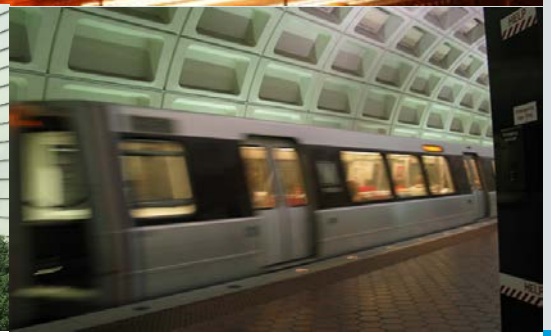


Long-Range Plan Task Force: Draft Analysis Results

November 15, 2017

Prepared for:
National Capital Region Transportation Planning Board

Transportation Planning Board
Item #9

Presentation Components

- **Analysis Process** (slides 3-10)
  - 10 Initiatives Selected for Analysis
  - Regional Challenges and Measures of Effectiveness
  - Sketch Planning Analysis Approach

- **Draft Analysis Results – Overview** (slides 11-19)
- **Initiative-by-Initiative Draft Results** (slides 20-40)
- **Overall Comparisons of Initiatives** (slides 41-43)

- **Other Factors to Consider** (slides 44-52)
- **Next Steps** (slides 53-55)

Analysis Process

10 Initiatives Selected for Analysis

Multimodal	Transit	Policy-Focused
1. Regional Express Travel Network	4. Regionwide High-Capacity Transitways	8. Optimize Regional Land Use Balance
2. Operational Improvements & Hotspot Relief	5. Regional Commuter Rail Enhancements	9. Transit Fare Policy Changes
3. Additional Northern Bridge Crossing/Corridor	6. Metrorail Regional Core Capacity Improvements	10. Amplified Travel Demand Management (for commute trips)
	7. Transit Rail Extensions	

Regional Challenges

Challenge	Description
1. Roadway Congestion	The region's roadways are among the most congested in the nation, making it harder for people and goods to reliably get where they need to go.
2. Transit Crowding	The transit system currently experiences crowding during peak hours and lacks the capacity to support future population and job growth without reducing ridership.
3. Inadequate Bus Service	Existing bus service is too limited in its capacity, coverage, frequency, and reliability, making transit a less viable option, especially for people with disabilities and limited incomes.
4. Access to Bike/Ped Options (Unsafe Walking & Biking)	Too few people have access to safe pedestrian and bicycle infrastructure or live in areas where walking and bicycling are not practical options for reaching nearby destinations.
5. Development Around Metrorail	Too many Metrorail stations, especially on the eastern side of the region, are surrounded by undeveloped or underdeveloped land, limiting the number of people who can live or work close to transit and leaving unused capacity in reverse-commute directions on several lines.
6. Housing and Job Location	Most housing, especially affordable housing, and many of the region's jobs are located in areas outside of Activity Centers where transit, bicycling, and walking are not safe and viable options.

Regional Challenges

Challenge	Description
7. Metrorail Repair Needs	Deferred Metrorail maintenance over the years has led to unreliability, delays, and safety concerns today, as well as higher maintenance costs.
8. Roadway Repair Needs	Older bridges and roads are deteriorating and in need of major rehabilitation to ensure safe, reliable, and comfortable travel for cars, trucks, and buses.
9. Incidents and Safety	Major accidents and weather disruptions on roadways and transit systems cause severe delays and inconvenience. Reducing injuries and fatalities for all users of the transportation system must be prioritized, with particular focus on protecting vulnerable users.
10. Pedestrian and Bicyclist Safety	The number of bicycle and pedestrian fatalities each year is holding steady even as the number of vehicle fatalities has declined steadily.
11. Environmental Quality	Increasing amounts of vehicle travel resulting from population and job growth could threaten the quality of our region's air and water.
12. Open Space Development	Wildlife habitat, farmland, and other open spaces are threatened by construction of new transportation facilities and residential and commercial development.
13. Bottlenecks	Bottlenecks on the highway and rail systems cause delays in interregional travel for both freight and passengers, hurting the region's economic competitiveness.
14. Reliable Access to Intercity Hubs (Travel Time Reliability)	Travel times to and from the region's airports are becoming less reliable for people and goods movement.

Performance Measures (Measures of Effectiveness) Selected for Use

Quantitative Measure	Expressed as
Travel Time	Average commute travel time per trip for single-occupant vehicle (SOV), high-occupancy vehicle (HOV), and transit
Traditional Congestion	Daily vehicle hours of delay
Accessibility by Transit	# of jobs accessible within 45 min transit commute
Accessibility by Auto	# of jobs accessible within 45 min car commute
Mode Share (Work Trips)	SOV, HOV, transit, bicycle/pedestrian, telework
VMT	Amount of daily vehicle miles travel (VMT) and VMT per capita
Reliable Travel	Share of miles traveled on reliable modes (e.g., express lanes, BRT, transit rail, commuter rail)
Transit Options for Households	Share of households in high capacity transit zones
Transit Options for Employment	Share of jobs in high capacity transit zones
Mobile Source Emissions	VOC, NOx, and CO_2

Qualitatively Assess Each Challenge
Road Congestion
Transit Crowding
Inadequate Bus Service
Access to Bike/Ped Options
Development around Metrorail
Housing & Job Location
Metrorail Repair Needs
Roadway Repair Needs
Incidents and Safety
Pedestrian & Bicyclist Safety
Environmental Quality
Open Space Development
Bottlenecks
Reliable Access to Intercity Hubs

Sketch-Planning Analysis

What is Sketch Planning?

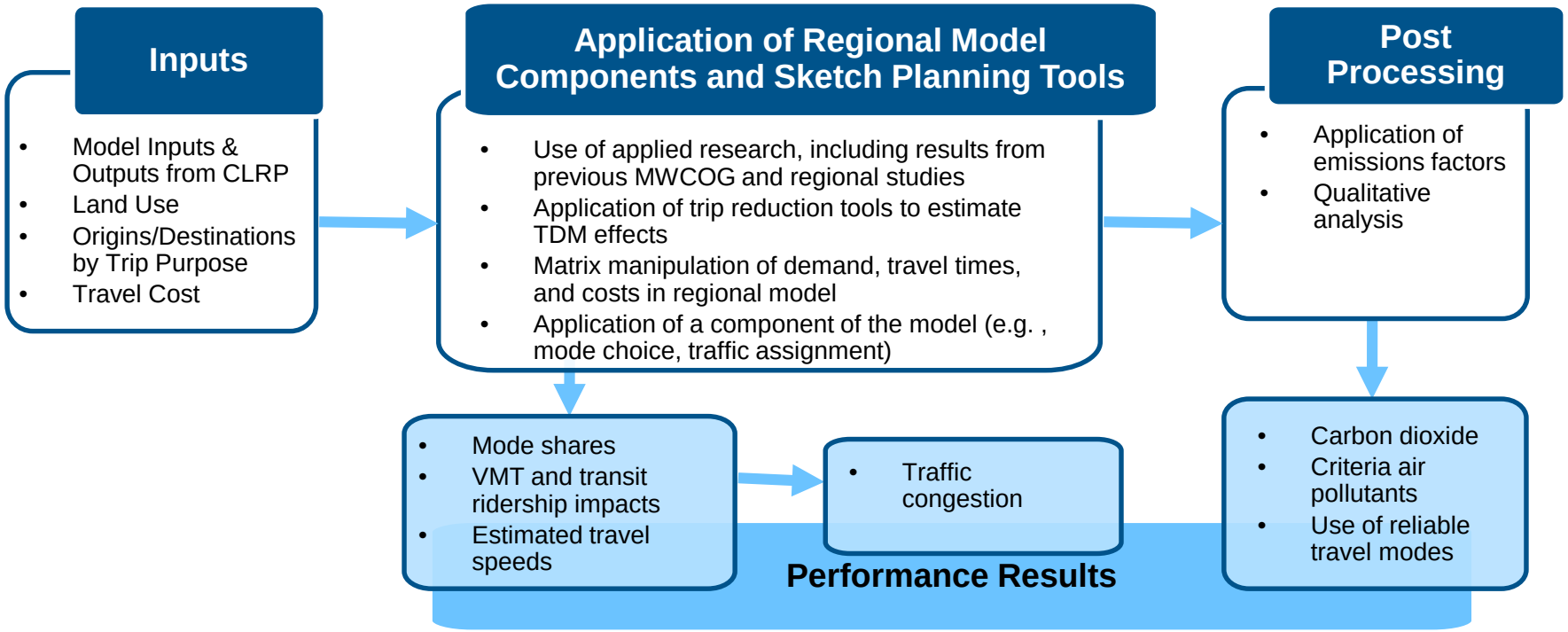
- Use of generally simplified methods and tools to conduct analysis, rather than full scale regional land use, travel demand, and emissions modeling.
- Relies on documented research, inputs/outputs/components of modeling tools, and spreadsheet analysis.
- Develops general estimates of effects; **not designed to assess individual project alignments or components that would require more detailed project-level studies.**

Why use a Sketch Planning approach here?

- Inform Task Force on the high-level impacts of various initiatives within a short time-frame, so that upon review, initiatives can be more thoroughly studied.
- Allows for vetting policy and investment ideas in a time- and cost-effective manner.

Sketch Planning Approach

- **Use of multiple tools**



Sketch-Planning Analysis Limitations

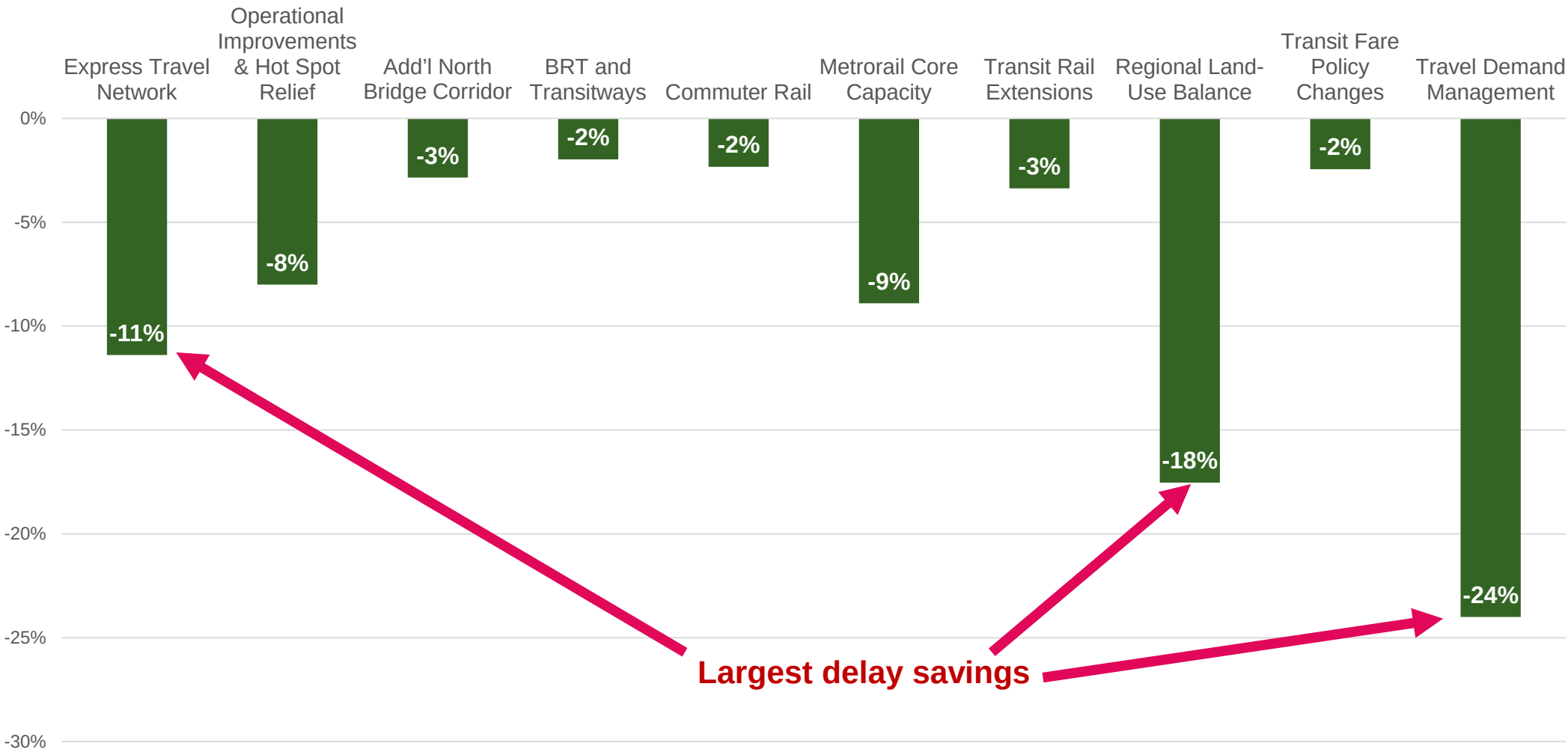
- Significant uncertainties regarding future travel demand impacts of emerging technologies and demographic changes not accounted for.
- Limited analysis of indirect effects of strategies (e.g., indirect effects of strategies on land use and trip-making behavior)
- Limited ability to examine conditions outside of the “typical” day (e.g., non-recurring congestion and reliability)

Draft Analysis Results - Overview

Observations

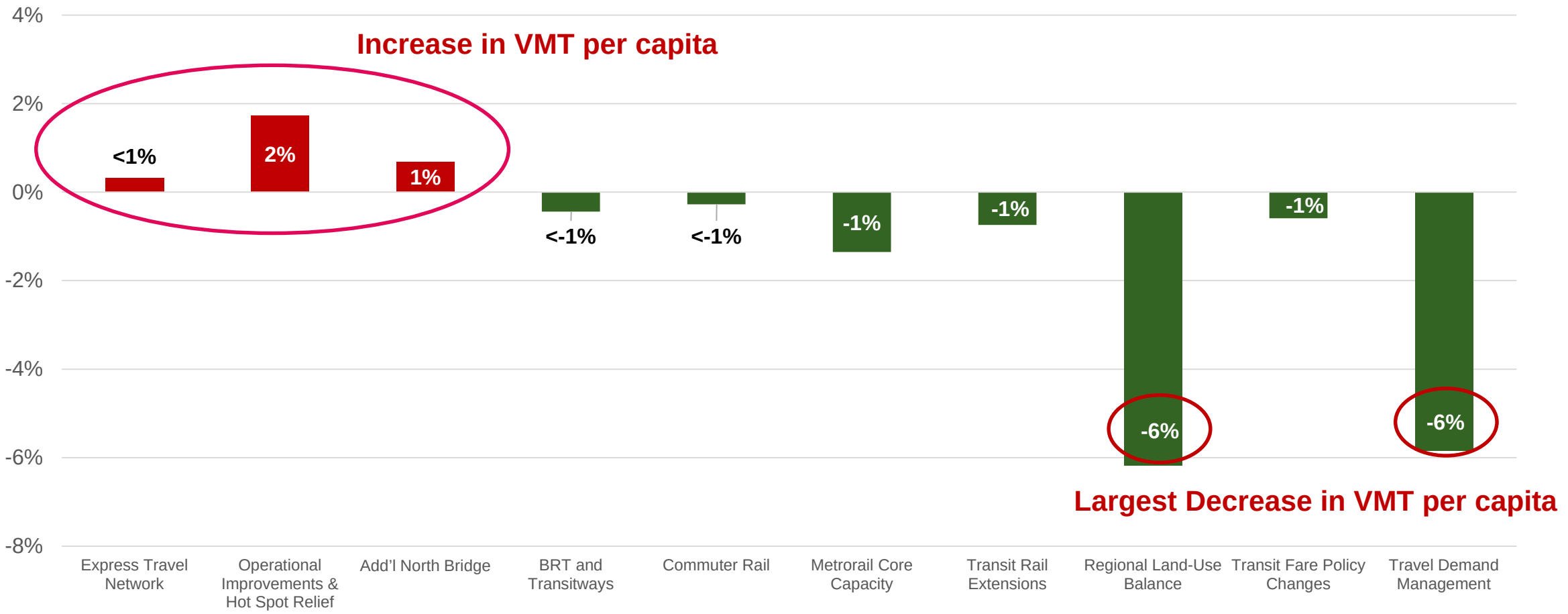
- At regional scale, many results look modest.
- However, small percentage changes at the regional scale can add up to a lot (of miles traveled, hours of delay, emissions).
- Also, there are often even more notable impacts in individual corridors or for specific segments of the population (e.g., lower income population).

Daily Vehicle Hours of Delay Improves under All Initiatives



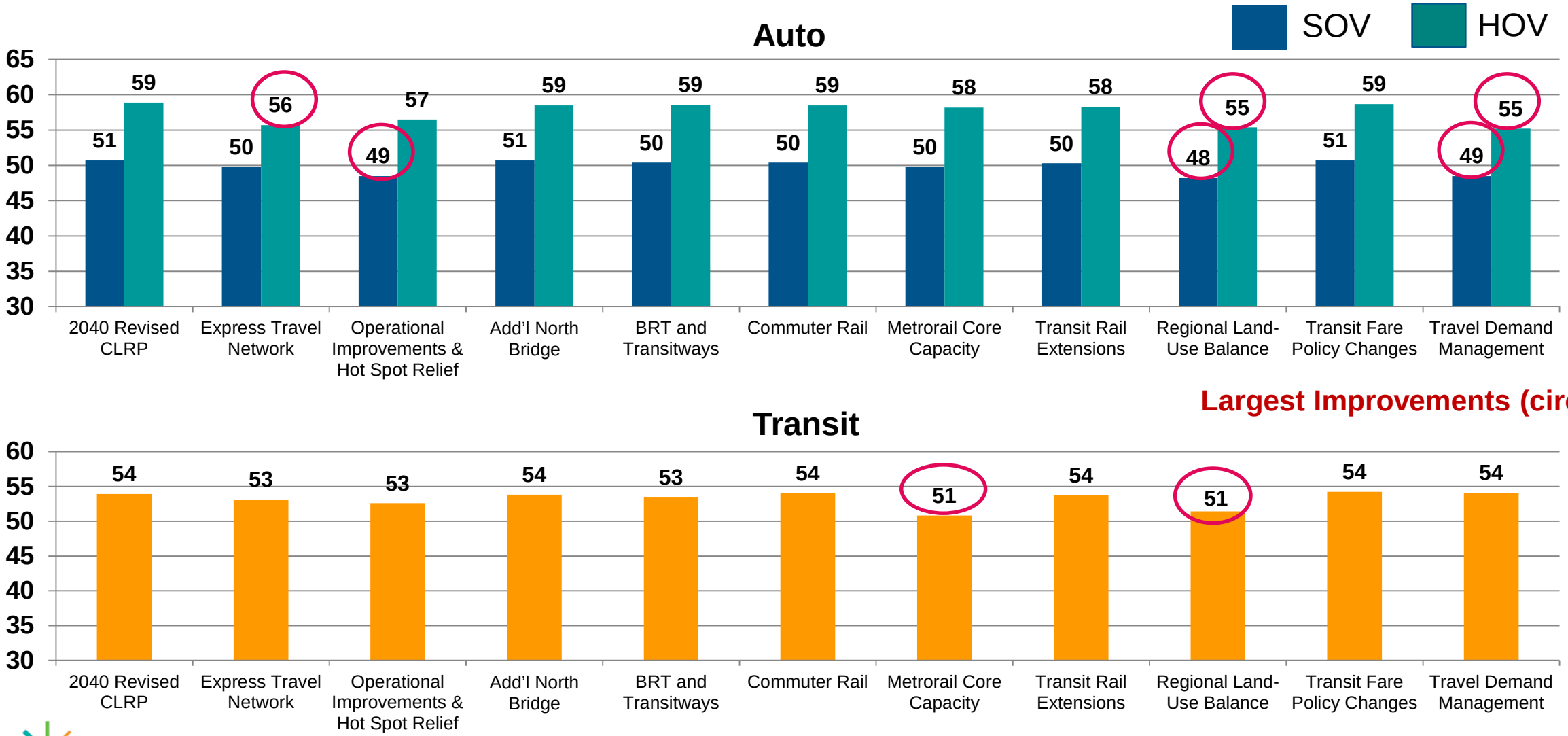
% change in daily vehicle hours of delay from 2040 CLRP

VMT per Capita Increases with Multimodal Initiatives, Decreases with Transit and Policy Initiatives



% Change in VMT per capita compared to 2040 CLRP

Average Commute Travel Times Have Small Changes: Best Initiatives achieve about 4 minute (up to 7%) time savings per trip

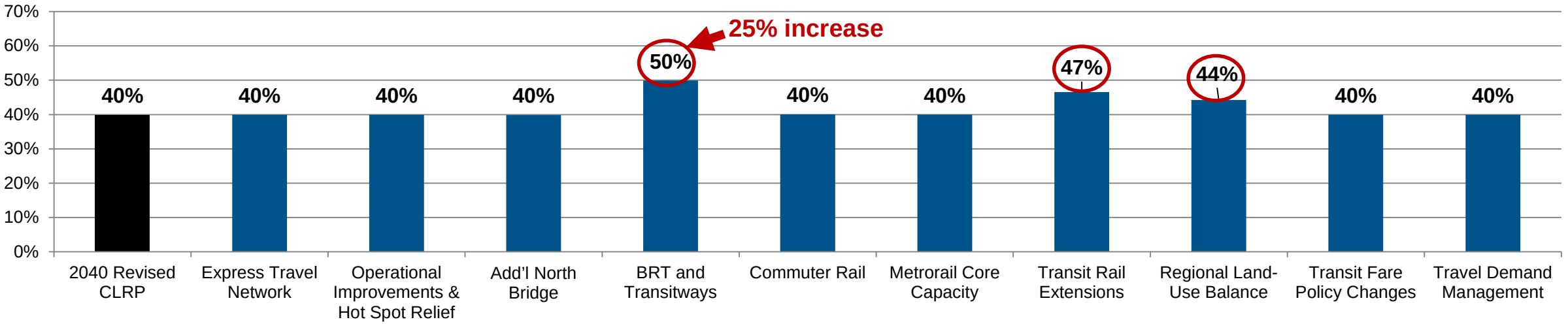


Largest Improvements (circled)

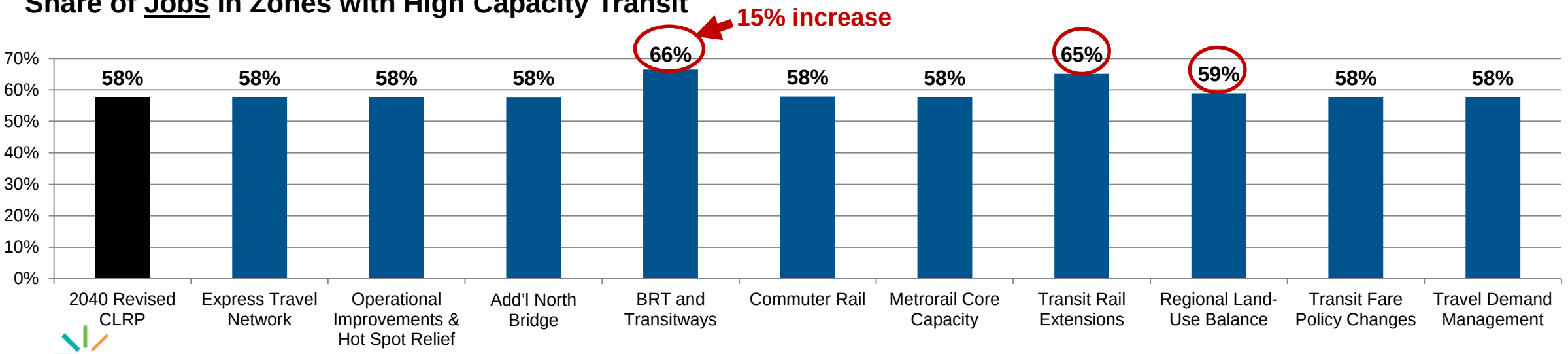
Average commute travel time per trip in minutes

Access to High Capacity Transit Increases for Three Initiatives

Share of Households in Zones with High Capacity Transit



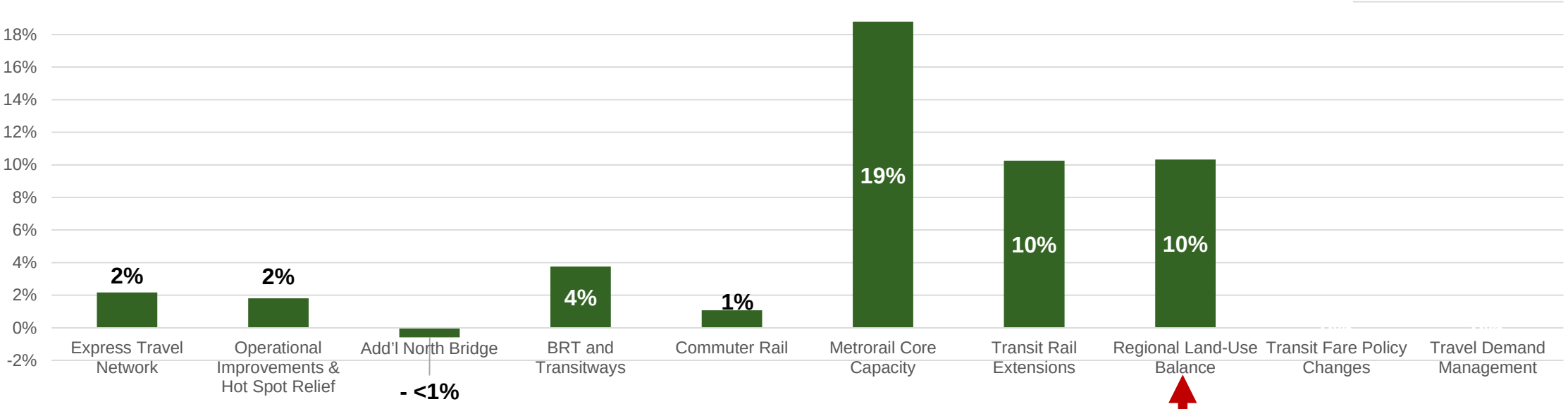
Share of Jobs in Zones with High Capacity Transit



ICF

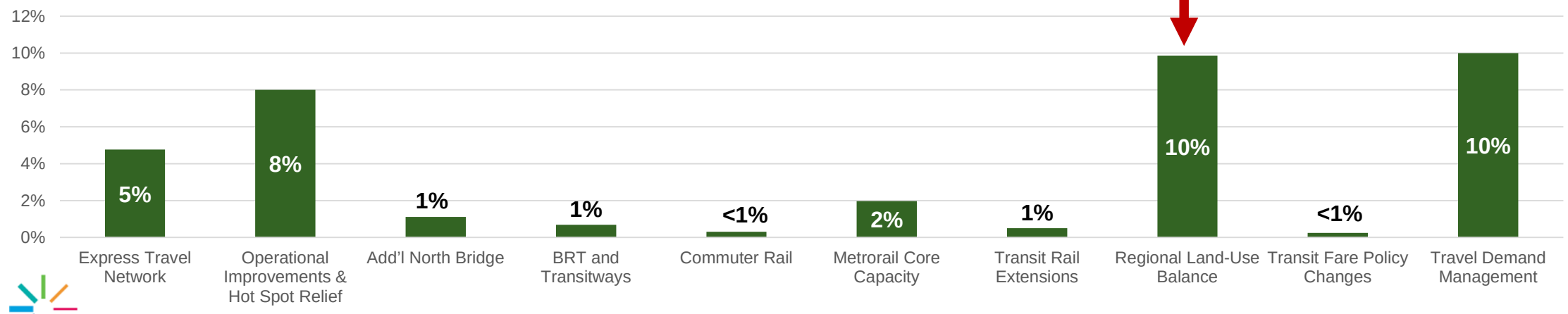
Job Access Improves under Most Initiatives

% Change in # of Jobs Accessible within 45-minute Transit Commute



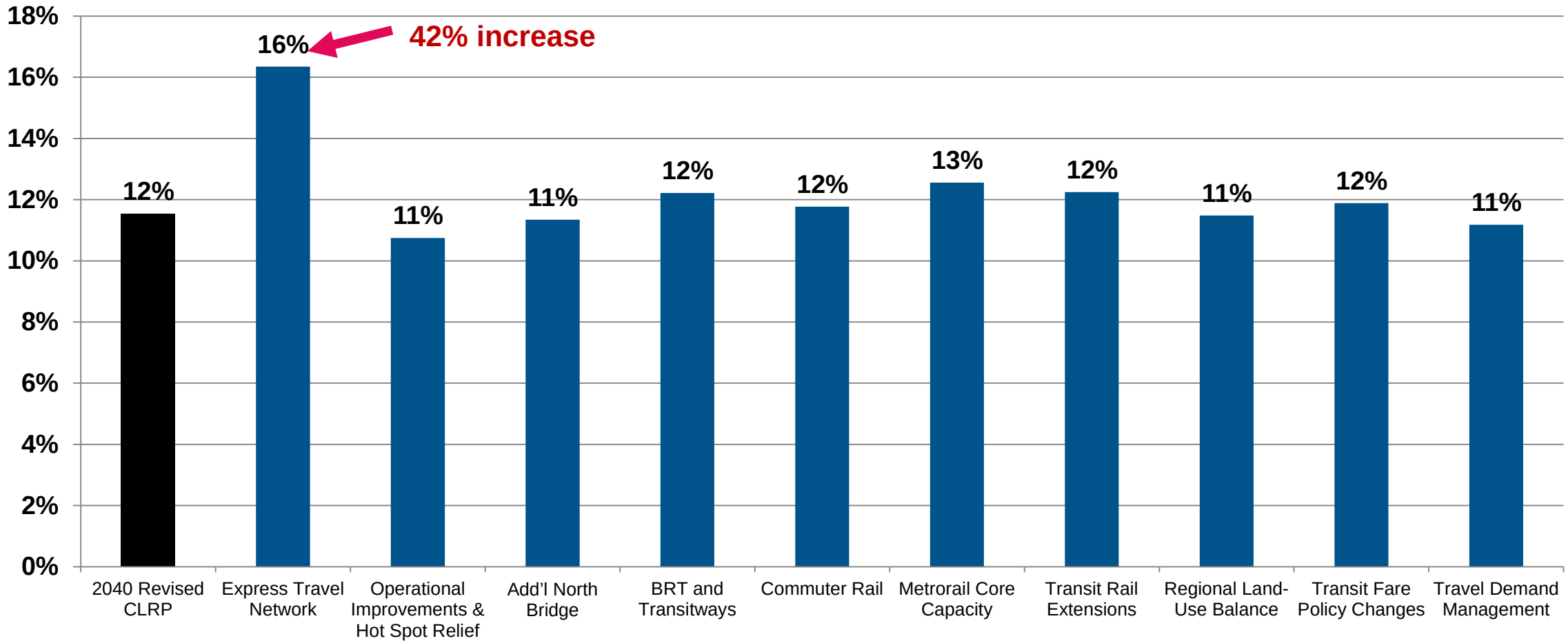
% Change in # of Jobs Accessible within 45-minute Auto Commute

Large benefit to both



ICF

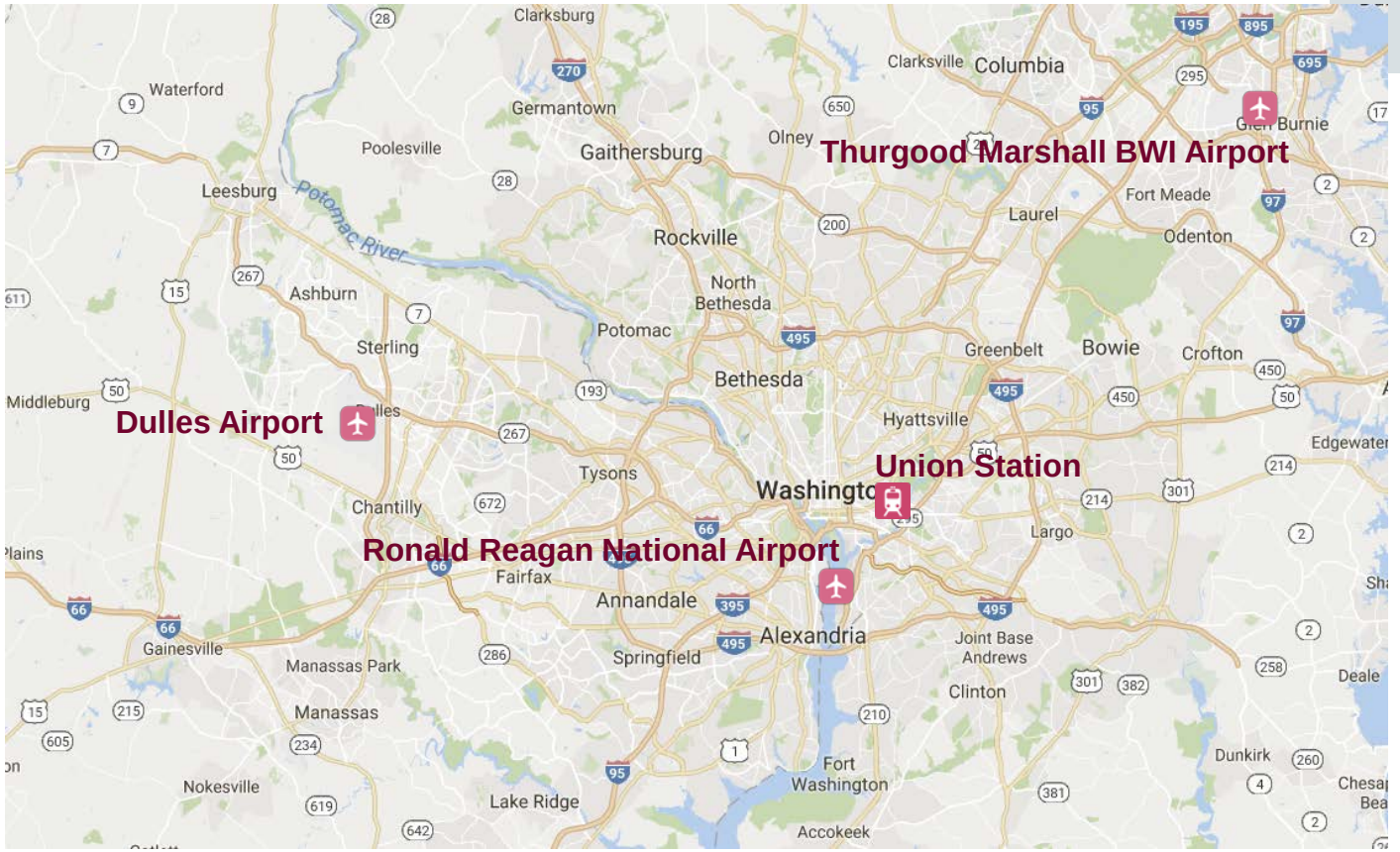
Use of Reliable Travel Options Increases the Most with the Express Travel Network



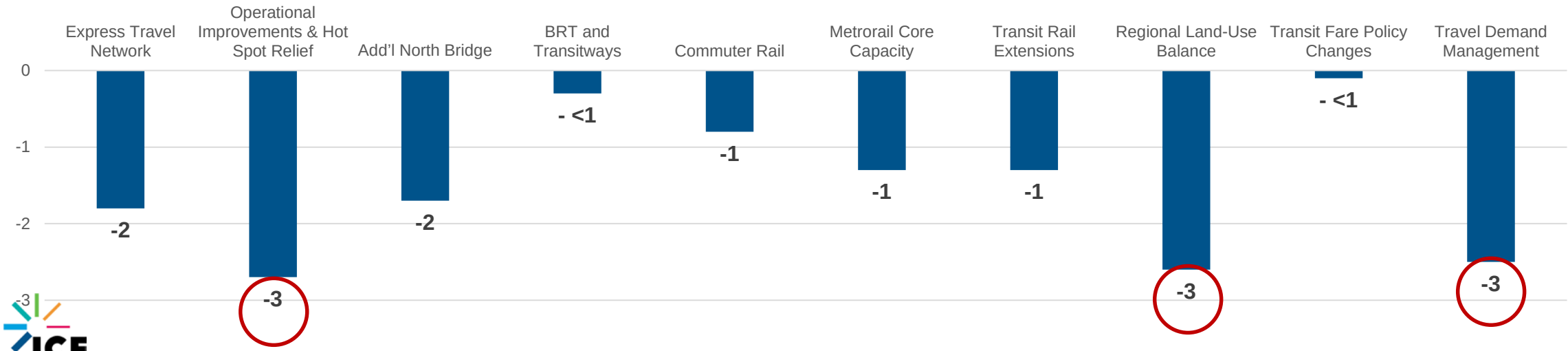
Share of Daily Miles Traveled on "Reliable" Modes (Express Lanes, Rail, BRT, Walk/Bike)

Average Best Travel Times to Intercity Hubs

Average change in time in minutes to all four hubs



Base = 81 minute average in 2040 CLRP



Initiative-By-Initiative Results

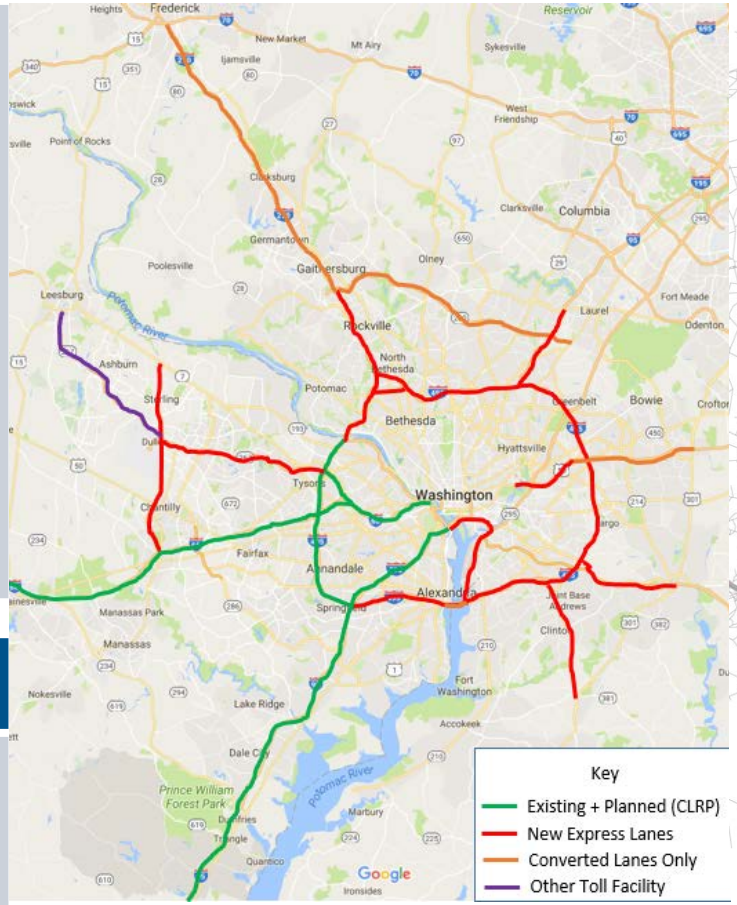
Initiative 1. Regional Express Travel Network

Components

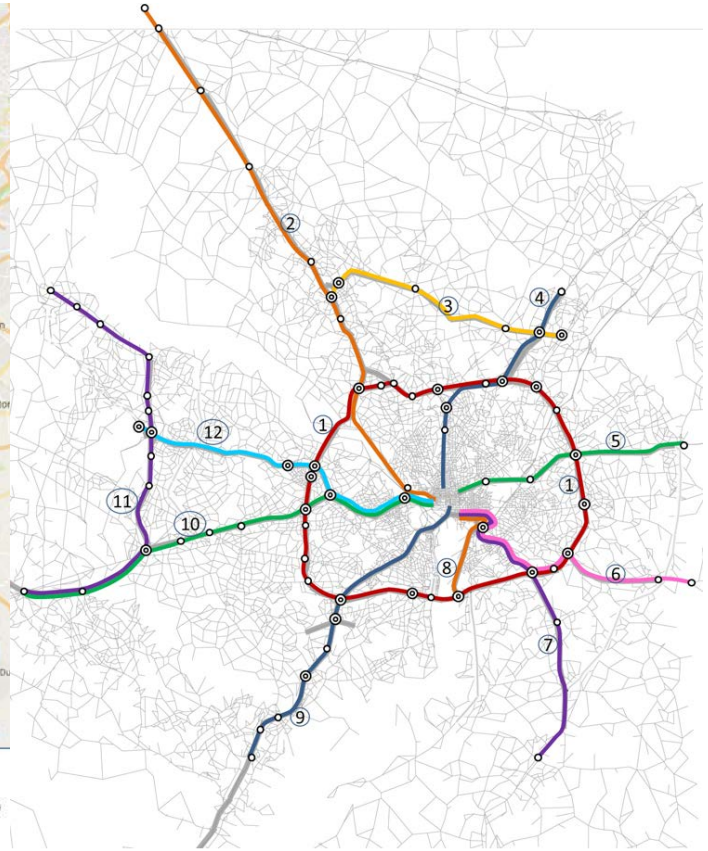
- Express toll lanes network on existing limited access highways
  - Through combination of new capacity and HOV lane conversion
- Expanded American Legion Bridge
  - 2 new express lanes in each direction
- Express bus services
  - Operating at 10 min headways peak, 20 min off-peak

Land Use

- 2040 CLRP Round 9.0 Cooperative Land Use Forecasts (unchanged)



Express Lane Network



Express Bus Network

(Source: Sabra Wang and Associates)

Initiative 1. Regional Express Travel Network - Results

Challenges	Compared to CLRP
Road Congestion	
Transit Crowding	
Inadequate Bus Service	
Access to Bike/Ped Options	
Development around Metrorail	
Housing & Job Location	
Metrorail Repair Needs	
Roadway Repair Needs	
Incidents and Safety	
Pedestrian & Bicyclist Safety	
Environmental Quality	
Open Space Development	
Bottlenecks	
Reliable Access to Intercity Hubs	

KEY: High, Medium, Low, Neutral, Negative

Quantitative MOEs	2040 CLRP	Initiative	Change from CLRP
Travel Time: average travel time per commute trip			
Single occupant vehicle (SOV)	50.7	49.8	-2%
High-occupancy vehicle (HOV)	58.9	55.7	-5%
Transit	53.9	53.1	-1%
Vehicle Hours of Delay			
Daily vehicle hours of delay	1.85 million	1.64 million	-11%
Jobs Accessibility			
Transit: # of jobs accessible within 45-min transit commute	523,000	534,000	2%
Auto: # of jobs accessible within 45-min auto commute	876,000	917,000	5%
Commute Mode Share			
Single occupancy vehicle (SOV)	58.1	58.2	<1%
High-occupancy vehicle (HOV)	11.6	11.5	-1%
Transit	24.6	24.8	1%
Bicycle/Pedestrian	5.6	5.6	0%
Reliable Trips			
Share of passenger miles on reliable modes	11.5%	16.3%	42%
Vehicle Miles Traveled (VMT)			
Daily VMT	141.91 million	142.37 million	<1%
Daily VMT per capita	21.2	21.2	<1%
Transit Options			
Share of households in zones with high-capacity transit	39.9%	39.9%	0%
Share of jobs in zones with high-capacity transit	57.7%	57.7%	0%

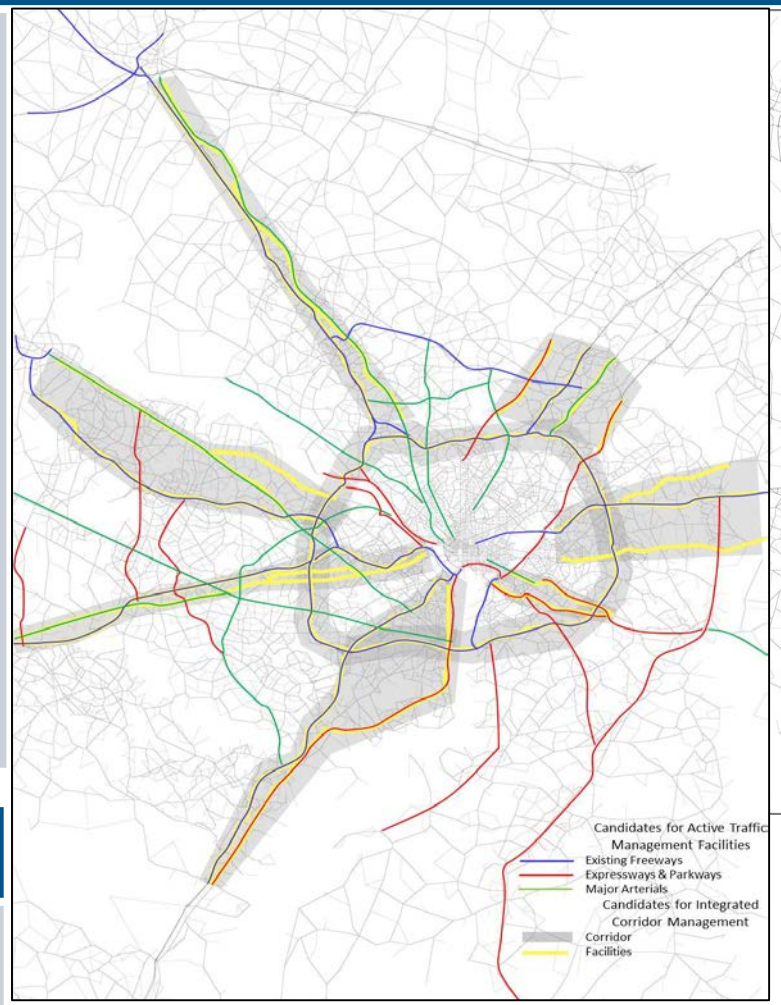
Initiative 2. Operational Improvements and Hotspot Relief

Components

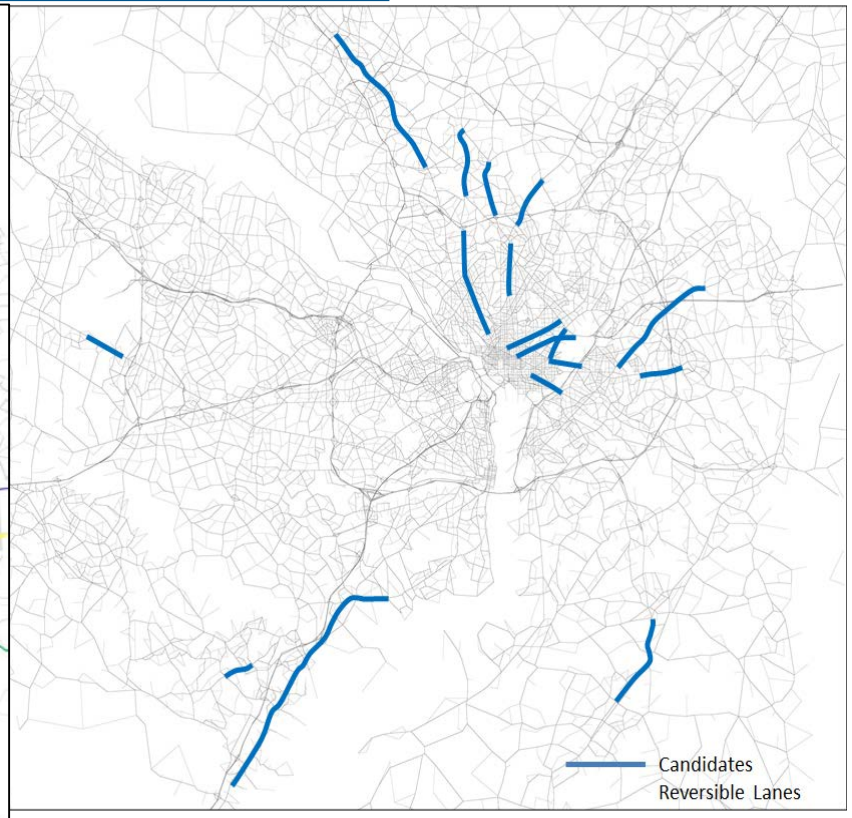
- Enhanced incident management, Active Traffic Management (ATM), and Integrated Corridor Mgmt. (ICM)
  - Improvement in effective capacity on freeways, parkways, and major arterials
- Top congestion hot spots
  - Application of technology & enhanced system operations strategies plus limited capacity enhancements
- Reversible lanes
  - Non-expressway segments with 3+ lanes with high directional volumes
- Demand-responsive services

Land Use

- 2040 CLRP Round 9.0 Cooperative Land Use Forecasts (unchanged)



ATM and ICM locations



Reversible Lane Candidates

(Source: Sabra Wang and Associates)

Initiative 2. Operational Improvements and Hotspot Relief - Results

Challenges	Compared to CLRP
Road Congestion	Medium
Transit Crowding	Neutral
Inadequate Bus Service	Neutral
Access to Bike/Ped Options	Neutral
Development around Metrorail	Neutral
Housing & Job Location	Neutral
Metrorail Repair Needs	Neutral
Roadway Repair Needs	Negative
Incidents and Safety	Low
Pedestrian & Bicyclist Safety	Negative
Environmental Quality	Low
Open Space Development	Neutral
Bottlenecks	Medium
Reliable Access to Intercity Hubs	Low

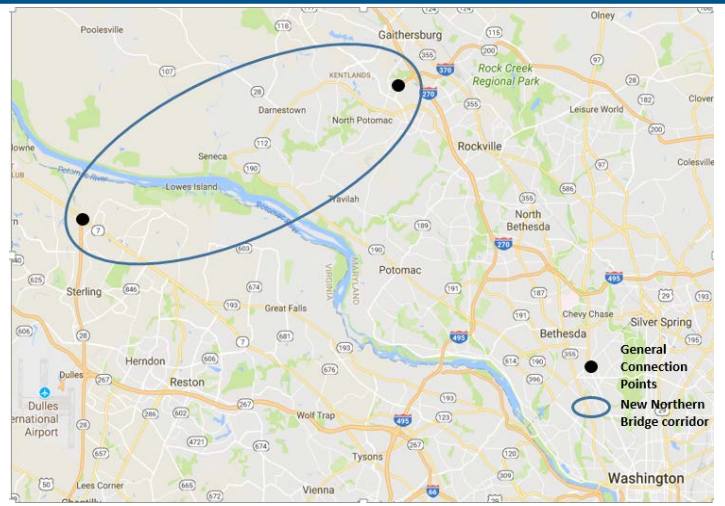
KEY: High, Medium, Low, Neutral, Negative

Quantitative MOEs	2040 CLRP	Initiative	Change from CLRP
Travel Time: average travel time per commute trip			
Single occupant vehicle (SOV)	50.7	48.5	-4%
High-occupancy vehicle (HOV)	58.9	56.5	-4%
Transit	53.9	52.6	-2%
Vehicle Hours of Delay			
Daily vehicle hours of delay	1.85 million	1.71 million	-8%
Jobs Accessibility			
Transit: # of jobs accessible within 45-min transit commute	523,000	532,000	2%
Auto: # of jobs accessible within 45-min auto commute	876,000	943,000	8%
Commute Mode Share			
Single occupancy vehicle (SOV)	58.1	60.0	3%
High-occupancy vehicle (HOV)	11.6	10.8	-7%
Transit	24.6	23.7	-4%
Bicycle/Pedestrian	5.6	5.6	0%
Reliable Trips			
Share of passenger miles on reliable modes	11.5%	10.7%	-5%
Vehicle Miles Traveled (VMT)			
Daily VMT	141.91 million	144.36 million	2%
Daily VMT per capita	21.2	21.5	2%
Transit Options			
Share of households in zones with high-capacity transit	39.9%	39.9%	0%
Share of jobs in zones with high-capacity transit	57.7%	57.7%	0%

Initiative 3. Additional Northern Bridge Crossing /Corridor

Components

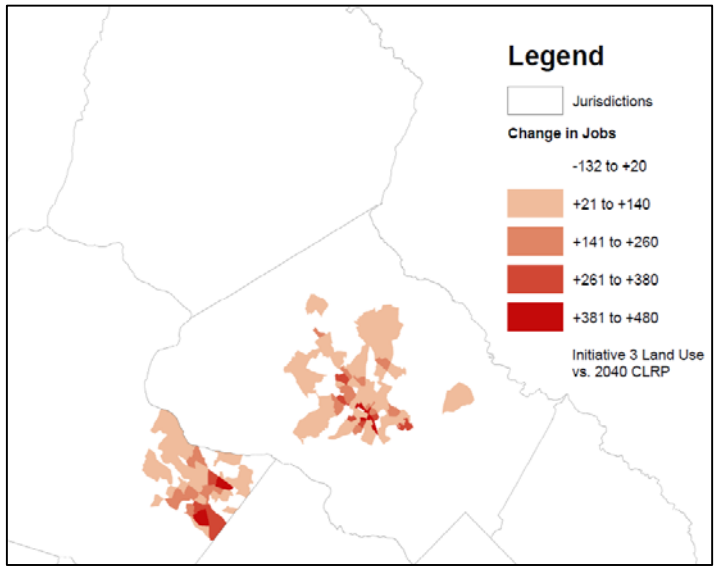
- New toll road (about 14 miles long)
  - Between VA28/VA 7 junction and I 270/I-370 junction (MD-200/Intercounty Connector)
  - 3-lanes each direction
  - Parkway-style facility with no interchanges between terminal points
  - Per-mile toll rates from MD-200
- New express bus service connecting Activity Centers along the corridor
  - 20 min peak, 30 min off-peak headways



General Connection Points for New Corridor

Land Use

- 2040 CLRP Round 9.0 Cooperative Land Use Forecasts altered
  - Modest increase in households and jobs in areas with existing development areas within Montgomery and Loudoun Counties impacted by the new facility



Location of Assumed Increase in Jobs in Corridor

(Source: Fehr & Peers)

Initiative 3. Additional Northern Bridge Crossing /Corridor - Results

Challenges	Compared to CLRP
Road Congestion	
Transit Crowding	
Inadequate Bus Service	
Access to Bike/Ped Options	
Development around Metrorail	
Housing & Job Location	
Metrorail Repair Needs	
Roadway Repair Needs	
Incidents and Safety	
Pedestrian & Bicyclist Safety	
Environmental Quality	
Open Space Development	
Bottlenecks	
Reliable Access to Intercity Hubs	

KEY: High, Medium, Low, Neutral, Negative

Quantitative MOEs	2040 CLRP	Initiative	Change from CLRP
Travel Time: average travel time per commute trip			
Single occupant vehicle (SOV)	50.7	50.7	0%
High-occupancy vehicle (HOV)	58.9	58.5	-1%
Transit	53.9	53.8	- <1%
Vehicle Hours of Delay			
Daily vehicle hours of delay	1.85 million	1.80 million	-3%
Jobs Accessibility			
Transit: # of jobs accessible within 45-min transit commute	523,000	520,000	- <1%
Auto: # of jobs accessible within 45-min auto commute	876,000	885,000	1%
Commute Mode Share			
Single occupancy vehicle (SOV)	58.1	58.3	<1%
High-occupancy vehicle (HOV)	11.6	11.6	0%
Transit	24.6	24.5	- <1%
Bicycle/Pedestrian	5.6	5.6	0%
Reliable Trips			
Share of passenger miles on reliable modes	11.5%	11.3%	-2%
Vehicle Miles Traveled (VMT)			
Daily VMT	141.91 million	142.93 million	1%
Daily VMT per capita	21.2	21.3	1%
Transit Options			
Share of households in zones with high-capacity transit	39.9%	39.8%	- <1%
Share of jobs in zones with high-capacity transit	57.7%	57.6%	- <1%

Initiative 4. Regionwide High Capacity Transitways

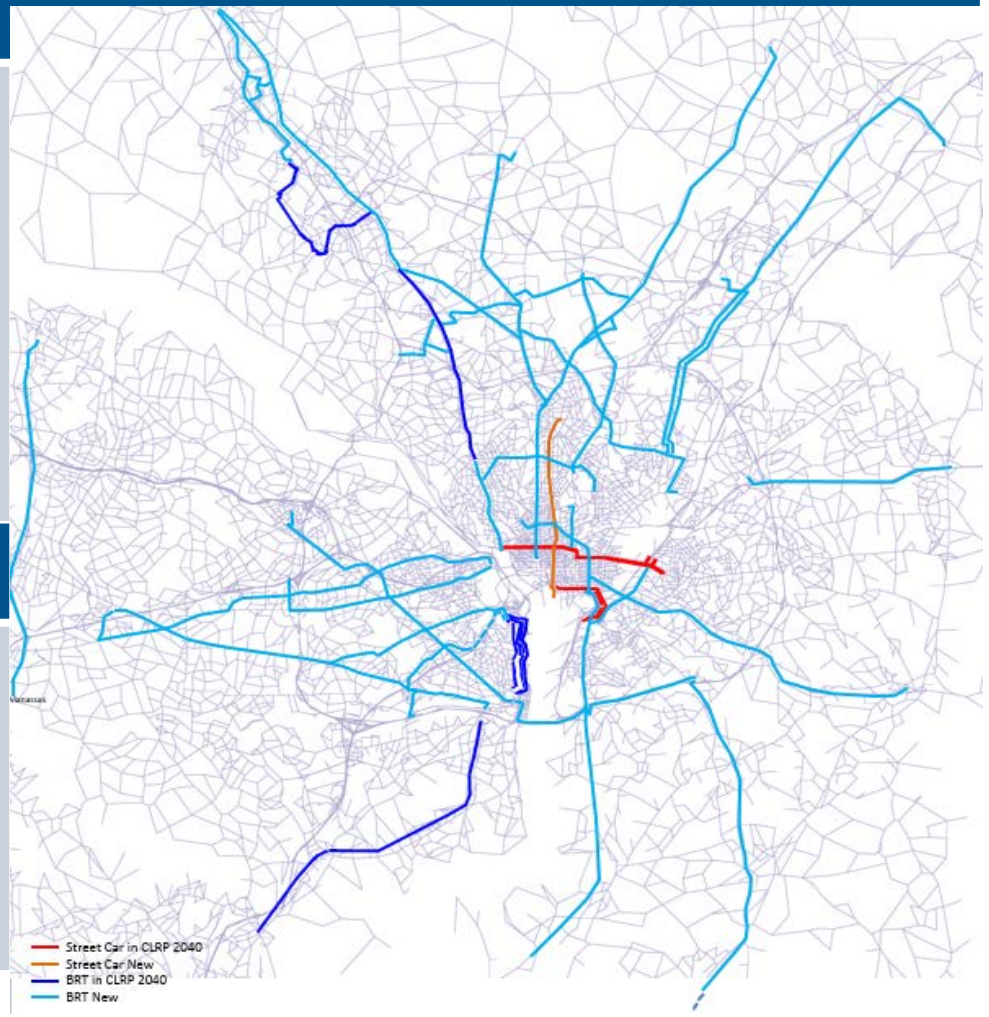
Components

- Additional bus rapid transit (BRT)/transitway networks in Montgomery County, Prince George's County, Northern Virginia (TransAction 2040), DC, and a transitway from Branch Ave to Waldorf

- Improved bicycle/pedestrian connections and access improvements
  - Bike/ped mode shares altered

Land Use

- 2040 CLRP Round 9.0 Cooperative land Use Forecasts adjusted to have modest increase in employment and household densities in zones with new services
  - Increase densities in zones with new BRT to 5 households/acre and 30 jobs/acre while maintaining the regional control totals



Initiative 4. Regionwide High Capacity Transitways - Results

Challenges	Compared to CLRP
Road Congestion	
Transit Crowding	
Inadequate Bus Service	
Access to Bike/Ped Options	
Development around Metrorail	
Housing & Job Location	
Metrorail Repair Needs	
Roadway Repair Needs	
Incidents and Safety	
Pedestrian & Bicyclist Safety	
Environmental Quality	
Open Space Development	
Bottlenecks	
Reliable Access to Intercity Hubs	

KEY: High, Medium, Low, Neutral, Negative

Quantitative MOEs	2040 CLRP	Initiative	Change from CLRP
Travel Time: average travel time per commute trip			
Single occupant vehicle (SOV)	50.7	50.4	-1%
High-occupancy vehicle (HOV)	58.9	58.6	-1%
Transit	53.9	53.4	-1%
Vehicle Hours of Delay			
Daily vehicle hours of delay	1.85 million	1.82 million	-2%
Jobs Accessibility			
Transit: # of jobs accessible within 45-min transit commute	523,000	542,000	4%
Auto: # of jobs accessible within 45-min auto commute	876,000	882,000	1%
Commute Mode Share			
Single occupancy vehicle (SOV)	58.1	57.4	-1%
High-occupancy vehicle (HOV)	11.6	11.5	-1%
Transit	24.6	25.5	4%
Bicycle/Pedestrian	5.6	5.6	<1%
Reliable Trips			
Share of passenger miles on reliable modes	11.5%	12.2%	6%
Vehicle Miles Traveled (VMT)			
Daily VMT	141.91 million	141.35 million	- <1%
Daily VMT per capita	21.2	21.1	- <1%
Transit Options			
Share of households in zones with high-capacity transit	39.9%	49.9%	25%
Share of jobs in zones with high-capacity transit	57.7%	66.5%	15%

ICF

Initiative 5. Regional Commuter Rail Enhancements

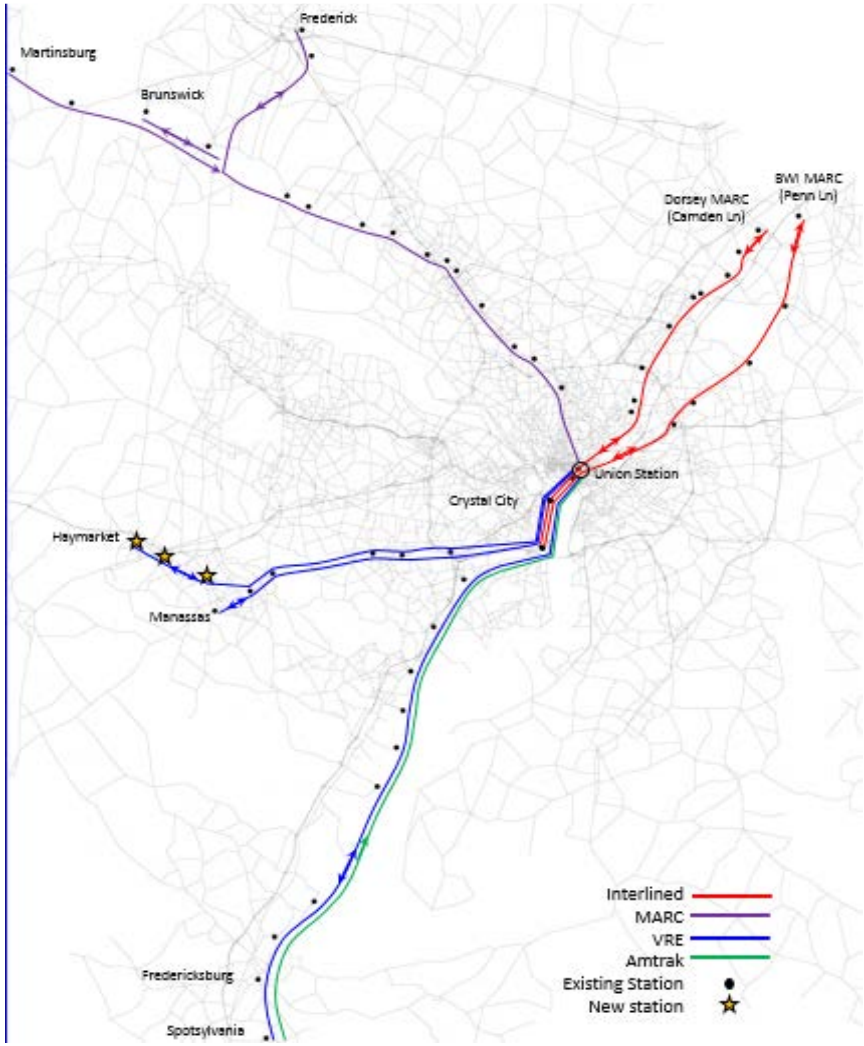
Components

- Improvements to MARC and VRE Commuter Rail Systems – Expand upon commuter rail enhancements already in CLRP
  - Upgrading all 60-min, peak-time headways in the CLRP to 30-min headways
  - Upgrading all 30-min headways in the CLRP to 20-min headways.
  - Establishing off-peak service on all MARC and VRE lines, if not already in CLRP, on 60-min headways.
  - Run-through services of the MARC Camden and Penn lines with VRE to extend to Alexandria.

- Improved bicycle/pedestrian connections and access improvements

Land Use

- 2040 CLRP Round 9.0 Cooperative Land Use Forecasts (unchanged)



Initiative 5. Regional Commuter Rail Enhancements - Results

Challenges	Compared to CLRP
Road Congestion	Medium
Transit Crowding	Neutral
Inadequate Bus Service	Neutral
Access to Bike/Ped Options	Medium
Development around Metrorail	Neutral
Housing & Job Location	Neutral
Metrorail Repair Needs	Neutral
Roadway Repair Needs	Neutral
Incidents and Safety	Medium
Pedestrian & Bicyclist Safety	Medium
Environmental Quality	Neutral
Open Space Development	Neutral
Bottlenecks	Neutral
Reliable Access to Intercity Hubs	Medium

KEY: High, Medium, Low, Neutral, Negative

Quantitative MOEs	2040 CLRP	Initiative	Change from CLRP
Travel Time: average travel time per commute trip			
Single occupant vehicle (SOV)	50.7	50.4	-1%
High-occupancy vehicle (HOV)	58.9	58.5	-1%
Transit	53.9	54.0	<1%
Vehicle Hours of Delay			
Daily vehicle hours of delay	1.85 million	1.81 million	-2%
Jobs Accessibility			
Transit: # of jobs accessible within 45-min transit commute	523,000	528,000	1%
Auto: # of jobs accessible within 45-min auto commute	876,000	878,000	<1%
Commute Mode Share			
Single occupancy vehicle (SOV)	58.1	57.8	-1%
High-occupancy vehicle (HOV)	11.6	11.5	-1%
Transit	24.6	25.1	2%
Bicycle/Pedestrian	5.6	5.6	<1%
Reliable Trips			
Share of passenger miles on reliable modes	11.5%	11.8%	2%
Vehicle Miles Traveled (VMT)			
Daily VMT	141.91 million	141.52 million	<1%
Daily VMT per capita	21.2	21.1	<1%
Transit Options			
Share of households in zones with high-capacity transit	39.9%	40.1%	<1%
Share of jobs in zones with high-capacity transit	57.7%	57.9%	<1%

Initiative 6. Metrorail Regional Core Capacity Improvements

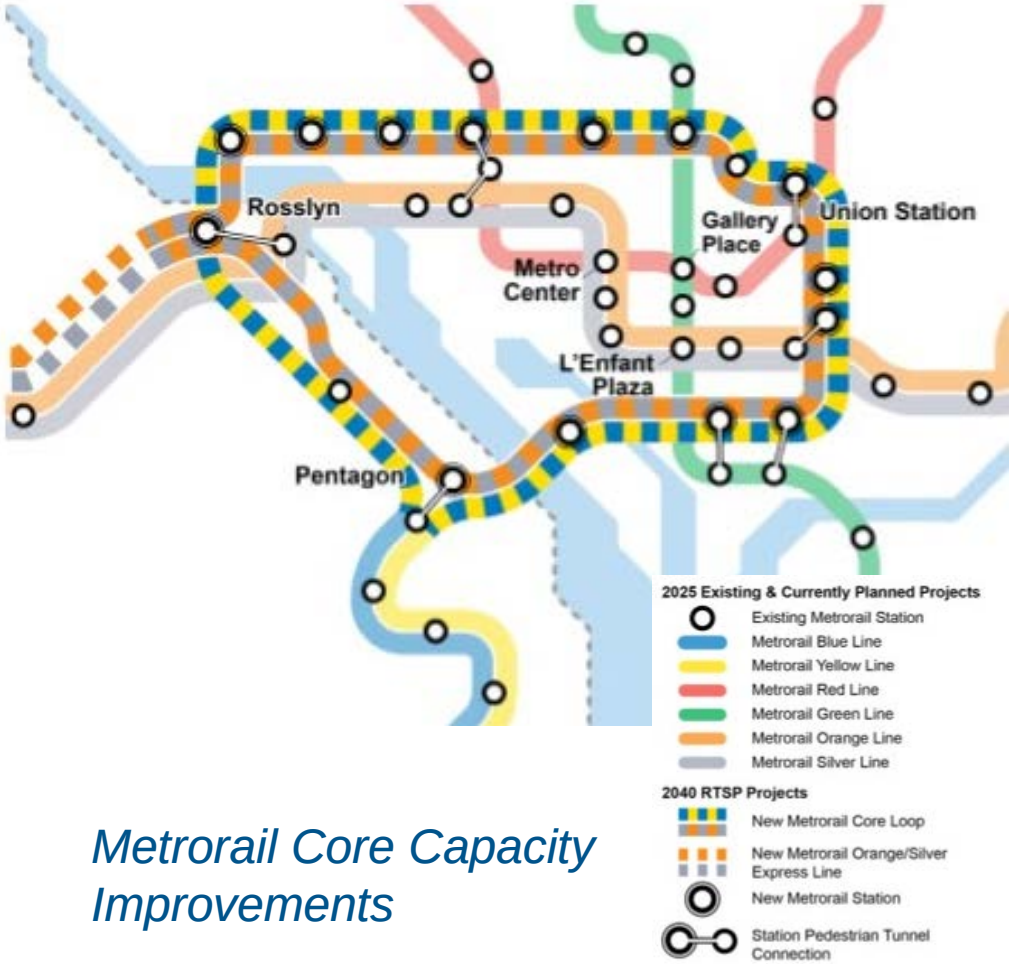
Components

Improvements
- 100% 8-car trains
- Station improvements at high-volume stations
- Improved bicycle/pedestrian connections and access improvements

New Additions
- Second Rosslyn station
- New Metrorail core line to add capacity across Potomac River (based on WMATA Momentum 2040).
- 14 new stations on the new core line (7 of which connect to existing stations)

Land Use

- 2040 CLRP Round 9.0 Cooperative Land Use Forecasts (unchanged)



Metrorail Core Capacity Improvements

Initiative 6. Metrorail Regional Core Capacity Improvements - Results

Challenges	Compared to CLRP
Road Congestion	
Transit Crowding	
Inadequate Bus Service	
Access to Bike/Ped Options	
Development around Metrorail	
Housing & Job Location	
Metrorail Repair Needs	
Roadway Repair Needs	
Incidents and Safety	
Pedestrian & Bicyclist Safety	
Environmental Quality	
Open Space Development	
Bottlenecks	
Reliable Access to Intercity Hubs	

KEY: High, Medium, Low, Neutral, Negative

Quantitative MOEs	2040 CLRP	Initiative	Change from CLRP
Travel Time: average travel time per commute trip			
Single occupant vehicle (SOV)	50.7	49.8	-2%
High-occupancy vehicle (HOV)	58.9	58.2	-1%
Transit	53.9	50.8	-6%
Vehicle Hours of Delay			
Daily vehicle hours of delay	1.85 million	1.69 million	-9%
Jobs Accessibility			
Transit: # of jobs accessible within 45-min transit commute	523,000	621,000	19%
Auto: # of jobs accessible within 45-min auto commute	876,000	893,000	2%
Commute Mode Share			
Single occupancy vehicle (SOV)	58.1	56.0	-4%
High-occupancy vehicle (HOV)	11.6	11.0	-5%
Transit	24.6	27.4	11%
Bicycle/Pedestrian	5.6	5.6	<1%
Reliable Trips			
Share of passenger miles on reliable modes	11.5%	12.6%	9%
Vehicle Miles Traveled (VMT)			
Daily VMT	141.91 million	139.99 million	-1%
Daily VMT per capita	21.2	20.9	-1%
Transit Options			
Share of households in zones with high-capacity transit	39.9%	40.0%	<1%
Share of jobs in zones with high-capacity transit	57.7%	57.7%	0%

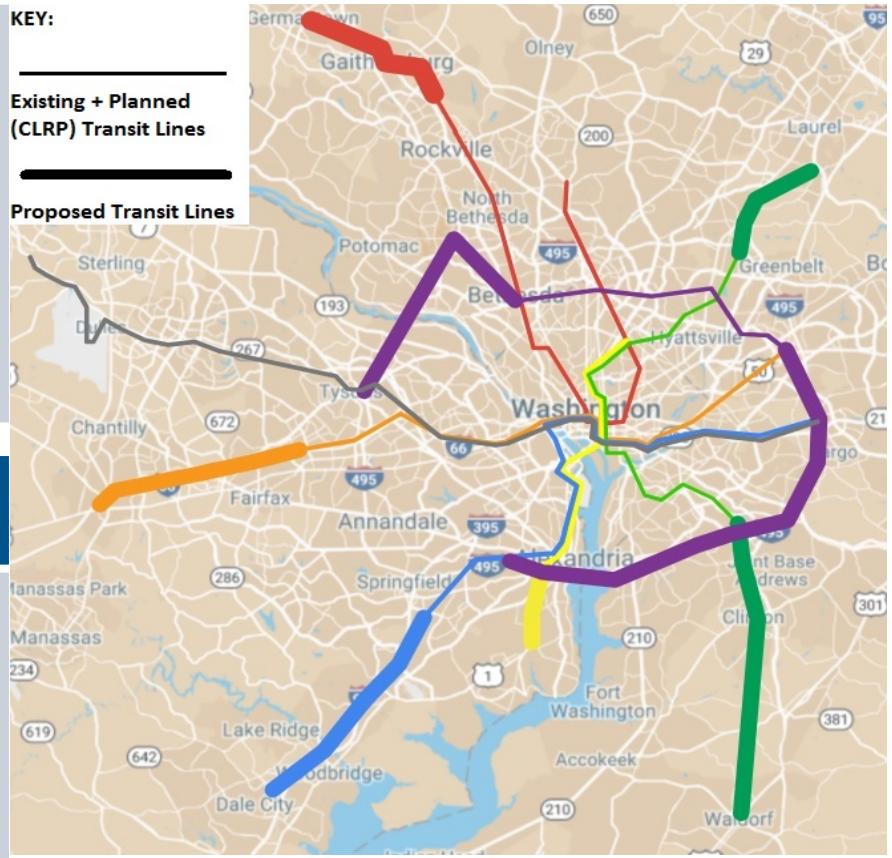
Initiative 7. Transit Rail Extensions

Components

- Extensions to all existing Metro lines (except Silver), with existing fare structures (cap on maximum fares)
- Purple Line light rail extension (as specified by Task Force to Tysons and Eisenhower Ave.)
- New light-rail from Branch Ave to Waldorf
- Improved bicycle and pedestrian connections and access improvements to rail stations

Land Use

- Assume some shift of land use to Activity Centers in these corridors
  - Increase densities in TAZs with new LRT to 7 households/acre and 45 jobs/acre
  - Increase densities in TAZs with new Metrorail to 15 households/acre and 90 jobs/acre
  - Maintain regional control totals, shift within jurisdictions



Existing Metrorail and Proposed Rail Extensions

Number of New Stations by Line	
Red	3
Blue	5
Green	4
Yellow	2
Orange	5
SMRT	11
Purple	32
Total	**62**

Initiative 7. Transit Rail Extensions - Results

Challenges	Compared to CLRP
Road Congestion	
Transit Crowding	
Inadequate Bus Service	
Access to Bike/Ped Options	
Development around Metrorail	
Housing & Job Location	
Metrorail Repair Needs	
Roadway Repair Needs	
Incidents and Safety	
Pedestrian & Bicyclist Safety	
Environmental Quality	
Open Space Development	
Bottlenecks	
Reliable Access to Intercity Hubs	

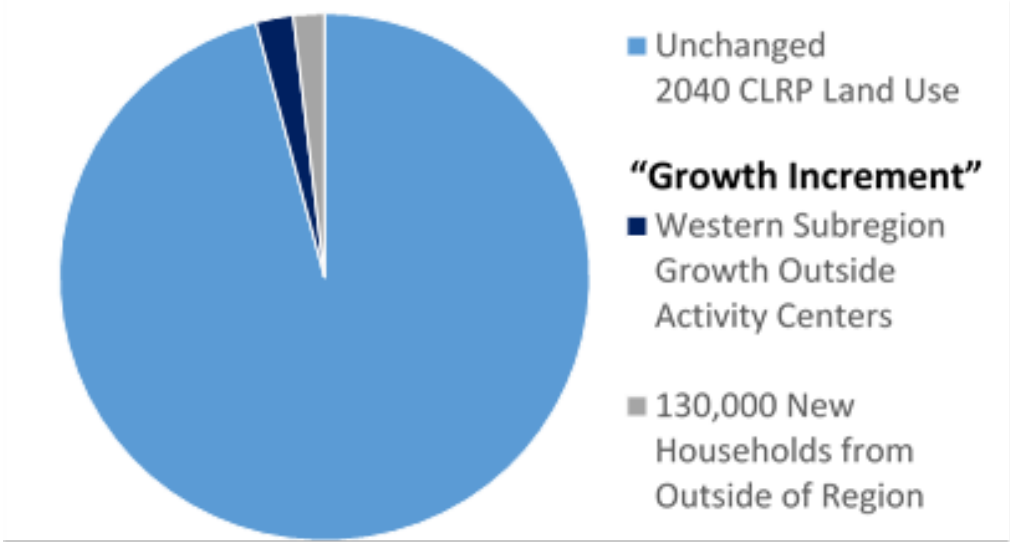
KEY: High, Medium, Low, Neutral, Negative

Quantitative MOEs	2040 CLRP	Initiative	Change from CLRP
Travel Time: average travel time per commute trip			
Single occupant vehicle (SOV)	50.7	50.3	-1%
High-occupancy vehicle (HOV)	58.9	58.3	-1%
Transit	53.9	53.7	-<1%
Vehicle Hours of Delay			
Daily vehicle hours of delay	1.85 million	1.79 million	-3%
Jobs Accessibility			
Transit: # of jobs accessible within 45-min transit commute	523,000	576,000	10%
Auto: # of jobs accessible within 45-min auto commute	876,000	879,000	1%
Commute Mode Share			
Single occupancy vehicle (SOV)	58.1	57.3	-1%
High-occupancy vehicle (HOV)	11.6	11.3	-3%
Transit	24.6	25.8	5%
Bicycle/Pedestrian	5.6	5.6	<1%
Reliable Trips			
Share of passenger miles on reliable modes	11.5%	12.2%	6%
Vehicle Miles Traveled (VMT)			
Daily VMT	141.91 million	140.74 million	-1%
Daily VMT per capita	21.2	21.0	-1%
Transit Options			
Share of households in zones with high-capacity transit	39.9%	46.5%	17%
Share of jobs in zones with high-capacity transit	57.7%	65.1%	13%

Initiative 8. Optimize Regional Land-Use Balance

Land Use

- Add 130,000 more households from outside region (with adjustment to external travel).
- Allocate 2025-2040 growth increment to balance job/household ratio between eastern and western subregions, shifting jobs from outside of activity centers.
- Within each subregion, allocate growth increment to individual jurisdictions to approach regional job/household region and factor activity centers with high capacity transit.



Jurisdiction	2040 CLRP			Initiative 8 Land Use		
	HH	Jobs	Ratio	HH	Jobs	Ratio
Eastern Subregion	1,054,764	1,604,039	1.52	1,107,094	1,702,578	1.54
Western Subregion	1,513,958	2,546,274	1.68	1,591,628	2,447,735	1.54
TPB Planning Region Total	2,568,722	4,150,313	1.62	2,698,722	4,150,313	1.54

Initiative 8. Optimize Regional Land-Use Balance - Results

Challenges	Compared to CLRP
Road Congestion	High
Transit Crowding	Negative
Inadequate Bus Service	Neutral
Access to Bike/Ped Options	High
Development around Metrorail	High
Housing & Job Location	High
Metrorail Repair Needs	Neutral
Roadway Repair Needs	Neutral
Incidents and Safety	Medium
Pedestrian & Bicyclist Safety	Low
Environmental Quality	Medium
Open Space Development	Medium
Bottlenecks	Medium
Reliable Access to Intercity Hubs	Low

KEY: High, Medium, Low, Neutral, Negative

Quantitative MOEs	2040 CLRP	Initiative	Change from CLRP
Travel Time: average travel time per commute trip			
Single occupant vehicle (SOV)	50.7	48.2	-5%
High-occupancy vehicle (HOV)	58.9	55.4	-6%
Transit	53.9	51.4	-5%
Vehicle Hours of Delay			
Daily vehicle hours of delay	1.85 million	1.53 million	-19%
Jobs Accessibility			
Transit: # of jobs accessible within 45-min transit commute	523,000	577,000	10%
Auto: # of jobs accessible within 45-min auto commute	876,000	962,000	10%
Commute Mode Share			
Single occupancy vehicle (SOV)	58.1	57.0	-2%
High-occupancy vehicle (HOV)	11.6	11.2	-4%
Transit	24.6	24.6	<1%
Bicycle/Pedestrian	5.6	7.2	29%
Reliable Trips			
Share of passenger miles on reliable modes	11.5%	11.5%	0%
Vehicle Miles Traveled (VMT)			
Daily VMT	141.91 million	137.44 million	-3%
Daily VMT per capita	21.2	19.9	-6%
Transit Options			
Share of households in zones with high-capacity transit	39.9%	44.3%	9%
Share of jobs in zones with high-capacity transit	57.7%	59.0%	2%

Initiative 9. Transit Fare Policy Changes

Components

- **Reduced Off-Peak Fares** – Metrorail fares reduced for off-peak direction during peak period and on underutilized segments.

- **Reduced Fares for Low-Income Residents** – Metrorail fares for low-income residents reduced to zero. The low-income group is assumed to be the lowest income quartile from the MWCOG model.

Land Use

- 2040 CLRP Round 9.0 Cooperative Land Use Forecasts (no change)

Initiative 9. Transit Fare Policy Changes - Results

Challenges	Compared to CLRP
Road Congestion	Low
Transit Crowding	Negative
Inadequate Bus Service	Neutral
Access to Bike/Ped Options	Neutral
Development around Metrorail	Neutral
Housing & Job Location	Neutral
Metrorail Repair Needs	Neutral
Roadway Repair Needs	Neutral
Incidents and Safety	Low
Pedestrian & Bicyclist Safety	Neutral
Environmental Quality	Low
Open Space Development	Neutral
Bottlenecks	Low
Reliable Access to Intercity Hubs	Neutral

KEY: High, Medium, Low, Neutral, Negative

Quantitative MOEs	2040 CLRP	Initiative	Change from CLRP
Travel Time: average travel time per commute trip			
Single occupant vehicle (SOV)	50.7	50.7	0%
High-occupancy vehicle (HOV)	58.9	58.7	<1%
Transit	53.9	54.2	1%
Vehicle Hours of Delay			
Daily vehicle hours of delay	1.85 million	1.81 million	-3%
Jobs Accessibility			
Transit: # of jobs accessible within 45-min transit commute	523,000	523,000	0%
Auto: # of jobs accessible within 45-min auto commute	876,000	878,000	<1%
Commute Mode Share			
Single occupancy vehicle (SOV)	58.1	57.9	<1%
High-occupancy vehicle (HOV)	11.6	11.4	-2%
Transit	24.6	25.2	2%
Bicycle/Pedestrian	5.6	5.6	0%
Reliable Trips			
Share of passenger miles on reliable modes	11.5%	11.9%	3%
Vehicle Miles Traveled (VMT)			
Daily VMT	141.91 million	141.08 million	-1%
Daily VMT per capita	21.2	21.1	-1%
Transit Options			
Share of households in zones with high-capacity transit	39.9%	39.9%	0%
Share of jobs in zones with high-capacity transit	57.7%	57.7%	0%

ICF

Initiative 10. Amplified Employer-based Travel Demand Management

Components

- Substantial increase in telework and flexible schedule adoption
  - 20% telework share (yields about 15% reduction in work trips from base)
  - Teleworkers come proportionately from other modes (drive alone, carpool, transit, etc.)
- Expanded employer-based transit/vanpool benefits
  - Transit/vanpool subsidies averaging $50 per month are provided by 80% of employers
- Increase in priced parking in major activity centers
  - 90% of parking for work-trips in activity centers is priced, with parking costs assumed to range from $4/day minimum (could reflect employer-provided parking cash out).

Land Use

- Land use: 2040 CLRP Round 9.0 Cooperative Land Use Forecasts (no change)

Initiative 10. Amplified Employer-based TDM - Results

Challenges	Compared to CLRP
Road Congestion	High
Transit Crowding	Medium
Inadequate Bus Service	Neutral
Access to Bike/Ped Options	Neutral
Development around Metrorail	Neutral
Housing & Job Location	Neutral
Metrorail Repair Needs	Neutral
Roadway Repair Needs	Neutral
Incidents and Safety	High
Pedestrian & Bicyclist Safety	Low
Environmental Quality	High
Open Space Development	Neutral
Bottlenecks	High
Reliable Access to Intercity Hubs	Low

KEY: High, Medium, Low, Neutral, Negative

Quantitative MOEs	2040 CLRP	Initiative	Change from CLRP
Travel Time: average travel time per commute trip			
Single occupant vehicle (SOV)	50.7	48.5	-4%
High-occupancy vehicle (HOV)	58.9	55.2	-6%
Transit	53.9	54.8	<1%
Vehicle Hours of Delay			
Daily vehicle hours of delay	1.85 million	1.39million	-24%
Jobs Accessibility			
Transit: # of jobs accessible within 45-min transit commute	523,000	523,000	0%
Auto: # of jobs accessible within 45-min auto commute	876,000	922,000	10%
Commute Mode Share			
Single occupancy vehicle (SOV)	58.1	53.2*	-8%*
High-occupancy vehicle (HOV)	11.6	14.3*	24%*
Transit	24.6	26.0*	6%*
Bicycle/Pedestrian	5.6	6.5*	16%*
Reliable Trips			
Share of passenger miles on reliable modes	11.5%	11.2%	-3%
Vehicle Miles Traveled (VMT)			
Daily VMT	141.91 million	133.61 million	-6%
Daily VMT per capita	21.2	19.9	-6%
Transit Options			
Share of households in zones with high-capacity transit	39.9%	39.9%	0%
Share of jobs in zones with high-capacity transit	57.7%	57.7%	0%

*Mode shares reflect trips taken. Due to telework, actual number of transit trips declines; bicycle/pedestrian stays flat; HOV increases slightly.

Overall Comparison Tables

KEY

- High
- Medium
- Low
- Neutral
- Negative

All assessments are in relation to 2040 CLRP baseline

CHALLENGES	BASE 2040 CLRP	I1 Express Travel Network	I2 Operational Improvements & Hotspot Relief	I3 Add' I Northern Bridge	I4 BRT and Transitways	I5 Commuter Rail	I6 Metrorail Core Capacity	I7 Transit Rail Extensions	I8 Optimize Regional Land-Use Balance	I9 Transit Fare Policy Changes	I10 Travel Demand Management
Road Congestion		Medium	Medium	Low	Low	Low	Medium	Low	High	Low	High
Transit Crowding	BASELINE	Neutral	Neutral	Neutral	Neutral	Neutral	High	Negative	Negative	Negative	Low
Inadequate Bus Service	BASELINE	Medium	Neutral	Neutral	High	Neutral	Neutral	Low	Neutral	Neutral	Neutral
Access to Bike/Ped	BASELINE	Neutral	Neutral	Neutral	Medium	Low	Medium	Medium	High	Neutral	Neutral
Development around Metrorail	BASELINE	Neutral	Neutral	Neutral	Medium	Neutral	Low	High	High	Neutral	Neutral
Housing & Job Location	BASELINE	Neutral	Neutral	Neutral	Medium	Neutral	Neutral	Medium	High	Neutral	Neutral
Metrorail Repair Needs	BASELINE	Neutral	Neutral	Neutral	Neutral	Neutral	Negative	Negative	Neutral	Neutral	Neutral
Roadway Repair Needs	BASELINE	Negative	Negative	Negative	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Incidents and Safety	BASELINE	Low	Low	Low	Low	Low	Low	Low	Medium	Low	High
Pedestrian & Bicyclist Safety	BASELINE	Neutral	Negative	Neutral	Neutral	Low	Low	Low	Low	Neutral	Low
Environmental Quality	BASELINE	Neutral	Low	Negative	Neutral	Neutral	Low	Low	Medium	Low	High
Open Space Development	BASELINE	Neutral	Neutral	Negative	Neutral	Neutral	Neutral	Neutral	Medium	Neutral	Neutral
Bottlenecks	BASELINE	Medium	Medium	Low	Neutral	Neutral	Medium	Neutral	Medium	Low	High
Reliable Access to Intercity Hubs	BASELINE	High	Low	Low	Low	Low	Medium	Medium	Low	Neutral	Low

QUANTITATIVE MOES	BASE 2040 CLRP	I1 Express Travel Network	I2 Operational Improvements & Hot Spot Relief	I3 Add'l North Bridge	I4 BRT and Transitways	I5 Commuter Rail	I6 Metrorail Core Capacity	I7 Transit Rail Extensions	I8 Regional Land-Use Balance	I9 Transit Fare Policy Changes	I10 Travel Demand Management
Travel Time (SOV)	50.7	-2%	-4%	0%	-1%	-1%	-2%	-1%	-5%	0%	-4%
Travel Time (HOV)	58.9	-5%	-4%	-1%	-1%	-1%	-1%	-1%	-6%	<1%	-6%
Travel Time (Transit)	53.9	-1%	-2%	- <1%	-1%	<1%	-6%	- <1%	-5%	1%	<1%
Daily Vehicle Hours of Delay	1.85 million	-11%	-8%	-3%	-2%	-2%	-9%	-3%	-19%	-3%	-24%
Jobs Accessible by Transit	523,000	2%	2%	- <1%	4%	1%	19%	10%	10%	0%	0%
Jobs Accessible by Auto	876,000	5%	8%	1%	1%	<1%	2%	1%	10%	<1%	10%
Mode Share: SOV	58.1%	<1%	3%	<1%	-1%	-1%	-4%	-1%	-2%	<1%	-8%*
Mode Share: HOV	11.6%	-1%	-7%	0%	-1%	-1%	-5%	-3%	-4%	-2%	24%*
Mode Share: Transit	24.6%	1%	-4%	- <1%	4%	2%	11%	5%	<1%	2%	6%*
Mode Share: Non-Motorized	5.6%	0%	0%	0%	<1%	<1%	<1%	<1%	29%	0%	16%*
Travel on Reliable Modes	11.5%	42%	-5%	-2%	6%	2%	9%	6%	0%	3%	-3%
VMT daily	141.91 million	<1%	2%	1%	- <1%	<1%	-1%	-1%	-3%	-1%	-6%
VMT daily per capita	21.17	<1%	2%	1%	- <1%	<1%	-1%	-1%	-6%	-1%	-6%
Share of Households in Zones with High-Capacity Transit	39.9%	0%	0%	- <1%	25%	<1%	<1%	17%	9%	0%	0%
Share of Jobs in Zones with High-Capacity Transit	57.7%	0%	0%	- <1%	15%	<1%	0%	13%	2%	0%	0%
VOC Emissions	18.9	0%	-3%	1%	-1%	0%	-2%	-1%	-4%	-1%	-8%
NOx Emissions	18.8	0%	0%	1%	0%	0%	-2%	-1%	-4%	-1%	-7%
CO_2 Emissions	47,082.3	0%	-1%	1%	-1%	0%	-2%	-1%	-4%	-1%	-7%

*Mode shares reflect trips taken. Due to telework, actual number of transit trips declines; bicycle/pedestrian stays flat; HOV increases slightly.

Other Factors to Consider

Factors to Consider in Selecting Among Initiatives

- **Measures of Effectiveness**
- **Other Factors**
  - Affordability and User Costs
  - Costs of Implementation
  - Equitable Distribution of Benefits
  - Placemaking
  - Right-of-Way and Community/Other Environmental Impacts
  - Public Support and Implementation Feasibility
- **Relationship of Initiatives**
  - Synergistic or antagonistic/overlapping effects

Affordability and User Costs

Initiative		Relative User Costs	Explanation of User Cost Ratings
I1	Express Travel Network	↑ / ↓	New express facilities require a toll to utilize for those with less than HOV3, with tolls that can be expensive. However, facilities are assumed to be free to HOV3+ and new express transit services could reduce out-of-pocket costs for travelers.
I2	Operational Improvements & Hotspot Relief	↓	Improvements in roadway operating conditions should yield some reduction in vehicle operating costs. .
I3	Additional Northern Bridge Crossing/Corridor	↑ / ↓	New facility is assumed to be tolled, which will add direct out-of-pocket costs for those who use the facility. However, new express bus services can help commuters save money and improvements in operating conditions on the Beltway should reduce vehicle operating costs.
I4	High-Capacity Transitways	↓	No changes to existing transit fare structures are assumed. Improved transit/bike/ped options provide some opportunities to shift from driving to transit or nonmotorized travel at lower cost.
I5	Commuter Rail Enhancements	↓	No changes to existing fare structures are assumed. Potential savings from new transit and bike/ped options.
I6	Metrorail Core Capacity Improvements	-	No expected changes to user costs and affordability.
I7	Transit Rail Extensions	↑ / ↓	Metrorail fares tend to be higher than existing bus services and may increase travel costs for some transit users. However, improved transit/bike/ped options provide opportunities to shift from driving to transit or nonmotorized travel at lower cost.
I8	Optimize Regional Land Use Balance	↓	Moving trip destinations closer should yield reduction in vehicle operating costs and more opportunities for low-cost bike/ped options.
I9	Transit Fare Policy Changes	↓↓↓	Free rail for low-income residents. Reduced fares for Metrorail commuters using underutilized, reverse commute segments.
I10	Amplified Employer-Based Travel Demand Management	↑ / ↓	Increased parking costs will increase out-of-pocket costs for some commuters. However, these will generally be offset by savings from transit subsidies, significant trip reductions, and trip sharing.

Key: ↓ = **Reduce user costs** ↑ = **Increase user costs**

Costs of Implementation

Initiative		Relative Costs to Implement	Explanation of Cost Ratings
I1	Express Travel Network	$	While total infrastructure costs would be high for new lane capacity, the private sector would largely cover the cost in exchange for toll revenue, with minimal public sector contribution (For instance, the I-66 express lane project outside the Beltway has the private developer responsible for all costs to develop, design, construct, maintain, and operate the project, as well as provide transit funding payments).
I2	Operational Improvements & Hotspot Relief	$$	Development of reversible lanes on major arterials, addition of integrated corridor management/active traffic management treatments, and targeted hot spot projects would likely be well over $1 billion across the region.
I3	Additional Northern Bridge Crossing/Corridor	$$	New corridor is somewhat similar in length to the $2.57 billion Intercounty Connector (MD-200). Tolls/toll revenue bonds would cover a portion of the cost.
I4	High-Capacity Transitways	$$	BRT lines on dedicated lanes generally cost $4-$50 million per mile. This initiative envisions dozens of new BRT and transitway services across the region, plus additional operating costs.
I5	Commuter Rail Enhancements	$$	New rail cars and station improvements will be required, plus additional operating costs.
I6	Metrorail Core Capacity Improvements	$$$	100% 8-car trains may cost $2.28 billion. A new core line, including new tunnel under the Potomac River would be several billion dollars. Costs per mile would be high in the urban core (for comparison, Second Avenue Subway in New York cost was $2.1 billion per mile).
I7	Transit Rail Extensions	$$$	Metrorail extensions may be comparable to the Silver line cost of about $250 million per mile, resulting in a total cost of several billion to build all extensions, plus additional operating costs. Light rail costs are extensive as well (For instance, existing purple line cost is about $2.65 billion for the 16-mile route; state will pay about $150 million/year for 30 years to cover debt service).
I8	Optimize Regional Land Use Balance	$	This initiative focuses primarily on policies and potential incentives to encourage more development in optimal locations. New revenue potential occurs from taxes to discourage development in certain locations.
I9	Transit Fare Policy Changes	$$	Low cost to implement but significant loss of fare revenue, likely above $150 million/year
I10	Amplified Employer-Based Travel Demand Management	$	This initiative primarily involves policies, with limited direct public sector expenditures. Costs may include increased public sector incentives to businesses, while new revenue potential occurs from parking taxes or fees.

Key: $ = **Low** (Less than $1 billion); $$ = **Medium** ($1 billion to $5 billion); $$$ = **High** (In excess of $5 billion)

Equitable Distribution of Benefits

Initiative		Impact to E/W Divide and Equity	Explanation of Rating
I1	Express Travel Network	Mixed	Transportation improvements appear equitably distributed. While express travel lanes with tolls may favor higher income and business travelers, combination with new express bus services supports equity. Needs additional analysis of distribution of benefits.
I2	Operational Improvements & Hotspot Relief	Positive	Demand responsive service for persons with disabilities improves access for disadvantaged populations. Need additional analysis of distribution of benefits.
I3	Additional Northern Bridge Crossing/Corridor	Negative	Investment and benefits primarily accrue to western areas, particularly around the Beltway
I4	High-Capacity Transitways	None	Transportation improvements appear equitably distributed. Need additional analysis of distribution of benefits.
I5	Commuter Rail Enhancements	None	Transportation improvements appear equitably distributed. Need additional analysis of distribution of benefits.
I6	Metrorail Core Capacity Improvements	None	Transportation improvements appear equitably distributed. Need additional analysis of distribution of benefits.
I7	Transit Rail Extensions	None	Transportation improvements appear equitably distributed. Need additional analysis of distribution of benefits.
I8	Optimize Regional Land Use Balance	Positive	Designed to reduce East-West Divide by shifting jobs to areas with poor jobs-housing balance.
I9	Transit Fare Policy Changes	Positive	Favors low-income residents and reverse commuters.
I10	Amplified Employer-Based Travel Demand Management	Mixed	May favor higher-income residents due to higher ability to telework, carpool, and absorb higher parking costs. However, transit benefits and reduced subsidies for parking may favor lower-income residents. Need additional analysis of distribution of benefits.

Placemaking

Initiative		Placemaking Impacts	Explanation of Rating
I1	Express Travel Network	Neutral	Potential for minor effect – Depending on design, express bus may support or detract from TOD in Activity Centers served.
I2	Operational Improvements & Hotspot Relief	Neutral	No clear relationship.
I3	Additional Northern Bridge Crossing/Corridor	Neutral	Potential for minor effect – Depending on design, express bus may support or detract from TOD in Activity Centers served.
I4	High-Capacity Transitways	Very Positive	Potential for significant positive effect if designed to support TOD and private investment in corridor; also assumed increased land use and bike/ped access at Activity Centers and stations.
I5	Commuter Rail Enhancements	Positive	Minor positive effect from improvements to bike/ped access at stations. No new stations.
I6	Metrorail Core Capacity Improvements	Positive	Potential positive effect on TOD from improvements to bike/ped access, stations, and rail service.
I7	Transit Rail Extensions	Very Positive	Potential for significant positive effect if designed to support TOD; also assumed increased land use in areas served.
I8	Optimize Regional Land Use Balance	Very Positive	Potential for significant positive effect from increasing development around underdeveloped station areas and the east side.
I9	Transit Fare Policy Changes	Neutral	No clear relationship.
I10	Amplified Employer-Based Travel Demand Management	Positive	Potential for positive effect if parking fees are used to improve placemaking.

Right of Way, Community, and Other Environmental Impacts

Initiative		Right of Way Needed	Explanation of Rating
I1	Express Travel Network	Yes	Roadway widening will occur along major highways, with potentially significant property impacts, particularly along the Beltway and I-270.
I2	Operational Improvements & Hotspot Relief	Yes	Limited roadway widening at congestion hot spots and development of reversible lanes may require right of way.
I3	Additional Northern Bridge Crossing/Corridor	Yes	New highway corridor will require significant new right-of-way and likely impacts to many properties along the estimated 14-mile route.
I4	High-Capacity Transitways	Yes	BRT lines and transitways will likely cause impacts to properties due to roadway widening needed for dedicated lanes.
I5	Commuter Rail Enhancements	Limited	No new rail lines or stations would be built. However, new run-through service may require expansions/adjustments to stations that may have some limited effects.
I6	Metrorail Core Capacity Improvements	Limited	New rail line would be underground. Disruption would occur during construction but with limited new land required for transportation infrastructure.
I7	Transit Rail Extensions	Yes	Significant rail extensions will create impacts on properties and other community impacts, but are generally assumed to be within existing highway rights of way.
I8	Optimize Regional Land Use Balance	No	No new land use requirements for roadways or rail systems.
I9	Transit Fare Policy Changes	No	No new land use requirements for roadways or rail systems.
I10	Amplified Employer-Based Travel Demand Management	No	No new land use requirements for roadways or rail systems.

Public Support and Implementation Feasibility

- TPB members represent different constituents with different priorities.
- The members may want to consider whether the projects will receive support or staunch opposition from any of the jurisdictions whose support would be necessary for implementation.
- They may also want to consider the likelihood of passing any required supporting legislation or policies.

Relationship of Initiatives

- Policy-focused Initiatives (#8, 9, and 10) generally support the benefits of other initiatives
- Several of the transit-focused initiatives may be drawing the same riders, so would not be expected to have additive effects
  - Example: Commuter Rail Enhancements (#5) vs. Transit Rail Extensions (#7)
  - However, Metrorail Core Capacity Improvements (#6) support Transit Rail Extensions (#7)
- Multimodal initiatives also serve some of the same functions
  - Example: Additional Northern Bridge Crossing/Corridor (#3) and Regional Express Travel Network (#1) both help to address delay on American Legion Bridge

Next Steps

Outcomes of this Process

“develop a process by which the TPB will later <u>endorse</u> a final selection…for future <u>concerted TPB action</u>.” [Resolution R16-2017]

Endorsement:

- Initiatives have potential to improve performance of the region’s transportation system and deserve to be comprehensively examined for implementation; would allow concepts represented by the initiatives in the aspirational element of *Visualize 2045.*

Concerted action:

- At a minimum would involve a commitment by all TPB member jurisdictions and agencies to collaborate and undertake further examination of the concepts

Upcoming Meetings

- Today, November 15 - Long-Range Plan Task Force discusses results. Determine whether to have 11/29 meeting.
- Wednesday, November 29 - Optional task force meeting for additional discussion
- Wednesday, December 6 - Task force meeting to finish discussion and vote on initiatives to recommend to TPB for its endorsement
- Wednesday, December 20 - TPB meeting to discuss and act upon task force's recommendation