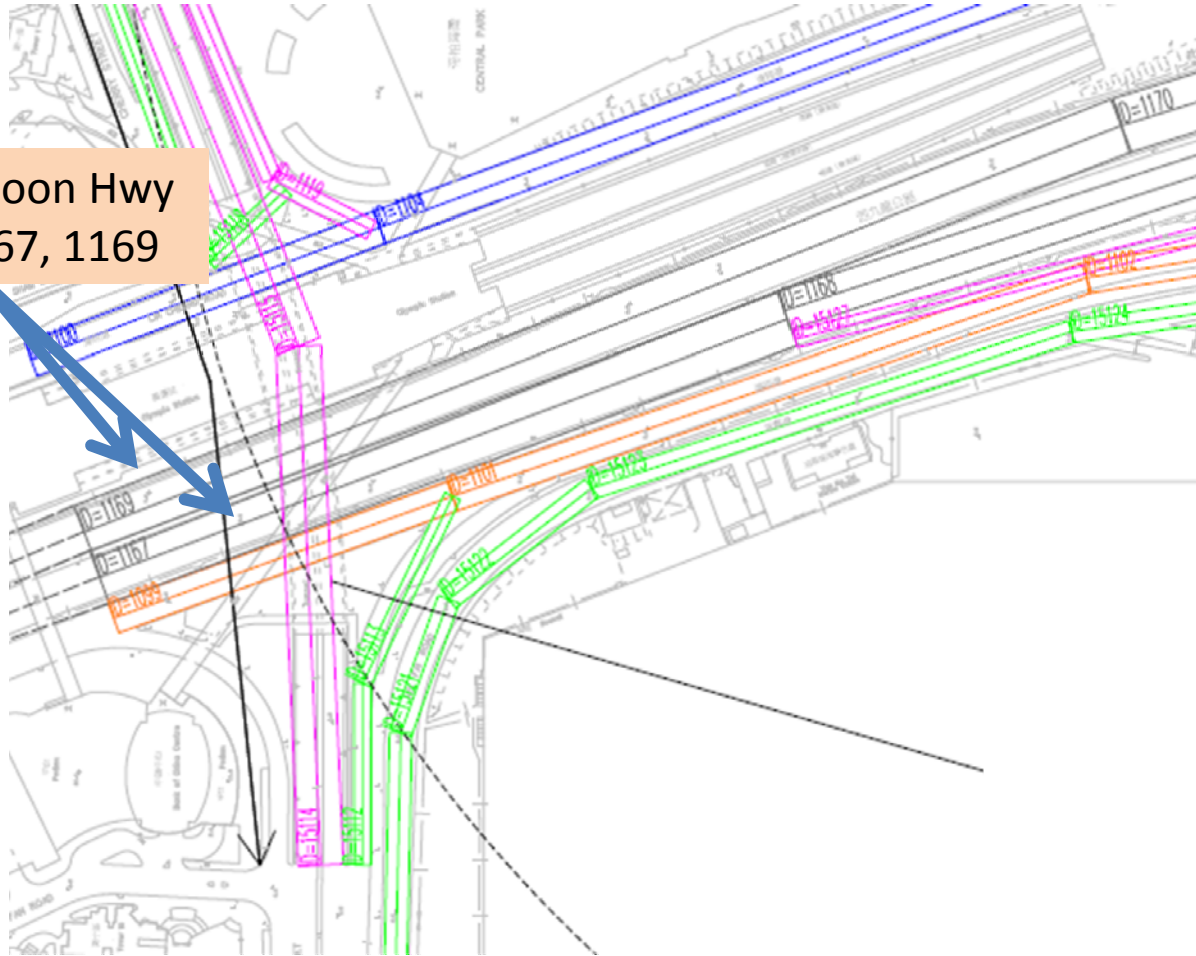


Exercise #1– HK Expressway

W Kowloon Hwy
Link 1167, 1169



Exercise #1 – HK Expressway Emission Factor

- Problem: Determine the “composite” NO_x running exhaust emission factor (grams/km) for the expressway links below. Additional information for exercise on EX1 spreadsheet.

Road Link	Link ID	Fleet Profile*	Link Length (km)	Peak Traffic Flow (veh/hr)
W Kowloon Hwy NB	1167	EX	0.260	4117
W Kowloon Hwy SB	1169	EX	0.395	4842

Exercise #1 – Expressway Fleet Profile

PC	Taxi	LGV3	LGV4	LGV6	HGV7	HGV8	PLB
45.77%	19.46%	0.24%	9.60%	5.69%	1.17%	3.33%	2.50%

PV4	PV5	NFB6	NFB7	NFB8	FBSD	FBDD	MC
0.41%	0.34%	1.34%	0.97%	0.97%	0.05%	3.5%	4.66%

Exercise #1 – Expressway Link (cont.)

- Scenario data:
 - Geographic Area: Hong Kong SAR
 - Calendar Years: 2015
 - Season: Annual
 - Scenario Type: EMFAC
 - Output File types: RTL
 - Pollutants: PM10, VOC
 - Temperature: 1 = 20 deg C
 - Relative Humidity: 1 = 70%
 - Speeds: 100kph, except 70kph for GV > 5.5t, FB, NFB
 - (edit example speed fractions in spreadsheet to match)

Exercise #1 – Expressway Link (cont.)

- Number of Runs: only 1 EMFAC-HK run is necessary as the fleet and speed distributions are the same for each link.

Exercise #1 (cont.)

- Steps
 - Setup EMFAC-HK model run
 - Look up emission factors for each vehicle class
 - NOTE: speeds differ by vehicle class
 - Compute “composite” (i.e., fleet-average) emission factor
 - Develop CALINE4 input parameters

Exercise #2: Future Projections (Accelerated Retirement)

- Context: This example evaluates emission changes if franchised double-deck buses older than 15 years old are retired from the fleet (replaced with newer ones). Generate results in 2013 and 2020.
- Replacement options:
 - 1: All old buses replaced with brand new buses.
 - 2: All old buses replaced with 1-5 yr-old buses.

Exercise #2: Future Projections

- Scenario data:
 - Geographic Area: Hong Kong SAR
 - Calendar Years: 2013, 2020
 - Season: Annual
 - Scenario Type: BURDEN
 - Output File types: CSV, BCD
 - Pollutants: PM10, VOC
 - Hint: Copy FBDD populations by age from GUI and implement desired program.

Exercise #3: Build/No-Build

- Context: This example evaluates emission changes if a roadway construction project is not implemented (i.e, build/no-build). Projections are made what traffic will be like on the road if the project is not done.
- Roadway (2015)
 - Assume expressway fleet distribution from Exercise #1
 - 4% reduction in population
 - Reduce speeds by 5 kph to simulate present congestion

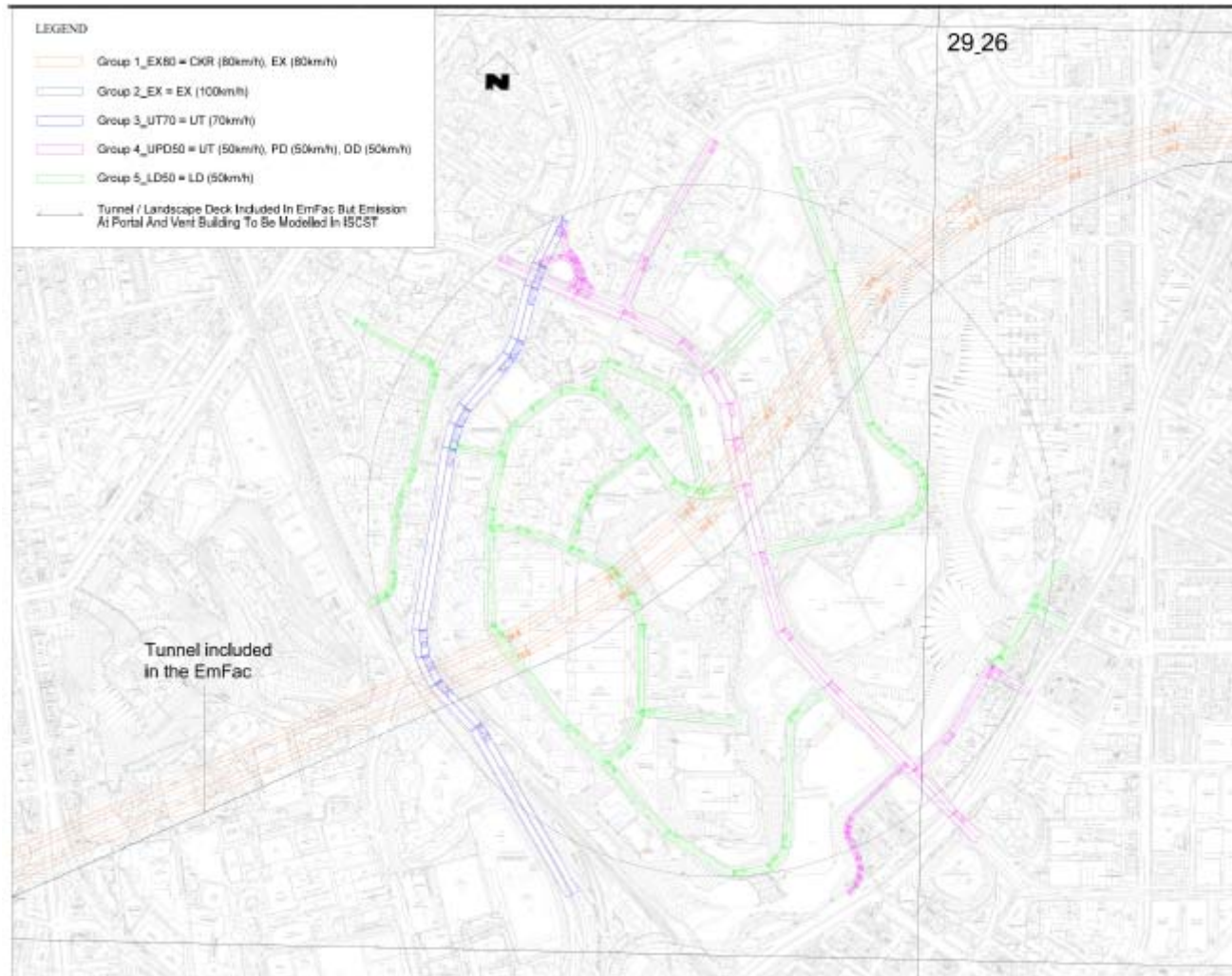
Exercise #3: Build/No-Build

- Scenario data:
 - Geographic Area: Hong Kong SAR
 - Calendar Year: 2025
 - Season: Annual
 - Scenario Type: BURDEN
 - Output File types: CSV, BCD
 - Pollutants: PM10, VOC

Exercise #4: EIA Example

- Project: Extensive new roadway to be built
- Sensitivity Analysis reveals 3 scenario years to evaluate:
 - 2021: commission year
 - 2026: interim year
 - 2036: 15 years after (peak VKT)
- 3 Roadway Groups:
 - EX (100 kph), UT (80 kph), PD (50 kph)
 - no starting emissions assumed

Exercise #4: Road Extent Example



Exercise #4: Simplifications

- For simplicity
 - default technology fractions
 - we'll evaluate calendar year 2021 only.
 - Fleet mix distributions for each roadway type provided on spreadsheet

Exercise #4 – EIA Example

- Scenario data:
 - Geographic Area: Hong Kong SAR
 - Calendar Years: 2021, 2026, 2036
 - Season: Annual
 - Scenario Type: EMFAC
 - Output File types: RTL
 - Pollutants: PM10, VOC
 - Temperature: 1 = 20 deg C
 - Relative Humidity: 1 = 70%
 - Speed Fractions:
 - Roads w/ posted speeds \geq 70kph
 - 100% at 70kph for GV > 5.5t, FB, NFB

Exercise #4: EIA Example

- Setup EMFAC-HK model run
- Look up emission factors for each vehicle class for appropriate speed
- Compute “composite” (i.e., fleet-average) NO_x running exhaust emission factor for each roadway type
- Develop CALINE4 input parameters