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### 27-Oct-2016

Your Ref: (6) in EP2/H4/S3/15 Pt. 37 Our Ref: H2613-LJV-EN-LE-4229

The EIA Ordinance Register Office Environmental Protection Department 27/F, Southorn Centre 130 Hennessy Road Wan Chai, Hong Kong

Dear Sir,

Contract No. HY/2011/08
Central-Wan Chai Bypass – Tunnel Buildings, Systems and Fittings, and Works
Associated with Tunnel Commissioning
Operational Air Quality Management Plan – EP2.13(e) Zero Portal Emission Design

Pursuant to Condition 2.13(e) of the Environmental Permit no. FEP-11/364/2009/B and referring to your captioned letter, we enclose four hard copies and one electronic copy for the captioned submission with ET's certification letter and IEC's verification letter for your information.

Should you have any query, please do not hesitate to contact our Mr. Malcolm Leung at 6323 9478, or malcolm.leung@leightonasia.com.

Yours faithfully For and on behalf of Leighton Joint Venture

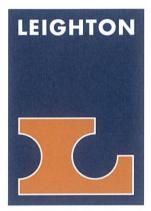
Colman/yVong Project Director

CW / PT / ML / CTS

Encl.

c.c. AECOM - Mr. David Kwan, CRE (CD only)
LAM - Mr. Raymond Dai, ETL (CD only)
ENVIRON - Mr. David Yeung, IEC (CD only)

Our Ref: H2613-LJV-EN-LE-4229 Page 1 of 1



Contract No. HY/2011/08 Central-Wan Chai Bypass – Tunnel Building, Systems and Fittings, and Works Associated with Tunnel Commissioning

Operational Air Quality Management Plan – EP2.13(e) Zero Portal Emission Design

Prepared by:

Malcolm Leung

**Environmental Officer** 

Approved by:

Colman Wong





# Lam Geotechnics Limited

Ground Investigation & Instrumentation Professionals

Date

G1525/CS/L251/LJV

19 October 2016

**Leighton Joint Venture** 39/F Sun Hung Kai Centre 30 Harbour Road Wan Chai

Attn: Site Agent, Mr. Colman Wong

Dear Mr. Wong,

Contract No. HY/2011/08 Central-Wanchai Bypass - Tunnel Buildings, Systems and Fittings, and Works Associated with Tunnel Commissioning

Operational Air Quality Management Plan (Zero Portal Emission Design) Rev.0

Referring to the captioned submission dated 17 August 2016 received through email on 17 August 2016, we have reviewed your submitted details and hereby certified this submission in accordance with Condition 2.13 (e) of FEP-11/364/2009/B.

Should you have any enquiry, please feel free to contact the undersigned at 2839 5666.

Yours faithfully,

Raymond Dai

Environmental Team Leader

C.C.

HyD

- Mr. Eddy Wu

(By Fax: 2714 5289)

AECOM AECOM - Mr. Peter Poon

(By Fax: 3912 3090)

- Mr. Frankie Fan

(By Fax: 2587 1877)

Ramboll Environ

- Mr. David Yeung

(By Fax: 3548 6988)









Ref.: AACWBIECEM00\_0\_8663L.16

25 October 2016

By E-mail

Leighton Joint Venture 39/F, Sun Hung Kai Centre 30 Harbour Road Hong Kong

Attention: Site Agent, Mr. Colman Wong

Dear Mr. Wong,

Re: Contract No. HY/2011/08

Central – Wan Chai Bypass – Tunnel Buildings, Systems and Fittings, and Works Associated with Tunnel Commissioning

Operational Air Quality Management Plan (Zero Portal Emission Design)

(Revision 0)

Reference is made to the captioned submission received on 17 August 2016.

Please be informed that we have no comments on the captioned submission. We write to verify it in accordance with Condition 2.13 (e) of FEP-11/364/2009/B.

Thank you for your kind attention.

Yours sincerely,

David Yeung

Independent Environmental Checker

c.c. HyD

Mr. Eddy Wu

by fax: 2714 5289

AECOM AECOM Mr. Peter Poon Mr. Frankie Fan by fax: 3912 3010 by fax: 2587 1877

LAM

Mr. Raymond Dai (ETL)

by fax: 2882 3331

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# <u>Appendices</u>

Appendix A

Tunnel Ventilation System – Overall TVS Schematic

Appendix B TVS Mode Table – Normal / Congested Operation (Uni-directional)

Date	Section/Description	Prepared	Reviewed	Authorised by
17.08.2016	Initial Revision	Malcolm Leung	Malcolm Leung	Colman Wong
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#### 1. BACKGROUND

- 1.1.1 To comply with the Condition 2.13(e) under Environmental Permit number: FEP-11/364/2009/B, an Operational Air Quality Management Plan (hereinafter referred to as "this plan") is prepared to demonstrate:
  - "the ventilation system of the Eastern Portal of the CWB Tunnel shall follow the zero portal emission design as described in Section 2.4.18 of the WDII&CWB EIA Report (Register No. AEIAR-125/2008)."
- 1.1.2 This plan provides the EIA's concepts and the design intent, which are implemented by the contract of the Central Wan Chai Bypass Tunnel Building, Systems and Fittings and Works Associated with Tunnel Commissioning (Contract No. HY/2011/08, hereinafter referred to as "the CWB-CC").
- 1.1.3 Leighton Joint Venture (the Contractor, hereinafter referred to as "LJV") has been awarded for the construction of the CWB-CC. LJV would build the ventilation system according to the relevant requirements.



#### 2. TUNNEL VENTILATION SYSTEM

- 2.1.1 The tunnel ventilation system is to maintain the air clean and remove air pollutants inside tunnel.
- 2.1.2 The ventilation system of the Eastern Portal of the CWB Tunnel shall follow the zero portal emission design as described in Section 2.4.18 of the WDII&CWB EIA Report (Register No. AEIAR-125/2008).

#### 2.2 Zero Portal Emission Design (ZPED)

- 2.2.1 Footnote 2 of the Section 2.4.18 defined the meaning of Zero Portal Emission Design (ZPED), which is applicable to the CWB project.
- "For a typical unidirectional tunnel, tunnel traffic will create piston effect which will 2.2.2 draw outside air from entry portal and drives the induced air to exit portal. Tunnel ventilation system will induce additional outside air to satisfy minimum air quality standard inside the tunnel in the event that piston effect alone is not able to induce adequate outside air to ventilate the tunnel. The tunnel air both induced by tunnel traffic and brought by tunnel ventilation system will escape through exit portal if no extraction system is provided upstream of the exit portal. If a powerful extraction system is provided upstream of the exit portal to extract all the polluted air, it is possible to have a system with "zero portal emission". The amount of air flow into the tunnel induced by traffic piston effect can be predicted by using the SES (subway environmental simulation) programme under all modes of traffic conditions. The portal extraction system will be designed with over capacity (about 20%) to cover the worst traffic scenario to ensure that no polluted tunnel air will escape through the exit portal. The extraction system will operate at reduced capacity to cover other scenarios when the emission rate of traffic induced air to exit portal is less than the maximum.
- 2.2.3 The current ventilation system proposed for the CWB project consists of three extraction fans for the eastern tunnel portal. Two fans will be adequate to extract all polluted air from the upstream tunnel section of the exit portal. The third fan would be used as standby in case one fan is under maintenance or out of order. Airflow direction sensor will be installed at the exit portal to monitor the airflow direction of the tunnel. This sensor will be used to control the operation of tunnel portal extraction system to ensure that the target of "zero portal emission" will be met. For reference, similar "zero portal emission" design has been adopted in Sydney M5 East Tunnel."
- 2.2.4 According to the Appendix 3.15 of the EIA Report, each fan was designed with the capacity of 125m³/s.

### 2.3 Design Intent of the Eastern Portal for the CWB Project

2.3.1 There are eastbound and westbound unidirectional tunnels at the Eastern Portal, which are separated by middle wall. Under normal operation, the eastbound tunnel portal is the exit portal of the Eastern Portal. Airflow direction sensor is installed to monitor the airflow direction of the tunnel for controlling fan group(s). The westbound



- tunnel portal is the entry portal and according to the abovementioned ZPED, continuous tunnel traffic will naturally draw outside air towards inside the tunnel.
- 2.3.2 Totally six nos. of fans with the capacity of 125m³/s each are installed for ventilation of the CWB eastern part tunnel. Polluted air is extracted through overhead ventilation duct and conveyed into the Air Purification System (APS) for treatment located at the East Ventilation Building and discharged via the East Ventilation Shaft (EVS). The Working Drawing ref. 60095653/RW/4121A (Appendix A) shows the schematic diaphragm of the tunnel ventilation system.
- 2.3.3 Extracted from the Working Drawing ref. 60095653/RW/4131B (**Appendix B**), the operation mode table of the tunnel ventilation system during normal/congested operation is shown in **Table 2.1**.

Table 2.1 TVS Mode Table: Normal / Congested Operation (Unidirectional)

	Tunnel C	Condition				Fan C	Froup		
Tunnel Section	Level Up	Level Down	Ventilation Level			EVB-	TVF-		
	Level op	Level Down		004	005	006	007	008	009
			5	ON	ON	OFF	ON	ON	ON
			4	ON	OFF	OFF	ON	ON	ON
Eastbound Tunnel at	Air Flow Velocity >0m/s towards	Air Flow Velocity >1m/s towards	3	OFF	OFF	OFF	ON	ON	ON
Eastern Portal	Portal	Tunnel	2	OFF	OFF	OFF	ON	ON	OFF
			1	OFF	OFF	OFF	ON	OFF	OFF
			0	OFF	OFF	OFF	OFF	OFF	OFF

- 2.3.4 According to the TVS Mode Table, ventilation levels up when air flow velocity is greater than 0m/s towards the Eastern Portal until the ventilation level 5 meets; and ventilation levels down when air flow velocity is greater than 1m/s towards the tunnel from the Eastern Portal until all fans are shut down. In addition, ventilation level would be maintained if the air flow velocity is between 0m/s and 1m/s towards the tunnel from the Eastern Portal.
- 2.3.5 To protect the tunnel ventilation system and the air purification system, the tunnel operator would provide an alternative ventilation mode during maintenance and emergency operation (eg. Equipment failure, fire incident, etc.).



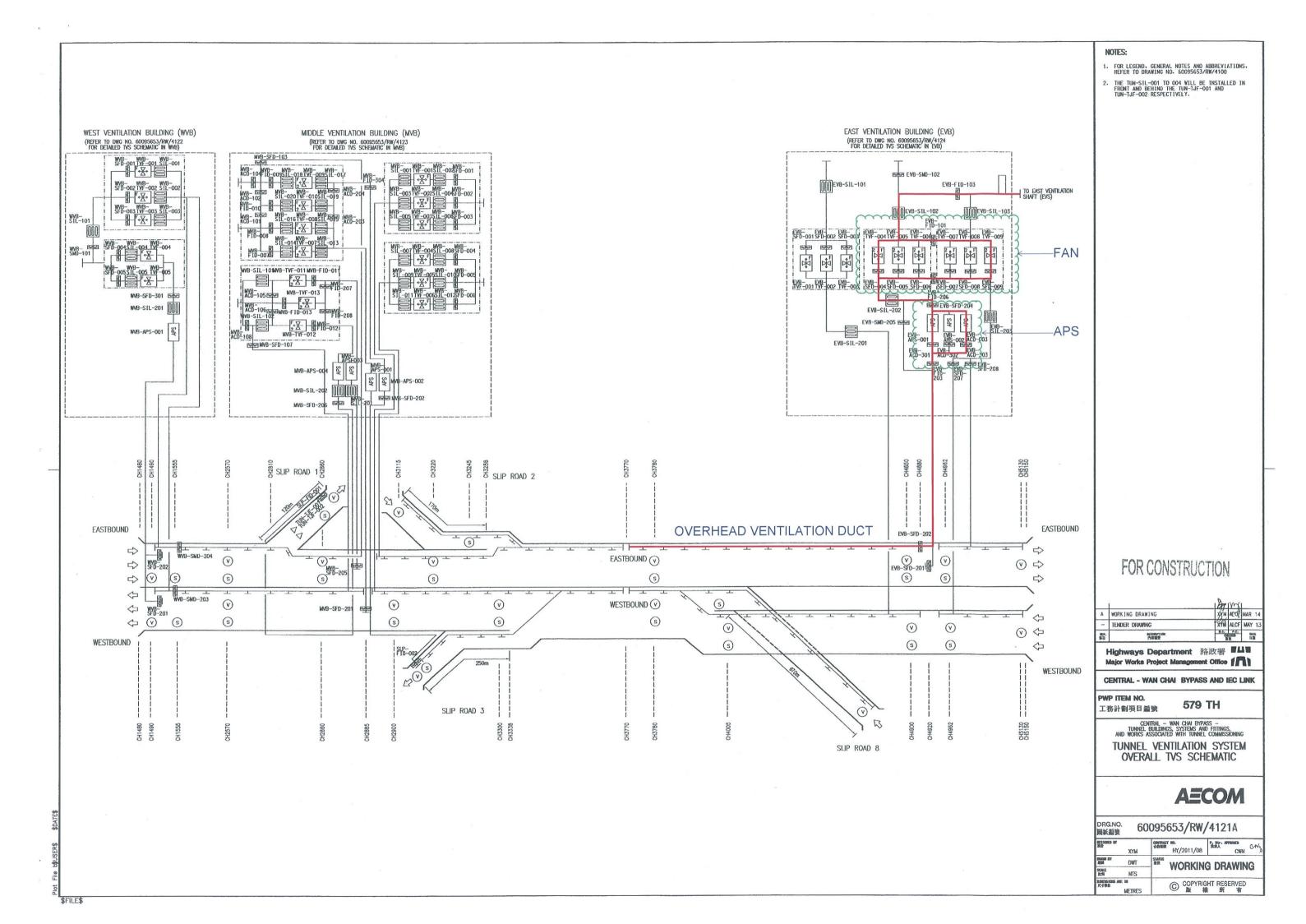
#### 3. CONCLUSION

- 3.1.1 Footnote 2 of the Section 2.4.18 defined the meaning of Zero Portal Emission Design (ZPED), which is applicable to the CWB project. Two fans will be adequate to extract all polluted air from the upstream tunnel section of the exit portal.
- 3.1.2 The current design intent is that six nos. of fans with the capacity of 125m³/s each are installed for ventilation of the CWB eastern part tunnel, inclusive of one no. standby fan. When the TVS mode meets ventilation level no. 5, five nos. of fans are in operation for extracting polluted air from the upstream tunnel section of the exit portal.
- 3.1.3 It is considered that the current design intent complies with the Condition 2.13(e) under Environmental Permit number: FEP-11/364/2009/B "the ventilation system of the Eastern Portal of the CWB Tunnel shall follow the zero portal emission design as described in Section 2.4.18 of the WDII&CWB EIA Report (Register No. AEIAR-125/2008).".





Appendix A Tunnel Ventilation System – Overall TVS Schematic





Appendix B TVS Mode Table – Normal / Congested Operation (Uni-directional)

#### OPERATING MODE TABLE FOR NORMAL/CONGESTION OPERATION (UNI-DIRECTIONAL TRAFFIC)

				F	AN GRO	UP	FAN	GROUP								
TUNNEL SECTION	TUNNEL	CONDITION	VENTILATION	TVF-001 SFD-001	TVF-002 SFD-002	TVF-003 SFD-003	TVF-004 F1D-004	VF-005 1D-005	MD-101	SFD-201	SFD-202	MD-203	-SMD-204	10-301	PS-001	TUNNEL OHVD SMDs
	LEVEL UP CONDITIONS	LEVEL DOWN CONDITIONS	LEVEL	WVB-T WVB-S	WVB-T WVB-S	WVB-T WVB-S	WVB-T WVB-F	WVB-T WVB-F	WVB-S	WVB-S	WVB-S	WVB-S	WVB-S	WVB-F	WVB-A	
ALLO ANTICO			0	OFF	OFF	OFF	OFF	OFF	CL	CL.	CL	CL	CL	CŁ	OFF	NOT APPLICABLE
WESTBOUND TUNNEL WEST PORTAL	TUNNEL AIR VELOCITY >Om/s TOWARDS PORTAL	TUNNEL AIR VELOCITY >1m/s TOWARDS TUNNEL	1	OFF	OFF	OFF	E	OFF	CL	OP	CL	CL	CL	0P	ON	NOT APPLICABLE
			2	OFF	OFF	OFF	Ε	E	CL	OP	CL	CL	CL	OP	ON	NOT APPLICABLE
									,						<b>,</b>	
	SYSTEM OFF			OFF	OFF	OFF	OFF	OFF	CL	CL	CL	CL	CL	CL	OFF	SMDs CLOSE IN ALL TUNNEL OHVD
	FAIL-SAFE POSITIO	N FOR DAMPER		CL	CL	CL	CL	CL	AS-IS	CL	CL	AS-IS	AS-IS	CL		

ABBREVIATIONS
S - FAN IN SUPPLY MODE AND DAMPER OPEN
E - FAN IN EXHAUST MODE AND DAMPER OPEN

E - FAN IN EXHAUS! MOUE AND DAM ON - FAN ON OFF - FAN OFF AND DAMPER CLOSE OP - DAMPER OPEN CL - DAMPER CLOSE AS-1S - NO CHANGE

2012		w																																				
		-	E. COURTERON		FAN	GROUP	F	AN GROUP		FAN GROU	_																											
TUNNEL SECT	LION	TUN	NEL CONDITION	VENTILATION LEVEL	SFD-001	-SFD-002 -TVF-003 -SFD-003	-TVF-004 -SFD-004	MVB-TVF-005 MVB-SFD-005	SFD	MVB-TVF-007 MVB-F1D-007 MVB-TVF-008	MVB-FID-008	MVB-F ID-009 MVB-TVF-010 MVB-F ID-010	MVB-F1D-011	MVB-TVF-012 MVB-F ID-012	NVB-TVF-013 NVB-FID-013	-ACD-101	-ACD-102	-SFD-103	-ACD-104	-ACD-105				-SFD-202	-ACD-203	-ACD204	-SFD-205	-F 10-207	014	-F 10-304	-APS-001	-APS-002	-APS-003	-APS-004	-TJF-001	TUN-TUF-002	TUNNEL OHYD (SEE NOTE	SMDs
15		LEVEL UP CONDITIONS	LEVEL DOWN CONDITIONS			MVB- MVB-	MVB-TYF MVB-SFD	MVB- MVB-	WAB-	MVB- MVB-	WA WAS	MVB MVB-	MVB	MVB- MVB-	MVB-	MVB-	MVB-	MVB-	MVB-	MAN S	d N	MVB	MWB	MVB-	MVB-	MVB-	MVB.	MVB	MVB	MVB	-BAW	MVB	MVB	MVB-	ND.	J.		
				0	AS-IS AS	-IS AS-IS	DFF	OFF	OFF A	S-IS AS-	IS AS-	IS AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS AS	-IS AS-	IS AS-	S AS-	IS AS-I	S AS-IS	AS-1S	AS-IS	AS-IS AS-	S AS-	S AS-15	S AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	OFF	OFF	TUN-SMD-101 CLOSE IN EB	TO 144 3 OHVD
EASTBOUND TUNNEL BETWEEN CH 2885	AND CH 3770	CD>80ppm+OR NO2>0+8ppm+OR VISIBILITY>0+004	CO<40ppm.AND NO2<0.4ppm.AND VISIBILITY<0.002	1	AS-IS AS	-IS AS-IS	S	OFF	OFF A	S-IS AS-	IS AS-	IS AS-1	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS AS-	-IS AS-	IS AS-	S AS-	IS AS-I	AS-IS	AS-IS	AS-IS	S-IS AS-	S AS-	S AS-15	S AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	OFF	OFF	TUN-SMD-101 OPEN IN EB	
		7131812111701004	713181217170.002	2	AS-IS AS	-IS AS-IS	s	s	OFF A	S-IS AS-	IS AS-	IS AS-I	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS AS-	-IS AS-	IS AS-	S AS-	IS AS-I	AS-IS	AS-IS	AS-IS	IS-IS AS-	S AS-	S AS-15	S AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	OFF	OFF	TUN-SMD-101 OPEN IN EB	TO 144 QHVD
				0	OFF C	FF OFF	AS-IS	AS-IS A	S-IS A	S-15 AS-	15 15-	IS AS-IS	21-24	AS-IS	AS-IS	21-24	AS-15	21-24	4S-1S AS	-1S AS-	-15 45-	S AS-	15 45-1	S AS-IS	AS-IS	AS-IS	AS-IS AS-	S AS-	S AS-IS	S AS-15	A5-15	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	TUN-SMD-601 CLOSE IN WB	TO 644
WESTBOUND TUNNEL BETWEEN CH 2885	AND CH 3770	CO>80ppm+OR NO2>0.8ppm+OR VISIBILITY>0-004	CO <40ppm, AND NO2<0, 4ppm, AND VISIBILITY<0,002	1		FF OFF	AS-15				-			-						-		-					IS-IS AS-			-			+	-			TUN-SMD-601 OPEN IN WB	
		VISIBILITY>0.004	VISIBILITY(0.002	2	S	S OFF	AS-15				-		-	-						-		-		-			S-IS AS-	_	-		-	1	1				TUN-SMD-601 OPEN IN WB	
		L	L				1.00						1																	20 20 20							OF EN TH WO	GITTE
	SLIP ROAD 1 TUNNEL	TUNNEL AIR VELOCITY >Om/s TOWARDS PORTAL	TUNNEL_AIR_VELOCITY	0	AS-IS AS	-15 AS-15	AS-IS	AS-IS A	S-15 A	S-IS AS-	IS AS-	IS AS-IS	OFF	OFF	OFF	AS-IS	AS-IS	AS-IS	AS-IS C	L C	L CL	CL	AS-1	S AS-IS	AS-IS	AS-IS	CL CL	CL	CL	AS-IS	AS-IS	AS-IS	OFF	OFF	OFF	OFF S	TUN-SMD-502 TO SLR-FID-001 CLOSE	571 CLOSE. E IN WB OHVD
SLIP POAD 1	TUNNEL		>1m/s TOWARDS TUNNEL	1	AS-IS AS	-IS AS-IS	AS-IS	AS-IS A	S-IS A	S-IS AS-	IS AS-	IS AS-IS	OFF	E	OFF	AS-IS	AS-IS	AS-IS	AS-IS C	L C	L CL	OP	AS-I	S AS-IS	AS-IS	AS-IS	CL OP	CL	CL	AS-IS	AS-IS	AS-IS	OFF	ON	OFF	OFF	TUN-SMD-502 TO SLR-FID-001 OPEN	571 CLOSE. N IN WB OHVD
TUNNEL - WESTBOUND TUNNEL BETWEEN CH 1480 AND CH 2885	WESTBOUND TUNNEL	CO>80ppm+OR NO2>0-8ppm+OR VISIBILITY>0-004 (SWITCH TO THE SAME	CO < 40ppm+ AND NO2< O - 4ppm+ AND	1a	AS-IS AS	-1S AS-1S	AS-15	AS-1S A	S-IS A	S-IS AS-	IS AS-	IS AS-IS	OFF	E	OFF	AS-IS	AS-IS	AS-IS	AS-IS C	L C	L OF	CL	AS-I	S AS-IS	AS-1S	AS-IS	CL DP	CL	CL	AS-IS	AS-IS	AS-IS	OFF	DN	OFF	OFF	TUN-SMD-502 TO SLR-FID-001 OPEN	571 OPEN. N IN WB CHVD
AND CH 2885	BETWEEN CH 1480 AND	WITH SUFFIX O	CO(40ppm.AND NO2CO.4ppm.AND VISIBILITYCO.002 (SWITCH TO THE SAME VENTILATION LEVEL WITHOUT SUFFIX 'a')	2	AS-IS AS	-IS AS-IS	AS-IS	AS-IS A	S-IS A	S-IS AS-	IS AS-	IS AS-IS	E	E	0FF	AS-IS	AS-IS	AS-IS	AS-IS C	CL C	L CL	OP	AS-I	AS-IS	AS-IS	AS-IS	OP OP	CL	CL	AS-IS	SI-SA	AS-IS	ON	ON	OFF	OFF	TUN-SMD-502 TO SLR-FID-001 OPEN	571 CLOSE, N IN WB OHVD
	CH 2885	SWITCH TO '1g' IF CURRENT VENTILATION LEVEL IS 0)	WITHOUT SUFFIX 'd')	2a	AS-IS AS	-IS AS-IS	AS-IS	AS-IS A	S-IS A	S-IS AS-	IS AS-	IS AS-IS	E	Ε	OFF	AS-IS	AS-IS	AS-IS	AS-IS C	CL C	L. OF	CL	AS-I	S AS-IS	AS-IS	AS-IS	OP OP	CL	CL	AS-IS	AS-1S	AS-IS	ON	ON	OFF	OFF	TUN-SMD-502 TO SLR-FID-001 OPEN	571 OPEN. N IN WB OHVD
										-																			_			_					TINI CHO 007 TO	072 (1055
	SLIP ROAD 3	TUNNEL AIR VELOCITY >Om/s TOWARDS PORTAL	TUNNEL AIR VELOCITY >1m/s TOWARDS TUNNEL	0	AS-IS AS	-IS AS-IS	AS-IS	AS-IS A	S-IS	OFF C	F OF	F OFF	AS-IS	AS-IS	AS-IS	CL	CL	CL	CL AS	-IS AS-	IS AS-	S AS-	IS CL	CL	CL	CL /	AS-IS AS-	S AS-	IS AS-IS	S CL	OFF	OFF	AS-IS	AS-IS	OFF	OFF I	TUN-SMD-003 TO IN EB OHVD, SLR-F	FID-002 OPEN
				1	AS-IS AS	-IS AS-IS	AS-IS	AS-IS A	S-IS	OFF OF	FE	OFF	AS-1S	AS-IS	AS-IS	CL	CL	CL	OP AS	-1S AS-	-1S AS-	S AS-	IS CL	OP	CL	CL /	IS-IS AS-	S AS-	S AS-15	S OP	OFF	ON	AS-IS	AS-IS	OFF	OFF 1	TUN-SMD-003 TO IN EB DHVD, SLR-F	FID-002 OPEN
SLIP ROAD 3 TUNNEL:	EASTBOUND	CO>80ppm+OR NO2>0-8ppm+OR	CO <40ppm, AND	1a	AS-IS AS	-IS AS-IS	AS-IS	AS-IS A	S-IS	OFF O	FE	OFF	AS-IS	AS-IS	AS-IS	CL	CL	0P	CL AS-	-IS AS-	-IS AS-	S AS-	IS CL	OP	CL	CL /	AS-IS AS-	S AS-	S AS-15	S OP	OFF	ON	AS-IS	AS-IS	OFF		TUN-SMD-003 TO IN EB DHVD, SLR-F	
TUNNEL, EASTBOUND TUNNEL BETWEEN CH 1480 AND CH 2885	TUNNEL BETWEEN CH 1480	VISIBILITY 0.004 (SWITCH TO THE SAME VENTILATION LEYEL	VISIBILITY(0.002	2	AS-IS AS	-IS AS-IS	AS-IS	AS-IS A	S-IS	E Of	FE	OFF	AS-IS	AS-IS	AS-IS	CL	CL	CL	OP AS	-1S AS-	-IS AS-	S AS-	IS OP	OP	CL		AS-IS AS-				ON	ON				OFF 1	TUN-SMD-003 TO IN EB DHVD, SLR-F	FID-002 OPEN
AND 011 2000	CH 1480 AND CH 2885	WITH SUFFIX 'a'	CO(40ppm.AND NO2CO.4ppm.AND VISIBILITY(0.002 (SWITCH TO THE SAME VENTILATION LEVEL WITHOUT SUFFIX 'a')	2a	AS-IS AS	-IS AS-IS	AS-IS	AS-IS A	S-1S	E O	FE	OFF	AS-IS	AS-IS	AS-IS	CL	CL	0P	CL AS-	-IS AS-	-IS AS-	S AS-	IS OP	OP.	CL	CL /	IS-IS AS-	S AS-	IS AS-15	S OP	ON	ON	AS-IS				TUN-SMD-003 TO	
	011 2003	SWITCH TO '1g' IF CURRENT VENTILATION LEVEL IS 0)		3	AS-15 AS	-IS AS-IS	AS-IS	AS-IS A	S-15	E E	E	OFF	-	AS-IS		CL	CL	CL	1000		-IS AS-	-	-	OP	CL		AS-IS AS-	-	-		ON	DN	-	+	-		TUN-SMD-003 TO IN EB DHVD, SLR-F	
				3a	AS-IS AS	-IS AS-IS	AS-IS	AS-IS A	S-1S	E E	E	OFF	AS-IS	AS-IS	AS-IS	CL	CL	OP	CL AS	-IS AS-	-IS AS-	S AS-	IS OP	OP	CL	CL /	AS-IS AS-	S AS-	IS AS-IS	S OP	ON	DN	AS-IS	AS-IS	OFF	OFF 1	TUN-SMD-003 TO IN EB OHVD+ SLR-F	FID-002 OPEN
	-	SYSTEM OFF			OFF C	FF OFF	OFF	OFF	OFF	OFF OF	F OF	F OFF	OFF	OFF	OFF	CL	CL	CL	CL C	L C	L CL	CL	. CL	CL	CL	CL	CL CL	CL	CL	CL	OFF	OFF	OFF	OFF	OFF	OFF	SMDs CLO IN ALL TUNNE	DSE EL OHVO
	F	AIL-SAFE POSITION FOR	DAMPER			L CL	CL	CL	CL	CL CI		. CL	CL	CL	CL	AS-IS	AS-IS	CL	AS-IS AS-	-IS AS-	-IS CL	AS-	IS CL	CL	AS-IS	AS-IS	CL CL	CL	CL	CL	-	-	-	-	-	-	-	

m		*******		)_		{	m	* * *		4.4	4.4	44,															
				) F	AN GRO	UP C			FAN	GROUP			2											-	AN GRO		
TUNNEL SECTION	TUNNEL	. CONDITION	VENTILATION LEVEL	SFD-001	TVF-002 SFD-002	TVF-003	TVF-004 SFD-004	TVF-005 SFD-005	TVF-006 SFD-006	TVF-007 SFD-007	TVF-008 SFD-008	TVF-009 SF0-009	F10-101	SMD-102	F10-103	SFD-201	SFD-202	SFD-203	SFD-204	SMD-205	F 10-206	SFD-207	SFD-208	APS-001 ACD-301		APS-003 ACD-303	TUNNEL OHYD SMOs (SEE NOTE 8)
	LEVEL UP CONDITIONS	LEVEL DOWN CONDITIONS		3	EVB-	EVB-		EVB-TVF- EVB-SFD-	EVB-TVF- EVB-SFD-	EVB-TVF- EVB-SFD-	EVB-TVF- EVB-SFD-	EVB	3.EVB-	EVB-	EV8-	EVB-	EVB-	EVB-	EV8-	EVB-	EVB	EVB-	EVB-	EV8-	EVB- EVB-	EV8-	
			0	M-1S	AS-IS	AS-S	OFF	OFF	OFF	OFF	OFF	OFF	CL	CL	CL	OFF	OFF	OFF	-								
			1	A1S	AS-IS	AS-	OFF	OFF	OFF	E	OFF	OFF	OP	CL	OP	OP	CL	OP	OP	CL	OP	CL	CL	ON	OFF	OFF	-
ASTBOUND TUNNEL T EASTERN PORTAL	TUNNEL AIR VELOCITY >Om/s TOWARDS PORTAL	TUNNEL AIR VELOCITY >1m/s TOWARDS TUNNEL	2	A3-1S	AS-IS	AS-	OFF	OFF	OFF	Ε	E	OFF	OP	CL	OP	OP	CL	OP	OP	CL	OP	CL	CL	ON	ON	OFF	
F EASTERN PORTAL	>Om/s TOWARDS PORTAL	>1m/s TOWARDS TUNNEL	3	A9-IS	AS-IS	AS-	OFF	OFF	OFF	E	E	Ε	OP	CL	OP	OP	CL	OP	OP	CL	OP	CL	CL	ON	ON	OFF	-
			4	A -IS	AS-IS	AS-	E	OFF	OFF	Ε	Ε	E	OP	CL	OP .	OP	CL	OP	OP	CL	OP	CL	CL	ON	ON	ON	_
			5	M-1S	AS-IS	AS-	E	E	OFF	E	E	Ε	OP	CL	OP	OP	CL	OP	OP	CL	OP	CL	CL	DN	ON	ON	
mmm	mm	mmm	ww	9			w																				
			0	OFF	OFF	OFF	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-1S	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-1S	AS-IS	AS-IS	TUN-SMD-701 TO 758 CLOSE IN WB OHYD TUN-SMD-901 TO 916 CLOSE IN SLIP ROAD 8 OF
ESTBOUND TUNNEL ETWEEN CH 3770 AND CH 5150, LIP ROAD 8 TUNNEL	CO>80ppm.OR NO2>0.8ppm.OR VISIBILITY>0.004	CO<40ppm,AND NO2<0.4ppm,AND VISIBILITY<0.002	1	S	OFF	OFF	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-1S	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	TUN-SMD-701 TO 758 OPEN IN WB DHVD TUN-SMD-901 TO 916 OPEN IN SLIP ROAD 8 OF
_IF ROAD & TORNEL	V13181E11170:004	V13101E111Q0:002	2	S	s	OFF	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-1S	AS-1S	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	AS-IS	TUN-SMD-701 TO 758 OPEN IN WB OHYD TUN-SMD-901 TO 916 OPEN IN SLIP ROAD 8 OH
	WATER THE WORLD IN S	ACTROLING ASSESS			1	1.0 1		Larr	055	T -	T =	T -	01	01	01	01	CL	CL	T 61	CL	CL	CL	DP	OFF	OFF	OFF	T -
ASTBOUND TUNNEL T EASTERN PORTAL	MAINTENANCE MODE IN E	ASTBOUND (EAST)	-	AS-IS	AS-IS	AS-15	OFF	OFF	OFF	E	E	Ł	CL	CL	CL	CL_	CL	CL.	CL	CL	CL	CL	UP	-	1	-	
EASTERN PORTAL	MAINTENANCE MODE IN E	ASTBOUND (WEST)	-	AS-IS	AS-IS	AS-15	5 E	E	E	OFF	OFF	OFF	CL	CL	OP {	OP	3CL	CL	CL	0P	CL	CL	CL	OFF	OFF	OFF	
	CYCTEH OFF			055	1 000	1 055	1 055	1 055	Torr	1 055	Loss	055	T 01		_	, ,	A	[ cı	CI	CI	CI	CI	T CL	OFF	OFF	OFF	SMDs CLOSE IN ALL TUNNEL OHVD
	SYSTEM OFF			OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	CL	CL	-	-	1										
F	AIL-SAFE POSITION FOR E	DAMPER		CL	CL	CL	CL	CL	CL	CL	CL	CL	CL	AS-IS	CL	CL	CL	CL	CL	AS-IS	CL	CL	CL	A5-15	A5-13	AS-IS	-

#### NOTES:

- FOR LEGEND, GENERAL NOTES AND ABBREVIATIONS, REFER TO DRAWING ND. 60090653/RW/4100.
- TUNNEL MOTORIZED DAMPERS IN OHYD WILL BE OPENED IN A PRE-DEFINED PATTERN ACCORDING TO THE OPERATING MODE FOR DISTRIBUTING THE SUPPLY FLOW ALONG THE VENTILATION ZONE.
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE TYS SCHEMATIC DRAWINGS FOR THE EQUIPMENT AND THE TYS OVERALL SCHEMATIC.
- 4. FAN WITHIN THE SAME FAN GROUP SHALL BE OPERATED IN THE SAME DIRECTION. WHEN MORE THAN ONE FANS ARE REQUIRED TO OPERATE. IF THE FIRST FAN RUNS IN THE FORWARD DIRECTION. AN INTERLOCK SHALL PREVENT THE OTHER FANS FROM OPERATING IN A REVERSE DIRECTION.
- 5. METHOD OF LEAST OPERATING HOURS IS USED TO DETERMINE AND SELECT THE FAN TO BE OPERATED WITHIN THE SAME FAN GROUP.
- 6. A FAN CAN CNLY BE ACTIVATED TO START-UP WITH NOME OF THE FOLLOWING SIGNAL IS TRUE: MOTOR OVERLOAD DAMPER TRIP EMERGENCY PUSH BUTTON OPERATED COMMAND FAILURE
- 7. MVB-TVF-010 IS A SHARED STANDBY FAN FOR FAN GROUPS MVB-TVF-007 & 008 AND MVB-TVF-009. IN CASE OF FAN FAILURE, DAMPERS MVB-ACD-101. 102. 203 AND 204 SHALL BE OPERATED IN AN APPROPRIATE STATUS TO SUIT THE STANDBY OPERATION.
- 8. MVB-TVF-013 IS A SHARED STANDBY FAN FOR MVB-TVF-011AND 012. IN CASE OF FAN FAILURE.DAMPER MVB-ACD-105. 106. 207 AND 208 SHALL BE OPERATED IN AN APPROPRIATE STATUS TO SUIT THE STANDBY OPERATION.
- 9. THE CONTRACTOR SHALL DETERMINE WHICH TUNNEL CHYD MOTORIZED DAMPERS ARE REQUIRED TO DEEN ACCORDING TO THE SITE CONDITIONS. THE SUPPLY A REFLOW SHALL BE APPROXIMATELY EVENLY DISTRIBUTED ACROSS THE VENTILATED TUNNEL SECTION FOR EVERY VENTILATION ZONE OF 200m OR PRORATED.
- 10. THE CONTROL OF TUNNEL VENTILATION SYSTEM SHALL BE EMBEDDED WITH A CHECKING LOGICAL TO AVOID THE OPERATION OF ANY DEAD PATH ARRANGEMENT AND PROVIDE ALERT TO THE OPERATOR.
- 11. THE CONTRACTOR SHALL VERIFY AND ADJUST THE TUNNEL CONDITIONS FOR SWITCHING BETWEEN VENTILATION LEVELS SUCH THAT THE SYSTEM OPERATION IS IN ACCORDANCE WITH THE SPECIFICATION AND STATUTORY REQUIREMENT.
- 12. THE FAN WILL OPERATE FOR AT LEAST 15 MINUTES (EXCEPT IN FIRE EMERGENCY MODE) BEFORE SWITCHING FROM OND LEYEL TO ANOTHER SO AS TO MINIMIZE THE HUNTING EFFECT.

# FOR CONSTRUCTION

		Bring
В	WORKING DRAWING	XXM ALCE MAR 14
A	TENDER ADDENDUM NO. 1	XYM ALCF JUN 13
-	TENDER DRAWING	XYM ALCF MAY 13
版V. 修訂	DESCRIPTION 內容數契	D.E. P.E. DATE 使模 日期

Highways Department 路政署 ▮↓↓ Major Works Project Management Office

CENTRAL - WAN CHAI BYPASS AND IEC LINK

PWP ITEM NO. 工務計劃項目編號

579 TH

TVS MODE TABLE NORMAL/CONGESTED OPERATION (UNI-DIRECTIONAL)

**AECOM** 

DRG.NO. 60095653/RW/4	DRO B基	G.NO 編號		60	095	653	/R	W/	4	1	3		1
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