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Transforming Transit in the Denver Region

Leveraging NWPR and ATN for Better Accessibility

Peter Muller
Project Development Director

Who is Vuba?

Technology agnostic ATN project developer staffed by

Engineers & planners

Transportation infrastructure program managers

Transportation infrastructure grant specialist

What is the Problem?

What mobility problems have you had in the last month?

	Yes	No
Been stuck in traffic	77%	23%
Worried about the cost of gas and running a car	38%	62%
Gone out of your way to transport somebody else	56%	44%
Had somebody else go out of their way for you	63%	37%
Had to walk a long way	73%	27%
Had difficulty finding parking	38%	61%
Been in a traffic accident	4%	96%
Worried about pollution	92%	8%
Worried about climate change	96%	4%
If you used public transit, was it slow and/or inconvenient?	62%	31%

7% Did not use transit

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What is the Problem?

Good Transit

Many accessible stations

High average speed

Good Capacity

Low cost per passenger mile

But

Adding a station adds a stop

Increasing capacity increases costs

With Conventional Intra-City Transit the Goals Conflict

Inter-City Transit Has Few Stations

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A Transformative Solution

ATN: A Superior Alternative
(Automated Transit Networks)

Many Inter-connected stations

All Trips Nonstop or Express

Good Capacity

Low Cost

In Addition

Personalized, On-Demand Service

Proven Technology

Network Effect & Scalability

Resulting in

Better local mobility

Better rail connectivity

Economic growth

Environmental and community benefits

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AUTOMATED TRANSIT NETWORKS (ATN)

ATN

Small, driverless, electric vehicles

Operating on dedicated guideways (at-grade or elevated)

Offline stations

Onboard switching

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How It Works

Step 2
A driverless electric vehicle is staged at or arrives at a station within a minute or less.

Step 3
Ride quickly above street traffic on an elevated guideway.

Step 1
Use a smartphone app or kiosk to request a ride.

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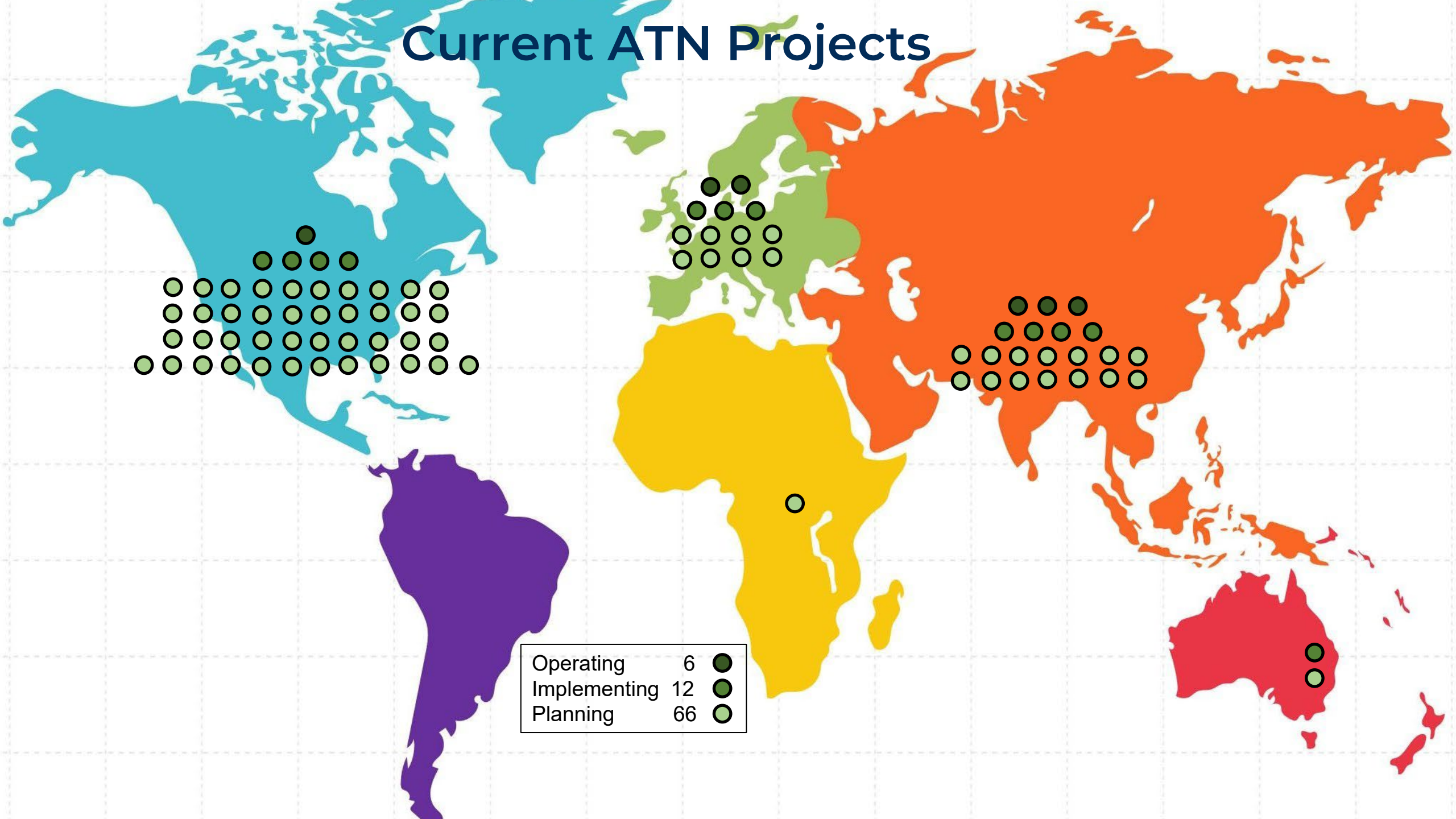
ATN 1975 - 2023

https://youtu.be/UPT7Emc_0-E

How stations work

https://youtu.be/AqWH31QtSRg

Current ATN Projects



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Technology attributes

- 4 – 22 Passenger driverless electric vehicles
- Up to 19,000 pphpd
- Up to 45 mph top speed
- Elevated guideways
- Many offline stations
- Short walking distances
- Short waiting times
- ADA compliant
- No in-system transfers
- Express trips at high average speed
- Seated travel
- Safe and secure

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Technology options

Dromos

Zhongtang Skytrain

Glydways

Modutram

Ultra

2getthere PRT

Why does ATN work?

4 – 8 seat vehicles accommodate wheelchairs, luggage, etc.

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Why does ATN work?

Dedicated guideways ensure safe, reliable travel
ASCE APM Standards

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Why does ATN work?

Lightweight vehicles require small, unobtrusive & inexpensive guideways

Why does ATN work?

Onboard switching enables short headways/high capacity

Why does ATN work?

Offline stations facilitate nonstop trips

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Why does ATN work?

Small Vehicles

Facilitate non-stop or express trips

Many vehicles – short waiting times

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Why does ATN work?

The Network Effect

Adding stations increases trip options

Doubling stations quadruples options

In practice doubling stations increases options 2.6X

Increased options increases ridership & revenues

Does not work for buses and trains

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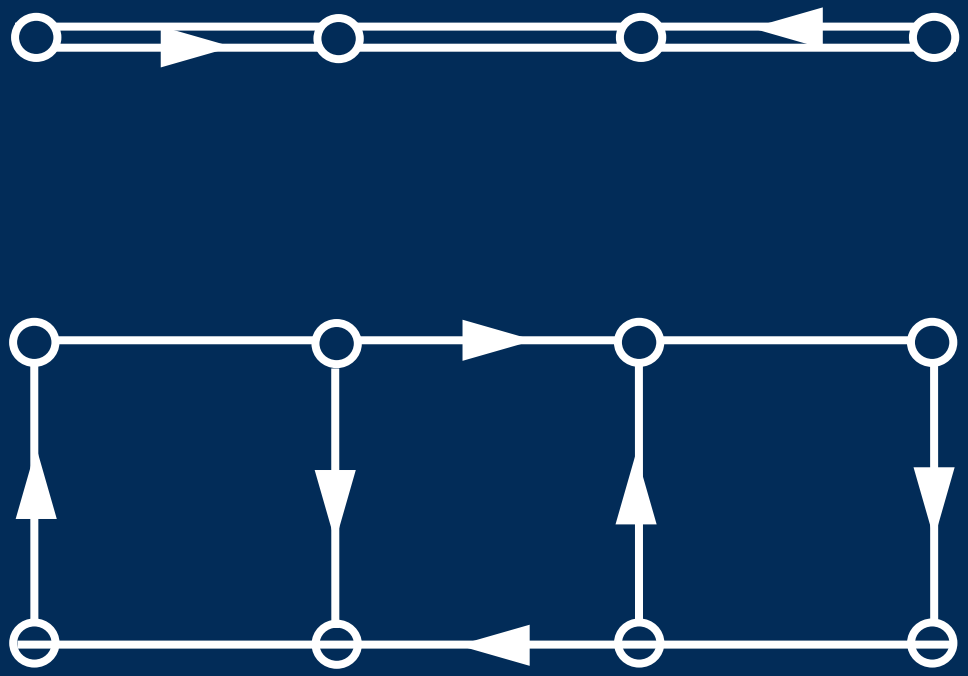
Why does ATN work?

Interconnected One-way Loops

2X the stations

1.5X the cost



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Why does ATN work?

Safety & All-Weather Reliability

All systems combined – over 200 M injury-free passenger miles

5,000X safer than BRT

5X more reliable than BRT

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Why does ATN work?

Advanced Ridesharing

Maximizes occupancy

Minimizes stopping

Tiered Fares

Premium – pay for the vehicle for your group, ride nonstop

Standard – must share rides & make some intermediate tops

Economy – school children, disadvantaged

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Sustainable

Smaller infrastructure
Reduced cost, space and visual impacts

Reduced energy per passenger mile
Fleet more adaptable to demand

Potential to reduce bus & automobile trips
Attractive alternative to cars

Significantly lower impacts and emissions

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Whose life could we Improve?

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The Next Generation of Public Transportation

Many interconnected stations

High average speed

Good capacity

Low cost per passenger mile

	Commuter Rail	Light Rail	Bus Rapid Transit	Automated People Mover	Automated Transit Network
Many stations					
High average speed					
Good capacity					
Low cost per pax mile					

Poor  Acceptable  Good 

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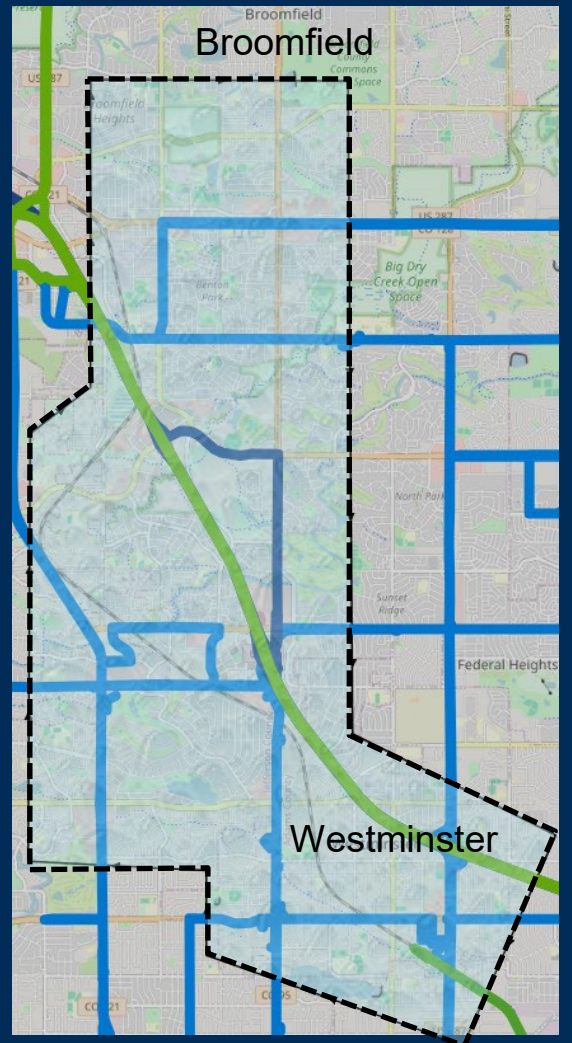
Broomfield/Westminster

Rail/BRT
Bus
Study Area



Existing Rail + Bus

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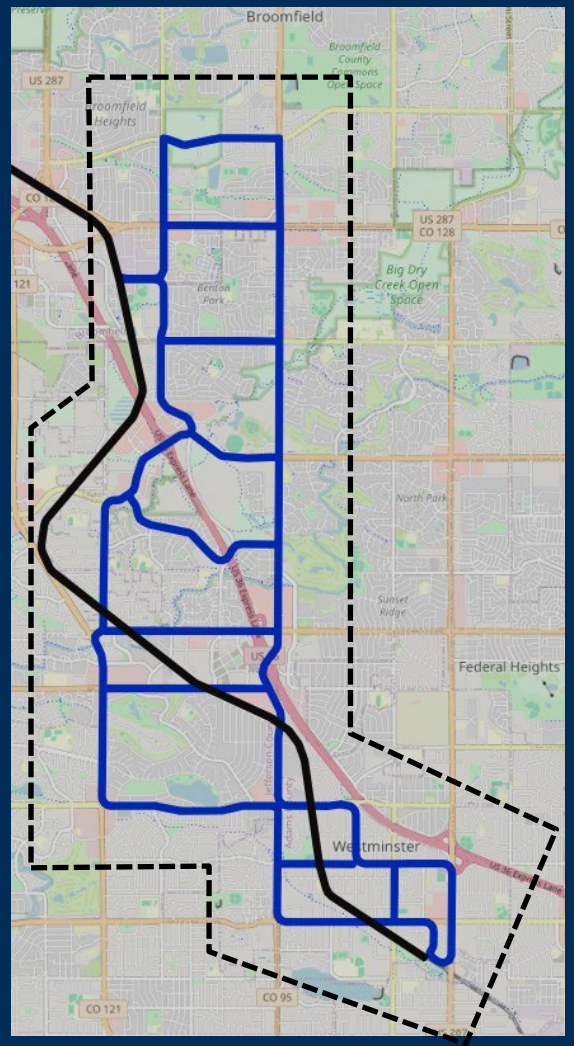
Bus & ATN Layouts

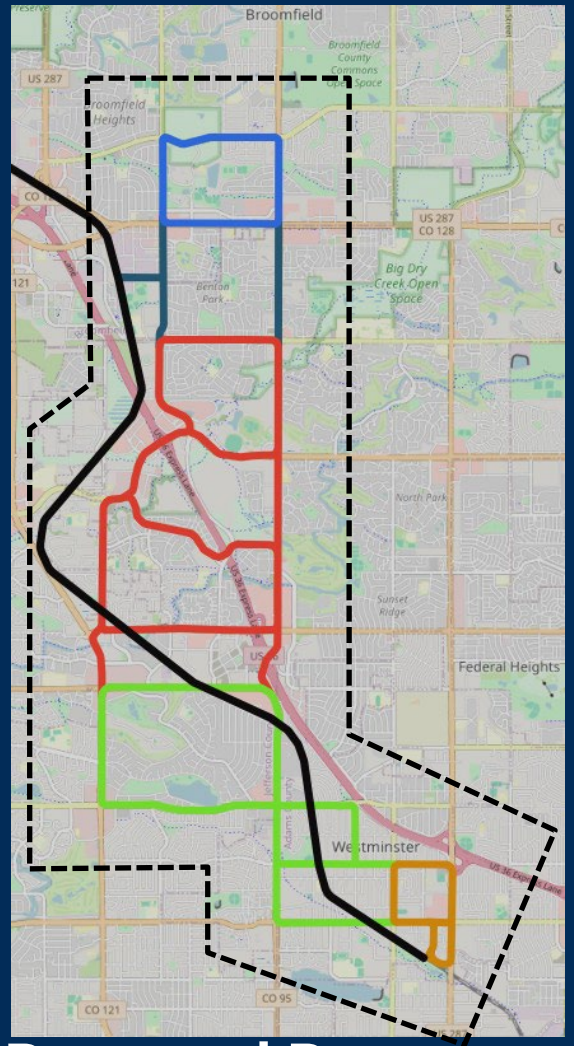


Proposed Passenger Rail + 15 Min Bus

Rail
Bus 15 min
ATN WM I
ATN WM II
ATN WM III
ATN BF I
ATN BF II

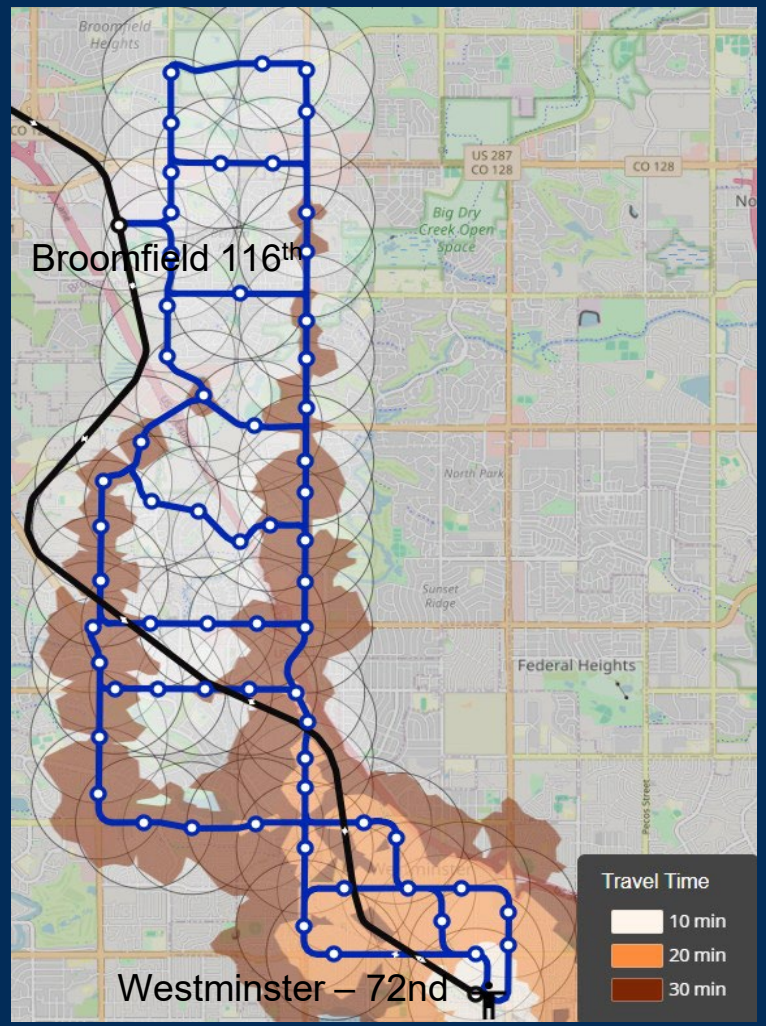
30 Miles

71 Stops/Stations



Proposed Passenger Rail + ATN

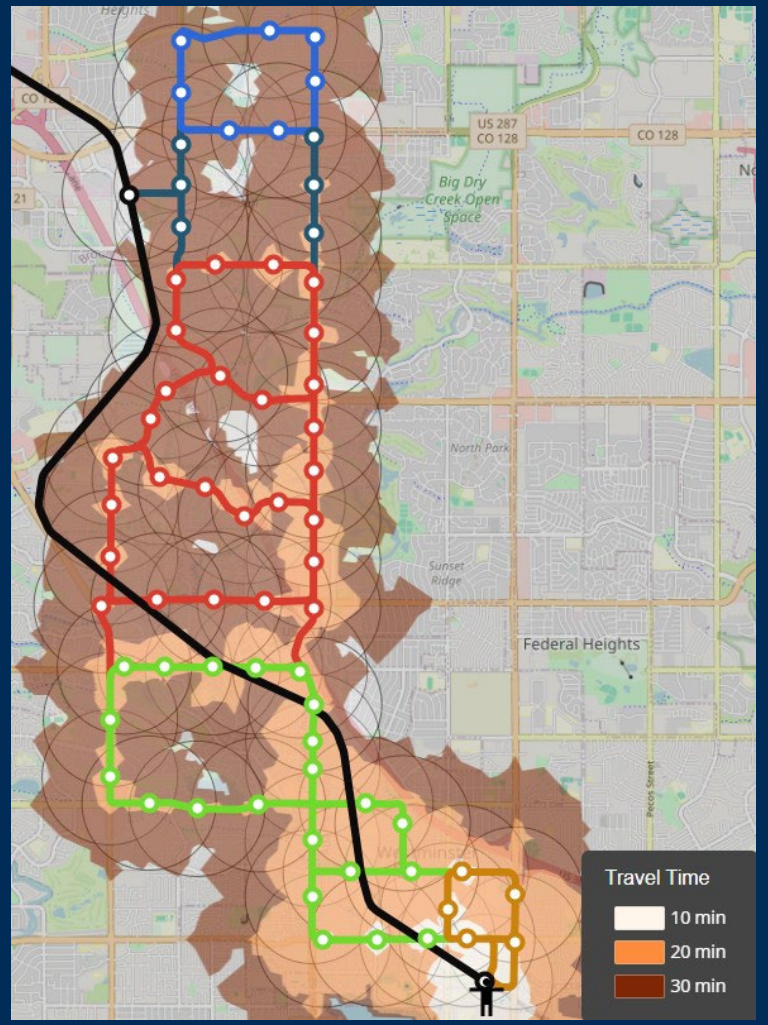
Mobility Comparison



Proposed Passenger Rail + 15 Min Bus

Rail
Bus 30 min
Bus 60 min
ATN WM I
ATN WM II
ATN WM III
ATN BF I
ATN BF II
Station Radius ½ mile

Waiting + Riding + Walking



Proposed Passenger Rail + ATN

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Bus / ATN Comparison

	BUS[1]	ATN[2]
Route Miles	30	30
Average wait times	7 min	1 min
Average speed	20 mph	35 mph
Annual Trips	812,250	11,600,000
Annual Capital + O&M Costs	$6.4 M	$57.3 M
Cost per trip	$8	$5

1 RTD-Denver Routes in Service Area

2 Based on PRT Consulting data.

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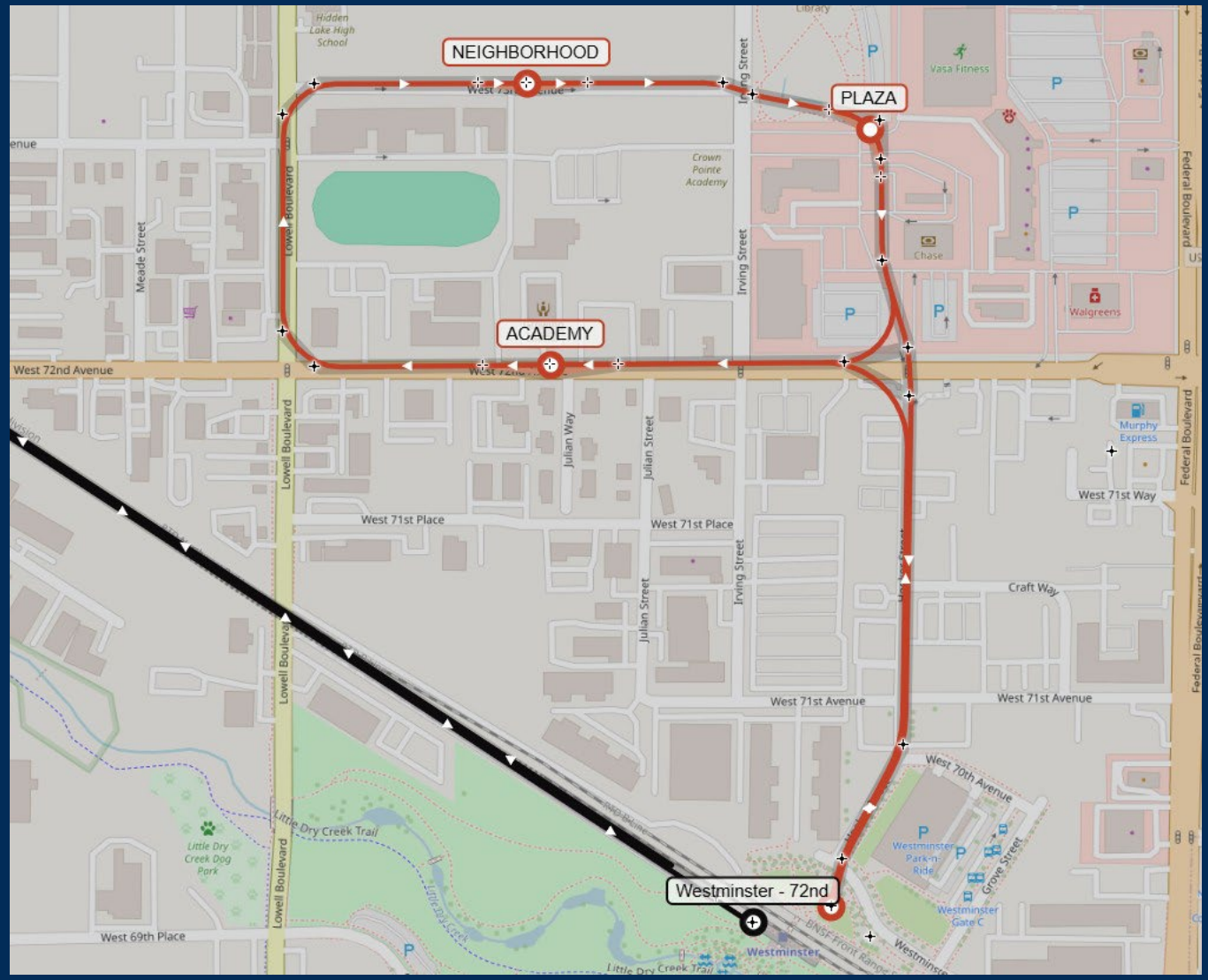
ATN Demonstration

Parameters
4 Stations
2 Miles
Wait time 1 min
Ride time 2 mins
Capital cost ~ $35 M

Demonstrates
Local implementation/use
Ridership revenue forecasting
Capital & O&M costing
Reliability
Safety



Path Forward

Obtain support from

- Broomfield
- Westminster
- Front Range Passenger Rail

Progressive unsolicited proposal

- Feasibility study
- Preliminary design
- Technology procurement
- DBFOM PPP
- Small demo construction + safety certification
- Verify in public service
- Expand

Pre-Feasibility Study

- Public input
- Layout viability
- Ridership revenues
- Benefit/cost
- Funding/financial viability
- Risks

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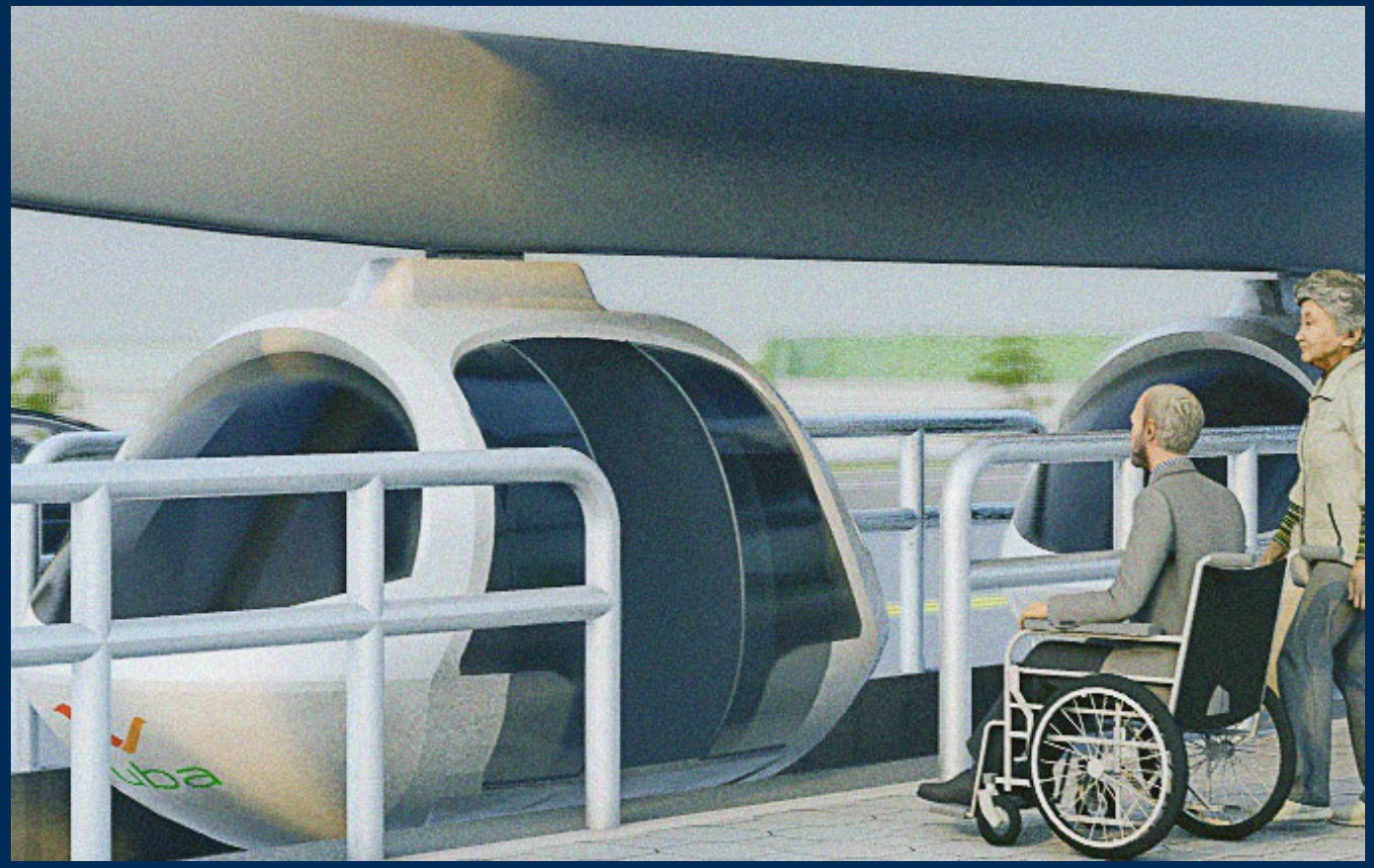
Questions?



Which do you prefer overall?

15 Minute bus? 56%

ATN? 44%

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