



Leighton Joint Venture

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Sun Hung Kai Centre
30 Harbour Road
Hong Kong
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05-Apr-2017

Your Ref:

Our Ref: H2613-LJV-EN-LE-5325

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(d) Electrostatic Precipitator System of the East Ventilation Building (EVB)

Pursuant to Condition 2.13(d) of the Environmental Permit no. FEP-11/364/2009/E, 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 Wong
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)

LEIGHTON



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(d) EVB Electrostatic Precipitator System
(Rev. 0)**

Prepared by:

Malcolm Leung
Environmental Officer

Approved by:

Colman Wong
Site Agent



Lam Geotechnics Limited

Ground Investigation & Instrumentation Professionals

Ref : G1525/CS/L388/LJV
Date : 31 March 2017

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 – EVB Electrostatic Precipitator System
(Rev.0)

Referring to the captioned submission dated 31 March 2017 received through email on 31 March 2017, we have reviewed your submitted details and hereby certified this submission in accordance with Condition 2.13 (d) of FEP-11/364/2009/E.

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	- Mr. Peter Poon	(By Fax: 3912 3090)
AECOM	- Mr. Frankie Fan	(By Fax: 2587 1877)
Ramboll Environ	- Mr. David Yeung	(By Fax: 3548 6988)

Ref.: AACWBIECEM00_0_9226L.17

3 April 2017

By Post

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 – EVB Electrostatic
Precipitator System**

Reference is made to the captioned submission received on 31 March 2017.

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

Thank you for your kind attention.

Yours sincerely,



David Yeung
Independent Environmental Checker

c.c.	HyD	Mr. Eddy Wu	by fax: 2714 5289
	AECOM	Mr. Peter Poon	by fax: 3912 3010
	AECOM	Mr. Frankie Fan	by fax: 2587 1877
	LAM	Mr. Raymond Dai (ETL)	by fax: 2882 3331

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Operational Air Quality Management Plan – EP2.13(d)

1.	Introduction	3
2.	ESP Design.....	4
3.	Conclusion	6

APPENDICES

Appendix A Layout of the APS Chambers

Revision	Date	Section/Description	Prepared	Reviewed	Authorised by
0	31.03.2017	For Submission under FEP-11/364/2009/E Condition 2.13(d)	Malcolm Leung	Malcolm Leung	Colman Wong

1. INTRODUCTION

- 1.1.1 To comply with the Condition 2.13(d) under Environmental Permit number: FEP-11/364/2009/E, an Operation Air Quality Management Plan (hereinafter referred to as “this plan”) is prepared to illustrate:
- (a) *an electrostatic precipitator system shall be installed to reduce the dust emission from the EVB operation. The electrostatic precipitator (ESP) system shall be designed to have a dust removal efficiency of 80% to reduce the level of respirable suspended particulates*
- 1.1.2 Respirable suspended particulates (RSP)¹ are particulate matters with aerodynamic diameter less than or equal to 10 micrometres, thus also named as PM₁₀. They are produced from combustion processes, vehicles and industrial sources.
- 1.1.3 Leighton Joint Venture (the Contractor, hereinafter referred to as “LJV”) for the contract of the Central - Wan Chai Bypass - Tunnel Building, Systems and Fittings and Works Associated with Tunnel Commissioning (Contract No. HY/2011/08) is responsible for the construction of the APS for the Central – Wanchai Bypass project. LJV had employed a specialist *FILTRONtec*® to provide and install the ESP system.

¹ Definition for Respirable Suspended Particulates, EPD
http://www.epd.gov.hk/epd/english/environmentinhk/air/data/emission_inve_rsp.html

Operational Air Quality Management Plan – EP2.13(d)

2. ESP DESIGN

2.1.1 The electrostatic precipitator shall be designed to operate under the specified conditions for a road tunnel environment with full capacities to handle the maximum design airflow passing through the East Ventilation Building (EVB). The operating concept of an ESP is shown as **Figure 2.1**.

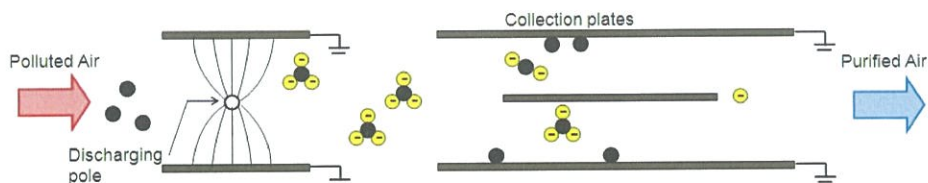


Figure 2.1: Operating Concept of ESP

2.1.2 The design for the sizing of the ESP filters (**Figures 2.2 & 2.3**) is based on three almost equal APS chambers and the fundamental *FILTRONtec*® ESP technology. The layout of the APS chambers is attached in **Appendix A**. The ESP filter is based on individual modules developed as a result of extensive initial research and development by *FILTRONtec*® during a 6-year program funded by the German government using real tunnel air at the Hamburg Elbe Tunnel.

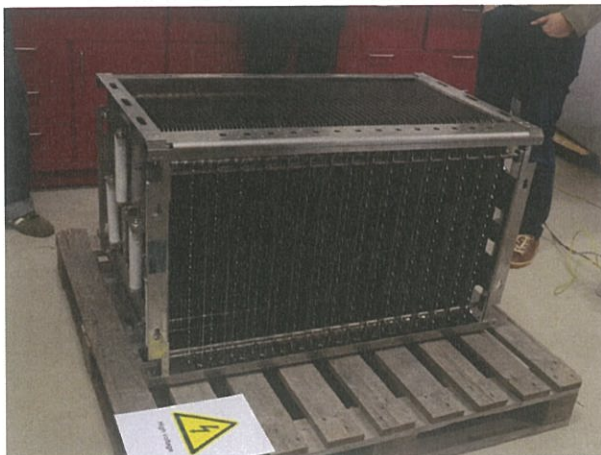


Figure 2.2: ESP Filter Module (*FILTRONtec GmbH* Model No. ESP-1000-123)

Operational Air Quality Management Plan – EP2.13(d)



Figure 2.3: ESP Filters installed at West Ventilation Building (WVB), Central – Wanchai Bypass

- 2.1.3 Hence, FILTRONtec® ESP Filter Model No. ESP-1000-123 has been selected and the characteristics are summarized in **Table 2.1**. The ESP Filter could remove $\geq 80\%$ of PM_{10} particles at PM_{10} particle concentration equal or greater than $0.5\text{mg}/\text{m}^3$.

Characteristic	Measure
Model no.	FILTRONtec® ESP Filter Model No. ESP-1000-123
Module Dimensions	0.60m(H) x 1.00m(W) x 0.59m(D)
Voltage: Ioniser (Discharging Pole)	16kV
Voltage: Collector (Collection Plate)	7 kV
Material	Stainless steel AISI 316Ti
Efficient airflow treated @ 5m/s velocity	$>85\%$ dust removal @ $2.5\text{-}3.0\text{m}^3/\text{s}$
	$\geq 80\%$ PM_{10} removal @ $PM_{10} \geq 0.5\text{mg}/\text{m}^3$
Optimal efficiency airflow face velocity	2.0-7.0m/s

Table 2.1 ESP Filter Module's Characteristics

3. CONCLUSION

- 3.1.1 The selection of the EVB ESP is in accordance with the Particular Specifications for removing RSP(PM10) and fulfils the needs of the CWB project.
- 3.1.2 Under this premise, it is considered that the current design fulfils Condition 2.13(d) under Environmental Permit number: FEP-11/364/2009/E: *“an electrostatic precipitator system shall be installed to reduce the dust emission from the EVB operation. The electrostatic precipitator (ESP) system shall be designed to have a dust removal efficiency of 80% to reduce the level of respirable suspended particulates”*.

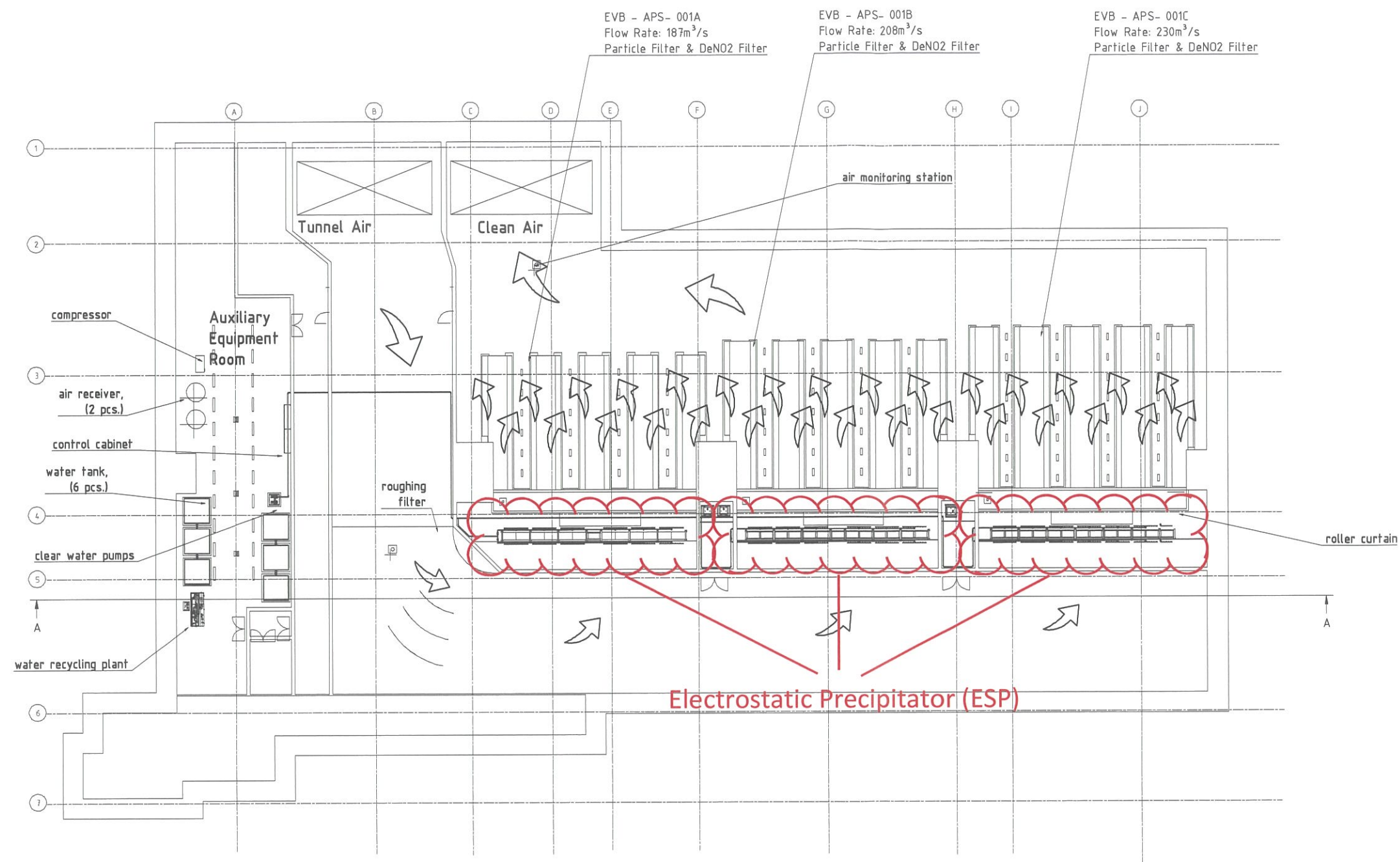
Appendix A Layout of the APS Chambers

APPROVED BY CUSTOMER

DATE

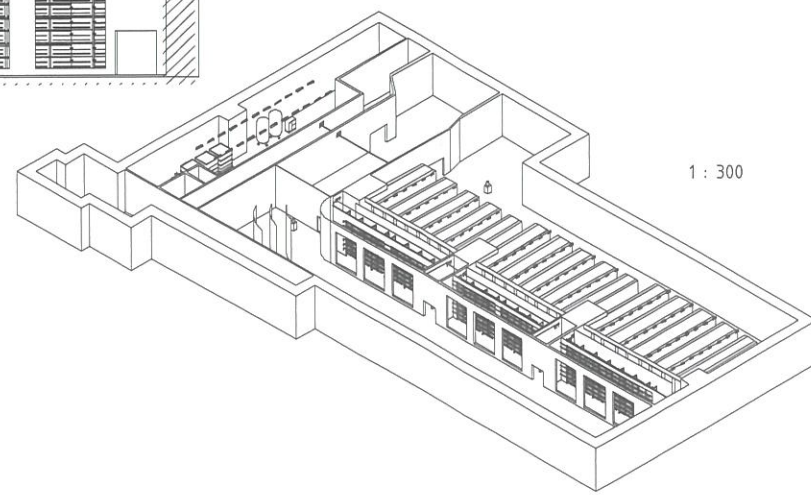
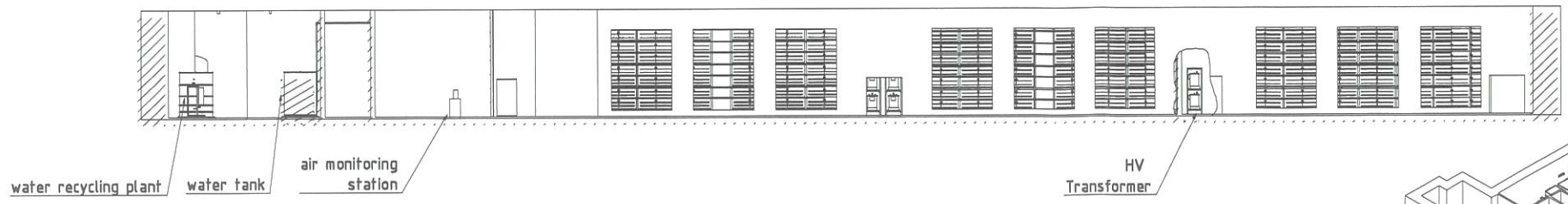
REVISIONS

LEVEL	DATE	DETAILS
01	01.09.14	building dimensions revised
02	16.09.14	DeNO2 desgin revised
03	20.10.14	air flow through DeNO2 revised



Electrostatic Precipitator (ESP)

A-A (1 : 125)



1 : 300

MATERIAL

DRAWN BY ASuprun CHECKED BY EDeux

Contractor:



Customer:

Highways Department 路政署
 Major Works Project Management Office
 Contract No. HY201108
 Central Wan Chai Bypass
 Tunnel Building, Systems and Fittings, and
 Works Associated with Tunnel Commissioning

FILTRONtec®
 EMISSION CONTROL SYSTEMS

FILTRONtec
 TEL +49 (0) 3494 638323 FAX +49 (0) 3494 638397

TITLE EVB APS-001A/B/C, 625 m³/s
 Overall layout

PROJECT Central Wan Chai Bypass
 CLIENT Hong Kong Highways Dept.
 DWG No FT-HCWB-3121
 SCALE 1:250 (300)
 DATE 16.09.14

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