Metrorail Line Load Application

Presented to

Travel Demand Forecasting Subcommittee

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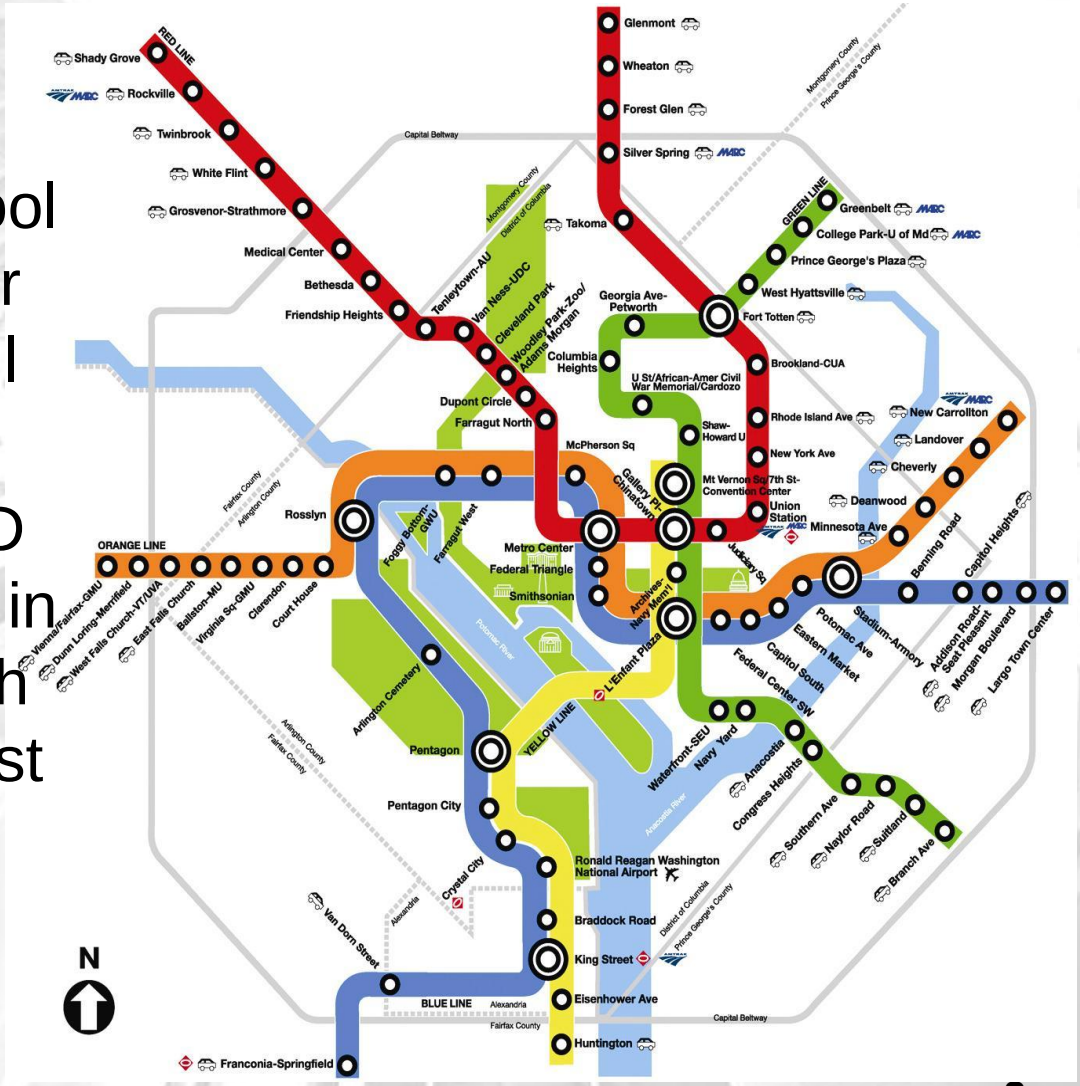
Metrorail Line Load Application

Purpose

- Develop a desktop based user-friendly tool to estimate passenger loads across Metrorail lines
- Integrate real-time OD faregate transactions in WMATA database with travel demand forecast modeling

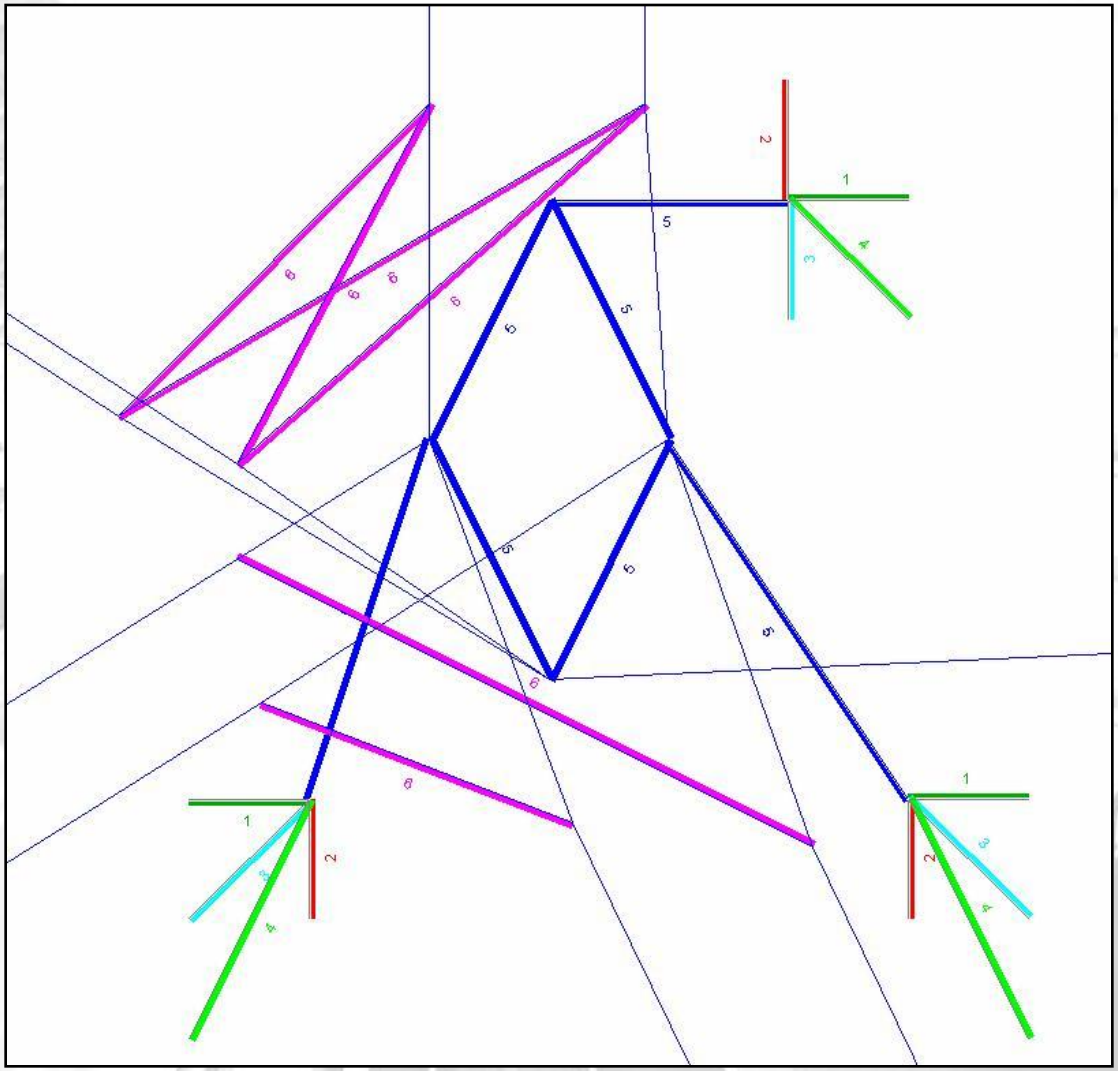


Application Development

- Line Load Application developed in CUBE / TP+, separate from the MWCOG Model
- WMATA's Metrorail network micro-coded to include access links to station mezzanines, connection links between mezzanine and platform levels and transfer links between Metrorail Lines
- Path assignments carried out directly in the application
  - Distances and speeds assigned to each link
  - Time perception (in-vehicle vs. out-of-vehicle) and transfer penalties introduced for each path
- Three (3) transit assignment networks developed:
  - 2008 current-year network
  - 2010 future-year network; includes split of Blue Line
  - 2020/2030 future-year network; incorporates extension of Metrorail to Dulles airport and addition of Potomac Yard station

Application Development

- L'Enfant Plaza Station
- 3 mezzanines
- 4 Metrorail Lines:
  - Orange, Blue, Yellow and Green
- 4 access-type links:
  - 1. Walk
  - 2. Bus
  - 3. Auto
  - 4. Commuter Rail
- 2 connection-type links (mode 5):
  - Mezzanine-Platform
  - Platform-Platform

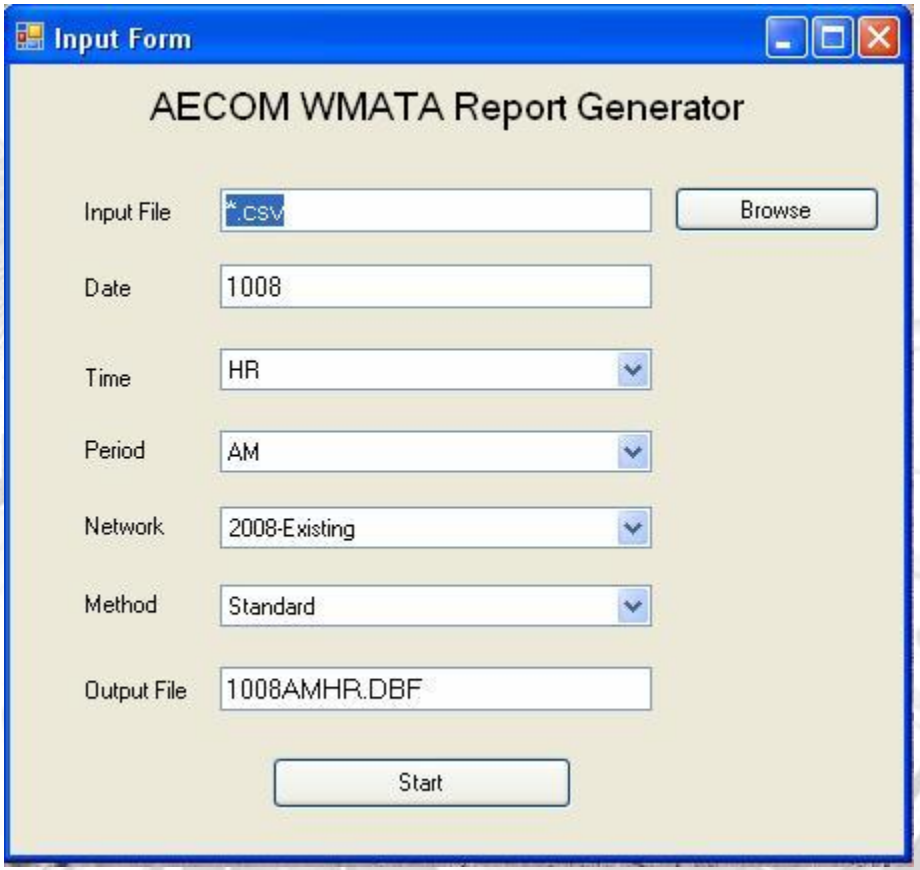


Application Development

- Transfer links (mode 6):
  - Yellow N. – Green S., Yellow S. – Green N., Blue/Orange W. – Green/Yellow N., Blue/Orange W. – Green S., Blue/Orange E. – Green/Yellow N., Blue/Orange E. – Green S.
- For 2008 current-year network, application uses WMATA actual mezzanine-to-mezzanine OD flows
- For 2010, 2020 and 2030 future-year networks, application uses forecasted OD flows
  - MWCOG/TPB Travel Forecasting Model Version 2.1D #50 and Round 7.0 Cooperative Land Use Forecasts
  - Washington Regional Demand Forecasting Model for forecasts by transit sub-mode and access mode
  - Daily forecasts developed using October 2007 actual average weekday ridership and estimated change in ridership from models
  - Forecasts by time period developed using October 2007 actual data (ratio of time period flow to total daily flow)

Application Interface

- Desktop, user-friendly
- Mezzanine-to-mezzanine flow, transit assignment model and time period as inputs
- Line loads between station pairs as output
- Graphic displays in Excel of:
  - total number of passengers leaving each station by Line and direction
  - total number of passengers per car leaving each station by Line and direction



Application Validation

	Description	Oct 2008 Report* (OPAS)	Load Application** (PLAN)	Difference (PLAN /OPAS)
Red				
Gallery Place - Metro Ctr	WB max load	31100	30118	-3%
Dupont - Farragut North	EB max load	30400	28053	-8%
Blue				
Rosslyn - Foggy Bottom	EB max load	13000	11402	-12%
L'Enfant - Smithsonian	WB max load	12000	11896	-1%
Orange				
Courthouse - Rosslyn	EB max load	28200	28260	0%
L'Enfant - Smithsonian	WB max load	14700	15569	6%
Yellow				
Pentagon - L'Enfant	EB max load	15400	15383	0%
L'Enfant - Pentagon	WB max load	n/a	10351	
Green				
Waterfront - L'Enfant	NB max load	21500	20080	-7%
Mt. Vernon - Gallery	SB max load	13900	14377	3%

Notes:

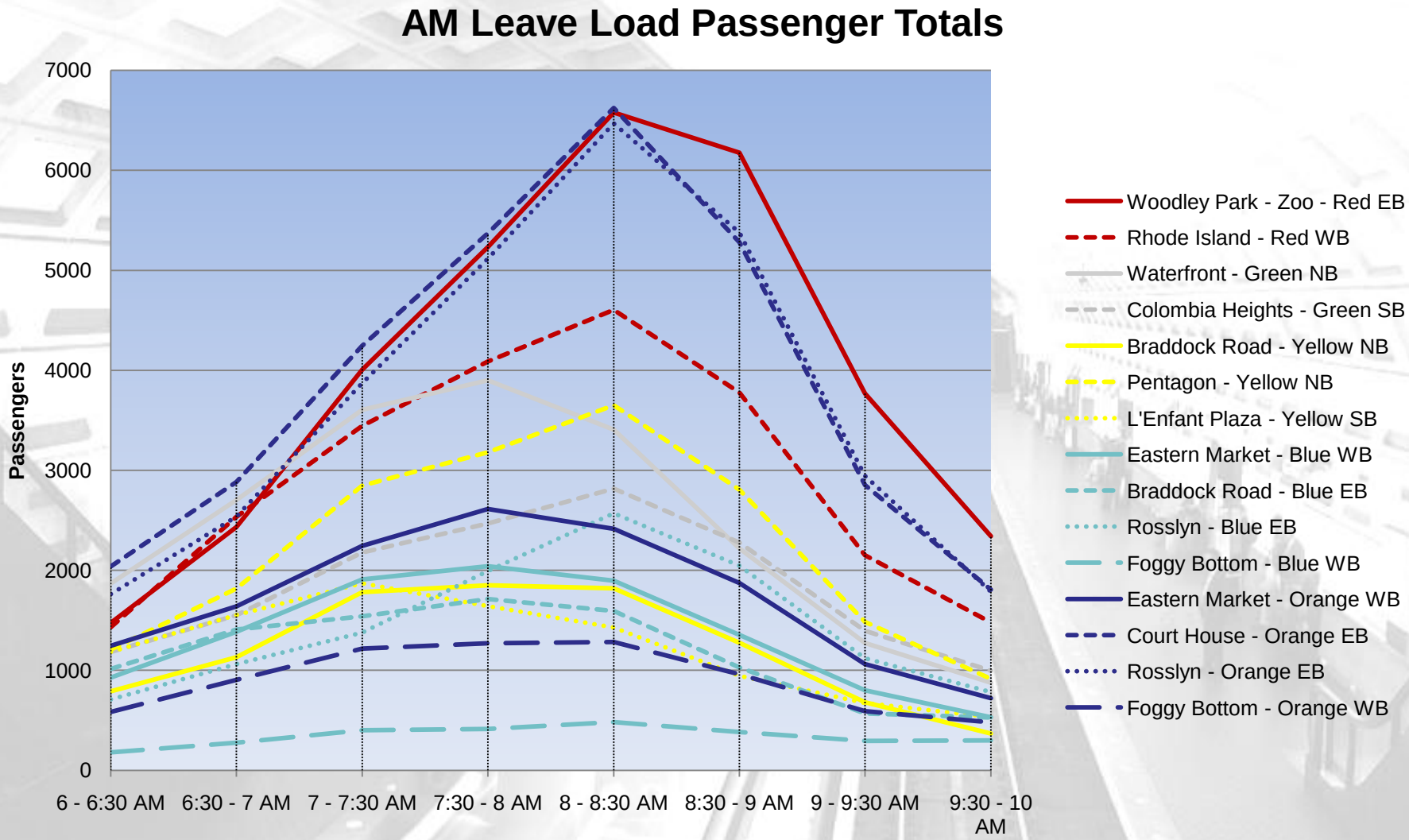
*: Oct 2008 max load report was based on counts conducted by traffic clerks on selected dates

: Line load application used the **average weekday boardings and alightings in Oct 2008

Example Uses for Metrorail Operations and Planning

- Metrorail Load Assessment
- 2009 COG Cordon Counts (Metrorail)
- Forecasts: 2010, 2020, and 2030

Metrorail Load Assessment
AM Peak Period, May 2009



Metrorail Load Assessment
AM Peak Period, May 2009

Metrorail Network

Single Direction Volume

- <7000
- 7001 - 14000
- 14001 - 21000
- 21001 - 28000
- >28000

Metrorail_Stations

Water

WMATA Compact Jurisdictions

Notes:
Link volumes are based on ridership data from May 5-7, 2009. Arrows indicate the direction of travel.

Washington Metropolitan Area Transit Authority
Office of Long-Range Planning
August 11, 2009

Metrorail Load Assessment
AM Peak Hour (8-9), May 2009

Metrorail Network

Single Direction Volume

- <3000
- 3001 - 6000
- 6001 - 9000
- 9001 - 12000
- >12000

Metrorail Stations

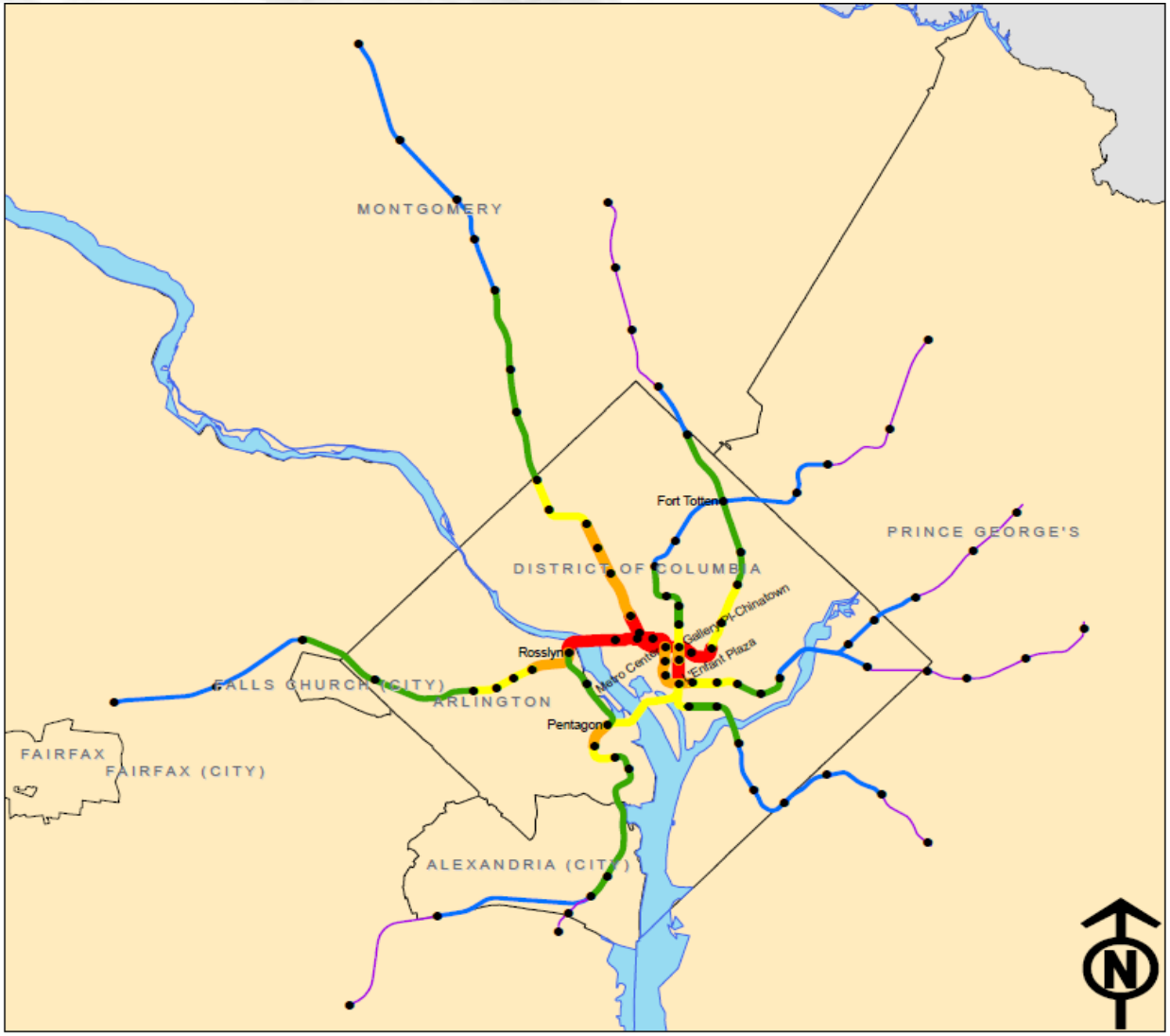
Water

WMATA Compact Jurisdictions

Notes:
Link volumes are based on ridership data from May 5-7, 2009. Arrows indicate the direction of travel.

Washington Metropolitan Area Transit Authority
Office of Long-Range Planning
August 11, 2009

Metrorail Load Assessment
Daily Total Volume, May 2009



LEGEND

Metrorail Network

Total Link Passenger Volume

- <25000
- 25001 - 50000
- 50001 - 75000
- 75001 - 100000
- 100001 - 125000
- >125000
- Metrorail Stations
- Water
- WMATA Compact Jurisdictions

Washington Metropolitan Area Transit Authority
Office of Long-Range Planning
July 30, 2009
Note: Map is based on ridership data from May 5-7, 2009

2009 COG Cordon Counts

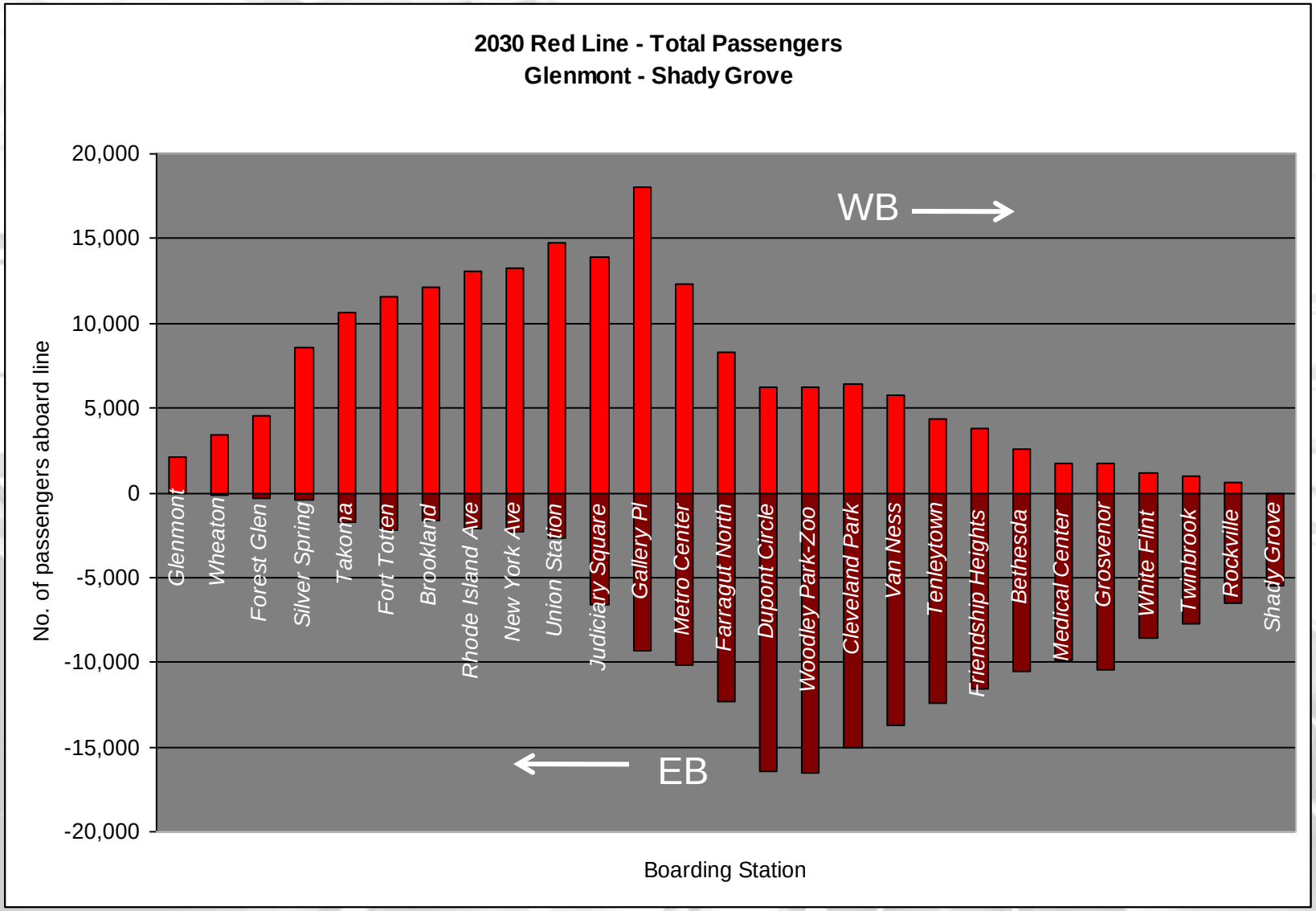
AM Passenger Leave Loads on Metrorail for Average of May 5-7, 2009								
	Time		8:00 - 8:30 AM			8:30 - 9:00 AM		
Line	Segment	Direction	# of Pass.	# of Cars	Pass/ Car	# of Pass.	# of Cars	Pass/ Car
Red	Woodley Park	EB (Glenmont)	6578	75	88	6176	78	79
Red	Rhode Island Avenue	WB (Shady Grove)	4604	77	60	3778	69	54
Green	Waterfront	NB (Greenbelt)	3407	52	66	2219	27	81
Green	Colombia Heights	SB (Branch Avenue)	2817	38	74	2278	34	67
Yellow	Braddock Road	NB (Fort Totten)	1821	30	61	1275	28	46
Yellow	Pentagon	NB (Fort Totten)	3652	28	130	2807	32	88
Yellow	L'Enfant Plaza	SB (Huntington)	1428	28	51	944	32	30
Blue	Eastern Market	WB (Franconia)	1897	31	62	1354	30	45
Blue	Braddock Road	EB (Largo)	1594	30	53	1028	30	34
Blue	Rosslyn	EB (Largo)	2571	30	86	2045	30	68
Blue	Foggy Bottom	WB (Franconia)	482	32	15	383	25	16
Orange	Eastern Market	WB (Vienna)	2416	42	58	1872	37	50
Orange	Court House	EB (New Carrollton)	6625	56	118	5280	55	97
Orange	Rosslyn	EB (New Carrollton)	6470	50	129	5379	68	79
Orange	Foggy Bottom	WB (Vienna)	1283	37	34	959	42	23
Average of System-wide Boardings			**48611**			**40602**		

2009 COG Cordon Counts

Preliminary Findings on Metrorail

- Current economic downturn slowed down the pace of ridership growth in 2009
- Off-peak trips (mid-days and evenings) grew faster than peak trips, likely a result of a robust downtown and regional activity centers
- AM peak period trips declined by 1% compare to 2008
- AM peak inbound trips to the Core grew, but outbound trips declined
- Limited AM outbound count locations (3) may not fully represent growth in and out of the Core.

Forecasts
2030 Red Line AM Peak Hour



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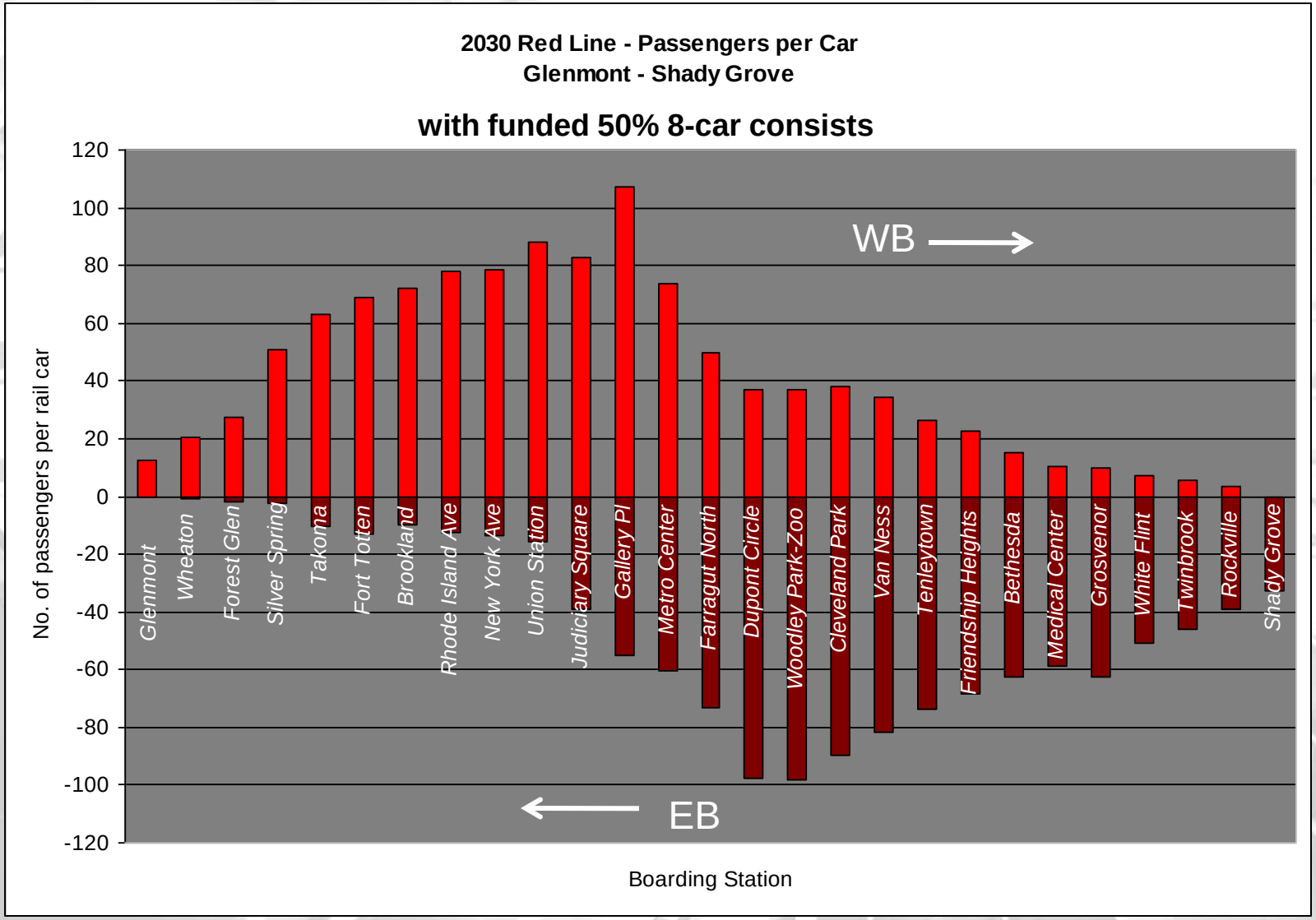
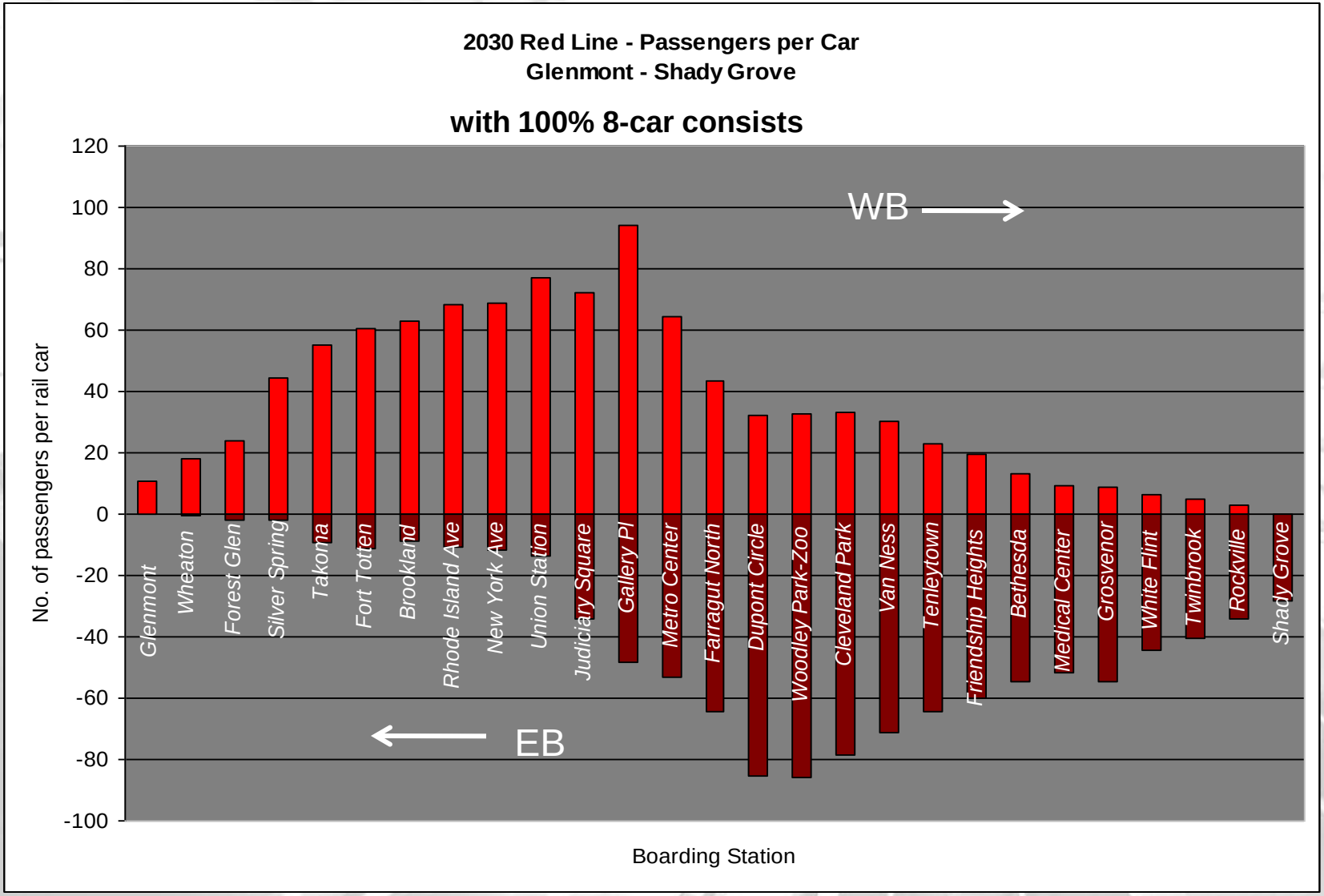
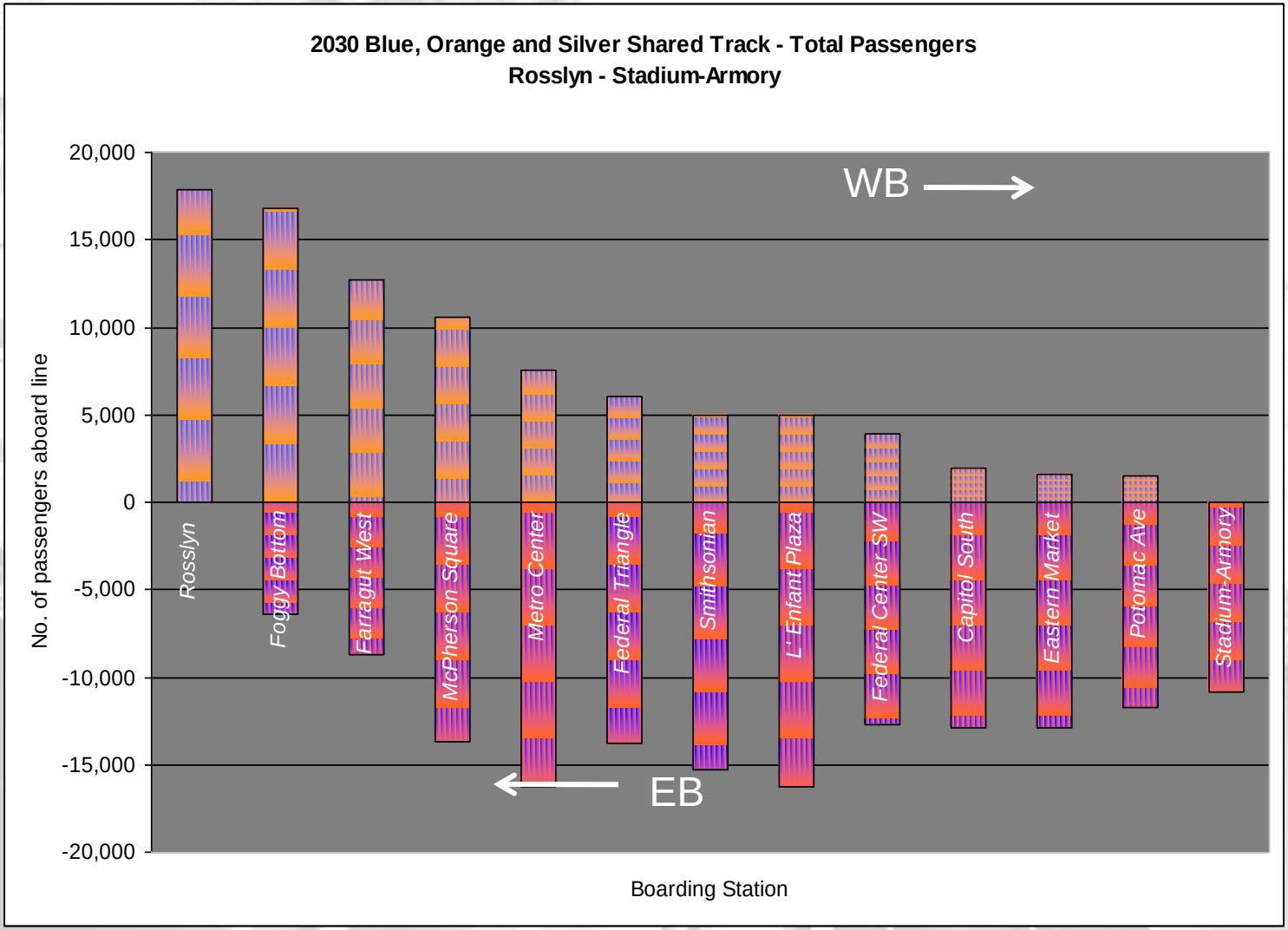


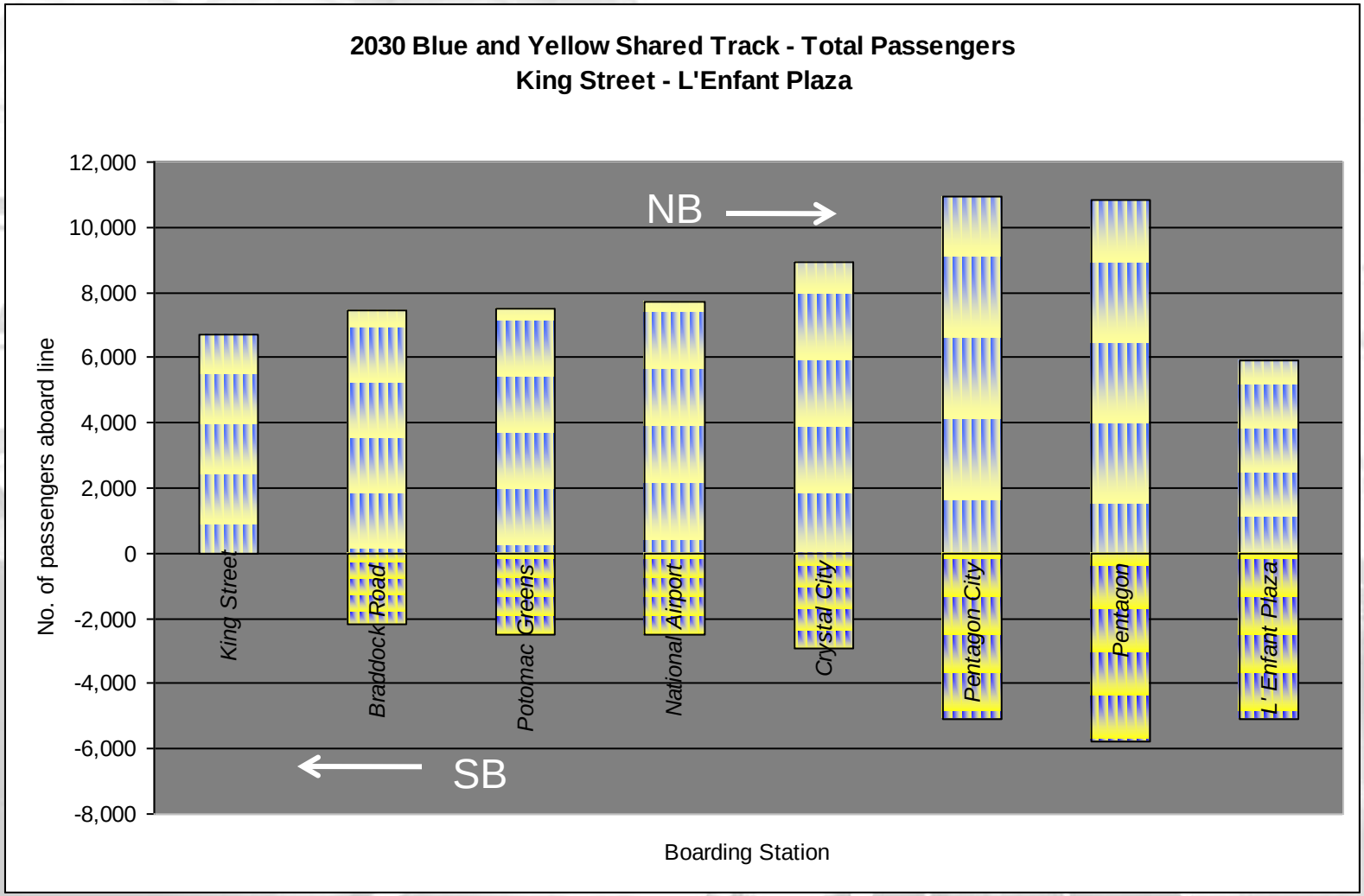
Forecasts
2030 Red Line AM Peak Hour



Forecasts
2030 Orange/Blue/Silver



Forecasts
2030 Blue/Yellow



Next Steps

- Apply to system network planning
- Assist in system performance analysis
- Integrate into rail operations ridership report
- Consider reducing manual counts
- Automate railcar counts to feed into rail load application