



# Identifying the Origins and Destinations of Transit Customers Using Farebox Data

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Manager, Monitoring & Forecasting

# Overview

- **Background**
  - » BC Transit, Monitoring & Forecasting
- **GFI Farebox**
- **Automated Passenger Counters (APC)**
- **Origin Destination Concept**
- **Proof Of Concept**



# Background

- **BC Transit**

- » Authority for public passenger transportation systems and rail transit systems in regions throughout BC. (1000+ vehicles in 80+ systems)

- **Monitoring & Forecasting**

- » Department for monitoring BC Transit's productivity with ridership and vehicle performance.

- » GIS (Geographical Information Systems)

- Feature Manipulation Engine (FME)
- Python
- ArcGIS



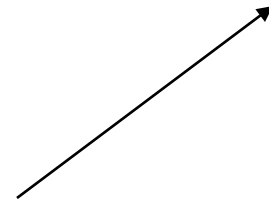
# GFI Farebox



# GFI Farebox - Boardings

Ts	Bus	Route	Seq	Amt	Longitude	Latitude
12/06/2011 07:08:39	8074	2	528		0	0
12/06/2011 07:08:49	8074	2		0	0	0
12/06/2011 07:09:35	8074	2		1.75	0	0
12/06/2011 07:12:56	8074	2		0	0	0
12/06/2011 07:14:03	8074	2		0	0	0
12/06/2011 07:20:55	8074	2		1.75	0	0
12/06/2011 07:21:01	8074	2	184415		0	0
12/06/2011 07:21:15	8074	2		0	0	0
12/06/2011 07:31:33	8074	2		0	0	0

**GPS**





# Automated Passenger Counters (APC)

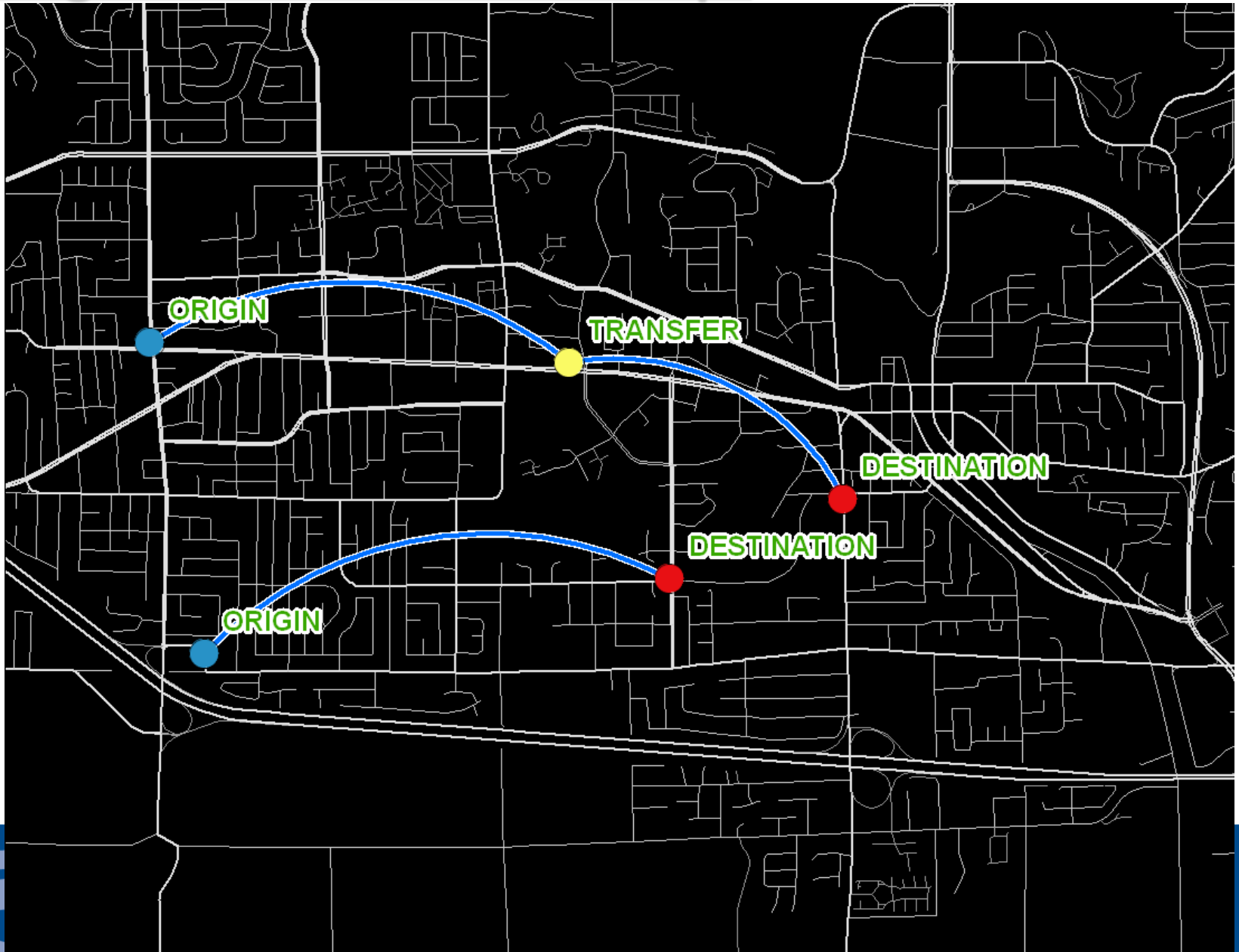


## Boardings & Alightings





# Origin – Destination Concept





## Proof Of Concept – Part 1

- Use unique IDs from GFI Farebox
- Link GFI in APC equipped vehicles by datetime to APC data to get coordinates
- Link GFI in non APC equipped vehicles to vehicle/block assignments to APC data by block and datetime estimates





GFI → GFI with Lat/Longs

APC → GFI with Lat/Longs

Block → Block with Lat/Longs

Block → Block with Lat/Longs

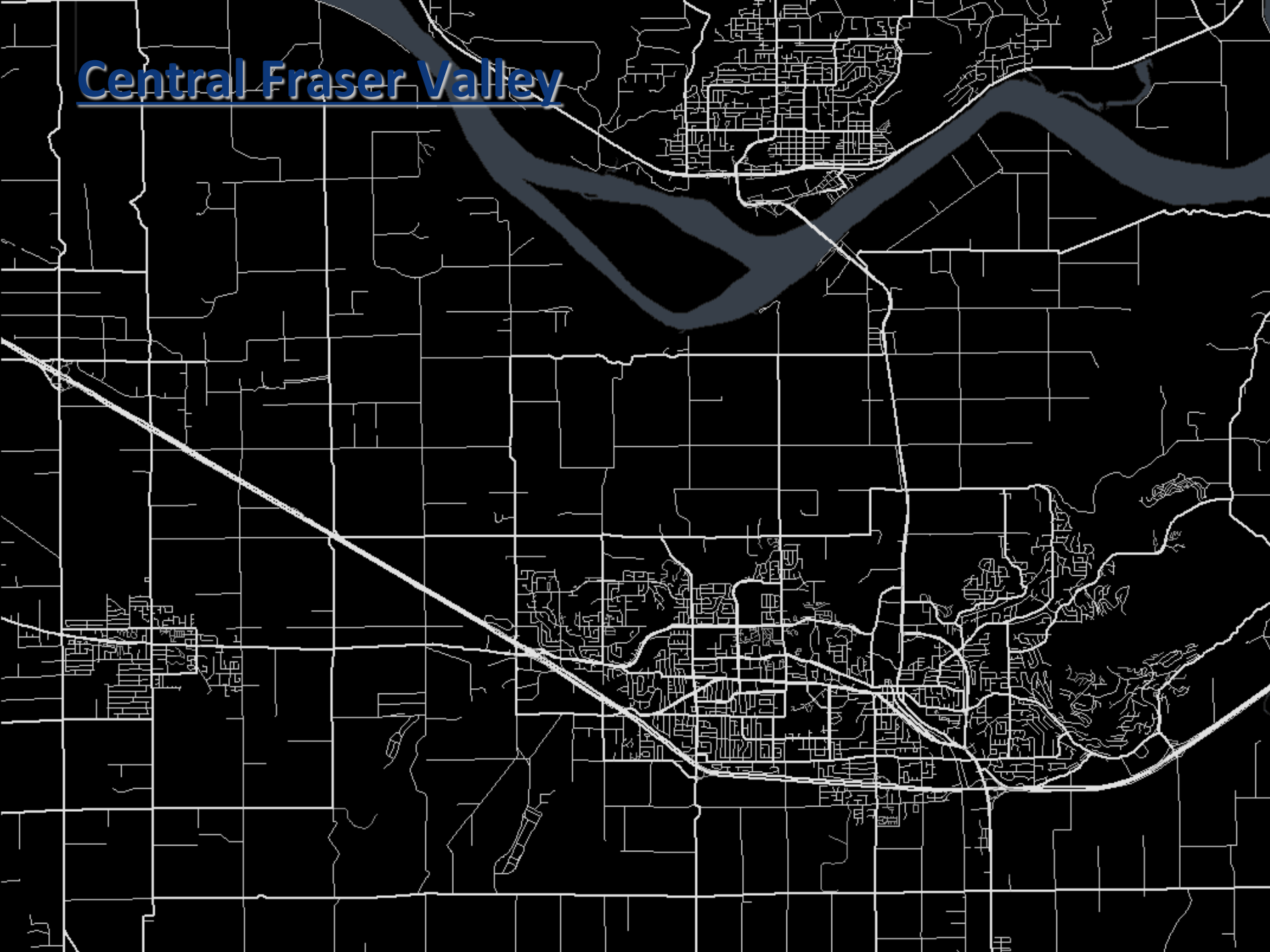


Block → GFI with estimated Lat/Longs

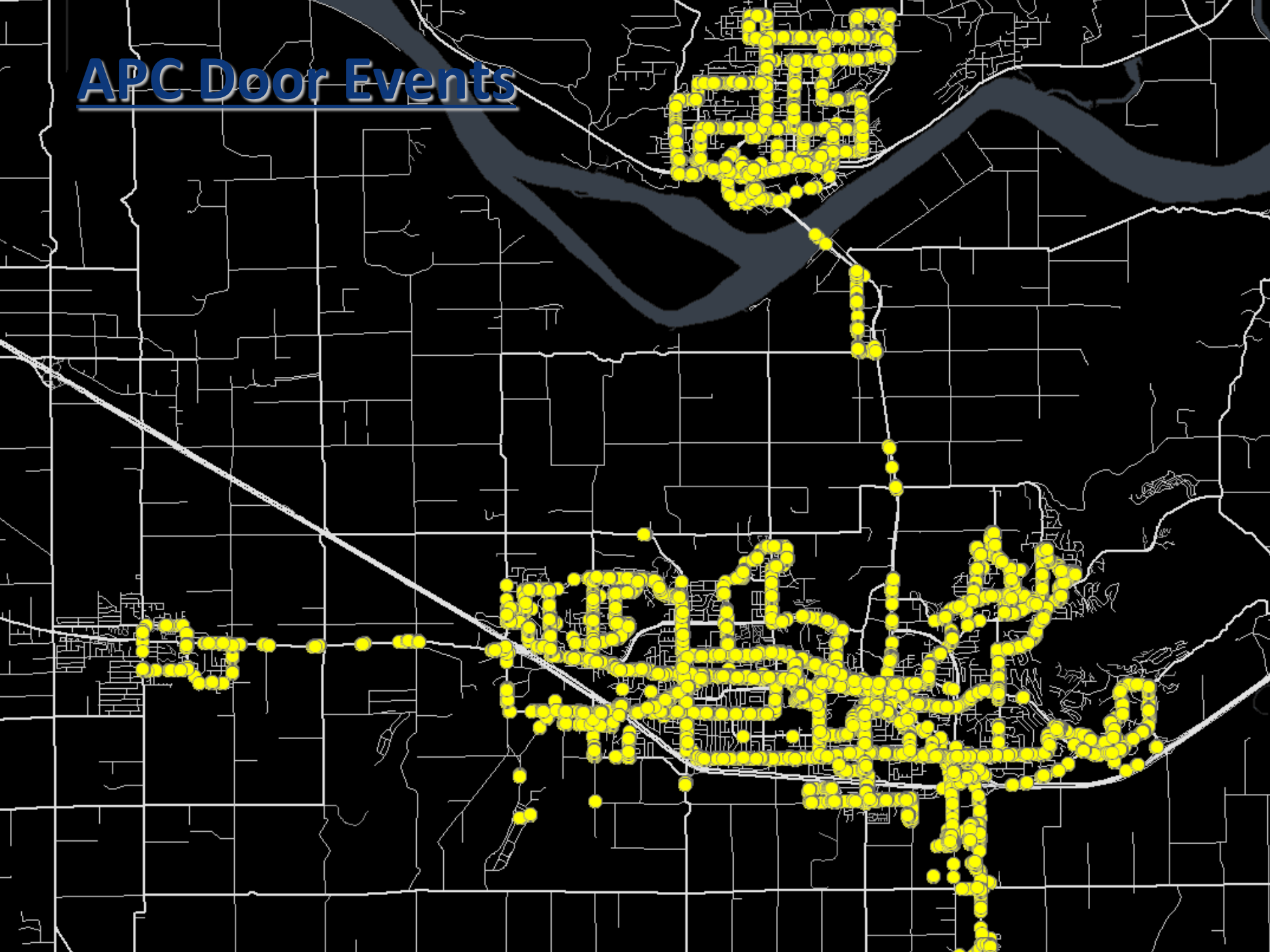
GFI → GFI with estimated Lat/Longs

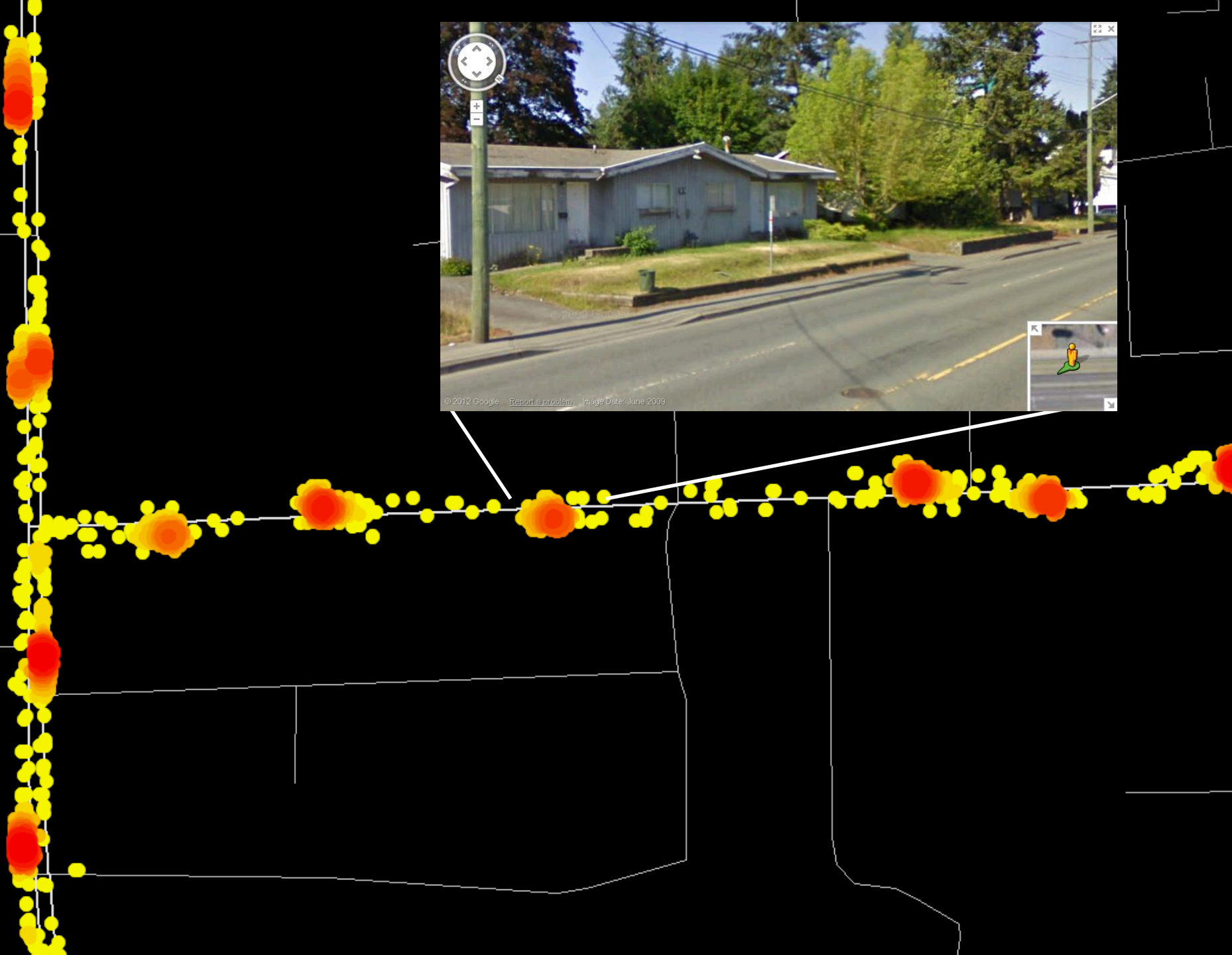


# Central Fraser Valley



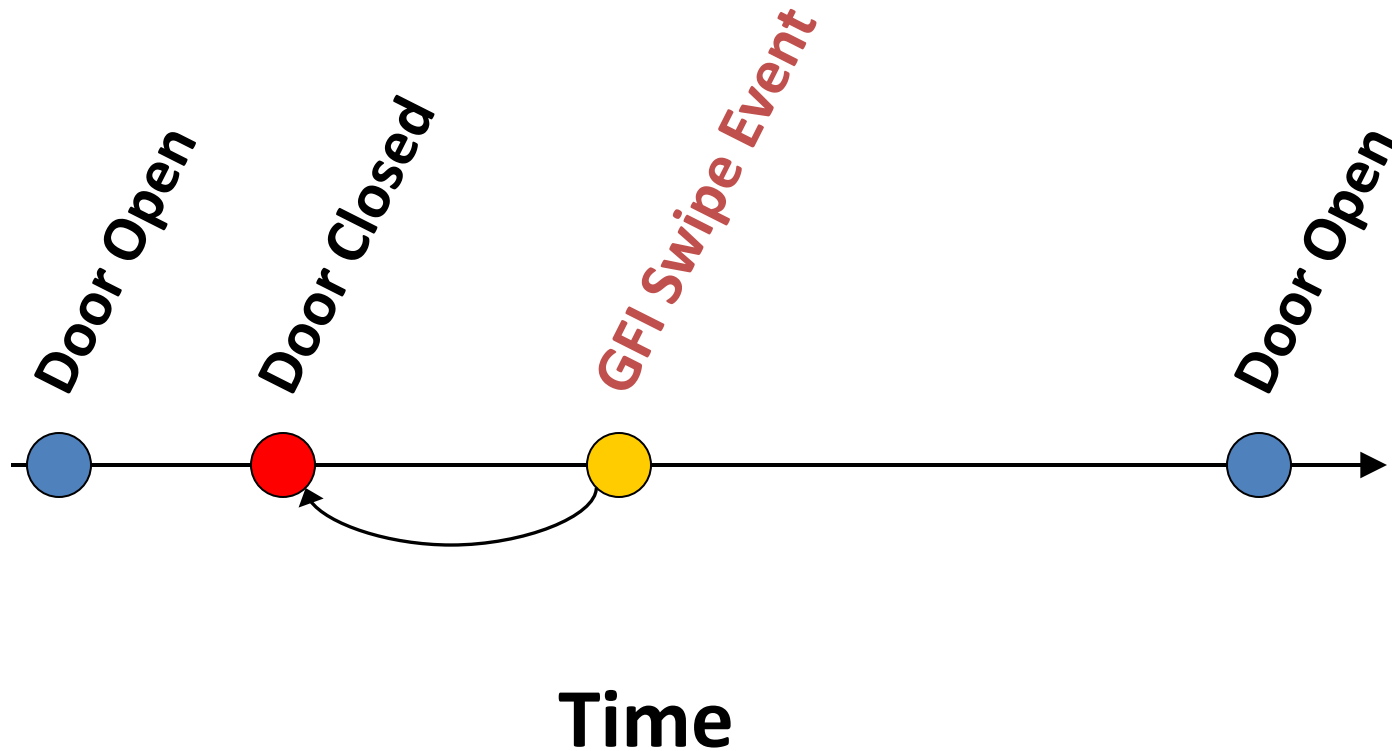
# APC Door Events



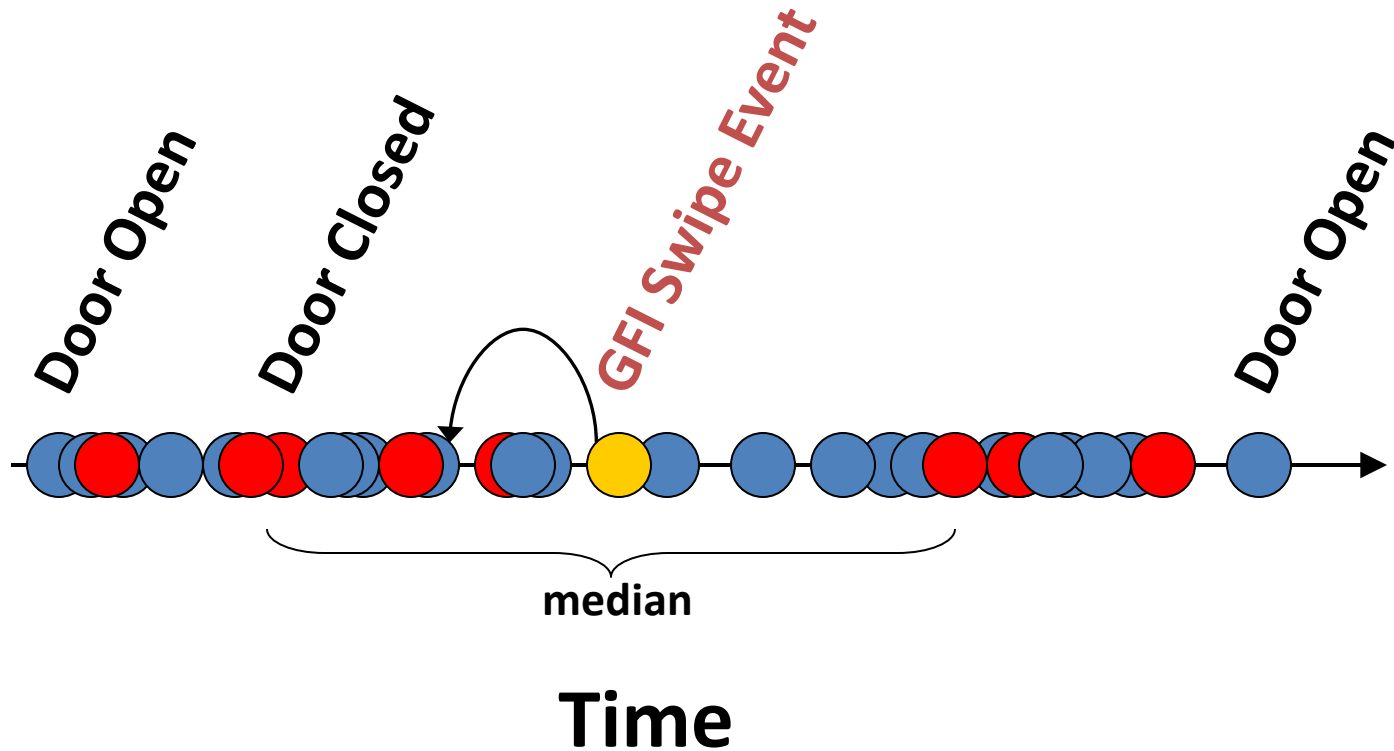




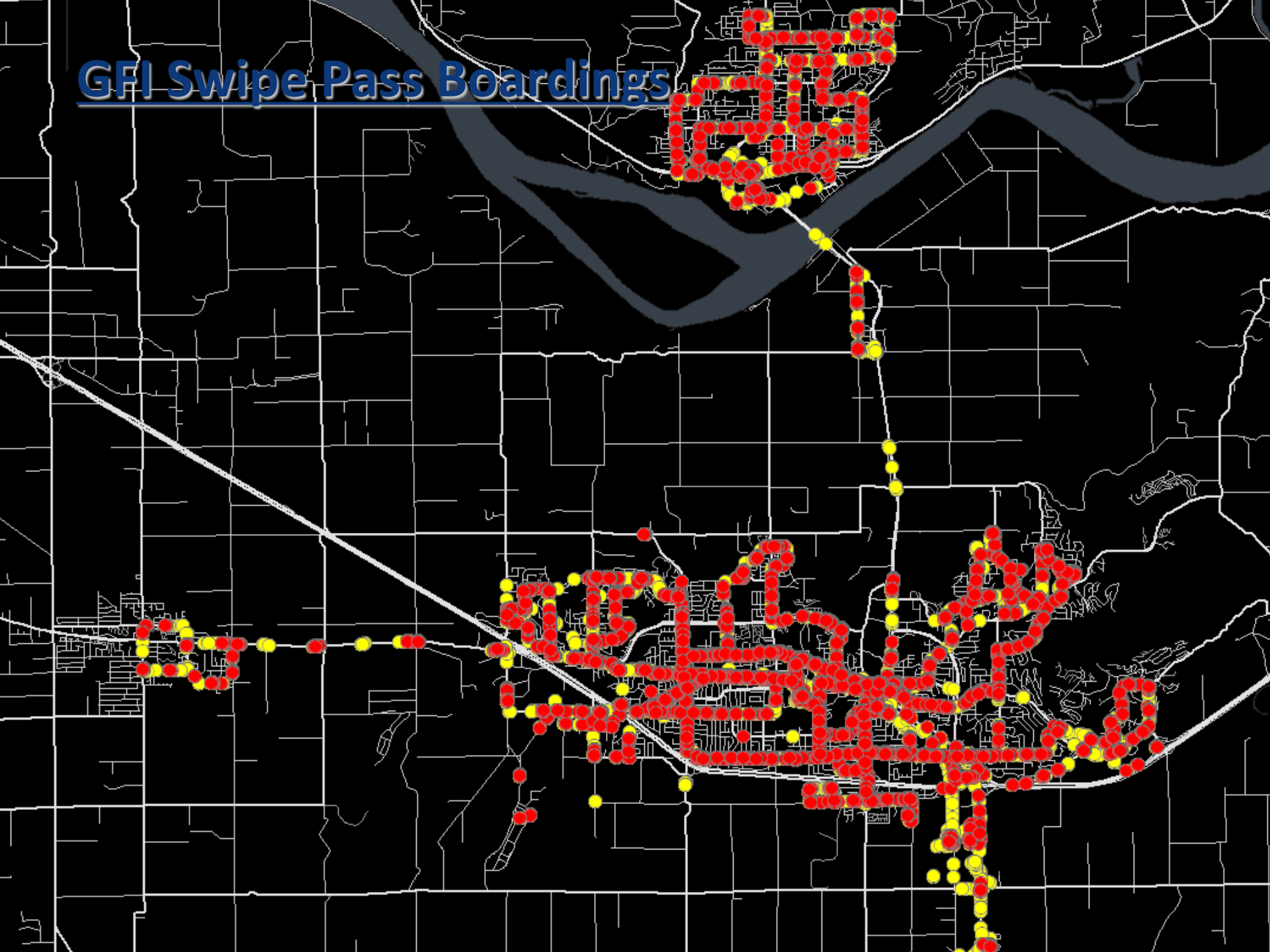
# Assigning a time to a point – APC Bus



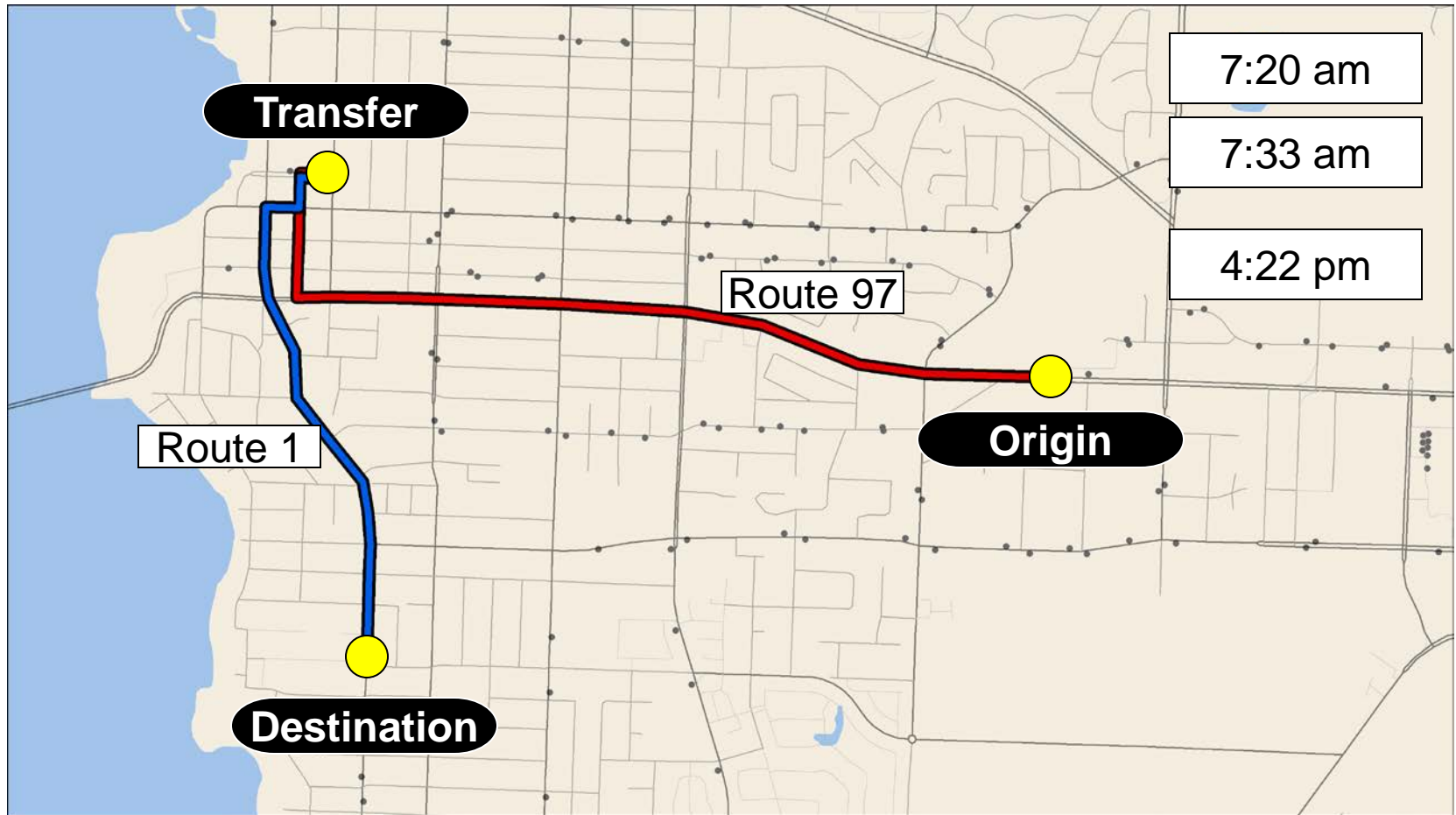
# Assigning a time to a point – **Non** APC Bus



# GFI Swipe Pass Boardings



# Proof Of Concept – Part 2



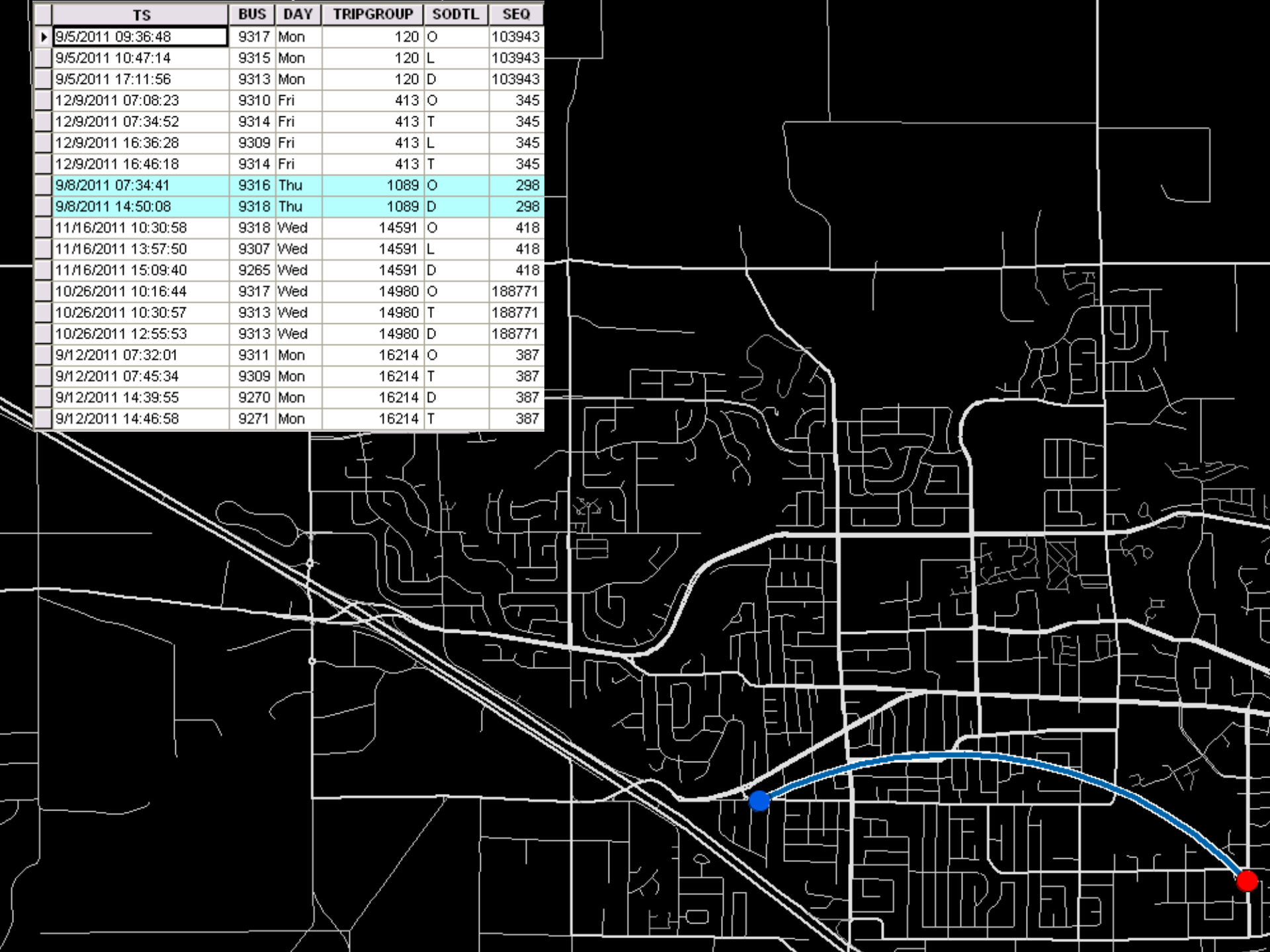
## Travel Behaviour

- S – Single use
- O – Origin
- T – Transfer
- L – Link in trip chain
- D – Destination

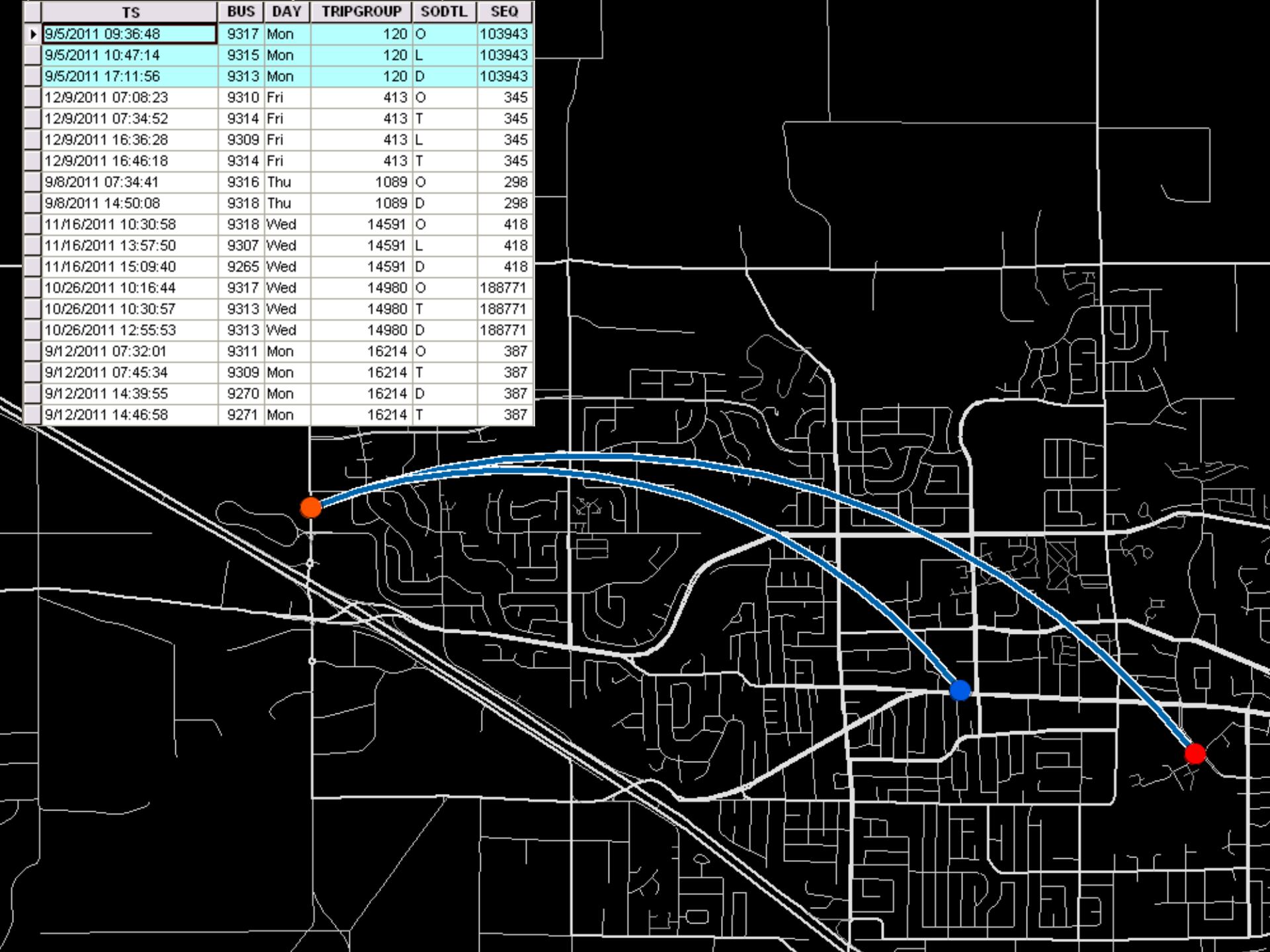




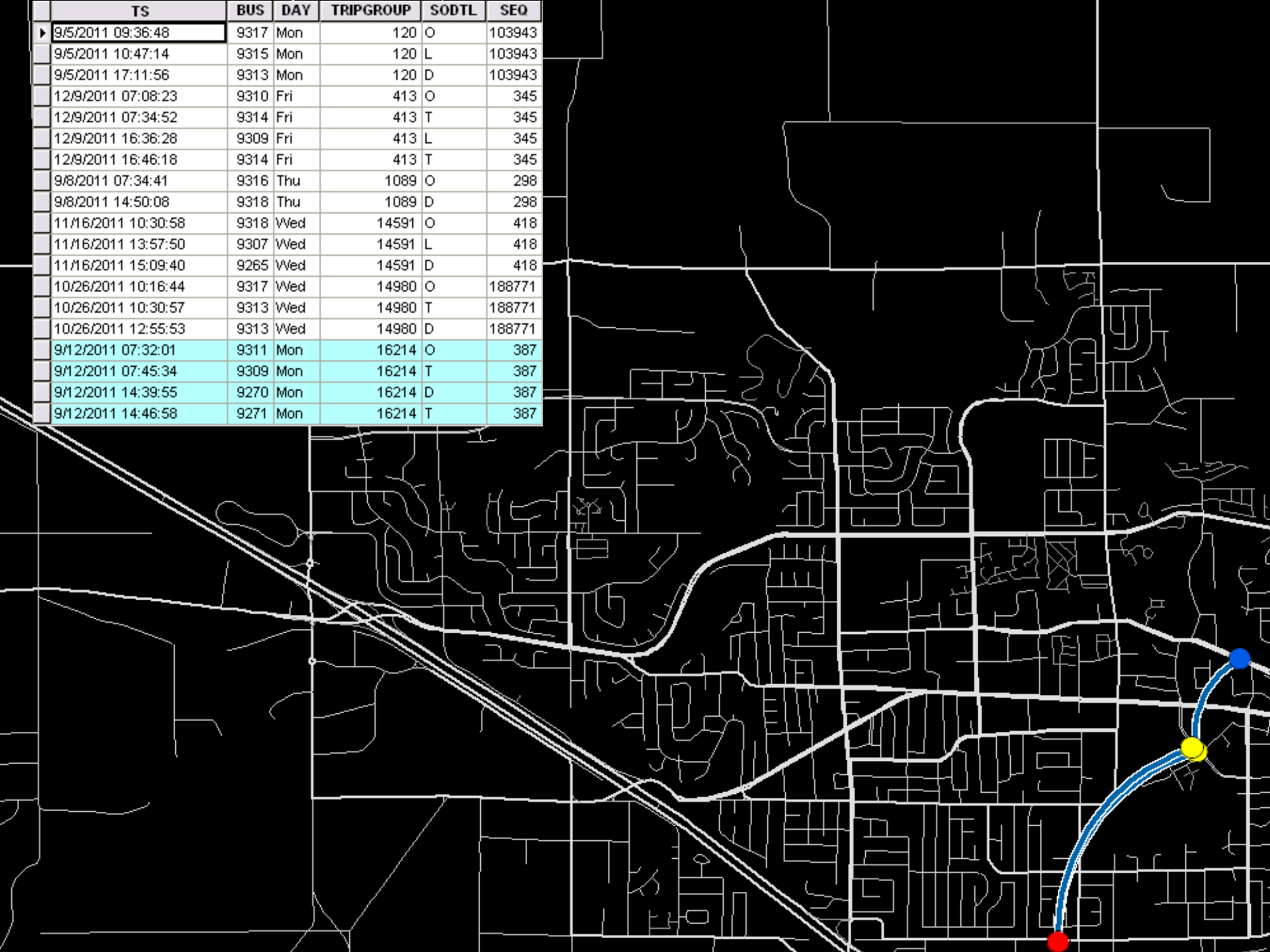
	TS	BUS	DAY	TRIPGROUP	SODTL	SEQ
▶	9/5/2011 09:36:48	9317	Mon	120	O	103943
	9/5/2011 10:47:14	9315	Mon	120	L	103943
	9/5/2011 17:11:56	9313	Mon	120	D	103943
	12/9/2011 07:08:23	9310	Fri	413	O	345
	12/9/2011 07:34:52	9314	Fri	413	T	345
	12/9/2011 16:36:28	9309	Fri	413	L	345
	12/9/2011 16:46:18	9314	Fri	413	T	345
	9/8/2011 07:34:41	9316	Thu	1089	O	298
	9/8/2011 14:50:08	9318	Thu	1089	D	298
	11/16/2011 10:30:58	9318	Wed	14591	O	418
	11/16/2011 13:57:50	9307	Wed	14591	L	418
	11/16/2011 15:09:40	9265	Wed	14591	D	418
	10/26/2011 10:16:44	9317	Wed	14980	O	188771
	10/26/2011 10:30:57	9313	Wed	14980	T	188771
	10/26/2011 12:55:53	9313	Wed	14980	D	188771
	9/12/2011 07:32:01	9311	Mon	16214	O	387
	9/12/2011 07:45:34	9309	Mon	16214	T	387
	9/12/2011 14:39:55	9270	Mon	16214	D	387
	9/12/2011 14:46:58	9271	Mon	16214	T	387



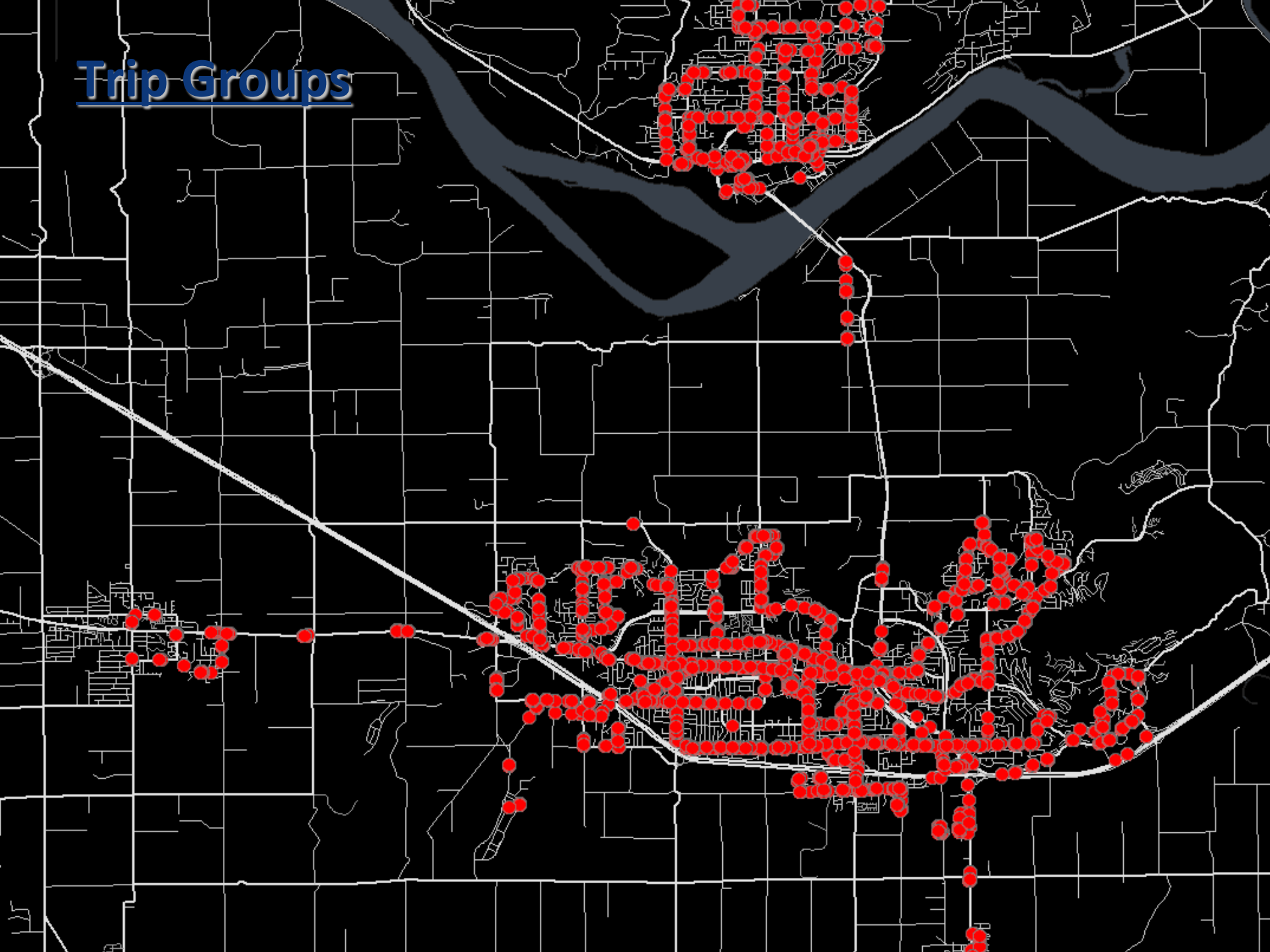
TS	BUS	DAY	TRIPGROUP	SODTL	SEQ
9/5/2011 09:36:48	9317	Mon	120	O	103943
9/5/2011 10:47:14	9315	Mon	120	L	103943
9/5/2011 17:11:56	9313	Mon	120	D	103943
12/9/2011 07:08:23	9310	Fri	413	O	345
12/9/2011 07:34:52	9314	Fri	413	T	345
12/9/2011 16:36:28	9309	Fri	413	L	345
12/9/2011 16:46:18	9314	Fri	413	T	345
9/8/2011 07:34:41	9316	Thu	1089	O	298
9/8/2011 14:50:08	9318	Thu	1089	D	298
11/16/2011 10:30:58	9318	Wed	14591	O	418
11/16/2011 13:57:50	9307	Wed	14591	L	418
11/16/2011 15:09:40	9265	Wed	14591	D	418
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9/12/2011 07:32:01	9311	Mon	16214	O	387
9/12/2011 07:45:34	9309	Mon	16214	T	387
9/12/2011 14:39:55	9270	Mon	16214	D	387
9/12/2011 14:46:58	9271	Mon	16214	T	387



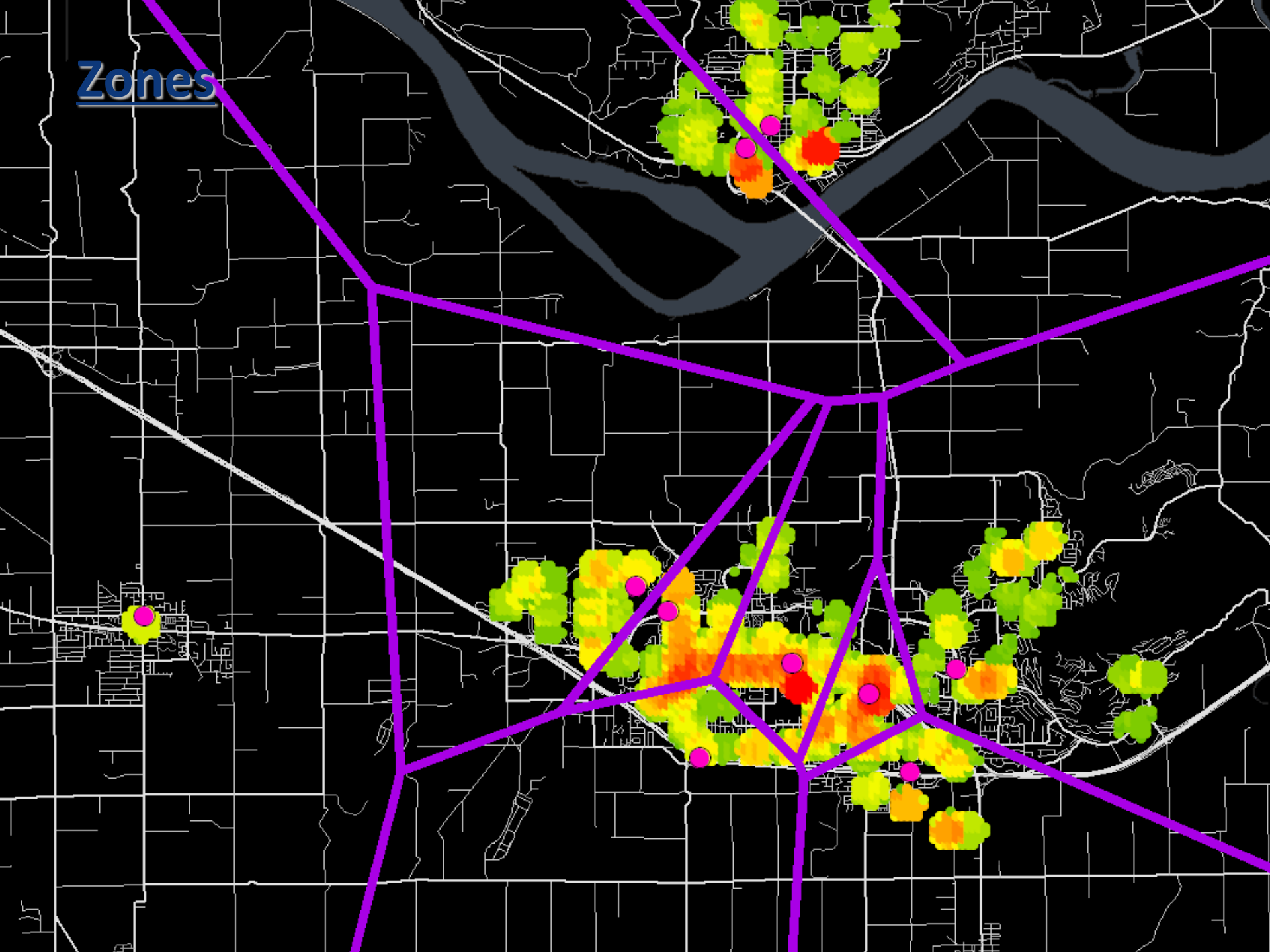
TS	BUS	DAY	TRIPGROUP	SODTL	SEQ
9/5/2011 09:36:48	9317	Mon	120	O	103943
9/5/2011 10:47:14	9315	Mon	120	L	103943
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9/8/2011 14:50:08	9318	Thu	1089	D	298
11/16/2011 10:30:58	9318	Wed	14591	O	418
11/16/2011 13:57:50	9307	Wed	14591	L	418
11/16/2011 15:09:40	9265	Wed	14591	D	418
10/26/2011 10:16:44	9317	Wed	14980	O	188771
10/26/2011 10:30:57	9313	Wed	14980	T	188771
10/26/2011 12:55:53	9313	Wed	14980	D	188771
9/12/2011 07:32:01	9311	Mon	16214	O	387
9/12/2011 07:45:34	9309	Mon	16214	T	387
9/12/2011 14:39:55	9270	Mon	16214	D	387
9/12/2011 14:46:58	9271	Mon	16214	T	387



# Trip Groups

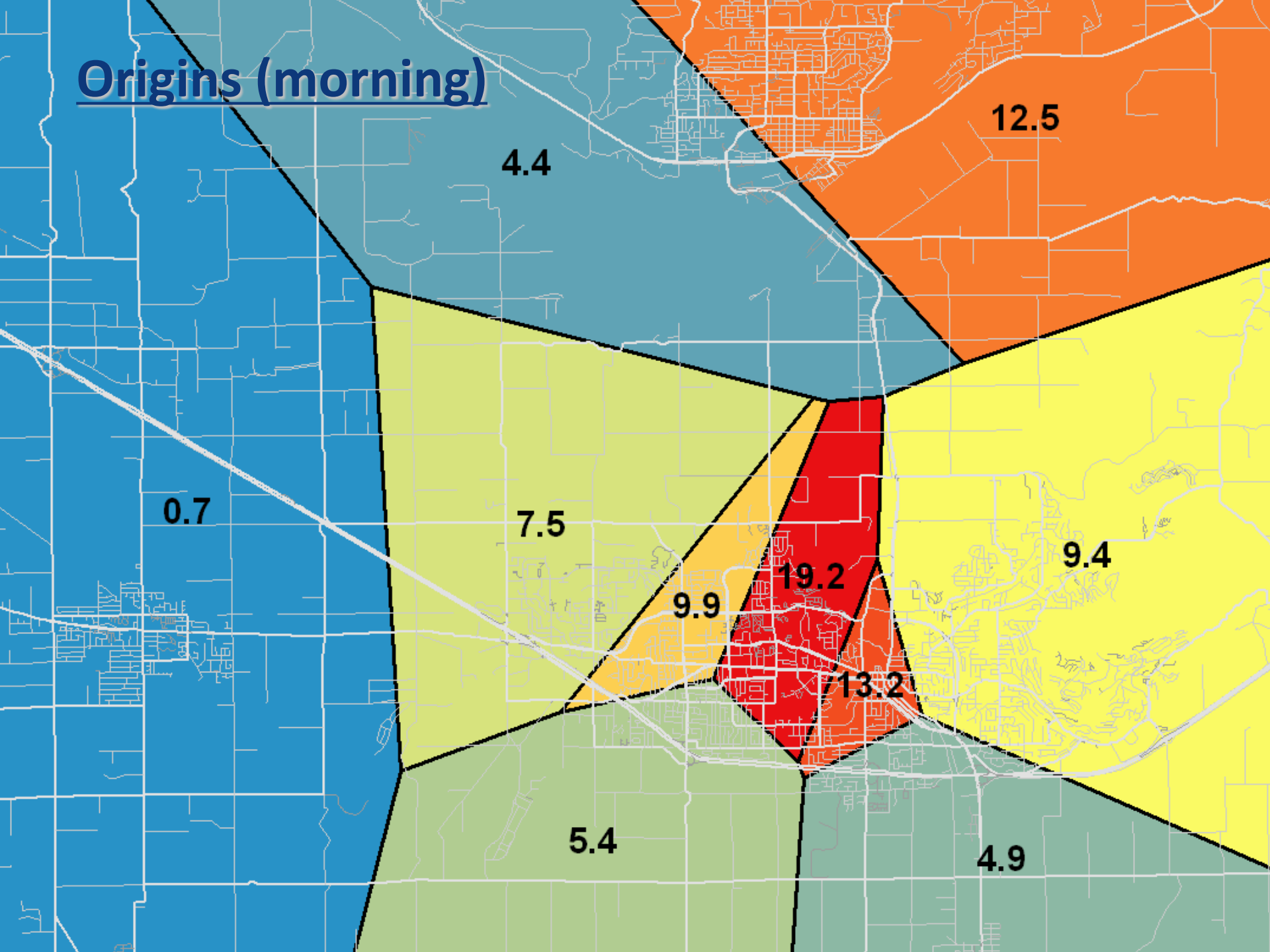


# Zones

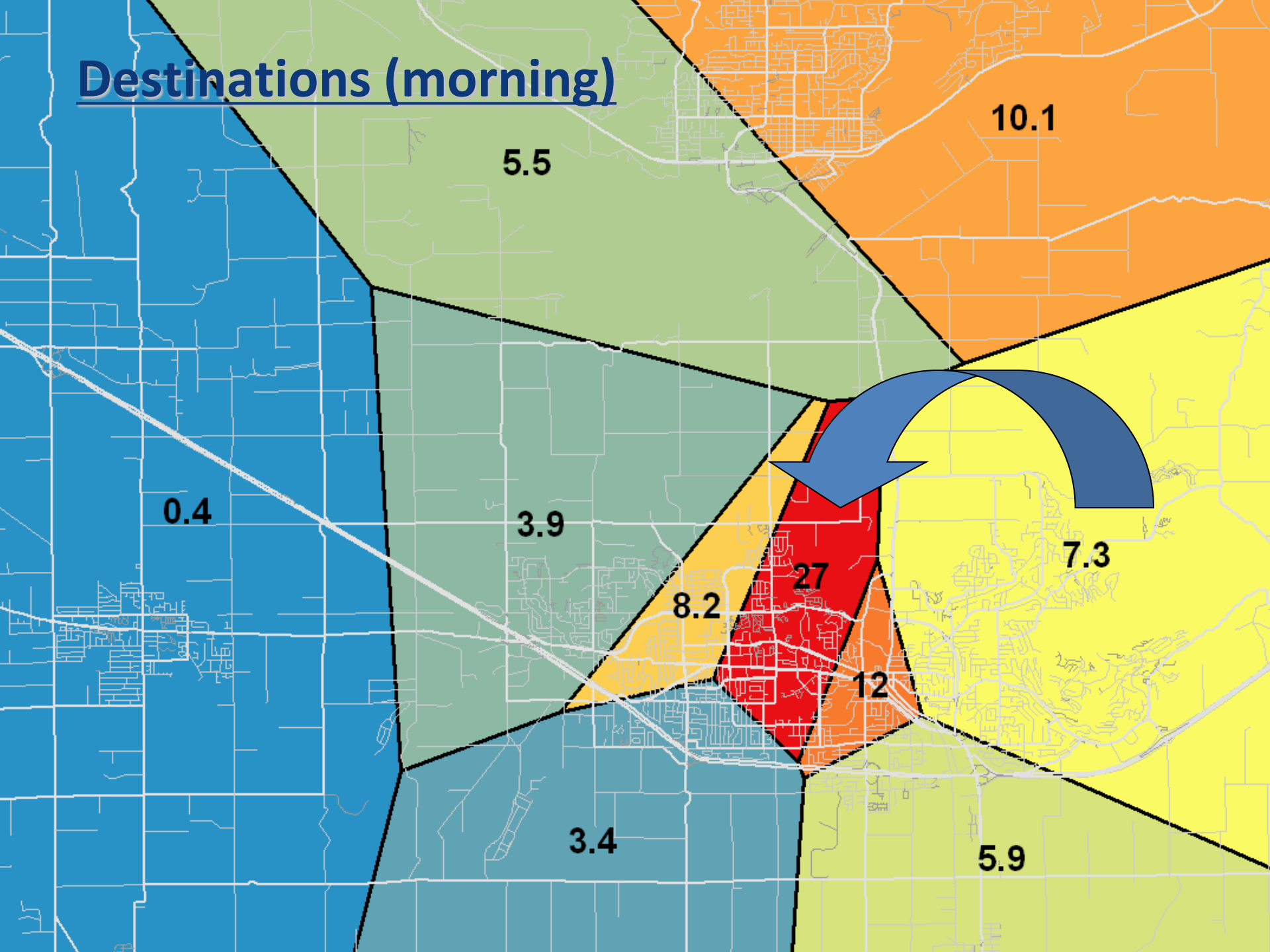




# Origins (morning)



# Destinations (morning)



## Future Steps

- **Improve GFI and APC data quality**
- **Review and test OD methodology**
- **Trip Diary to help interpret customer behaviour**
- **Develop more deliverables**
- **Complete GFI – GPS link pilot**



- Thank You**
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