

# The Schedule-Based transit model of the Chicago Metropolitan Area

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# Why Google Transit Feed?

- More than **445** cities covered **worldwide**
- More than **150** cities in **US**
- Google provides some open source tools which help reading and analyzing the GTF data



## How to get the Data?

- The data in GTF format is owned by the corresponding transit authority, not by Google and in many cases **openly available** on the web or by a request from the authority
- In the Chicago region data available for CTA and Metra



## Essential Tables 1/2

- **Stops** (id, name, x, y, zone, type, parent)
- **Routes** (id, name, type). Types:
  - **0** - Tram, Streetcar, Light rail. Any light rail or street level system within a metropolitan area.
  - **1** - Subway, Metro. Any underground rail system within a metropolitan area.
  - **2** - Rail. Used for intercity or long-distance travel.
  - **3** - Bus. Used for short- and long-distance bus routes.
  - **4** - Ferry. Used for short- and long-distance boat service.
  - **5** - Cable car. Used for street-level cable cars where the cable runs beneath the car.



## Essential Tables 2/2

- **Trips** (trip\_id, route\_id, service\_id)
- **Stop\_Times** (trip\_id, arrival\_time, departure\_time, top\_id)
- **Calendar** (service\_id, monday, tuesday, wednesday, thursday, friday, saturday, sunday, start\_date, end\_date)
- **Shapes** (id, x, y)

## Data Manipulations(1/2)

- For data manipulation purposes it can be loaded into a database (like sqlite) and then filtered using “SELECT” operator
- For the Chicago model we used python scripts to filter and clean up the data.
- Python *shputils* package can be used to convert the resulting tables into shape format for the visualization.

## Data Manipulations(1/2)

- Only “normal day” trips needs to be selected. The filtering should be done on Trips table using the Calendar table
- All of the “special occasion” trips needs to be filtered out.
- For the Chicago model the trip were considered to be a “normal” if the service was marked to be available on Tuesday and Wednesday.

Service file example:

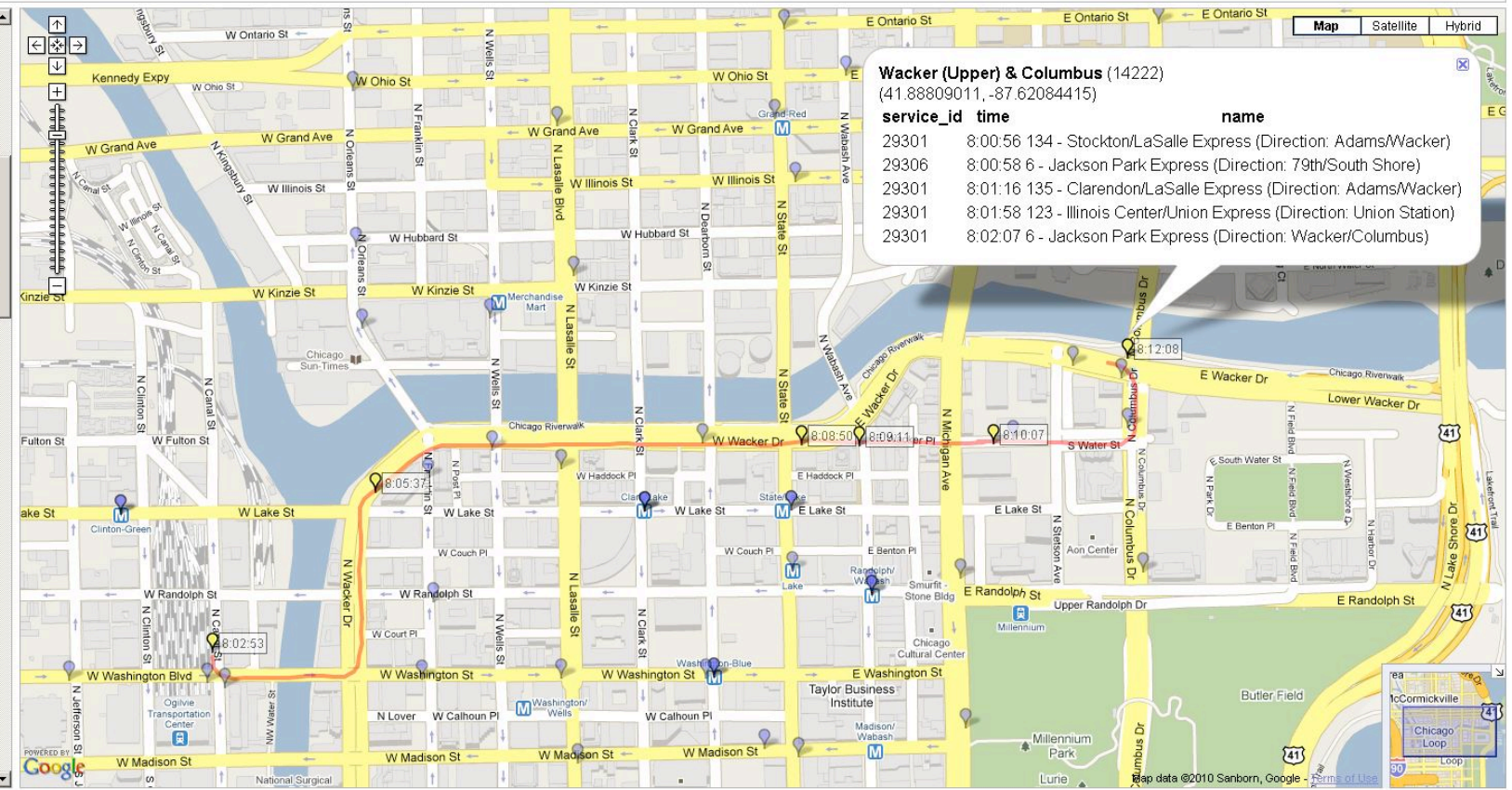
```
Id,mon,tue,wed,thu,fri,sat,sun,start_date,end_date  
29301,1,1,1,1,1,0,0,20090510,20090630
```



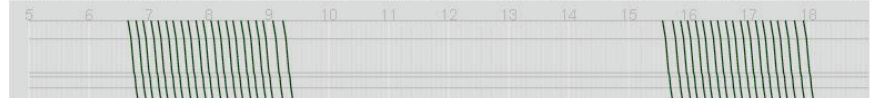
# Google Schedule Viewer

Chicago Transit Authority

- Yellow Line
- 1 Indiana-Hyde Park
- 10 Museum of S & I
- 100 Jeffery Manor Express
- 103 West 103rd
- 106 East 103rd
- 108 Halsted/95th
- 11 Lincoln/Sedgwick
- 111 Pullman/111th/115th
- 112 Vincennes/111th
- 119 Michigan/119th
- 12 Roosevelt
- 120 Ogilvie/Wacker Express
- 121 Union/Wacker Express
- 122 Illinois Center/Ogilvie Express
- Canal & Randolph/Washington to Wacker (Upper) & Columbus, 6 stops, 40 trips: ..... 8:02:53 8:09:53 8:17:53 .....
- Wacker (Upper) & Columbus to Canal & Randolph/Washington, 8 stops, 40 trips: ..... 8:03:58 8:11:58 8:18:58 .....
- 123 Illinois Center/Union Express
- 124 Navy Pier
- 125 Water Tower Express
- 126 Jackson
- 129 West Loop/South Loop
- 132 Goose Island Express
- 134 Stockton/LaSalle Express
- 135 Clarendon/LaSalle Express
- 136 Sheridan/LaSalle Express
- 14 Jeffery Express
- 143 Stockton/Michigan Express
- 144 Marine/Michigan Express
- 145 Wilson/Michigan Express
- 146 Inner Drive/Michigan Express
- 147 Outer Drive Express
- 148 Clarendon Michigan Express
- 15 Jeffery Local
- 151 Sheridan
- 152 Addison
- 165 Devon

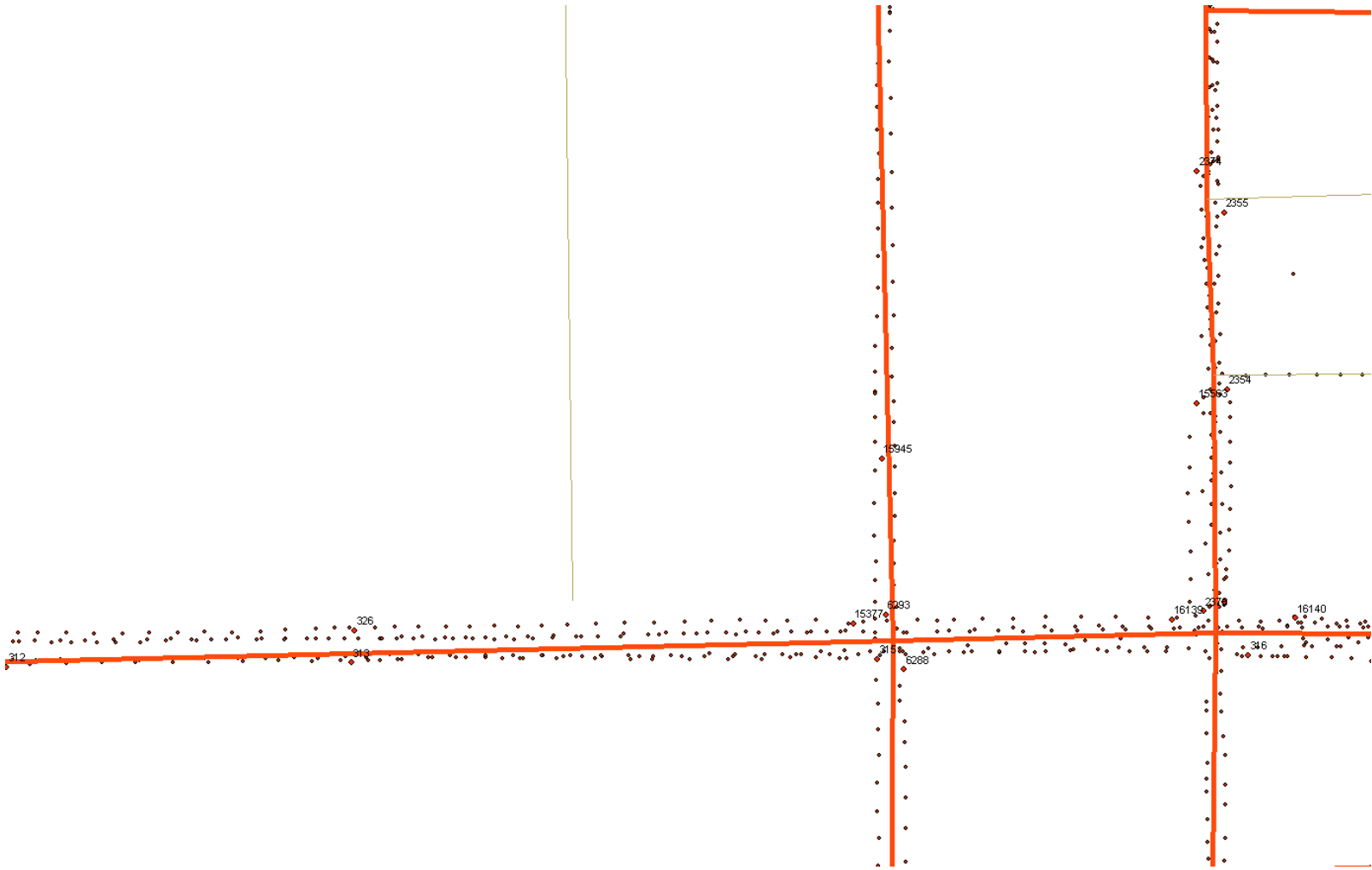


trips.txt block\_id=3973288 route\_id=122 direction\_id=1 service\_id=29301 shape\_id=2932361 trip\_id=33126557  
 routes.txt route\_long\_name=Illinois Center/Ogilvie Express route\_type=3 route\_text\_color= route\_color= route\_id=122 route\_url=http://www.transitchicago.com/riding\_cta/busroute.aspx?RouteId=273 route\_short\_name=122

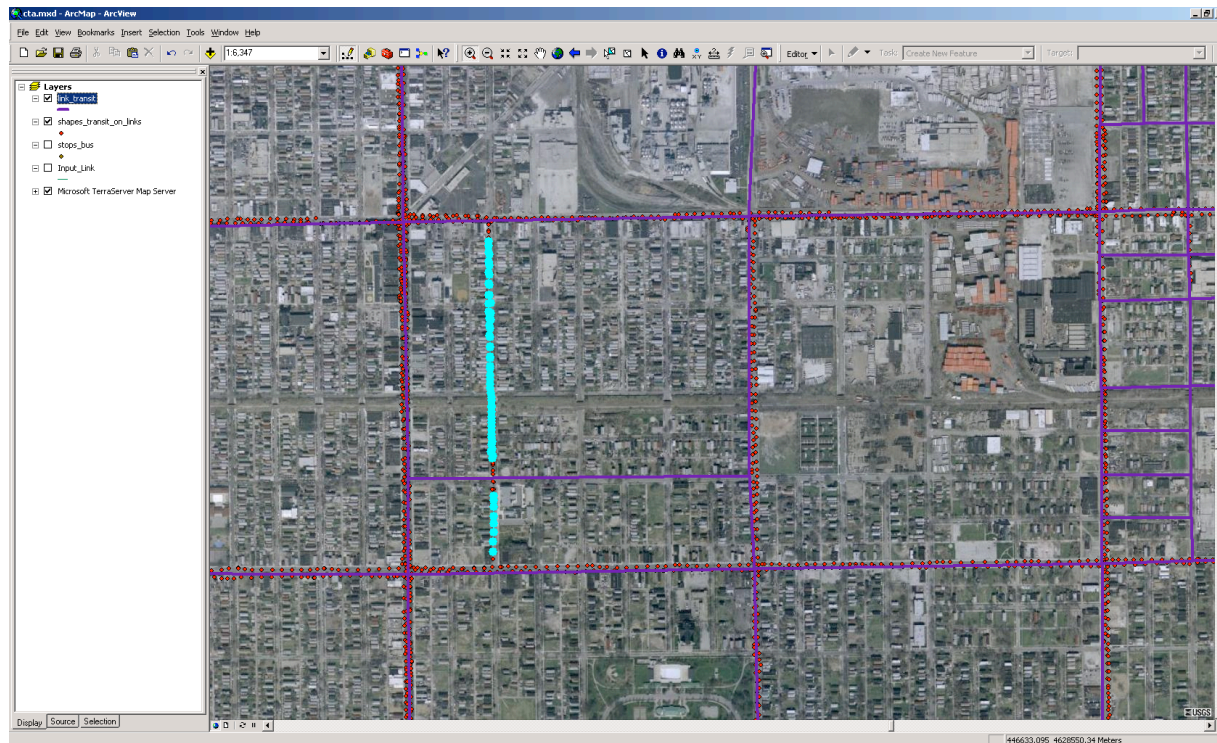
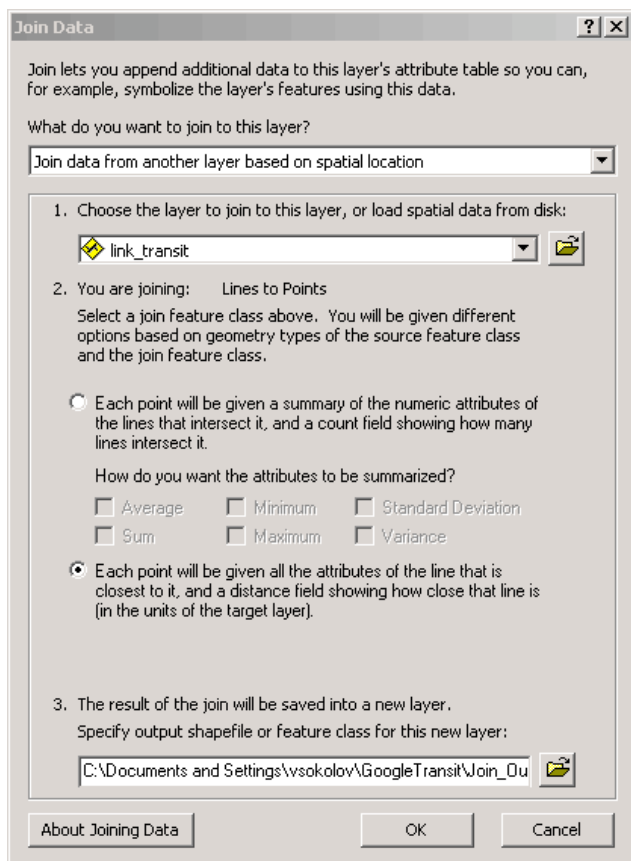




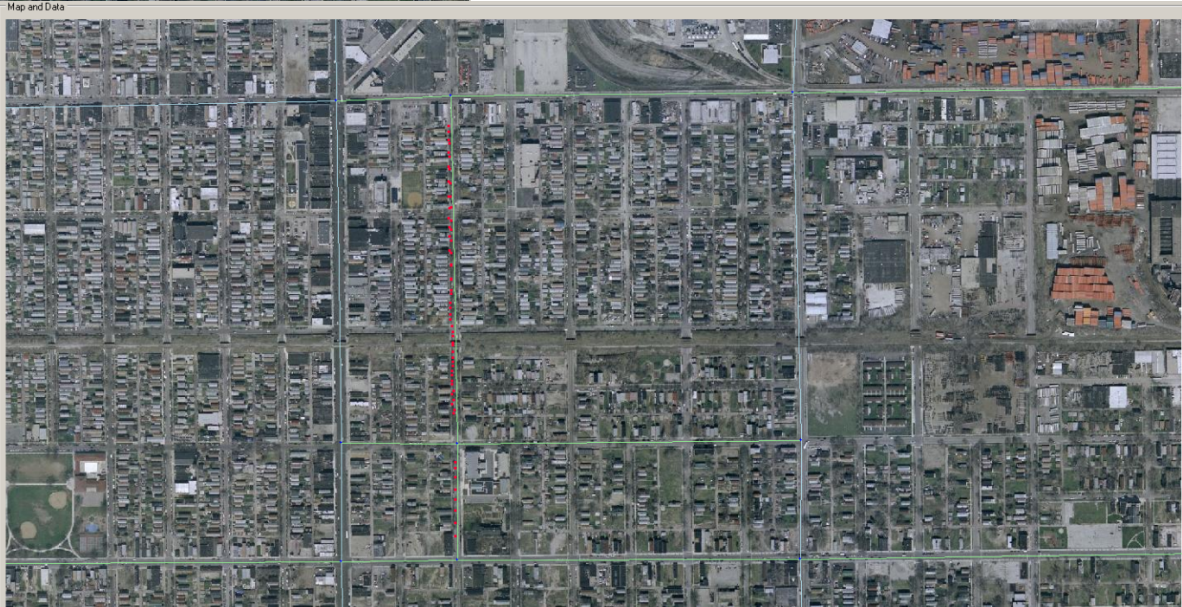
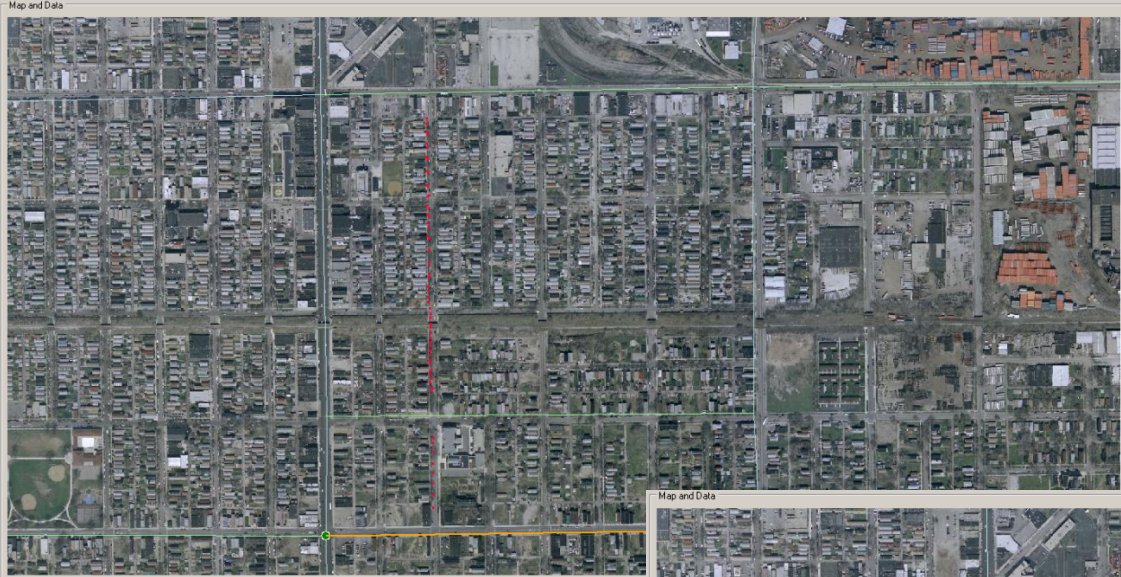
# GPS Trace (Shapes)



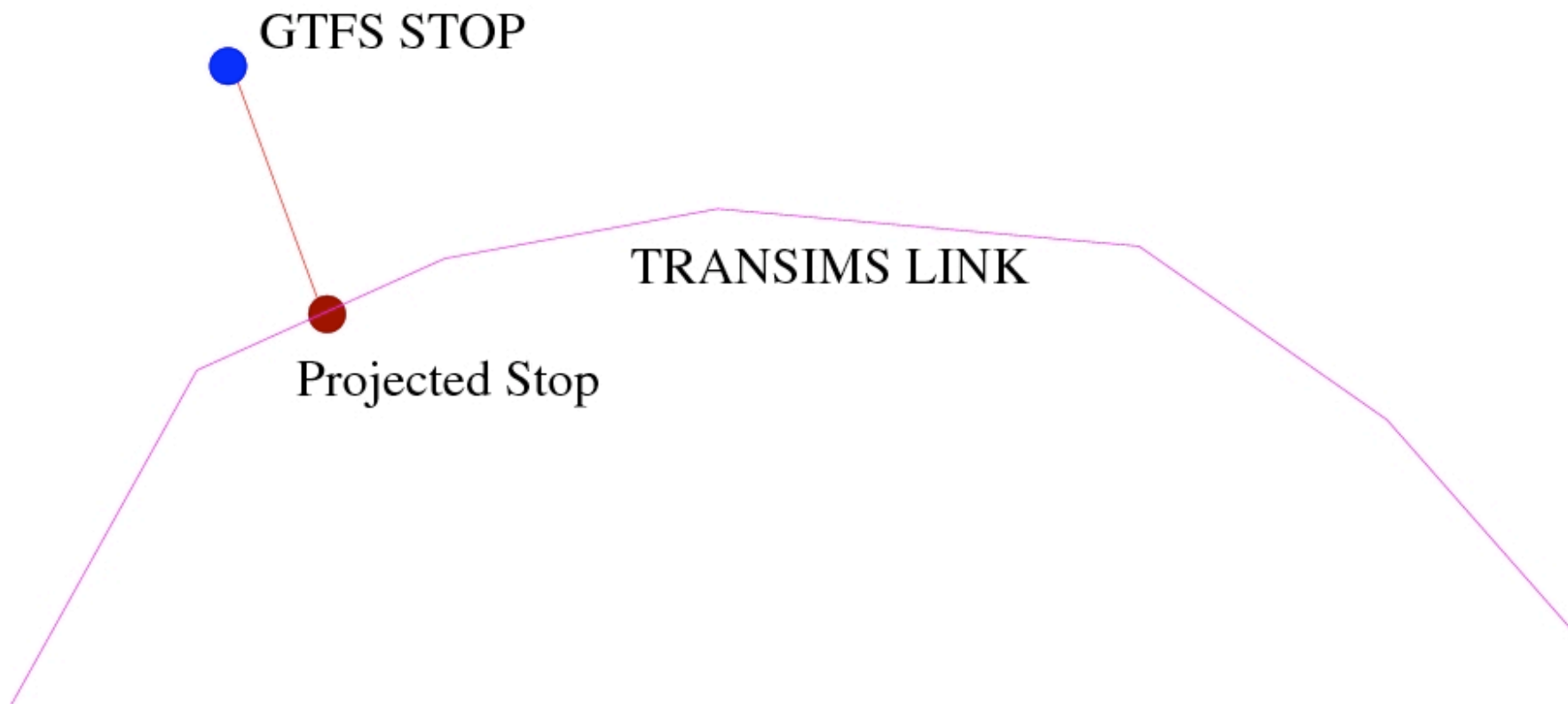
# Matching GTF Data to the TRANSIMS Network



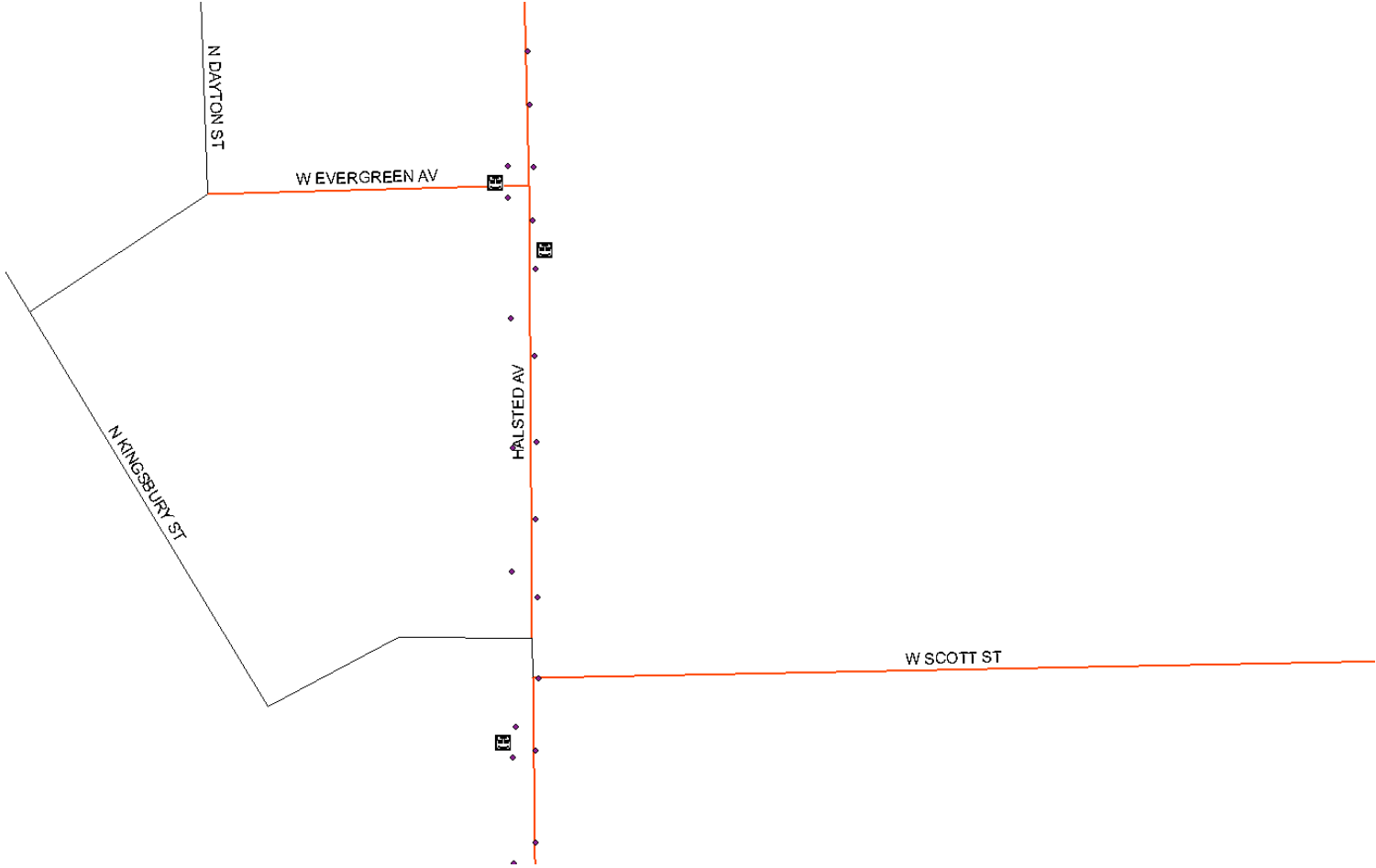
# Network Adjustment



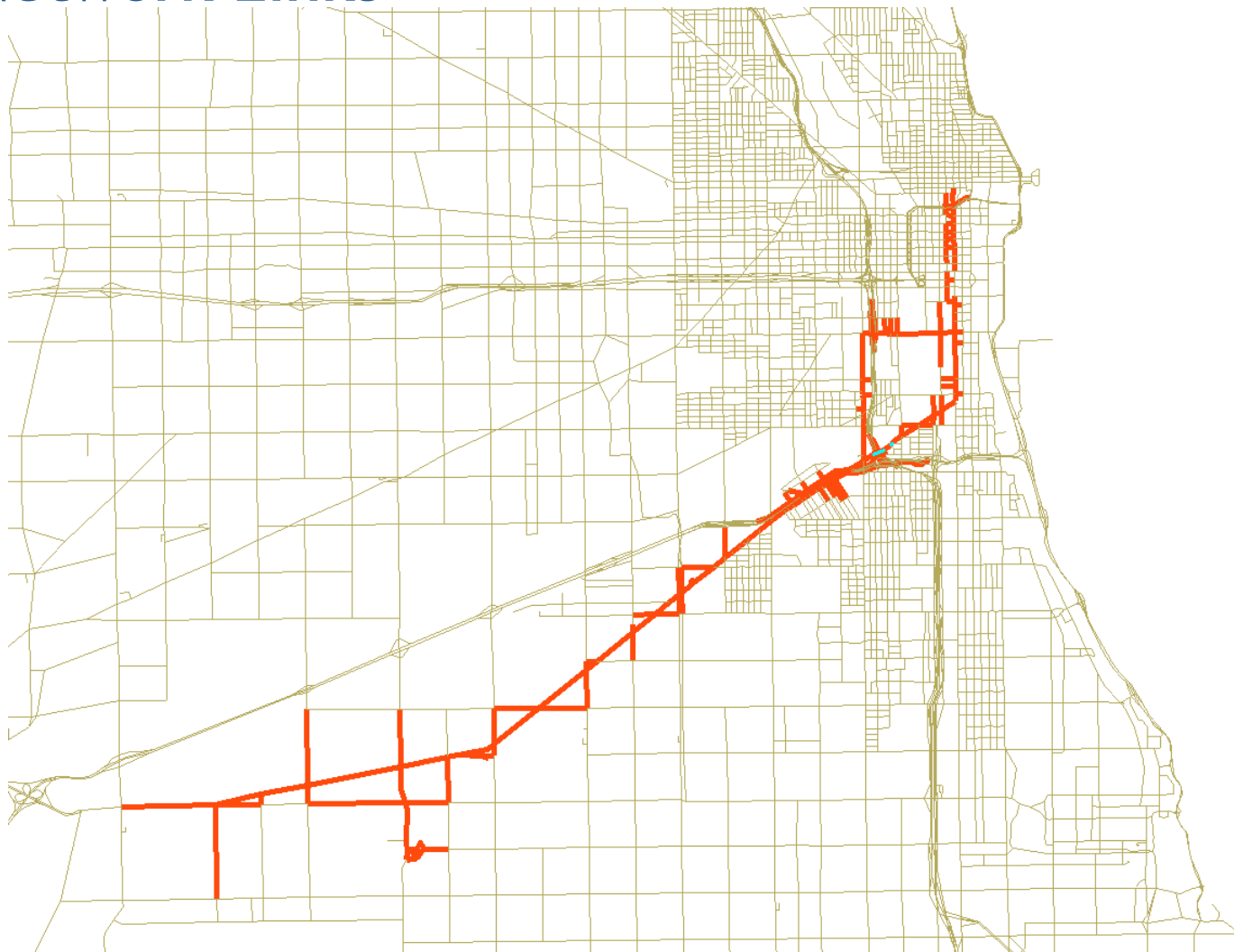
# Stop Projections



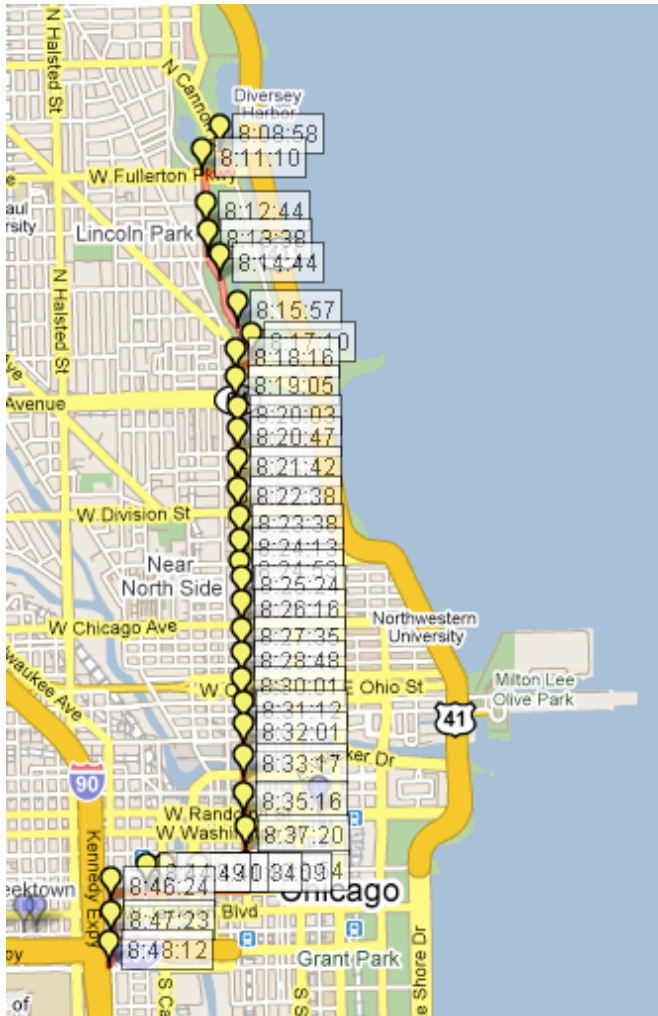
# Potential Problems - Broken Path



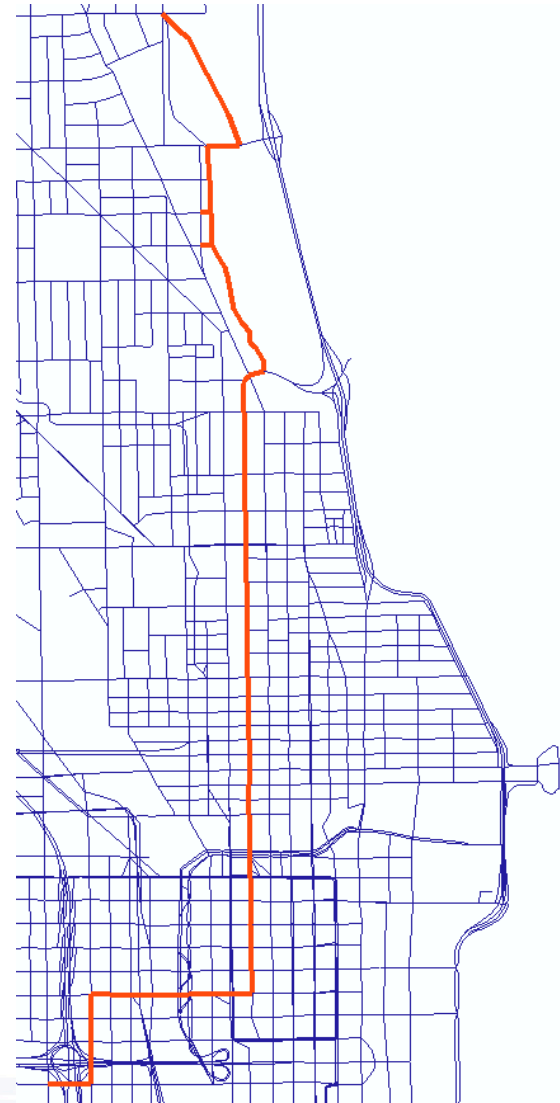
# Potential Problems - Matching GPS Traces to the Network Links



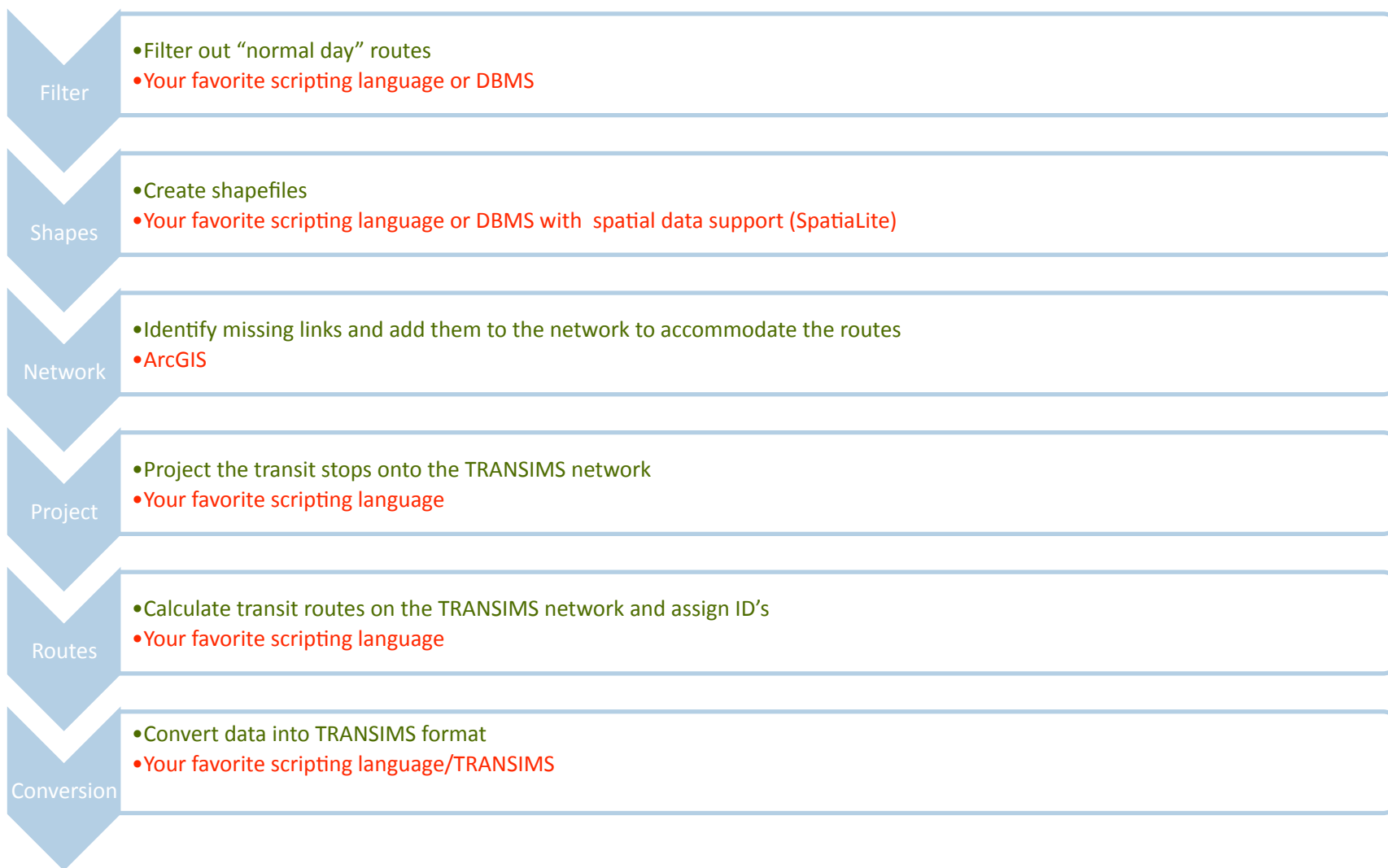
# Converted Route



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# Steps and Tools Overview





# References

- **Schedule-based dynamic transit modeling: theory and applications**, edited by: Nigel H. M. Wilson, Agostino Nuzzolo, Kluwer, 2004
- **A Doubly Dynamic Schedule-based Assignment Model for Transit Networks**, Agostino Nuzzolo, Francesco Russo, Umberto Crisalli, *TRANSPORTATION SCIENCE* Vol. 35, No. 3, August 2001, pp. 268-285
- **A stochastic transit assignment model using a dynamic schedule-based network**, C.O. Tong and S.C. Wong, *Transportation Research Part B: Methodological*, Volume 33, Issue 2, April 1998, Pages 107-121
- **General Transit Feed Specification** by Google at [http://code.google.com/transit/spec/transit\\_feed\\_specification.html](http://code.google.com/transit/spec/transit_feed_specification.html)