Appendix 3.9a Calculation of Emission Rates for Ventilation Shafts and Building

Traffic pattern for short tunnel in 2018 (18:00 - 19:00)*

Road No.	Road Name	DIR	Hour	Total	PC	LGV(3)	LGV(4)	PLB	LGV(6)	HGV(7)	HGV(8)	FBDD	MC	TAXI	PrLB(4)	PrLB(5)	NFB(6)	NFB(7)	NFB(8)	FBSD
20	Proposed Connecting Road (M)	NB	18:00 ~ 19:00	803	191	2	18	2	14	128	420	6	1	14	0	2	2	2	2	0
21	Proposed Connecting Road (M)	SB	18:00 ~ 19:00	605	113	3	20	2	16	96	320	6	2	15	2	2	4	4	2	0

*Note: The hourly traffic flow from 18:00 to 19:00 is selected because this is the worst case hour in 2018 when the total hourly emission from all vehicle classes is the largest (see Appendix G2).

Traffic pattern for long tunnel in 2018 (18:00 - 19:00)*

Road No.	Road Name	DIR	Hour	Total	PC	LGV(3)	LGV(4)	PLB	LGV(6)	HGV(7)	HGV(8)	FBDD	MC	TAXI	PrLB(4)	PrLB(5)	NFB(6)	NFB(7)	NFB(8)	FBSD
26	Proposed Connecting Road (P)	NB	18:00 ~ 19:00	665	80	2	18	0	14	127	417	0	1	8	0	0	0	0	1	0
27	Proposed Connecting Road (P)	SB	18:00 ~ 19:00	521	66	3	20	0	16	92	307	0	2	9	2	1	2	2	1	0

*Note: The hourly traffic flow from 18:00 to 19:00 is selected because this is the worst case hour in 2018 when the total hourly emission from all vehicle classes is the largest (see Appendix G2).

Emission Factor from EMFAC (Trunk Road 80kph) - Peak hour in 2018 (g/veh-km)

18:00 - 19:00	PC	LGV(3)	LGV(4)	PLB	LGV(6)	HGV(7)	HGV(8)	FBDD	MC	TAXI	PrLB(4)	PrLB(5)	NFB(6)	NFB(7)	NFB(8)	FBSD
NOx	0.075	0.506	0.177	0.086	1.620	2.875	3.639	2.520	0.552	0.157	0.027	0.108	1.197	2.395	2.617	0.000
RSP	0.0013	0.0527	0.0295	0.0286	0.0736	0.1231	0.1057	0.0382	0.0230	0.0087	0.0000	0.0542	0.0249	0.0499	0.0218	0.0000

Total emission from different vehicle classes for short tunnel (g/km-hr)

																		Total	
18:00 - 19:00	NOx	23	2	7	0	49	644	2695	30	1	4	0	0	8	16	9	0	3488.06	g/km-hr
	RSP	0	0	1	0	2	28	78	0	0	0	0	0	0	0	0	0	111.39	g/km-hr

Total emission from different vehicle classes for long tunnel (g/km-hr)

																		Total	
18:00 - 19:00	NOx	11	2	7	0	49	629	2636	0	1	3	0	0	3	5	4	0	3350.06	g/km-hr
	RSP	0	0	1	0	2	27	77	0	0	0	0	0	0	0	0	0	107.69	g/km-hr

Total emission from tunnels (g/s)

18:00 - 19:00	Length	Emission rates		
		NOx	RSP	
Short tunnel	0.9 km	0.87202	0.0278	g/s
Long tunnel	4.8 km	4.46675	0.1436	g/s

Distribution of emission at ventilation shalfs of short tunnel

	Vent N	Vent S	
% Distribution	57%	43%	
NOx	0.497	0.37497	g/s
RSP	0.0159	0.01197	g/s

Vent N - Ventilation shaft at northern portal
Vent S - Ventilation shaft at sorthern portal

Distribution of emission at ventilation shalfs of long tunnel

	Vent S	Vent N	mid vent	
% Distribution	33%	45%	22%	
NOx	1.474	2.01004	0.98269	g/s
RSP	0.0474	0.06461	0.03159	g/s

Vent S - Ventilation shaft at southern portal (near Fanling)
Vent N - Ventilation shaft at northern portal (near Sha Tau Kok Road - Wo Hang)
Mid Vent - Mid-ventilation building

Design assumptions to be adopted by ISCST model, including dimensions of all ventilation shalfs/building

Gas exit temperature	293	K
Stack inside diameter*	6	m
Gas exit velocity	6	m/s
Gas exit flow rate	169.7	m3/s

* Cirular stacks are assumed