



**SANTA CRUZ METROPOLITAN TRANSIT DISTRICT (METRO)  
BOARD OF DIRECTORS SPECIAL MEETING MINUTES\*  
OCTOBER 14, 2022 – 9:00AM**

**SEACLIFF INN  
7500 OLD DOMINION CT.  
APTOS, CA**

A special meeting of the Board of Directors of the Santa Cruz Metropolitan Transit District (METRO) convened on Friday, October 14, 2022 at the Seacliff Inn, 7500 Old Dominion Ct., Aptos, CA.

The Board Meeting Agenda Packet can be found online at [www.SCMTD.com](http://www.SCMTD.com). \*Minutes are “summary” minutes, not verbatim minutes. Audio recordings of Board meeting open sessions are available to the public upon request.

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**1 CALL TO ORDER** at 9:01 AM by Chair Pageler.

**2 ROLL CALL:** The following Directors were **present**, representing a quorum:

<b>Director Kristen Brown</b>	<b>City of Capitola</b>
<b>Director Rebecca Downing</b>	<b>County of Santa Cruz</b>
Director Jimmy Dutra	City of Watsonville
<b>Director Shebreh Kalantari-Johnson</b>	<b>City of Santa Cruz</b>
<b>Director Manu Koenig</b>	<b>County of Santa Cruz</b>
<b>Director Donna Lind</b>	<b>City of Scotts Valley</b>
<b>Director Bruce McPherson</b>	<b>County of Santa Cruz</b>
Director Donna Meyers	City of Santa Cruz
<b>Director Larry Pageler</b>	<b>County of Santa Cruz</b>
Director Ari Parker	City of Watsonville
<b>Director Mike Rotkin</b>	<b>County of Santa Cruz</b>
Ex-Officio Director Dan Henderson	UC Santa Cruz
Ex-Officio Director Alta Northcutt	Cabrillo College
Michael Tree	CEO/General Manager
Julie Sherman	General Counsel

**3 ANNOUNCEMENTS**

Today’s meeting is being broadcast by Community Television of Santa Cruz County.

**4 COMMUNICATIONS TO THE BOARD OF DIRECTORS**

Director Lind thanked METRO for hosting the recent firefighters training for local fire departments.

There were no public comments.

Hearing nothing further, Chair Pageler moved to the next agenda item.

- 5 ADDITIONAL DOCUMENTATION TO SUPPORT EXISTING AGENDA ITEMS**  
Chair Pageler mentioned the handout for Item 6 on the agenda (attached).

## **REGULAR AGENDA**

- 6 CEO/GENERAL MANAGER AND BOARD WORKSHOP / STRATEGIC PLANNING**

Michael Tree, CEO/General Manager, welcomed the attendees and provided a brief summary of the three goals to be addressed in the workshop—ridership, zero emission buses, and housing.

Adam Sonenshein, Vice President of Fairbank, Maslin, Maullin, Metz & Associates (FM3 Research), spoke to his presentation. He provided highlights from a recent survey of Santa Cruz County (County) residents covering such topics as community attitudes and awareness of Santa Cruz METRO being the transit provider in the area, frequency of ridership, reasons for or against riding, and residents' highest priorities for METRO. Discussion followed on why the frequency of routes was initially reduced and if it can return to pre-COVID levels. Safety concerns were raised, the staggered school schedules throughout the County was discussed along with the terrain of the area and the impacts each has on the ridership.

Jarrett Walker, President of Jarrett Walker & Associates, spoke to his presentation and provided insights on fixed transit and the use of space, bus service being a climate and equity solution, and how expanding ridership provides accessibility (or freedom). He spoke of the four key features of geometric land use—density, walkability, linearity and proximity. Frequency is key and METRO needs to determine the ridership and coverage goals (both important but produce different results). He summarized METRO's current state of service. Discussion continued on particular service areas and possible solutions as well as pushback from neighborhoods, having community representation and the economics of where people can afford to live, which is not always in a service area.

*Director Koenig departed at 11:05 AM.*

Danielle Glagola, METRO's Marketing, Communications and Customer Service Director, introduced METRO's new marketing program to protect and improve the environment – One Ride At A Time – and drive ridership on METRO. She discussed the partnership with Monterey Bay National Marine Sanctuary Foundation and showed the new bus wraps of marine animals.

Steve Clermont, Director at Center for Transportation and the Environment (CTE), provided background on his organization and the projects they've helped METRO with since 2016. He explained the California Air Resources Board (CARB) Innovative Clean Transit (ICT) Regulation Rollout Plan requirements for Zero-Emission Buses (ZEBs). He explained the difference between Battery Electric Buses (BEBs) and Fuel Cell Electric Buses (FCEBs). He gave various transition scenarios that included infrastructure and the challenges or risks METRO needs to consider in implementing its plan.

Chuck Farmer, METRO's Chief Financial Officer, followed up with METRO's ZEB Implementation Plan and broke it down into three phases to fully transition the fleet by the end of 2037. He laid out the bus delivery schedule and METRO's sources of funding to achieve this transition.

Discussion ensued on Mr. Clermont and CFO Farmer's presentations. Concern was raised on how METRO is currently charging the Watsonville Circulator and if it makes sense to have a facility in Watsonville to take care of those charging needs. Highway 17 was discussed with regard to which type of ZEB would work best in that terrain. Questions rose on the feasibility of creating an income source with hydrogen or if AMBAG could be involved in creating a central valley system for multiple users.

Isaac Holly, METRO's IT and ITS Director, provided a brief presentation on the Automatic Vehicle Locator (AVL) and Automatic Passenger Counter (APC) projects, providing screen shots of the type of features the application can provide.

Bonnie Lipscomb, Economic Development Director for the City of Santa Cruz (City), distributed a handout and provided an update on the City's redevelopment and mixed use, affordable housing projects. Collaboration with METRO is vital in moving forward. She provided a second handout on local market trends and additional housing projects in the works.

Brian Spector, Principal Architect & President of Spector Corbett Architects, Inc., spoke on two METRO properties—Soquel Park & Ride/ParaCruz Facility and Watsonville Transit Center and the initial analysis taking place on those properties for mixed use, affordable housing.

Several Board Members expressed gratitude for the workshop and the content shared.

The above-mentioned presentations/handouts are attached.

Hearing nothing further, Chair Pageler moved to the next agenda item.

**7 ANNOUNCEMENT OF NEXT BOARD OF DIRECTORS MEETING: FRIDAY, OCTOBER 28, 2022 AT 9:00 AM VIA TELECONFERENCE**

**8 ADJOURNMENT**

Chair Pageler adjourned the meeting at 12:56 PM.

Respectfully submitted,

Donna Bauer  
Executive Assistant

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**BOARD OF DIRECTORS SPECIAL MEETING  
OCTOBER 14, 2022**

9:00AM – 9:10AM

**Open Session**

Larry Pageler, Board Chair

9:10AM – 9:15AM

**Expectations of the Meeting**

Michael Tree, CEO/General Manager

**Opportunities for Increasing Ridership**

9:15AM – 9:40AM

**Community Survey Results**

Adam Sonenshein, Vice President – FM3 Research

9:40AM – 10:25AM

**Key Planning Concepts**

Jarrett Walker, President - Jarrett Walker & Associates

10:25AM – 10:55AM

**Q & A with Jarrett Walker**

10:55AM – 11:10AM

**Break**

**Zero Emission Plan & Technology**

11:10AM – 11:15AM

**One Ride At A Time Project**

Danielle Glagola, Marketing, Communications & Customer Service Director

11:15AM – 11:40AM

**Zero Emission Bus Technologies**

Steve Clermont, Director - Center for Transportation & the Environment (CTE)

11:40AM – 11:55AM

**METRO Zero Emission Bus Implementation Plan**

Chuck Farmer, CFO

11:55AM – 12:15PM

**Working Lunch**

**Opportunities for Housing**

12:15PM – 12:20PM

**CAD/AVL and APC Project**

Isaac Holly, IT and ITS Director

12:20PM – 12:35PM

**METRO Center Project**

John Urgo, Planning & Development Director

Bonnie Lipscomb, Economic Development Director - City of Santa Cruz

Jessica de Wit, Housing & Community Development Manager - City of Santa Cruz

12:35PM – 12:50PM

**Soquel Park & Ride/ParaCruz Facility and Watsonville Transit Center**

Brian Spector, Principal Architect & President - Spector Corbett Architects, Inc.

12:50PM – 12:52PM

**Closing Comments**

Michael Tree, CEO/General Manager

12:52PM – 1:00PM

**Board Member Comments**

1:00PM

**Adjournment**

Larry Pageler, Board Chair

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**WELCOME**

October 14, 2022

Board of Directors Special Meeting

Attachment

# Building a Better METRO

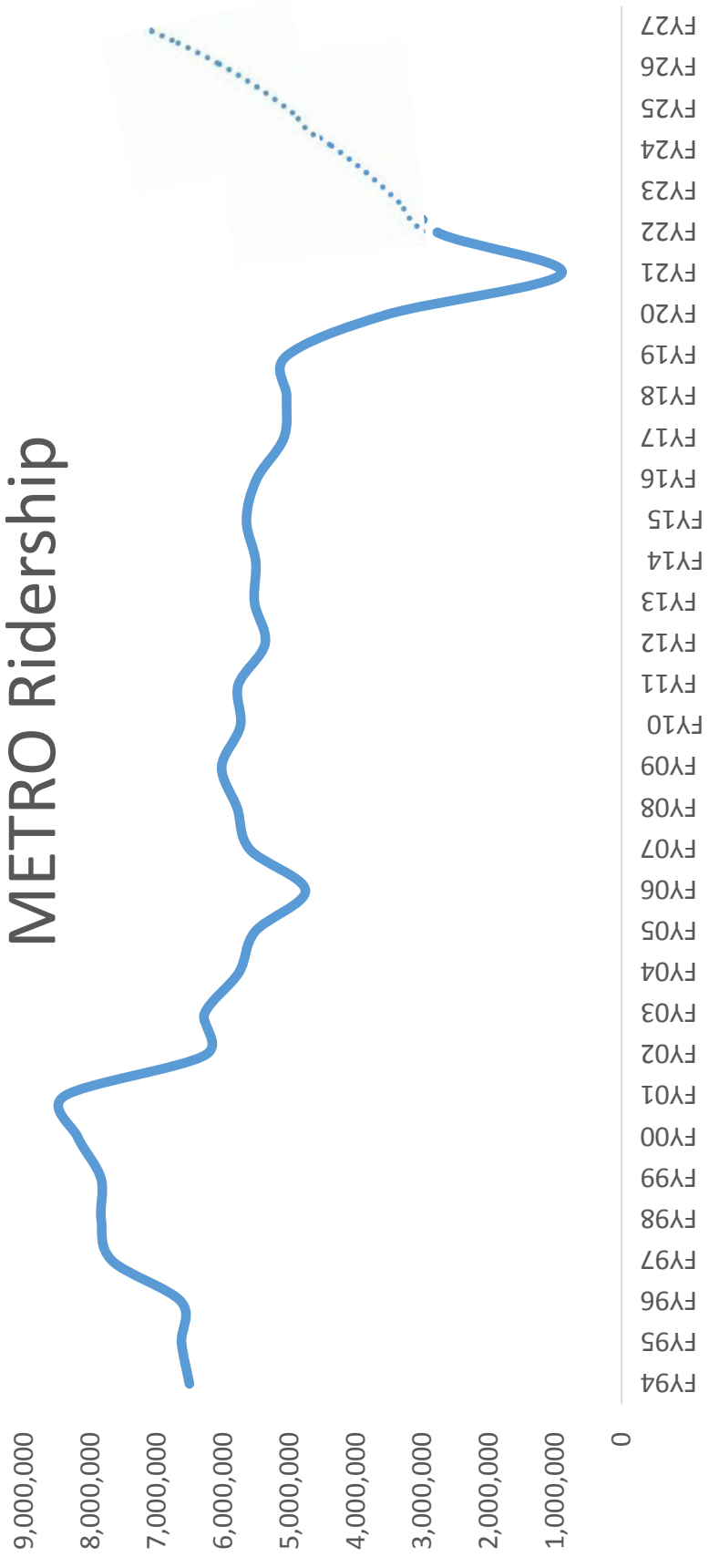




## Goals for Santa Cruz METRO

- 100% ridership increase within the next 5 years
- Purchase only zero emission buses moving forward, converting entire 96 bus METRO fleet by 2037
- Develop 175 housing units at METRO Transit Centers within the next decade

# METRO Ridership










# Santa Cruz County Public Transportation Usage and Priorities

*Highlights of a Survey of County Residents*



FAIRBANK, MASLIN,  
MAULLIN, METZ  
& ASSOCIATES

# Survey Specifics and Methodology

Dates	September 28 – October 6, 2022
Research Population	Santa Cruz County Adult (Ages 18+) Residents
Total Interviews	1,054
Margin of Sampling Error	(Full Sample) $\pm 4.0\%$ at the 95% Confidence Level
Contact Methods	 Telephone Calls  Email Invitations  Text Invitations
Data Collection Modes	 Telephone Interviews  Online Interviews
Languages	English and Spanish

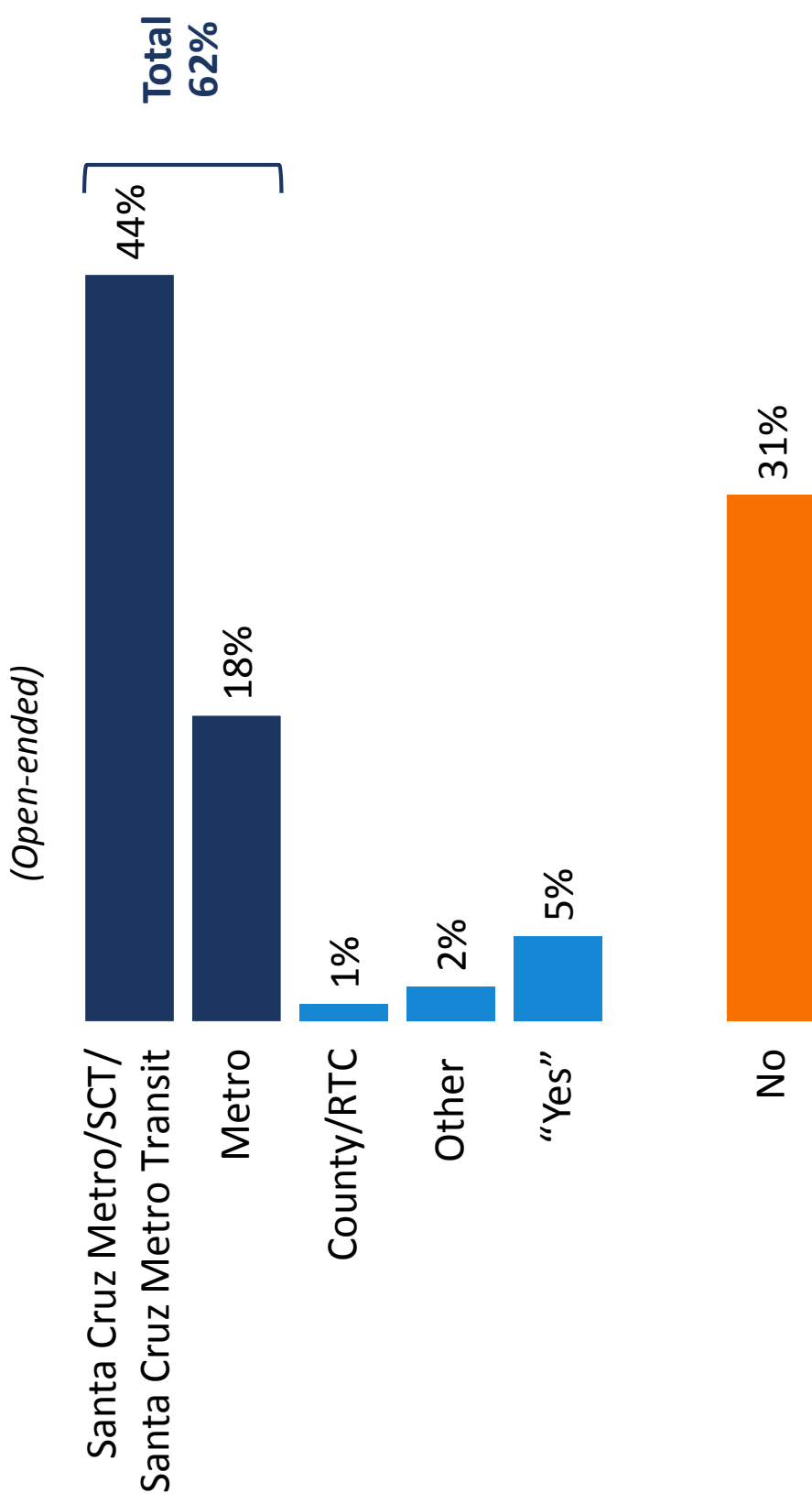
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*(Note: Not All Results Will Sum to 100% Due to Rounding)*

# Community Attitudes and Basic Awareness

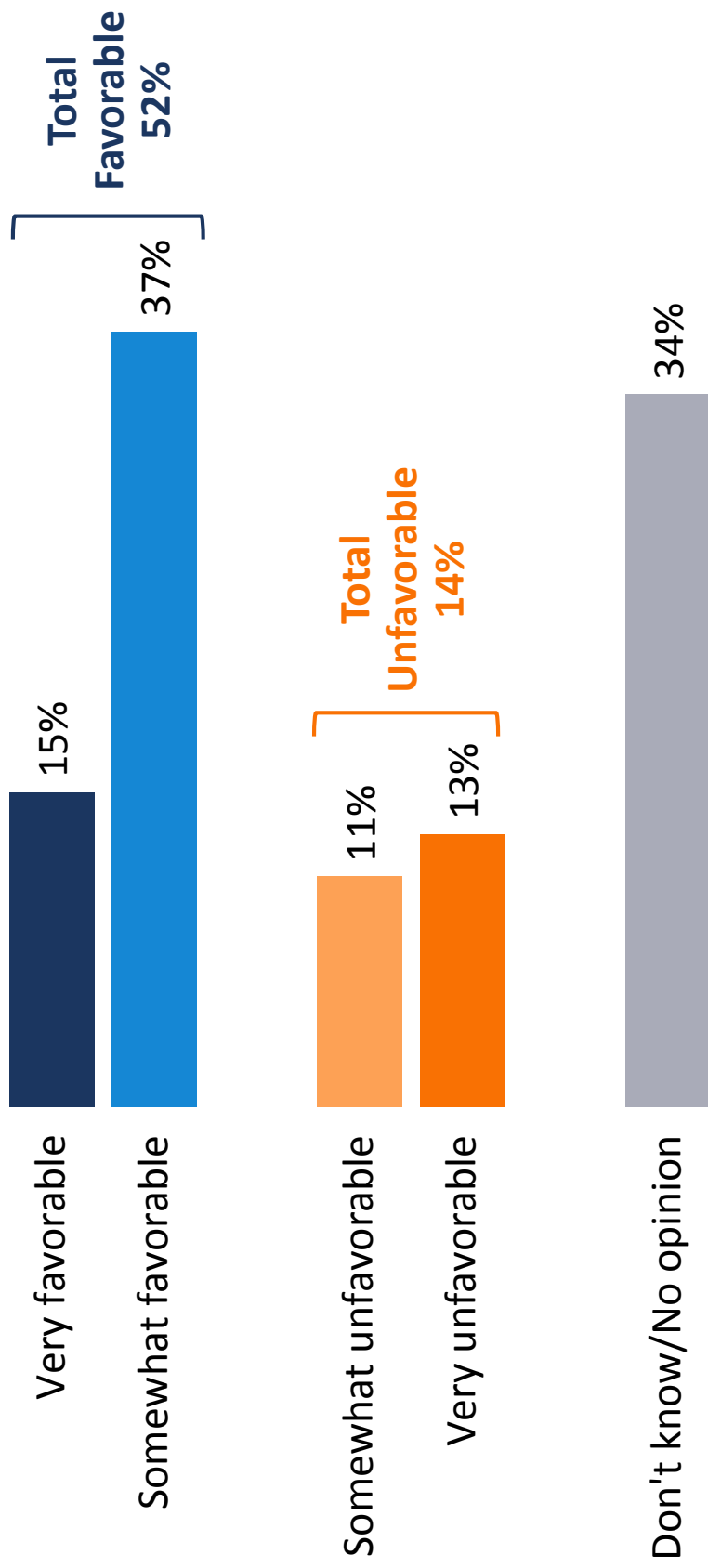
# About six-in-ten respondents could name “Santa Cruz Metro,” “Metro” or a close variation as the agency that runs the bus system in their area.

*Do you happen to know the name of the local agency that runs the bus system in your area?*



# A majority of residents have a favorable opinion of METRO, with a third who cannot rate the agency.

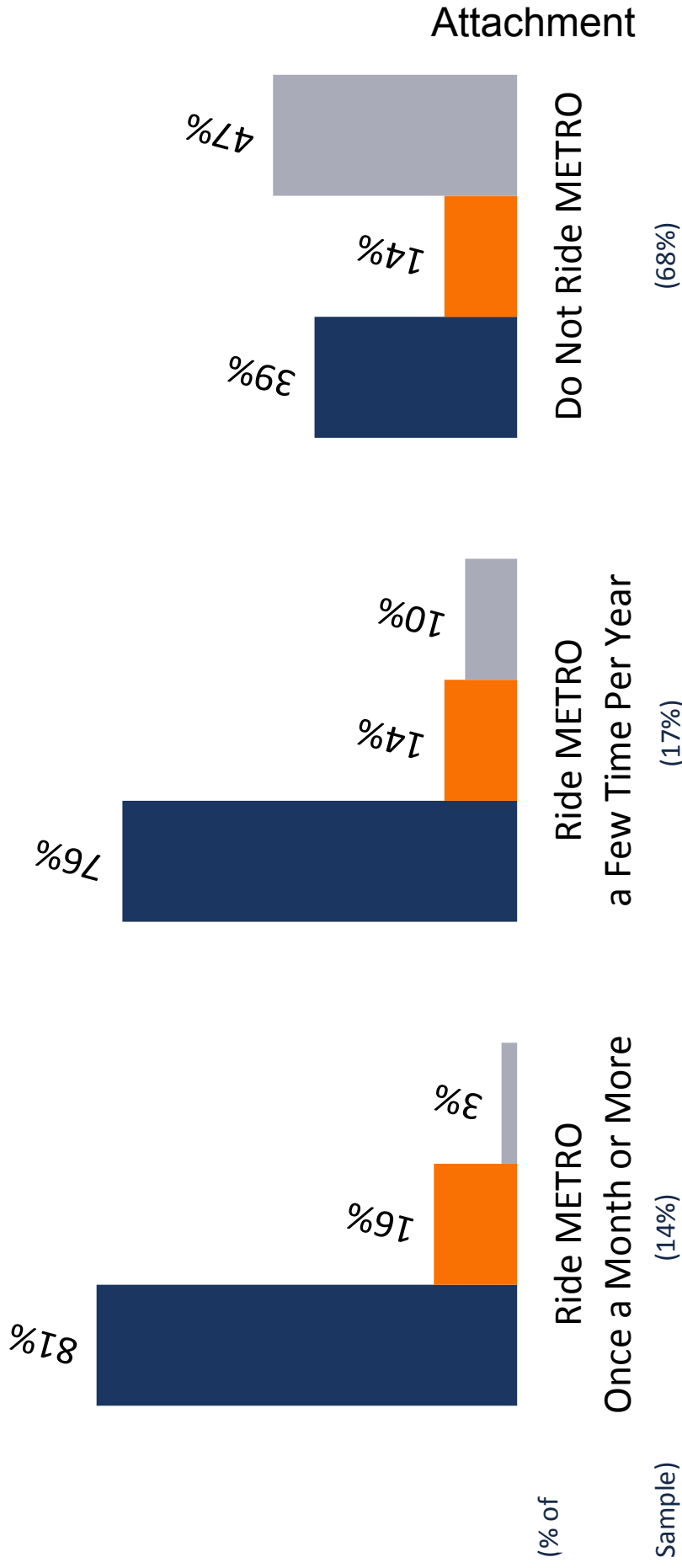
*As you may know, the local bus system in your area is run by an agency called Santa Cruz METRO. Is your impression of Santa Cruz METRO generally favorable or unfavorable?*



# Current METRO riders have very favorable opinions of the agency, while those who do not ride are more likely to have no opinion.

Opinions of METRO by Current Ridership

■ Total Favor ■ Total Oppose ■ No Opinion/Don't Know

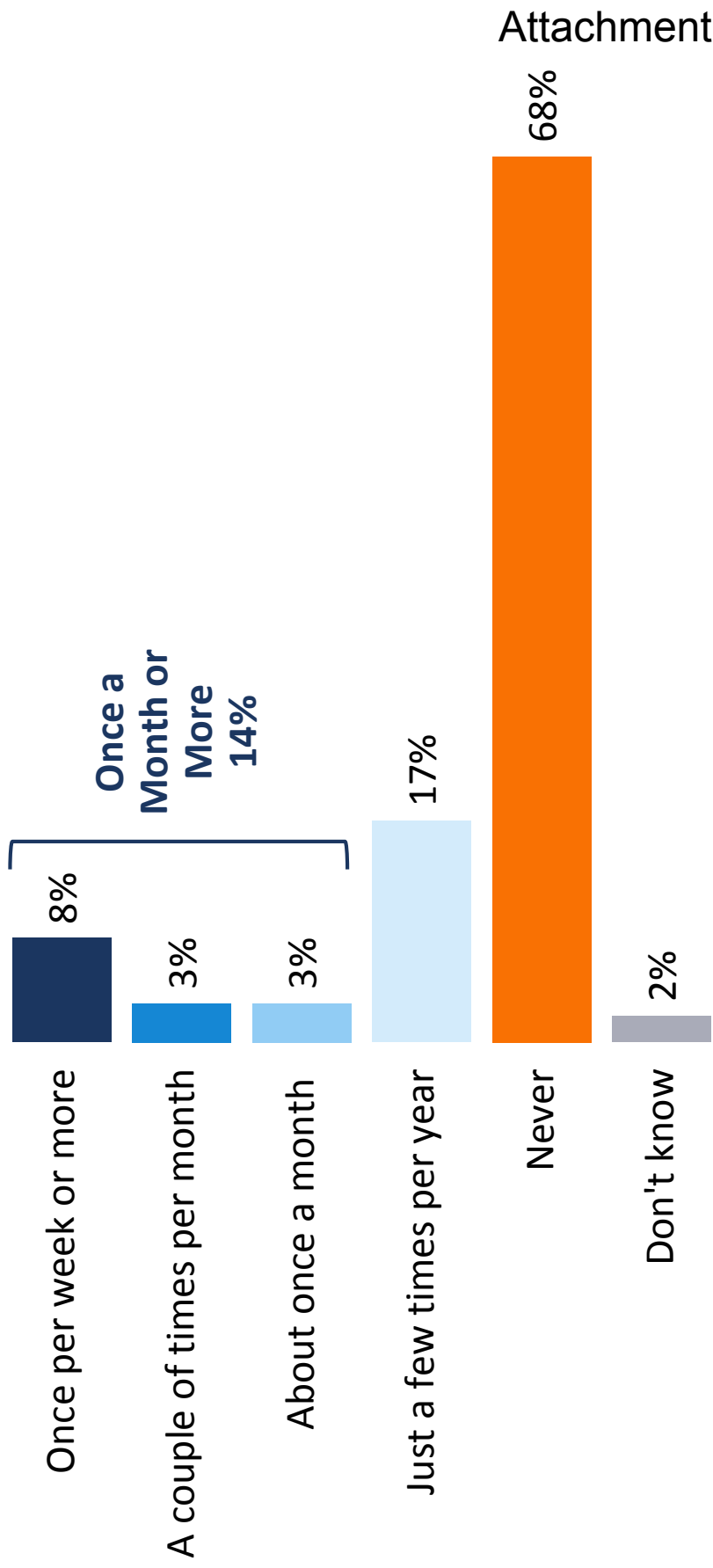


Q3. As you may know, the local bus system in your area is run by an agency called Santa Cruz METRO. Is your impression of Santa Cruz METRO generally favorable or unfavorable?

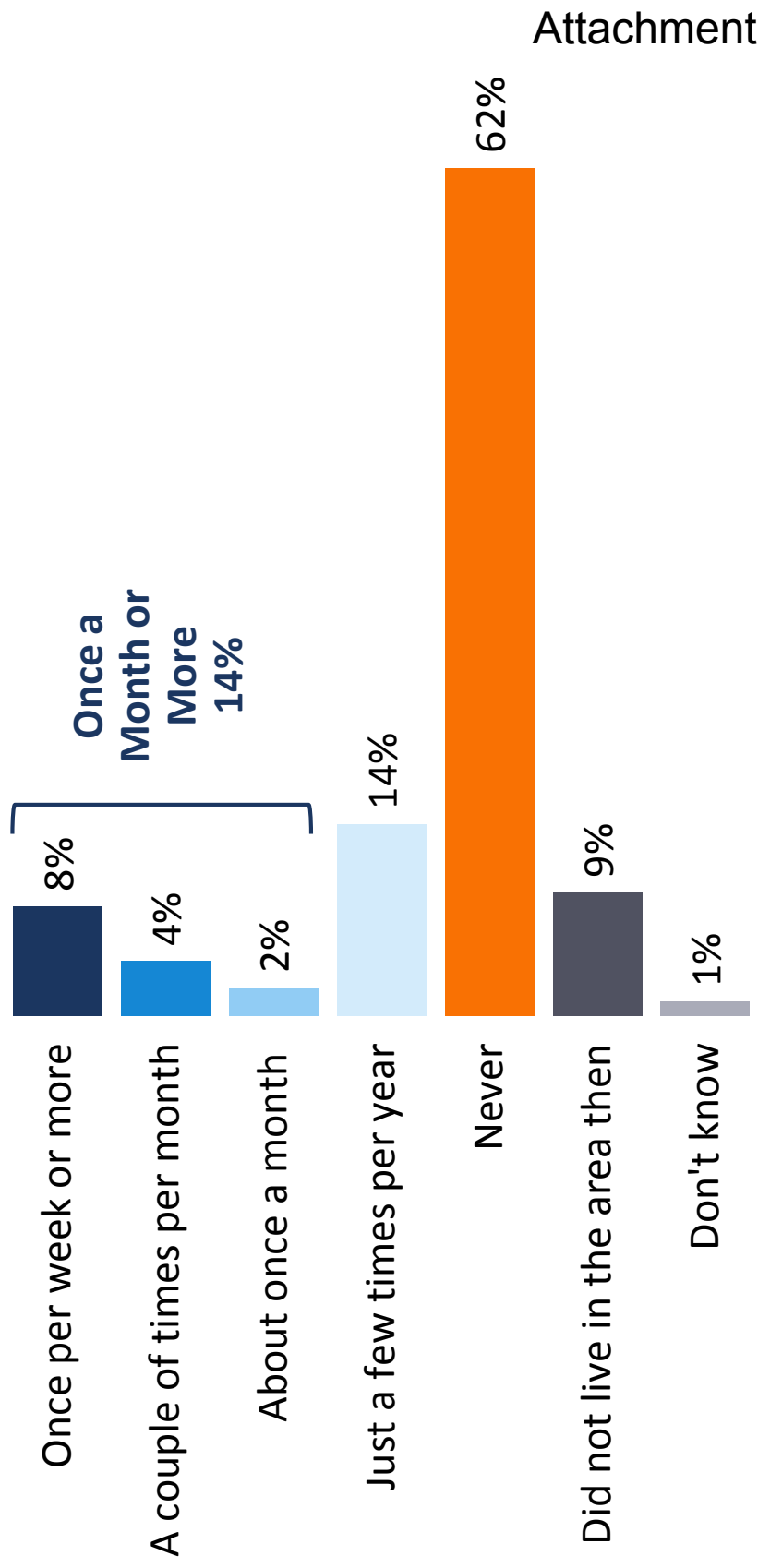


# Current, Prior and Potential Ridership

# Nearly 70% of respondents do not ride METRO buses these days, with 14% who report riding once a month or more.



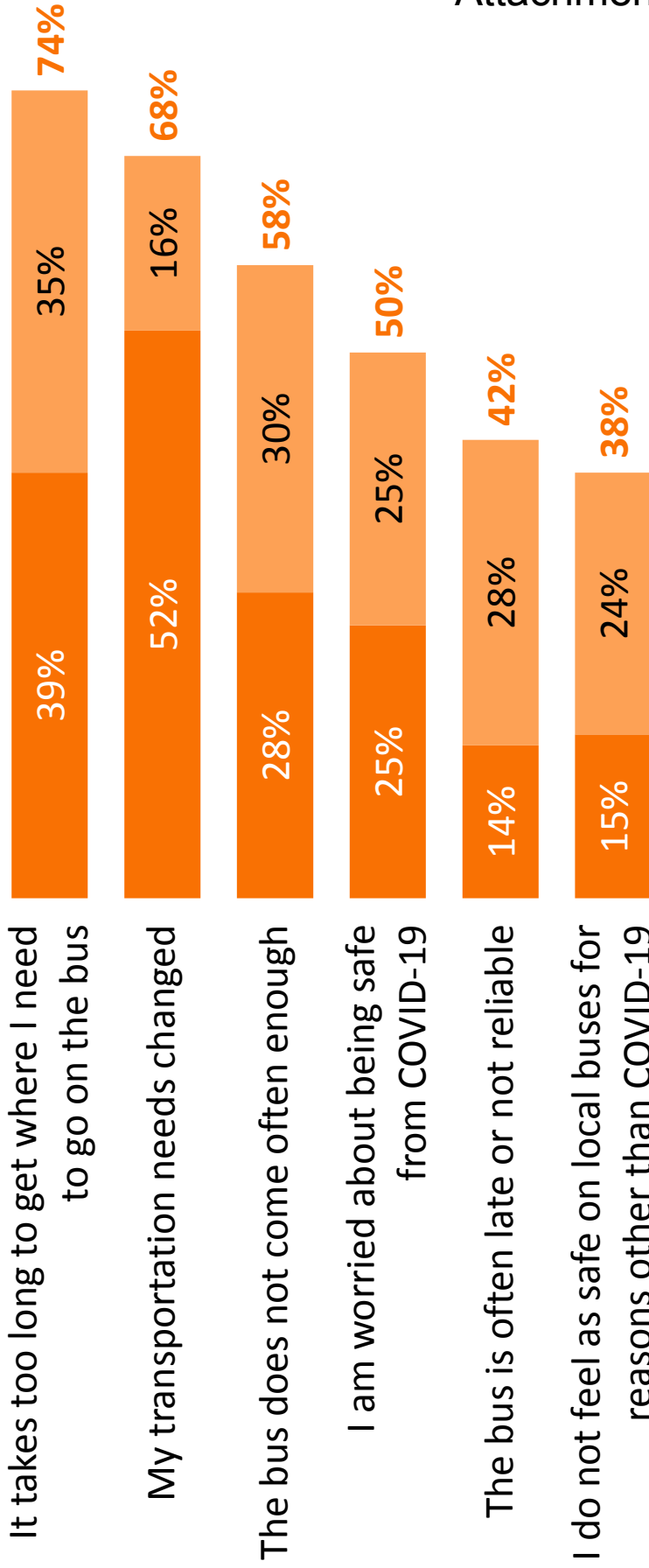
# 14% of respondents were riding METRO once a month or more before the COVID pandemic.



# The most common reasons for riding METRO less often now relate to the length of riding, changing transportation needs, or the frequency of buses.

(Asked Only if Riding Less Often Now, n=94)

■ Major Reason    ■ Minor Reason

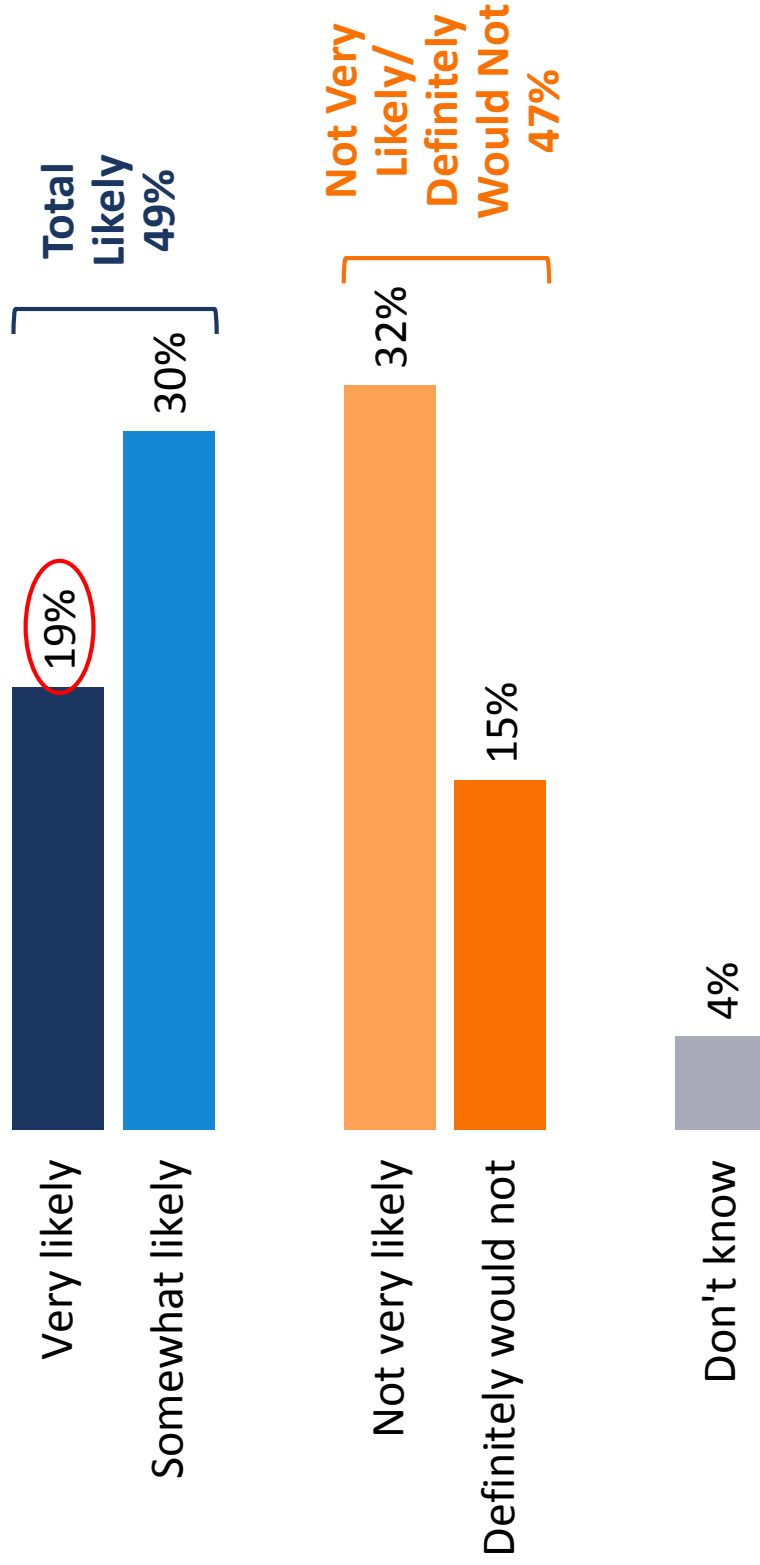


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**Nearly half of non-riders/infrequent riders reported they would be likely to ride METRO regularly if buses came more often and dropped off in more convenient locations.**

*If in the future, Santa Cruz METRO provides bus service within walking distance of your home that runs every 15 minutes, and could drop you off within a block or 2 of where you need to go, thinking realistically, how likely would you be to use that service once a month or more?*

**(Asked of Respondents Who Currently Ride METRO Less than Once Per Month, n=910)**



# Priorities for METRO service

# Residents' highest priorities for METRO are providing routes for workers to get to jobs; affordable transportation for people who do not have personal transportation; services for seniors, people with disabilities and students; and reducing traffic.

■ Ext. Impt.  
 ■ Very Impt.  
 ■ Smwt. Impt.  
 ■ Not Very/Not Impt. At All  
 ■ Don't Know  
 Ext./Very Impt.

Providing routes that make it possible for workers to get to where most jobs are



Providing affordable transportation in places where many or most residents may not have personal transportation



Providing services that are tailored to the needs of the elderly and persons with disabilities



Providing transportation to the area's community colleges and universities



Helping reduce the growth of traffic congestion



Providing routes that make it possible for people to get to stores and appointments

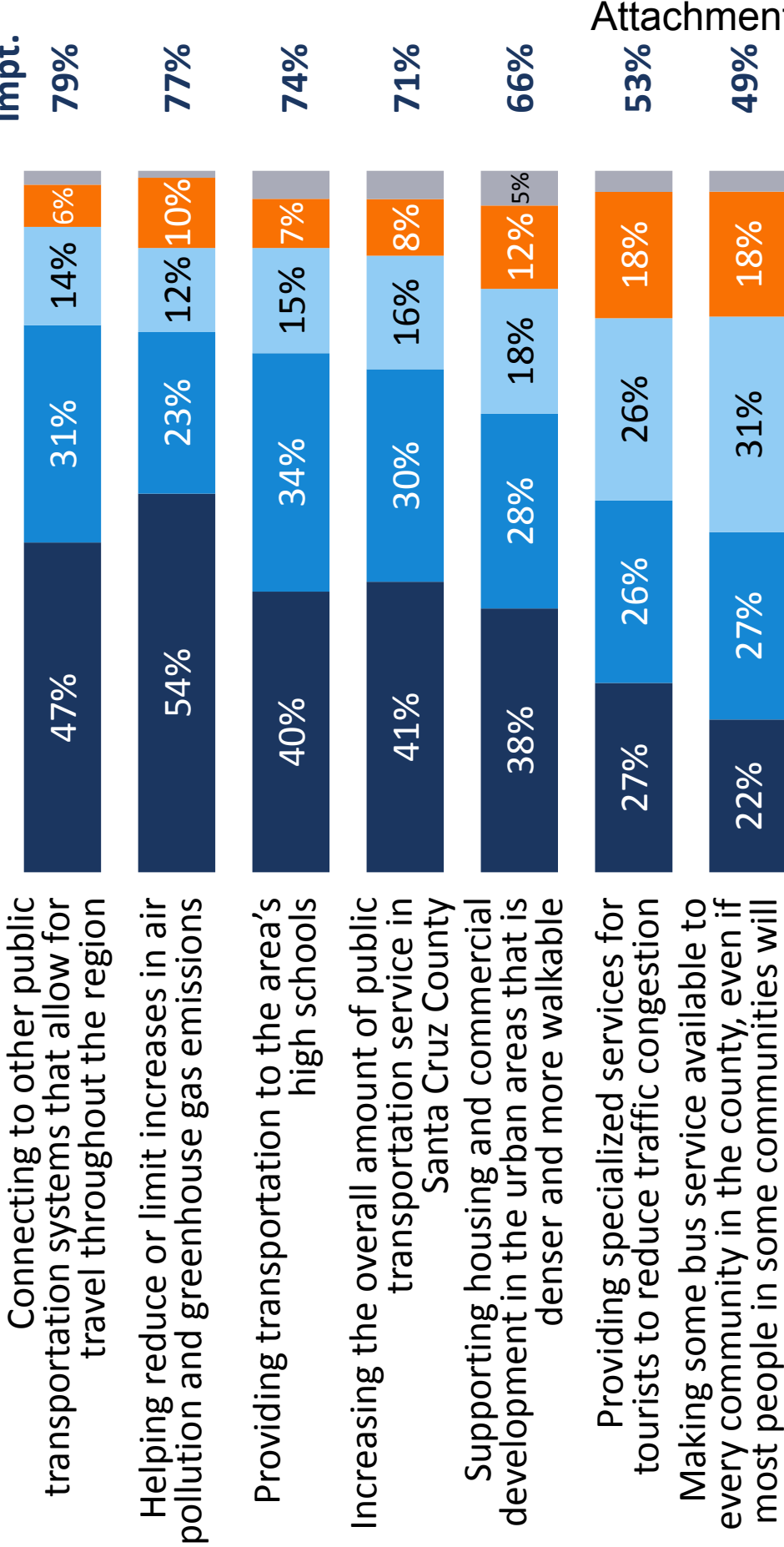


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Q10. As you may know, Santa Cruz METRO, which runs the local bus service, is a public agency. Whether you would ever use the bus or not, Santa Cruz METRO wants to understand what people believe is important for the public transportation system to provide in Santa Cruz County. I am going to read a list of services that Santa Cruz METRO offers now or could offer in the future. For each one, please tell me how important it is to you: is it extremely important, very important, somewhat important, not very important or not important at all?

# Continued

■ Ext. Impt. ■ Very Impt. ■ Smwt. Impt. ■ Not Very/Not Impt. At All ■ Don't Know



Q10. As you may know, Santa Cruz METRO, which runs the local bus service, is a public agency. Whether you would ever use the bus or not, Santa Cruz METRO wants to understand what people believe is important for the public transportation system to provide in Santa Cruz County. I am going to read a list of services that Santa Cruz METRO offers now or could offer in the future. For each one, please tell me how important it is to you: is it extremely important, very important, somewhat important, not very important or not important at all?



# There is a strong preference for frequent service over broad availability.

*Santa Cruz METRO is a public agency spending everyone's tax dollars. It has only a limited number of buses and limited money to operate them. That means they have to make hard choices about how much service they can provide and where in Santa Cruz County they can provide it. With that in mind, which of the following options would you prefer?*

Provide fast and frequent service, that comes every 15 minutes and takes the most direct routes, even if that means transit is only available in the areas where the most people live and work

OR

Provide service to as many places as possible, even if that means the bus only comes every hour or 2 and most trips take a very long time

All Residents

69%

26%

Once a Month or More

68%

30%

A Few Times Per Year

63%

34%

Never

70%

24%

Attachment

# The preference for frequent service is even stronger when framed in context of the need for service that gets residents to work or school on time.

*Here's another way to think about this: when you rely on a bus that doesn't come very often, it's hard to be on time. You might have to arrive early and wait, or risk being late and losing your job. Hearing that, which option would you prefer?*

Provide service every 15 minutes in areas with lots of jobs and schools, so that many people can rely on buses to get to work or school on time, even if it means some people don't have any service

OR

Providing service to everybody, even if it means that bus only comes every hour or 2 throughout the county, and fewer people can take it to get to work or school on time

All Residents

74%

22%

Once a Month or More

70%

26%

A Few Times Per Year

68%

29%

Never

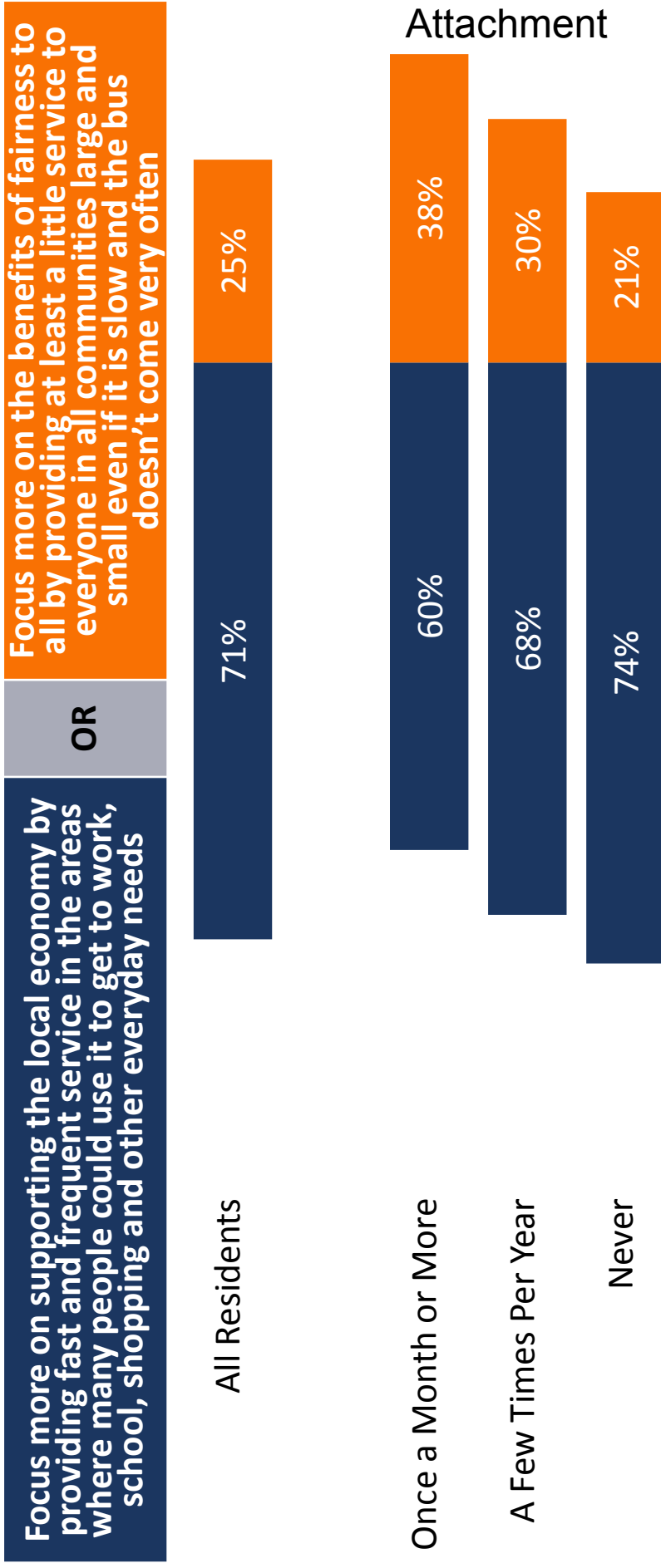
76%

18%

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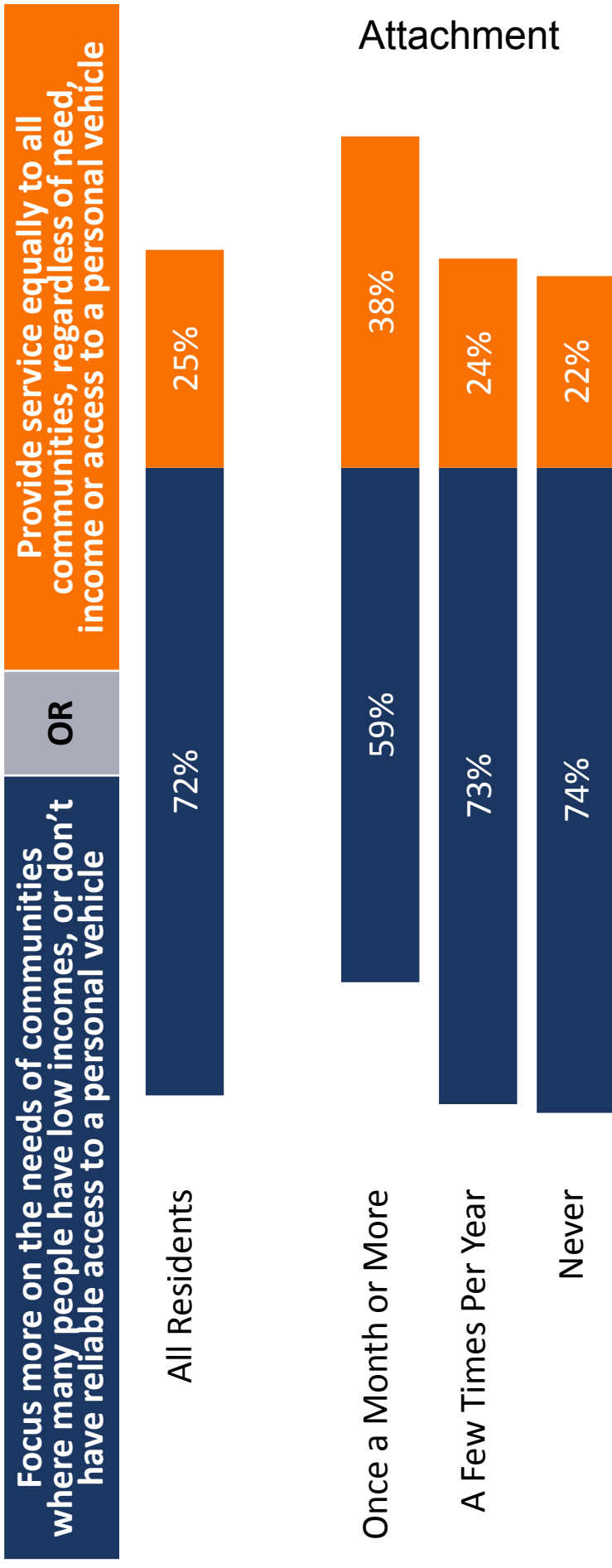
# Seven-in-ten prioritize frequent service to support the local economy over broad service availability in the name of fairness.

*Santa Cruz METRO also has to consider the benefits of transit to the whole community. If you could tell them which of the following to choose, what would you tell them?*



**A similar percentage thinks METRO should prioritize low-income communities where more people do not have personal transportation.**

*Here are a different set of options that Santa Cruz METRO also needs to consider. Again, which of the following options would you prefer?*





# Santa Cruz County Public Transportation Usage and Priorities

*Highlights of a Survey of County Residents*



FAIRBANK, MASLIN,  
MAULLIN, METZ  
& ASSOCIATES

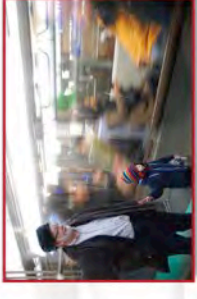
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Jarrett Walker, PhD

JarrettWalker.com

HumanTransit.org

Twitter: @humantransit



**HUMAN  
TRANSIT**

How Clearer  
**Thinking**  
about Public Transit  
Can Enrich Our  
Communities  
and Our Lives

Jarrett Walker

## Executive Workshop: Santa Cruz Metropolitan Transit District

Attachment

# Why fixed transit?

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# Ultimately, it's about Space



# It's about Space

- Technology never changes geometry!



Bus

Private Car

Taxi / Uber

Driverless Car

Driverless Bus?

# Fixed transit is existential for cities

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- In dense cities, are those wanting to be dense, transit is existential. *The city is impossible without it.*
- So be careful when anyone tells you that new ideas or technologies are “disrupting” fixed route transit.

# What is a bus?



Bus

- Public transit ...
- capable of high ridership ...
- using roads.

*This is the entire definition.*

# What's wrong with bus service?

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- Good bus service helps with too many problems.
  - Climate
  - Equity / Social Justice
  - Access to opportunity
- ... Which makes it hard to sell to people who care about only one problem.

# Bus service is a Climate Solution

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- The fastest, most effective way to make transit **useful to more people in more situations**.
  - Low capital cost
  - Fast implementation

... and an equity solution

- Can scale affordable to cover most of a city's people and destinations.

To expand ridership, expand freedom (access).

# The Wall Around Your Life

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# Access to Opportunity

Here is a person.



JARRETT  
WALKER  
+ ASSOCIATES

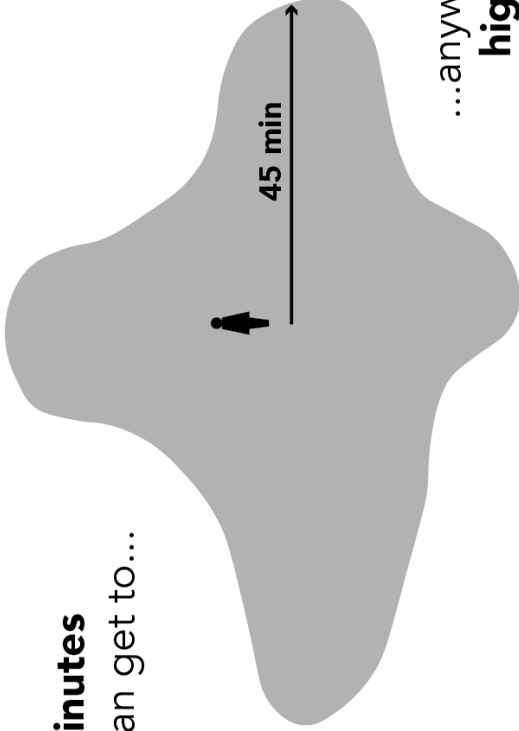


# Access to Opportunity

She is in a city full of possible destinations.

# Access to Opportunity

In **45 minutes**  
she can get to...



JARRETT  
WALKER  
+ ASSOCIATES

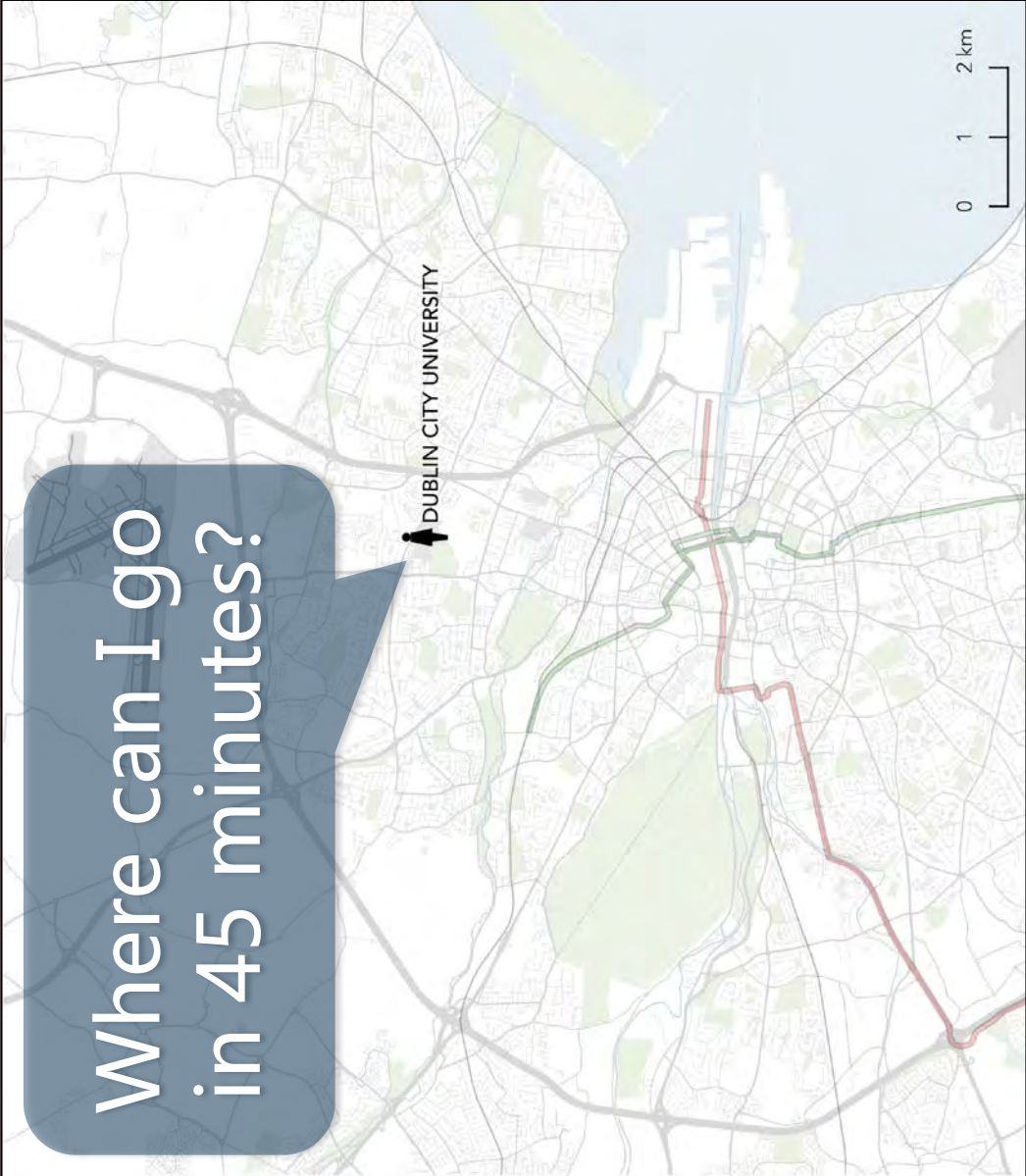
...anywhere in the  
**highlighted area.**

# Access to Opportunity

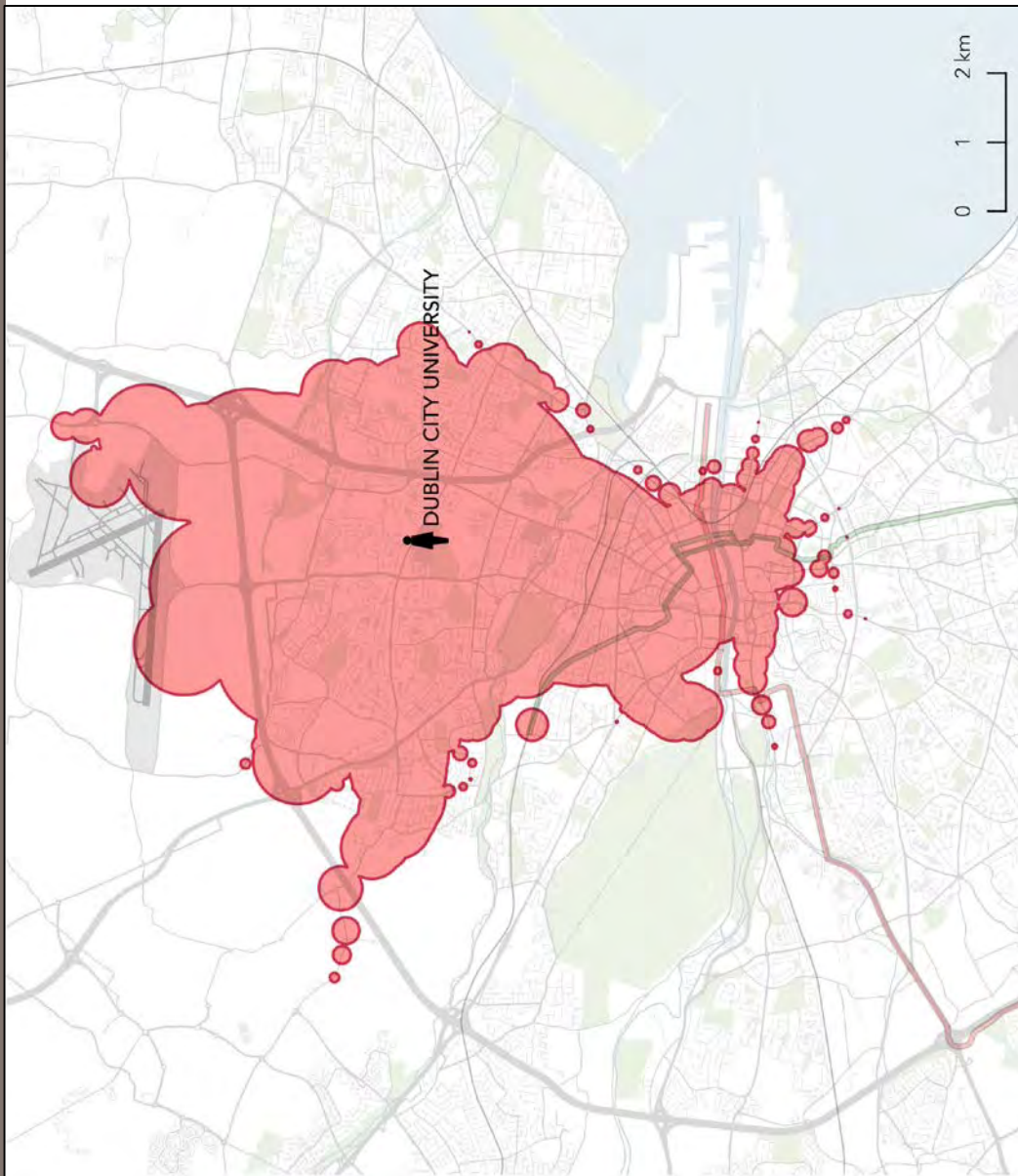
Her access to destinations is the number of destinations in that area.

You can count the jobs or schools or shopping in that area to estimate her access.

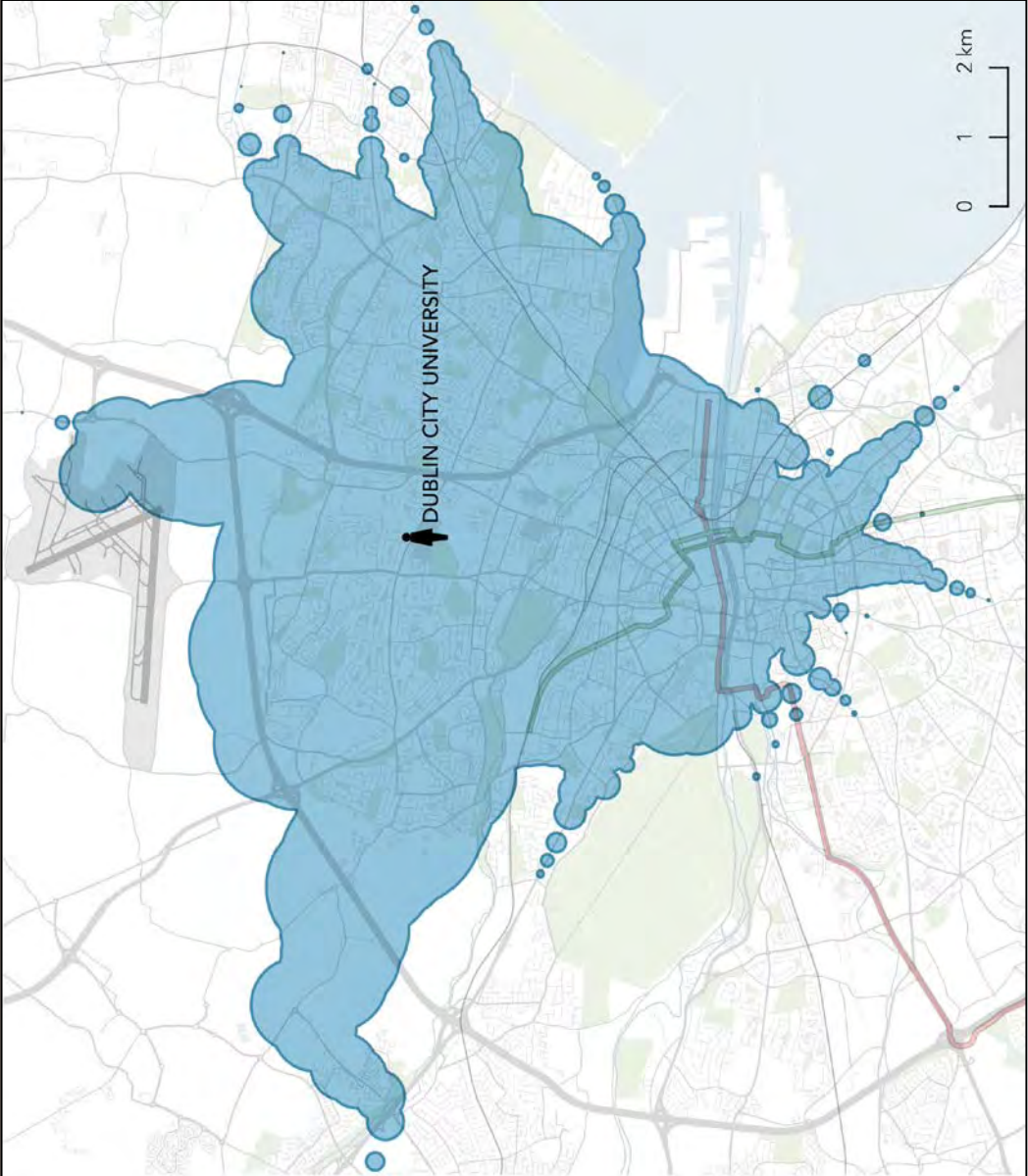
JARRETT  
WALKER  
ASSOCIATES



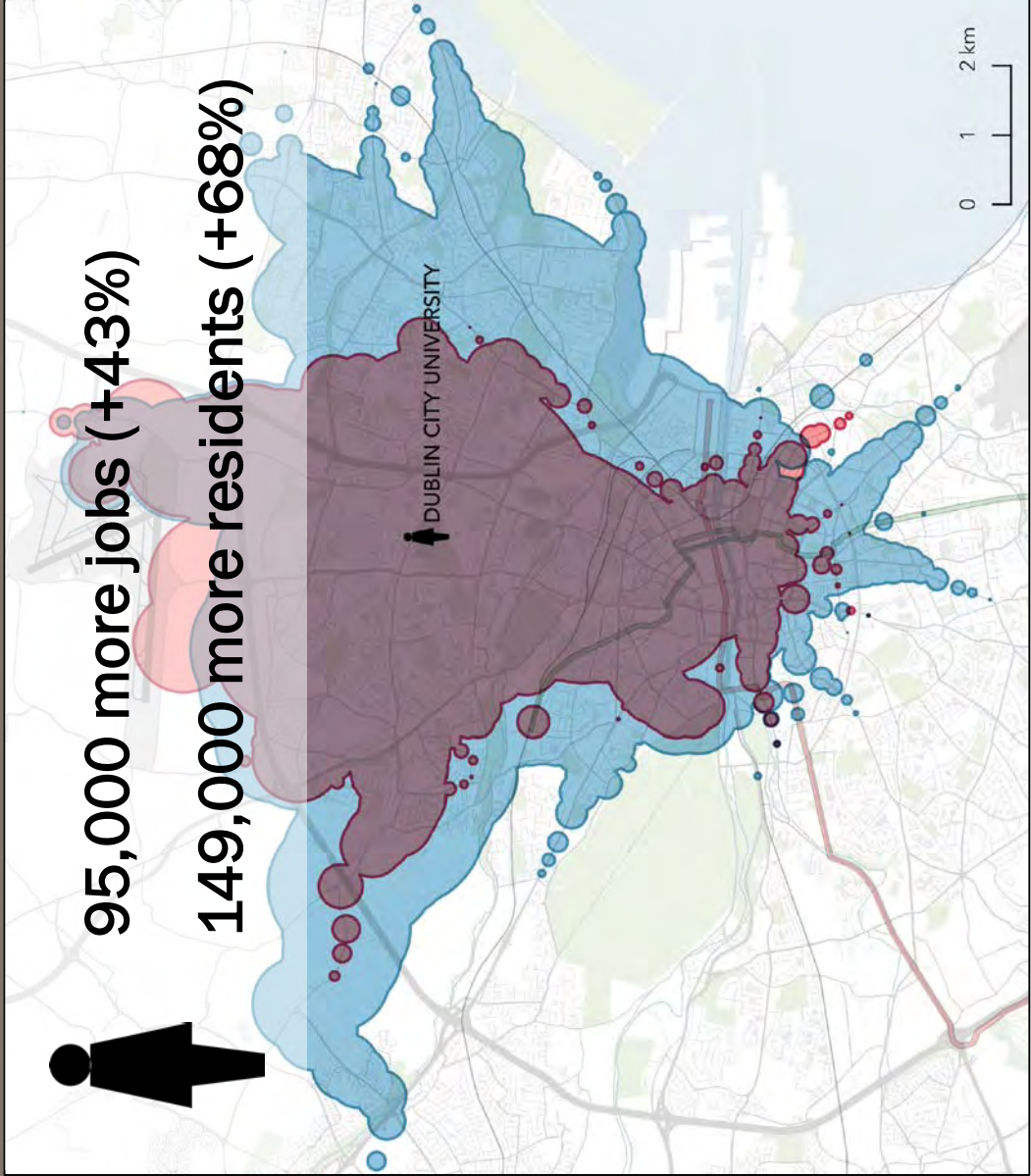
# existing network



# proposed network



# Jane can get to:



# Travel Time = walk + wait + ride

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- **WALK**
  - Walking distance, infrastructure, pedestrian network
- **WAIT**
  - Frequency
- **RIDE**
  - Speed and reliability

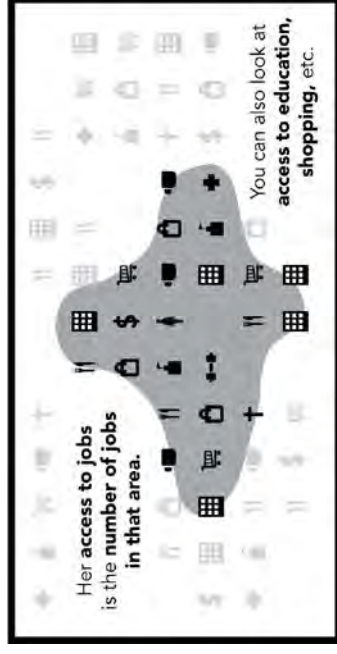


# Access = Freedom = Usefulness

When a transit network maximizes access, it increases the likelihood that the service is useful for any particular trip.

Maximizing access by transit also improves:

- Access to economic opportunity.
- Value of investments in a walkable community.
- Functionality of the city.
- Personal freedom.

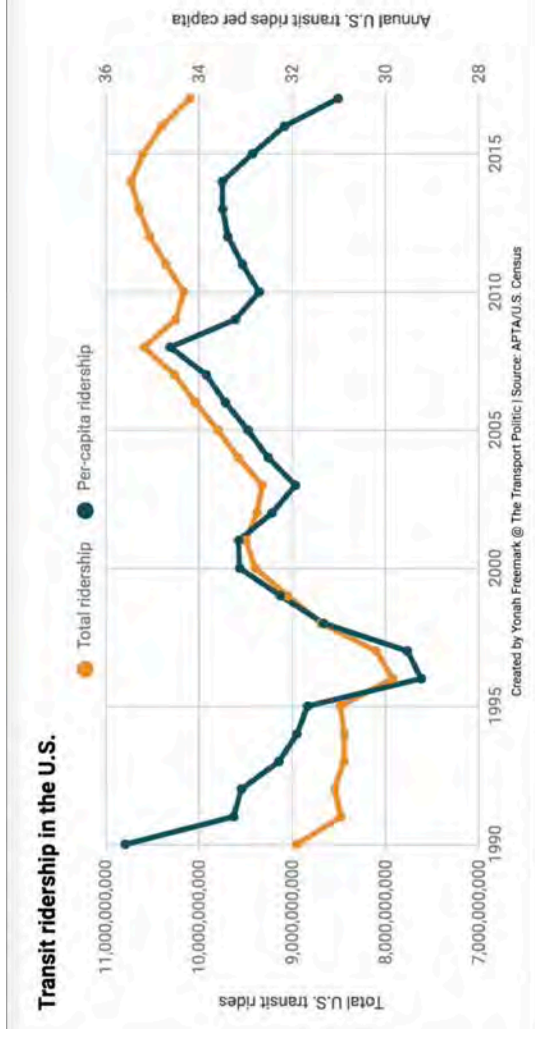


# Access is Enduring

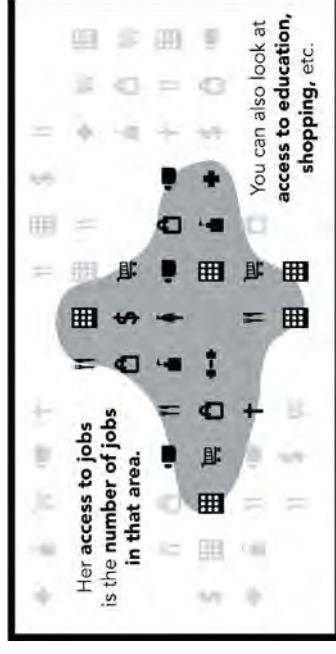
Ridership is volatile.

Access is how network design influences ridership.

It isolates the impact of the network from the impact of other things.

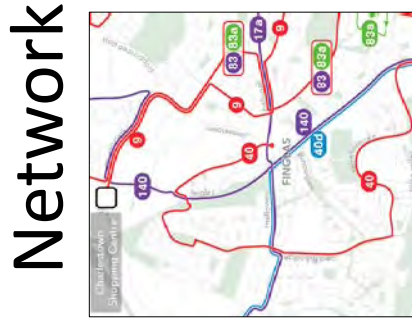


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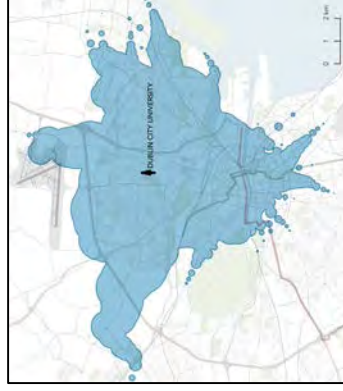


# Access is a geometric fact.

Geometry



Network → Access



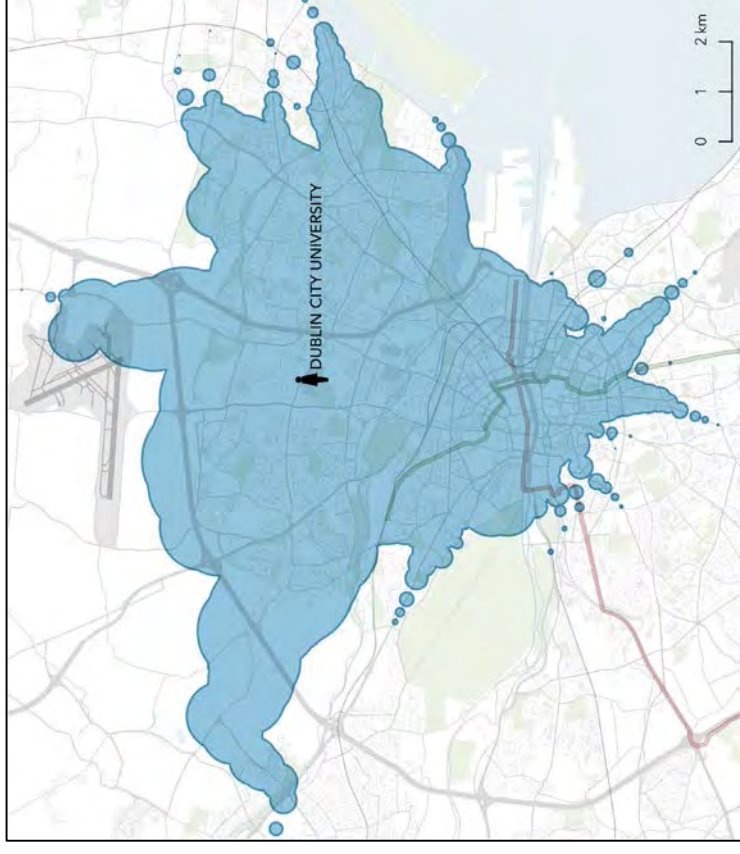
Social  
Science

↑  
Ridership  
Prediction

When we talk about prediction, we're not talking about freedom.

# How does transit maximize freedom?

- High Frequency Lines
- Forming a Connected Network
- Reasonably fast and reliable
- Focused on Transit Friendly Places
  - Dense
  - Walkable
  - Linear
  - Proximate



“Frequency is freedom!”

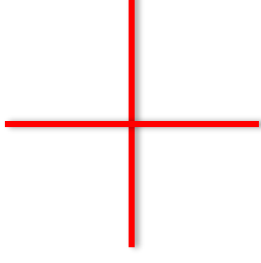
# Frequency

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# Frequency comes first

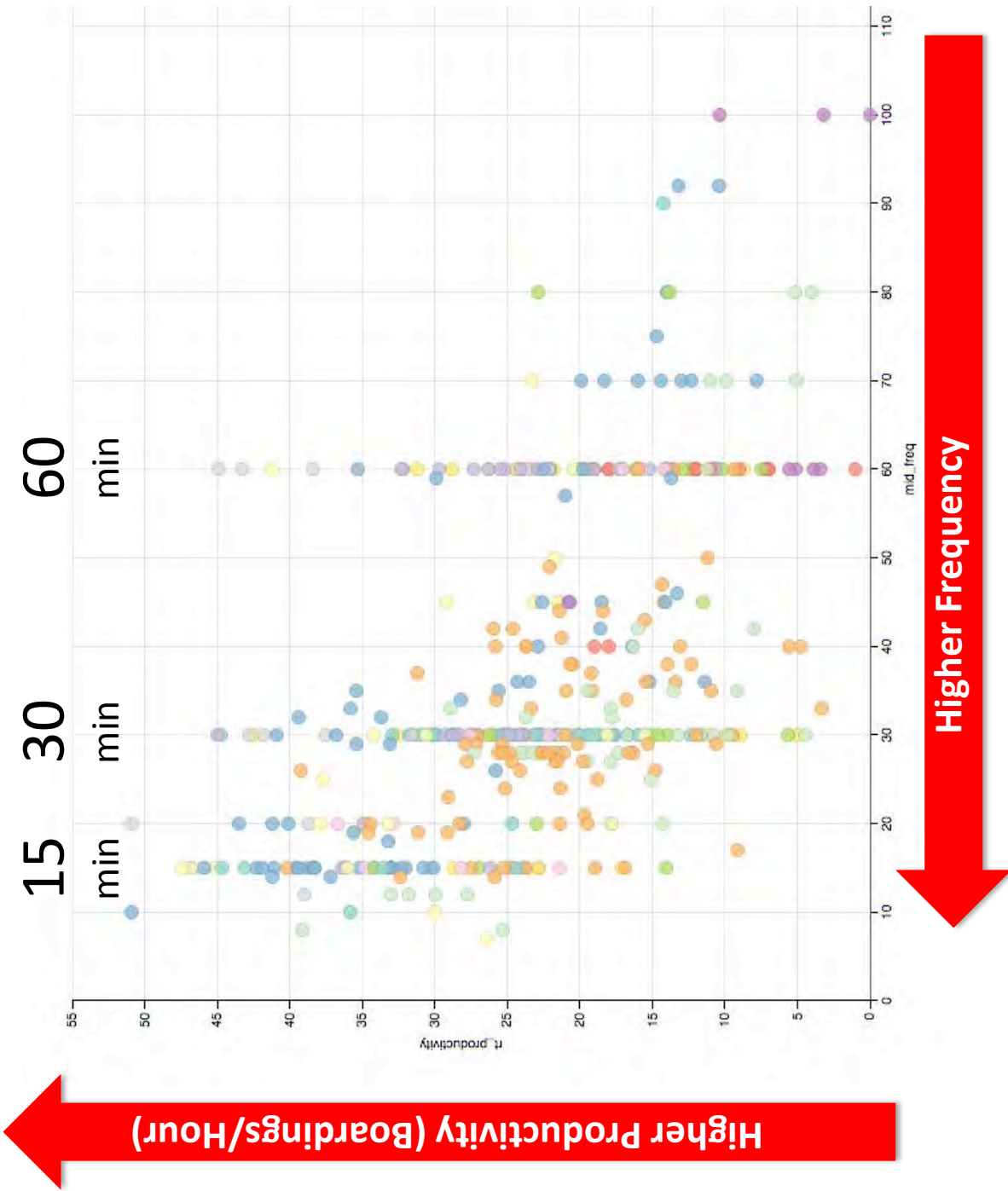
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- High frequency means public transport is coming soon.  
This has three independent benefits:
  - **Reduced Waiting**
  - **Easier Connections**
  - **Reduced Impact of Disruptions**
- Lines with higher frequency tend to have not just higher ridership, but higher ridership per unit of service.

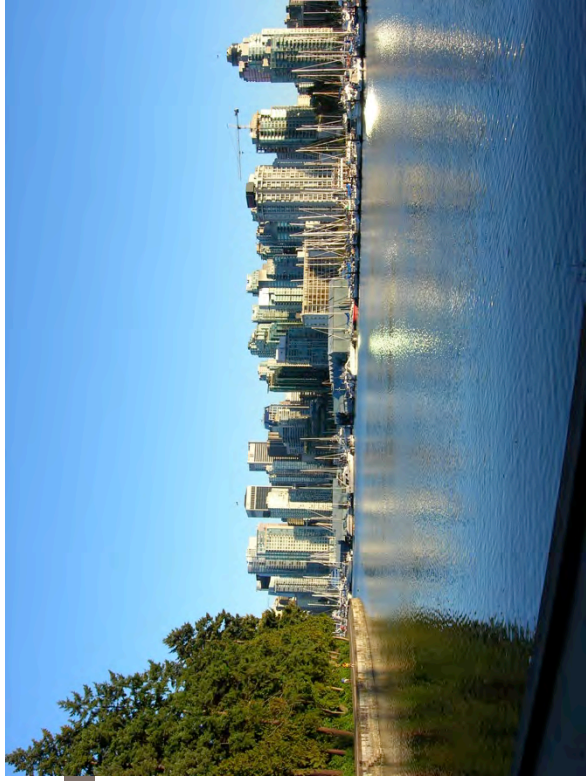


# HIGH FREQUENCY → HIGH PRODUCTIVITY

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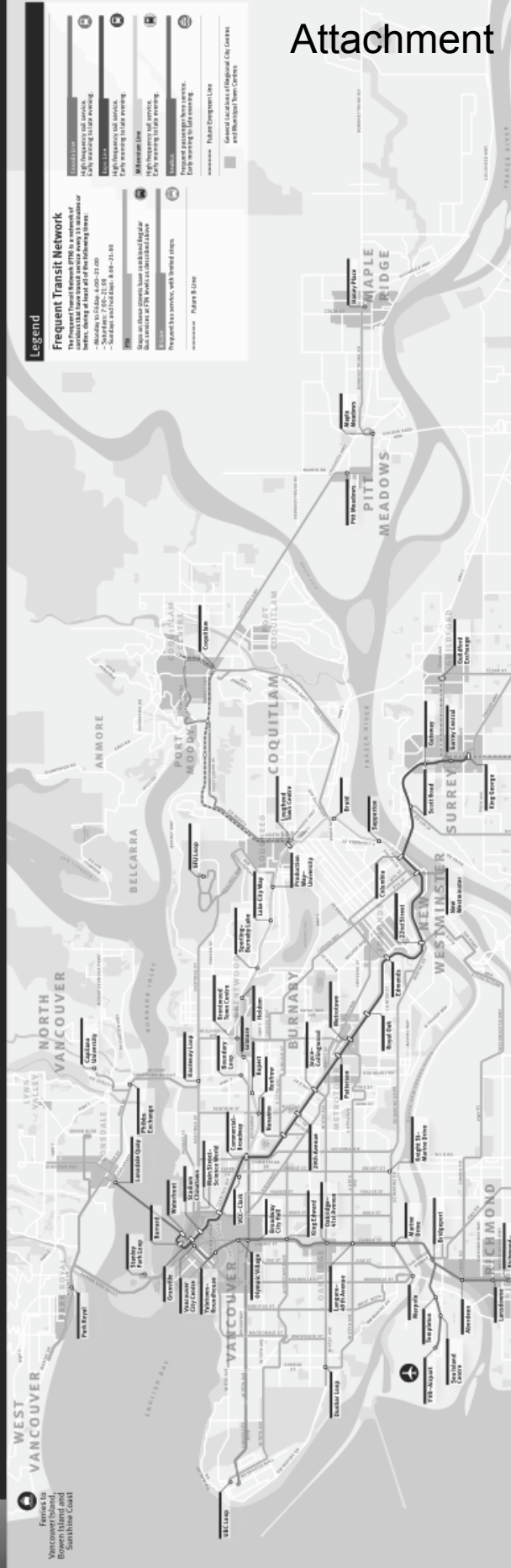


# Frequent Network Brands



“Over half of all population and jobs will be on the Frequent Network.”  
-- Regional Goal 3

## T Frequent Transit Network in Metro Vancouver





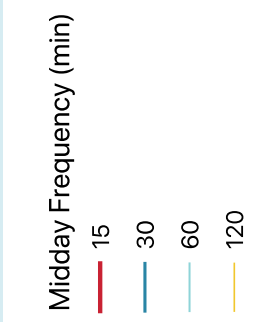
# Frequency → Affordability

- Useful enough to be liberating, and
- Abundant enough that it can't drive up housing prices everywhere.
- Helps build apartments with less parking → affordability





All-day Frequency



Put liberating service where it will liberate the most people.

# Where does high-ridership transit go?

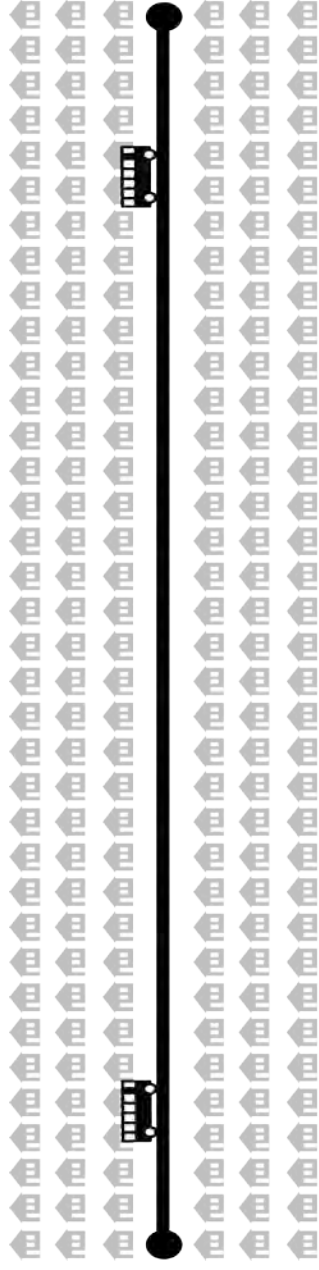
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# Density

How many people are near transit?

The more people are going to and from the area around each stop, the more people will ride transit.

High  
Ridership



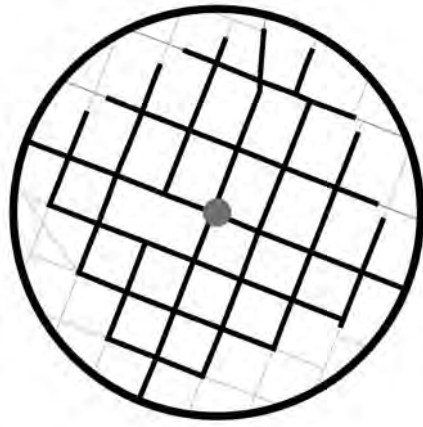
Lower  
Ridership



Attachment

# Walkability

Can the people around the stop walk to the stop?



High  
Ridership



Lower  
Ridership

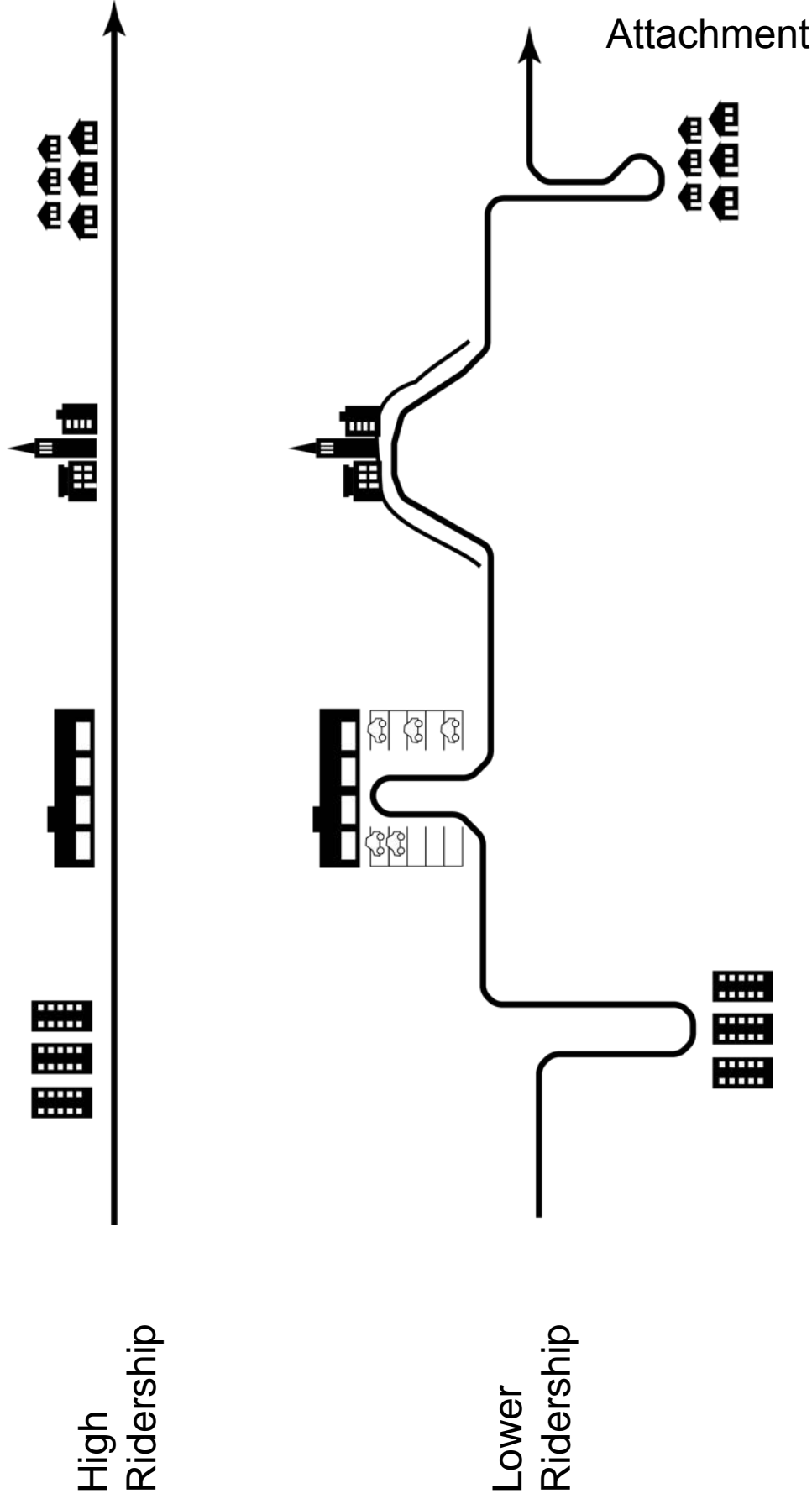


Michael Cynychki

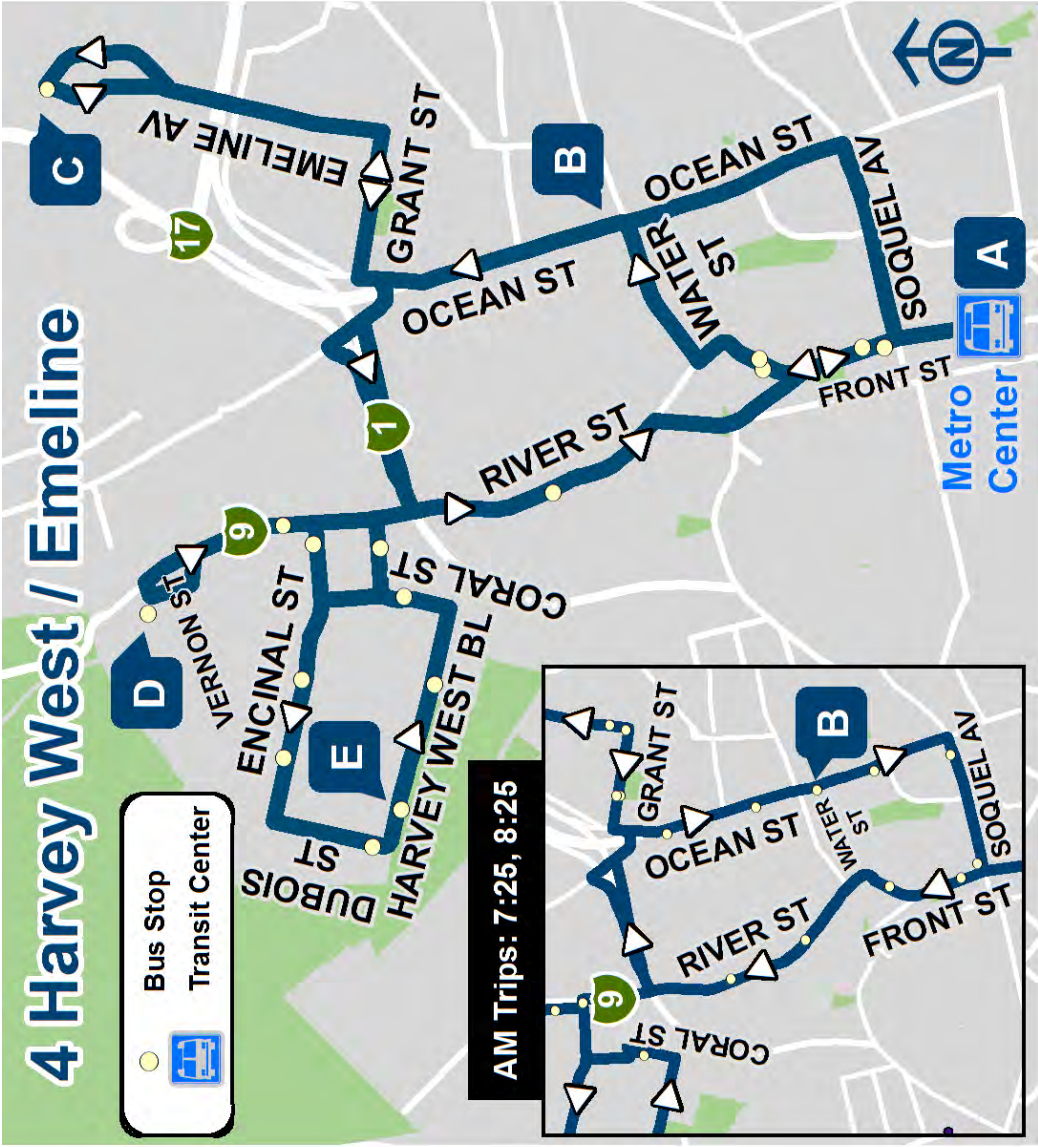
# Linearity

Can transit run in straight lines that are useful to through-riders?

The straighter the line, the shorter the journey, and the more people can find it useful.

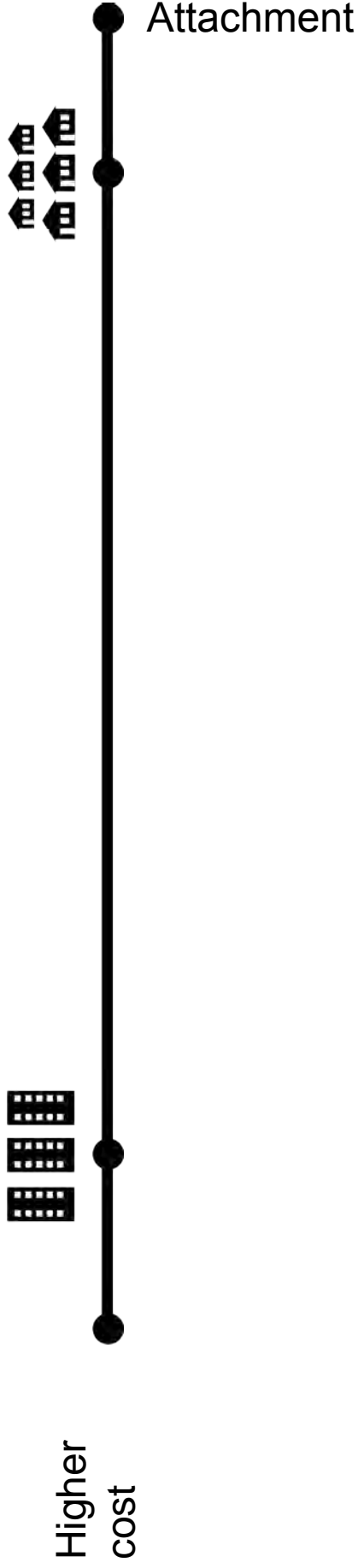
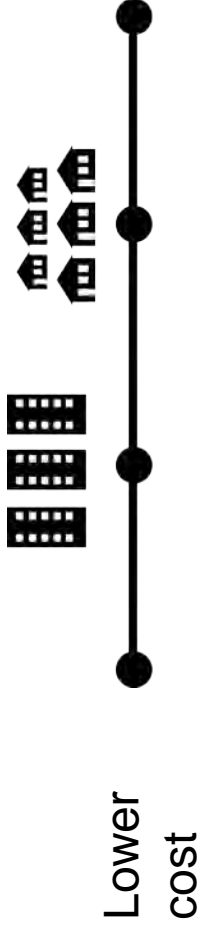


# (Bad Linearity)



# Proximity

Does transit have to cross long low-ridership gaps?





The Ridership-Coverage Tradeoff

# But is Ridership What You Want?

Attachment

# It's Like Plumbing

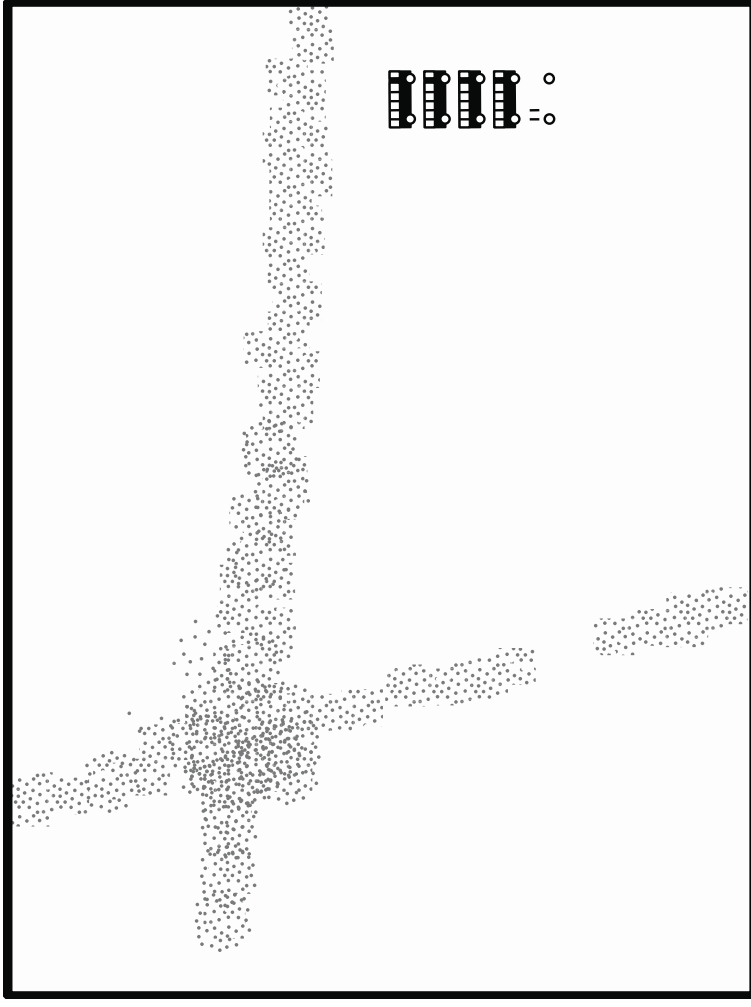


# How should a transit agency allocate its resources?

Fictional Urban Area

Dots = residents and jobs

You have 18 buses

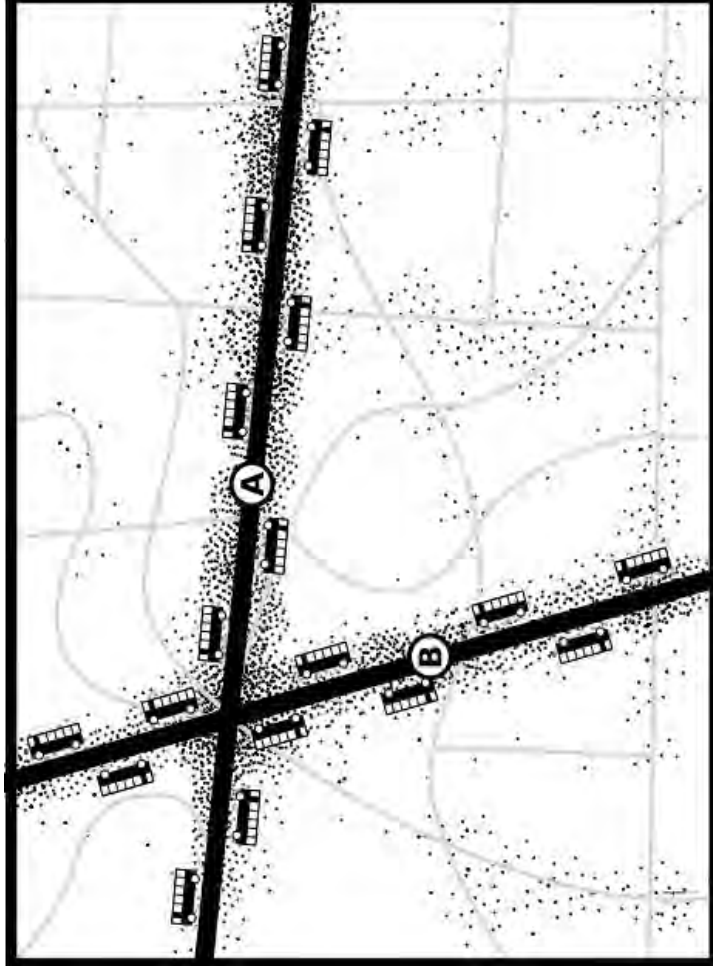


# Ridership Goal “Maximum Ridership”

Think like a business, choosing *which markets you will enter*.

The straight lines offer density, walkability, and an efficient transit path, so you focus service there.

Because all 18 buses are focused on few lines, they are frequent.



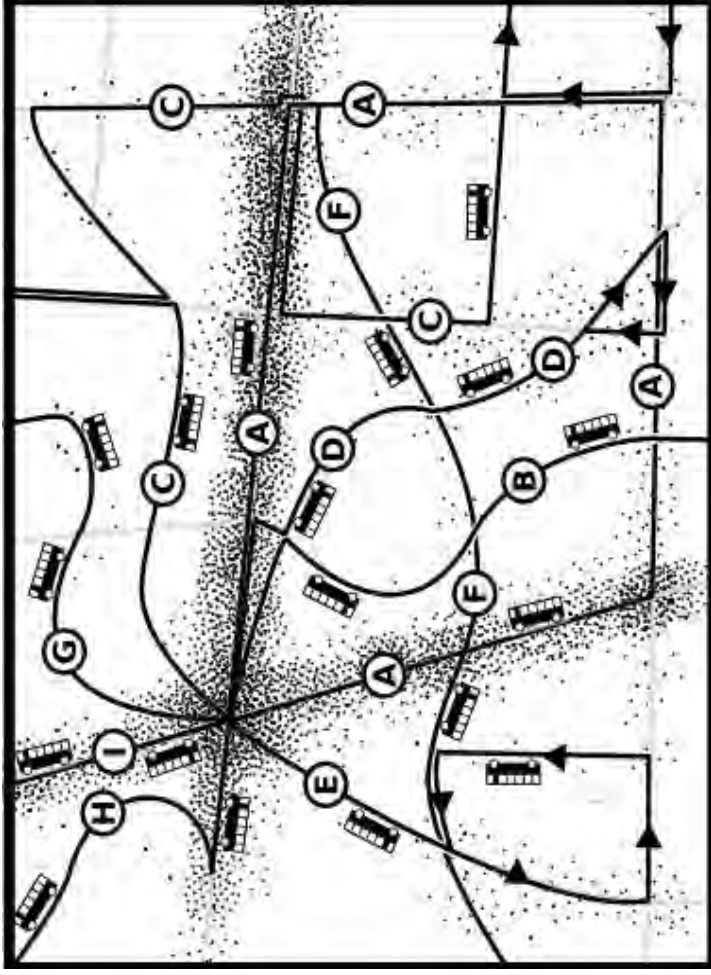
## Performance Measure: *Productivity*

Ridership relative to cost

# Coverage Goal “Some service for everyone”

Think like a government service.  
Try to serve everyone, even those in expensive-to-serve places.

The result is more routes covering everyone, but less frequency, more complexity, and lower ridership.

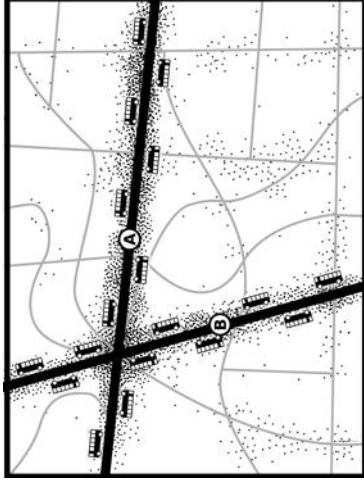


Attachment

## Performance Measure: Coverage

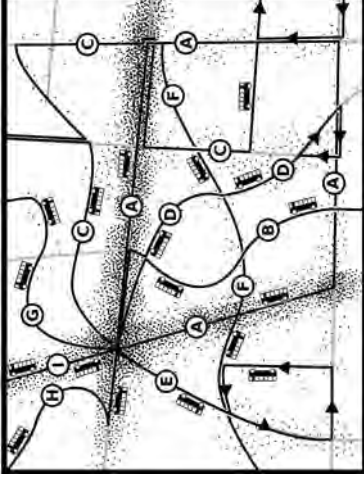
% of population and jobs near some service

Both goals are important,  
... but they lead opposite directions!



## Ridership Goal

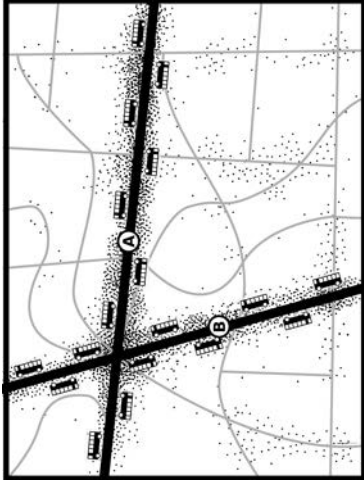
- “Think like a business.”
- Focus where ridership potential is highest.
- Support dense and walkable development.
- Max. competition with cars
- Maximum VMT reduction



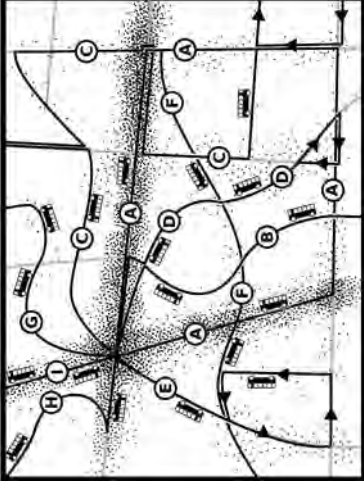
## Coverage Goal

- “Think like a public service.”
- “Access for all”
- Support low-density development.
- Lifeline access for everyone.
- Service to every member city or electoral district.

So it helps to choose a point on the spectrum ...



**Ridership Goal**



**Coverage Goal**



You are here.  
60% Ridership  
40% Coverage

Attachment

# For example ...

## Ridership Services (60%)

- UCSC
- SC – Watsonville
- SC – San Lorenzo Vy.

## Coverage Services (40%)

- Most Watsonville locals
- Most rural service.
- Most circuitous short Santa Cruz services.

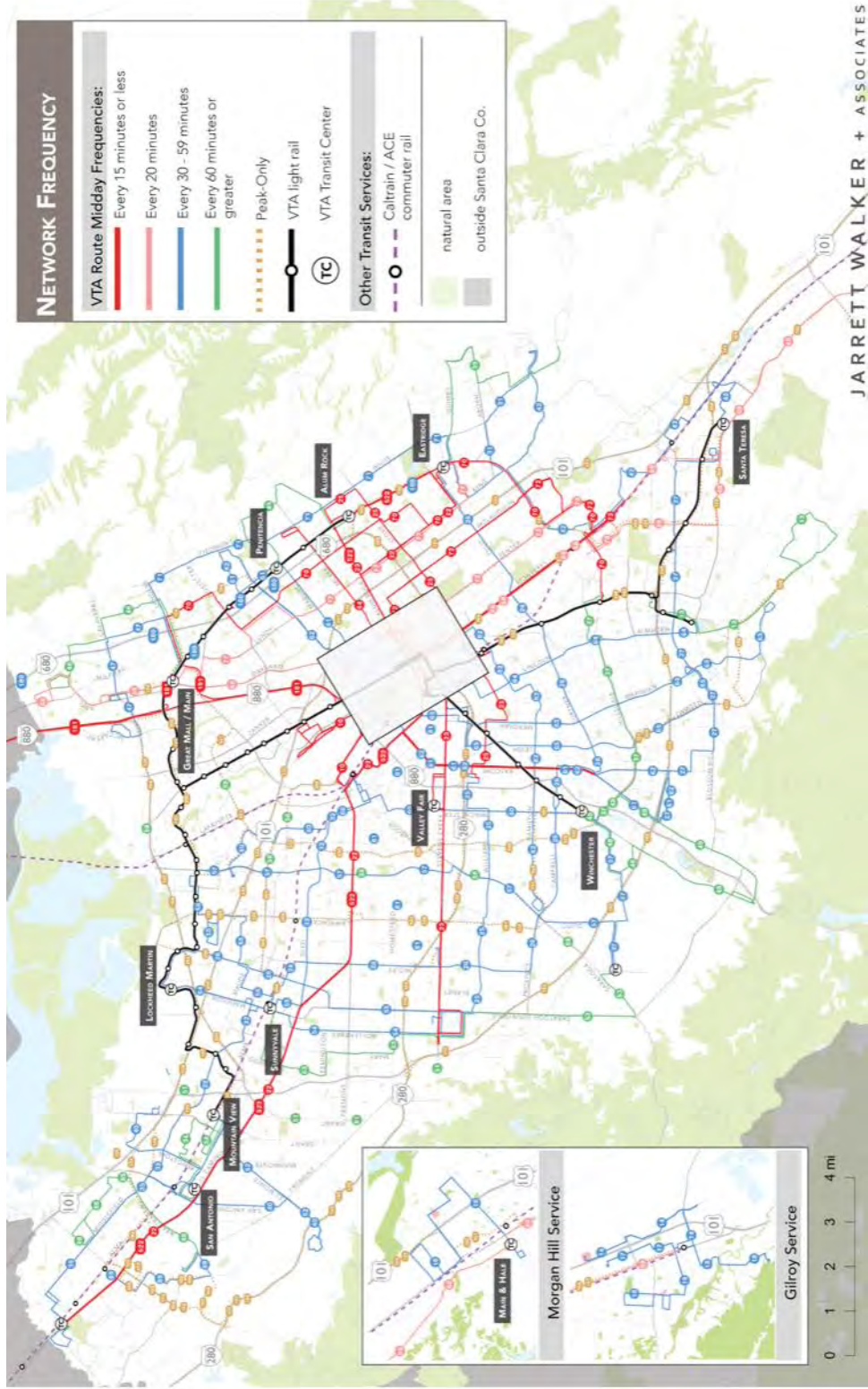
Almost all of your coverage service has an equity dimension, benefiting disadvantaged areas.



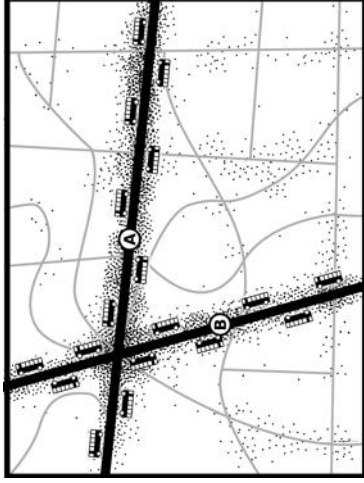
# Case Study of a Ridership- Coverage Conversation: VTA

Attachment

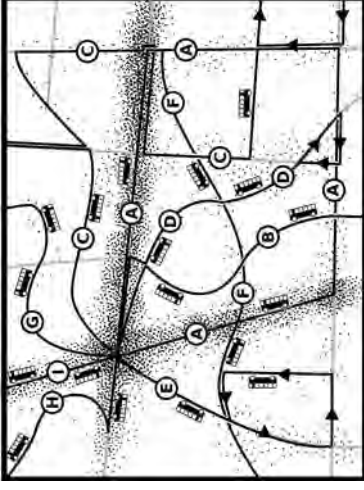
# Current All-day Frequency



So it helps to choose a point on the spectrum ...



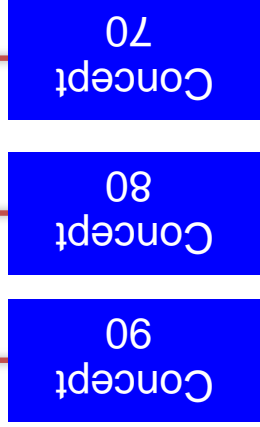
**Ridership Goal**



**Coverage Goal**



How much should VTA focus on ridership? 70%? 80% 90%?



Attachment

# Please Learn 4 Colors

These will be used consistently throughout the project.



Rapid. Every 15 min or better and widely spaced stops.



Every 15 minutes.



Every 30 minutes.

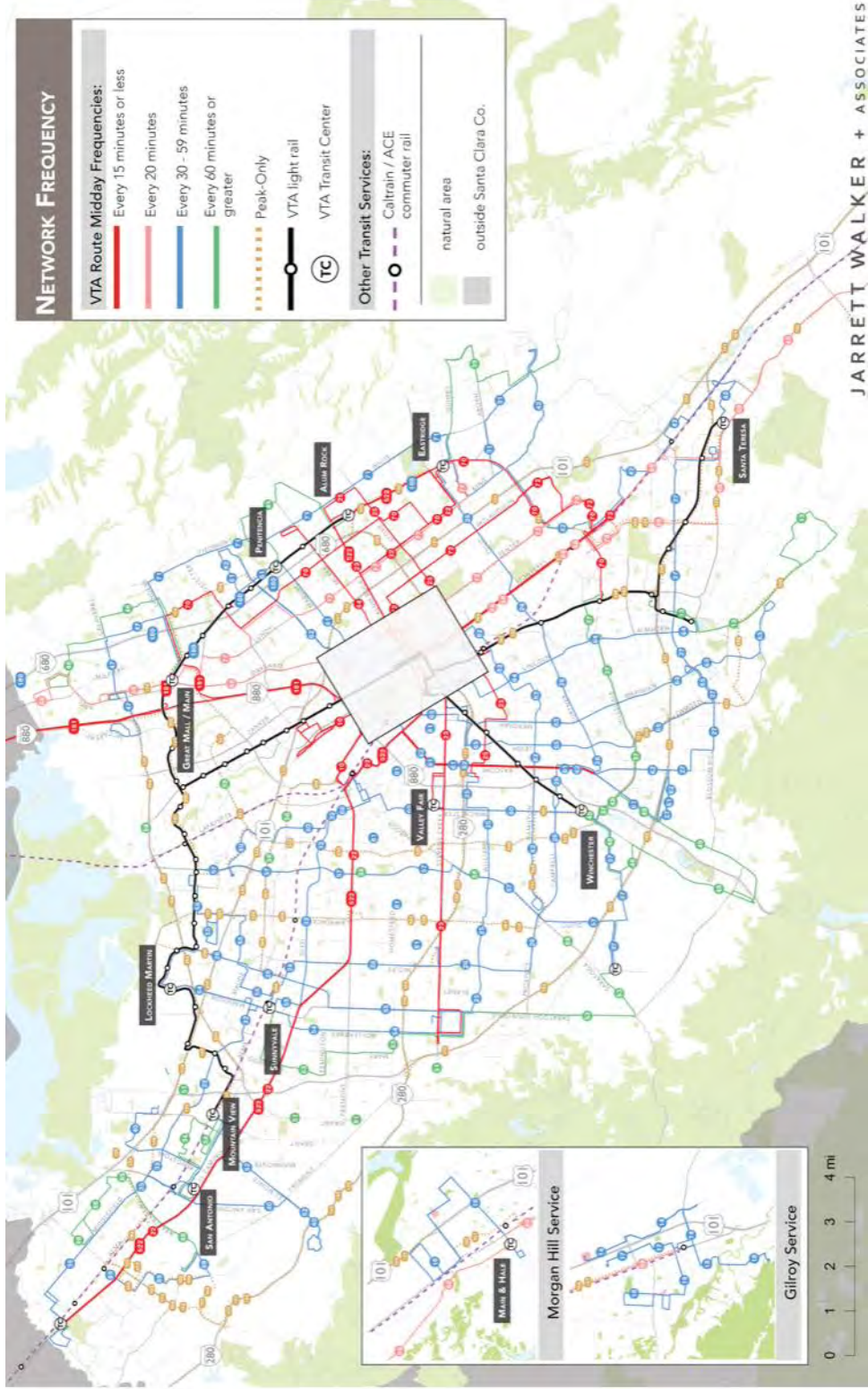


Every 60 minutes.

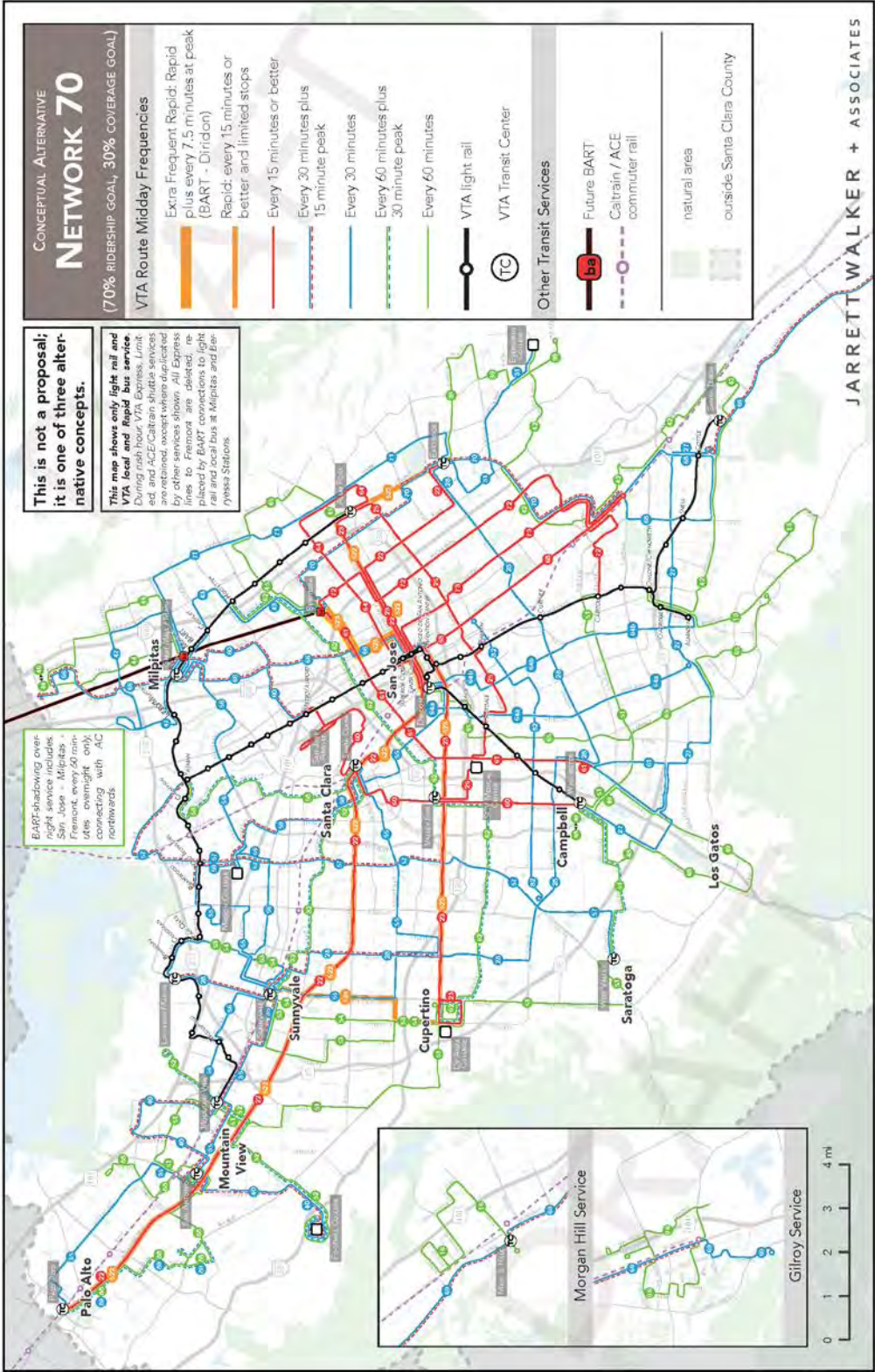


Frequent Network

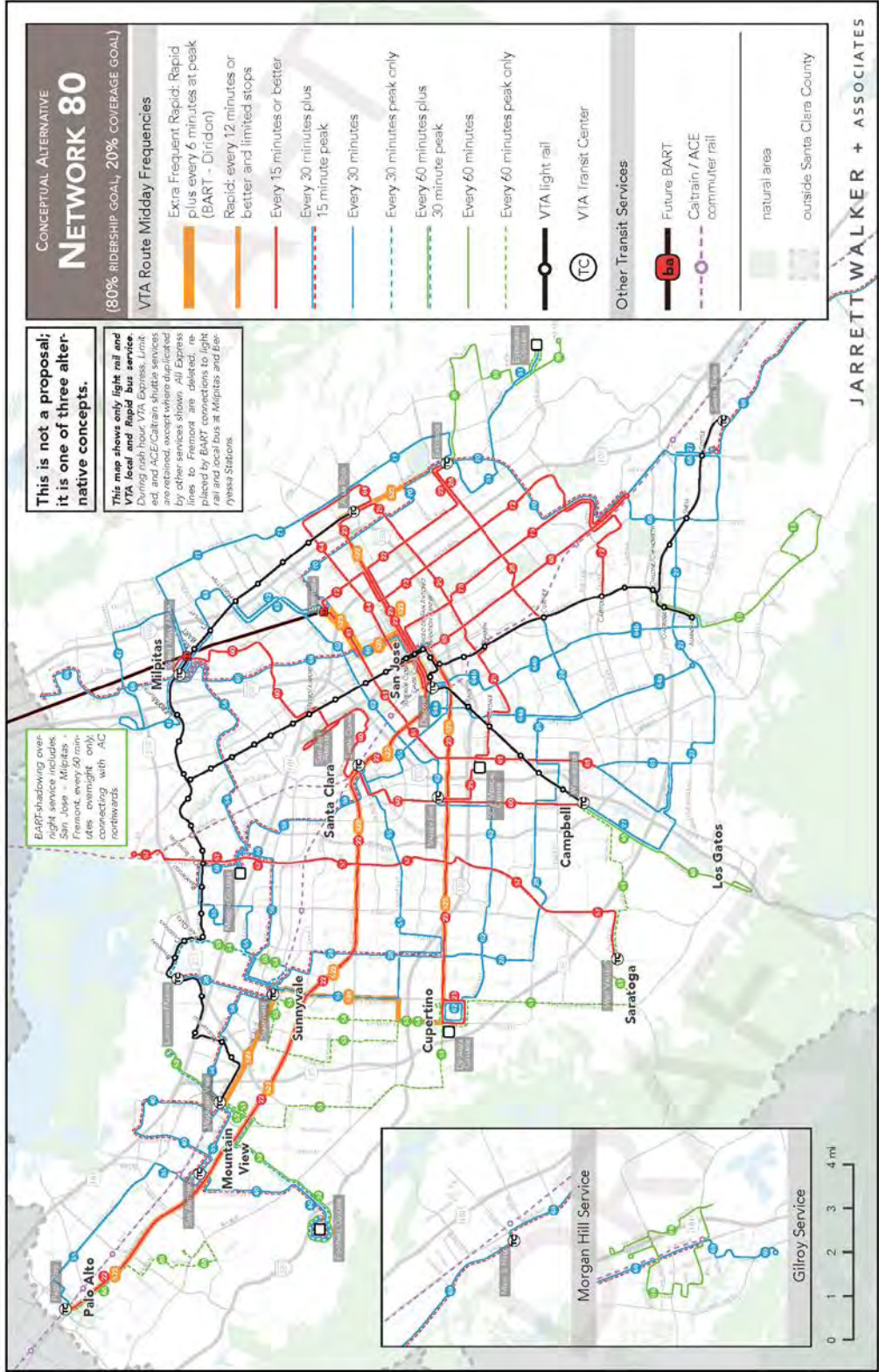
# Previous All-day Frequency



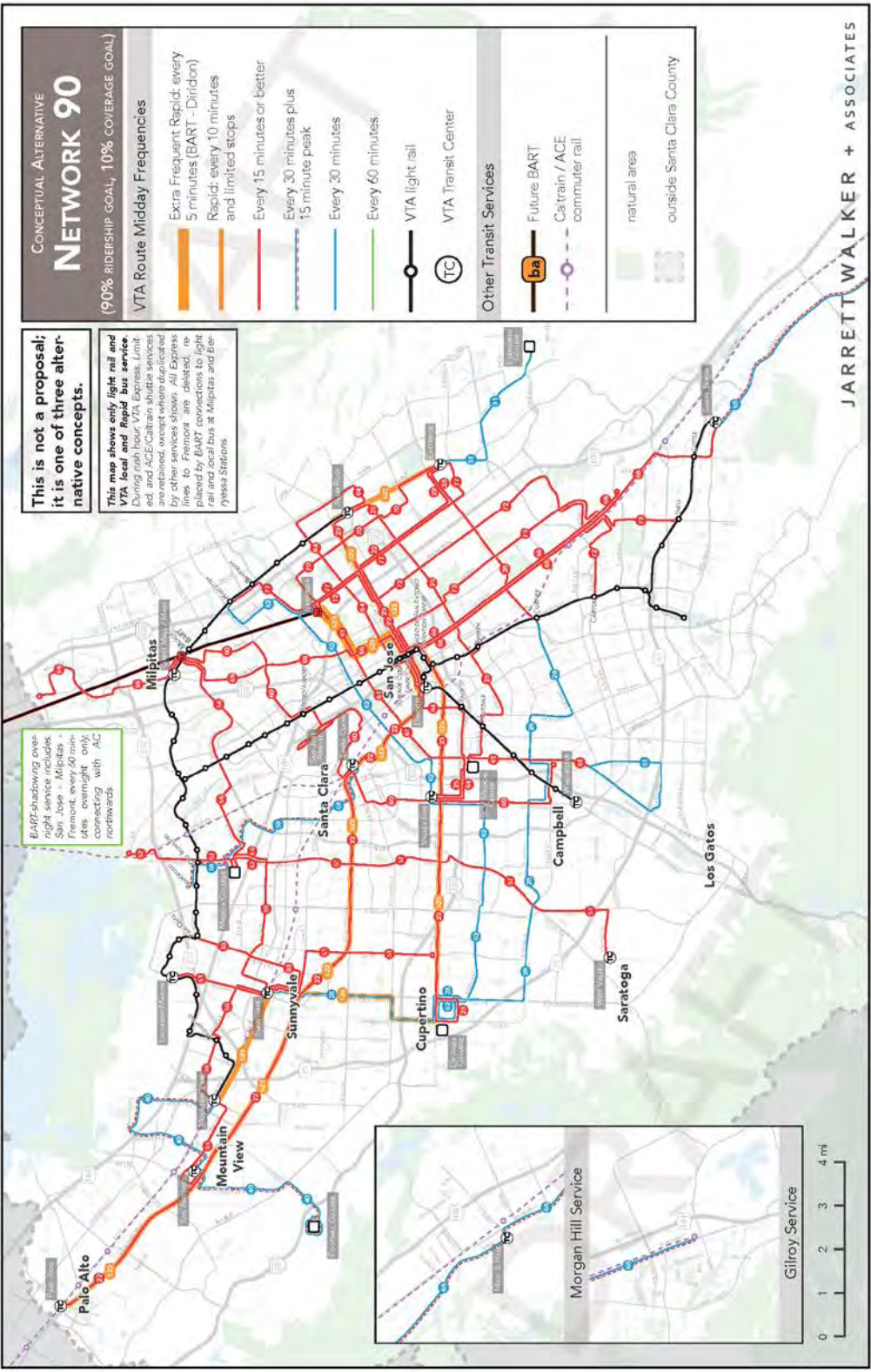
# Concept 70 (70% Ridership, 30% Coverage)



# Concept 80 (80% Ridership, 20% Coverage)



# Concept 90 (90% Ridership, 10% Coverage)



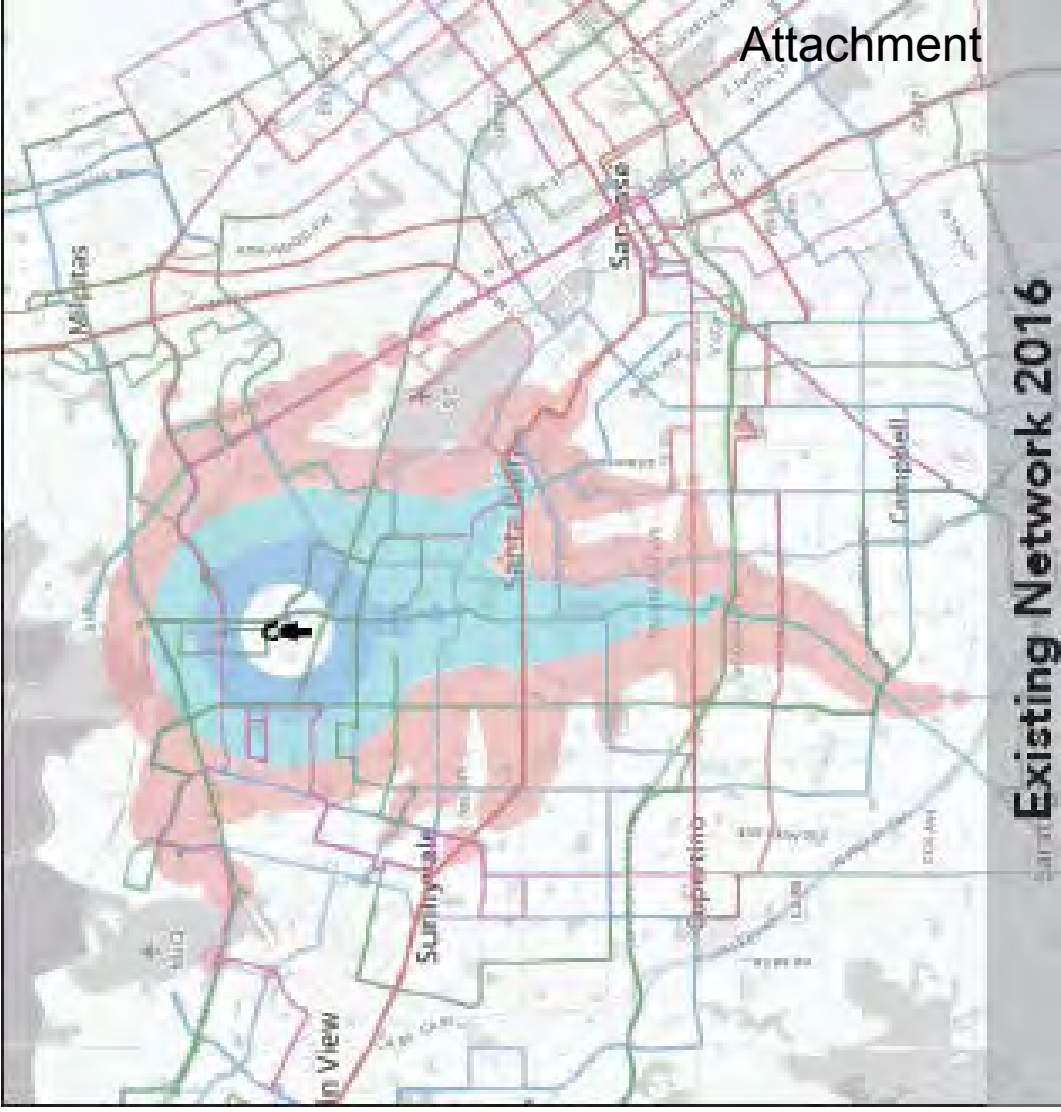


# Visualizing Access

How far can Jane travel in    or  minutes?

Northern  
Santa Clara  
12 noon

**Existing  
Network**



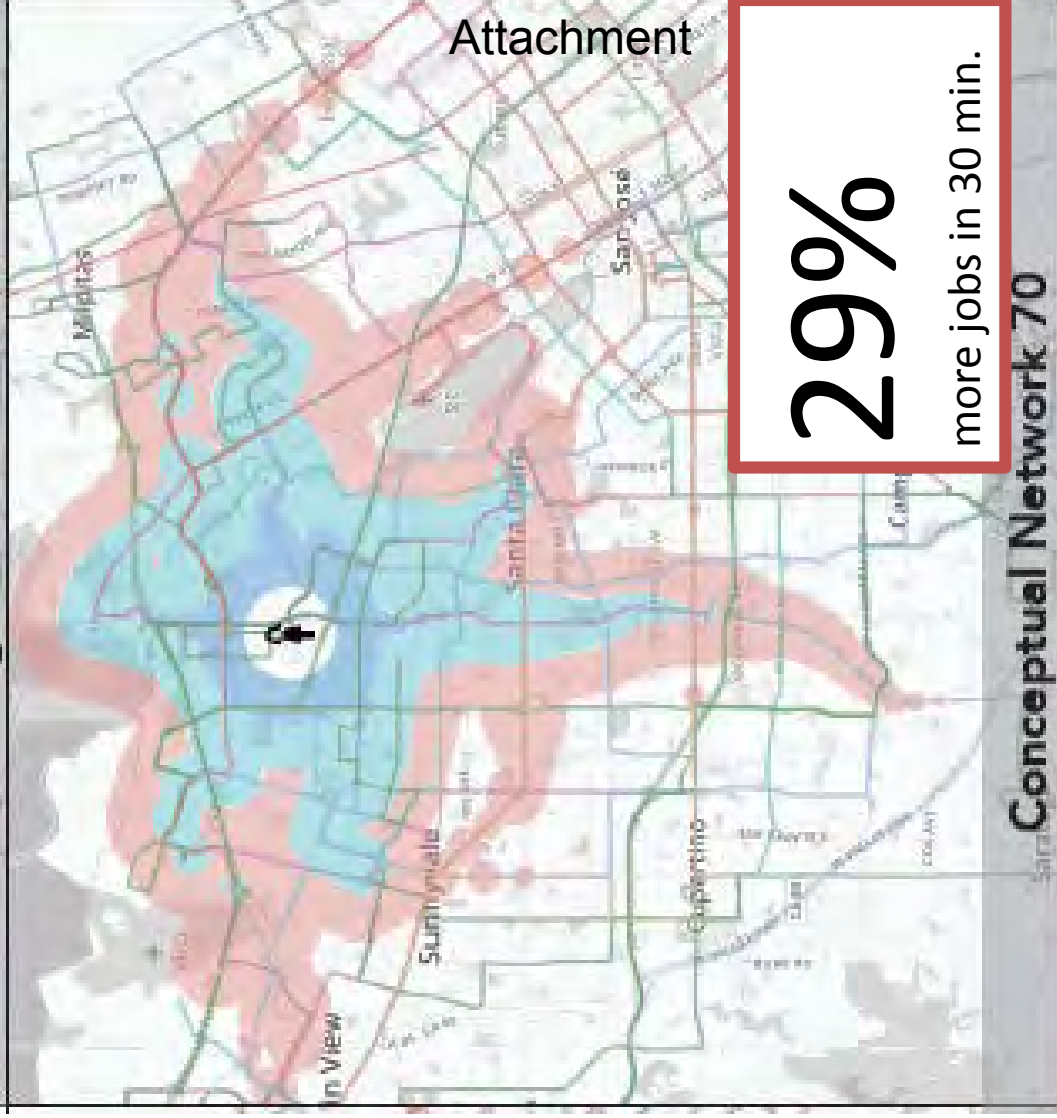
# Visualizing Access

How far can Jane travel in  15  30  45  60 minutes?

Northern  
Santa Clara  
12 noon

**Concept 70**

(70% ridership)



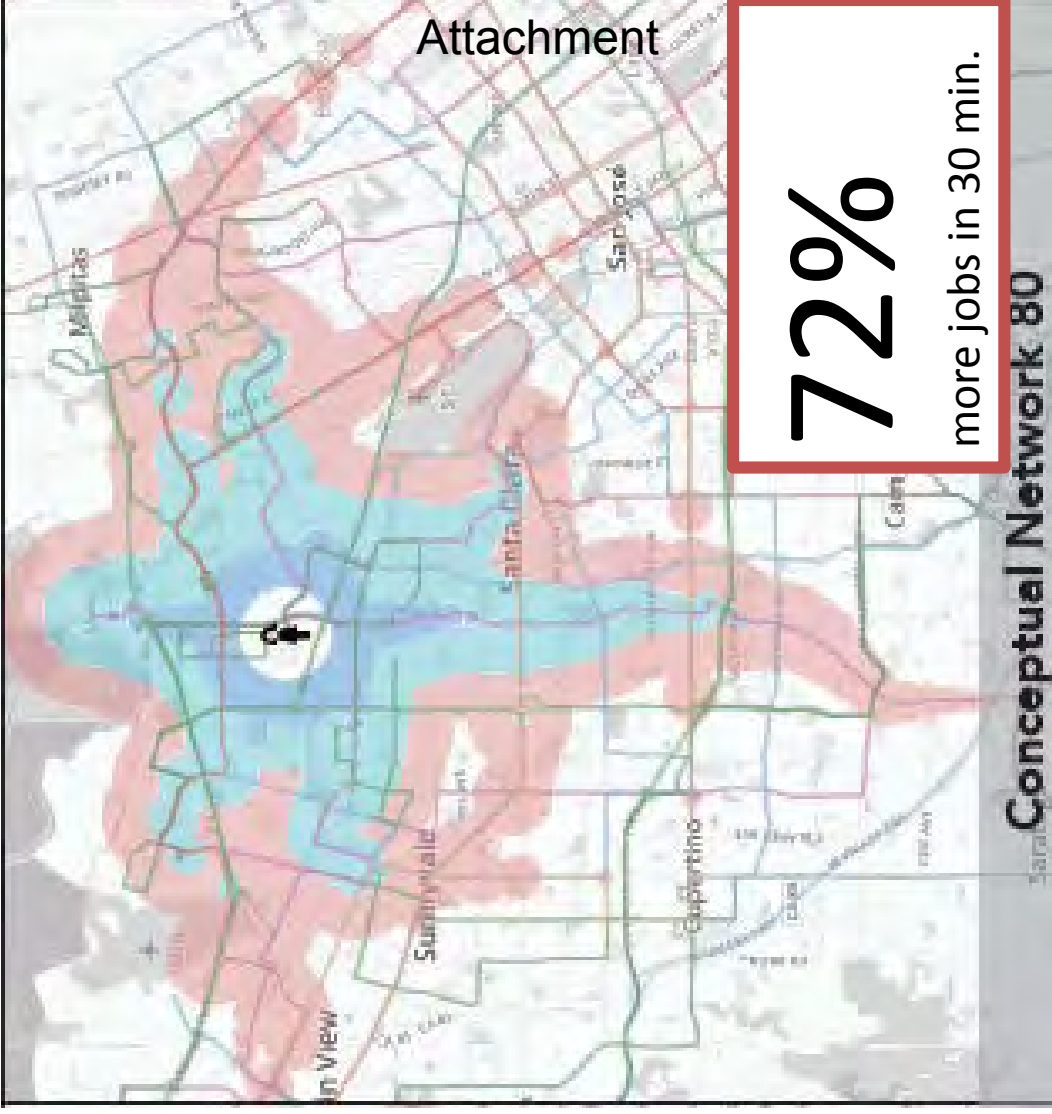
# Visualizing Access

How far can Jane travel in  15  30  45 or  60 minutes?

Northern  
Santa Clara  
12 noon

**Concept 80**

(80% ridership)



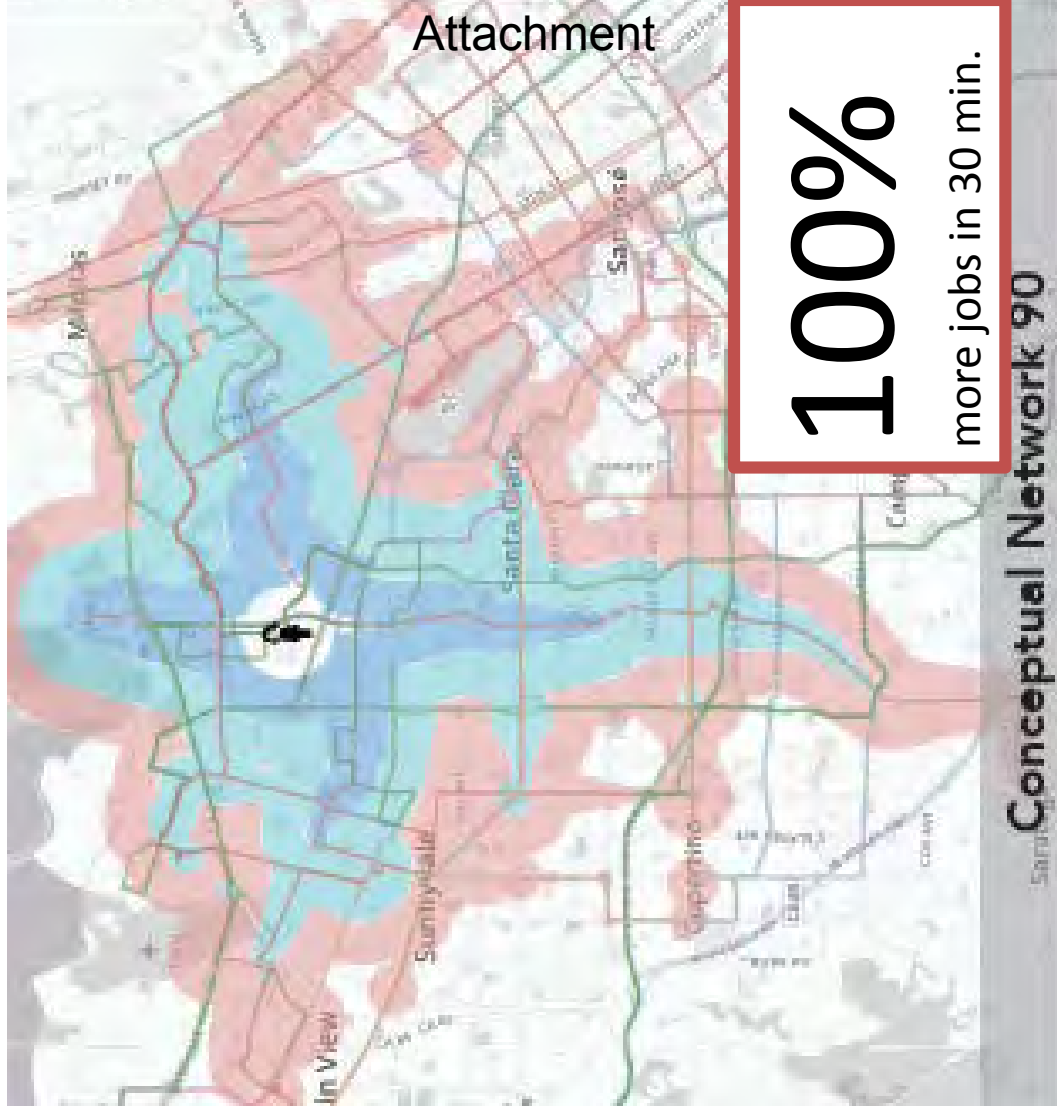
# Visualizing Access

How far can Jane travel in    or  minutes?

Northern  
Santa Clara  
12 noon

**Concept 90**

(90% ridership)



Attachment

**100%**

more jobs in 30 min.

Conceptual Network 90

# To Sum Up

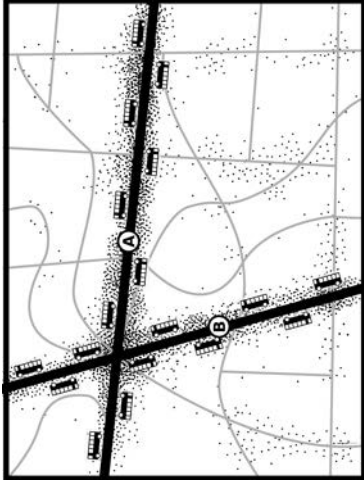
Attachment

# You do not have much transit ...

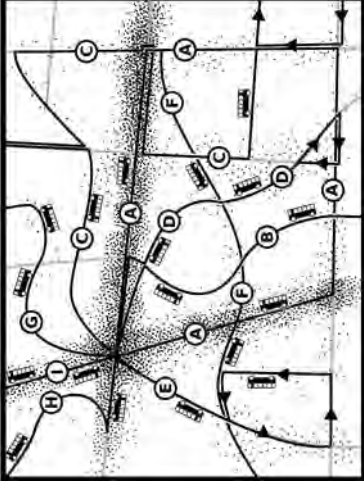
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- Constrained by staffing ...
- But ultimately reflecting local investment decisions.
- You can afford a network of mostly 30-60 min routes.
- You would need more resources to either:
  - Grow frequency without cutting coverage, OR
  - Grow coverage without cutting frequency.

So it helps to choose a point on the spectrum ...



**Ridership Goal**



**Coverage Goal**



You are here.  
60% Ridership  
40% Coverage

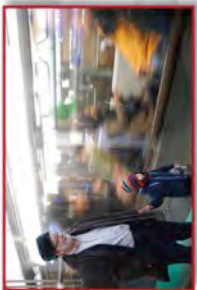
Attachment

Jarrett Walker

Blog: [HumanTransit.org](http://HumanTransit.org)

Twitter: [@humantransit](https://twitter.com/humantransit)

Thank you!



## HUMAN TRANSIT

How Clearer  
Thinking  
about Public Transit  
Can Enrich Our  
Communities  
and Our Lives

Jarrett Walker



# One Ride At A Time

Attachment



# Monterey Bay National Marine Sanctuary Foundation

Local non-profit partner for NOAA's Monterey Bay National Marine Sanctuary



**Monterey Bay**  
National Marine  
Sanctuary Foundation



Attachment



# Santa Cruz METRO One Ride At A Time

Protecting & improving the environment

- Customer loyalty approach
  - Increase ridership
  - Incentivize riders
  - Contribute to our local environment
    - Reduce emissions via public transit
    - Protect & preserve our local Monterey Bay via non-profit partnerships













Thank you





# Santa Cruz METRO Board Retreat

October 14, 2022

# About CTE



**WHO WE ARE**  
501(c)(3) nonprofit engineering and planning firm



**OUR MISSION**  
Improve the health of our climate and communities by bringing people together to develop and commercialize clean, efficient, and sustainable transportation technologies



**PORTFOLIO**  
\$900 million

- *Research, demonstration, deployment*
- *100 Active Projects totaling over \$400 million*



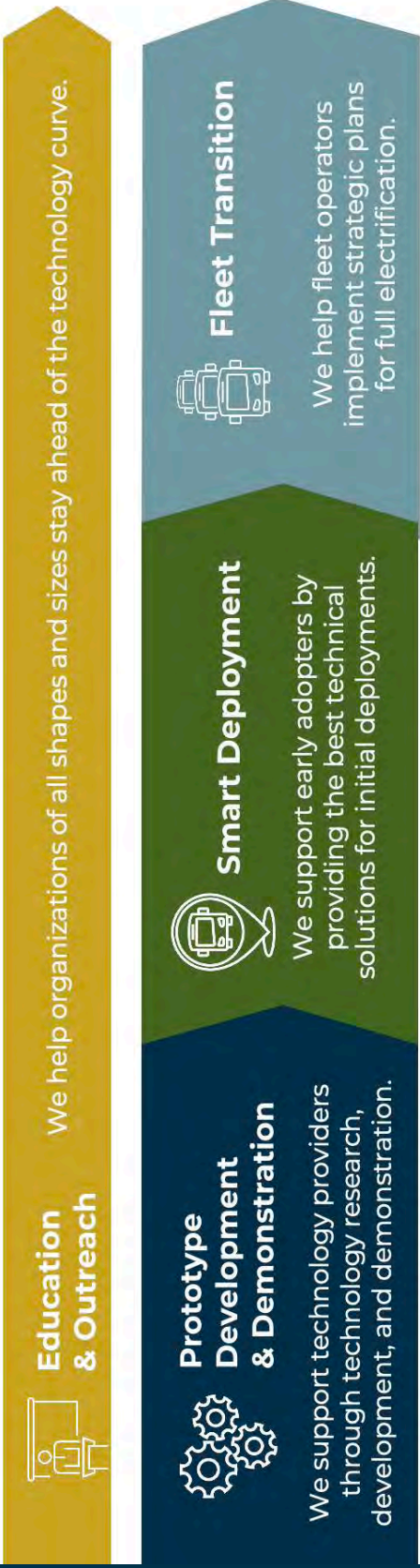
**OUR FOCUS**  
Zero-Emission Transportation Technologies



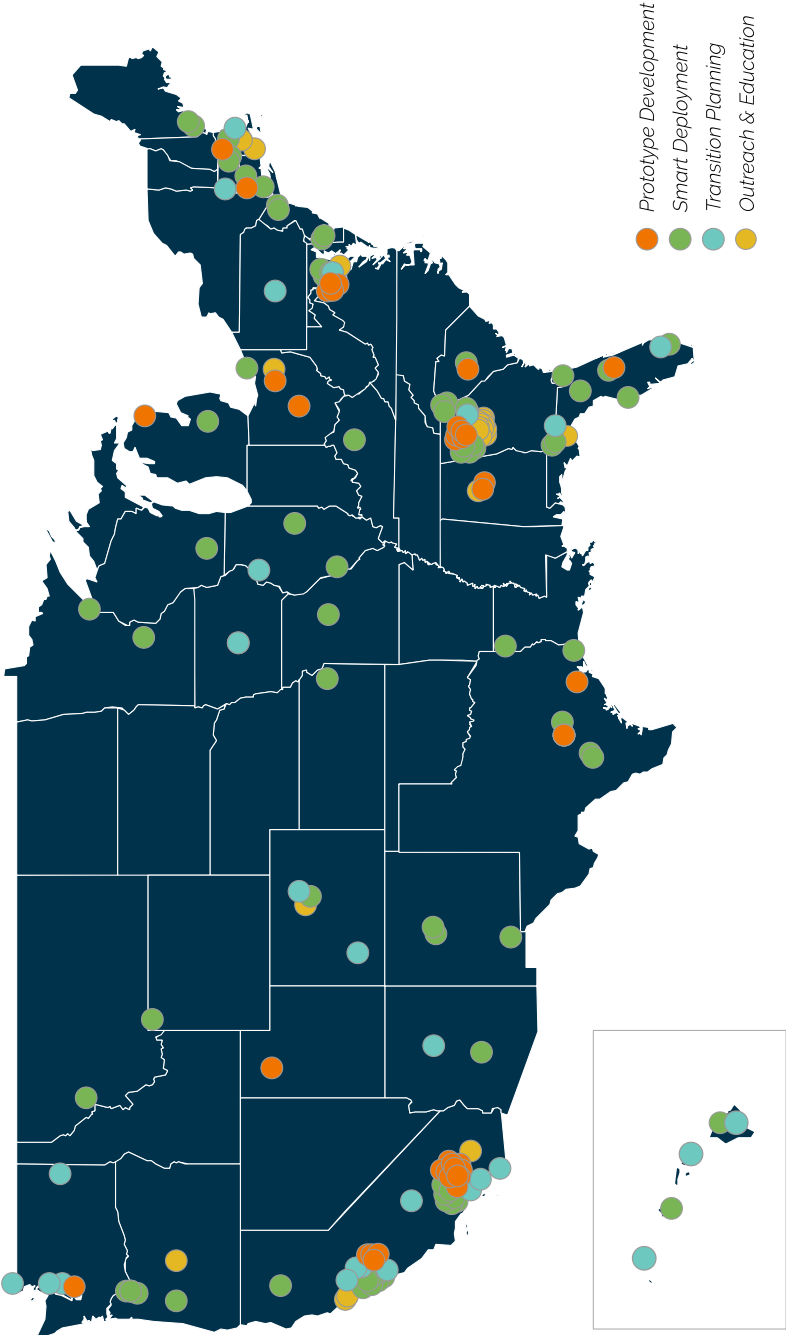
**NATIONAL PRESENCE**  
Atlanta, Berkeley, Los Angeles, St. Paul



# CTE's Four Service Areas



CTE Projects



# METRO and CTE Partnership

## Development

- Submitted LowNo application together in 2016, 2017 and 2022
- Assisted with the 2021 RAISE grant

## Projects

- 2016 LowNo project
- 2019 Proterra Deployment
  - Route, Charge and Rate Modeling
  - Charge Management Assessment
- 2020 Zero-Emission Bus Transition Plan



# CARB's ICT Regulation

## CARB Innovative Clean Transit Regulation

100% ZEB Fleet by 2040 is a goal, not a mandate  
CARB ICT is a *purchasing* mandate:

Starting January 1	ZEB Percentage of Total New Bus Purchases
2026	25%
2027	25%
2028	25%
2029	100%

### **ZEB Purchase Requirements – Small Agencies**

- Small CA Transit Agencies (<100 buses) are required to submit a board-approved ZEB Rollout Plan by **July 1, 2023**.
- Agencies may request exemption from ZEB purchase requirements
- Cutaway buses, motor coaches, and articulated buses will be excluded until January 1, 2026 or the applicable bus type has passed and obtained a Altoona bus testing report



# Zero Emission Bus 101



## Why Zero-Emission Buses?

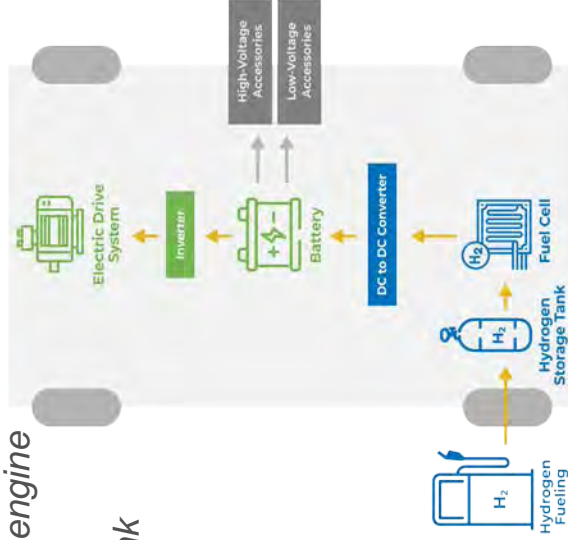
- Cleaner, lowers transit's contribution to climate change
  - Zero tailpipe emissions
  - Lower source emissions
- More efficient, lower energy consumption
- Quieter, Preferred by passengers
- Lower maintenance costs
- Lower fuel cost in some parts of the country
- US-produced fuel source, predictable fuel co:



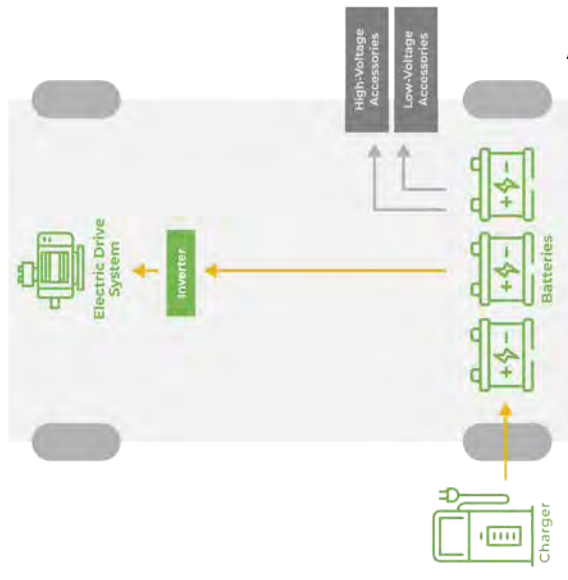
# Zero Emission Buses —What’s Different?

- Propulsion System
  - *Traction Motor instead of engine*
- Energy Storage System
  - *Battery instead of fuel tank*
- HVAC
  - *No “free” heat*
  - *Electric heater*
- Time to “Re-fuel”
  - *FCEB: 10 minutes*
  - *BEB: ~3 hours*

FUEL CELL ELECTRIC VEHICLE

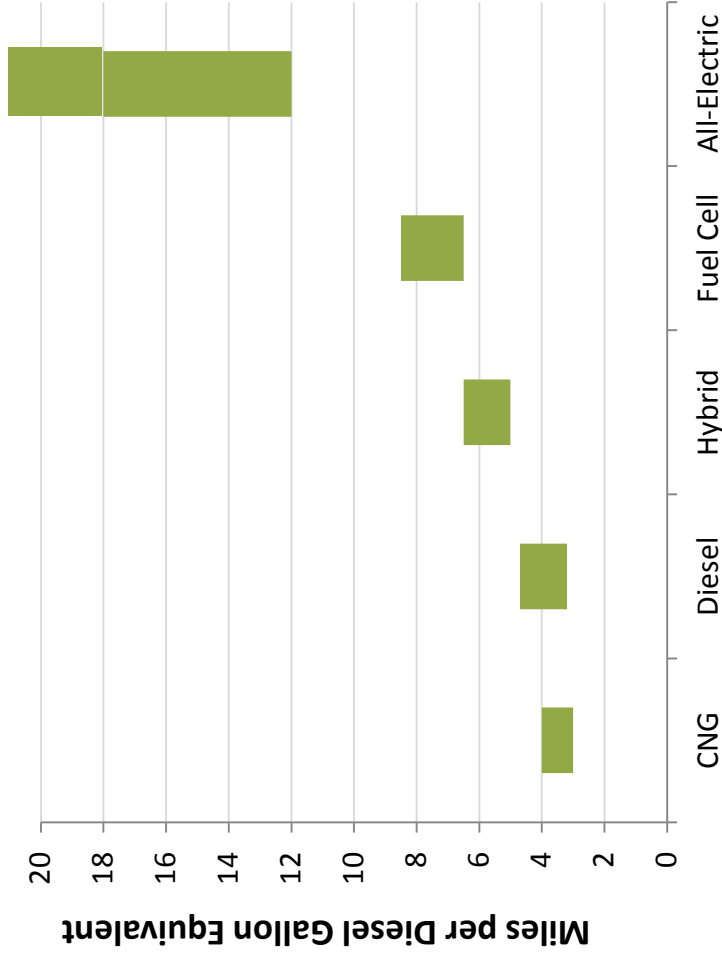


BATTERY ELECTRIC VEHICLE



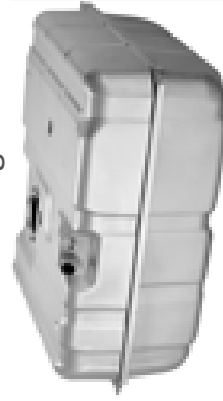
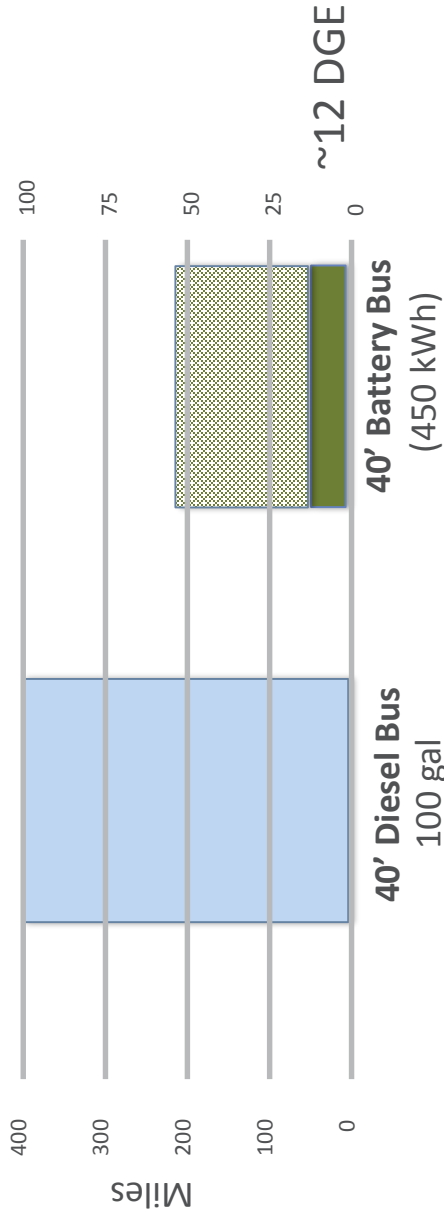
# Efficiency Comparison

- Battery-electric buses are ~4x more efficient than diesel
- BEB efficiency (and range) changes with local conditions and driving habits more than diesel and CNG buses.



# BEB vs Diesel Range

Different methods of storing energy require different deployment plans.



**Electric drive is four times as efficient as a diesel engine!!!**

U.S. Department of Energy: 38 kWh is equivalent to 1 gallon of diesel

Source: Center for Transportation & the Environment

## Factors Affecting ZEB Range

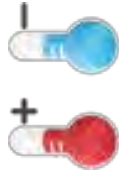
- **Route characteristics:** speed, stops, grade



- **Ridership**



- **Climate:** Heating and cooling



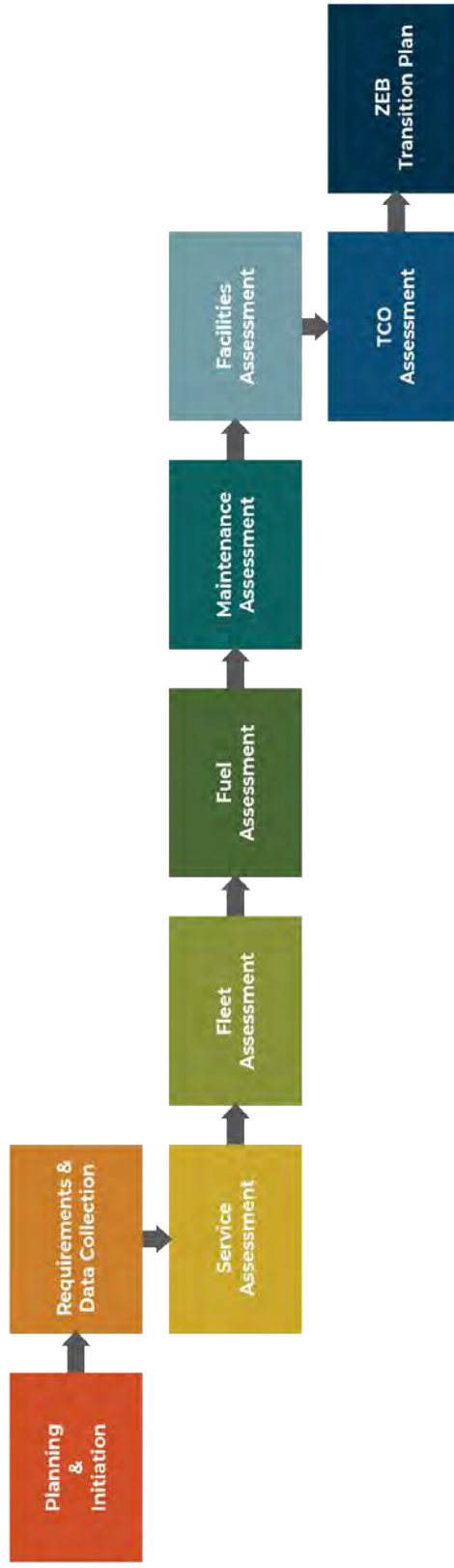
- **Battery degradation**



- **Operator**



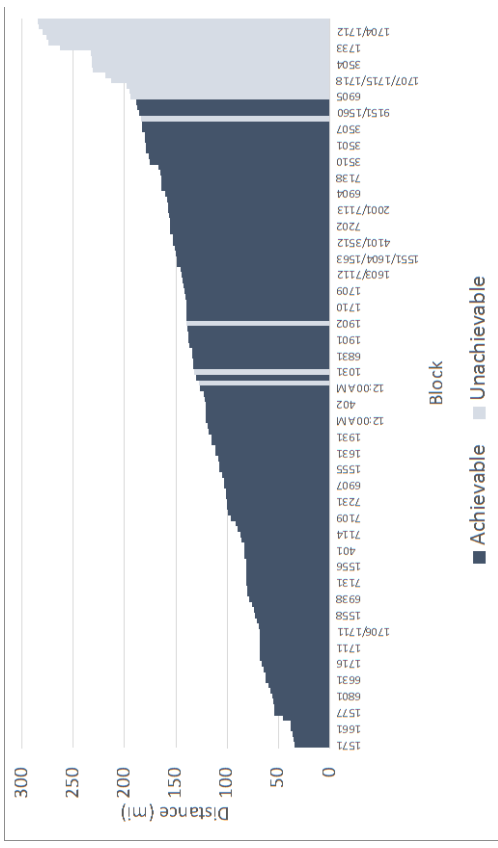
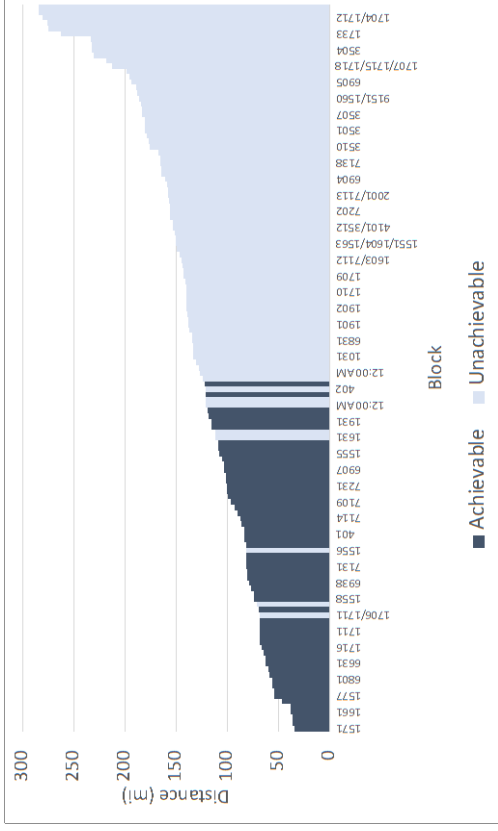
# ZEB Transition Approach and Methodology



# Key Findings: Bus Modeling

Attachment

- BEB Feasibility from JKS is low
- strenuous topography
- long blocks

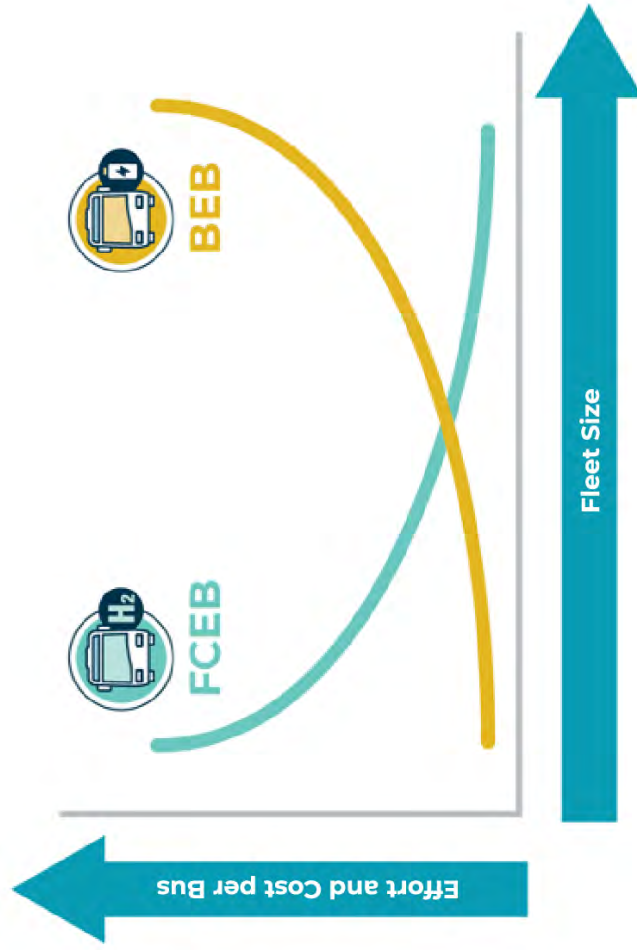


# Key Findings: ZEB Scenarios

ZEB Transition Scenarios		
Scenario	Feasibility	Comments
Depot-Charge BEB Only	62%	BEBs charged only at the depot
Depot + On-route Charge BEB	100%	BEBs mostly charged at the depot, with on-route charging at Pacific Station and Watsonville Transit Center
Mixed Fleet: Depot-Charge BEB & FCEB	100%	BEBs charged at the depot, supplemented with FCEBs for longest/strenuous blocks
FCEB Only	100%	FCEBs only



# Key Findings: Infrastructure



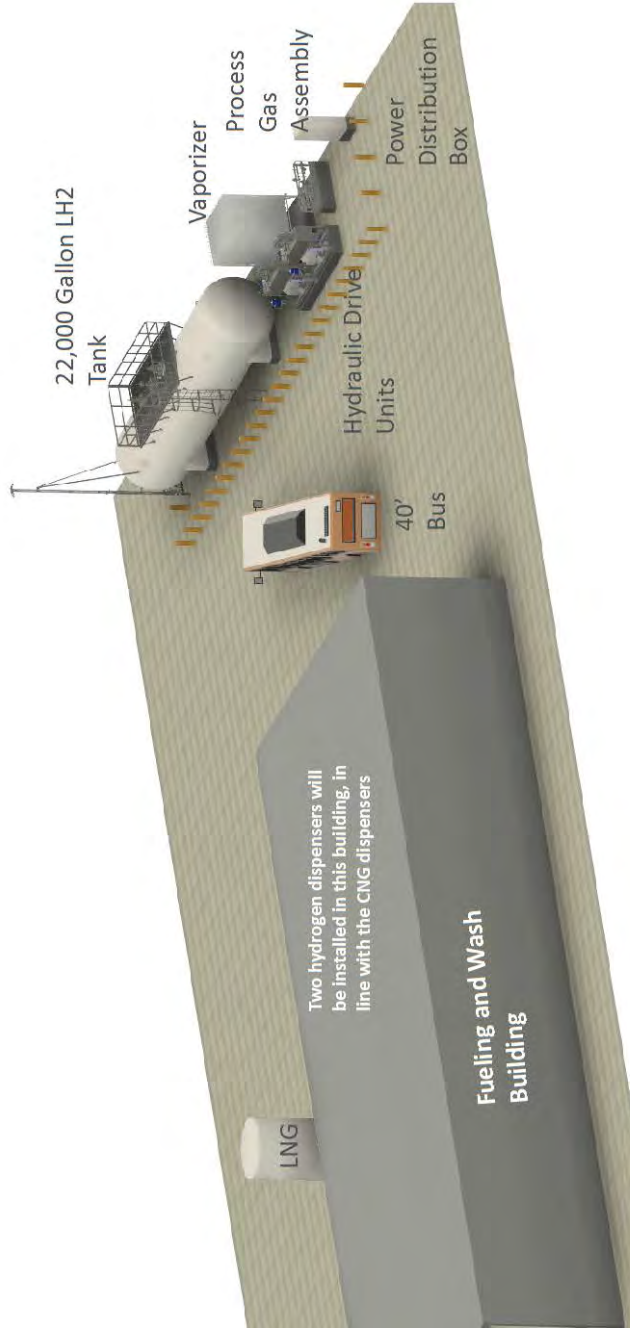
# Key Findings: Infrastructure



# Key Findings: Infrastructure



# Key Findings: Infrastructure



# Key Findings: Infrastructure



## Key Considerations

- Must maintain all fueling equipment (diesel, CNG) through transition and beyond if ICE vehicles remain as part of spare or contingency fleet
- Mixed fleet, at scale, will be challenging at JKS due to space limitations
  - Consider technology-dedicated parking facilities (i.e., FCEB at JKS, BEB in Watsonville)
- Impact of refueling time on operations
  - RNG/CNG ~ 10 minutes
  - FCEB ~ 10 minutes
  - BEB ~ 3-4 hours

## Transition Risks

- Supply chain issues and production demands pushing deployments by 2-3 years
  - Impacts bus production, utility upgrades, etc.
- Grid-supplied electricity subject to rolling black-outs, outages, etc.
  - Must further invest in Resilience/Redundancy mitigation strategies
- Hydrogen production limited (but expanding), fuel cost is high, and demand is increasing
  - On-site production???
- Technology maturity
  - BEBs: more in service, more options available;
  - FCEBs: low adoption rate, fewer models available, currently only two OEMs
- Operational constraints
  - BEBs: Range Limited
  - FCEBs: performance issues on hills and at highway speeds
- Emergency Response and Incident Impact
  - BEB vs. FCEB thermal event

## Recommendation

- ZEB Priority
  - Allow for mixed fleet, but prioritize FCEBs over BEBs
- Near Term Bus Purchasing Goal
  - Stated Preference for ZEBs
  - Model service requirements for *each* procurement to assess best technology
  - Purchase RNG buses only when BEB or FCEBs are not suitable for service requirement
    - Don't allow technology constraints to impact transit service
- Long-term Purchasing Goal
  - Adhere to ICT procurement schedule
- Next Steps
  - “Authorities-Having-Jurisdiction” Application Study for H2





Questions?

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# **Santa Cruz METRO's Zero-Emission Bus Implementation Plan**

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## Zero-Emission Bus (ZEB) Implementation Plan

- PHASE 1 – Deploy 2 ZEB's on new circulator route in Watsonville – fall 2021
- PHASE 2 – Convert 100% of the fleet serving Watsonville to ZEB by 2027
  - Currently served by Battery Electric Buses (BEBs), Compressed Natural Gas (CNG) and Diesel as needed
  - Will transition to a mix with Hydrogen Fuel Cell Electric buses (FCEBs) until full fleet serving Watsonville is ZEB
- PHASE 3 – Fully transitioned fleet to ZEB by end of 2037
  - Projected to be a mixed fleet with FCEBs and BEBs– Predominately Hydrogen focus

---

## Process to Zero-Emission Buses

- Strategy to convert to Zero-Emission buses
- Three scenarios were looked at in the process:
  1. All CNG buses until mandated by Government CARB's ICT regulations
  2. Gradual increase in ZEB buses until mandated
  3. All ZEB buses going forward
- Results:
  1. Total financial spending through FY2036 varied between a total of \$130M to \$140M across all scenarios
  2. The final financial spending result is a \$1.9M lower spend under scenario 3 primarily due to rebates and external funding available for ZEB

# Bus Cost Comparison as of October 2022

## 40 Foot Bus

	Electric	Hydrogen	CNG
Cost	\$1,200,000	\$1,350,000	\$830,000
Rebates:			
VW Grant	180,000	400,000	0
Fed Rebate	45,000	45,000	0
State Rebate (5.3%)	63,600	71,550	0
Subtotal	288,600	516,550	0
<b>Total Cost to Metro</b>	<b>\$911,400</b>	<b>\$833,450</b>	<b>\$830,000</b>

Original Cost for Hydrogen is \$520,000 more than CNG

\$3,450 Per Bus for Hydrogen after Rebates over CNG

## Artic Bus

	Electric	Hydrogen	CNG
Cost	\$1,400,000	\$1,600,000	\$1,000,000
Rebates:			
VW Grant	180,000	400,000	0
Fed Rebate	45,000	45,000	0
State Rebate (5.3%)	74,200	84,800	0
Subtotal	299,200	529,800	0
<b>Total Cost to Metro</b>	<b>\$1,100,800</b>	<b>\$1,070,200</b>	<b>\$1,000,000</b>

Hydrogen \$600k more than CNG

After \$530k in Rebates, Hydrogen only \$70k more than CNG

\* Possible CCCE funding will be available for Battery Electric and Hydrogen Fuel Cell not reflected above

# Bus Delivery Schedule

	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37	FY38
<b>Buses</b>																
Hydrogen Electric ZEB *	5	8	6													
Artic CNG		5														
<b>Total New Buses</b>	5	13	6	7	6	7	6	7	6	7	6	7	6	7	6	7
Buses Beyond Life	29	2	8	15	6					3	14	6	4	6	5	13
<b>End of Year Beyond Life</b>	24	13	15	23	23	16	10	3	-3	-7	1	0	-2	-3	-4	2

- Bus Schedule contemplates a start of 8 Hydrogen Fuel Cell buses with a steady 6 to 7 buses each year afterwards.
- Strategy is to smooth the future buying of buses and move away from the historical process of buying when METRO receives a grant to help spread the delivery of buses and streamline the financial costs.

\* ZEB is either full Battery Electric or Hydrogen Fuel Cell. ZEB type will be determine at a future date

# METRO Sources of Funds

Bus Type	Year	Buses	FTA 5339-A	FTA 5307	LPP	LCTOP	VW Grant	HVIP	STIP	LONO	MBARD	5339-B	State Rebate	Bus Repl Fund	Total
Electric	FY23	5			969,394					4,655,276					5,624,670
<b>CNG Artic</b>	<b>FY24</b>	<b>5</b>	<b>500,000</b>	<b>4,500,000</b>										903,000	<b>5,000,000</b>
Hydrogen	FY24	8	1,680,000	2,654,000	903,000	1,060,000	3,200,000	1,440,000			400,000	4,022,000	699,300		10,800,000
Hydrogen	FY25	6	525,000			1,200,000		1,680,000			400,000	1,055,500	815,850		8,262,000
Hydrogen	FY26	7	551,250	3,853,750	300,000	1,200,000		1,440,000			400,000	922,500	699,300	3,069,688	9,828,000
Elect/Hydro	FY27	6	578,813		300,000	1,200,000		1,440,000			400,000		815,850		8,586,000
Elect/Hydro	FY28	7	607,753		300,000	1,200,000		1,680,000	3,000,000		400,000		699,300		10,206,000
Elect/Hydro	FY29	6	638,141		300,000	1,200,000		1,440,000			400,000	4,121,859	699,300	135,000	8,910,000
Elect/Hydro	FY30	7	670,048		300,000	1,200,000		1,680,000			400,000	1,878,141	815,850	3,668,311	10,584,000
Elect/Hydro	FY31	6	703,550		300,000	1,200,000		1,440,000	3,000,000		400,000		699,300	1,515,450	9,234,000
Elect/Hydro	FY32	7	738,728		300,000	1,200,000		1,680,000			400,000		815,850	5,855,772	10,962,000
Elect/Hydro	FY33	6	775,664		300,000	1,200,000		1,440,000	3,000,000		400,000		699,300	1,767,336	9,558,000
Elect/Hydro	FY34	7	814,447		300,000	1,200,000		1,680,000			400,000		815,850	6,158,053	11,340,000
Elect/Hydro	FY35	6	855,170		300,000	1,200,000		1,440,000			400,000		699,300	5,011,830	9,882,000
Elect/Hydro	FY36	7	897,928		300,000	1,200,000		1,680,000			400,000	4,972,072	815,850	1,480,500	11,718,000
<b>Total</b>	<b>96</b>		10,536,491	11,007,750	4,203,000	16,429,394	3,200,000	18,720,000	9,000,000	4,655,276	5,200,000	16,972,072	9,090,900	31,795,687	<b>140,494,670</b>

- Full Replacement of 96 buses by FY 2037
- Multiple sources of funding will be available to cover the costs of the buses
- METRO covers roughly 22% of the total funding needed for the local match amount



# Where's My Bus?

Real-time location features in a responsive website package



Real-Time Bus Tracking



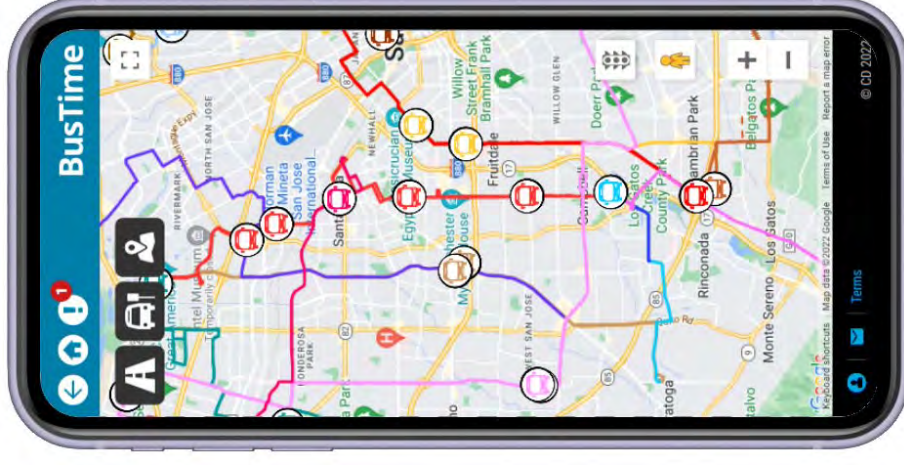
View Route and Stop Information



Find Stops and Routes Near Me



Integrated Trip Planner



**Use Case:** A passenger uses BusTime to see bus routes in their area.

# When Will My Bus Get Here?

Real-time arrival predictions at your fingertips



Real-Time Predictions

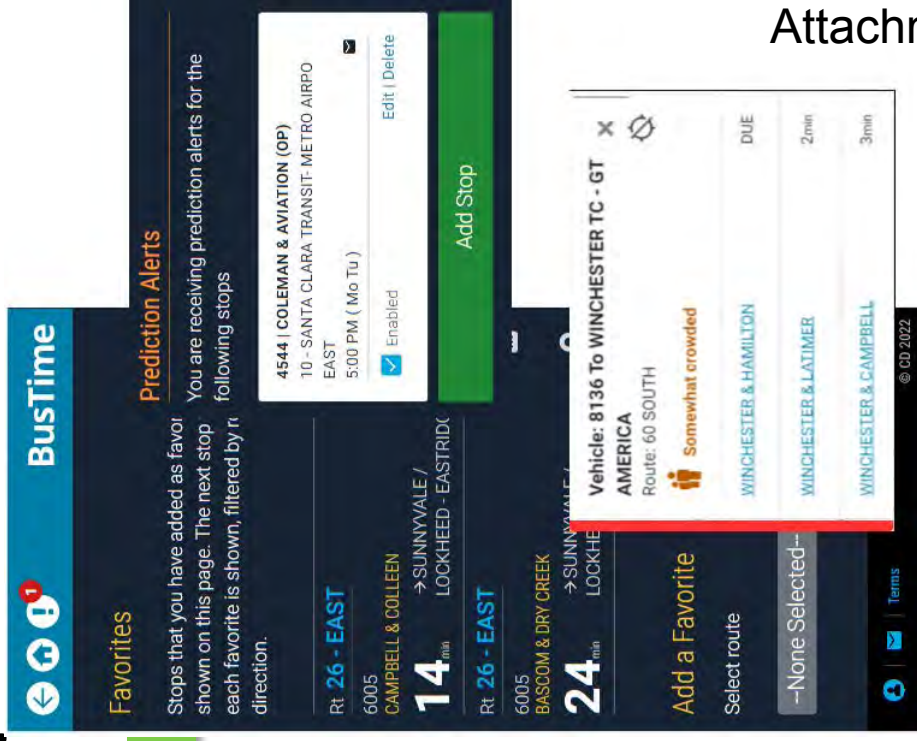


Mark Stops as Favorites



Prediction Alerts

**Use Case:** A passenger is leaving their home or work and receives real-time predictions on their phone.



Attachment

# What's Going On?

Keep passengers informed with BusTime real-time communication



Full Disruption Management Integration



Service Bulletins



Update Digital Signage

**Use Case:** Dispatchers need to update passengers about a service outage.

The collage consists of three screenshots from a mobile application:

- Top Screenshot (Service Bulletins):** Shows a notification for "ROUTE 27: Leigh Ave Detour". It states "Affected Service: System-Wide" and "The following Rt. 27 stops will not be serviced due to temporary detour: - Los Gatos - Gregg".
- Middle Screenshot (BusTime):** Shows a "BusTime" notification for route "26 - EAST" with a "1 min" delay. It includes the text "Text 'BUSTIMESTEST 071' to '41411' for stop times" and a "not activated" warning.
- Bottom Screenshot (857: FAIR OAKS & SAN CONRADO):** Shows a notification for route "857: FAIR OAKS & SAN CONRADO". It lists the "Next EST" as "26 To SUNNYVALE/LOCKHEED - EASTRIDGE" at "9:59 PM SCH" and includes the text "Text 'BUSTIMESTEST 857' to '41411' for stop times".

# Real-Time Bus Crowding

Bus crowding Information for increased rider comfort



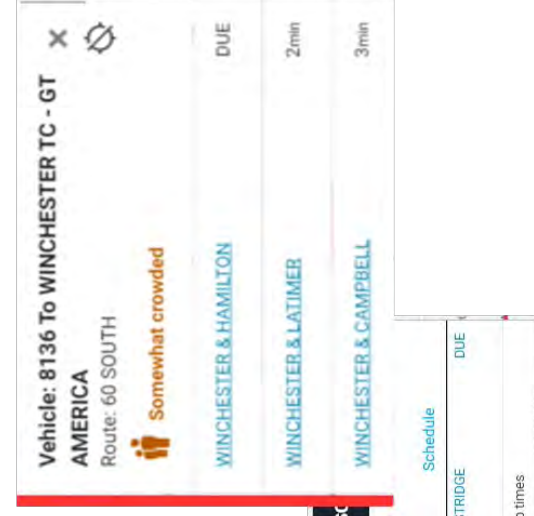
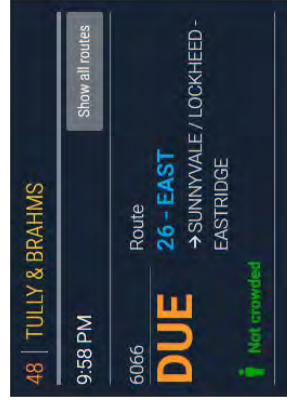
Crowded Bus Indicators



Configurable Crowding Thresholds



GTFS-RT support for crowding information



Attachment

**Use Case:** A passenger uses BusTime to see if their approaching bus is crowded.

48 | TULLY & BRAHMS

9:58 PM

6056

Route  
26 - EAST  
→ SUNNVALE / LOCKHEED -  
EASTRIDGE

**DUE**

Not crowded

Show all routes

Vehicle: 8136 To WINCHESTER TC - GT

AMERICA

Route: 60 SOUTH

Somewhat crowded

WINCHESTER & HAMILTON

WINCHESTER & LATIMER

WINCHESTER & CAMPBELL

Schedule

DUE

Text "BUSTIMEST 870" to "41411" for stop times

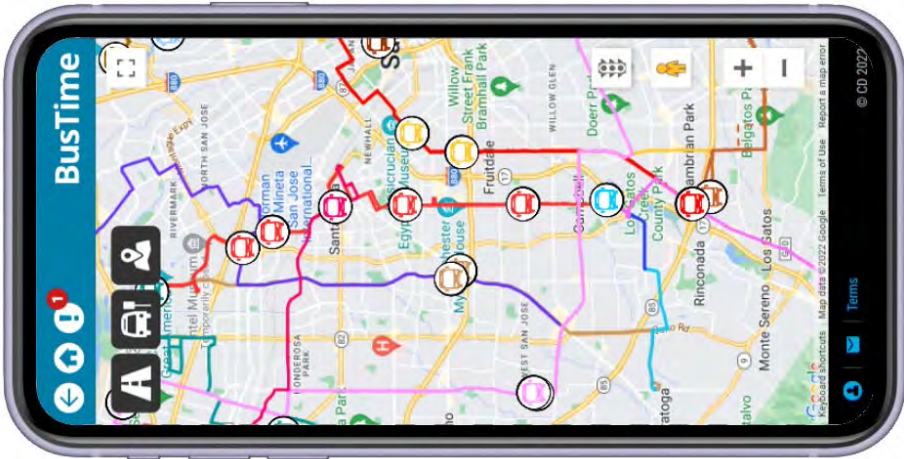
870- WOLFE & OLD SAN FRANCISCO

Show all scheduled routes for this stop

Next EST

7126 - 26 To SUNNVALE/LOCKHEED - EASTRIDGE

Not crowded



**BusTime**

**Favorites**

Stops that you have added as favorite are shown on this page. The next stop for each favorite is shown, filtered by its direction.

**Prediction Alerts**

You are receiving prediction alerts for the following stops

4544 | COLEMAN & AVIATION (OP)

10 - SANTA CLARA TRANSIT METRO AIRPO

EAST

5:00 PM ( Mo Tu )

Enabled

Edit | Delete

**Add Stop**

Rt 26 - EAST

6005

CAMPBELL & COLLEEN

14 min

→ SUNNVALE /  
LOCKHEED - EASTRIDGE

Rt 26 - EAST

6005

BASCOM & DRY CREEK

24 min

→ SUNNVALE /  
LOCKHEED - EASTRIDGE

**Add a Favorite**

Select route

-None Selected-

Vehicle: 8136 To WINCHESTER TC - GT

AMERICA

Route: 60 SOUTH

Somewhat crowded

WINCHESTER & HAMILTON

WINCHESTER & LATIMER

WINCHESTER & CAMPBELL

DUE

2min

3min

© 03 2022

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## CITY INITIATED PROJECTS



### The Recipe for Success,

- Public Private Partnerships (P3)
  - City owned land
  - Experience affordable housing developers
  - Design and funding collaboration
- ↓
- New Affordable Housing
  - Low upfront City cost
  - City controlled commercial
  - Delivery of multiple benefit projects

21

## PACIFIC STATION

### Redevelopment of Downtown Metro Station

- Two Phases
  - Pacific Station North
  - Pacific Station South
- New Transit Center
- 196 Affordable Units
- Medical/Dental Clinics
- Office
- Mixed Commercial
- New Maple Paseo
- Bike + Ped Friendly



22

# PACIFIC STATION

DOWNTOWN PLAN DIAGRAM: CURRENT SITE WITH FUTURE BUILDINGS

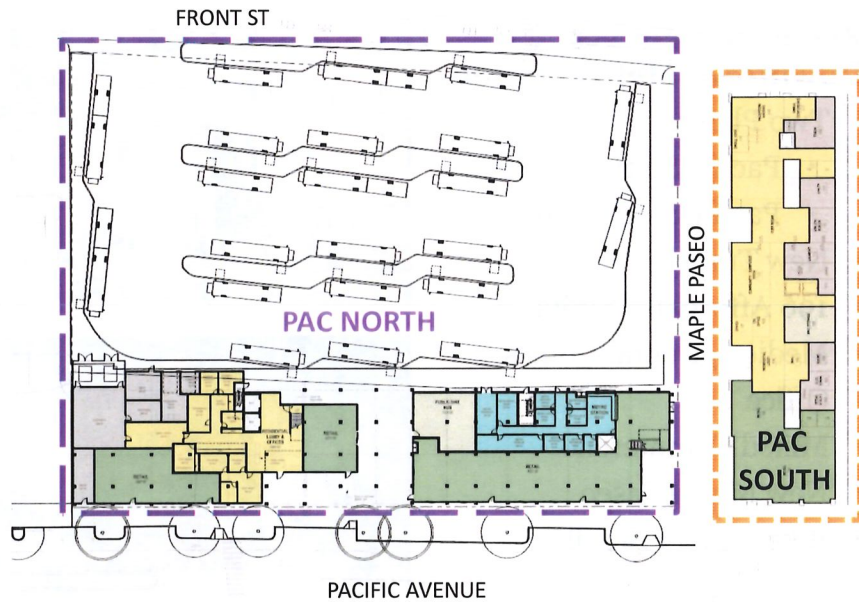


PACIFIC STATION SANTA CRUZ JANUARY 13, 2021



23

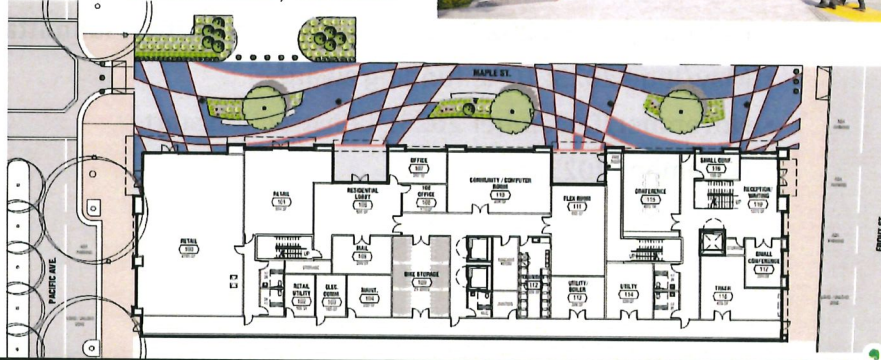
# PACIFIC STATION



24

## PACIFIC STATION SOUTH

- Broke Ground (5/19)
- Lease-up: Early 2024
- 70 Affordable Units
- Medical/Dental Clinics
  - Dientes / SC
  - Community Health



25

## PACIFIC STATION NORTH

- Fully Permitted
- 126 Affordable Units
- New Metro Station
- Office + Retail
- Expanded Maple Paseo



26

# PACIFIC STATION NORTH

## Estimated Project Timeline:

- December 2022: Building Permit plans submittal
- February/March 2023: TCAC funding application submittal
- May/June 2023: TCAC funding award
- November/December 2023: Construction start
- December 2025: Lease-up

27

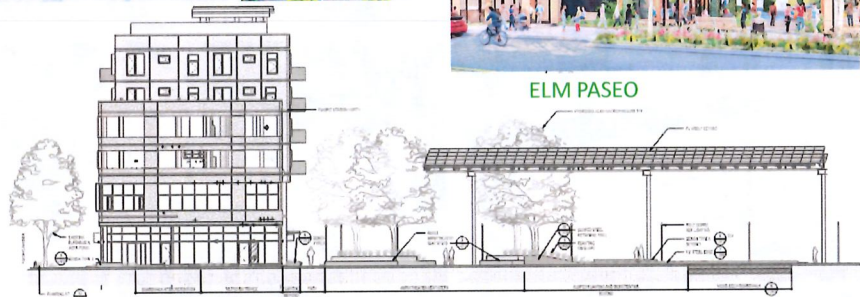
# PACIFIC STATION NORTH



All-ELECTRIC SOLAR PV

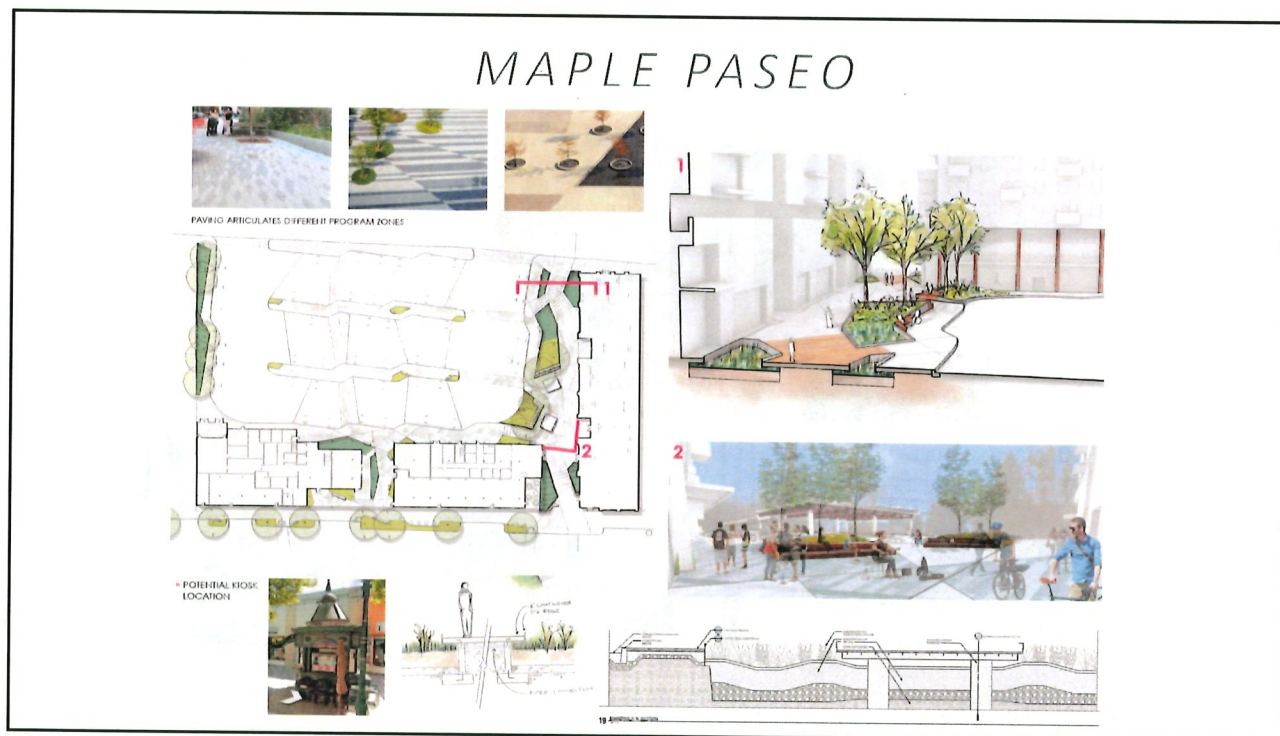


ELM PASEO



MAPLE ALLEY PROFILE

28



29

### DOWNTOWN LIBRARY AFFORDABLE HOUSING PROJECT

DRAFT DESIGN

- Flagship Downtown Library
  - >38,000 SF
  - 3,400 SF roof deck
- 124 affordable housing units
- ~2,000 SF childcare facility
- 245-345 vehicular parking spaces, 255+ bicycle parking spaces

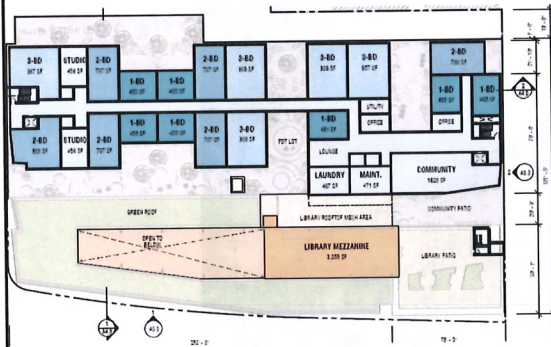
30

### ADJACENT LIBRARY PUBLIC SPACES



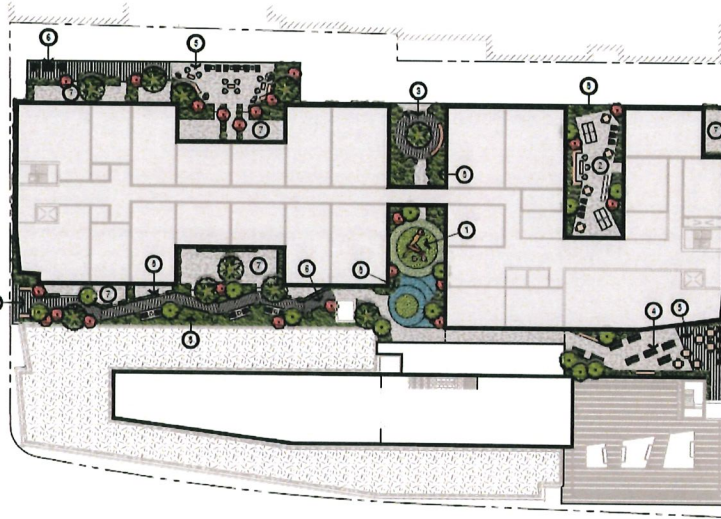
31

### Affordable Housing and Library Roof Deck



32

# Affordable Housing Open Space and Landscape Plan



## PODIUM PRECEDENTS

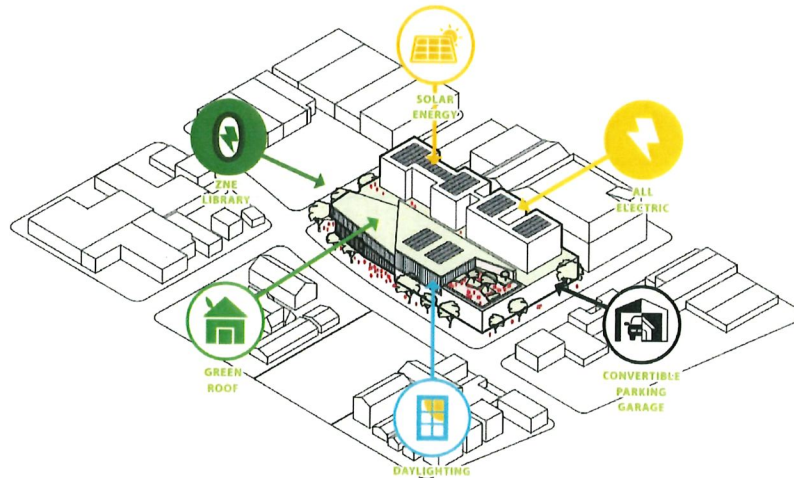


## KEYNOTES

- 1 (N) TOT LOT, NATURE PLAY CLIMBING STRUCTURES AND PIP SURFACING
- 2 (N) TEEN COURTYARD WITH WEATHER PROOF SHUFFLEBOARD AND PING PONG TABLES
- 3 (N) PODIUM GARDEN WITH CONCRETE PLANK WALK
- 4 (N) RAISED VEGETABLE BEDS FOR RESIDENCE USE/MAINTENANCE
- 5 (N) COMMUNITY GATHERING SPACE
- 6 (N) PLANK WALK, CONCRETE
- 7 (N) PRIVATE RESIDENCE PATIO SPACE
- 8 (N) RAISED STEEL PLANTERS

33

# SUSTAINABILITY



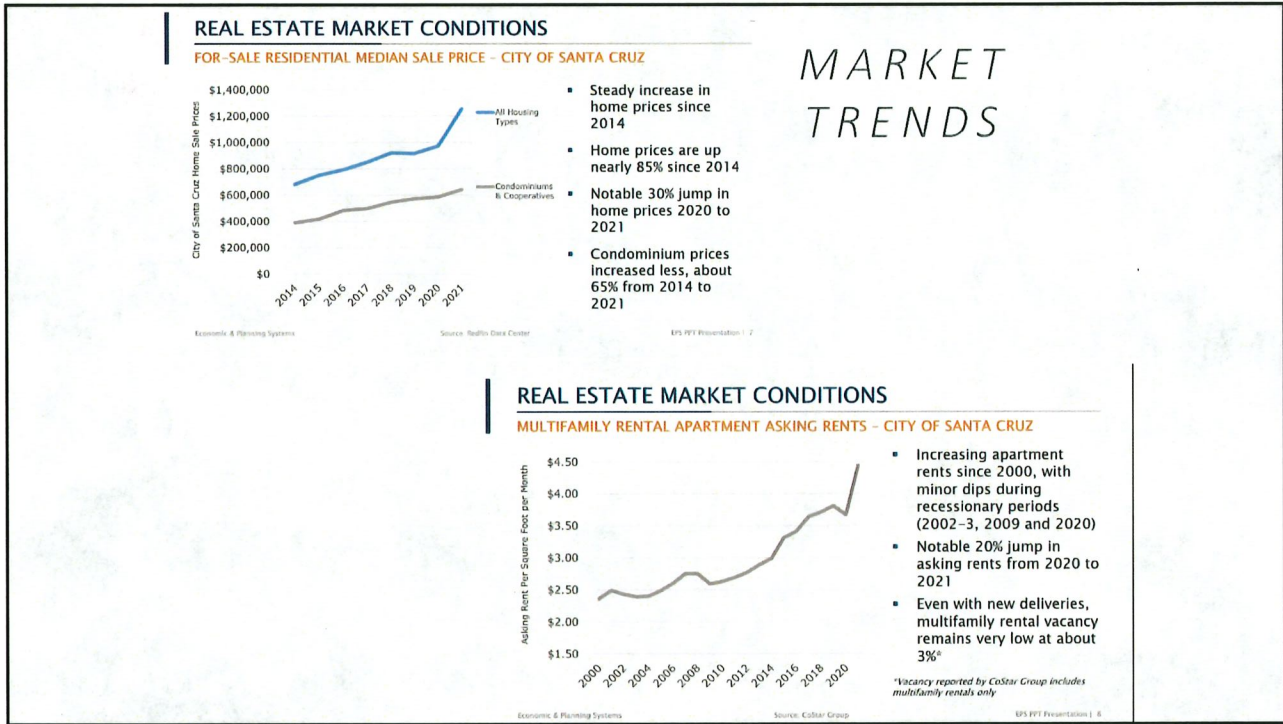
## SUSTAINABILITY GOALS

SANTA CRUZ DOWNTOWN LIBRARY | JAYSON + EDEN + THE SANTA CRUZ HOUSING + SANTA CRUZ

34

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1

# Housing Element

Income Level:	VLI Units	LI Units	Moderate Units	Above Moderate Units	Total Units
Draft 6 <sup>th</sup> Cycle RHNA	857	562	709	1,606	3,736

- ▶ Affirmatively Furthering Fair Housing
- ▶ Overhauled Sites Inventory

2

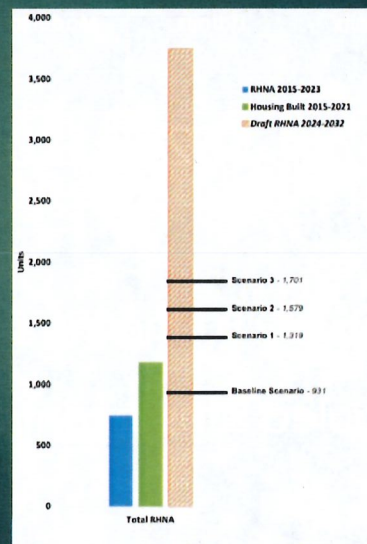
# Housing Units in Process

Affordable Housing Units	Permanent Supportive Housing Units	Total Units
~841	~224	>2,300

3



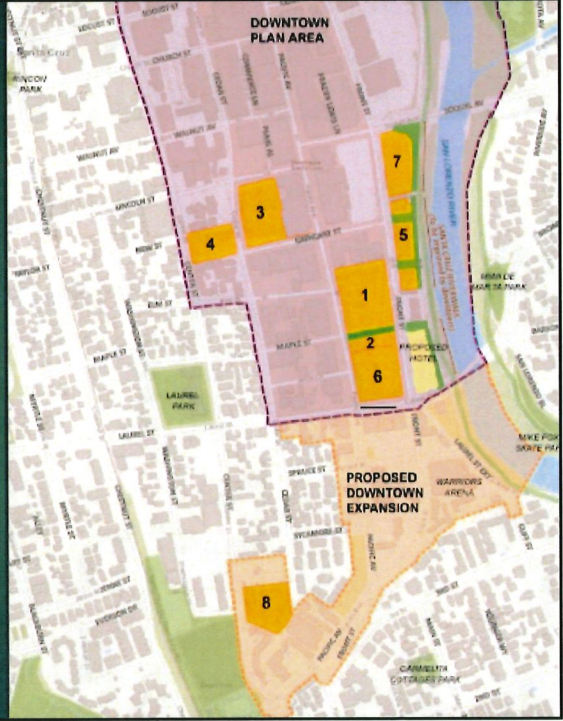
# Downtown Plan Expansion



1,600+ units being studied

4

Housing projects currently in the pipeline/under development in the downtown and downtown proposed expansion area



5

## 428 Front Street – Mixed Use



11,500 s.f.  
commercial

175 total units  
20 affordable  
(15 VLI, 5 LI)

6

## 530 Front Street – Mixed Use



276 total units  
~37 affordable  
(27 VLI & 10 LI)

9,000 s.f.  
commercial

7

## Pacific / Front / Laurel – Mixed Use



205 total units  
Land  
dedicated to  
City for  
affordable  
housing

+ 10,000 s.f.  
commercial

8

# 532 Center – Calvary Church



65 Units  
25% supportive housing (30% AMI)  
75% low income housing (80% AMI)  
  
3,400 s.f. commercial

9

# 130 Center St. – Mixed Use



233 SRO units  
35 affordable (@ 50%AMI)  
198 market  
  
2,600 s.f. commercial

10

# 190 West Cliff



89 Condos  
10 Affordable  
8 @ 50% AMI  
2 @ 80% AMI

14,000 s.f.  
commercial

11

# 314 Jessie Street



50 total units  
All affordable,  
supportive housing  
- 2 manager's units

12

# 415 Natural Bridges



20 total units

19 SROs (VLI)

1 Manager's Unit

13

# 350 Ocean St.



6,000 s.f.  
commercial

63 total units  
62 affordable,  
1 manager's

14

## 908 Ocean Street – Mixed Use



7,850 s.f.  
commercial

351 total units  
52 affordable

15

## 831 Water St.



141 total units  
55 - 82  
affordable

5,000 s.f.  
commercial

16



## 1800 Soquel Ave.



84 total units  
13 affordable  
(7 VLI & 6 LI)

1,500 s.f.  
commercial

17

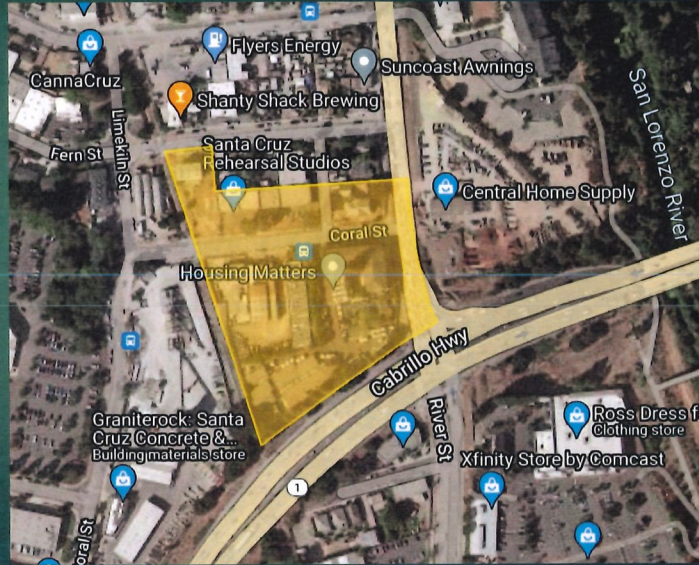
## 119 Coral St.



120 Permanent Supportive Housing Units  
100% affordable – manager's units

18

# Coral St. Master Plan: Future Affordable Housing



19

## Future Affordable Housing Opportunity Site



20