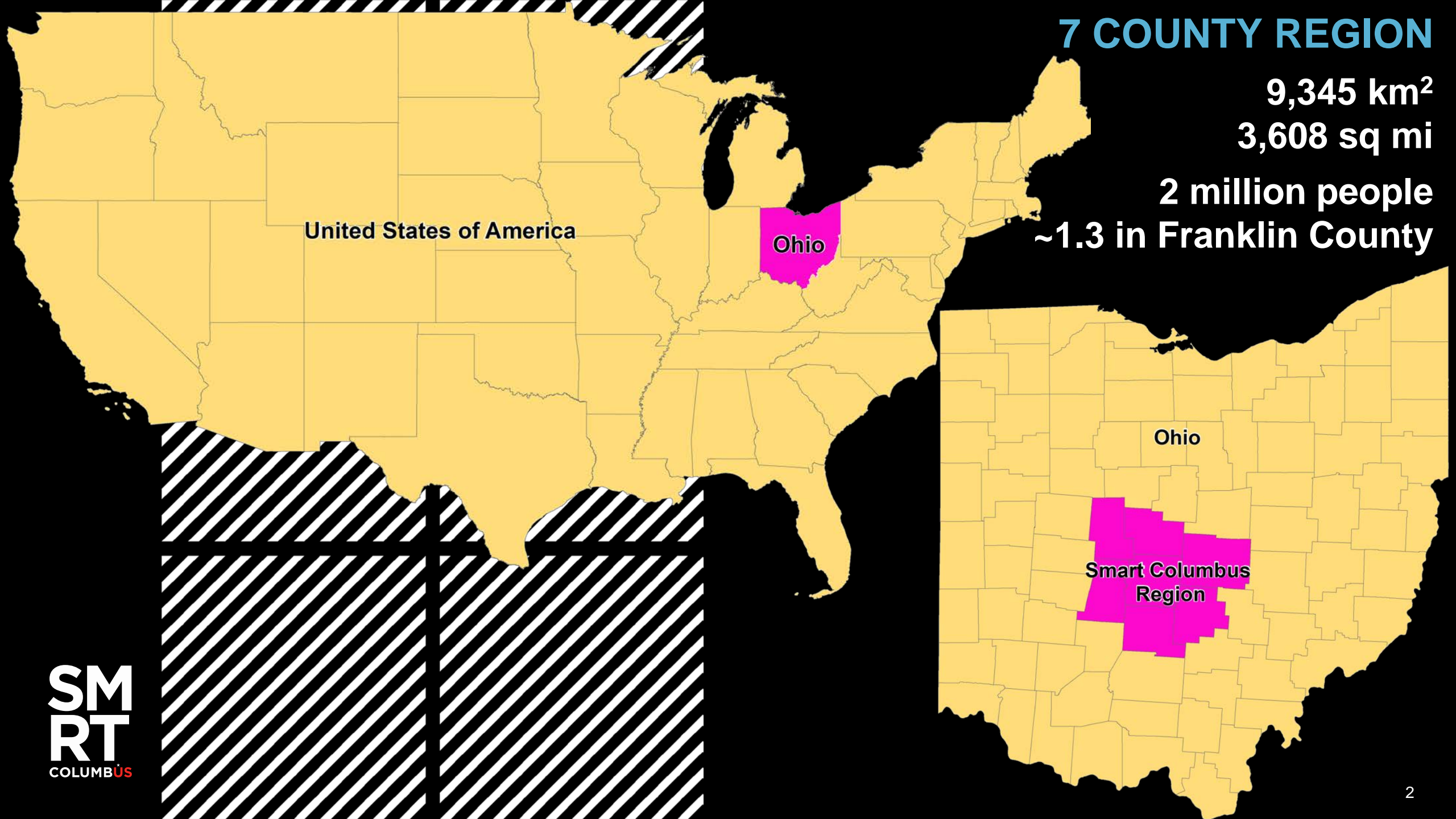


Mobility as a Service – Pivot Project Overview





7 COUNTY REGION

9,345 km²
3,608 sq mi

2 million people
~1.3 in Franklin County

United States of America

Ohio

Ohio

Smart Columbus
Region



SMART COLUMBUS OVERVIEW

“Mobility is the
great equalizer of
the 21st century.”

– Mayor Andrew J. Ginther



\$40 MILLION

78 APPLIED • COLUMBUS WON

VISION:

To empower our residents to live their best lives through responsive, innovative and safe mobility solutions.

MISSION:

To demonstrate how an intelligent transportation system and equitable access to transportation can have positive impacts on every day challenges faced by cities.

OUTCOMES:



SAFETY



MOBILITY



OPPORTUNITY



ENVIRONMENT



AGENCY
EFFICIENCY



CUSTOMER
SATISFACTION

THE CITY OF
COLUMBUS

ANDREW J. GINTHER, MAYOR



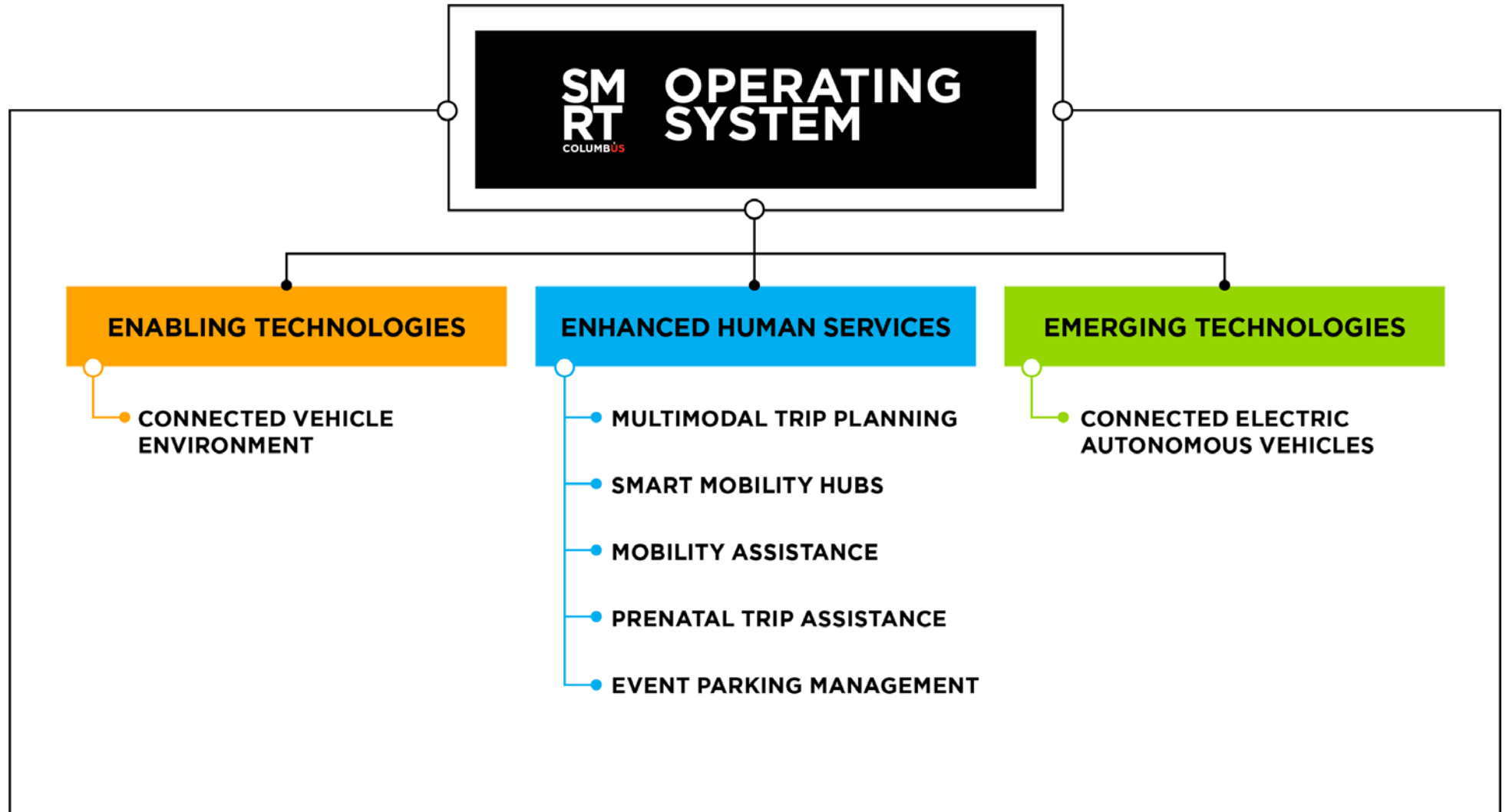
U.S. Department of Transportation



SMART CITY
CHALLENGE



USDOT PORTFOLIO



USDOT PORTFOLIO – Infrastructure

Connected Vehicle Environment

- 90+ roadside units
- 1,000-1,200 on-board units
 - 350-500 private vehicles
 - 200 City and County LDV
 - 430 transit vehicles
 - 110 emergency vehicles
 - 14 freight vehicles

Smart Mobility Hubs

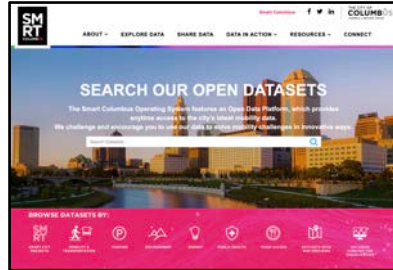
- 6 locations
- Facilitate first-mile/last-mile connections
- Anchored by an interactive kiosk

Connected Electric Autonomous Vehicles

- Smart Circuit Deployment (May Mobility)
 - December 2018-September 2019
 - 6 vehicles
- Linden LEAP (Easy Mile) – 2 vehicles:
 - Passenger Deployment – February 2020
 - Food Pantry Deployment – July 2020



USDOT PORTFOLIO – Software



Operating System

- Big data and complex data exchange
- Analytics and visualization
- Data aggregation, fusion and consumption
- Replicable and scalable



Mobility Assistance

- Research study with app for turn-by-turn navigation
- Increase independence
- Up to 30 participants



empowered mobility

Multimodal Trip Planning App

- Publicly available app (Pivot)
- Public and private mobility providers



Prenatal Trip Assistance

- Research study to improve transportation for moms-to-be
- 143 participants

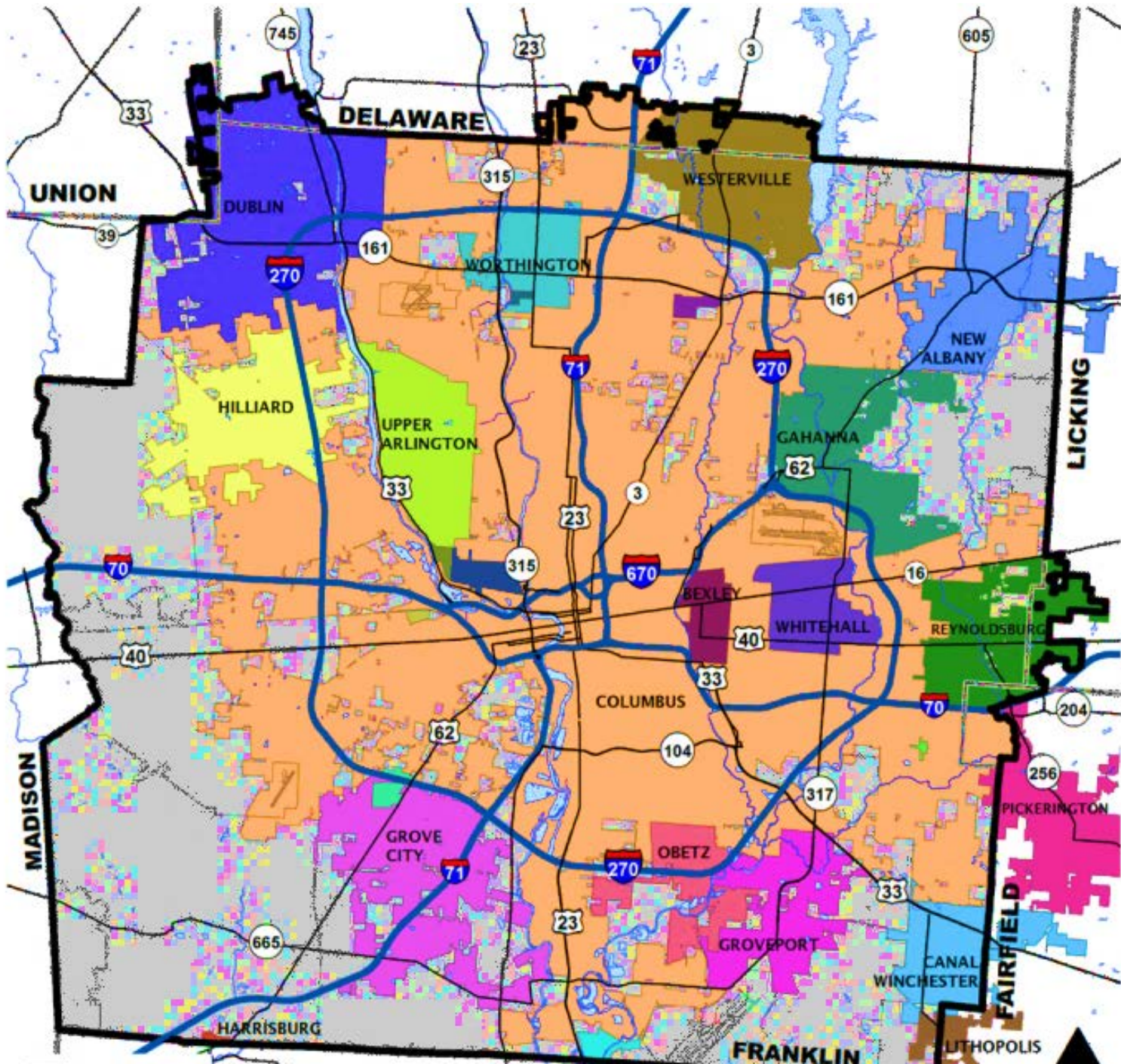


Event Parking Management

- Publicly available app (ParkColumbus)
- Probability of on-street parking
- Reserve private lot/garage spaces

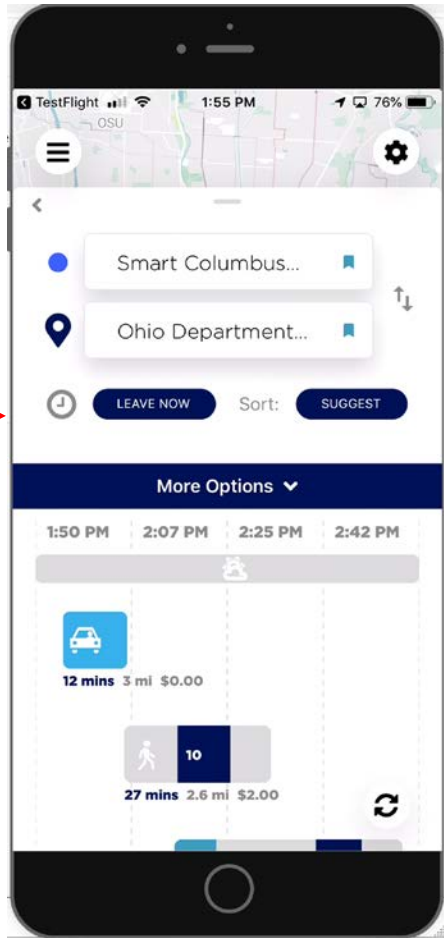


MULTIMODAL TRIP PLANNING APPLICATION OVERVIEW

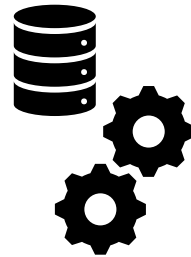


CONCEPT

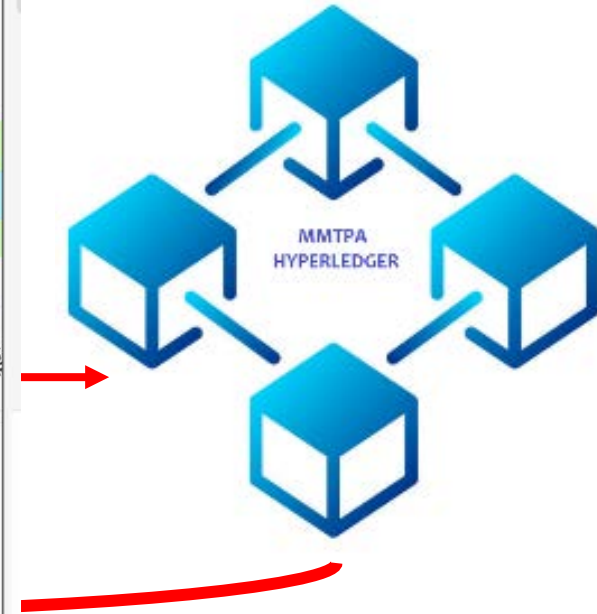
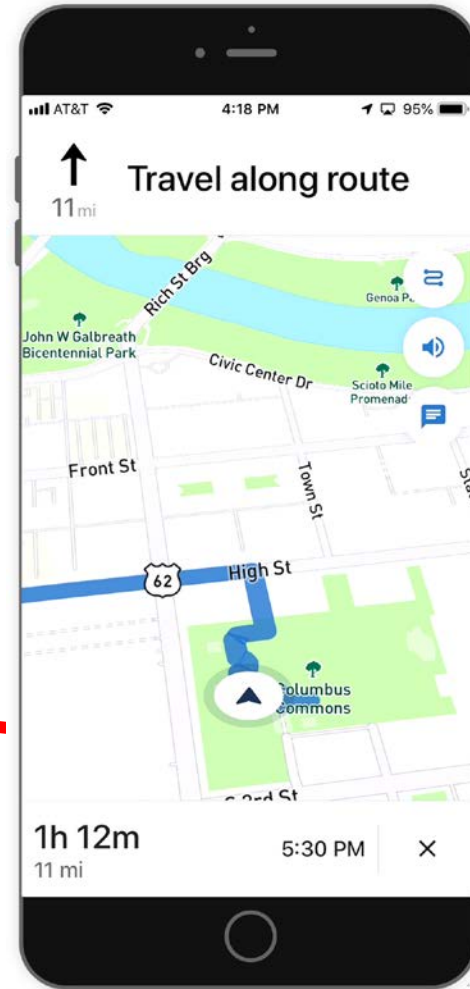
MODE



TRIP OPTIMIZATION



MACHINE LEARNING



GOALS AND OUTCOMES



MOBILITY



OPPORTUNITY



CUSTOMER
SATISFACTION

- Shift away from single occupancy vehicles
- Encourage and promote alternate modes of transportation
- Provide access to on-demand and multimodal trip planning
- A solution that uses both private and public mobility providers
- A way to plan, book and seamlessly pay for your trip

MOBILITY SERVICE PROVIDER PARTNERS

Uber

COGO
BIKE SHARE

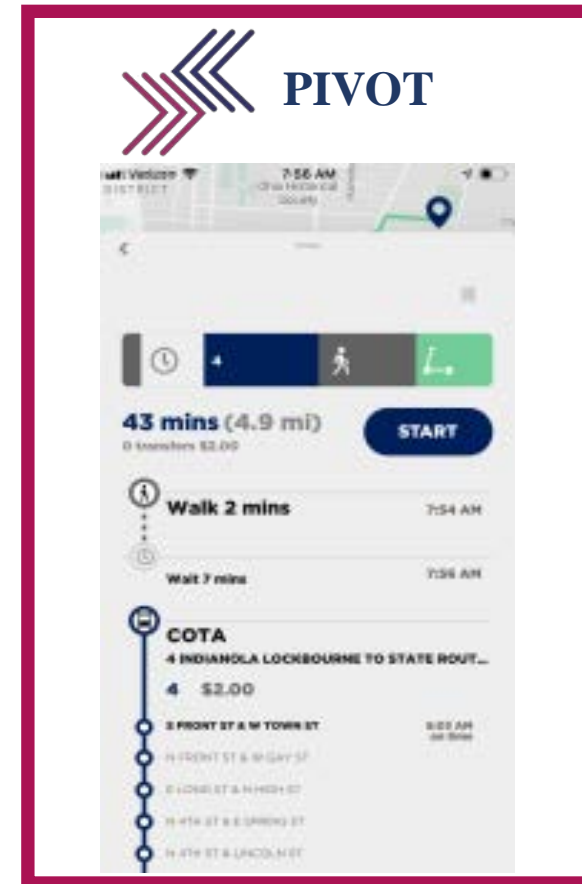


COTA



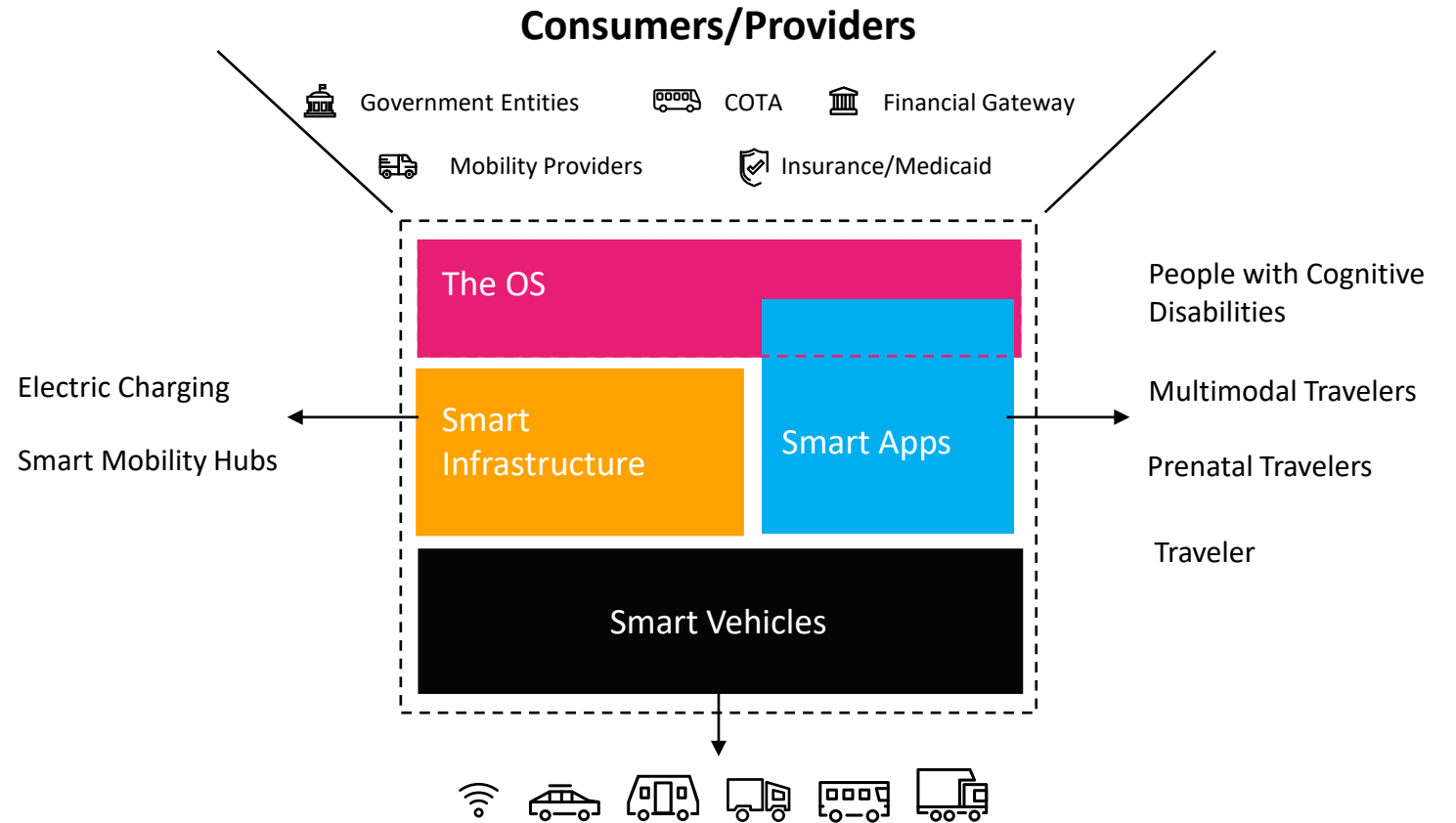
gohio
commute

A Smarter Way



RELATIONSHIP TO OTHER PROJECTS

- Common Payment System
- Smart Columbus Operating System
- Smart Mobility Hubs
- Connected, Electric, Autonomous Vehicle





empowered mobility

PIVOT OVERVIEW

WHAT MAKES PIVOT UNIQUE

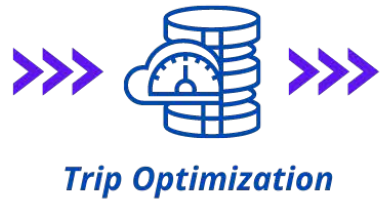
- Aggregates data from scooters, bike-share, ride-hailing, ride-sharing, and public transportation to present customized multimodal (or single mode) trips to the user based on the user's preferences
- Google and Transit App provide different mode options, but not a seamless trip with mixed-mode travel
- Open source platform that can be adapted by other states, cities, and agencies, and is flexible enough to change and accommodate the needs of various organizations (Open Trip Planner)
- Neutral, standards driven multimodal platform



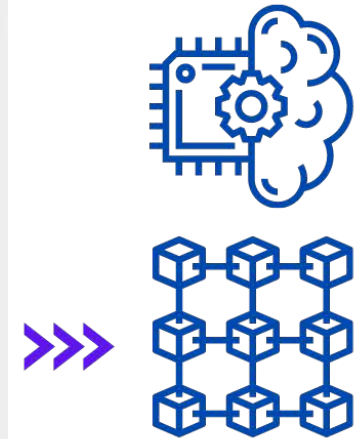
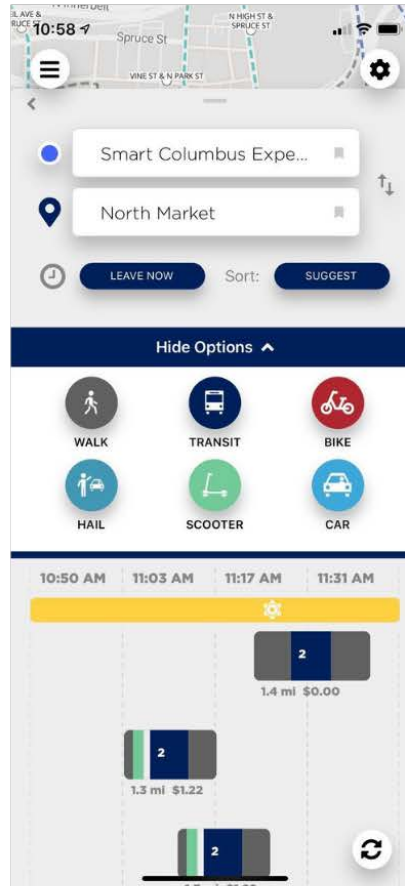
empowered mobility

THE ROLE OF DATA

Modes



Pivot Trip Plan



Machine Learning Trip History

THE ROLE OF DATA

Data Used for Pivot Trip Optimization

- Historic INRIX (3 years)
- Live INRIX
- User Feedback
- Historic trip information from Pivot
- Weather

Future Data to be Used in Pivot Trip Optimization

- SharedStreets telemetry data (Uber and Lyft historic speeds)
- Connected Vehicle Environment
- Signal phase and timing
- Waycare
- OHGO

THE ROLE OF DATA

SharedStreets Mobility Metrics

Date:

Provider:

Daily Summary

TOTAL TRIPS

13

AVG TRIP DISTANCE

0.65 mi

TOTAL TRIP DISTANCE

8 mi

AVG TRIP DURATION

3m 23s

Weekly Summary

TOTAL TRIPS

72

AVG TRIP DISTANCE

1.72 mi

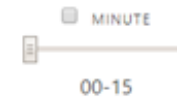
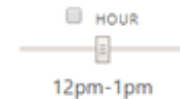
TOTAL TRIP DISTANCE

123 mi

AVG TRIP DURATION

8m 24s

Time Filter



SHARED STREET DATA

Trip Volume

Streets Bins

Trip Volume measures the number of vehicles that moved over a street or zone, filtered to protect individual privacy

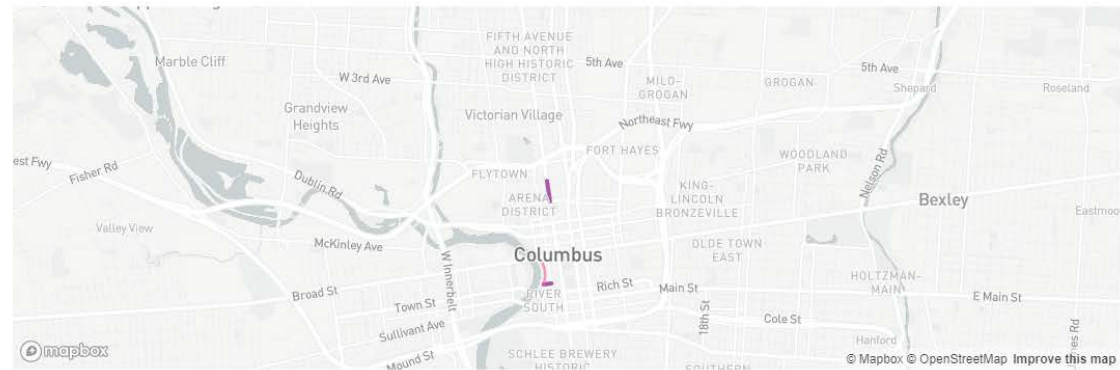


Export

Pick Ups

Streets Bins

Pickups measures the total number of trips that began within a zone



Export

PLAN YOUR TRIP

Profile Menu

- Registration
- Saved Places
- Metrics
- Gohio Commute
- Help >Privacy>Feedback



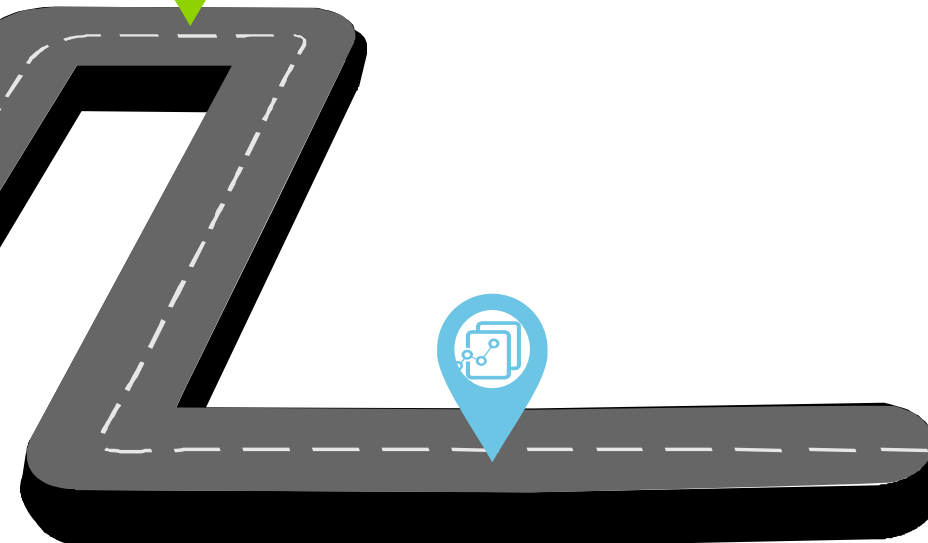
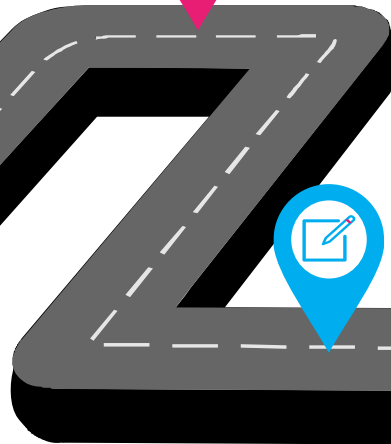
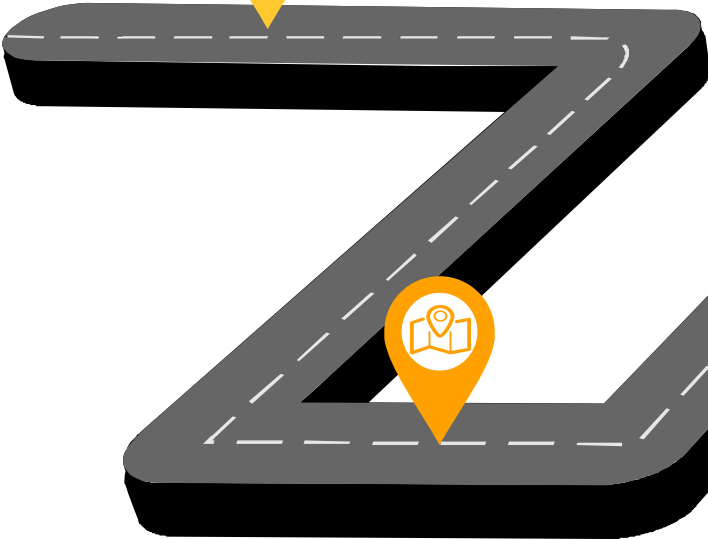
Settings

- Wheelchair Accessibility
- Options
- Modes



Deep Linking Tools

- Nearby Rides
- Trip Plan



Main Map

- Stops, Routes, & Rentals
- Alerts
- Scheduled Trips
- Bus Stop Data

Plan!

- Location on Map
- Geocoder
- Weather
- Review Options & Sort

Book!

- Vertical/Horizontal Navigation
- Turn by Turn Directions
- Voice

DEVELOPMENT LESSONS LEARNED

- Stakeholder engagement
 - Mobility providers
 - Users
- CPS challenges
 - Business
 - Legal
- Product development
 - Flexible/Agile
 - Balance Waterfall
- Accommodating new modes
 - Scooters
 - ebikes

LESSONS LEARNED

1. Be flexible
2. Iterative Development/Testing:
 - a) Impact to schedule
 - b) Reduce fixing on the fly:
 - c) Agile not unorganized (hybrid approach)
3. Stakeholder Collaboration:
 - a) City/systems engineering/development team collaboration
 - b) Engage all testers early in the process and maintain consistency
 - c) Role of the beta testing group
4. Importance of documentation:
 - a) Results
 - b) Prioritizing bugs, enhancements and fixes



LESSONS LEARNED



**Keep Comms
team involved**



**Keep Partners
in the Loop**



**Leverage stakeholders'
communication channels**



Testimonials



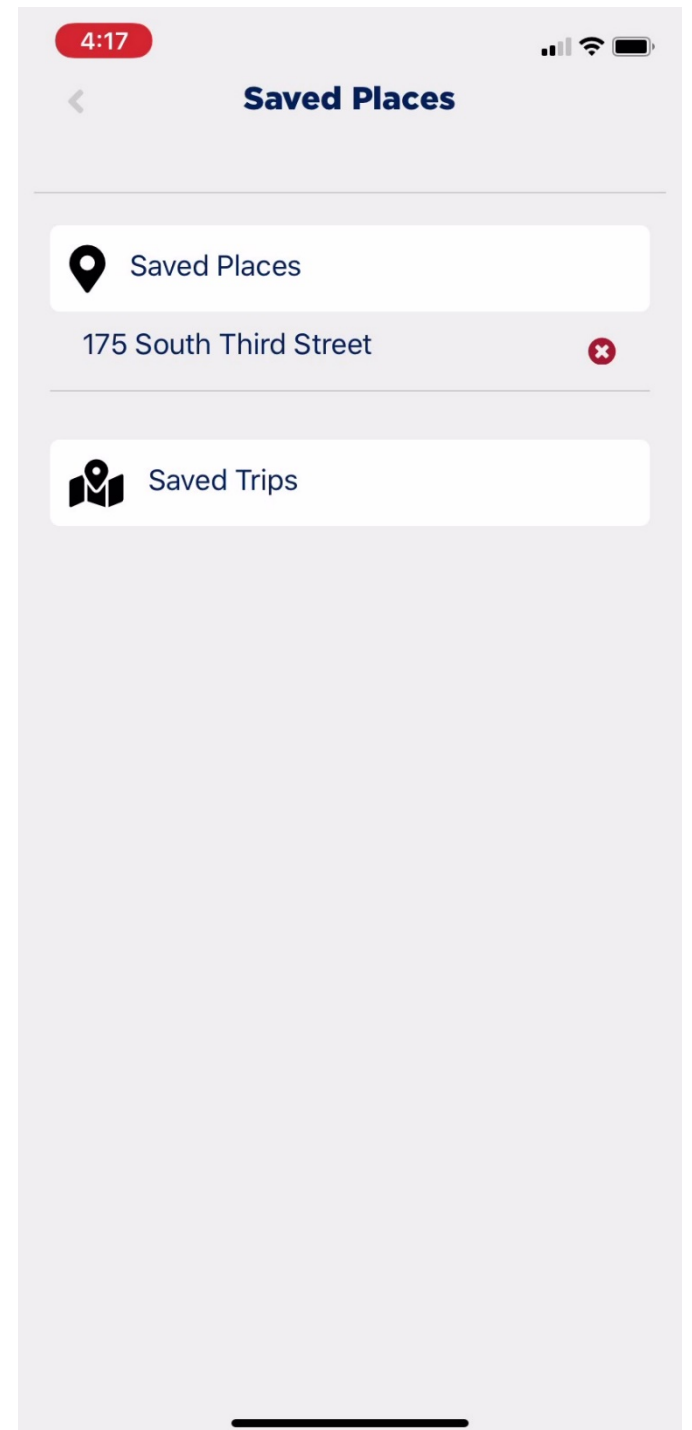
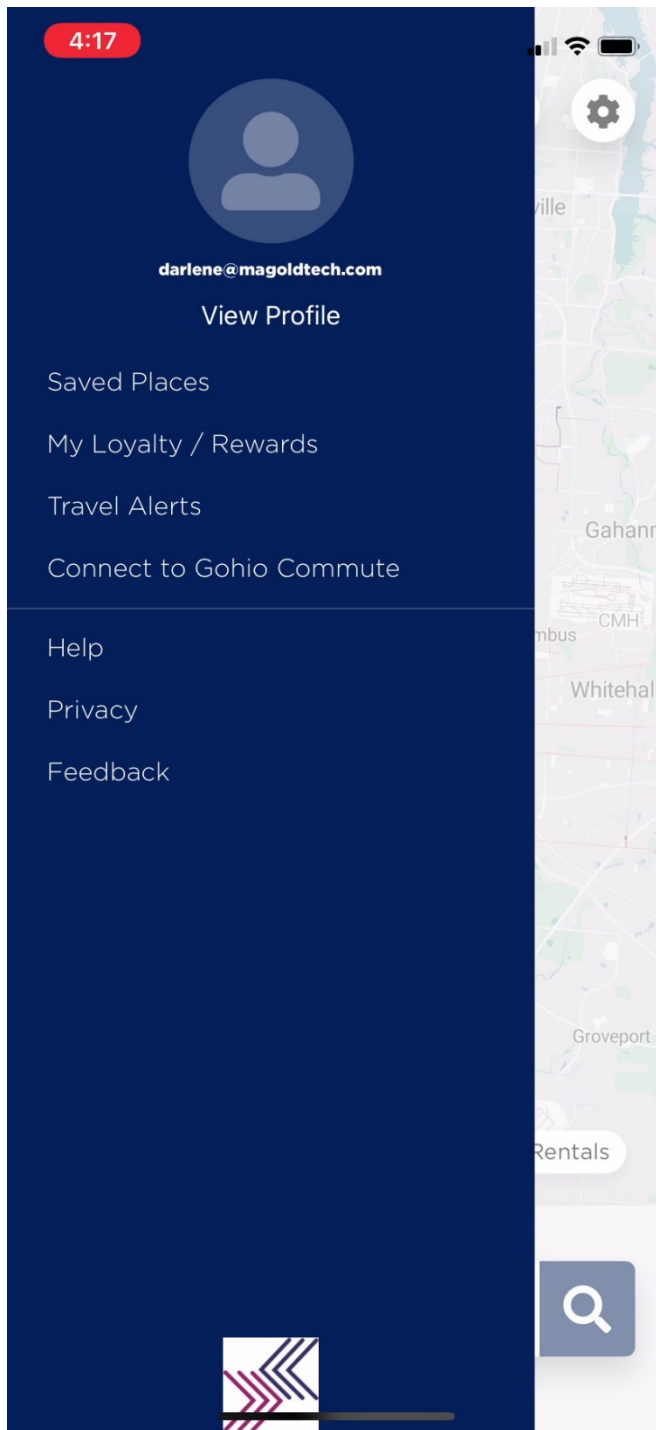
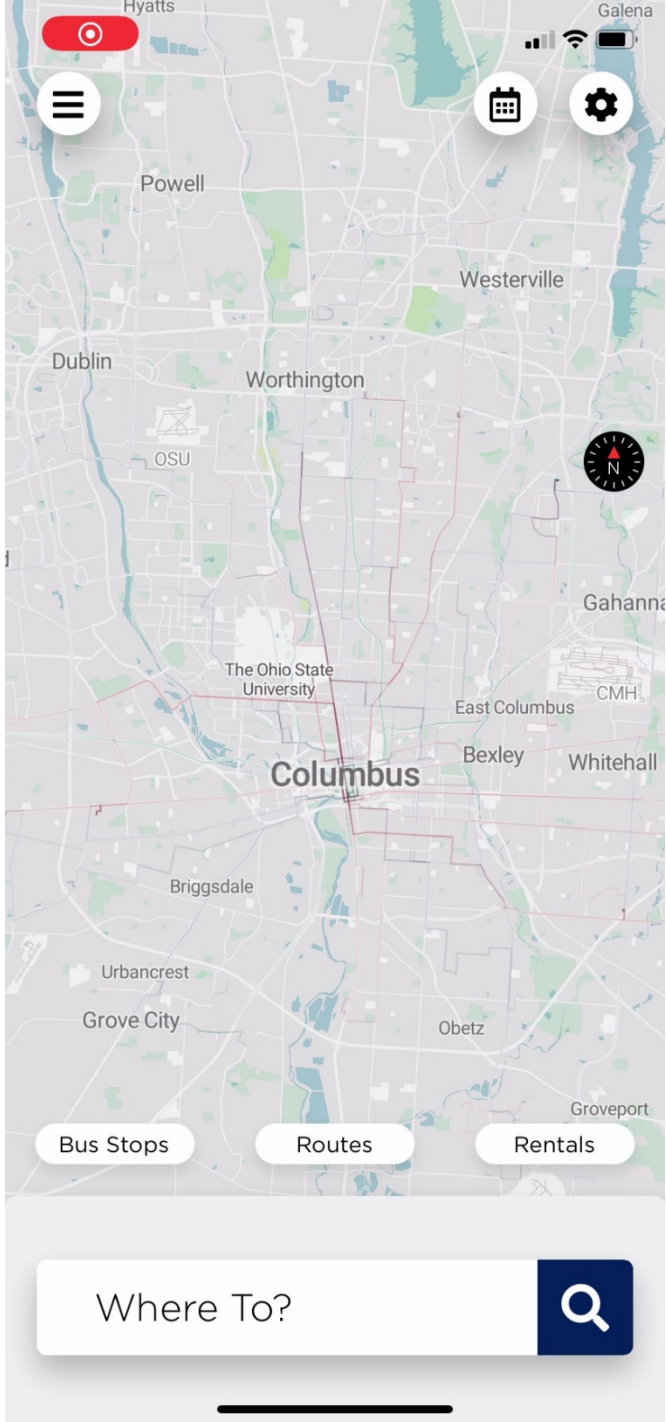
Co-creation

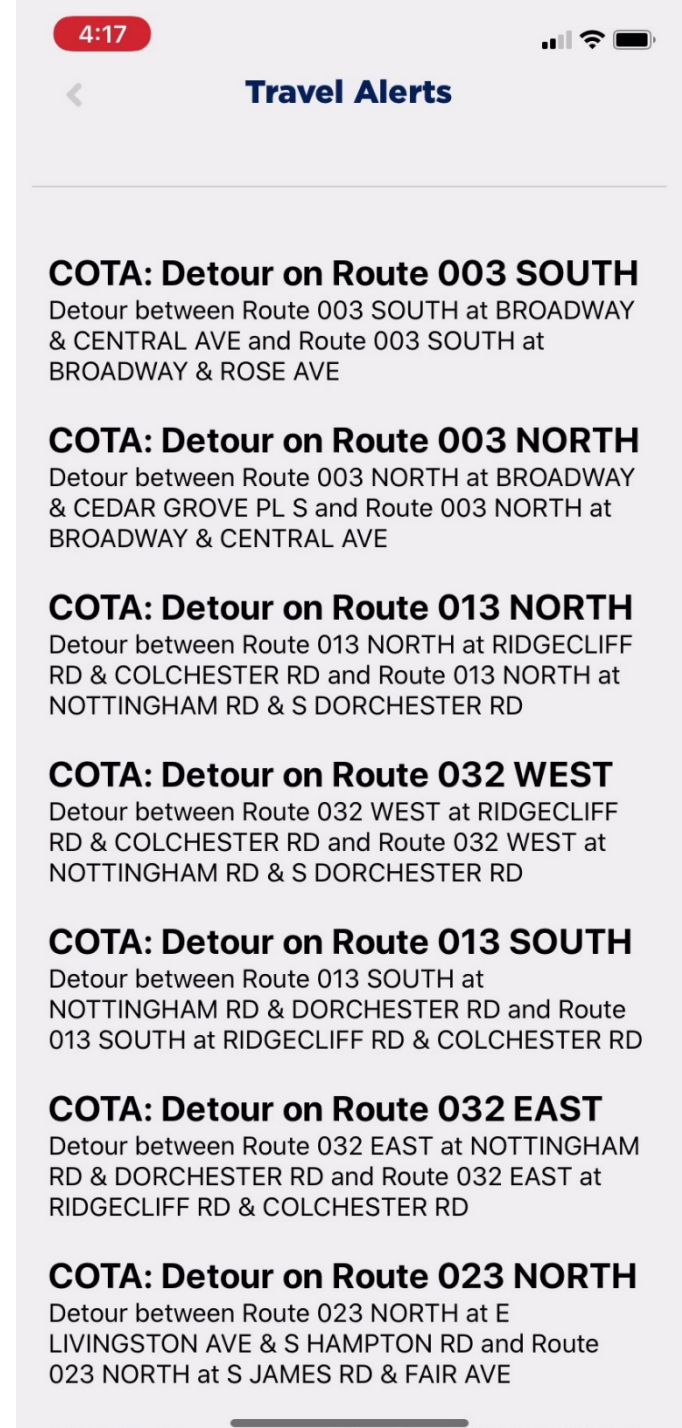
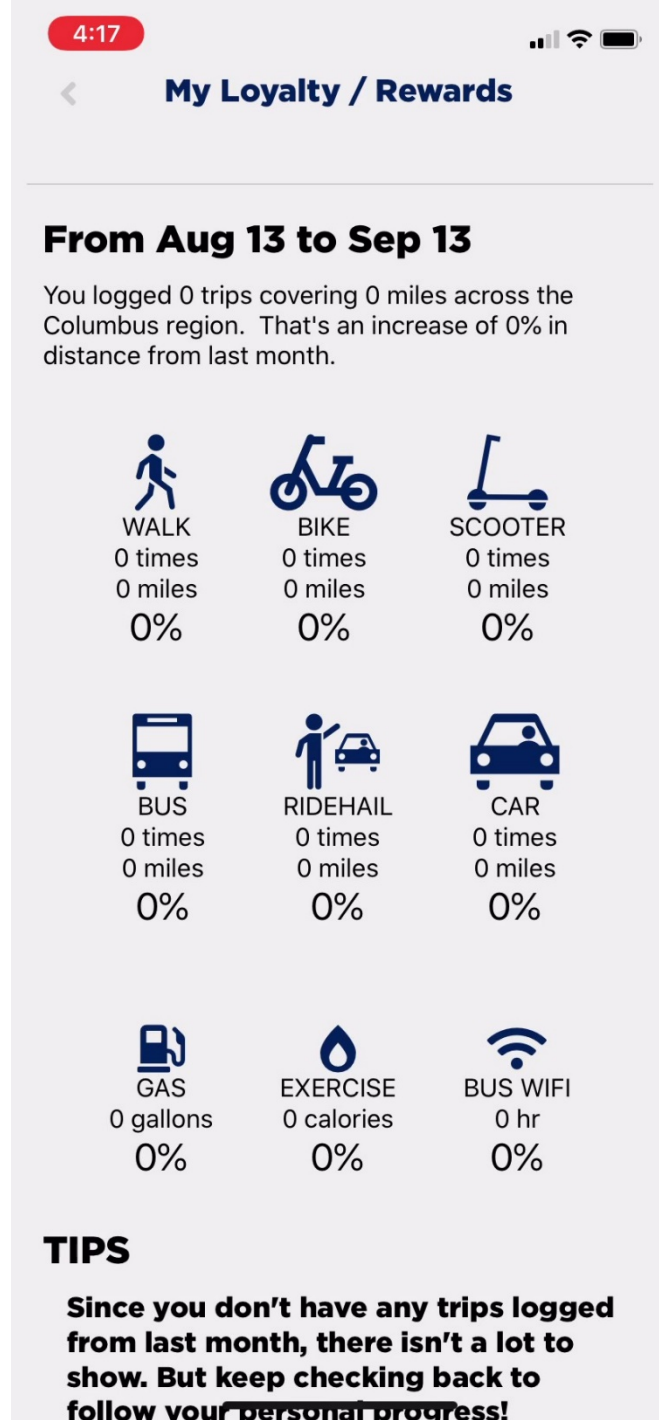
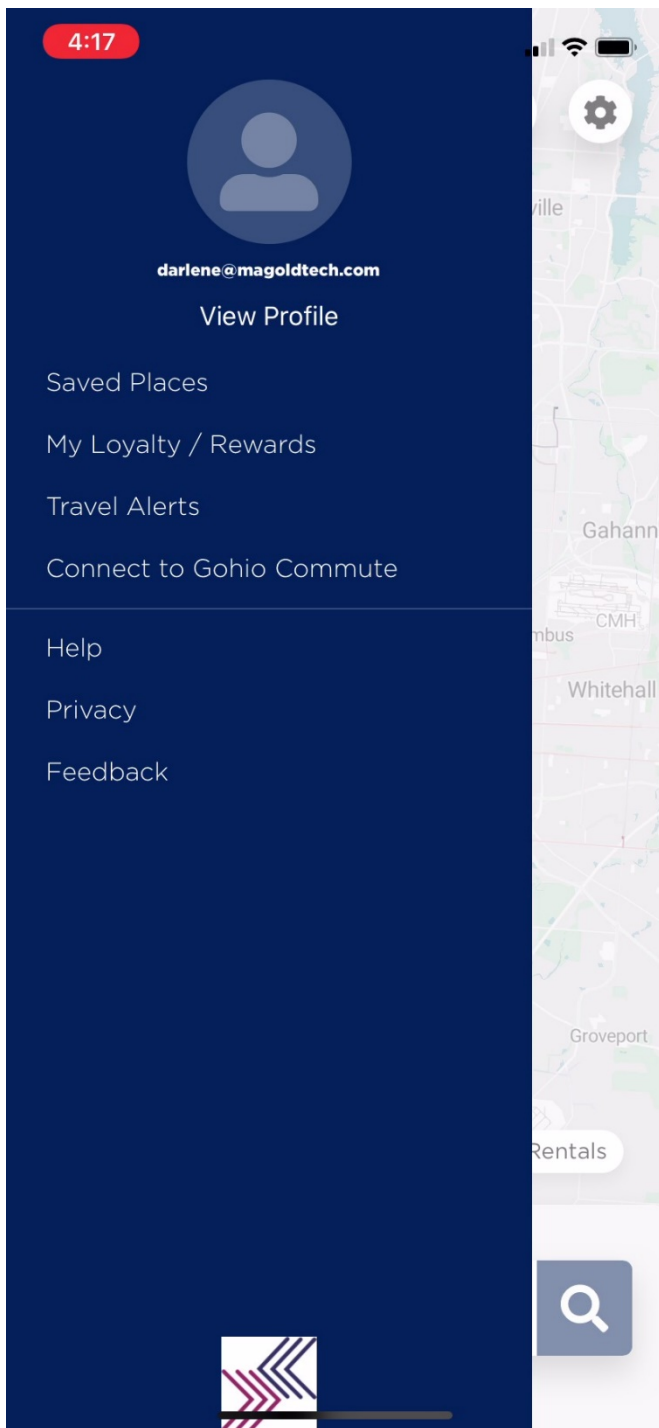


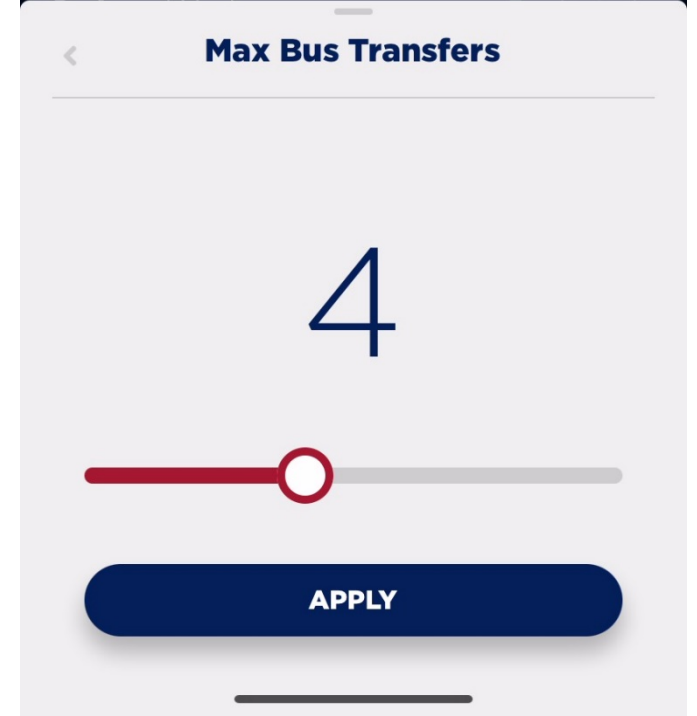
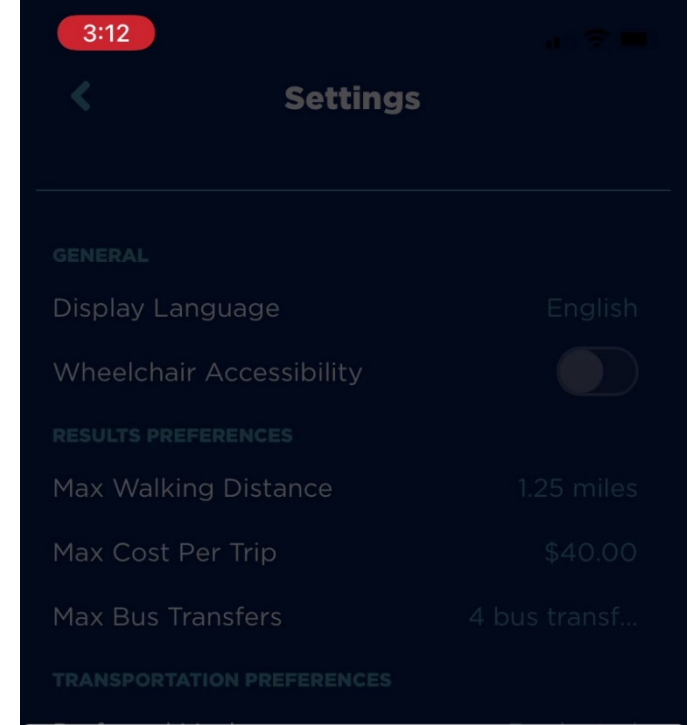
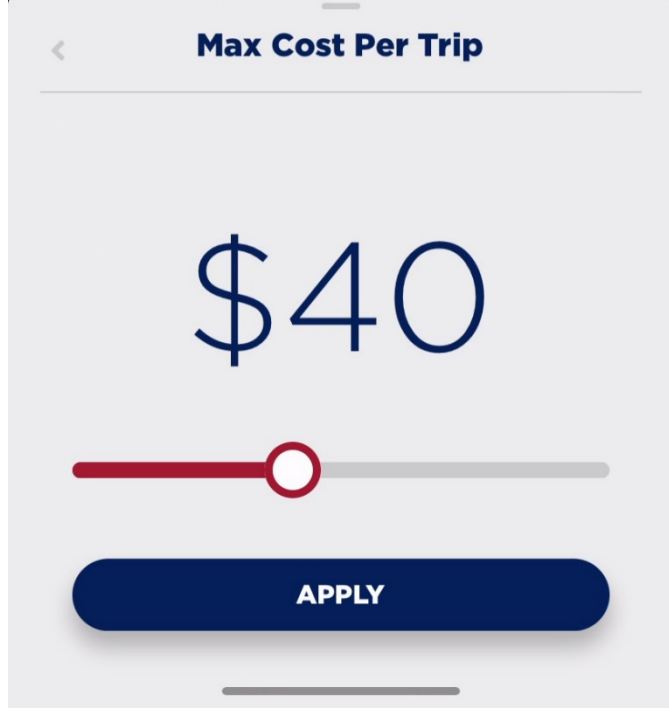
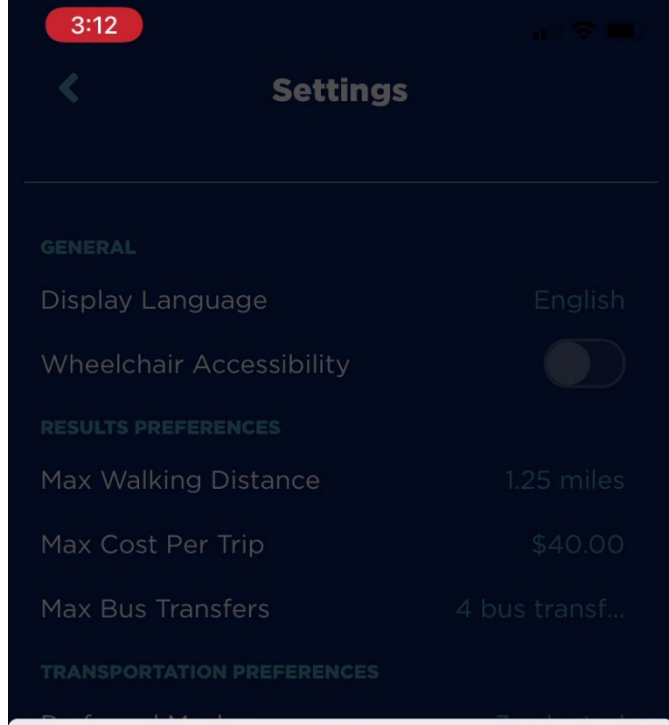
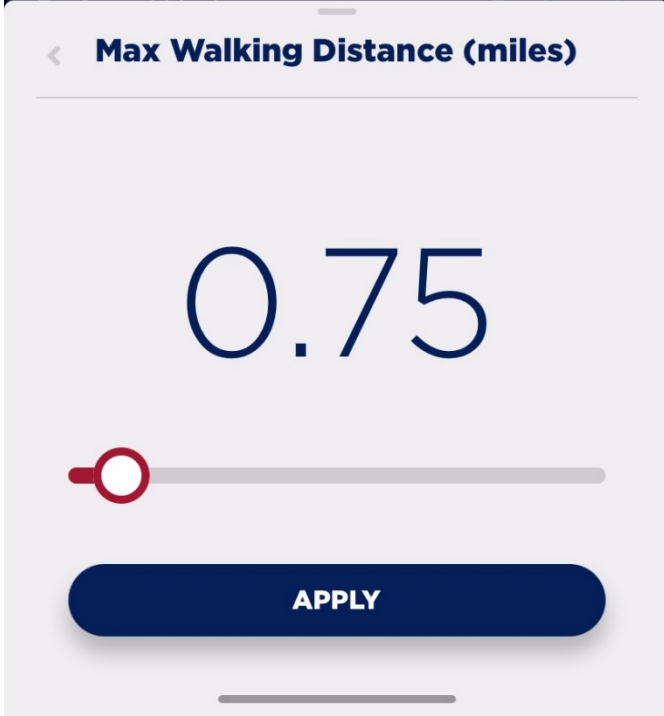
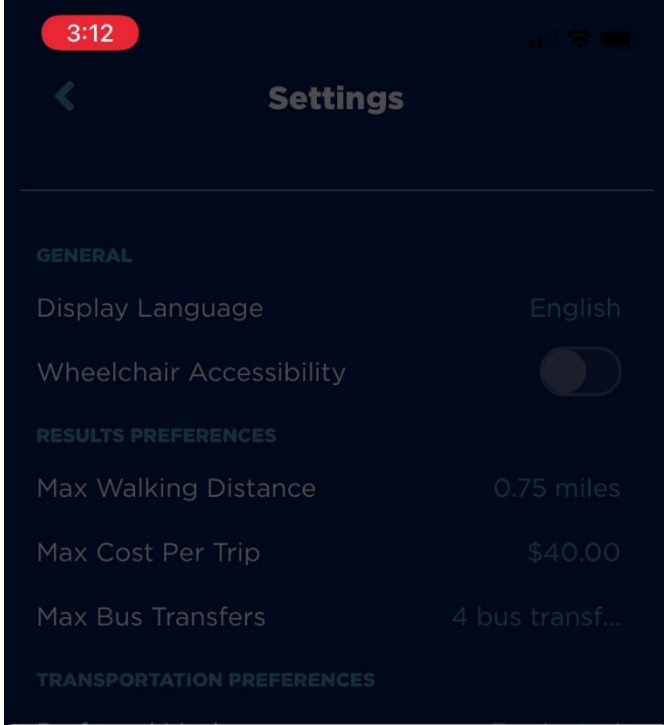
COVID

Features

Pivot helps you find the best way to get where you're going using different travel options available in Central Ohio.

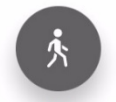






Preferred Modes

PERSONAL



WALK



CAR

BIKE



PUBLIC TRANSIT



COTA



OSU CABS

RIDE HAIL



SCOOTER



Preferred Modes

PERSONAL



WALK



CAR

BIKE



PERSONAL



COGO

PUBLIC TRANSIT



COTA



OSU CABS

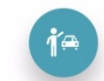
RIDE HAIL



YELLOW CAB



LYFT



UBER

SCOOTER



BIRD



LIME

Settings

GENERAL

Display Language English

Wheelchair Accessibility

RESULTS PREFERENCES

Max Walking Distance 1.25 miles

Max Cost Per Trip \$40.00

Max Bus Transfers 1 bus transfer

TRANSPORTATION PREFERENCES

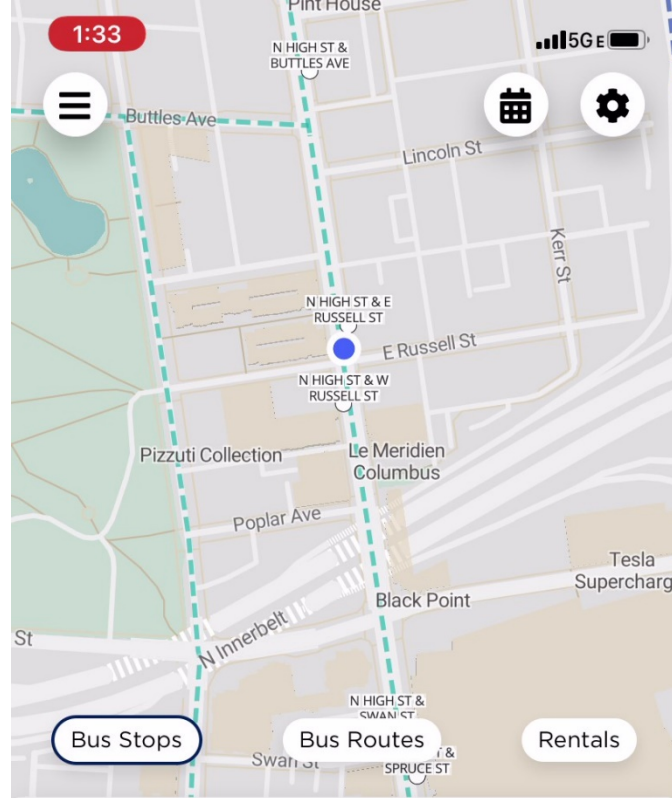
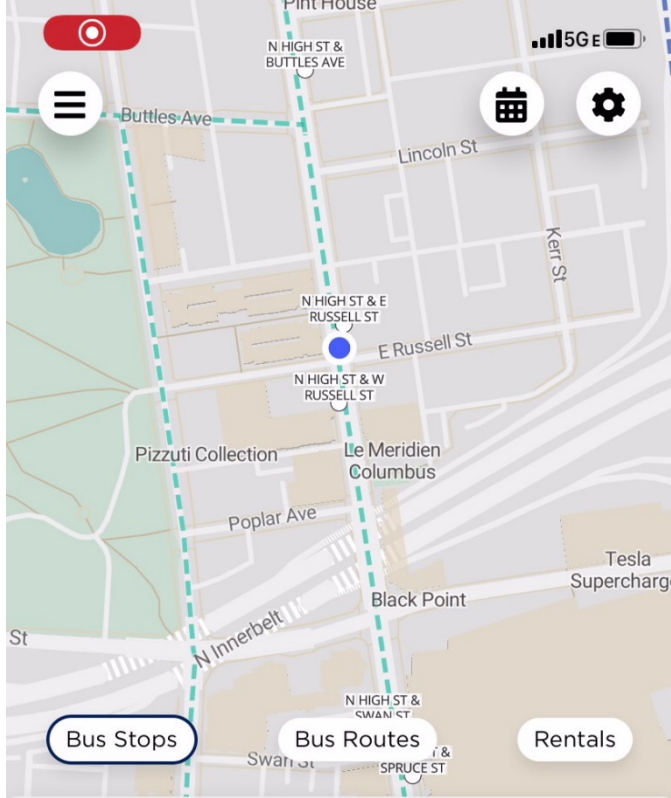
Preferred Modes 6 selected

NOTIFICATIONS

Push

SMS

Email



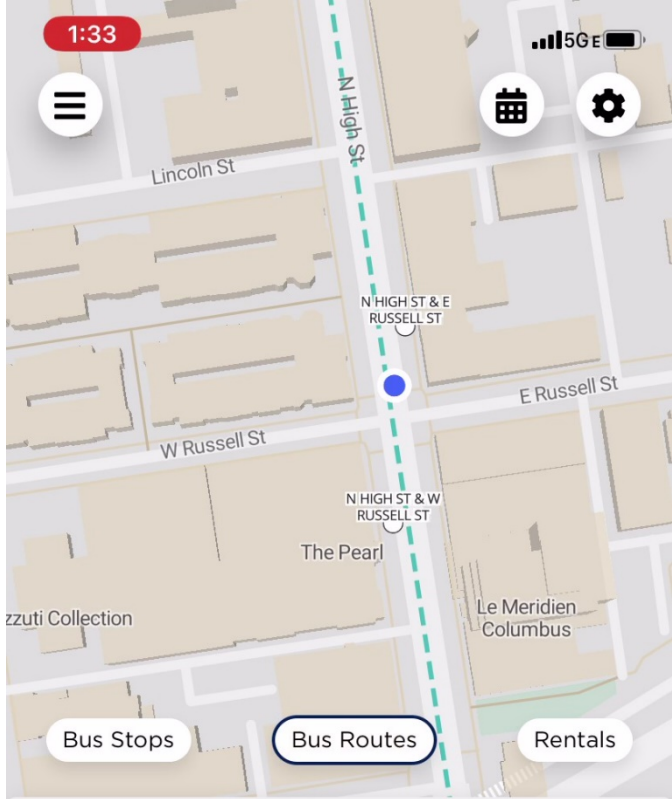
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1308	N HIGH ST & W RUSSELL ST
8136	N HIGH ST & WARREN ST
4096	N HIGH ST & SWAN ST
1306	N HIGH ST & W HUBBARD AVE
4095	N HIGH ST & SPRUCE ST
1515	SUMMIT ST & WARREN ST

1178	N HIGH ST & E RUSSELL ST
1308	N HIGH ST & W RUSSELL ST
8136	N HIGH ST & WARREN ST
4096	N HIGH ST & SWAN ST
1306	N HIGH ST & W HUBBARD AVE
4095	N HIGH ST & SPRUCE ST
1515	SUMMIT ST & WARREN ST

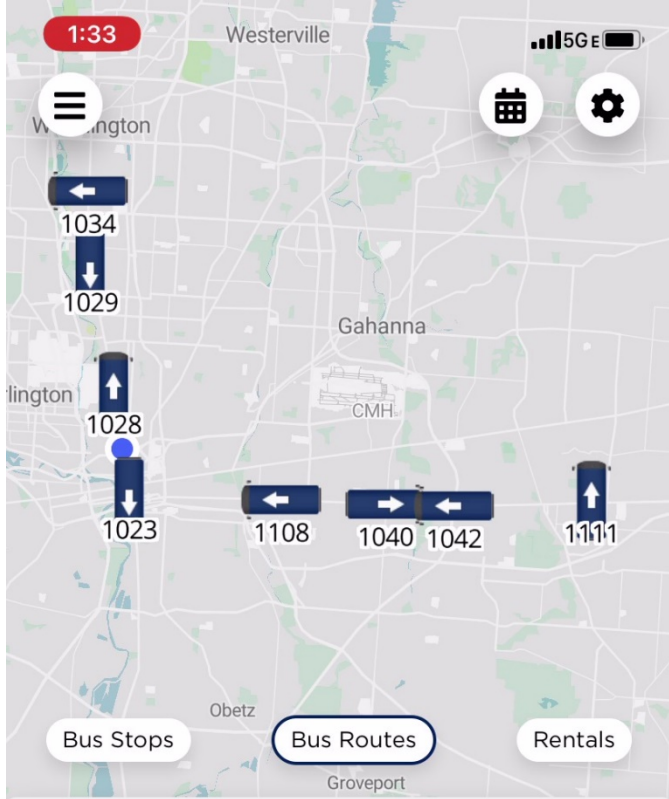
COTA

N HIGH ST & E RUSSELL ST

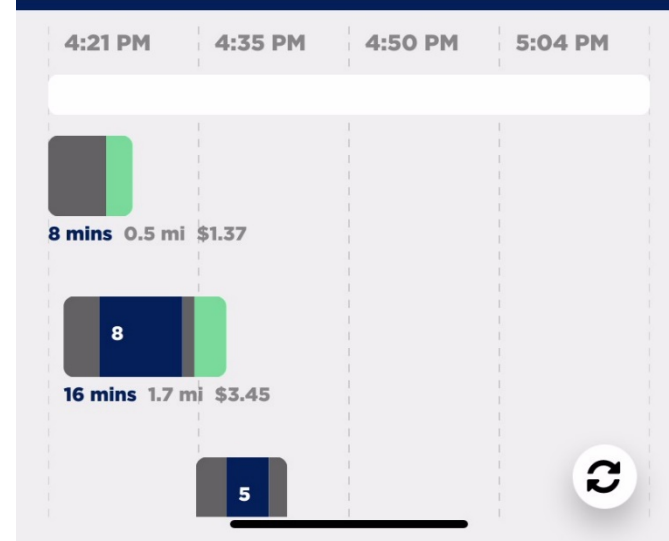
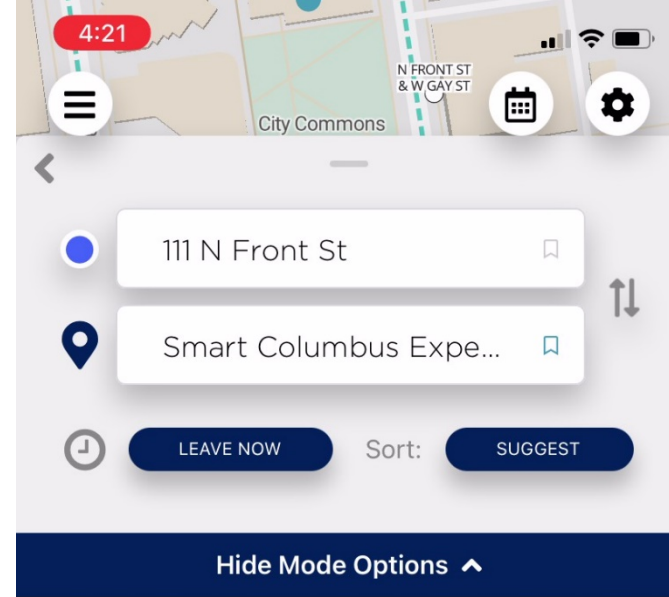
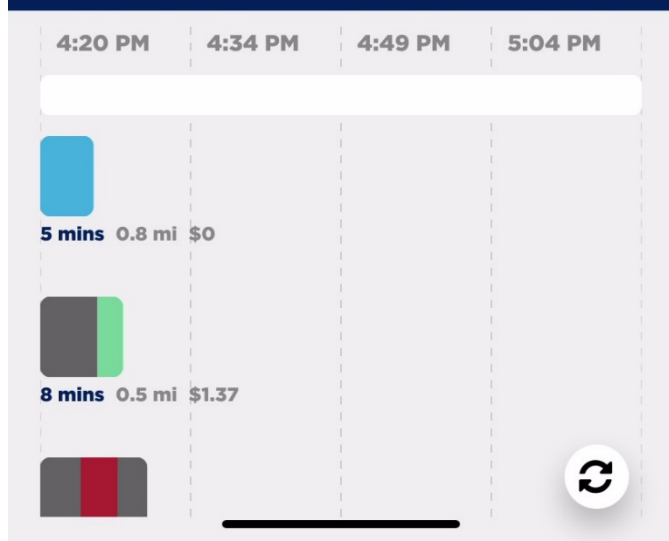
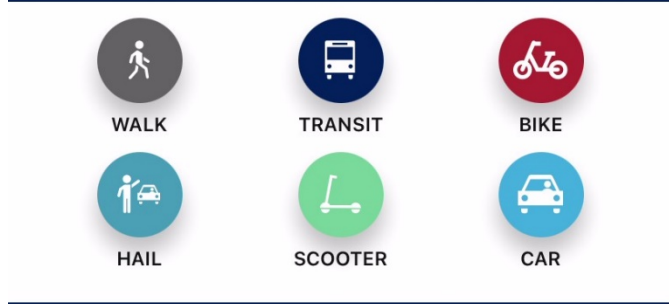
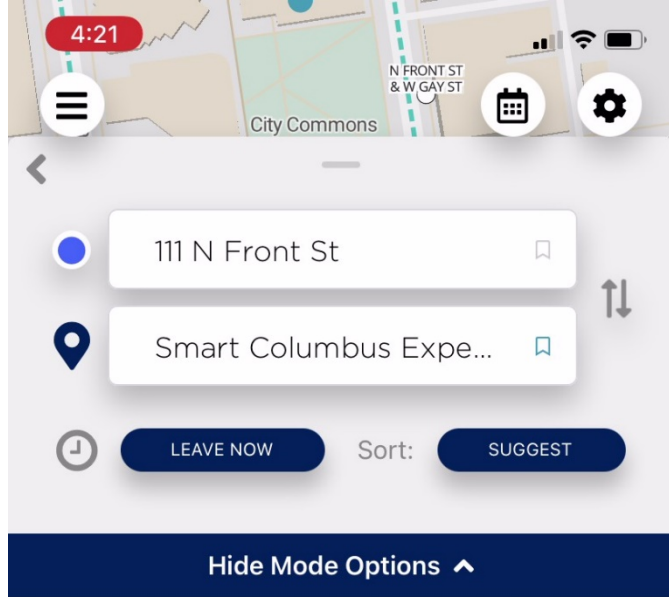
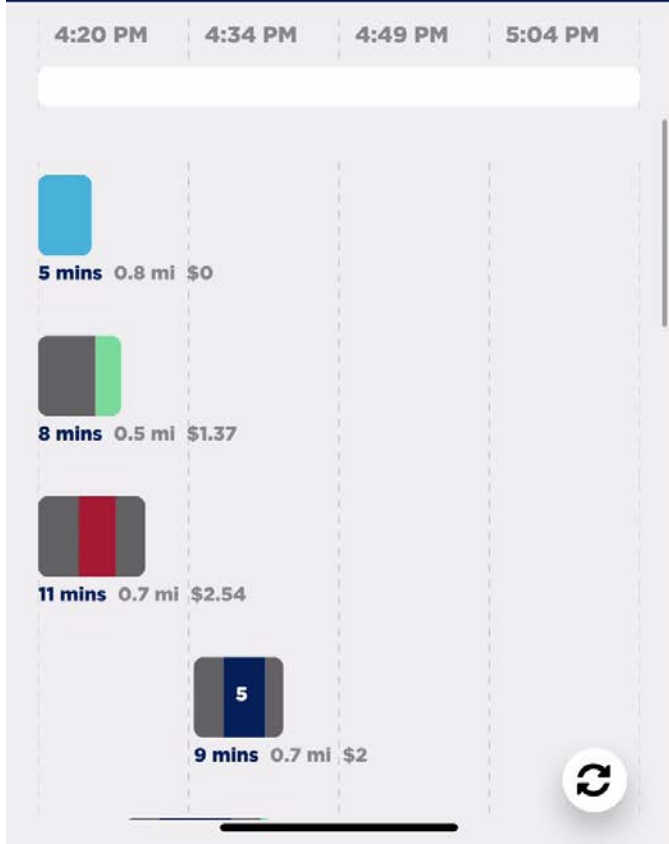
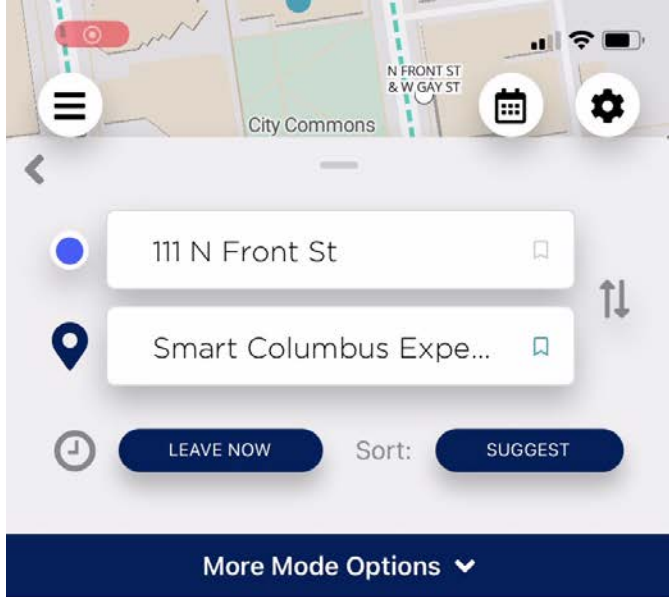
1	TO SAWMILL AND BETHEL	📶	🕒 1:39 PM	bus 1223
2	TO HIGH AND FENWAY	📶	🕒 1:42 PM	bus 1210
2	TO HIGH AND FENWAY	📶	🕒 1:58 PM	bus 1108
5	TO RENNER ROAD PARK AND RIDE	📶	🕒 2:07 PM	bus 1514
1306	N HIGH ST & W HUBBARD AVE			
4095	N HIGH ST & SPRUCE ST			
1515	SUMMIT ST & WARREN ST			



- 1 - KENNY/LIVINGSTON
- 2 - E MAIN/N HIGH
- 3 - NORTHWEST/HARRISBURG
- 4 - INDIANOLA/LOCKBOURNE
- 5 - W 5TH AVE/REFUGEE
- 6 - CLEVELAND/SULLIVANT
- 7 - MT VERNON



- 1 - KENNY/LIVINGSTON
- 2 - E MAIN/N HIGH
- 3 - NORTHWEST/HARRISBURG
- 4 - INDIANOLA/LOCKBOURNE
- 5 - W 5TH AVE/REFUGEE
- 6 - CLEVELAND/SULLIVANT
- 7 - MT VERNON



5:10

Smart Columbus Expe...
Scioto Audubon Metro...

LEAVE NOW Sort: SUGGEST

More Mode Options ▾

5:10 PM	5:24 PM	5:38 PM	5:52 PM
 11 mins 1.8 mi \$0			
		 17 mins 1.4 mi \$2.97	
			 24 mins 2 mi \$2
			 20 mins 2.1 mi \$5.21
			 27 mins 1.8 mi \$2

5:11

Smart Columbus Expe...
Scioto Audubon Metro...

LEAVE NOW Sort: SUGGEST

More Mode Options ▾

5:10 PM	5:24 PM	5:38 PM	5:52 PM
			 17 mins 1.4 mi \$2.97
			 24 mins 2 mi \$2
			 20 mins 2.1 mi \$5.21
			 27 mins 1.8 mi \$2
			 19 mins 2.1 mi \$5.21
			 12 mins 1.8 mi \$6 - \$9
			 13 mins 2.1 mi \$7 - \$10

5:11

Spaghetti Warehouse COSI Columbus

RIVER SOUTH

Cultural Arts Center

Chance Snow Showers

17 mins (1.4 mi)
0 bus transfers \$2.97

START

Walk 6 mins 5:10 PM
less than 0.25 mi

COGO \$2.97 5:15 PM
1.1 mi **9 LEFT**

Walk 4 mins 5:22 PM
less than 0.25 mi

5:11 9th Ave E 9th Ave SUMMIT ST & E 9TH AVE N 4TH ST & E 9TH AVE

S High St & w Blenkner St → 420 W Whittier St

Tap to edit locations

! If you do not make it for your bus, you can view other trip options.

Show Me

Chance Snow Showers

5 3 mins

12 mins (1.8 mi)
0 bus transfers \$6 - \$9

START

Walk 2 mins
less than 0.25 mi 5:10 PM

COTA
5 WEST FIFTH REFUGEE TO GENDER ROAD \$2.00

#7466 - S FRONT ST & W TOWN ST 5:12 PM
delayed 2 mins

S HIGH ST & W MAIN ST

S HIGH ST & W MOUND ST

#2201 - S HIGH ST & W BLENKNER ST 5:16 PM

Lyft 5:16 PM

Arrive at Destination 5:22 PM

5:11 W Rid St E Main St

S High St & w Blenkner St → 420 W Whittier St

Tap to edit locations

3-5 min

Pisocia Vera

Kroger

The Book Loft of German Village

Scioto Audubon Metro Park

Wendy's

BREWERY DISTRICT

Promo applied: 10% off, up to \$3

Lyft 3

Get there by 5:18-5:20 PM

Show less

Pickup in 3-5 min \$7.50
Standard \$8.33

Pickup within 15 min \$6.61
Wait & Save

Preferred \$10.48
3 New 5:19 PM

PayPal + Promo Schedule

Select Lyft

5:12

Path
CONTINUE FOR LESS THAN 1 MINUTE

! If you do not make it for your bus, you can view other trip options.

Show Me

5:22 PM 12 mins END

2 mins

13 mins (1.8 mi)
0 bus transfers \$6 - \$9

Walk 2 mins
less than 0.25 mi 5:10 PM

COTA
5 WEST FIFTH REFUGEE TO GENDER ROAD \$2.00

#7466 - S FRONT ST & W TOWN ST 5:12 PM
delayed 2 mins

S HIGH ST & W MAIN ST

S HIGH ST & W MOUND ST

#2201 - S HIGH ST & W BLENKNER ST 5:16 PM

Lyft 5:16 PM

Arrive at Destination 5:22 PM



empowered mobility

 **LEARN MORE**

**SIGN UP FOR OUR
E-NEWSLETTER**

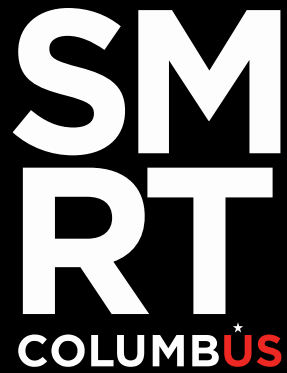
CONTACT:

SmartColumbus@columbus.gov

columbus.gov/smartcolumbus



@SmartCbus



Mandy K. Bishop, PE, SI
Deputy Director of Public Service/
Smart Columbus Program Manager
City of Columbus
mkbishop@columbus.gov
Twitter: @mandy614njnerd

THANK YOU

