# Potential Future Service and Fare Optimization Concepts

Riders' Advisory Council
November 9, 2022

# Purpose of Service and Fare Optimization

- Bring fresh perspective and adapt service and fares to best serve customers and maximize Metro's value to the region

- Opportunity to consider changes that align with values and priorities: customer-centric, equitable and inclusive, efficient and effective, optimizing use of assets, fare policy principles

- Build on recent service and fare changes by developing concepts for consideration as part of FY2024 budget and beyond
  - Launch Better Bus network redesign effort
  - Metrorail service optimization and fare concept development

# Transit Benefits the Entire Region

## Customers and Communities

- Increases access to opportunity
- Serves vulnerable communities
- Reduces the need to own a car
- Provides access to large venues and special events

## Safety

- Safer way to travel
- Reduces auto crashes and road deaths

## Environment

- Reduces greenhouse gas emissions
- Improves air quality

## Economic Development

- Increases employee access to jobs
- Transit-oriented development is shaping the region

## Transportation System

- Reduces traffic congestion
- Reduces need for highway construction and parking infrastructure

# Potential Future Metrorail Service Optimization

# What Service Optimization Could Accomplish

| Customer Focus / Drives Ridership | Equitable | Asset Optimization |
|---|---|---|

**Customer Focus / Drives Ridership**

- Improve customers' access to destinations and grow system ridership
  - Increase service frequency in areas with high ridership potential
  - Minimize transfer wait times

**Equitable**

- Increase access to opportunity
  - Focus on currently under-served areas
  - Especially benefit people of color and low-income customers
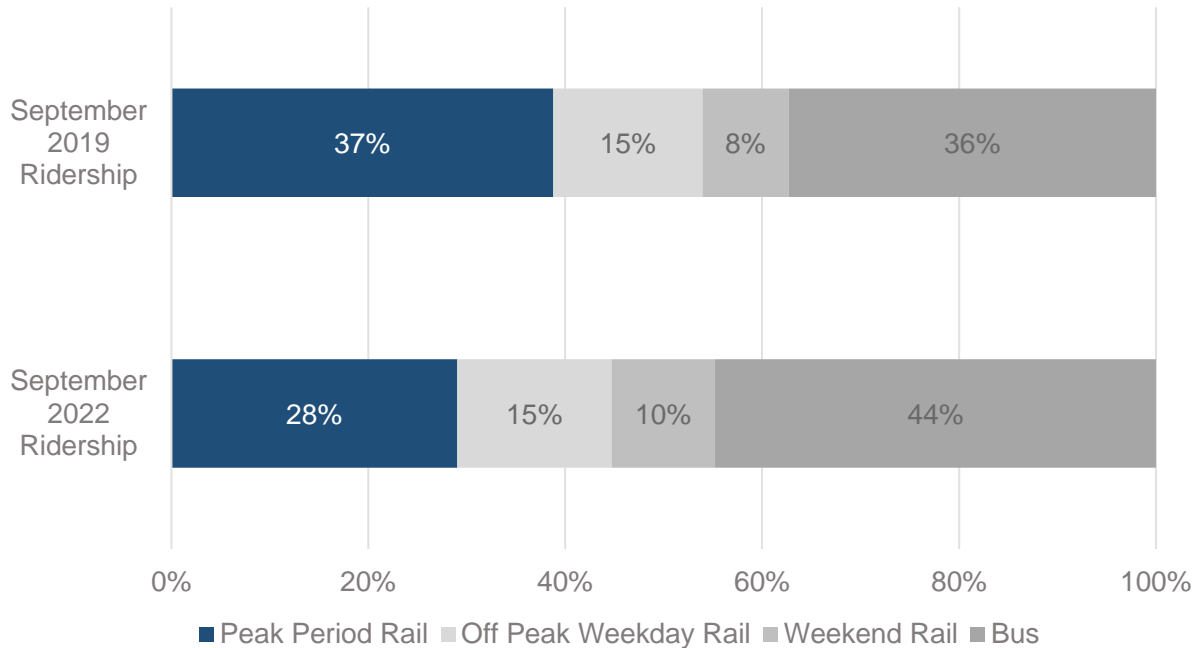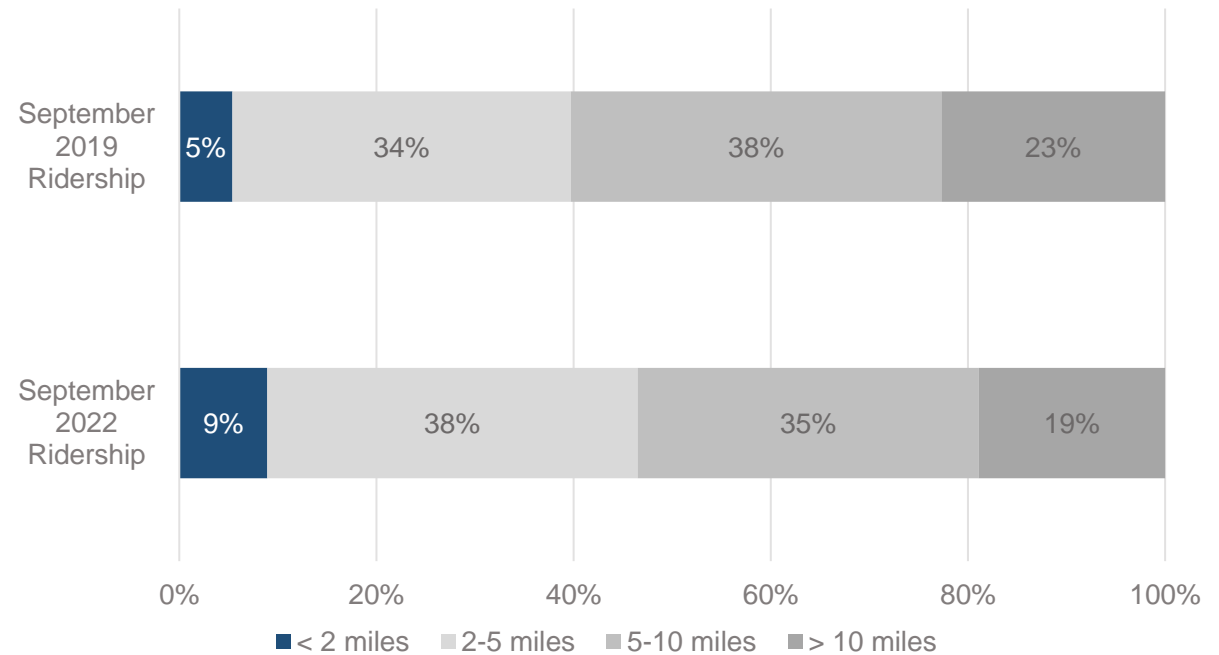
**Asset Optimization**

- Optimize use of assets and value delivered from system investments
  - Use available railcar fleet
  - Maximize system design capacity and train throughput

# Changing Rail Ridership Profile



**Peak period rail trips dropped from 37 to 28 percent**

September 2019 Ridership: 37% | 15% | 8% | 36%

September 2022 Ridership: 28% | 15% | 10% | 44%

Legend: Peak Period Rail | Off Peak Weekday Rail | Weekend Rail | Bus

**Rail trips of 5 miles or less increased from 39 percent to 47 percent**

September 2019 Ridership: 5% | 34% | 38% | 23%

September 2022 Ridership: 9% | 38% | 35% | 19%

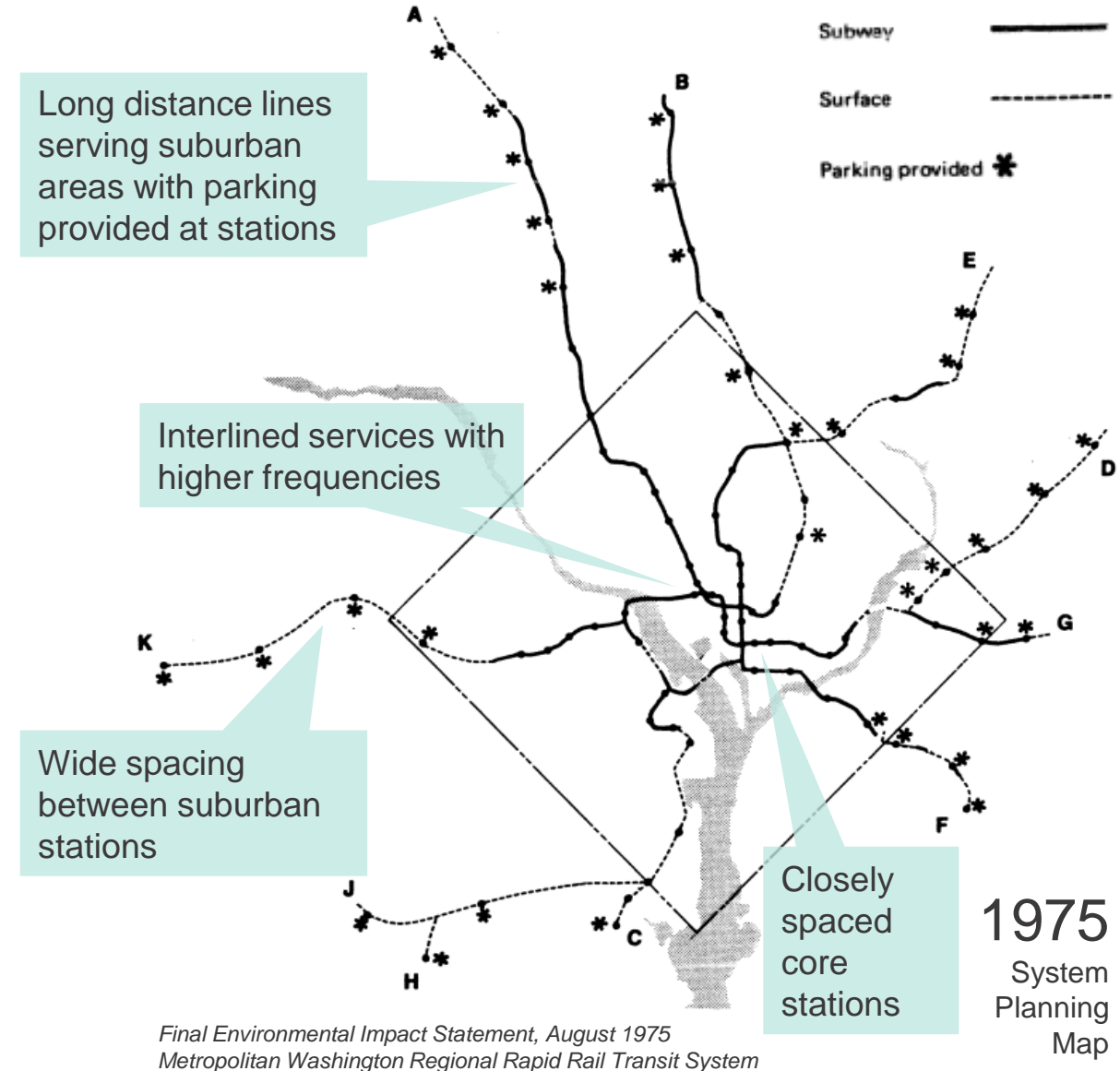Legend: < 2 miles | 2-5 miles | 5-10 miles | > 10 miles

# Metro was designed as a hybrid system
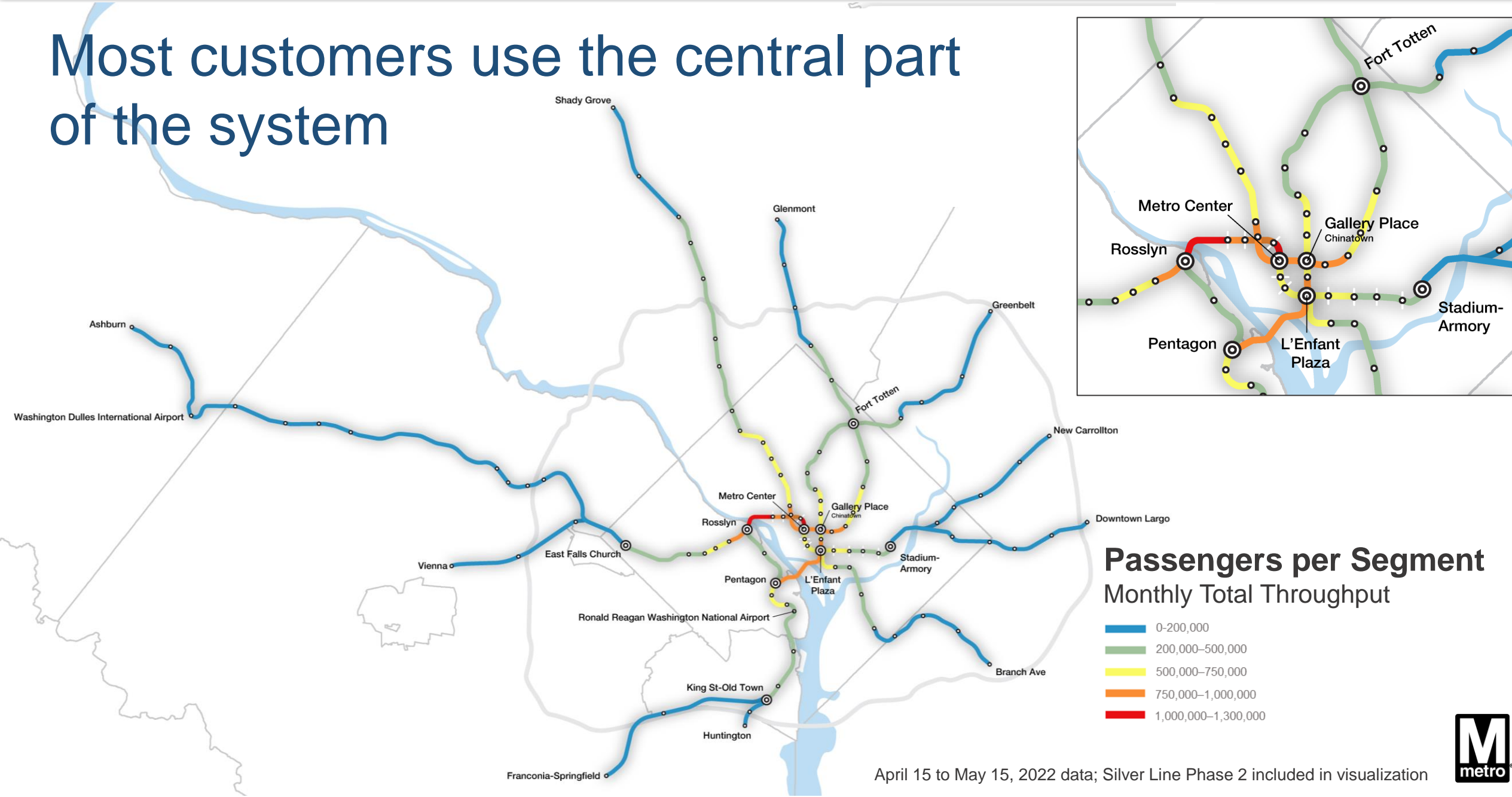
- ▪ **Regional rail:**
  - Customers travel farther with longer total journey times

- ▪ **Urban rapid transit:**
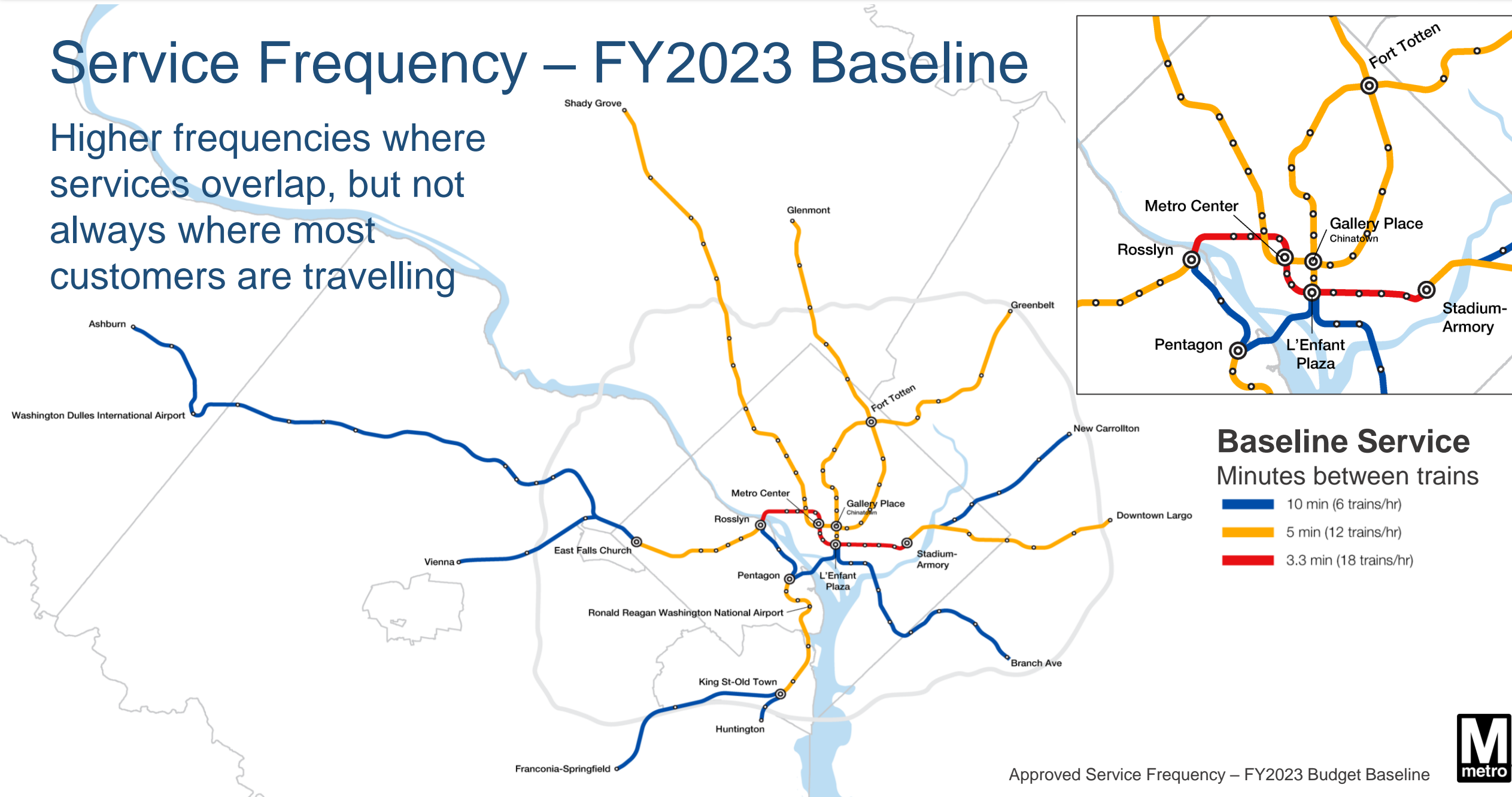  - Customers travel shorter distances with less total journey time



Subway —————
Surface - - - - - -
Parking provided ✳

Long distance lines serving suburban areas with parking provided at stations

Interlined services with higher frequencies

Wide spacing between suburban stations

Closely spaced core stations

1975 System Planning Map

*Final Environmental Impact Statement, August 1975*
*Metropolitan Washington Regional Rapid Rail Transit System*

# Most customers use the central part of the system



**Passengers per Segment**
Monthly Total Throughput

| | |
|---|---|
| ▬ | 0-200,000 |
| ▬ | 200,000–500,000 |
| ▬ | 500,000–750,000 |
| ▬ | 750,000–1,000,000 |
| ▬ | 1,000,000–1,300,000 |

April 15 to May 15, 2022 data; Silver Line Phase 2 included in visualization

# Service Frequency – FY2023 Baseline

Higher frequencies where services overlap, but not always where most customers are travelling



**Baseline Service**
Minutes between trains

- 10 min (6 trains/hr)
- 5 min (12 trains/hr)
- 3.3 min (18 trains/hr)

Approved Service Frequency – FY2023 Budget Baseline

# Strengthening the Network with Frequency and Efficient Transfers

**Frequent service**:

- Focuses service where the network is carrying the most customers
- Offers benefits for customers across the entire network, enabling efficient and predictable transfers and providing access to more destinations



**Customer use of the Network**
Passengers per Segment per Month

| | |
|---|---|
| ▬ (blue) | 0-200,000 |
| ▬ (green) | 200,000–500,000 |
| ▬ (yellow) | 500,000–750,000 |
| ▬ (orange) | 750,000–1,000,000 |
| ▬ (red) | 1,000,000–1,300,000 |

April 15 to May 15, 2022 data



**Efficient & Predictable Transfers**
L'Enfant Plaza Station

Destination Access Example:

# Anacostia Station

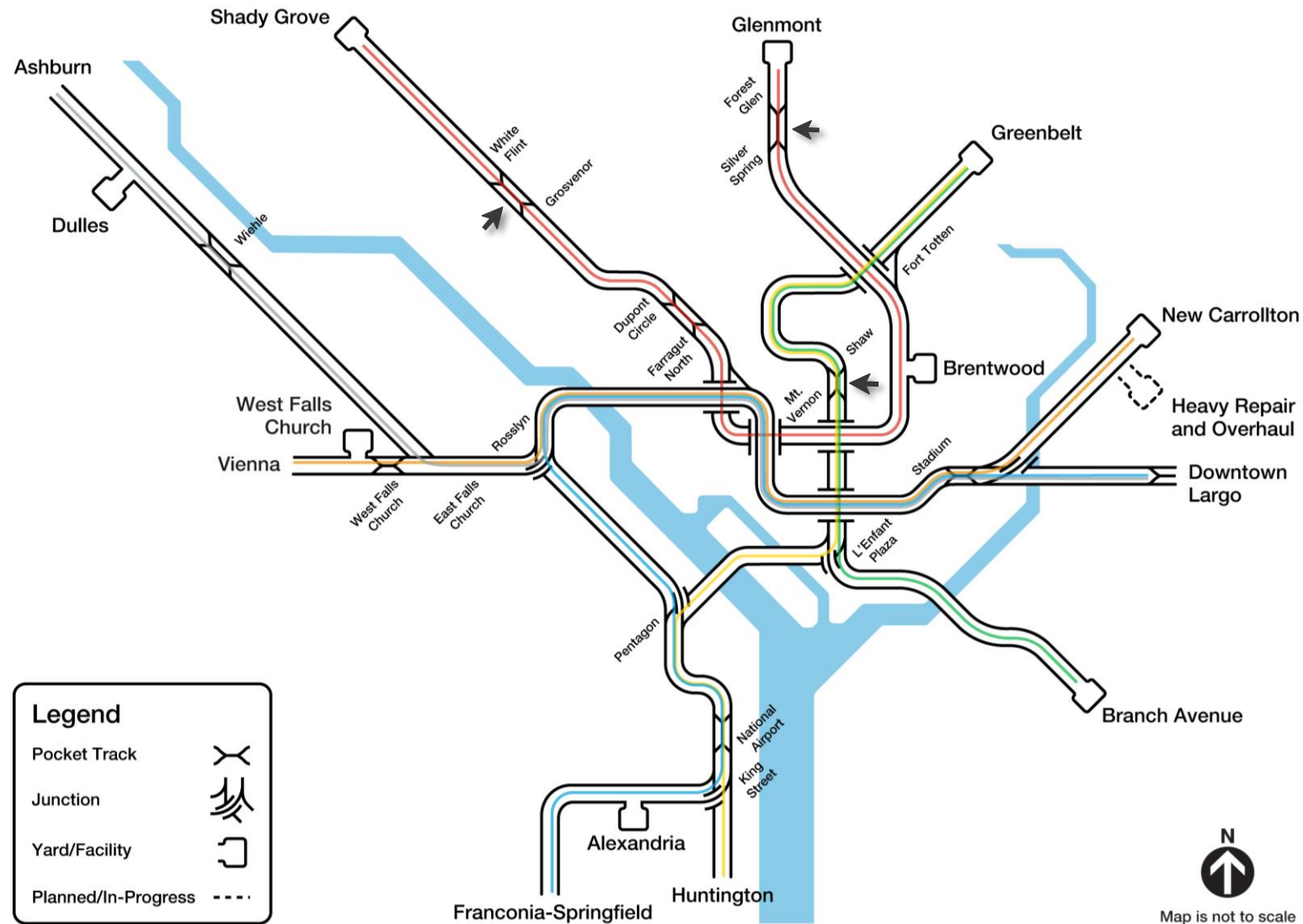For a customer starting a short walk from Anacostia Metro Station…

By reducing average **wait times for Green Line trains and enabling** further time savings with quicker **transfers to Yellow or Red Line:**

**Jobs accessible within 30 minutes increase approximately 25%**
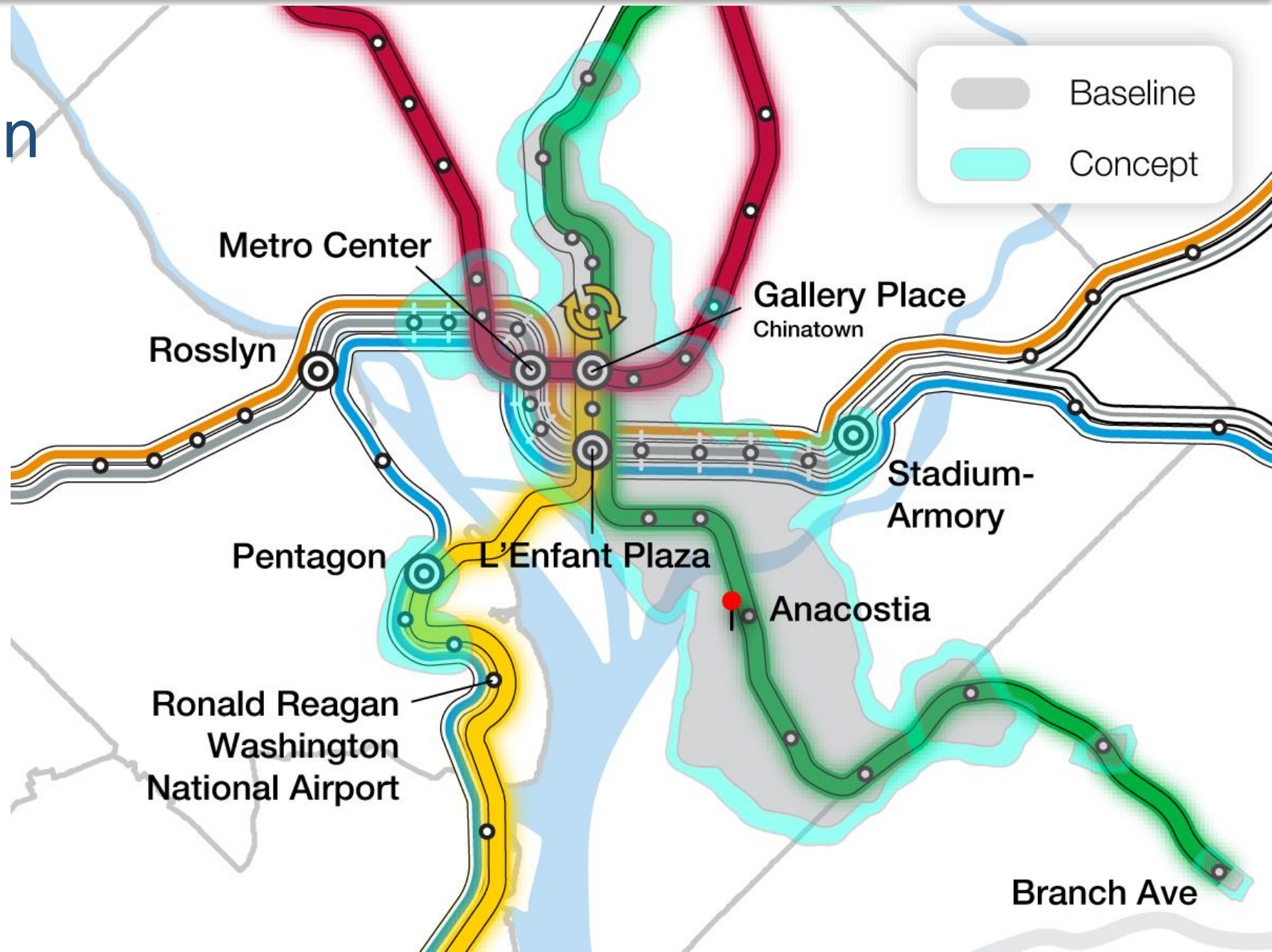
# Infrastructure & Railcars

- Limited locations to reliably turn trains in service

  - New infrastructure investment could enable more service flexibility beyond FY2024

- With railcar fleet (including 7000 series) fully available, can deploy more trains in service than FY2023 budget baseline

12



Legend

| | |
|---|---|
| Pocket Track | ✕ |
| Junction | ⋇ |
| Yard/Facility | ⅃ |
| Planned/In-Progress | - - - - |

Map is not to scale

# Most Metrorail costs are operations and maintenance of fixed assets or otherwise do not vary with service levels

- Metrorail is a $100 billion regional system supported by ongoing annual operating and capital expenditures maintaining and renewing assets

- The investment provides potential capacity to deliver service at relatively low marginal cost

  - Both fixed and variable costs are potentially changeable independent of service levels, but only variable costs necessarily scale with the amount of service delivered

  - Some types of service level changes affect fixed costs, including changes to operating hours (affecting the cost of operating stations) or changes above certain thresholds affecting fleet and facility footprint (long-term capacity)

## FY2023 Metrorail Costs
### Share of $1.3B Operating Budget

Rolling Stock Maintenance **10%**

Rail Operators **8%**

Traction Energy **4%**

Variable Costs **22%**
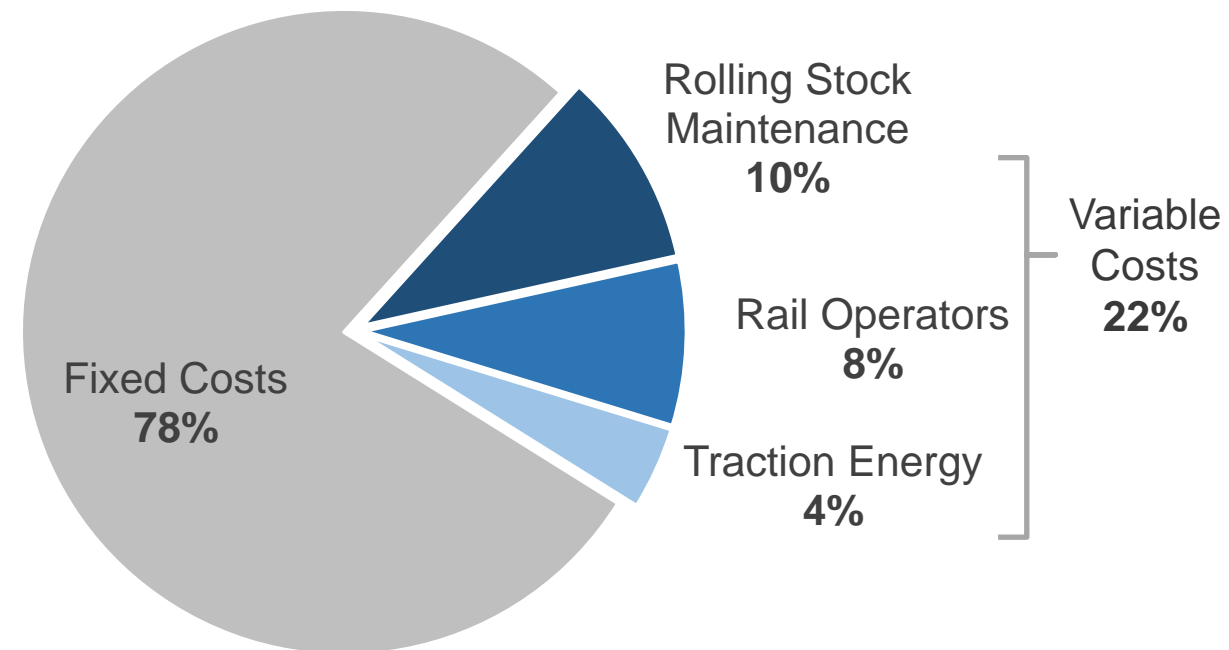
Fixed Costs **78%**

Fixed costs include operation and maintenance of railyards, track, structures, stations, signals, elevators/escalators, fare collection, maintenance equipment and vehicles, police and security, and administrative support.

# Service Optimization Concepts

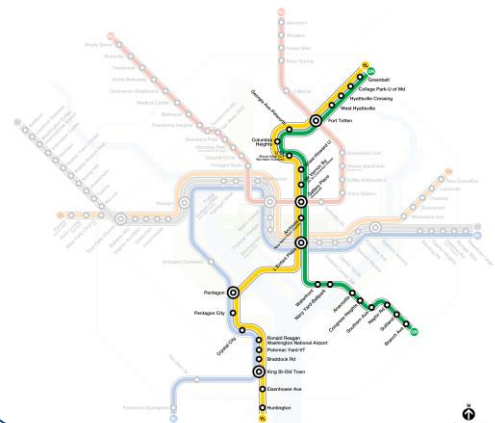**Evaluate through multiple lenses:**

Drives Ridership  Equitable  Asset Optimization

## Green/Yellow (GR YL)

- Increase service on core and southern segments Green and Yellow Lines
- Serve fast-growing parts of the region, including major sports venues and airport



## Red (RD)

- Optimize Red Line service, concentrating frequency in high ridership segments (post-pandemic ridership patterns)



## Blue/Orange/Silver (BL OR SV)

- Improve Orange Line service
- Consider first and last train times, airport service, and balance of BL/OR/SV frequency in core and to terminals
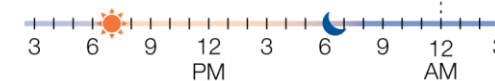


## Operating Hours

- Consider options including opening earlier on Saturday and Sunday and closing later on Friday and Saturday
- Consider pre-scheduled maintenance outages
- Night-time options

| | |
|---|---|
| **Monday–Thursday** | 5AM–12AM |
| **Friday** | 5AM–1AM |
| **Saturday** | 7AM–1AM |
| **Sunday** | 7AM–12AM |

3  6  9  12  3  6  9  12  3
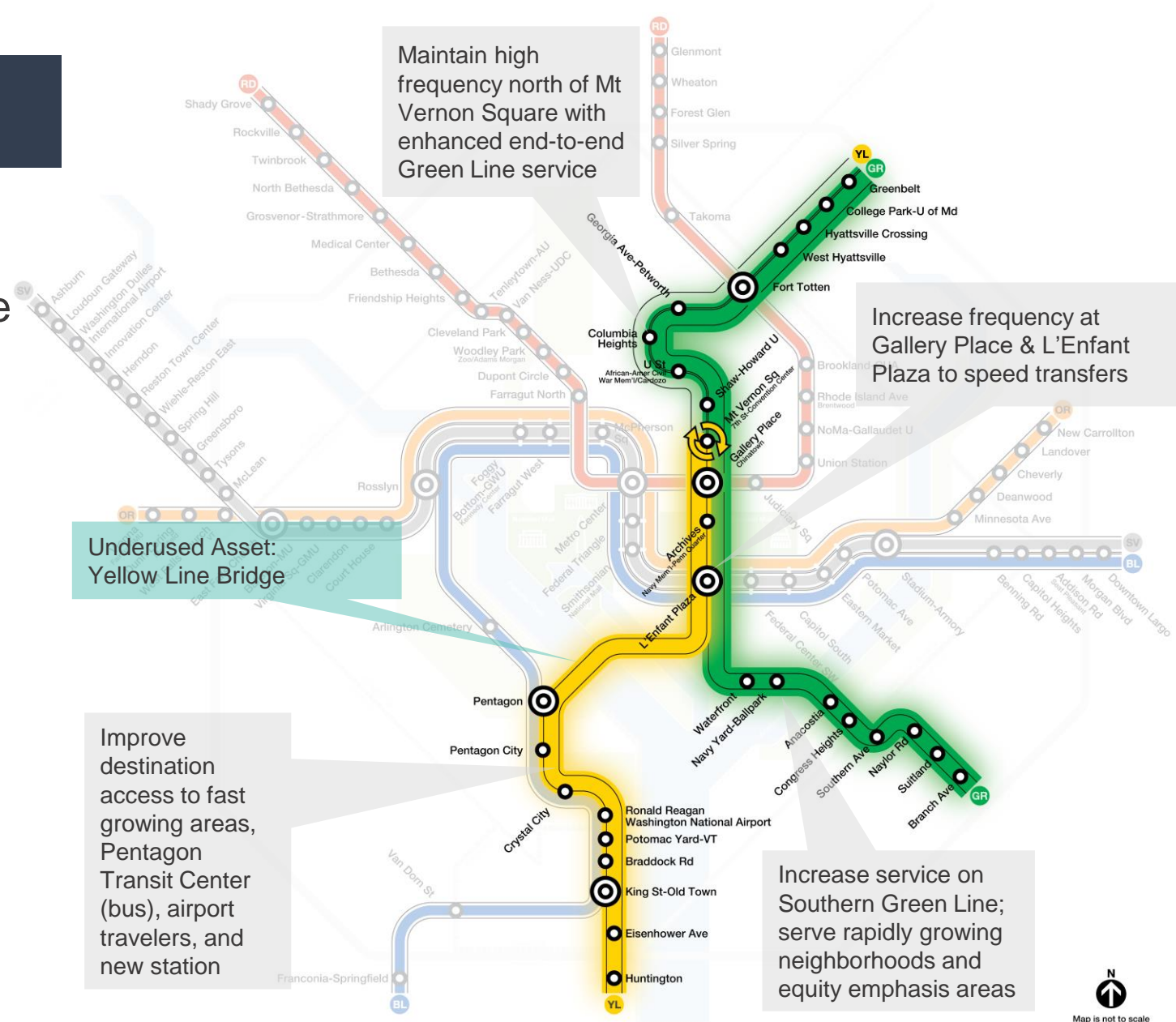PM                        AM

## Green/Yellow Line Concepts

### Increased Green and Yellow Service with Yellow Line Short Turns

Increase frequency of Green and Yellow Line south of Mt. Vernon Sq. to match effective frequency of Northern Green Line

Opportunity to grow ridership with enhanced service for fast growing parts of system, games and other events at four major sports venues, airport travelers (DCA), and a new station (Potomac Yard)

Reduces transfer times at Gallery Place and L'Enfant Plaza, provides equity benefits on Southern Green Line, increases utilization of key assets (e.g., Yellow Line bridge)



Maintain high frequency north of Mt Vernon Square with enhanced end-to-end Green Line service

Increase frequency at Gallery Place & L'Enfant Plaza to speed transfers

Underused Asset: Yellow Line Bridge

Improve destination access to fast growing areas, Pentagon Transit Center (bus), airport travelers, and new station

Increase service on Southern Green Line; serve rapidly growing neighborhoods and equity emphasis areas

Map is not to scale

## Red Line Concepts

**Improve Red Line Transfers with Additional Service between Grosvenor and Silver Spring**

Provide more service in the busiest segments of the Red Line by making use of short turns between Grosvenor and Silver Spring, reducing transfer times to other lines

Realignment to improve core frequency and serve growing areas with an approximately similar level of total service

Increased frequency benefits four customer trips for every trip with longer waits (4 to 1 ratio)

Reduced frequency compared to baseline

Focus service in the busiest segment between Grosvenor and Silver Spring, serve growing areas

Reduced wait times to transfer to the Red Line at Metro Center, Gallery Place, and Fort Totten

Benefits up to four times as many customer trips with more service as trips negatively impacted
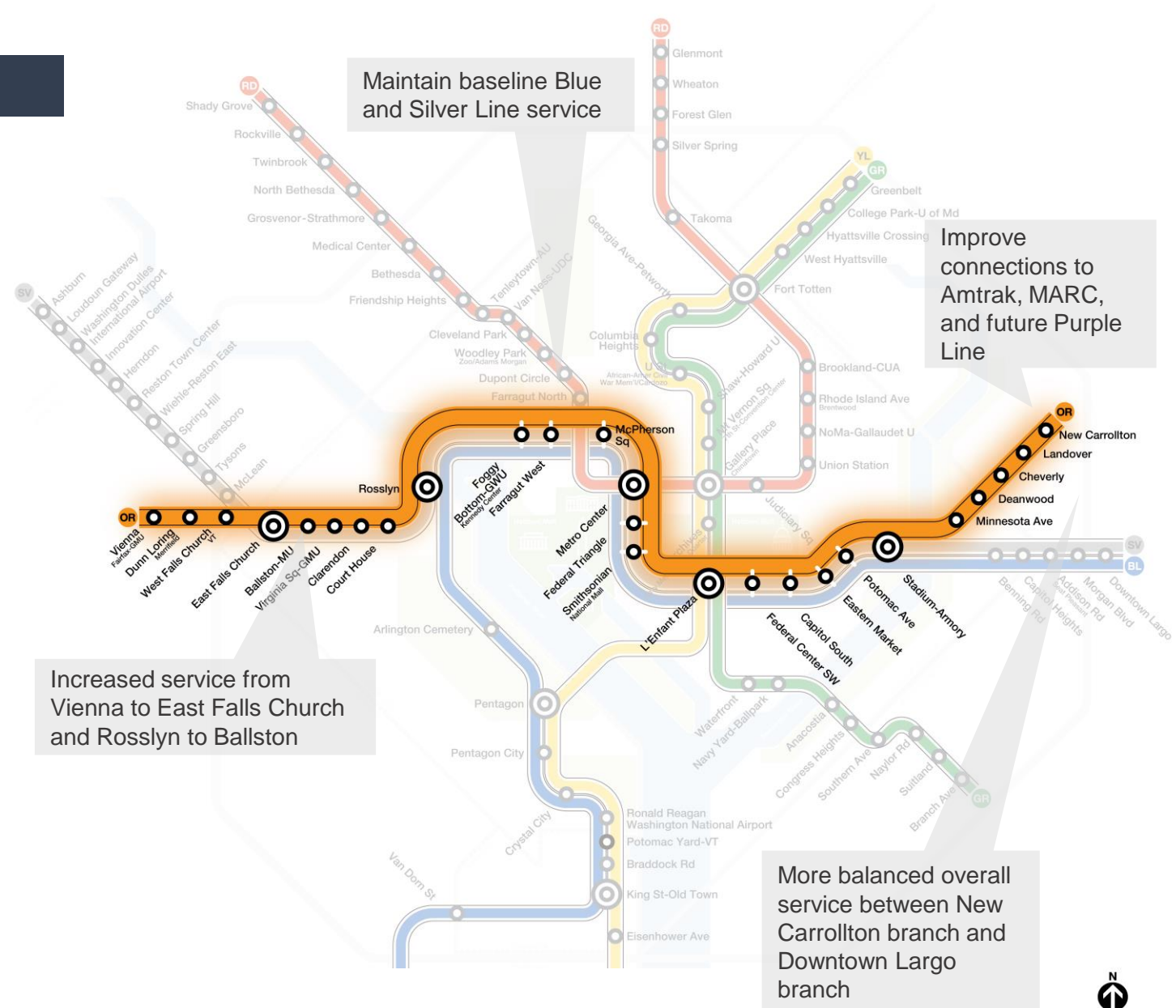


Map is not to scale

## Blue/Orange/Silver Line Concepts

### Improve Orange Line Service

Provide more service on the Orange Line while maintaining baseline service on the Blue and Silver Lines

Current ridership on the eastern Orange and Blue/Silver branches is roughly even, and the New Carrollton branch historically had 10-25% more riders

Improves potential connections at New Carrollton to Amtrak, MARC, and the future Purple Line



Maintain baseline Blue and Silver Line service

Improve connections to Amtrak, MARC, and future Purple Line

Increased service from Vienna to East Falls Church and Rosslyn to Ballston

More balanced overall service between New Carrollton branch and Downtown Largo branch

Map is not to scale

## Blue/Orange/Silver Line Concepts

### Silver Line Express Services

Mitigate the long travel time to and from Ashburn with a new express service

Potential to reduce travel time to and from Dulles and Ashburn by 4 to 6 minutes by adding some trains that skip approximately seven stops between Rosslyn and Wiehle
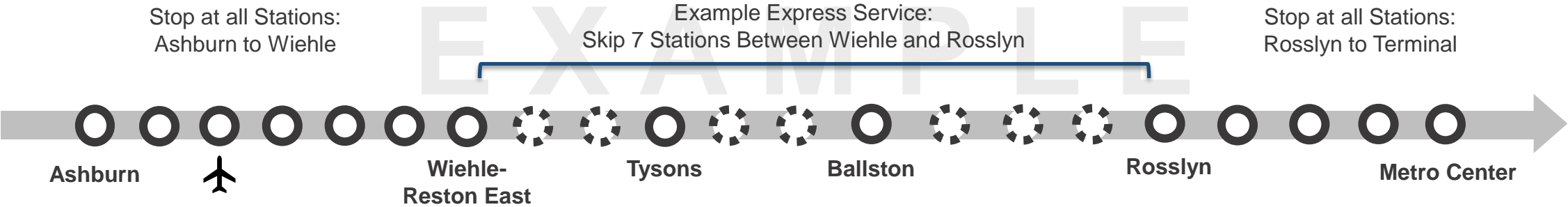
Options include:

- A **few express trains per day**
- Add a new **all-day express service** pattern

**Metro is designed as a two-track system with no passing tracks. Without passing:**

- An express train can only 'catch up' to the train in front of it
- Travel time savings can be no greater than the local service headway

| Estimated Ridership (Millions, Annual) | Incremental Revenue ($, Millions, Annual) | Incremental Operating Cost ($, Millions, Annual) | Incremental Net Operating Budget Impact ($, Millions, Annual) |
|---|---|---|---|
| 0 to 1.5 | $ 0 to 4 | $ 0.5 to 22 | $ 0.1 to 17 |

Stop at all Stations: Ashburn to Wiehle

Example Express Service: Skip 7 Stations Between Wiehle and Rosslyn

Stop at all Stations: Rosslyn to Terminal

Ashburn    Wiehle-Reston East    Tysons    Ballston    Rosslyn    Metro Center

# How service concepts could fit together at system level

- Increase core frequency on Green, Yellow, Red and Orange Lines, reducing transfer times and concentrating service in fast growing areas with high ridership potential

**Core**
Trains arrive every 3 to 6 minutes

**Systemwide**
Trains arrive every 8 to 12 minutes or better

| Estimated Ridership Change (Annual) | Incremental Net Operating Budget Impact ($, Millions, Annual) |
|---|---|
| 4 million (+3.5%) | $ 18.5 |

Assumes railcar fleet fully available (including 7000 series)

**Preliminary: Annual Customer Trips**
Baseline: 112m
Concept: 116m

- Not Impacted 23%
- New Trips 3%
- Negatively Impacted 12%
- Positively Impacted 62%
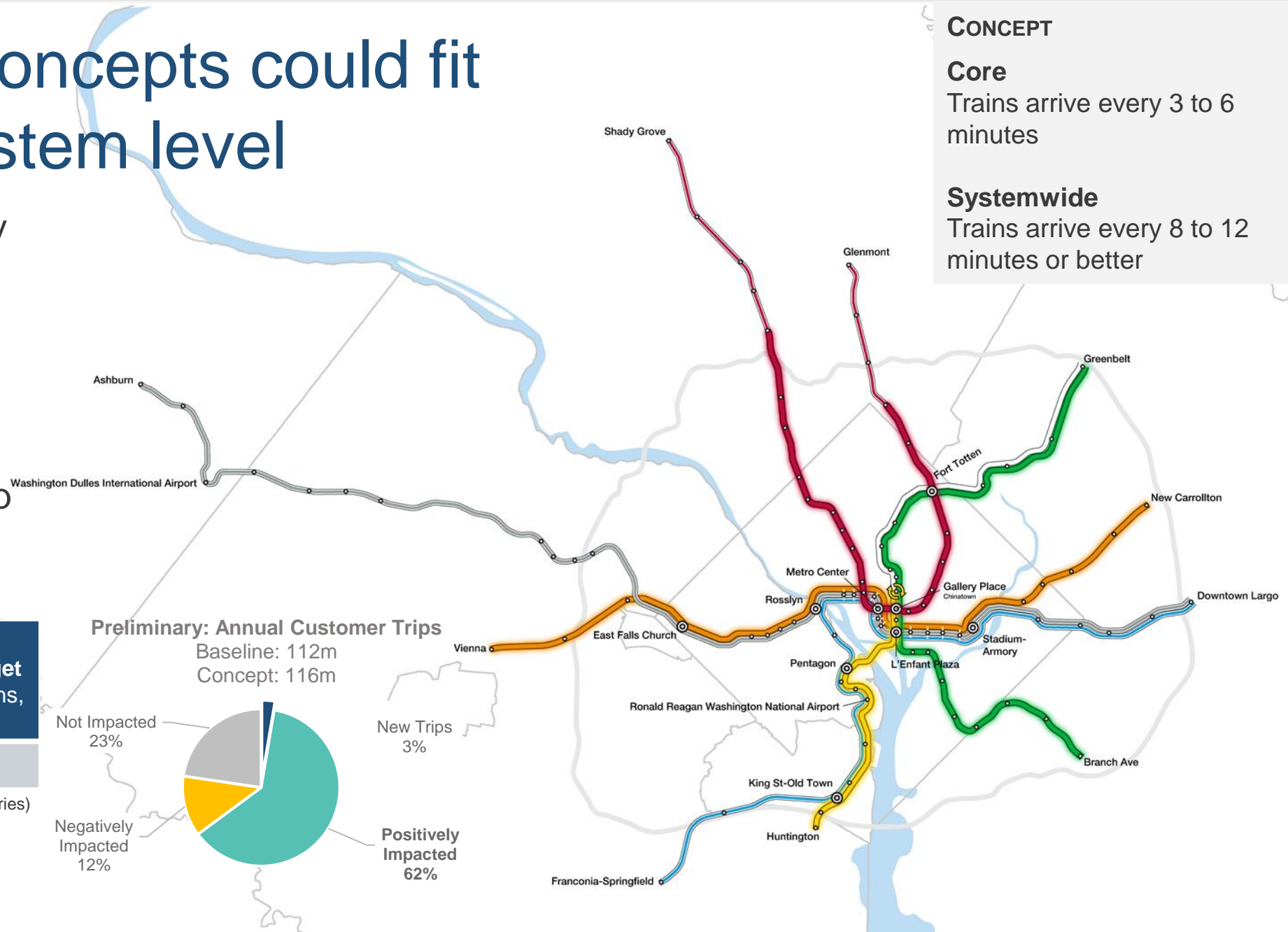
# Considerations and Constraints

| Considerations | Constraints |
|---|---|
| ■ Ridership | ■ Trunk line capacity |
| ■ Equity | ■ Railcar availability & reliability |
| ■ Customer, community, region-wide impacts | ■ Staffing |
| ■ Cost | ■ Operational complexity |
| ■ Implementation timeline | ■ Infrastructure |
| | ■ Overnight maintenance |

# Potential Future
# Fare Optimization

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

# Board-adopted Fare Policy Principles (October 2021)

**Customer Focused**

Adopt customer-focused fare policies and systems to position Metro as an attractive choice in a competitive travel market

**Simple and Convenient**

Make it simple, intuitive, and convenient for customers to purchase fares and take transit

**Equitable**

Maintain equitable fares and practices that promote broad access to regional destinations

**Seamless**

Create a seamless customer experience across modes and operators to promote regional mobility

**Built to Drive Ridership**

Maximize ridership to support service and regional mobility

**Generate Revenue to Maintain Financial and Service Stability**

Ensure sustainable revenue and cost efficiency to maintain financial health and sufficient service

Fare policy principles guide development and evaluation of potential fare policy changes

# Balancing Considerations in Fare Policy

**Simplicity**

Ease of use / understanding

Cost of fare collection

**Complexity**

Linking price to value delivered

Linking price to cost of service

Customer price sensitivity

**Equity**

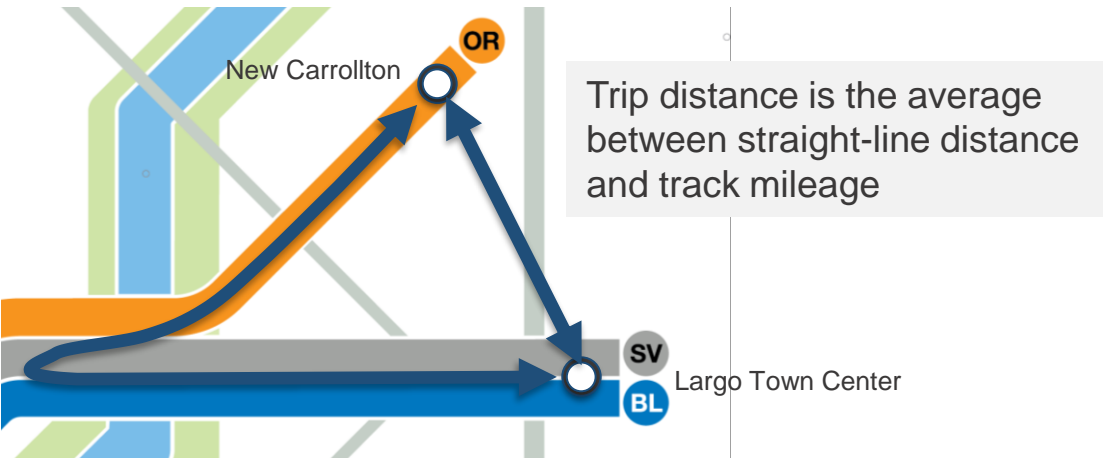Metro will provide safe, equitable, reliable, and cost-effective public transportation
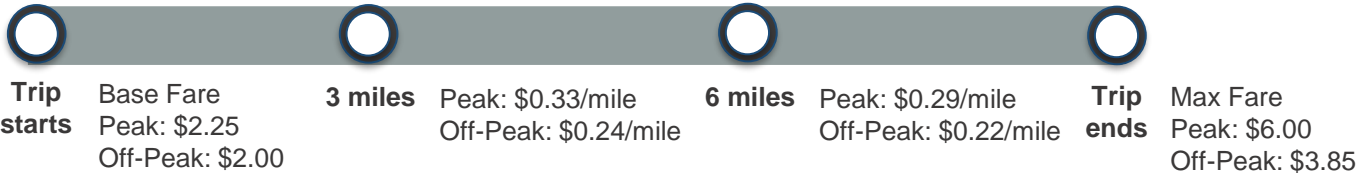
# Current Fare Structure

**Determining trip distance between stations**



Trip distance is the average between straight-line distance and track mileage

## 🚈 Rail Fares

- Fares are based on the distance between origin and destination stations
- Mileage rates are applied to that composite distance
- Rates higher during peak periods
- $2 weekend, late night flat fare

**Mileage rates**



| | |
|---|---|
| **Trip starts** | Base Fare<br>Peak: $2.25<br>Off-Peak: $2.00 |
| **3 miles** | Peak: $0.33/mile<br>Off-Peak: $0.24/mile |
| **6 miles** | Peak: $0.29/mile<br>Off-Peak: $0.22/mile |
| **Trip ends** | Max Fare<br>Peak: $6.00<br>Off-Peak: $3.85 |

## 🚌 Bus Fares

- $2 flat fare across system
- Higher prices for express and airport services

| Bus Service Type | Fare |
|---|---|
| Metrobus, MetroExtra, MetroWay, REX | $2.00 |
| Commuter Bus Routes (17B/G/K/M, 18G/J/P) | $4.25 |
| Airport Routes (5A) | $7.50 |

# Recent customer-friendly fare changes
## Promote ridership, equity, seamless experience

| FY2022 Improvements | FY2023 Improvements |
|---|---|

**Permanent**

- Free rail-bus transfers ($2 transfer discount)
- Rail weekend $2 flat fares
- Lower 7-Day Regional Bus Pass Price
  - Pass price of $12, previously $15
- Regional providers included in rail-bus combo passes

- Late-night $2 Metrorail fares
- Lower monthly unlimited pass price
  - Price of 32 trips, previously 36

**Promo**

- 50 percent off rail-bus combo passes (1, 3, 7 day) for a month

- 50 percent off 7-day unlimited passes for six months

**Ridership impacts from fare or service changes build over time**
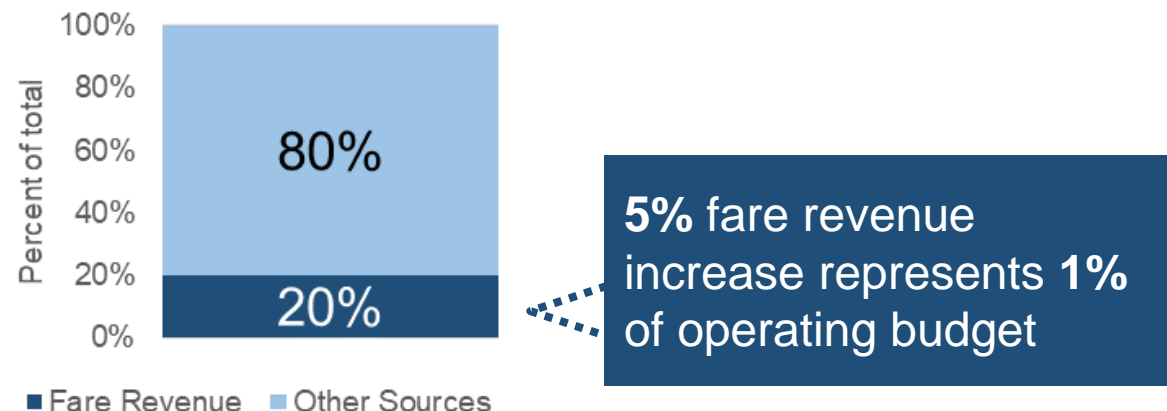
# Lower Ridership Reduces Financial Impacts of Fare Changes

■ Fare revenue reduced compared to pre-pandemic, contributes less to overall operating budget

■ General fare increases would be expected to result in less revenue now than compared to pre-pandemic

**Pre-pandemic operating budget**



**5%** fare revenue increase represents **<2%** of operating budget
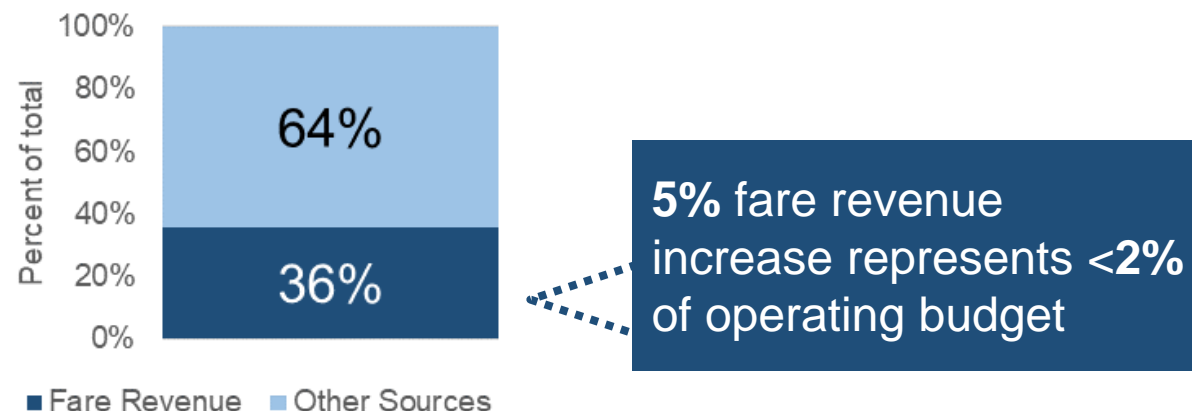
**FY2024 forecast operating budget[1]**



**5%** fare revenue increase represents **1%** of operating budget

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

1. FY2024 Operating Budget Outlook, September 2022: $377M fare revenue

# There Are Many Opportunities to Improve Customer Experience

Buying fares is one part of the customer experience

**1**

### Plan transit trip

WMATA trip planner
Access
Schedules

**2**

### Access station

Convenience
Appearance
Wayfinding
Security

**3**

### Buy fare

Ease
Value
Legibility

**4**

### Pay fare

Ease

**5**

### Wait for train

Wait time
Comfort
Security

**9**

### Exit station

Convenience
Appearance
Wayfinding
Cleanliness
Security

**8**

### Exit train

Appearance
Cleanliness
Wayfinding
Security

**7**

### Sit/stand on train

Travel time
Personal space
Comfort
Security

**6**

### Enter train

Appearance
Customer engagement
Cleanliness

27

# Fare Optimization Goals

| **Simple and Convenient** | **Equitable** | **Financial Stability** |
|---|---|---|
| ▪ Customers can figure out fare in seconds<br><br>▪ Fares are easy to understand and communicate | ▪ Ability to pay does not determine ability to ride<br><br>▪ Ensure people of color and low-income customers equal access to quality service<br><br>▪ Roughly aligns price to value received | ▪ Ensure sustainable revenue and cost efficiency to maintain financial health and sufficient service |

# Fare Optimization Concepts

**Evaluate through these lenses:**

Simplicity    Equity    Financial Stability

## 1 Fare Structure

### A Fare Free

- Do not charge fares

### B Flat Fare

- Set one fare for all rail trips
- Can set price lower to grow ridership or higher to grow revenue

### C Zone-Based Fares

- Charge by zones traveled rather than mileage
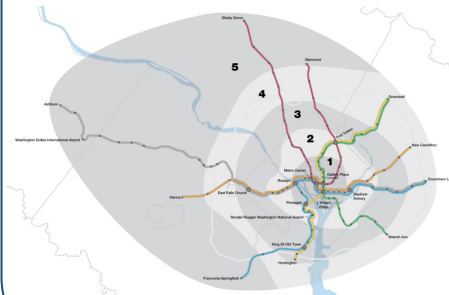


### D Improved Distance-Based Fares

- Simplify the fare structure
- Use technology and other tactics to simplify customer experience



## 2 Fare Pricing

- Change minimum/ maximum fares
- Changing or eliminating peak/ off-peak fares
- Low-income fare products
- Parking fees
- $1 bus fare

# International Benchmarking of Metro Fare Structures

Metro fare systems vary globally with some regional clustering

Distance-based fares are more common on longer networks and in Asia

U.S. examples of distance-based fares:
- WMATA
- BART
- PATCO
- Sound Transit



FLAT FARE (37%)   ZONE-BASED FARE (19%)   DISTANCE-BASED FARE (44%)

Source: Community of Metros/Transport Strategy Centre at Imperial College London

COMET — Community of Metros Benchmarking Group
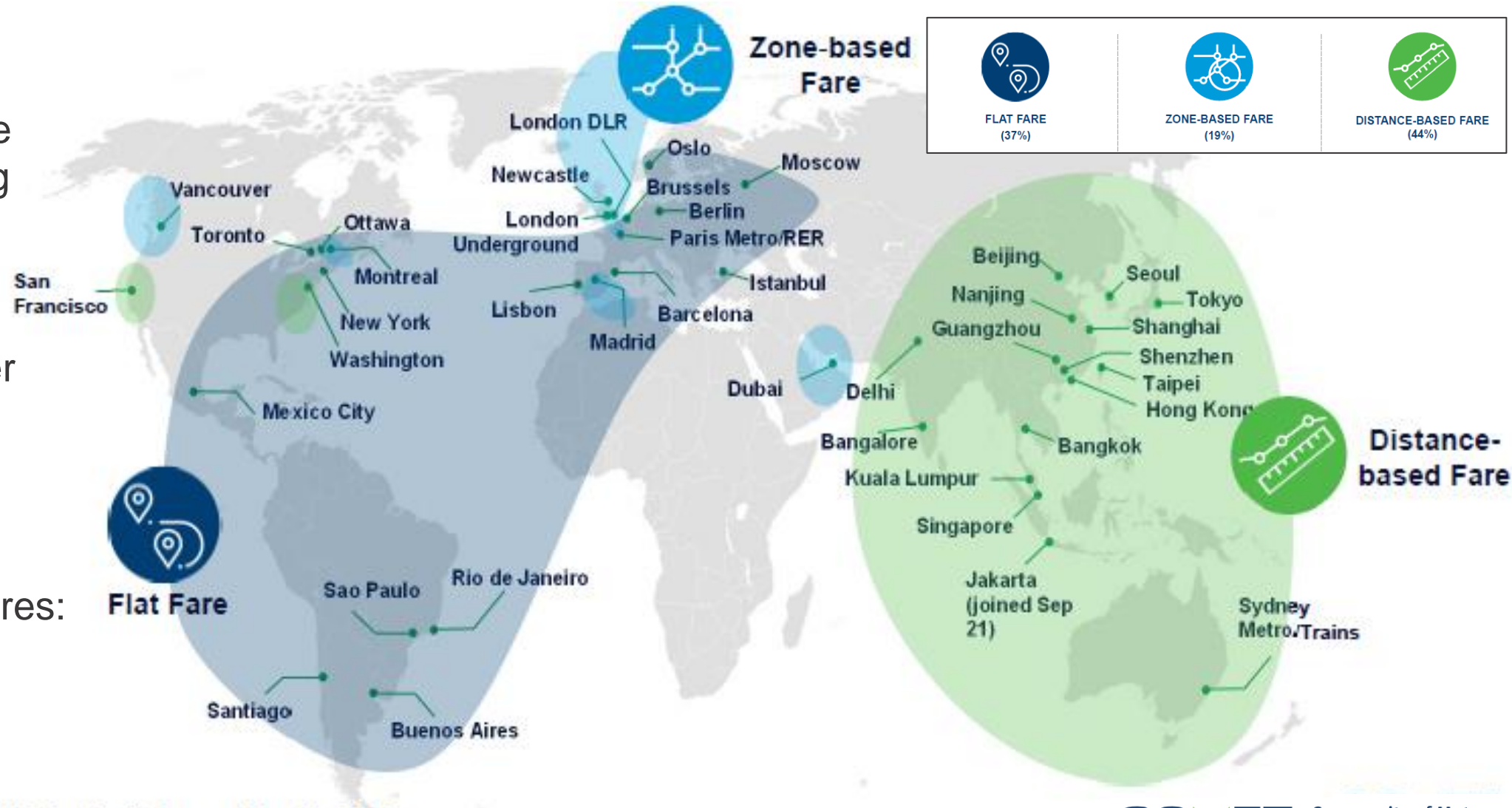
# Concept A: Fare-Free System

## No charge for customers

- No charge for any trip (bus or rail)

- Requires full subsidy, $465m (FY24)[1]

- Lowers income barriers to transit

- Grows ridership

- Long-term considerations:

  - Potential crowding and security issues

  - Subsidy growth over time

  - Costs of fare collection

# Concept B: Flat-Fare System

## All customers pay one flat rate

- Initial concepts:
  - $2 all trips, all times
  - $3 all trips, all times
  - $4 all trips, all times

- $2 flat fare would grow ridership but require more subsidy

- $3 or $4 flat fare would lose ridership and increase subsidy

- All have equity impacts and considerations

| Flat Fare Concept | | | |
|---|---|---|---|
| **Measures** | **$2 Flat Fare** | **$3 Flat Fare** | **$4 Flat Fare** |
| Est. Ridership Impacts | +5M to +6M | -8M to -13M | -23M to -30M |
| Est. Revenue Impacts | -$61M to -64M | -$10M to -$24M | -$18M to +$12M |

(Impact estimates based on preliminary conceptual analysis)

# Concept C: Zone-Based Fares

**Replace mileage-based rail fares with zone-based fares**

## Multiple Options for Creating Zones

**Station Typologies**
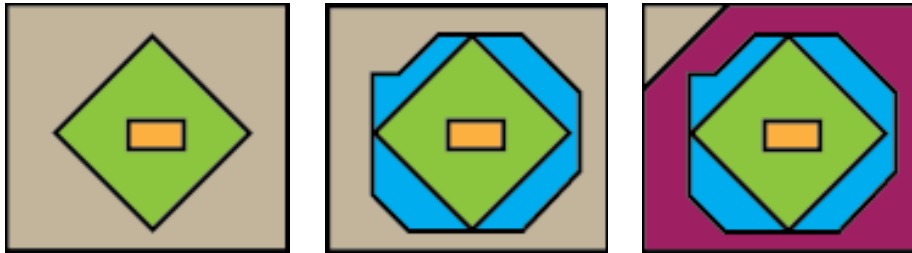
**Political Boundaries**

**Distance from a Center Point**

## Other Policy Levers
- Options for charging fares:
  - Zone pairs?
  - Number of zones crossed?
- Options for setting prices:
  - Change minimum/maximum fares?
  - Keep regular and discounted fares?
  - Target revenue growth?

The zone-fare concept is flexible and can be shaped to desired policy outcomes. Its complexity and impacts on ridership, revenue, and equity would depend on those policy decisions.

# Example Zone Fare Concept: Zones by Distance

- Fares based on distance from Metro Center
  - Maintain current base, maximum, and discounted fares
  - Maintain $2 late night and weekend fares
- Fares based on the number of zone boundaries a trip crosses, capped at fare to the core
- Tradeoffs between simplicity and granularity
  - Fewer zones vs. linking price and value vs. avoiding large price jumps between zones
- Basing zones on distance vs. other options:
  - Better links price to service used
  - Boundaries set by geometry rather than geography
  - Lower potential equity risks than other zone options
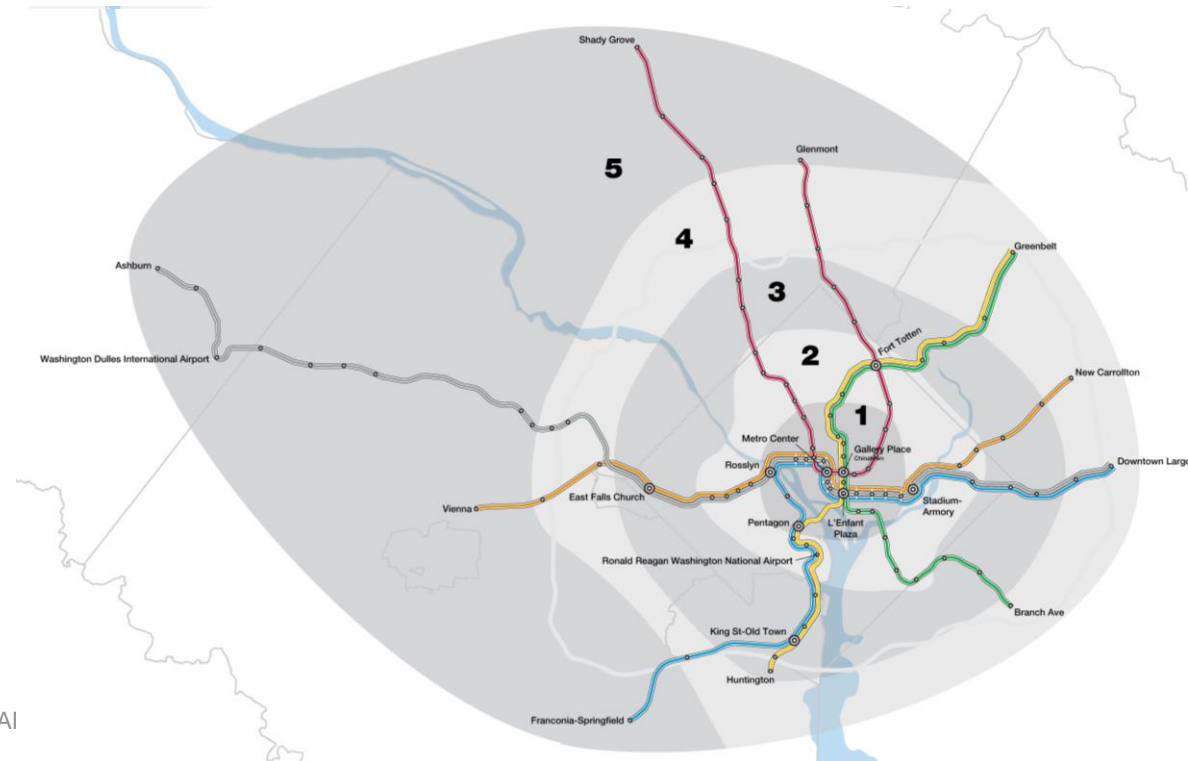
# Zone-Based Fares

| Opportunities | Concerns |
|---|---|
| ▪ Greatly reduces the number of fare combinations | ▪ Major change for customers to learn |
| ▪ Simplifies fare tables | ▪ Would require intensive customer engagement and training |
| ▪ Should be easy to communicate and understand | ▪ Some customers would face large fare increases (higher costs for short trips between zones) |
| ▪ Retains rough link between price and value received | ▪ May lose price-sensitive customers |

# Concept D: Improving Distance-Based Fares

| Simplifying the __Structure__ of Distance Fares | Simplifying the __Use__ of Distance Fares |
|---|---|

- Change or eliminate peak/off-peak difference

- Round fares to $0.25 increments

- Consolidate mileage tiers:

| Time | Current Mileage Rate | Potential Mileage Rate |
|---|---|---|
| Peak | $0.29 - $0.33 | $0.33 |
| Off-Peak | $0.22 - $0.24 | $0.22 |

- Simplify distance calculation (e.g., straight-line distance)

- Allow negative SmarTrip balances

- Custom fare maps for each station, mobile web fare calculators

- Tourist/visitor pass products
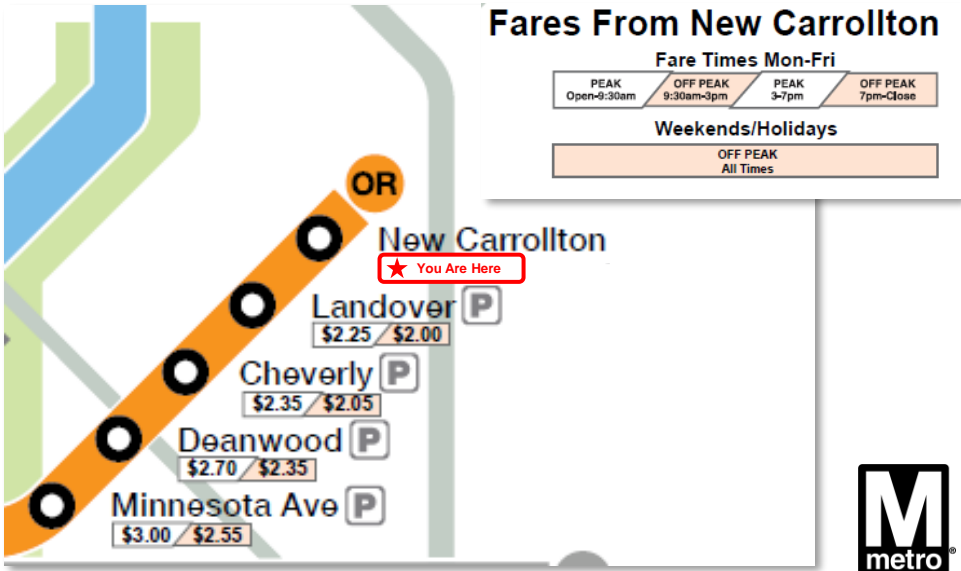
# Improving Distance-Based Fares

| Opportunities | Concerns |
|---|---|
| ▪ Minor changes for customers to learn<br><br>▪ Simplifies fare tables and reduces number of fare combinations<br><br>▪ Tools could automatically show customers their fare<br><br>▪ Price well aligned to value received | ▪ Still results in a complex fare table and many fare combinations<br><br>▪ Can be difficult to explain and communicate |

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

# A Low-Income Fare Product Would Promote Equity and Access

- Low-income customers are more likely to avoid riding Metro due to cost

  - Fares represent a higher percentage of income compared to wealthier riders

  - Less likely to receive tax or employer subsidies through SmartBenefits

  - May be enrolled in assistance programs such as Medicaid, SNAP, or TANF

- A discounted fare program would make transit more affordable, lower barriers, promote ridership

- 17 of the 50 largest transit agencies currently have low-income fare programs

**Equitable**
Maintain equitable fares and practices that promote broad access to regional destinations
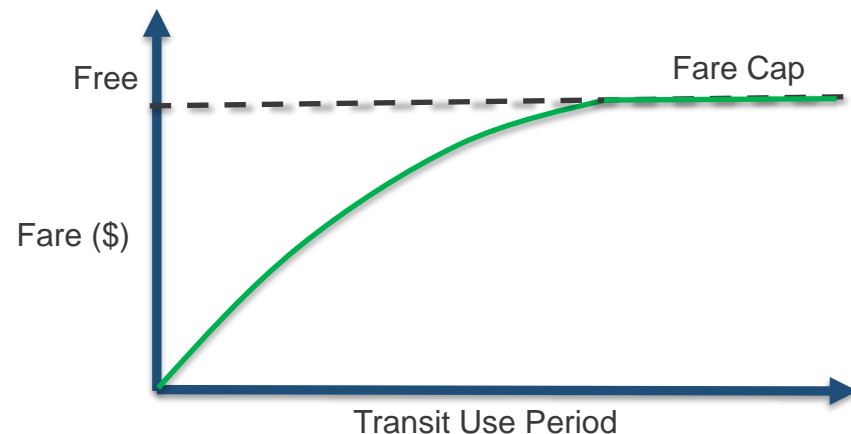
**Low Income Share of Ridership, %**

15% — Metrorail
50% — Metrobus
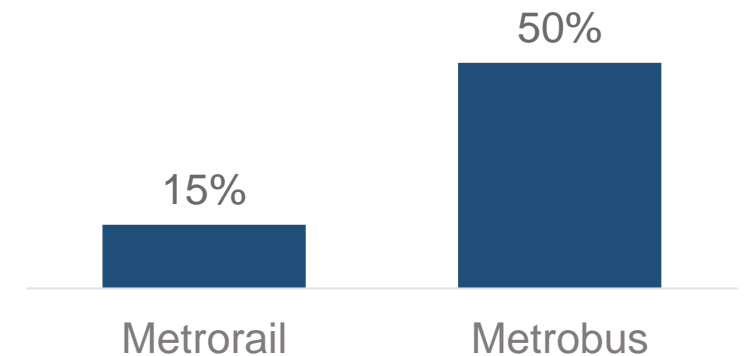
Source: Rail and Bus Passenger Surveys

# Potential Improvements Beyond FY2024

| Fare Capping | Regional Fare Integration |
|---|---|

- Caps the maximum total fares customers pay per day
- Encourages ridership
- Promotes equity

- Create common fare media and linked payments between Metro, regional rail, commuter bus, and bikeshare operators
- Allows customers to pay for all multimodal trips with one fare medium
- Creates the possibility for future regional fare policies (i.e., transfers and passes)

# Appendix

Metrorail Service Optimization

# Service Frequency Details

| Line | Segment | Peak Headway Minutes between trains | | | All Day Base Headway* Minutes between trains | | |
|---|---|---|---|---|---|---|---|
| | | August** | FY23 Budget | Concept*** | August** | FY23 Budget | Concept*** |
| RD | **Grosvenor to Silver Spring** | **10** | **5** | **4** | **10** | **6** | **5** |
| RD | Shady Grove, Glenmont Terminals | 10 | 5 | 8 | 10 | 6 | 10 |
| GR YL | **Mt. Vernon Sq to L'Enfant Plaza** | **7.5** | **5** | **2.5 to 3** | **7.5** | **6** | **3** |
| GR | Greenbelt Terminal | 15 | 5 | 5 to 6 | 15 | 6 | 6 |
| GR | Branch Avenue Terminal | 15 | 10 | 5 to 6 | 15 | 12 | 6 |
| YL | Huntington Terminal | 15 | 10 | 5 to 6 | 15 | 12 | 6 |
| BL YL | Pentagon to Reagan National Airport | 7.5 | 5 | 3 to 4 | 7.5 | 6 | 4 |
| BL OR SV | **Rosslyn to Stadium-Armory** | **5** | **3.3** | **3** | **5** | **4** | **3.75** |
| OR SV | East Falls Church to Rosslyn | 7.5 | 5 | 4.3 | 7.5 | 6 | 5.5 |
| OR | New Carrollton Terminal | 15 | 10 | 7.5 | 15 | 12 | 10 |
| BL SV | Downtown Largo Terminal | 7.5 | 5 | 5 | 7.5 | 6 | 6 |
| BL | Franconia Terminal | 15 | 10 | 10 | 15 | 12 | 12 |
| OR | Vienna Terminal | 15 | 10 | 7.5 | 15 | 12 | 10 |
| SV | Wiehle (Future Ashburn) Terminal | 15 | 10 | 10 | 15 | 12 | 12 |

**Typical Service in August 2022 (before Yellow Line construction shutdown) with reduced service due to limited availability of 7000 series

*Until 9:30pm, 7 days a week
***Assumes railcar fleet fully available (including 7000 series)

# Low-Income Fare Program Design Considerations

Primary considerations: Create a unified regional program managed by Metro, or coordinate with local/jurisdictional programs?

**Program design considerations**

**Other considerations**

### Eligibility

What criteria should be used to determine eligibility?

### Discount

What discount should participants receive?

### Cost and Funding

What is the anticipated program cost and how should it be funded?

### Verification

Where and how should applicants be verified for the program?
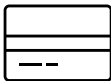
### Pass Distribution and Upkeep

How should discounted passes be distributed?

What reloading or deactivation methods are needed, if any?

### Outreach and Partners

What outreach should be done to raise awareness?

What partners does Metro need to make the program successful?