Pedestrian Accessiblity in Google Maps

UX Case Study

Introduction

Google Maps is used everyday by pedestrians to navigate through cities and neighborhoods. However, the app's navigation system doesn't account for the different mobility needs and abilities of pedestrians. Pedestrians that travel in alternative ways are constantly met with obstacles that prevent them from reaching their destination safely and quickly.

Project Context	Timeline	Roles	Team
MIS 585	12 weeks	Research	Manuela Perez Luna
Final Project	Sep 2022 - Dec 2022	Ideation	Neha Kuchipudi
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Current State

Google Maps features two accessibility features: Accessible Places and Accessible Transit. These two features provide important accessibility information on buildings and public transit options.

The Problem

The current state of accessibility in Google Maps doesn't account for an important part — the pedestrian path. The route leading up to a destination can have hazards and obstacles that make it inaccessible and prevent some users from reaching their destination safely and quickly. Along with that, not all pedestrians are the same, everyone has different mobility levels and abilities. Different mobility devices have unique needs and Google Maps only accounts for one.

Competitive Analysis

We completed a competitive analysis of the three most popular navigation maps on the market and the only two navigation apps geared towards wheelchairs. The three most popular navigation apps are focused on driving navigation. The two navigation apps geared towards wheelchairs do not provide adequate information.

Driving route information ie. tolls, highways, etc.	✓	✓	✓	✗	✗
Driving route customization ie. avoiding tolls, highways, etc.	✓	✓	✓	✗	✗
Driving hazard reporting ie. reporting crashes, police, etc.	✓	✓	✓	✗	✗
Pedestrian accessibility information ie. stairs, terrain, etc.	✓	✗	✗	✗	✓
Pedestrian route customization ie. avoiding stairs, terrain, etc.	✗	✗	✗	✗	✗
Pedestrian hazard reporting ie. reporting hazards on sidewalk	✗	✗	✗	✗	✗
Building accessibility information ie. accessibility of entrances, elevators, etc.	✓	✗	✗	✓	✓
Transit accessibility information ie. accessibility of trains, buses, etc.	✓	✗	✗	✓	✓
Voice navigation guidance ie. narrated navigation directions	✓	✓	✓	✗	✗
Voice commands ie. hands-off voice hazard reporting	✓	✗	✗	✗	✗

Market Research

A solution to alleviate this problem wouldn't just serve mobility aid users, but any pedestrian that travels in alternative ways.

MOBILITY AID USERS

1.7 million Americans use wheelchairs or scooters and another 6.1 million Americans use other mobility aid devices. 6.5 million Americans use canes, crutches or other similar assistive devices.

BABY TRANSPORT USERS

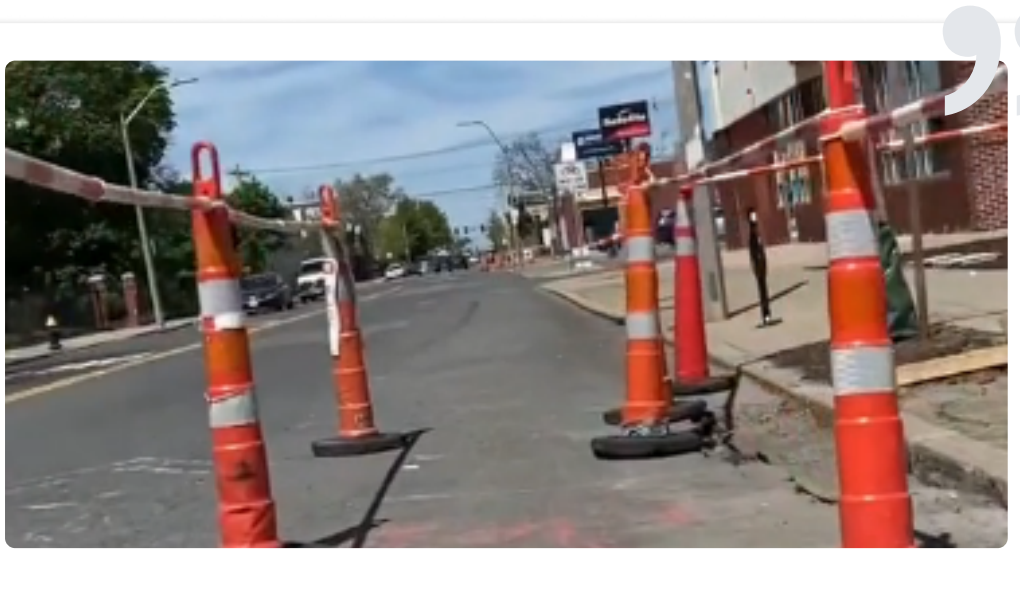
95% of parents reported using strollers for babies under the age of one; 94% of parents reported using strollers for babies 1-2 years of age and 75% reported using for babies 2-3 years of age.

MICROMOBILITY USERS

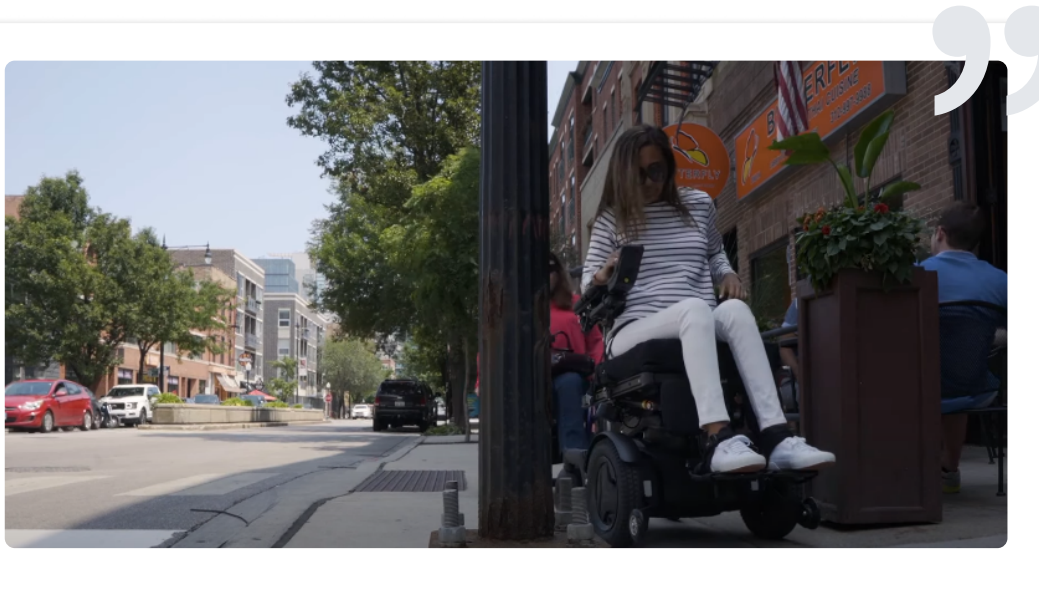
52 million Americans use bikes for recreational purposes or to commute to places. Shared micromobility is becoming an increasingly popular mode of travel in cities as well.

User Research

We learned more about our user's current experience through videos and interviews.



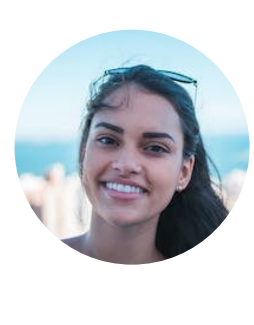
> The route I wanted to go on was blocked by a big sign that said "detour" and I couldn't get around it... The detour had sidewalks closed with no curb cuts **so I had to just ride on the road.**
>
> — Niki



> If it's raining or the weather is bad and there's a lot of obstacles... **it takes me 10 minutes to get down any sidewalk** when anyone else who's able-bodied can just walk right down.
>
> — Michelle

User Personas

Based on our user research, we were able to develop a few personas that summarized the needs, goals and pain points of our users.



Ameya (they/them)

Boston, MA

Ameya has an apartment in a metropolitan area and works a remote tech job. They have a car, but prefer to use their electric wheelchair to travel around the area and run errands as everything they need is in close proximity to their apartment.

Frustrations

- ✗ Places are too crowded to operate wheelchair in
- ✗ Has to drive wheelchair on road when sidewalk is inaccessible
- ✗ Unexpected construction or obstacles obstruct sidewalks
- ✗ Has to spend time finding a detour if route is inaccessible

Goals

- ✓ Reach destination safely in wheelchair
- ✓ Reach destination quickly in wheelchair
- ✓ Prevent damage to wheelchair

Lori (she/her)

Salem, NH

Lori lives in a house in the outskirts of the city. She's a new mother and is on maternity leave from her job. She likes to spend time outside and get out of the house, so she regularly pushes her baby in a stroller when she walks around her neighborhood.

Frustrations

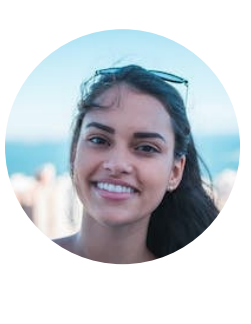
- ✗ Pushing the stroller uphill can get tiring
- ✗ Sudden dead ends on sidewalks are frustrating
- ✗ Unexpected construction disturbs her baby
- ✗ Tricky to estimate walking conditions outdoors

Goals

- ✓ Safely walk in neighborhood
- ✓ Keep her baby safe
- ✓ Prevent damage to stroller
- ✓ Enjoy her walk

Journey Map

We developed a journey map that documented one of our user persona's current experience.



Ameya (they/them)

Ameya is trying to go to an ice cream shop near their apartment.

	Plan	Select Route	Start Route	Obstacle	Adjust Route	Turn Back
User Action	Ameya searches for and finds an ice cream shop nearby. Ameya checks the accessibility information of the ice cream shop.	Ameya selects quickest route to ice cream shop.	Ameya follows directions along selected route.	There is construction on the sidewalk along the route. Ameya can't get their wheelchair past the construction.	Ameya tries to find an alternate route to the ice cream place around the construction.	Ameya doesn't want to risk damage to their wheelchair or spend time finding another route to the ice cream shop so they turn back home.
User Goal	Find an accessible ice cream shop.	Get to ice cream shop quickly and safely.	Get to ice cream place quickly and safely.	Find a way around the construction.	Find another route to safely and quickly get to ice cream place and avoid construction.	Get back home safely.
Interface	Mobile Google Maps app shows nearby ice cream shops.	Mobile Google Maps app shows viable routes to ice cream shop.	Mobile Google Maps app alerts Ameya of turns and directions via voice dictation.	Mobile Google Maps app directs user to follow route with construction on sidewalk.	Mobile Google Maps shows alternate routes to the ice cream place from location.	Close out of Google Maps app.
Feelings	• I'm in the mood to eat ice cream. • How do I get to the ice cream place? • I hope the ice cream place is wheelchair accessible.	• I hope this route is wheelchair accessible. • I hope I don't encounter any obstacles in my path.	• Did I take the right turn? • I can't check my phone since I'm busy operating my wheelchair.	• This construction was unexpected. • How do I get around this construction? • Should I just drive on the road instead?	• Is it even worth it to spend time finding another route? • Will this alternate route have more hazards and obstacles for my wheelchair?	• I didn't get to buy ice cream. • I don't want to risk damage to my wheelchair.
Issues	• Ameya doesn't know how to get to ice cream place.	• Obstacles and hazards are not shown on map. • Ameya can't plan their route ahead of time.	• Ameya can't check phone while operating wheelchair.	• Sidewalk is inaccessible. • Construction was unexpected. • Ameya couldn't plan their route around the construction ahead of time.	• Google Maps doesn't show upcoming hazards on the route.	• Google Maps doesn't show upcoming hazards on the route. • Google Maps doesn't show wheelchair accessible routes.
Experience	🙂	😐	😐	☹	😐	☹

Hazard Research

We researched the limits of different mobility devices and factors that affect them. We identified a few key hazards that users of mobility devices should be aware of as they can cause damage or inhibit the performance of their device.

Inclement weather
Rain, icy sidewalks

Uneven Terrain
Unpaved sidewalks, bumps

Steps
Staircases, curb cuts

Steep Inclines
Steep incline hills

Steep Declines
Steep decline hills

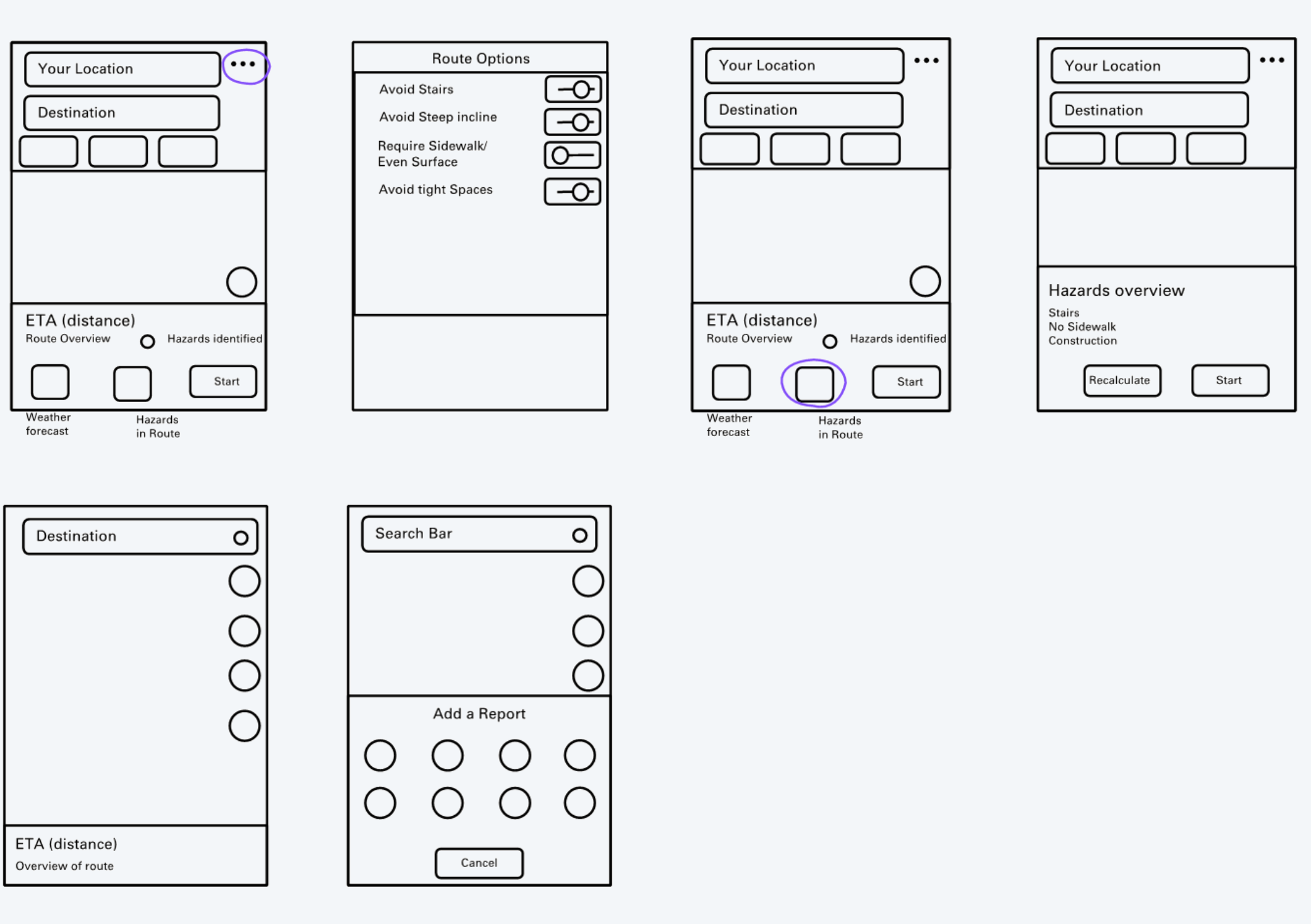
Construction
Sidewalk construction

Sidewalk dead ends
Sudden sidewalk dead ends

Crowded Areas
High foot traffic, crowds

Object on sidewalk
Obstructions on sidewalk

LOFI WIREFRAMES


Your Location
Destination
ETA (distance)
Route Overview
Hazards identified
Start
Weather forecast
Hazards in Route
Route Options
Avoid Stairs
Avoid Steep incline
Require Sidewalk/ Even Surface
Avoid tight Spaces
Hazards overview
Stairs
No Sidewalk
Construction
Recalculate
Overview of route
Search Bar
Add a Report
Cancel

Report Icongraphy

We altered the original colors of the icons of reports on the map so they're accessible and easy to identify.

ORIGINAL COLORS

✗ Fails WCAG contrast ratio

→

FIXED COLORS

✓ Passes WCAG contrast ratio

Multiple Reports in an Area

To prevent unreadable clusters of multiple reports in an area, we created a component that shows the number of reports and the icons of the types of reports. Pedestrians can zoom in on the area for more information and exact locations of the reports.

6 reports

Images and Captions for Reports

Allowing users to add image and captions to reports to describe hazards helps those with auditory or visual disabilities.

Add a caption to describe the report

Add a photo

Hands-Free Reporting and Alerts

Use of Google Assistant for voice commands and diction allows those who may not be able to use their hands with their mobility aid the ability to report hazards and be alerted of upcoming reports.

Hey Google, report uneven terrain.

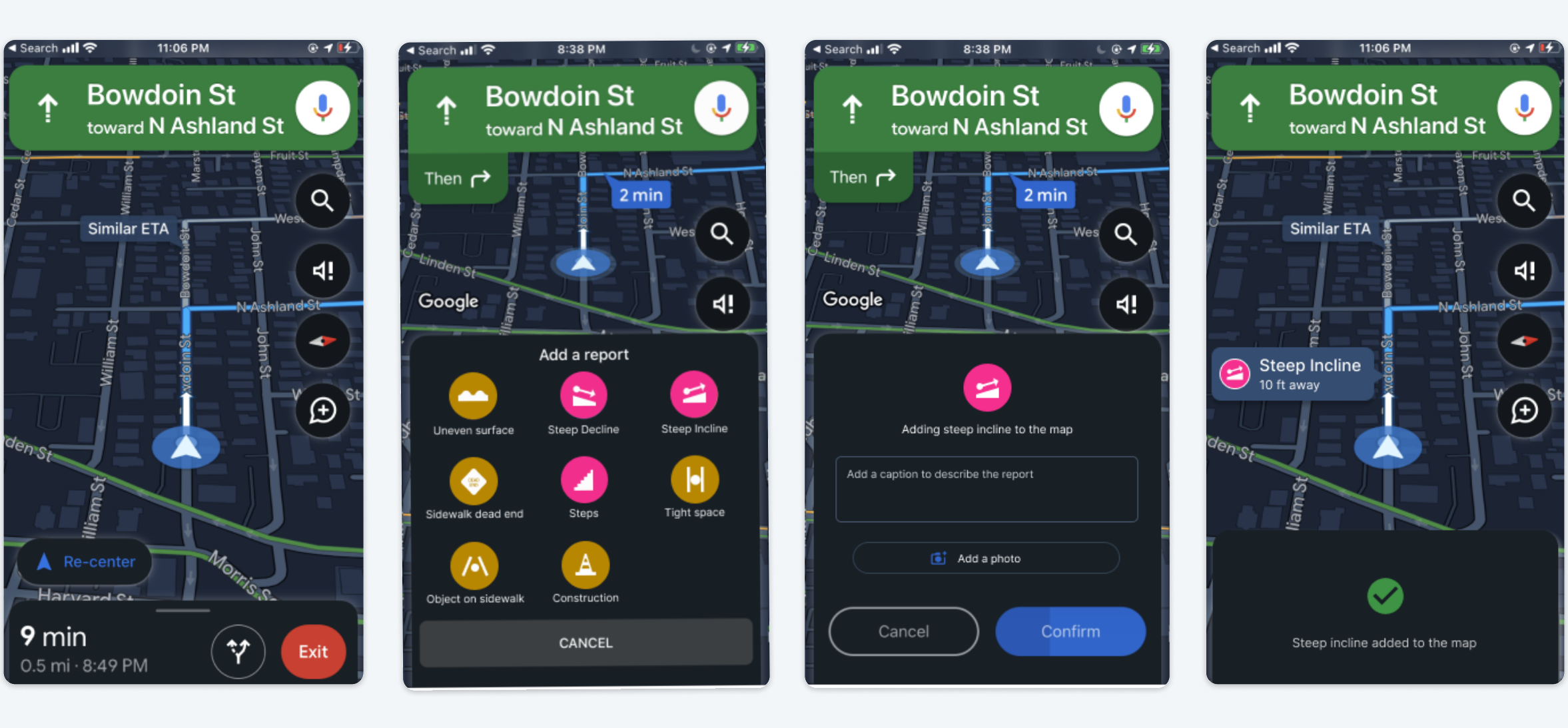
OK, uneven terrain reported.

Object on sidewalk reported ahead. Object is described as "a red scooter."

HIFI WIREFRAMES

Reporting

Any Google Maps user can add reports to the map. Users can select from an array of report types and add an image and caption to the report as well.

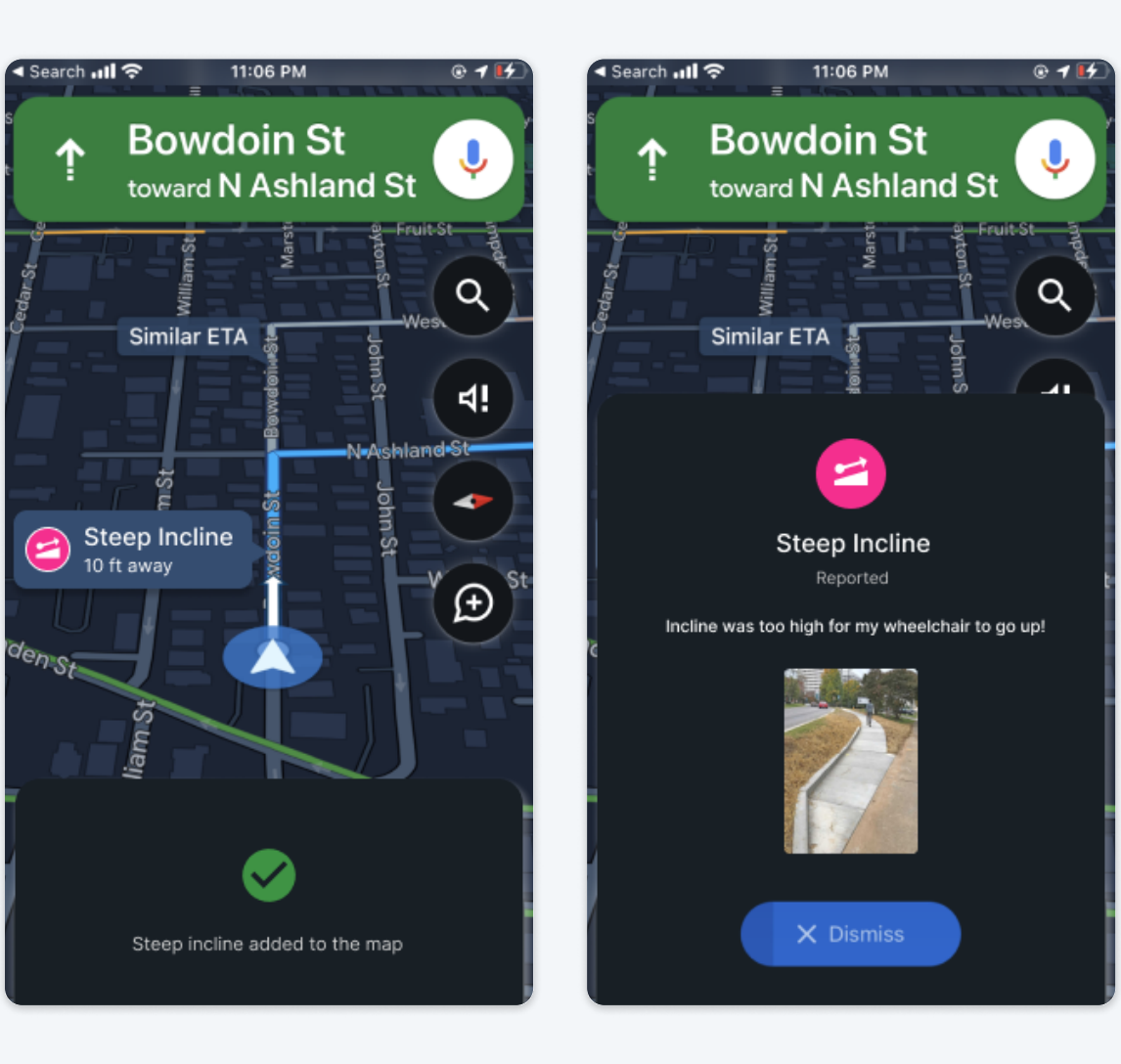

Bowdoin St
toward N Ashland St
Similar ETA
Re-center
9 min
0.5 mi · 8:49 PM
Exit
Then
2 min
Google
Add a report
Uneven surface
Steep Decline
Steep Incline
Sidewalk dead end
Steps
Tight space
Object on sidewalk
Construction
CANCEL
Add a caption to describe the report
Add a photo
Cancel
Confirm
Steep Incline
10 ft away

Adding steep incline to the map

Steep incline added to the map

Upcoming Reports

Upcoming reports will show on the map. Users can click the reports for an image and caption description of the report. Google Assistant will also notify of upcoming reports verbally.

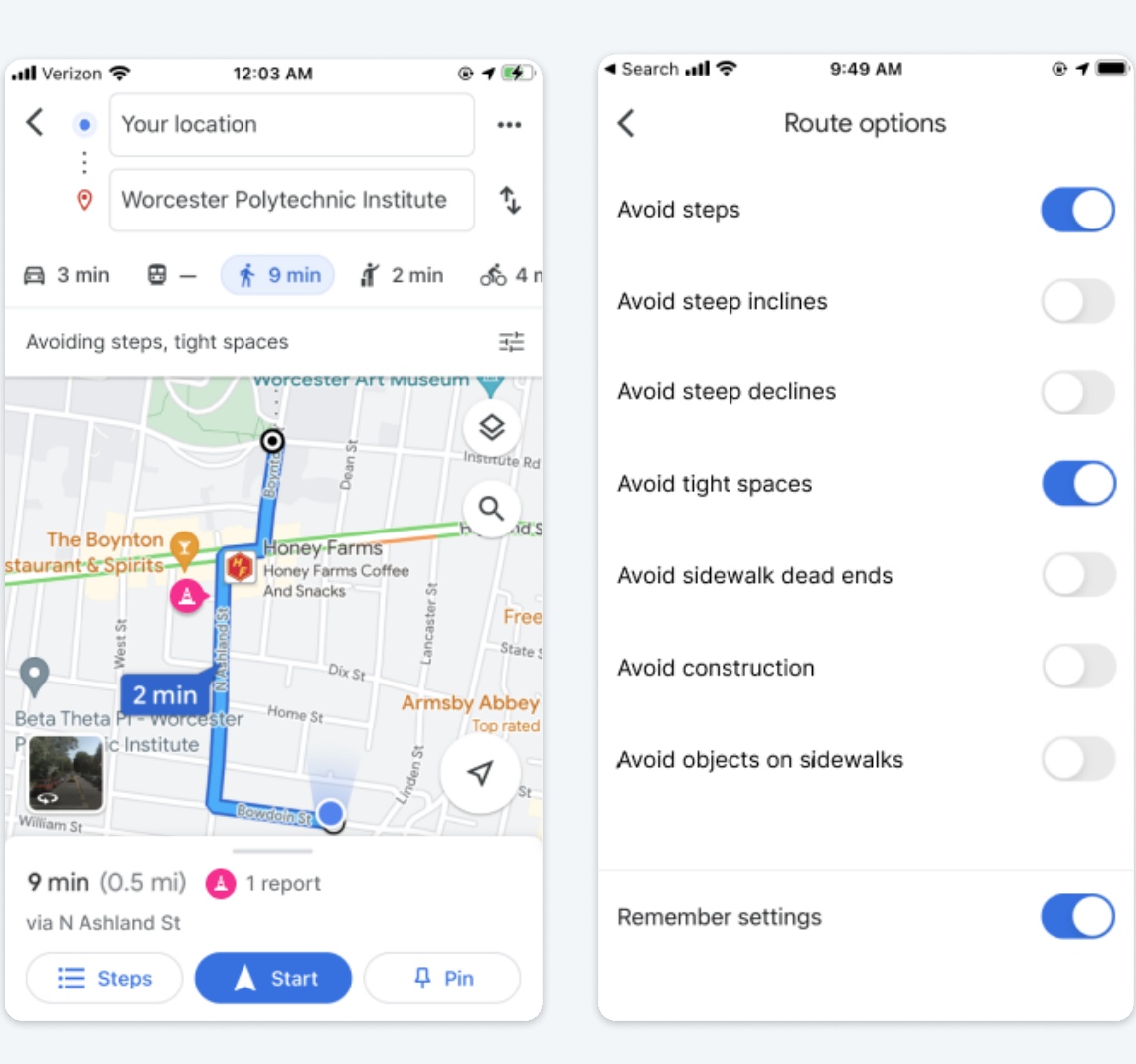

Bowdoin St
toward N Ashland St
Similar ETA
Steep Incline
10 ft away
Steep Incline
Reported
Dismiss

Steep incline added to the map

Incline was too high for my wheelchair to go up!

Customization

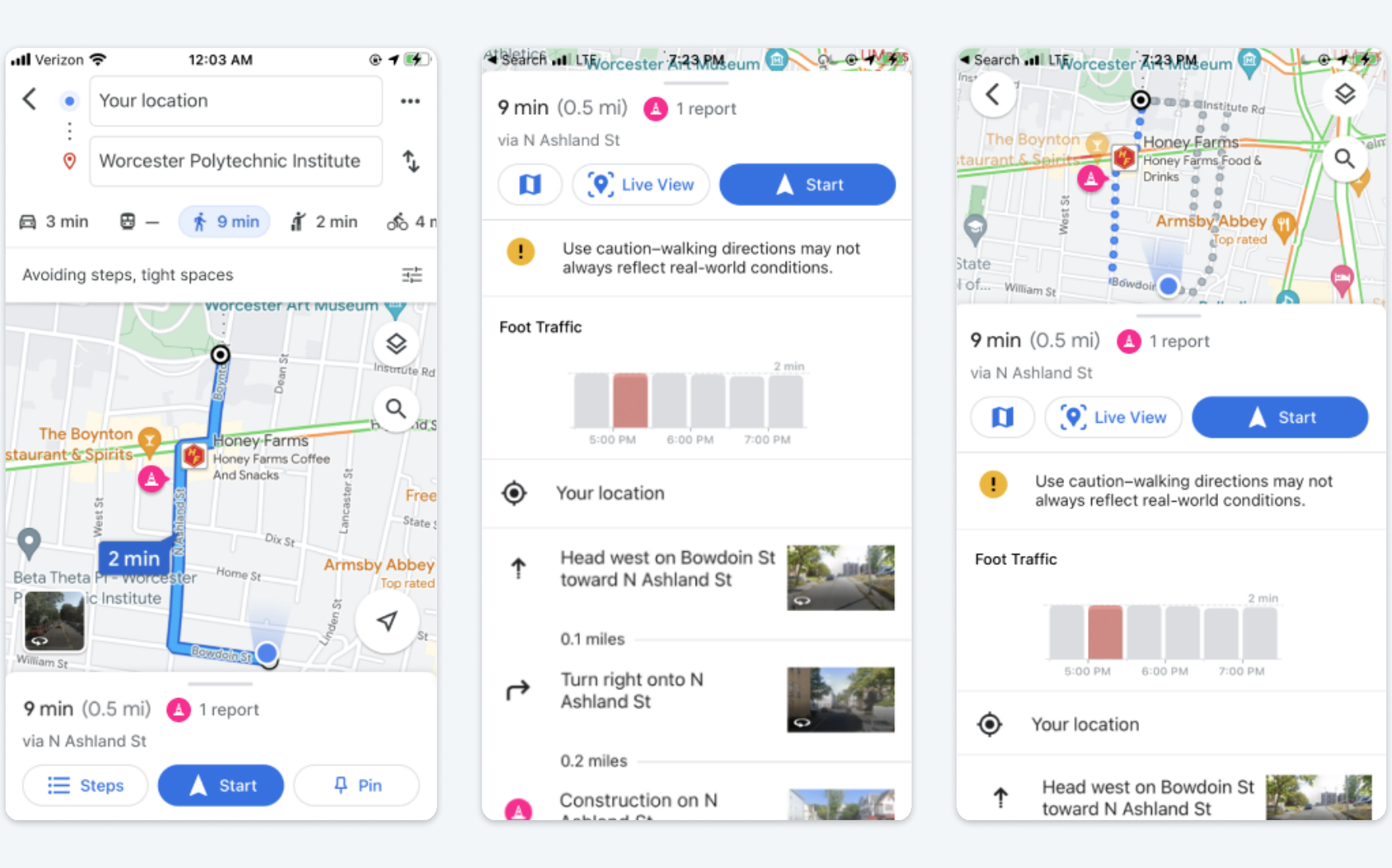
Upcoming reports will show on the map. Users can click the reports for an image and caption description of the report. Google Assistant will also notify of upcoming reports verbally.


Your location
Worcester Polytechnic Institute
3 min
9 min
2 min
Avoiding steps, tight spaces
9 min (0.5 mi)
1 report
via N Ashland St
Steps
Start
Pin
Route options

- Avoid steps ☑
- Avoid steep inclines ☐
- Avoid steep declines ☐
- Avoid tight spaces ☑
- Avoid sidewalk dead ends ☐
- Avoid construction ☐
- Avoid objects on sidewalks ☐
- Remember settings ☑

Alternate Routes

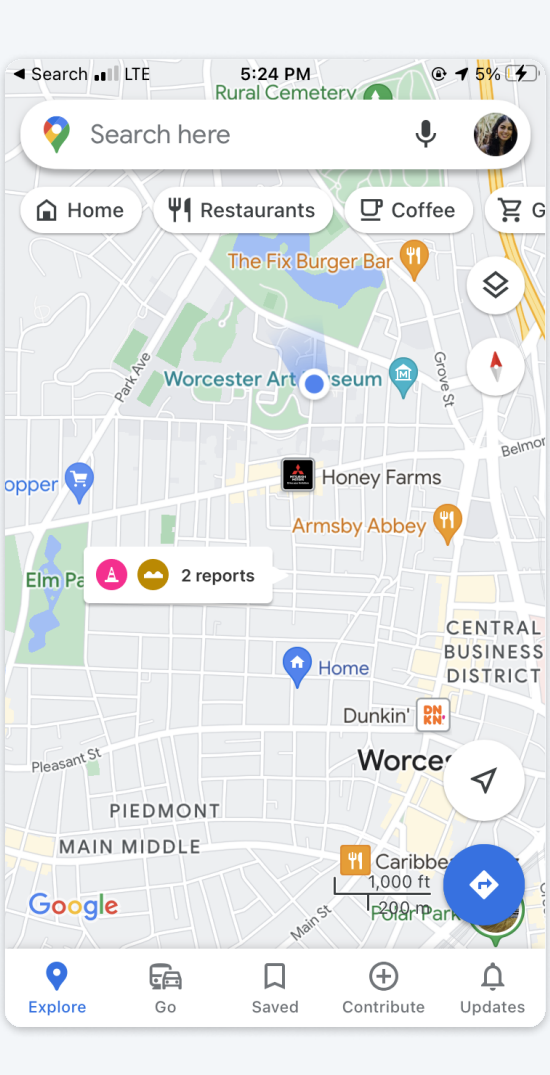
Google Maps will calculate routes based on the customizations that the user has added. Multiple routes are calculated and displayed for the user to choose from. Users can even see estimated foot traffic along that route.


Your location
Worcester Polytechnic Institute
Avoiding steps, tight spaces
9 min (0.5 mi)
1 report
via N Ashland St
Steps
Start
Pin
Live View
Foot Traffic
Your location
Head west on Bowdoin St toward N Ashland St
0.1 miles
Turn right onto N Ashland St
0.2 miles
Construction on N

Use caution–walking directions may not always reflect real-world conditions.

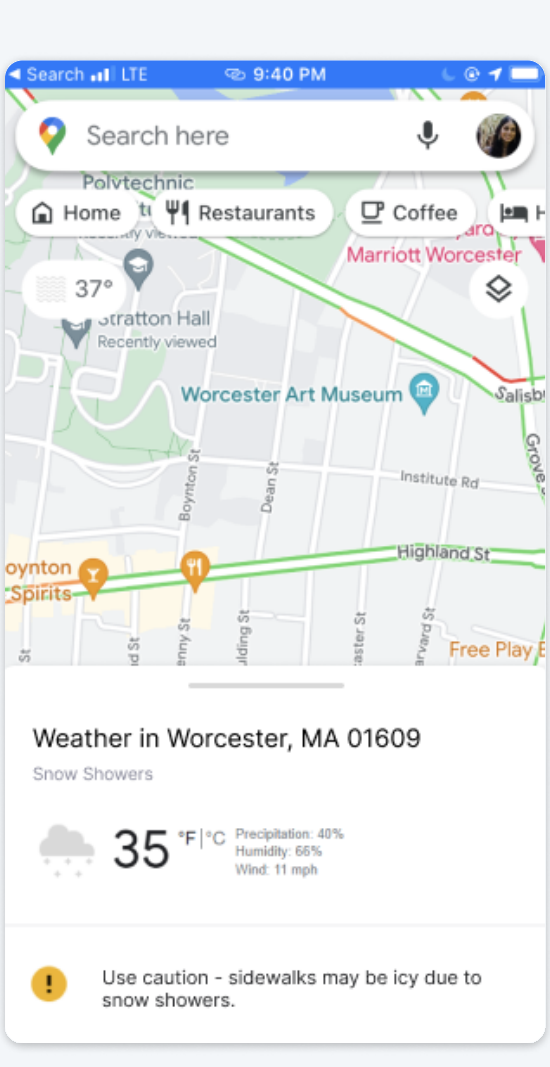
Reports on the Map

Users can see reports anywhere on the map, even if they're not following a route currently.


Search here
Home
Restaurants
Coffee
Worcester Art Museum
Honey Farms
Armsby Abbey
2 reports
CENTRAL BUSINESS DISTRICT
PIEDMONT
MAIN MIDDLE
Explore
Go
Saved
Contribute
Updates

Inclement Weather

Users can see the current weather and sidewalk conditions before they go out.


Search here
Home
Restaurants
Coffee
37°
Worcester Art Museum
35 °F|°C

Weather in Worcester, MA 01609

Snow Showers

Use caution - sidewalks may be icy due to snow showers.