

Microsoft Maps Logistic APIs

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Microsoft Enterprise Maps

The Contoso Cookie Company



The Contoso Cookie Company

Contoso Cookie Factory founded in 1924

- 332 Store locations
- 1 Factory, soon a second will be opened
- Home delivery started in 2019
- 10 Cookies & Milk trucks

Challenges

- How do we optimize the deliveries from the factory to the store?
- What is the best route for our semi-trucks in the city?
- Or home delivery takes too much time and is suboptimal.
- We like to target only local customers.



Truck Routing



What is the best route for our trucks in the city?

Navigating a semi-truck is challenging

- Low or narrow bridges / Tunnels
- Tight turns
- Steep gradient
- Cargo / Regulator restrictions
- Road closures
- Strong crosswinds
- Traffic conditions



Truck Routing API

Optimized Routing for Commercial Vehicles

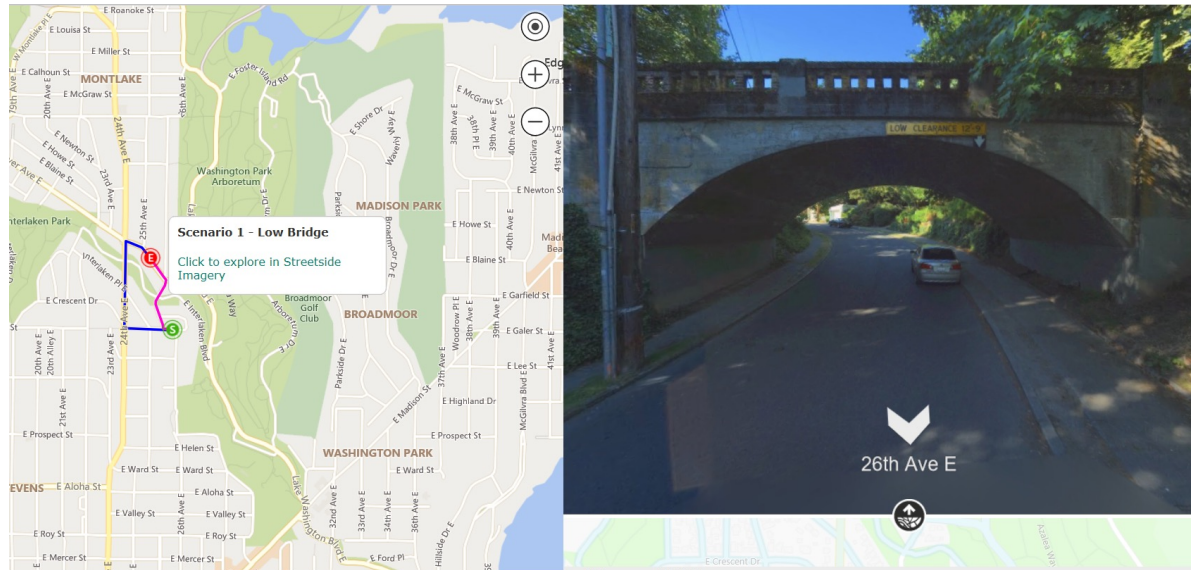
- Extension to our existing routing APIs
- Calculates the route between waypoints (from point A to point B), supporting up to 25 waypoints per call
- Vehicle's height, width, length and weight
- Number of axles
- Number of trailers
- Maximum gradient
- Turn radius
- Avoid tolls, highways, border crossing
- Avoid cross winds and grounding risk
- Transportation of hazardous materials
- Hazardous permits
- Historic traffic data
- Speed limitations



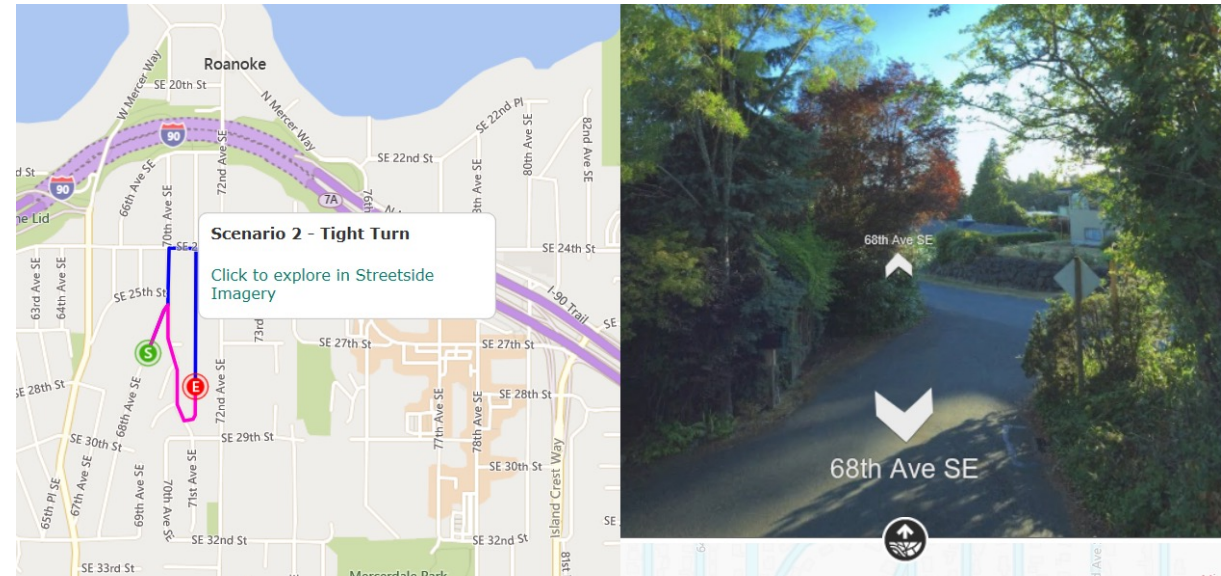
Common Restrictions

Designed for professional transportation routing logistics, the Truck Routing API calculates routes that take into consideration the attributes for commercial vehicles along with common restrictions.

Low Bridges



Sharp Turns

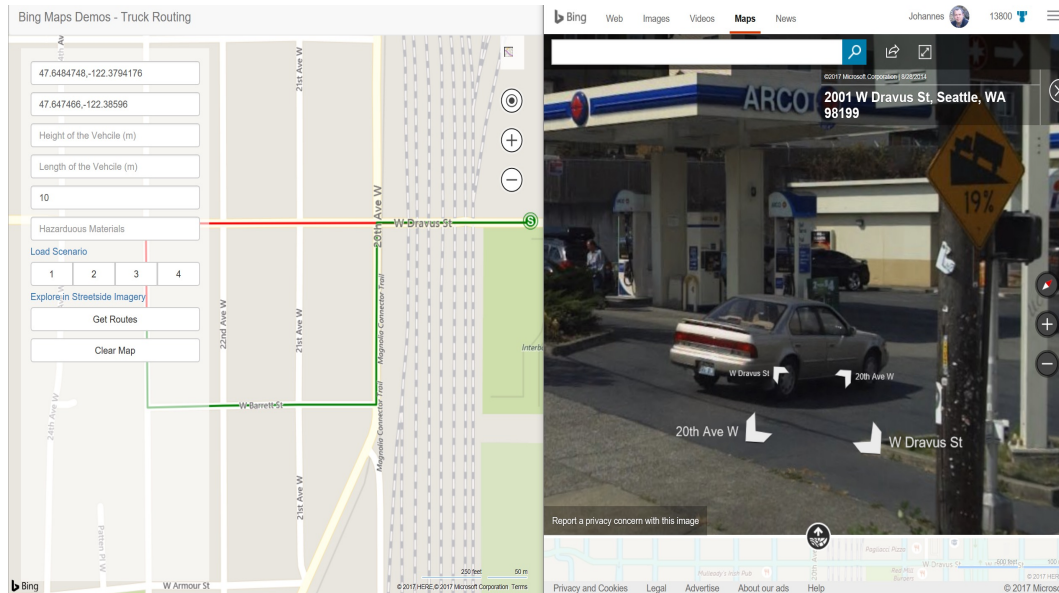


Blue line represents commercial vehicle/truck route
Red line represents car route

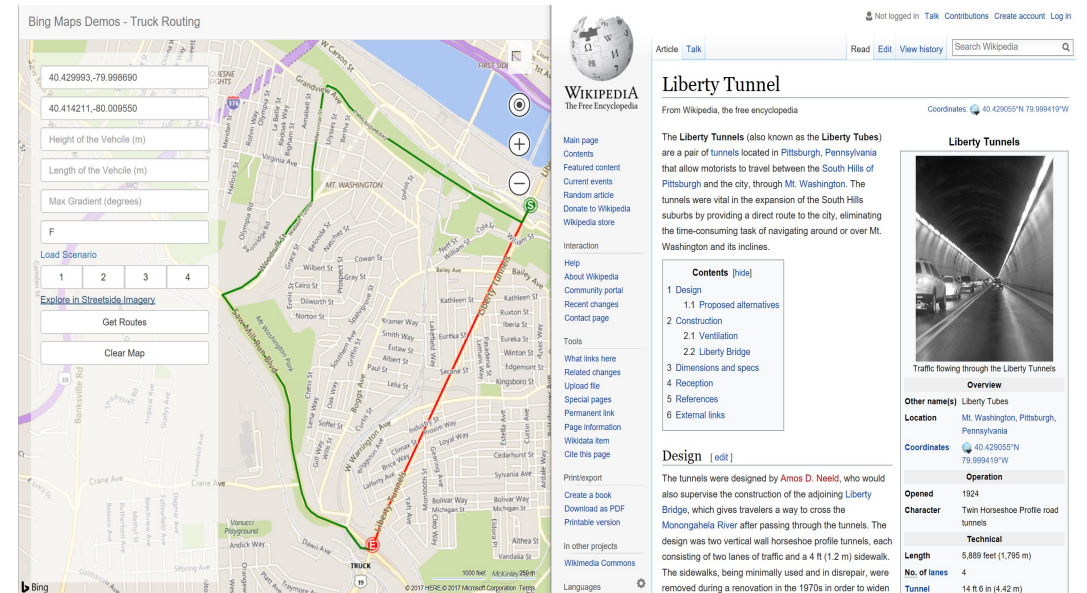
Common Restrictions cont.

There are many restrictions for commercial vehicles, particularly based upon their cargo. Speed limits are different, an underpass may be too low, a bridge may not support its weight, the turning radius might be too small, an incline too high, etc.

Steep Gradients



Flammable Cargo



Green line represents commercial vehicle/truck route
Red line represents car route

Next-level routing logistics

A commercial routing tool that calculates routes optimized for trucks and other commercial vehicles.

Truck Routing Demo

Click the sample scenarios to see a route calculated for a truck based on predefined truck attributes. See why the truck route is different from a route calculated for a car by clicking on "Explore in Streetside Imagery"

Click to Load Scenario

LOW BRIDGE TIGHT TURN

STEEP GRADIENT

FLAMMABLE CARGO

GET ROUTES

CLEAR MAP

Explore in Streetside Imagery

Truck Attributes

Start Location	End Location
<input type="text"/>	<input type="text"/>
Vehicle Height (m)	Vehicle Length (m)
<input type="text"/>	<input type="text"/>
Max Gradient (degrees)	Hazardous Materials
<input type="text"/>	<input type="text"/>

Microsoft Bing

The map displays a truck route (purple line) starting in Seattle and ending in Issaquah. The route is optimized for trucks, avoiding low bridges and tight turns. Key locations shown include Seattle, Kirkland, Redmond, Bellevue, and Issaquah. The route follows major highways like I-5, I-90, and SR-520. A legend in the bottom right corner shows a road icon.

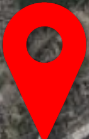
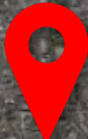
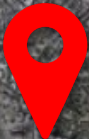
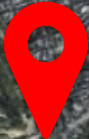
GET STARTED NOW

Optimized Routing for Professional Transportation

With the Bing Maps Truck Routing API, you can determine a safe and efficient route for your commercial vehicles, saving time and money, as well as avoiding unsafe conditions and legal restrictions. In addition, use the Streetside imagery capabilities of the Bing Maps platform to view why your vehicle needs to take a different route, such as a low bridge, sharp corner, waterway, and more.

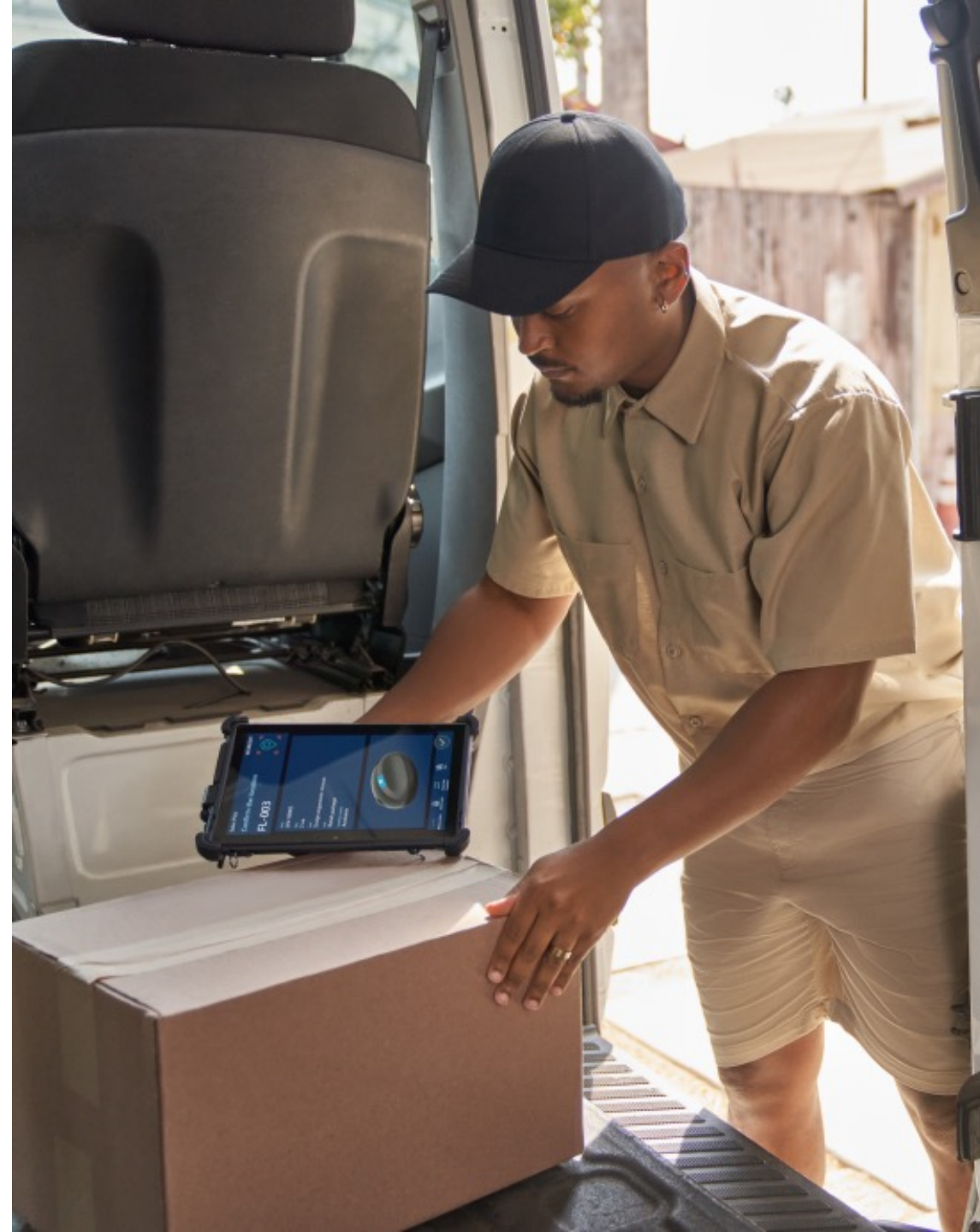
Legend

Store Locations



How do we optimize the deliveries from the factory to the store?

- For example, we have 32 stores in London, what is the optimal route and order to deliver?
- We need to calculate the route every week, depending on the store stock.
- What is the best time to start the delivery?
- In some areas we can not deliver after 12am.
- How many trucks do we need for the delivery?
- When we have two factories, how do we split the delivery?



Distance Matrix API

Maximize efficiency by calculating travel time and distances

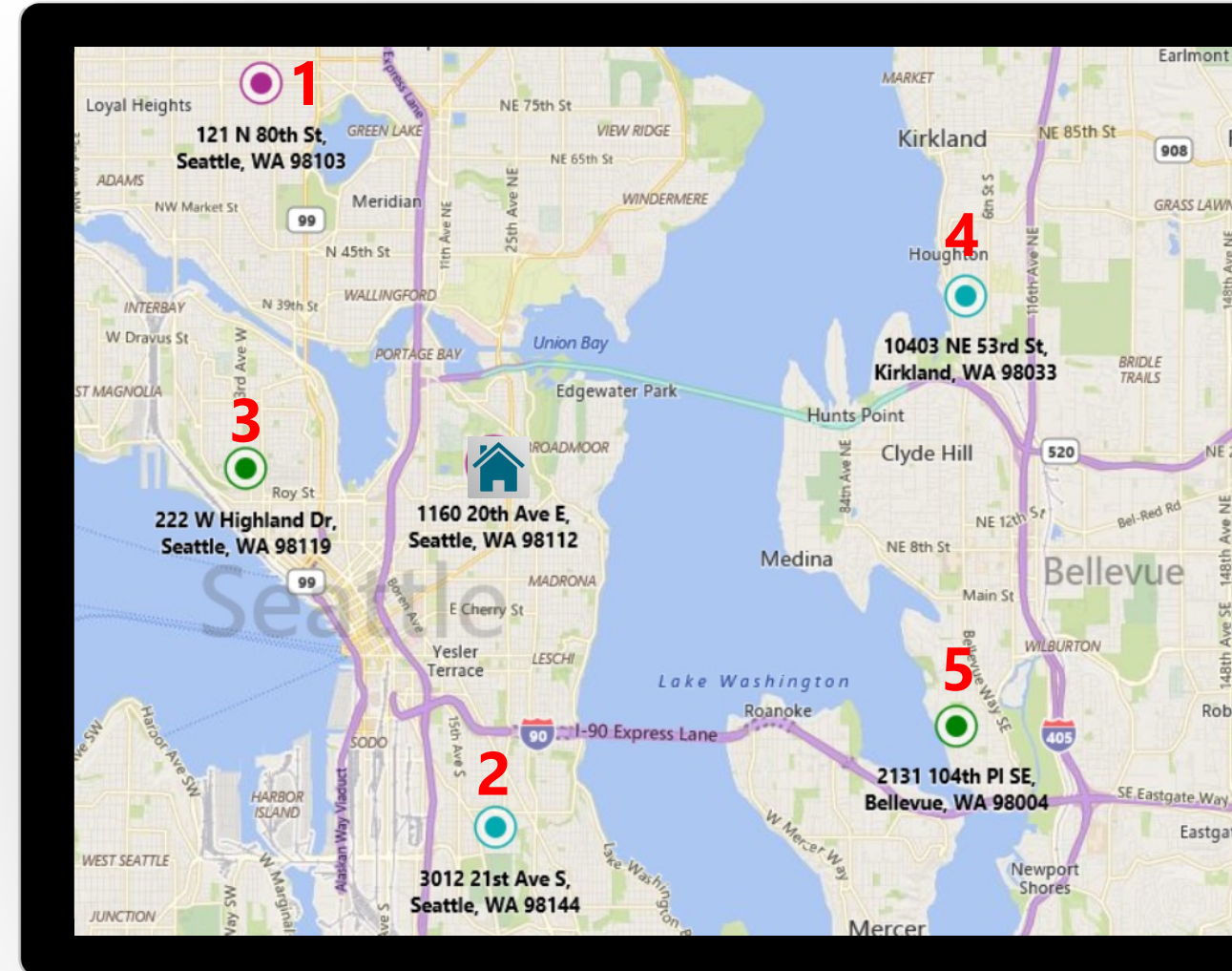
- Calculates distances and travel times between origins and destinations with an optional travel-time histogram
- Uses predicted traffic conditions
- Trucking logistics with single or multiple start points and numerous end-points – Time Windows, Vehicle Capacity, Multiple Depots, Split Deliveries, Backhauls, etc.
- See the driver's location and estimated time of arrival
- Determining arrival times based on travel times
- Scenarios 1 origin, and 10,000 destinations, or 100 origins and 100 destinations



Same origin, many destinations

	factory	Store 1	Store 2	Store 3	Store 4	Store 5
Home	0	11.7	10.5	9.8	13.1	16.7
Store 1	11.6	0	14.3	10.5	17.9	21.3
Store 2	10.5	15.0	0	11.3	17.5	12.9
Store 3	9.4	10.7	10.5	0	16.5	17.5
Store 4	13.1	18.0	17.5	17.0	0	11.7
Store 5	17.0	21.5	12.9	17.8	11.7	0

- The single origin represents is the factory
- We have 5 stores to visit
- 600 possibilities!! Which is best?

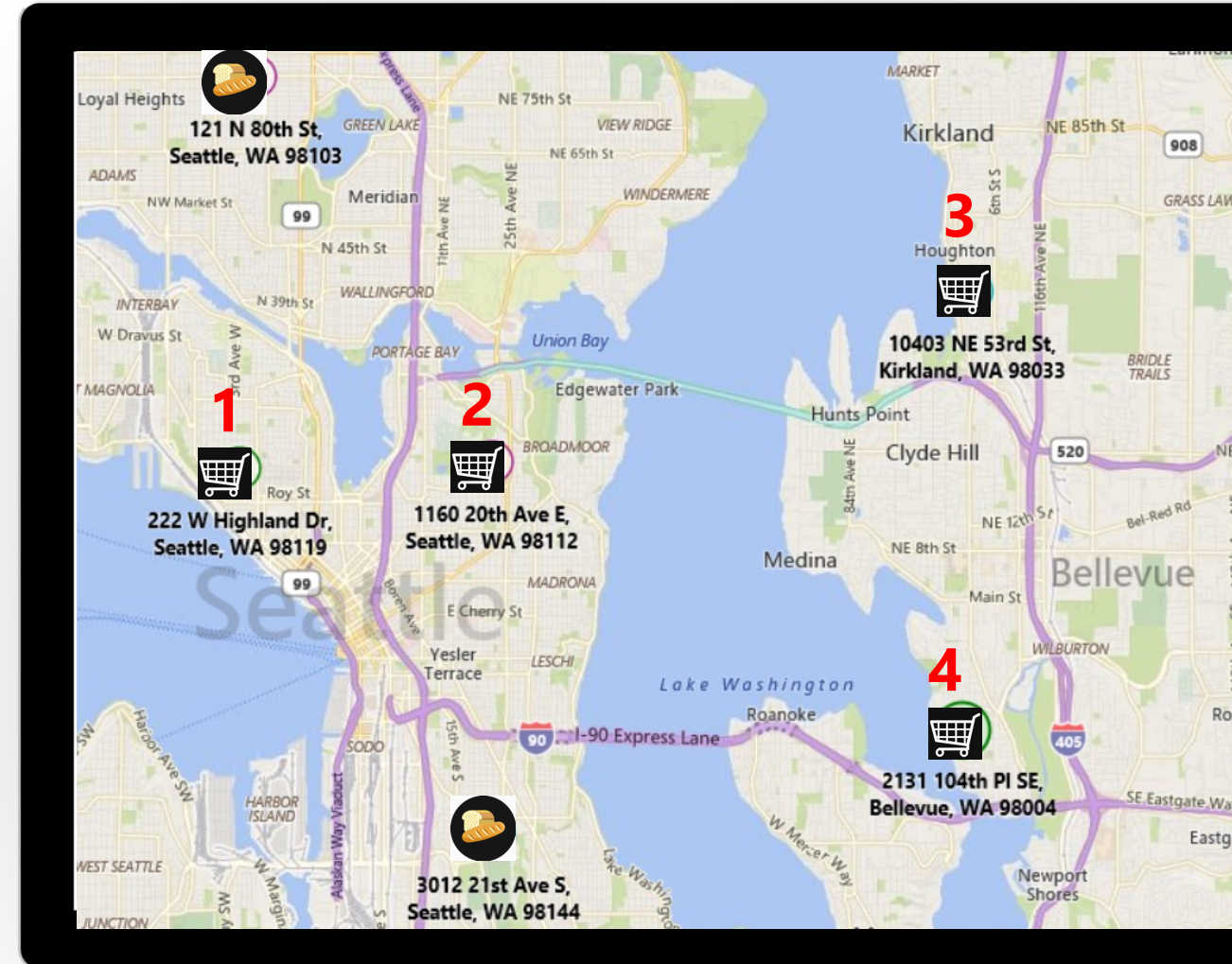


* Example visualization of the API's JSON or XML response in an application or experience.

Two origins and four destinations

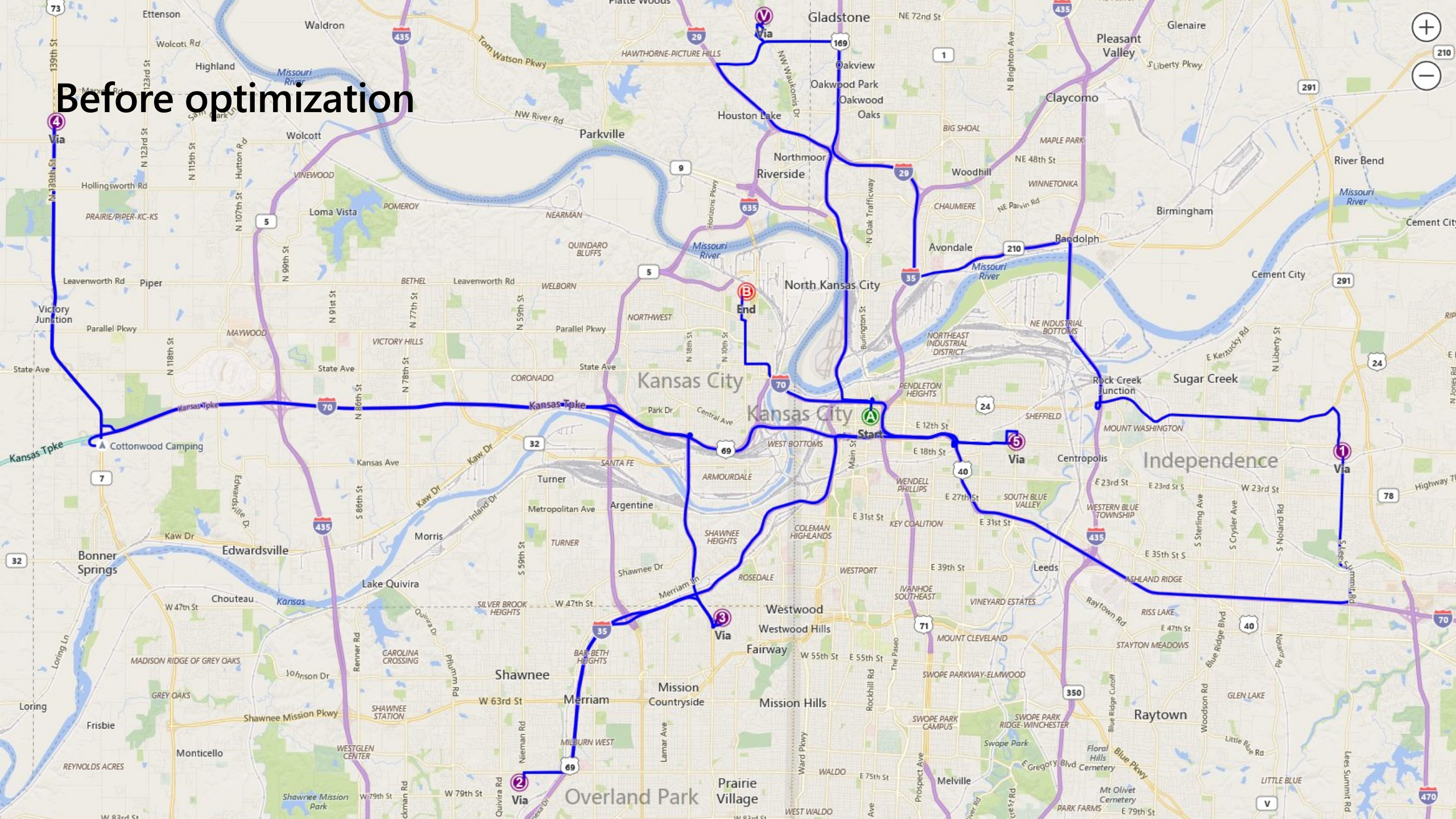
	Factory Uptown	Factory Downtown
Store 1	10.54	11.26
Store 2	11.63	10.57
Store 3	17.93	17.45
Store 4	21.27	12.88

- When the Cookie Company has 2 factory locations in the region
- They have 4 locations they need to deliver to daily
- Which factory should be delivering to each store?

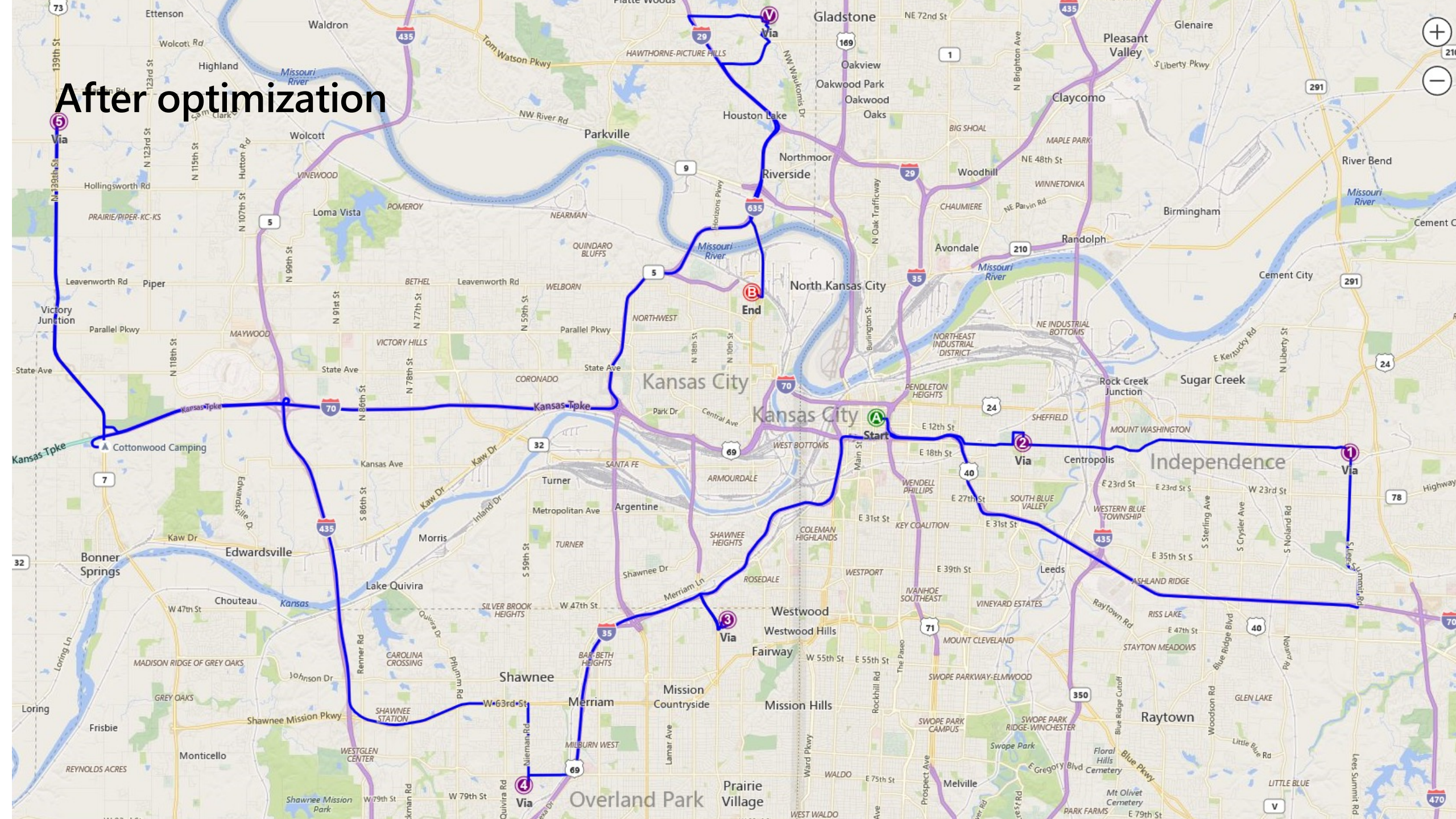


* Example visualization of the API's JSON or XML response in an application or experience.

Before optimization



After optimization



Tracking

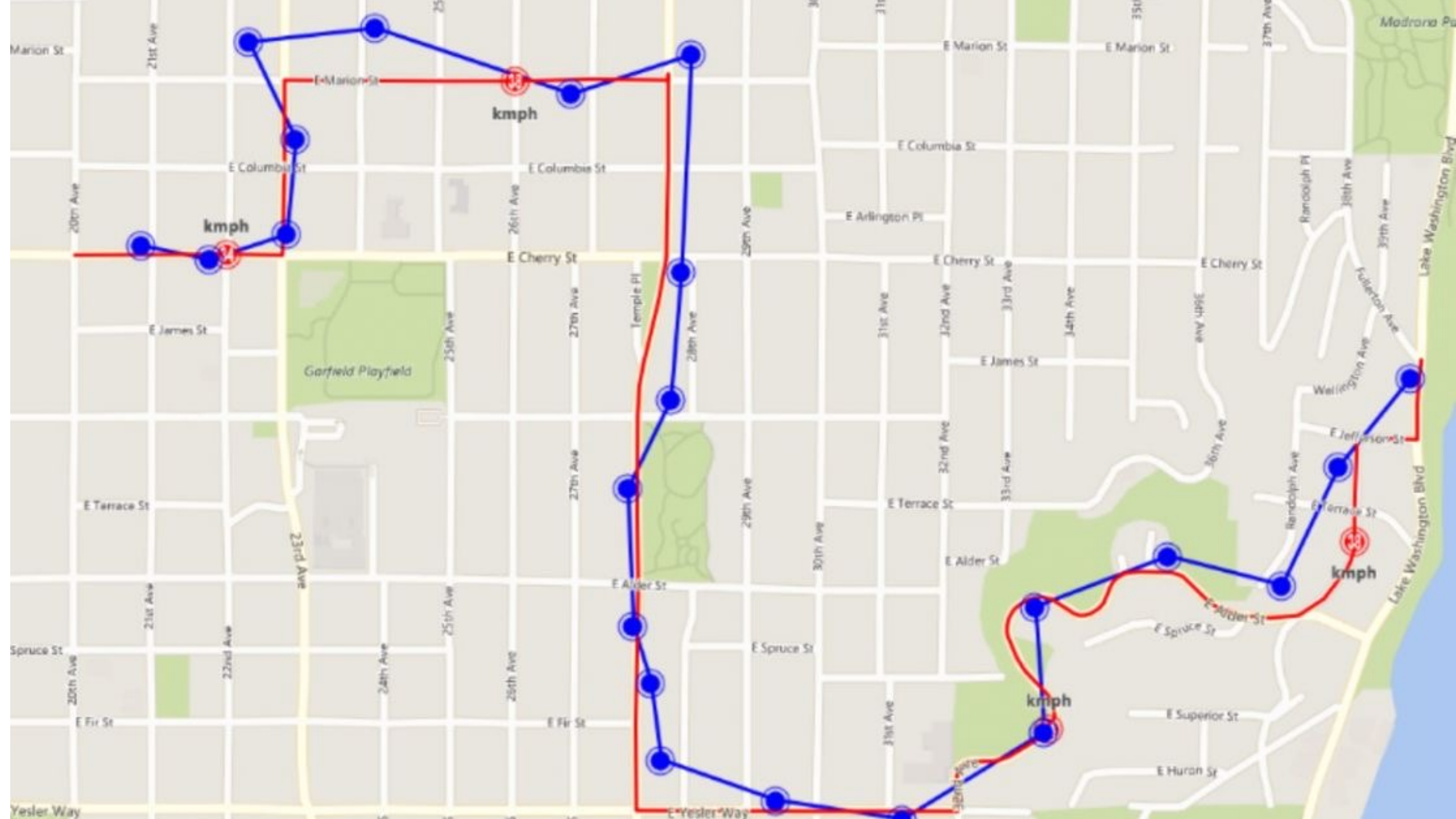


Snap to Road

Users can track an asset's route by snapping its GPS points to the nearest roads for display purposes. They can also view data for each point, including associated road names and posted speed limits.

- Interpolate GPS points and get a path that smoothly follows the geometry of the road for advanced data visualization.
- Determine if a driver is adhering to the posted speed limits and monitor if they go off-route.
- Assess how much time the asset has been traveling, and look at overlapping routes to optimize deliveries.





Home Delivery

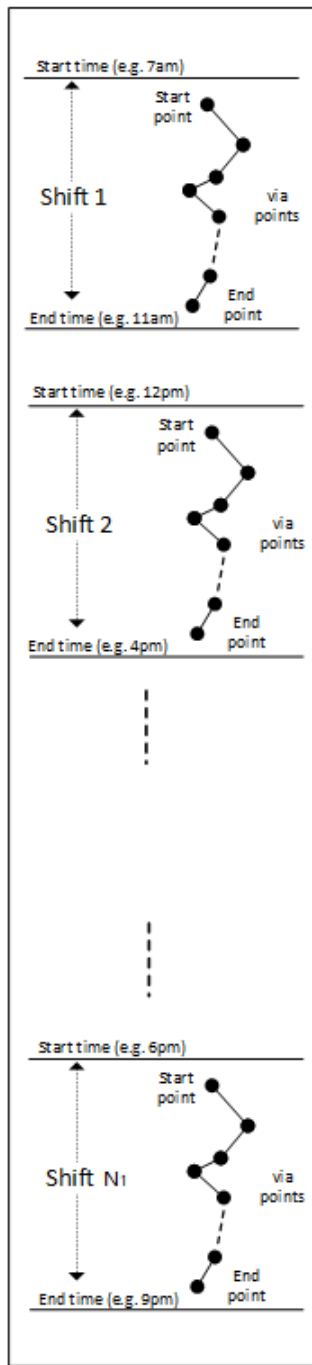


Multi-stop Route Planning

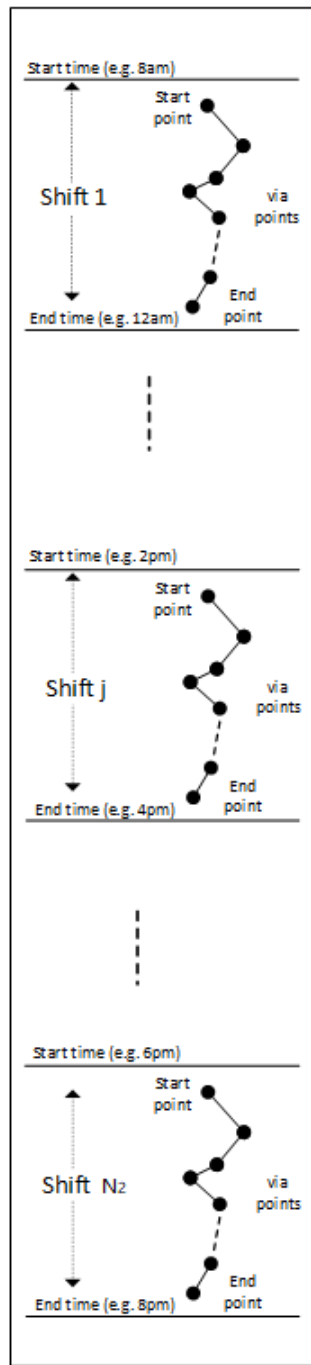
Automate itineraries for multiple agents and optimize all their routes

- Multiple delivery stops
- Time windows when the customer is available,
- Different priorities for each of the stops,
- Multiple delivery agents with different shifts,
- Traffic conditions,
- Travel time between stops,
- How long the delivery is expected to take
- Input Parameters:
 - Agent (Name, shifts)
 - Agent Shift (StartTime, EndTime, StartLocation (optional), EndLocation (optional))
 - ItineraryItem (Name, OpeningTime(optional), ClosingTime (optional), DwellTime (optional), Priority (optional), Location)
 - Type (Simple Request, TrafficRequest)
 - CostValue (TravelTime, Distance)

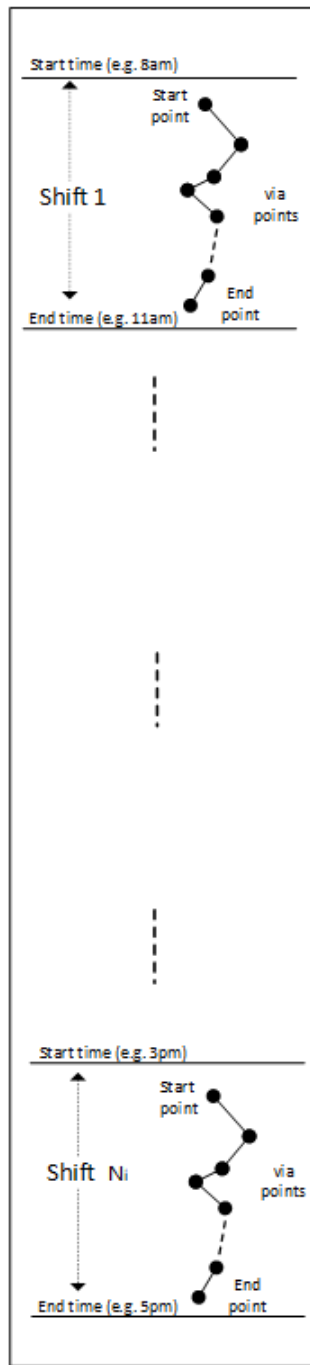
Agent 1's Itinerary



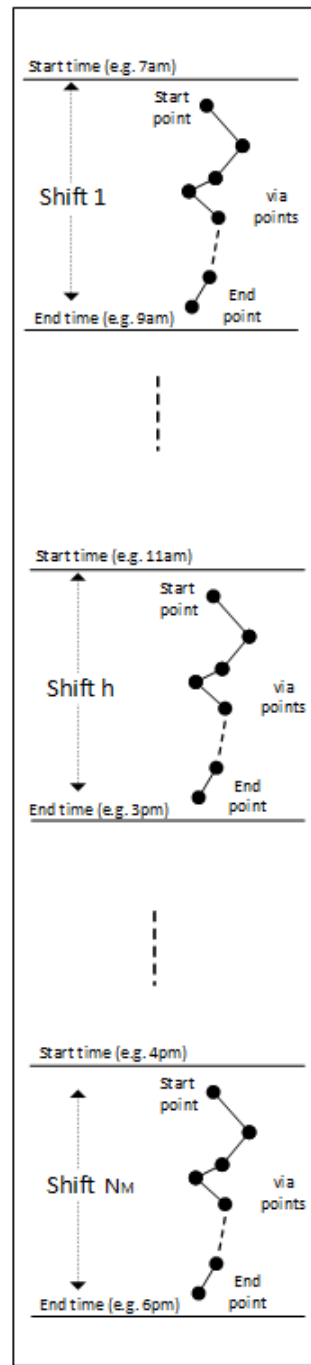
Agent 2's Itinerary



Agent i's Itinerary



Agent M's Itinerary



Multi-Itinerary Optimization Demo

Click the sample scenarios and select parameters below to see how the API handles route optimization for:

- Multiple agents and multiple shifts
- Service time windows
- Dwell time (i.e., how long an agent needs to be at a location)
- Capacity constraints
- Service ordering restrictions
- Priority of stops
- Traffic
- Price optimization objective

Click to Load Scenario

2 AGENTS 5 STOPS

4 AGENTS 40 STOPS

Optimize for

Travel Time



Use traffic information

True



Agents

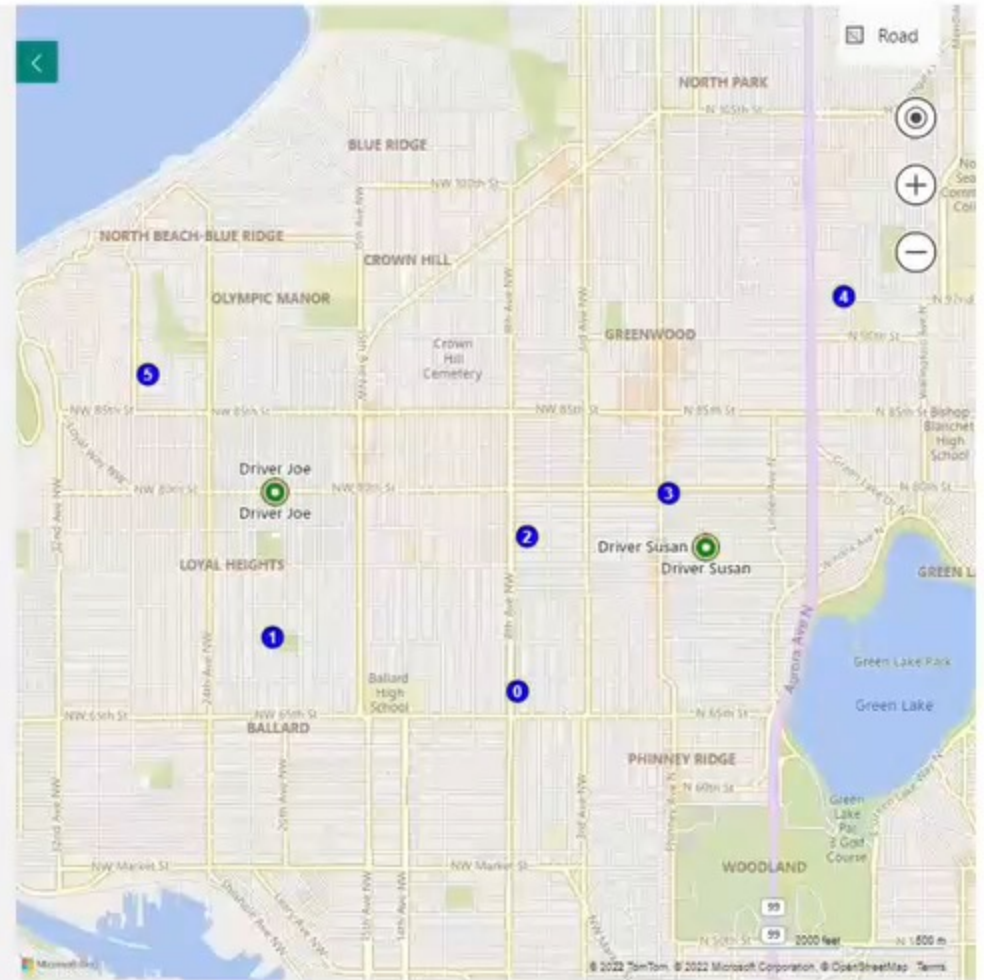
Agent	Shift Start	Start Location	Shift End	End Location	Capacity	Fixed Price	Price/ KM	Price/ Hour
Driver Joe	2020-01-09T08:00:00	47.88678, -122.38289	2020-01-09T20:00:00	47.88678, -122.38289	6	\$0	1	3
Driver Susan	2020-01-09T08:00:00	47.88412, -122.35208	2020-01-09T19:00:00	47.88412, -122.35208	10	100	1	5

Itinerary Stops

Stop	Name	Opening	Closing	Dwell	Priority	Location	Quantity	Drop Off
0	Pizza Place	2020-01-09T12:00:00	2020-01-09T20:00:00	00:02:00	1	47.87716, -122.36853	1000	
1	Customer 1	2020-01-09T17:30:00	2020-01-09T18:30:00	00:02:00	1	47.87981, -122.38304	-1	

GET ROUTES

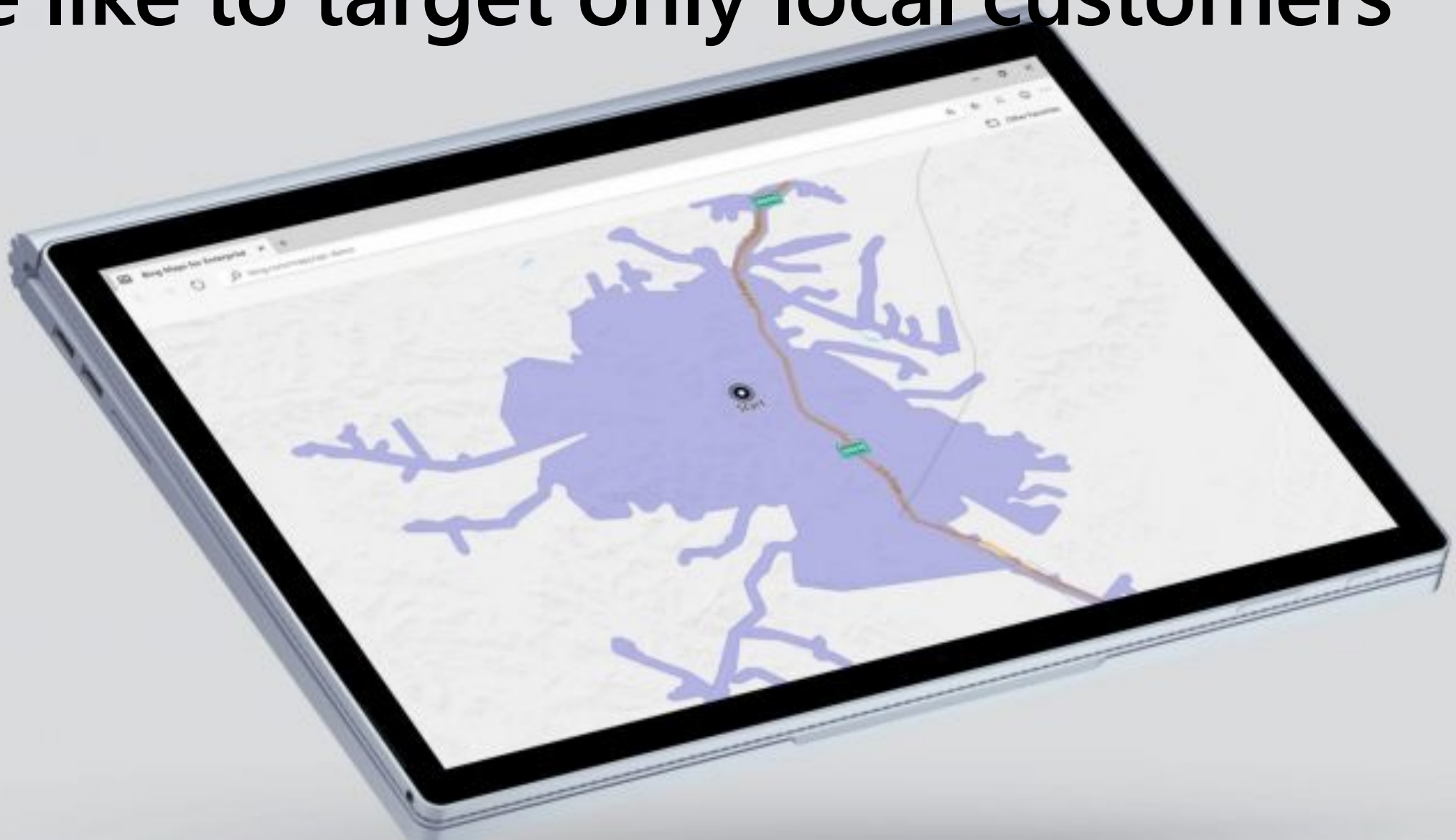
Optimized Itinerary



Scenario	Optimized for	Traffic	Road Network
2 AGENTS 5 STOPS	TravelTime	TrafficRequest	true

GET STARTED NOW

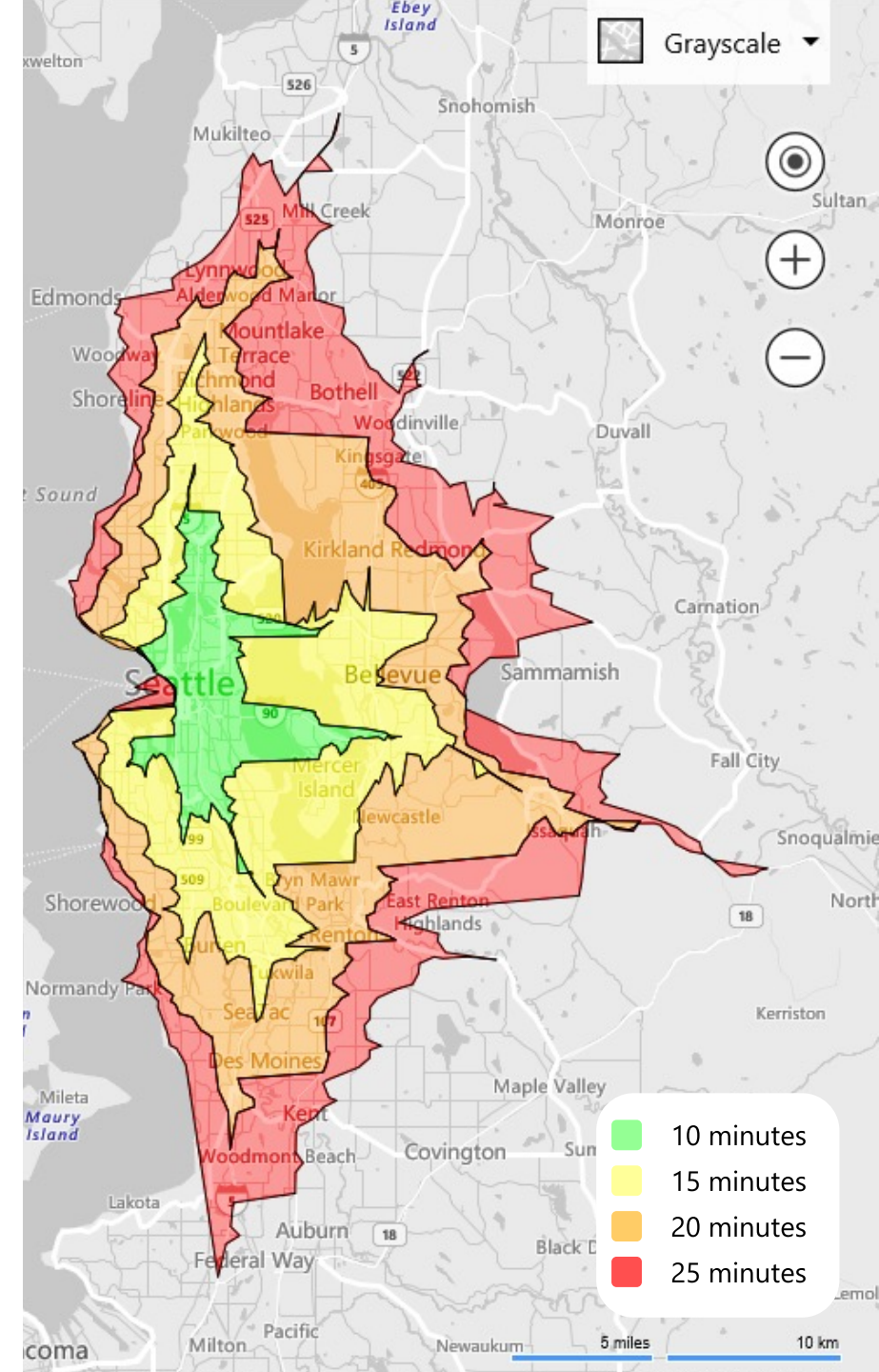
We like to target only local customers



Isochrone

Calculates the area that can be traveled to within a specified distance or time

- Calculates a travel-time or travel-distance polygon array of latitude/longitude points that describe the isoline
- Supports drawing a shape on a map and using the shape in spatial queries
- API inputs:
 - **startPoint** Latitude/Longitude or address
 - **routeMode** (driving, walking or public transportation)
 - **road types** to minimize or avoid (highway-minimizeHighways, tolls-, minimizeTolls)
 - **maxDistance** for which the polygon shall be created
 - **maxTime** for which the polygon shall be created
 - **departTime**
- Historic traffic data will be used in calculating the routes if the date and time are specified in the call



Visualize what's near and far

You can use the Bing Maps Isochrone API to plan the area that can be reached from a designated starting point within a set time period. Try the demo to see how it works.

Isochrone Demo

An Isochrone is the shape representing travel time or distance. They can be very useful in filtering search results. Try it:

Select Travel Mode
Walking ▼

Select Business Category
Gas Station ▼

Travel Time (minutes)
—|— 15

Microsoft Bing

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GET STARTED NOW

Thank you!

Microsoft.com/Maps