Interstate BRIDGE Replacement Program

Metro Council
Update on Ramp-to-ramp Connections (Auxiliary Lanes)

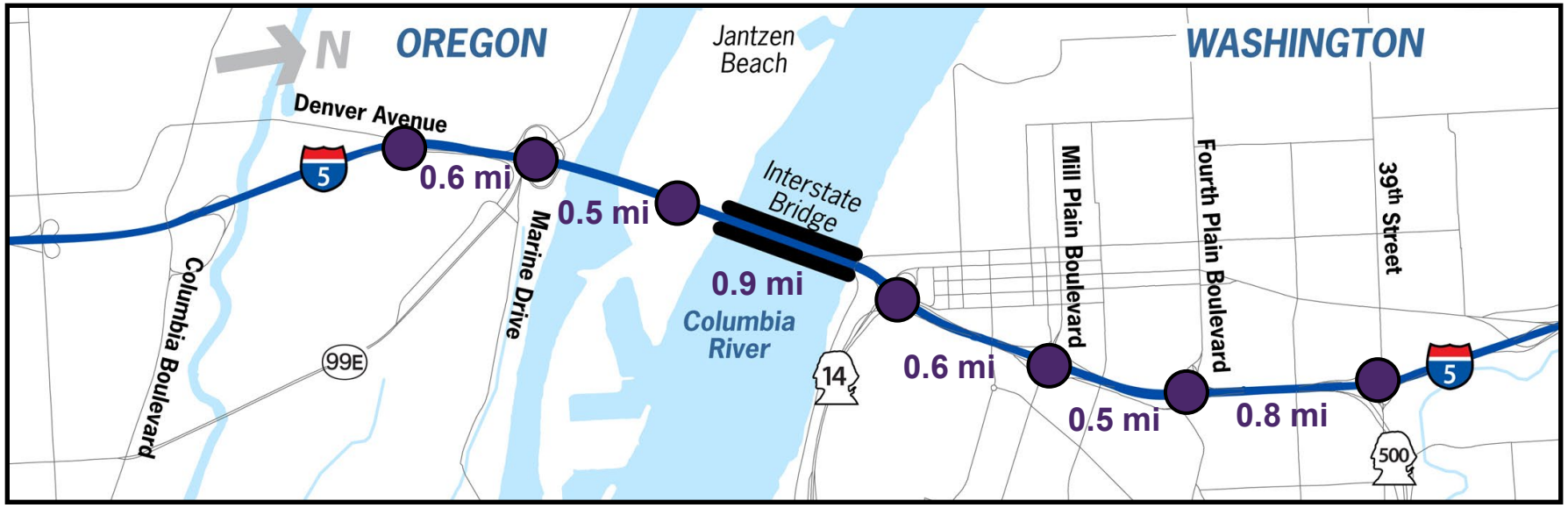
May 3, 2022

www.interstatebridge.org

IBR Background Traffic/Design Information

Interstate BRIDGE Replacement Program

Seven Closely Spaced Interchanges

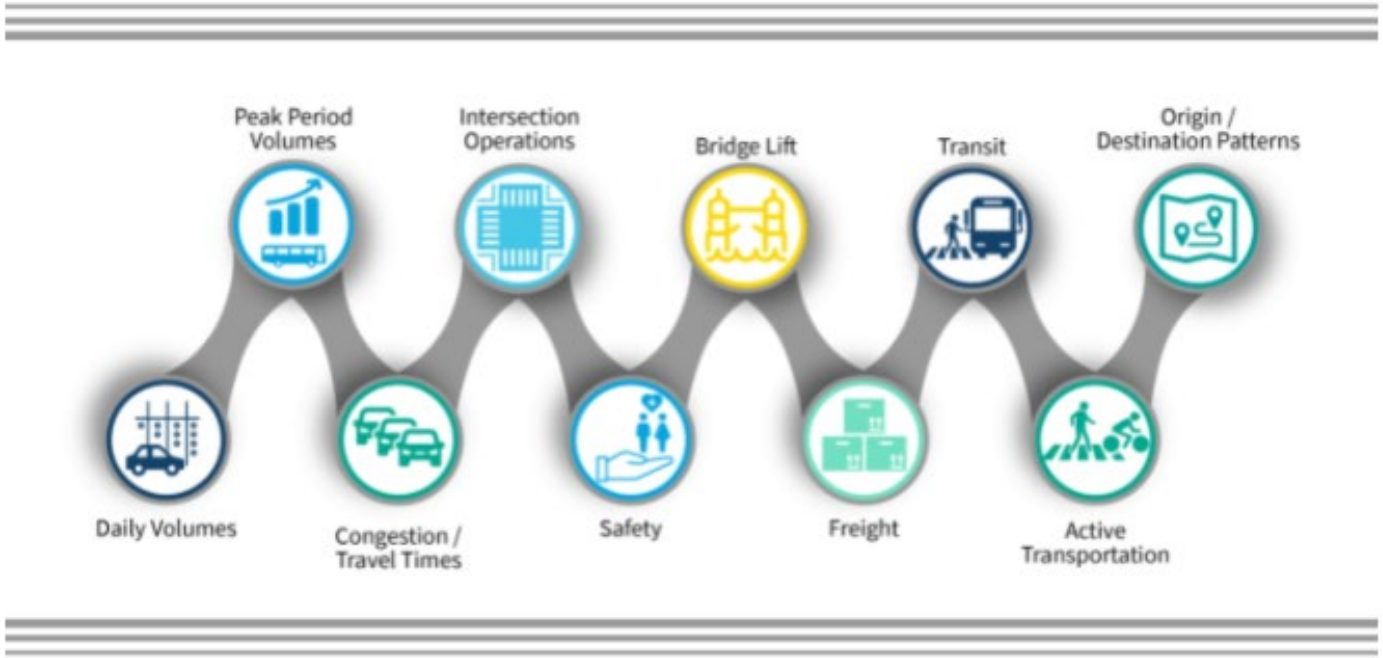


Standard Spacing: Desirable = 2 Miles
Minimum = 1 Mile

Interstate BRIDGE Replacement Program

Existing Counts

- Started with current data/counts from 2019
- Collected additional data in 2021 to fill in where counts weren't available
  - *This 2021 data was factored to represent 2019 conditions*



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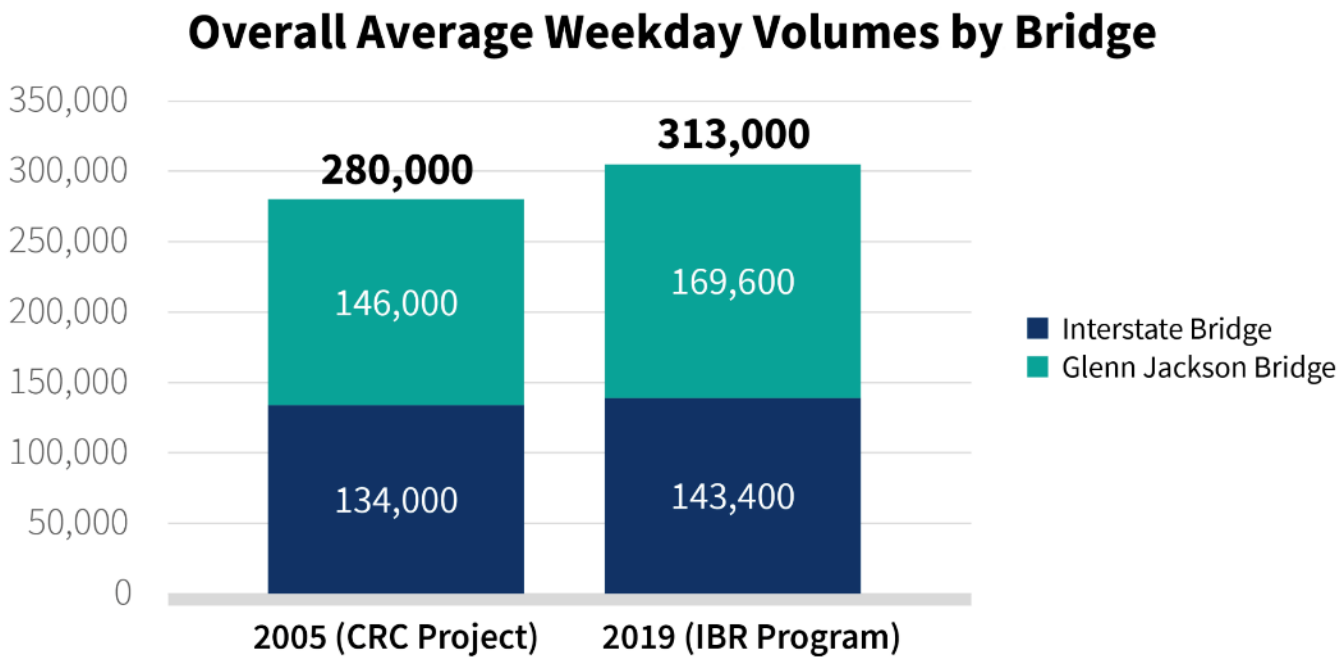
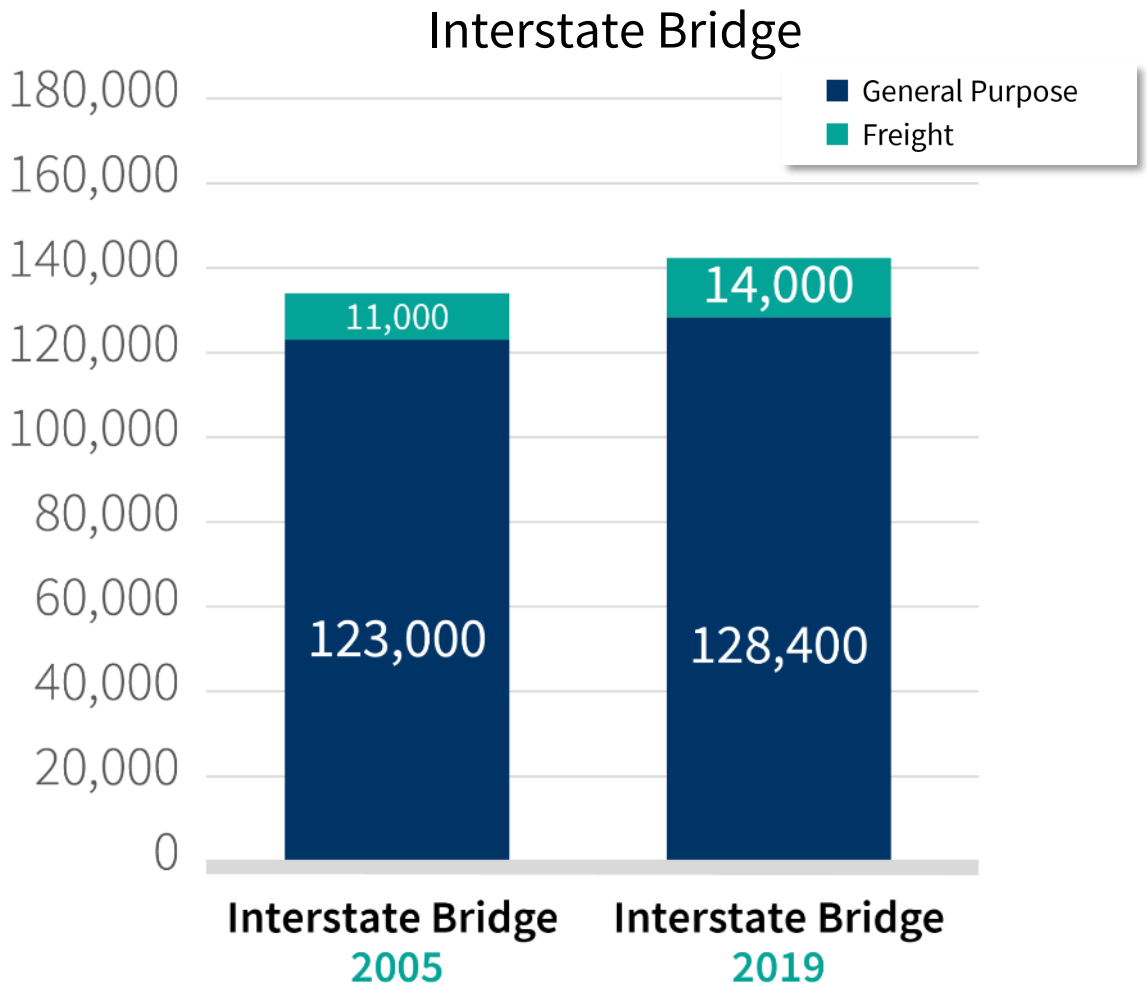
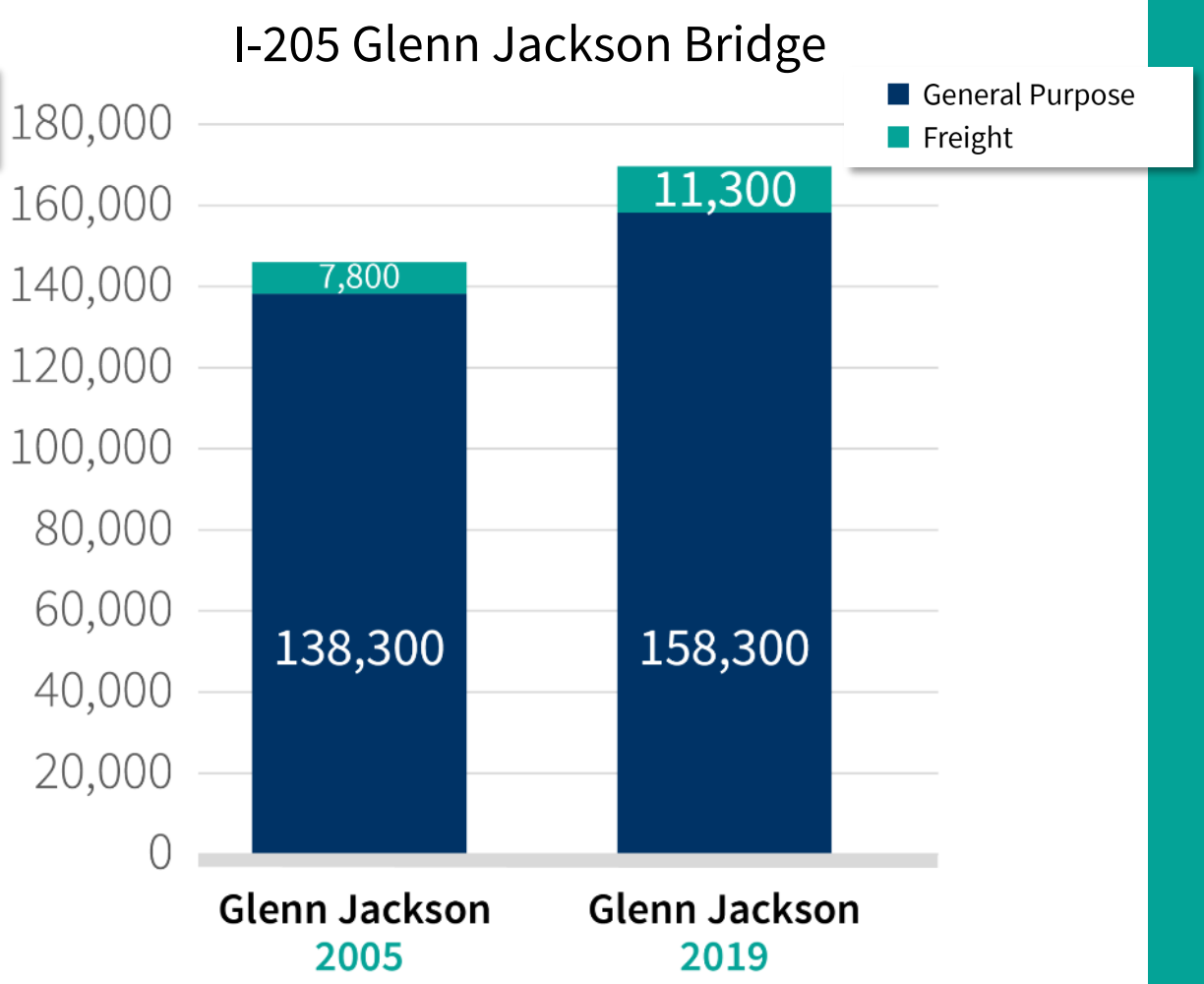
Traffic Growth Rates

- Overall average weekday daily traffic (AWDT) increased 12% between 2005 and 2019.



Average Weekday Volumes – Vehicles and Freight

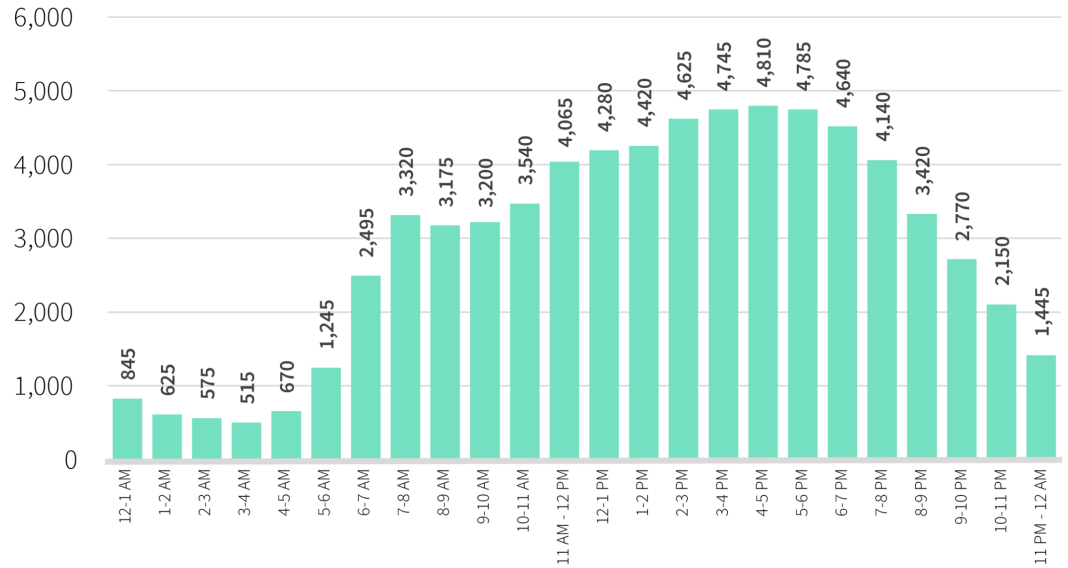




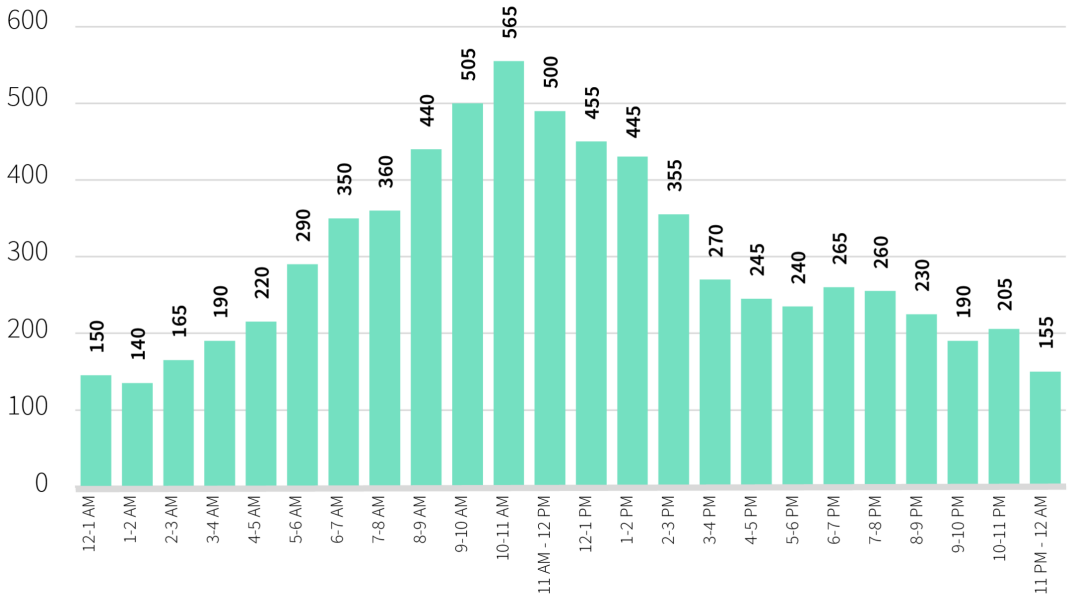
Interstate BRIDGE Replacement Program

Interstate Bridge Hourly Profiles – Northbound Vehicles and Freight Volumes

Interstate Bridge Hourly Profile - Overall Northbound Weekday Service Volumes



Interstate Bridge Hourly Profile - Northbound Weekday Freight Service Volumes



Freight traffic does not peak during typical commute hours (6-9 AM and 3-6 PM). The highest freight volumes occur during the middle of the day, as freight trucks try to avoid the most congested periods of the day.

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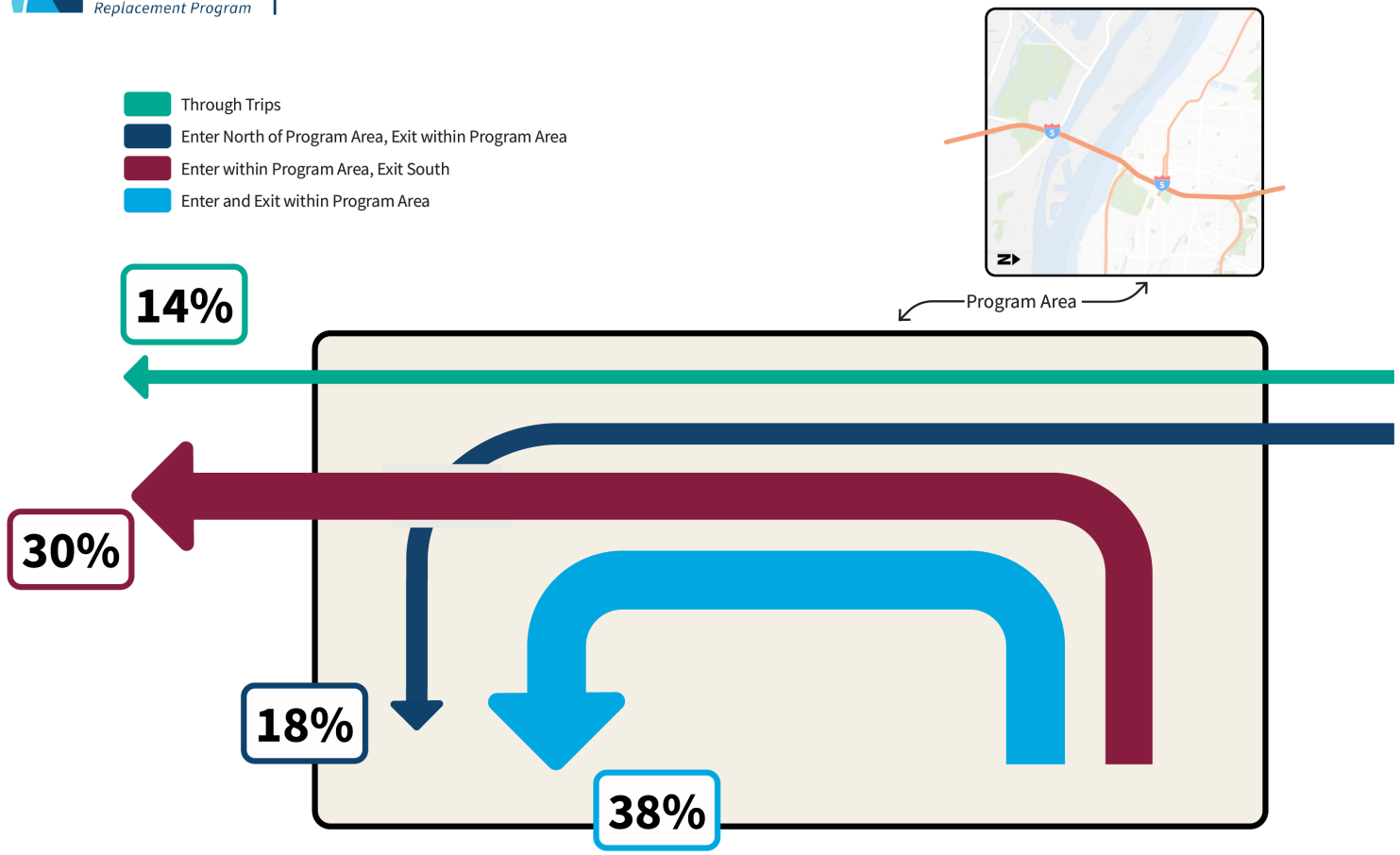
AM Peak Hour – Southbound
85% of Traffic to/from 7 interchanges

Interstate BRIDGE Replacement Program

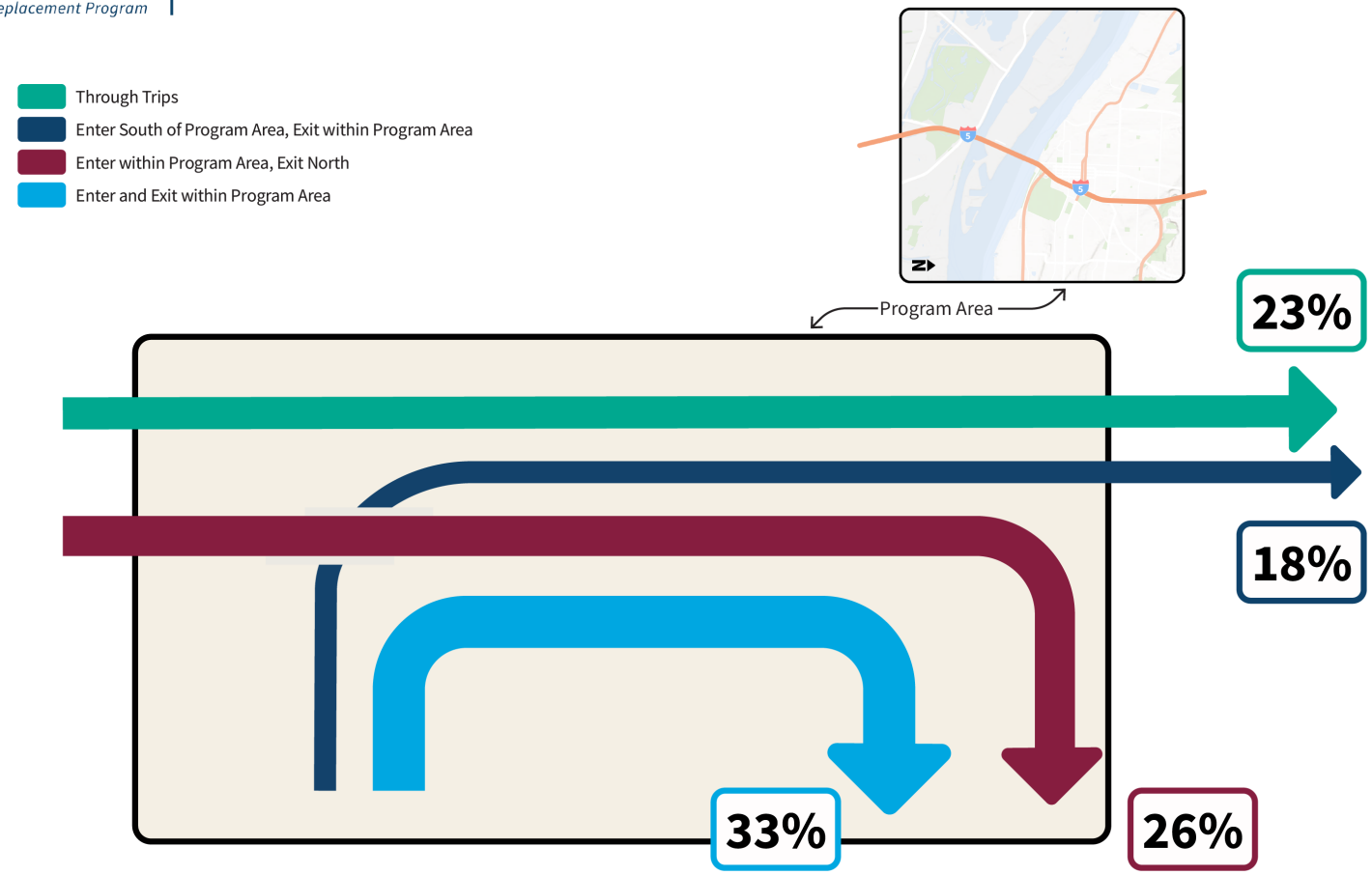
Program Area Peak Travel Patterns Southbound - SR 500 to Victory Blvd



PM Peak Hour - Northbound
75% of Traffic to/from 7 interchanges

Interstate BRIDGE Replacement Program

Program Area Peak Travel Patterns Northbound - Victory Blvd to SR 500



Hours of Backups in the Program Area

- **There are multiple bottleneck locations within and influencing the IBR Program Area.**
- **These include:**
  - **Northbound I-5** – Capitol Hwy to Interstate Bridge for 7 hours from 12:30-7:30 PM
  - **Southbound I-5 -** Main Street to Interstate Bridge for 3.5 hours from 6-9:30 AM.
  - **Southbound I-5** – Marine Drive to Going Street for 4 hours from 7-11 AM.

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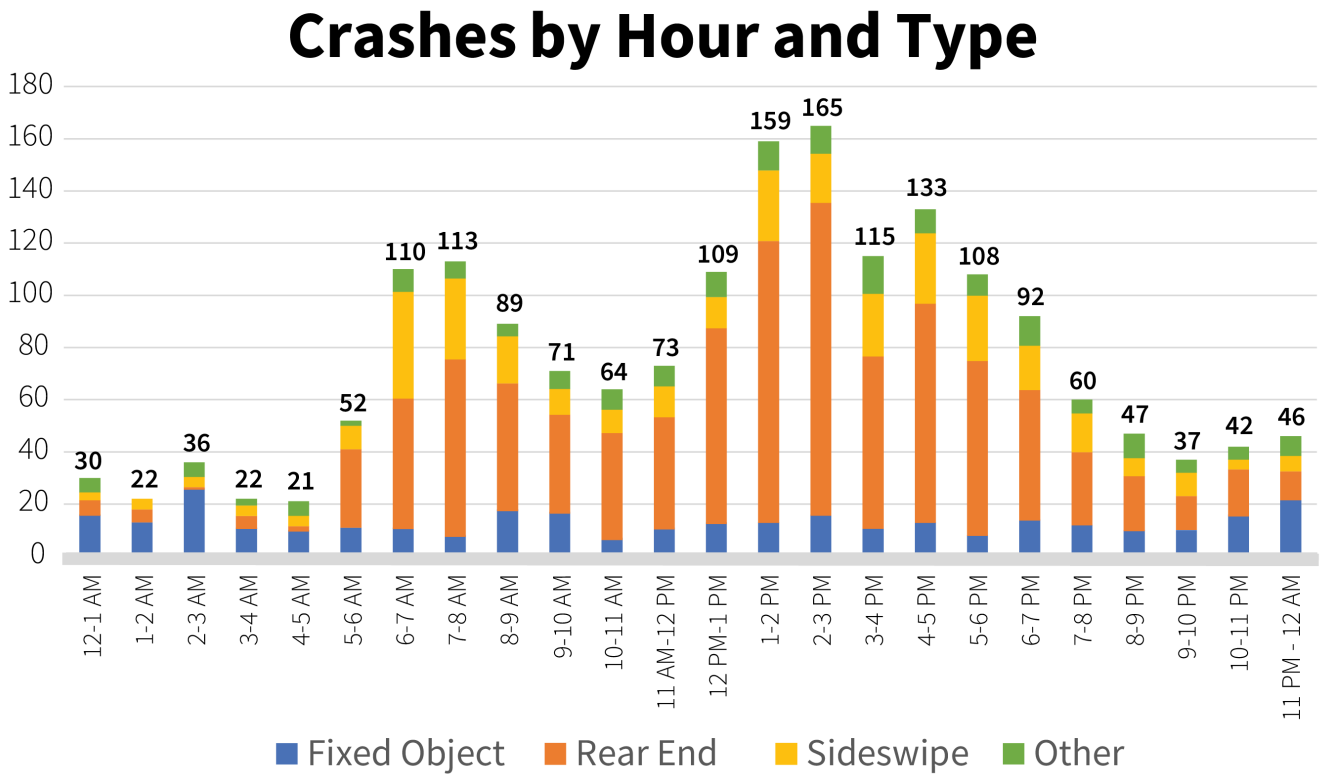
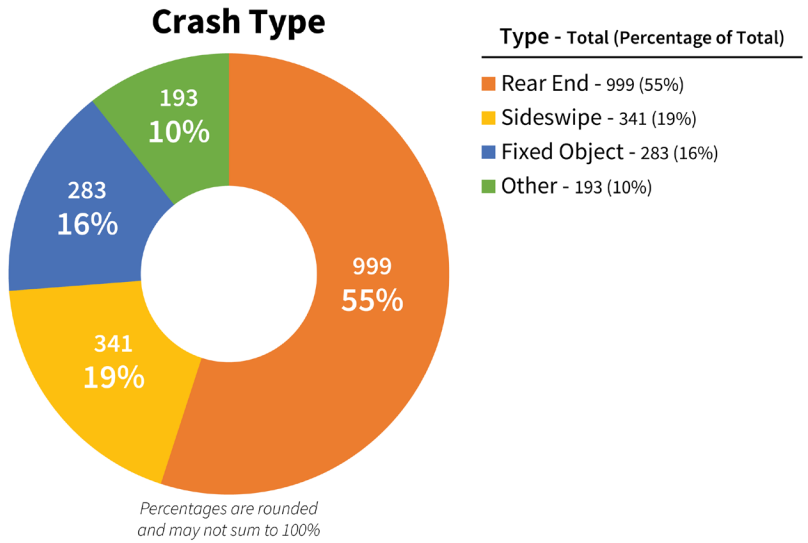
Over 1,800 Crashes in the IBR Program Area (2015-2019)





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Safety Issues

- **Following features all contribute to the high number of crashes and crash rate within the I-5 IBR Program Area**
  - Short merges, diverges, & weaving sections
  - Presence and duration of congested traffic conditions
  - Bridge lifts / traffic stops

Ramp to Ramp Connections
(Auxiliary Lanes)

Interstate BRIDGE Replacement Program

What are Auxiliary Lanes?

- **Ramp-to-ramp connections to facilitate acceleration and deceleration, weaving, merging, and diverging for automobiles and trucks between two or more interchanges**

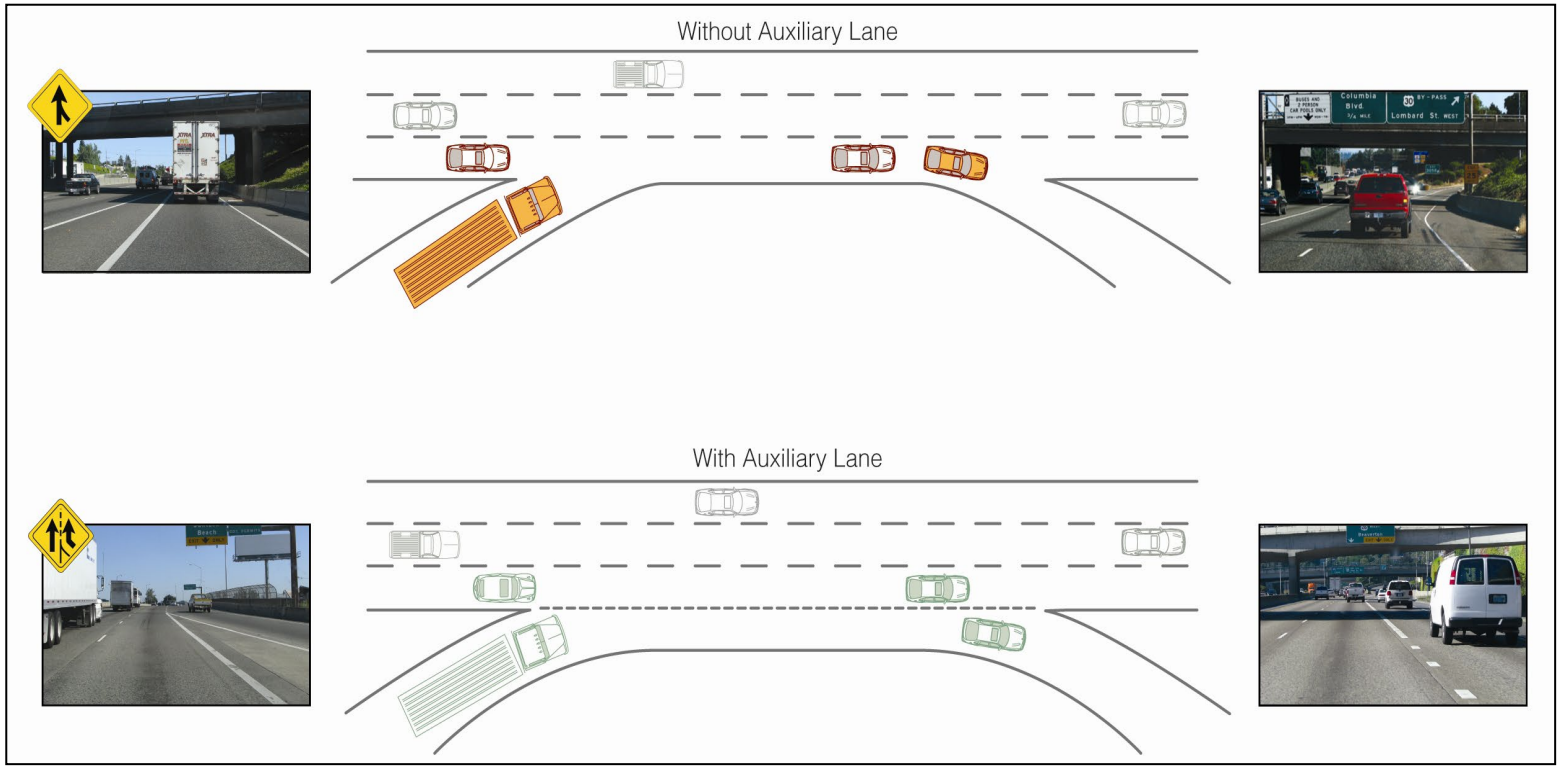

Figure shows typical highway Merge and Diverge Conditions, with (top) and without (bottom) Aux Lane

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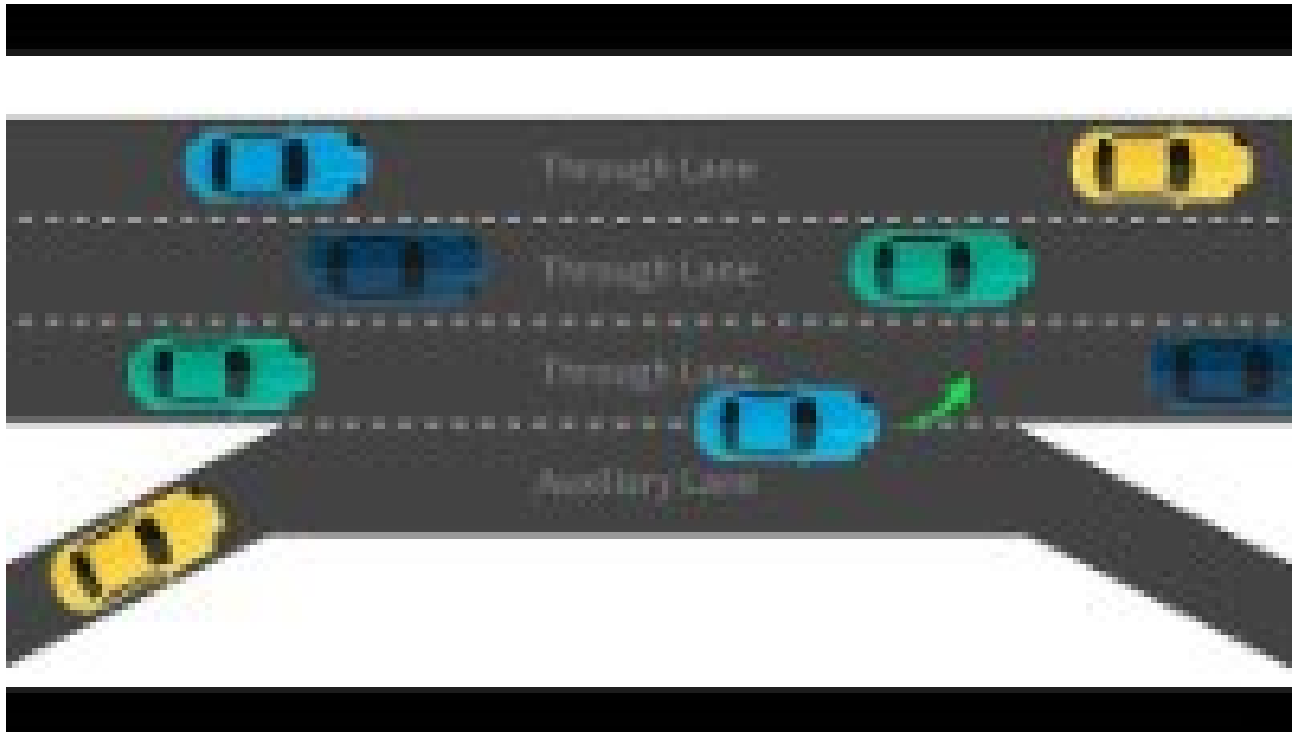
What are Auxiliary Lanes?



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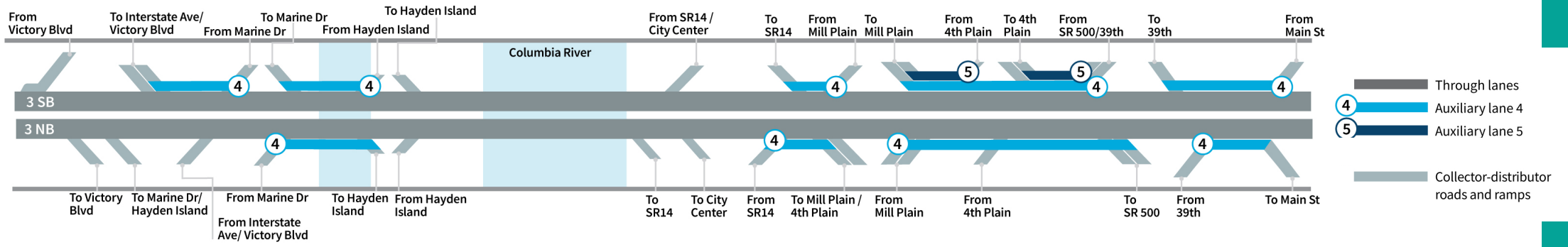
Auxiliary Lanes exist today in the IBR Program Area



IBR Program Design Considerations

- Design throughout the corridor needs to address multiple issues:
  - *Traffic congestion*
  - *Interchange spacing not allowing adequate time for vehicles to make on/off decisions*
  - *High on and off ramp traffic volumes*
  - *Conflicts between through, regional, and local traffic*
  - *Freight requirements (volumes, origin/destination patterns, steep grades)*

IBR Program Design Considerations

- Design throughout the corridor needs to address multiple issues:
  - *Crashes caused by short merging/weaving distances resulting in idling vehicles and increased emissions*
  - *Diversion to local roadways to avoid I-5 congestion causing increased volumes and emissions in local communities*
  - *Transit sitting in general purpose lanes subject to the same back-ups as cars and trucks*
  - *Limited active transportation facilities*
  - *Maintenance of traffic during construction*

Ramp to Ramp Connections (Auxiliary Lanes) Analysis

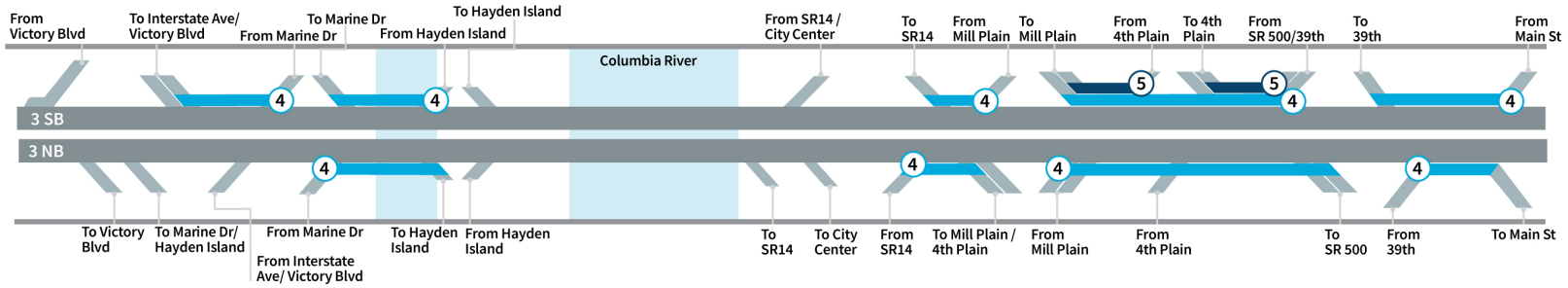
Interstate BRIDGE Replacement Program

IBR Program Design Considerations

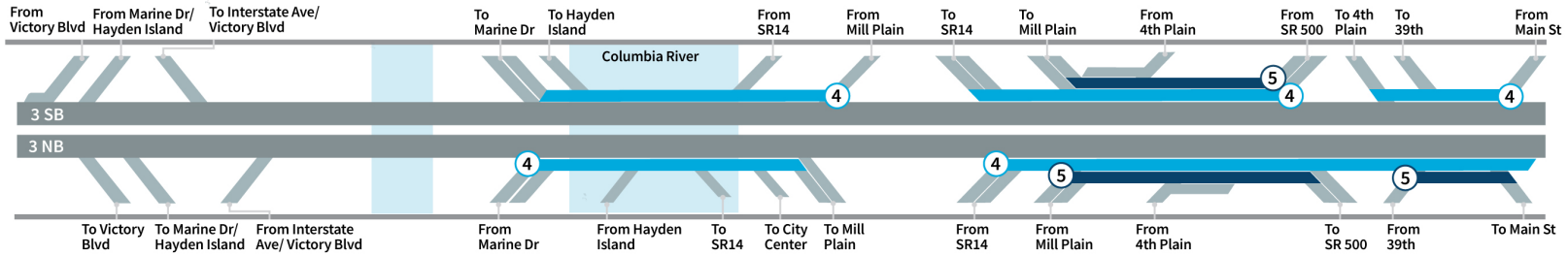
- Strategies for addressing corridor issues
  - Strategically addressing substandard ramp spacing, high traffic and freight volumes, high crashes through various highway design solutions including auxiliary lanes, collector-distributor lanes, and braided ramps
  - Addressing traffic volumes and speed differential issues via demand and system management strategies including ramp meters, advisory speed signs, transit, etc.
    - A combination of competitive transit investments including High-Capacity Transit, express bus and Bus on Shoulder
  - Variable rate tolling, combined with Oregon congestion pricing, to encourage use of other modes, encourage off-peak travel, and reduce discretionary trips

IBR Program - Auxiliary Lane Options

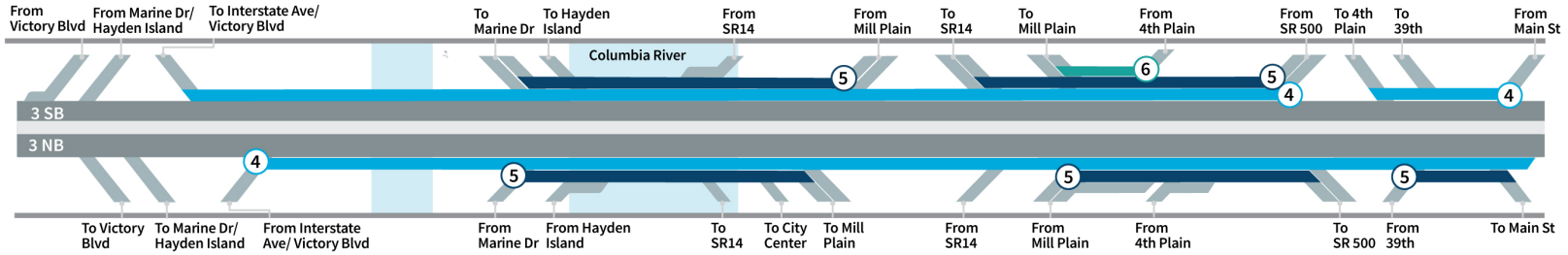
No Build



1 Auxiliary Lane



2 Auxiliary Lane



All options, have 3 lanes thru traffic Northbound and Southbound

- Through lanes
- 4 Auxiliary lane 4
- 5 Auxiliary lane 5
- 6 Auxiliary lane 6
- Collector-distributor roads and ramps

Future Volume/Mode Share Forecasting

- **Travel Demand Modeling is the process used to predict travel behavior and resulting demand for a specific timeframe given a defined set of assumptions.**
- **The modeling assumes 2018 RTP assumptions for the IBR program, which includes variable rate tolling**
- **Projects future demand, mode choice, traffic volumes, likely travel patterns (origins/destinations) out to 2045 based on current data**
  - The Model includes land use plans and transportation projects identified by the region to be built into the future, which are included in the Regional Transportation Plans (e.g., Rose Quarter, Division BRT Transit, etc.)
  - Metro/RTC (ESG partner agencies) owns this model, and other regional agencies use it to predict travel behavior

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IBR Tolling Sensitivity Analysis

- **Purpose**
  - Forecast the impacts of toll rate scenarios on traffic/transit volumes on I-5 and I-205
  - Purpose is not to recommend a toll rate structure or provide revenue estimates
  - Initial results are draft and will be updated based on background modeling assumptions that will change between this round of modeling (screening phase) and future modeling (Environmental, Traffic and Revenue Studies)

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IBR Tolling Sensitivity Analysis

- **Initial Takeaways**
  - Tolls (or toll rate changes) on I-5
    - *Reduce volumes on I-5, divert some trips to I-205*
    - *Reduce total trips across river on I-5 and I-205*
    - *Increases transit demand*
    - *Limited impact to overall commute trips (home-to-work, work-to-home) during peak hours*
    - *Significant reduction to discretionary trips*
  - Tolls plus Oregon Mobility Pricing
    - *Retains more trips on I-5 during peak period*
    - *Reduce discretionary trips which show up more in off-peak time periods*
  - Conclusion
    - Since tolling, and increased rates, do not significantly reduce peak period auto trips even with higher mode shares to transit, safety improvements including ramp to ramp connections are still needed to address the numerous of safety issues experienced by travelers in the corridor

Auxiliary lanes for IBR are proposed to address:

- Close interchange spacing
  - *All interchanges are spaced below **minimum interchange spacing standards:** For example, Marine Drive to Hayden Island interchange spacing is 0.5 mile.*
- Short Merges, weaves & diverges
  - ***Example Short Merge:** Northbound Hayden Island On-Ramp acceleration distance is not long enough to get up to freeway speeds*
- High on-ramp & off-ramp volumes
  - ***Example:** Southbound Marine Drive Off-Ramp is 1,400 – 1,800 vehicles per hour.*
- High vehicle crashes
  - ***Example of Importance:** Substandard merge, diverge, weaving lengths combined with heavy volumes lead to more crashes, and crashes, of any severity increases congestion & impact reliability*
- Lane balance
  - *Proper arrangement of traffic lanes on the freeway and ramps to realize efficient traffic operations by **minimizing the required number of lane shifts**.*

Aux Lane (1 and 2) Tradeoffs compared to No Build

- **Contributes to equity benefits including mode choice benefits (High-Capacity Transit, BOS and Active Transportation)**
- **Variable rate tolling reduces auto trips, increase transit demand,**
- **Contributes to climate and equity benefits by reducing overall congestion**
  - Off-peak benefits, including weekends
  - Less diversion to local streets
  - Faster congestion recovery from crashes and incidents
- **Fewer lane changes required (i.e., lane balance)**
- **Large safety improvements**
  - **Lane widths** to allow for current vehicle widths, turning, and comfort
  - **Fewer sideswipe** crashes
  - **Full shoulders** to allow BOS and to recover from breakdowns and emergency vehicle access
  - **Improved visibility** (hills and curves)
  - **No bridge lifts**

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Benefits of 1-Aux Lane compared to 2045 No Build

- **Travel time improvements**
  - SB AM travel time is reduced by 3 minutes (5% faster) between I-5/I-205 split and I-405
  - NB PM travel time is reduced by 11 minutes (30% faster) between Broadway Ave. and SR 500
- **Congestion**
  - Congestion is similar during AM/PM peak period peak direction, but reduces in off-peak periods
- **Safety benefits**
  - Crashes are expected to decrease
- **Mode shift**
  - Daily transit mode share is expected to increase from 7% in the No Build to 11% in the Build (approximately 2% in 2019)
  - Peak hour transit mode share is expected to increase from 14% in the No Build to 17% in the Build (~10% in 2019)
- **Climate**
  - GHG reduction due to less congestion and VMT reduction, mode shift away from single occupant vehicles (transit and active transportation), variable rate tolling, no bridge lifts
- **Equity**
  - Increased modal options

Benefits of 2-Auxiliary Lane compared to No Build

- **Travel time improvements**
  - SB AM travel time is reduced by 6 minutes (10% faster) between I-5/I-205 split and I-405
  - NB PM travel time is reduced by 25 minutes (70% faster) between Broadway Ave. and SR 500
- **Reduced congestion**
  - Congestion reduces 20% during AM/PM peak period peak direction
- **Safety benefits**
  - Crashes are expected to decrease
- **Mode shift**
  - Daily transit mode share is expected to increase from 7% in the No Build to 11% in the Build (2% in 2019)
  - Peak hour transit mode share is expected to increase from 14% in the No Build to 17% in the Build (~10% in 2019)
- **Climate**
  - Anticipated greater GHG reduction due to less congestion, mode shift away from single occupant vehicles (transit and active transportation), variable rate tolling, no bridge lifts
- **Equity**
  - Increased modal options, improved travel time reliability

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