DOWNTOWN TRANSPORTATION PLANNING AND THE BKR TRAVEL DEMAND MODEL

TRANSPORTATION COMMISSION
JUNE 14, 2012

DOWNTOWN TRANSPORTATION PLANNING AND THE BKR TRAVEL DEMAND MODEL

Presentation and Discussion

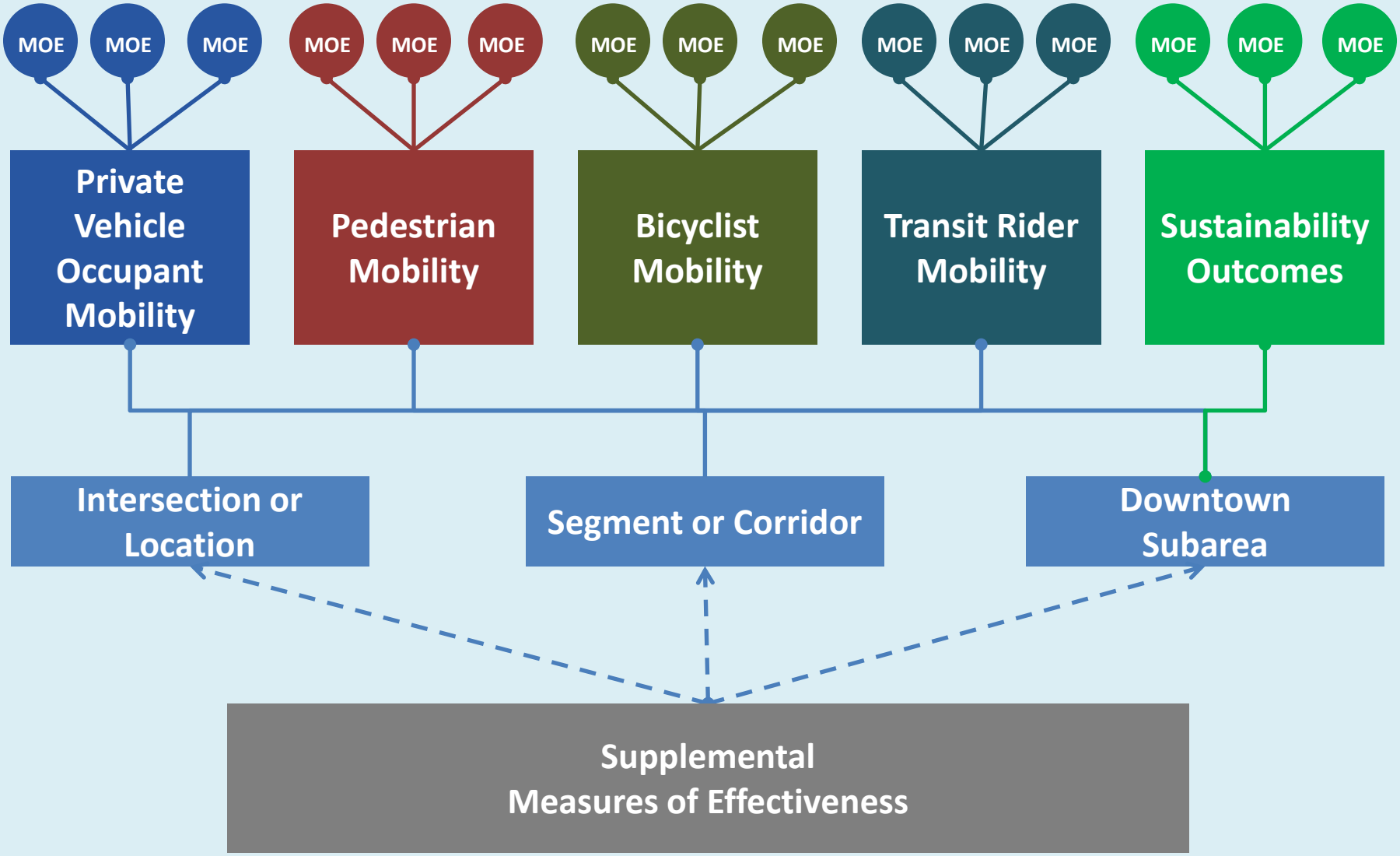
- Measures of Effectiveness
- Using the BKR Model in the Planning Process
- Background on the BKR Model
- Modeling Assumptions
- Next Steps

Measures of Effectiveness

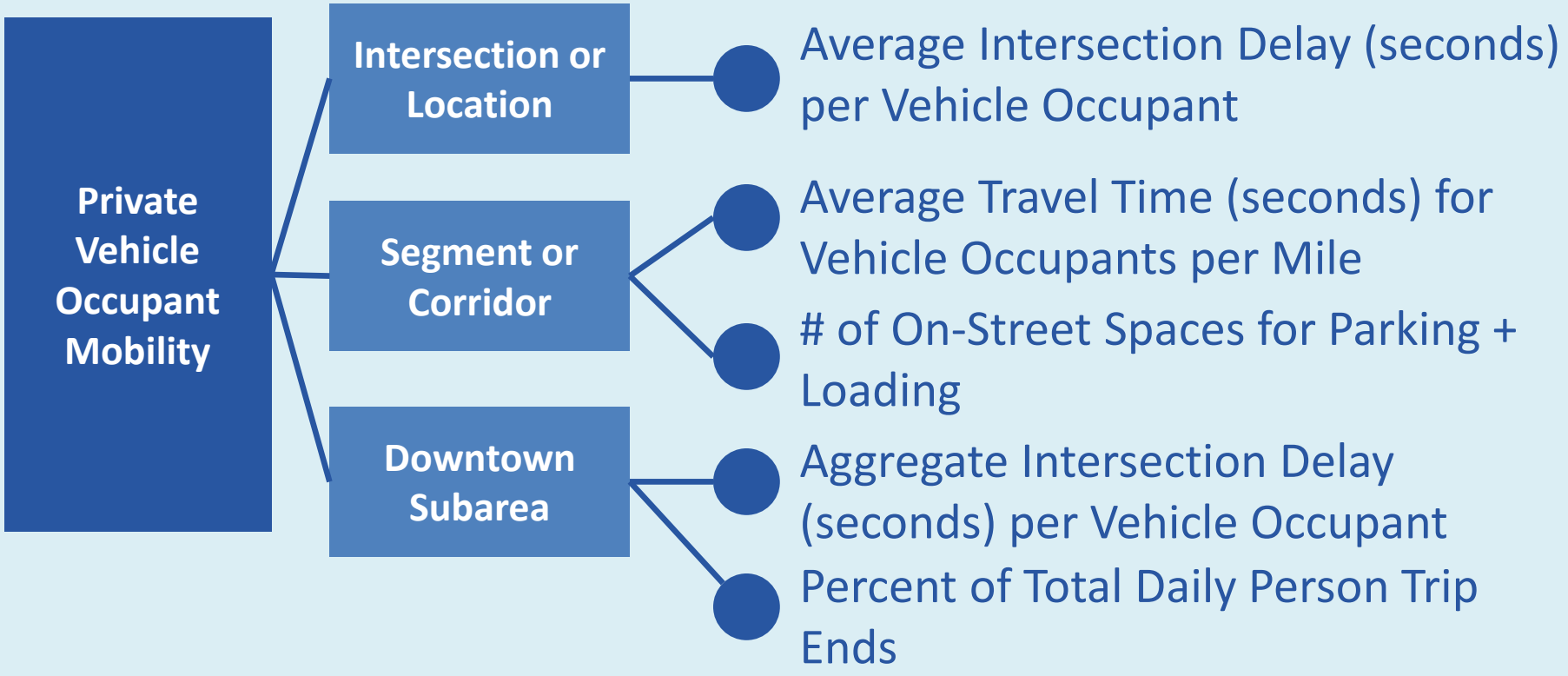
Purpose

- Help identify and prioritize project ideas that address mobility issues
- Based on international best practices applied to Bellevue
- Include qualitative and quantitative metrics
- Inform on the performance of each project
- Measure the effect of a project on four types of users
  - Private vehicle occupants
  - Pedestrians
  - Bicyclists
  - Transit riders
- Describe the mobility outcomes geographically
  - Specific intersection or location
  - Along a corridor
  - Downtown Bellevue as a whole
- Include sustainability metrics for the Downtown as a whole

Measures of Effectiveness

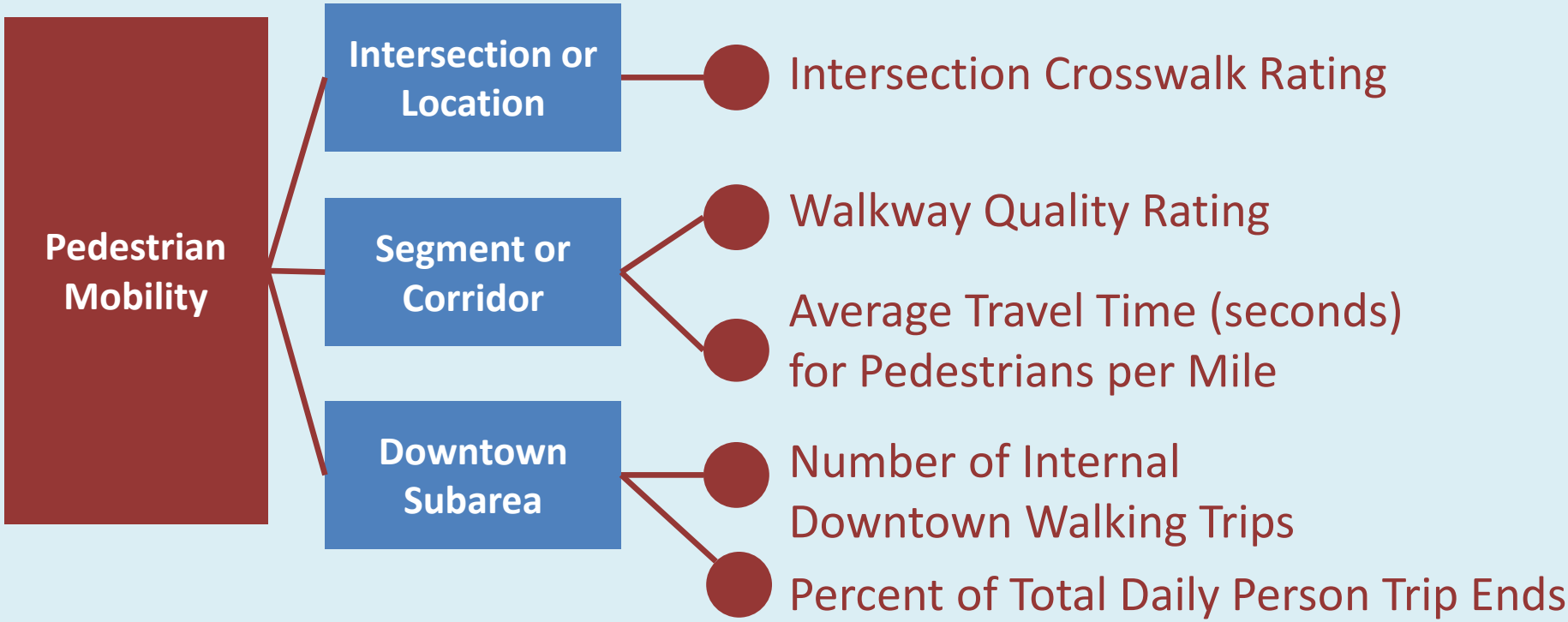


Private Vehicle Occupant Mobility



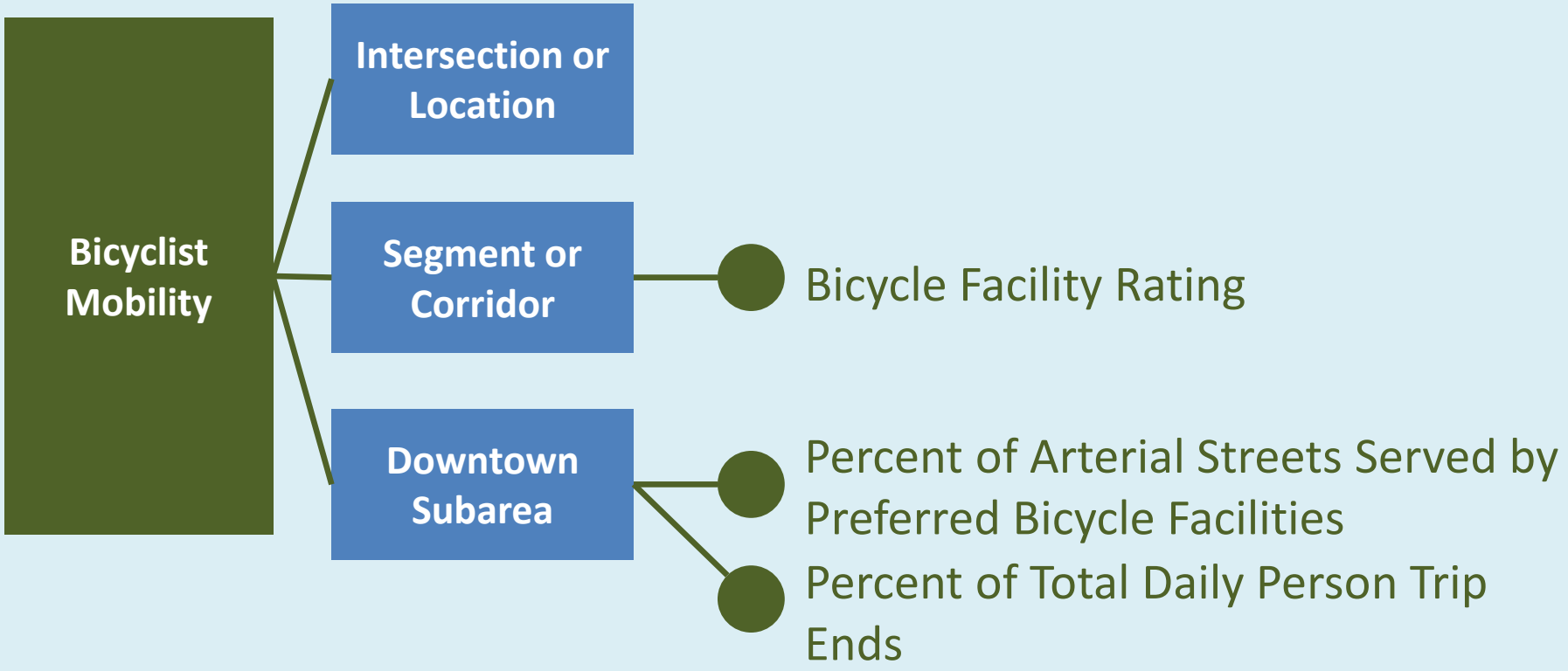
Measures of Effectiveness

Pedestrian Mobility



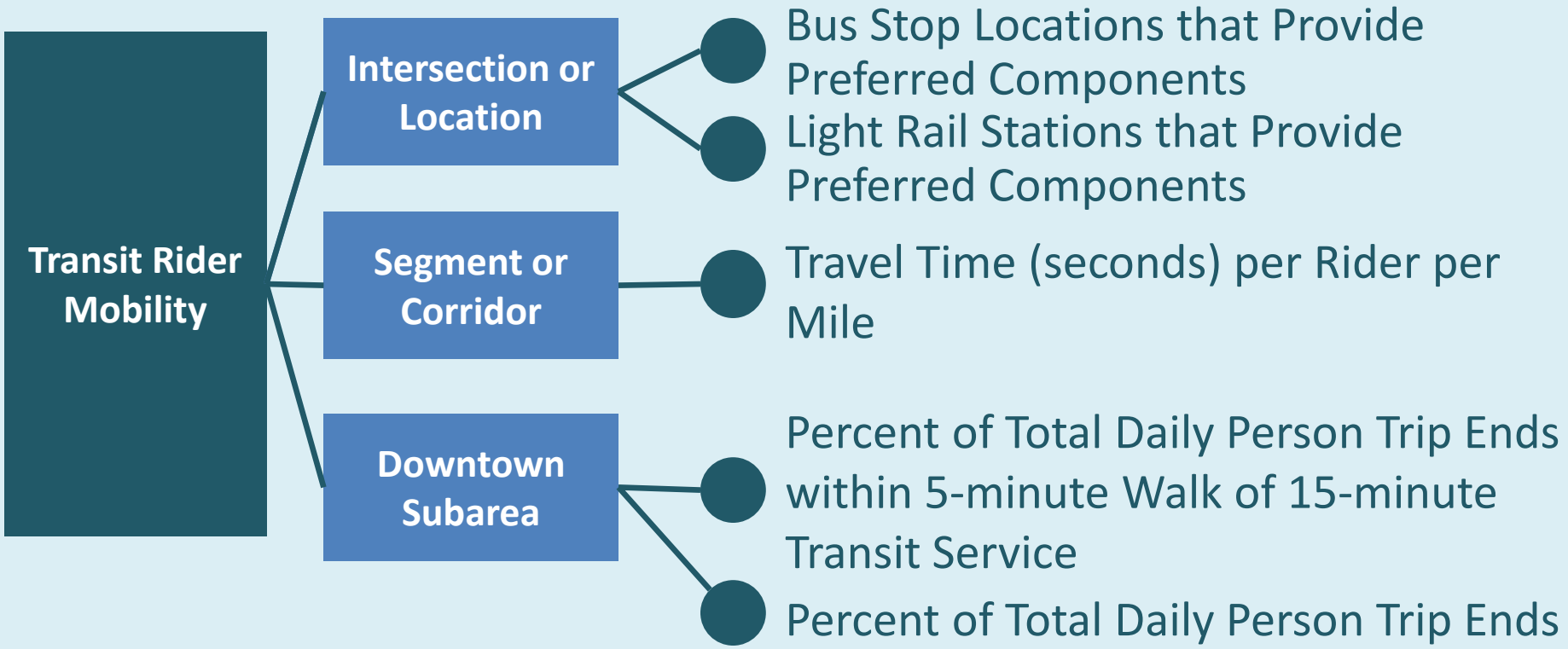
Measures of Effectiveness

Bicyclist Mobility



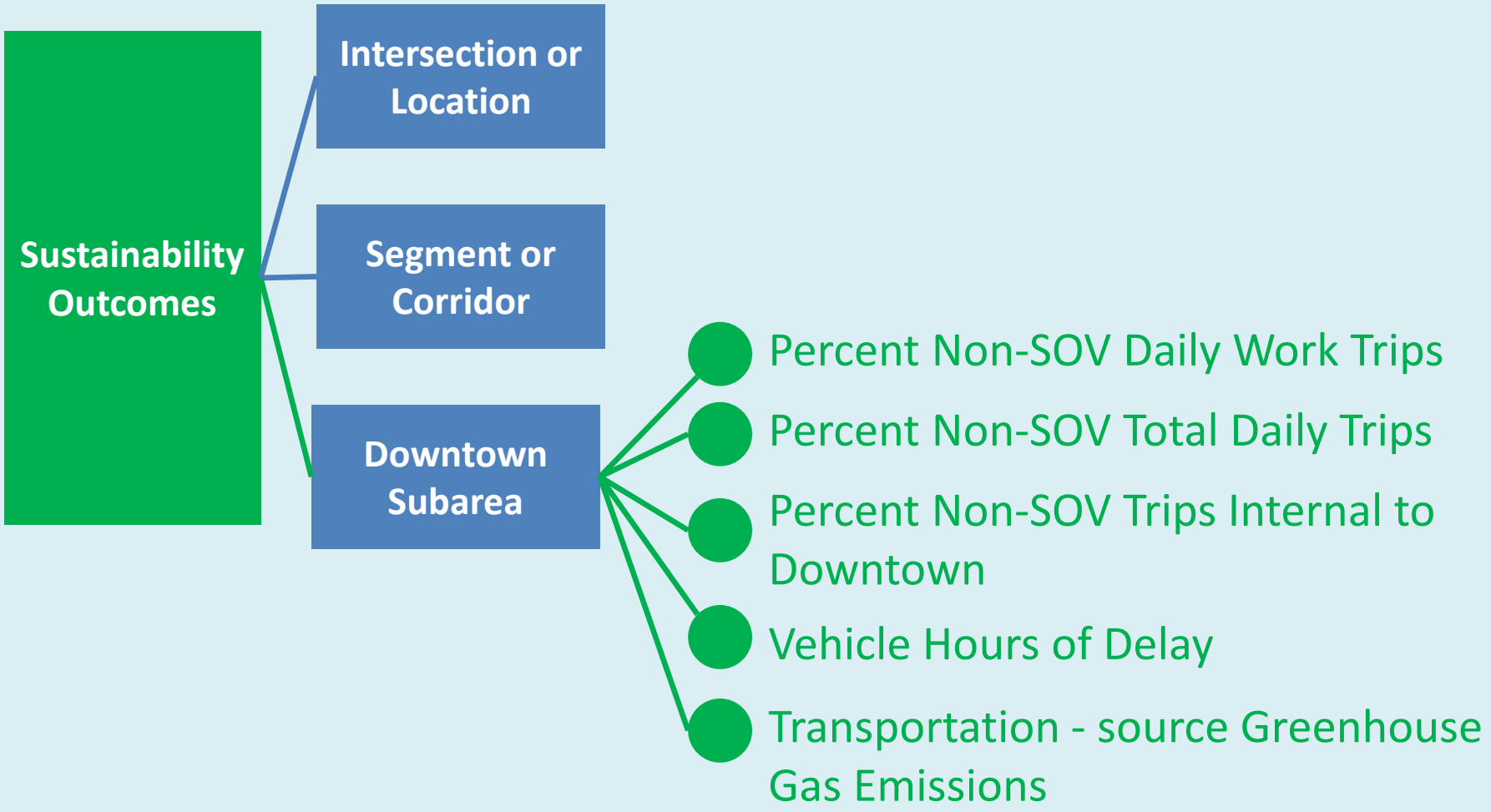
Measures of Effectiveness

Transit Rider Mobility



Measures of Effectiveness

Sustainability Outcomes

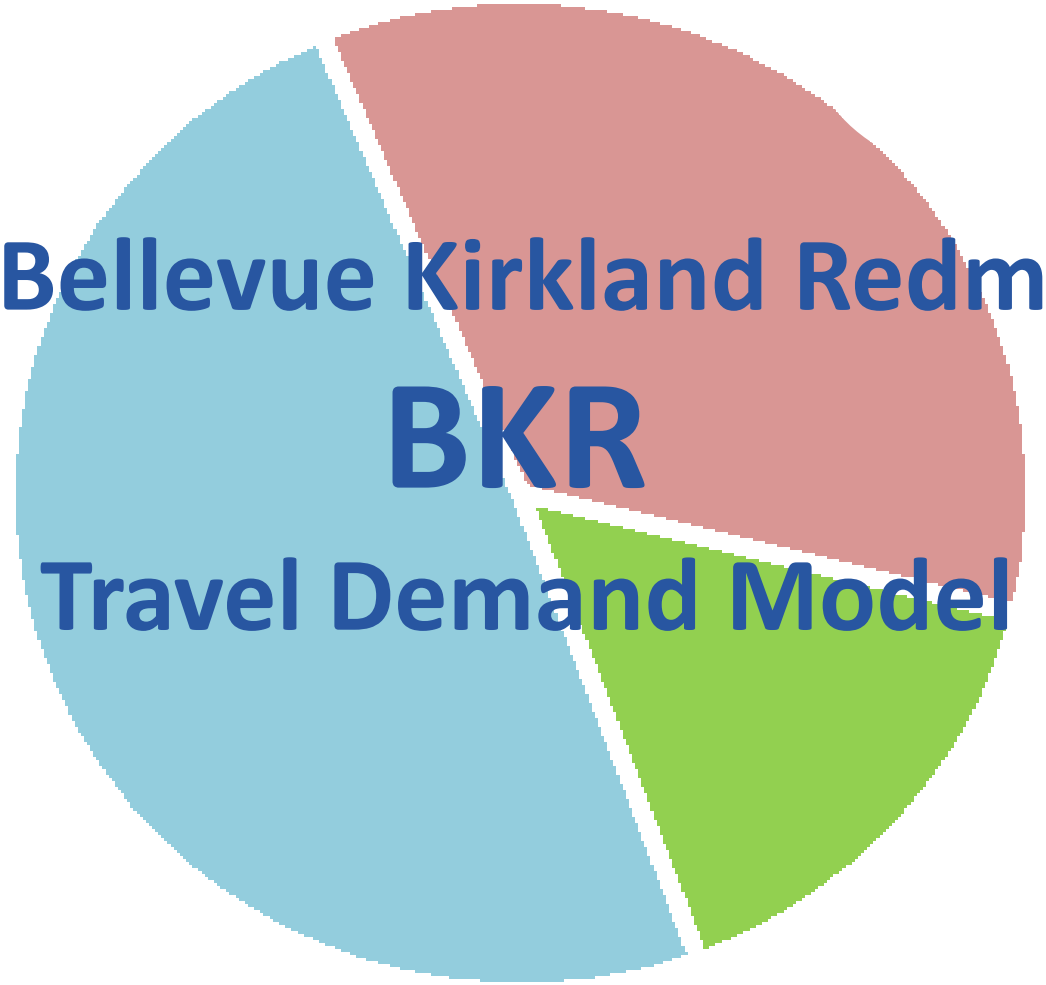


Measures of Effectiveness

The Bellevue Kirkland Redmond

BKR

Travel Demand Model



Using the BKR Model
Downtown Transportation Plan Update

- What the BKR Model can tell us
  - PM Peak hour travel demand, intersection aggregate LOS
  - Evaluate changes from land use or roadway modifications
  - Mode share for specific areas
  - Baseline LOS shows where capacity project ideas may be needed
  - Baseline used to “test” effectiveness of project ideas
- What the BKR model does not tell us
  - Operational delay
  - Turn movement counts and traffic operations
  - Bicycle mode share

Using the BKR Model
Downtown Transportation Plan Update, cont.

- Other modeling tools for greater precision/focus that use specific input from BKR
  - Synchro – macro operations analysis, LOS, turn movements
  - VISSIM – micro simulation of a specific geographic area
  - Dynameq – mesoscopic level with intersection queueing

Travel Demand Modeling Definitions

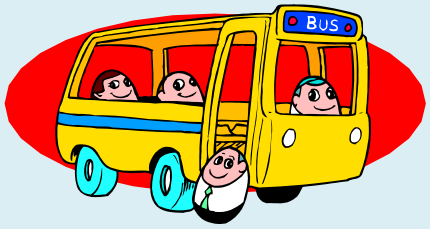
Person Trip

One trip made by a person - any mode any purpose

Trip Mode

Auto Shared

Transit Rider



Auto Alone

Pedestrian

Travel Demand Modeling Definitions

TRIP PURPOSE

Home-Based Work:

Home-Based Other:

Non-Home Based:

BKR Model – Four Steps

- **Trip Generation: How Many Trips**

Person trips produced and attracted by the land uses assigned to each TAZ

- **Trip Distribution: Where People are Going**

Trips are linked on the transportation network between producing and attracting TAZs.

- **Mode Choice: What Mode People are Using**

Motorized modes of travel chosen by each person making a trip between TAZs. In Downtown Bellevue, many trips for short distances between small TAZs are converted to pedestrian mode

- **Trip Assignment**: **What Route People are Taking**

Person trips are assigned to a specific travel path between TAZs by mode of travel

BKR Travel Demand Forecast Methodology

- Trip Generation — Based on land use forecast (i.e. 2030) — Land Use Forecast for Horizon Year
- Trip Distribution — Where trips go on the street network — Transportation Network Assumptions
- Mode Choice — SOV, HOV, Transit, Ped/Bike
- Trip Assignment — Trips assigned to specific streets

Travel Demand Forecast

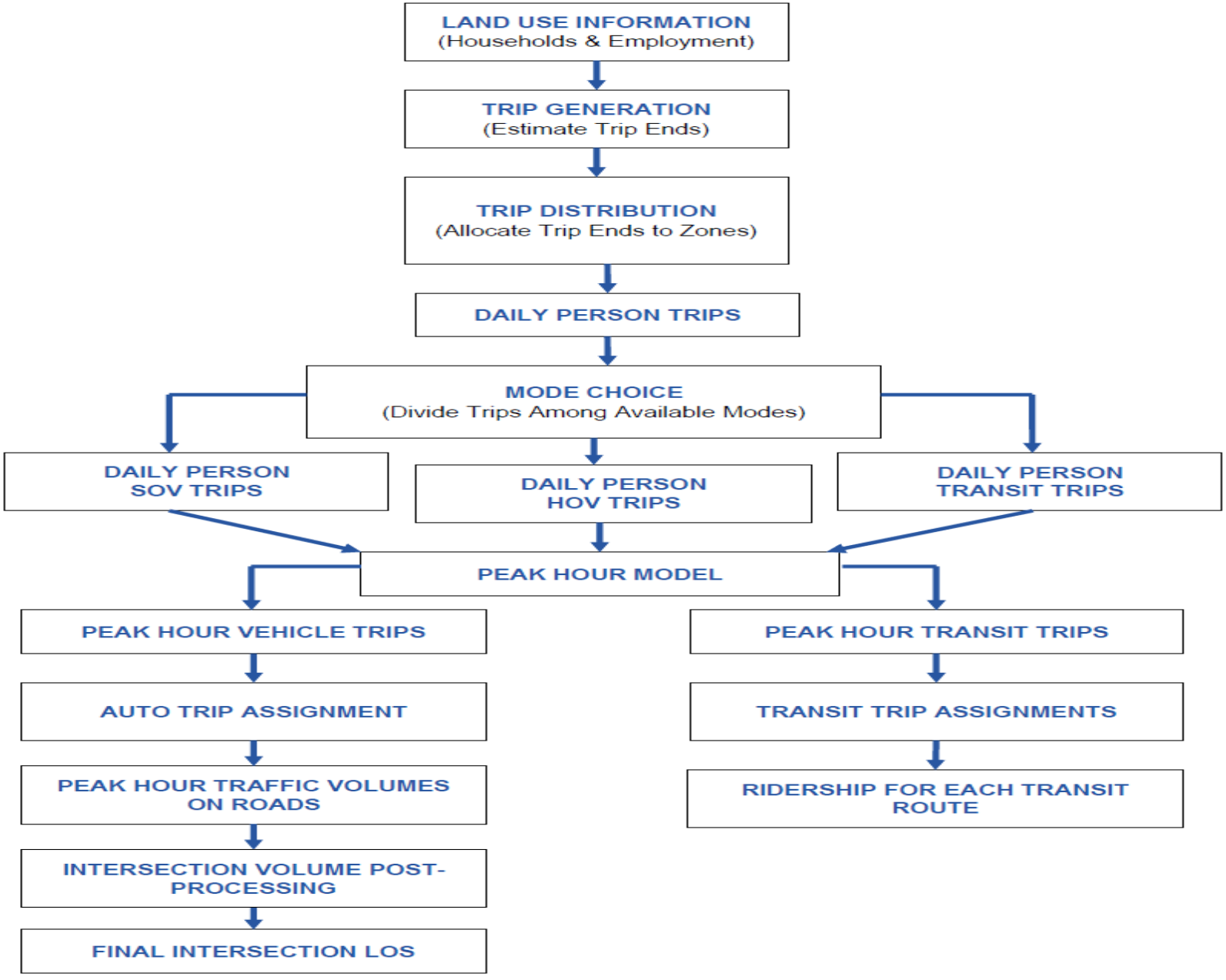
Using the BKR Model
Downtown Transportation Plan Update

- **Baseline Assumptions for 2030**
  - Land Use in each TAZ
  - Transportation Network and Transit Service
  - Many other assumptions
    - Parking and auto operating costs
    - Tolls on SR 520 and HOT Lanes on 405
- **Provides a glimpse of future motorized mobility**
  - Overall Travel Demand
  - Travel Demand by Mode
  - Vehicular Level of Service
  - Informs Measures of Effectiveness

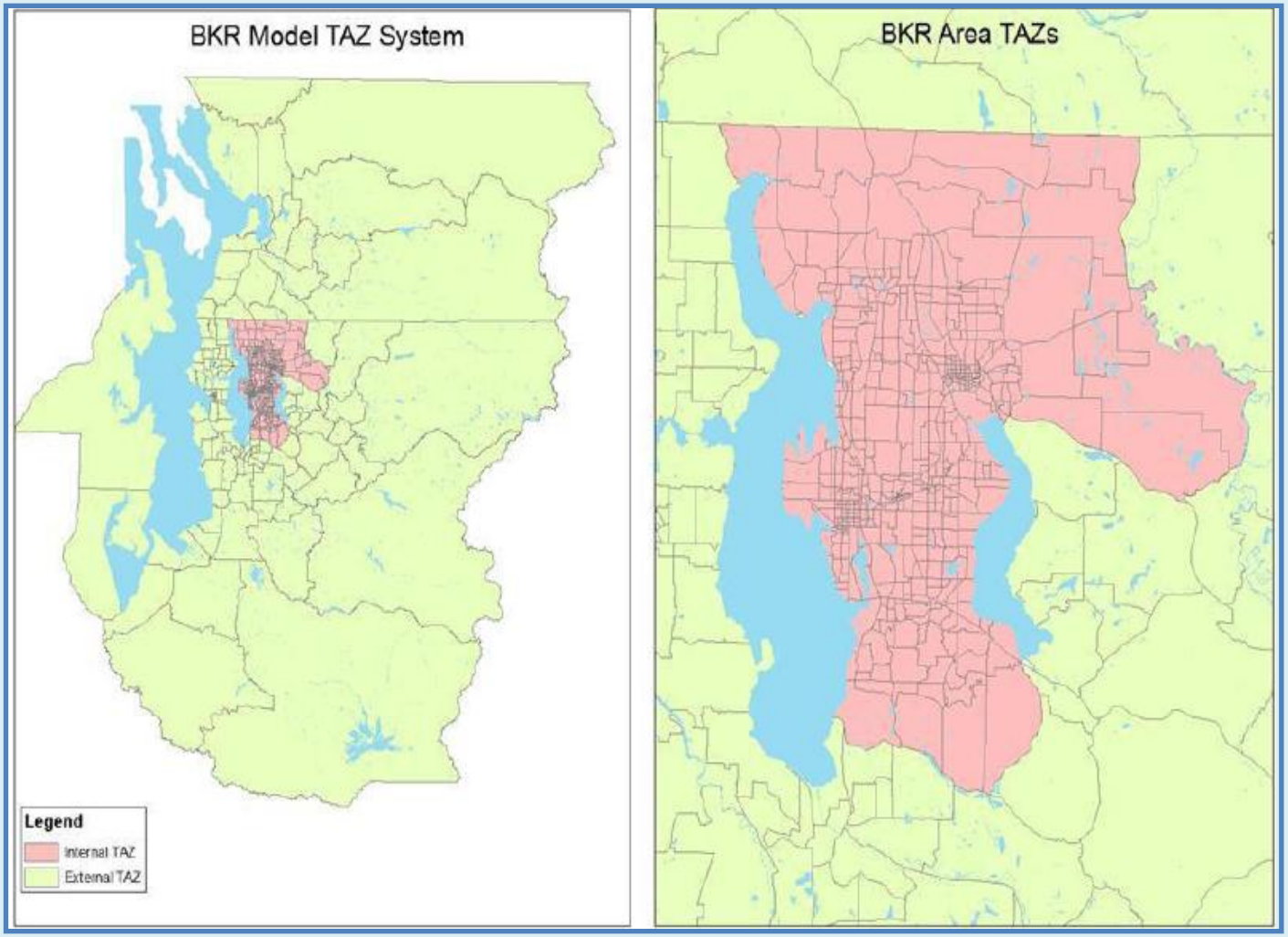
Select BKR Modeling Information

- Overall change from 2010 base year to 2030 baseline(aka “No Build”)
- System level vehicular travel time measures
- Volume of travel demand compared to roadway capacity
- Transit results showing PM peak boarding and alighting
- Park & Ride usage

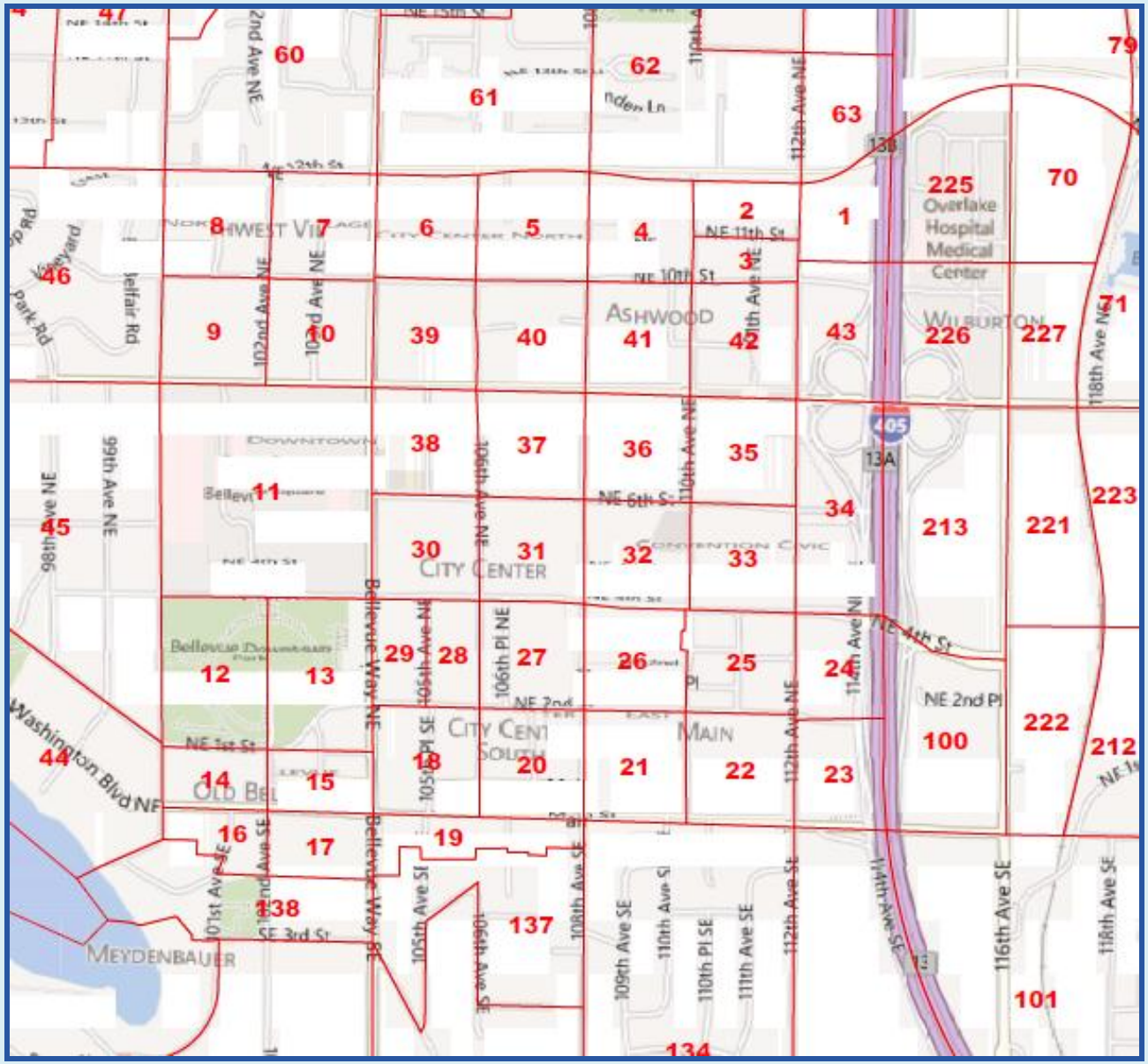
BKR Flow Chart



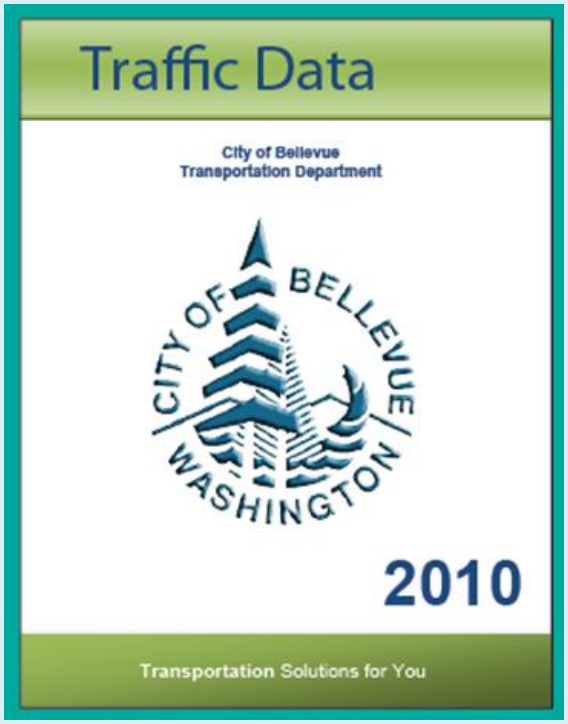
BKR Travel Demand Model
Regional Traffic Analysis Zones (TAZs)



BKR Travel Demand Model
TAZ Structure - Downtown



Background/Assumptions for the BKR Model



Based on land use forecast (i.e. 2030) ← Land Use Forecast for Horizon Year

Where trips go on the street network ← Transportation Network Assumptions

Background/Assumptions for the BKR Model

2010 Base Year

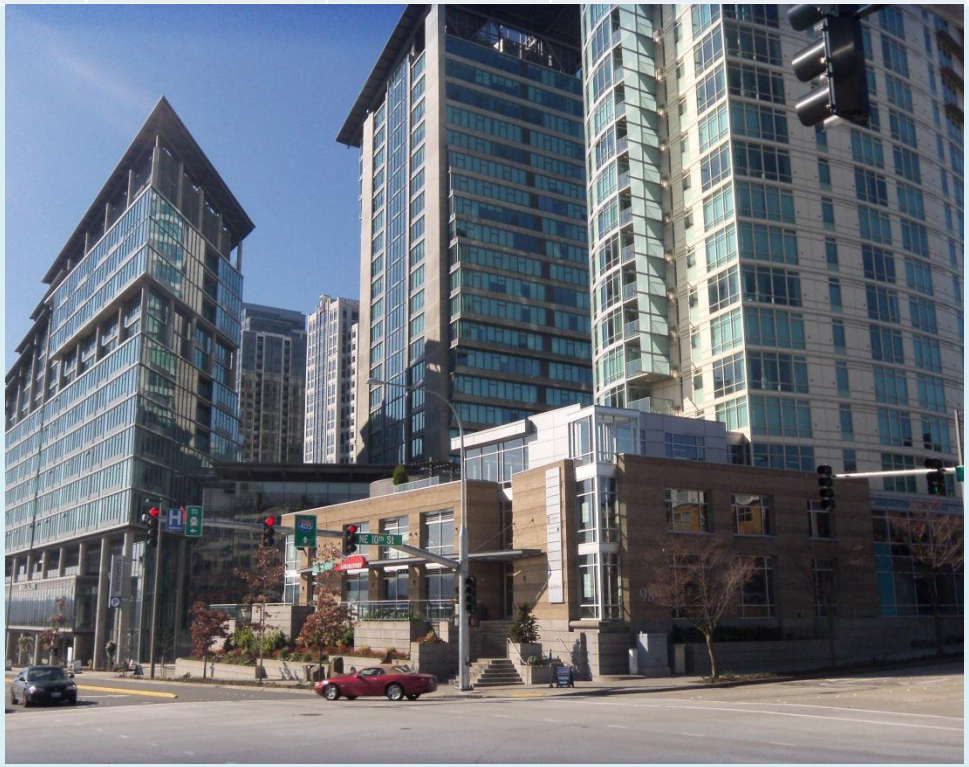
- Existing conditions
  - Land Use by TAZ – population and employment
  - Transportation Network/Transit Service
- Validated to actual travel information for 2010

2030 Baseline

- Assumed conditions
  - Land use by TAZ – population and employment
  - Transportation Network/Transit Service – “reasonably foreseeable” given status of planning and funding

Land Use Assumptions

	1990	2000	2010	2030	2010/2030 Growth
Employment	22,257	34,042	42,525	70,300	+27,775/65%
Population	1,182	2,588	7,147	19,000	+11,853/166%



Transportation Network Assumptions

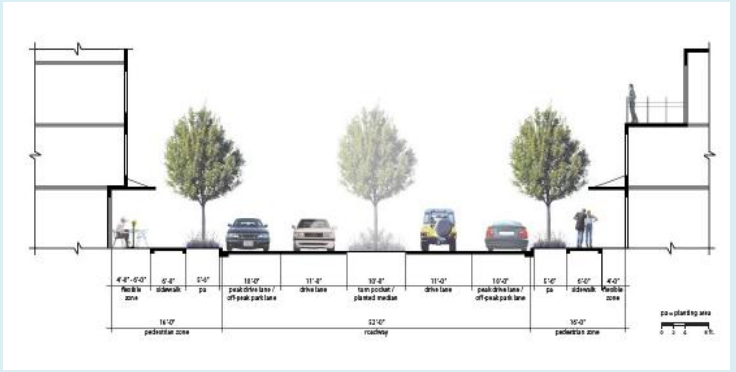
"Reasonably Foreseeable"

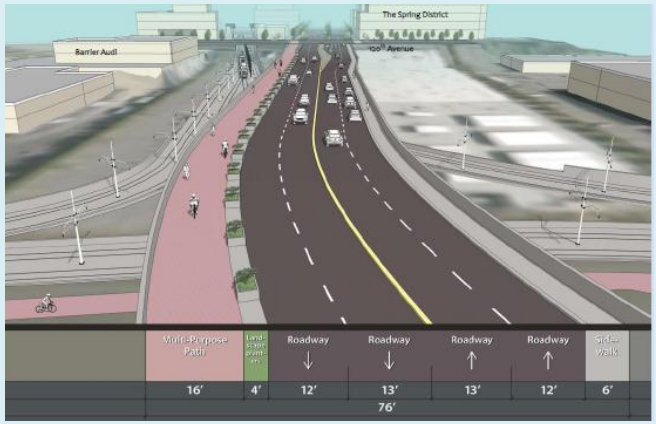
- Roadway Infrastructure
  - NE 4th Street Extension
  - 120th Avenue NE Improvements
  - SR 520 Bridge & HOV Project
- Transit Facilities
  - East Link LRT
- Regional Roadway Tolling
  - I-405 & SR 167 HOT Lane Tolls

Transportation Network Assumptions

Not on the "Reasonably Foreseeable" list but likely to be studied in the DTP update

- NE 6th Street Extension
- 124th Avenue NE/SR 520 Interchange
- NE 2nd St/I-405 Interchange and arterial expansion
- NE 15th St "Zone 1" - 112th Ave NE to 120th Ave NE





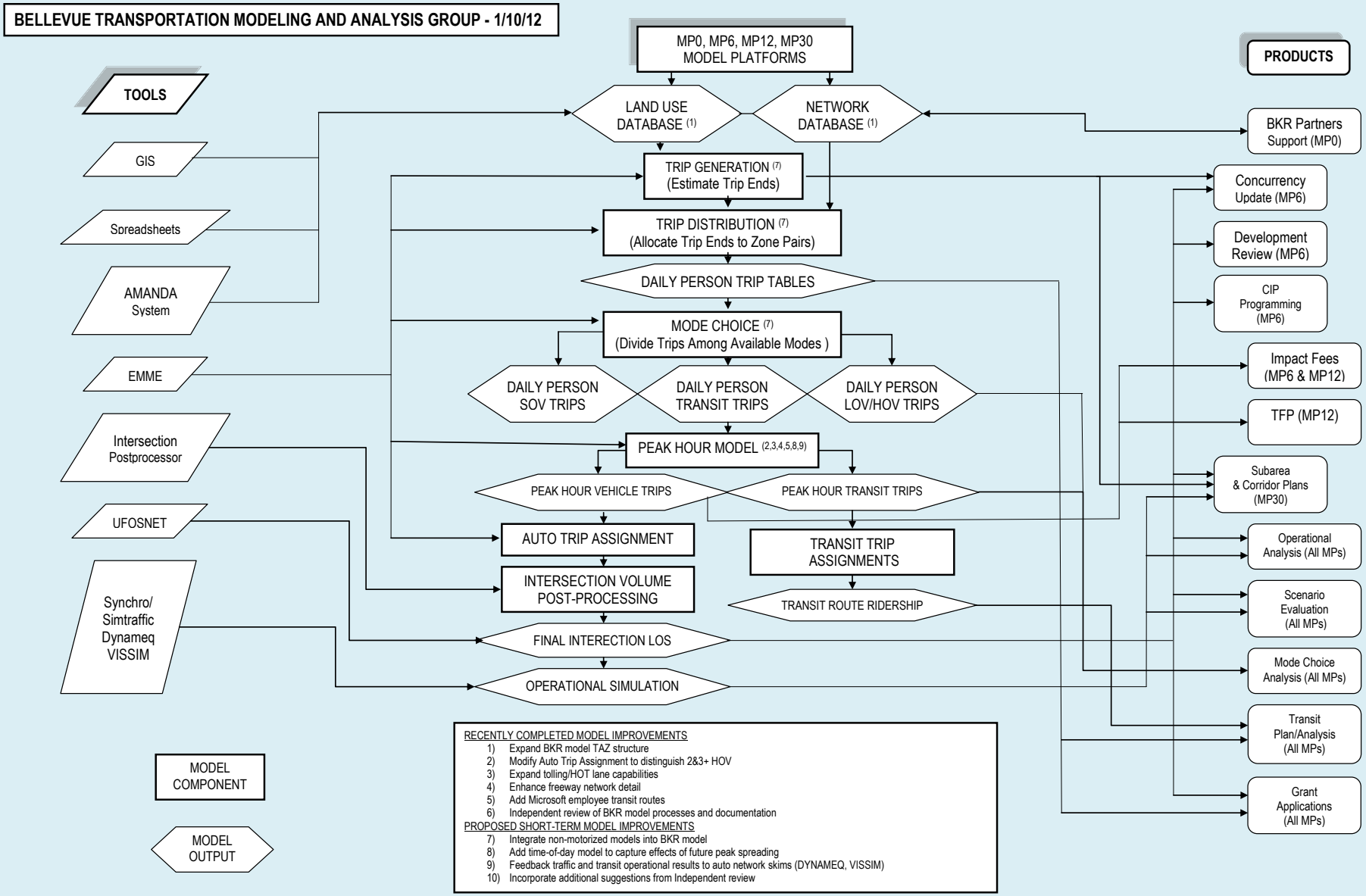
Transportation System Assumptions

Other BKR Modeling Assumptions

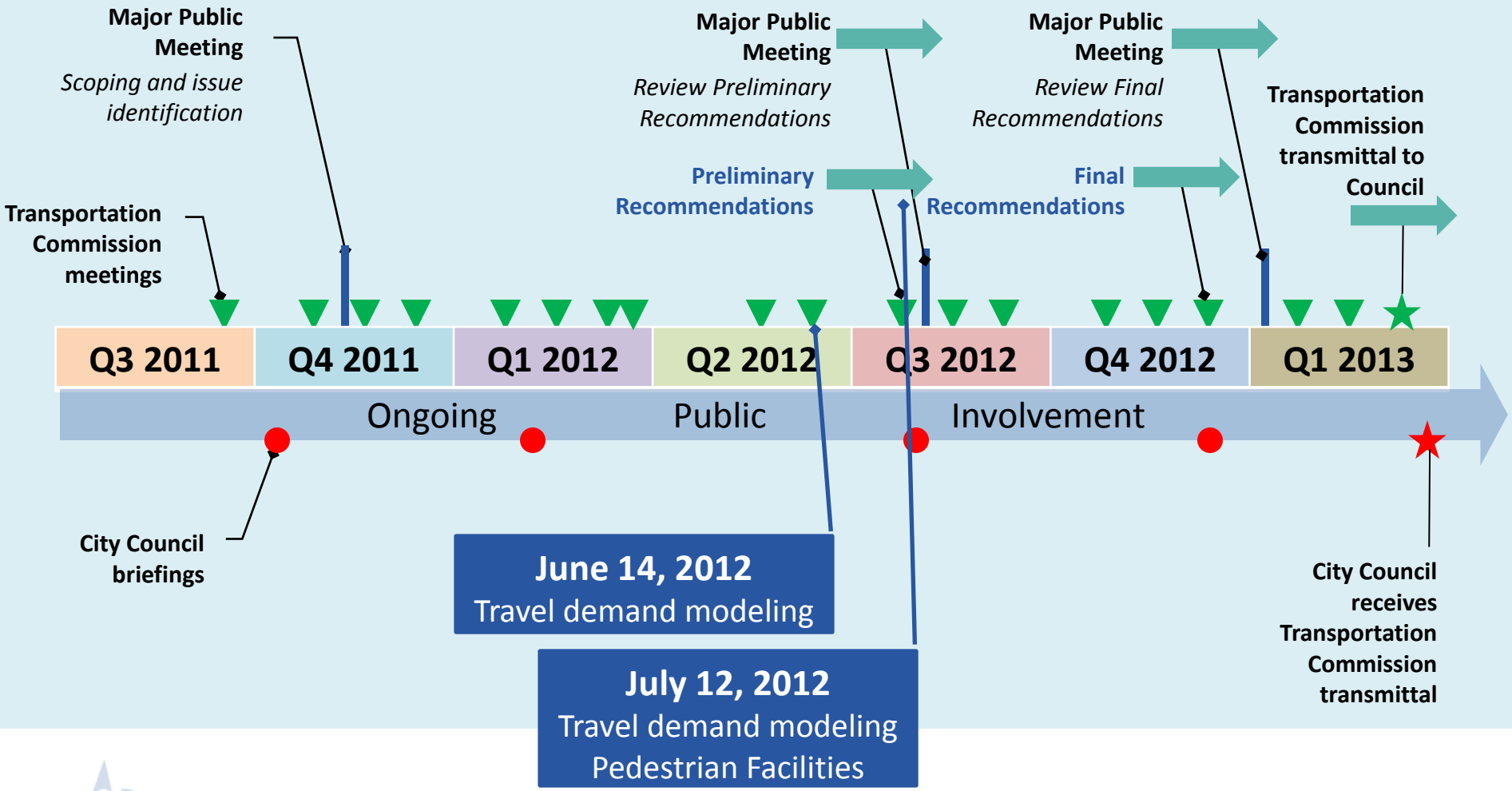
- Downtown Parking Supply
- Parking Management
- Parking Cost
- Bus Transit Service

- Signal Operations - SCATS

Expanded BKR Flow Chart



Plan Update Timeline



Downtown Transportation Plan Update

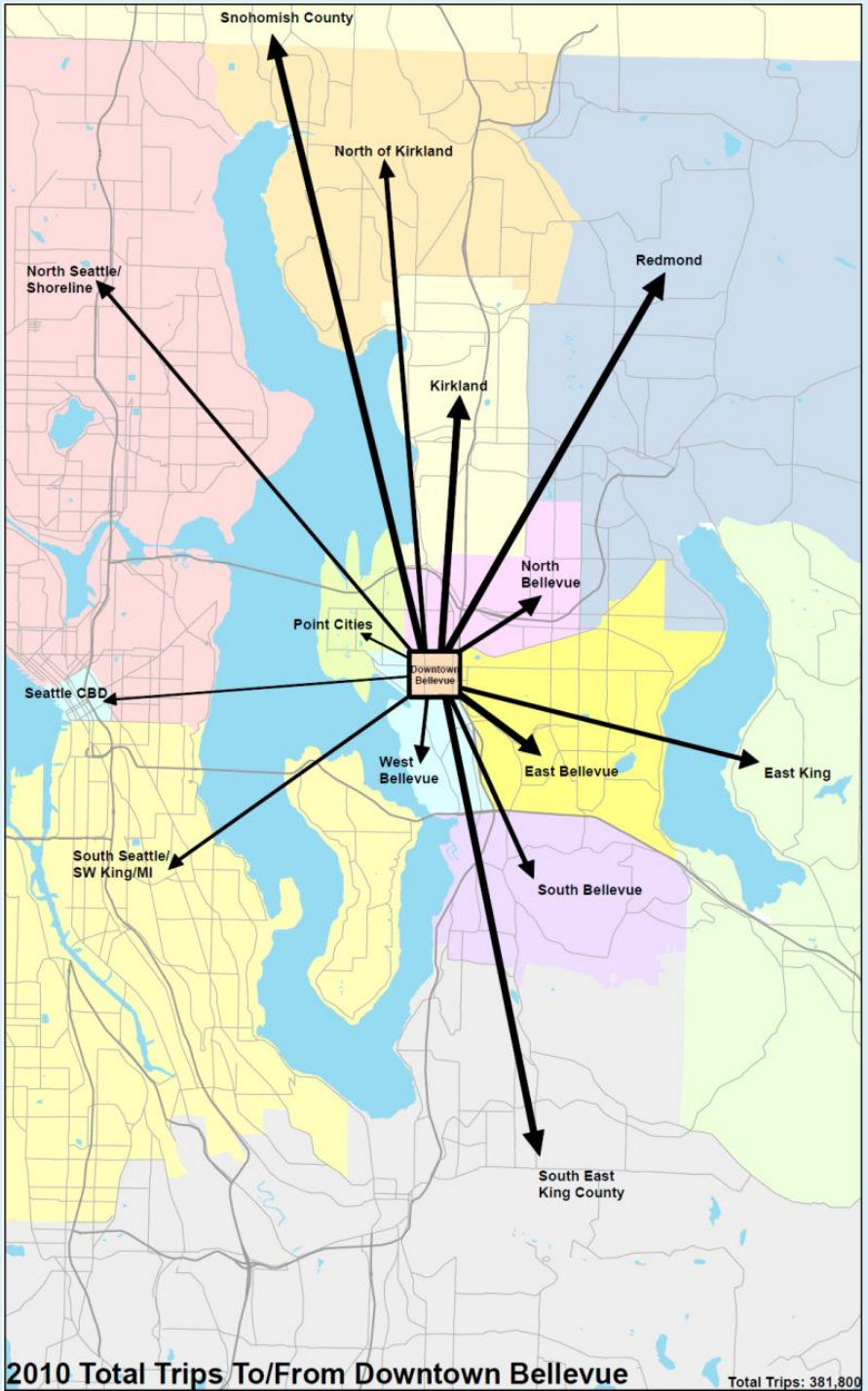
Thank you!

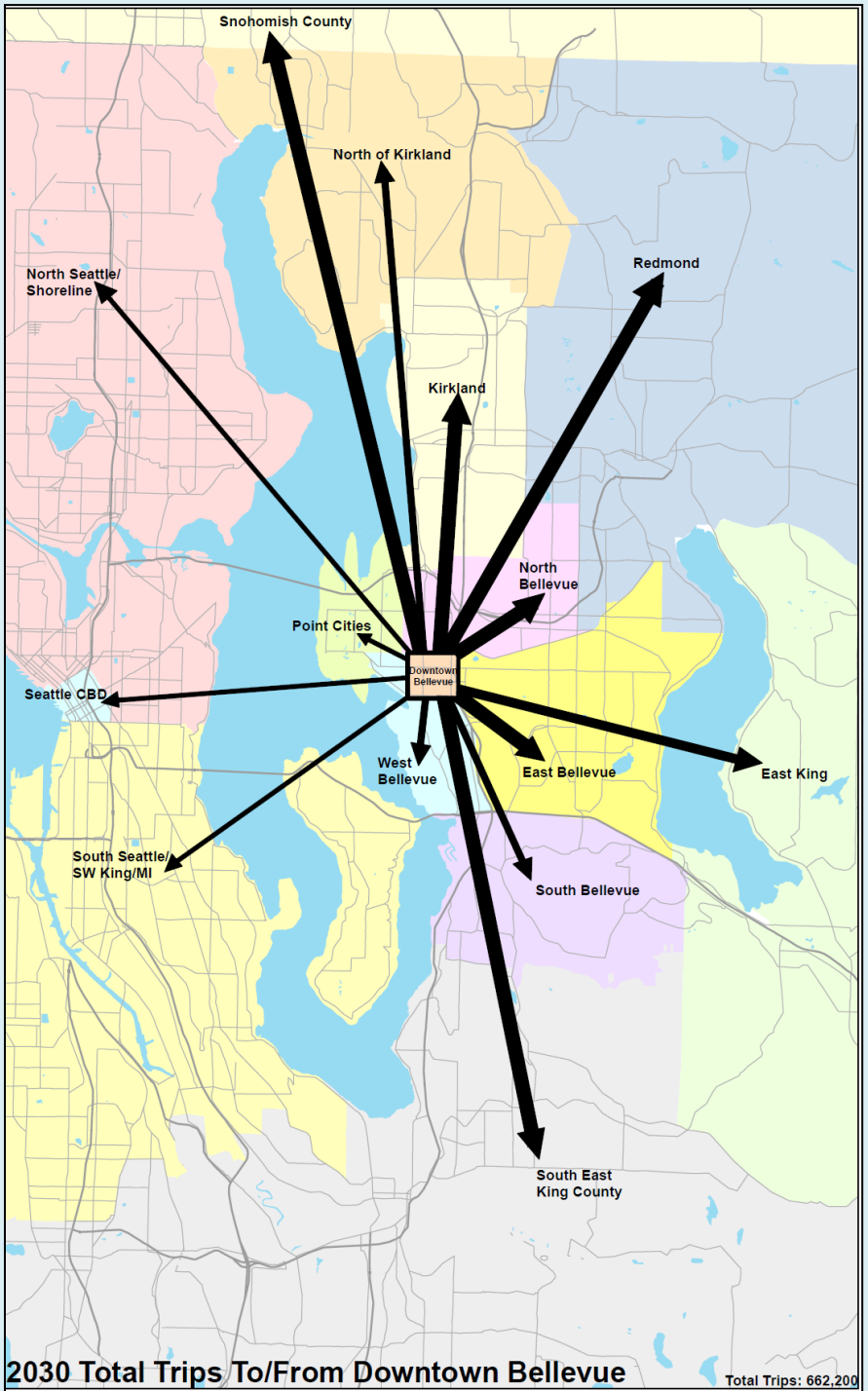
Kevin McDonald
Judy Clark
Sean Wellander

www.bellevuewa.gov/DowntownTransportationPlanUpdate

Supplemental information on following slides

- 2010/2030 Total Trips to/from Downtown Bellevue
- 2010/2030 PM Peak Hour trips to/from Downtown Bellevue
- BKR PM Peak Transit activity boarding and alightings
- BKR PM Peak Transit activity boarding and alightings
- 2011 Downtown Bellevue mode share survey
- 2003 – 2011 Bellevue transit ridership trends
- American Community Survey results
- Comments/observations on transit use


Snohomish County
North of Kirkland
Redmond
North Seattle/
Shoreline
Kirkland
North
Bellevue
Point Cities
Downtown
Bellevue
Seattle CBD
West
Bellevue
East Bellevue
East King
South Seattle/
SW King/MI
South Bellevue
South East
King County
2010 Total Trips To/From Downtown Bellevue
Total Trips: 381,800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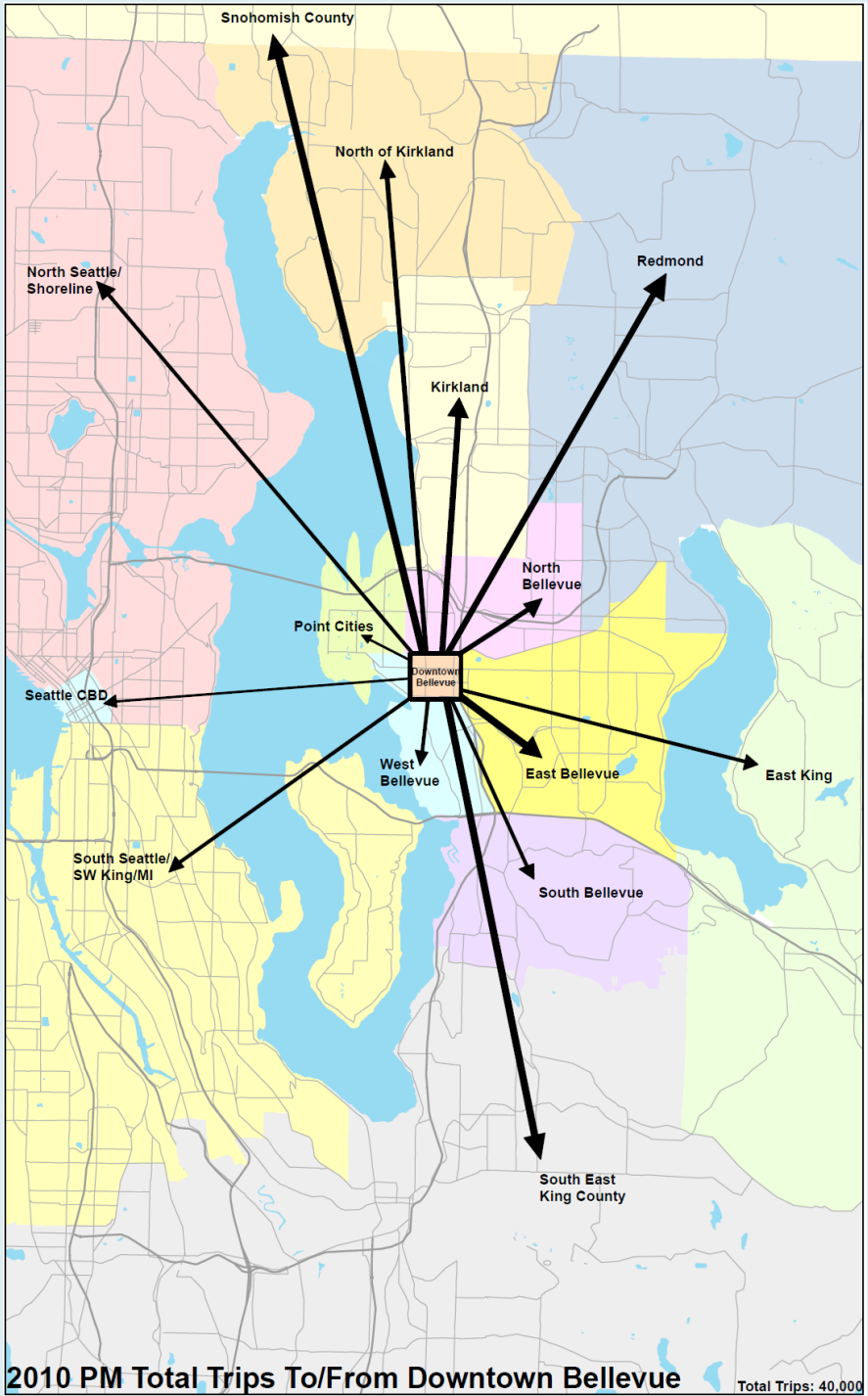
Seattle CBD
West
Bellevue
East Bellevue
East King
South Seattle/
SW King/MI
South Bellevue
South East
King County
2030 Total Trips To/From Downtown Bellevue
Total Trips: 662,200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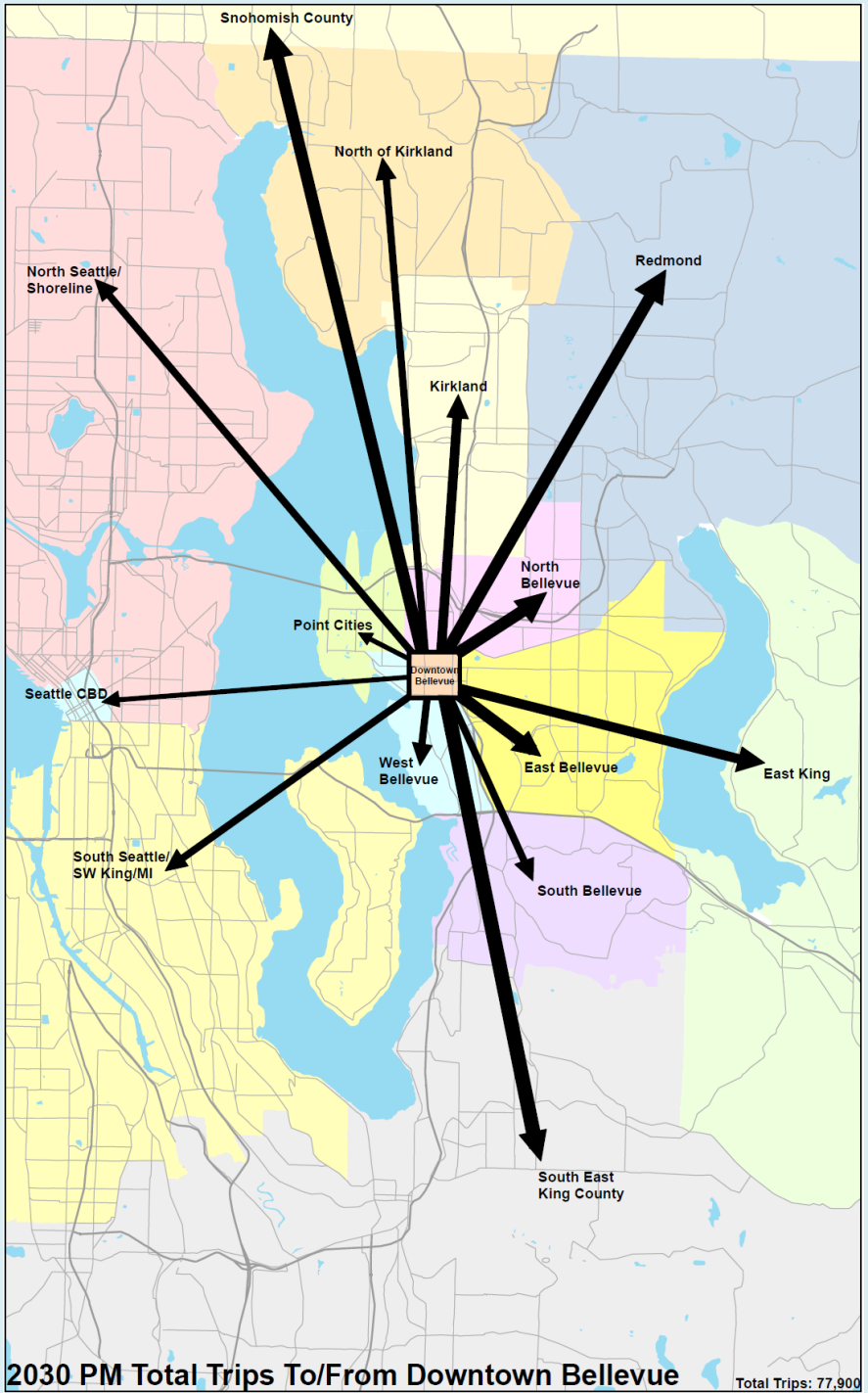
Seattle CBD
West
Bellevue
East Bellevue
East King
South Seattle/
SW King/MI
South Bellevue
South East
King County
2010 PM Total Trips To/From Downtown Bellevue
Total Trips: 40,000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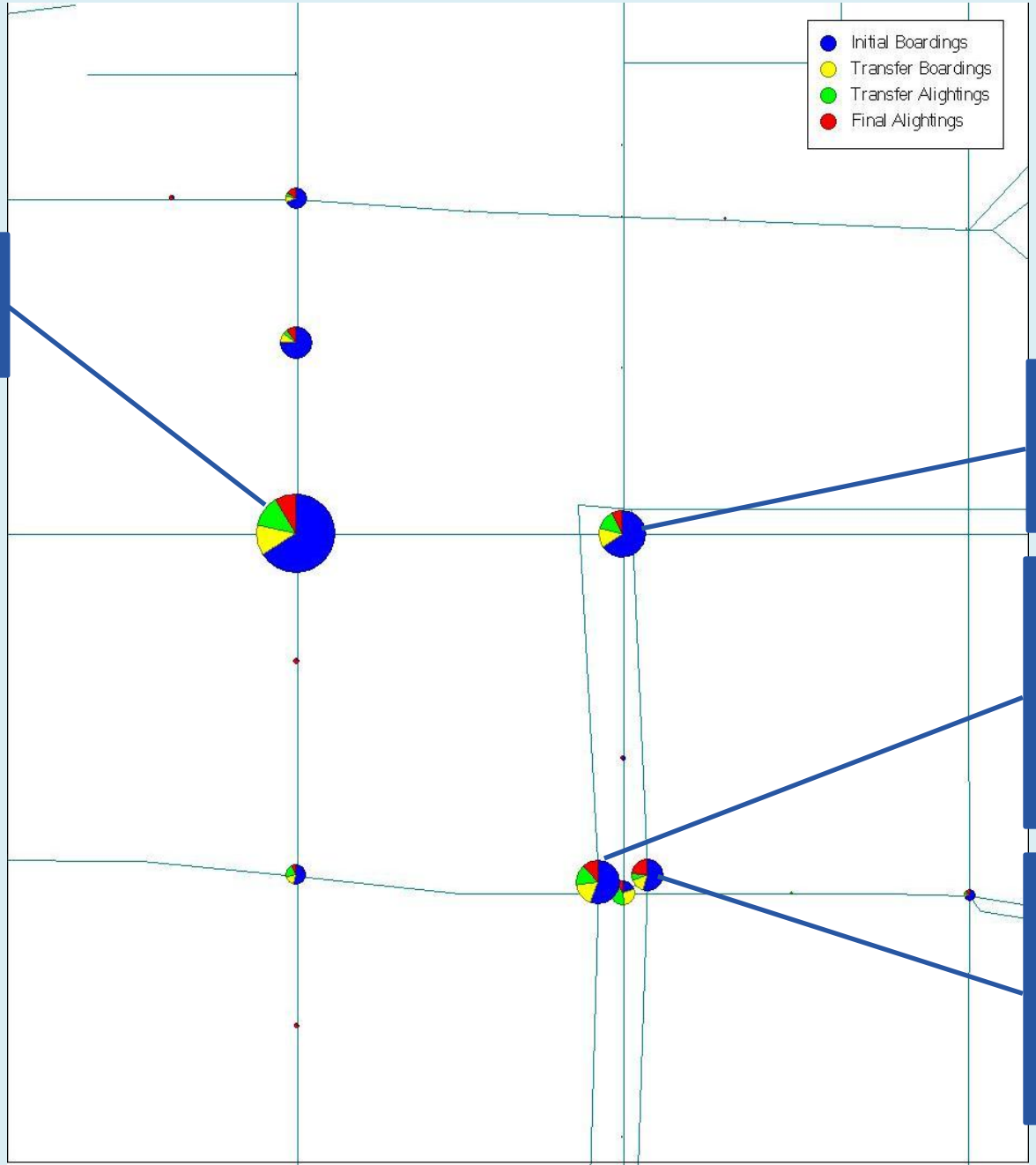
Seattle CBD
West
Bellevue
East Bellevue
East King
South Seattle/
SW King/MI
South Bellevue
South East
King County
2030 PM Total Trips To/From Downtown Bellevue
Total Trips: 77,900

BKR - Transit Activity Boardings and Alightings



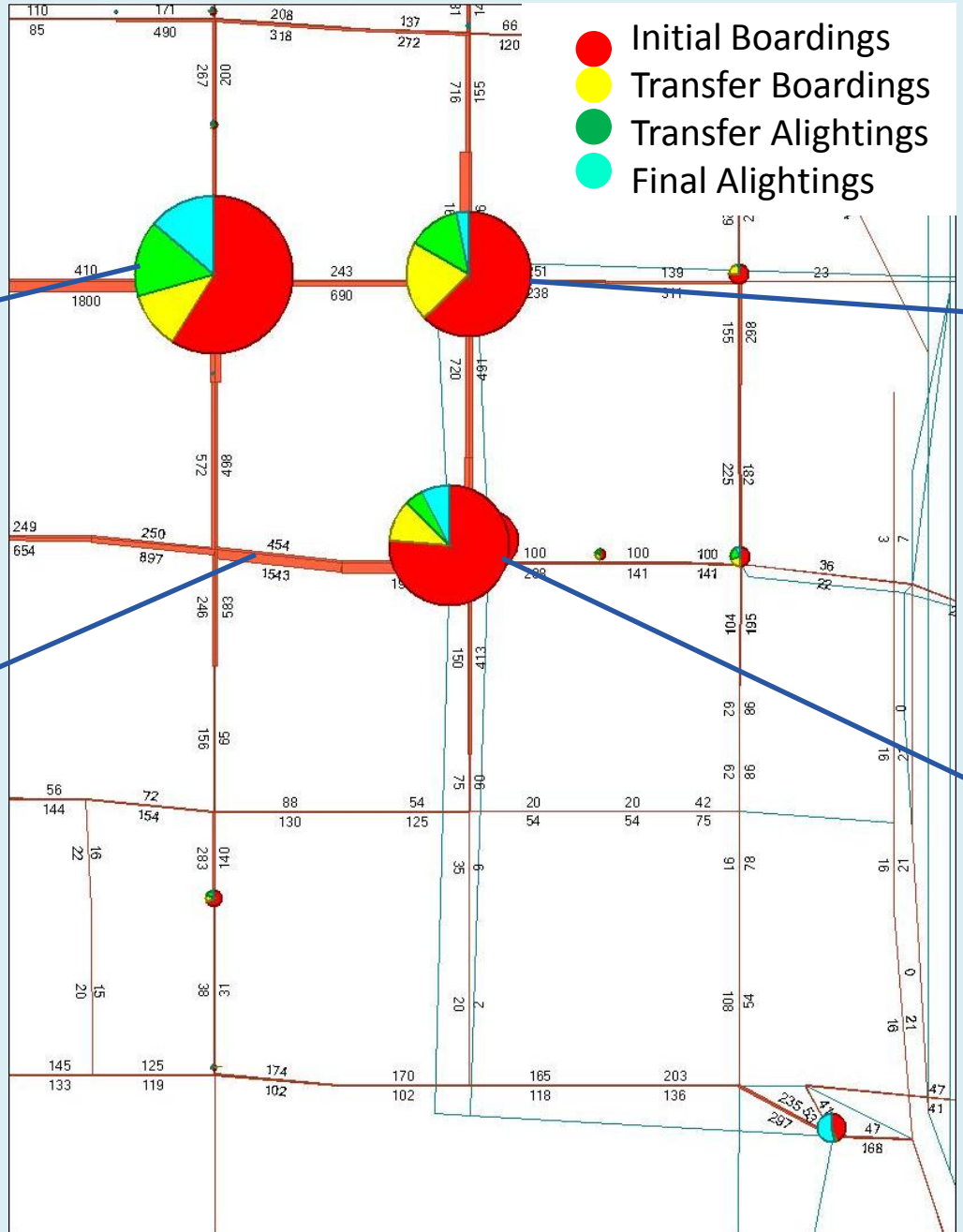
Bellevue Transit Center west

Bellevue Transit Center east

East Link Bellevue Transit Center Station Southbound/ westbound

East Link Bellevue Transit Center Station Northbound/ eastbound

BKR - Transit Activity Boardings and Alightings



Bellevue Transit Center West Entrance

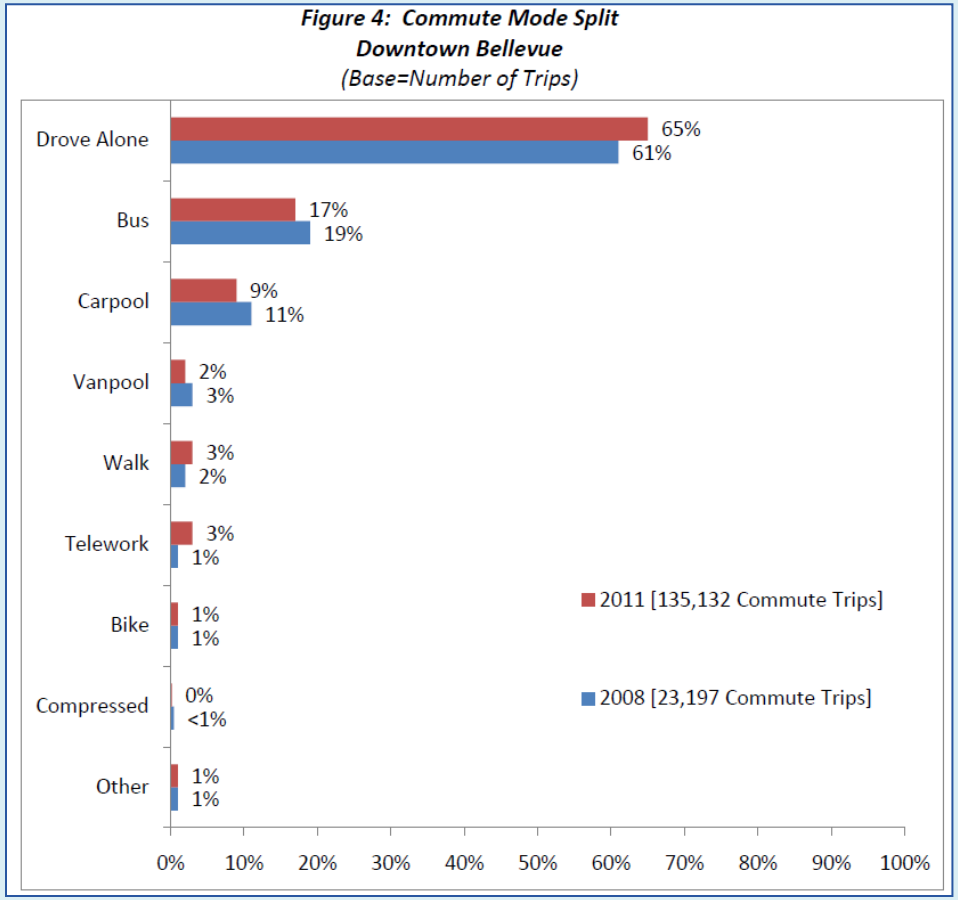
Note: The small numbers on each side of the lines represent the number of pedestrians that walk to or from transit on the east or west/north or south sides of the street

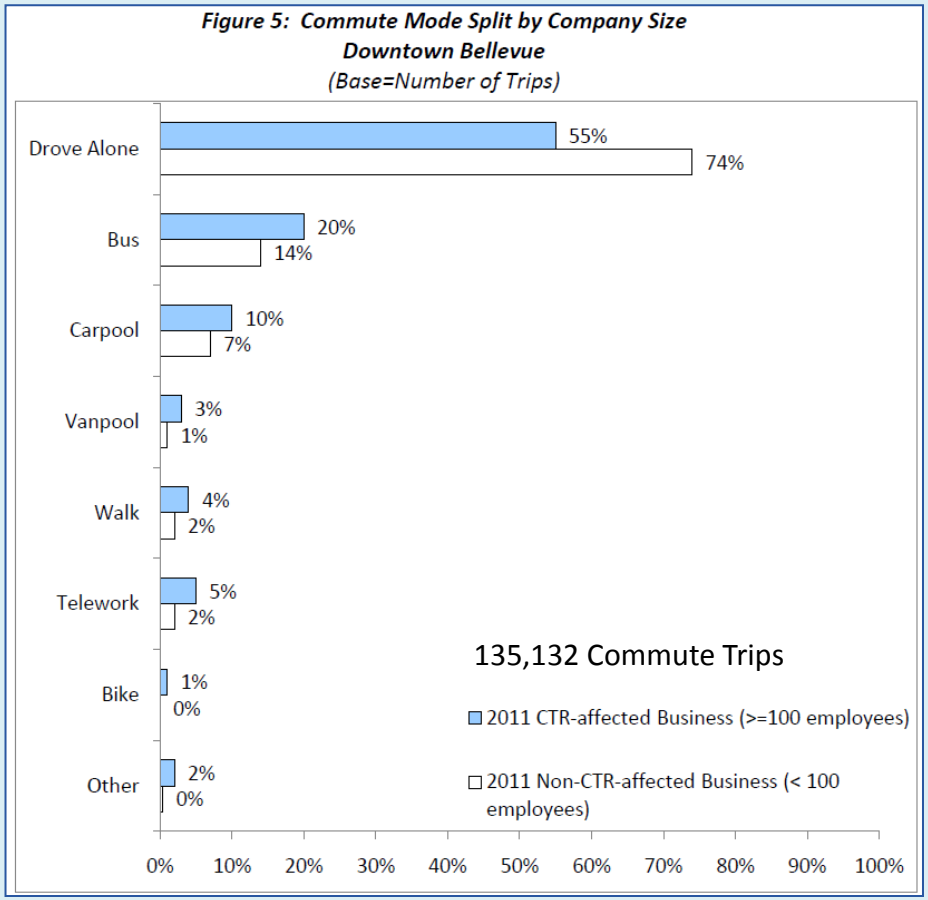
Bellevue Transit Center East Entrance

East Link Bellevue Transit Center Station Southbound

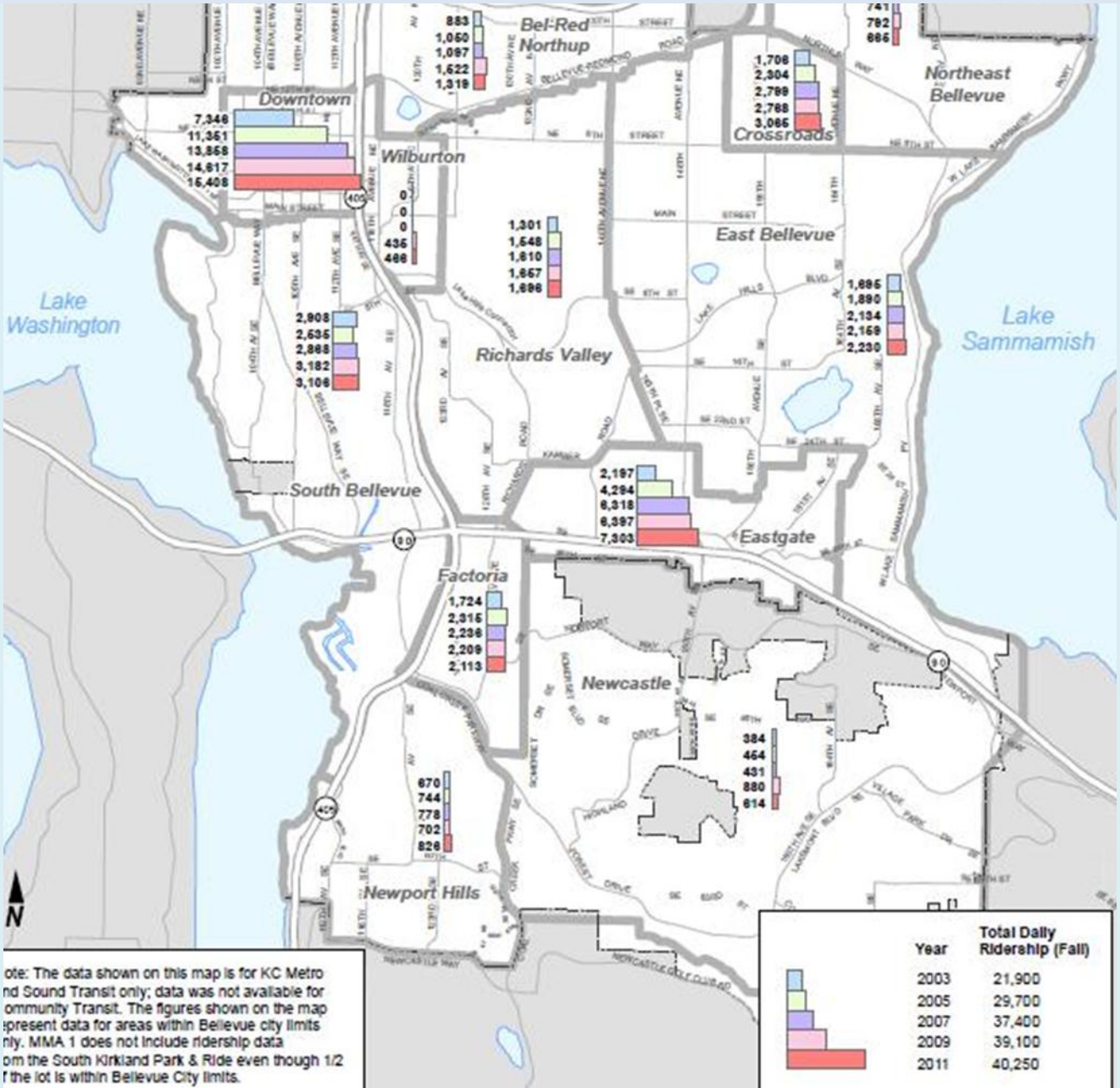
Note: Northbound/ eastbound activity is a smaller circle that is eclipsed by the larger circle representing the higher volume of southbound/ westbound passengers

2011 Bellevue Downtown Commute Mode Share Survey





2003 – 2011 Transit Ridership



2009 American Community Survey

Transit Mode Share for Commuters in Selected Cities

	Public Transit	Total	MoE
1	Seattle	19.5%	+/-1.4
2	Bellevue	14.2%	+/-2.8
3	Portland	11.5%	+/-1.0

2009 American Community Survey

	Bellevue city, Washington			
Data Set: **2009 American Community Survey 1-Year Estimates**				
Selected Economic Characteristics	2009 Estimate	2008 Estimate	2007 Estimate	2006 Estimate
COMMUTING TO WORK				
Workers 16 years and over	**66,812**	**61,260**	**59,880**	**59,451**
Car, truck, or van -- drove alone	66.00%	69.80%	71.70%	70.10%
Car, truck, or van -- carpooled	9.50%	9.00%	6.90%	8.60%
Public transportation (excluding taxicab)	14.20%	7.50%	9.20%	8.80%
Walked	5.00%	5.30%	4.50%	3.10%
Other means	1.30%	1.60%	1.10%	2.20%
Worked at home	4.10%	6.80%	6.60%	7.20%

2009 American Community Survey

	Estimate 2009	Estimate 2008	Delta
Workers 16 years and over	66,812	61,260	5,552
Car, truck, or van -- drove alone	44,096	42,759	1,336
Car, truck, or van -- carpooled	6,347	5,513	834
Public transportation (excluding taxicab)	9,487	4,595	4,893
Walked	3,341	3,247	94
Other means	869	980	-112
Worked at home	2,739	4,166	-1,426
	66,879	61,260	5,619

FHWA, Census, Microsoft Feedback

Census said
"I took a look at the Bellevue case, and found nothing that would suggest any unusual data quality issue... ***All transit cases are by bus, so I wonder if (beyond expected sampling error) there has been a significant real increase in bus ridership in the form of some commuter-oriented line****.*
Local-level planners, I'm sure, could tell a better story in terms of any real increase."

I wonder how much a difference [Microsoft] Connect might have contributed to this. What do you think?

Microsoft said *"I question direct benefit from Connector since that does not yet serve Bellevue CBD and only goes to Overlake. However, it is possible the other programmatic benefits of our Commute program that our population use in Bellevue could cause this, particularly ORCA and Shuttle Connect programs."*