THE UNIVERSITY OF TEXAS AT AUSTIN
CENTER FOR TRANSPORTATION RESEARCH

Open Source Tools and ITS Data for Transit Modeling and Visualization

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Public Transit Visualization Needs

Travel demand model outputs

- Current / base year conditions
- Future scenarios

Common information needs

- Route and network representation
- Individual passenger movements
- Origin-destination and route segment flows
- Travel times and vehicle movements
- Passenger loading and volumes

Innovations

Google's General Transit Feed Specification (GTFS)

- Shape files for network representation
- Explicit timetable representation

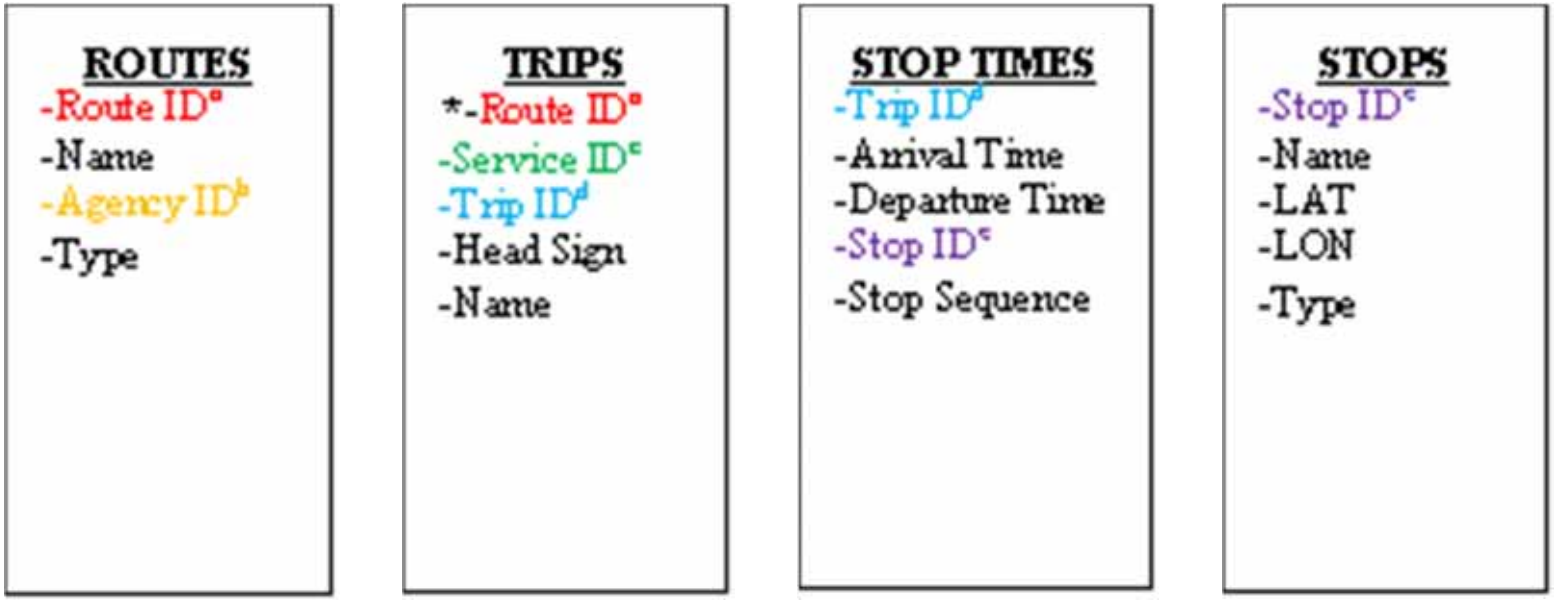
Transit ridership (smart card) and operations (AVL) data

Open-source travel demand modeling tools

Enabling…

- Schedule-based transit assignment
- Extensive data for model calibration and validation
- Tools for vehicle and passenger trip visualization

GTFS and Network Information

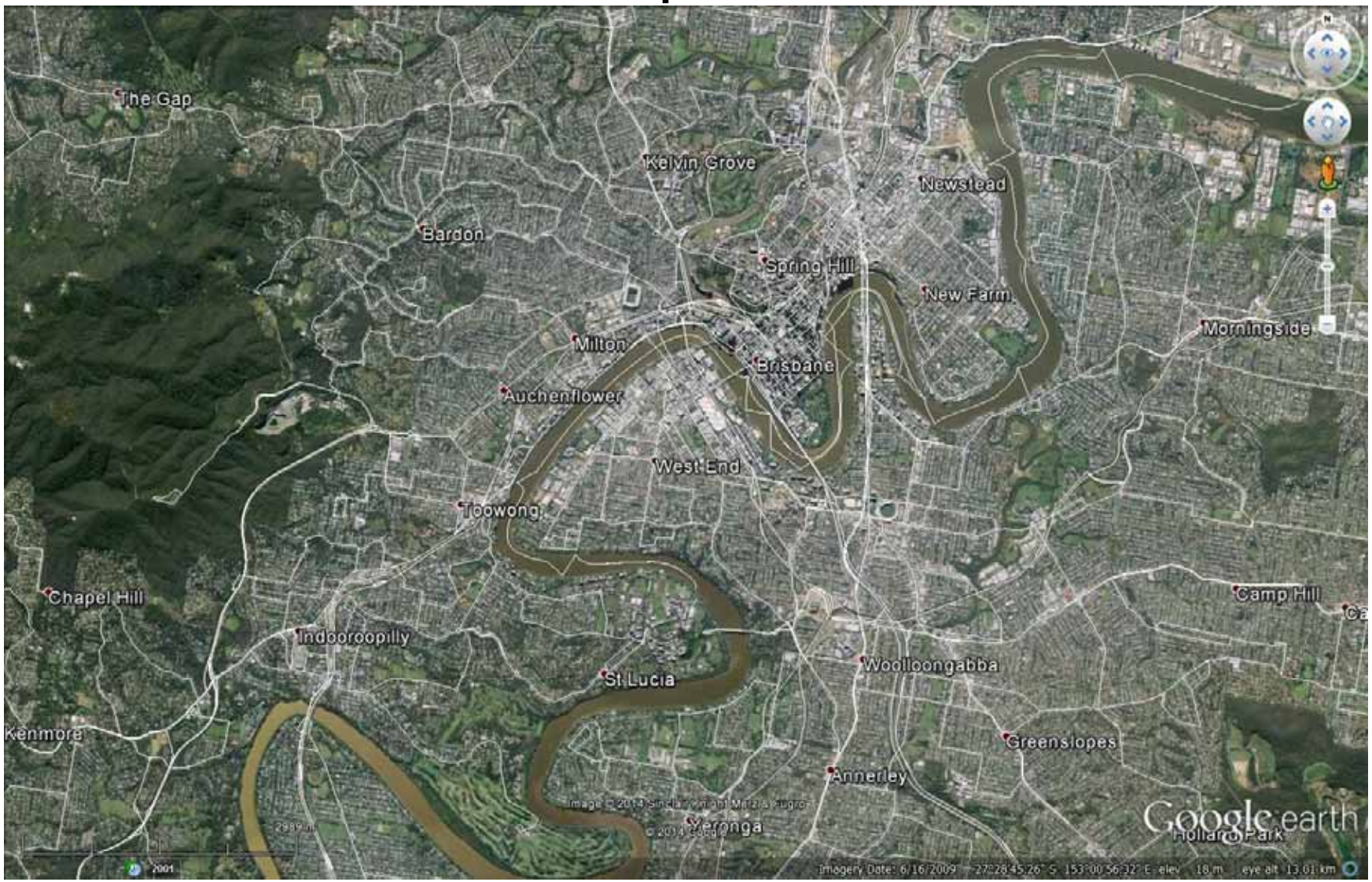


- Schedule representation
- Route and directional identifier
- Stop locations and sequences
- Trip ID and service ID for vehicle

Network is:

- ***pre-defined***
- ***In* de facto *format***
- ***schedule-based***
- ***geo-referenced***

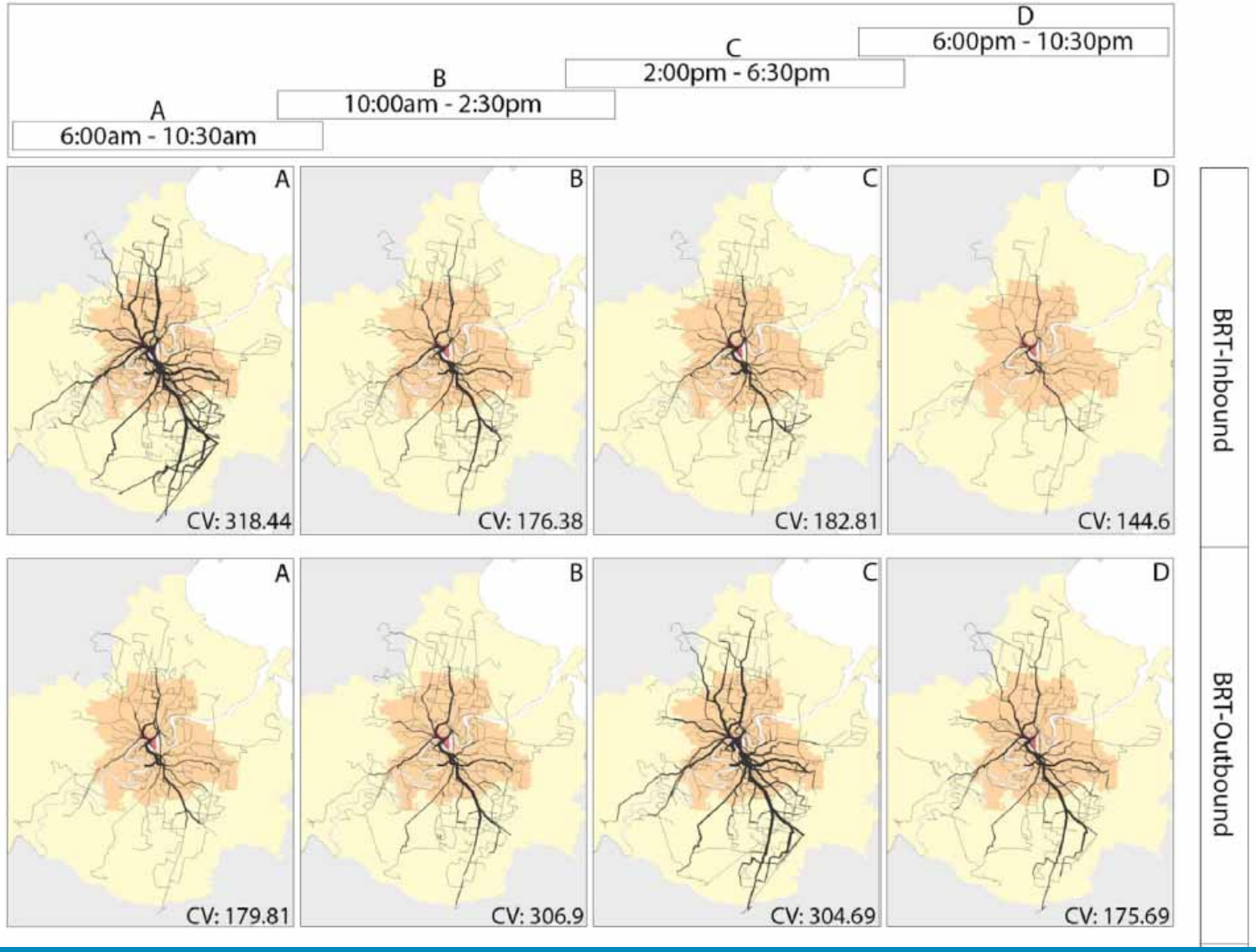
Network Representation



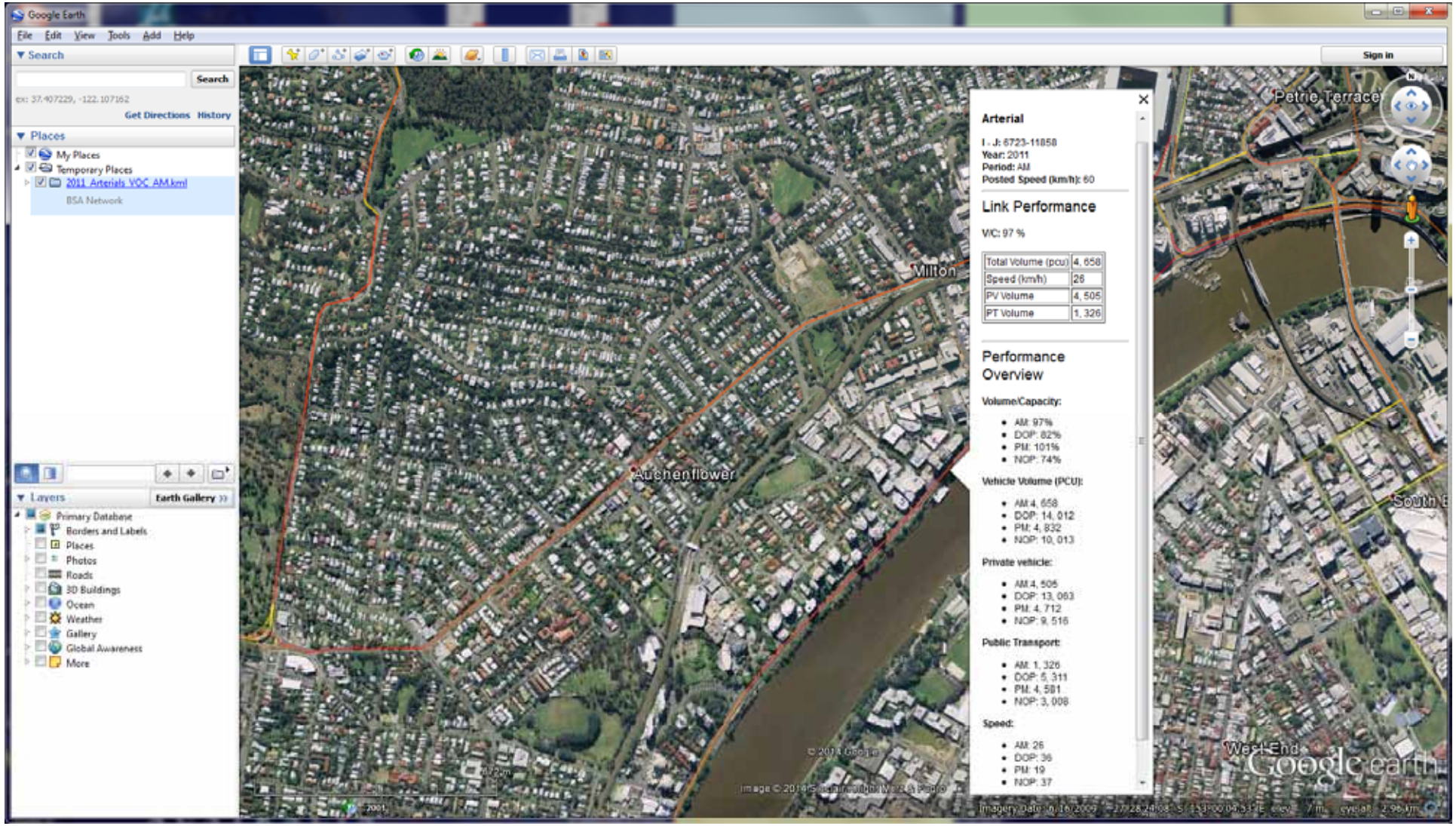
New Transit Data Sources

- Smart Card data
  - Time stamp, location, route, direction, fare paid
  - Origin, destination (?)
- AVL data
  - Time stamp, location, route
  - Vehicle schedule adherence, travel time reliability
- Passenger counters
  - Boardings, alightings, loads
- Mobile apps…

Passenger Flows from Smart Cards

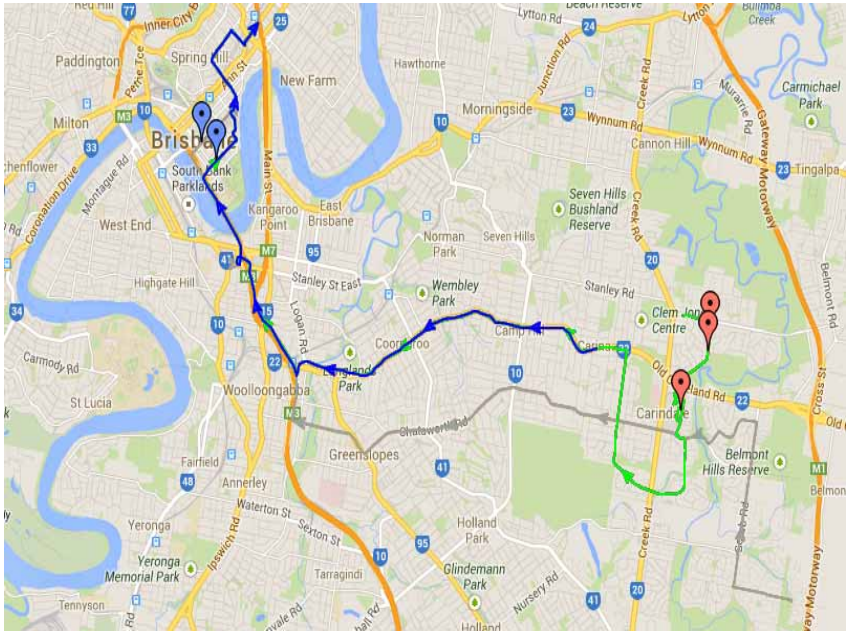


Google Earth Visualization of Model Outputs

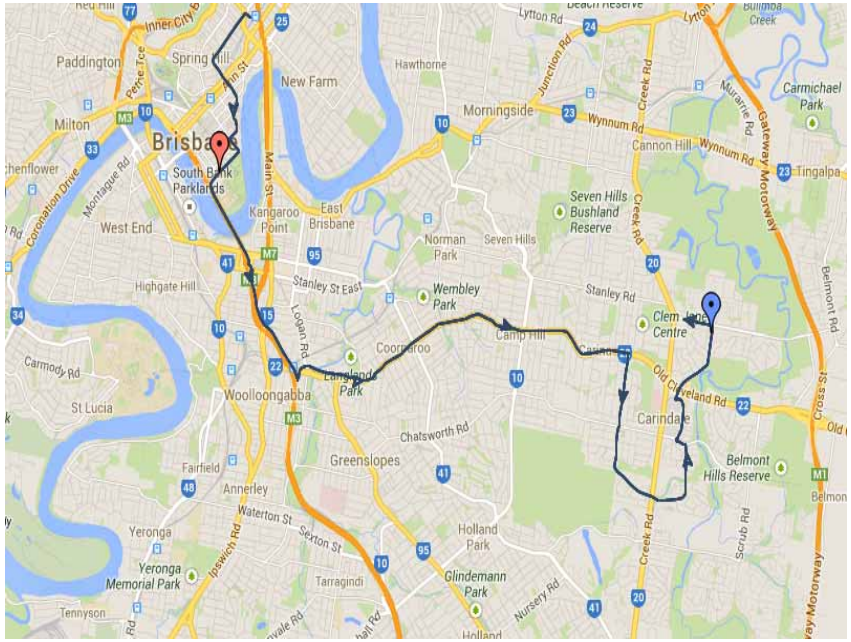


An Individual's Journeys by Time of Day

(Red denotes Origin; Yellow denotes Transfer point; Blue denotes Destination)



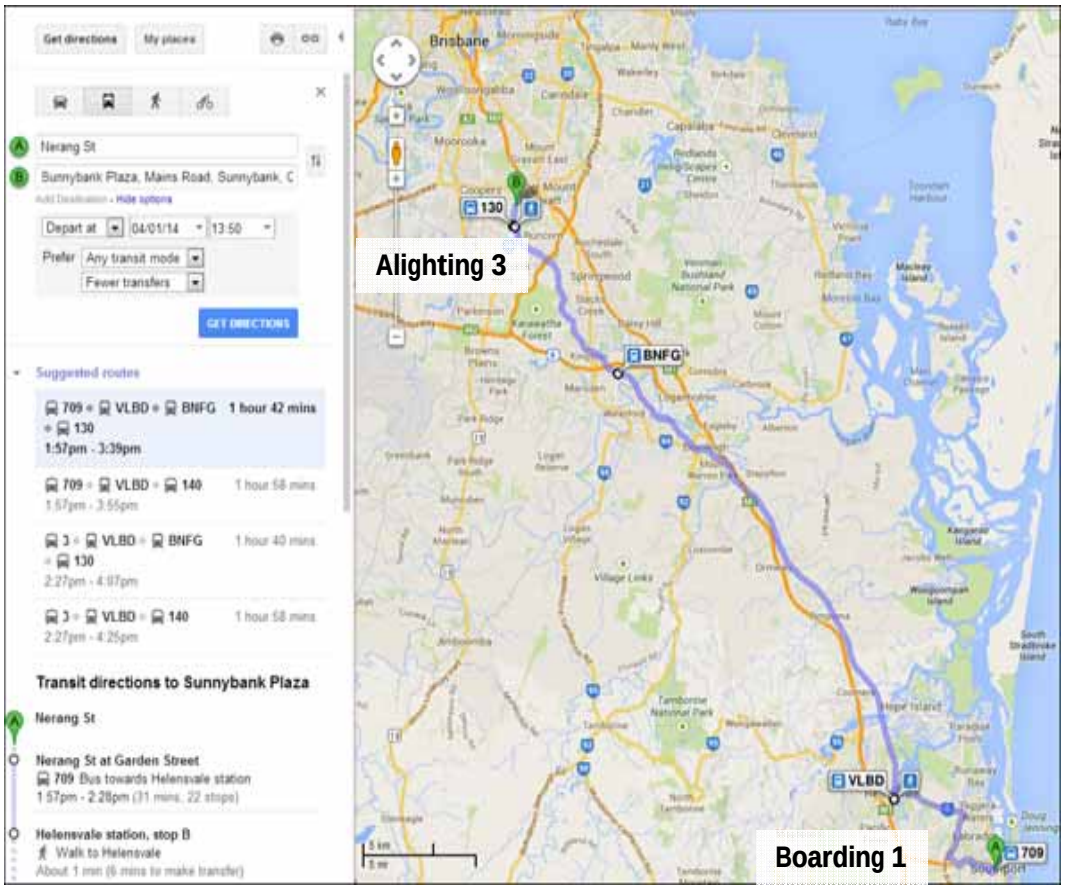
6 am to 8 am



4 pm to 6 pm

Passenger Journeys / Activities

Boarding time	Alighting time	Boarding Stop	Alighting stop	Trip ID
2/03/2013 13:50	2/03/2013 14:20	Garden Street [23496]	Town Centre Drive [29273]	1
2/03/2013 14:25	2/03/2013 15:58	Helensvale Railway Station [C109]	Brisbane Central Railway Station [C5]	2
2/03/2013 16:29	2/03/2013 16:55	Queen Street Bus Station - Platform A5 [BT001001]	Sunnybank Mains Road [BT005635]	3



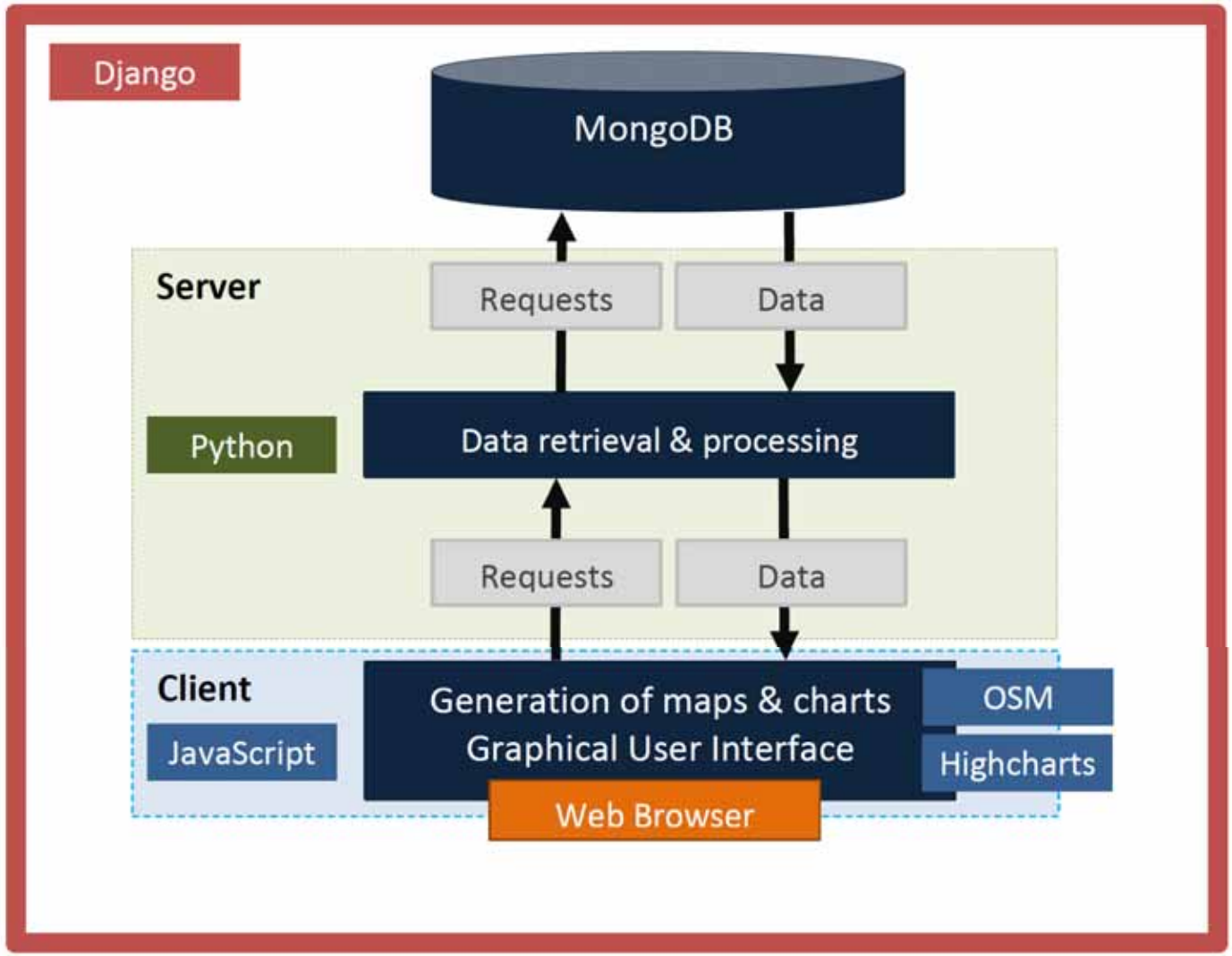
FAST-TrIPs Tools

- Methodological approach and framework components
- Transit model (FAST-TrIPs) outputs
- Sample measures for visualization
- Tool exhibition

Methodological Approach

- Web-based approach
- Interactive features
- Flexible data aggregation and manipulation
- Data analytics

Framework Components



Model Data

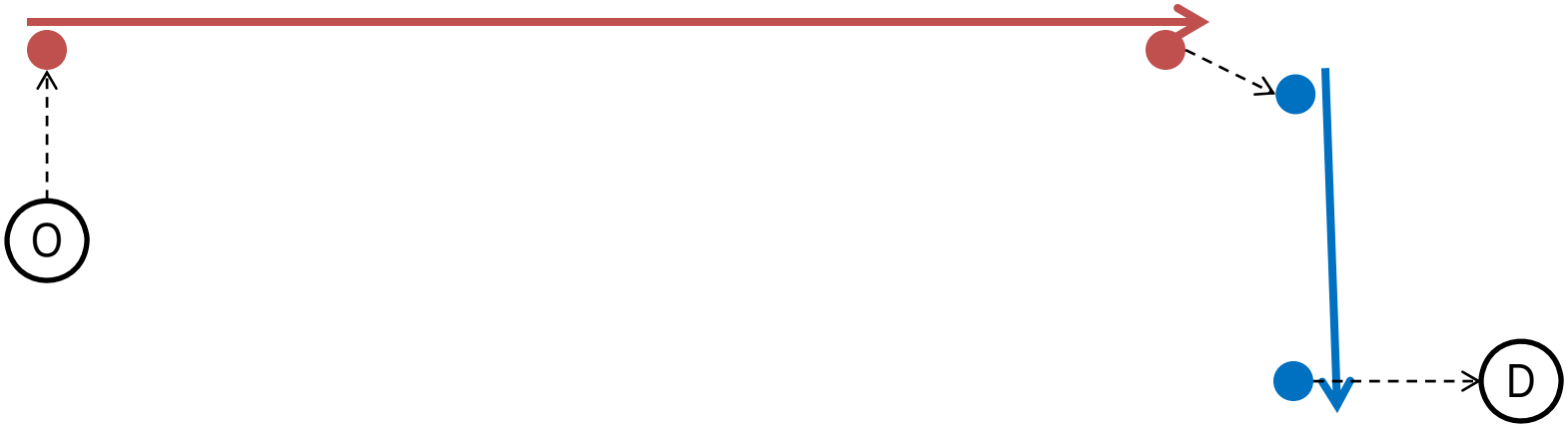
- Transit network and schedule:
  - Stops, routes and their schedule (from GTFS)
- Transit vehicle trajectories:
  - Including time stamps, load, boarding/alighting, etc.
- Passenger trajectories:
  - Boarding and alighting stops
  - Vehicle trips taken
  - Access and transfer links

Transit Vehicle Trajectories

Trip ID	Route ID	Direction	Stop ID	Time	Boarding	Alighting	Dwell Time	…
19853	19	N	584	06:34:00	10	0	60 sec	…
19853	19	N	658	06:37:40	2	1	14 sec	…
19853	19	N	659	06:39:15	5	3	30 sec	…
…								
19866	19	N	584	07:04:00	8	0	60 sec	…
19866	19	N	658	07:08:00	4	2	24 sec	…
19866	19	N	659	07:09:50	6	0	28 sec	…
…								

Passenger Trajectories

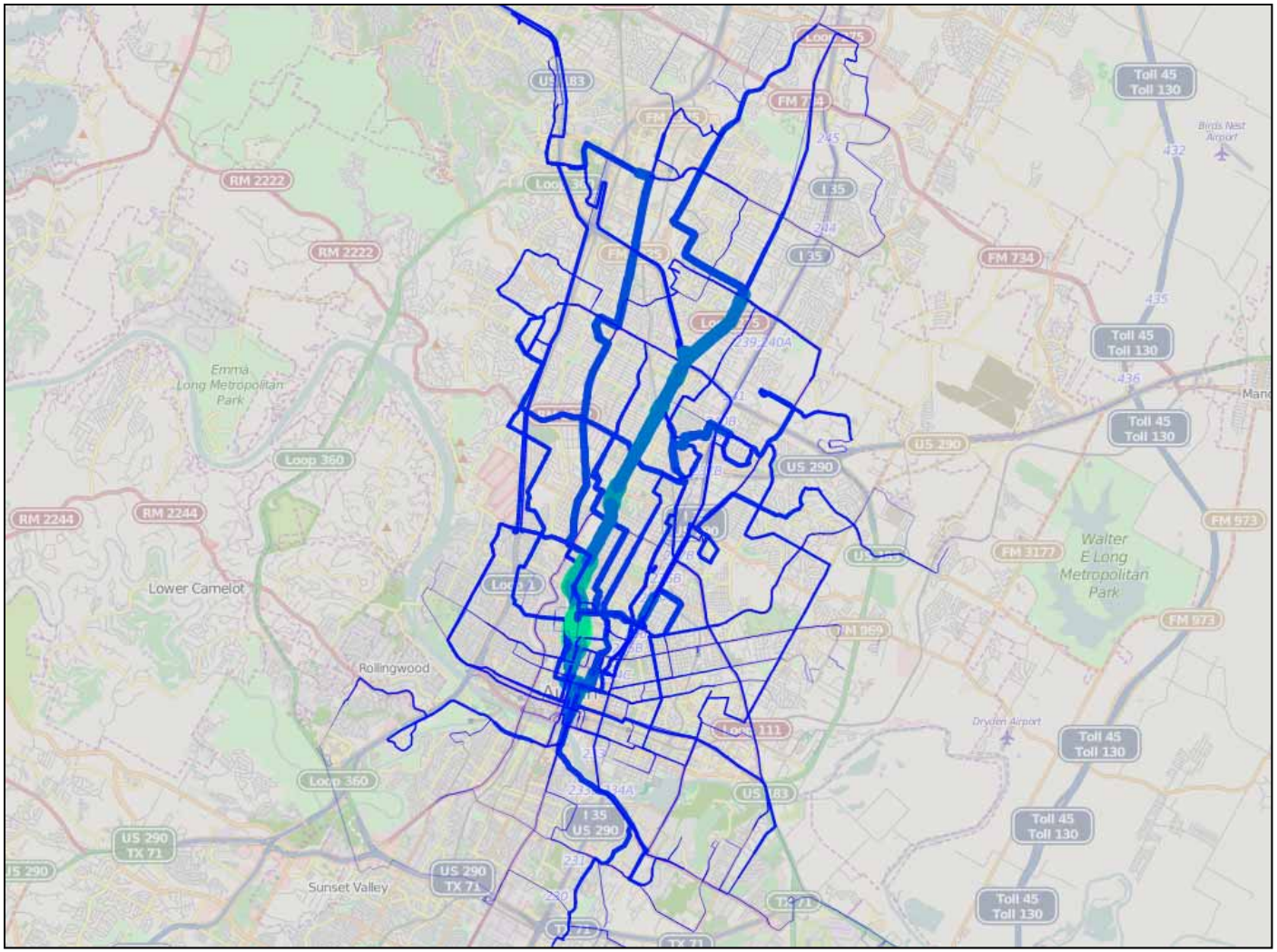
Passenger ID	Type	Orig	Dest	Dep Time	Boarding Trips	Boarding Stops	Alighting Stops	...
5210	3	165	359	06:25	19858	866	968	...
5211	3	165	767	08:10	19858, 35669	458, 469	459, 378	...
5212	2	458	274	07:30	48531	298	667	...
...								



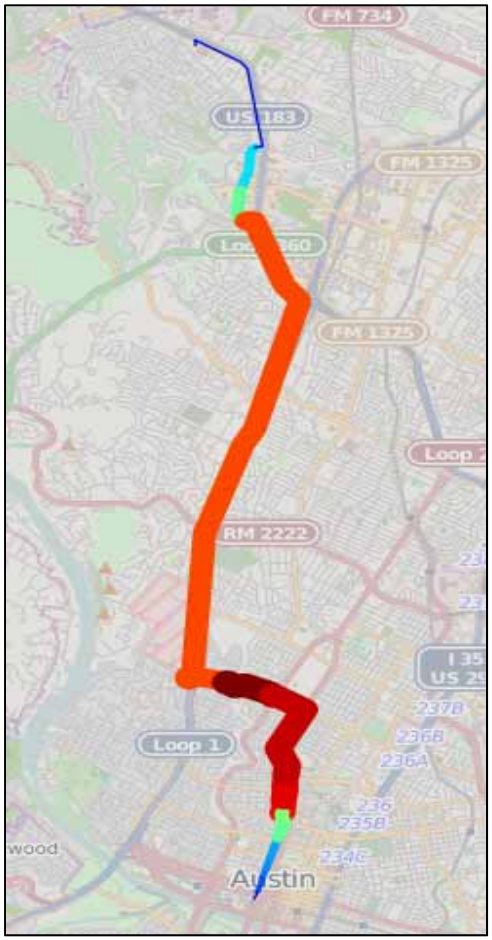
Sample Measures

- Route/Vehicle Measures:
  - Route ridership
  - Load and crowding per segment per time of day
- Additional Information by Route/Vehicle:
  - Stops activities: boarding/alighting/dwell time
  - Feeds: a "select-link-analysis" feature for transit networks
- Stop Measures:
  - Boarding/alighting/dwell time
- OD-Paths:
  - OD flow by time-of-day
  - Active paths and flow in selected OD pairs

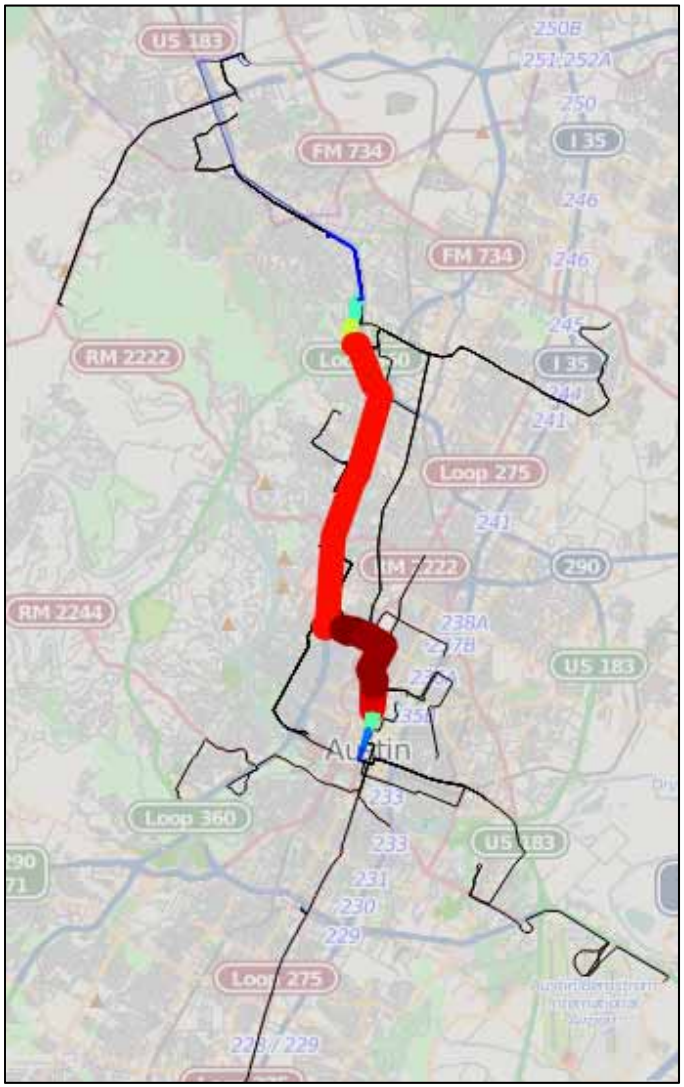
Route Measures - Ridership

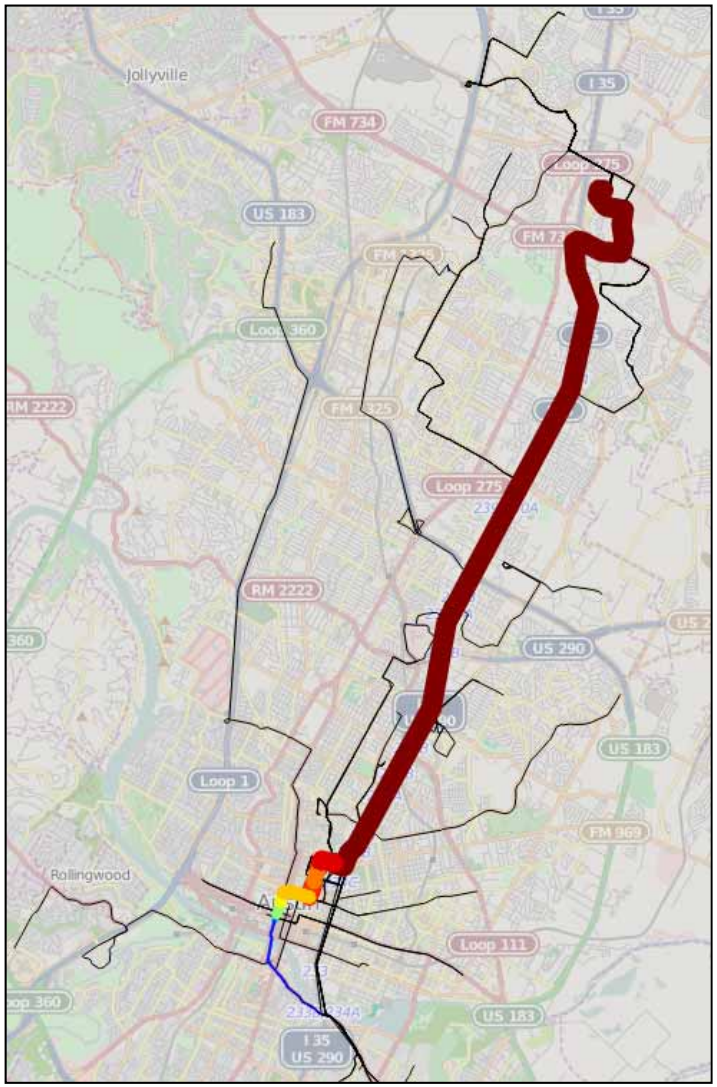


Route Measures - Crowding

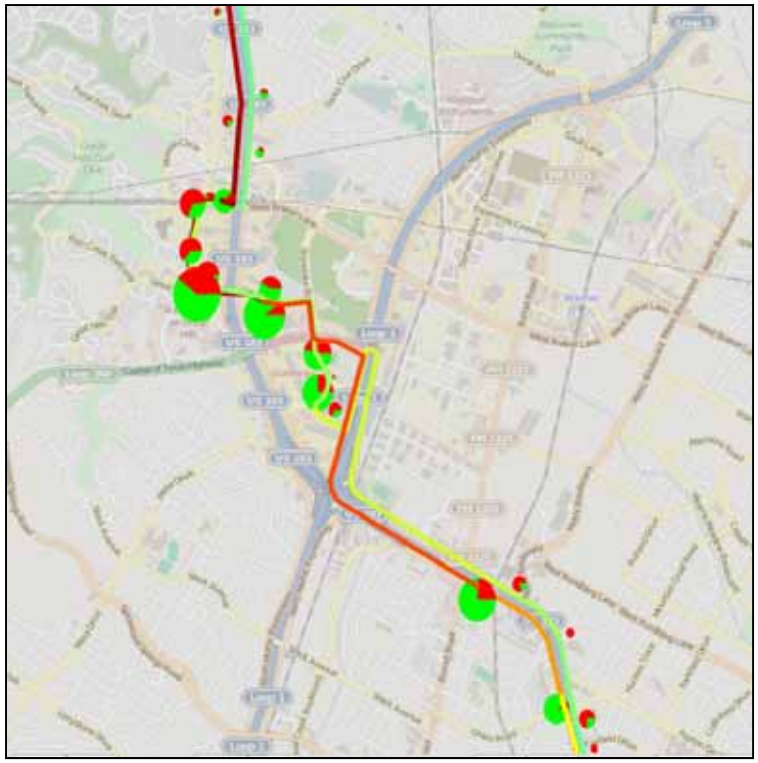


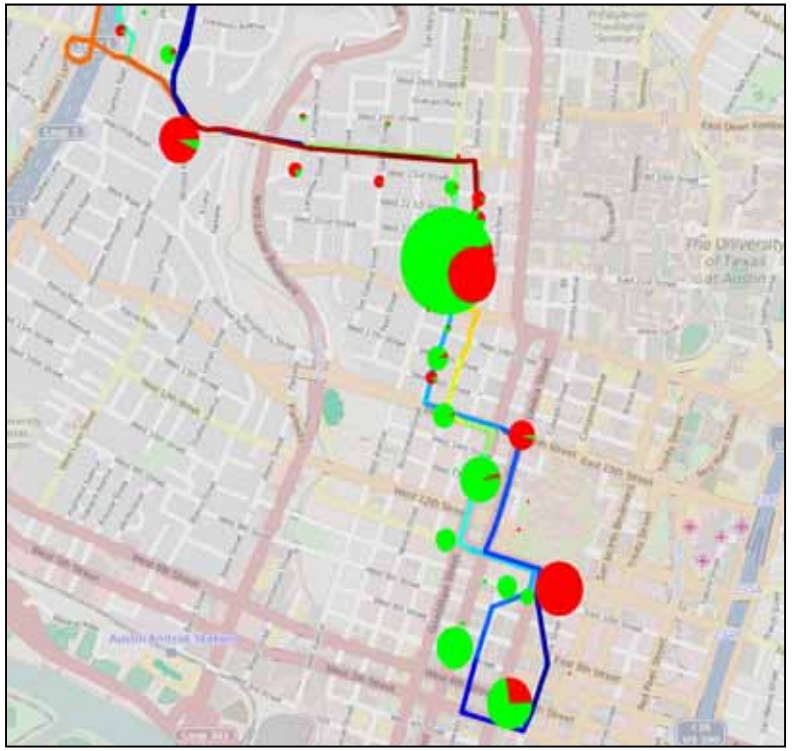
Additional Route Measures - Feeds



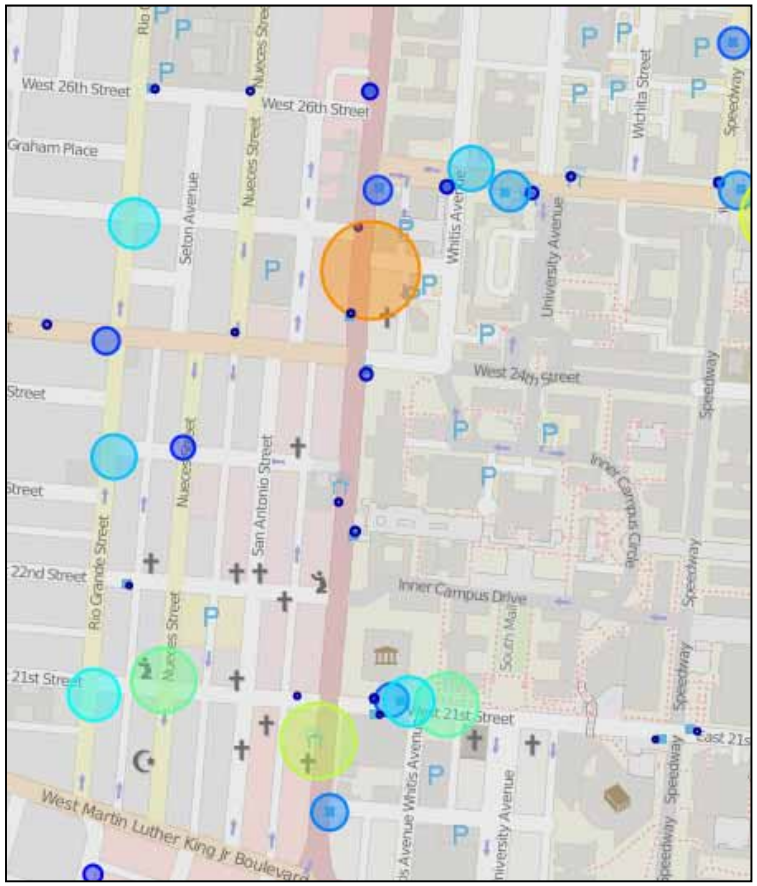


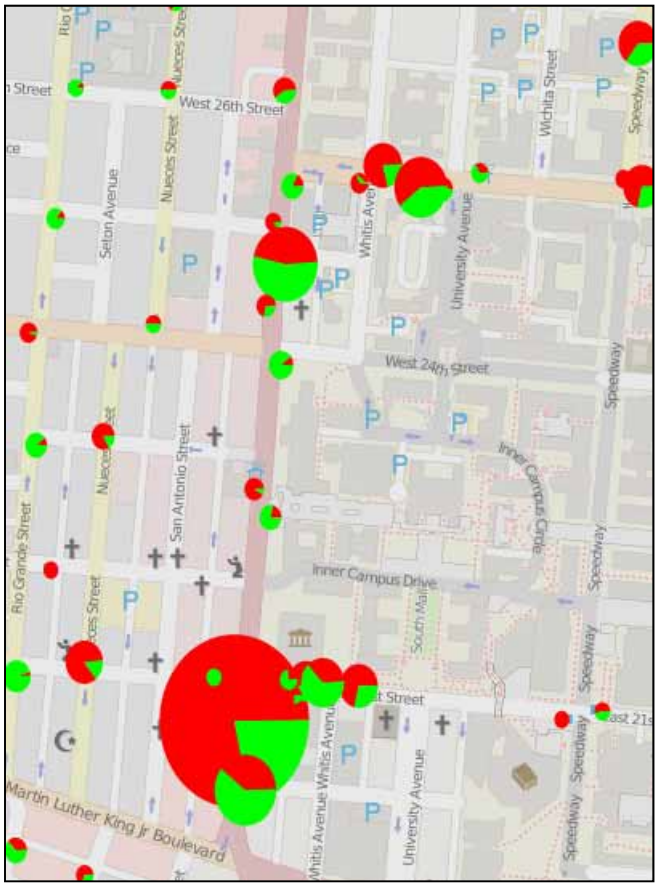
Additional Route Measures - Stops



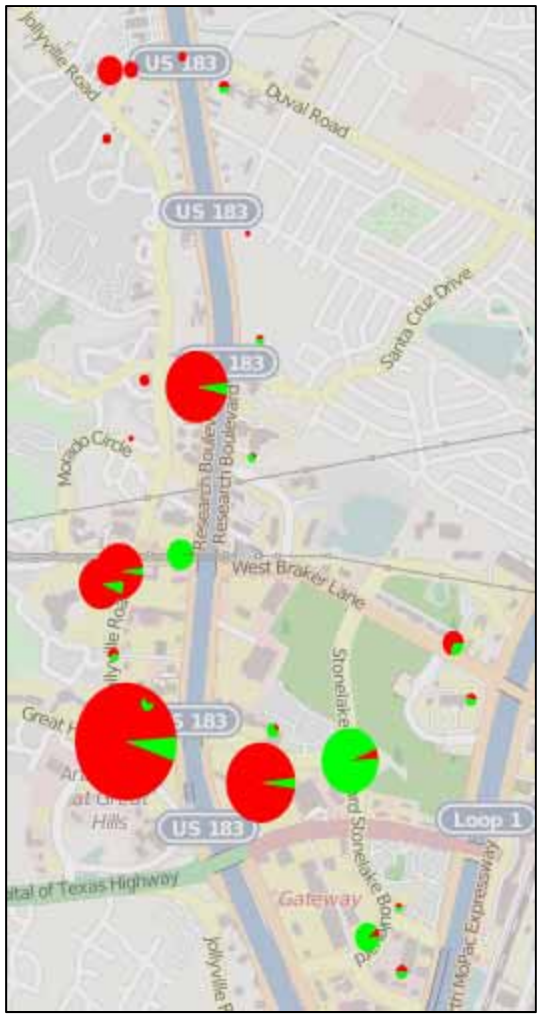


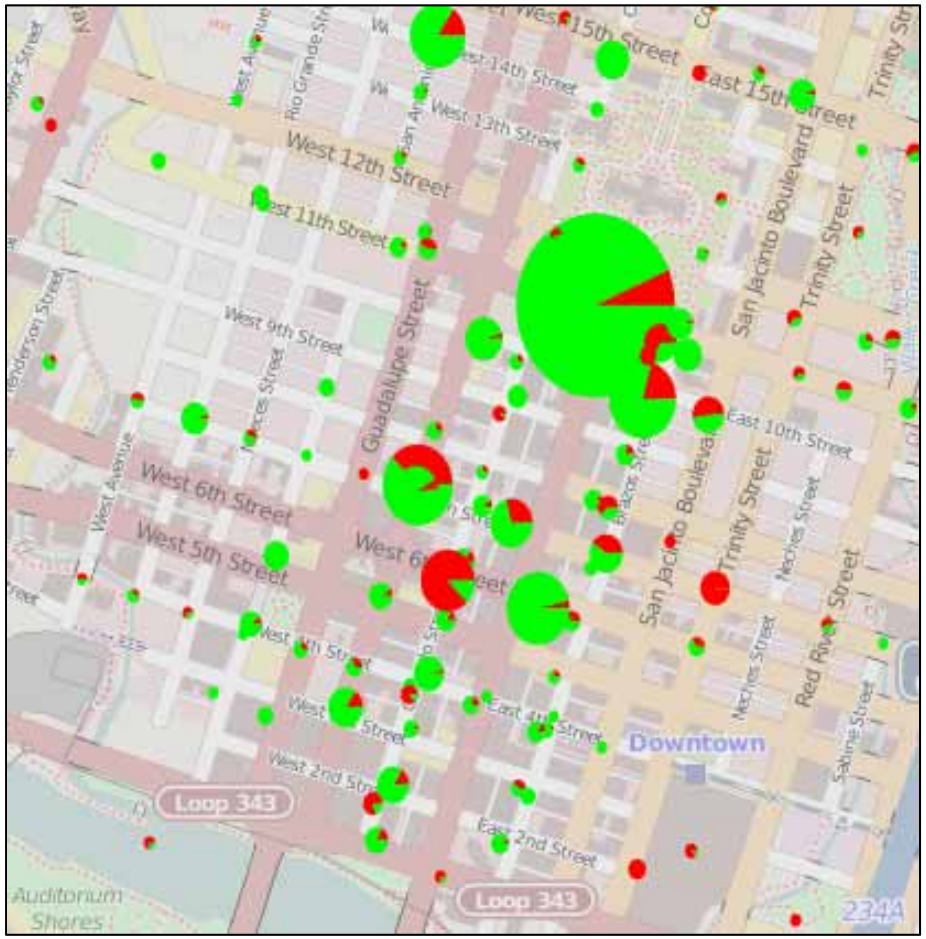
Stop Measures - Dwell Time, Boarding/Alighting

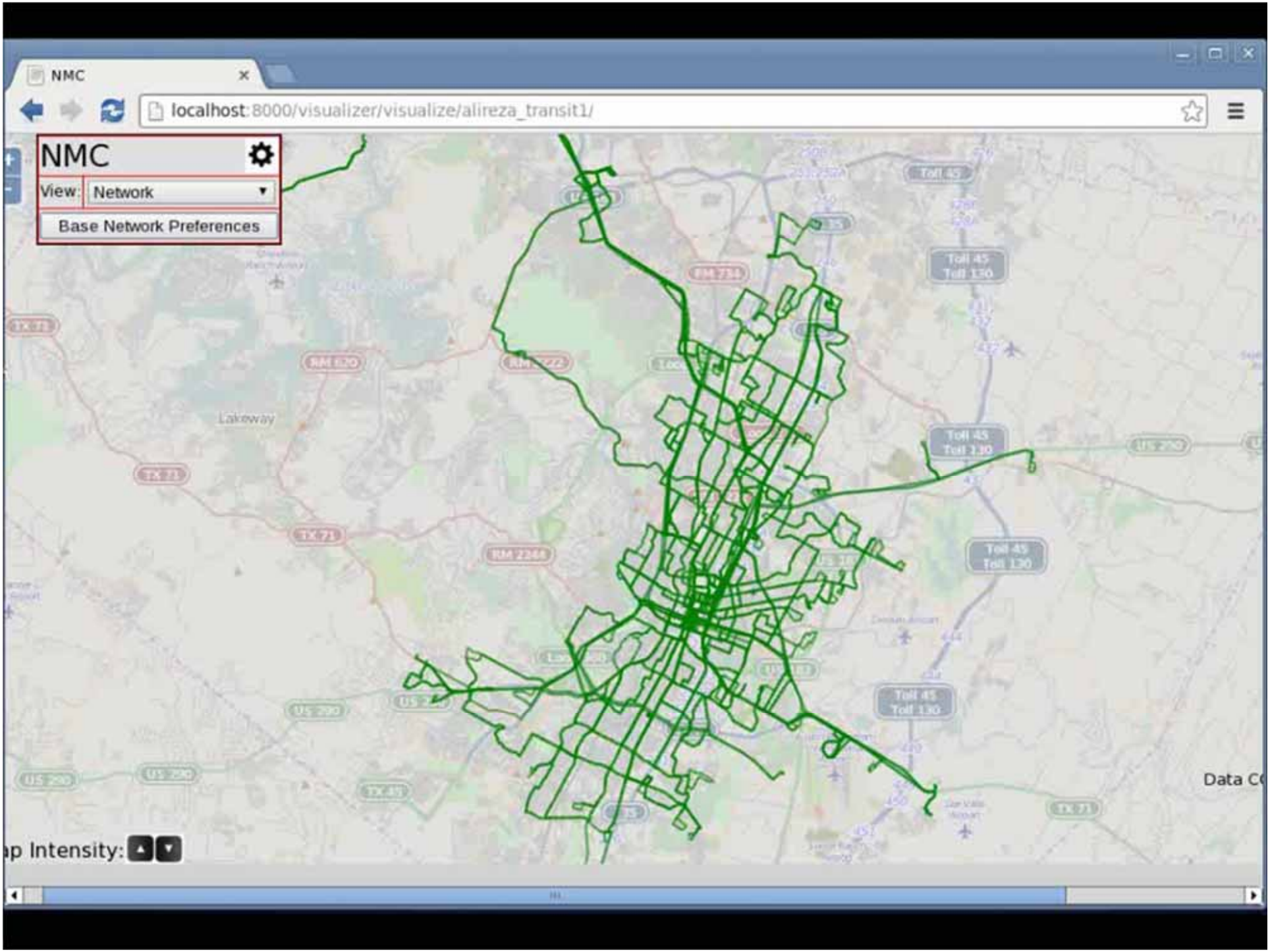




Stop Measures- Boarding and Alighting



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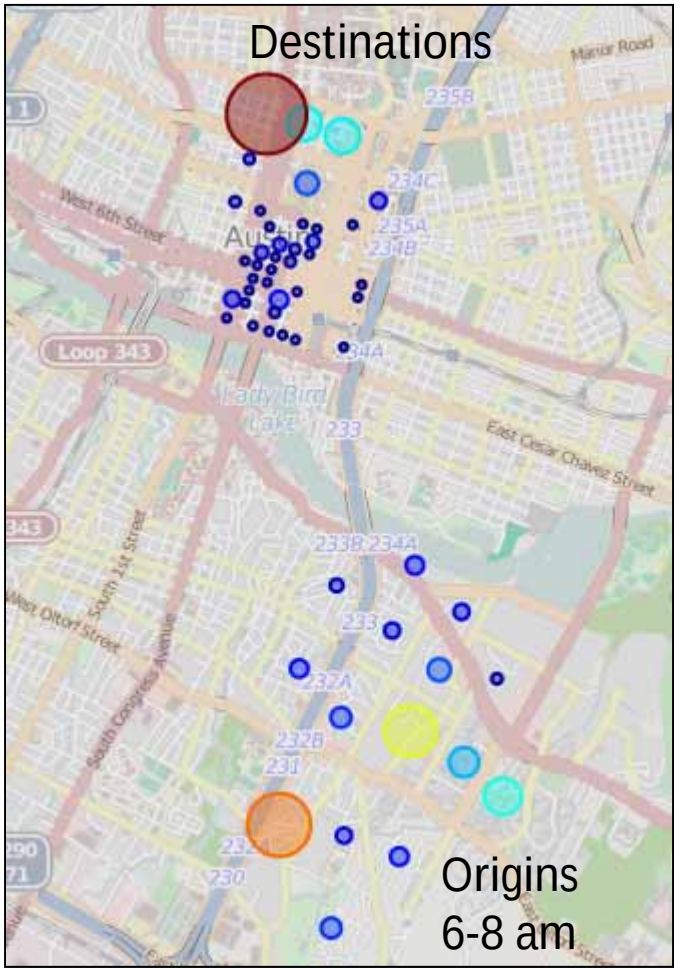
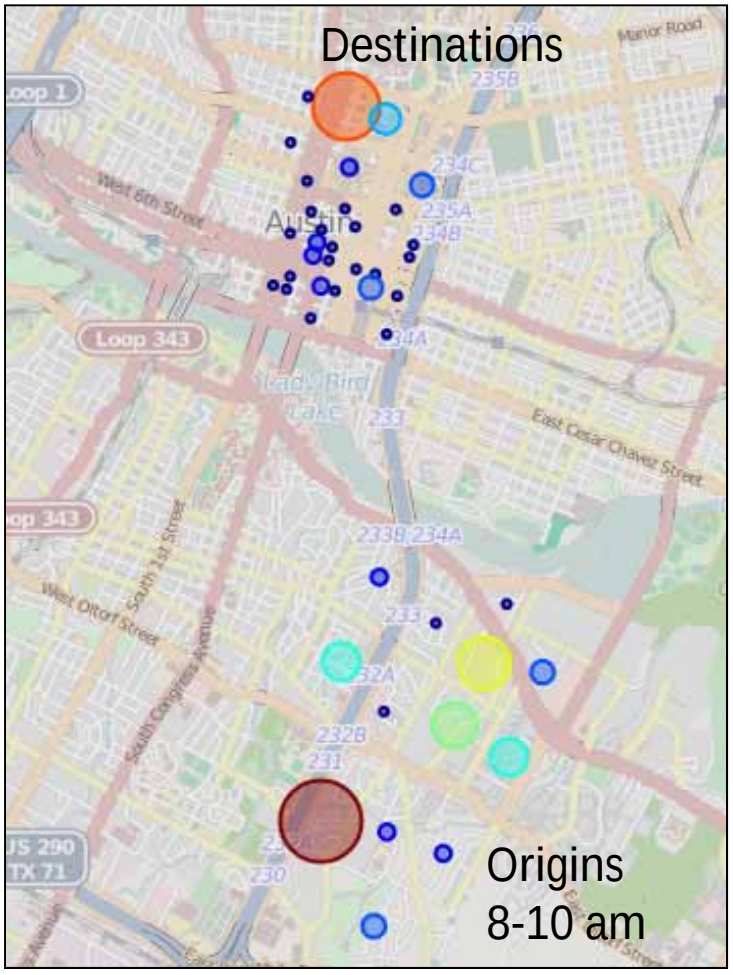
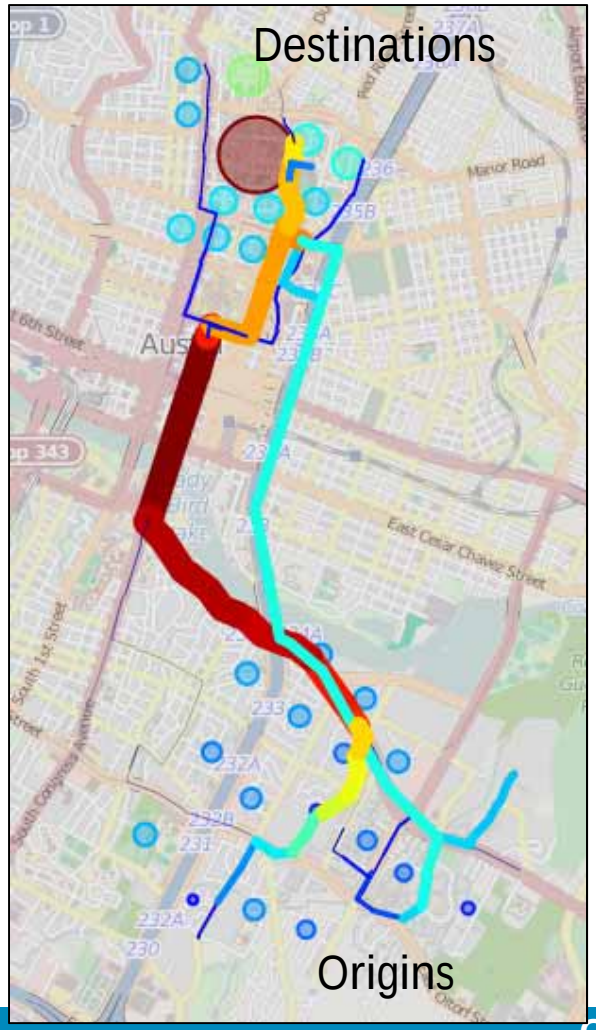
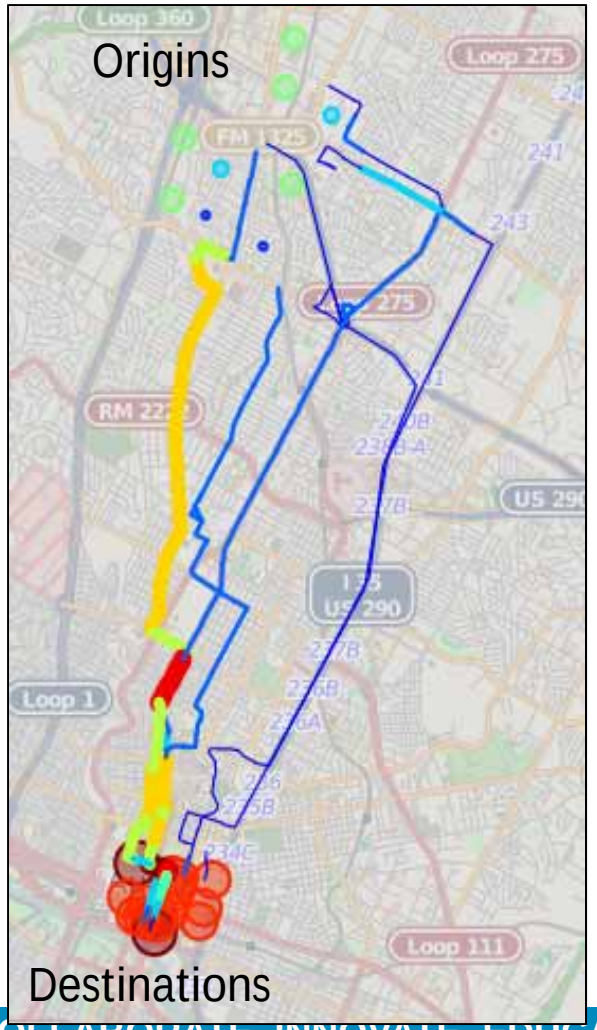
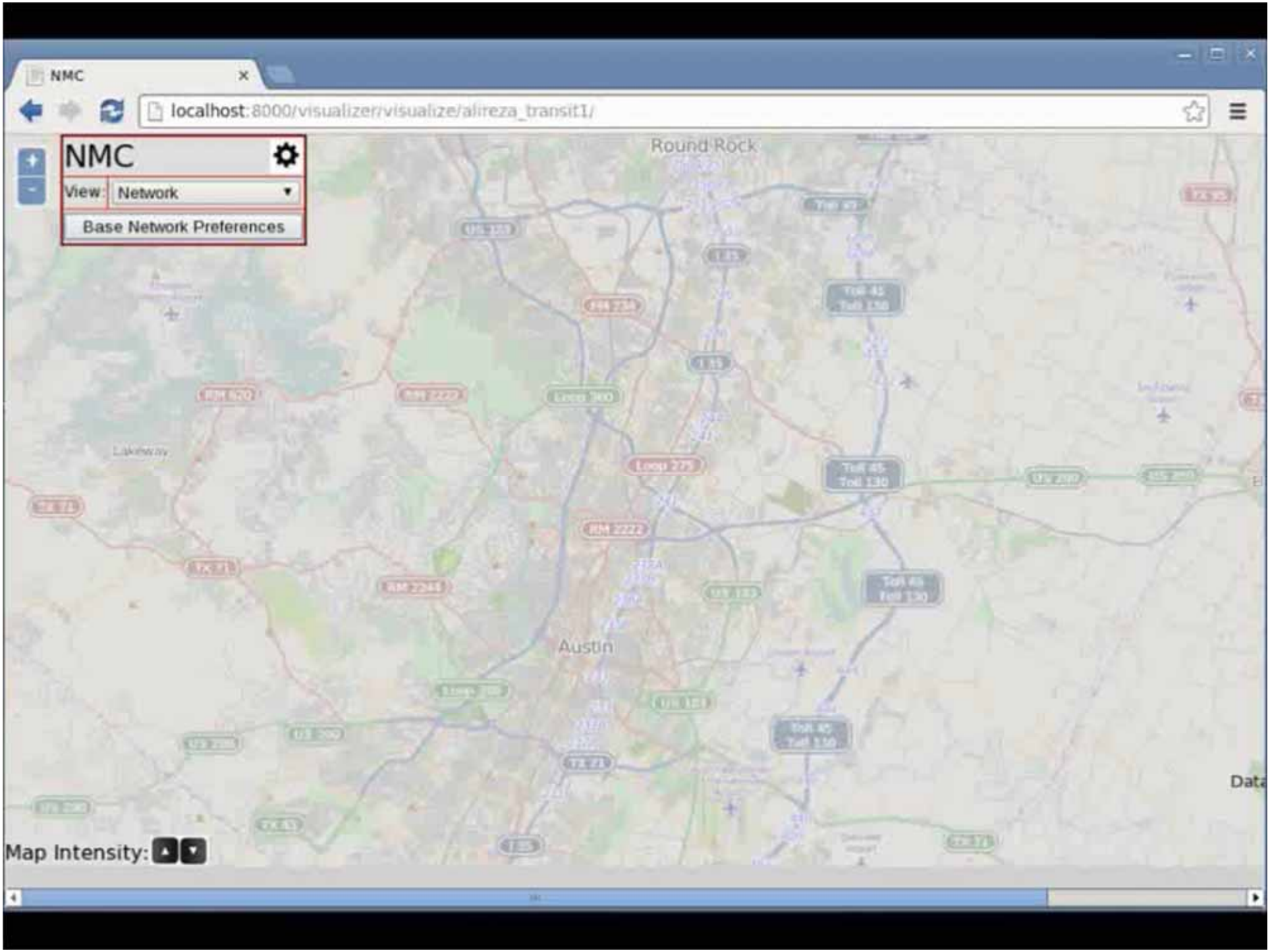




Transit Paths



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Thank You!

Questions?

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