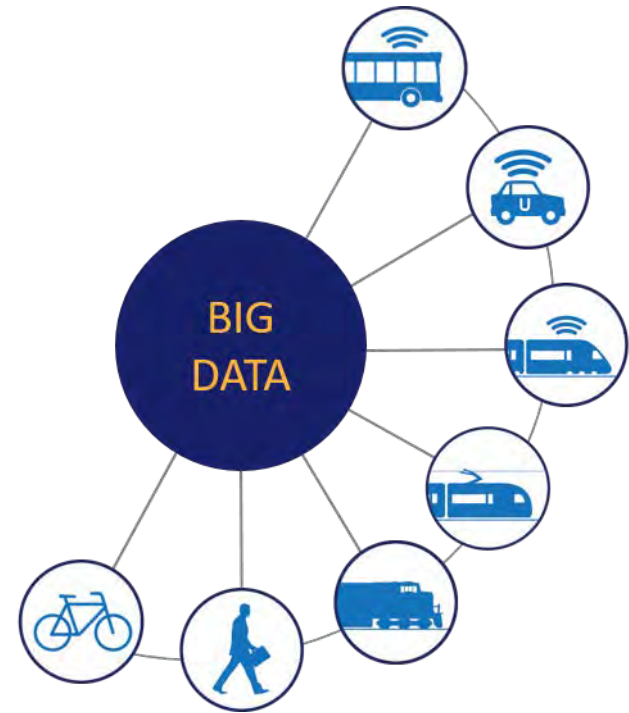
Transportation Context

- » Origin and Destination (O&D)
 - Locations
 - Traveler / Trip Information
- » Travel Performance
 - Travel Time, Speed & Reliability
- » Transportation Systems Management and Operations (TSMO)
 - Coordinated Incident Response
 - Traveler Information Services



Supplementing *Traditional Methods*

- » Validate Existing Conditions
- » Visualize Real-Time
 - Operations
 - Congestion
- » Other?
 - Evacuation Planning



Evolving Methods



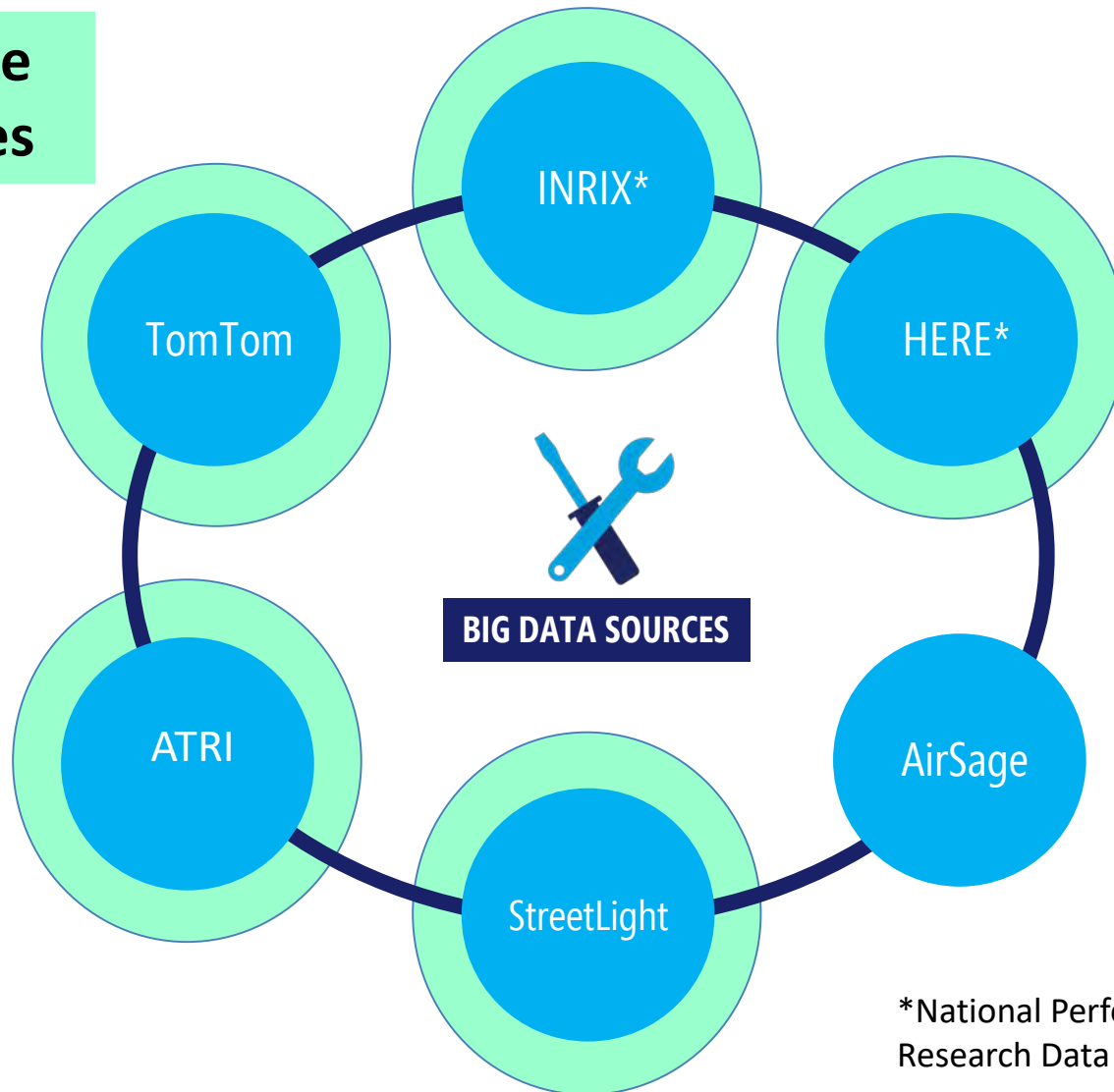
Analysis	Yesterday	Today
Origin and Destination	License Plate Recognition	<ul style="list-style-type: none"> • Vehicular Navigation Systems • Smart Phone and Tablet Apps
	Roadside, Paper and/or Online Surveys	
Travel Time and Speeds	Floating Car Studies Radar Studies	
Capture Rates	Up to 1% <i>(if we were lucky)</i>	O&D <ul style="list-style-type: none"> • 15–25% of adults¹ • 1-3% vehicles² • 10-12% trucks Congestion <ul style="list-style-type: none"> • 100%

¹ Location-Based Services (LBS)

² Global Positioning System (GPS)

Sample List of Sources / Vendors

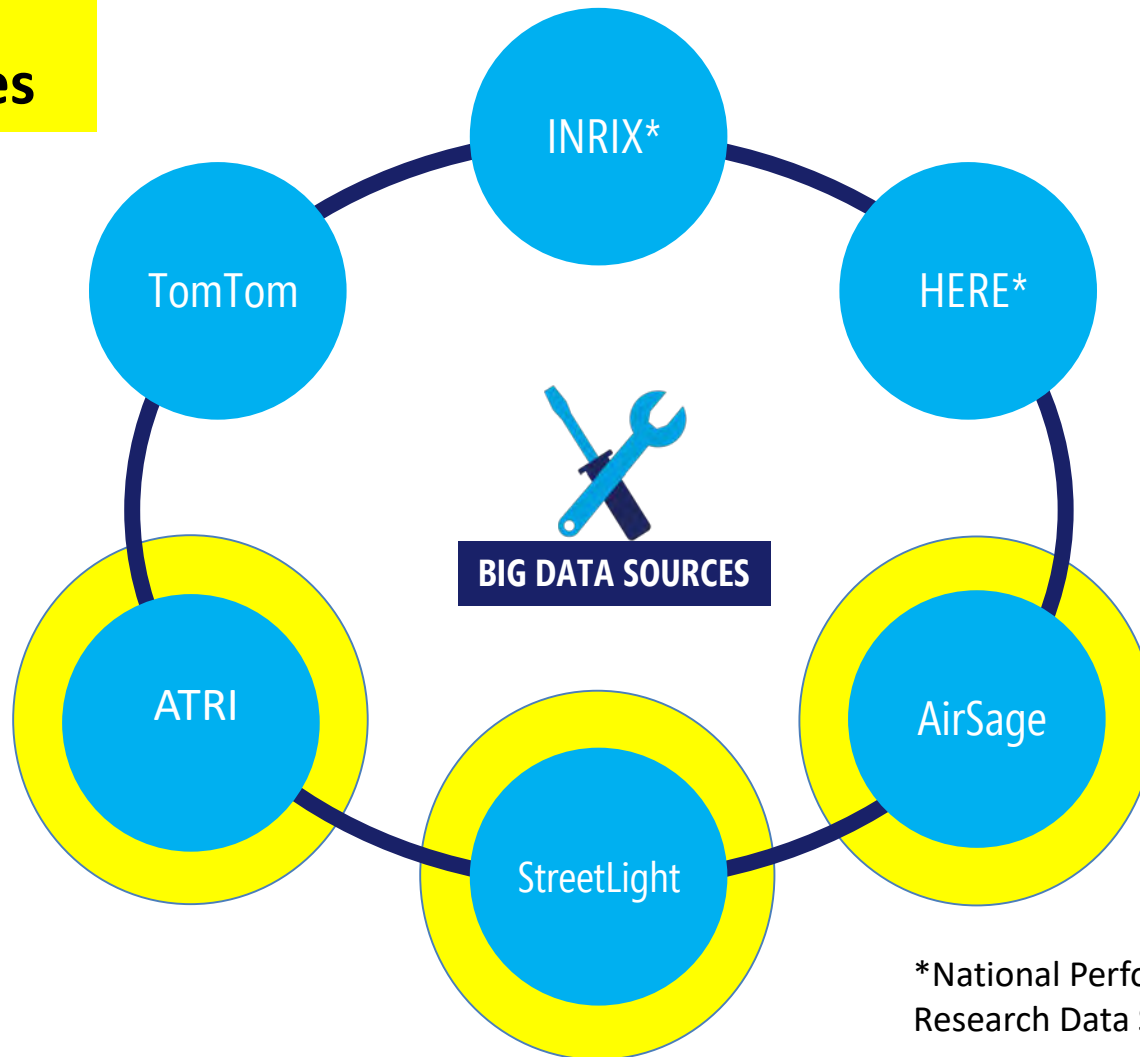
Performance Data Sources



*National Performance Research Data Set (NPMRDS)

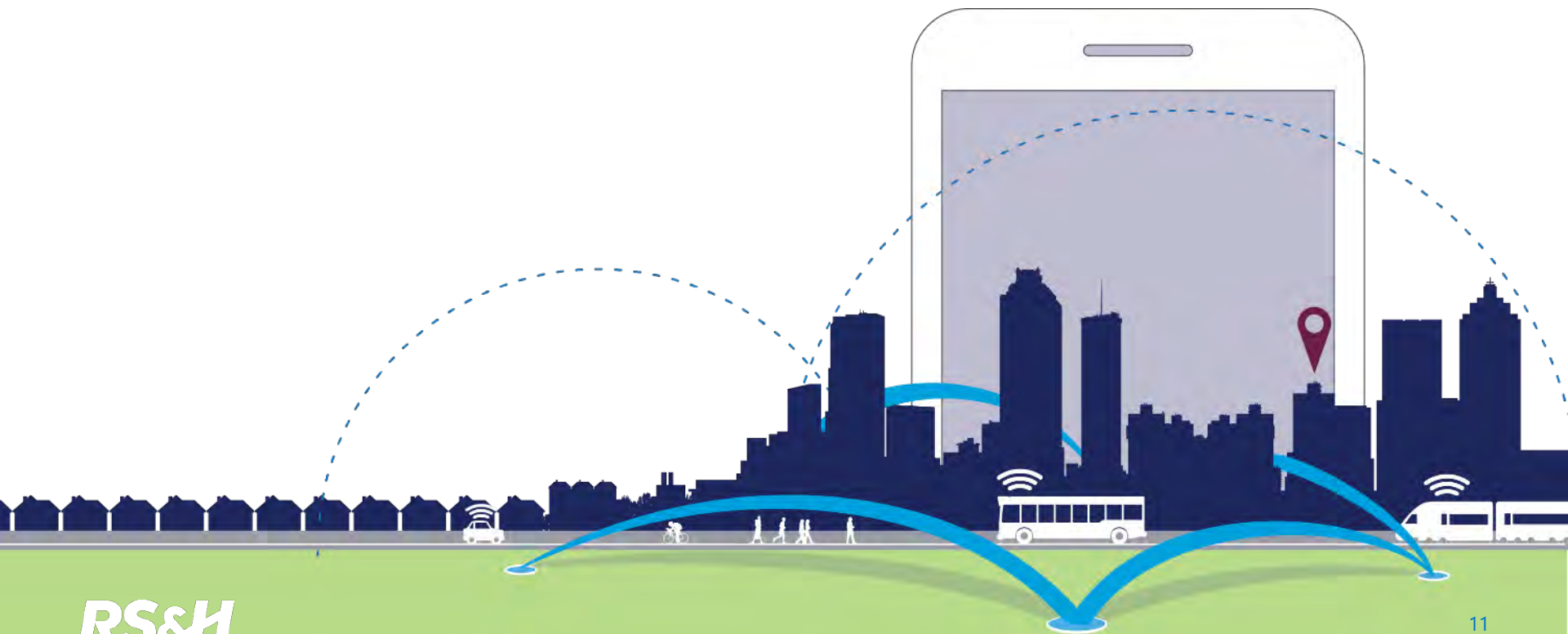
Sample List of Sources / Vendors

O&D Data Sources



*National Performance
Research Data Set (NPMRDS)

Utilizing O&D Data



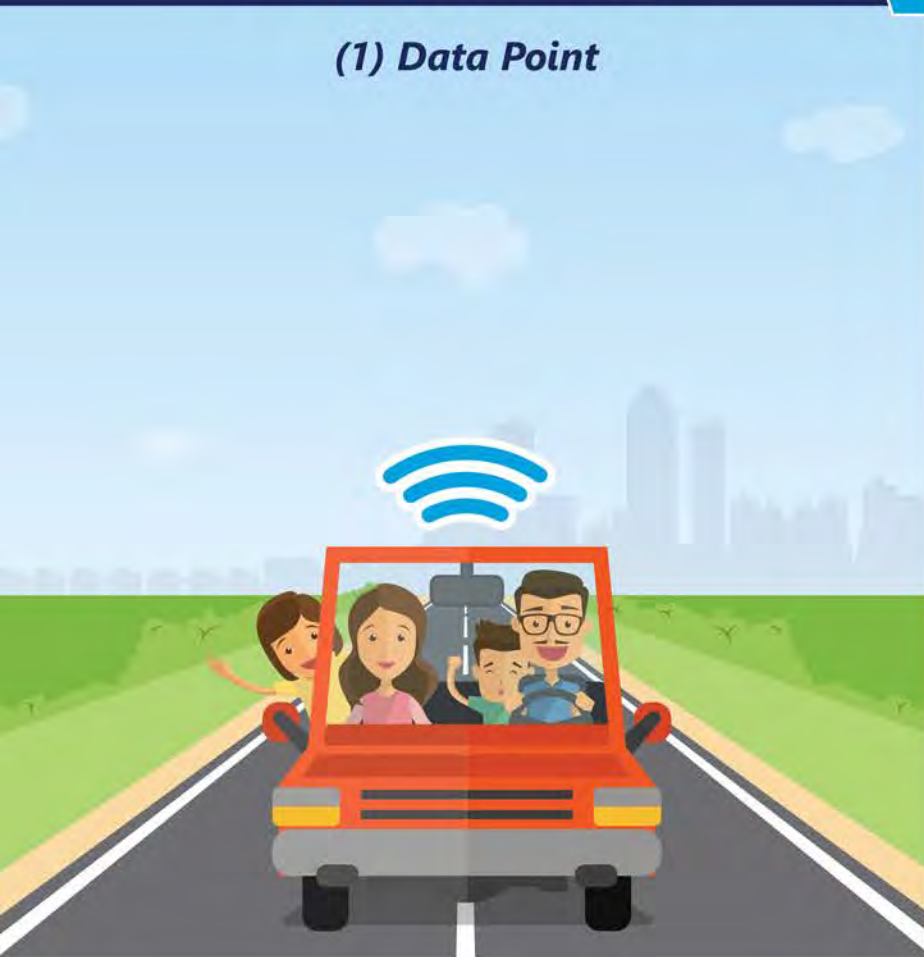
Technology Sources

GPS Vehicular Data

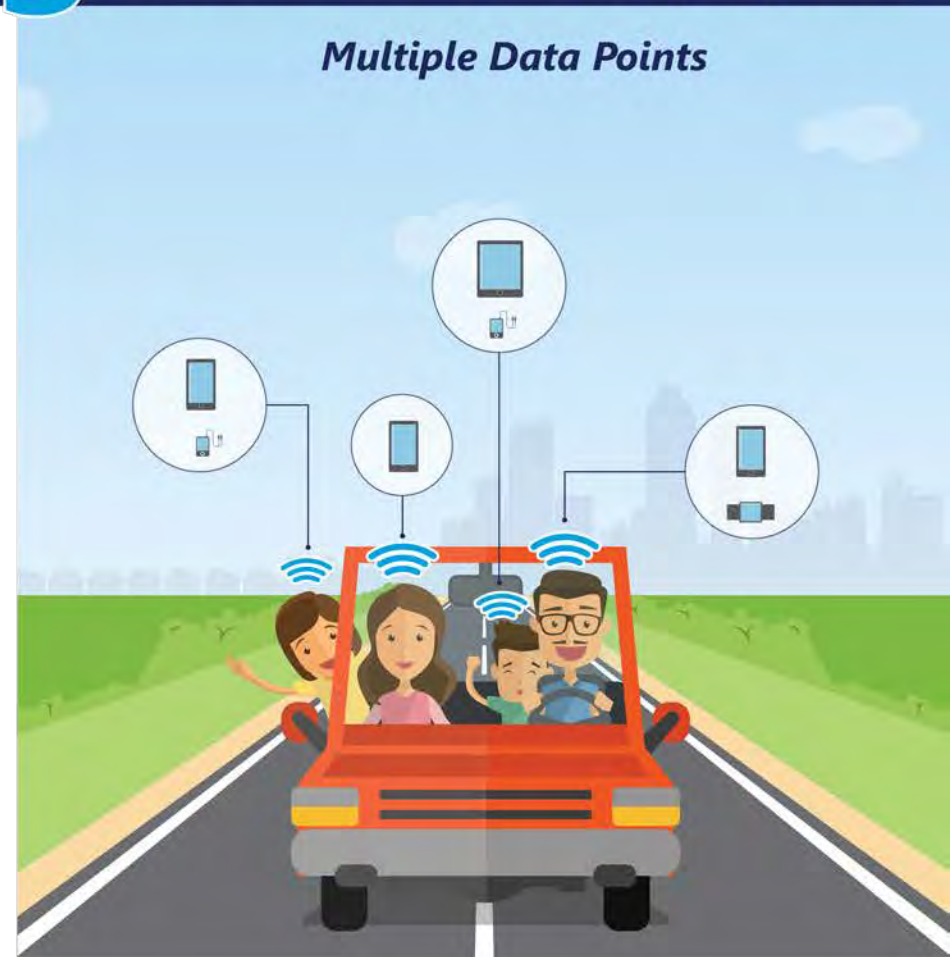
VS

Location-Based-Service (LBS) Data

(1) Data Point

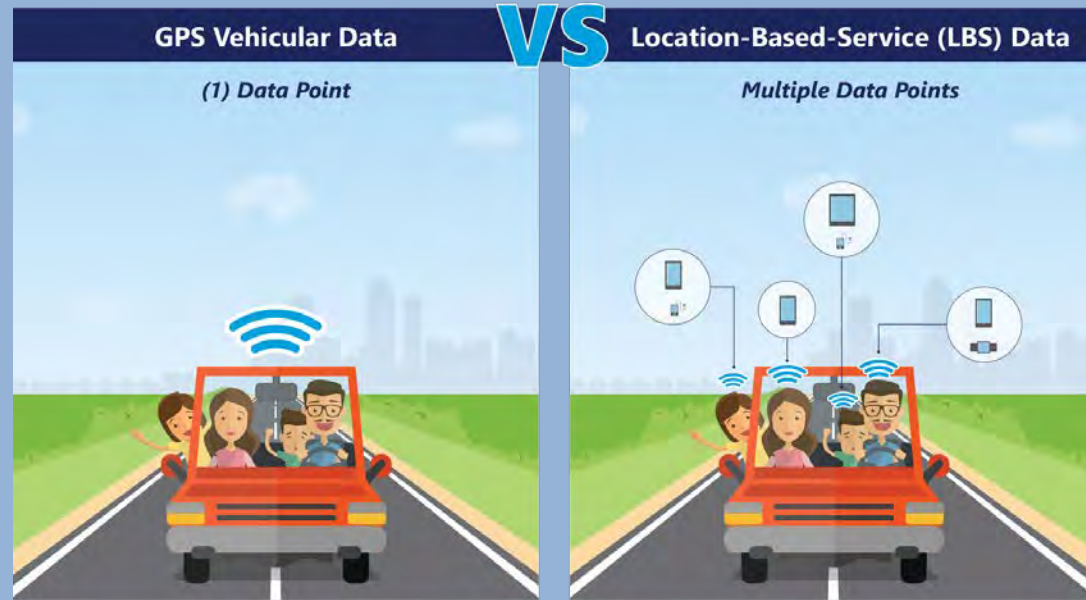


Multiple Data Points



Data Types

Locational



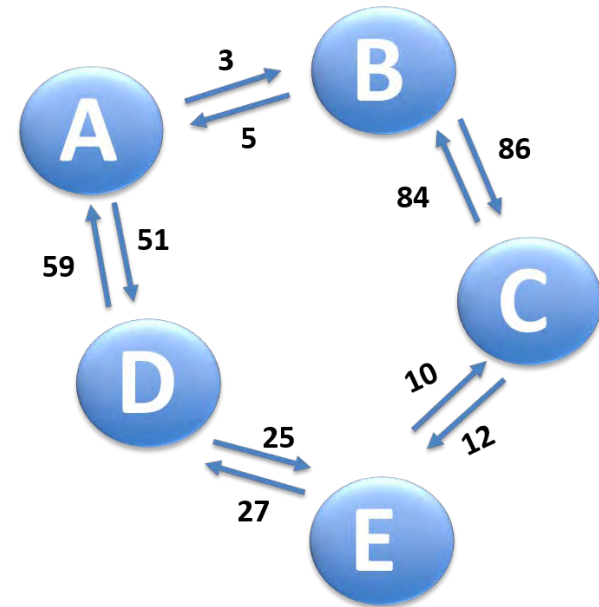
Contextual

- US Census
- Local Parcel-level
- Road Network

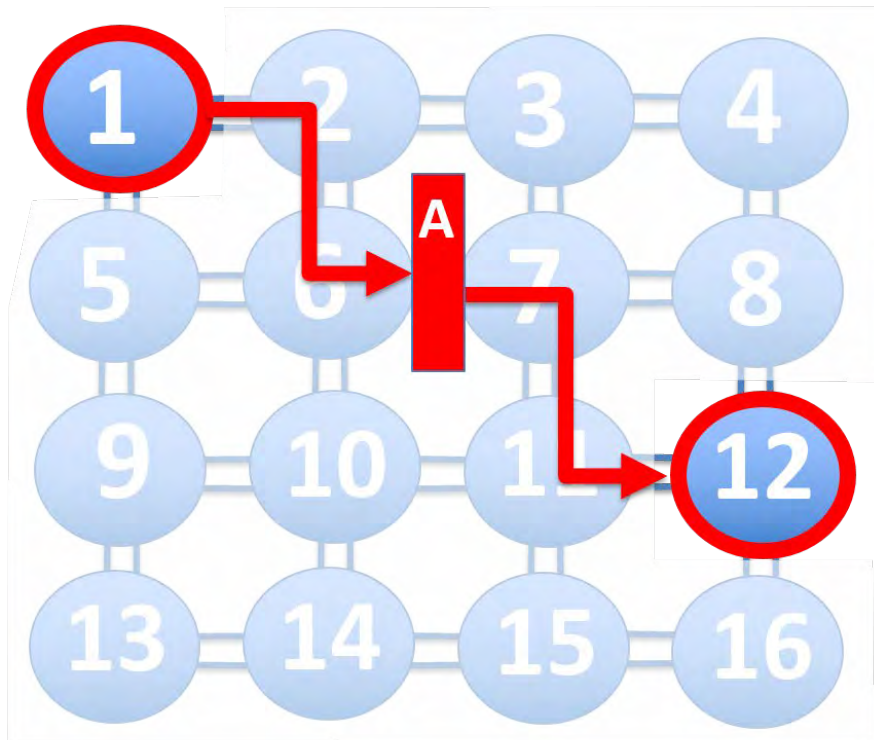
Analysis Type 1: *O&D Matrix Development*

- » Between Locations
 - Volumes
 - Travel Times
 - Personal vs. Commercial trips

	A	B	C	D	E
A	0	3	0	51	0
B	5	0	86	0	0
C	0	84	0	0	12
D	59	0	0	0	25
E	0	0	10	27	0

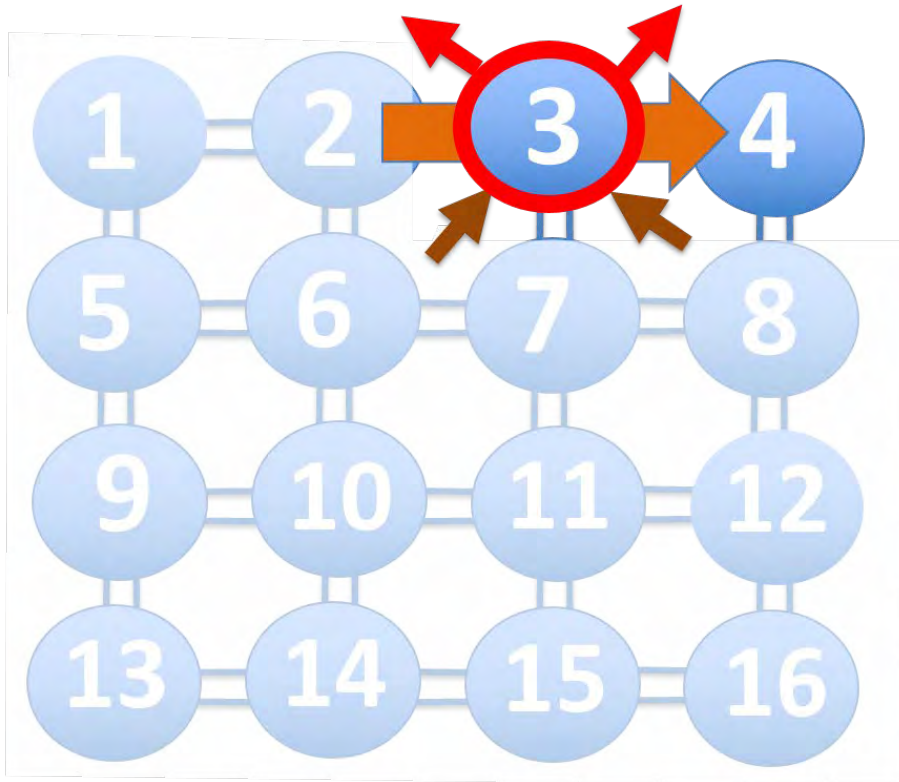


Analysis Type 2: *O&D with Destination "Pass-Through"*



- » Volumes
- » Travel Times
- » Example
 - Assess trips from zone 1 to zone 12 passing through **Gate A**

Analysis Type 3: *O&D with Zonal Analysis*



- » **Volumes** or
- » **Travel Times**
 - 1) **Originate** in
 - 2) **Destined** for, or
 - 3) **Pass through**

- » **Example**
 - Assess trips associated with **Zone 3**

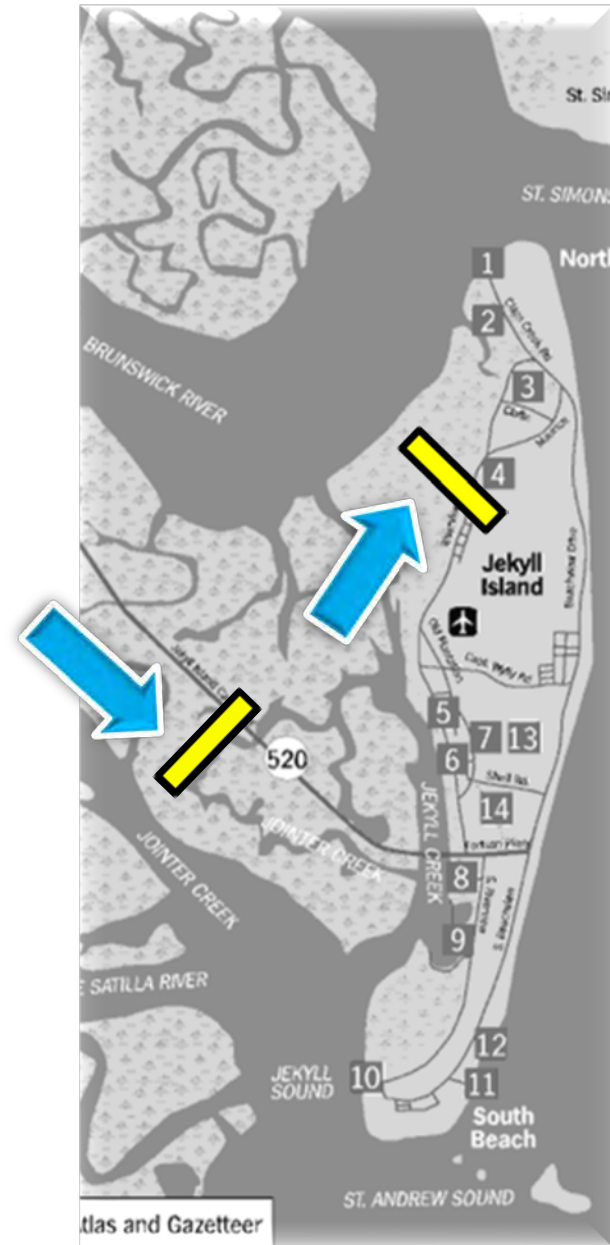
Example



Step 1a *Develop Gates*

» Gates

- Similar to Laying “Traffic Tubes”
- Generally Correspond to Roadway
- Accuracy: **5 m (16 ft)**
- Bi-directional data available



Example

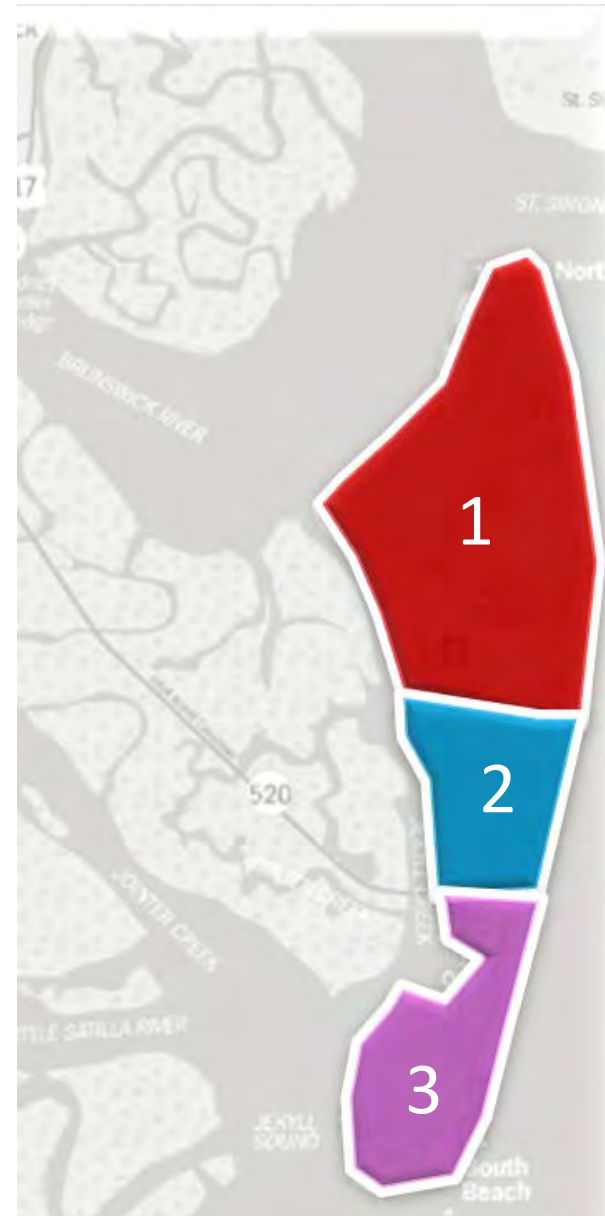


Step 1b

Developing Zones

» Zone Development

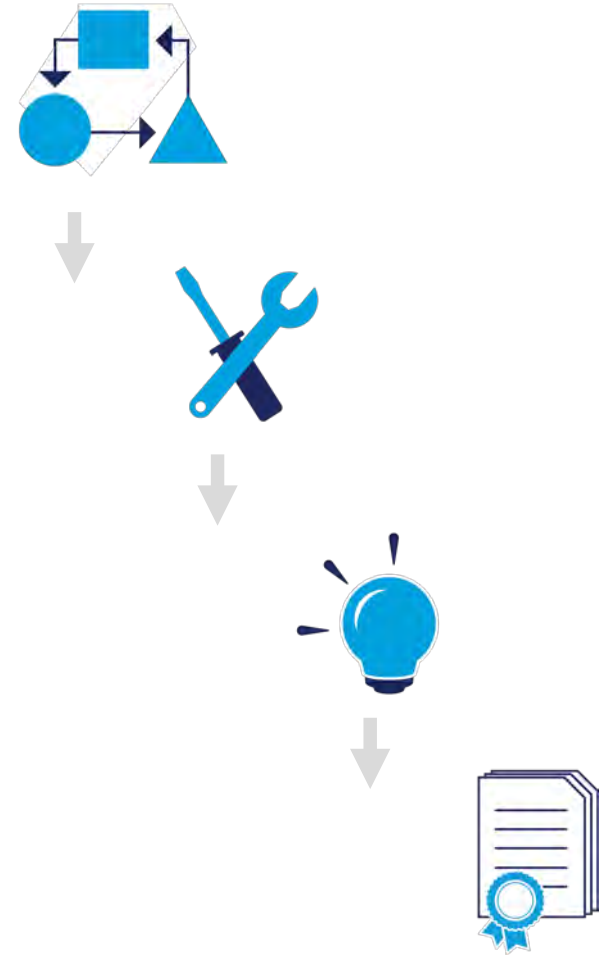
- Zones Depend Upon Specific Analysis
 - Small such as a parcel
 - Large: County, City, Census Block Group, Block, etc...
- Data Accuracy **5m (16 ft)**



Example

Steps 2 & 3 *Analysis and Results*

- » Run Analyses
- » Download Data Analyze Data
 - .CSV files
- » Develop O&D Matrices
 - Excel
 - Pivot Tables
- » Present Results
 - Graphically
 - Tabular Format





BIG DATA for *Vehicular Planning*



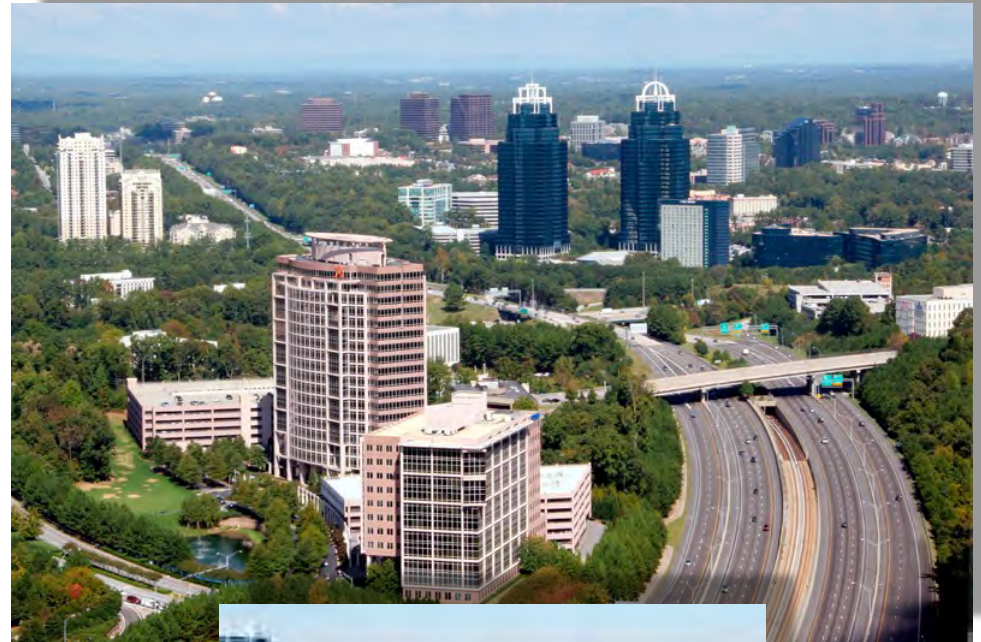
Analysis Criteria Options

- » Vehicular Trip Attributes
 - Trip duration
 - Trip length
 - Trip speed
 - Trip circuitry
- » Truck and Freight Classifications
 - Heavy Duty (>26,000 lbs) vs.
 - Medium Duty (14,000 – 26,000 lbs)
- » Vendor Results from presented as Indices
 - Separate for Auto / truck trips
- » Compare Against AADTs / Daily Volumes



PCIDs Case Study

- » Major Atlanta Activity/Employment Center
- » Self-Taxing Business District
- » Three (3) MARTA Heavy Rail Stations



Study Purpose

O&D Analysis for CIDs

- » Analyze Existing Trip O&Ds for AM and PM Peak Periods using StreetLight Data
- » Better Understand Travel Patterns
- » Several Ongoing Major GDOT Investment Projects



O&D Data

Technical Specifics



- » Data Coverage:
 - January 2017 – December 2017
- » Data Type:
 - GPS Navigation Data
- » Periods Analyzed
 - Peak AM (6am-10am)
 - Peak PM (3pm-7pm)
- » Focus Areas
 - Personal Vehicle Travel
 - Average Weekday
 - AM Peak Inbound
 - PM Peak Outbound
- » Utilized GDOT Traffic Counts to Estimate Trips

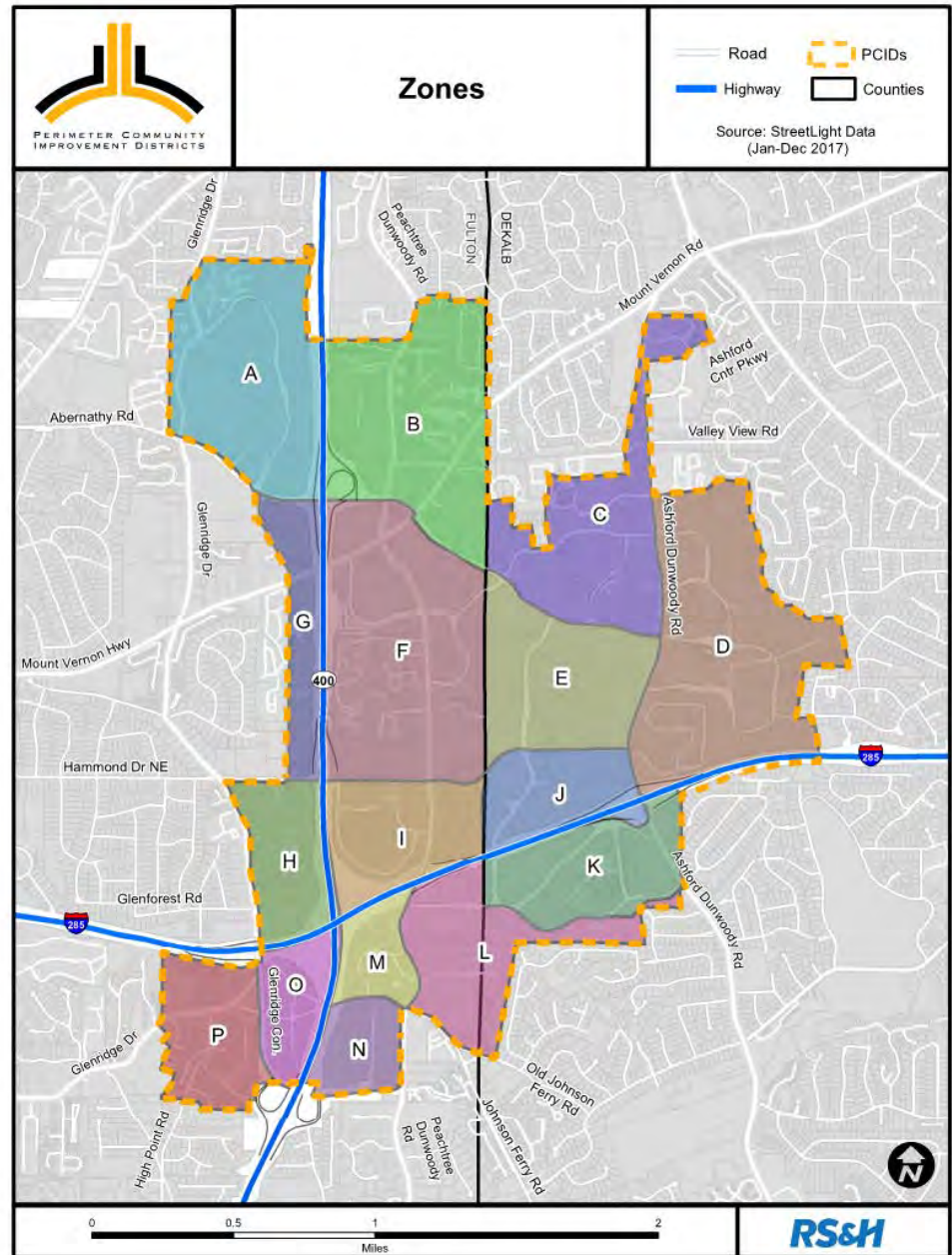


Zone I – Concourse (King and Queen Buildings); includes Westin Hotel and Remaining Office Campus

Zone Development



ID	Name
A	Glenlake
B	North
C	Perimeter Place
D	East
E	Perimeter Mall
F	Central
G	Barfield
H	North Glenridge
I	Concourse
J	South Dunwoody
K	Lake Hearn
L	St Joseph's Hospital
M	Northside Hospital
N	Children's Hospital
O	South Glenridge
P	West Glenridge

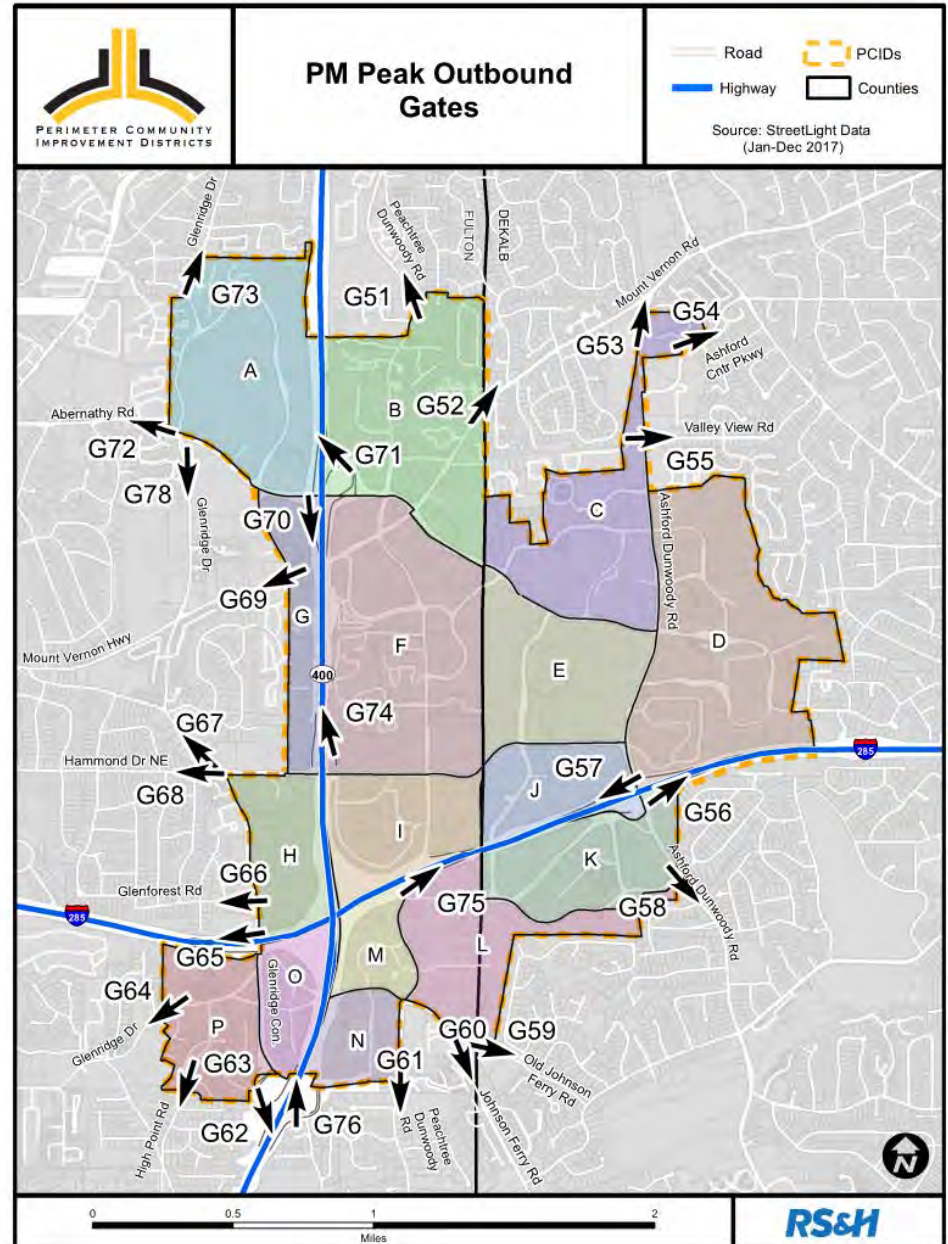


Utilizing BIG DATA in the Transportation Planning Process

Gate Development



Gate Number	Gate Description	Outbound Direction
G51	Peachtree Dunwoody Rd (North)	NB
G52	Mount Vernon Hwy (East)	EB
G53	Ashford Dunwoody Rd (North)	NB
G54	Ashford Center Pkwy	EB
G55	Valley View Rd	EB
G56	I-285 EB On-Ramp at Ashford Dunwoody Rd	EB
G57	I-285 WB On-Ramp at Ashford Dunwoody Rd	WB
G58	Ashford Dunwoody Rd (South)	SB
G59	Old Johnson Ferry Rd	SB
G60	Johnson Ferry Rd	SB
G61	Peachtree Dunwoody Rd (South)	SB
G62	GA 400 SB On-Ramp at Glenridge Connector	SB
G63	High Point Rd	SB
G64	Glenridge Dr (South)	WB
G65	I-285 WB On-Ramp at Glenridge Dr/Connector	WB
G66	Glenforest Rd	WB
G67	Glenridge Dr (Central)	NB
G68	Hammond Dr	WB
G69	Mount Vernon Hwy (West)	WB
G70	GA 400 SB On-Ramp at Abernathy Rd	SB
G71	GA 400 NB On-Ramp at Abernathy Rd	NB
G72	Abernathy Rd	WB
G73	Glenridge Dr (North)	NB
G74	GA 400 NB On-Ramp at Hammond Dr	NB
G75	I-285 EB On-Ramp at Peachtree Dunwoody Rd	EB
G76	GA 400 NB On-Ramp at Glenridge Connector	NB
G78	Glenridge Dr (South of Abernathy)	SB



Utilizing BIG DATA in the Transportation Planning Process

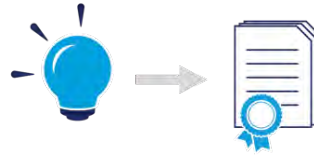
Development of O&D Matrices



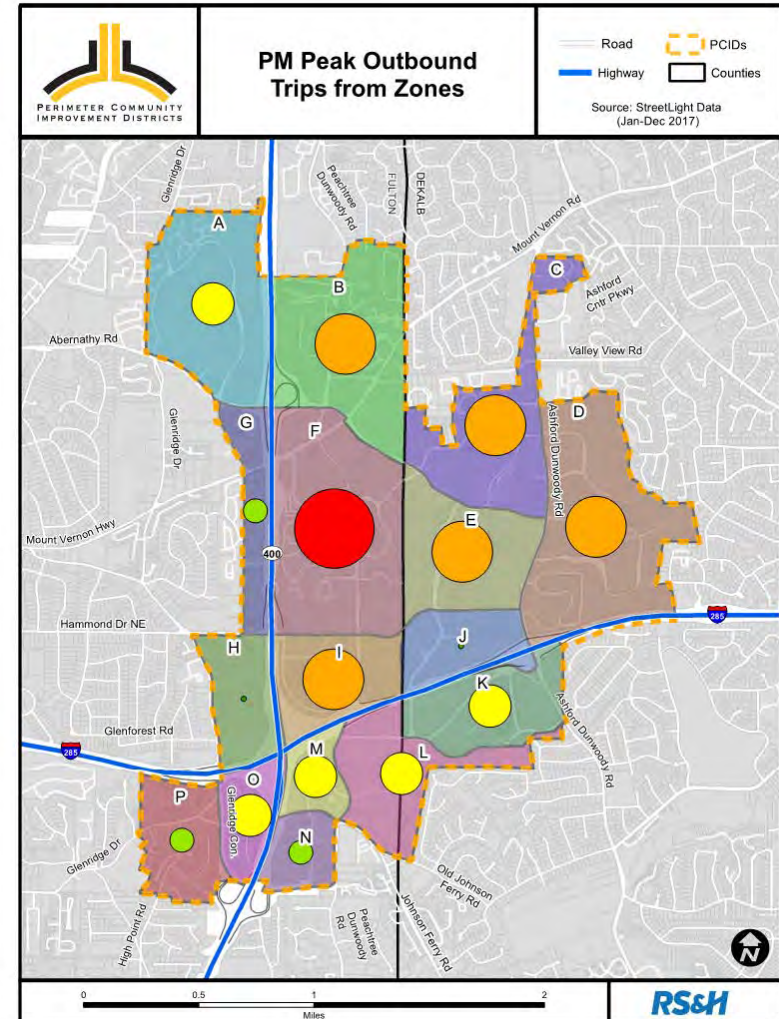
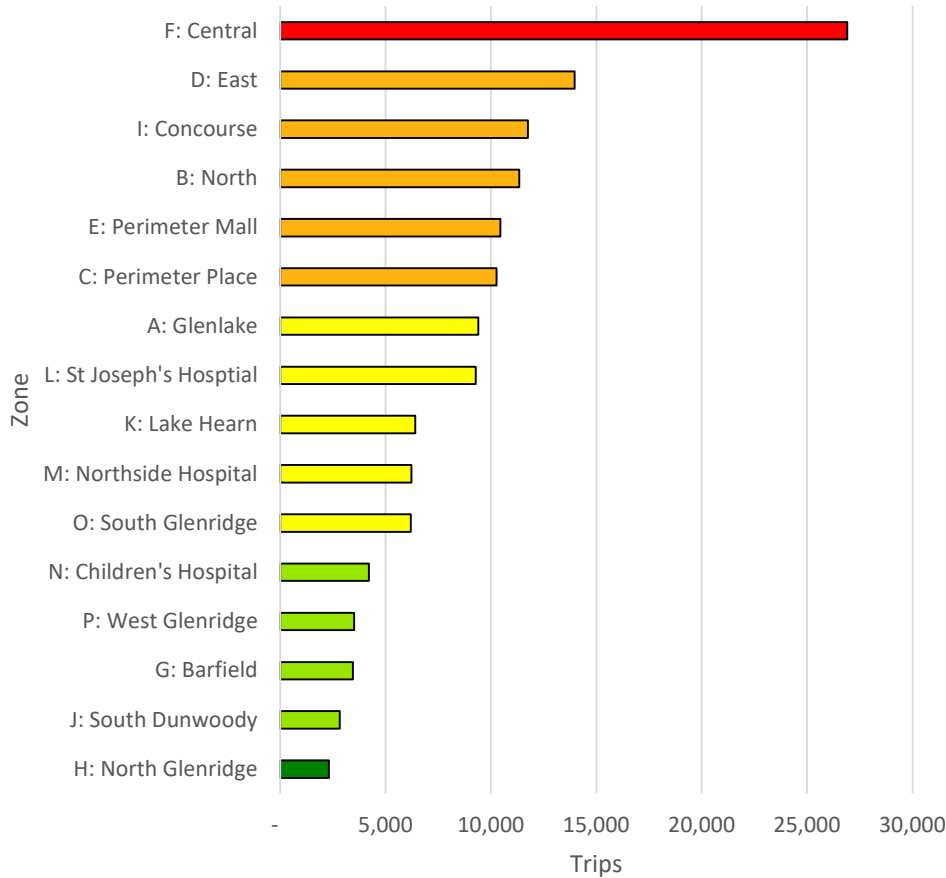
Gate	Gate Description	Inbound Direction	Zone															
			A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
			Glenlake	North	Perimeter Place	East	Perimeter Mall	Central	Barfield	North Glenridge	Concourse	South Dunwoody	Lake Hearn	St Joseph's Hospital	Northside Hospital	Children's Hospital	South Glenridge	West Glenridge
G1	Peachtree Dunwoody Rd (North)	SB	0%	8%	0%	1%	2%	3%	1%	1%	1%	3%	2%	1%	1%	1%	0%	
G2	Mount Vernon Hwy (East)	WB	2%	19%	1%	0%	4%	8%	8%	6%	3%	0%	3%	1%	2%	2%	5%	
G3	Ashford Dunwoody Rd (North)	SB	0%	0%	26%	10%	9%	2%	0%	0%	2%	4%	3%	1%	1%	0%	0%	
G4	Ashford Center Pkwy	WB	2%	0%	11%	4%	4%	2%	1%	0%	1%	1%	1%	0%	0%	0%	0%	
G5	Valley View Rd	WB	0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
G6	I-285 WB Off-Ramp at Ashford Dunwoody Rd	WB	2%	4%	10%	23%	14%	3%	2%	1%	1%	17%	22%	1%	1%	1%	0%	
G7	I-285 EB Off-Ramp at Ashford Dunwoody Rd	EB	0%	1%	15%	30%	11%	1%	0%	0%	2%	27%	32%	1%	2%	0%	0%	
G8	Ashford Dunwoody Rd (South)	NB	2%	3%	4%	10%	7%	1%	0%	0%	3%	10%	8%	1%	0%	0%	0%	
G9	Old Johnson Ferry Rd	NB	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	1%	0%	
G10	Johnson Ferry Rd	NB	1%	1%	0%	0%	0%	2%	3%	5%	3%	0%	0%	9%	8%	9%	7%	
G11	Peachtree Dunwoody Rd (South)	NB	1%	2%	3%	1%	3%	4%	1%	7%	10%	12%	2%	10%	6%	12%	5%	
G12	GA 400 NB Off-Ramp at Glenridge Connector	NB	0%	0%	0%	0%	0%	2%	3%	10%	10%	2%	6%	15%	11%	12%	18%	
G13	High Point Rd	NB	0%	0%	2%	1%	1%	1%	1%	1%	1%	0%	1%	2%	2%	2%	8%	
G14	Glenridge Dr (South)	EB	0%	1%	1%	1%	2%	2%	1%	2%	2%	0%	1%	5%	10%	11%	12%	
G15	I-285 EB Off-Ramp at Glenridge Dr/Connector	EB	1%	0%	0%	0%	0%	3%	6%	7%	4%	0%	1%	9%	14%	11%	7%	
G16	Glenforest Rd	EB	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
G17	Glenridge Dr (Central)	SB	0%	0%	0%	0%	0%	0%	0%	24%	0%	0%	0%	3%	9%	10%	15%	
G18	Hammond Dr	EB	1%	1%	3%	4%	6%	10%	16%	13%	19%	10%	4%	4%	3%	0%	0%	
G19	Mount Vernon Hwy (West)	EB	2%	6%	5%	1%	3%	6%	6%	1%	1%	0%	0%	1%	0%	0%	0%	
G20	GA 400 NB Off-Ramp at Abernathy Rd EB	NB	5%	20%	7%	1%	10%	10%	5%	0%	0%	1%	0%	0%	0%	0%	0%	
G21	GA 400 SB Off-Ramp at Abernathy Rd	SB	20%	17%	7%	4%	12%	23%	4%	1%	1%	2%	3%	1%	1%	0%	0%	
G22	Abernathy Rd	EB	11%	13%	2%	6%	9%	8%	24%	2%	5%	2%	2%	4%	2%	1%	0%	
G23	Glenridge Dr (North)	SB	20%	0%	0%	0%	0%	1%	1%	0%	0%	0%	0%	1%	1%	1%	1%	
G24	GA 400 SB Off-Ramp at Hammond Dr	SB	0%	0%	0%	3%	1%	3%	11%	11%	15%	6%	11%	8%	7%	3%	9%	
G25	I-285 WB Off-Ramp at Peachtree Dunwoody Rd	WB	1%	1%	0%	0%	1%	5%	3%	5%	15%	0%	0%	16%	13%	10%	5%	
G26	GA 400 SB Off-Ramp at Glenridge Connector	NB	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	2%	5%	10%	21%	
G27	GA 400 NB Off-Ramp at Abernathy Rd WB	NB	17%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	
G28	Glenridge Dr (North of Abernathy)	NB	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Sum			100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	

Results

Origins by Zone

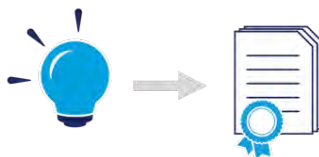


PM Outbound Trips from Zones

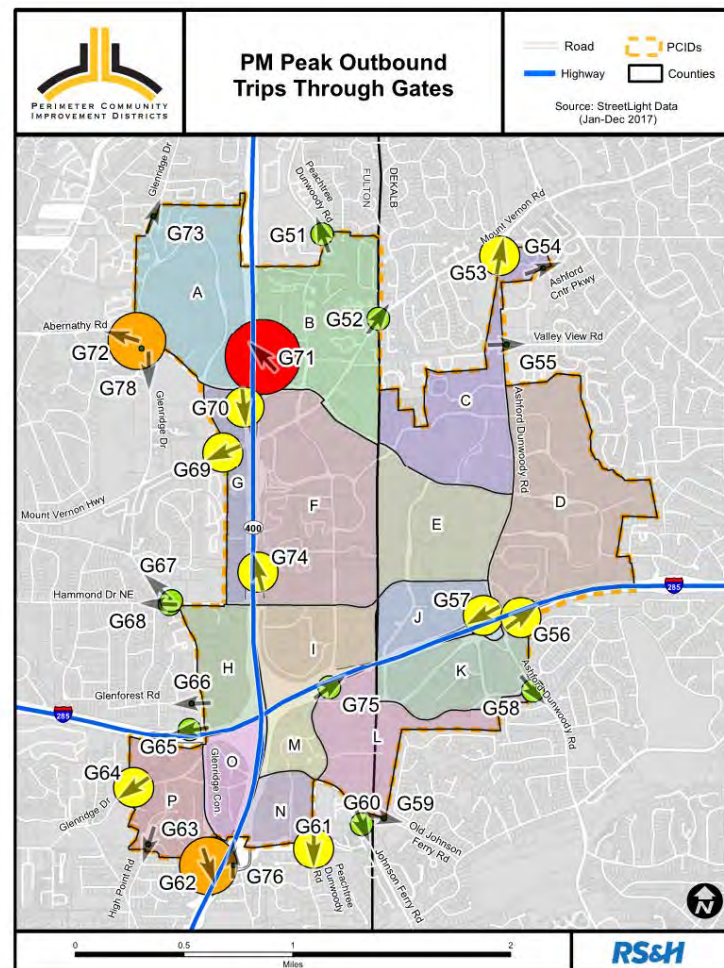
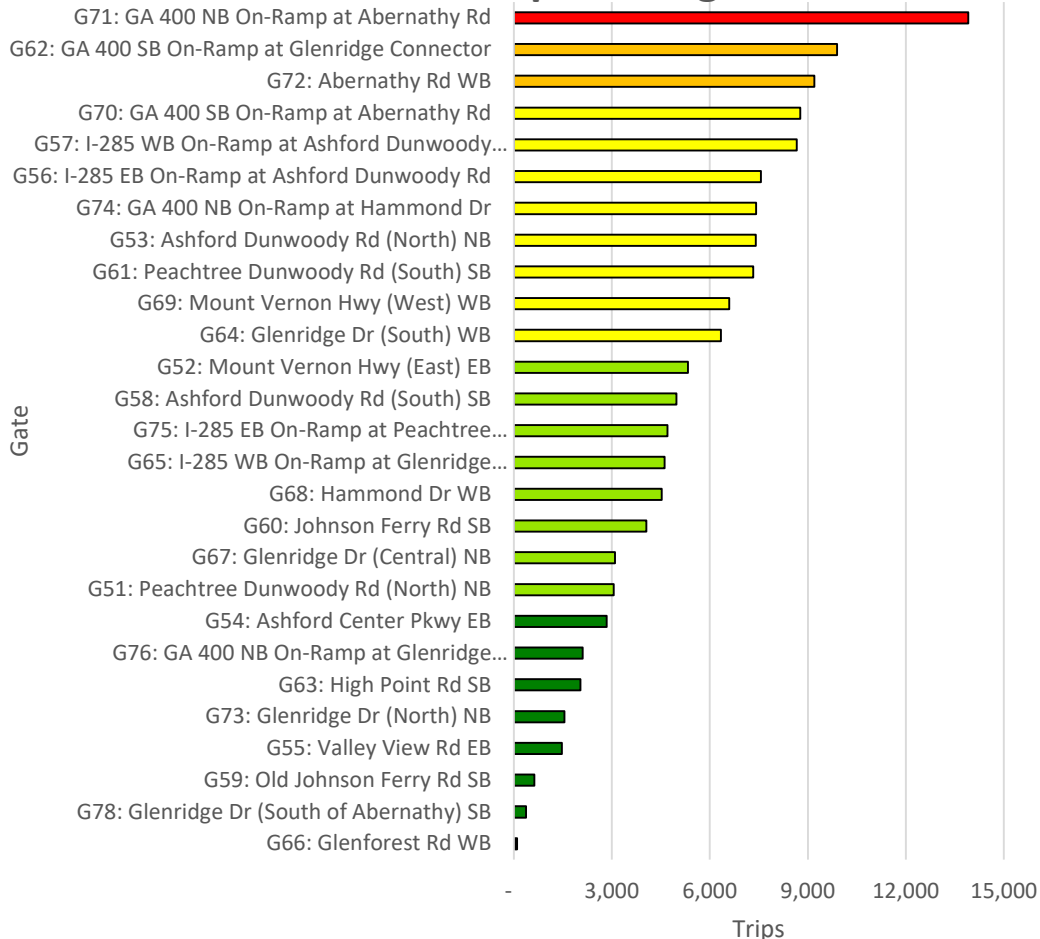


Results

PM Trips By Gate



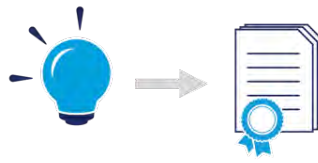
PM Outbound Trips through Gates



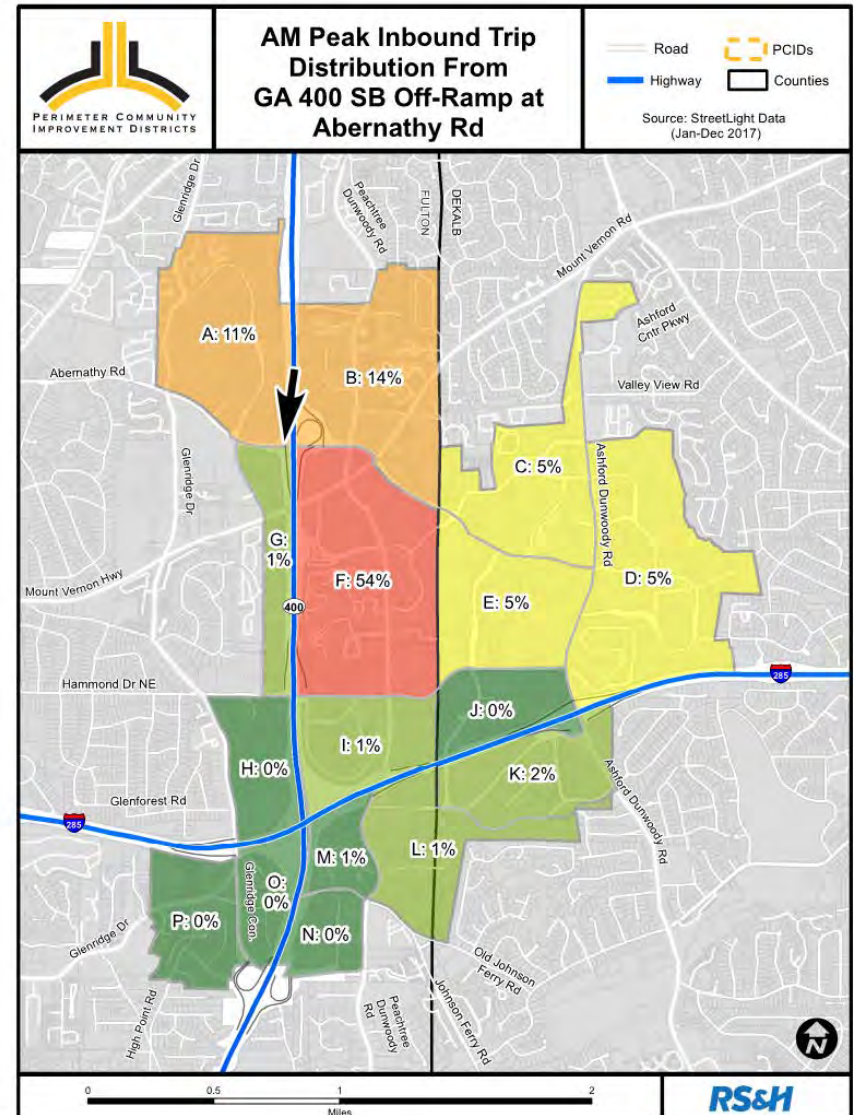
Utilizing BIG DATA in the Transportation Planning Process

Results

Trips thru Interchange



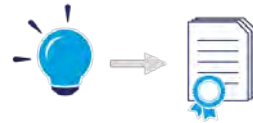
» **54%** of the trips on the **GA 400 southbound** off-ramp at **Abernathy Road** are destined for the Central Perimeter... specifically **Zone F**



Utilizing BIG DATA in the Transportation Planning Process

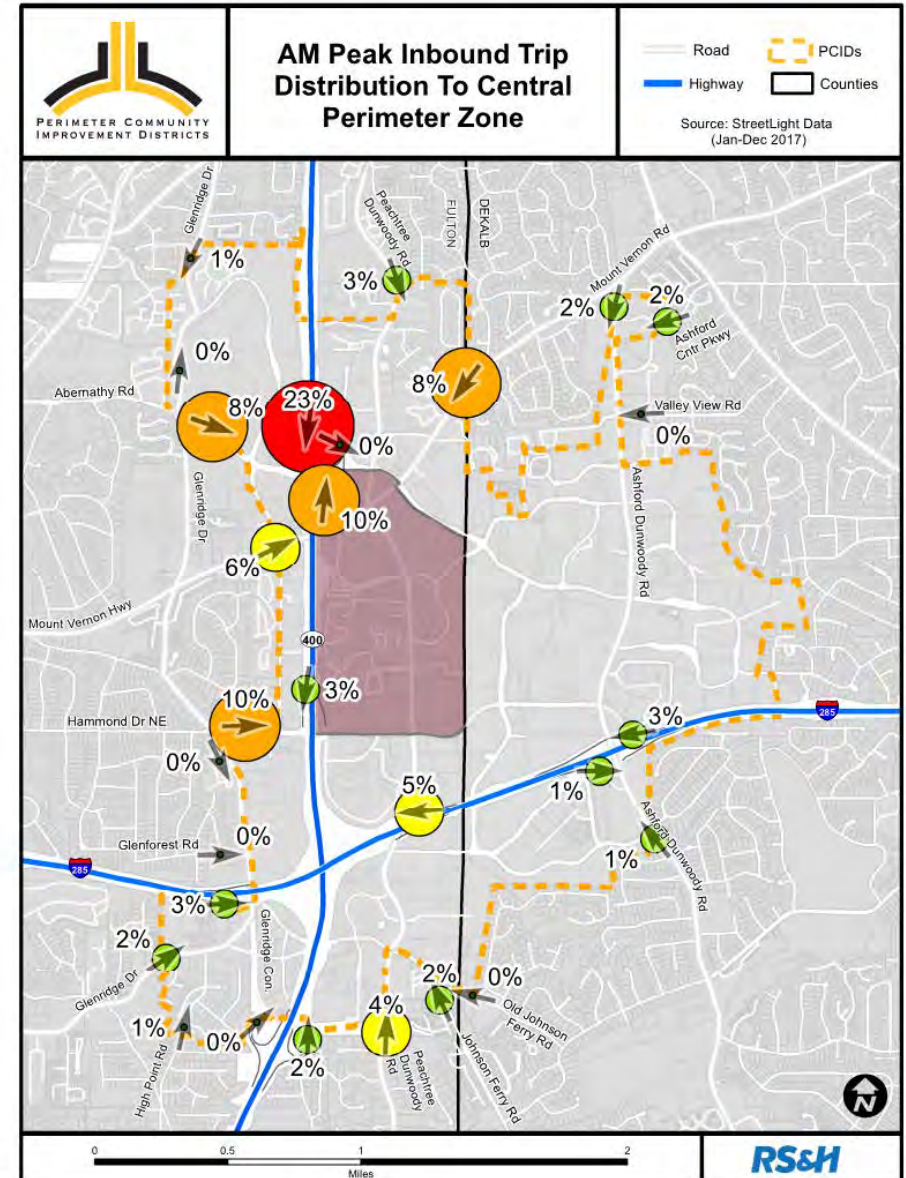
Results

Trip Routes to Destination



» What are the primary routes used in the AM Peak period for trips destined to the Central Perimeter Zone F

- **23%: GA 400 SB** at Abernathy Road
- **3%: GA 400 SB** at **Hammond Drive**

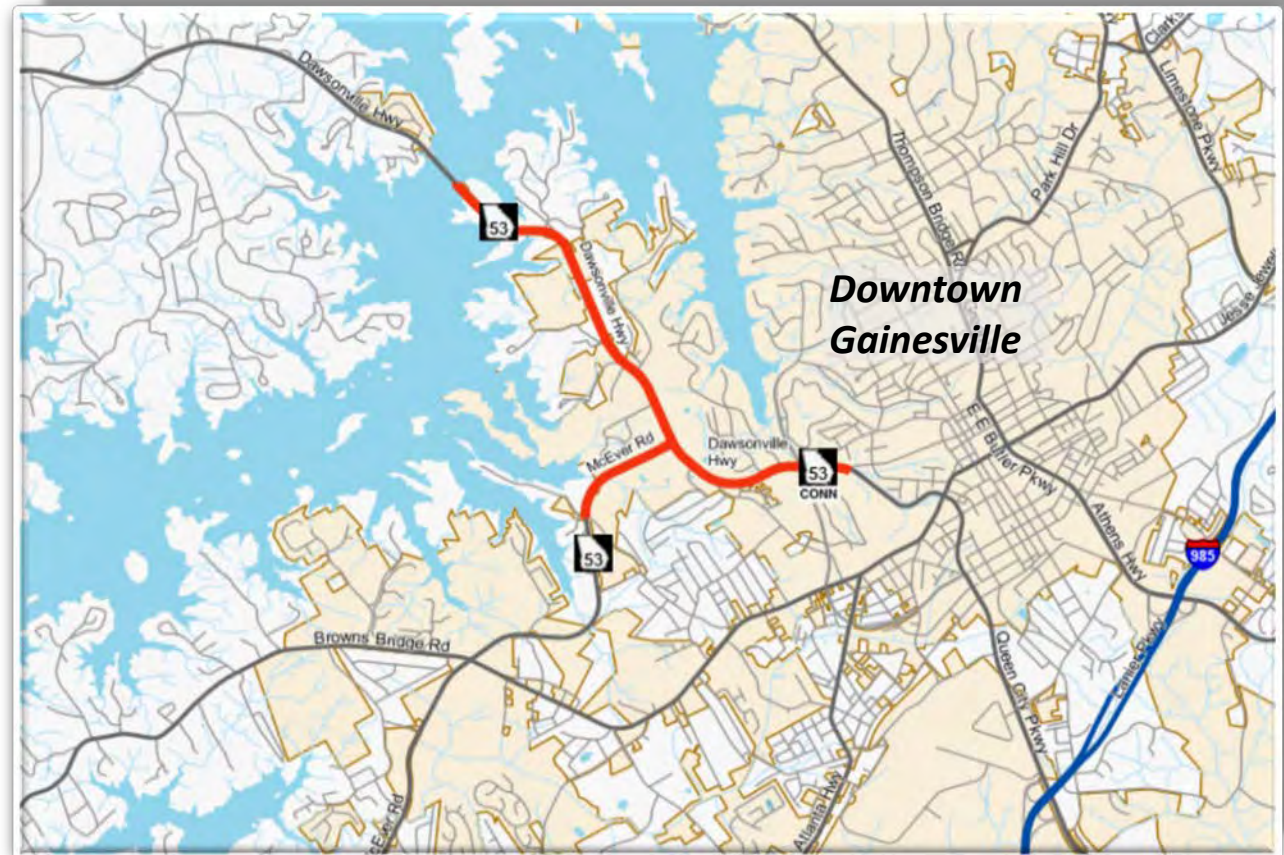


Study Purpose

Gainesville, GA Case Study



- » Excessive Congestion
- » Rapid Development
- » Benefit of New Connections



O&D Analysis

Zone and Gate Development



- » Three (3) Gates
- » Zones Specific to Development

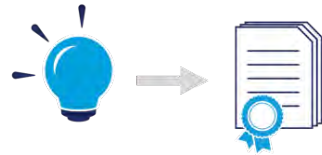


Develop O&D Matrices

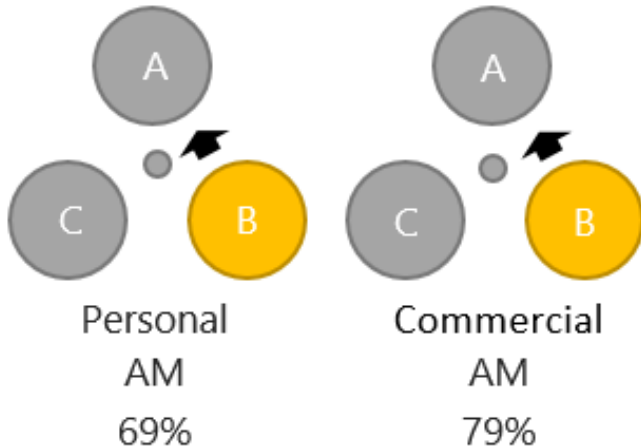


Location	Days of Week	Direction	Time Period	Personal						Commercial					
				A	B	C	Core Com.	Shallowford	Other Streets	A	B	C	Core Com.	Shallowford	Other Streets
A: Dawsonville Highway (North of <u>Ahaluna Drive</u>)	Weekday	Southbound	All Day (12am-12am)		59%	20%	12%	7%	2%	66%	26%	4%	3%	1%	
	Weekday	Southbound	Peak AM (6am-10am)		70%	17%	4%	9%	0%	68%	26%	3%	3%	0%	
	Weekday	Southbound	Mid-Day (10am-3pm)		53%	22%	16%	6%	3%	63%	27%	6%	3%	1%	
	Weekday	Southbound	Peak PM (3 pm-7pm)		52%	24%	14%	7%	3%	63%	30%	3%	3%	1%	
	Weekday	Northbound	All Day (12am-12am)		45%	22%	21%	7%	5%	61%	28%	6%	4%	1%	
	Weekday	Northbound	Peak AM (6am-10am)		56%	24%	8%	5%	7%	62%	29%	5%	3%	1%	
	Weekday	Northbound	Mid-Day (10am-3pm)		44%	20%	24%	7%	5%	62%	29%	5%	3%	1%	
	Weekday	Northbound	Peak PM (3 pm-7pm)		44%	23%	21%	7%	5%	54%	33%	6%	5%	2%	
B: Dawsonville Highway (South of <u>Shallowford Road</u>)	Weekday	Southbound	All Day (12am-12am)	40%		13%	38%	2%	7%	69%	9%	17%	1%	3%	
	Weekday	Southbound	Peak AM (6am-10am)	44%		20%	26%	3%	7%	68%	9%	18%	2%	3%	
	Weekday	Southbound	Mid-Day (10am-3pm)	30%		13%	48%	3%	6%	61%	12%	22%	2%	3%	
	Weekday	Southbound	Peak PM (3 pm-7pm)	33%		13%	44%	2%	8%	73%	9%	14%	3%	1%	
	Weekday	Northbound	All Day (12am-12am)	44%		12%	33%	2%	9%	78%	9%	10%	1%	2%	
	Weekday	Northbound	Peak AM (6am-10am)	69%		13%	11%	1%	6%	79%	9%	9%	1%	2%	
	Weekday	Northbound	Mid-Day (10am-3pm)	35%		11%	42%	2%	10%	74%	8%	14%	1%	3%	
	Weekday	Northbound	Peak PM (3 pm-7pm)	51%		11%	28%	1%	9%	77%	11%	9%	1%	2%	
C: <u>McEver Road</u> (Northwest of <u>Sherwin-Williams / Aaron's Driveway</u>)	Weekday	Westbound	All Day (12am-12am)	32%	21%		37%	5%	5%	61%	15%	18%	3%	3%	
	Weekday	Westbound	Peak AM (6am-10am)	25%	58%		11%	3%	3%	57%	20%	18%	3%	2%	
	Weekday	Westbound	Mid-Day (10am-3pm)	30%	20%		39%	7%	4%	57%	16%	22%	3%	2%	
	Weekday	Westbound	Peak PM (3 pm-7pm)	28%	20%		42%	4%	6%	69%	14%	13%	1%	3%	
	Weekday	Eastbound	All Day (12am-12am)	33%	28%		28%	6%	5%	61%	19%	13%	4%	3%	
	Weekday	Eastbound	Peak AM (6am-10am)	24%	43%		21%	6%	6%	65%	15%	14%	3%	3%	
	Weekday	Eastbound	Mid-Day (10am-3pm)	29%	24%		33%	9%	5%	56%	23%	15%	4%	2%	
	Weekday	Eastbound	Peak PM (3 pm-7pm)	44%	22%		25%	5%	4%	64%	19%	11%	2%	4%	

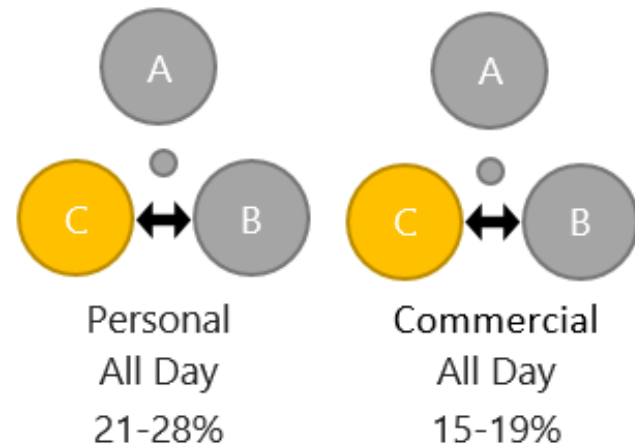
Results



Weekday Dawsonville Highway Personal and Commercial Trips



Weekday McEver Road (C) - Dawsonville Highway South (B) Personal and Commercial Trips



Results

Weekday Personal Vehicle Trips

Road	Category	Observation
Dawsonville Highway	Southbound commuters	70% of AM trips travel south from (A) to (B)
	Northbound commuters	69% of AM trips travel north from (B) to (A)
McEver Road	Traveling to Dawsonville Highway north	33% of all-day trips between (C) and (A)



Results

- » O&D Results Informed Future Traffic Forecast
- » Calculation of Benefits for New Connection





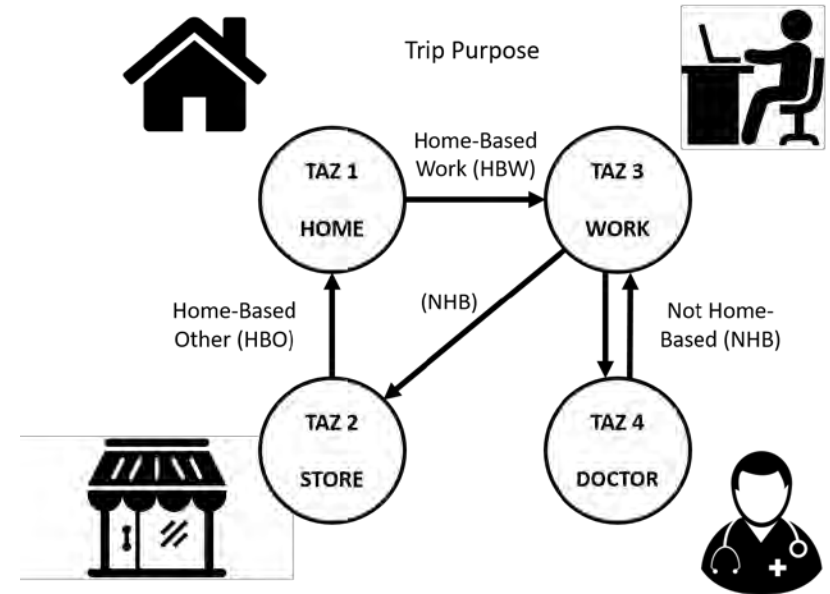
BIG DATA *for Transit Planning*



BIG DATA

for Transit Planning

- » Big Data and Transit
 - Origin/Destination
 - Cumulative from / to all zones
 - Passing through areas / zones
 - Specific from / to select zones
 - Trip purpose
 - (Home-based, work-based, combinations etc)
 - Simple Trip purpose (Residential-based, Commercial-based)
 - Other-based combinations
 - Global view of network performance
 - Congestion / Delay
 - Speed



Transit Planning

Traveler Information



» Traveler Attribute Data

- Demographics of Travelers
 - Household income
 - Race
 - Education level of head of household
 - Family status
- Local Distribution of Home and Work Places
- Regional / National Distribution of Tourists
 - Out of town visitors
 - Origin Locations of visitors (state and/or MSA)



Case Study

Chatham Area Transit (CAT)



» Background

- Oldest Transit System in Georgia
- 2nd Largest Transit Authority in the State

» System Operations

- Serving City of Savannah & Parts of Unincorporated Chatham Co.
- Fixed Route, Demand-response, CAT Freedom, & Bike Share
- Free Downtown Shuttle & Ferry Service



69 Buses



26 ADA
Vehicles



4 Ferry
Vessels



1,300 Bus
Stops



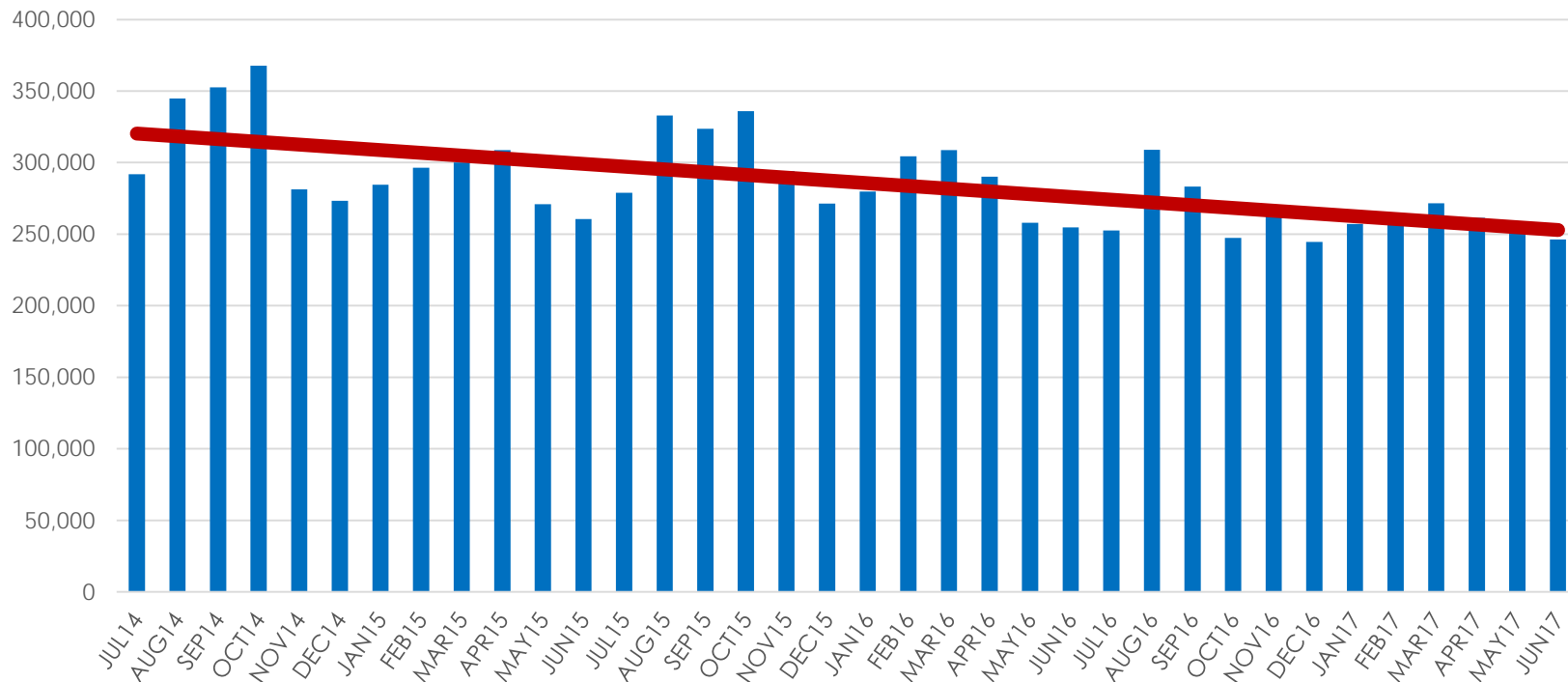
4.25M
Passengers
Per Year

Study Purpose

Decreasing System Ridership



3 Year: Fixed Route Ridership



-13%

Study Purpose



- ▶ **Why** is Ridership Decreasing When Population & Local Economy is Growing?
 - Failing equipment
 - Decreased reliability
 - Changing demographics
 - Lower fuel costs
 - TNCs

- ▶ Should Routes Be Redesigned? If so, **How?**
 - Collect and analyze data (Origin-Destination Study)
 - Solicit community input
 - Identify new service areas, markets, and modal options

Changing Focus

Transit in Georgia



- ▶ Changing Statewide focus on Regional Transit Partnerships
 - HB 848: House Commission on Transit Governance & Funding
 - HB 930: Unified transit governance and funding structure in Metro Atlanta region; creates the ATL as the new designated recipient of federal funds.
 - Anticipated legislation for the remainder of the State



Transit Challenges

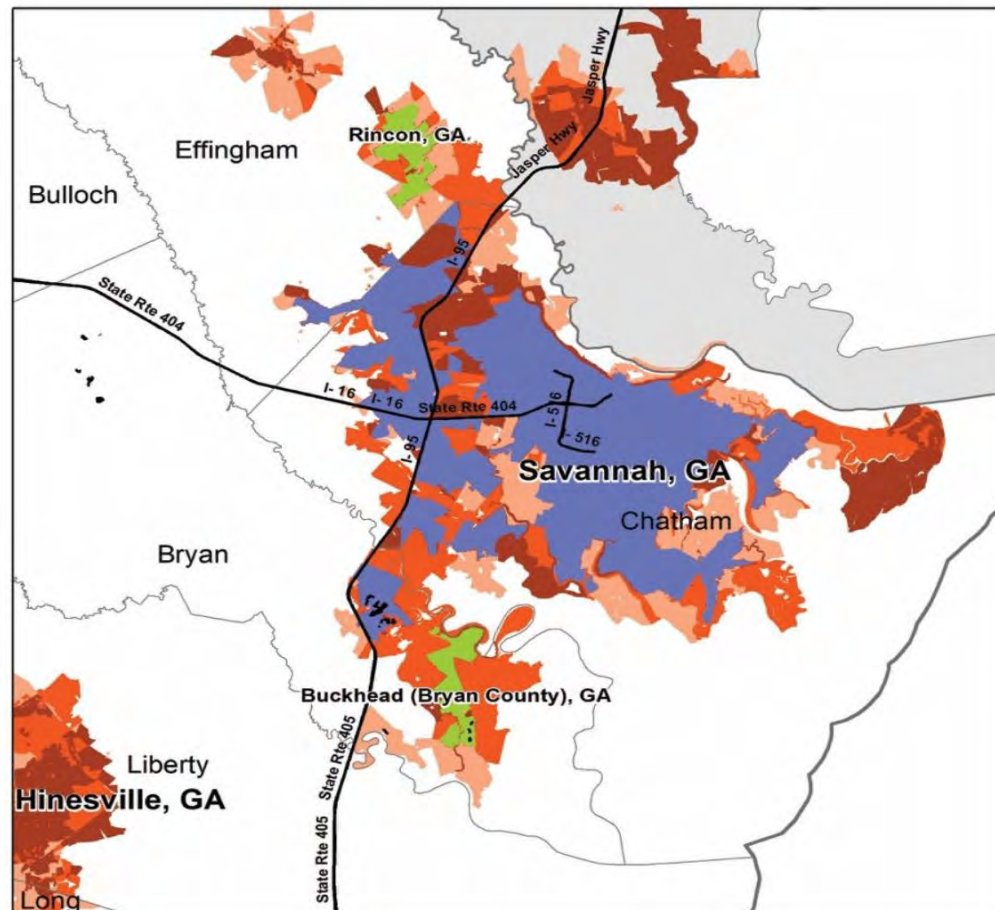
Trending Urban



► Trending Urban

- Census anticipates growing / expanding UZAs
- Serving historically suburban and rural areas presents challenges

Source: Dr. Laurie Garrow, Dr. Thomas Douthat, Anna Nord, Sara Douglass, and Georgia Tech

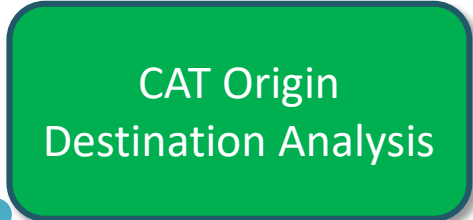


Study Approach

Data Sources



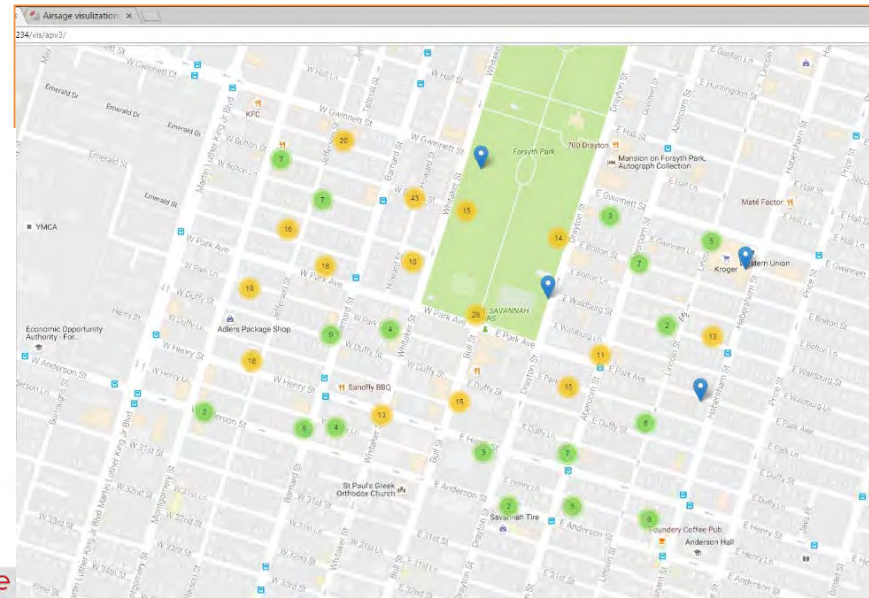
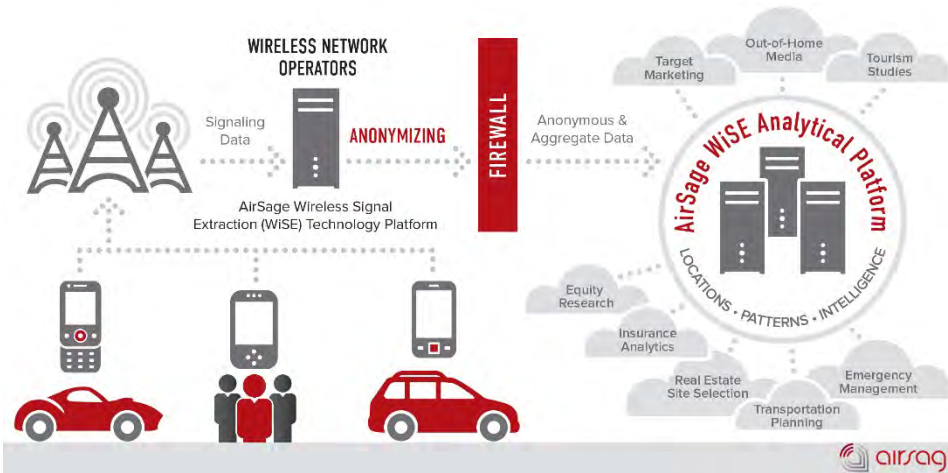
NPMRDS



Utilizing BIG DATA in the Transportation Planning Process

Study Approach

O&D Data



	A	B	C	D	E	F	G	H	I
1	Origin Zone	Destination	Start Date	End Date	Aggregation	Subscriber	Purpose	Time of Day	Count
2	94	37	20130702	20130731	WD	Visitor	OO	H00:H24	5.08
3	420	343	20130702	20130731	WD	Resident	HW	H00:H24	1.49
4	548	33	20130702	20130731	WD	Resident	WO	H00:H24	5.01
5	68	164	20130702	20130731	WD	Resident	OO	H00:H24	4.96
6	256	400	20130702	20130731	WD	Resident	HO	H00:H24	5.97
7	498	62	20130702	20130731	WD	Resident	HW	H00:H24	4.37



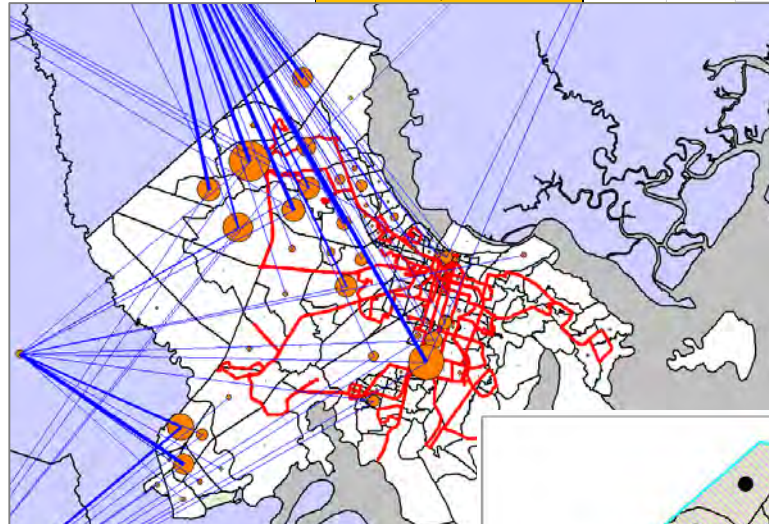
Utilizing BIG DATA in the Transportation Planning Process



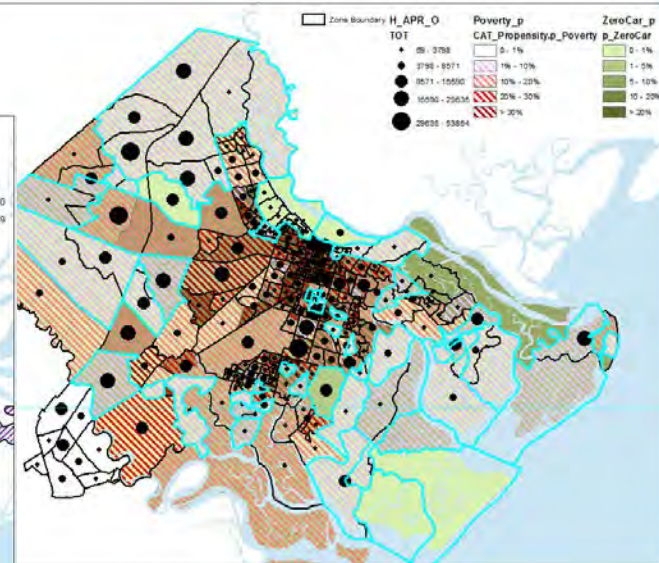
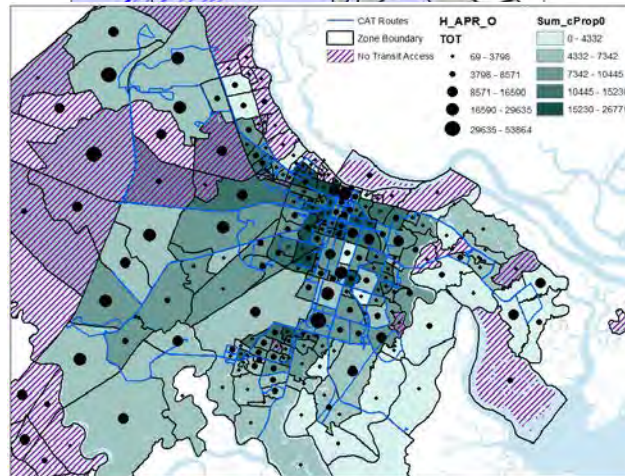
Methodology

Category (April 2016)	Aggregate	Percenta	Category (October 2015)	Aggregate	Percenta
24-Hour Counts*	1,445,268	N/A	24-Hour Counts**	1,452,606	N/A
Day Period Counts**	1,159,165	100%	Day Period Counts**	1,562,488	100%
AM Peak - All Trips/Resident Classes	271,771	23.45%	AM Peak - All Trips/Resident Classes	367,454	23.52%
			Mid-Day Peak - All Trips/Resident Classes	744,792	47.67%
			PM Peak - All Trips/Resident Classes	450,241	28.82%
			Home Worker - All Trips	161,587	10.34%
			Home Worker - AM Peak/All Trips	32,651	2.09%
			Home Worker - Mid-Day Peak/All Trips	84,542	5.41%
			Home Worker - PM Peak/All Trips	44,394	2.84%
			Home Worker - AM Peak/HBO	30,425	1.95%
			Home Worker - Mid-Day Peak/HBO	71,471	4.57%
			Home Worker - PM Peak/HBO	37,498	2.40%
			Home Worker - AM Peak/NHB	2,226	0.14%
			Home Worker - Mid-Day Peak/NHB	13,072	0.84%
			Home Worker - PM Peak/NHB	6,895	0.44%
			Resident Worker - All Trips	385,055	24.64%
			Resident Worker - AM Peak/All Trips	91,100	5.83%
			Resident Worker - Mid-Day Peak/All Trips	173,407	11.10%
			Resident Worker - PM Peak/All Trips	120,548	7.72%
			Resident Worker - AM Peak/HBW	33,827	2.16%
			Resident Worker - Mid-Day Peak/HBW	34,994	2.24%
			Resident Worker - PM Peak/HBW	25,523	1.63%
			Resident Worker - AM Peak/HBO	25,125	1.61%
			Resident Worker - Mid-Day Peak/HBO	42,561	2.72%
			Resident Worker - PM Peak/HBO	36,887	2.36%

- 73 Trip purpose and subscriber type data combinations mapped and assessed



- Travel behaviors layered with transit and census data.



Analysis

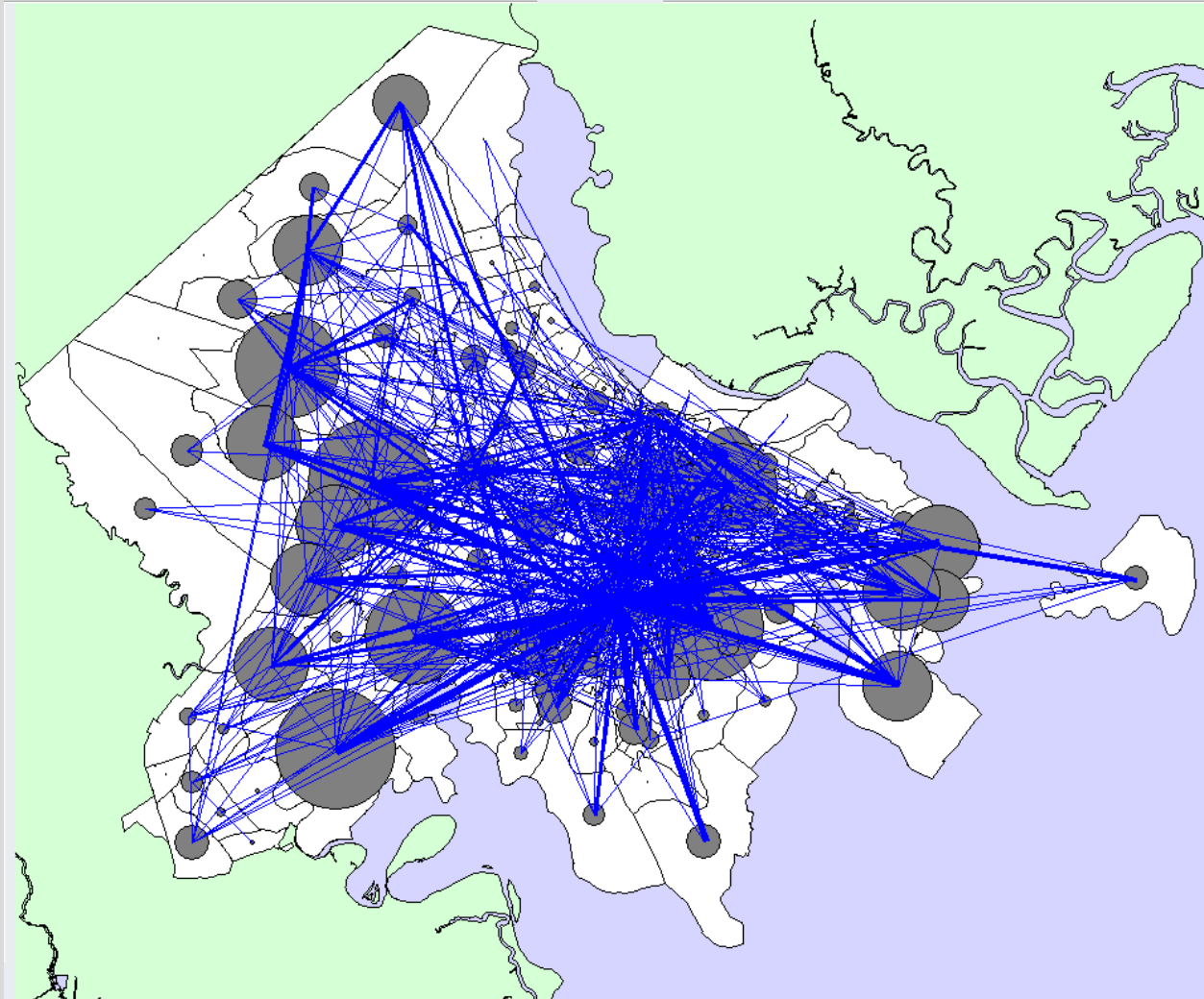


Travel Time and Type of Traveler:

- Morning (7:00 AM – 10:00 AM)
- “Home” Based “Work”
- “Resident Worker”

Origins and Desire Lines

Dataset: April 2016



Utilizing BIG DATA in the Transportation Planning Process

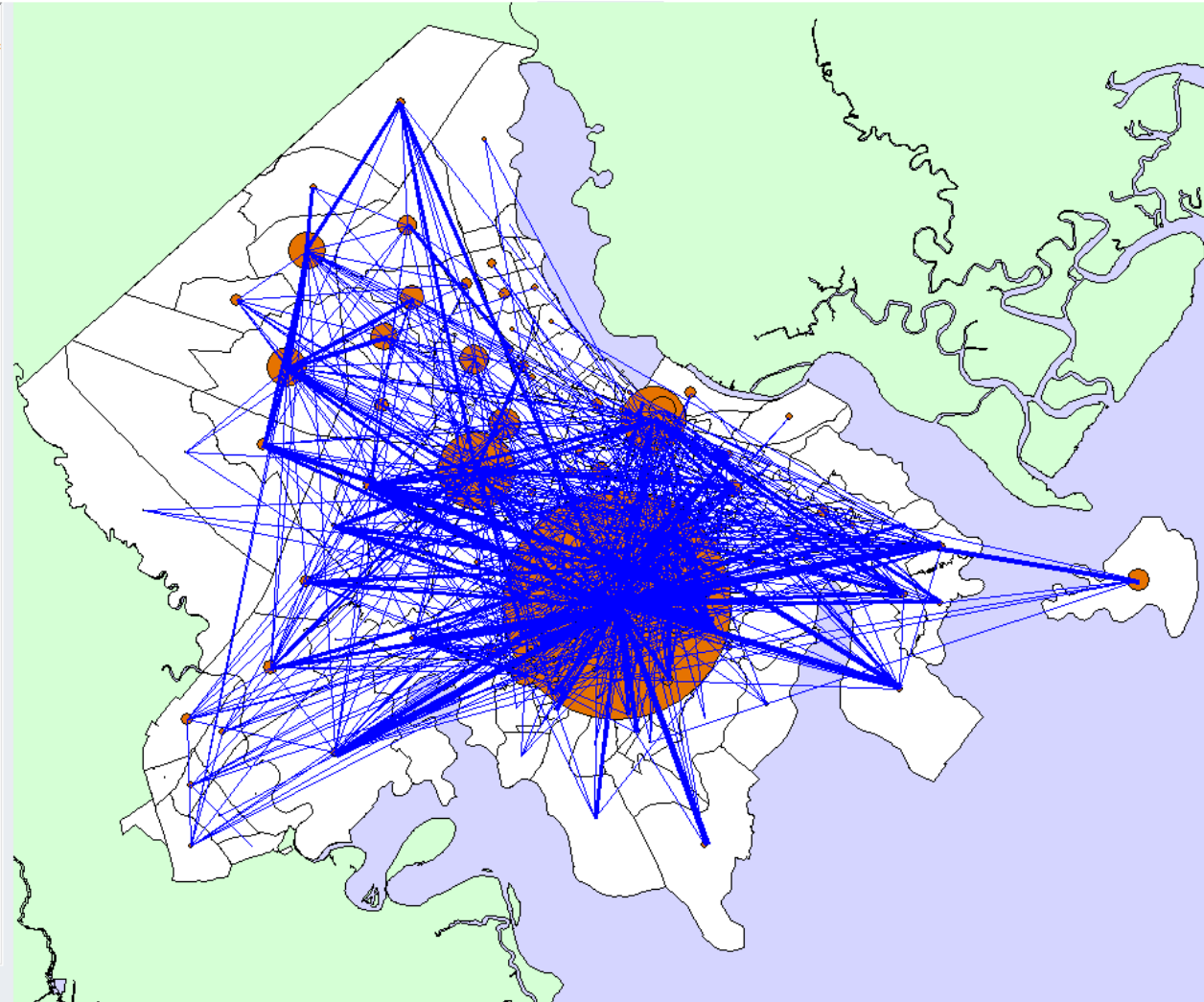
Analysis



Travel Time and Type of Traveler

- Morning (7:00 AM – 10:00 AM)
- “Home” Based “Work”
- “Resident Worker”

Destinations and Desire Lines



Dataset: April 2016

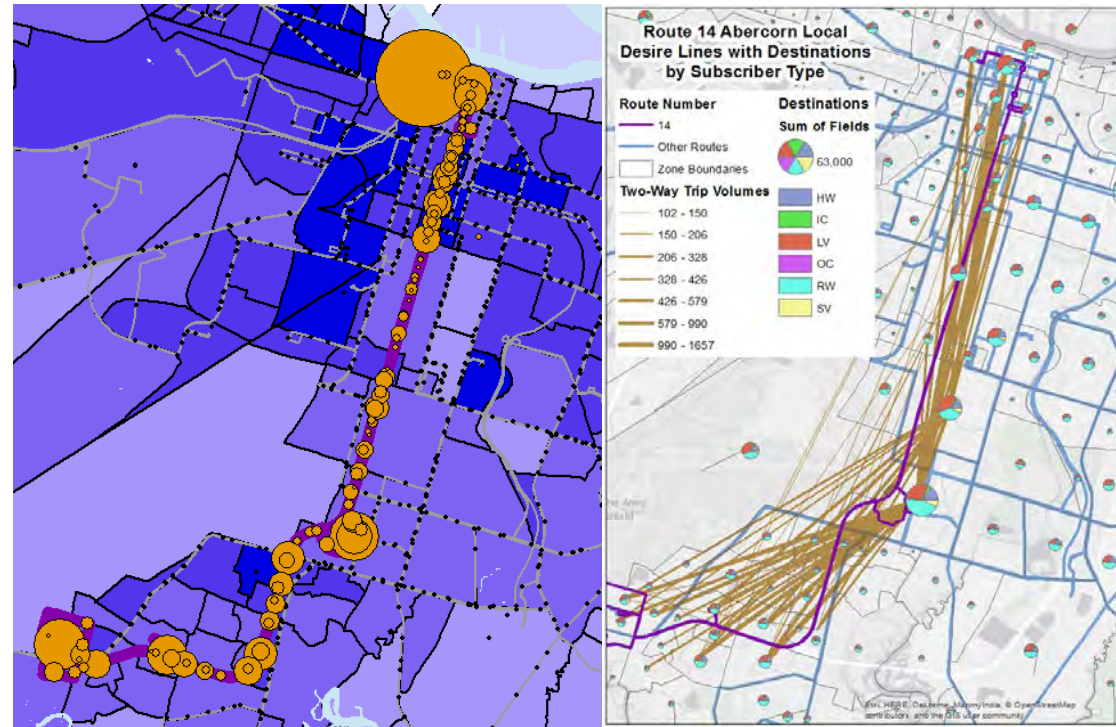


Utilizing BIG DATA in the Transportation Planning Process

Analysis



- ▶ Applying the Data to Route Analysis
 - Ridership
 - Key Areas Served
 - High Demographic Propensity
 - Connecting Route Structure
 - Origins / Destinations



Analysis

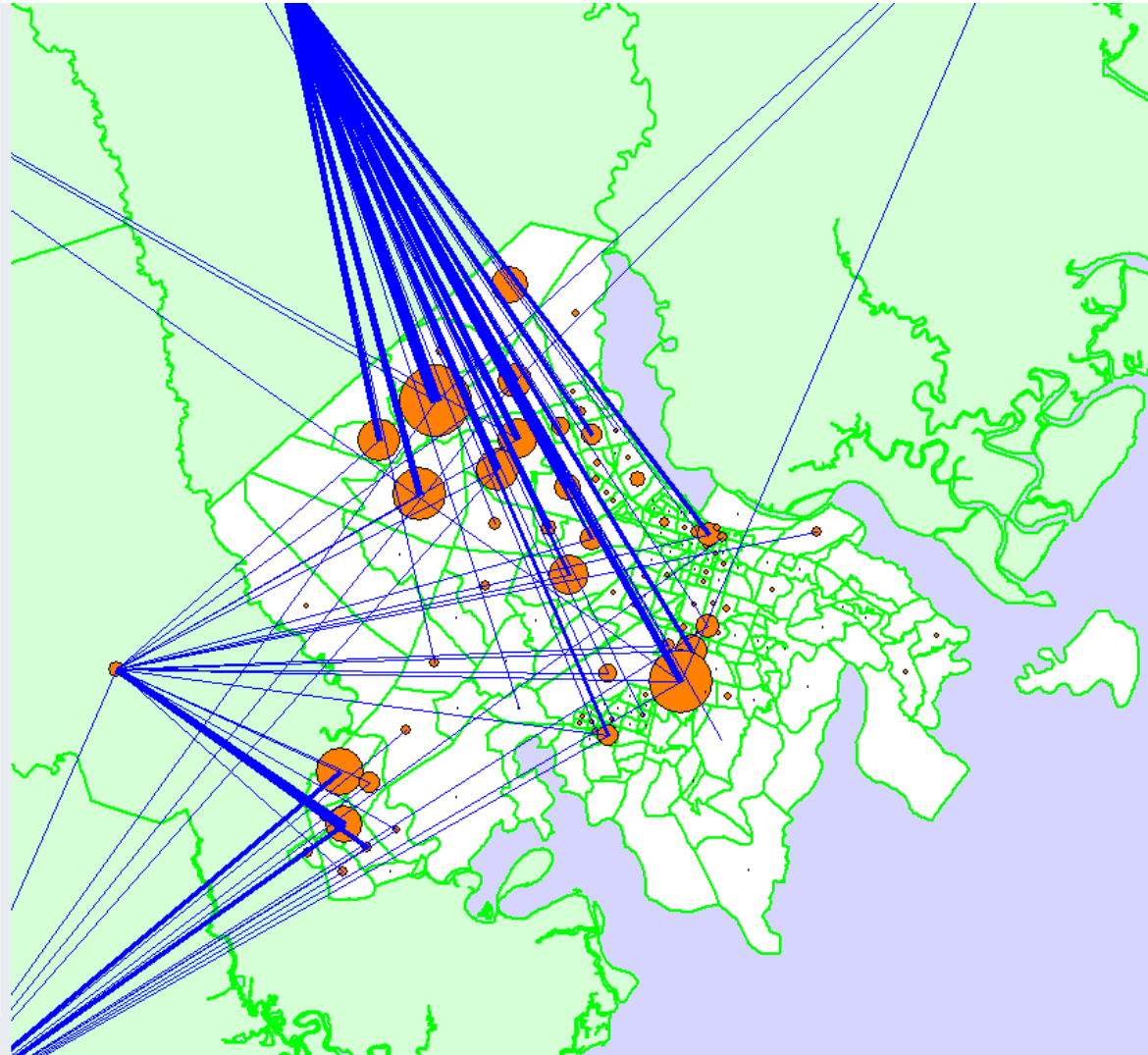


Travel Time and Type of Traveler

- Morning (7:00 AM – 10:00 AM)
- “Home” Based “Work”
- “Inbound Commuter”

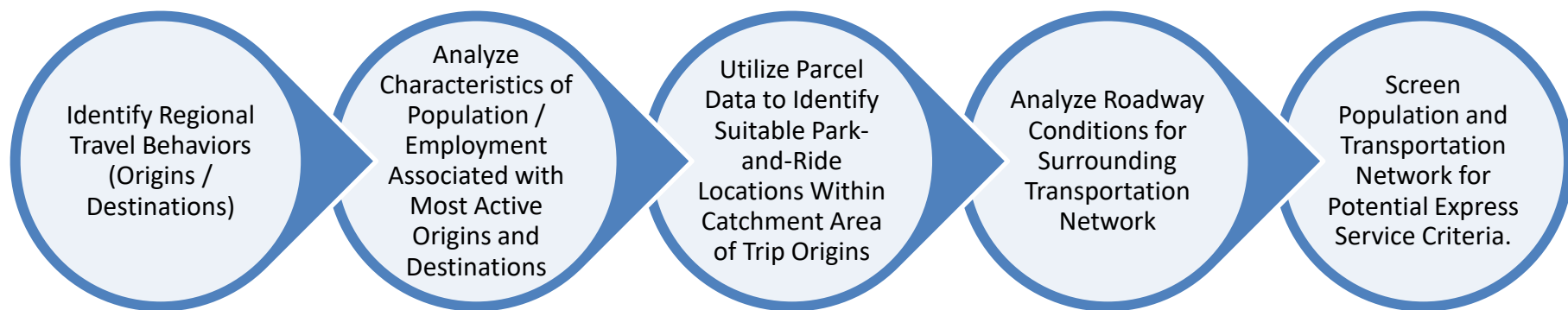
Destinations and Desire Lines

Dataset: April 2016



Utilizing BIG DATA in the Transportation Planning Process

BIG DATA for *Regional Transit Service Analysis*



NPMRDS



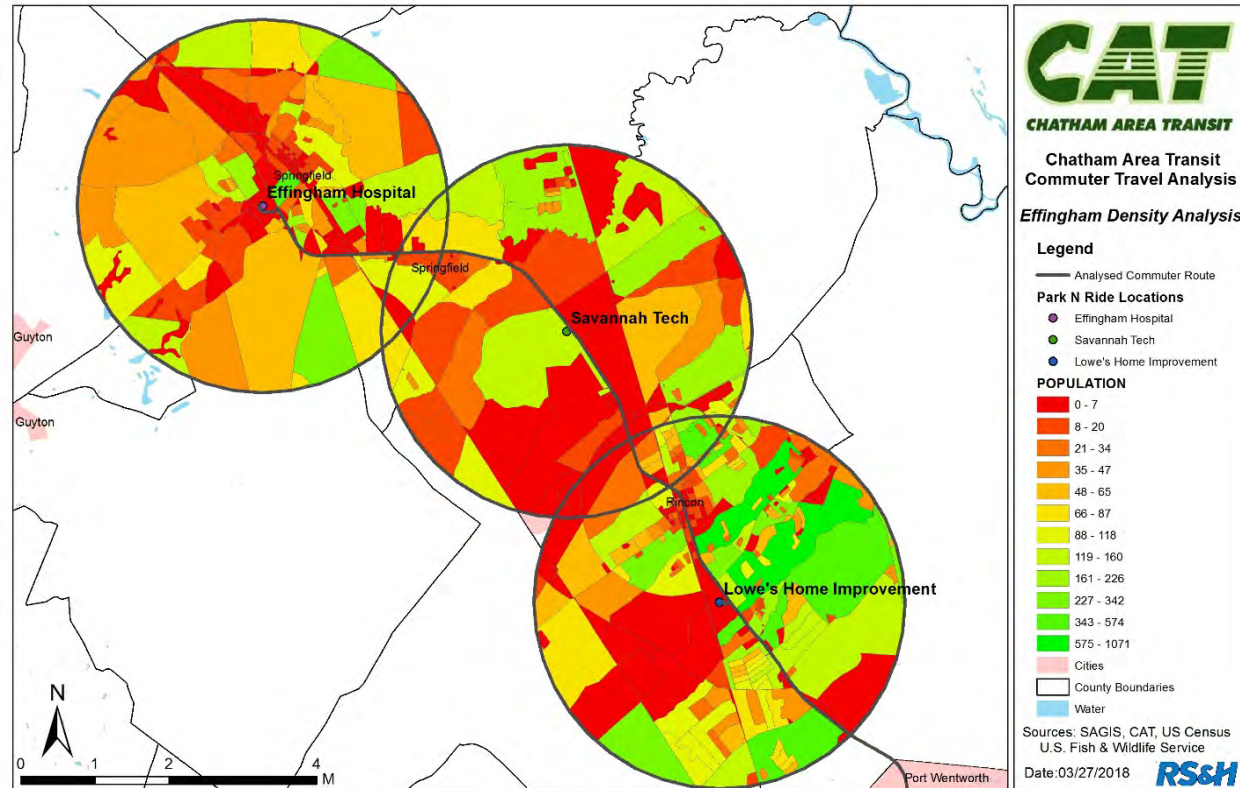
Utilizing BIG DATA in the Transportation Planning Process

BIG DATA for Regional Transit Service Analysis



» Primary Factors for Regional Express Service

- Location
- Densities
- Roadway Features



BIG DATA for Transit

What Comes Next?



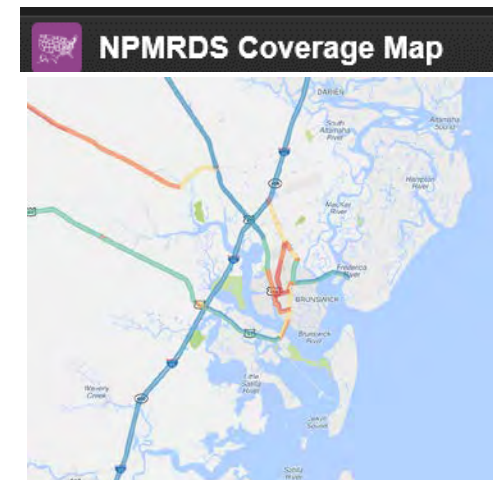
- » We have BIG DATA, now what?
- » Owning and Analyzing the Data:
 - Data quality control
 - Readiness
 - Storage
 - Training
 - Local data sets
 - Staff, timing, resources
- » Next Steps and Ongoing Uses:
 - Regional Analysis for adjoining counties
 - Funding and Implementation?

Other BIG DATA in Transportation



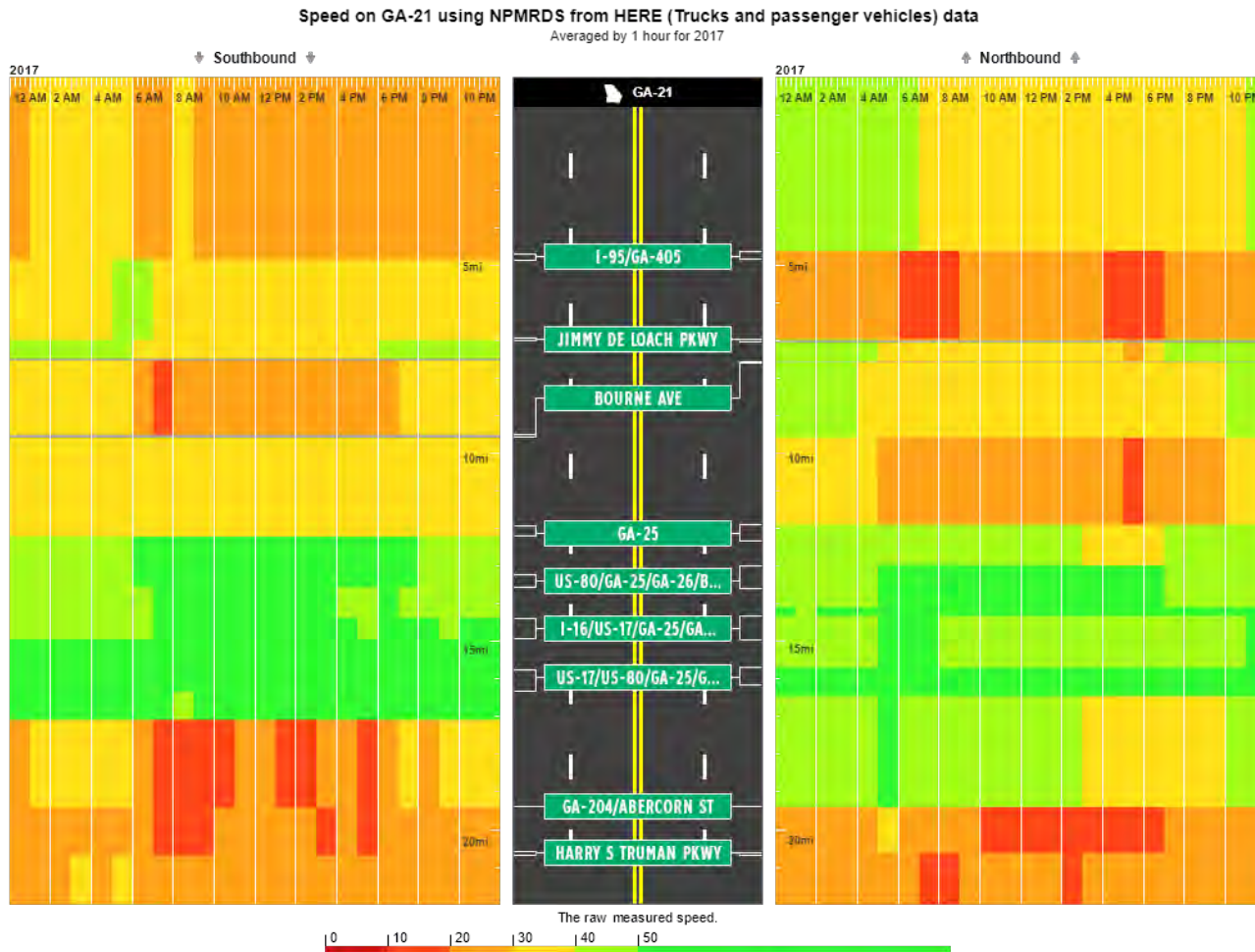
Other BIG DATA in Transportation *Performance / Operations*

- » Vehicle Probe Data
 - HERE
 - INRIX
 - TomTom
- » MAP-21 / FAST ACT
 - Regional Integrated Transportation Information System (RITIS)
 - FHWA's National Performance Research Data Set (NPMRDS)



Other BIG DATA in Transportation

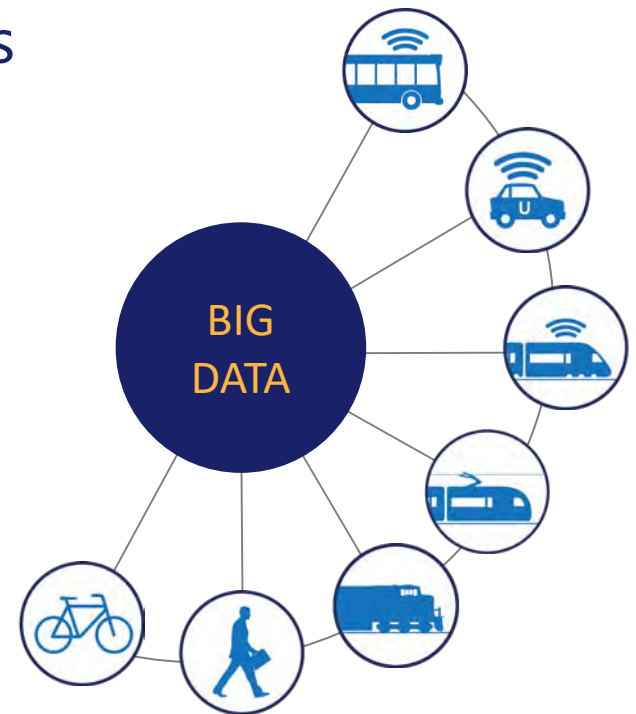
Performance / Operations



Other BIG DATA

On the Horizon

- » Multimodal / Non-motorized
- » Dockless Alternatives
- » Autonomous and Connected Vehicles
- » Predictive Analytics
- » Freight Distribution



For More Information



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Thank You!

RS&H

