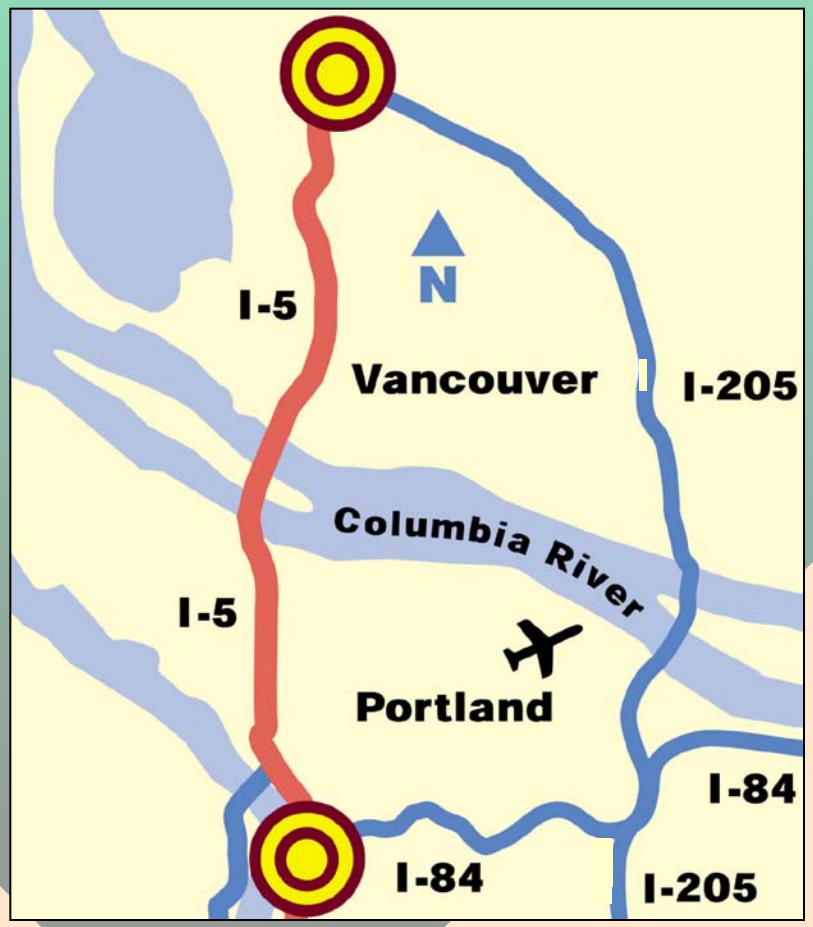
Bridge Influence Area - Summary of Findings



About this Presentation

- Focus is on:
  - Bridge Influence Area (BIA)
  - Traffic operations
  - Impacts
  - Costs
- Keep in mind -- draft recommendations include:
  - LRT Loop
  - Substantially increased transit
  - Aggressive TDM targets

Task Force Draft Recommendations for the I-5 River Crossing

- **River Crossing Capacity:**
  - New transit and vehicle capacity should be constructed across the Columbia River in the I-5 Corridor.
  - **For vehicles**, there should be no more than 3 through lanes in each direction and up to two supplemental lanes (auxiliary or local access) in each direction across the Columbia River (total 5 lanes in each direction). **For transit**, there should be two light rail tracks across the Columbia River in the I-5 Corridor.
  - In adding river-crossing capacity, every effort should be made to avoid displacements and encroachments.
  - The proposed design should include safety considerations.

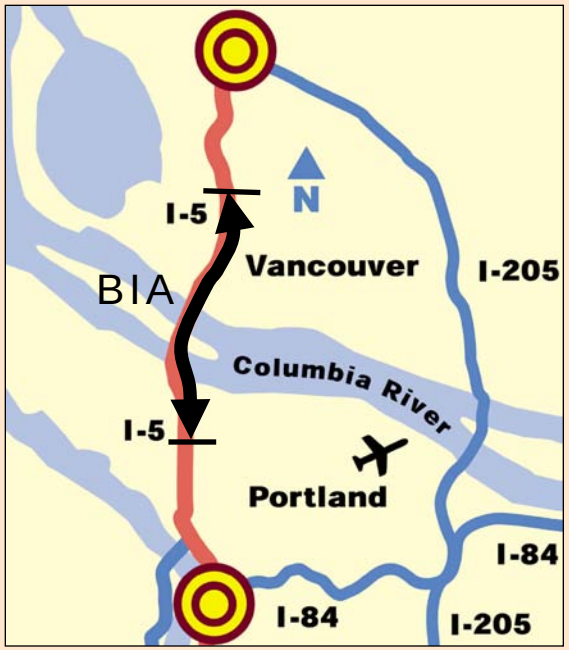
Task Force Draft Recommendations for the I-5 Bridge Influence Area

- **Bridge Influence Area:**
  - Between the SR 500 and Columbia Blvd. interchanges, the freeway needs to be designed to balance all of the on and off traffic, consistent with 3 through lane Corridor capacity and 5 lanes of bridge capacity, in each direction.

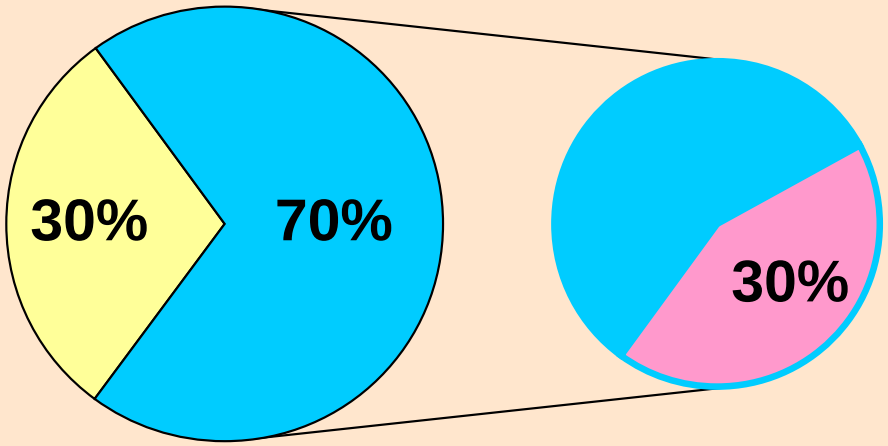
- .

I-5 Columbia River Bridge Traffic

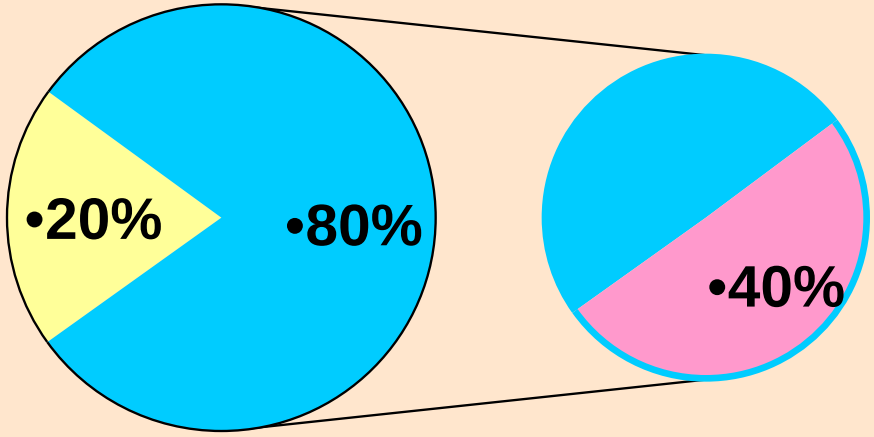
2020 Through Trips vs. Bridge Influence Area Trips



- Through Trips
- Enters or Exits I-5 Within the BIA
- Enters and Exits I-5 Within the BIA



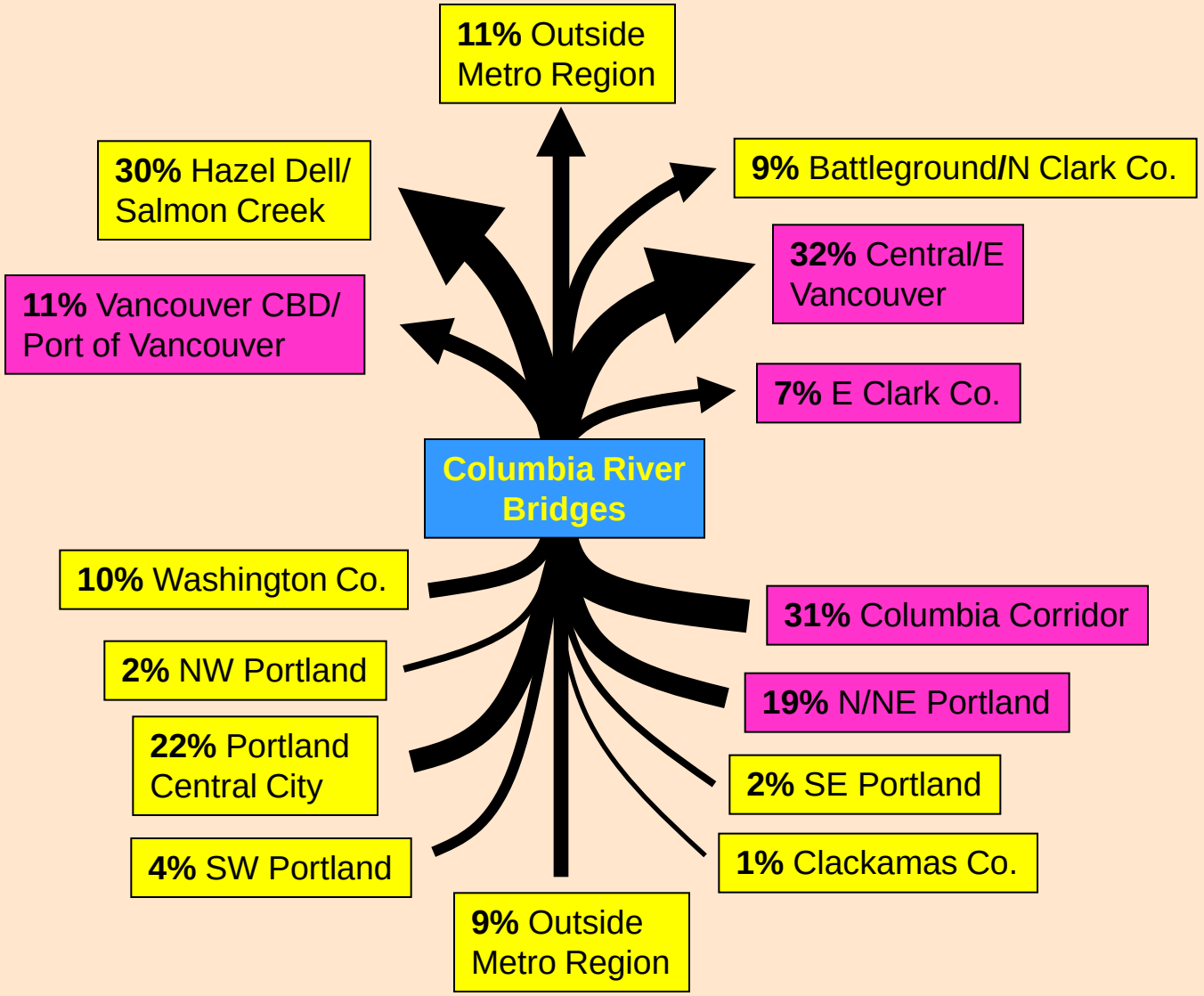
Southbound - AM Peak Period



Northbound - PM Peak Period

Origins and Destinations of Trips Crossing the Bridge

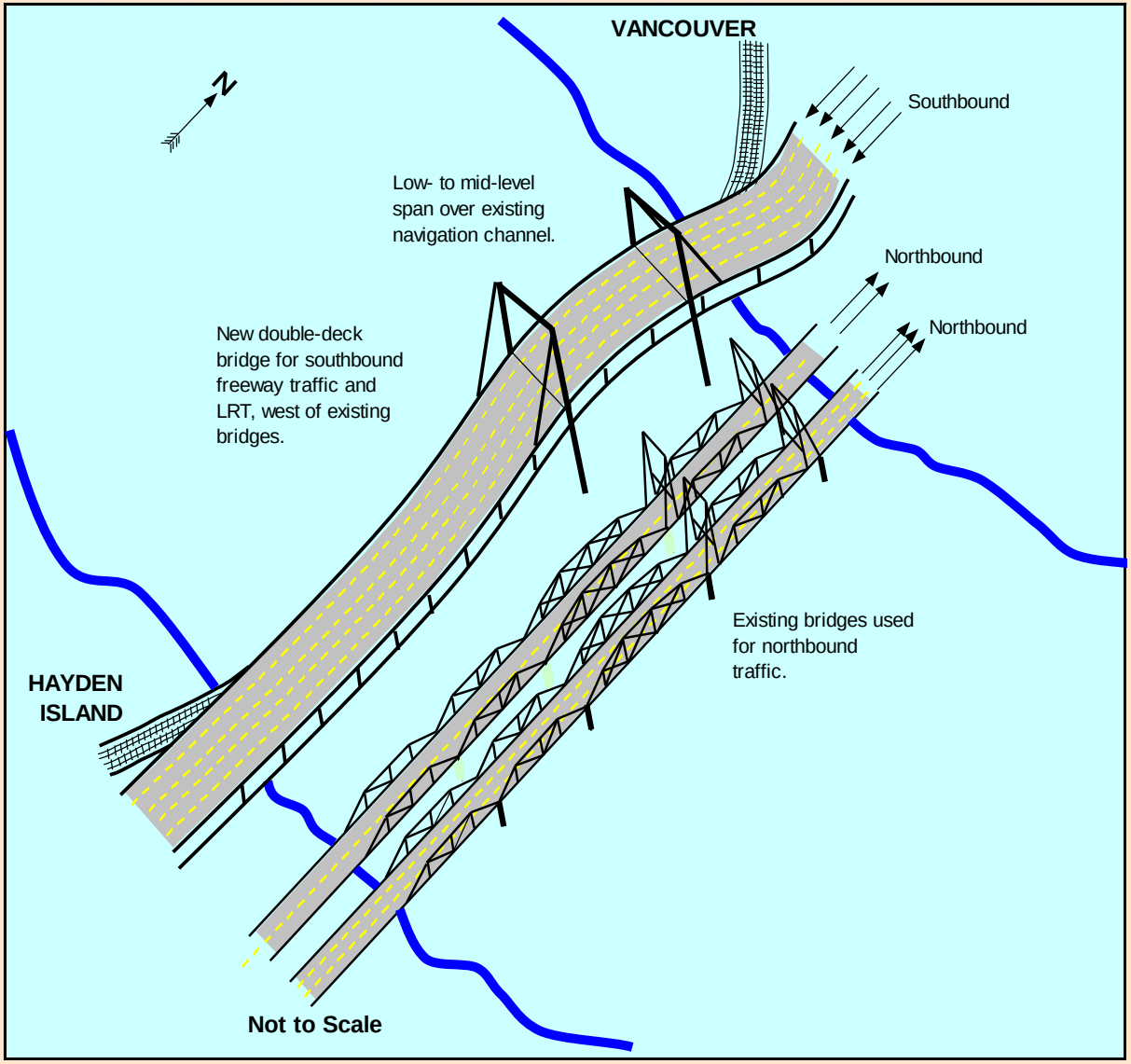
NB PM Peak (2020)



Bridge Influence Area Concepts

A Range of River Crossing Concepts Developed to Evaluate:

- Supplemental vs. replacement bridge concepts
- Joint use (LRT-highway) vs. separate bridges
- Alignments east and west of existing bridges
- Freeway lanes and arterial lanes

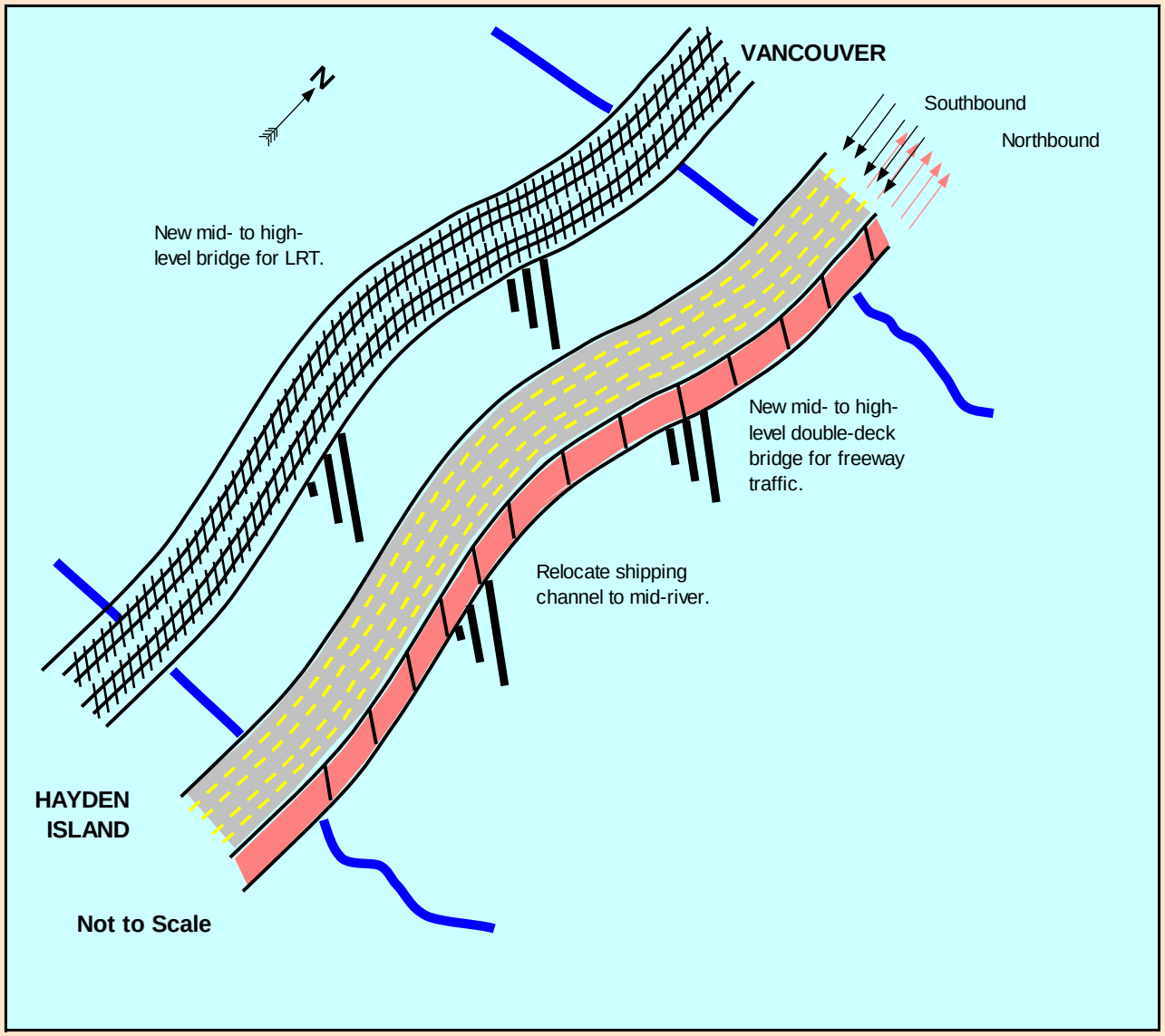


Concept 1:
5-lane southbound supplemental bridge for freeway traffic w/LRT

1. Southbound traffic on new five-lane bridge, LRT on lower deck -- west of existing bridges

2. Low- to mid-level bridge, with lift span over existing navigation channel

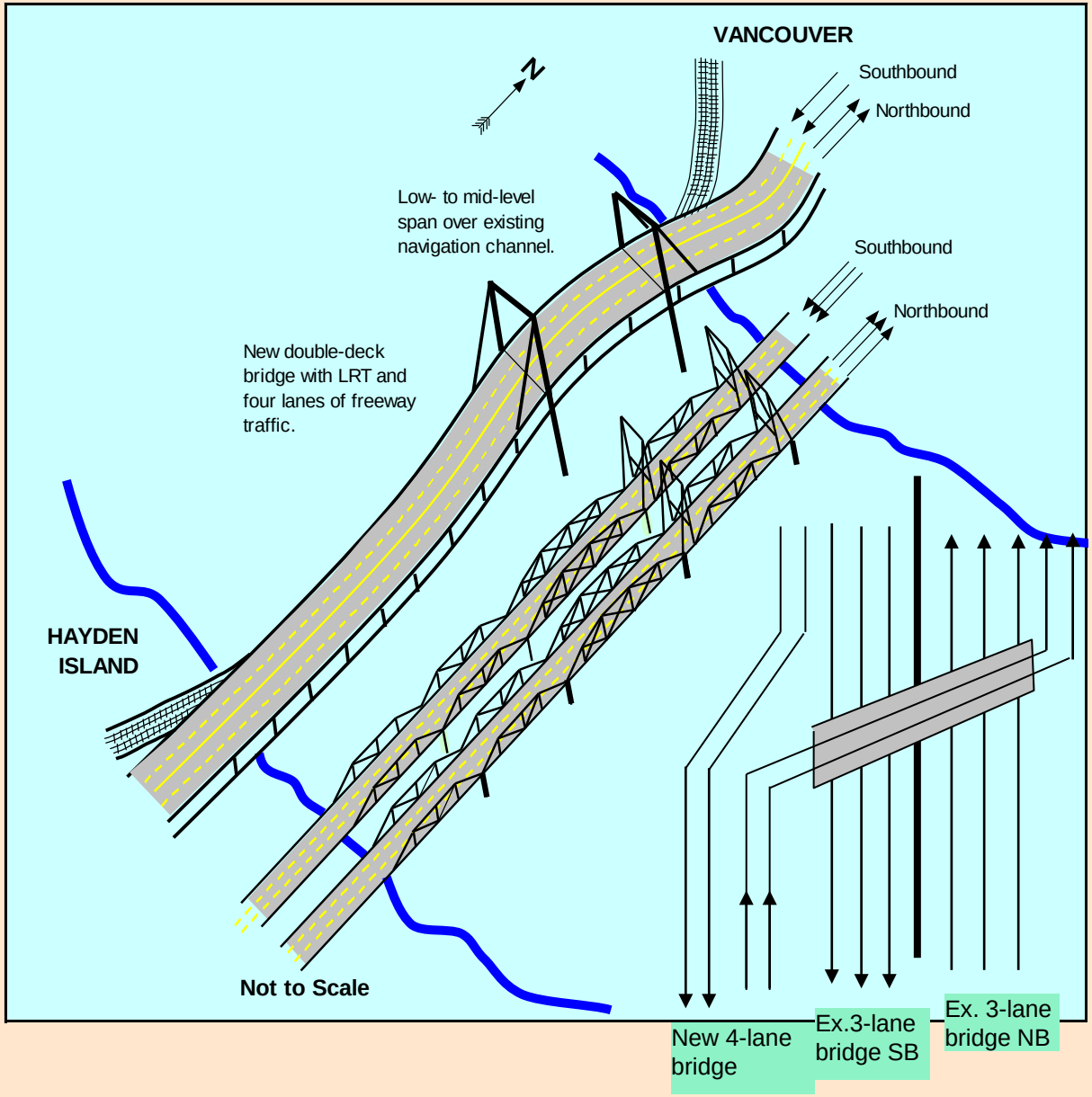
3. Northbound traffic would be split between the two existing bridges



Concept 4:
10-lane double deck, replacement bridge, plus LRT on separate new bridge

1. Mid- to high-level bridges. Navigation channel relocated to center of river

2. Potential fixed spans for highway and LRT (with Coast Guard reduction of existing lift requirements), or lift spans

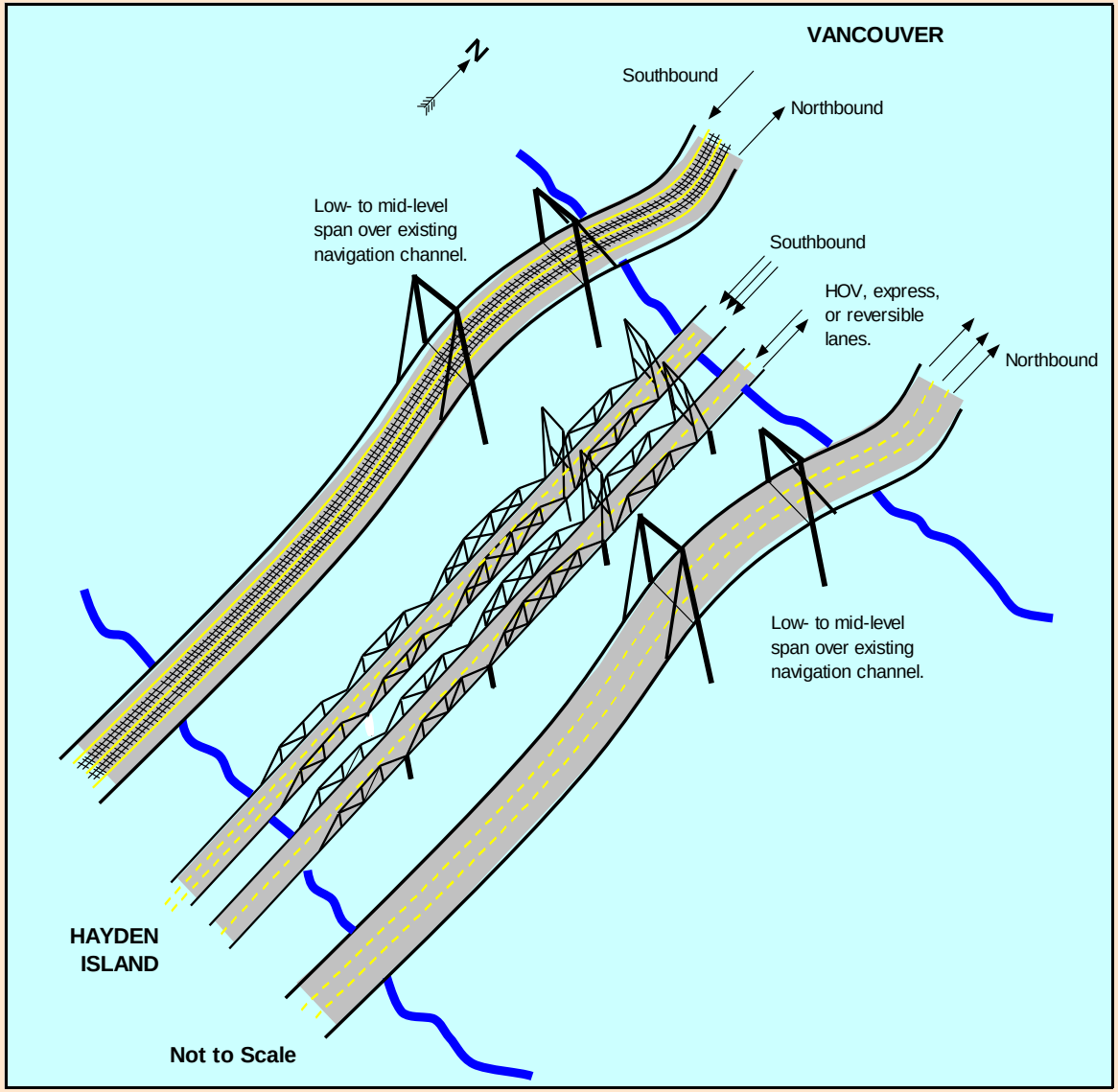


Concept 6:
4-lane supplemental collector-distributor bridge w/LRT, plus 6 lane freeway

1. Provides for new four-lane bridge with LRT west of the existing bridges

2. Low- to mid-level bridge with lift span over current navigation channel

3. Use four-lane bridge as collector-distributor (i.e., ramp access for Hayden Island, etc.). Requires fly-over ramps north and south, as shown in the schematic on the left



Concept 7:
8-lane freeway concept plus new LRT bridge with two-lane arterial

1. Provides for new four-lane bridge with LRT

2. Low- to mid-level bridges with lift spans over current navigation channel

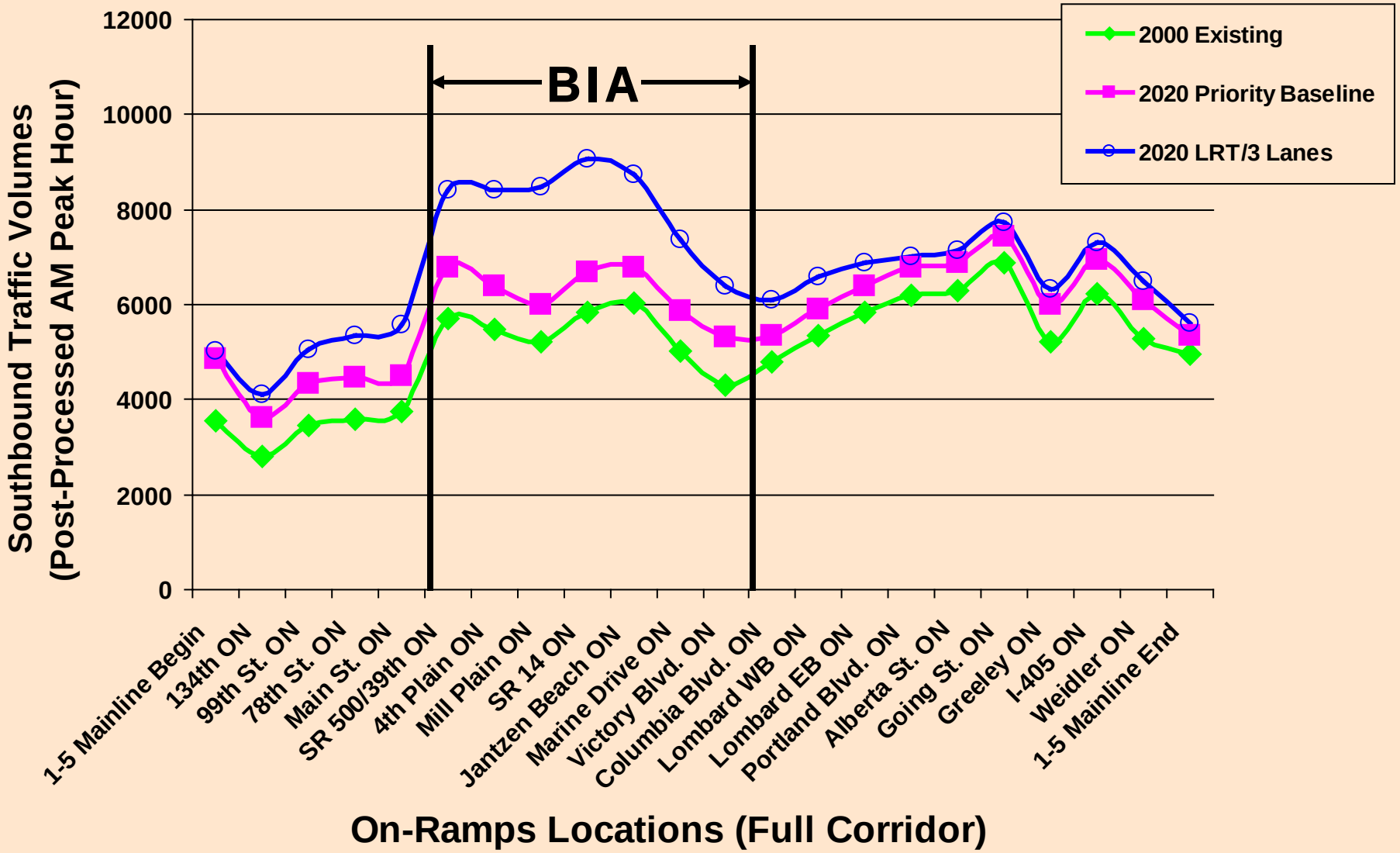
3. Two lanes on existing northbound bridge could be used for HOV, express lanes, or (potentially) reversible lanes

BIA Performance

Is Freeway Effectiveness Increased with Additional Capacity in the BIA?

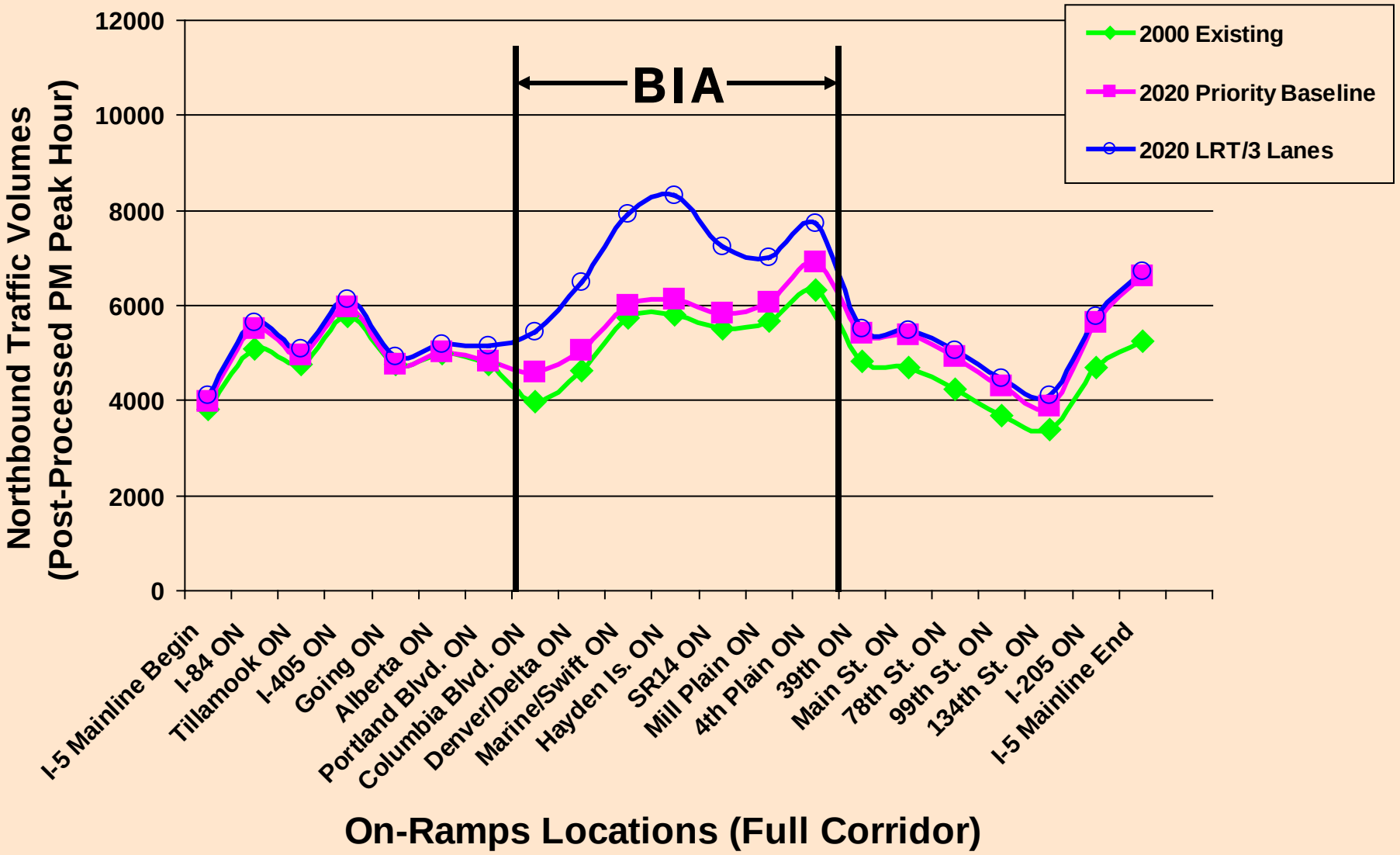
Southbound Travel Volumes

Along I-5 (AM Peak Hour)



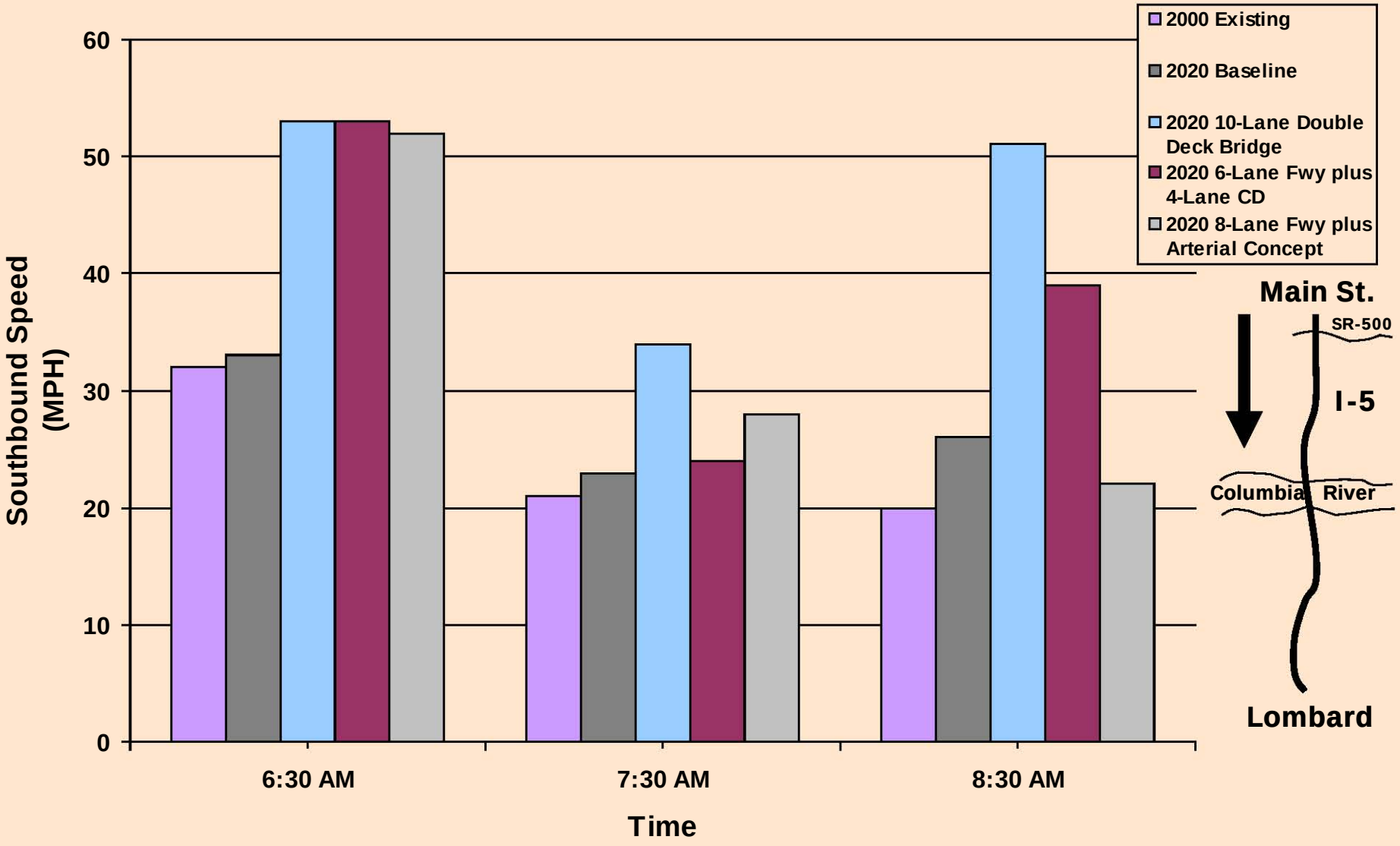
Northbound Travel Volumes

Along I-5 (PM Peak Hour)



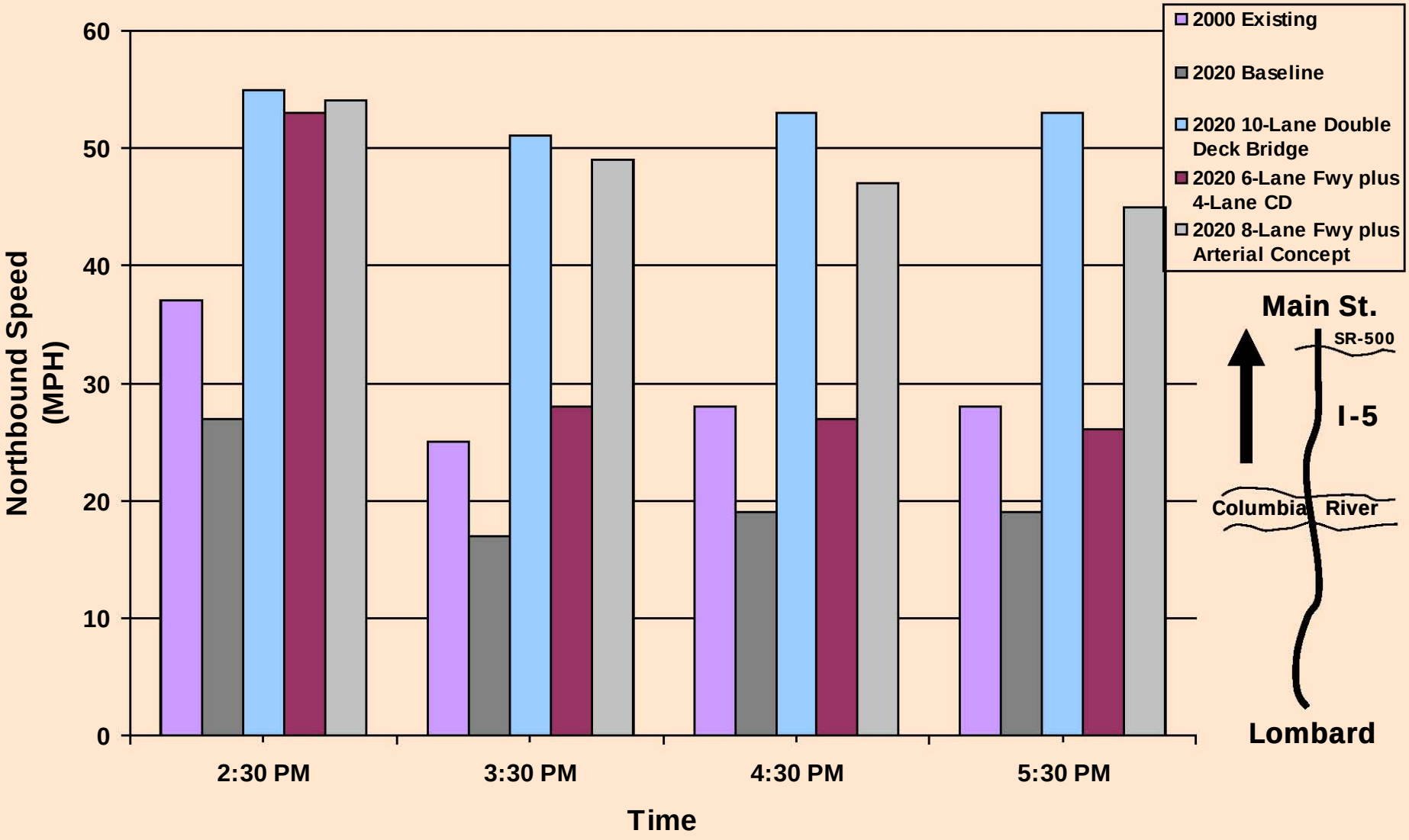
Average Speed

I-5 Southbound - Main St. to Lombard (All Traffic)

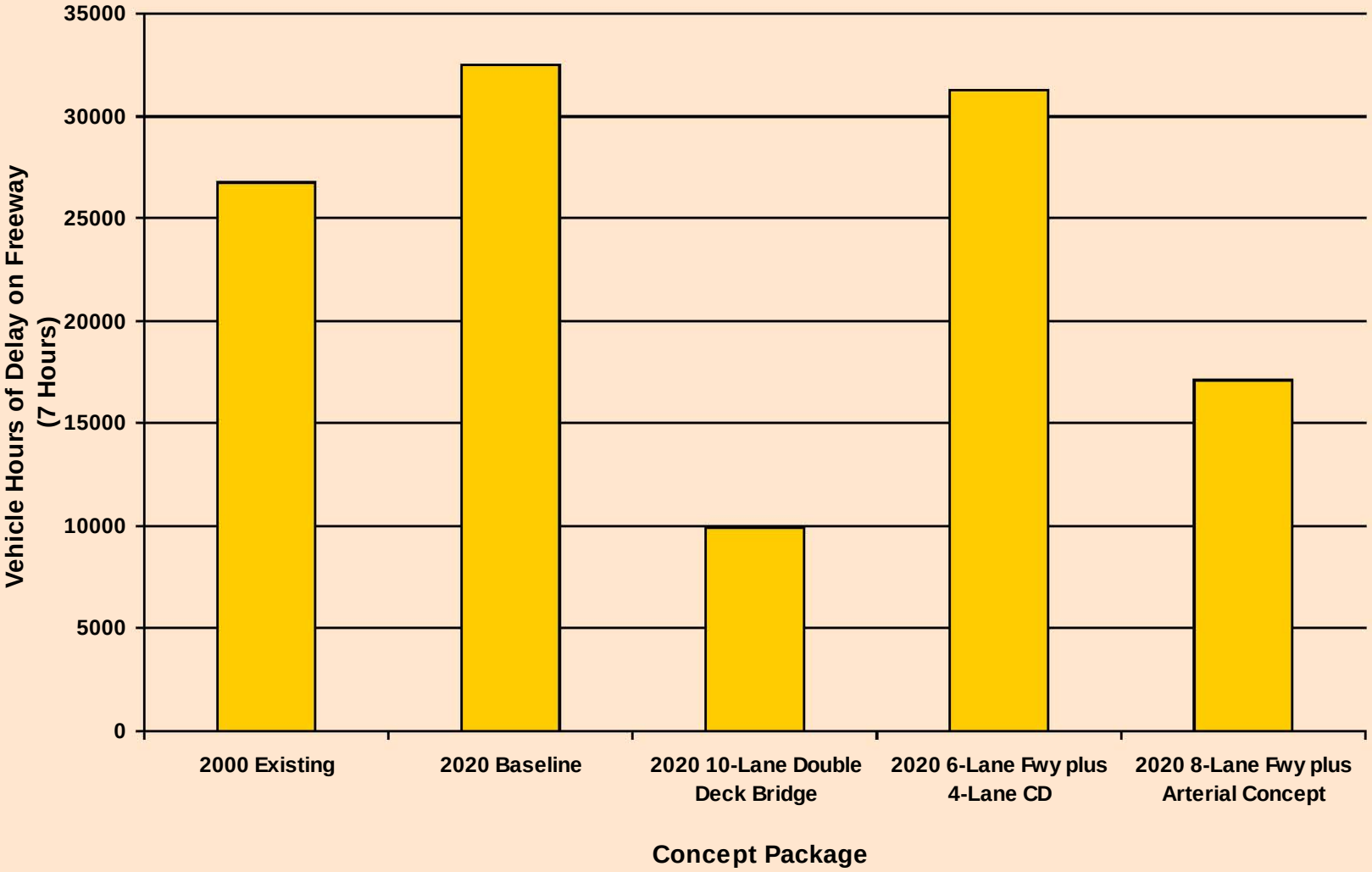


Average Speed

I-5 Northbound - Main St. to Lombard (All Traffic)



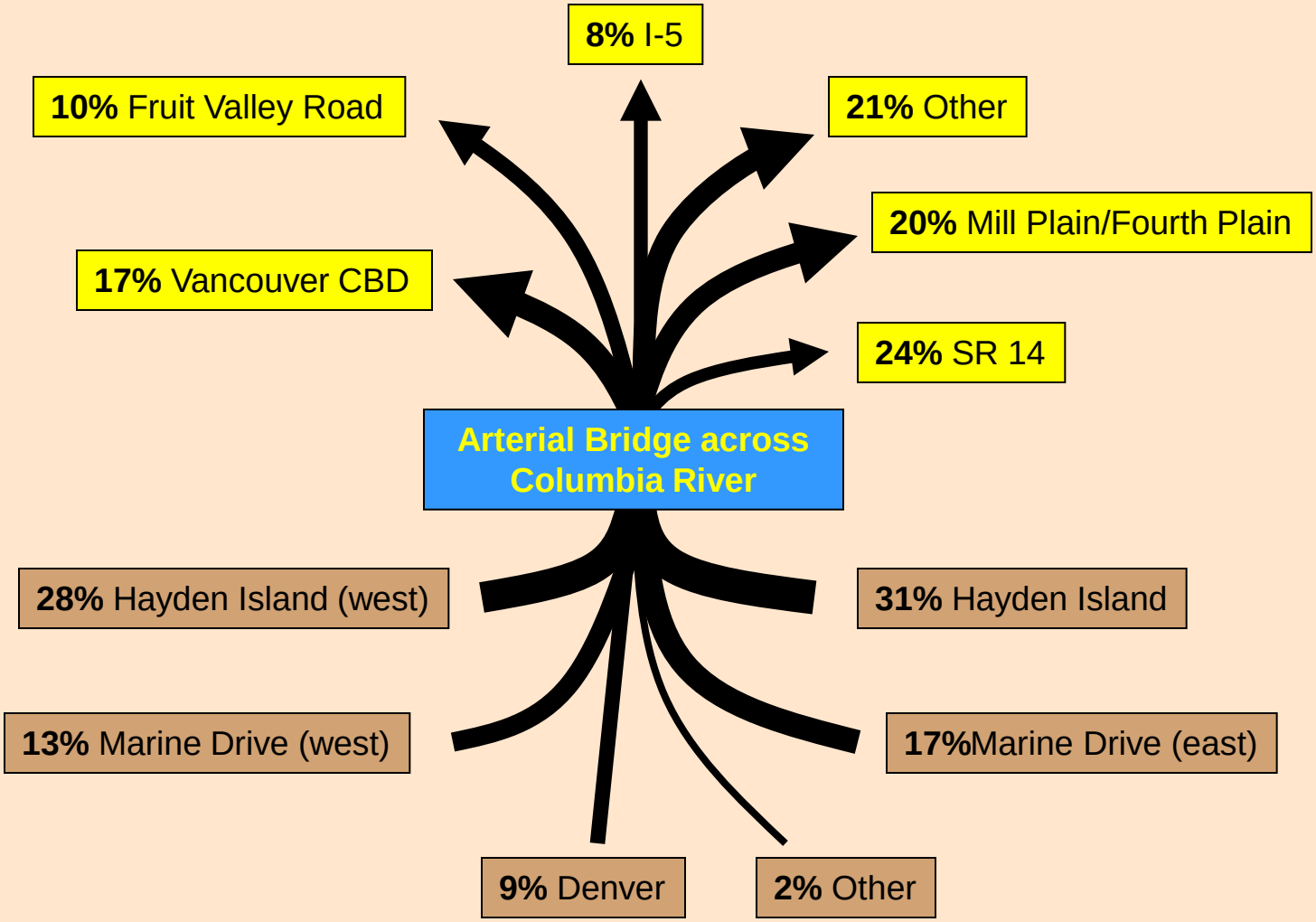
Vehicle Hours of Delay on I-5
(AM and PM Peak Periods)



How Will an Arterial Bridge Function, When Considered With Improved Freeway Capacity?

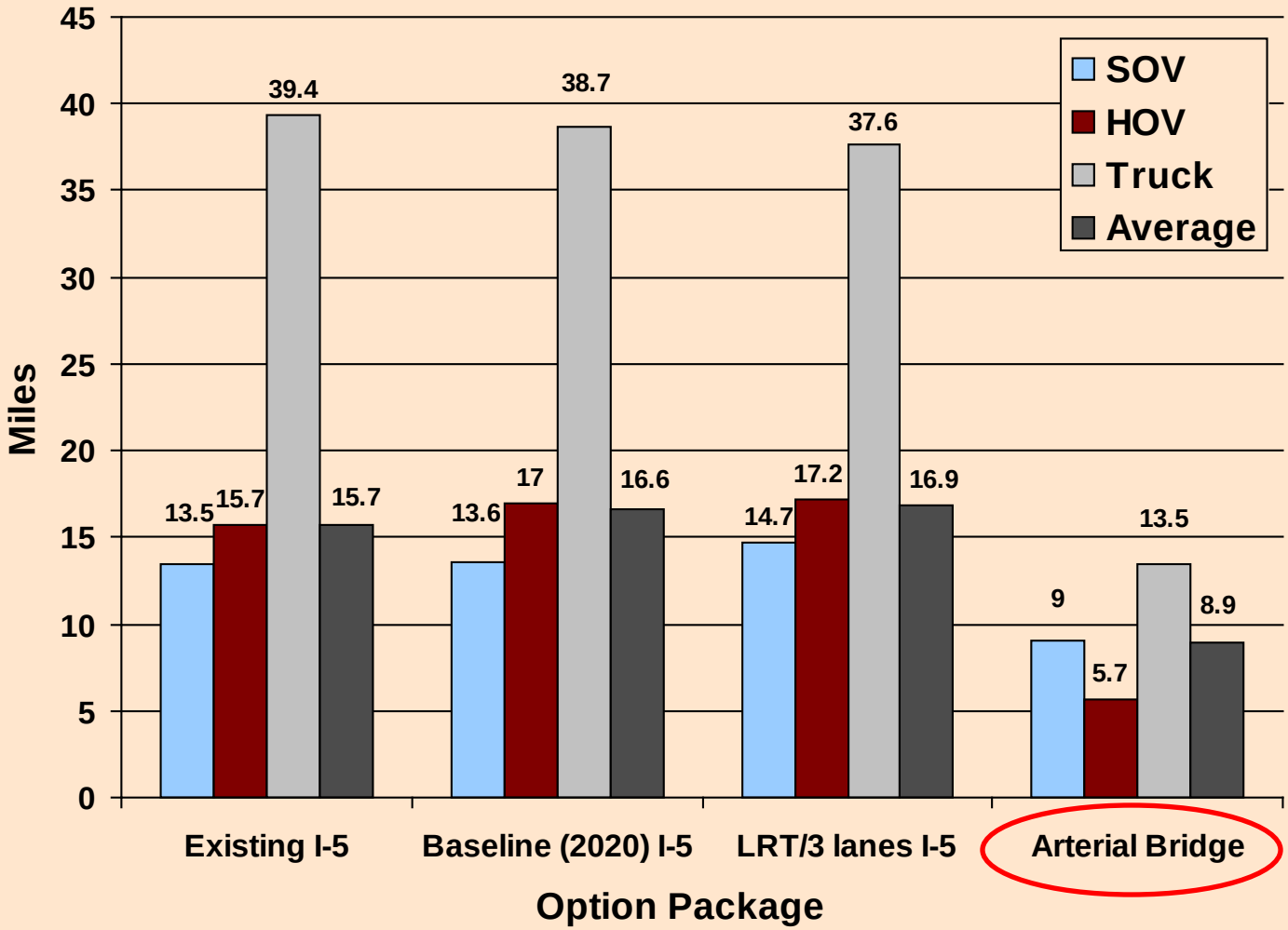
An Arterial Bridge Can Provide Transportation Benefits

Trip Patterns, NB Across Columbia River (PM Peak Period)



Most Trips Are Regional -- Not Local

Average Trip Length
Northbound Across Columbia River (PM Peak Hour)



Arterial Bridge Travel Demands

- Arterial bridge reduces peak direction volumes on I-5 bridge by 1,100 - 1,500 during peak hour
- The arterial bridge does not appear to act as a “bypass” to the I-5 bridge:
  - 10% of PM Arterial traffic from/to I-5
  - 24% of AM Arterial traffic from/to I-5

Arterial Bridge With Additional Freeway Capacity:

- Adding one additional freeway lane and one arterial lane in each direction appears to offer substantial transportation performance benefits, but...
- The trade-off appears to be more delay at interchange ramps and along arterials approaching I-5 with the freeway/arterial lane combination
- The arterial connection, in conjunction with an additional freeway lane, can provide important transportation benefits -- it does remove local trips from the freeway, thus reducing the need for freeway level improvements

Other Transportation Performance Issues

Does bridge type matter?

- The replacement bridge handles traffic operations the best.
- A supplemental freeway bridge has operational problems, but they may be overcome with further design and operations work.
- Concepts for a supplemental collector-distributor bridge result in traffic operations problems that are difficult to overcome
- The collector-distributor bridge is too heavily utilized because it serves several interchanges -- the existing bridges are underutilized because they primarily handle through traffic.

What are the benefits to freight mobility?

Improvements

- Addition capacity in BIA
- Make Columbia Blvd a full interchange
- Improve access to I-5 at Marine Drive interchange
- Full connections between Columbia Blvd., Denver Ave, Marine Drive, MLK Blvd., and Hayden Island.

Benefits

- Improved access to/from key industrial destinations: Port of Vancouver, Columbia Corridor, Rivergate
- Improved travel times and reduced delay on I-5
- Increased reliability and predictability

What about HOV?

- HOV utilization and performance is highly dependent on the facilities provided:
  - Additional river crossing capacity is needed for HOV system continuity
  - Direct access ramps should be considered at key locations (i.e., SR 500)
  - Bridge design affects HOV performance (a supplemental bridge splits freeway traffic, which limits HOV access)
  - Further study is required to determine effectiveness of an HOV system corridor-wide.

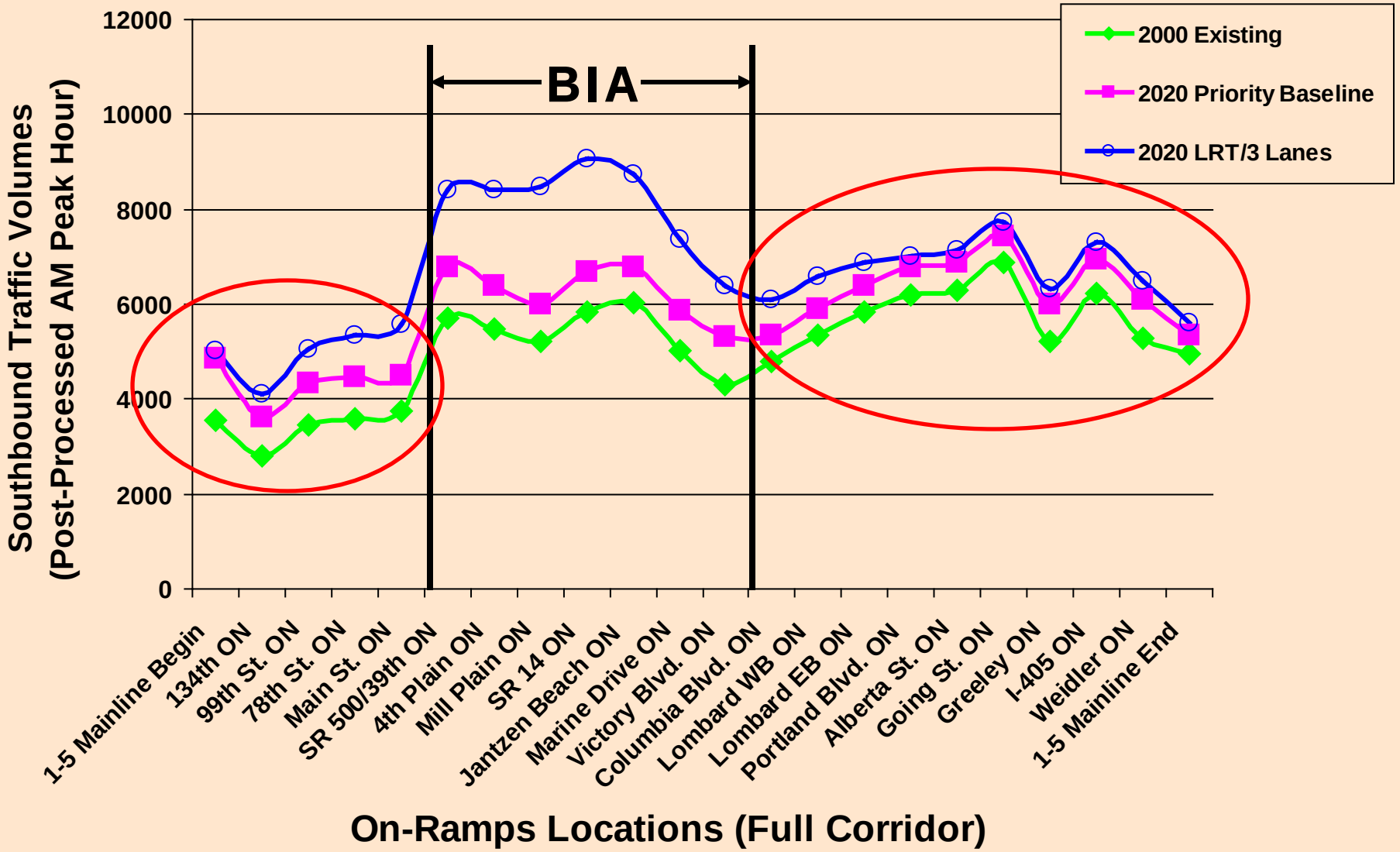
How will Safety be Affected?

- All concepts reduce weaving and merging.
- Replacement bridge provides for current design standards for all freeway users; supplemental bridge means traffic on existing bridges will not have standard shoulders.
- Existing bridges do not meet current seismic standards (could fail in a major earthquake).
- Bridge options that minimize number of crossings are more desirable for marine navigation.

Potential Traffic Impacts from Increased BIA Capacity

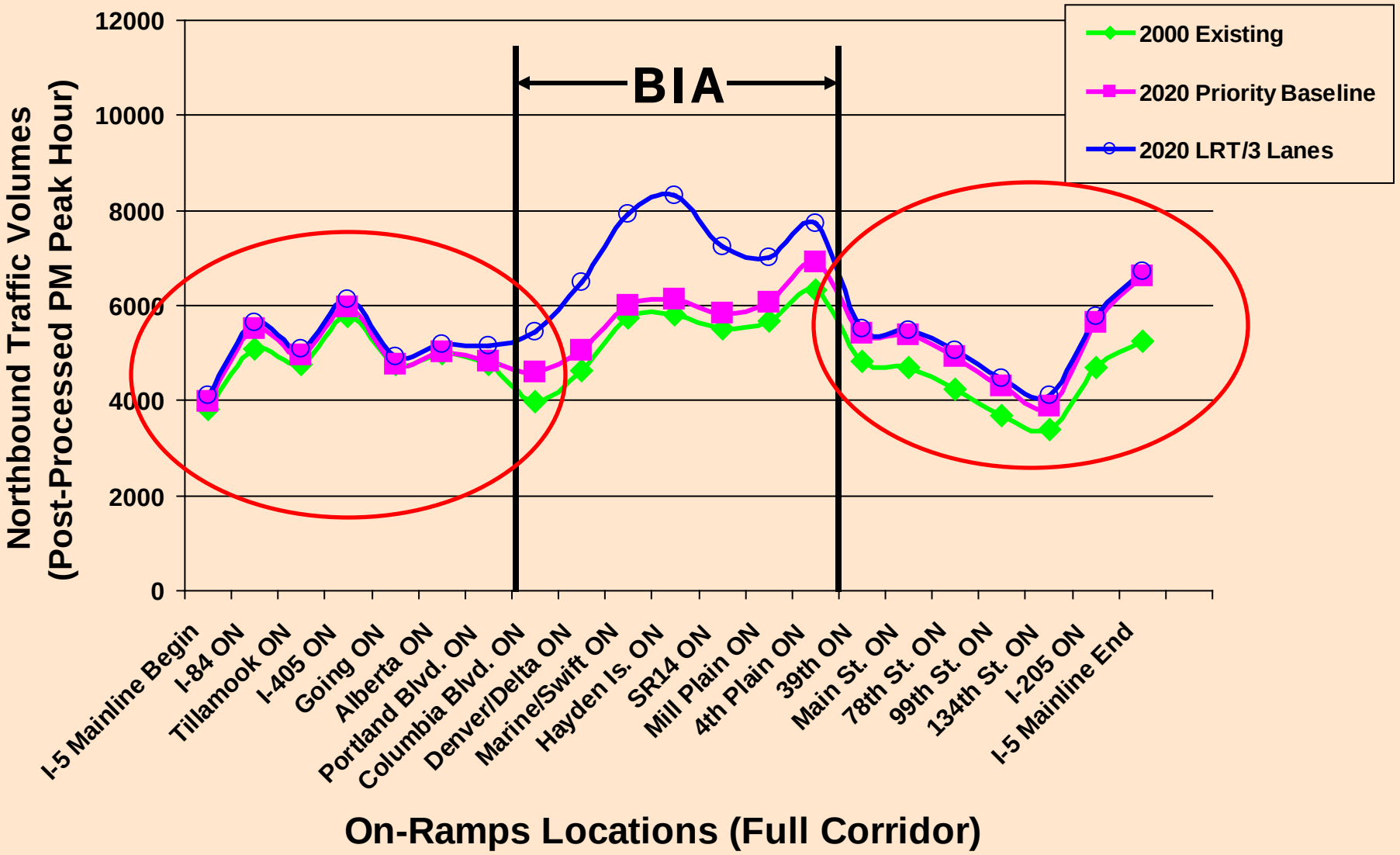
Southbound Travel Volumes

Along I-5 (AM Peak Hour)



Northbound Travel Volumes

Along I-5 (PM Peak Hour)



Changes in Travel Demand on Other Major Corridors

- In Portland, traffic will increase on arterials near the BIA (Denver, MLK, Columbia), but the effect of the capacity increase is dispersed as you travel away from the BIA.
- In Vancouver, BIA capacity increases will result in additional growth in traffic on SR 500 and SR 14 (beyond the background changes from 2000 to 2020).

What are the Potential Costs and Impacts?

Estimated Costs

Concept	BIA Estimated Costs $2002 dollars - in millions*			
	LRT	Arterial	Freeway	Total
Ten- lane Freeway Concepts				
5-lane southbound supplemental bridge for freeway traffic w/LRT	$69	$0	$969	$1,038
10-lane double deck, replacement bridge, plus LRT on separate new bridge	$186	$0	$989	$1,175
Eight freeway lanes plus two-lane arterial				
8-lane freeway concept, plus new LRT bridge with two-lane arterial	$69	$142	$612	$824

* Costs of potential improvements from SR 500 to Columbia Blvd, plus the Delta Park to Lombard widening.

Cost Considered

- Potential highway and transit costs in the BIA range from $825 million -1.2 billion (in 2002 dollars)
- Costs exclude major maintenance and seismic retrofit costs for existing bridges
- When these extra costs of maintaining the existing bridges are factored in, the costs of concepts are within 20% of one another

Potential Property Impacts

	Concept #1: 5-lane southbound supplemental bridge for freeway traffic w/LRT		Concept #4: 10-lane double deck, replacement bridge, plus LRT on separate new bridge		Concept #6: 4-lane supplemental collector-distributor bridge w/LRT, plus 6 lane freeway		Concept #7: 8-lane freeway concept plus new LRT bridge with two-lane arterial	
	Resi-dential	Non-Resi-dential	Resi-dential	Non-Resi-dential	Resi-dential	Non-Resi-dential	Resi-dential	Non-Resi-dential
Displacements								
Vancouver	0	0	0	1	0	2	0	0
Portland	8	16	6	8	20	21	6	17
Total	*8*	*16*	*6*	*9*	*20*	*23*	*6*	*17*
Encroachments								
Vancouver	21	15	9	8	15	26	13	10
Portland	0	17	0	27	1	17	0	19
Total	*21*	*32*	*9*	*35*	*16*	*43*	*13*	*29*

Fish Habitat

- All concepts have the potential for impacts to fish habitat associated with Columbia River, North Portland Harbor and Columbia Slough crossings
- Concept 4, the replacement bridge has the most crossings, while Concept 1 has the fewest.
- Impacts are dependent on the number bridges and their type, size and location
- Impacts will need detailed evaluation in an EIS and ultimately will need mitigation

Wetlands and Parks

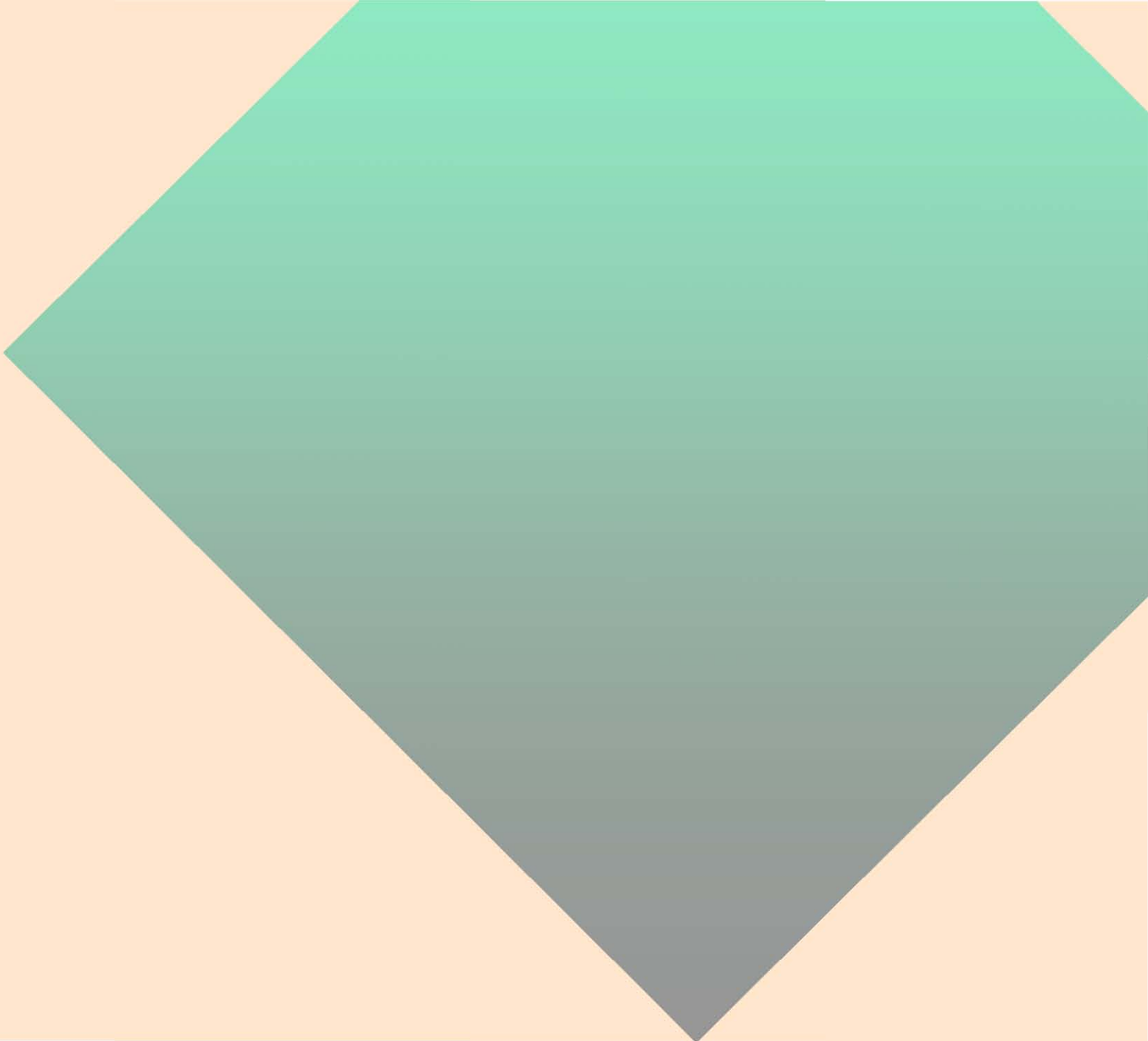
- Potential impacts to the radio tower wetland and Delta Park.
- All concepts, except concept 1, have encroachments onto Delta Park (60-120 feet depending on concept)
- All concepts, except concept 4, have encroachments onto the radio tower wetlands site (100-240 feet depending on concept)
- Impacts will depend on the design of improvements and will need detailed evaluation in an EIS

Historical

- All concepts have encroachments onto the Ft. Vancouver Historical Site (60-120 feet depending on concept).
  - An encroachment over 60’ would impact the FHWA building, however no historic buildings would be impacted
- Concept 4, a replacement bridge, would involve a full impact to the Columbia River Bridge.
  - The existing northbound bridge is registered on the National Register of Historic Places and the southbound bridge is eligible for registration.

Key Resources - EIS Work

- Actual impacts to natural, cultural and historic resources will need to be determined in an EIS process. Mitigation may be required for some impacts.
- If a park, historic or cultural resource is impacted, federal regulations require a determination in the EIS process that there is no feasible or prudent alternative. While this standard is quite high, it is balanced with the overall needs of the community.



Overall Findings

BIA Findings

- Additional crossing capacity in the BIA is needed for transit and vehicles to address current and future corridor congestion problems
- Without investment, congestion and delay will grow steadily and spread into the mid-day periods
- Overall, improvements in the BIA significantly enhance system performance compared to today and 2020 Baseline

BIA Findings - cont.

- BIA improvements are likely to result in:
  - Minimal traffic increases on I-5 outside the BIA
  - Increases in traffic on arterial with direct access to the BIA
- Traffic increases dissipate as you move away from the BIA

BIA Findings - cont.

- An arterial connection in the I-5 corridor would improve connections between local street systems and serve a significant number of trips
- While an arterial-only bridge would not address the capacity problems on the freeway, it could be an effective component of an overall transportation package

Implementation Findings - cont.

- Concepts with 10 freeway lanes, and concepts with 8 freeway plus arterial lanes, appear promising and should both continue into an EIS for further detailed study to specifically identify:
  - Optimal amount of capacity
  - Optimal balance of freeway and arterial lanes
  - Specific impacts and costs

Implementation Findings - cont.

- A joint use (hwy/lrt) bridge could be cost effective, but there are other important factors to consider:
  - right of way impacts
  - construction staging
  - optimal alignment for LRT and hwy, and
  - light rail station siting

Implementation Findings - cont.

- While conversion of an existing bridge for LRT use is technically feasible, it may not be cost effective particularly if seismic retrofitting is required.
- Further investigation of costs and comparison to costs of a new bridge is needed.

Implementation Findings - cont.

- Further study is needed to determine whether new bridge should be a replacement or supplemental.
- Several factors will influence decision:
  - optimizing traffic operations (replacement is easier)
  - costs (supplemental may be as costly as replacement)
  - right of way impacts (replacement appears to have fewer impacts)
  - impacts to cultural and historic resources (both supplemental and replacements have trade-offs)

Implementation Finding - cont.

- A corridor-wide HOV lane is a possibility with a new river crossing
- HOV utilization and performance is highly dependent on how it is designed
- Further design work in an EIS is needed to ensure that it will operate well and have good utilization

Cost Findings

- Potential highway and transit costs in the BIA range from $825 million to $1.2 billion.
- There is not a significant enough cost differential to eliminate any of the options based on cost alone.

Property Impact Findings

- Should improvements be made in the BIA, it is unlikely that property impacts can be avoided altogether.
- There are design concepts that can minimize property impacts.
- Even so, the need for additional right of way will likely require the purchase of homes and businesses, primarily on Hayden Island.

Key Resource Impact Findings

- There are several important natural and historic resources in the BIA.
- In making improvements to the BIA it will be difficult to entirely avoid impacts to all key resources in the corridor.
- The EIS process will allow a full exploration of impacts to natural, cultural and historic resources and to determine the best balance for the environment and the community.

Land Use Findings

- Overall, BIA improvements are compatible with local and regional land use plans.

- Bi-state coordination in the area of growth management is needed to minimize the risk that local and regional land use decisions will compromise the transportation benefits of improvements in the BIA.

Overall Finding

- Draft recommendations for the BIA and the river crossing support the Task Force's Problem, Vision and Values statement and require little change.

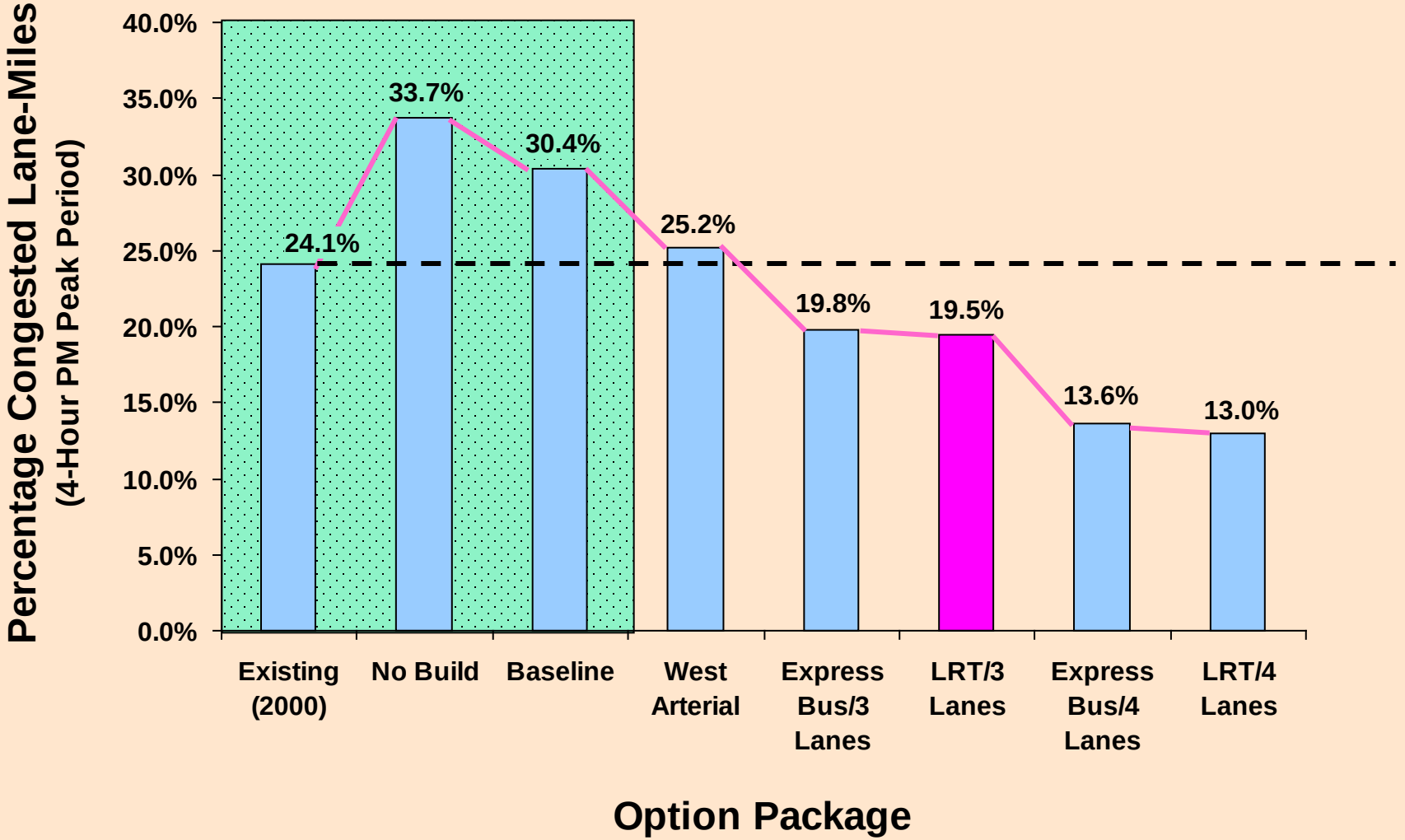
Specific Questions about BIA Improvements

Do We Need More River Crossing Capacity?

If Yes, how much?

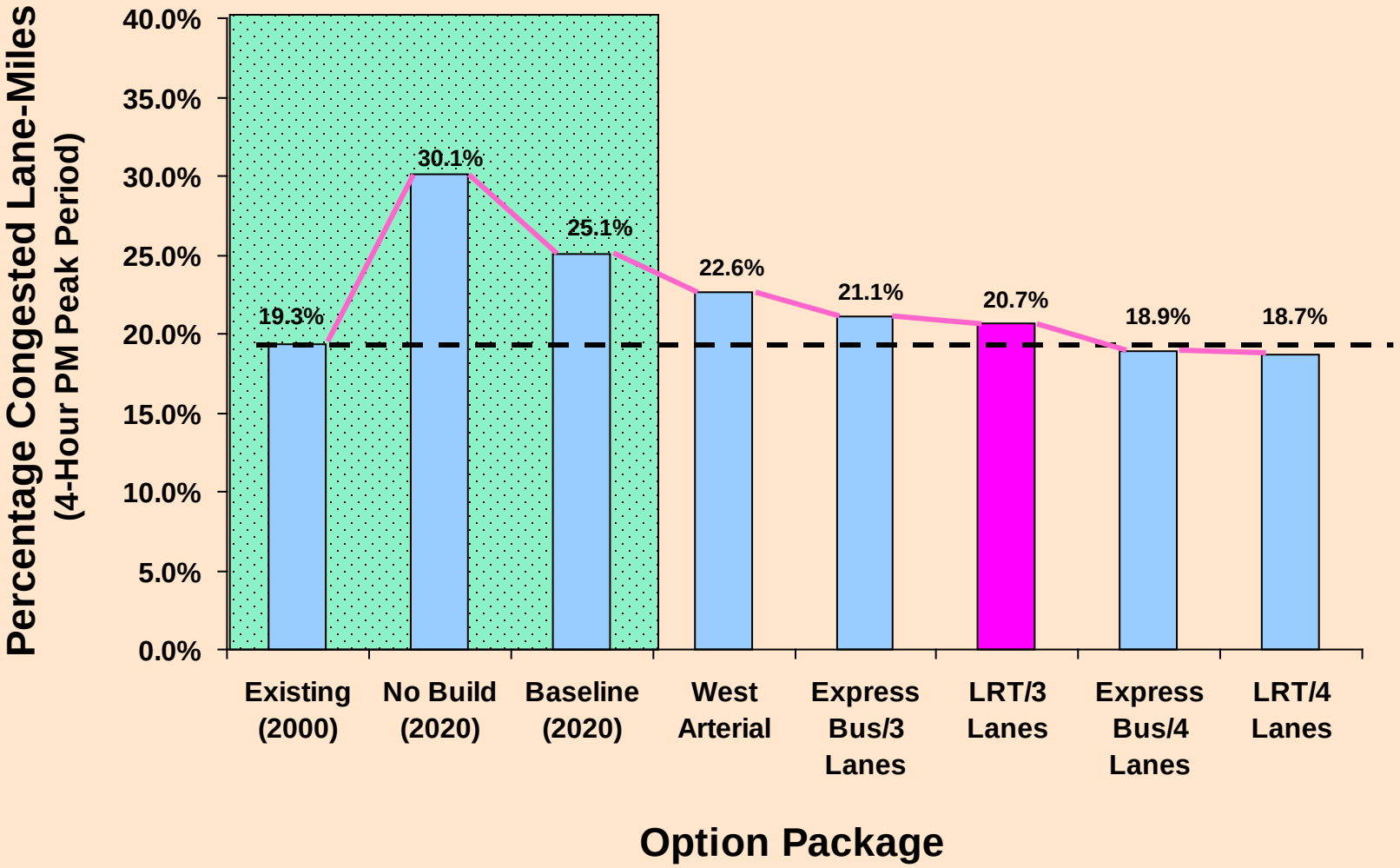
Congestion on I-5 and I-205

Congested Lane-Miles (PM Peak)



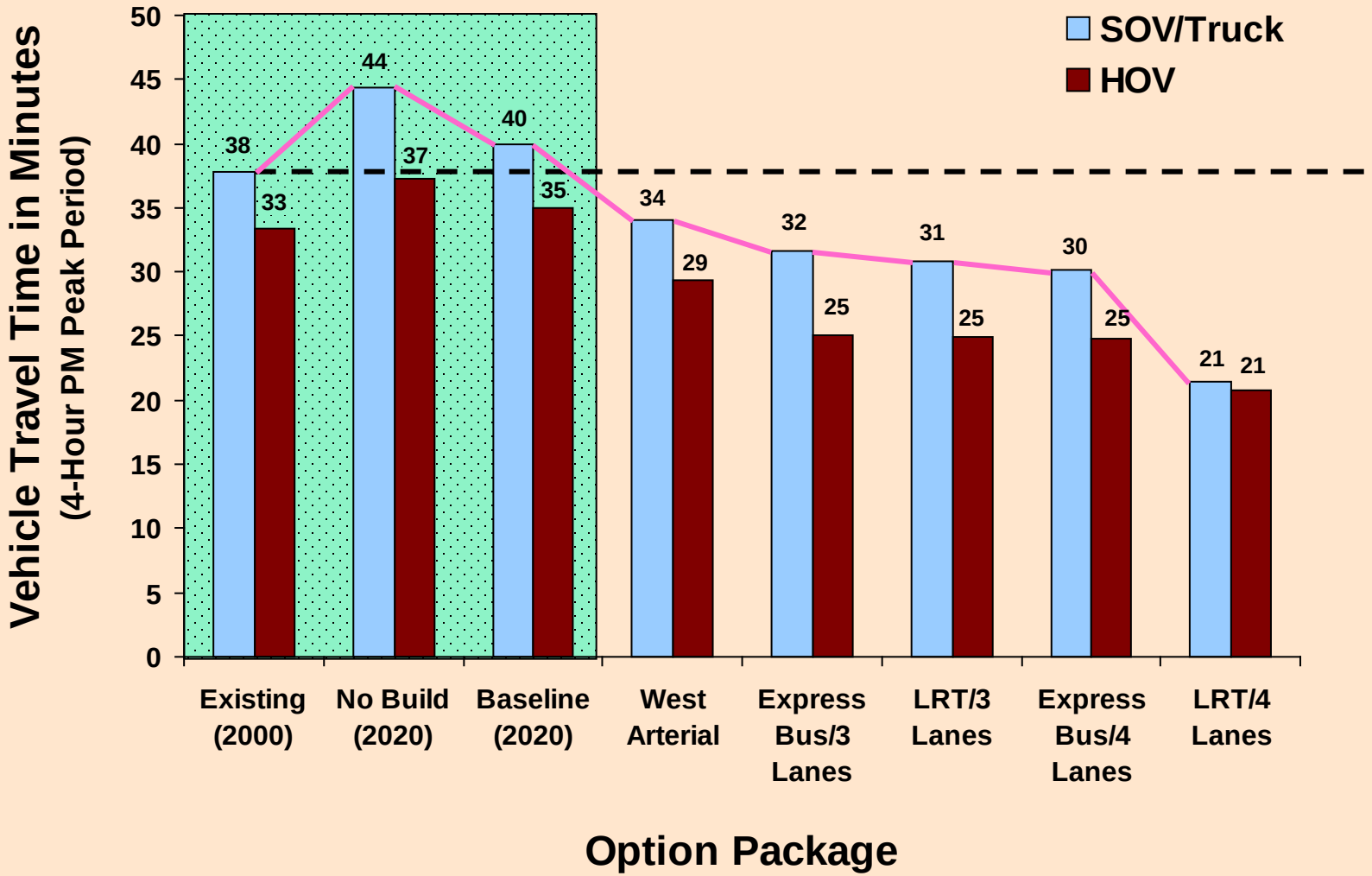
Congestion on Truck Routes

Congested Lane-Miles (PM Peak)



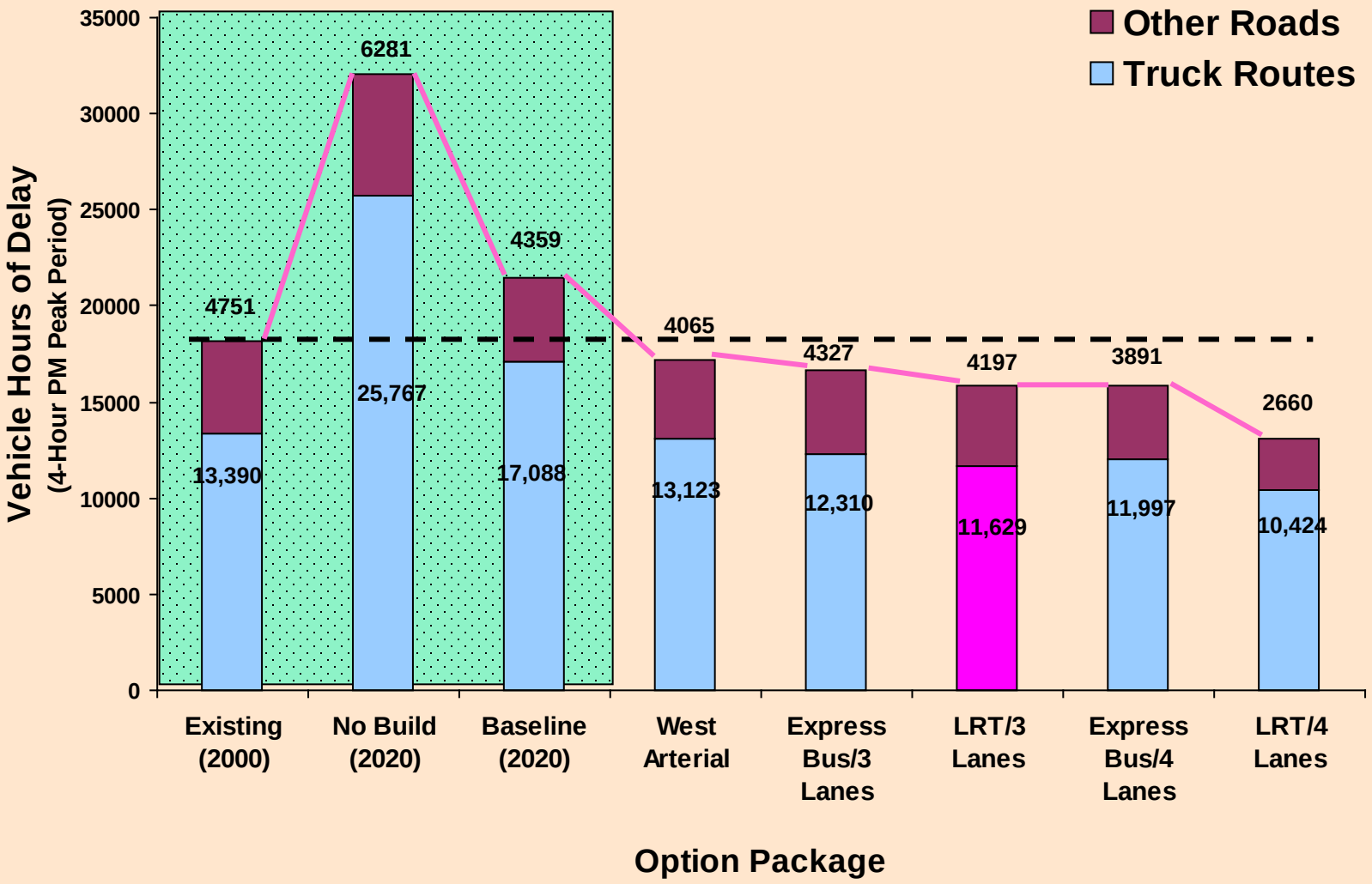
Vehicle Travel Times

Downtown Portland to Salmon Creek (PM Peak)



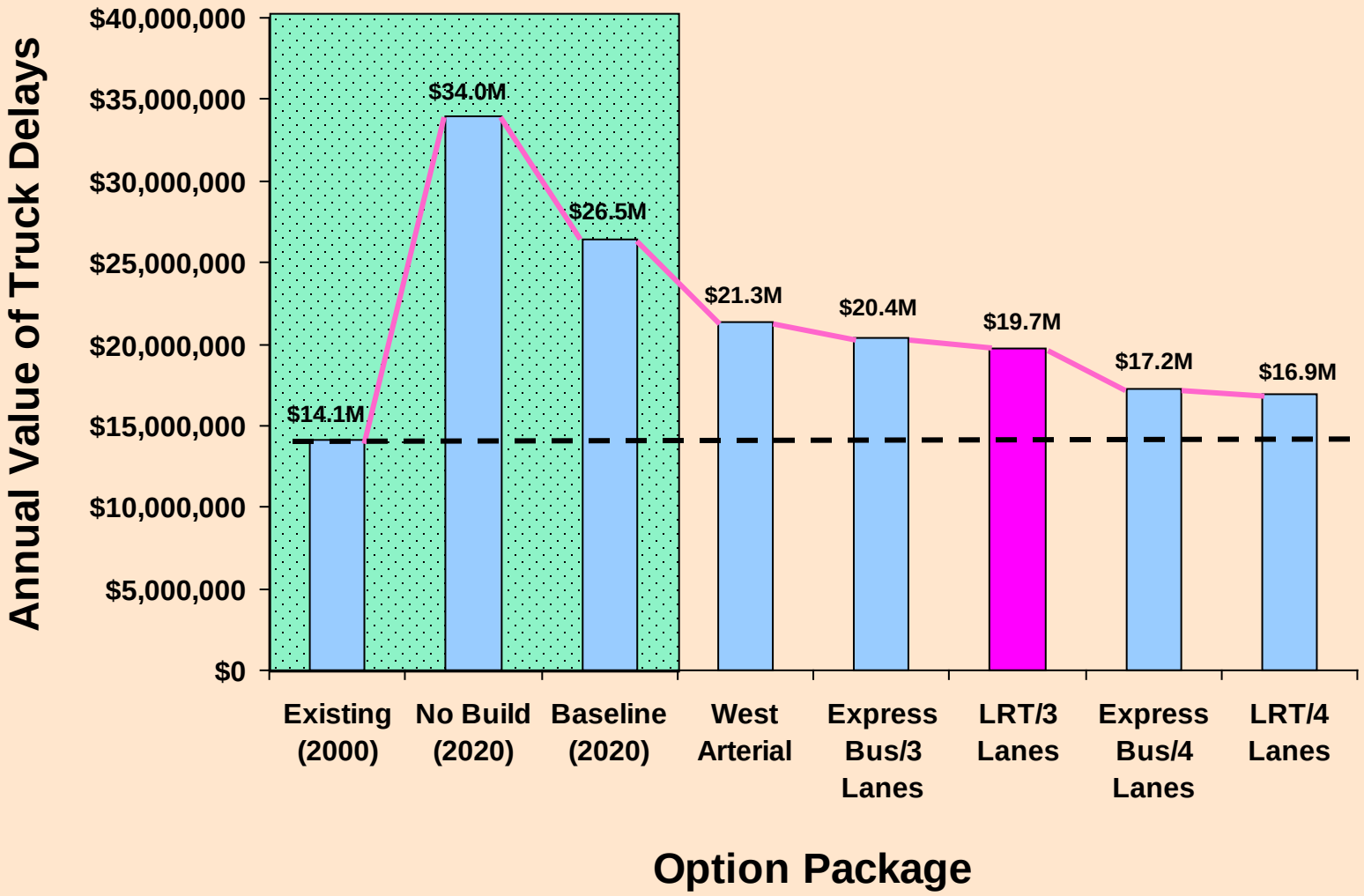
Vehicle Hours of Delay

In the Study Area (PM Peak)



Value of Truck Delay

(In the Study Area)



Without Additional Capacity Congestion will Move into the Mid-Day

	2000	2020
Morning	7-9 a.m.	6-10 a.m.
Evening	4-6 p.m.	2:30 – 8 p.m.

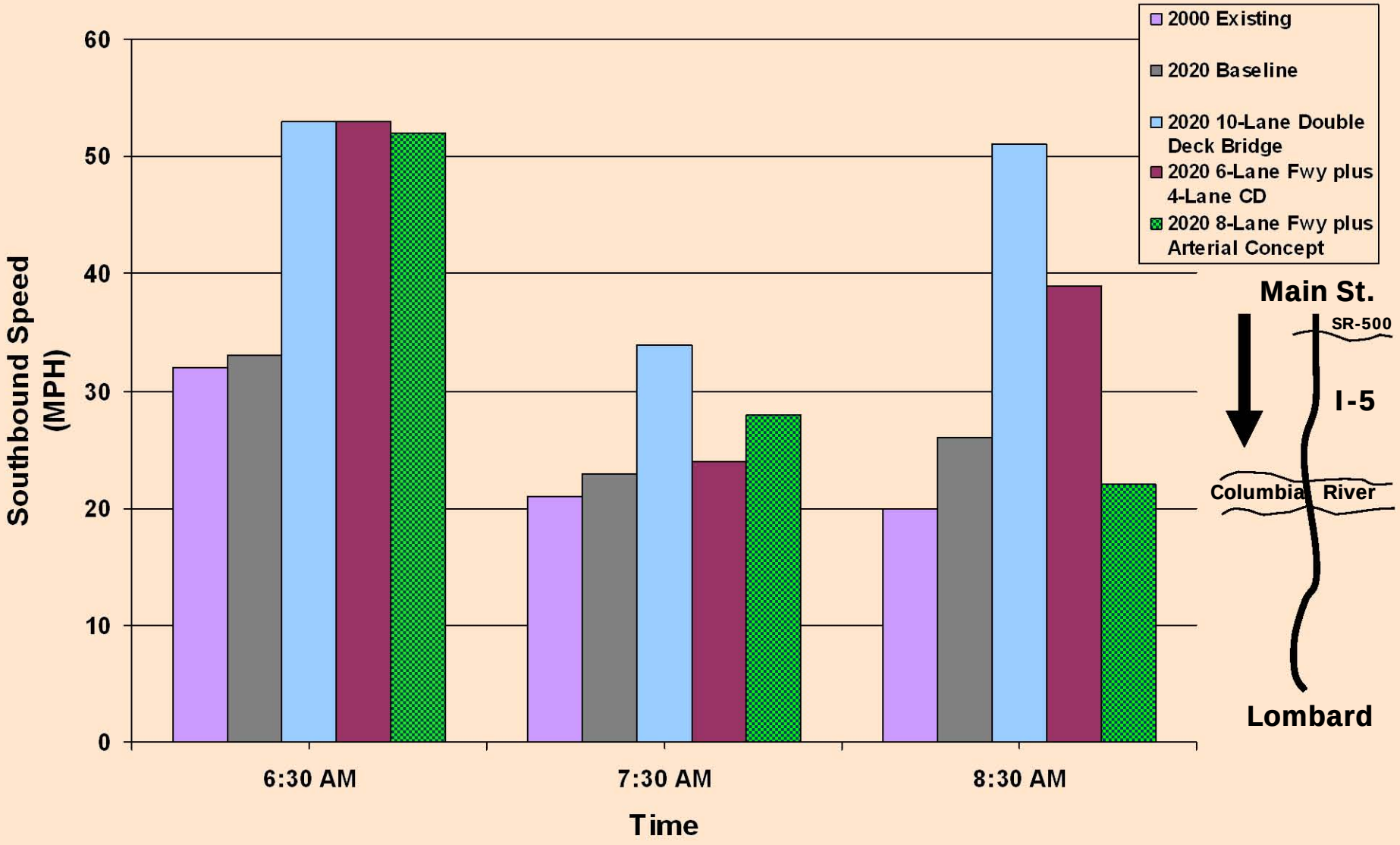
Findings

- Travel demands will be increasing over the next 20 years due to growth
- Additional freeway capacity is needed for vehicles to address the “bottleneck” caused by the existing bridges and to serve future demand.
- To maintain, and improve, today’s level of performance (travel times, speeds, hours of congestion), up to two additional lanes, in each direction, are needed in the BIA
- Without additional capacity, and other transportation improvements, users of the freeway system can expect delay time to about double and for congestion to creep into the mid-day period.

How does an Arterial Bridge work with additional freeway crossing capacity?

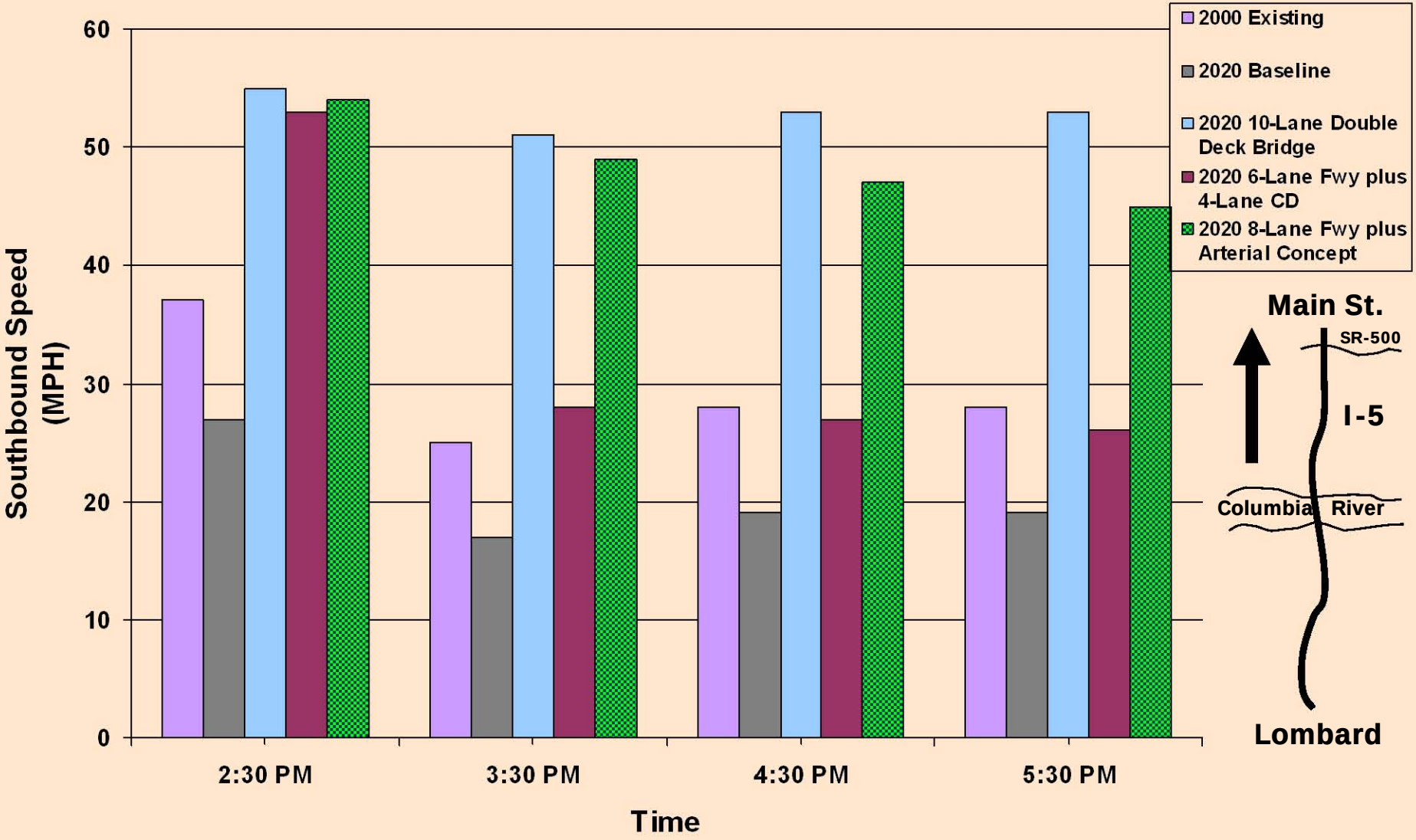
Average Speed

I-5 Southbound - Main St. to Lombard (All Traffic)



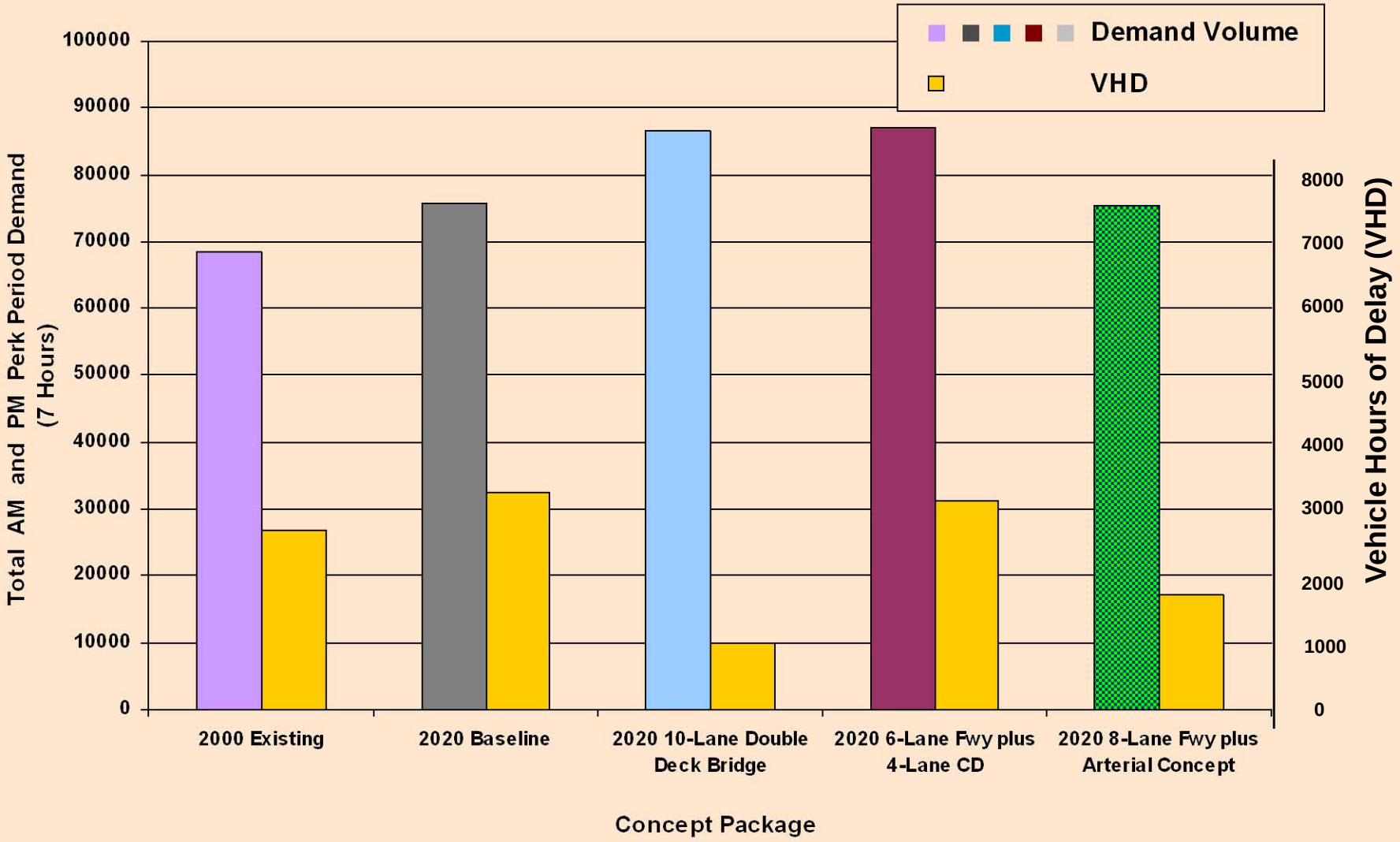
Average Speed

I-5 Northbound - Main St. to Lombard (All Traffic)

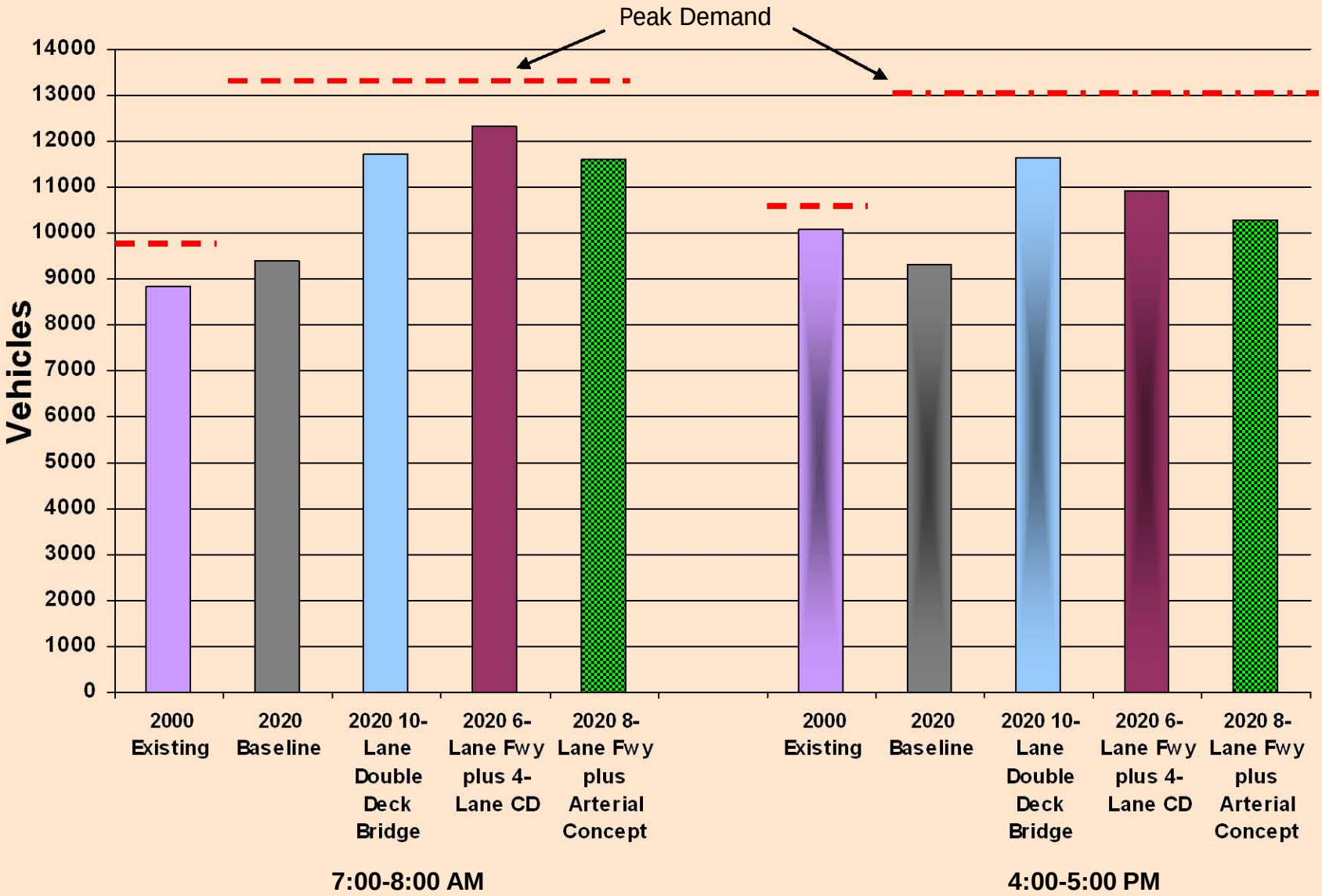


Demand and Vehicle Hours of Delay

(AM and PM Peak Periods)



Served Demand
AM and PM Peak Hours



Findings

- Adding one additional freeway lane and one arterial lane in each direction appears to offer similar transportation performance benefits, but...
- The trade-off appears to be more delay at interchange ramps and along arterials approaching I-5 with the freeway/arterial lane combination
- The arterial connection, in conjunction with an additional freeway lane, can provide important transportation benefits -- it does remove local trips from the freeway, thus reducing the need for freeway level improvements

Can an Arterial Bridge alone address the corridor's problems?

Findings

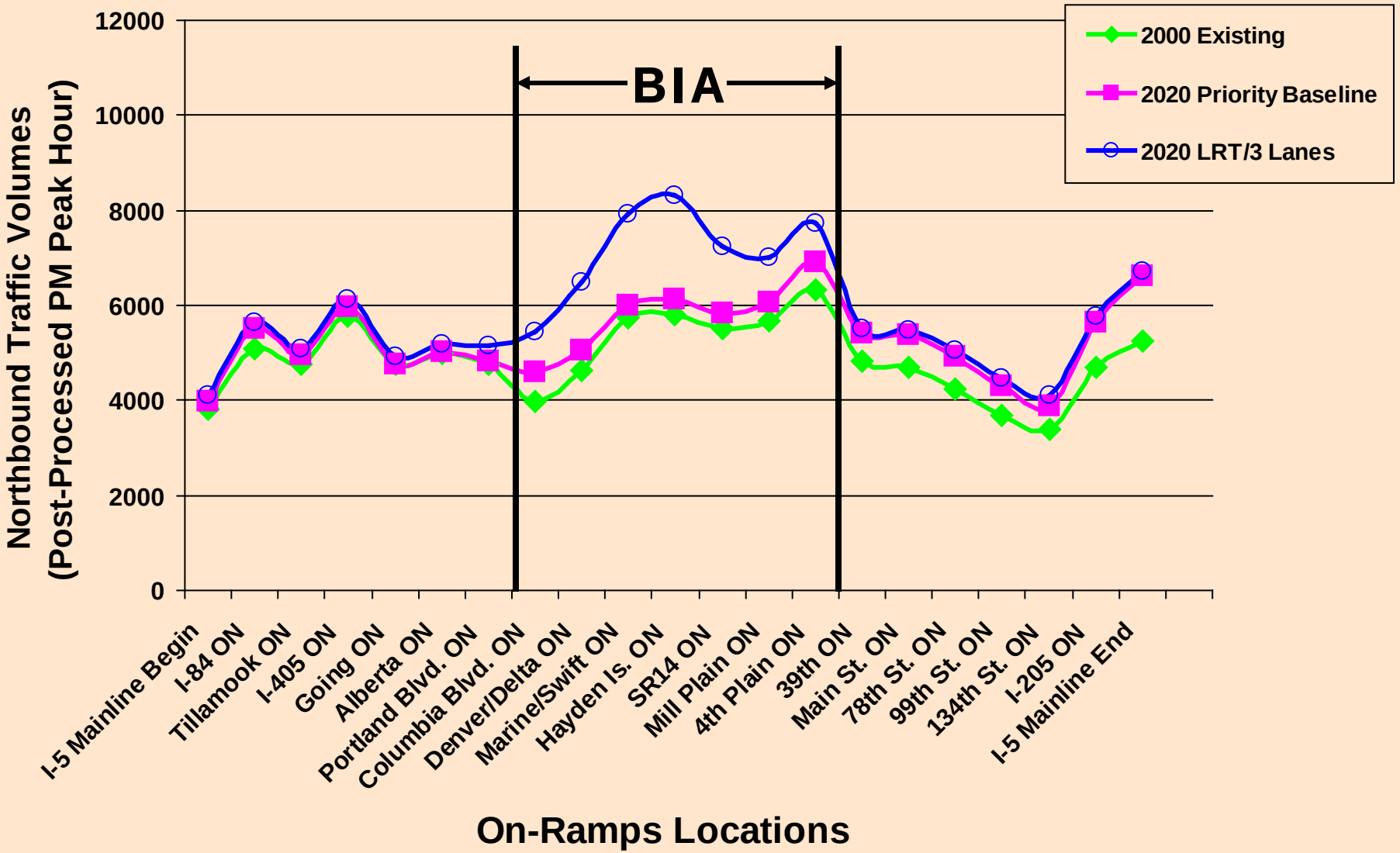
- An arterial bridge alone, without additional freeway lanes will not address the problems on I-5 -- it would provide only a slight improvement in freeway performance compared to a “do-nothing” scenario.
- With an arterial only bridge, users of the freeway can expect substantially more congestion and delay - even during the mid-day periods
- The arterial road itself will carry short and long distance trips, resulting in congestion along most of the arterial and its intersections.

What Happens to BIA Traffic?

Is the BIA Increasing Traffic on Arterial Streets?

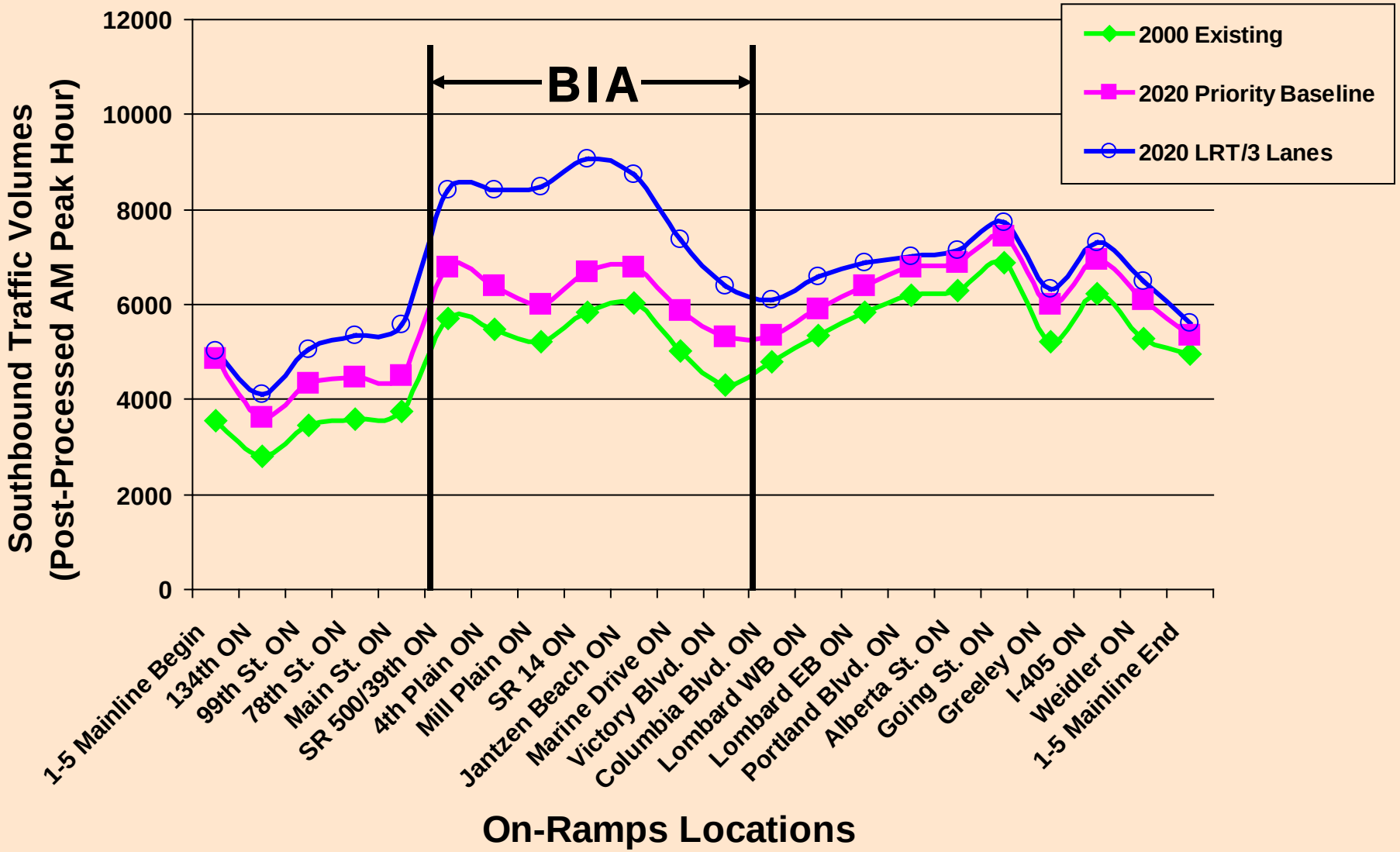
Minor Changes in I-5 Traffic Volumes Outside the BIA

Northbound (PM Peak Hour)



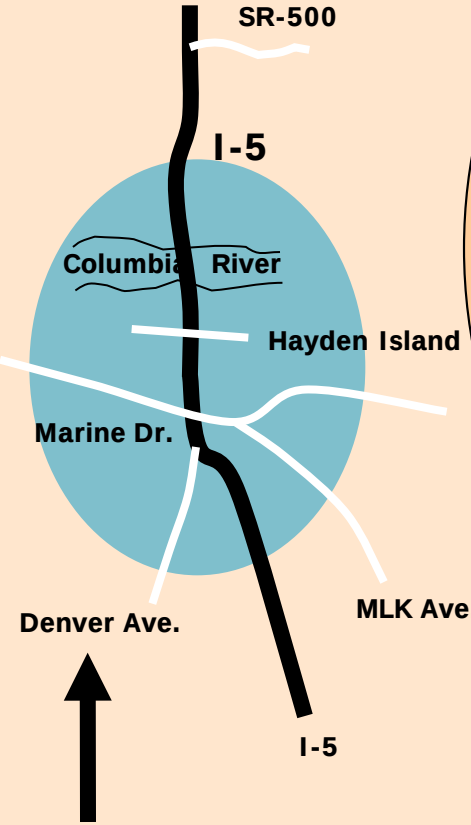
Minor Changes in I-5 Traffic Volumes Outside the BIA

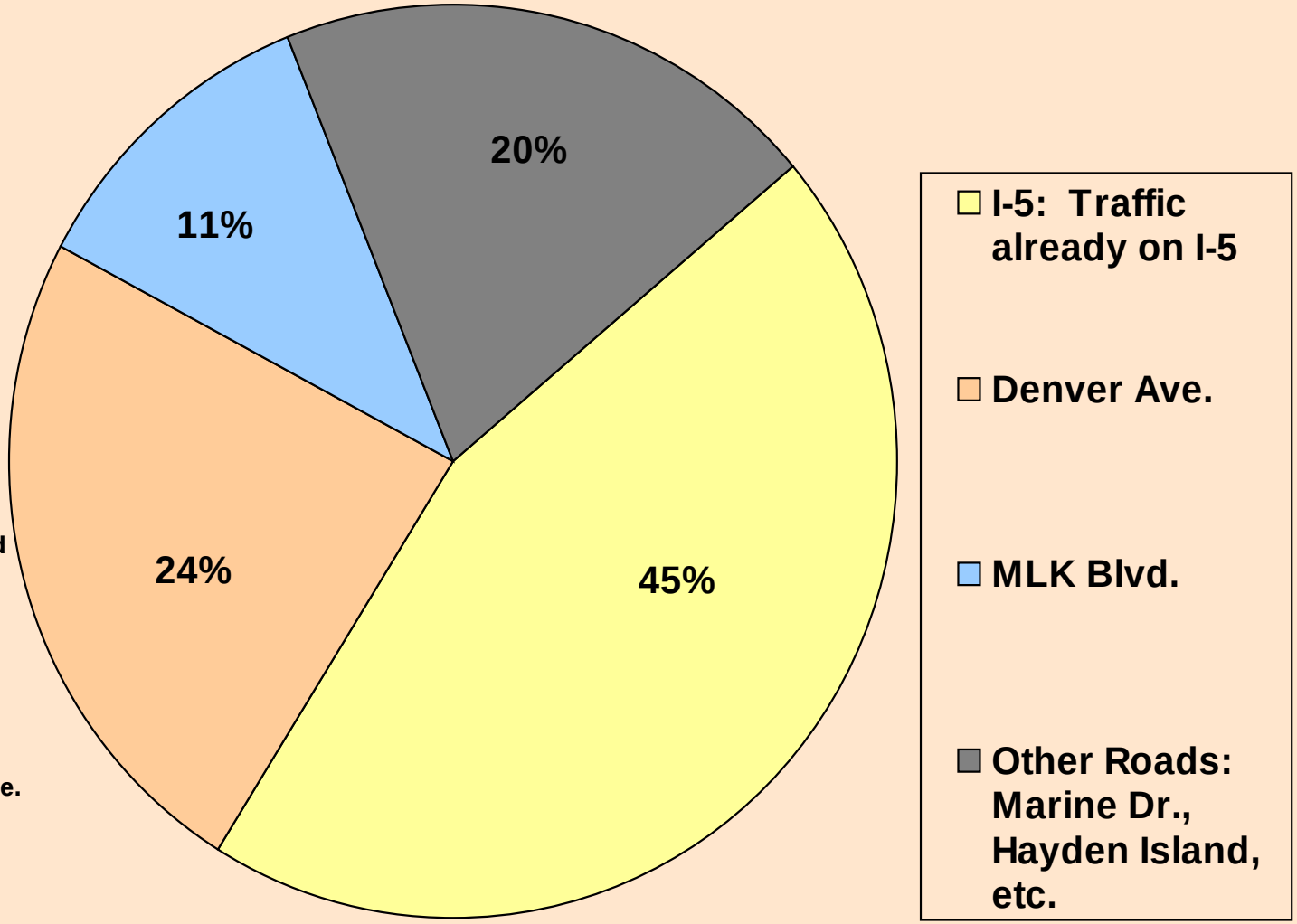
Southbound (AM Peak Hour)



Where are Trips Coming From in Portland?

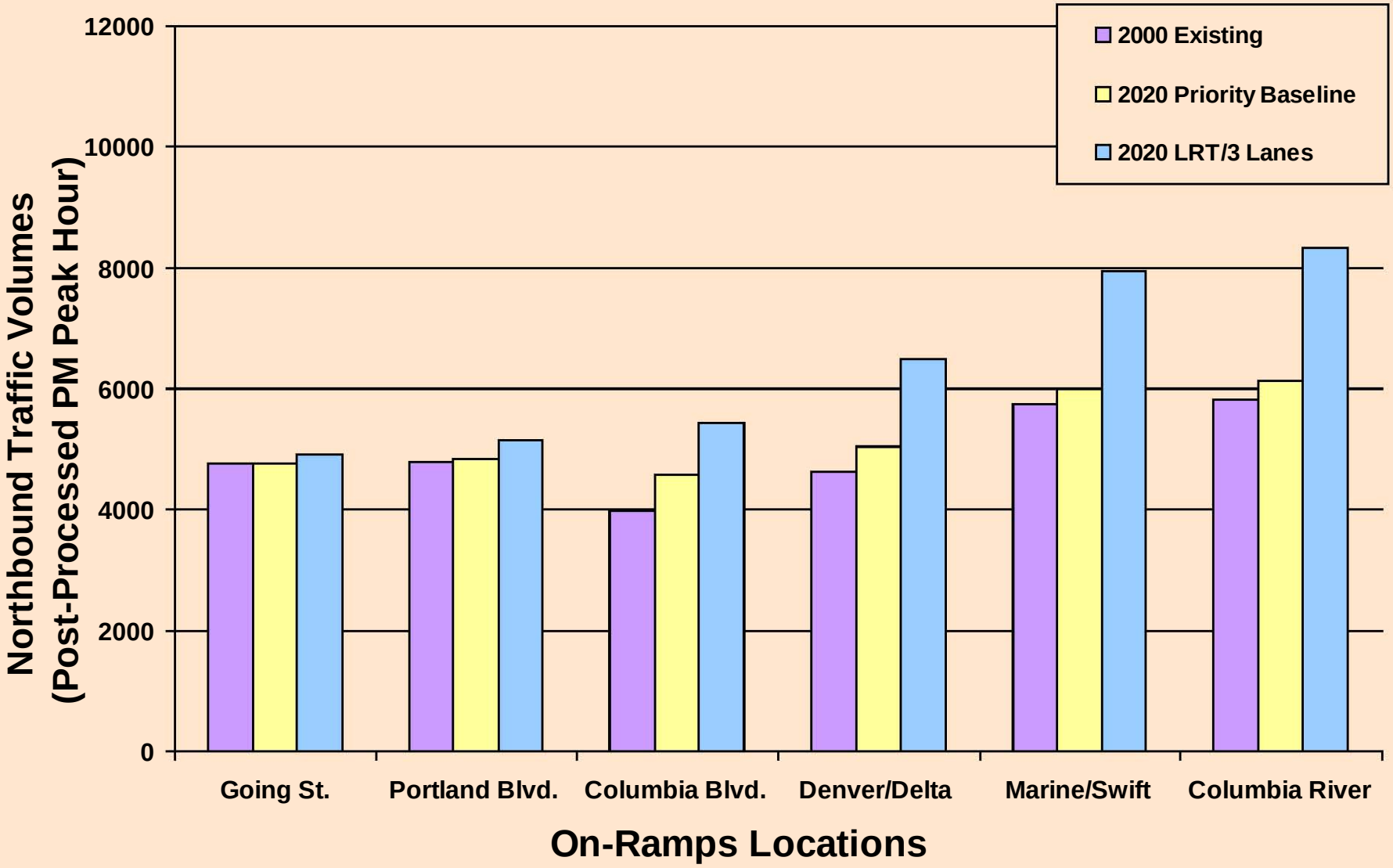
Northbound traveling to I-5 Columbia River Bridge (PM Peak Period)





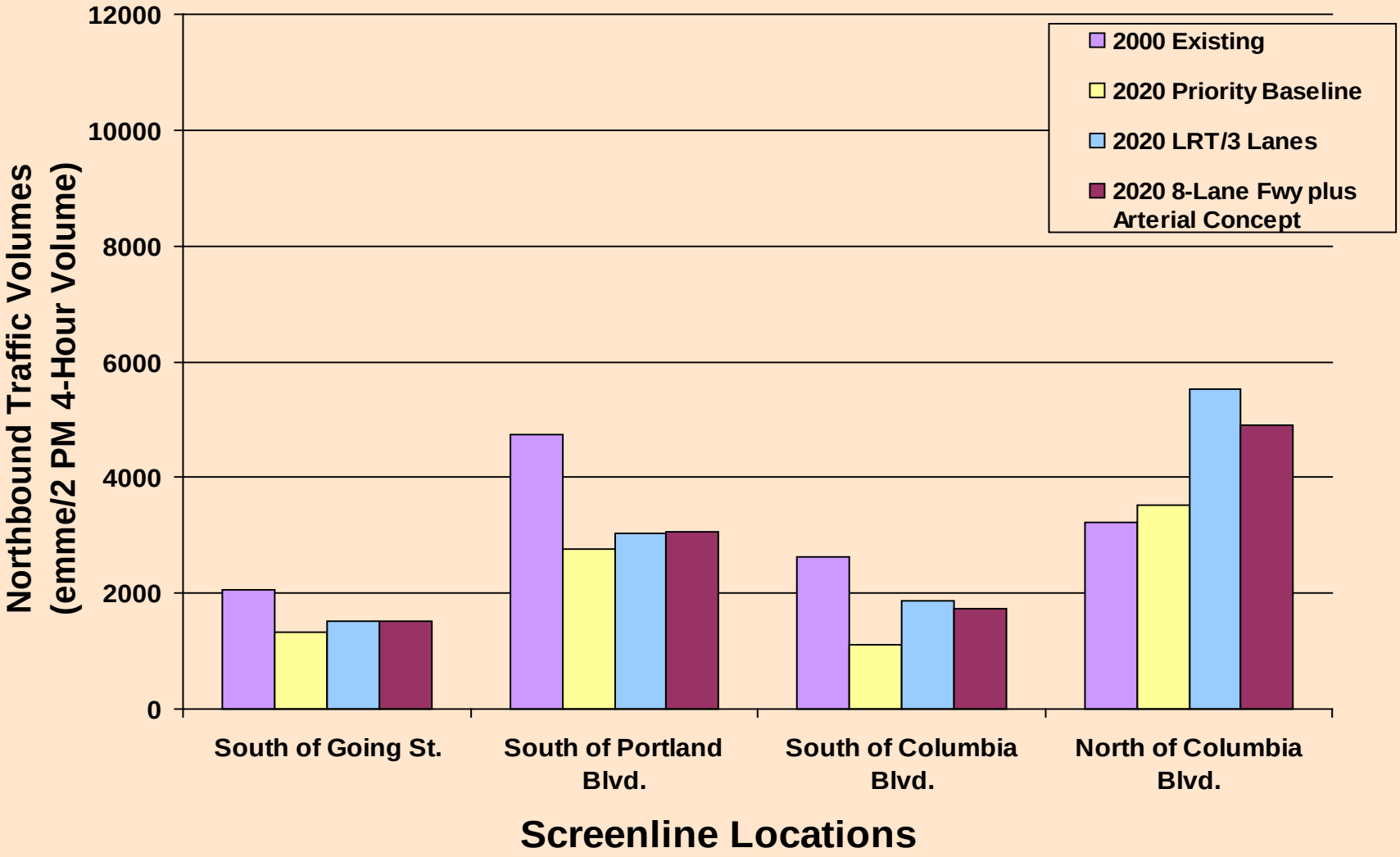
I-5 Travel Volumes in Portland

Northbound (PM Peak Hour)



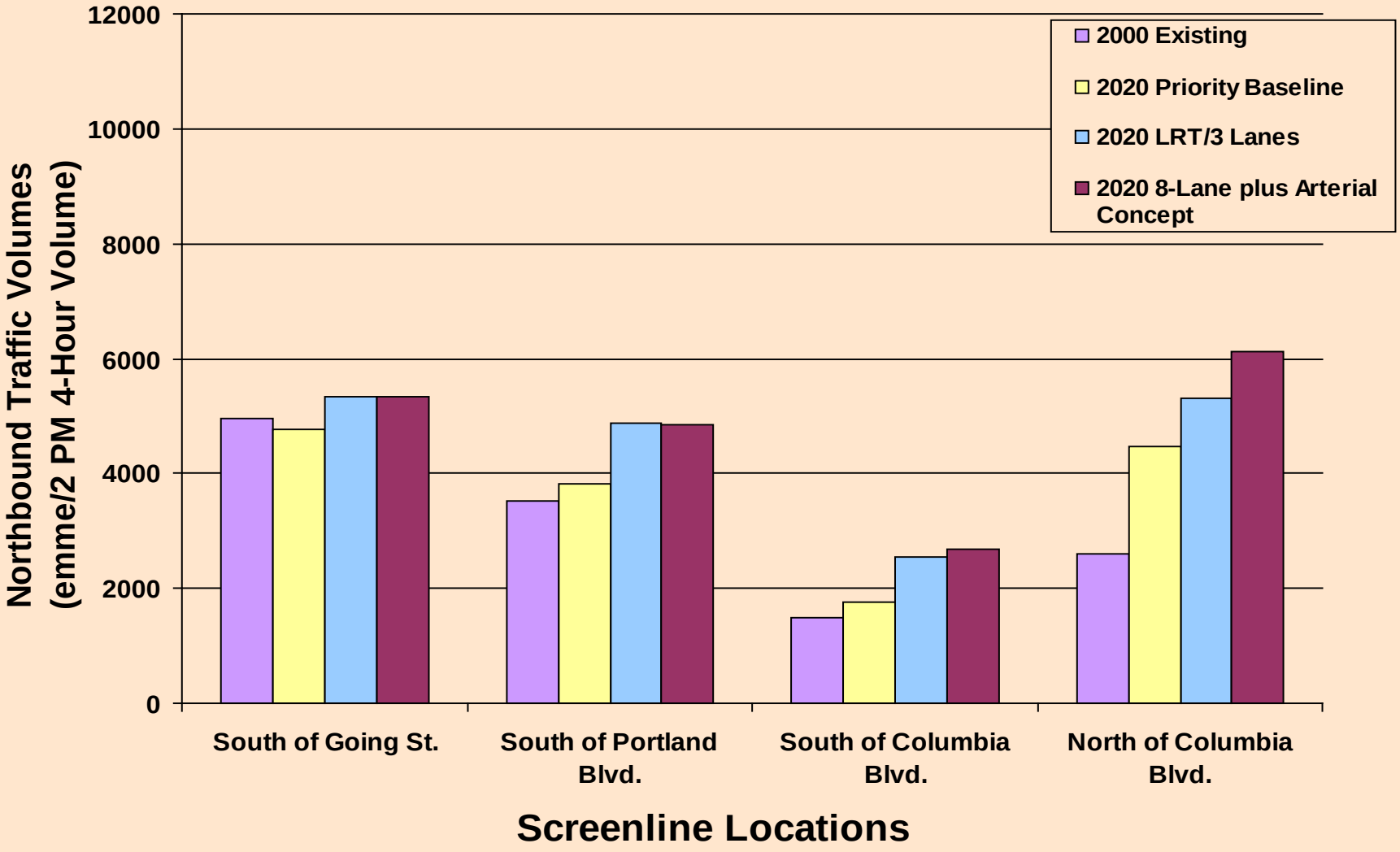
Denver/Interstate Corridor Volumes

Northbound (PM Peak Period)



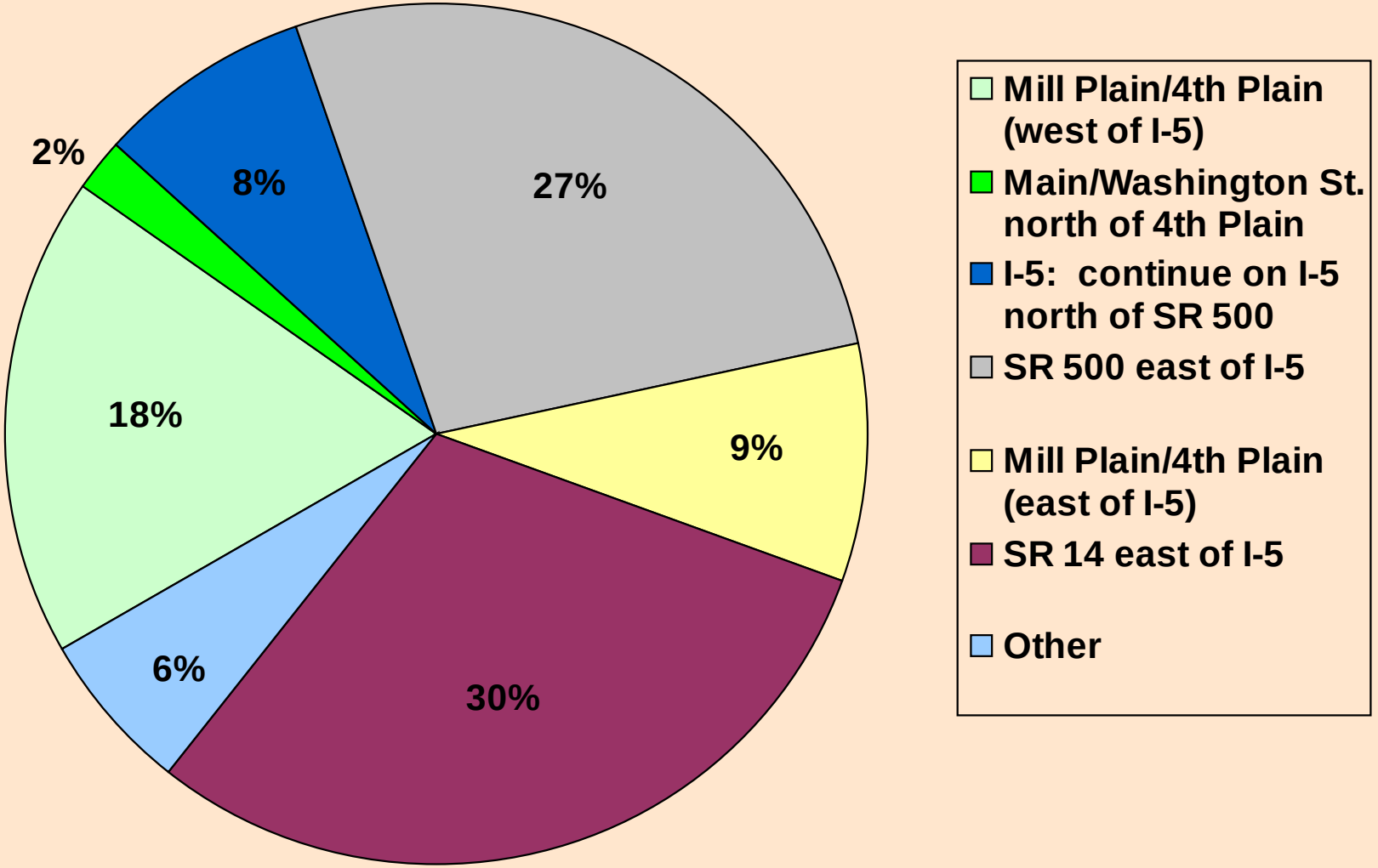
Martin Luther King Blvd. Corridor Volumes

Northbound (PM Peak Period)



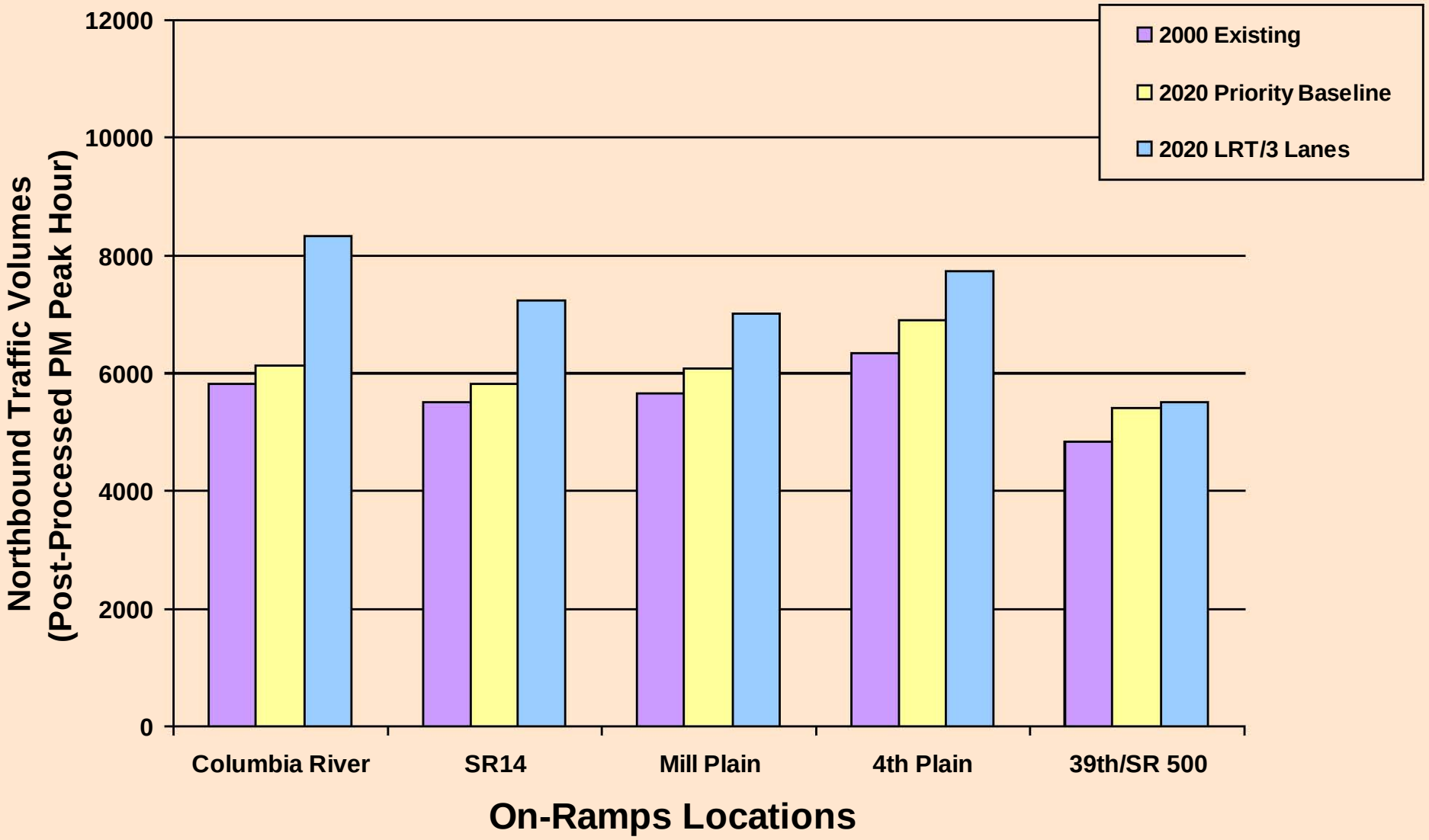
Where are Trips going to in Vancouver?

Northbound traveling to I-5 Columbia River Bridge (PM Peak Period)



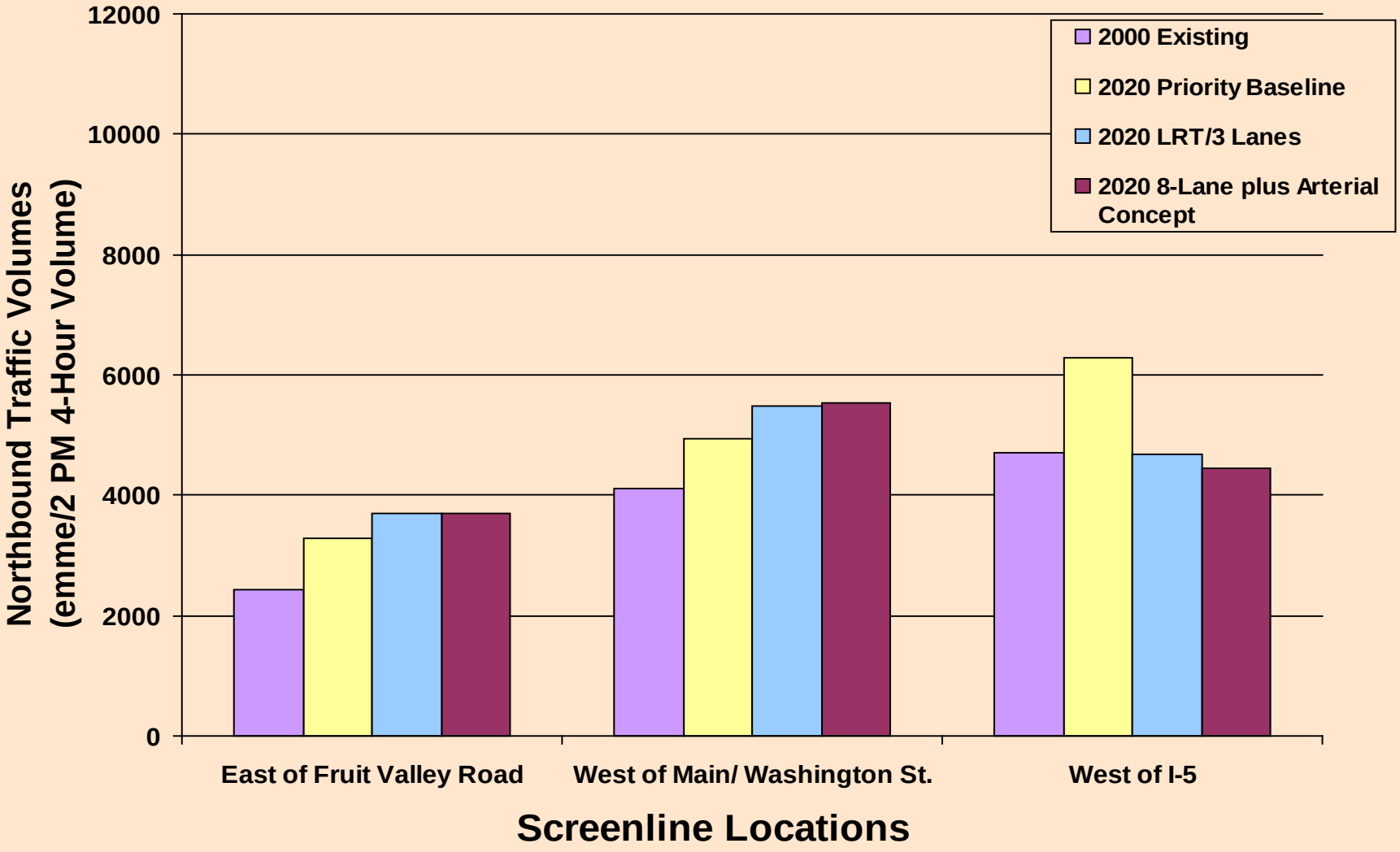
I-5 Traffic Volumes in Vancouver

Northbound (PM Peak Hour)



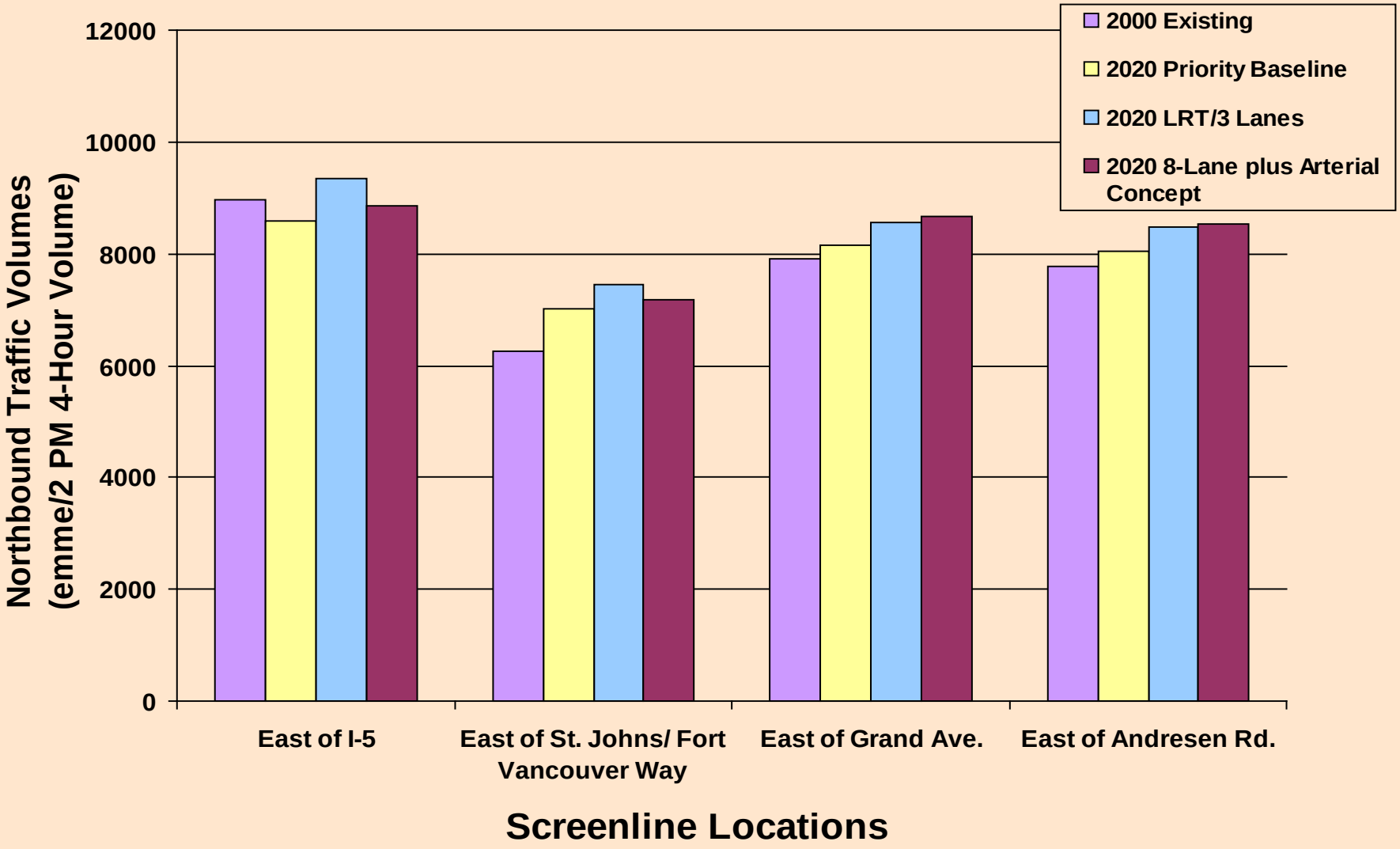
Mill Plain/4th Plain Blvd. Volumes

West of I-5 (Northbound, PM Peak Period)



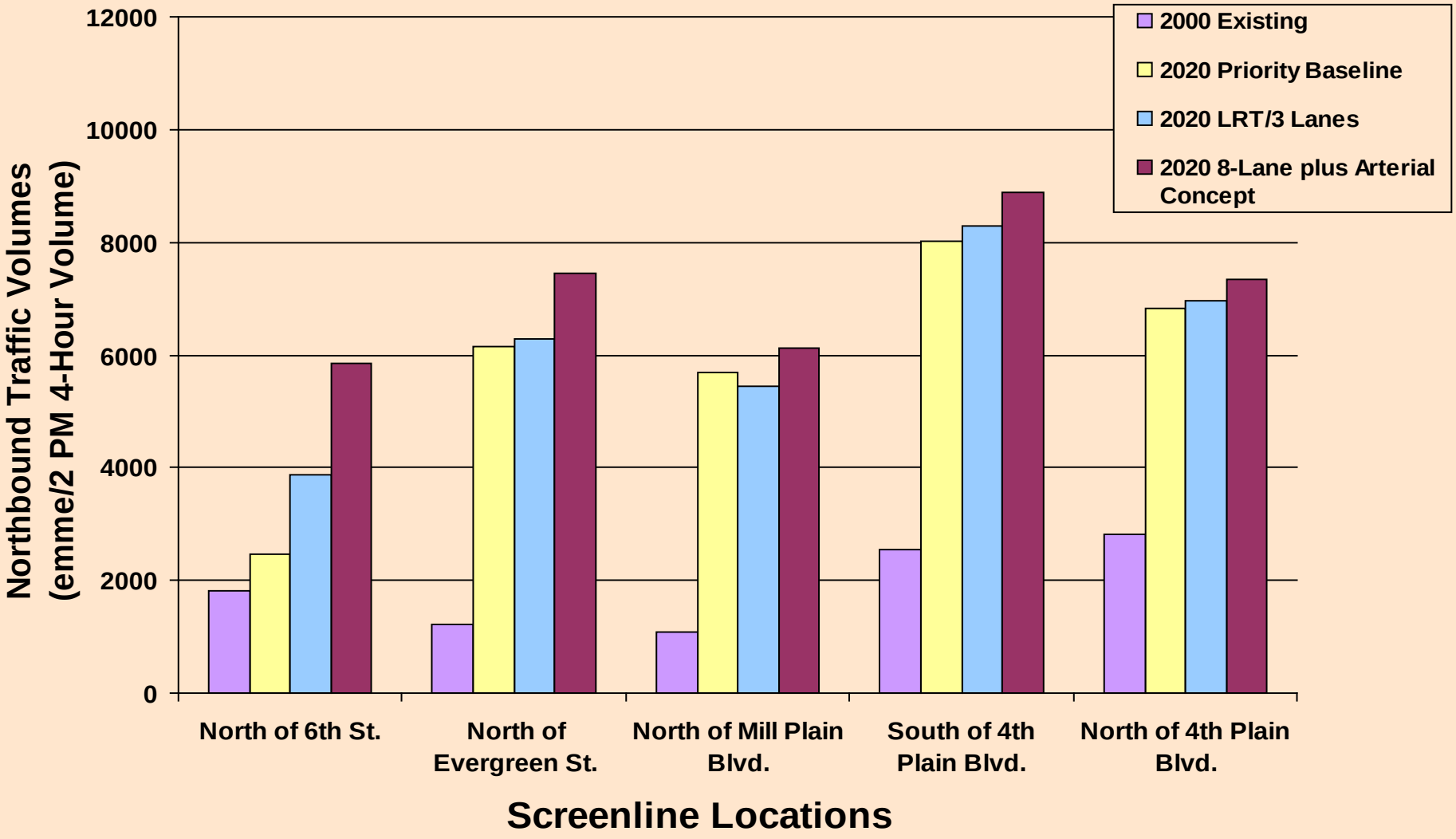
Mill Plain/4th Plain Blvd. Volumes

East of I-5 (Northbound, PM Peak Period)



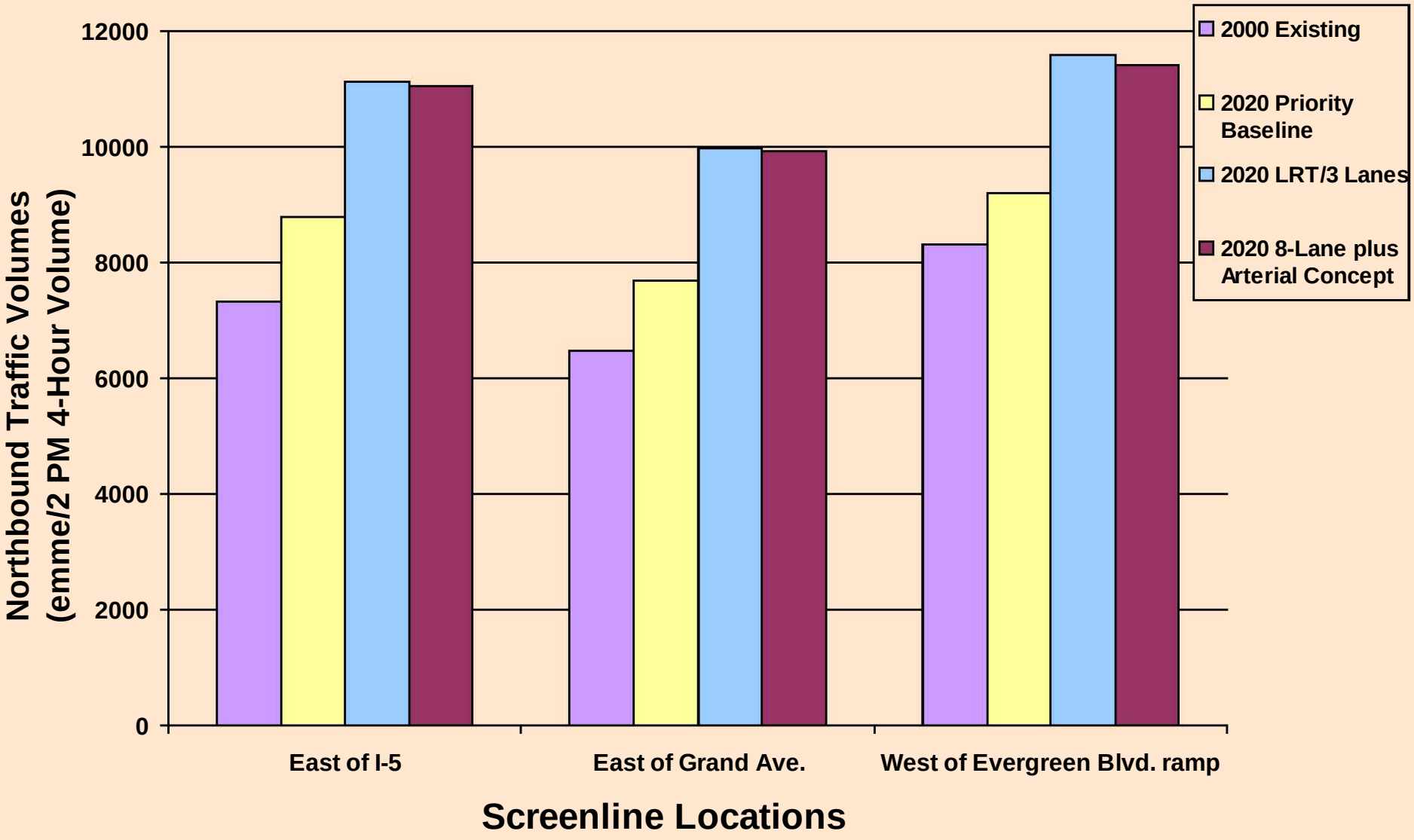
Columbia/Washington Corridor Volumes

Northbound (PM Peak Period)



SR 14 Volumes

(PM Peak Period)



Findings

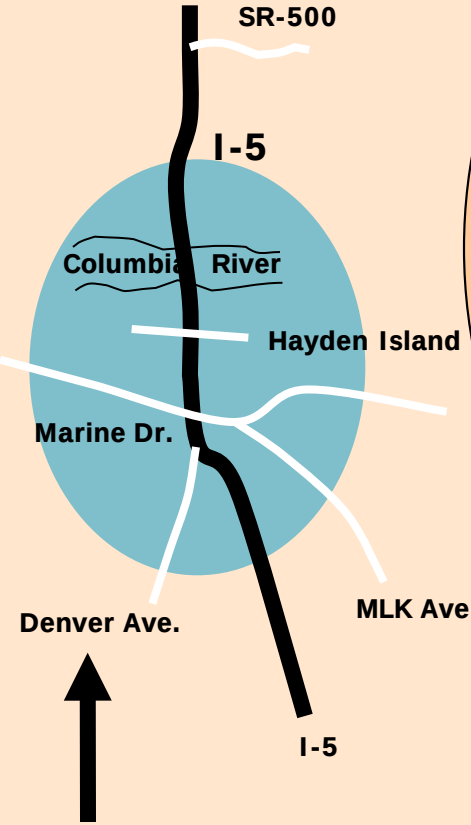
- Traffic increases on the freeway outside the BIA will be minimal compared to baseline and existing conditions
- Arterials that provide direct access to the freeway in the BIA will see an increase in traffic
- While that increase is significant, it dissipates as you move away from the BIA
- Overall, adding capacity in the BIA would not substantially increase traffic on arterials outside the improvement area

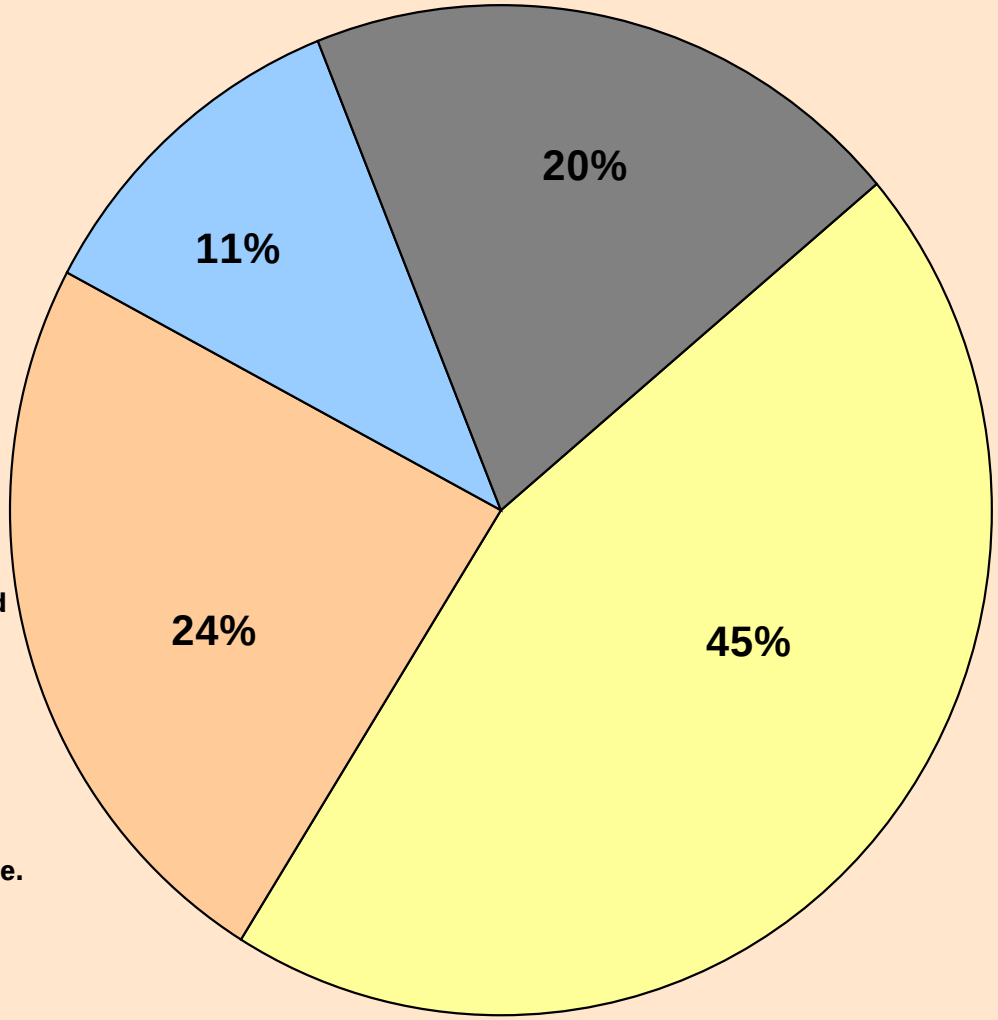
Bottom Line Findings

- Concepts with 10 freeway lanes, and concepts with 8 freeway plus arterial lanes, appear promising.
- Trade-offs need to be evaluated in future studies, including the balance of traffic on the freeway vs. local streets

Where are Trips Coming From in Portland?

Northbound traveling to I-5 Columbia River Bridge (PM Peak Period)

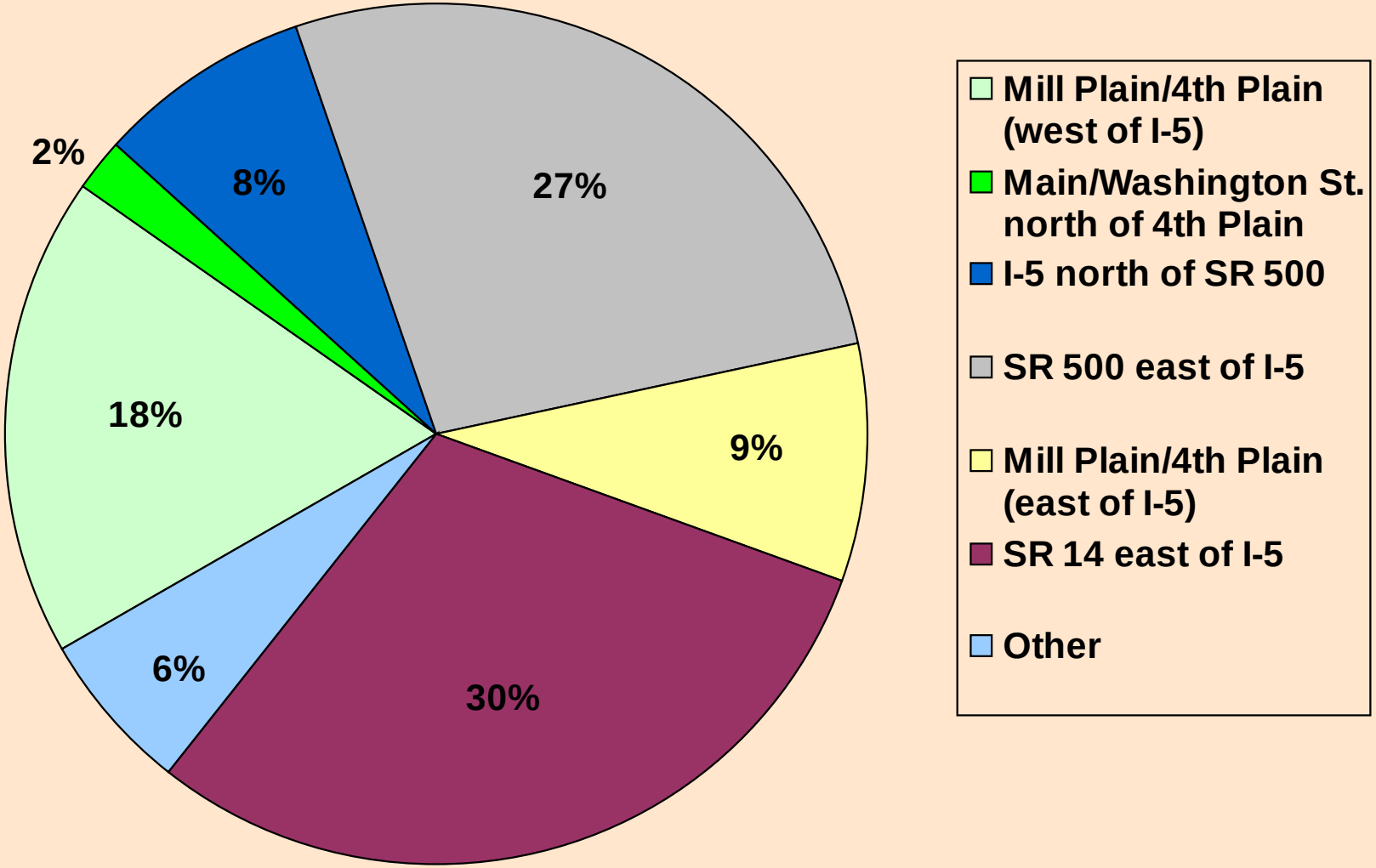




- I-5: Traffic already on I-5 (N of Columbia)
- Denver Ave. (N of Columbia)
- MLK Blvd. (N of Columbia)
- Other Roads: Marine Dr., Hayden Island, etc.

Traffic Distribution of Increased Trips Across the Columbia River

Northbound traveling to I-5 Columbia River Bridge (PM Peak Period)



Northbound Travel Demands

Along SR 500 - east of I-5 (PM Peak Period)