MBTA ORIGIN DESTINATION TRANSFER VISUALIZATION TOOL

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Office of Performance Management and Innovation

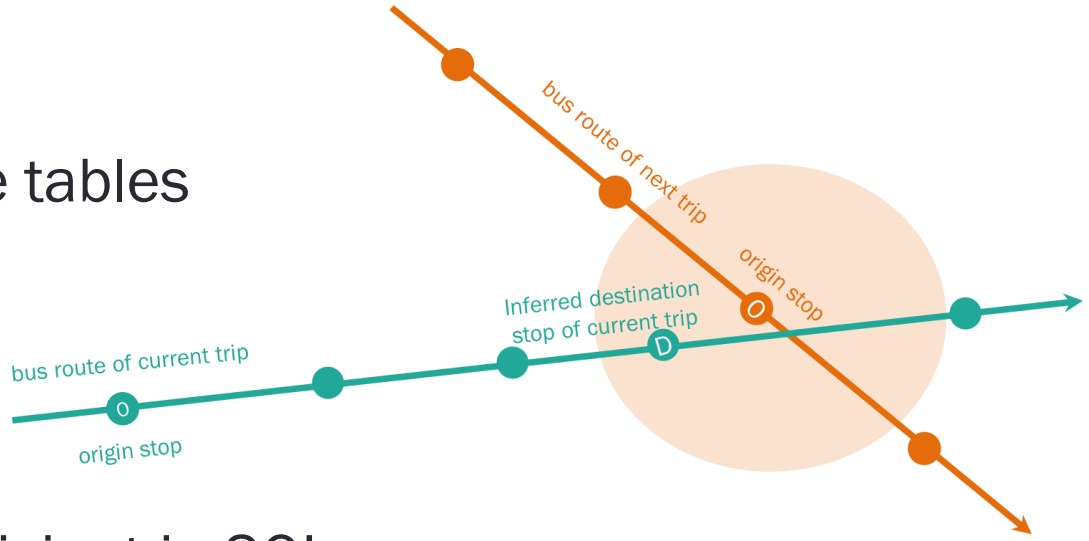
MBTA | MassDOT

Overview

- Office of Performance Management and Innovation
  - Develop and track performance focusing on data analysis to improve customer experience
  - Implement pilot programs and innovative tools to support strategic initiatives
- Origin Destination Transfer (ODX) Visualization Tool
  - Allows service planners or researchers to quickly visualize origin-destination passenger data
    - Understand travel patterns
    - Analyze the impact of service or policy changes

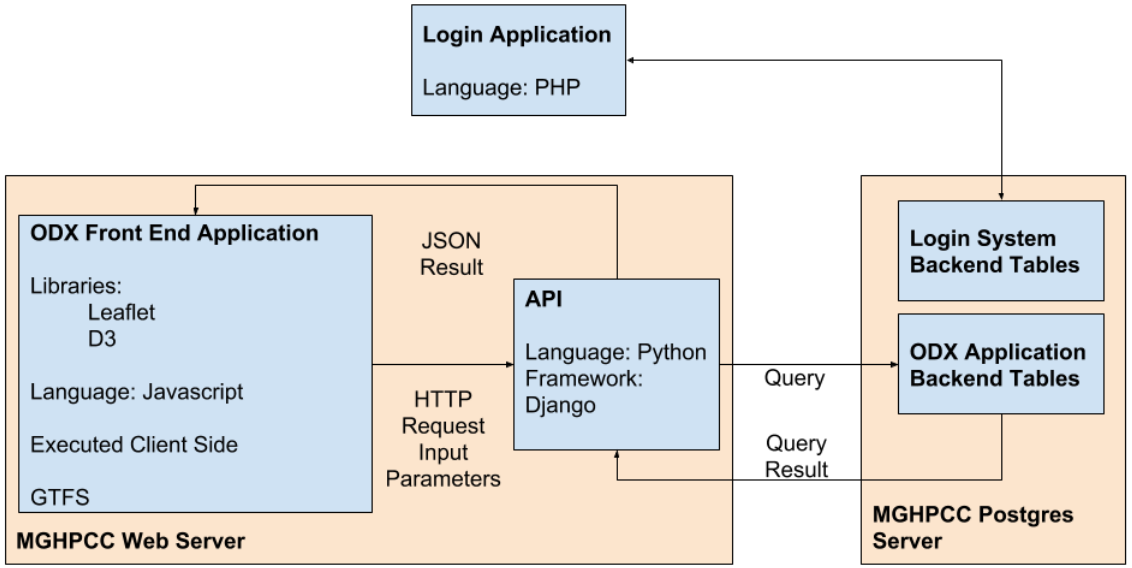
Background – ODX Data

- Collaborating with MIT, MBTA has calculated and stored ODX data since 2014
  - Calculated by an algorithm that tracks fare data over the course of each day
  - Combined with vehicle location data
  - Infers origins, destinations, and transfers
- Stored in research database in disaggregate tables
  - Can be queried and aggregated to:
    - Analyze impacts of proposed or past service changes
    - Evaluate policy changes and pilot programs
    - Describe typical travel behavior
- Previously only available to researchers proficient in SQL

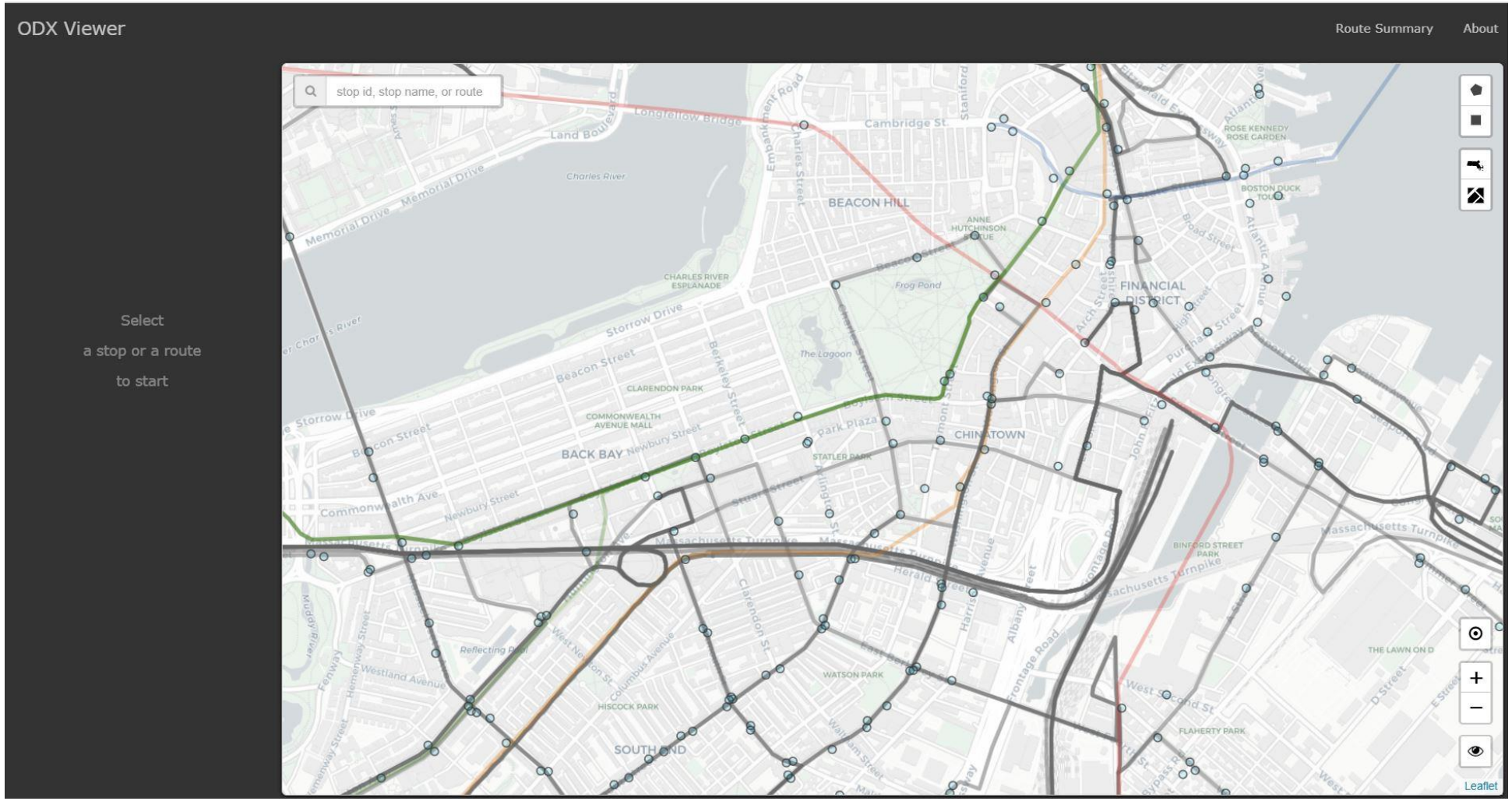


Design Process

- Goal: provide quick and easy access to ODX data without the need to query the database
- Process:
  - Gather use cases and requirements
  - Develop mock ups and wire frames
  - Test and iterate
- Service planners have access to a variety of datasets and tools, try to fill gaps
  - Transfer activity
  - Final destination for multi-leg journeys
  - Fare products used
- MBTA's rich GTFS dataset + talented our intern + Leafleft + D3

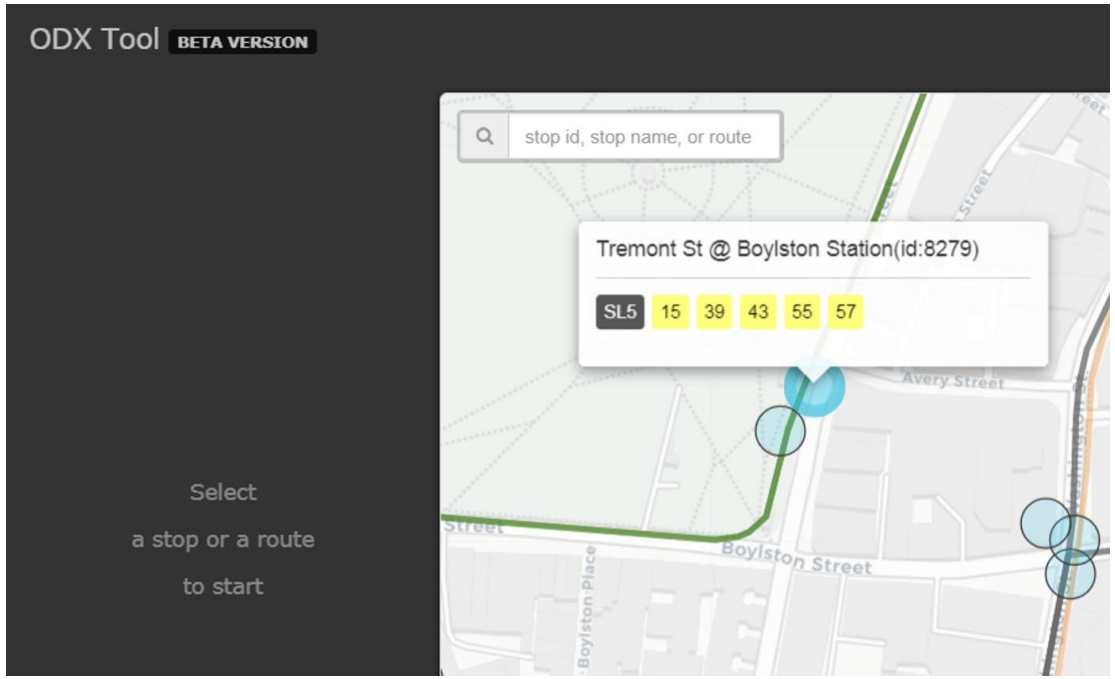


Visualization Tool

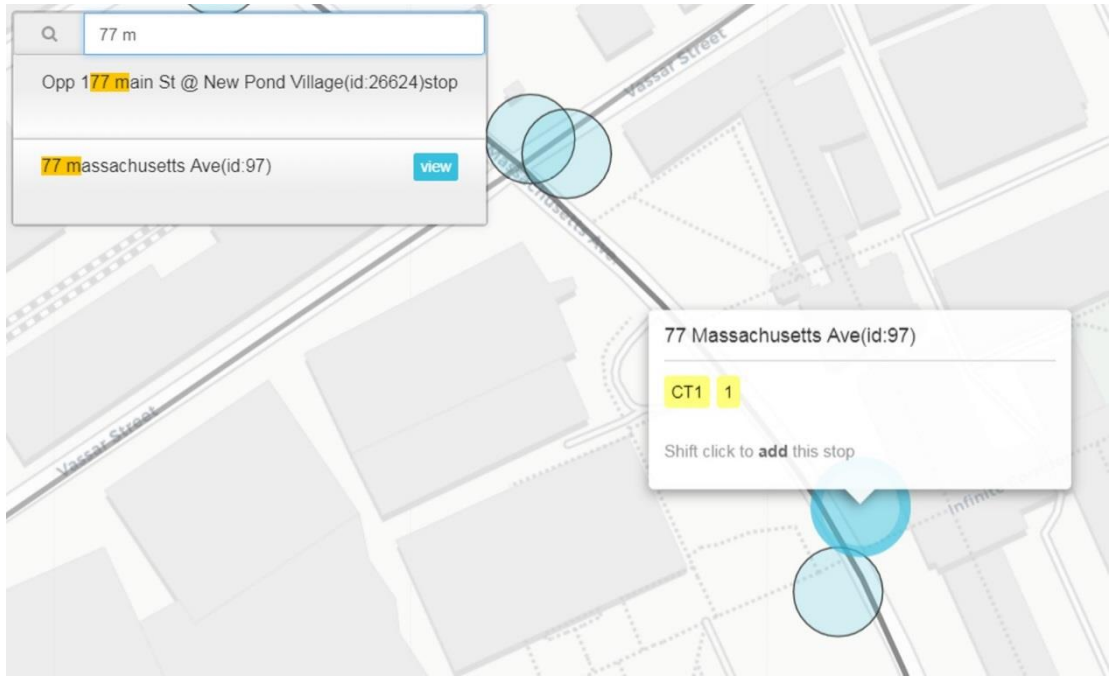


Selection

Select Stop(s)



Search for Stop(s)



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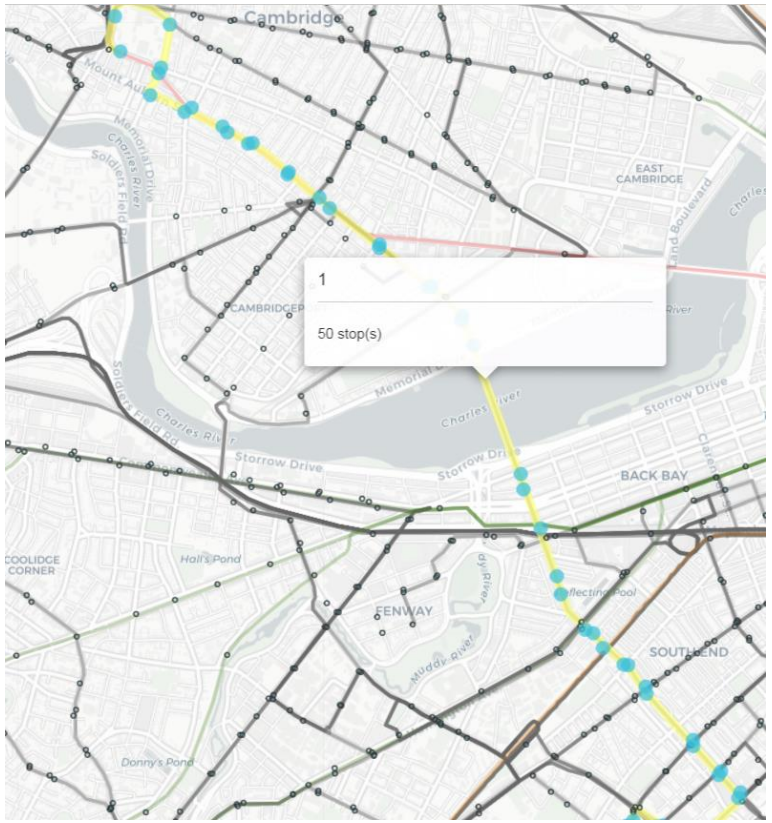
Selection

Select Routes



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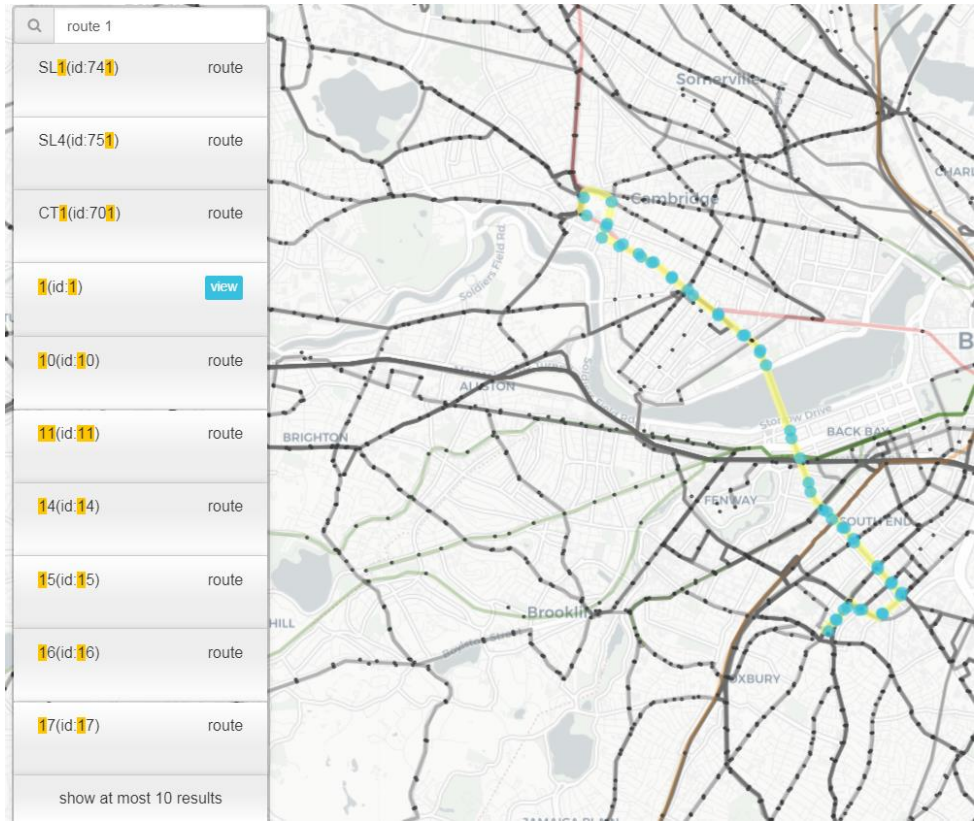

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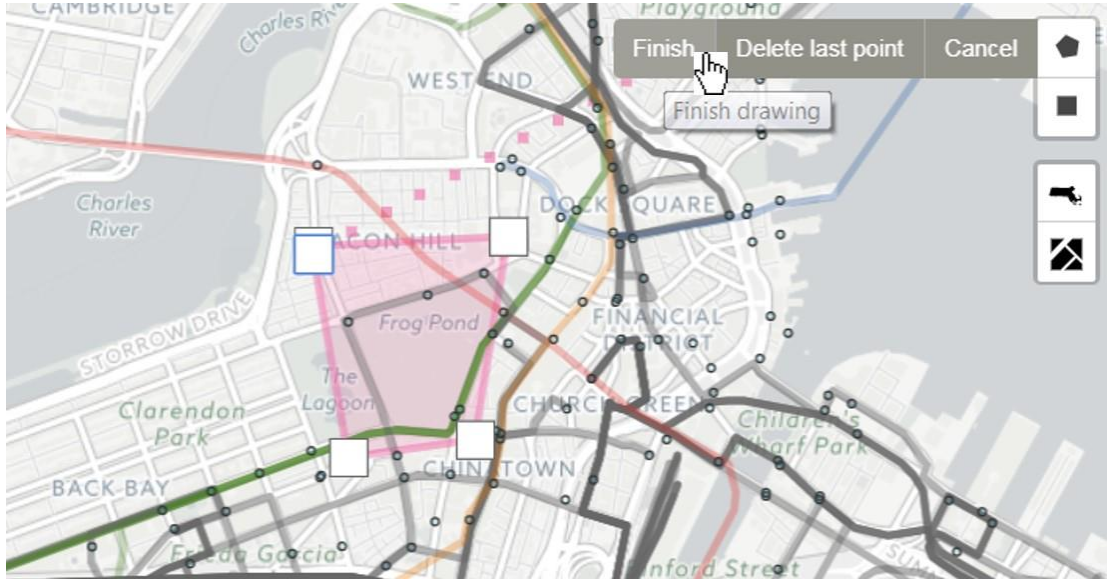
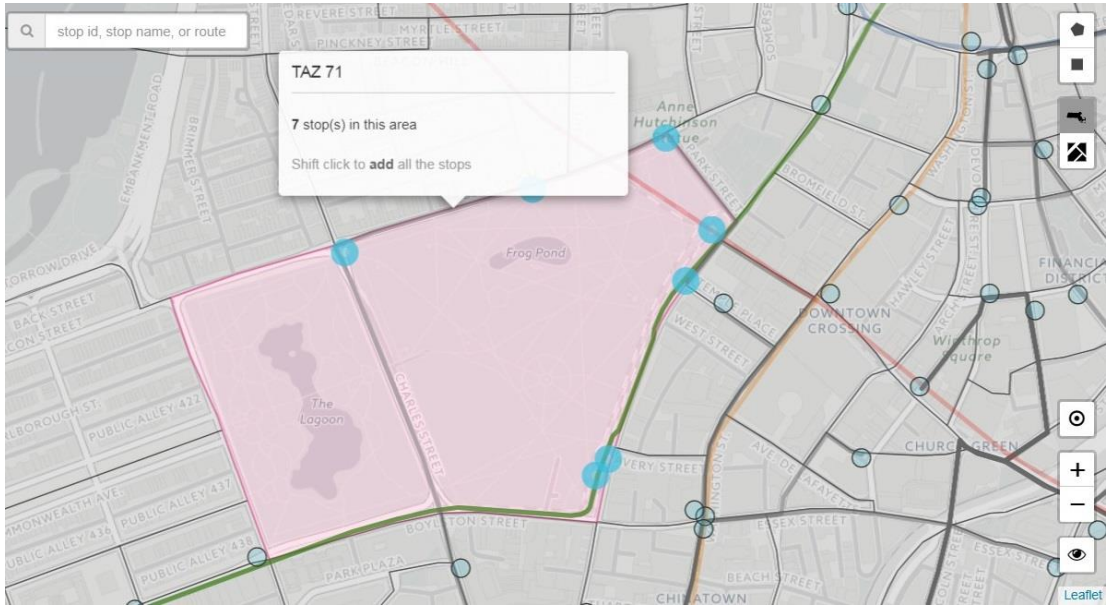
Selection

Draw Polygon/Rectangle



Select by TAZ



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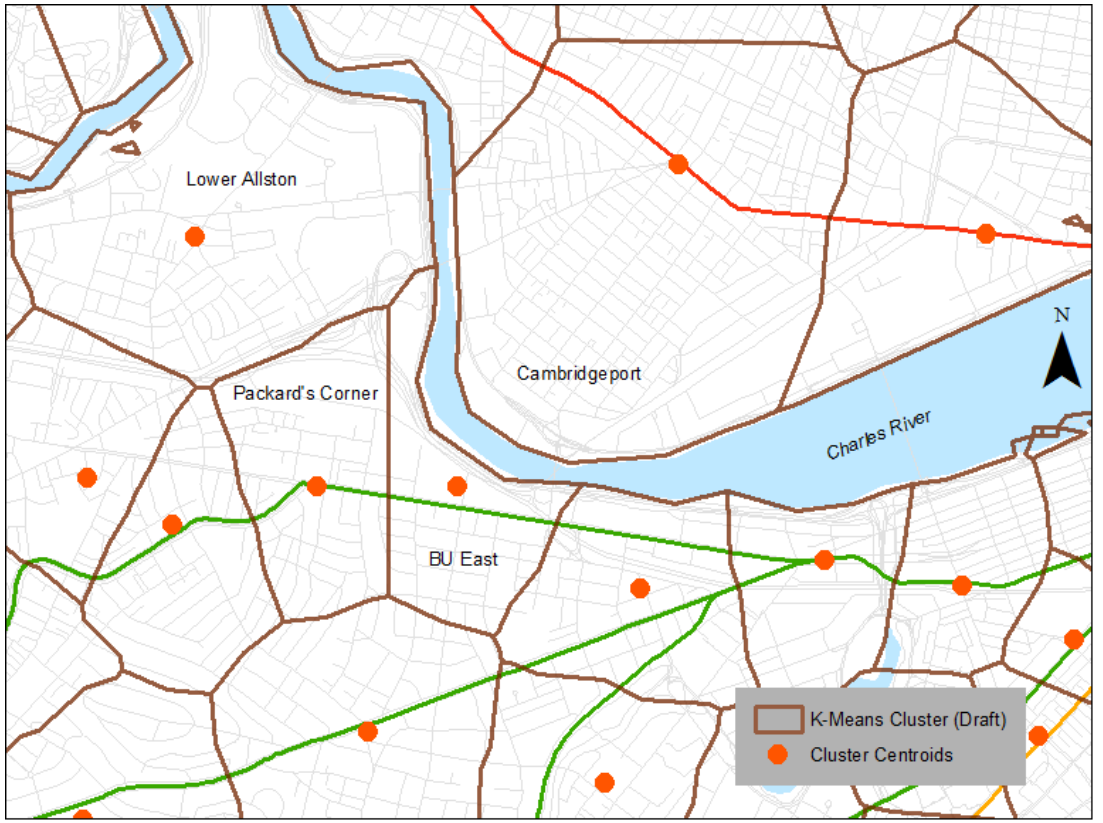
Clusters

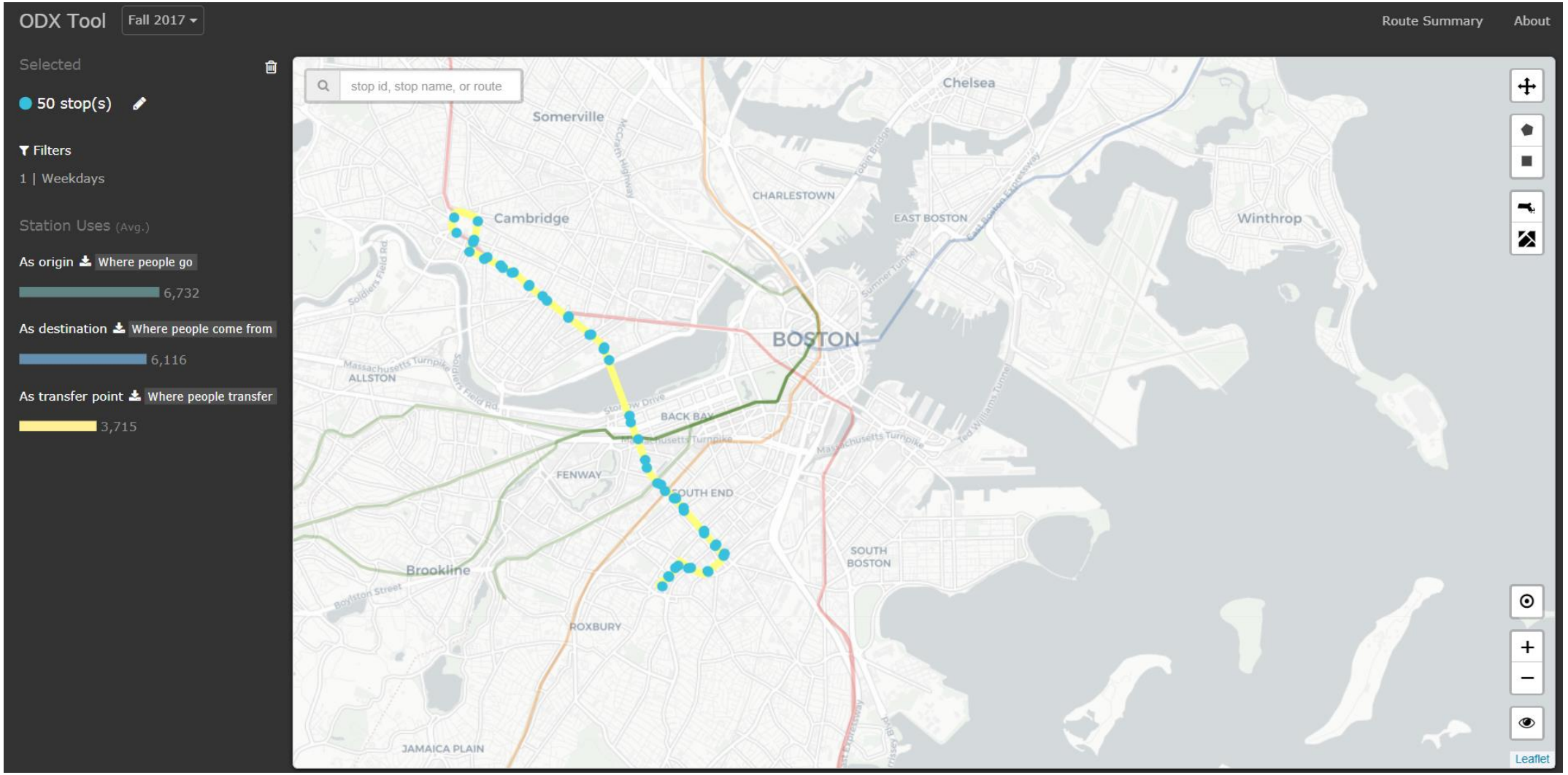
Cluster Creation

- TAZ boundaries are typically on major streets making assignment of stops to TAZs difficult
- Custom geographic clusters were created using:
  - K-means algorithm to determine ideal centroid locations based on scheduled frequency of service
  - Arcmap cost-benefit geoprocessing tools to create corresponding polygons

Example Clusters



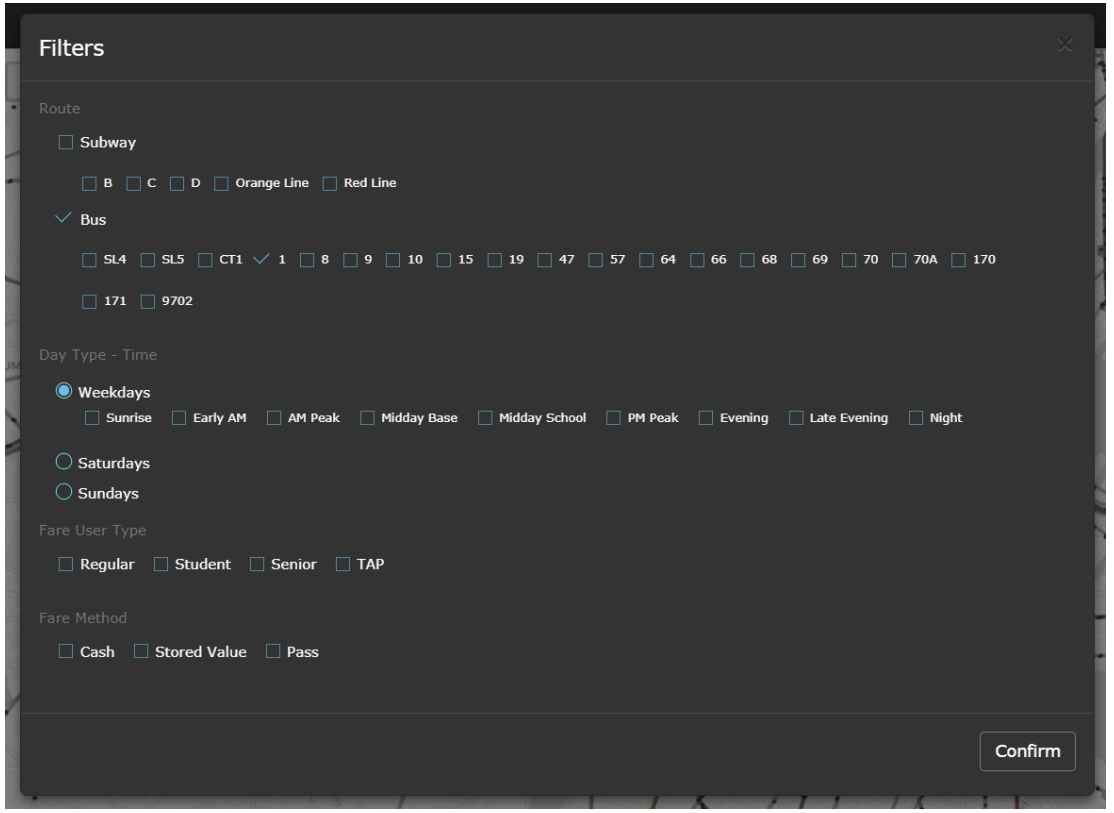
Results


ODX Tool
Fall 2017
Route Summary
About
Selected
50 stop(s)
Filters
1 | Weekdays
Station Uses (Avg.)
As origin
Where people go
6,732
As destination
Where people come from
6,116
As transfer point
Where people transfer
3,715
stop id, stop name, or route
Somerville
Chelsea
Cambridge
CHARLESTOWN
EAST BOSTON
Winthrop
BOSTON
ALLSTON
BACK BAY
FENWAY
SOUTH END
SOUTH BOSTON
Brookline
ROXBURY
JAMAICA PLAIN
Leaflet

Results

Summary

Filters



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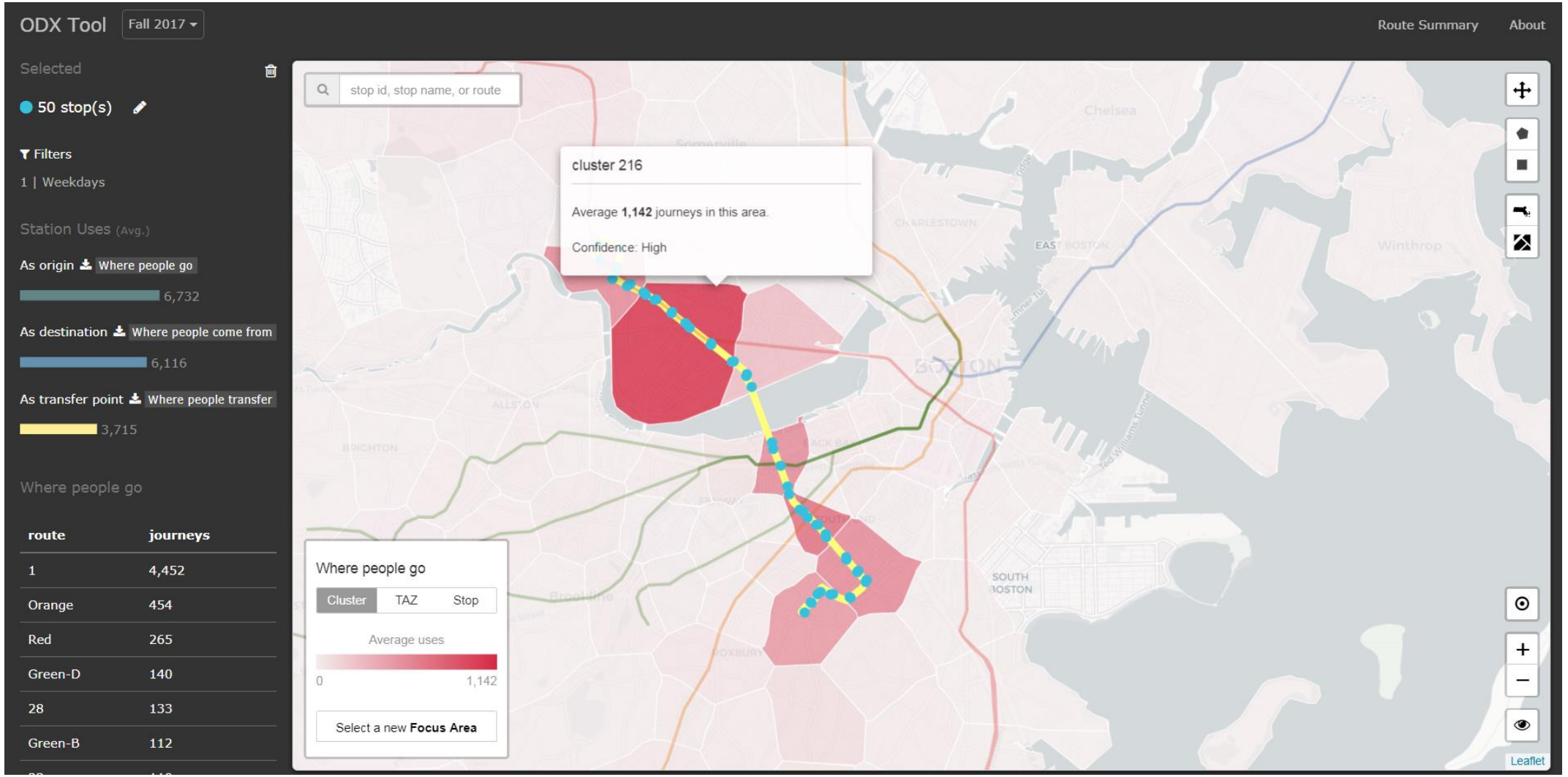
Results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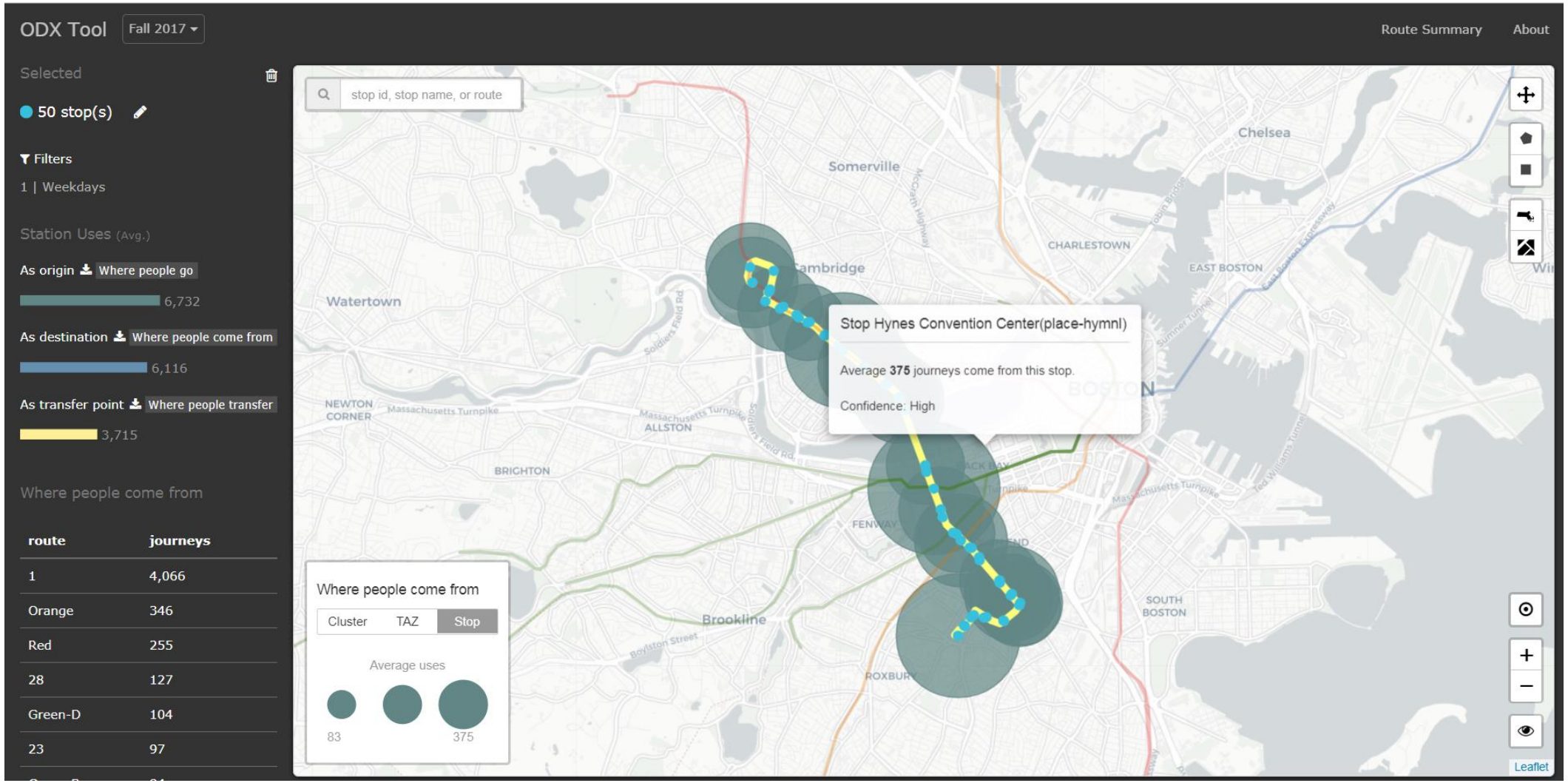
route
journeys
1
4,452
Orange
454
Red
265
Green-D
140
28
133
Green-B
112
stop id, stop name, or route
cluster 216
Average 1,142 journeys in this area.
Confidence: High
Where people go
Cluster
TAZ
Stop
Average uses
0
1,142
Select a new Focus Area
Leaflet

Results



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Next Steps

- Current only Fall 2017 ODX Data is included in the Beta version of the tool
- Update with more ratings (seasons) and allow users to see changes over time
- Incorporate more exploration options
  - Find highest cash payment locations
  - Find locations with most student/senior/TAP fares paid
  - Find journey O-Ds with highest travel times/number of transfers