APPLICATION OF THE POST-PANDEMIC TRAVEL BEHAVIOUR MODULE TO SUPPORT SKYTRAIN FLEET PLANNING

RTM USER GROUP MEETING

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April 8, 2024

AGENDA

1. Post-Pandemic Travel Behaviour Module
2. SkyTrain Link Forecasting

POST-PANDEMIC TRAVEL BEHAVIOUR MODULE

RTM 3.6

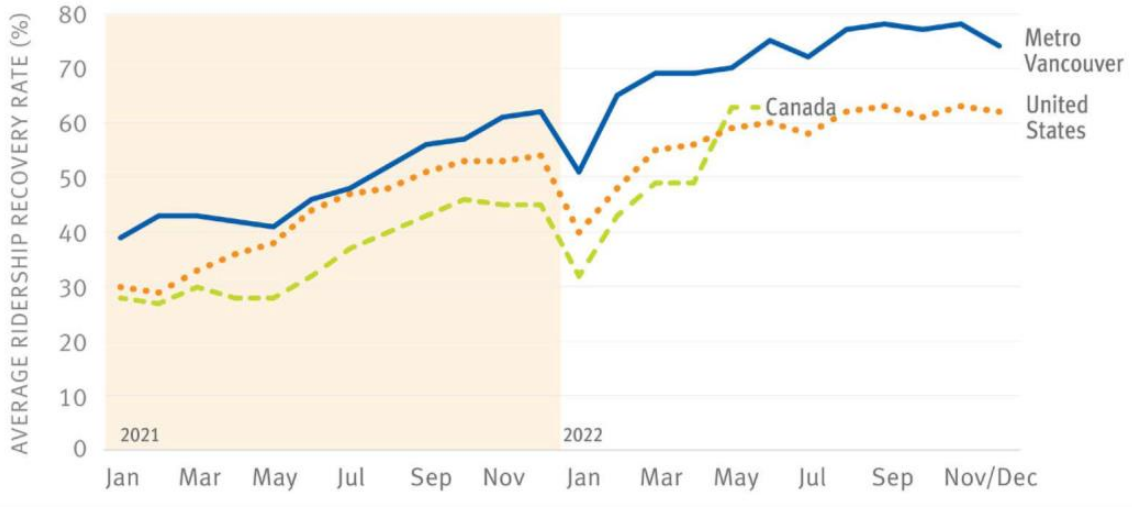
- RTM 3.6 was released June 2023
- Included new features, network and land use updates, bug fixes, etc.
- Parsons supported implementation of new 2022 Base Year

2022 BASE YEAR

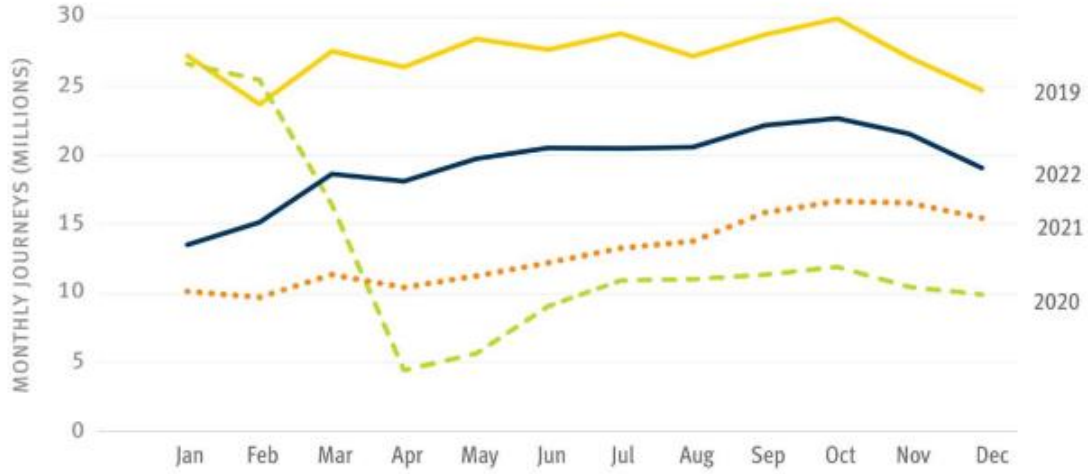
- **2017 Base Year was outdated – particularly in a post-pandemic context. Many stakeholders indicated desire for a new base year.**
- **New Trip Diary Survey was on the way – but not fast enough.**
- **‘Intermediate’ base year proposed for 2022.**
- **2022 Base Year development included:**
  - New networks
  - New 2022 land use inputs (initially interpolated from 2017/2035, then augmented with Census, etc. analysis)
  - Post-Pandemic Travel Behaviour module

POST-PANDEMIC TRAVEL BEHAVIOUR (OVERVIEW)

- **Questions:**
  - What is the *new normal*?
  - Will it persist?
- **Clear from ridership data that travel – particularly on transit – had not recovered from the pandemic.**
- **Behaviour in a 2022 Base Year is therefore different from 2017, and we need to quantity that difference.**
- **The further uncertainty is whether such behavioural differences will continue into the future, or whether travel will trend towards pre-pandemic characteristics.**
- **The *Post-Pandemic Travel Behaviour module* applies changes to model inputs that reflect observed travel patterns. It was estimated using 2022 data, but can be toggled on for other model years (e.g. 2035 / 2050).**



Ridership Recovery (Source: TransLink)



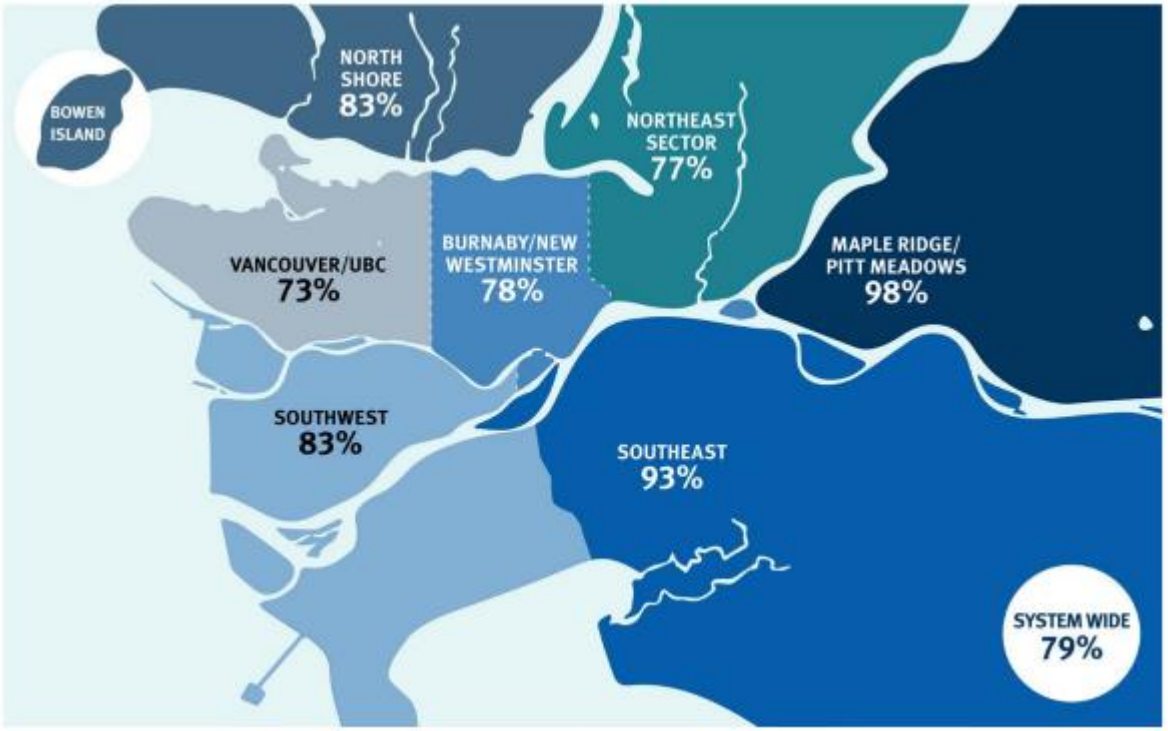
System-Wide Monthly Journeys, 2019-2022 (Source: TransLink)

POST-PANDEMIC TRAVEL BEHAVIOUR (DEVELOPMENT)

- **Previous TransLink work with exploratory modelling (EMAT) identified statistically significant factors of pandemic-related travel behaviours. Each factor encompasses a series of RTM scalar matrix values.**
- **Three key factors (and corresponding scalar matrices) considered for post-pandemic analysis:**
  - Telecommuting (selected hbw production and attraction coefficients)
  - Propensity for Vehicle Ownership (car ownership ASCs)
  - Propensity to Ride Share (transit ASCs)
- **Varied the three EMAT factors to find the best fit against:**
  - Overall transit ridership (primary)
  - Transit screenlines (limited)
  - Auto screenlines (limited)

POST-PANDEMIC TRAVEL BEHAVIOUR (LIMITATIONS)

- **Validation was focused largely on system-wide ridership, but we know that recovery has varied by area.**
- **The EMAT factors in aggregate are coarse.**
- **We further tested modifying *individual* coefficients (primarily for hbw prod/atr) to improve sub-regional performance.**
  - For example, trying to reflect different work-from-home rates for specific employment types (e.g. FIRE).
  - Ultimately, these changes were not implemented.
- **As always, careful local validation is recommended for local projects.**



Ridership Recovery by Sub-Region, Fall 2022 (Source: TransLink)

SKYTRAIN LINK FORECASTING

PROJECT NEED

- **Periodically, TransLink reviews its fleet planning strategy for the SkyTrain system.**
- **Demands will change over time due to:**
  - Population and employment growth
  - Network changes (e.g. Broadway Subway, Surrey-Langley)
  - Service changes (headways, vehicle capacities, etc.)
- **Need to know peak-point, peak-hour, peak-direction ridership under a variety of scenarios to identify where and when planned passenger capacities will become insufficient.**
  - Note that the peak-point locations on each line may change.

FORECASTING PROCESS

- The general forecasting process had been established previously by TransLink Forecasting team.
- Calibration factors determined for *every* link in the SkyTrain network.
- Multiple scenarios combining horizon year and network assumptions to allow for interpolation to anticipated opening years and more precise planning.

UNCERTAINTY

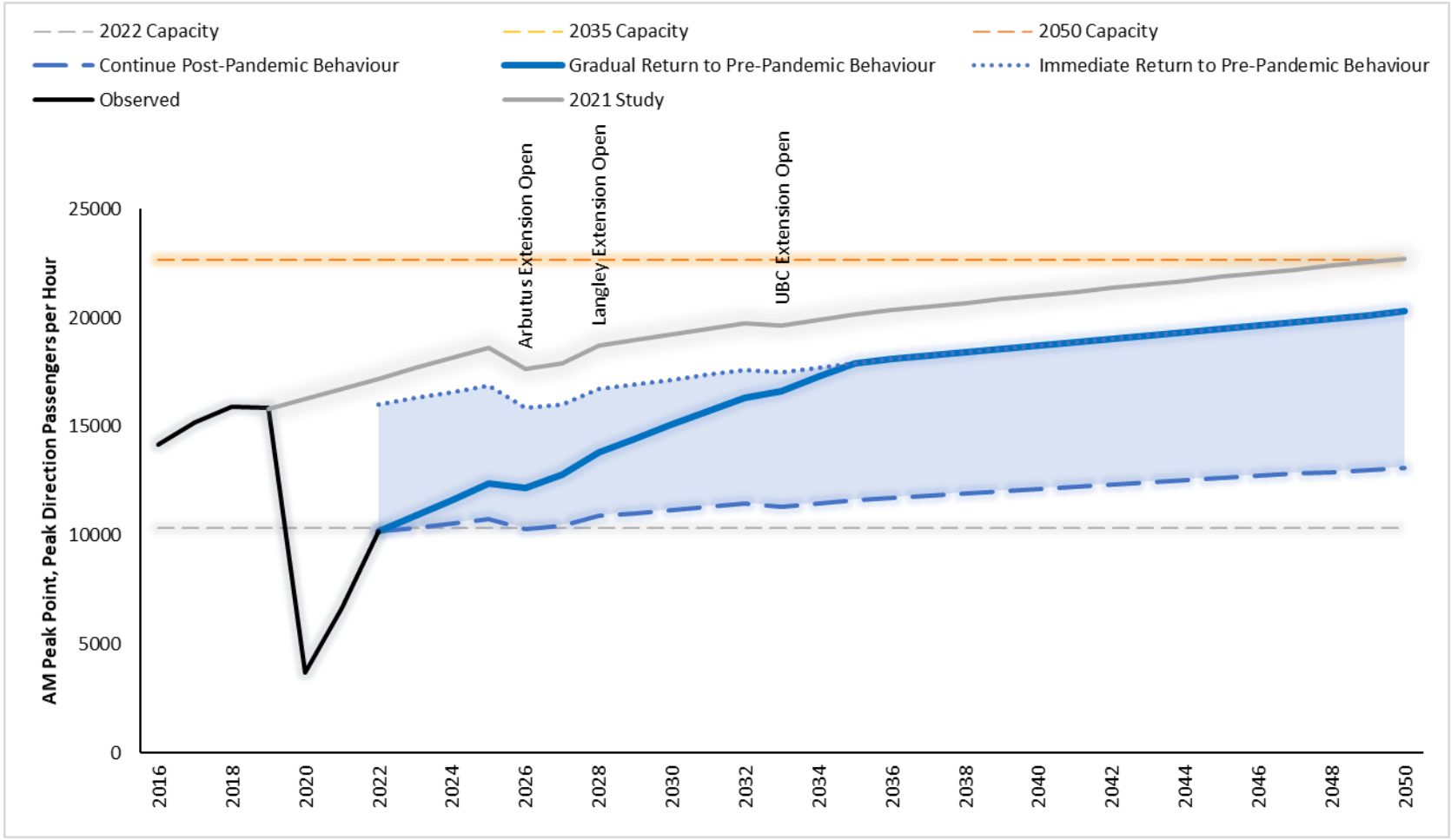
- This time, pandemic recovery provides an additional variable.
- Important to quantify the uncertainty and provide TransLink planners with ranges of potential outcomes.
- New combinations of scenarios required, incorporating:
  - Post-Pandemic Travel Behaviour Module (on vs off)
  - 2022 Base Year

Network	Year		
	2017	2035	2050
Base	☑	☑	☒
Broadway	☑	☑	☒
Broadway + SLS	☑	☑	☒
UBC + SLS	☑	☑	☑

Network	Year					
	2022	2035	2050	2022	2035	2050
Base	☑	☑	☒	☑	☑	☒
Broadway	☑	☑	☒	☑	☑	☒
Broadway + SLS	☑	☑	☒	☑	☑	☒
UBC + SLS	☑	☑	☑	☑	☑	☑
	Continue Post-Pandemic Behaviour			Return to Pre-Pandemic Behaviour		

OUTPUTS

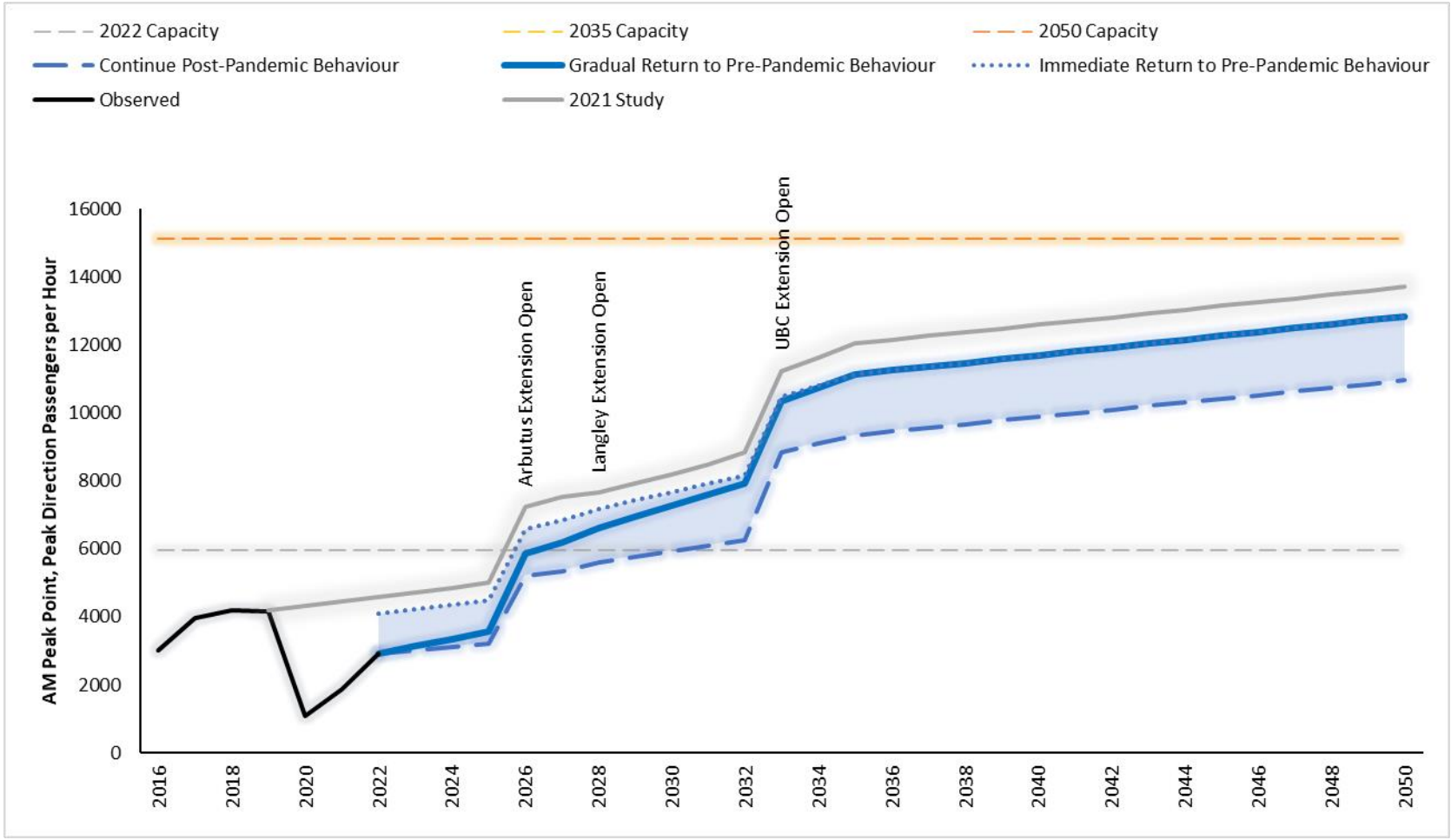
- **Three possible outcomes define the range:**
  - Current post-pandemic behaviour continues
  - Gradual return to pre-pandemic behaviour by 2035
  - Immediate return to pre-pandemic behaviour
- **Why the difference from previous study?**
  - Updated model, assumptions
  - Updated link calibration factors



Expo Line, inbound from Commercial-Broadway Station

OUTPUTS

- Peak point is not necessarily static.
- For example, Millennium Line peak point shifts further west with each extension of the line.
- It can also differ by recovery scenario. Millennium Line peak point under a ‘Continue Post-Pandemic Behaviour’ is different.
  - ‘Study-from-home’ rate assumed to have already recovered completely in Post-Pandemic Travel Behaviour Module.



Millennium Line, peak point (variable location)

FINDINGS

- **Largest percentage change in ridership tends to be on links in Vancouver**
- **Clear negative correlation between 2019 ridership and 2019-2022 ridership change**
  - Pre-pandemic, places with highest link demands were towards destinations with high concentration of employment (e.g. on the Expo Line links through east Vancouver heading towards downtown Vancouver).
  - These are the places that have recovered the least (though they remain the peak points).
- **Therefore, fleet planning decisions are sensitive to the post-pandemic recovery of (for example) office demand.**