NREL
Transforming ENERGY

Identifying ADA Paratransit Deserts, Availability, & Resilience

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Contents

1 Background: What is ADA Paratransit?

2 Problem Statement

3 Research Questions

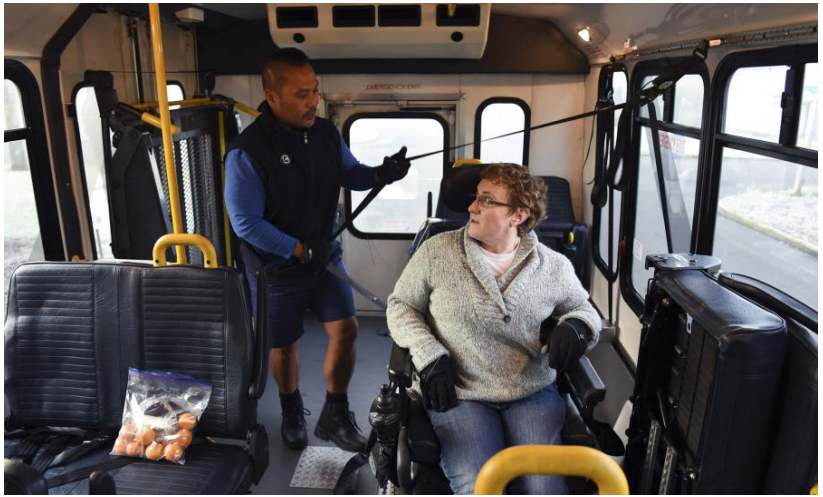
4 Data Sources

5 Methods

6 Major Difficulties

7 Conclusions

Background



What is ADA Paratransit?

The 5 W's of ADA Paratransit

Who: People with disabilities who cannot use fixed-route public transit

What: Door-door/curb-curb shared ride service

Where: Within three-fourths (3/4) of a mile of each bus route & rail station

When: Same days & hours as nearest fixed route
Next-day advance reservations required

Why: Americans with Disabilities Act
49 C.F.R. Part 37 (Federal Transit Administration)

Problem Statement

Advancement of Geographic Information Systems

- Scheduling software accurately disqualifies trips

But… there are no comprehensive ADA area maps

- Riders lack knowledge of service areas
- Planners can’t see how route cuts impact riders

High Costs & Energy Use of ADA Paratransit

Mode	kWh/pax-mile	$e_k = (E_k / \min_k E_k)$	Dollar/pax-mile
Walking	0.072	2.7	0
Biking	0.027	1	0
Driving	0.9	33	1.0*
Transit	0.65	24	1.6*
Paratransit	**4.13****	**153**	**3.85****

* P. Condon & K. Dow, A Cost Comparison of Transportation Modes (2009)

** Transportation Energy Data Book (2014)

Real World Example

Research Questions

Where?

is ADA service provided

When?

is ADA service provided

Who?

is impacted by service changes

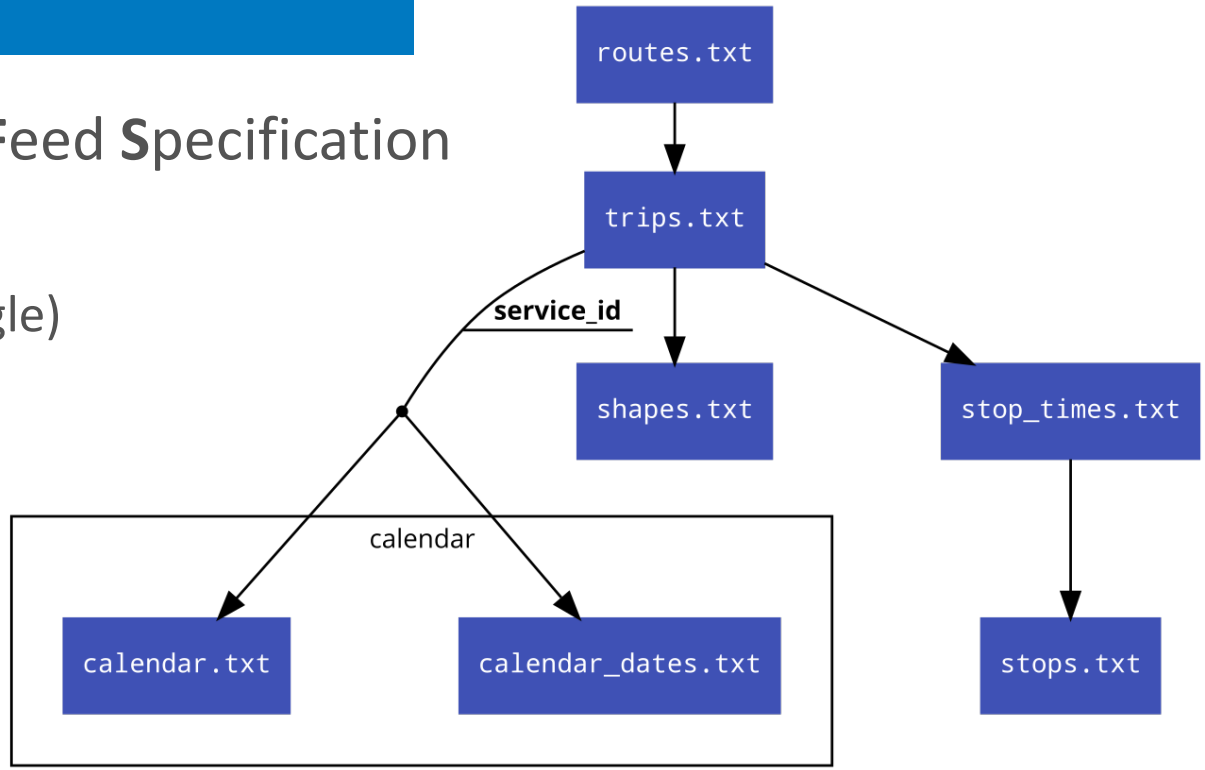
How resilient?

is the service

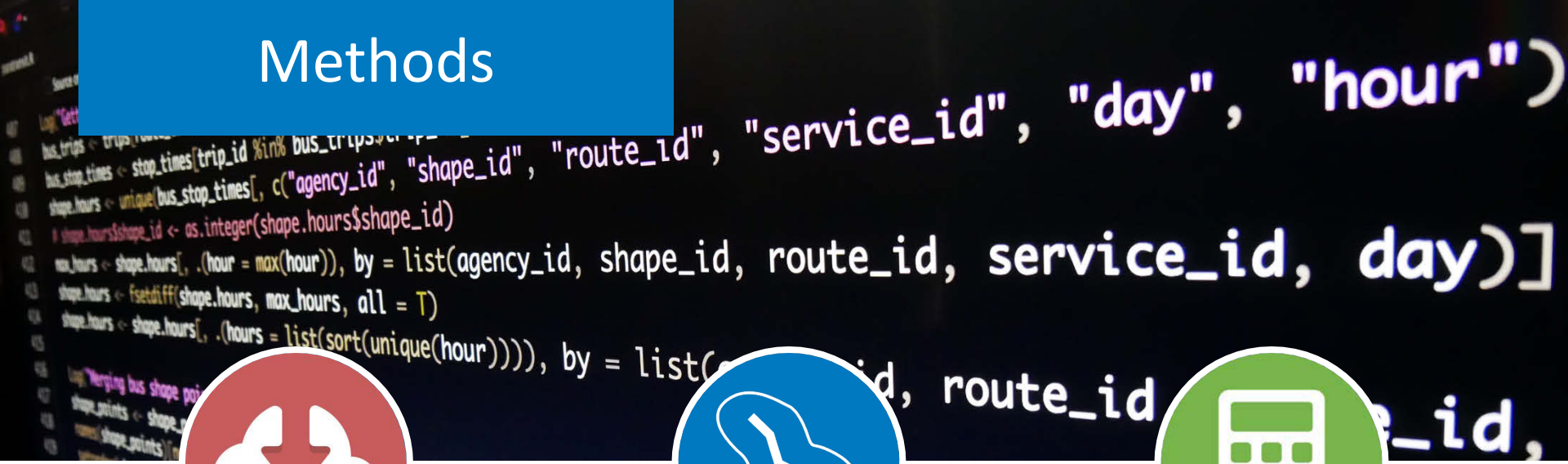
Data Sources

General **T**ransit **F**eed **S**pecification (GTFS)

(Developed by Google)



Methods



Download

GTFS data from transit agency

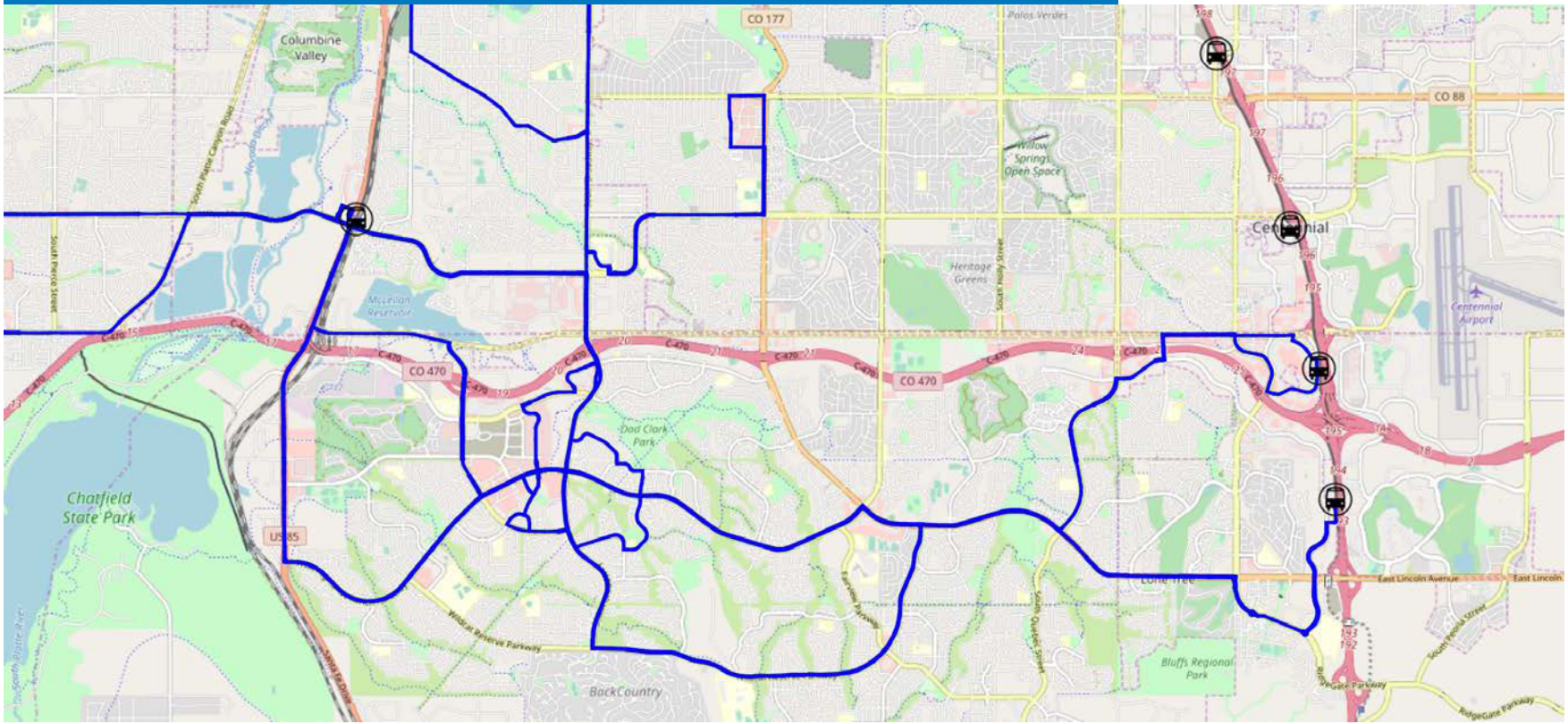
Buffer

route lines & stations to ¾ mile (3,960 feet)

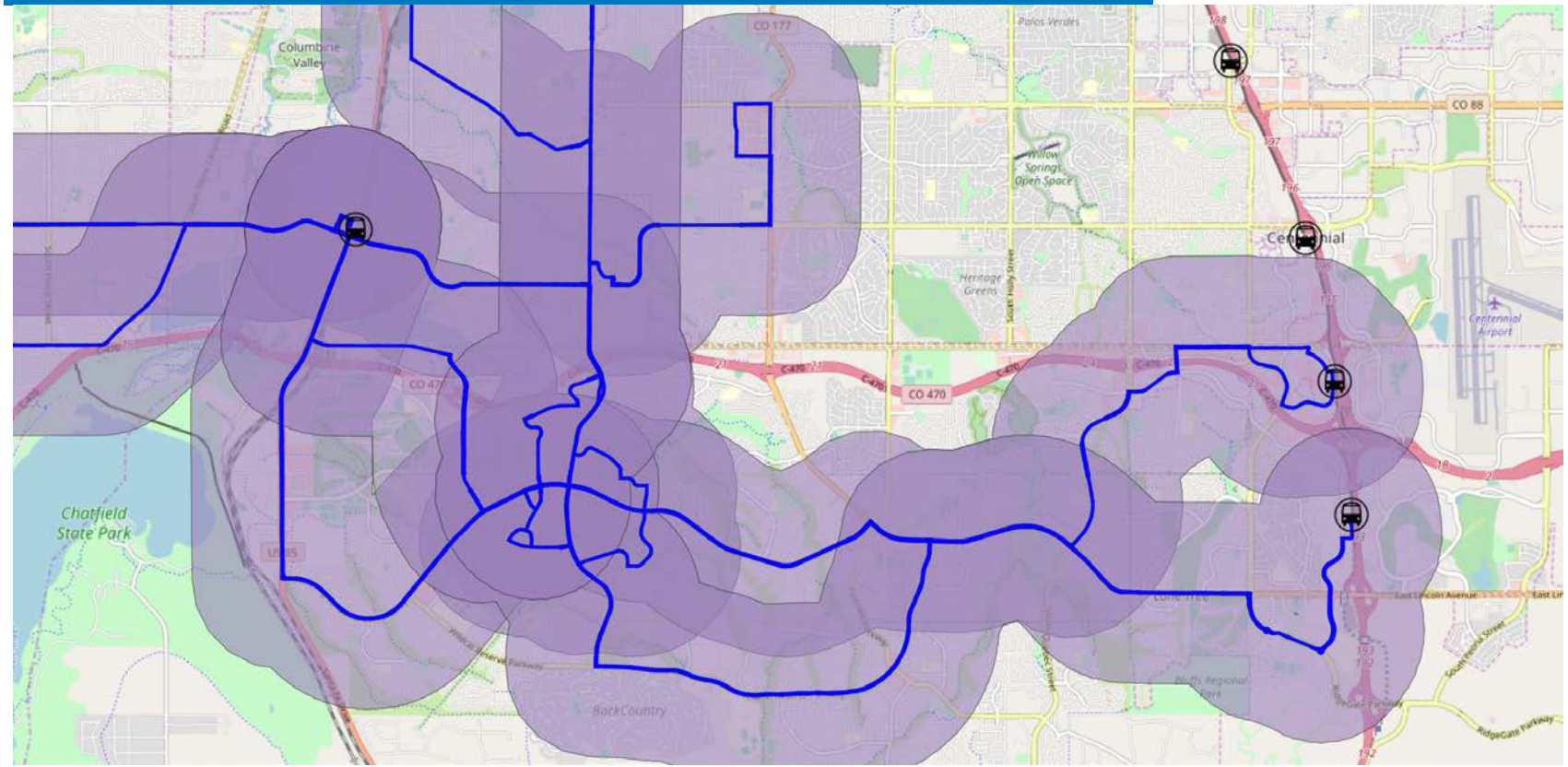
Calculate

- Availability (days & hours)
- Resilience (# of routes)
- Populations affected

Routes & Rail Stations

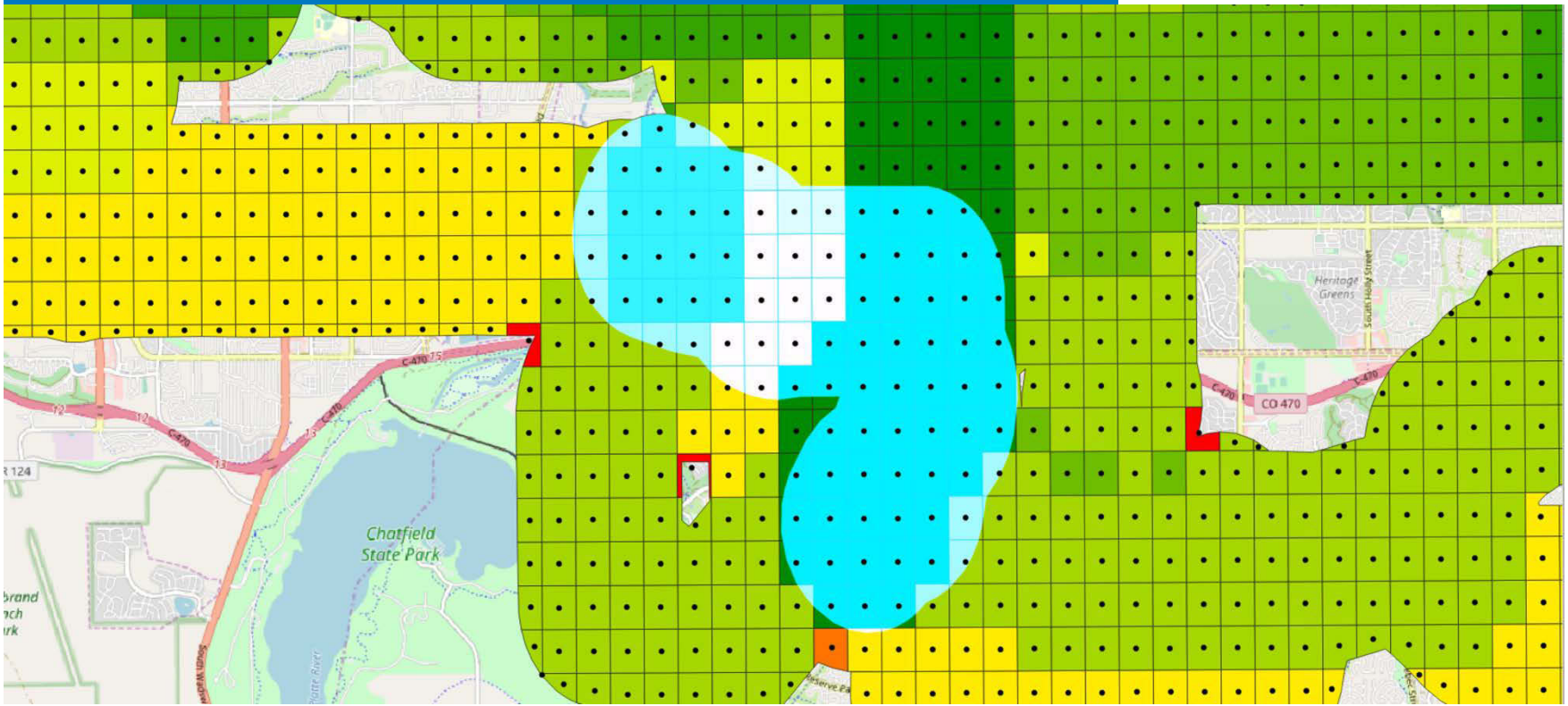


Buffering



Columbine Valley
CO 177
Palos Verdes
CO 88
Willow Springs Open Space
Centennial
Heritage Greens
South Holly Street
Centennial Airport
CO 470
Chatfield State Park
US 85
Wildcat Reserve Parkway
BackCountry
Bluffs Regional Park
East Lincoln Avenue
South Peoria Street
RidgeGate Parkway

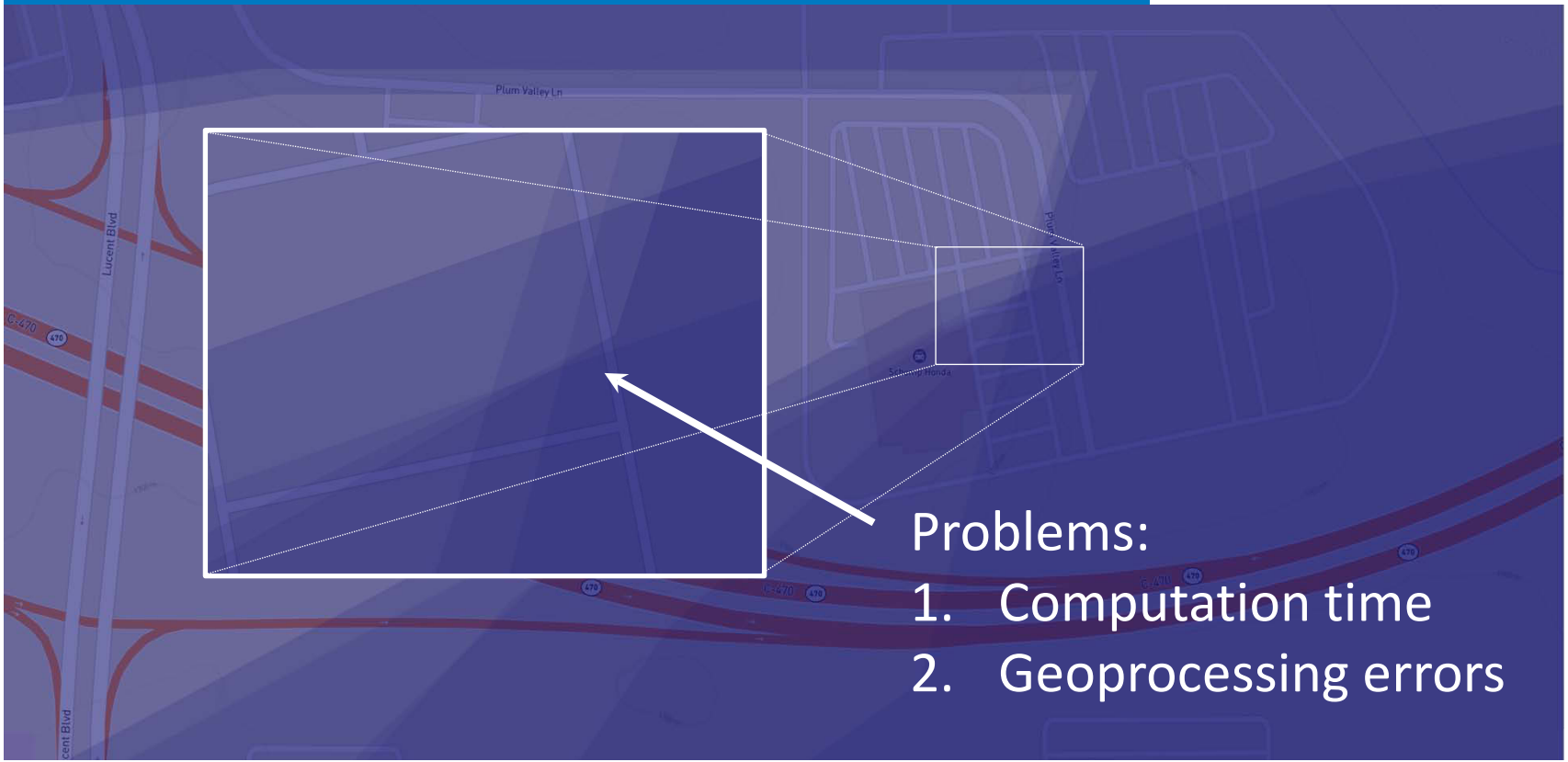
Grid System


Chatfield
State Park
Heritage
Greens
South Holly Street
C-470
CO 470
R 124

Major Difficulties

- GTFS limitations
  - Shapes.txt
  - Lack of “commuter” vs. “local” route identification
- Grid system
  - Geoprocessing errors
  - Computation time
  - Precision

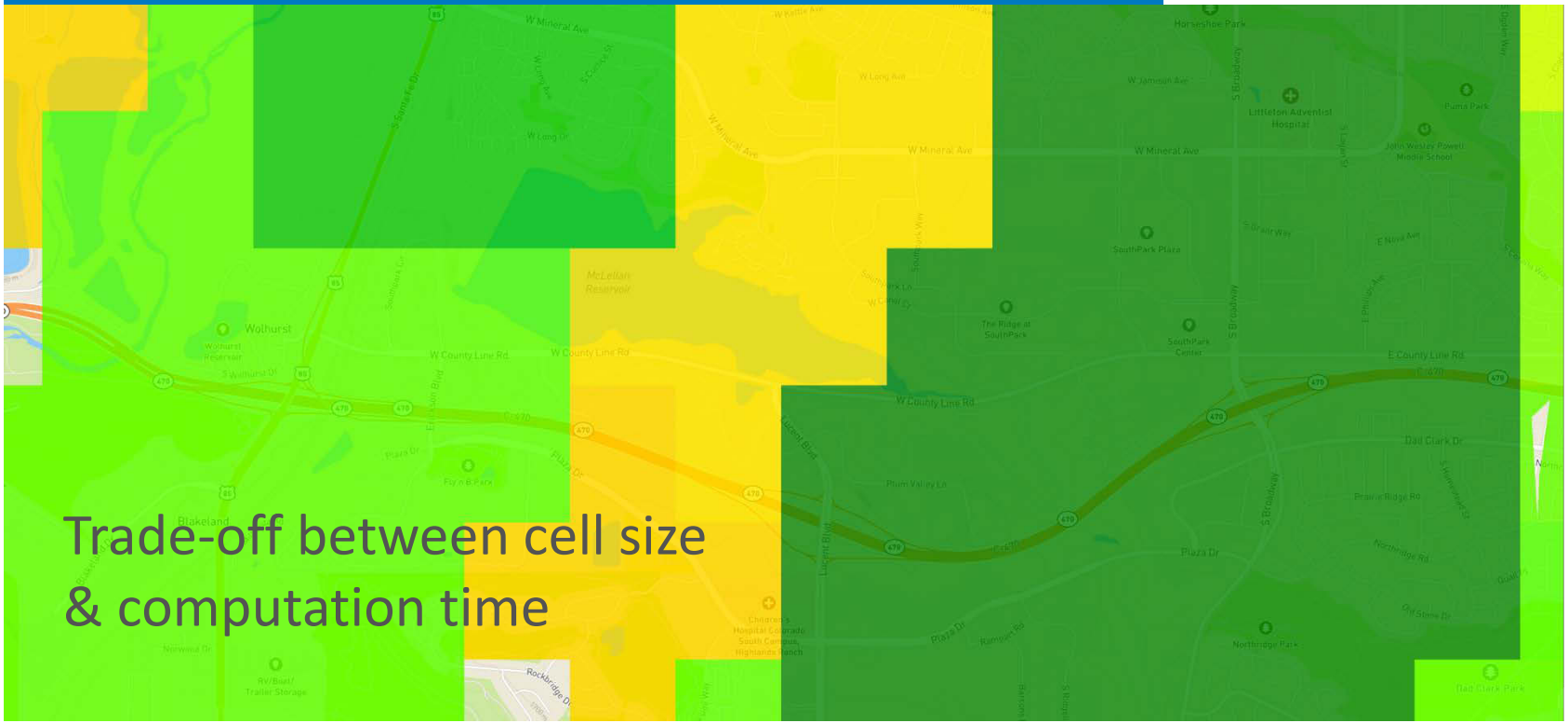
Geoprocessing Example



Problems:

1. Computation time
2. Geoprocessing errors

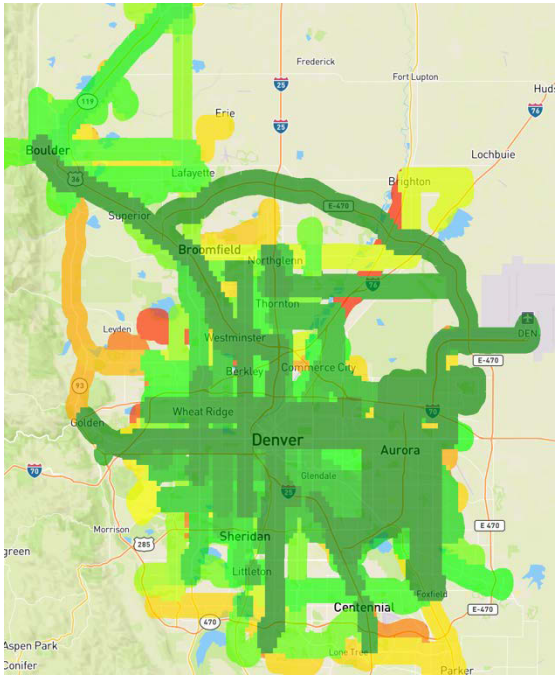
Grid Cell Precision

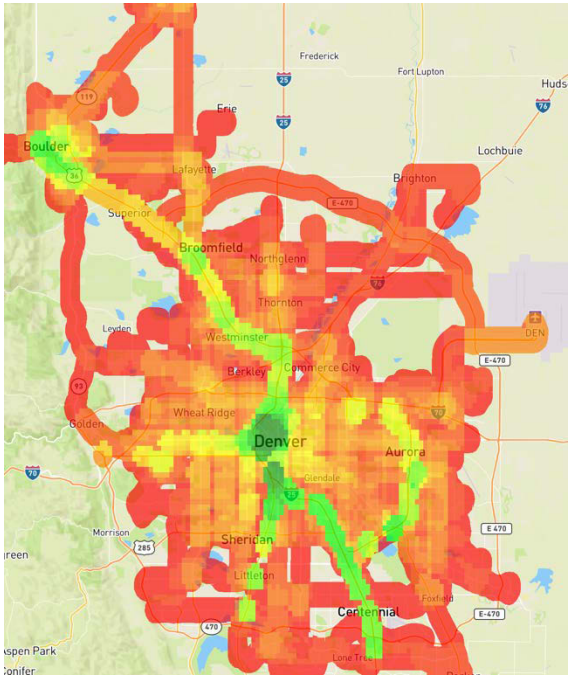


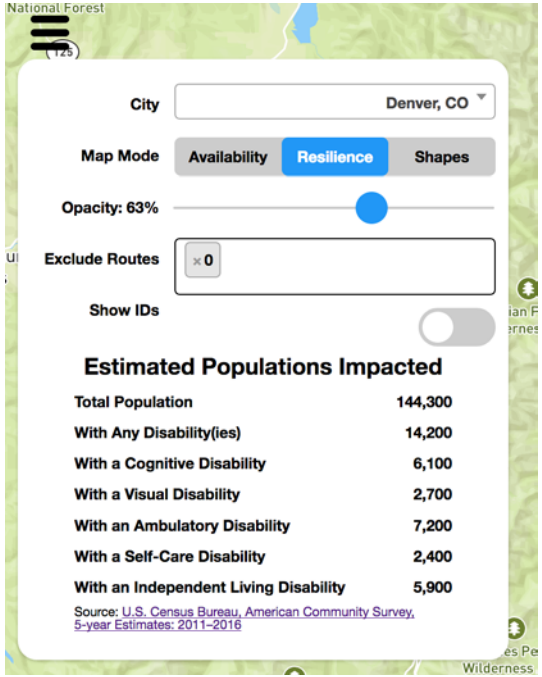
Trade-off between cell size & computation time

Conclusions

Riders and planners can now readily observe on a web map the **where**, **when**, **resilience**, and **impacts** of ADA paratransit:







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Thank you.

Questions?

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