

Contract No.: NE/2015/02

Project Title:

Tseung Kwan O – Lam Tin Tunnel – Road P2 and Associated Works

Noise Mitigation Plan

Document No: CSF/0/0008E
Revision: 18
Date: 11 June 2020

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Revision History

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Checked by:

Position	Signature	Name	Date

Prepared by:

Environmental Officer		Gary Fung	11 June 2020
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PART A GENERAL

1.0 Introduction

Due to the recent update of the construction programme, the PME list will be changed in the noise mitigation plan revision 18 to suit with the on-site construction activities accordingly.

2.0 Background

2.1 Project Description

To cope with the anticipated transport need, “Further Development of Tseung Kwan O – Feasibility Study” (the “TKO Study”) recommended the provision of Tseung Kwan O – Lam Tin Tunnel (TKO – LT Tunnel) and Cross Bay Link (CBL) to meet the long-term traffic demand between TKO and the external areas.

The TKO-LT Tunnel, together with the proposed Trunk Road T2 in Kai Tak Development (KTD) and Central Kowloon (CKR), will form Route 6 in the strategic road network. Route 6 will provide an east-west express link between Kowloon and TKO areas. Upon completion, this strategic route will also provide the necessary relief to the existing heavily trafficked road network in the central and eastern Kowloon areas, and reduce the related environmental impacts on these areas.

CRBC - Build King Joint Venture (JV) was commissioned by Civil Engineering and Development Department (CEDD) as the appointed contractor for one of the contracts.

The Works to be executed under this Contract included, but not exclusively, the following items:

- i. Construction of about 500m long seawall structure and reclamation about 3 hectares at Tseung Kwan O;
- ii. Construction of about 200m long Road P2 Underpass including landscape deck, Road P2 Electrical Plant Room, Road P2 Underground Fixed Foam Tank Room, Road P2 Underground Sump Pit Room and Road P2 Stormwater Plant Room;
- iii. Construction of U troughs A and B of about 300m long, within the reclamation, from the abutments of the proposed viaducts to the southern end of Road P2 Underpass;
- iv. Construction of U troughs A and B of about 200m long from the northern end of Road P2 Underpass structure to CH550 of setting out line P2 including the box structure supporting existing Tong Yin Street; and U trough C with associated cycle track, footpath and amenity area;
- v. Construction of Slip Road 2 of about 156m long;
- vi. Reprovisioning of Drainage Services Department (DSD) Transformer Room and
- vii. Associated roads, retaining wall, drainages, traffic aids, lighting, utilities, landscaping and electrical and mechanical work

A Site Layout showing the site boundary is shown in Appendix A.

2.2 Requirements for Noise Mitigation Plan (NMP)

According to the condition 2.5 of the EP-458/2013/C, the Permit Holder shall, no later than one month before the commencement of construction of the Project, submit to the Director of Environmental Protection (DEP) for approval three hard copies and two electronic copies of Noise Mitigation Plan (NMP) detailing the temporary and permanent mitigation measures for the construction and operation phases traffic noise impacts arising from the Project. All noise mitigation measures implemented shall be properly maintained during construction and operation phases of the Project.

The NMP shall include:

- A layout plan to show the location of major construction activities
- A layout plan to show the location of Noise Sensitive Receivers (NSRs)
- A schedule of construction works to be carried out at the works areas of the Project within 300m from the NSRs
- An updated construction methodology of the proposed construction works
- An updated powered mechanical equipment (PME) list for the proposed construction works
- An updated proposal of air-borne noise and operation traffic noise mitigation measures for the NSRs including the provision of noise barriers, enclosures and other measures
- An updated prediction of noise levels in accordance with the above updated information and mitigation proposals in place

All measures recommended in the approved NMP will be fully and properly implemented during the construction and operation phases of the Project.

The Project Manager will review the construction program and list of PMEs from time to time, which formed the basis of construction noise assessments, to be practicable and reasonable.

3.0 Description of Construction Works in the Study Area

3.1 Noise Sensitive Receivers NSRs

The 300m study areas of the identified 4 NSRs with predicted residual construction noise impacts are shown in Table 2.1. The location of NSRs and its Assessment Point (AP), works area and the notional distance between NSRs and works area are depicted in Appendix A. Refer to EIA Report Section 4.7.1, the predicted unmitigated construction noise levels of NSR ID 9 (AP ID N6101) are below 75 dB(A) and the distance between N6101 and notional sources positions of all portions are more than 300m. In addition, noise mitigation measures would therefore be required to reduce noise levels at the NSRs for compliance with the noise standard. In addition, CM6(A), CM7(A) and CM8(A) will be the noise impact monitoring station during the construction period. However, CM6, CM7 and CM8 will be still the noise sensitive receiver for the prediction of construction noise impacts.

Table 2.1 NSRs with Predicted Unmitigated Construction Noise Impacts during Normal Daytime Working Hours (Extracted from Table 4.10 of EIA Report)

NSR ID EIA	AP ID	NSR ID EM&A Manual	Name of NSR	Noise Criteria, dB(A)	Predicted Unmitigated Construction Noise Levels during Normal Daytime Working Hour (Leq _{30min}), dB(A)	Exceedance, dB(A)
8	N5012	CM6	Block 1, Ocean Shores	75	60-84	9
8	N5012	CM7	Block 7, Ocean Shores	75	59-77	2
9	N6101	N/A	Tower 1, Metro Town	75	56-73	0
10	N7603	CM8	Tower 6, Park Central	75	54-81	6

Traffic noise levels have been predicted at NSR Assessment Point (AP) including existing residential, institutional uses, and future uses on planned receivers for the scenarios of “with” and “without” Project at the assessment year. Without the noise mitigation measures in place, the predicted noise levels at the identified NSRs and its APs have been fulfilled any of the three sensitivity tests, direct mitigation measures would be required.

3.2 Construction Activities

As mentioned in Section 1.1, the construction of Road P2 and associated works is covered by this Contract. The potential construction noise impacts of the Project may arise from the following major construction activities:

- Seawall construction at TKO side
- Filling activities at TKO side
- Road and road pavement formation and associated earthworks
- Drainage culvert construction
- Reprovisioning of infrastructure, services and utilities

These construction activities will involve the use of PME including breakers, excavators, lorries, mobile cranes, concrete truck mixers, pokers, rollers, derrick barge, bulldozer, dump truck, compressor, vibratory poker, generator, piling, vibrator hammer, etc. A breakdown of the major construction activities in sequence to be carried out within the Project are provided in Appendix B.

3.3 Updated Preliminary Construction Programme

The updated preliminary construction programme prepared by CRBC – Build King Joint Venture (JV) has been used in this NMP and has been presented on a monthly basis for the duration of the construction works in corresponding worksites.

The construction schedule has been adjusted such that to minimize concurrent construction works to be carried out in the vicinity as far as practicable. The updated preliminary construction programme is provided in Appendix B.

3.4 Updated Powered Mechanical Equipment List

The updated Powered Mechanical Equipment (PME) list for the construction works is provided in Table 3.1. The Sound Power Levels (SWL) for the PMEs have been adopted from EPD's Technical Memorandum on Noise from Construction Work Other than Percussive Piling (GW-TM), list of SWLs of other commonly used PME or British Standard BS 5228-1:2009. It should be noted that the PMEs to be adopted for individual construction activities are provided in Appendix C.

3.5 Operation Phase Fixed Plant Noise

The maximum allowable sound power levels for the proposed pumping station to meet the relevant noise criteria are determined. Table 2.2 shows the required sound power level for the nearest affected NSRs to achieve noise compliance and Table 2.3 shows the predicted noise levels at representative NSR AP.

Table 2.2 Predicted Maximum Allowable Sound Power Levels for Fixed Noise Sources

Fixed Plant Noise Source	Sound Power Level (SWL, dB(A)) required at source in order to meet the criteria	
	Daytime / Evening Time	Night Time
P2 Pumping Station	106	96

Table 2.3 Summary of Predicted Operation Noise Levels

NSR AP	NSR Description	Predicted Noise Level, dB(A) / Criteria, dB(A)		
		Day time	Evening time	Night time
N5012	Block 1, Ocean Shores	60/60	60/60	50/50
N5031	Block 3, Ocean Shores	60/60	60/60	50/50

All representative NSR APs are predicted to meet their own respective daytime, evening time and night time noise criterion.

4.0 Noise Assessment and Assumptions

4.1 Assessment Methodology and Assumptions

The construction noise assessment has been carried out in accordance with the methodology used in the approved EIA Report (Register No. AEIAR-173/2013). The individual work sites and relative distance from the NSRs are the same as that adopted in the EIA Report.

The methodology outlined in the GW-TM was used for the assessment of construction noise (excluding percussive piling) and the Sound Power Levels (SWLs) of the equipment were taken from Table 3 of GW-TM. Where no SWL is provided in the GW-TM, reference was made to BS 5228 or other previous similar studies or from measurements taken at other sites in Hong Kong. In determine the distance from the source position to the NSR and in cases where the NSR is a building, a positive 3 dB(A) shall be applied to the predicted noise level (PNL). The percentage on-time for each PME has been estimated individually for each construction activity to ensure practicality and is consistent with the assumptions made in the EIA Report.

For the TKO side, the separation distance between the CBL and the nearest NSR (Ocean Shores) would be more than 600m. In addition, the distance of the nearest NSR (Ocean Shores) to Area 68, and from the nearest NSR (Ocean Shores) to Area GIC (4) would be more than 300m. No cumulative impacts would be expected during the construction phase.

All mitigation measures and their effectiveness proposed in the EIA Report including the use of temporary movable noise barrier, acoustic mat and quiet plant have been considered as shown in Table 3.1. The use of quiet plant associated with construction work is prescribed in British Standard "Code of practice for noise and vibration control on construction and open sites, BS5228" which contains the SWLs for specific quiet PME.

Movable temporary noise barriers that can be located close to noisy plant and be moved iteratively with the plant along a worksite can be very effective for screening noise from NSRs. A typical design which has been used locally is a wooden/steel framed barrier with a small cantilevered upper portion of superficial density no less than 14 kg/m² on a skid footing. A cantilevered top cover would be required to achieve screening benefits at upper floors of NSRs and it could achieve at least 5-10 dB(A) reduction. In addition, use of full enclosure can provide about 10 dB(A) noise reduction.

SilentUp barrier at Portion IV and Portion V and Portion IX

According to Insertion Loss (IL) Measurement Report of Movable Noise Barrier for Drilling Rig, the noise insertion loss of the SilentUp barrier demonstrated that when a drilling rig is located 1.5m away

from the sound barrier, noise level at the NSR (CM6) can be reduced by 11.7 dB(A) up to a height of 39m. For use of SilentUp barrier in Portion IV, the drill rig will be located at an angle of 45 degrees so that the distance from sound barrier will be approx. 5.1m (refer to schematic diagram in Appendix D).

For Portion V, when the drill rig is located 1.5m away from the sound barrier, noise reduction of 11.7 dB(A) can be covered up to a height of 102m of the NSR (CM6) (refer to schematic diagram in Appendix D).

Table 3.1 PME List with Proposed Mitigation Measures

Location	PME Type	TM Ref. / Other Ref / BS5228 Ref	Type of Noise Mitigation Measures	Noise Level Reduction dB(A)
Portion III (Demolition of DSD Transformer room)	Breaker, excavator mounted (hydraulic)	CNP 028	Noise Barrier	-5
Portion IV DN2100 SMH9101-9108 (Pre-boring) (Scenario 1-2)	Crane (240 kw) (105T)	BS C4/52	Noise Barrier	-5
	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier (SilentUp)	-11.7
	Air Compressor	CNP 002	Noise Barrier	-5
	Concrete Lorry Mixer (6 m ³)	BS D6/33	Noise Barrier	-5
	Water pump, submersible (electric)	CNP 283	Noise Barrier	-5
	Breaker, excavator mounted (hydraulic)	CNP 028	Acoustic box / Noise Barrier (SilentUp)	-10 / -11.7
Portion IV DN2100 SMH9101-9108 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	Noise Barrier	-5
	Power pack (diesel)	CNP 174	Noise Barrier	-5
	Water pump, submersible (electric)	CNP 283	Noise Barrier	-5
	Excavator (223 kw) (40T)	BS C4/63	Noise Barrier	-5
	Generator, Silenced, <=75 dB(A) at 7m	CNP 102	Noise Barrier	-5
	Welding Machine	CNP 107	Noise Barrier	-5
Portion IV DN2100 SMH9101-9108 (ELS)	Crane (240 kw) (105T)	BS C4/52	Noise Barrier	-5
	Water pump, submersible (electric)	CNP 283	Noise Barrier	-5
	Excavator (223 kw) (40T)	BS C4/63	Noise Barrier	-5
	Dump Truck	CNP 068	Noise Barrier	-5
	Generator, Silenced, <=75 dB(A) at 7m	CNP 102	Noise Barrier	-5
	Welding Machine	CNP 107	Noise Barrier	-5
Portion IV Installation of DN2100 and Manhole Construction (Scenario 1)	Crane (240 kw) (105T)	BS C4/52	Noise Barrier	-5
	Excavator (223 kw) (40T)	BS C4/63	Noise Barrier	-5
	Dump Truck	CNP 068	Noise Barrier	-5
	Generator, Silenced, <=75 dB(A) at 7m	CNP 102	Noise Barrier	-5
Portion IV Installation of DN2100 and Manhole Construction (Scenario 2)	Crane (240 kw) (105T)	BS C4/52	Noise Barrier	-5
	Excavator (223 kw) (40T)	BS C4/63	Noise Barrier	-5
	Roller, Vibratory (51 kw)	BS D8/30	Noise Barrier	-5
	Concrete Lorry Mixer (6 m ³)	BS D6/33	Noise Barrier	-5
	Light goods vehicle, gross vehicle weight < 5.5 tonne	CNP 143	Noise Barrier	-5
	Water pump, submersible (electric)	CNP 283	Noise Barrier	-5
	Dump Truck	CNP 068	Noise Barrier	-5
	Road Roller	CNP 185	Noise Barrier	-5
Portion IV DN2100 SMH9101 -9103(Pre Drill & Sheet piling works)	Crane (240 kw) (105T)	BS C4/52	Noise Barrier	-5
	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier	-5
	Generator, Silenced, <=75 dB(A) at 7m	CNP 102	Noise Barrier	-5

	Air Compressor	CNP 002	Noise Barrier	-5
	Excavator (223 kw) (40T)	BS C4/63	Noise Barrier	-5
	Piling, Vibration Hammer	CNP 172	Noise Barrier	-5
	Power pack (diesel)	CNP 173	Noise Barrier	-5
	Breaker, excavator mounted (hydraulic)	CNP 028	Acoustic box / Noise Barrier (SilentUp)	-10 / -11.7
Portion V Road P2 U-Trough B CH318-363 (Pre-boring) (Scenario 1 & 2)	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier	-5
	Breaker, excavator mounted (hydraulic)	CNP 028	Acoustic box / Noise Barrier (SilentUp)	-10 / -11.7
	Air Compressor	CNP 002	Noise Barrier	-5
Portion V Road P2 U-Trough B CH318-363 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	Noise Barrier	-5
	Power pack (diesel)	CNP 174	Noise Barrier	-5
Portion VI Installation of Dewatering System	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier	-5
Portion VI Road P2 U-Trough B CH318-363 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	Noise Barrier	-5
	Power pack (diesel)	CNP 174	Noise Barrier	-5
Portion VIII Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 (Pre-boring)	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier	-5
	Breaker, excavator mounted (hydraulic)	CNP 028	Acoustic box / Noise Barrier (SilentUp)	-10 / -11.7
Portion VIII Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 (ELS)	Breaker, excavator mounted (hydraulic)	CNP 028	Acoustic box / Noise Barrier (SilentUp)	-10 / -11.7
Portion VIII Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170(Backfilling)	Breaker, excavator mounted (hydraulic)	CNP 028	Acoustic box / Noise Barrier (SilentUp)	-10 / -11.7
Portion VIII Road P2 U-Trough B CH363-411 (Installation of Dewatering System)	Air Compressor	CNP 002	Noise Barrier	-5
	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier	-5
Face Towards Ocean Shore				
Portion IV Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Pre Drill) (Scenario 1-2)	G.I. Drilling Rig	BS C2/43	Noise Barrier	-5
	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier	-5
	Air Compressor	CNP 002	Noise Barrier	-5
Portion IV Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Piling) (Scenario 1-2)	Crane (240 kw) (105T)	BS C4/52	Noise Barrier	-5
	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier (SilentUp)	-11.7
	Generator, Silenced, <=75 dB(A) at 7m	CNP 102	Noise Barrier	-5
	Air Compressor	CNP 002	Noise Barrier	-5
	Excavator (223 kw) (40T)	BS C4/63	Noise Barrier	-5
	Concrete Lorry Mixer	BS D6/33	Noise Barrier	-5
	Water pump, submersible (electric)	CNP 283	Noise Barrier	-5
Portion IV Road P2 Underpass CH103.5 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	Noise Barrier	-5
Portion VII U Trough A&B S200 CH890 - CH980 (Piling)	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier	-5
Portion VII U Trough A&B S200 CH890 - CH980 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	Noise Barrier	-5
Portion IX Dredging and Reclamation	Winch (Electric)	CNP 262	Noise Barrier	-5
	Breaker, excavator mounted (hydraulic)	CNP 028	Acoustic box / Noise Barrier (SilentUp)	-10 / -11.7

Portion IX (Marine Ground Treatment)	Band Drain Machine (hydraulic Vibratory lance starting up)	BS D4/107a	Noise Barrier	-5
Portion IX Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH821(Pilling)(Scenario 1-7)	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier	-5
Portion IX Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH821(Installation of Dewatering System)	Drill Rig, Rotary Type (Diesel)	CNP 072	Noise Barrier	-5
Area A	Breaker, excavator mounted (hydraulic)	CNP 028	Acoustic box / Noise Barrier (SilentUp)	-10 / -11.7

4.2 Proposed Mitigation Strategy and Noise Assessment Results

The air-borne construction noise impacts for the construction activities under Contract NE/2015/02 have been assessed and summarised in Table 3.2.

The detail assessment result for NE/2015/02 is presented in Appendix C. The proposed mitigation measures described above are included in the assessment and, as such only the mitigation scenario has been presented.

The predicted cumulative noise levels and the exceedances of the daytime construction noise criteria are summarised in the following Table 3.2.

From the calculation of construction noise assessment of using the SilentUp barrier at Portion IV shown that there will be no exceedance of 75 dB(A) up to 39m of the NSR (CM6). For the level of above 39m of the NSR (CM6), the calculation of construction noise assessment without using the SilentUp barrier shown that there is also no exceedance of 75 dB(A) of the NSR(CM6).

Contractor will consider the mini – excavator for the future noise enhancement work when it is possible.

Given that the recent / upcoming population intake for the new development in the surrounding area, contractor will consider the nearest NSR in the noise assessment when it is necessary.

The predicted cumulative noise level at above 39m without SilentUp barrier at Portion IV demonstrated that there is the same result of the schematic diagram of Portion V (refer to Appendix D).

Table 3.2 Predicted mitigated cumulative noise levels summary

NSR ID EIA Report	NSR ID EM&A Report	Name of NSR	Noise Criteria, dB(A)	Predicted Mitigated Construction Noise Levels during Normal Daytime Working Hour (Leq _{30min}), dB(A))	Exceedance, dB(A)
N5012	CM6	Block 1, Ocean Shores	75	57 -75	No
N5072	CM7	Block 7, Ocean Shores	75	60 -69	No
N7603	CM8	Tower 6, Park Central	75	60 -71	No

A summary of the range of noise levels for both mitigated and unmitigated scenarios are presented Table 3.3.

Table 3.3 Summary table of noise levels during operation phase

Scenario	Operation Phase Traffic Noise Level Range dB(A)
Unmitigated	31 - 79
Mitigated	31 - 78

Direct mitigation measures should be considered or proposed on road project under the subject Designated Project (DP) such that the noise from the “new” road would be reduced to a level that fulfil the EIAO requirements. The proposed direct mitigation measures are summarized below with total length of the mitigation measures rounded off to the nearest 10m and show in Appendix C:

- Fully Enclosure 4 (FE4) about 200m of Landscape Deck provided on Road P2
- Low Noise Surfacing 1 about 190m of Low Noise Surfacing on North and South Bound P2 Road

Regarding the fixed plant noise sources, sound attenuators, noise barriers and acoustic enclosures can be installed to ensure the specified maximum SWLs in Table 2.2 are achieved.

4.3 Concurrent Project Assessment

Construction noise impacts from the NE/2015/03 Tseung Kwan O – Lam Tin Tunnel Northern Footbridge project has been incorporated in the noise assessment refer to the Appendix C. NMP will be regularly revised to assess the concurrent project’s construction noise impacts on NSRs.

5.0 Conclusion

The noise mitigation plan summarized different construction work activities in different stage during the whole construction period. The potential construction noise impacted of various noise mitigation measures from the selected PME will be minimized the cumulative noise level to the NSRs practically. With the implementation of the proposed noise mitigation measures, updated construction programme and PME list Table 3.1, construction noise impacts at all identified NSRs would comply with the noise criteria of 75 dB(A) for residential premises.

With the proposed noise mitigation measures in PME list Table 3.1, the type of PME should be adopted with the noise enclosure or barrier for the relatively direct noise mitigation to minimize the construction noise to the NSRs.

Where necessary, further review and updated will be performed during the construction and operation phases and liaison with affected parties is recommended to minimize the construction and operation phases traffic noise impacts as far as practicable.

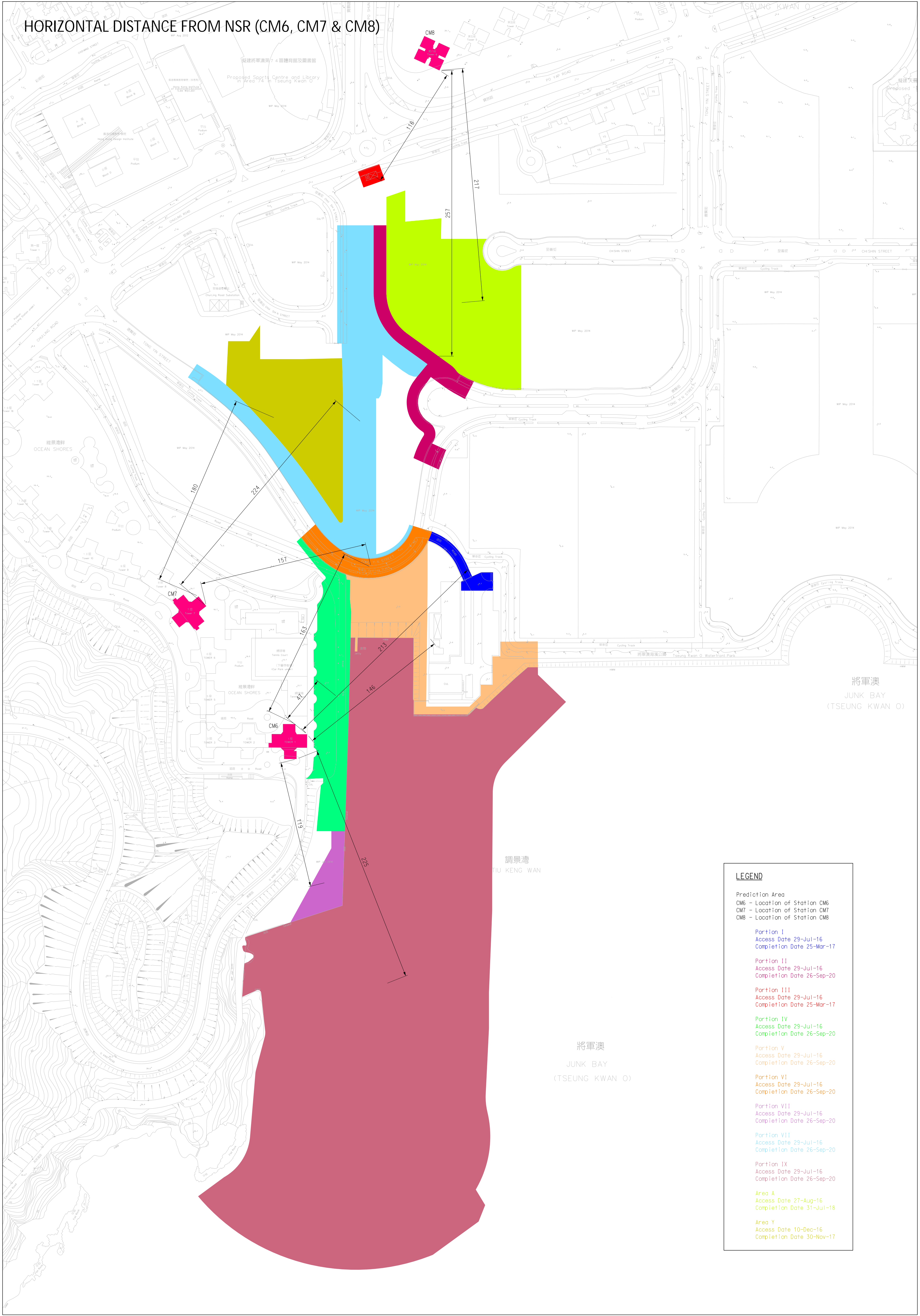
The proposed noise mitigation measures of the PME list in Table 3.1 will also apply to the other NSRs with the affected area. Since the NSR CM6, CM7 & CM8 have been represented the closest noise sensitive receiver of the construction site, the cumulative noise level of other NSRs would also comply with the noise criteria of 75 dB(A).

The traffic noise impact assessment is the same as that presented in the latest environmental permit (i.e. EP-458/2013/C) and there is no update/revision.

Appendix A

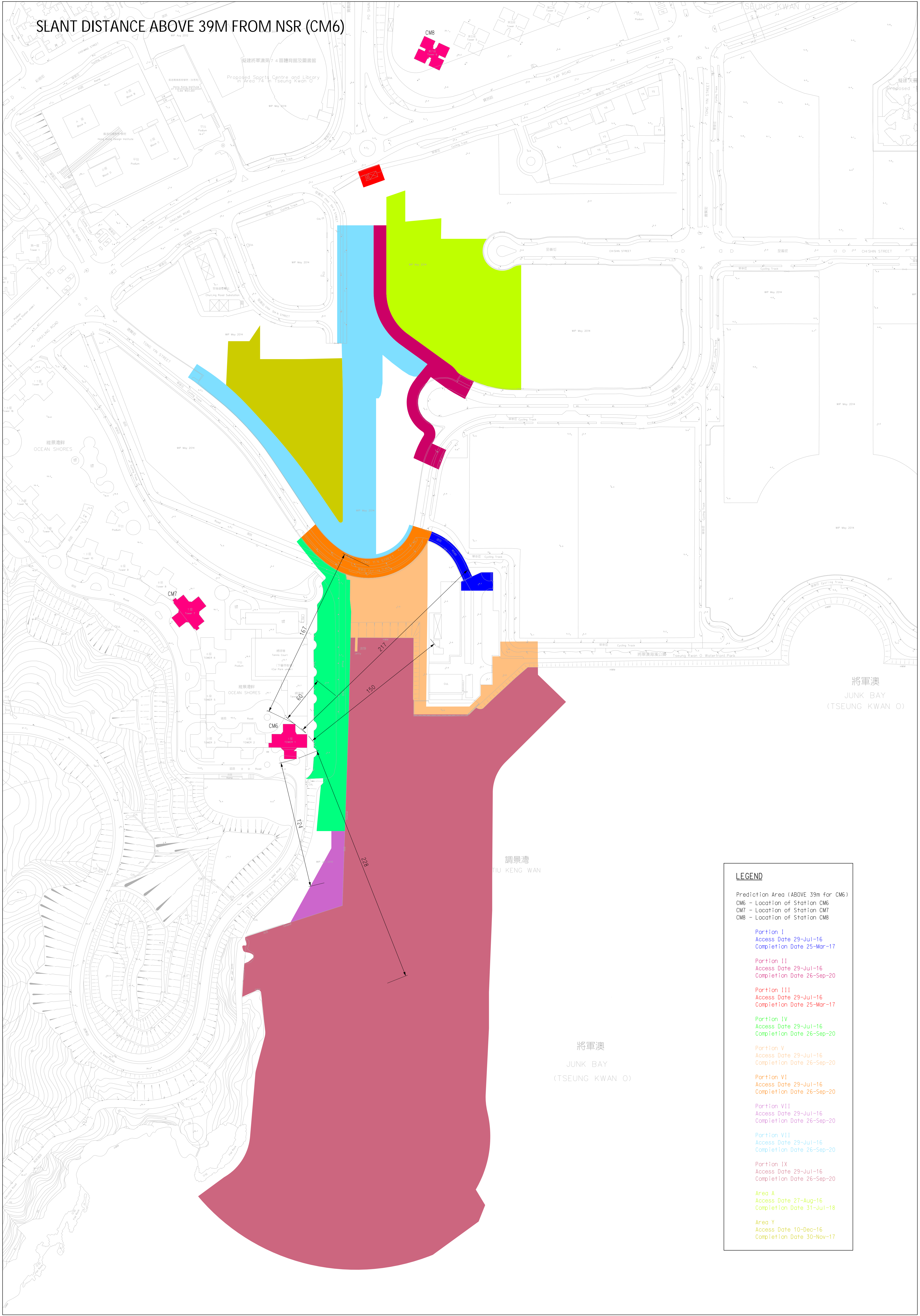
Site Layout and NSR Locations

HORIZONTAL DISTANCE FROM NSR (CM6, CM7 & CM8)



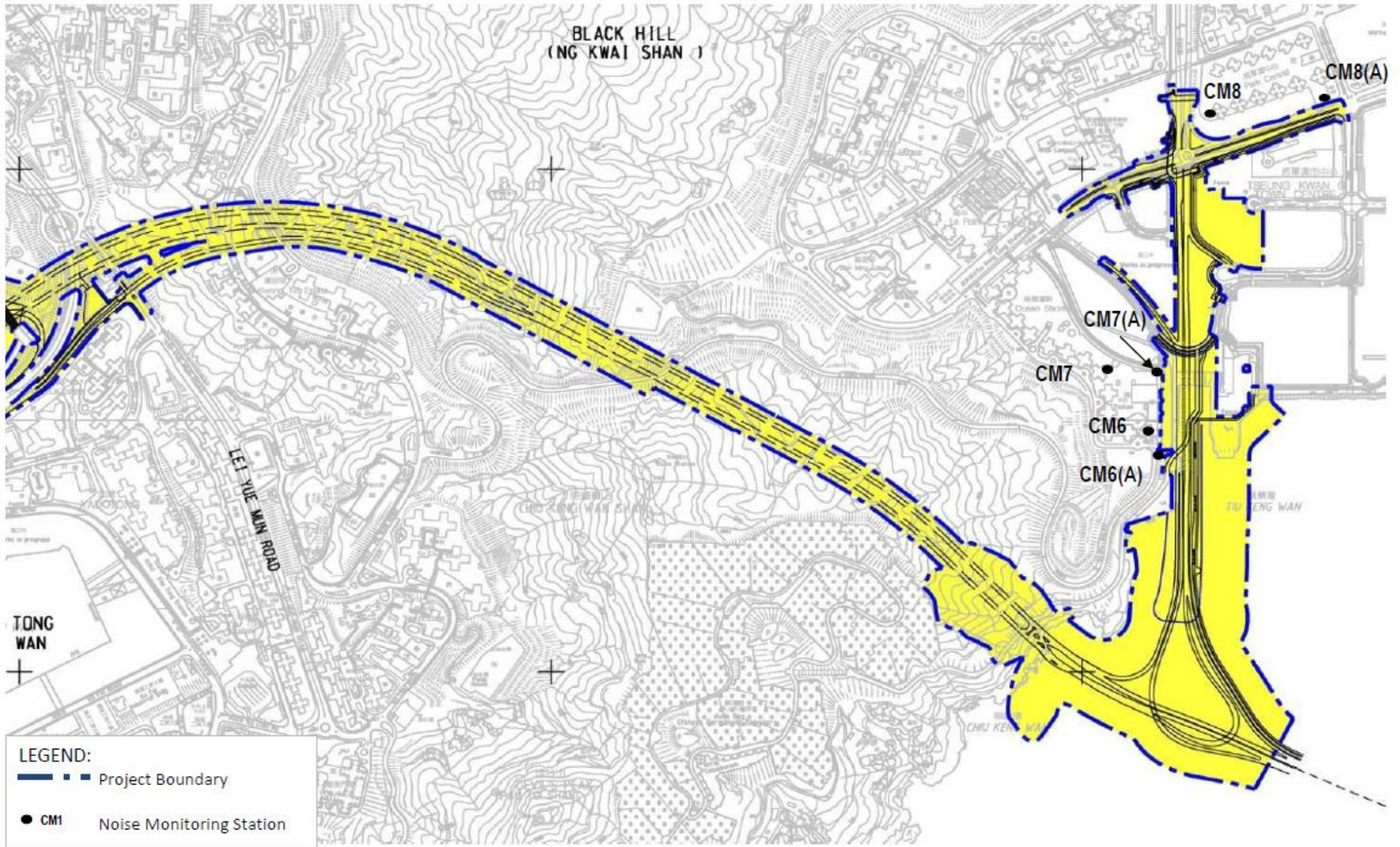
LEGEND	
Prediction Area	
CM6	- Location of Station CM6
CM7	- Location of Station CM7
CM8	- Location of Station CM8
Portion I	
Access Date	29-Jul-16
Completion Date	25-Mar-17
Portion II	
Access Date	29-Jul-16
Completion Date	26-Sep-20
Portion III	
Access Date	29-Jul-16
Completion Date	25-Mar-17
Portion IV	
Access Date	29-Jul-16
Completion Date	26-Sep-20
Portion V	
Access Date	29-Jul-16
Completion Date	26-Sep-20
Portion VI	
Access Date	29-Jul-16
Completion Date	26-Sep-20
Portion VII	
Access Date	29-Jul-16
Completion Date	26-Sep-20
Portion VIII	
Access Date	29-Jul-16
Completion Date	26-Sep-20
Portion IX	
Access Date	29-Jul-16
Completion Date	26-Sep-20
Area A	
Access Date	27-Aug-16
Completion Date	31-Jul-18
Area Y	
Access Date	10-Dec-16
Completion Date	30-Nov-17

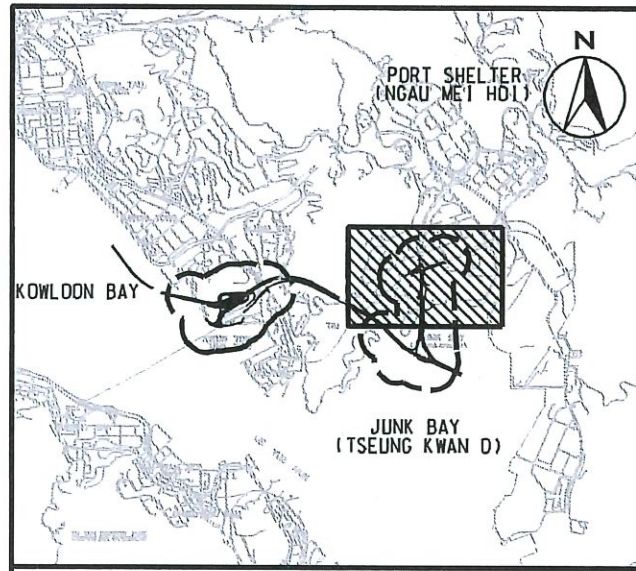
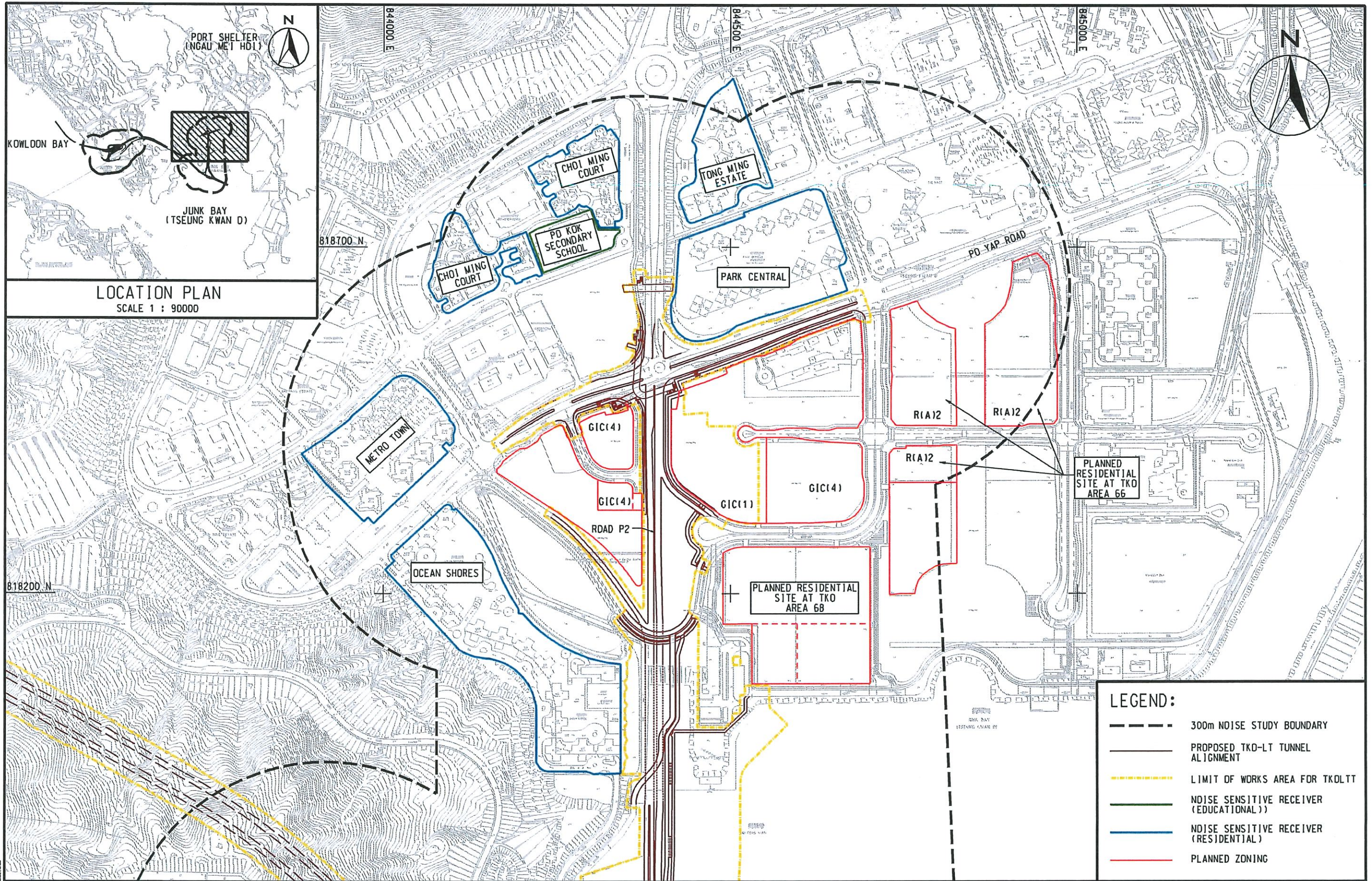
SLANT DISTANCE ABOVE 39M FROM NSR (CM6)



LEGEND	
Prediction Area (ABOVE 39m for CM6)	
CM6 - Location of Station CM6	
CM7 - Location of Station CM7	
CM8 - Location of Station CM8	
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Portion II	Access Date 29-Jul-16 Completion Date 26-Sep-20
Portion III	Access Date 29-Jul-16 Completion Date 25-Mar-17
Portion IV	Access Date 29-Jul-16 Completion Date 26-Sep-20
Portion V	Access Date 29-Jul-16 Completion Date 26-Sep-20
Portion VI	Access Date 29-Jul-16 Completion Date 26-Sep-20
Portion VII	Access Date 29-Jul-16 Completion Date 26-Sep-20
Portion VIII	Access Date 29-Jul-16 Completion Date 26-Sep-20
Portion IX	Access Date 29-Jul-16 Completion Date 26-Sep-20
Area A	Access Date 27-Aug-16 Completion Date 31-Jul-18
Area Y	Access Date 10-Dec-16 Completion Date 30-Nov-17

Impact Monitoring Location





LOCATION PLAN
SCALE 1 : 90000

LEGEND:

- 300m NOISE STUDY BOUNDARY
- PROPOSED TKD-LT TUNNEL ALIGNMENT
- - - - - LIMIT OF WORKS AREA FOR TKOLTT
- NOISE SENSITIVE RECEIVER (EDUCATIONAL)
- NOISE SENSITIVE RECEIVER (RESIDENTIAL)
- PLANNED ZONING

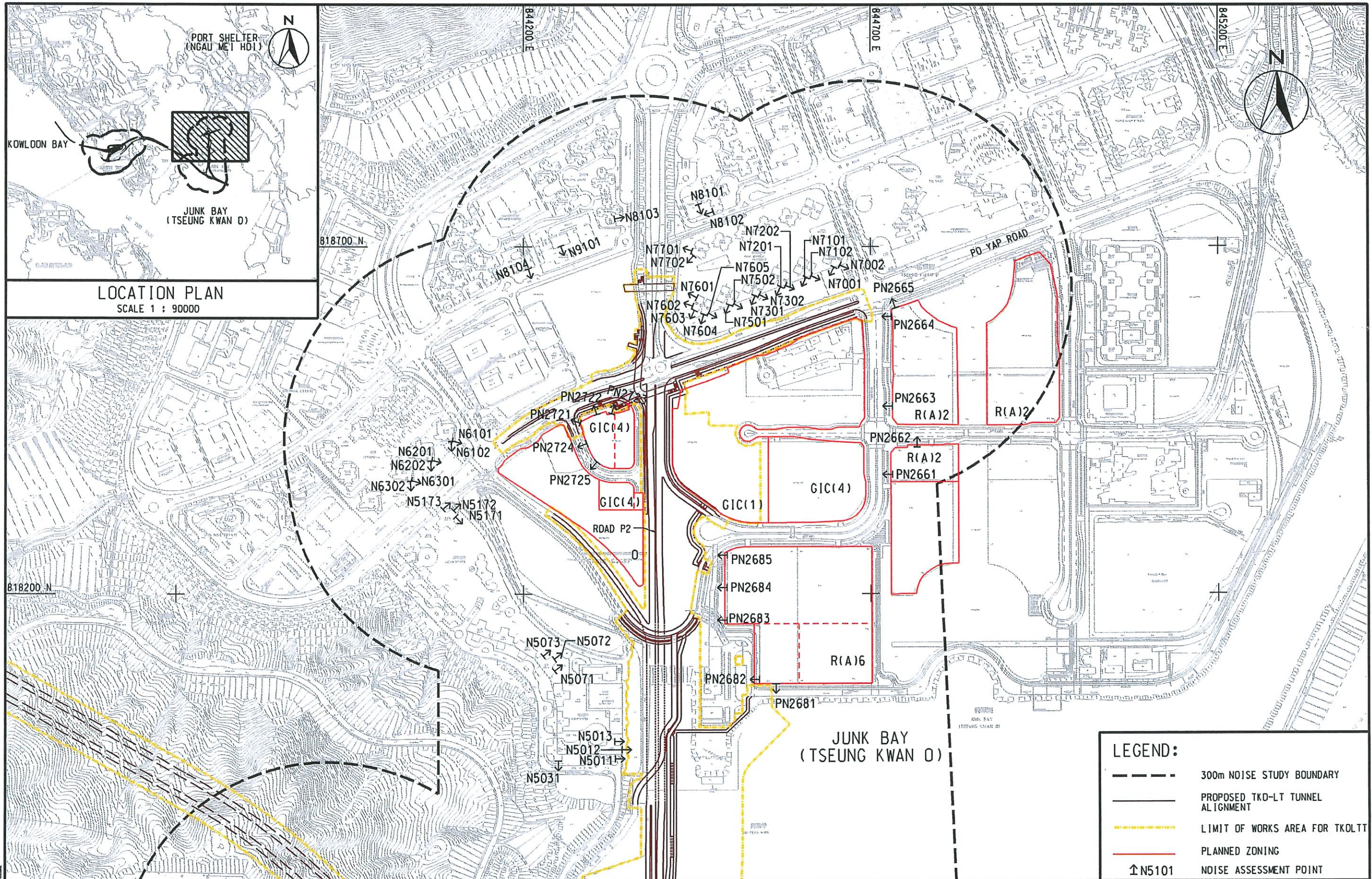
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AGREEMENT NO. CE 42/2008 (CE)
TSEUNG KWAN O - LAM TIN TUNNEL AND ASSOCIATED WORKS - INVESTIGATION
LOCATIONS OF NOISE SENSITIVE RECEIVERS

SHEET 4 OF 4

SCALE	A3 1 : 5000	DATE	JAN. 2013
CHECK	--	DRAWN	HLLS
JOB NO.	60097677	DRAWING No.	FIGURE 4.1
		REV	--



LOCATION PLAN
SCALE 1 : 90000

LEGEND:

- 300m NOISE STUDY BOUNDARY
- PROPOSED TKO-LT TUNNEL ALIGNMENT
- LIMIT OF WORKS AREA FOR TKO-LT
- PLANNED ZONING
- ±N5101 NOISE ASSESSMENT POINT



AGREEMENT NO. CE 42/2008 (CE)
TSEUNG KWAN O - LAM TIN TUNNEL AND ASSOCIATED WORKS - INVESTIGATION
LOCATIONS OF NOISE ASSESSMENT POINTS

SHEET 4 OF 4

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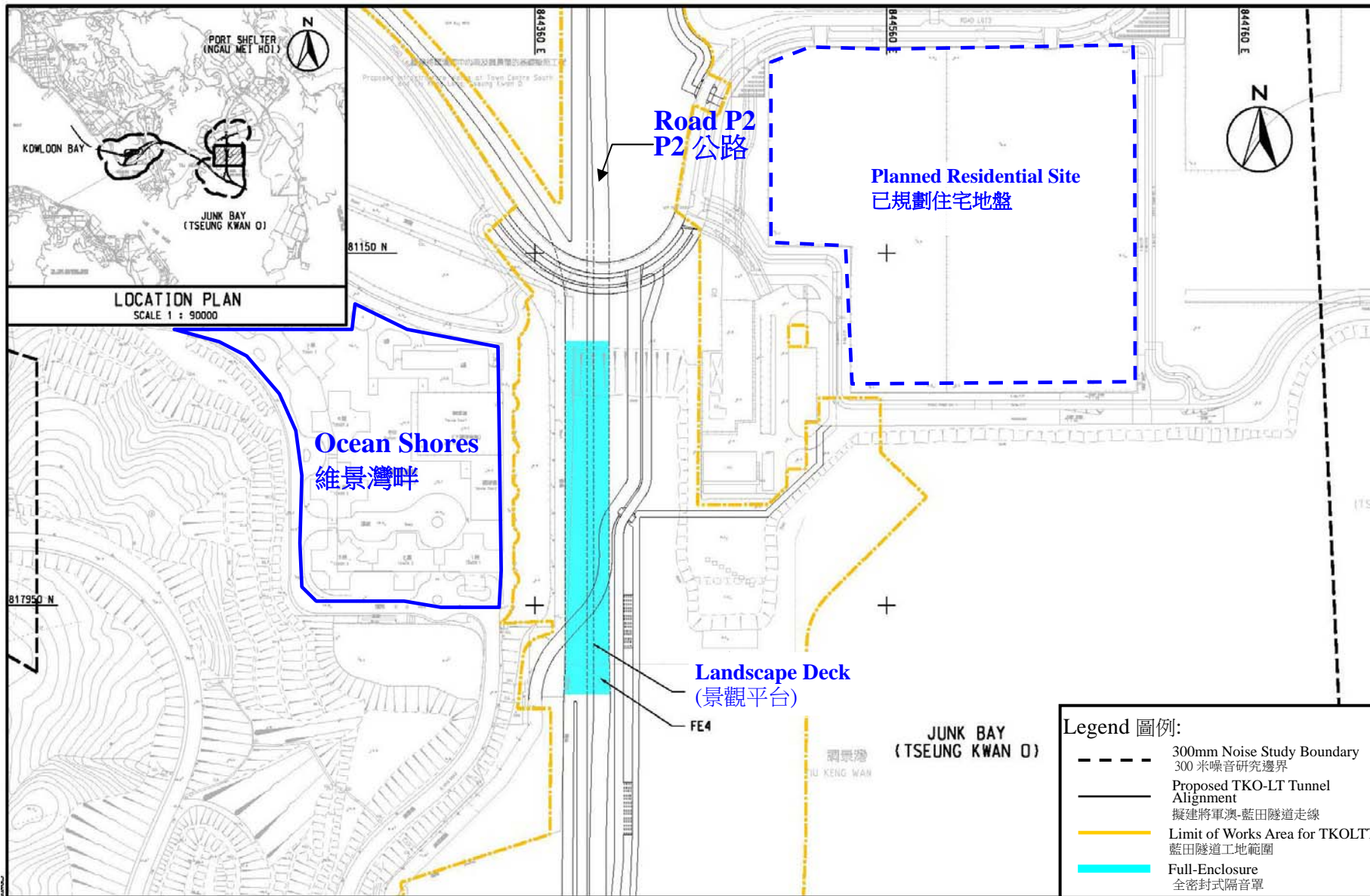
Appendix B

Updated Preliminary Construction Programme

Activity ID	Activity Name	Start	Finish
NE/2015/02 Tseung Kwan O - Lam Tin Tunnel - Road P2 and Associated Works		7/11/2016	26/11/2021
Reprovisioning of DSD Transformer Room			
Portion I	Transformer Room	7/11/2016	6/11/2017
Portion III	Demolition of DSD Transformer Room	6/11/2017	30/12/2017
Land Works			
Portion II	Retaining Wall	31/7/2018	25/5/2020
Portion IV	DN2100 SMH9101 -9108 (Pre-boring) (Scenario 1) - 3 drill rig	25/5/2017	31/8/2018
Portion IV	DN2100 SMH9101 -9108 (Pre-boring) (Scenario 2) - 1 dill rig	1/9/2018	30/11/2018
Portion IV	DN2100 SMH9101 -9108 (Sheet Piling)	1/9/2018	31/12/2018
Portion IV	DN2100 SMH9101 -9108 (ELS)	1/9/2018	31/1/2019
Portion IV	Installation of DN2100 and Manhole Construction (Scenario 1)	1/10/2018	31/12/2018
Portion IV	Installation of DN2100 and Manhole Construction (Scenario 2)	1/1/2019	31/3/2019
Portion IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Pre Drill) (Scenario 1)	1/12/2018	31/12/2018
Portion IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Pre Drill) (Scenario 1)	1/2/2019	31/3/2019
Portion IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Pre Drill) (Scenario 2)	1/1/2019	31/1/2019
Portion IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Piling) (Scenario 1)	1/9/2019	31/10/2019
Portion IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Piling) (Scenario 2)	1/3/2019	30/9/2019
Portion IV	Road P2 Underpass CH103.5 (Sheet Piling)	1/9/2019	31/10/2019
Portion IV	DN2100 SMH9101 -9103(Pre Drill & Sheetpiling works)	7/3/2020	30/6/2020
Portion V	Road P2 U-Trough B CH318-363 (Pre-boring) (Scenario 1)	1/8/2018	31/8/2018
Portion V	Road P2 U-Trough B CH318-363 (Pre-boring) (Scenario 2)	1/9/2018	30/11/2018
Portion V	Road P2 U-Trough B CH318-363 (Sheet Piling)	1/5/2018	31/1/2019
Portion V	Road P2 U-Trough B CH318-363 (ELS)	1/10/2018	31/12/2018
Portion V	Road P2 U-Trough B CH318-363 (Structure)	1/1/2019	30/9/2019
Portion V	Road P2 U-Trough B CH318-363 Road and Drainage Works	1/3/2019	30/9/2019
Portion V	Modification of Vertical Seawall	1/6/2019	31/12/2019
Portion VI	Road P2 U-Trough B CH318-363 (Removal of Existing Abandoned Box Culvert)	5/2/2018	30/4/2018
Portion VI	Road P2 U-Trough B CH318-363 (Installation of Dewatering System)	1/9/2018	31/1/2019
Portion VI	Road P2 U-Trough B CH318-363 (Preboring) (Scenario 1)	1/5/2018	31/8/2018
Portion VI	Road P2 U-Trough B CH318-363 (Preboring) (Scenario 2)	1/9/2018	30/9/2018
Portion VI	Road P2 U-Trough B CH318-363 (Sheet Piling)	1/9/2018	30/9/2018
Portion VI	Road P2 U-Trough B CH318-363 (ELS)	1/10/2018	31/12/2018
Portion VI	Road P2 U-Trough B CH318-363 (Structure)	1/1/2019	30/9/2019
Portion VI	Road P2 U-Trough B CH318-363 Road and Drainage Works	29/3/2019	30/9/2019
Portion VII	DN2100 SMH9108-Outfall (Pre-boring)	1/4/2018	31/8/2018
Portion VII	DN2100 SMH9108-Outfall (Sheet Piling)	1/4/2018	31/8/2018
Portion VII	Installation of DN2100 and Manhole Construction and Outfall Installation	1/5/2018	28/2/2019
Portion VII	U Trough A&B S200 CH890 - CH980 (Pre Drill)	1/8/2019	30/11/2019
Portion VII	U Trough A&B S200 CH890 - CH980 (Piling)	1/8/2019	31/12/2019
Portion VII	U Trough A&B S200 CH890 - CH980 (Sheet Piling)	1/10/2019	31/12/2019
Portion VIII	Road P2 Underpass (Piling) P2 CH411-500	3/2/2017	25/4/2017
Portion VIII	Road P2 Underpass (ELS) P2 CH411-500	20/2/2017	13/12/2017
Portion VIII	Road P2 Underpass, U-Trough (Structure) P2 CH411-500	7/10/2017	31/7/2018
Portion VIII	Road & Drainage Works P2 CH411-500	9/7/2018	6/12/2019
Portion VIII	Road P2 Underpass (Piling) SR2 CH170-250	25/4/2017	10/7/2017
Portion VIII	Road P2 Underpass (ELS) SR2 CH170-250	12/6/2017	14/10/2017
Portion VIII	Road P2 Underpass, U-Trough (Structure) SR2 CH170-250	23/10/2017	27/4/2018
Portion VIII	Road & Drainage Works SR2 CH170-250	2/6/2018	3/1/2020
Portion VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 (Pre-boring)	1/8/2020	31/12/2020
Portion VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 (ELS)	1/11/2020	31/3/2021
Portion VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 (Installation of Dewatering system)	1/11/2020	31/1/2021
Portion VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170(Backfilling)	1/3/2021	31/10/2021
Portion VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 (Structure)	1/3/2021	31/10/2021
Portion VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 Road and Drainage Works	1/9/2021	31/12/2021
Area A		27/8/2016	31/12/2019
Area Y		16/12/2016	30/11/2017
Marine Works			
Portion IX	Steel Cofferdam and Water Gate	7/11/2016	10/11/2017
Portion IX	Seawall Construction	11/11/2017	31/7/2020
Portion IX	Marine Ground Treatment	1/8/2018	28/2/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH821 (Backfilling)	1/8/2018	28/2/2019
Portion IX	Road P2 Underpass CH105-318, (Removal of Temporary 1500 Drain)	15/4/2019	31/5/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 1)	1/5/2019	31/5/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 1)	1/8/2019	30/9/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 1)	1/3/2020	31/10/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Scenario 2)	1/3/2019	31/3/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 2)	1/1/2020	28/2/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 3)	1/1/2019	31/1/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 4)	1/2/2019	28/2/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 4)	1/7/2019	31/7/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 4)	1/10/2019	31/12/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 1)	1/1/2019	28/2/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 2)	1/9/2019	31/10/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 2)	1/5/2020	31/10/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 3)	1/11/2019	28/2/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 4)	1/7/2019	31/8/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 5)	1/3/2020	31/7/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 6)	1/5/2019	31/5/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 7)	1/6/2019	30/6/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Installation of Dewatering system)	1/7/2019	31/8/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (ELS) (Sheet Piling) (Scenario 1)	1/3/2019	31/5/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (ELS) (Sheet Piling) (Scenario 1)	1/8/2019	31/3/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (ELS) (Sheet Piling) (Scenario 2)	1/4/2020	31/7/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (ELS) (Welding & Excavation) (Scenario 1)	1/7/2019	31/12/2019
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (ELS) (Welding & Excavation) (Scenario 1)	1/3/2020	31/3/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (ELS) (Welding & Excavation) (Scenario 2)	1/1/2020	28/2/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Structure) (Scenario 1)	1/12/2020	31/12/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Structure) (Scenario 2)	1/11/2020	30/11/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Structure) (Scenario 3)	1/2/2020	30/4/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Structure) (Scenario 3)	1/6/2020	31/10/2020
Portion IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Structure) (Scenario 4)	1/5/2020	30/5/2020
Portion IX	Road & Drainage Works	1/10/2020	30/4/2021

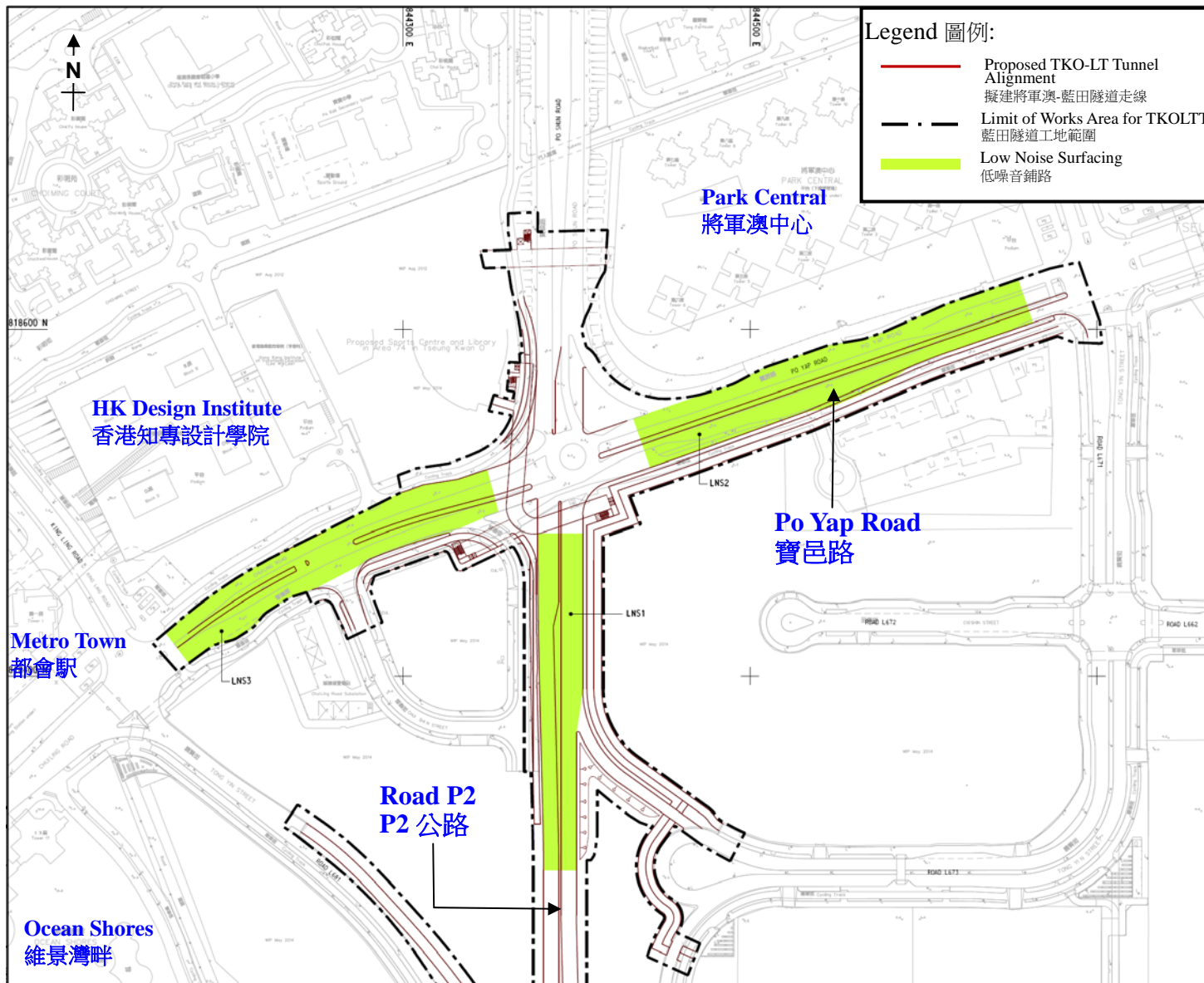
Appendix C

Proposed Mitigation Measures and Detailed Noise Assessment



Project Title: Tseung Kwan O – Lam Tin Tunnel and Associated Works
 工程項目名稱: 將軍澳 - 藍田隧道及相關工程
 Noise Mitigation Measure at Road P2
 P2公路的噪音緩解措施

(to be read in conjunction with the Noise Mitigation Plan for Road P2 and Associated Works submitted under Condition 2.5)
 (要與根據條件 2.5 提交的 P2 路及相關工程的噪音影響緩解計劃一併閱讀)
 (Plan originated from the Figure 4.6 (sheet 4 of 4) of approved EIA Report: AEIAR-173/2013)
 (圖則源自已批准環評報告-AEIAR-173/2013 內的圖 4.6(版 4 of 4))



Project Title: Tseung Kwan O – Lam Tin Tunnel and Associated Works
 工程項目名稱: 將軍澳 - 藍田隧道及相關工程
 Noise Mitigation Measure at Road P2 and Po Yap Road
 P2公路及寶邑路的噪音緩解措施

(to be read in conjunction with the Noise Mitigation Plan for Road P2/D4 and Associated Works and the Noise Mitigation Plan for Road P2 and Associated Works submitted under Condition 2.5)
 (要與根據條件 2.5 提交的 P2/D4 路及相關工程的噪音影響緩解計劃及 P2 路及相關工程的噪音影響緩解計劃一併閱讀)
 (This figure was prepared based on Figure 4 of the ER Report submitted under VEP Application (VEP-472/2015)
 (本圖是根據更改環境許可證申請文件 - 申請書編號: VEP-472/2015 所提交的環境檢討報告圖 4 編制)



Project Management Initials: Designer: AT/HI Checked: R/PC/M Approved: C/W/N
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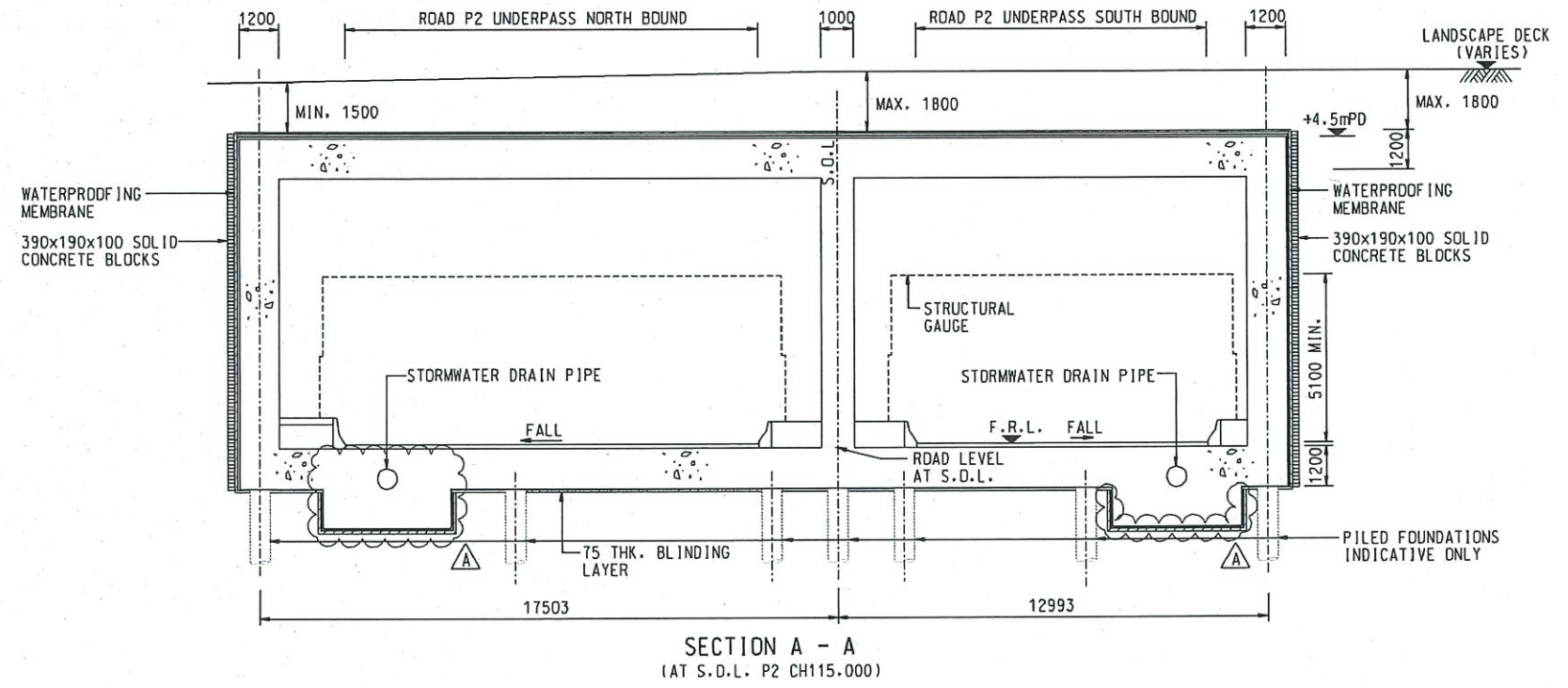
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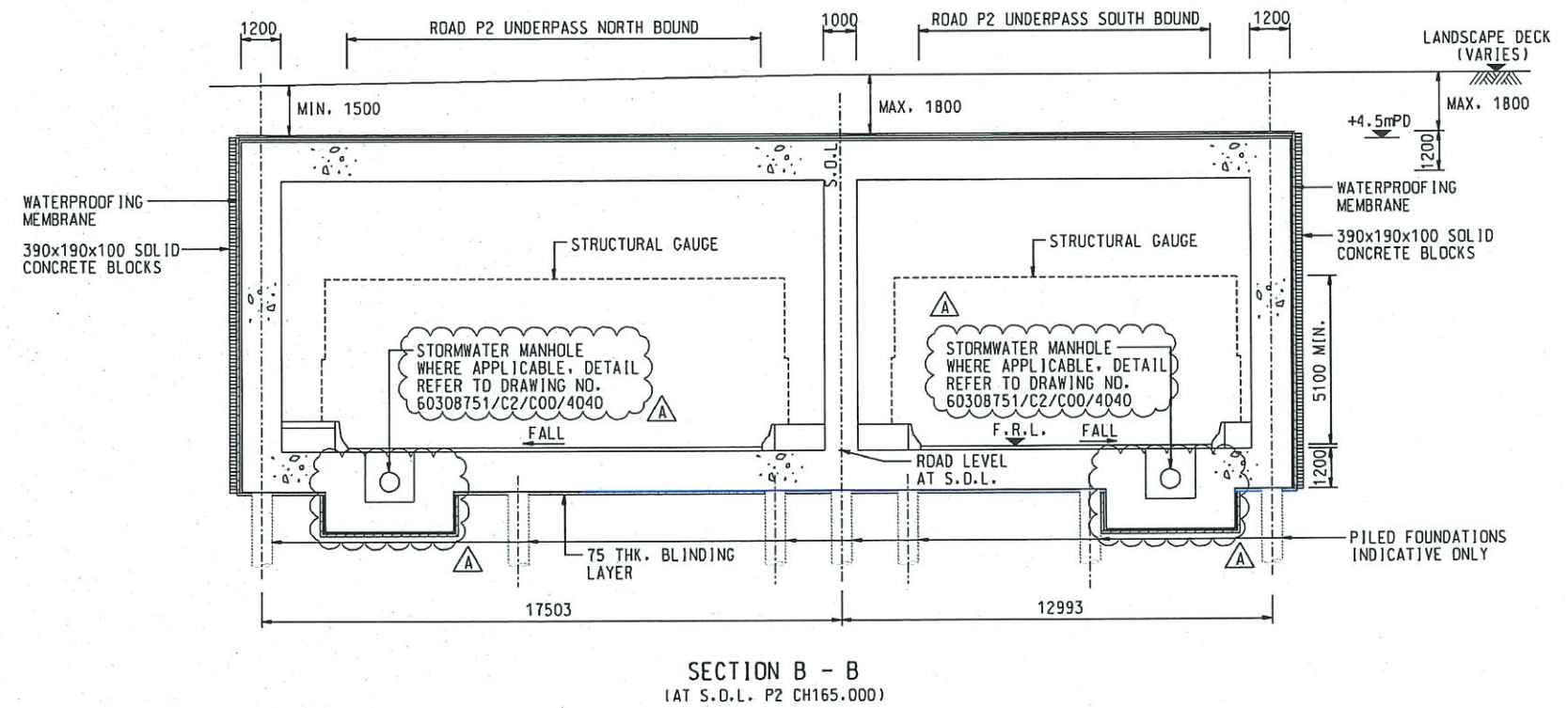
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 Civil Engineering and Development Department

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FE4



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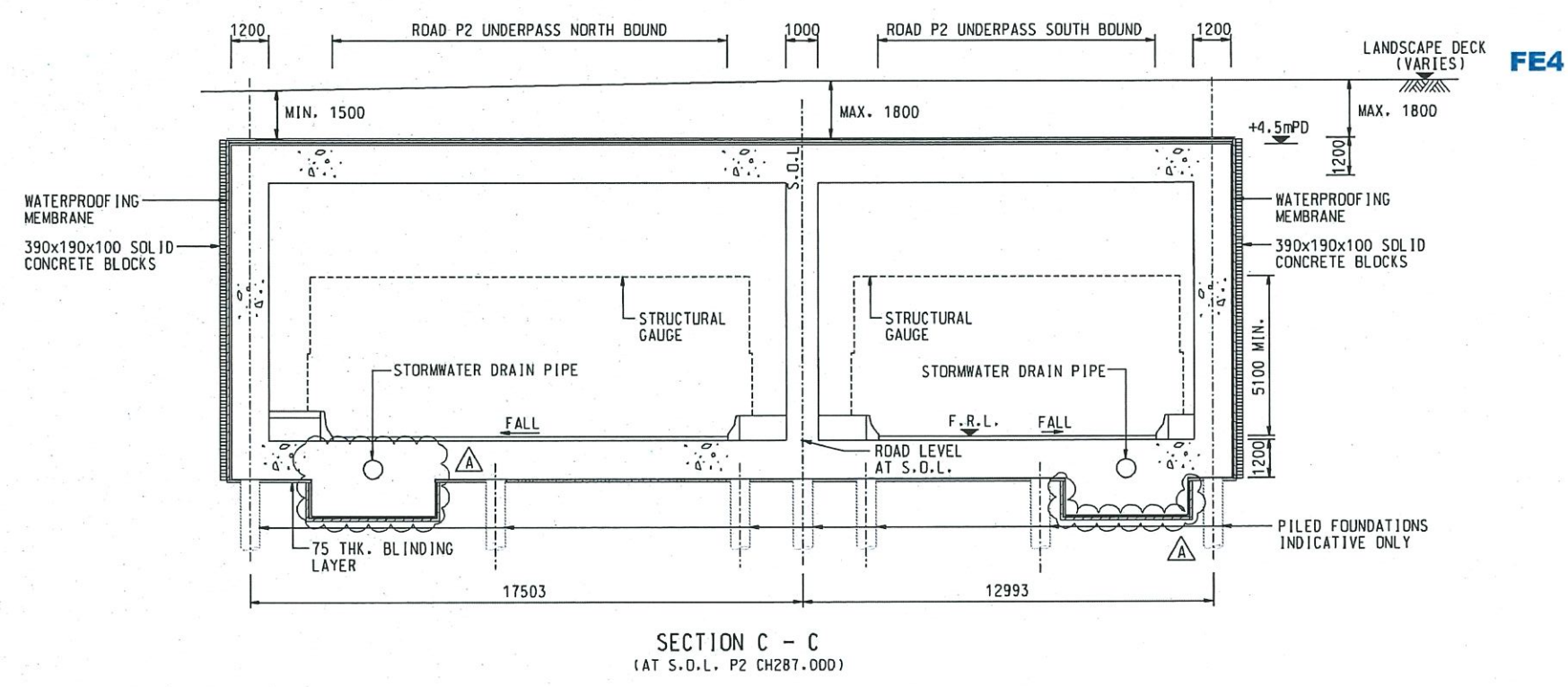
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SHEET 1 OF 2

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PROJECT NO.
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CONTRACT NO.
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SHEET TITLE
 ROAD P2 UNDERPASS - SECTION

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PROJECT
TSEUNG KWAN O - LAM TIN TUNNEL

CONTRACT TITLE
TSEUNG KWAN O - LAM TIN TUNNEL ROAD P2 AND ASSOCIATED WORKS

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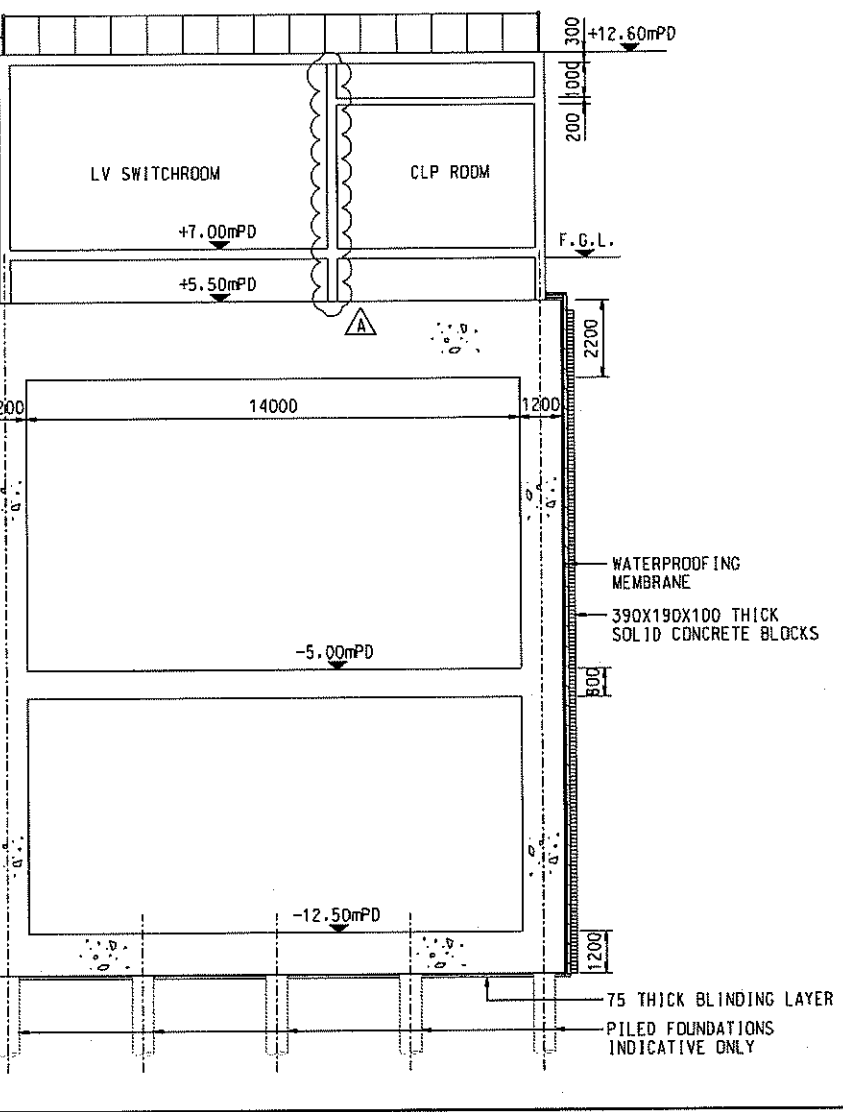
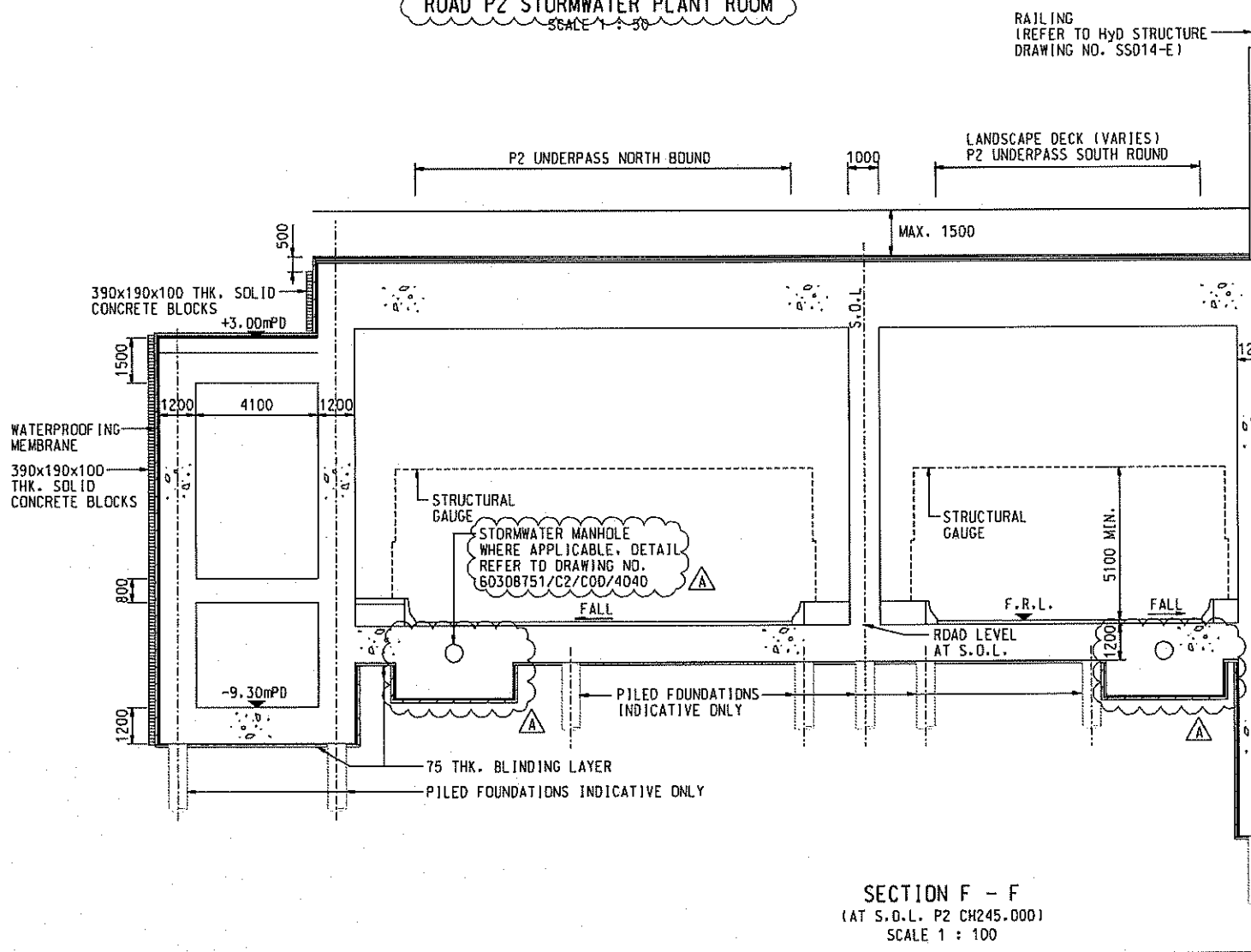
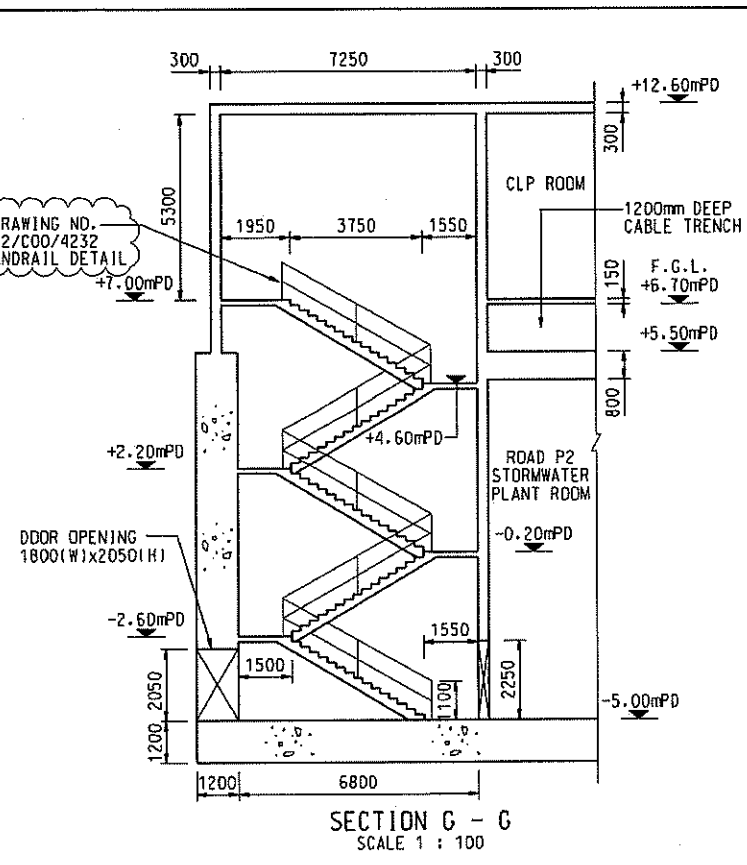
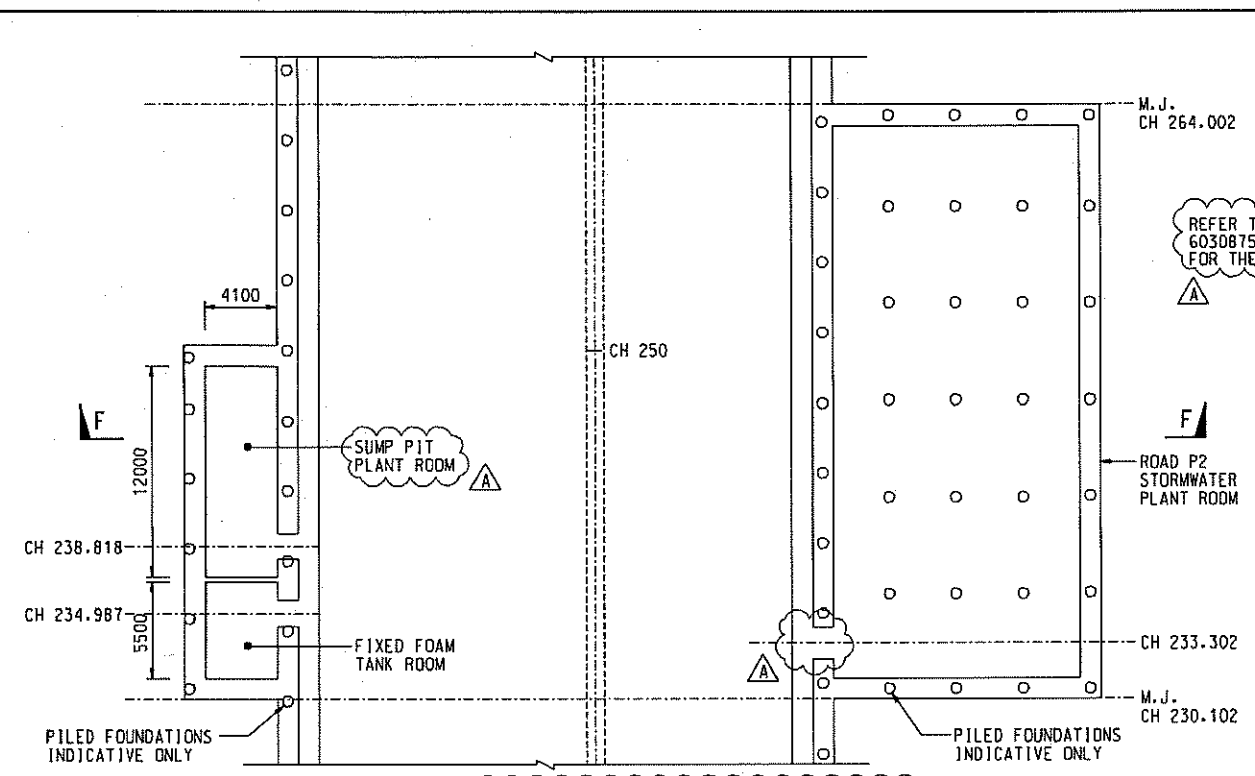
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CONTRACT NO.
NE/2015/02

SHEET TITLE
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SHEET NUMBER
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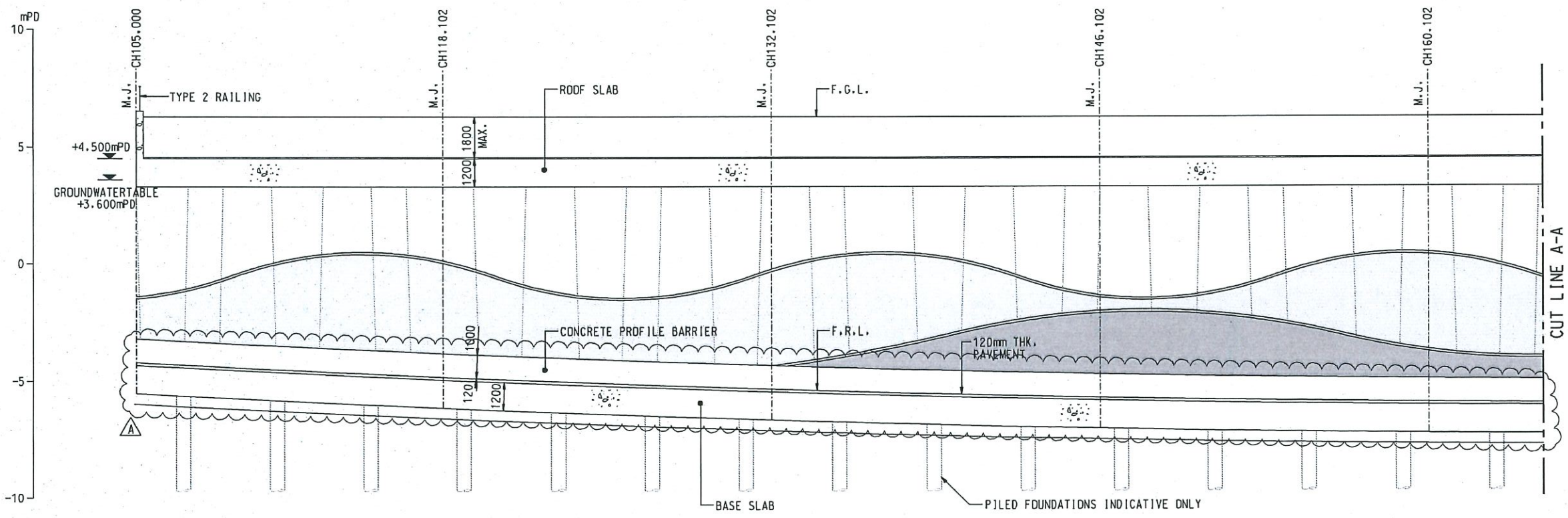
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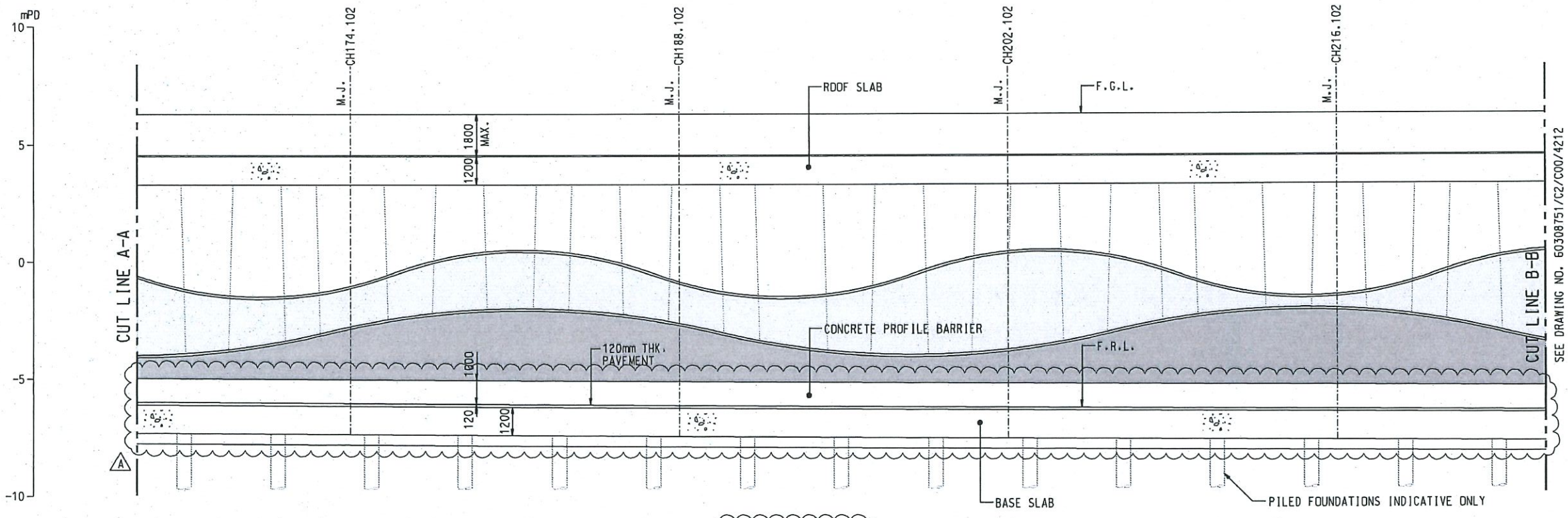
CLIENT
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CEDD Civil Engineering and Development Department

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ELEVATION D - D



ELEVATION D - D

ISSUE/REVISION

NO.	DATE	DESCRIPTION	CHKD.
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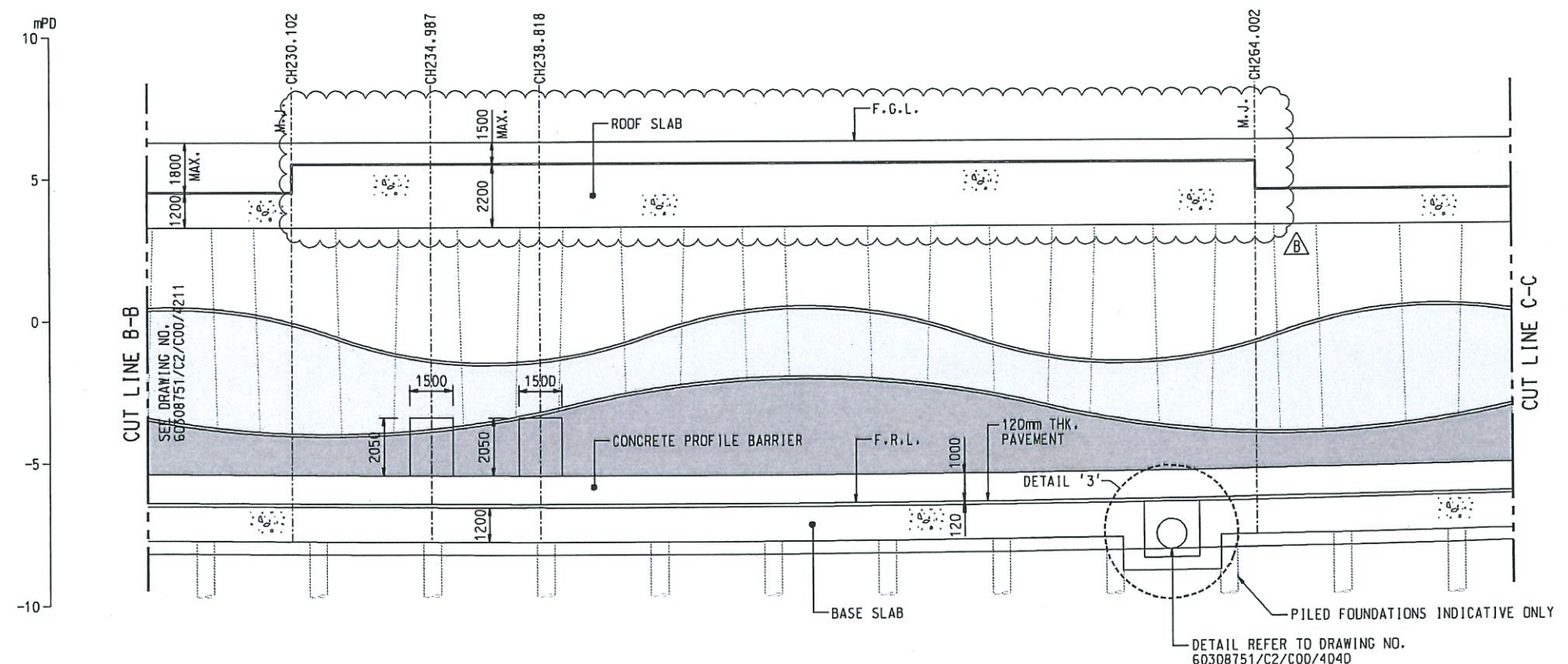
KEY PLAN

PROJECT NO.
 60308751
CONTRACT NO.
 NE/2015/02

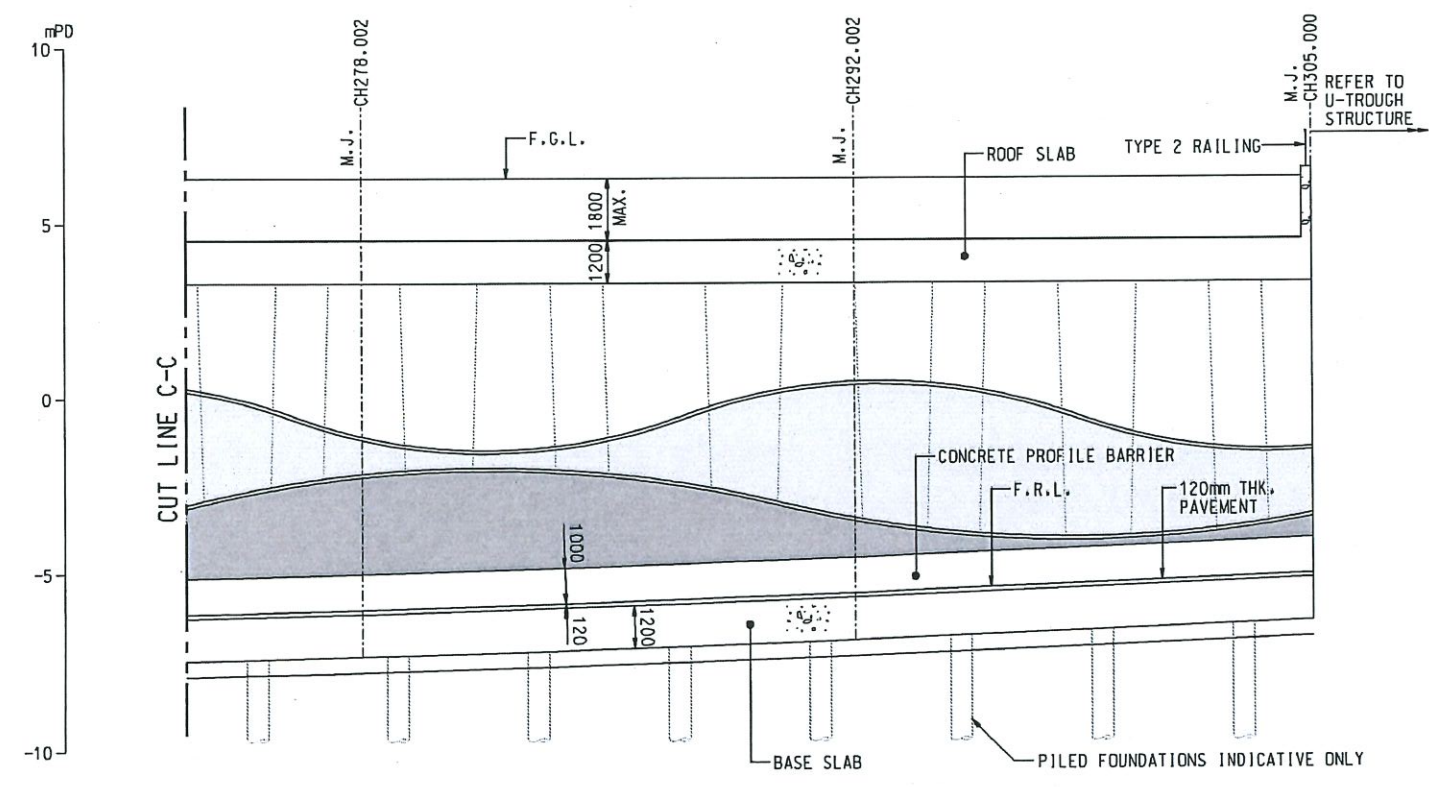
SHEET TITLE
 ROAD P2 UNDERPASS - NORTHBOUND ELEVATION

SHEET NUMBER
 60308751/C2/C00/4209A

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ELEVATION D - D



ELEVATION D - D

- NOTES:
- FOR NOTES AND LEGEND, REFER TO DRAWING NO. 60308751/C2/C00/4201.
 - THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60308751/C2/C00/4201 AND 4209.

AECOM

PROJECT
TSEUNG KWAN O - LAM TIN TUNNEL

CONTRACT TITLE
TSEUNG KWAN O - LAM TIN TUNNEL ROAD P2 AND ASSOCIATED WORKS

CLIENT
CEDD 土木工程拓展署
 Civil Engineering and Development Department

CONSULTANT
AECOM Asia Company Ltd.
 www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

NO.	DATE	DESCRIPTION	CHK.	APP.
B	MAR.16	TENDER ADDENDUM NO. 2	RPCM	
A	FEB.16	TENDER ADDENDUM NO. 1	RPCM	
-	JAN.16	TENDER DRAWING	RPCM	

STATUS

SCALE
 A1:100

DIMENSION UNIT
 MILLIMETRES

KEY PLAN

PROJECT NO.
 60308751

CONTRACT NO.
 NE/2015/02

SHEET TITLE
 ROAD P2 UNDERPASS - NORTHBOUND ELEVATION

SHEET NUMBER
 60308751/C2/C00/4210B

SHEET 2 OF 2

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Project Management Institute Designer: ATTH Checked: FPCM Approved: CWN
 CADD
 ISO/A1 84mm x 64mm
 Pld File by: WANGLUY 20160228
 PATH: P:\Project\60308751\ROAD\116\Connect2400/C2_C00_4211.dgn

NOTES:
 1. FOR NOTES AND LEGEND, REFER TO DRAWING NO. 60308751/C2/C00/4201.
 2. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60308751/C2/C00/4201 AND 4212.

AECOM
PROJECT
TSEUNG KWAN O - LAM TIN TUNNEL

CONTRACT TITLE
TSEUNG KWAN O - LAM TIN TUNNEL ROAD P2 AND ASSOCIATED WORKS

CLIENT

 土木工程拓展署
 Civil Engineering and Development Department

CONSULTANT

 AECOM Asia Company Ltd.
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ISSUE/REVISION

NO.	DATE	DESCRIPTION	CHK	APP
A	FEB.16	TENDER ADDENDUM NO.1		
-	JAN.16	TENDER DRAWING		

STATUS

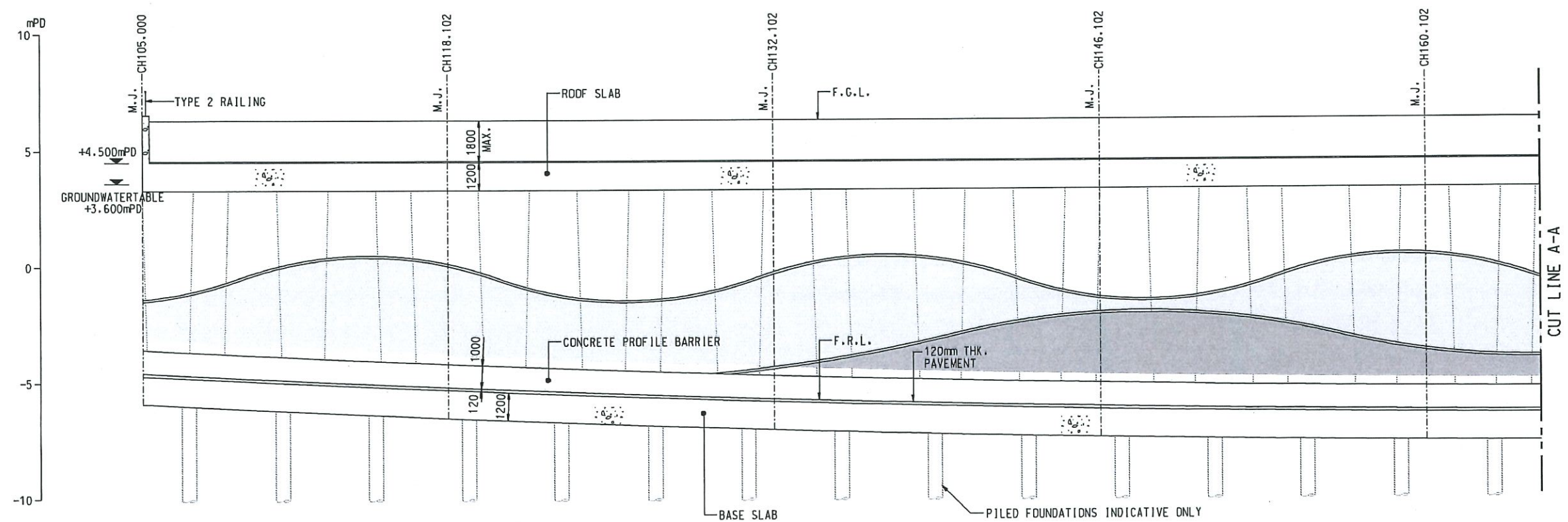
SCALE
 A1 : 100
DIMENSION UNIT
 MILLIMETRES

KEY PLAN

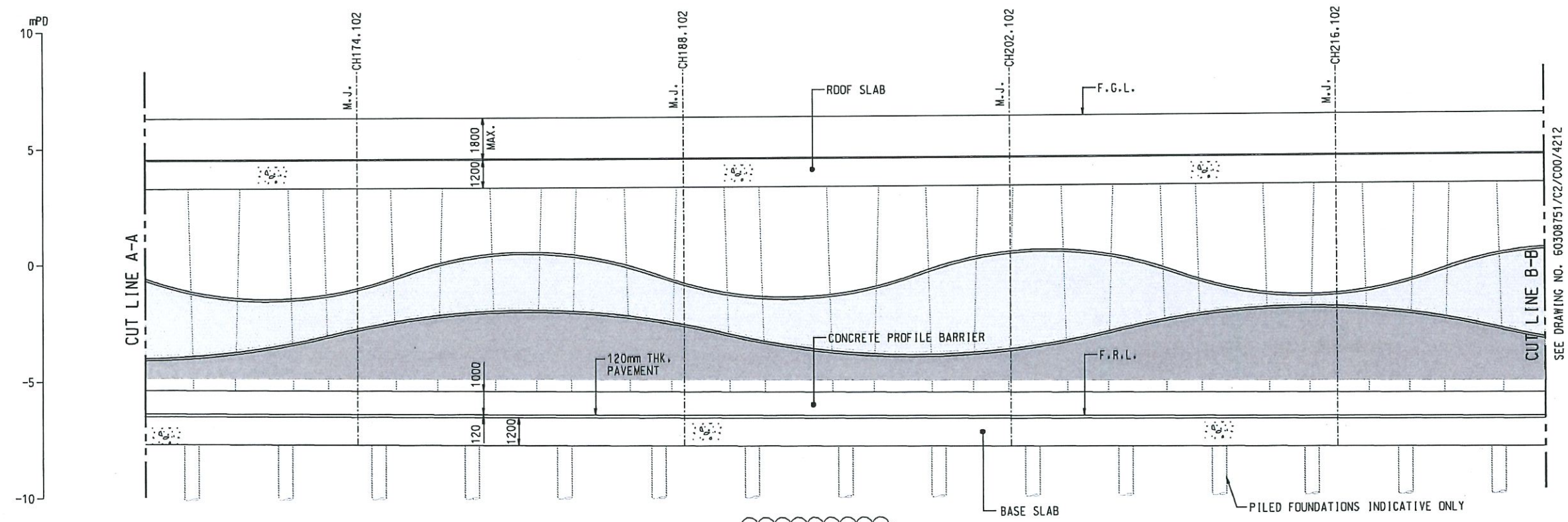
PROJECT NO.
 60308751
CONTRACT NO.
 NE/2015/02

SHEET TITLE
 ROAD P2 UNDERPASS - SOUTHBOUND AND CROSS PASSAGE ELEVATION
 SHEET 1 OF 2

SHEET NUMBER
 60308751/C2/C00/4211A



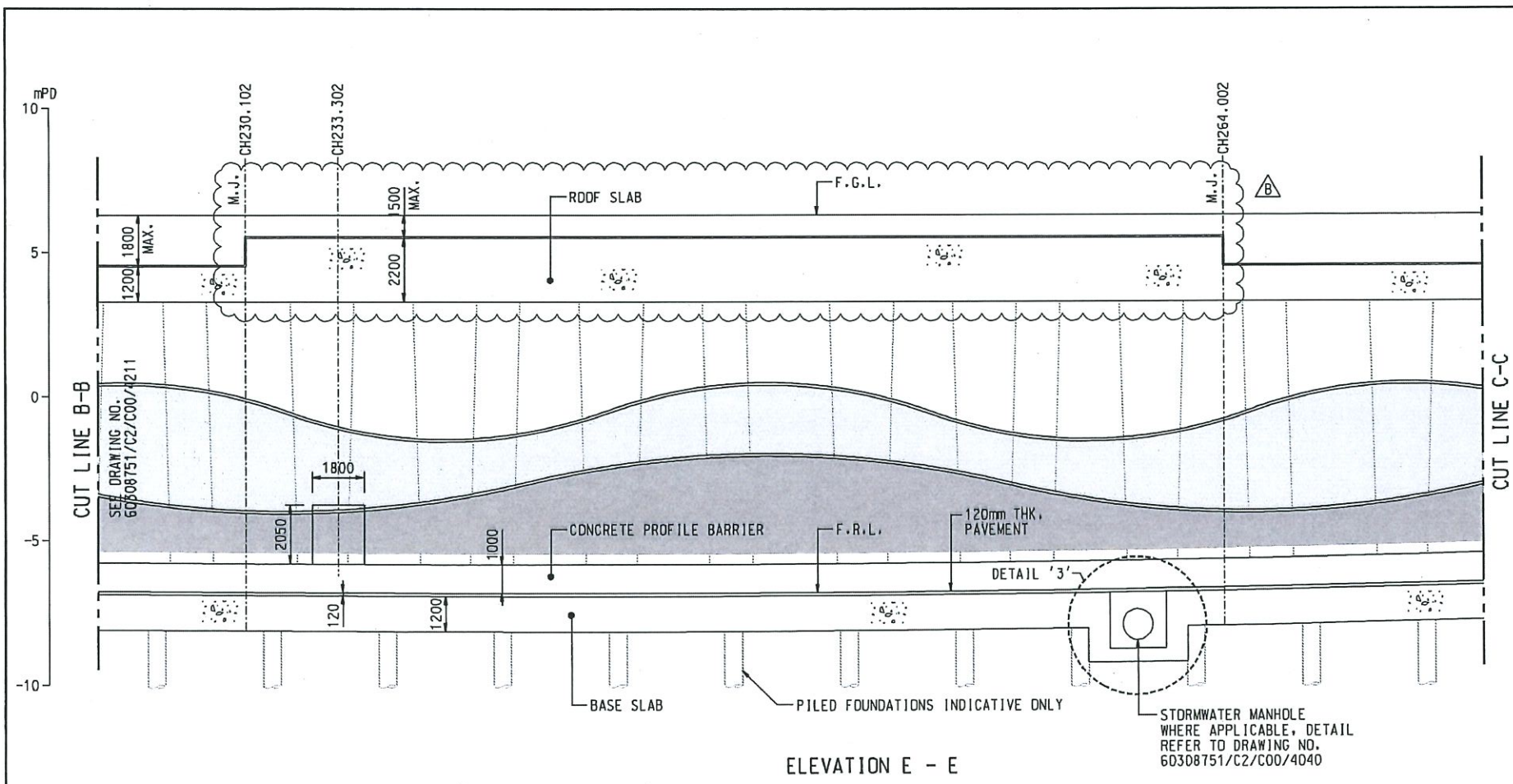
ELEVATION E - E



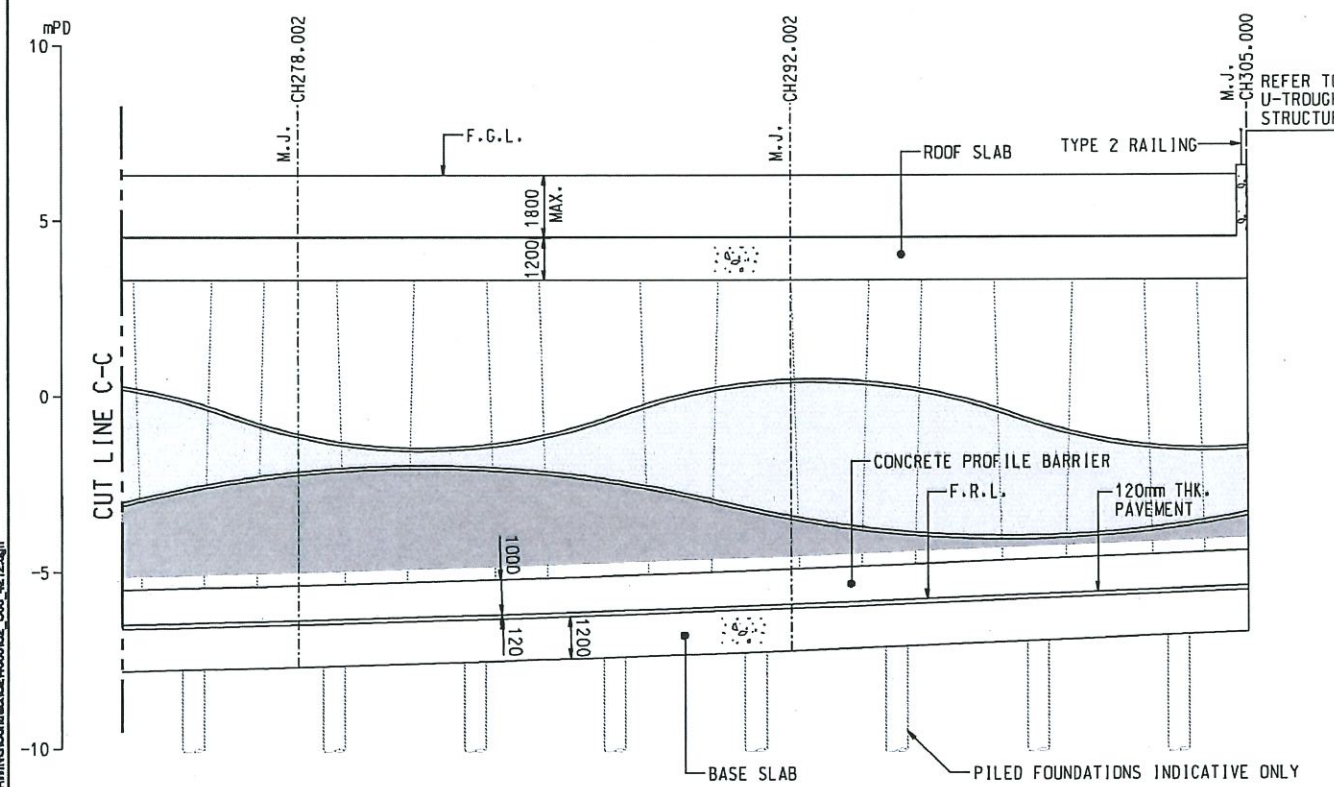
ELEVATION E - E

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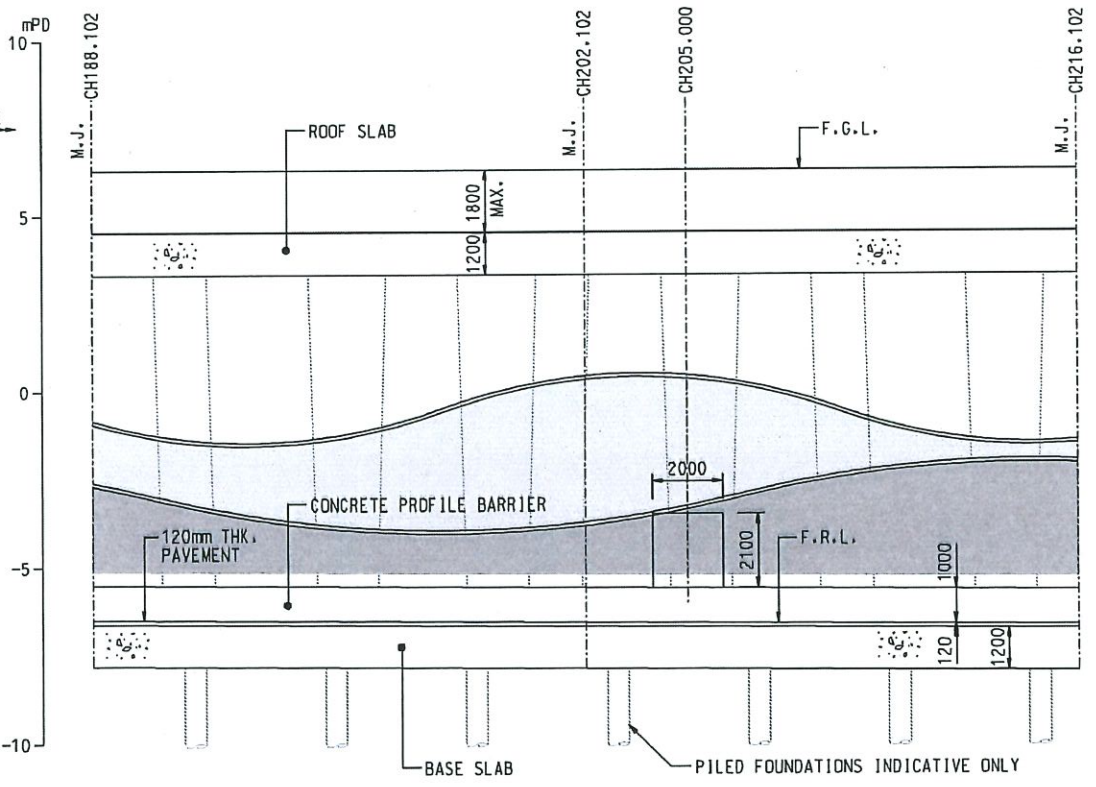
Project Management: Designer: ATHH Checked: RPCM Approved: CWN 190 A1 90mm x 84mm
 File by: WANGYI2_20160716
 PATH: P:\Project\60308751\CAD\WGN\Contract\C2_000_4212.dgn



ELEVATION E - E



ELEVATION E - E



ELEVATION FOR CROSS PASSAGE
 (AT S.D.L. ROAD P2 UNDERPASS CH 205.00)

- NOTES:
- FOR NOTES AND LEGEND, REFER TO DRAWING NO. 60308751/C2/C00/4201.
 - THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60308751/C2/C00/4201 AND 4211.

AECOM
PROJECT
TSEUNG KWAN O - LAM TIN TUNNEL

CONTRACT TITLE
 TSEUNG KWAN O - LAM TIN TUNNEL ROAD P2 AND ASSOCIATED WORKS

CLIENT
CEDD 土木工程拓展署
 Civil Engineering and Development Department

CONSULTANT
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ISSUE/REVISION

NO.	DATE	DESCRIPTION	CHK.
B	MAR.16	TENDER ADDENDUM NO.2	RPCM
A	FEB.16	TENDER ADDENDUM NO.1	RPCM
-	JAN.16	TENDER DRAWING	RPCM

STATUS

SCALE
 A1:100
DIMENSION UNIT
 MILLIMETRES

KEY PLAN

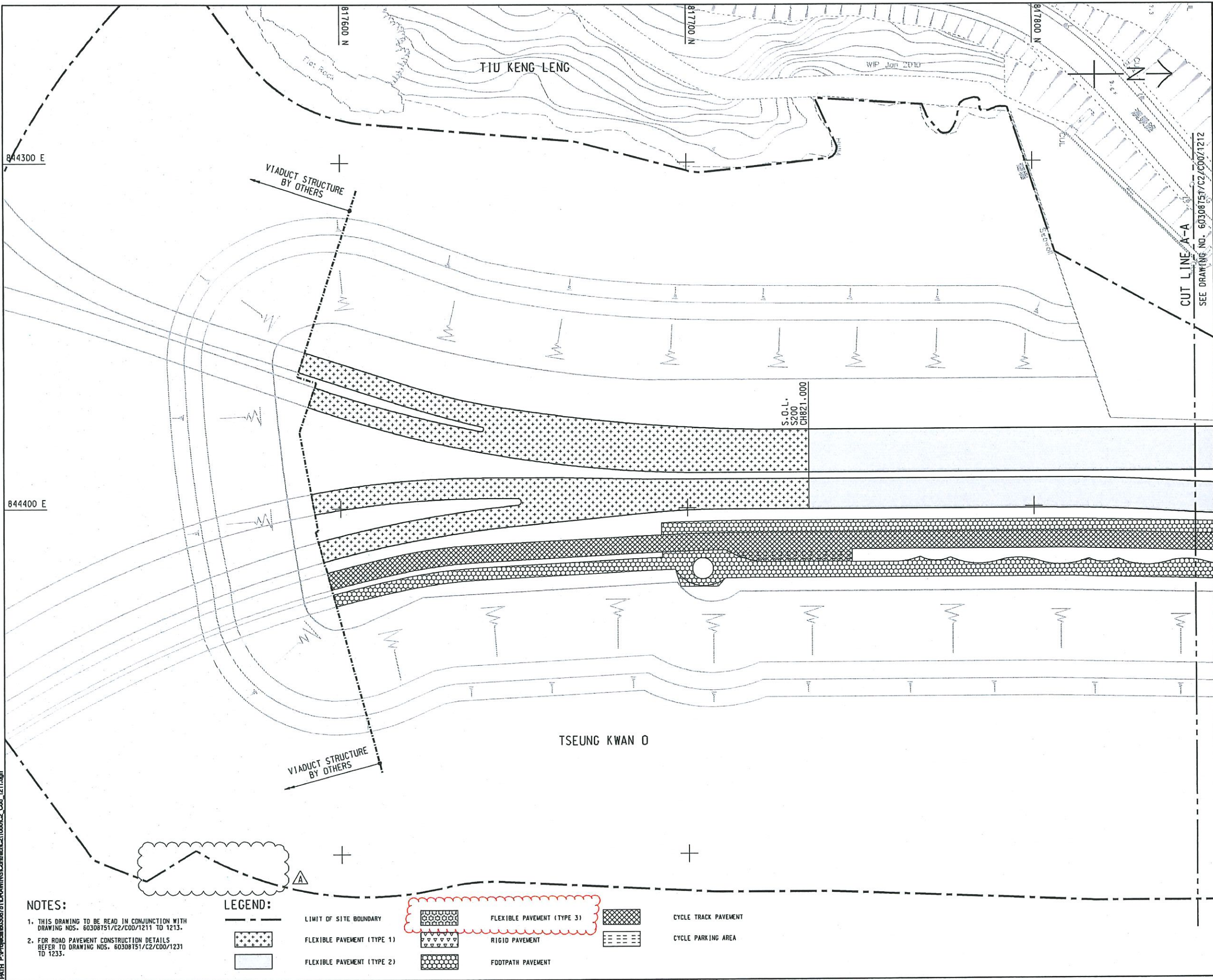
PROJECT NO.
 60308751
CONTRACT NO.
 NE/2015/02

SHEET TITLE
 ROAD P2 UNDERPASS - SOUTHBOUND AND CROSS PASSAGE ELEVATION
 SHEET 2 OF 2

SHEET NUMBER
 60308751/C2/C00/4212B

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Project Management Initials: Designer: ATTH Checked: RPCM Approved: CHW
 2016/02/18
 Plot File by: LUCIFVA
 Path: P:\Program\60308751\DRAWINGS\Comment\21009C2_C00_1211.dgn



NOTES:

- THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60308751/C2/C00/1211 TO 1213.
- FOR ROAD PAVEMENT CONSTRUCTION DETAILS REFER TO DRAWING NOS. 60308751/C2/C00/1231 TO 1233.

LEGEND:	
	LIMIT OF SITE BOUNDARY
	FLEXIBLE PAVEMENT (TYPE 1)
	FLEXIBLE PAVEMENT (TYPE 2)
	FLEXIBLE PAVEMENT (TYPE 3)
	RIGID PAVEMENT
	FOOTPATH PAVEMENT
	CYCLE TRACK PAVEMENT
	CYCLE PARKING AREA

AECOM

PROJECT
TSEUNG KWAN O - LAM TIN TUNNEL

CONTRACT TITLE
 TSEUNG KWAN O - LAM TIN TUNNEL ROAD P2 AND ASSOCIATED WORKS

CLIENT
 土木工程拓展署
 Civil Engineering and Development Department

CONSULTANT
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SUB-CONSULTANTS

ISSUE/REVISION

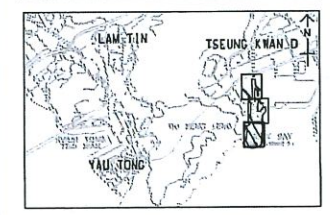
NO.	DATE	DESCRIPTION	CHKD
A	FEB.16	TENDER ADDENDUM NO. 1	RPCM
-	JAN.16	TENDER DRAWING	RPCM

STATUS
 RA

SCALE
 A1:1:500

DIMENSION UNIT
 METRES

KEY PLAN A1:1:50000



PROJECT NO.
 60308751

CONTRACT NO.
 NE/2015/02

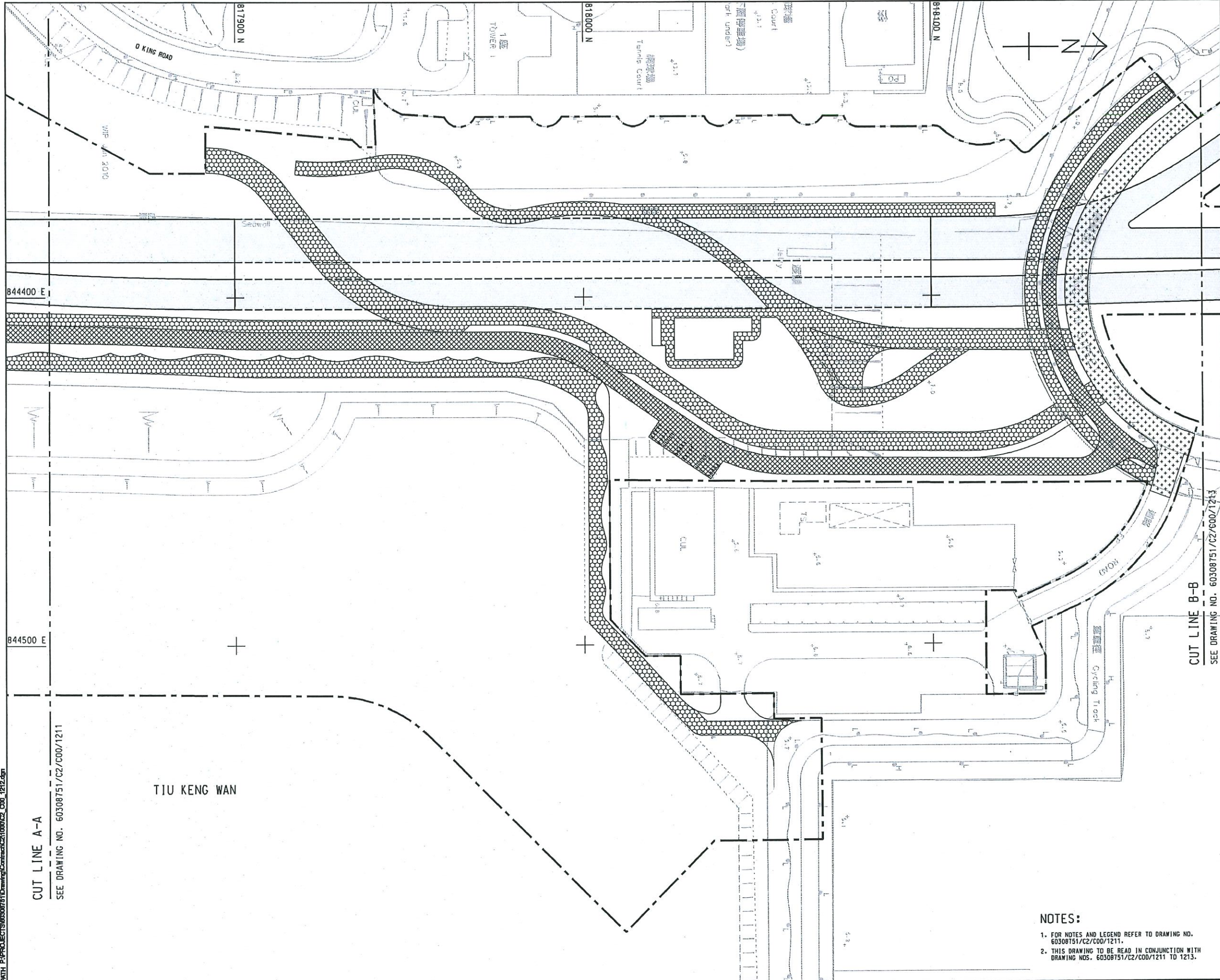
SHEET TITLE
 ROAD PAVEMENT LAYOUT

SHEET NUMBER
 60308751/C2/C00/1211A

SHEET 1 OF 3

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File Path: P:\PROJECTS\60308751\Drawing\Contract\60308751\C2_1212.dgn
 Project Management Initials: Designer: ATHH, Checker: RPCM, Approver: CWN
 ISO A1 841mm x 641mm



CUT LINE A-A
 SEE DRAWING NO. 60308751/C2/C00/1211

CUT LINE B-B
 SEE DRAWING NO. 60308751/C2/C00/1213

AECOM

PROJECT
 TSEUNG KWAN O - LAM TIN TUNNEL

CONTRACT TITLE
 TSEUNG KWAN O - LAM TIN TUNNEL ROAD P2 AND ASSOCIATED WORKS

CLIENT
 土木工程拓展署
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ISSUE/REVISION

NO.	DATE	DESCRIPTION	BY	CHK
1	JAN.16	TENDER DRAWING	RPCM	CWN

STATUS

SCALE
 A1:500
DIMENSION UNIT
 METRES

KEY PLAN A1:80000



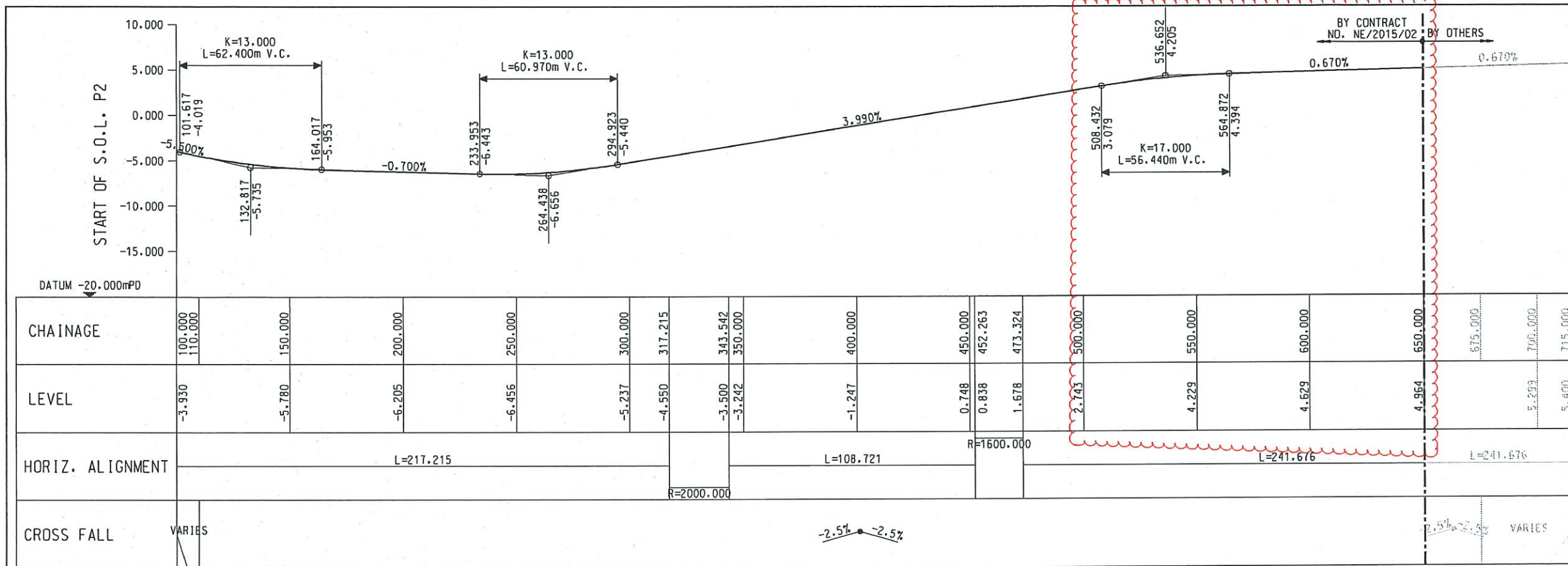
PROJECT NO.
 60308751
CONTRACT NO.
 NE/2015/02

SHEET TITLE
 ROAD PAVEMENT LAYOUT

SHEET NUMBER
 60308751/C2/C00/1212

- NOTES:**
- FOR NOTES AND LEGEND REFER TO DRAWING NO. 60308751/C2/C00/1211.
 - THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60308751/C2/C00/1211 TO 1213.

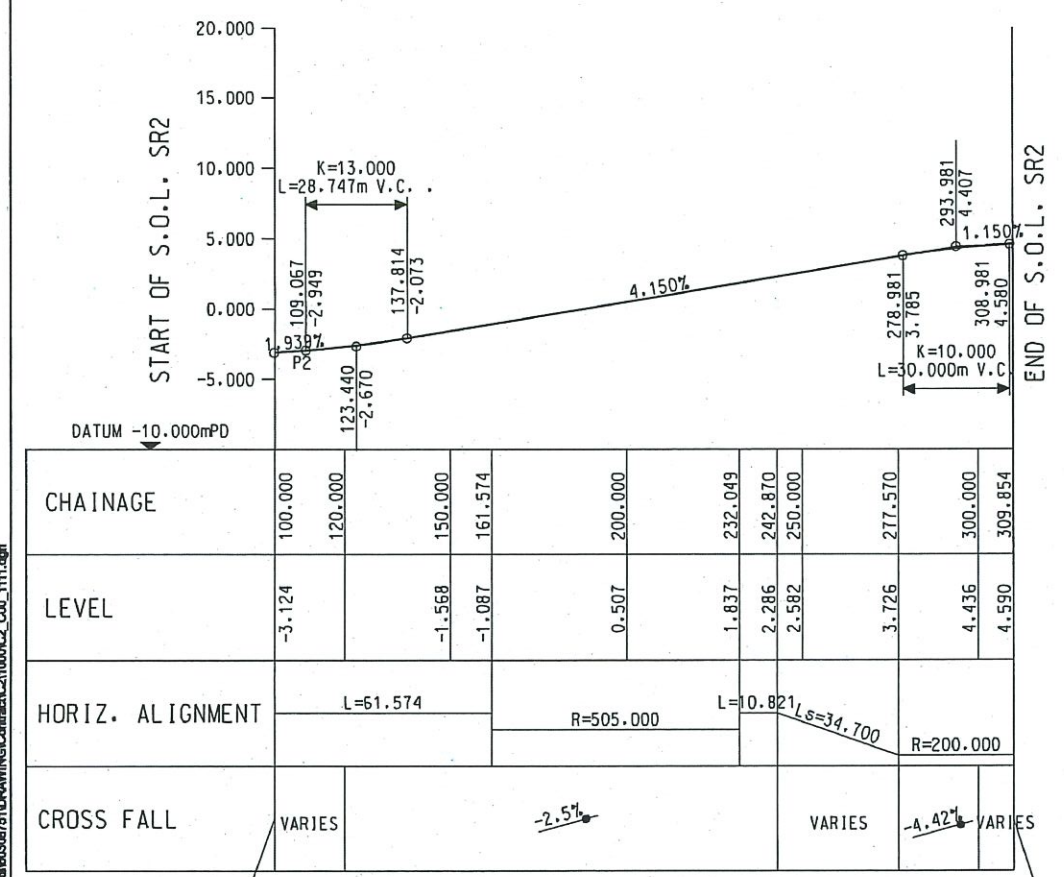
Project Management Initials: Designer: ATHH Checked: RPCM Approved: CWN
 City: 9p
 Scale: 190 A1 80mm x 84mm



CHAINAGE	LEVEL	HORIZ. ALIGNMENT	CROSS FALL
100.000	-3.930		VARIES
110.000			
150.000	-5.780		
200.000	-6.205	L=217.215	
250.000	-6.455		
300.000	-5.237		
317.215	-4.550	R=2000.000	
343.542	-3.500		
350.000	-3.242		
400.000	-1.247	L=108.721	
450.000	0.748		
452.263	0.838	R=1600.000	
473.324	1.678		
500.000	2.743		
550.000	4.229	L=241.676	
600.000	4.629		
650.000	4.964		
675.000			
700.000			
715.000	5.400	L=241.676	VARIES

VERTICAL PROFILE ALONG THE SETTING OUT LINE P2
 HORIZONTAL SCALE A1 1 : 1000
 VERTICAL SCALE A1 1 : 250

MATCH WITH EXISTING PAVEMENT APPROX. 0.5% 0.5%

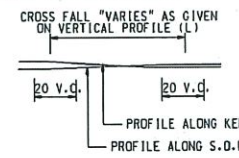


CHAINAGE	LEVEL	HORIZ. ALIGNMENT	CROSS FALL
100.000	-3.124		VARIES
120.000			
150.000	-1.568		
161.574	-1.087	L=61.574	
200.000	0.507	R=505.000	
232.049	1.837		
242.870	2.286	L=10.821, Ls=34.700	
250.000	2.582		
277.570	3.726		
300.000	4.436	R=200.000	
309.854	4.590		

VERTICAL PROFILE ALONG THE SETTING OUT LINE SR2 SLIP ROAD
 HORIZONTAL SCALE A1 1 : 1000
 VERTICAL SCALE A1 1 : 250

NOTES:

- THIS DRAWING TO BE READ IN CONJUNCTION WITH THE SETTING OUT PLAN, DRAWING NOS. 60308751/C2/C00/1101 TO 1103.
- ALL LEVELS SHOWN ON THE VERTICAL PROFILE ARE IN METRES ABOVE PRINCIPAL DATUM AND REFER TO THE FINISHED ROAD LEVEL ALONG SETTING OUT LINE.
- CROSS FALL SHOWN IN THIS DRAWING IS TAKEN IN THE DIRECTION OF INCREASING CHAINAGES.
- VERTICAL CURVE OF 20m LONG SHALL BE APPLIED AT ALL CHANGES OF GRADIENT ALONG THE CARRIAGEWAY KERB UNLESS L<20m, FOR CHANGES OF GRADIENT ALONG THE CARRIAGEWAY KERB WITH L<20m, THE VERTICAL CURVE SHALL BE L(m) LONG.



ABBREVIATION:

- K CONSTANT WHERE BY VERTICAL RADIUS=100 x K
- R RADIUS (METRES)
- V.C. VERTICAL CURVE (METRES)
- LS SPIRAL LENGTH (METRES)
- L STRAIGHT LINE (METRES)



PROJECT
TSEUNG KWAN O - LAM TIN TUNNEL

CONTRACT TITLE
TSEUNG KWAN O - LAM TIN TUNNEL ROAD P2 AND ASSOCIATED WORKS

CLIENT
 土木工程拓展署
CEDD
 Civil Engineering and Development Department

CONSULTANT
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SUB-CONSULTANTS

NO.	DATE	DESCRIPTION	CHK.
	JAN 16	TENDER DRAWING	RPCM

SCALE
 A1 AS SHOWN
 DIMENSION UNIT
 METRES

PROJECT NO.
 60308751
 CONTRACT NO.
 NE/2015/02

SHEET TITLE
ROAD WORKS - VERTICAL PROFILES
 SHEET NUMBER
 60308751/C2/C00/1111

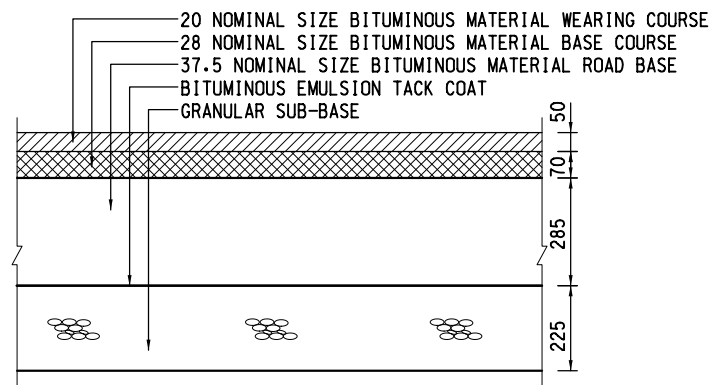
START OF S.O.L. P2

END OF S.O.L. P2

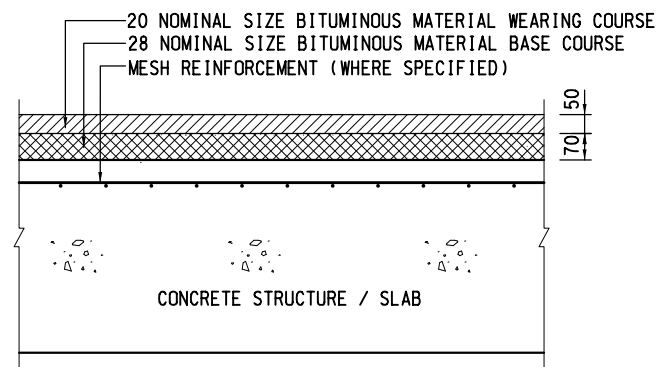
START OF S.O.L. SR2

END OF S.O.L. SR2

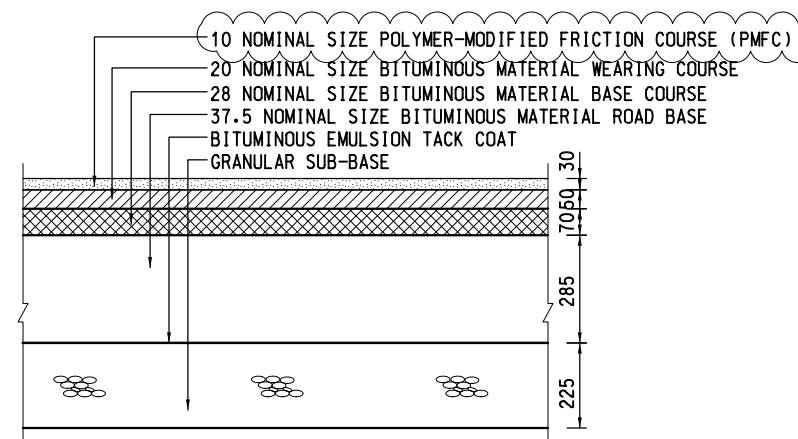
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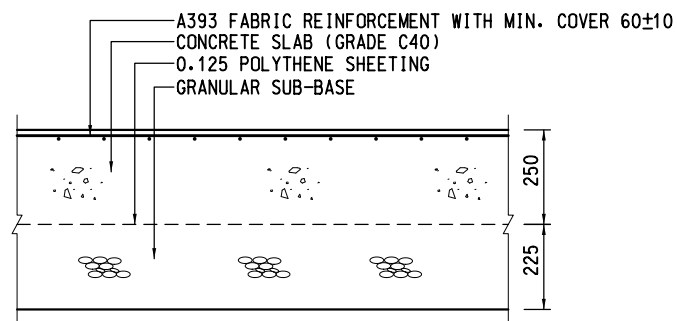
TYPICAL DETAILS FOR FLEXIBLE PAVEMENT (TYPE 1)



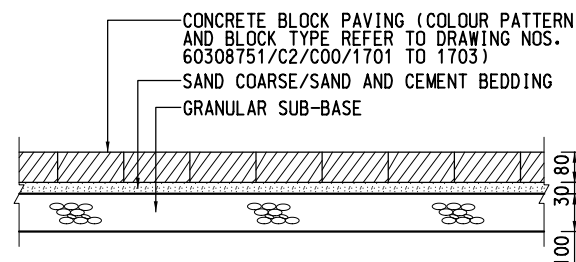
TYPICAL DETAILS FOR FLEXIBLE PAVEMENT (TYPE 2)



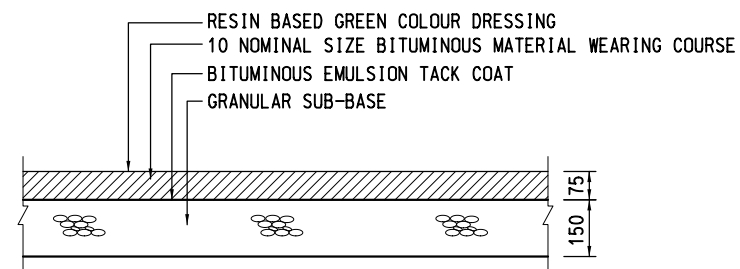
TYPICAL DETAILS FOR FLEXIBLE PAVEMENT (TYPE 3)



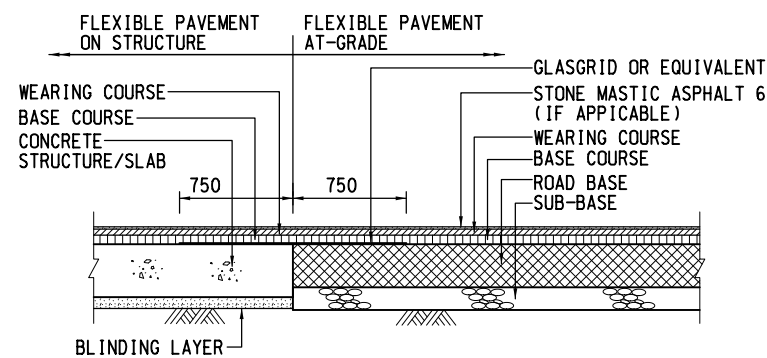
TYPICAL DETAILS FOR RIGID PAVEMENT



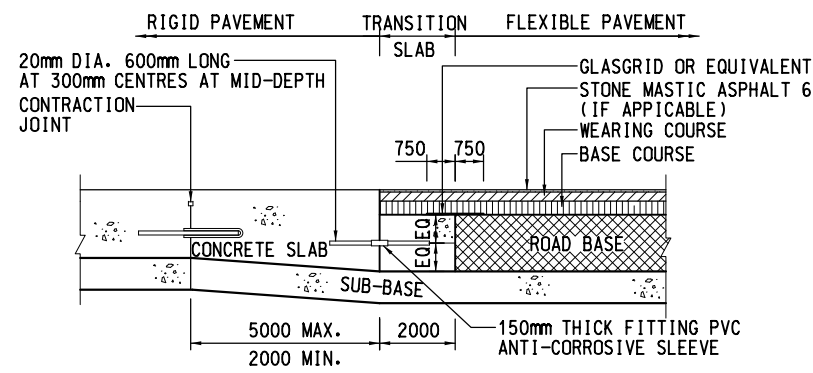
TYPICAL DETAILS FOR FOOTPATH PAVEMENT



TYPICAL DETAILS FOR CYCLE TRACK PAVEMENT



TRANSITION DETAILS BETWEEN FLEXIBLE PAVEMENT ON STRUCTURE AND FLEXIBLE PAVEMENT AT-GRADE
N.T.S.



TRANSITION DETAILS BETWEEN RIGID PAVEMENT AND FLEXIBLE PAVEMENT
N.T.S.

NOTES:

- THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60308751/C2/C00/1231 TO 1233.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH THE LATEST REVISION OF HIGHWAYS DEPARTMENT STANDARD DRAWINGS INCLUDING BUT NOT LIMITED TO DRAWING NOS. H1101 TO H1134.
- FOR MESH REINFORCEMENT DETAILS REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NO. H1102.
- WHERE A CAPPING LAYER IS REQUIRED, IT SHALL BE CONSTRUCTED TO GIVE A MINIMUM CBR VALUE OF 15%.
- AT JOINTS, THE FIRST SLAB SHALL BE CAST BEFORE THE SECOND SLAB.
- RESIN BASED COLOUR DRESSING APPROVED BY THE SUPERVISOR IN ACCORDANCE WITH PS SECTION 11 SHALL BE APPLIED ON CYCLE TRACK.
- THE CONTRACTOR MAY SUBMIT ALTERNATIVE SUPPORT DETAILS FOR DOWEL AND TIE BARS FOR THE SUPERVISOR'S ACCEPTANCE.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.

REV.	DATE	DESCRIPTION	DRAWN	PRE.	APP.
-	10-OCT-17	-	DKSS	JJL	YYL SHMY

AECOM

KEY PLAN	
CONTRACT NO. NE/2015/02	
TSEUNG KWAN O - LAM TIN TUNNEL - ROAD P2 AND ASSOCIATED WORKS	
ROAD WORKS DETAILS	
SKETCH NO. 60308751/C2/SSK0256	REV. -
EXTRACTED FROM DRG. NO. 60308751/C2/C00/1231	SCALE 1:20 (A3)

CRBC - Build King Joint Venture

Construction Noise Assessment

Period: 0700 to 1900 (except general holidays)

Noise Sensitive Receiver: CM6(0-39m)

Mitigation Measures Scenario

Noise Criteria:

75dB(A)

Portion	Activity	PME	TM Ref. / other Ref.	No. of plants	SWL	Total SWL	On-time, %	Time Factor	Distance from Notional Sources, m	Distance Attenuation*, dB(A)	Barrier Correction, dB(A)	Façade Correction, dB(A)	Predicted Noise Level, dB(A)	Total Predicted Noise Level for each group, dB(A)
VI	Road P2 U-Trough B CH318-363 (Removal of Existing Abandoned Box Culvert)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	162	-52.22	0	3	50.77	63.44
		Piling, large diameter bored, oscillator	CNP 165	1	115	115	30	-5	162	-52.22	0	3	62.77	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	162	-52.22	0	3	52.77	
		Water pump, submersible (electric)	CNP 283	2	85	88	50	-3	162	-52.22	0	3	35.78	
VI	Road P2 U-Trough B CH318-363 (Installation of Dewatering System)	Air Compressor	CNP 002	3	102	107	50	-3	162	-52.22	0	3	54.54	59.31
		Drill Rig, Rotary Type (Diesel)	CNP 072	3	110	115	50	-3	162	-52.22	-5	3	57.54	
VI	Road P2 U-Trough B CH318-363 (Preboring) (Scenario 1)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	162	-52.22	0	3	50.77	61.4
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	162	-52.22	0	3	57.77	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	162	-52.22	0	3	47.77	
		Air Compressor	CNP 002	2	102	105	50	-3	162	-52.22	0	3	52.78	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	162	-52.22	0	3	52.77	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	162	-52.22	0	3	43.77	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	162	-52.22	0	3	38.79	
		Welding Machine	CNP 107	4	99	105	50	-3	162	-52.22	0	3	52.79	
VI	Road P2 U-Trough B CH318-363 (Preboring) (Scenario 2)	Crane (240 kw) (105T)	BS C4/52	2	103	106	50	-3	162	-52.22	0	3	53.78	60.66
		Drill Rig, Rotary Type (Diesel)	CNP 072	2	110	113	50	-3	162	-52.22	0	3	53.57	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	162	-52.22	0	3	47.77	
		Air Compressor	CNP 002	4	102	108	50	-3	162	-52.22	0	3	53.58	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	162	-52.22	0	3	52.77	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	162	-52.22	0	3	43.77	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	162	-52.22	0	3	38.79	
		Welding Machine	CNP 107	4	99	105	50	-3	162	-52.22	0	3	52.79	
VI	Road P2 U-Trough B CH318-363 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	162	-52.22	-5	3	57.77	59.12
		Power pack (diesel)	CNP 174	1	100	100	50	-3	162	-52.22	-5	3	42.77	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	162	-52.22	0	3	38.79	
		Welding Machine	CNP 107	4	99	105	50	-3	162	-52.22	0	3	52.79	
VI	Road P2 U-Trough B CH318-363 (ELS)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	162	-52.22	0	3	50.77	59.47
		Excavator (223 kw) (40T)	BS C4/63	2	105	108	50	-3	162	-52.22	0	3	55.78	
		Dump Truck	CNP 068	1	105	105	50	-3	162	-52.22	0	3	52.77	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	162	-52.22	0	3	38.79	
VI	Road P2 U-Trough B CH318-363 (Structure)	Welding Machine	CNP 107	4	99	105	50	-3	162	-52.22	0	3	52.79	61.48
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	162	-52.22	0	3	50.77	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	162	-52.22	0	3	52.77	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	162	-52.22	0	3	50.78	
		Saw, Circular Wood	CNP 201	2	108	111	50	-3	162	-52.22	0	3	58.78	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	162	-52.22	0	3	43.77	
VI	Road P2 U-Trough B CH318-363 Road and Drainage Works	Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	162	-52.22	0	3	38.79	60.96
		Welding Machine	CNP 107	4	99	105	50	-3	162	-52.22	0	3	52.79	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	162	-52.22	0	3	50.77	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	162	-52.22	0	3	52.77	
		Roller, Vibratory	BS D8/30	1	101	101	50	-3	162	-52.22	0	3	48.77	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	162	-52.22	0	3	43.77	
		Light goods vehicle, gross vehicle weight < 5.5 tonne	CNP 143	1	101	101	50	-3	162	-52.22	0	3	48.77	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	162	-52.22	0	3	38.79	
		Dump Truck	CNP 068	1	105	105	50	-3	162	-52.22	0	3	52.77	
		Road Roller	CNP 185	1	108	108	50	-3	162	-52.22	0	3	55.77	
Welding Machine	CNP 107	4	99	105	50	-3	162	-52.22	0	3	52.79			

Note: SPL = SWL + TF + DC + BC + FC, where

SPL = Predicted noise level in dB(A)
 SWL = Sound Power Level in dB(A)
 TF = Time factor in dB(A) = 10 log (P)

P = On-time percentage
 DC = Distance attenuation correction in dB(A) = -(20 log D + 8)
 D = Distance in m between the noise source and the receiver

BC = Barrier correction in dB(A)
 FC = Façade correction in dB(A) = 3 dB(A)

CRBC - Build King Joint Venture

Construction Noise Assessment
 Period: 0700 to 1900 (except general holidays)
 Noise Sensitive Receiver: CM6(0-39m)
 Mitigation Measures Scenario

Noise Criteria: 75dB(A)

Portion	Activity	PME	TM Ref. / other Ref.	No. of plants	SWL	Total SWL	On-time, %	Time Factor	Distance from Notional Sources, m	Distance Attenuation*, dB(A)	Barrier Correction, dB(A)	Façade Correction, dB(A)	Predicted Noise Level, dB(A)	Total Predicted Noise Level for each group, dB(A)
IV	DN2100 SMH9101 - 9108 (Pre-boring) (Scenario 1) - 3 drill rig	Crane (240 kw) (105T)	BS C4/52	3	103	108	50	-3	47	-41.39	-5	3	61.37	71.81
		Drill Rig, Rotary Type (Diesel)	CNP 072	3	110	115	50	-3	178	-53.03	-11.7	3	59.46	
		Air Compressor	CNP 002	6	102	110	50	-3	47	-41.39	-5	3	61.17	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	47	-41.39	-5	3	49.60	
		Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	47	-41.39	-5	3	44.62	
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	50	-3	47	-41.39	-10	3	70.60	
		Crane (240 kw) (105T)	BS C4/52	1	103	108	50	-3	47	-41.39	-5	3	56.60	
IV	DN2100 SMH9101 - 9108 (Pre-boring) (Scenario 2) - 1 drill rig	Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	115	50	-3	47	-41.39	-11.7	3	54.68	65.57
		Air Compressor	CNP 002	2	102	110	50	-3	47	-41.39	-5	3	56.39	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	47	-41.39	-5	3	49.60	
		Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	47	-41.39	-5	3	44.62	
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	50	-3	47	-41.39	-10	3	63.61	
		Crane (240 kw) (105T)	BS C4/52	1	103	108	50	-3	47	-41.39	-5	3	56.60	
		Power pack (diesel)	CNP 174	1	100	100	50	-3	47	-41.39	-5	3	51.38	
IV	DN2100 SMH9101 - 9108 (Sheet Piling)	Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	47	-41.39	-5	3	44.62	68.96
		Excavator (223 kw) (40T)	BS C4/63	3	105	110	50	-3	47	-41.39	-5	3	63.37	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	47	-41.39	-5	3	56.61	
		Welding Machine	CNP 107	4	99	105	50	-3	47	-41.39	-5	3	58.62	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	47	-41.39	-5	3	56.60	
		Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	47	-41.39	-5	3	44.62	
		Excavator (223 kw) (40T)	BS C4/63	3	105	110	50	-3	47	-41.39	-5	3	63.37	
IV	DN2100 SMH9101 - 9108 (ELS)	Dump Truck	CNP 068	2	105	108	50	-3	47	-41.39	-5	3	61.61	67.24
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	47	-41.39	-5	3	56.61	
		Welding Machine	CNP 107	4	99	105	50	-3	47	-41.39	-5	3	58.62	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	47	-41.39	-5	3	56.60	
		Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	47	-41.39	-5	3	44.62	
		Excavator (223 kw) (40T)	BS C4/63	3	105	110	50	-3	47	-41.39	-5	3	63.37	
		Dump Truck	CNP 068	2	105	108	50	-3	47	-41.39	-5	3	61.61	
IV	Installation of DN2100 and Manhole Construction (Scenario 1)	Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	47	-41.39	-5	3	56.61	66.11
		Crane (240 kw) (105T)	BS C4/52	3	103	108	50	-3	47	-41.39	-5	3	61.37	
		Excavator (223 kw) (40T)	BS C4/63	3	105	110	50	-3	47	-41.39	-5	3	63.37	
		Dump Truck	CNP 068	2	105	108	50	-3	47	-41.39	-5	3	61.61	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	47	-41.39	-5	3	56.61	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	47	-41.39	-5	3	56.60	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	47	-41.39	-5	3	58.60	
IV	Installation of DN2100 and Manhole Construction (Scenario 2)	Roller, Vibratory	BS D8/30	1	101	101	50	-3	47	-41.39	-5	3	54.60	66.08
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	47	-41.39	-5	3	49.60	
		Light goods vehicle, gross vehicle weight < 5.5 tonne	CNP 143	1	101	101	50	-3	47	-41.39	-5	3	54.60	
		Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	47	-41.39	-5	3	44.62	
		Dump Truck	CNP 068	1	105	105	50	-3	47	-41.39	-5	3	58.60	
		Road Roller	CNP 185	1	108	108	50	-3	47	-41.39	-5	3	61.60	
		G.I. drilling rig	BS C2/43	2	102	105	50	-3	47	-41.39	-5	3	58.61	
IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Pre Drill) (Scenario 1)	Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	47	-41.39	-5	3	63.60	65.29
		Air Compressor	CNP 002	1	102	102	50	-3	47	-41.39	-5	3	55.60	
		G.I. drilling rig	BS C2/43	4	102	108	50	-3	47	-41.39	-5	3	61.62	
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	47	-41.39	-5	3	63.60	
		Air Compressor	CNP 002	1	102	102	50	-3	47	-41.39	-5	3	55.60	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	47	-41.39	-5	3	56.60	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	47	-41.39	-5	3	58.60	
IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Piling) (Scenario 2)	Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	47	-41.39	-5	3	53.60	66.14
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	47	-41.39	-5	3	56.60	
		Drill Rig, Rotary Type (Diesel)	CNP 072	2	110	113	50	-3	47	-41.39	-11.7	3	59.91	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	47	-41.39	-5	3	53.60	
		Air Compressor	CNP 002	4	102	108	50	-3	47	-41.39	-5	3	61.62	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	47	-41.39	-5	3	58.60	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	47	-41.39	-5	3	49.60	
IV	DN2100 SMH9101 - 9103(Pre Drill & Sheetpiling works)	Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	47	-41.39	-5	3	44.62	65.98
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	47	-41.39	-5	3	56.60	
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	47	-41.39	-5	3	63.60	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	47	-41.39	-5	3	53.60	
		Air Compressor	CNP 002	1	102	102	50	-3	47	-41.39	-5	3	55.60	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	47	-41.39	-5	3	58.60	
		Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	47	-41.39	-5	3	68.60	
IV	Road P2 Underpass CH103.5 (Sheet Piling)	Power pack (diesel)	CNP 174	1	100	100	50	-3	47	-41.39	-5	3	58.60	71.41
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	47	-41.39	-5	3	56.60	
		Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	47	-41.39	-5	3	68.60	
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	50	-10	47	-41.39	-10	3	63.61	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	47	-41.39	-5	3	53.60	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	47	-41.39	-5	3	58.60	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	47	-41.39	-5	3	49.60	
IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Piling) (Scenario 2)	Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	47	-41.39	-5	3	44.62	67.14
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	47	-41.39	-5	3	56.60	
		Drill Rig, Rotary Type (Diesel)	CNP 072	3	110	115	50	-3	47	-41.39	-11.7	3	61.67	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	47	-41.39	-5	3	53.60	
		Air Compressor	CNP 002	6	102	110	50	-3	47	-41.39	-5	3	63.38	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	47	-41.39	-5	3	58.60	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	47	-41.39	-5	3	49.60	
V	Road P2 U-Trough B CH318-363 (Pre-boring) (Scenario 1)	Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	47	-41.39	-5	3	44.62	62.99
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	146	-51.26	0	3	51.73	
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	146	-51.26	-5	3	53.73	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	146	-51.26	0	3	48.73	
		Air Compressor	CNP 002	2	102	105	50	-3	146	-51.26	-5	3	48.74	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	146	-51.26	0	3	53.73	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	146	-51.26	0	3	44.73	
V	Road P2 U-Trough B CH318-363 (Pre-boring) (Scenario 2)	Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	146	-51.26	0	3	39.75	60.09
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	50	-3	146	-51.26	-10	3	60.73	
		Crane (240 kw) (105T)	BS C4/52	2	103	106	50	-3	146	-51.26	0	3	54.74	
		Drill Rig, Rotary Type (Diesel)	CNP 072	2	110	113	50	-3	146	-51.26	-5	3	54.52	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	146	-51.26	0	3	48.73	
		Air Compressor	CNP 002	4	102	108	50	-3	146	-51.26	-5	3	49.53	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	146	-51.26	0	3	53.73	
V	Road P2 U-Trough B CH318-363 (Sheet Piling)	Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	146	-51.26	0	3	44.73	58.92
		Water pump, subsersible (electric)	CNP 283	4	85	91	50	-3	146	-51.26	0	3	39.75	
		Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	146	-51.26	-5	3	58.73	
		Power pack (diesel)	CNP 174	1	100	100	50	-3	146	-51.26	-5	3	43.73	
		Water pump, subsersible (electric)	CNP 283											

Portion	Activity	PME	TM Ref. / other Ref.	No. of plants	SWL	Total SWL	On-time, %	Time Factor	Distance from Notional Sources, m	Distance Attenuation*, d B(A)	Barrier Correction, dB(A)	Facade Correction, dB(A)	Predicted Noise Level, dB(A)	Total Predicted Noise Level for each group, dB(A)
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Backfilling)	Road Roller	CNP 185	1	108	108	50	-3	225	-55.06	0	3	52.93	55.95
		Excavator (223 kw) (40T)	BS C4/63	2	105	108	50	-3	225	-55.06	0	3	52.94	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 1)	G.I. drilling rig	BS C2/43	2	102	105	50	-3	225	-55.06	0	3	49.94	49.94
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 2)	G.I. drilling rig	BS C2/43	3	102	107	50	-3	225	-55.06	0	3	51.70	51.70
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 3)	G.I. drilling rig	BS C2/43	4	102	108	50	-3	225	-55.06	0	3	52.95	52.95
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 4)	G.I. drilling rig	BS C2/43	5	102	109	50	-3	225	-55.06	0	3	53.92	53.92
IX	Road P2 Underpass CH105-318 (Removal of Temporary 1500 Drain)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	225	-55.06	0	3	47.92	60.32
		Piling, large diameter bored, oscillator	CNP 165	1	115	115	50	-3	225	-55.06	0	3	59.92	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	225	-55.06	0	3	44.92	
		Water pump, subsurface (electric)	CNP 283	2	85	88	50	-3	225	-55.06	0	3	32.93	
		Excavator (223 kw) (40T)	BS C4/63	2	103	106	50	-3	225	-55.06	0	3	50.94	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 1)	Drill Rig, Rotary Type (Diesel)	CNP 072	2	110	113	50	-3	225	-55.06	-5	3	52.94	60.17
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	225	-55.06	0	3	47.94	
		Air Compressor	CNP 002	4	102	108	50	-3	225	-55.06	0	3	52.95	
		Excavator (223 kw) (40T)	BS C4/63	3	105	110	50	-3	225	-55.06	0	3	54.70	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	225	-55.06	0	3	40.93	
		Water pump, subsurface (electric)	CNP 283	4	85	91	50	-3	225	-55.06	0	3	35.95	
		Dump Truck	CNP 068	1	105	105	50	-3	225	-55.06	0	3	49.93	
		Welding Machine	CNP 107	2	99	102	50	-3	225	-55.06	0	3	46.94	
		Crane (240 kw) (105T)	BS C4/52	6	103	111	50	-3	225	-55.06	0	3	55.71	
		Drill Rig, Rotary Type (Diesel)	CNP 072	6	110	118	50	-3	225	-55.06	-5	3	57.71	
		IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 2)	Generator, Silenced, <=75 dB(A) at 7m	CNP 102	6	100	108	50	-3	225	-55.06	0	
Air Compressor	CNP 002			12	102	113	50	-3	225	-55.06	0	3	57.72	
Excavator (223 kw) (40T)	BS C4/63			4	105	111	50	-3	225	-55.06	0	3	55.95	
Concrete Lorry Mixer	BS D6/33			2	96	99	50	-3	225	-55.06	0	3	43.94	
Water pump, subsurface (electric)	CNP 283			4	85	91	50	-3	225	-55.06	0	3	35.95	
Dump Truck	CNP 068			3	105	110	50	-3	225	-55.06	0	3	54.70	
Welding Machine	CNP 107			4	99	105	50	-3	225	-55.06	0	3	49.95	
Crane (240 kw) (105T)	BS C4/52			7	103	111	50	-3	225	-55.06	0	3	56.38	
Drill Rig, Rotary Type (Diesel)	CNP 072			7	110	118	50	-3	225	-55.06	-5	3	58.38	
Generator, Silenced, <=75 dB(A) at 7m	CNP 102			7	100	108	50	-3	225	-55.06	0	3	53.38	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 3)			Air Compressor	CNP 002	14	102	113	50	-3	225	-55.06	0	3
		Excavator (223 kw) (40T)	BS C4/63	4	105	111	50	-3	225	-55.06	0	3	55.95	
		Concrete Lorry Mixer	BS D6/33	4	96	102	50	-3	225	-55.06	0	3	46.95	
		Water pump, subsurface (electric)	CNP 283	4	85	91	50	-3	225	-55.06	0	3	35.95	
		Dump Truck	CNP 068	4	105	111	50	-3	225	-55.06	0	3	55.95	
		Welding Machine	CNP 107	7	99	107	50	-3	225	-55.06	0	3	52.38	
		Crane (240 kw) (105T)	BS C4/52	8	103	112	50	-3	225	-55.06	0	3	56.96	
		Drill Rig, Rotary Type (Diesel)	CNP 072	8	110	119	50	-3	225	-55.06	-5	3	58.96	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	8	100	109	50	-3	225	-55.06	0	3	53.96	
		Air Compressor	CNP 002	16	102	114	50	-3	225	-55.06	0	3	58.97	
		Excavator (223 kw) (40T)	BS C4/63	6	105	113	50	-3	225	-55.06	0	3	57.71	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 4)	Concrete Lorry Mixer	BS D6/33	6	96	104	50	-3	225	-55.06	0	3	48.71	65.78
		Water pump, subsurface (electric)	CNP 283	8	85	94	50	-3	225	-55.06	0	3	38.96	
		Dump Truck	CNP 068	6	105	113	50	-3	225	-55.06	0	3	57.71	
		Welding Machine	CNP 107	8	99	108	50	-3	225	-55.06	0	3	52.96	
		Crane (240 kw) (105T)	BS C4/52	9	103	113	50	-3	225	-55.06	0	3	57.48	
		Drill Rig, Rotary Type (Diesel)	CNP 072	9	110	120	50	-3	225	-55.06	-5	3	59.48	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	9	100	110	50	-3	225	-55.06	0	3	54.48	
		Air Compressor	CNP 002	18	102	115	50	-3	225	-55.06	0	3	59.49	
		Excavator (223 kw) (40T)	BS C4/63	6	105	113	50	-3	225	-55.06	0	3	57.71	
		Concrete Lorry Mixer	BS D6/33	6	96	104	50	-3	225	-55.06	0	3	48.71	
		Water pump, subsurface (electric)	CNP 283	9	85	95	50	-3	225	-55.06	0	3	39.48	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 5)	Dump Truck	CNP 068	6	105	113	50	-3	225	-55.06	0	3	57.71	66.13
		Welding Machine	CNP 107	9	99	109	50	-3	225	-55.06	0	3	53.48	
		Crane (240 kw) (105T)	BS C4/52	12	103	114	50	-3	225	-55.06	0	3	58.72	
		Drill Rig, Rotary Type (Diesel)	CNP 072	12	110	121	50	-3	225	-55.06	-5	3	60.72	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	8	100	109	50	-3	225	-55.06	0	3	53.96	
		Air Compressor	CNP 002	24	102	116	50	-3	225	-55.06	0	3	60.73	
		Excavator (223 kw) (40T)	BS C4/63	6	105	113	50	-3	225	-55.06	0	3	57.71	
		Concrete Lorry Mixer	BS D6/33	6	96	104	50	-3	225	-55.06	0	3	48.71	
		Water pump, subsurface (electric)	CNP 283	8	85	94	50	-3	225	-55.06	0	3	38.96	
		Dump Truck	CNP 068	6	105	113	50	-3	225	-55.06	0	3	57.71	
		Welding Machine	CNP 107	8	99	108	50	-3	225	-55.06	0	3	52.96	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 6)	Crane (240 kw) (105T)	BS C4/52	15	103	115	50	-3	225	-55.06	0	3	59.69	66.83
		Drill Rig, Rotary Type (Diesel)	CNP 072	15	110	122	50	-3	225	-55.06	-5	3	61.69	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	10	100	110	50	-3	225	-55.06	0	3	54.93	
		Air Compressor	CNP 002	30	102	117	50	-3	225	-55.06	0	3	61.70	
		Excavator (223 kw) (40T)	BS C4/63	10	105	115	50	-3	225	-55.06	0	3	59.93	
		Concrete Lorry Mixer	BS D6/33	8	96	105	50	-3	225	-55.06	0	3	49.96	
		Water pump, subsurface (electric)	CNP 283	15	85	97	50	-3	225	-55.06	0	3	41.69	
		Dump Truck	CNP 068	8	105	114	50	-3	225	-55.06	0	3	58.96	
		Welding Machine	CNP 107	12	99	110	50	-3	225	-55.06	0	3	54.72	
		Crane (240 kw) (105T)	BS C4/52	2	102	106	50	-3	225	-55.06	0	3	49.94	
		IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Installation of Dewatering System)	Air Compressor	CNP 002	2	102	106	50	-3	225	-55.06	0	
Crane (240 kw) (105T)	BS C4/52			2	103	106	50	-3	225	-55.06	0	3	50.94	
Generator, Silenced, <=75 dB(A) at 7m	CNP 102			2	100	103	50	-3	225	-55.06	0	3	47.94	
Piling, Vibration Hammer	CNP 172			2	115	118	50	-3	225	-55.06	0	3	62.94	
Power pack (diesel)	CNP 174			2	100	103	50	-3	225	-55.06	0	3	47.94	
Water pump, subsurface (electric)	CNP 283			4	85	91	50	-3	225	-55.06	0	3	35.95	
Excavator (223 kw) (40T)	BS C4/63			1	105	105	50	-3	225	-55.06	0	3	49.93	
Welding Machine	CNP 107			4	99	105	50	-3	225	-55.06	0	3	49.95	
Crane (240 kw) (105T)	BS C4/52			3	103	108	50	-3	225	-55.06	0	3	52.70	
Generator, Silenced, <=75 dB(A) at 7m	CNP 102			3	100	105	50	-3	225	-55.06	0	3	49.70	
Piling, Vibration Hammer	CNP 172			3	115	120	50	-3	225	-55.06	0	3	64.70	
Power pack (diesel)	CNP 174	3	100	105	50	-3	225	-55.06	0	3	49.70			
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (ELS) (Sheet Piling) (Scenario 1)	Water pump, subsurface (electric)	CNP 283	4	85	91	50	-3	225	-55.06	0	3	35.95	63.84
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	225	-55.06	0	3	49.93	
		Welding Machine	CNP 107	4	99	105	50	-3	225	-55.06	0	3	49.95	
		Crane (240 kw) (105T)	BS C4/52	3	103	108	50	-3	225	-55.06	0	3	52.70	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	3	100	105	50	-3	225	-55.06	0	3	49.70	
		Piling, Vibration Hammer	CNP 172	3	115	120	50	-3	225	-55.06	0	3	64.70	
		Power pack (diesel)	CNP 174	3	100	105	50	-3	225	-55.06	0	3	49.70	
		Water pump, subsurface (electric)	CNP 283	4	85	91	50	-3	225	-55.06</				

CRBC - Build King Joint Venture

Construction Noise Assessment
 Period: 0700 to 1900 (except general holidays)
 Noise Sensitive Receiver: CM7
 Mitigation Measures Scenario

Noise Criteria: 75dB(A)

Portion	Activity	PME	TM Ref. / other Ref.	No. of plants	SWL	Total SWL	On-time, %	Time Factor	Distance from Notional Sources, m	Distance Attenuation*, dB(A)	Barrier Correction, dB(A)	Façade Correction, dB(A)	Predicted Noise Level, dB(A)	Total Predicted Noise Level for each group, dB(A)
VI	Road P2 U-Trough B CH318-363 (Removal of Existing Abandoned Box Culvert)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	157	-51.95	0	3	51.04	61.88
		Piling, large diameter bored, oscillator	CNP 165	1	115	115	30	-5	157	-51.95	0	3	60.83	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	157	-51.95	0	3	53.04	
		Water pump, submersible (electric)	CNP 283	2	85	88	50	-3	157	-51.95	0	3	36.05	
VI	Road P2 U-Trough B CH318-363 (Installation of Dewatering System)	Air Compressor	CNP 002	3	102	107	50	-3	157	-51.95	0	3	54.82	59.58
		Drill Rig, Rotary Type (Diesel)	CNP 072	3	110	115	50	-3	157	-51.95	-5	3	57.82	
VI	Road P2 U-Trough B CH318-363 (Preboring) (Scenario 1)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	157	-51.95	0	3	51.04	61.67
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	157	-51.95	0	3	58.04	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	157	-51.95	0	3	48.04	
		Air Compressor	CNP 002	2	102	105	50	-3	157	-51.95	0	3	53.05	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	157	-51.95	0	3	53.04	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	157	-51.95	0	3	44.04	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	157	-51.95	0	3	39.06	
		Welding Machine	CNP 107	4	99	105	50	-3	157	-51.95	0	3	53.06	
VI	Road P2 U-Trough B CH318-363 (Preboring) (Scenario 2)	Crane (240 kw) (105T)	BS C4/52	2	103	106	50	-3	157	-51.95	0	3	54.05	60.93
		Drill Rig, Rotary Type (Diesel)	CNP 072	2	110	113	50	-3	157	-51.95	0	3	53.84	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	157	-51.95	0	3	48.04	
		Air Compressor	CNP 002	4	102	108	50	-3	157	-51.95	0	3	53.85	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	157	-51.95	0	3	53.04	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	157	-51.95	0	3	44.04	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	157	-51.95	0	3	39.06	
		Welding Machine	CNP 107	4	99	105	50	-3	157	-51.95	0	3	53.06	
VI	Road P2 U-Trough B CH318-363 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	157	-51.95	-5	3	58.04	59.39
		Power pack (diesel)	CNP 174	1	100	100	50	-3	157	-51.95	-5	3	43.04	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	157	-51.95	0	3	39.06	
		Welding Machine	CNP 107	4	99	105	50	-3	157	-51.95	0	3	53.06	
VI	Road P2 U-Trough B CH318-363 (ELS)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	157	-51.95	0	3	51.04	59.74
		Excavator (223 kw) (40T)	BS C4/63	2	105	108	50	-3	157	-51.95	0	3	56.05	
		Dump Truck	CNP 068	1	105	105	50	-3	157	-51.95	0	3	53.04	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	157	-51.95	0	3	39.06	
VI	Road P2 U-Trough B CH318-363 (Structure)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	157	-51.95	0	3	51.04	61.75
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	157	-51.95	0	3	53.04	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	157	-51.95	0	3	51.05	
		Saw, Circular Wood	CNP 201	2	108	111	50	-3	157	-51.95	0	3	59.05	
VI	Road P2 U-Trough B CH318-363 Road and Drainage Works	Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	157	-51.95	0	3	44.04	61.24
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	157	-51.95	0	3	39.06	
		Welding Machine	CNP 107	4	99	105	50	-3	157	-51.95	0	3	53.06	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	157	-51.95	0	3	51.04	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	157	-51.95	0	3	53.04	
		Roller, Vibratory	BS D8/30	1	101	101	50	-3	157	-51.95	0	3	49.04	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	157	-51.95	0	3	44.04	
		Light goods vehicle, gross vehicle weight < 5.5 tonne	CNP 143	1	101	101	50	-3	157	-51.95	0	3	49.04	
VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 (Pre-boring)	Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	157	-51.95	0	3	39.06	64.92
		Dump Truck	CNP 068	1	105	105	50	-3	157	-51.95	0	3	53.04	
		Road Roller	CNP 185	1	108	108	50	-3	157	-51.95	0	3	56.04	
		Welding Machine	CNP 107	4	99	105	50	-3	157	-51.95	0	3	53.06	
		Crane (240 kw) (105T)	BS C4/52	2	103	106	50	-3	224	-55.02	0	3	50.98	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	4	100	106	50	-3	224	-55.02	0	3	50.99	
		Air Compressor	CNP 002	6	102	110	50	-3	224	-55.02	0	3	54.75	
		Drill Rig, Rotary Type (Diesel)	CNP 072	3	110	115	50	-3	224	-55.02	-5	3	54.74	
VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 (ELS)	Excavator (223 kw) (40T)	BS C4/63	2	105	108	50	-3	224	-55.02	0	3	52.98	66.14
		Concrete Lorry Mixer	BS D6/33	3	96	101	50	-3	224	-55.02	0	3	45.74	
		Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	224	-55.02	0	3	59.97	
		Power pack (diesel)	CNP 174	1	100	100	50	-3	224	-55.02	0	3	44.97	
		Breaker, excavator mounted (hydraulic)	CNP 028	2	122	125	50	-3	224	-55.02	-10	3	59.98	
		Water pump, submersible (electric)	CNP 283	2	85	88	50	-3	224	-55.02	0	3	32.98	
		Excavator (223 kw) (40T)	BS C4/63	4	105	111	50	-3	224	-55.02	0	3	55.99	
		Breaker, excavator mounted (hydraulic)	CNP 028	2	122	125	50	-3	224	-55.02	-10	3	59.98	
VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 (Backfilling)	Dump Truck	CNP 068	2	105	108	50	-3	224	-55.02	0	3	52.98	65.15
		Water pump, submersible (electric)	CNP 283	16	85	97	50	-3	224	-55.02	0	3	42.01	
		Crane (240 kw) (105T)	BS C4/52	2	103	106	50	-3	224	-55.02	0	3	50.98	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	4	100	106	50	-3	224	-55.02	0	3	50.99	
		Air Compressor	CNP 002	4	102	108	50	-3	224	-55.02	0	3	52.99	
		Piling, Vibration Hammer	CNP 172	2	115	118	50	-3	224	-55.02	0	3	62.98	
		Power pack (diesel)	CNP 174	2	100	103	50	-3	224	-55.02	0	3	47.98	
		Excavator (223 kw) (40T)	BS C4/63	4	105	111	50	-3	224	-55.02	0	3	55.99	
VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 (Structure)	Breaker, excavator mounted (hydraulic)	CNP 028	2	122	125	50	-3	224	-55.02	-10	3	59.98	63.94
		Dump Truck	CNP 068	2	105	108	50	-3	224	-55.02	0	3	52.98	
		Water pump, submersible (electric)	CNP 283	16	85	97	50	-3	224	-55.02	0	3	42.01	
		Air Compressor	CNP 002	3	102	107	50	-3	224	-55.02	-5	3	46.74	
		Drill Rig, Rotary Type (Diesel)	CNP 072	3	110	115	50	-3	224	-55.02	-5	3	54.74	
		Crane (240 kw) (105T)	BS C4/52	2	103	106	50	-3	224	-55.02	0	3	50.98	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	224	-55.02	0	3	47.98	
		Air Compressor	CNP 002	2	102	105	50	-3	224	-55.02	0	3	49.98	
VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 Road and Drainage Works	Saw, Circular Wood	CNP 201	2	108	111	50	-3	224	-55.02	0	3	55.98	63.26
		Concrete Lorry Mixer	BS D6/33	2	96	99	50	-3	224	-55.02	0	3	43.98	
		Poker, Vibratory, Handheld	CNP 170	2	113	116	50	-3	224	-55.02	0	3	60.98	
		Concrete Pump	CNP 047	2	109	112	50	-3	224	-55.02	0	3	56.98	
		Water pump, submersible (electric)	CNP 283	16	85	97	50	-3	224	-55.02	0	3	42.01	
		Excavator (223 kw) (40T)	BS C4/63	2	105	108	50	-3	224	-55.02	0	3	52.98	
		Roller, Vibratory	BS D8/30	2	101	104	50	-3	224	-55.02	0	3	48.98	
		Saw, Circular Wood	CNP 201	2	108	111	50	-3	224	-55.02	0	3	55.98	
VIII	Road P2 U-Trough A&B CH363-411 & Road SR2 U-Trough B CH110-170 Road and Drainage Works	Asphalt Paver	BS DB/24	1	101	101	50	-3	224	-55.02	0	3	45.97	63.26
		Dump Truck	CNP 068	2	105	108	50	-3	224	-55.02	0	3	52.98	
		Lorry	BS D8/25	2	96	99	50	-3	224	-55.02	0	3	43.98	
		Crane	BS D7/114	2	101	104	50	-3	224	-55.02	0	3	48.98	
		Concrete Pump	CNP 047	1	109	109	50	-3	224	-55.02	0	3	53.97	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	224	-55.02	0	3	40.97	
		Poker, Vibratory, Handheld	CNP 170	1	113	113	50	-3	224	-55.02	0	3	57.97	
		Power Rammer Petrol	CNP 169	1	108	108	50	-3	224	-55.02	0	3	52.97	
Water pump, submersible (electric)	CNP 283	16	85	97	50	-3	224	-55.02	0	3	42.01			

Note: SPL = SWL + TF + DC + BC + FC, where

SPL = Predicted noise level in dB(A)
 SWL = Sound Power Level in dB(A)
 TF = Time factor in dB(A) = 10 log (P)

P = On-time percentage
 DC = Distance attenuation correction in dB(A) = (-20 log D + 8)
 D = Distance in m between the noise source and the receiver

BC = Barrier correction in dB(A)
 FC = Façade correction in dB(A) = 3 dB(A)

CRBC - Build King Joint Venture

Construction Noise Assessment
 Period: 0700 to 1900 (except general holidays)
 Noise Sensitive Receiver: CM8

Noise Criteria: 75dB(A)

Portion	Activity	PME	TM Ref. / other Ref.	No. of plants	SWL	Total SWL	On-time, %	Time Factor	Distance from Notional Sources, m	Distance Attenuation*, dB(A)	Barrier Correction, dB(A)	Façade Correction, dB(A)	Predicted Noise Level, dB(A)	Total Predicted Noise Level for each group, dB(A)	Total Predicted Noise Level Portion II dB(A)				
III	Demolition of DSD Transformer Room	Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	50	-3	116	-49.29	-5	3	67.70	68	68				
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	116	-49.29	0	3	60.70						
		Lorry	BS D8/25	1	96	96	50	-3	116	-49.29	0	3	46.70						
		Water pump, submersible (electric)	CNP 283	2	85	88	50	-3	116	-49.29	0	3	38.71						
II	Retaining Wall	Excavator (223 kw) (40T)	BS C4/63	2	105	108	50	-3	257	-56.20	0	3	51.80	59.86	59.86				
		Dump Truck	CNP 068	2	105	108	50	-3	257	-56.20	0	3	51.80						
		Saw, Circular Wood	CNP 201	4	108	114	50	-3	257	-56.20	0	3	57.81						
		Bar Bender and Cutter	CNP 021	4	90	96	50	-3	257	-56.20	0	3	39.81						
		Water pump, submersible (electric)	CNP 283	2	85	88	50	-3	257	-56.20	0	3	31.80						
		Concrete Lorry Mixer	BS D6/33	2	96	99	50	-3	257	-56.20	0	3	42.80						
		Roller, Vibratory	BS D8/30	1	101	101	50	-3	257	-56.20	0	3	44.79						
		Area A		Excavator (223 kw) (40T)	BS C4/63	4	105	111	50	-3	217	-54.73	0			3	56.28	60.54	60.54
				Dump Truck	CNP 068	1	105	105	50	-3	217	-54.73	0			3	50.26		
Breaker, excavator mounted (hydraulic)	CNP 028			1	122	122	50	-3	217	-54.73	-10	3	57.26						
Crane (240 kw) (105T)	BS C4/52			1	103	103	50	-3	217	-54.73	0	3	48.26						
Water pump, submersible (electric)	CNP 283			3	85	90	50	-3	217	-54.73	0	3	35.03						
Construction of Northern Footbridge	Pre-drilling works (Near Tiu Keng Leng Sports Centre) Feb 17 to Mar, 17	Drill Rig	CNP 072	1	110	110	20	-7	60	-43.56	-5	3	57.45	69.71	69.71				
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	20	-7	60	-43.56	-5	3	69.45						
Construction of Northern Footbridge	Construction of soldier wall (Near Tiu Keng Leng Sports Centre) Apr 17 to Oct 17	Air Compressor	CNP 002	1	102	102	20	-7	60	-43.56	-5	3	49.45	66.35					
		Crane	BS D7/114	1	101	101	20	-7	60	-43.56	0	3	53.45						
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	40	-4	60	-43.56	0	3	55.46						
		Concrete Lorry Mixer	BS D6/33	2	96	99	20	-7	60	-43.56	0	3	51.46						
		Piling, Vibration Hammer	CNP 172	1	115	115	20	-7	60	-43.56	-5	3	62.45						
		Water Pump, Submersible (electric)	CNP 283	1	85	85	10	-10	60	-43.56	0	3	34.44						
		Excavator	BS D8/13	1	110	110	20	-7	60	-43.56	0	3	62.45						
Construction of Northern Footbridge	Pre-drilling & Piling works (Near Park Central Block 6) Aug 17 to Oct, 17	Drill Rig	CNP 072	1	110	110	30	-5	93	-47.37	-5	3	55.40	68.83	70.78				
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	30	-5	93	-47.37	-5	3	67.40						
		Air Compressor	CNP 002	1	102	102	20	-7	93	-47.37	-5	3	45.64						
		Crane	BS D7/114	1	101	101	20	-7	93	-47.37	0	3	49.64						
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	40	-4	93	-47.37	0	3	51.65						
		Concrete Lorry Mixer	BS D6/33	2	96	99	20	-7	93	-47.37	0	3	47.65						
		Piling, Vibration Hammer	CNP 172	1	115	115	20	-7	93	-47.37	-5	3	58.64						
		Water Pump, Submersible (electric)	CNP 283	1	85	85	10	-10	93	-47.37	0	3	30.63						
		Excavator	BS D8/13	1	110	110	20	-7	93	-47.37	0	3	58.64						
		Construction of Northern Footbridge	Construction of Footbridge (Near Park Central Block 6) Nov 17 to Apr 19	Crane	BS D7/114	1	101	101	40	-4	60	-43.56	0			3	56.46	67.79	
Dump Truck	BS D8/25			1	105	105	20	-7	60	-43.56	0	3	57.45						
Generator, Silenced, <=75 dB(A) at 7m	CNP 102			1	100	100	70	-2	60	-43.56	0	3	57.89						
Concrete Lorry Mixer	BS D6/33			2	96	99	30	-5	60	-43.56	0	3	53.22						
Saw, Circular Wood	CNP 201			4	108	114	60	-2	60	-43.56	-5	3	66.22						
Water Pump, Submersible (electric)	CNP 283			1	85	85	20	-7	60	-43.56	0	3	37.45						
Construction of Northern Footbridge	Construction of Footbridge (Near Tiu Keng Leng Sports Centre) Nov 17 to Apr 19	Crane	BS D7/114	1	101	101	40	-4	93	-47.37	0	3	52.65	63.99	69.30				
		Dump Truck	BS D8/25	1	105	105	20	-7	93	-47.37	0	3	53.64						
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	70	-2	93	-47.37	0	3	54.08						
		Concrete Lorry Mixer	BS D6/33	2	96	99	30	-5	93	-47.37	0	3	49.41						
		Saw, Circular Wood	CNP 201	4	108	114	60	-2	93	-47.37	-5	3	62.41						
		Water Pump, Submersible (electric)	CNP 283	1	85	85	20	-7	93	-47.37	0	3	33.64						

Note: SPL = SWL + TF + DC + BC + FC, where
 SPL = Predicted noise level in dB(A)
 SWL = Sound Power Level in dB(A)
 TF = Time factor in dB(A) = 10 log (P)
 P = On-time percentage
 DC = Distance attenuation correction in dB(A) = -(20 log D + 8)
 D = Distance in m between the noise source and the receiver
 BC = Barrier correction in dB(A)
 FC = Façade correction in dB(A) = 3 dB(A)

CRBC - Build King Joint Venture

Construction Noise Assessment

Period: 0700 to 1900 (except general holidays)

Noise Sensitive Receiver: CM6(Above 39m)

Mitigation Measures Scenario

Noise Criteria:

75dB(A)

Portion	Activity	PME	TM Ref. / other Ref.	No. of plants	SWL	Total SWL	On-time, %	Time Factor	Distance from Notional Sources, m	Distance Attenuation*, dB(A)	Barrier Correction, dB(A)	Façade Correction, dB(A)	Predicted Noise Level, dB(A)	Total Predicted Noise Level for each group, dB(A)
VI	Road P2 U-Trough B CH318-363 (Removal of Existing Abandoned Box Culvert)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	167	-52.43	0	3	50.55	63.22
		Piling, large diameter bored, oscillator	CNP 165	1	115	115	30	-5	167	-52.43	0	3	62.55	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	167	-52.43	0	3	52.55	
		Water pump, submersible (electric)	CNP 283	2	85	88	50	-3	167	-52.43	0	3	35.57	
VI	Road P2 U-Trough B CH318-363 (Installation of Dewatering System)	Air Compressor	CNP 002	3	102	107	50	-3	167	-52.43	0	3	54.33	59.09
		Drill Rig, Rotary Type (Diesel)	CNP 072	3	110	115	50	-3	167	-52.43	-5	3	57.33	
VI	Road P2 U-Trough B CH318-363 (Preboring) (Scenario 1)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	167	-52.43	0	3	50.55	61.18
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	167	-52.43	0	3	57.55	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	167	-52.43	0	3	47.55	
		Air Compressor	CNP 002	2	102	105	50	-3	167	-52.43	0	3	52.57	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	167	-52.43	0	3	52.55	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	167	-52.43	0	3	43.55	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	167	-52.43	0	3	38.58	
		Welding Machine	CNP 107	4	99	105	50	-3	167	-52.43	0	3	52.58	
VI	Road P2 U-Trough B CH318-363 (Preboring) (Scenario 2)	Crane (240 kw) (105T)	BS C4/52	2	103	106	50	-3	167	-52.43	0	3	53.57	60.44
		Drill Rig, Rotary Type (Diesel)	CNP 072	2	110	113	50	-3	167	-52.43	0	3	53.35	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	167	-52.43	0	3	47.55	
		Air Compressor	CNP 002	4	102	108	50	-3	167	-52.43	0	3	53.36	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	167	-52.43	0	3	52.55	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	167	-52.43	0	3	43.55	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	167	-52.43	0	3	38.58	
		Welding Machine	CNP 107	4	99	105	50	-3	167	-52.43	0	3	52.58	
VI	Road P2 U-Trough B CH318-363 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	167	-52.43	-5	3	57.55	58.9
		Power pack (diesel)	CNP 174	1	100	100	50	-3	167	-52.43	-5	3	42.55	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	167	-52.43	0	3	38.58	
		Welding Machine	CNP 107	4	99	105	50	-3	167	-52.43	0	3	52.58	
VI	Road P2 U-Trough B CH318-363 (ELS)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	167	-52.43	0	3	50.55	59.25
		Excavator (223 kw) (40T)	BS C4/63	2	105	108	50	-3	167	-52.43	0	3	55.57	
		Dump Truck	CNP 068	1	105	105	50	-3	167	-52.43	0	3	52.55	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	167	-52.43	0	3	38.58	
		Welding Machine	CNP 107	4	99	105	50	-3	167	-52.43	0	3	52.58	
VI	Road P2 U-Trough B CH318-363 (Structure)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	167	-52.43	0	3	50.55	61.26
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	167	-52.43	0	3	52.55	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	167	-52.43	0	3	50.57	
		Saw, Circular Wood	CNP 201	2	108	111	50	-3	167	-52.43	0	3	58.57	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	167	-52.43	0	3	43.55	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	167	-52.43	0	3	38.58	
		Welding Machine	CNP 107	4	99	105	50	-3	167	-52.43	0	3	52.58	
VI	Road P2 U-Trough B CH318-363 Road and Drainage Works	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	167	-52.43	0	3	50.55	60.75
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	167	-52.43	0	3	52.55	
		Roller, Vibratory	BS D8/30	1	101	101	50	-3	167	-52.43	0	3	48.55	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	167	-52.43	0	3	43.55	
		Light goods vehicle, gross vehicle weight < 5.5 tonne	CNP 143	1	101	101	50	-3	167	-52.43	0	3	48.55	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	167	-52.43	0	3	38.58	
		Dump Truck	CNP 068	1	105	105	50	-3	167	-52.43	0	3	52.55	
		Road Roller	CNP 185	1	108	108	50	-3	167	-52.43	0	3	55.55	
		Welding Machine	CNP 107	4	99	105	50	-3	167	-52.43	0	3	52.58	

Note: SPL = SWL + TF + DC + BC + FC, where

SPL = Predicted noise level in dB(A)
 SWL = Sound Power Level in dB(A)
 TF = Time factor in dB(A) = 10 log (P)

P = On-time percentage
 DC = Distance attenuation correction in dB(A) = -(20 log D + 8)
 D = Distance in m between the noise source and the receiver

BC = Barrier correction in dB(A)
 FC = Façade correction in dB(A) = 3 dB(A)

CRBC - Build King Joint Venture

Construction Noise Assessment
 Period: 0700 to 1900 (except general holidays)
 Noise Sensitive Receiver: CM6(Above 39m)
 Mitigation Measures Scenario

Noise Criteria: 75dB(A)

Portion	Activity	PME	TM Ref. / other Ref.	No. of plants	SWL	Total SWL	On-time, %	Time Factor	Distance from Notional Sources, m	Distance Attenuation*, dB(A)	Barrier Correction, dB(A)	Façade Correction, dB(A)	Predicted Noise Level, dB(A)	Total Predicted Noise Level for each group, dB(A)
IV	DN2100 SMH9101 - 9108 (Pre-boring) (Scenario 1) 3 drill rig	Crane (240 kw) (105T)	BS C4/52	3	103	108	50	-3	60	-43.50	-5	3	59.26	72.26
		Drill Rig, Rotary Type (Diesel)	CNP 072	3	110	115	50	-3	60	-43.50	0	3	69.05	
		Air Compressor	CNP 002	6	102	110	50	-3	60	-43.50	-5	3	59.06	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	60	-43.50	-5	3	47.49	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	60	-43.50	-5	3	42.51	
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	50	-3	60	-43.50	-10	3	68.49	
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	50	-3	60	-43.50	-10	3	61.50	
IV	DN2100 SMH9101 - 9108 (Pre-boring) (Scenario 2) 1 drill rig	Crane (240 kw) (105T)	BS C4/52	1	103	108	50	-3	60	-43.50	-5	3	54.49	66.73
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	115	50	-3	60	-43.50	0	3	64.27	
		Air Compressor	CNP 002	2	102	110	50	-3	60	-43.50	-5	3	54.28	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	60	-43.50	-5	3	47.49	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	60	-43.50	-5	3	42.51	
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	50	-3	60	-43.50	-10	3	61.50	
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	50	-3	60	-43.50	-10	3	64.27	
IV	DN2100 SMH9101 - 9108 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	60	-43.50	-5	3	64.27	67.01
		Power pack (diesel)	CNP 174	1	100	100	50	-3	60	-43.50	-5	3	49.27	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	60	-43.50	-5	3	42.51	
		Excavator (223 kw) (40T)	BS C4/63	3	105	110	50	-3	60	-43.50	-5	3	61.26	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	60	-43.50	-5	3	56.61	
		Welding Machine	CNP 107	4	99	105	50	-3	60	-43.50	-5	3	56.51	
		Welding Machine	CNP 107	4	99	105	50	-3	60	-43.50	-5	3	56.51	
IV	DN2100 SMH9101 - 9108 (ELS)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	60	-43.50	-5	3	54.49	65.36
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	60	-43.50	-5	3	42.51	
		Excavator (223 kw) (40T)	BS C4/63	3	105	110	50	-3	60	-43.50	-5	3	61.26	
		Dump Truck	CNP 068	2	105	108	50	-3	60	-43.50	-5	3	59.50	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	60	-43.50	-5	3	56.61	
		Welding Machine	CNP 107	4	99	105	50	-3	60	-43.50	-5	3	56.51	
		Welding Machine	CNP 107	4	99	105	50	-3	60	-43.50	-5	3	56.51	
IV	Installation of DN2100 and Manhole Construction (Scenario 1)	Crane (240 kw) (105T)	BS C4/52	3	103	108	50	-3	60	-43.50	-5	3	59.26	64.00
		Excavator (223 kw) (40T)	BS C4/63	3	105	110	50	-3	60	-43.50	-5	3	61.26	
		Dump Truck	CNP 068	2	105	108	50	-3	60	-43.50	-5	3	59.50	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	60	-43.50	-5	3	54.50	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	60	-43.50	-5	3	54.50	
IV	Installation of DN2100 and Manhole Construction (Scenario 2)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	60	-43.50	-5	3	54.49	63.97
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	60	-43.50	-5	3	56.49	
		Roller, Vibratory	BS D8/30	1	101	101	50	-3	60	-43.50	-5	3	52.49	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	60	-43.50	-5	3	47.49	
		Light goods vehicle, gross vehicle weight < 5.5 tonne	CNP 143	1	101	101	50	-3	60	-43.50	-5	3	52.49	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	60	-43.50	-5	3	42.51	
		Dump Truck	CNP 068	1	105	105	50	-3	60	-43.50	-5	3	56.49	
IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Pre Drill) (Scenario 1)	G.I. drilling rig	BS C2/43	2	102	105	50	-3	60	-43.50	-5	3	56.50	63.18
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	60	-43.50	-5	3	61.49	
		Air Compressor	CNP 002	1	102	102	50	-3	60	-43.50	-5	3	53.49	
		Air Compressor	CNP 002	1	102	102	50	-3	60	-43.50	-5	3	53.49	
		Air Compressor	CNP 002	1	102	102	50	-3	60	-43.50	-5	3	53.49	
IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Pre Drill) (Scenario 2)	G.I. drilling rig	BS C2/43	4	102	108	50	-3	60	-43.50	-5	3	59.51	64.03
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	60	-43.50	-5	3	61.49	
		Air Compressor	CNP 002	1	102	102	50	-3	60	-43.50	-5	3	53.49	
		Air Compressor	CNP 002	1	102	102	50	-3	60	-43.50	-5	3	53.49	
		Air Compressor	CNP 002	1	102	102	50	-3	60	-43.50	-5	3	53.49	
IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Piling) (Scenario 1)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	60	-43.50	-5	3	54.49	70.32
		Drill Rig, Rotary Type (Diesel)	CNP 072	2	110	113	50	-3	60	-43.50	0	3	69.50	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	60	-43.50	-5	3	51.49	
		Air Compressor	CNP 002	4	102	108	50	-3	60	-43.50	-5	3	59.51	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	60	-43.50	-5	3	56.49	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	60	-43.50	-5	3	47.49	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	60	-43.50	-5	3	42.51	
IV	Road P2 Underpass CH105-318, (Non Surcharge & On Top Surcharge)(Piling) (Scenario 2)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	60	-43.50	-5	3	54.49	71.95
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	60	-43.50	-5	3	61.49	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	60	-43.50	-5	3	51.49	
		Air Compressor	CNP 002	1	102	102	50	-3	60	-43.50	-5	3	53.49	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	60	-43.50	-5	3	56.49	
		Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	60	-43.50	-5	3	66.49	
		Breaker, excavator mounted (hydraulic)	CNP 028	1	122	122	10	-10	60	-43.50	-10	3	61.50	
IV	Road P2 Underpass CH105.3 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	60	-43.50	-5	3	66.49	67.63
		Power pack (diesel)	CNP 174	1	100	100	50	-3	60	-43.50	0	3	56.49	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	60	-43.50	0	3	59.49	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	60	-43.50	0	3	59.49	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	60	-43.50	0	3	59.49	
V	Road P2 U-Trough B CH318-363 (Pre-boring) (Scenario 1)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	150	-51.53	0	3	51.73	62.99
		Drill Rig, Rotary Type (Diesel)	CNP 072	1	110	110	50	-3	150	-51.53	-5	3	53.73	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	150	-51.53	0	3	48.73	
		Air Compressor	CNP 002	2	102	105	50	-3	150	-51.53	-5	3	48.74	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	150	-51.53	0	3	53.73	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	150	-51.53	0	3	44.73	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	150	-51.53	0	3	39.75	
V	Road P2 U-Trough B CH318-363 (Pre-boring) (Scenario 2)	Crane (240 kw) (105T)	BS C4/52	2	103	106	50	-3	150	-51.53	0	3	54.74	60.09
		Drill Rig, Rotary Type (Diesel)	CNP 072	2	110	113	50	-3	150	-51.53	-5	3	54.52	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	150	-51.53	0	3	48.73	
		Air Compressor	CNP 002	4	102	108	50	-3	150	-51.53	-5	3	49.53	
		Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	150	-51.53	0	3	53.73	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	150	-51.53	0	3	44.73	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	150	-51.53	0	3	39.75	
V	Road P2 U-Trough B CH318-363 (Sheet Piling)	Piling, Vibration Hammer	CNP 172	1	115	115	50	-3	150	-51.53	-5	3	58.73	58.92
		Power pack (diesel)	CNP 174	1	100	100	50	-3	150	-51.53	-5	3	43.73	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	150	-51.53	0	3	39.75	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	150	-51.53	0	3	51.73	
		Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	150	-51.53	0	3	51.73	
V	Road P2 U-Trough B CH318-363 (ELS)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	150	-51.53	0	3	51.73	60.43
		Excavator (223 kw) (40T)	BS C4/63	2	105	108	50	-3	150	-51.53	0	3	56.74	
		Dump Truck	CNP 068	1	105	105	50	-3	150	-51.53	0	3	53.73	
		Water pump, submersible (electric)	CNP 283	4	85	91	50	-3	150	-51.53	0	3	39.75	
		Welding Machine	CNP 107	4	99	105	50	-3	150	-51.53	0	3	53.75	
		Welding Machine	CNP 107	4	99	105	50	-3	150	-51.53	0	3	53.75	
		Welding Machine	CNP 107	4	99	105	50	-3	150	-51.53	0	3	53.75	
V	Road P2 U-Trough B CH318-363 (Structure)	Crane												

Portion	Activity	PME	TM Ref. / other Ref.	No. of plants	SWL	Total SWL	On-time, %	Time Factor	Distance from Notional Sources, m	Distance Attenuation*, d B(A)	Barrier Correction, dB(A)	Facade Correction, dB(A)	Predicted Noise Level, dB(A)	Total Predicted Noise Level for each group, dB(A)
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Backfilling)	Road Roller	CNP 185	1	108	108	50	-3	228	-55.17	0	3	52.82	55.83
		Excavator (223 kw) (40T)	BS C4/63	2	105	108	50	-3	228	-55.17	0	3	52.83	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 1)	G.I. drilling rig	BS C2/43	2	102	105	50	-3	228	-55.17	0	3	49.83	49.83
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 2)	G.I. drilling rig	BS C2/43	3	102	107	50	-3	228	-55.17	0	3	51.59	51.59
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 3)	G.I. drilling rig	BS C2/43	4	102	108	50	-3	228	-55.17	0	3	52.84	52.84
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888(Pre Drill) (Scenario 4)	G.I. drilling rig	BS C2/43	5	102	109	50	-3	228	-55.17	0	3	53.81	53.81
IX	Road P2 Underpass CH105-318 (Removal of Temporary 1500 Drain)	Crane (240 kw) (105T)	BS C4/52	1	103	103	50	-3	228	-55.17	0	3	47.81	60.21
		Piling, large diameter bored, oscillator	CNP 165	1	115	115	50	-3	228	-55.17	0	3	59.81	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	1	100	100	50	-3	228	-55.17	0	3	44.81	
		Water pump, subsensible (electric)	CNP 283	2	85	88	50	-3	228	-55.17	0	3	32.82	
		Excavator (223 kw) (40T)	BS C4/63	2	103	106	50	-3	228	-55.17	0	3	50.83	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 1)	Drill Rig, Rotary Type (Diesel)	CNP 072	2	110	113	50	-3	228	-55.17	-5	3	52.83	60.06
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	228	-55.17	0	3	47.83	
		Air Compressor	CNP 002	4	102	108	50	-3	228	-55.17	0	3	52.84	
		Excavator (223 kw) (40T)	BS C4/63	3	105	110	50	-3	228	-55.17	0	3	54.59	
		Concrete Lorry Mixer	BS D6/33	1	96	96	50	-3	228	-55.17	0	3	40.82	
		Water pump, subsensible (electric)	CNP 283	4	85	91	50	-3	228	-55.17	0	3	35.84	
		Dump Truck	CNP 068	1	105	105	50	-3	228	-55.17	0	3	49.82	
		Welding Machine	CNP 107	2	99	102	50	-3	228	-55.17	0	3	46.83	
		Crane (240 kw) (105T)	BS C4/52	6	103	111	50	-3	228	-55.17	0	3	55.60	
		Drill Rig, Rotary Type (Diesel)	CNP 072	6	110	118	50	-3	228	-55.17	-5	3	57.60	
		IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 2)	Generator, Silenced, <=75 dB(A) at 7m	CNP 102	6	100	108	50	-3	228	-55.17	0	
Air Compressor	CNP 002			12	102	113	50	-3	228	-55.17	0	3	57.61	
Excavator (223 kw) (40T)	BS C4/63			4	105	111	50	-3	228	-55.17	0	3	55.84	
Concrete Lorry Mixer	BS D6/33			2	96	99	50	-3	228	-55.17	0	3	43.83	
Water pump, subsensible (electric)	CNP 283			4	85	91	50	-3	228	-55.17	0	3	35.84	
Dump Truck	CNP 068			3	105	110	50	-3	228	-55.17	0	3	54.59	
Welding Machine	CNP 107			4	99	105	50	-3	228	-55.17	0	3	49.84	
Crane (240 kw) (105T)	BS C4/52			7	103	111	50	-3	228	-55.17	0	3	56.27	
Drill Rig, Rotary Type (Diesel)	CNP 072			7	110	118	50	-3	228	-55.17	-5	3	58.27	
Generator, Silenced, <=75 dB(A) at 7m	CNP 102			7	100	108	50	-3	228	-55.17	0	3	53.27	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 3)			Air Compressor	CNP 002	14	102	113	50	-3	228	-55.17	0	3
		Excavator (223 kw) (40T)	BS C4/63	4	105	111	50	-3	228	-55.17	0	3	55.84	
		Concrete Lorry Mixer	BS D6/33	4	96	102	50	-3	228	-55.17	0	3	46.84	
		Water pump, subsensible (electric)	CNP 283	4	85	91	50	-3	228	-55.17	0	3	35.84	
		Dump Truck	CNP 068	4	105	111	50	-3	228	-55.17	0	3	55.84	
		Welding Machine	CNP 107	7	99	107	50	-3	228	-55.17	0	3	52.27	
		Crane (240 kw) (105T)	BS C4/52	8	103	112	50	-3	228	-55.17	0	3	56.85	
		Drill Rig, Rotary Type (Diesel)	CNP 072	8	110	119	50	-3	228	-55.17	-5	3	58.85	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	8	100	109	50	-3	228	-55.17	0	3	53.85	
		Air Compressor	CNP 002	16	102	114	50	-3	228	-55.17	0	3	58.86	
		IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 4)	Excavator (223 kw) (40T)	BS C4/63	6	105	113	50	-3	228	-55.17	0	3
Concrete Lorry Mixer	BS D6/33			6	96	104	50	-3	228	-55.17	0	3	48.60	
Water pump, subsensible (electric)	CNP 283			8	85	94	50	-3	228	-55.17	0	3	38.85	
Dump Truck	CNP 068			6	105	113	50	-3	228	-55.17	0	3	57.60	
Welding Machine	CNP 107			8	99	108	50	-3	228	-55.17	0	3	52.85	
Crane (240 kw) (105T)	BS C4/52			9	103	113	50	-3	228	-55.17	0	3	57.36	
Drill Rig, Rotary Type (Diesel)	CNP 072			9	110	120	50	-3	228	-55.17	-5	3	59.36	
Generator, Silenced, <=75 dB(A) at 7m	CNP 102			9	100	110	50	-3	228	-55.17	0	3	54.36	
Air Compressor	CNP 002			18	102	115	50	-3	228	-55.17	0	3	59.37	
Excavator (223 kw) (40T)	BS C4/63			6	105	113	50	-3	228	-55.17	0	3	57.60	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 5)			Concrete Lorry Mixer	BS D6/33	6	96	104	50	-3	228	-55.17	0	3
		Water pump, subsensible (electric)	CNP 283	9	85	95	50	-3	228	-55.17	0	3	39.36	
		Dump Truck	CNP 068	6	105	113	50	-3	228	-55.17	0	3	57.60	
		Welding Machine	CNP 107	9	99	109	50	-3	228	-55.17	0	3	53.36	
		Crane (240 kw) (105T)	BS C4/52	12	103	114	50	-3	228	-55.17	0	3	58.61	
		Drill Rig, Rotary Type (Diesel)	CNP 072	12	110	121	50	-3	228	-55.17	-5	3	60.61	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	8	100	109	50	-3	228	-55.17	0	3	53.85	
		Air Compressor	CNP 002	24	102	116	50	-3	228	-55.17	0	3	60.62	
		Excavator (223 kw) (40T)	BS C4/63	6	105	113	50	-3	228	-55.17	0	3	57.60	
		Concrete Lorry Mixer	BS D6/33	6	96	104	50	-3	228	-55.17	0	3	48.60	
		IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 6)	Water pump, subsensible (electric)	CNP 283	8	85	94	50	-3	228	-55.17	0	3
Dump Truck	CNP 068			6	105	113	50	-3	228	-55.17	0	3	57.60	
Welding Machine	CNP 107			8	99	108	50	-3	228	-55.17	0	3	52.85	
Crane (240 kw) (105T)	BS C4/52			15	103	115	50	-3	228	-55.17	0	3	59.58	
Drill Rig, Rotary Type (Diesel)	CNP 072			15	110	122	50	-3	228	-55.17	-5	3	61.58	
Generator, Silenced, <=75 dB(A) at 7m	CNP 102			10	100	110	50	-3	228	-55.17	0	3	54.82	
Air Compressor	CNP 002			30	102	117	50	-3	228	-55.17	0	3	61.59	
Excavator (223 kw) (40T)	BS C4/63			10	105	115	50	-3	228	-55.17	0	3	59.82	
Concrete Lorry Mixer	BS D6/33			8	96	105	50	-3	228	-55.17	0	3	49.85	
Water pump, subsensible (electric)	CNP 283			15	85	97	50	-3	228	-55.17	0	3	41.58	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (Piling) (Scenario 7)			Dump Truck	CNP 068	8	105	114	50	-3	228	-55.17	0	3
		Welding Machine	CNP 107	12	99	110	50	-3	228	-55.17	0	3	54.61	
		Crane (240 kw) (105T)	BS C4/52	2	103	106	50	-3	228	-55.17	0	3	50.83	
		Drill Rig, Rotary Type (Diesel)	CNP 072	2	110	113	50	-3	228	-55.17	-5	3	52.83	
		Air Compressor	CNP 002	2	102	105	50	-3	228	-55.17	0	3	49.83	
		Crane (240 kw) (105T)	BS C4/52	2	103	106	50	-3	228	-55.17	0	3	50.83	
		Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	228	-55.17	0	3	47.83	
		Piling, Vibration Hammer	CNP 172	2	115	118	50	-3	228	-55.17	0	3	62.83	
		Power pack (diesel)	CNP 174	2	100	103	50	-3	228	-55.17	0	3	47.83	
		Water pump, subsensible (electric)	CNP 283	4	85	91	50	-3	228	-55.17	0	3	35.84	
		IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (ELS) (Sheet Piling) (Scenario 1)	Excavator (223 kw) (40T)	BS C4/63	1	105	105	50	-3	228	-55.17	0	3
Welding Machine	CNP 107			4	99	105	50	-3	228	-55.17	0	3	49.84	
Crane (240 kw) (105T)	BS C4/52			3	103	108	50	-3	228	-55.17	0	3	52.59	
Generator, Silenced, <=75 dB(A) at 7m	CNP 102			3	100	105	50	-3	228	-55.17	0	3	49.59	
Piling, Vibration Hammer	CNP 172			3	115	120	50	-3	228	-55.17	0	3	64.59	
Power pack (diesel)	CNP 174			3	100	105	50	-3	228	-55.17	0	3	49.59	
Water pump, subsensible (electric)	CNP 283			4	85	91	50	-3	228	-55.17	0	3	35.84	
Excavator (223 kw) (40T)	BS C4/63			1	105	105	50	-3	228	-55.17	0	3	49.82	
Welding Machine	CNP 107			4	99	105	50	-3	228	-55.17	0	3	49.84	
Crane (240 kw) (105T)	BS C4/52			2	103	106	50	-3	228	-55.17	0	3	50.83	
IX	Road P2 Underpass CH105-318, U Trough A&B P2 CH105-S200 CH888 (ELS) (Welding & Excavation) (Scenario 2)			Generator, Silenced, <=75 dB(A) at 7m	CNP 102	2	100	103	50	-3	228	-55.17	0	3
		Excavator (223 kw) (40T)	BS C4/63	2	105	108	50	-3	228	-55.17	0			

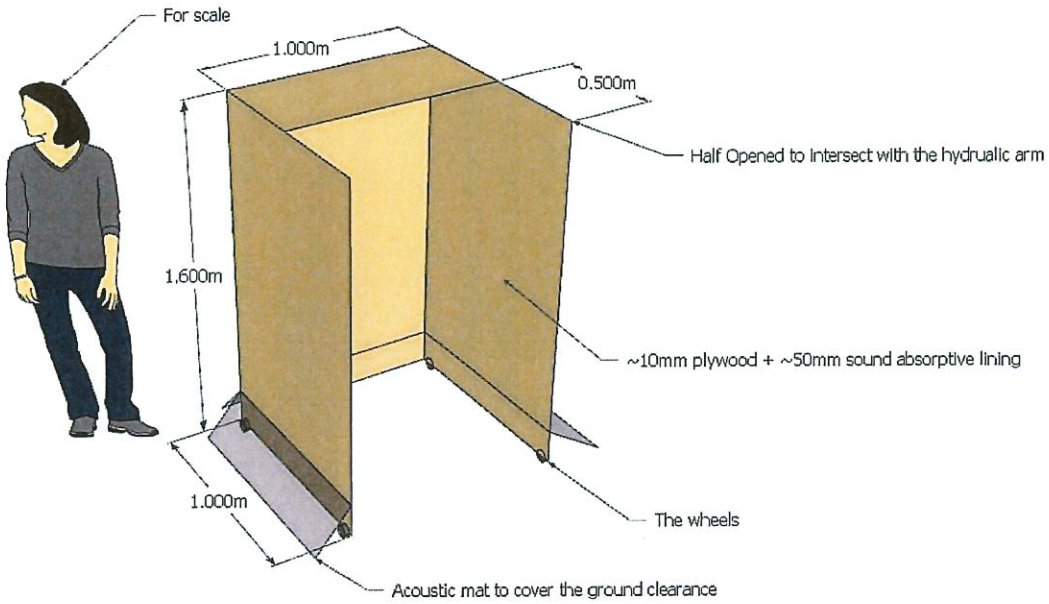
Appendix D

Sample of Movable Noise Barriers, Acoustic Mat and Enclosure

Noise Enclosure for generator & air compressor



Acoustic Box



Noise Barrier (3.5 m)



Acoustic Mat 3.5m



Test Report

No. SDHG1408012625RP

Date: Aug.19, 2014

Page 1 of 3

CHEUNG KEE CANVAS LTD.
G/F, 352, RECLAMATION ST, KLN. HK

The following sample(s) was / were submitted and identified on behalf of the client as:

Sample Description : PVC TARPAULIN
Item : CK 2009 SOUND PROOF CANVAS(1.6M)
Sample Receiving Date : Aug.13, 2014
Test Performing Date : Aug.13, 2014 to Aug.19, 2014
Test Required : In accordance with ISO 10140-2-2010 Acoustics -- Laboratory measurement of sound insulation of building elements -- Part 2: Measurement of airborne sound insulation
Test Result(s) : For further details, please refer to the following page(s)

Signed for and on behalf of
SGS-CSTC Co., Ltd.



Irvette Zhang
Approved signatory



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SDHG 072326

I. Test conducted

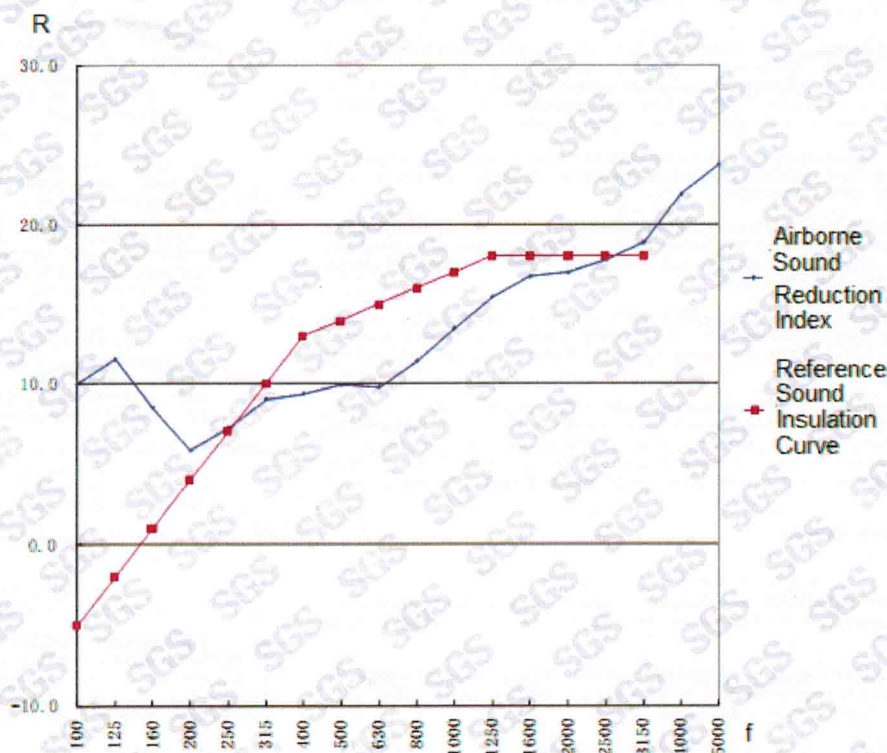
The test is performed in accordance with ISO 10140-2-2010 Acoustics -- Laboratory measurement of sound insulation of building elements -- Part 2: Measurement of airborne sound insulation
 The evaluation of the single-number rating from the results in one-third octave bands is done in accordance with ISO 717-1:1996 Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation

II. Sample Description and Conditioning

Sample name(provided by sponsor): PVC Tarpaulin
 Color: Gray
 Mass per unit area : 958 g/m²
 Area, S, of test element : 3.8 m²
 Air temp. in the test rooms : 27°C
 Relative humidity in the test rooms : 58%
 Receiving room volume : 67.9 m³

III. Test results

f Hz	R dB
100	10.1
125	11.6
160	8.6
200	5.9
250	7.3
315	9.1
400	9.4
500	10.0
630	9.9
800	11.5
1000	13.5
1250	15.5
1600	16.7
2000	17.0
2500	17.8
3150	18.9
4000	21.9
5000	23.9
Rw (C;Ctr)	14(-1;-2)



Key
 R-- sound reduction index, in dB
 f--frequency, in Hz

To be continued...

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STATEMENTS:

For laboratory measurements using sound pressure, the sound reduction index is calculated using:

$$R = L_1 - L_2 + 10 \lg \frac{S}{A} (dB)$$

where

L_1 is the energy average sound pressure level in the source room, in decibels;

L_2 is the energy average sound pressure level in the receiving room, in decibels;

S is the area of the free test opening in which the test element is installed, in square metres;

A is the equivalent sound absorption area in the receiving room, in square metres.

Photo Appendix:



Remark: This test was subcontracted to qualified subcontractor.

End of Report



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SDHG 072324

CEDD Contract No. NE/2015/02

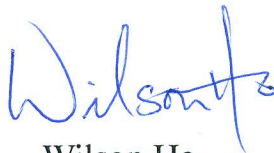
Tseung Kwan O - Lam Tin Tunnel Road P2 and Associated Works

**Insertion Loss (IL) Measurement Report of Movable Noise Barrier
for Drilling Rig**

Report No.: 17351-3

For
CRBC-Build King JV

Approved by:



Wilson Ho

MIOA, MHKIOA, MHKIEIA, AFCHKRI, PMHKIQEP

Prepared by: MY



26 October 2017



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1. Measurement Date, Personnel and Standard

- Date** : 24 October 2017 10:30-15:30 hours
- Personnel** : Conducted by Joanne Shi and Chris Ng, supervised by Wilson Ho of Wilson Acoustics Limited (WAL), assisted by Karen Chiu of CRBC-Build King JV.
- Site** : Construction site of Tseung Kwan O - Lam Tin Tunnel near the junction of O King Road and Tong Yin St.
- Standard** : *ISO 10847:1997 - In-situ determination of insertion loss of outdoor noise barriers of all types.*

2. Introduction

A 5m (H) x 7m (W) U-shape movable noise barrier (total length of 10m, **Photo 1, Appendix A**) is used to provide barrier effect for drilling rig towards nearby NSRs. Drilling rig are used for retaining wall construction during daytime (0700-1900 hours) at the construction site (**Figure 1**) near Ocean Shores of the subjected project. Ocean Shores Tower 1 is identified as the critical NSR. The movable noise barrier will be always facing the NSRs and the drilling rig will be placed 1.5m away from the barrier (**Figure 1**).

Wilson Acoustics Limited is commissioned by CRBC-Build King JV to conduct an Insertion Loss (IL) measurement for the movable noise barrier. This document presents the measurement results of the IL measurement at the worst-case location.



Photo 1. Noise Barrier (front view)

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Insertion Loss (IL) Measurement Report of Movable Noise Barrier for Drilling Rig

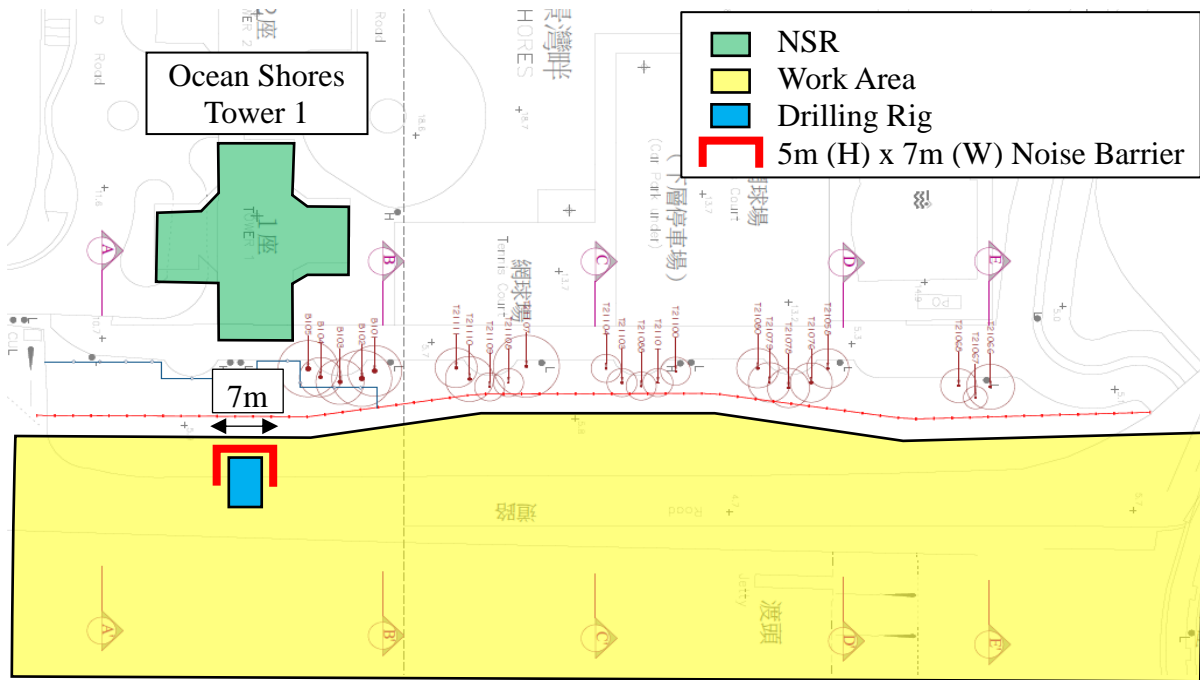


Figure 1. Site Plan with NSR of Noise Barrier Worst-case Location (Top View)

3. Instrumentation

Field calibration of sound level meter was conducted using an acoustic calibrator before and after measurements (**Table 1**). The field calibration confirmed that there was no shift on the sensitivity of the sound level meters at the calibration frequency.

Table 1: Measurement Equipment

Equipment	Brand Name & Model No.	Serial No.	Calibration Expiry
Sound level meter	Svantek - SVAN958	20890	22 Jun 2019
Sound level meter	Svantek - SVAN958	23412	12 Mar 2019
Acoustics calibrator	Svantek - SV30A	10814	14 Jun 2018
Loudspeaker	QSC – K12	GDD541208	N/A

4. Insertion Loss (IL) Testing Methodology

4.1 Testing Standard and Calculation of Insertion Loss (IL)

ISO 10847- In-situ determination of insertion loss of outdoor noise barriers of all types was used. The IL of the noise barrier was determined by comparison of the measured noise levels with and without the noise barrier. Based on the measured noise levels at the receiver and reference microphone (1m from loudspeakers) locations, the IL is given by:

CEDD Contract No. NE/2015/02 Tseung Kwan O - Lam Tin Tunnel Road P2 and Associated Works
Insertion Loss (IL) Measurement Report of Movable Noise Barrier for Drilling Rig

$$IL = L(\text{with}) - L(\text{without})$$

Where $L(\text{with}) = L(\text{ref, with}) - L(\text{rec, with})$

$L(\text{without}) = L(\text{ref, without}) - L(\text{rec, without})$

L (ref, with) is the noise level of reference microphone with noise barrier installed between the drilling rig and the receiver.

L (rec, with) is the noise level of receiver microphone with noise barrier installed between the drilling rig and the receiver.

L (ref, without) is the noise level of reference microphone without noise barrier.

L (rec, without) is the noise level of receiver microphone without noise barrier.

4.2 Loudspeaker and Receiver Microphone Locations

As the NSR, Ocean Shores Tower 1, is not accessible, noise measurement was conducted next to the NSR. The measurement results would not be affected due to the similar measurement conditions.

A schematic concept of measurement methodology is presented in **Figure 2** and **3**. A loudspeaker was located at ground level (major noise source of drilling rig, the drilling interfaces between the ground and pipe pile, is at ground level) in the site area with horizontal distance of ~23m from the receiver microphone. The receiver microphone was located 2m above the ground level of that location (there is a level difference of ~6m between the ground level of site area and ground level of receiver microphone).

For the ‘with noise barrier’ scenario, a noise barrier was placed at the closest to the receiver microphone. The loudspeaker is placed 1.5m from the noise barrier.

The noise barrier was removed for measurement of the ‘without noise barrier’ scenario. The distance between the loudspeaker and receiver microphone location was remain unchanged for both scenarios.

4.3 Playback of Drilling Rig Noise

Drilling rig noise, major noise source, was recorded and played back by loudspeaker to simulate real operation. The loudspeaker provided steady continuous noise source for accurate measurement. Reference noise measurement was conducted 1m from the loudspeaker throughout the measurement to monitor the loudspeaker output variation.

4.4 Site Conditions

During the noise measurement, all other noisy activities were stopped.

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Insertion Loss (IL) Measurement Report of Movable Noise Barrier for Drilling Rig

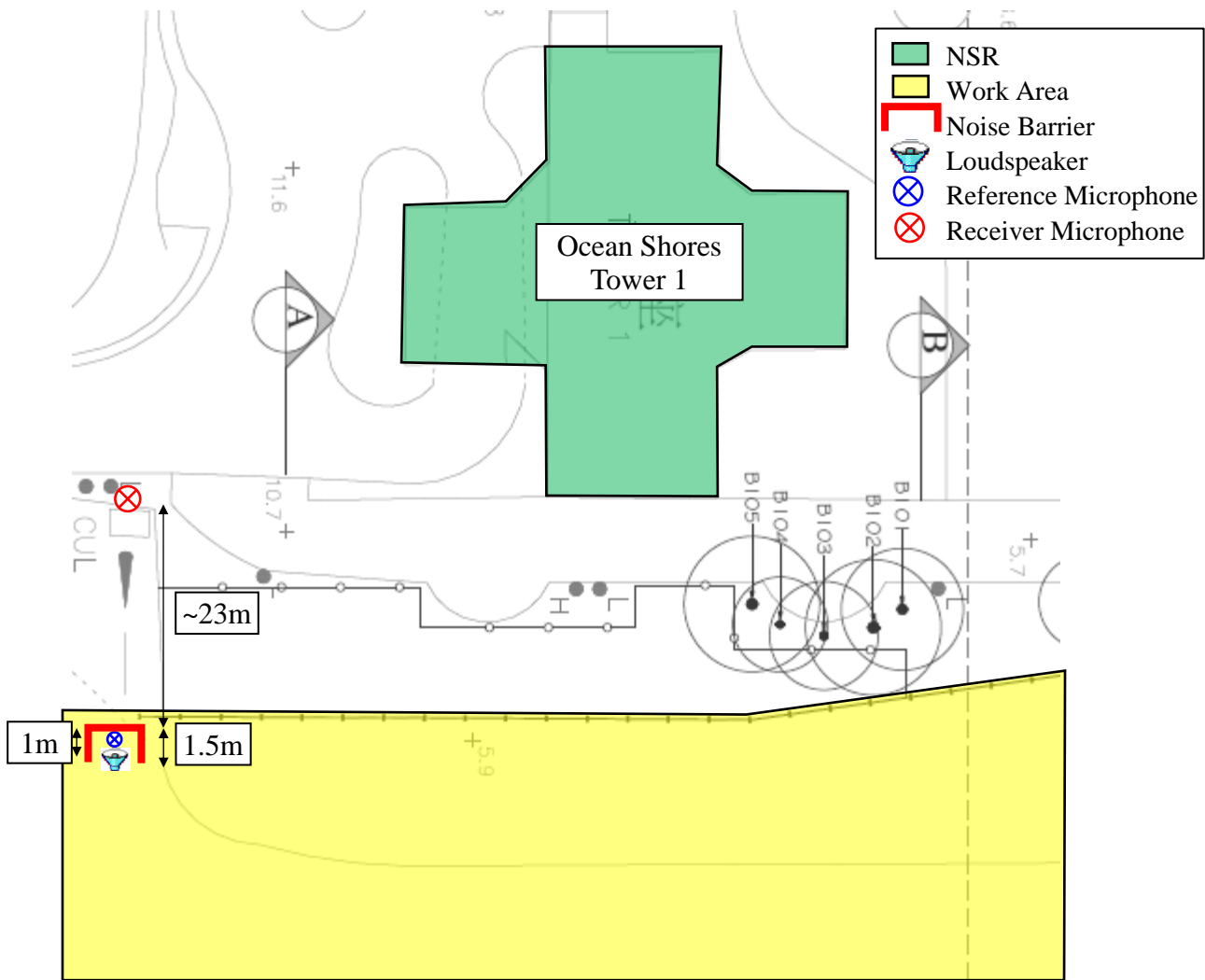


Figure 2. Schematic Concept of IL Measurement (Plan View)

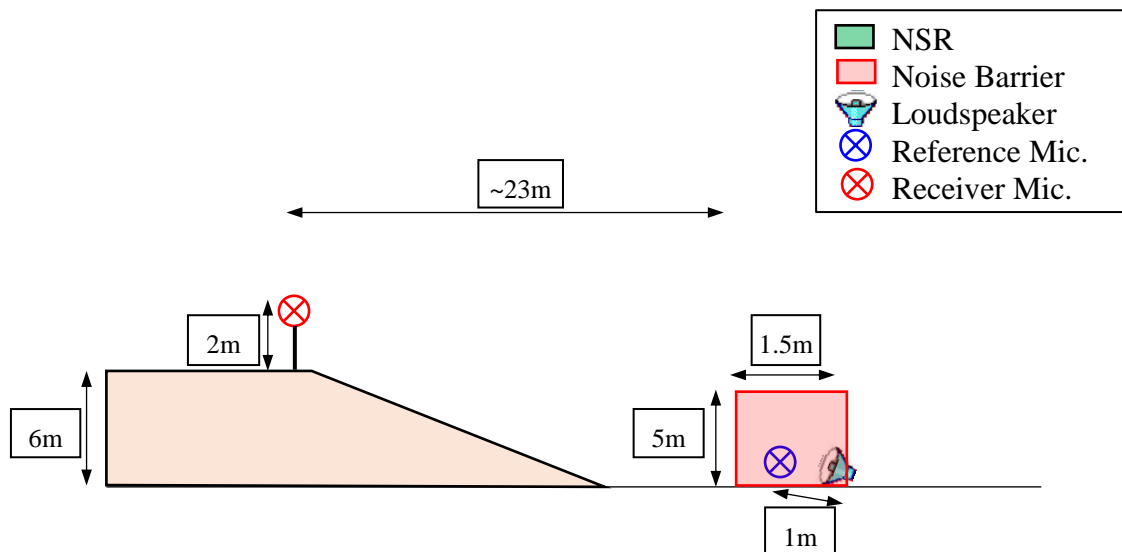


Figure 3. Schematic Concept of IL Measurement (Side View)

5. Measurement Results

5.1 Background Noise Measurement Results

Background noise measurements were conducted when all PMEs were switched off. For conservative approach, background noise correction was conducted with the minimum background $L_{eq,15s}$ (**Table 2**).

Table 2: Background (B/G) Noise Measurement Results, $L_{eq,15s}$, dB(A)

B/G Noise, $L_{eq,30s}$, dB(A)				Minimum B/G, dB(A)
58.0	57.6	57.0	57.4	57.0

5.2 Insertion Loss Measurement Results

The IL measurement results of the noise barrier were measured to be **11.7dB(A)** for drilling rig noise as shown in **Table 3**. Measurement photos are shown in **Appendix A**.

Table 3: IL Measurement Results for the Noise Barrier

Receiver Mic. Location	Loudspeaker without Noise Barrier				Loudspeaker with Noise Barrier				IL, dB(A)
	Ref. Mic. Noise Level	Receiver Mic. Noise Level			Ref. Mic. Noise Level	Receiver Mic. Noise Level			
		$L_{eq,30s}$	B/G	B/G Corrected		$L_{eq,30s}$	B/G	B/G Corrected	
R1	111.6	78.0	57.0	78.0	112.8	67.8	57.0	67.4	
	111.7	78.2	57.0	78.2	112.7	67.8	57.0	67.4	
	111.9	78.2	57.0	78.2	112.7	67.7	57.0	67.3	
	111.7	78.0	57.0	78.0	112.6	67.7	57.0	67.3	
Average	111.7			78.1	112.7			67.4	
IL =									11.7

6. Conclusion

The Insertion loss measurement for the Movable Noise Barrier was conducted according to *ISO 10847:1997* for Drilling Rig noise. Insertion loss was measured to be 11.7dB(A). IL of **12dB(A)** is proposed for the Movable Noise Barrier for Drilling Rig.

Appendix A: Measurement Photos



Photo A1. Receiver Microphone



Photo A2. Loudspeaker, Reference Microphone and Enclosure for with Noise Barrier Scenario



Photo A3. Loudspeaker and Reference Microphone for without Noise Barrier Scenario



Appendix B: Noise Spectrum

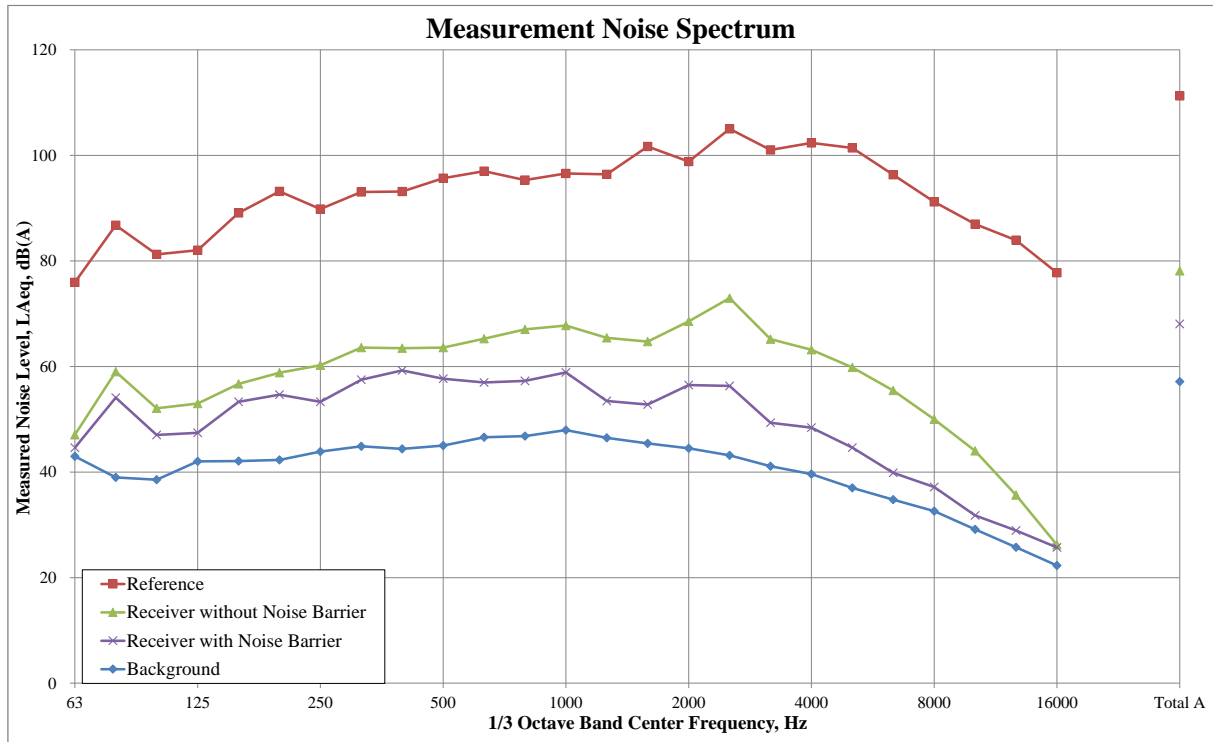


Figure B1: Measurement Noise Spectrum



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Insertion Loss (IL) Measurement Report of Movable Noise Barrier for Drilling Rig

Appendix C: Equipment Calibration Certificate

Figure C1: SVAN 958 (20890) Calibration Certificate, Page 1



CALIBRATION CERTIFICATE

Certificate Information				
Date of Issue	23-Jun-2017		Certificate Number	MLCN171137S
Customer Information				
Company Name	Wilson Acoustics Limited			
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong			
Equipment-under-Test (EUT)				
Description	Sound & Vibration Analyser			
Manufacturer	Svantek			
Model Number	SVAN 958			
Serial Number	20890			
Equipment Number	--			
Calibration Particular				
Date of Calibration	23-Jun-2017			
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-2018			
Calibration Procedure	MLCG00, MLCG15			
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C	
		Relative Humidity	55% ± 25%	
	EUT	Stabilizing Time	Over 3 hours	
		Warm-up Time	10 minutes	
		Power Supply	Internal battery	
Calibration Results	Calibration data were detailed in the continuation pages.			
Approved By & Date				
		K.O. Lo	23-Jun-2017	
Statements				
<ul style="list-style-type: none"> * Calibration equipment used for this calibration are traceable to national / international standards. * The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement. * MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. * The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited. 				

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CEDD Contract No. NE/2015/02 Tseung Kwan O - Lam Tin Tunnel Road P2 and Associated Works
Insertion Loss (IL) Measurement Report of Movable Noise Barrier for Drilling Rig

Figure C2: SVAN 958 (20890) Calibration Certificate, Page 2



Certificate No.MLCN171137S

Calibration Data						
Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
		105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
		105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
		105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
		105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE (1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
		105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Patrick
Date : 23-Jun-2017

Checked By : K.O. Lo
Date : 23-Jun-2017

Page 2 of 2

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香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B2 室

Unit B2, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk




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Insertion Loss (IL) Measurement Report of Movable Noise Barrier for Drilling Rig

Figure C3: SVAN 958 (23412) Calibration Certificate, Page 1



MAXLAB

CALIBRATION CERTIFICATE

<i>Certificate Information</i>																
Date of Issue	13-Mar-2017															
Certificate Number	MLCN170405S															
<i>Customer Information</i>																
Company Name	Wilson Accoustics Limited															
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong															
<i>Equipment-under-Test (EUT)</i>																
Description	Sound & Vibration Analyser															
Manufacturer	Svantek															
Model Number	SVAN 958															
Serial Number	23412															
Equipment Number	--															
<i>Calibration Particular</i>																
Date of Calibration	13-Mar-2017															
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-2018															
Calibration Procedure	MLCG00, MLCG15															
Calibration Conditions	<table border="1"> <tr> <td>Laboratory</td> <td>Temperature</td> <td>23 °C ± 5 °C</td> </tr> <tr> <td></td> <td>Relative Humidity</td> <td>55% ± 25%</td> </tr> <tr> <td>EUT</td> <td>Stabilizing Time</td> <td>Over 3 hours</td> </tr> <tr> <td></td> <td>Warm-up Time</td> <td>10 minutes</td> </tr> <tr> <td></td> <td>Power Supply</td> <td>Internal battery</td> </tr> </table>	Laboratory	Temperature	23 °C ± 5 °C		Relative Humidity	55% ± 25%	EUT	Stabilizing Time	Over 3 hours		Warm-up Time	10 minutes		Power Supply	Internal battery
Laboratory	Temperature	23 °C ± 5 °C														
	Relative Humidity	55% ± 25%														
EUT	Stabilizing Time	Over 3 hours														
	Warm-up Time	10 minutes														
	Power Supply	Internal battery														
Calibration Results	Calibration data were detailed in the continuation pages.															
<i>Approved By & Date</i>																
	 K.O. Lo 13-Mar-2017															
<i>Statements</i>																
<ul style="list-style-type: none"> * Calibration equipment used for this calibration are traceable to national / international standards. * The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement. * MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. * The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited. 																

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Insertion Loss (IL) Measurement Report of Movable Noise Barrier for Drilling Rig

Figure C4: SVAN 958 (23412) Calibration Certificate, Page 2



Certificate No MLCN170405S

Calibration Data						
Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
130 dB		114.0 dB	114.0 dB	0.0 dB	0.2 dB	
LIN / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB	
	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB	

- END -

Calibrated By : Patrick	Checked By : K.O. Lo
Date : 13-Mar-2017	Date : 13-Mar-2017

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CEDD Contract No. NE/2015/02 Tseung Kwan O - Lam Tin Tunnel Road P2 and Associated Works
Insertion Loss (IL) Measurement Report of Movable Noise Barrier for Drilling Rig

Figure C5: Acoustics Calibrator (10814) Calibration Certificate, Page 1



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CALIBRATION CERTIFICATE

<i>Certificate Information</i>																
Date of Issue	15-Jun-2017															
Certificate Number	MLCN171088S															
<i>Customer Information</i>																
Company Name	Wilson Accoustics Limited															
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong															
<i>Equipment-under-Test (EUT)</i>																
Description	Acoustic Calibrator															
Manufacturer	Svantek															
Model Number	SV 30A															
Serial Number	10814															
Equipment Number	--															
<i>Calibration Particular</i>																
Date of Calibration	15-Jun-2017															
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-18 1351(MLTE049) / MLEC17/06/02 / 6-Jun-18															
Calibration Procedure	MLCG00, MLCG15															
Calibration Conditions	<table border="1"> <tr> <td>Laboratory</td> <td>Temperature</td> <td>23 °C ± 5 °C</td> </tr> <tr> <td></td> <td>Relative Humidity</td> <td>55% ± 25%</td> </tr> <tr> <td>EUT</td> <td>Stabilizing Time</td> <td>Over 3 hours</td> </tr> <tr> <td></td> <td>Warm-up Time</td> <td>Not applicable</td> </tr> <tr> <td></td> <td>Power Supply</td> <td>Internal battery</td> </tr> </table>	Laboratory	Temperature	23 °C ± 5 °C		Relative Humidity	55% ± 25%	EUT	Stabilizing Time	Over 3 hours		Warm-up Time	Not applicable		Power Supply	Internal battery
Laboratory	Temperature	23 °C ± 5 °C														
	Relative Humidity	55% ± 25%														
EUT	Stabilizing Time	Over 3 hours														
	Warm-up Time	Not applicable														
	Power Supply	Internal battery														
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.															
<i>Approved By & Date</i>																
	 K.O. Lo 15-Jun-2017															
<i>Statements</i>																
<ul style="list-style-type: none"> * Calibration equipment used for this calibration are traceable to national / international standards. * The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement. * MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. * The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited. 																



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Insertion Loss (IL) Measurement Report of Movable Noise Barrier for Drilling Rig

Figure C6: Acoustics Calibrator (10814) Calibration Certificate, Page 2



Certificate No. MLCN171088S

<i>Calibration Data</i>					
EUT Setting		Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
94	dB	94.0 dB	0.0 dB	0.15 dB	± 0.3 dB
114	dB	113.9 dB	0.1 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Patrick
Date : 15-Jun-17

Checked By : K.O. Lo
Date : 15-Jun-17

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Acoustics Innovation

SilentUP[®]

Retractable Noise Barrier

PATENTED

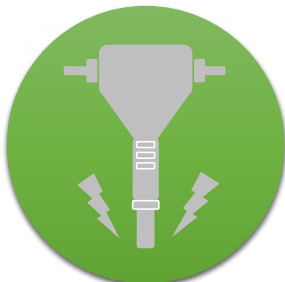


Product of Hong Kong
THE WORLD'S FIRST
RETRACTABLE NOISE BARRIER
26 dB(A) NOISE REDUCTION

Happy Valley Race Course



Roadworks



Breaking
Drilling



Piling



Loading
Unloading



Concreting

 aihk.hk

 info@aihk.hk

 (852) 2702-2007

R&D Division of





Product Description

SilentUP® is a patented retractable noise barrier for construction works and outdoor music events. It can be easily installed and mobilized by people without using any machines. No concrete foundation is required and the installation process is quiet enough to be conducted even at night time. The panels are installed upwards from ground level and connected by magnetic gap sealing.

Our product has been widely used in Hong Kong. Visit our website for the job references aihk.hk/SilentUP/reference.

Benefits

- ▶ Quiet and manual installation
- ▶ Flexible construction site planning
- ▶ Facilitate Construction Noise Permit (CNP) application process
- ▶ Minimize noise complaints
- ▶ No concrete foundation required

Technical Information

SilentUP® noise barrier material conforms to the flammability requirement specifications.

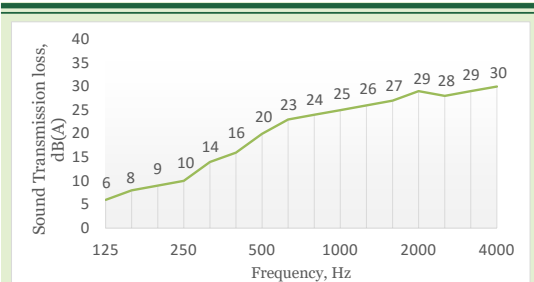
BS EN ISO 15025:2002 6 TYPE B
GB8624-1997 TYPE B

Product Specification

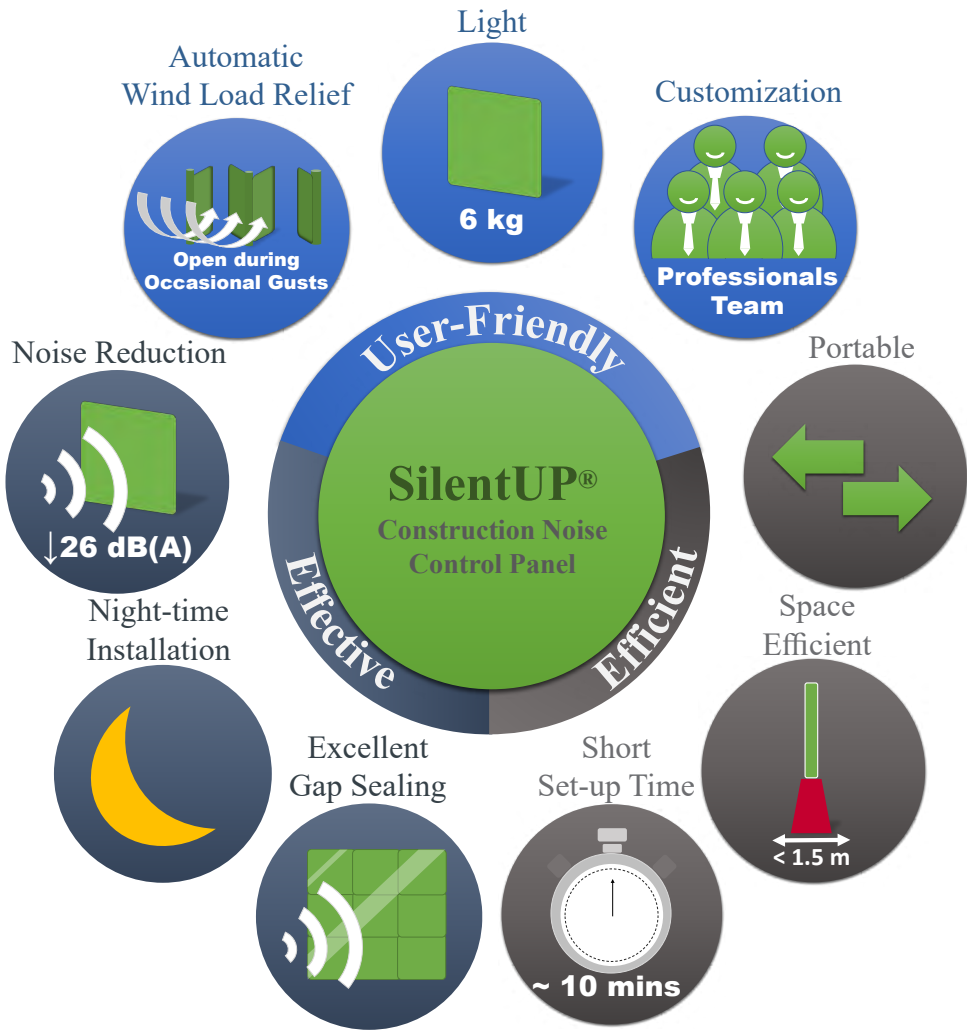
Modular Size	1m(H) x 1.35m(W)
Modular Weight	6kg
Maximum Height	10m
Insertion Loss*	26 dB(A)
STC	23
Standard Colour	Grey
Panel Thickness	100mm on edges

* Tested with white noise source

Sound Transmission Loss



Testing method in accordance with BS EN ISO 10140-2: 2010



Client Feedback

“Some of our contractors have used the retractable noise barriers to facilitate CNP application. They have found this innovative product useful - lightweight, easy to manoeuvre, and fit for purpose.”

Richard Kwan
Environment Manager
MTR Corporation Ltd

“We are impressed by SilentUP’s quick installation and relocation, it is definitely one of the best innovations and practicable approaches for the noise mitigation measures for the construction activities.”

Lighting Chan
Environmental Compliance Support Manager,
Leighton Asia Ltd

“We are happy with Acoustics Innovation’s professional service (SilentUP Noise Barrier) in helping us achieve our noise mitigation goals.”

Ronald Fung
Project QA & Environmental Manager
Kier - Laing O’Rourke - Kaden Joint Venture

“SilentUP is definitely a useful tool to minimize the noise pollution. We successfully obtained a CNP and most importantly no complaint has been received from the NSRs.”

Clarence Yeung
Environmental Officer
Chun Wo Construction and Engineering Co. Ltd

Installation videos available at aihk.hk/youtube

Appendix E

Catalogues of On-site Plant

Hydraulic Crawler Crane

CKS

900

Model : CKS900

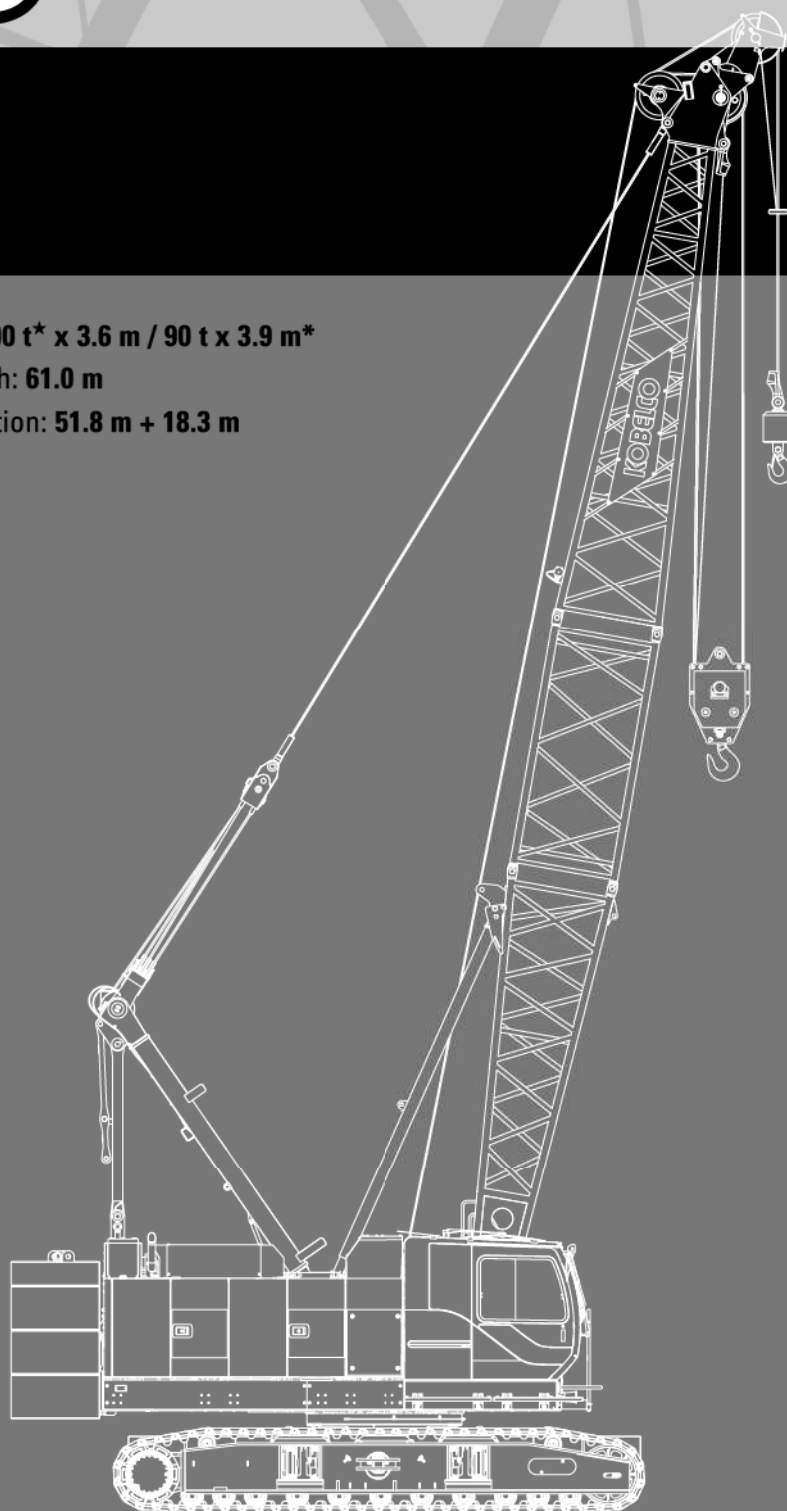
Max. Lifting Capacity: **100 t*** x 3.6 m / **90 t x 3.9 m***

Max. Crane Boom Length: **61.0 m**

Max. Fixed Jib Combination: **51.8 m + 18.3 m**

* The value are theoretical result.

* Auxiliary sheave is necessary.



KOBELCO

CKS900 CONTENTS

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7	WORKING RANGES
10	SUPPLEMENTAL DATA
11	LIFTING CAPACITIES
16	SUPPLEMENTAL DATA FOR CLAMSHELL
17	LIFTING CAPACITIES
18	SUPPLEMENTAL DATA FOR REDUCED WEIGHTS
19	LIFTING CAPACITIES
20	SUPPLEMENTAL DATA FOR BARGE
21	LIFTING CAPACITIES
22	TRANSPORTATION PLAN
25	PARTS AND ATTACHMENTS

SPECIFICATIONS



Power Plant

Model: HINO J08E-VM

Type: 4 cycle, water-cooled, vertical in-line 6, direct injection, turbo-charger, intercooler

Displacement: 7,684 liters

Rated power: 213 kW/2,100 min⁻¹

Max. Torque: 1,017 N·m/1,600 min⁻¹

Cooling System: Water-cooled

Starter: 24V-5kW

Radiator: Corrugated type core, thermostatically controlled

Air cleaner: Dry type with replaceable paper element

Throttle: Twist grip type hand throttle, electrically actuated

Fuel filter: Replaceable paper element

Batteries: Two 12V x 136 Ah/5HR capacity batteries, series connected

Fuel tank capacity: 400 liters



Hydraulic System

Main pumps: 3 variable displacement piston pumps

Control: Full-flow hydraulic control system for infinitely variable pressure to all winches, propel and swing. Controls respond instantly to the touch, delivering smooth function operation.

Cooling: Oil-to-air heat exchanger (plate-fin type)

Filtration: Full-flow and bypass type with replaceable element

Max. relief valve pressure:

Load hoist, boom hoist and propel system: 31.9 MPa

Swing system: 27.5 MPa

Control system: 5.4 MPa

Hydraulic Tank Capacity: 440 liters



Boom Hoisting System

Powered by a hydraulic motor through a planetary reducer.

Brake: A spring-set, hydraulically released multiple-disc brake is mounted on the boom hoist motor and operated through a counter-balance valve.

Drum Lock: External ratchet for locking drum

Drum: Single drum, grooved for 16mm dia. wire rope

Line Speed: Single line on first drum layer

Hoisting/Lowering: 70 to 2 m/min

Boom hoisting/lowering: 16 mm x 150 m

Boom guy line: 30 mm

Boom backstops: Required for all boom length



Load Hoisting System

Front and rear drums for load hoist powered by a hydraulic variable plunger motors, driven through planetary reducers.

Negative Brake: A spring-set, hydraulically released multiple-disc brake is mounted on the hoist motor and operated through a counter-balance valve. (Positive free fall brake is optional)

Drum Lock: External ratchet for locking drum

Drums:

Front Drums:

614 mm P.C.D x 617 mm wide drum, grooved for 26 mm wire rope. Rope capacity is 240 m working length and 360 m storage length.

Rear Drum: 614 mm P.C.D x 617 mm, grooved for 26 mm wire rope. Rope capacity is 165 m working length and 360 m storage length.

Diameter of wire rope

Main winch: 26 mm x 240 m

Aux. winch: 26 mm x 165 m

Third winch: 22 mm x 145 m

Line Speed*:

Hoisting/lowering: 120 to 3 m/min

Line Pull:

Max. Line Pull*: 208 kN {21.2 ft}

(Referential performance)

Rated Line Pull: 112 kN {11.4 ft}

*Single line on first drum layer



Swing System

Swing unit is powered by hydraulic motor driving spur gears through planetary reducer, the swing system provides 360° rotation.

Swing parking brakes: A spring-set, hydraulically released multiple-disc brake is mounted on swing motor.

Swing circle: Single-row ball bearing with an integral internally cut swing gear.

Swing lock: Manually, four position lock for transportation

Swing Speed: 4.0 min⁻¹



Upper Structure

Torsion-free precision machined upper frame. All components are located clearly and service friendly. Engine will with low noise level.

Counterweight: 31.9 ton



Cab & Control

Totally enclosed, full vision cab with safety glass, fully adjustable, high backed seat with a headrest and armrests, and intermittent wiper and window washer (skylight and front window).

Cab fittings:

Air conditioner, convenient compartment (for tool), cup holder, cigarette lighter, sun visor, roof blind, tinted glass, floor mat, footrest, and shoe tray



Lower Structure

Steel-welded carbody with axles. Crawler assemblies can be hydraulically extended for wide-track operation or retracted for transportation. Crawler belt tension is maintained by hydraulic jack force on the track-adjusting bearing block.

Carbodyweight: 14.4 ton

Crawler drive: Independent hydraulic propel drive is built into each crawler side frame. Each drive consists of a hydraulic motor propelling a driving tumbler through a planetary gear box. Hydraulic motor and gear box are built into the crawler side frame within the shoe width.

Crawler brakes: Spring-set, hydraulically released parking brakes are built into each propel drive.

Steering mechanism: A hydraulic propel system provides both skid steering (driving one track only) and counter-rotating steering (driving each track in opposite directions).

Track rollers: Sealed track rollers for maintenance-free operation.

Shoe (flat): 800 mm wide each crawler

Max. gradeability: 40%



Weight

Including upper and lower machine, 31.9 ton counterweight and 14.4 ton carbody weight, basic boom (or basic boom + basic jib), hook, and other accessories.

Weight: 90.1 ton

Ground pressure: 101 kPa



Attachment

Boom & Jib:

Welded lattice construction using tubular, high-tensile steel chords with pin connection between sections.

Boom and Jib length

	Min. Length (Min. combination)	Max. Length (Max. combination)
Crane Boom	12.2 m	61.0 m
Fixed Jib	24.4 m + 9.1 m	51.8 m + 18.3 m

Main Specifications (Model: CKS900)

Crane Boom	
Max. Lifting Capacity	100 t * x 3.6 m / 90 t x 3.9 m **3
Max. Length	61.0 m
Fixed Jib	
Max. Lifting Capacity	10.9 t x 18.0 m
Max. Combination	51.8 m + 18.3 m
Main & Aux. Winch	
Max. Line Speed (1st layer)	120 m/min
Rated Line Pull (Single line)	112 kN {11.4 tf}
Wire Rope Diameter	26 mm
Wire Rope Length	240 m (Main), 165 m (Aux)
Brake Type (free fall)	Wet-type multiple disc brake (Optional)
Working Speed	
Swing Speed	4.0 min ⁻¹ {rpm}
Travel Speed	1.7/1.1 km/h
Power Plant	
Model	HINO J08E-VM
Engine Output	213 kW/2100min ⁻¹
Fuel Tank	400 liters

Hydraulic System	
Main Pumps	3 variable displacement
Max. Pressure	31.9 MPa {325 kgf/cm ² }
Hydraulic Tank Capacity	440 liters
Self-Removal Device	
	Counterweight/self-removal device (Option)
Weight	
Operating Weight	90.1 t *1
Ground Pressure	101 kPa
Counterweight	31,900 kg
Transport Weight	41,360 kg *2

Units are SI units. { } indicates conventional units.

Line speeds in table are for light loads. Line speed varies with load.

*1 Including upper and lower machine, 31.9 ton counterweight, 14.4 ton carbody weight, basic boom, hook, and other accessories.

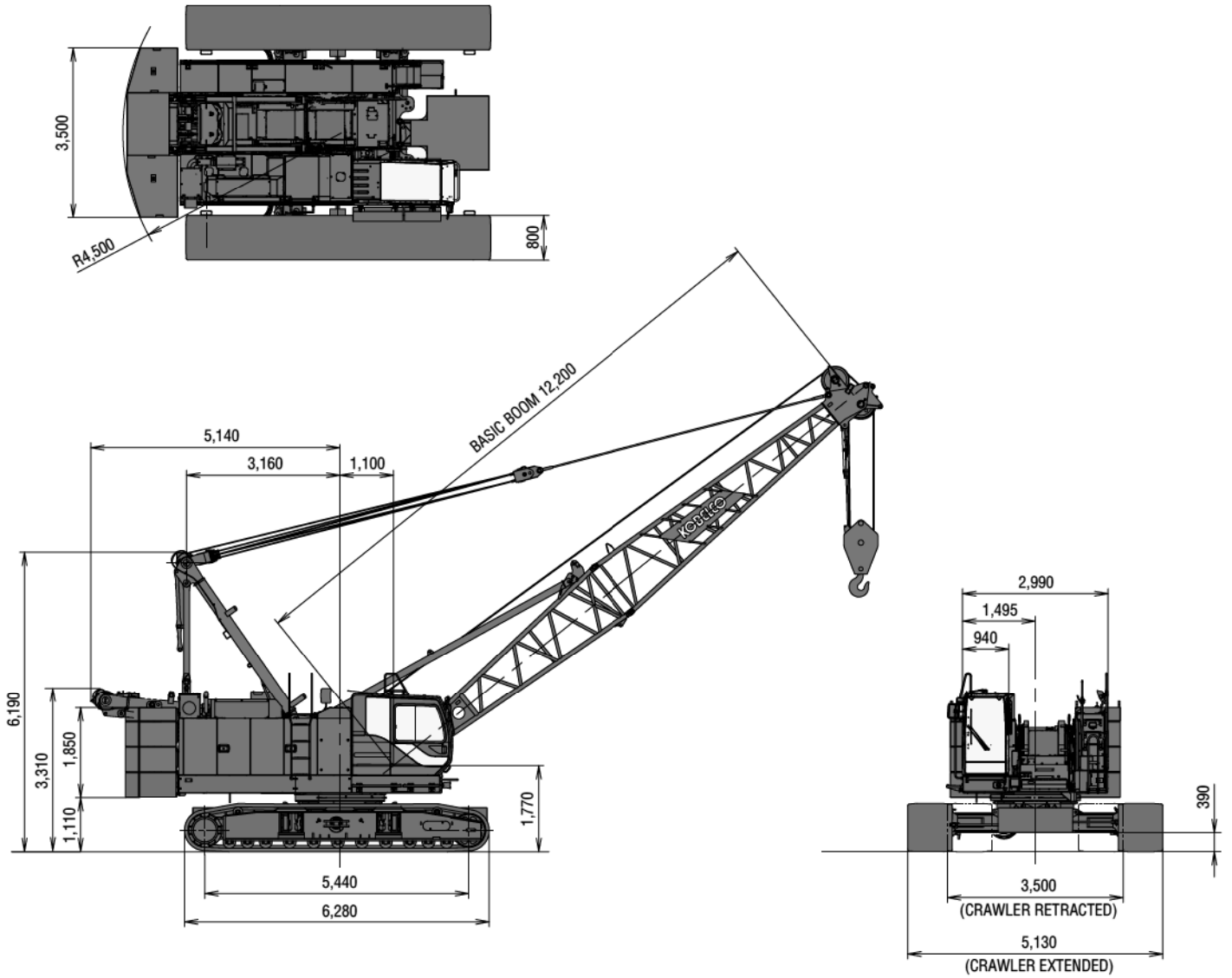
*2 Base machine with boom base, gantry, crawlers, and wire ropes (front/boom hoist)

*3 Auxiliary sheave is must.

* The value are theoretical result.

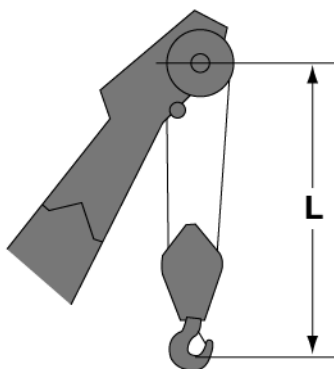
GENERAL DIMENSIONS

(Unit: mm)

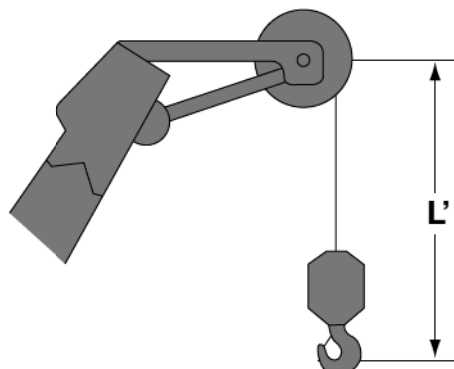


This catalog may contain photographs of machines with specifications, attachments and optional equipment.

Limit of Hook Lifting



Hook	L
90 t hook	4.1 m
70 t hook	4.1 m
50 t hook	4.0 m
35 t hook	3.9 m



Hook	L'
Ball hook	3.5 m

SUPPLEMENTAL DATA FOR REDUCED WEIGHTS RATING CHART

- Ratings according to EN13000.
- Operating radius is the horizontal distance from centerline of rotation to a vertical line through the center of gravity of the load.
- Deduct weight of hook block(s), slings and all other load handling accessories from main boom ratings shown.
- Ratings shown are based on freely suspended loads and make no allowance for such factors as wind effect on lifted load, ground conditions, out-of-level, operating speeds or any other condition that could be detrimental to the safe operation of this equipment. The operator, therefore, has the responsibility to judge the existing conditions and reduce lifted loads and operating speeds accordingly.
- Ratings are for operation on a firm and level surface, up to 1% gradient.
- At radii and boom lengths where no ratings are shown on chart, operation is not intended nor approved.
- Boom inserts and guy lines must be arranged as shown in the "operator's manual".
- Boom hoist reeving is 12 part line.
- Gantry must be in raised position for all conditions.
- Boom backstops are required for all boom lengths.
- The boom should be erected over the front of the crawlers, not laterally.
- Ratings inside of boxes are limited by strength of materials.
- The minimum rated load is 1.4(Ton).
- Crawler frames must be fully extended for all crane operations.

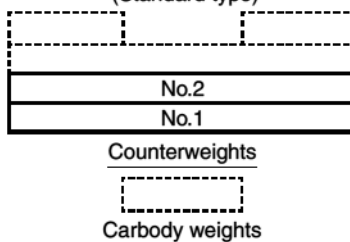
(Crane boom lifting)

- The total load that can be lifted is the value for weight of hook block, slings, and all other load handling accessories deducted from main boom ratings shown.

Counterweight	Carbody weight	Boom length	
		Without aux.	With aux.
20.5 ton	Without	12.2 m ~ 57.9 m	12.2 m ~ 54.9 m
19.8 ton	Without	12.2 m ~ 57.9 m	12.2 m ~ 54.9 m

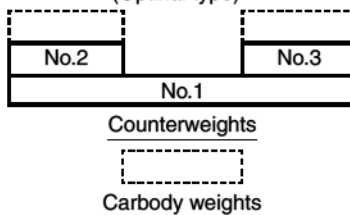
Assembling the counterweight

20.5 ton counterweight
without carbody weight
(Standard type)



Assembling the counterweight

(Equipped with self removal device)
19.8 ton counterweight
without carbody weight
(Optimal type)



- The lifting capacity does not change due to the type of counterweights. (Standard or optimal)

<Reference Information>

Main hoist loads

No. of Parts of Line	1	2	3	4	5
Maximum Loads (kN)	112	224	335	447	559
Maximum Loads (t)	11.4	22.8	34.2	45.6	57.0

No. of Parts of Line	6	7	8
Maximum Loads (kN)	671	779	883
Maximum Loads (t)	68.4	79.4	90.0

Auxiliary hoist loads

No. of Parts of Line	1
Maximum Loads (kN)	108
Maximum Loads (t)	11.0

Weight of hook block					
Hook Block	90 t	70 t	50 t	35 t	Ball Hook
Weight (t)	1.3	0.9	0.85	0.7	0.3

Operation of this equipment in excess of rated loads
or disregard of instruction voids the warranty.

Manitowoc 11000-1

Product Guide

ASME B30.5

Metric / Imperial



Features

- 100 t (110 USt) capacity
- 61,0 m (200 ft) heavy-lift boom
- Max boom + jib combination:
57,9 m (190 ft) + 18,3 m (60 ft)
- 213 kW (285 HP) engine
- 163 m/min (535 fpm) maximum line speed
- 113 kN (25,200 lb) rated line pull

Features

Energy saving systems

Green-Engine mode conserves fuel during full speed drum operation under load, at a lower engine RPM. Other available options include Green-Winch Mode and Auto Idling Stop Mode.



Self-erecting counterweight

Eliminates the need for an assist crane, and also allows for reduced counterweight chart operation.



Retractable crawlers

Crawlers can be extended and retracted for better jobsite maneuverability. On some models, these crawlers can also ship attached for easier transport and quicker setup.



Contents

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Fixed jib boom range / load charts	18
Clamshell	21
Manitowoc Crane Care	22

Specifications

Upperworks



Engine

HINO J08E-UV, 6 cylinder, water-cooled diesel, direct fuel injection with turbocharger, 213 kW (285 HP) at 2100 high-idle RPM. Maximum torque 1017 N•m (750 lb•ft) net at 1,600 rpm; Interim Tier 4/ Stage IIIB (Required for sale in the US/Canada/ Europe; requires "Ultra Low Sulfur Diesel")

HINO J08E-VM, 6 cylinder, water-cooled diesel, direct fuel injection with turbocharger, 213 kW (285 HP) at 2100 high-idle RPM. Maximum torque 1017 N•m (750 lb•ft) net at 1,600 rpm; Tier 3 (Required for sale outside the US/Canada/Europe)

One diesel fuel tank, 400 liters (105 gallons) capacity.

Two 12 volt 136 AH capacity batteries, 24 volt system and 90 amp alternator.

All wiring harnesses and connectors are numbered for easier servicing. Machine is equipped with individual fused branch circuits.



Controls

Full-flow hydraulic control system for constant variable pressure to front and rear drums, boom hoist brakes and clutches. Controls respond instantly to the touch, delivering smooth function operation.



Hydraulic system

All three variable displacement piston-type pumps are driven by a heavy-duty pump drive. One of these pumps is used in the left propel circuit and hook hoist circuit, and can accommodate an optional third circuit. Another is used in the right propel circuit, boom hoist circuit and hook hoist circuit. The third variable displacement pump is used in the swing circuit. In addition, two gear pumps are used in the control system and auxiliary equipment, and two gear pumps serve the brake cooling system.

Maximum pressure rating31.9 MPa (4,630 psi)

Load hoist, boom hoist and propel . . . 2 Piston pumps
Swing 1 Piston pump
Control system and auxiliary 2 Gear pumps
Brake cooling system 2 Gear pumps

Reservoir capacity: 440 liter (116 US gallon)

Cooling: oil-to-air heat exchanger

Filtration: full-flow and bypass type with replaceable paper elements.



Drums

Front and rear drums for load hoist powered by variable displacement piston-type motors, driven through planetary reducers. Powered hoisting/ lowering and free-fall operation is standard. Drum turn indicators for front and rear drums are also standard.

Drums: (front and rear) 614 mm (24.2") P.C.D. x 617 mm (24.3") wide drums, grooved for 26.0 mm wire rope.

Brakes: Counterbalance valve and spring set hydraulically released multiple disk brake mounted on hoist motor. External ratchet is fitted for locking drum.

Wire rope capacity:

Front drum 235 m (771 ft) working length
 Rear drum 160 m (525 ft) working length

Line speed: Single line on the first drum layer

Hoisting: 120m/min (390 ft/min)

Lowering: 120m/min (390 ft/min)

▶ **Optional third drum:** grooved for 22 mm wire rope; free-fall is optional.
 Wire rope working length 145m (476').



Swing system

Swing unit: Powered by a hydraulic piston-type motor driving spur gears through planetary reducers, the swing system provides 360° rotation.

Swing brake: A spring-set, hydraulically released multiple-disc brake is mounted on swing motor.

Swing lock: 4-Position lock for transportation.

Rotating bed turntable: Single-row ball bearing with an integral internally cut swing gear.

Swing speed: 4.0 rpm



Boom support system

Single drum powered by a hydraulic axial piston motor through a planetary reducer.

Brake: A spring-set, hydraulically released multiple-disc brake is mounted on the boom hoist motor. An external ratchet is fitted for locking the drum.

Drum: Single drum, grooved for 16 mm diameter wire rope. Boom hoist reeving is 12-part line.

Wire Rope Capacity:

Drum 150 m (492 ft) working length.

Specifications

Line speed: Single line on first drum layer.

Hoisting 70m/min (230 ft/min)

Lowering 70m/min (230 ft/min)



Gantry

This high folding type gantry is fitted with a sheave frame for boom hoist reeving. It provides full up, full down positions.



Counterweight

Upper weight (5 pieces): 31,300 kg (69,000 kg)
Carbody weight (2 pieces): 14,400 kg (31,750 lb)



Operator's cab

Totally enclosed, full vision cab fitted with tinted safety glass and opening front window. A fully adjustable, highbacked seat with arm rests. Short handle control levers; electronic twist grip hand throttle. An air conditioner, a signal horn and windshield wiper are standard.

Lights:

- 2 - Front flood lights
- 1 - Cab inside light

Safety device

New easy to read at a glance LMI and maintenance display.

Lowerworks



Carbody

The durable carbody features steel welded construction with extendible axles.



Crawlers

Crawler assemblies can be hydraulically extended for wide-track operation or retracted for transportation.

Crawler belt tension adjusted with hydraulic jack and maintained by shims between idler block and frame.

The independent hydraulic propel drive is built into each crawler side frame. Each drive consists of a hydraulic motor propelling a driving tumber through a planetary gearbox. Hydraulic motor and gear box are built into the crawler side frame within the shoe

width. The track rollers are sealed for maintenance-free operation.

Crawler brakes: multiple disk type, spring set hydraulically released parking brakes are built into each propel drive.

Crawler shoes

914 mm (36") wide crawler.

Travel speed

(High/Low) 1.73/1.2 km/h (1.07/0.71 mph)

Attachments



Boom

Welded lattice construction using tubular, high-tensile steel chords with pin connections between sections.

Two idler sheaves and three point sheaves are standard.

Basic boom length 12,2 m (40'). Basic boom consists of the boom butt 5,8 m (19') and boom top 6,39 m (21').

Optional boom inserts are welded lattice construction with tubular, high-tensile steel chords and pin connections on each one of 3,0 m (10'), 6,1 m (20') and 12,2 m (40') inserts.

Maximum total length of boom 61,0 m (200').



Fixed jib

The optional fixed jib employs welded lattice construction with tubular, high-tensile steel chords with pin connections between sections.

Basic jib length 9,14 m (30'). Basic jib length consists of jib butt section 4,57 m (15') and jib top 4,57 m (15').

Optional jib boom inserts of 3,0 m (10'), 6,1 m (20') are available for extension capabilities up to 18 m (60').

Maximum total length of boom and jib 57,9 m (190') + 18 m (60') is 76,2 m (250').

Tool and accessories

A set of tools and accessories are furnished.

Optional Equipment

Optional: Blocks and hooks each with roller bearing sheaves grooved for 26.0 mm diameter wire rope, and roller bearing swivel with hook latch.

Specifications

- ▶ 11.3 t swivel hook and weight ball, 460 kg (15 USt ball hook, 1,310 lb wedge socket for 26 mm wire rope.)
- ▶ 35 t hook block, 700 kg with one 617 mm Nominal O.D. roller bearing sheave. (40 USt hook block, 2,311 lb with three 24" Nominal O.D. roller bearing sheaves.)
- ▶ 70 t hook block, 900 kg, three 617 mm Nominal O.D. roller bearing bearing sheaves. (75 USt hook block, 3,820 lb, with four 24" Nominal O.D. roller bearing sheaves.)
- ▶ 90 t hook block, 1 300 kg, with four 617 mm Nominal O.D. roller bearing sheaves. (110 USt hook block, 2,946 lb with four 24" Nominal O.D. roller bearing sheaves.)
- ▶ Optional: Detachable upper boom point with one 575 mm Nominal outer diameter roller bearing steel sheave grooved for 26mm rope for liftcrane.
- ▶ Machine inclination sensor.
- ▶ Swing angle detection and angle limiter.
- ▶ Counterweight detection.
- ▶ Hydraulic tagline.
- ▶ External lamp for overload alarm.

Working weight

Approximately 90,000 kg (198,500 lb) including upperworks and lowerworks, full upper counterweights, full carbody counterweights, and 12,2 m (40') basic boom.

Ground pressure

Approximately 88.8 kPa (12.9 psi) with basic boom and no load.


Gradeability

With basic boom: 40%.

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SUMITOMO SH75U MIDI EXCAVATOR

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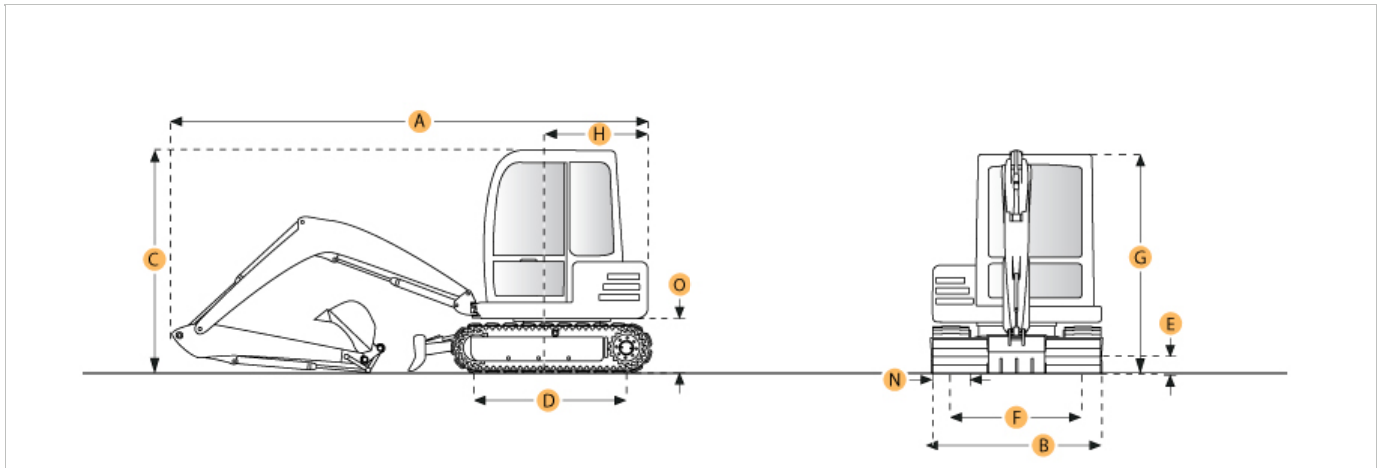
 Print specification

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Selected Dimensions

Boom/Stick Option (HEX) 1

A. SHIPPING LENGTH OF UNIT	20.4 ft in	6230 mm
C. SHIPPING HEIGHT OF UNIT	15.9 ft in	4840 mm
I. MAX CUTTING HEIGHT	24 ft in	7300 mm
J. MAX LOADING HEIGHT	17.2 ft in	5230 mm
K. MAX REACH ALONG GROUND	21.2 ft in	6455 mm
L. MAX VERTICAL WALL DIGGING DEPTH	10.2 ft in	3100 mm
M. MAX DIGGING DEPTH	13.8 ft in	4200 mm

Dimensions

B. WIDTH TO OUTSIDE OF TRACKS	7.6 ft in	2320 mm
G. HEIGHT TO TOP OF CAB	8.8 ft in	2695 mm
H. TAIL SWING RADIUS	3.8 ft in	1150 mm

Undercarriage

N. SHOE SIZE	17.7 in	450 mm
--------------	---------	--------

Specification

Engine

NUMBER OF CYLINDERS	4	
MAKE	2353	
MODEL	4JB1	
NET POWER	49 hp	36.5 kw
POWER MEASURED @	2000 rpm	
DISPLACEMENT	169.1 cu in	2.8 L
MAX TORQUE	130.2 lb ft	176.5 Nm
TORQUE MEASURED @	1800 rpm	

Operational

OPERATING WEIGHT	17460.6 lb	7920 kg
HYDRAULIC SYSTEM RELIEF VALVE PRESSURE	3982.5 psi	27458.6 kPa
HYDRAULIC PUMP FLOW CAPACITY	34.9 gal/min	132 L/min

Swing Mechanism

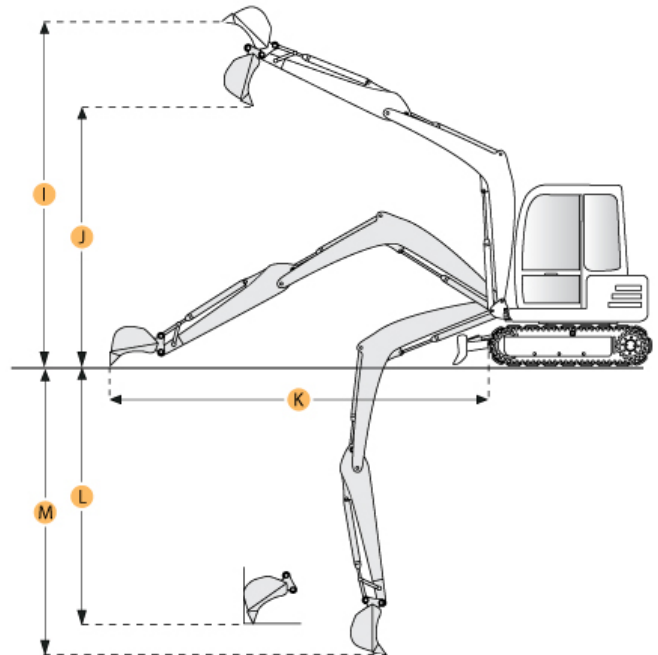
SWING SPEED	12 rpm
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Undercarriage

SHOE SIZE	17.7 in	450 mm
GROUND PRESSURE	5 psi	34.3 kPa
MAX TRAVEL SPEED	2.7 mph	4.4 km/h

Buckets

REFERENCE BUCKET CAPACITY	0.37 yd3	0.28 m3
MINIMUM BUCKET CAPACITY	0.14 yd3	0.11 m3
MAXIMUM BUCKET CAPACITY	0.37 yd3	0.28 m3



Boom/Stick Option (HEX) 1

BOOM/STICK OPTION (HEX) 1	Boom 3700mm / Stick 1740mm	
SHIPPING HEIGHT OF UNIT	15.9 ft in	4840 mm
SHIPPING LENGTH OF UNIT	20.4 ft in	6230 mm
MAX DIGGING DEPTH	13.8 ft in	4200 mm
MAX REACH ALONG GROUND	21.2 ft in	6455 mm
MAX CUTTING HEIGHT	24 ft in	7300 mm
MAX LOADING HEIGHT	17.2 ft in	5230 mm
MAX VERTICAL WALL DIGGING DEPTH	10.2 ft in	3100 mm

Dimensions

WIDTH TO OUTSIDE OF TRACKS	7.6 ft in	2320 mm
HEIGHT TO TOP OF CAB	8.8 ft in	2695 mm
REMOVAL COUNTERWEIGHT CLEARANCE	2.5 ft in	765 mm
TAIL SWING RADIUS	3.8 ft in	1150 mm

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OEM specifications are provided for base units. Actual equipment might vary with options.

Vi030-6B / Vi035-6B

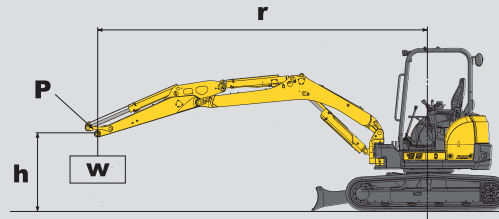
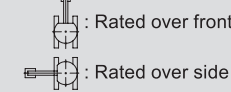
[Gross] 20.4kW | [Gross] 20.4kW



Lifting capacity

Excavator equipped with ROPS/FOPS and rubber tracks (without quick coupler and without bucket)

- r** : Reach from swing center line : mm (in)
- h** : Lift point height : mm (in)
- w** : Lifting capacity : kg (lbs)
- P** : Lift point



- The rated lifting capacities that are indicated below are based on ISO 10567 and do not exceed 87% of the excavator's hydraulic lifting capacity or 75% of its static tilt load (tipping load) capacity.
- The following operating criteria are also applicable to the calculation of these maximum loads;
 - The "Lift point" is the location of the front point on the arm
 - The three indicated machine position are :
 - arm over the front end (blade down),
 - arm over the front end (blade up), and
 - arm over the side (blade up).
- The weight of the excavator's bucket, hook, sling and other lifting accessories have been taken into consideration when calculating these maximum loads.

Vi030-6B

LIFT POINT HEIGHT	r : REACH mm(in)											
	RATED LIFT CAPACITY OVER END BLADE DOWN kg (lbs)				RATED LIFT CAPACITY OVER END BLADE UP kg (lbs)				RATED LIFT CAPACITY OVER SIDE BLADE UP kg (lbs)			
h : mm(in)	MAX	3000 (118.1)	2500 (98.5)	2000 (78.7)	MAX	3000 (118.1)	2500 (98.5)	2000 (78.7)	MAX	3000 (118.1)	2500 (98.5)	2000 (78.7)
3000 (118.1)	* 760 (1675)	* 600 (1322)			510 (1124)	* 600 (1322)			390 (859)	* 600 (1322)		
2500 (98.5)	* 760 (1675)	* 710 (1565)			430 (947)	* 710 (1565)			330 (727)	540 (1190)		
2000 (78.7)	* 780 (1719)	* 850 (1873)	* 900 (1984)		390 (859)	660 (1455)	* 900 (1984)		280 (617)	490 (1080)	700 (1543)	
1000 (39.4)	* 830 (1829)	* 1180 (2601)	* 1530 (3373)		360 (793)	610 (1344)	820 (1807)		250 (551)	430 (947)	580 (1278)	
0 (Ground)	* 870 (1918)	* 1300 (2866)	* 1680 (3703)	* 2170 (4784)	360 (793)	570 (1256)	750 (1653)	1120 (2469)	270 (595)	400 (881)	520 (1146)	760 (1675)
-1000 (-39.4)	* 950 (2094)	* 1180 (2601)	* 1560 (3439)	* 1870 (4122)	460 (1014)	550 (1212)	750 (1653)	1060 (2336)	330 (727)	400 (881)	540 (1190)	730 (1609)
-1500 (-59.1)	* 930 (2050)		* 1250 (2755)	* 1690 (3725)	610 (1344)		780 (1719)	1080 (2380)	450 (992)		570 (1256)	780 (1719)

Vi035-6B

LIFT POINT HEIGHT	r : REACH mm(in)											
	RATED LIFT CAPACITY OVER END BLADE DOWN kg (lbs)				RATED LIFT CAPACITY OVER END BLADE UP kg (lbs)				RATED LIFT CAPACITY OVER SIDE BLADE UP kg (lbs)			
h : mm(in)	MAX	3500 (137.8)	3000 (118.1)	2500 (98.5)	MAX	3500 (137.8)	3000 (118.1)	2500 (98.5)	MAX	3500 (137.8)	3000 (118.1)	2500 (98.5)
3000 (118.1)	* 780 (1719)	* 740 (1631)	* 730 (1609)		480 (1058)	600 (1322)	* 710 (1565)		450 (992)	580 (1278)	* 710 (1565)	
2000 (78.7)	* 800 (1763)	* 870 (1918)	* 970 (2138)	* 1130 (2491)	410 (903)	580 (1278)	750 (1653)	* 1110 (2447)	370 (815)	570 (1256)	700 (1543)	* 1110 (2447)
1000 (39.4)	* 820 (1807)	* 1060 (2336)	* 1310 (2888)	* 1730 (3813)	360 (793)	540 (1190)	690 (1521)	900 (1984)	340 (340)	510 (1124)	640 (1410)	820 (1807)
0 (Ground)	* 850 (1873)	* 1180 (2601)	* 1460 (3218)	* 1820 (4012)	370 (815)	510 (1124)	640 (1410)	850 (1873)	360 (793)	480 (1058)	600 (1322)	780 (1719)
-1000 (-39.4)	* 880 (1940)	* 1090 (2403)	* 1340 (2954)	* 1680 (3703)	420 (925)	490 (1080)	630 (1388)	840 (1851)	400 (881)	460 (1014)	600 (1322)	760 (1675)
-1500 (-59.1)	* 870 (1918)	* 930 (2050)	* 1170 (2579)	* 1420 (3130)	510 (1124)	490 (1080)	640 (1410)	840 (1851)	480 (1058)	480 (1058)	610 (1344)	760 (1675)
-2000 (-78.7)	* 840 (1851)				670 (1477)				640 (1410)			

Note : The maximum loads marked with an asterisk (*) were limited by the Excavator's hydraulic lifting capacity rather than by its static tilt load (tipping load) capacity.

Standard Equipment

- Blade
- Boom swing function
- Cylinder cover (boom, arm, bucket, blade)
- Rubber or Steel tracks
- Back mirror
- ROPS / FOPS Canopy, Cabin
- Work light on canopy
- Windshield washer (cabin)
- LCD monitor
- Joystick pilot controls
- Arm rests
- Suspension and reclining seat
- Seat belt
- P.T.O switch
- Travel dual speed switch
- Auto deceleration
- Eco mode
- Engine stop switch
- Air conditioner
- External power socket (12V)
- Cup holder
- Floor mats
- Evacuation hammer (cabin)

Please note that the standard equipment may vary from this list. Consult your Yanmar dealer for confirmation

YANMAR CONSTRUCTION EQUIPMENT CO.,LTD.

OVERSEAS SALES DEPT.
MARKETING & SALES DEPT.

1717-1 Kumano, Chikugo, Fukuoka 833-0055, JAPAN
TEL +81-942-53-5465 FAX +81-942-53-5132

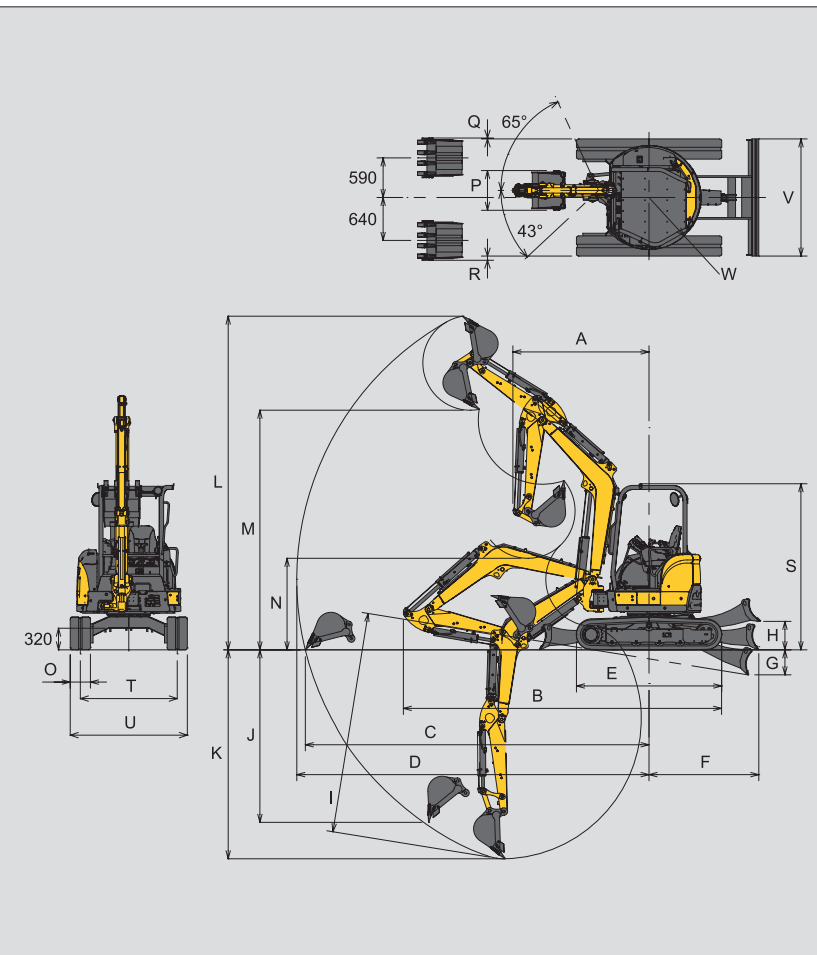
yanmar.com

All data subject to change without notice.

Dimensions

Unit : mm (ft-in)

	Vi030-6B		Vi035-6B	
	Canopy spec / Cabin spec			
	Quick Coupler	without Quick Coupler	Quick Coupler	without Quick Coupler
A	2200 (7'3") Swing 1980 (6'6")	2050 (6'9") Swing 1840 (6'0")	2170 (7'1") Swing 1950 (6'5")	2020 (6'8") Swing 1810 (5'11")
B	4520 (14'10")	4470 (14'8")	4770 (15'8")	4730 (15'6")
C	4890 (16'1")	4730 (15'6")	5270 (17'3")	5110 (16'9")
D	5020 (16'6")	4870 (16'0")	5390 (17'8")	5230 (17'2")
E	2160 (7'1")			
F	1480 (4'10")		1630 (5'4")	
G	325 (1'1")		370 (1'3")	
H	375 (1'3")		425 (1'5")	
I	3110 (10'2")	2950 (9'8")	3440 (11'3")	3290 (10'10")
J	2160 (7'1")	2290 (7'6")	2410 (7'11")	2560 (8'5")
K	2970 (9'9")	2820 (9'3")	3250 (10'8")	3100 (10'2")
L	4710 (15'5")	4550 (14'11")	5110 (16'9")	4960 (16'3")
M	3010 (9'11")	3160 (10'4")	3410 (11'2")	3560 (11'8")
N	1110 (3'8")	1230 (4'0")	1240 (4'1")	1360 (4'6")
O	300 (1'0")			
P	540 (1'9")		590 (1'11")	
Q	85 (0'3")		15 (0'1")	
R	135 (0'5")		65 (0'3")	
S	2460 (8'1")		2470 (8'1")	
T	1250 (4'1")		1440 (4'9")	
U	1550 (5'1")		1740 (5'9")	
V	1550 (5'1")		1740 (5'9")	
W	775 (2'7")			



Specifications

Model	Vi030-6B				Vi035-6B								
	Canopy		Cabin		Canopy		Cabin						
Spec	Quick Coupler		without Quick Coupler		Quick Coupler		without Quick Coupler						
Type	Quick Coupler	without Quick Coupler	Quick Coupler	without Quick Coupler	Quick Coupler	without Quick Coupler	Quick Coupler	without Quick Coupler					
Operating Weight	Rubber track	kg (lbs)	3175 (7000)	3125 (6890)	3315 (7308)	3265 (7198)	3585 (7905)	3535 (7795)	3725 (8214)	3675 (8103)			
	Steel track	kg (lbs)	3275 (7220)	3225 (7110)	3415 (7529)	3365 (7419)	3685 (8125)	3635 (8015)	3825 (8434)	3775 (8324)			
Engine	Type	Water-cooled 4-cycle diesel											
	Model	YANMAR 3TNV88-ZSBV											
	Rated Output	kW (hp) / rpm		20.4 (27.3) / 2200 [Gross]									
Performance	Bucket capacity, standard (ISO heaped)	cu.m (cu.ft)				0.10 (3.53)				0.11 (3.88)			
	Max Digging Force	Bucket	kN (lbf)	23.5 (5283)	29.9 (6722)	23.5 (5283)	29.9 (6722)	25.1 (5643)	32.1 (7216)	25.1 (5643)	32.1 (7216)		
		Arm	kN (lbf)	16.7 (3754)	18.1 (4069)	16.7 (3754)	18.1 (4069)	18.8 (4226)	20.4 (4586)	18.8 (4226)	20.4 (4586)		
	Traveling Speed, High/Low	km / h (MPH)		4.5 (2.7) / 2.7 (1.6)									
	Swing Speed	rpm		10.5				9.5					
	Boom Swing Angle, (L / R)	degrees		43 / 65									
Ground Contact Pressure	Rubber track	kPa (PSI)	29.3 (4.25)	28.9 (4.19)	30.6 (4.44)	30.1 (4.37)	33.1 (4.80)	32.7 (4.74)	34.3 (4.97)	33.9 (4.92)			
	Steel track	kPa (PSI)	30.2 (4.38)	29.8 (4.32)	31.4 (4.55)	31.0 (4.50)	34.0 (4.93)	33.6 (4.87)	35.2 (5.10)	34.8 (5.05)			
Hydraulic System	Pump Capacity	L / min (GPM)	37.4 (9.9) x 2 [Variable displacement pump]				37.0 (9.8) x 2 [Variable displacement pump]						
			20.9 (5.5) x 1, 9.9 (2.6) x 1 [Gear pump]				26.2 (6.9) x 1, 10.8 (2.9) x 1 [Gear pump]						
	Main Relief Set Pressure	MPa (PSI)	20.6 (2988) x 2		19.6 (2843) x 1		22.1 (3205) x 2		21.1 (3059) x 1				
Blade	Width	mm (ft-in)	1550 (5'1")				1740 (5'8")						
Dimensions	Stroke, Raise / Lower from G.L.	mm (ft-in)	375 (1'3") / 325 (1'1")				425 (1'5") / 370 (1'3")						
Fuel tank capacity	L (Gals)	41 (10.8)											

Hydraulic PTO

Model	Vi030-6B			Vi035-6B		
	Output	L / min (GPM)		MPa (PSI)	L / min (GPM)	
MPa (PSI)		2200RPM	1100RPM		MPa (PSI)	2200RPM
Combined Flow, Double Actions	19.6 (2842)	58.3 (15.4)	29.15 (7.7)	22.1 (3204)	63.2 (16.7)	31.6 (8.35)

Designed for Operators and the Environment



CLEAN DIESEL ENGINE

Allowing reduced emissions and stubborn strength

[Features our next-generation electronically controlled engine]

With plenty of power on tap, Yanmar's TNV direct injection diesel engines are the result of our single-minded pursuit of advanced technologies, such as our improved fuel injection system, that allow even cleaner emissions and reduced noise. This lets us contribute to a work environment that is kind to both people and the globe.



[3TNV88]
20.4kW
/ 2200rpm

Improved fuel combustion efficiency

You will see 20% fuel savings against previous models, thanks to our new hydraulic system that increases hydraulic circuit efficiency and the energy savings from our electronically controlled engines.

Electronically controlled engine	+	More efficient hydraulics
20% better fuel economy over previous models		
Previous Model		20% down
New Model		
Eco Mode		15% down

[Eco Mode]
Switching to this controls the engine speed for efficiency and greatly reduces fuel consumption.

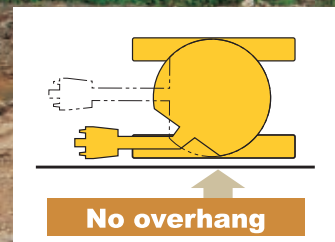
[Auto Deceleration]
Switching the operating levers to neutral automatically drops the engine rpm and reduces on both fuel consumption and noise.

Achieving even greater fuel savings

TRUE ZERO SWING TAIL

Swivel without worrying about what's behind you

The rear remains within the vehicle width, operating near walls is easy, pleasant, and goes smoothly.



UNIVERSAL DESIGN

A wider range of people can operate the machinery easily and enjoyably

Easily check all sorts of important information even at night

[Back light large-screen LCD monitor]

Important information such as operating status and problems are shown using lights and buzzers on and an easy-to-read monitor.

- LED lights
- Clock
- Hours meter
- Fuel meter
- Water temperature meter
- Menu switch
- F1-F4 switch

LCD monitor display examples

2012/03

Mon	Tue	Wed	Thu	Fri	Sat	Sun
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Hours of operation over a month

2012/03/21

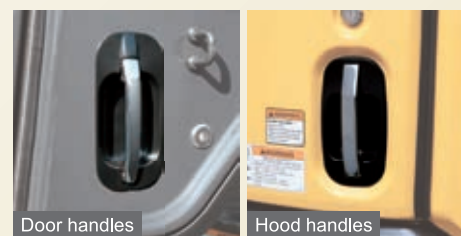
AM 2.6 h

PM 0.0 h

2.6 h

Hours of operation in a day

Easy to grasp and open with either hand



Easy to grip making it easy to climb up or down



The seat adjusts to suit operator size and position



Easy and simple to operate

Opening the cab turns the interior light on for a few seconds, improving safety



Safe, Simple, Stable Operability



Compliant with ROPS / FOPS standards
[Cabin, canopy]



Durable
[Steel plate hood]



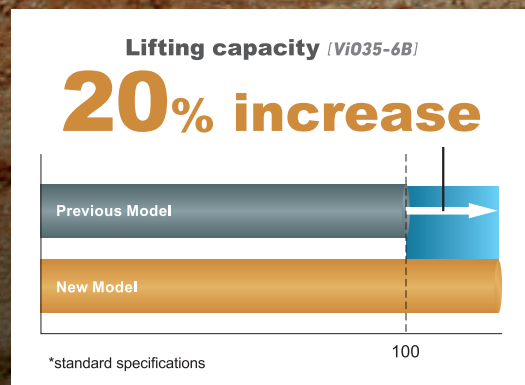
1740mm (Vi035-6B)
(5'9")

Than previous models **12% increase**

Allows for increased lifting capacity and stable, efficient operation.

[Optimum machine balance through a wider track]

Attaching the optional counterweights lets you increase the lifting capacity even further.



We also supply tough steel tracks. (Steel track specifications)



[Spring steel cylinder guards protect the cylinder rods]



Guarded from damage
[Boom-mounted light]

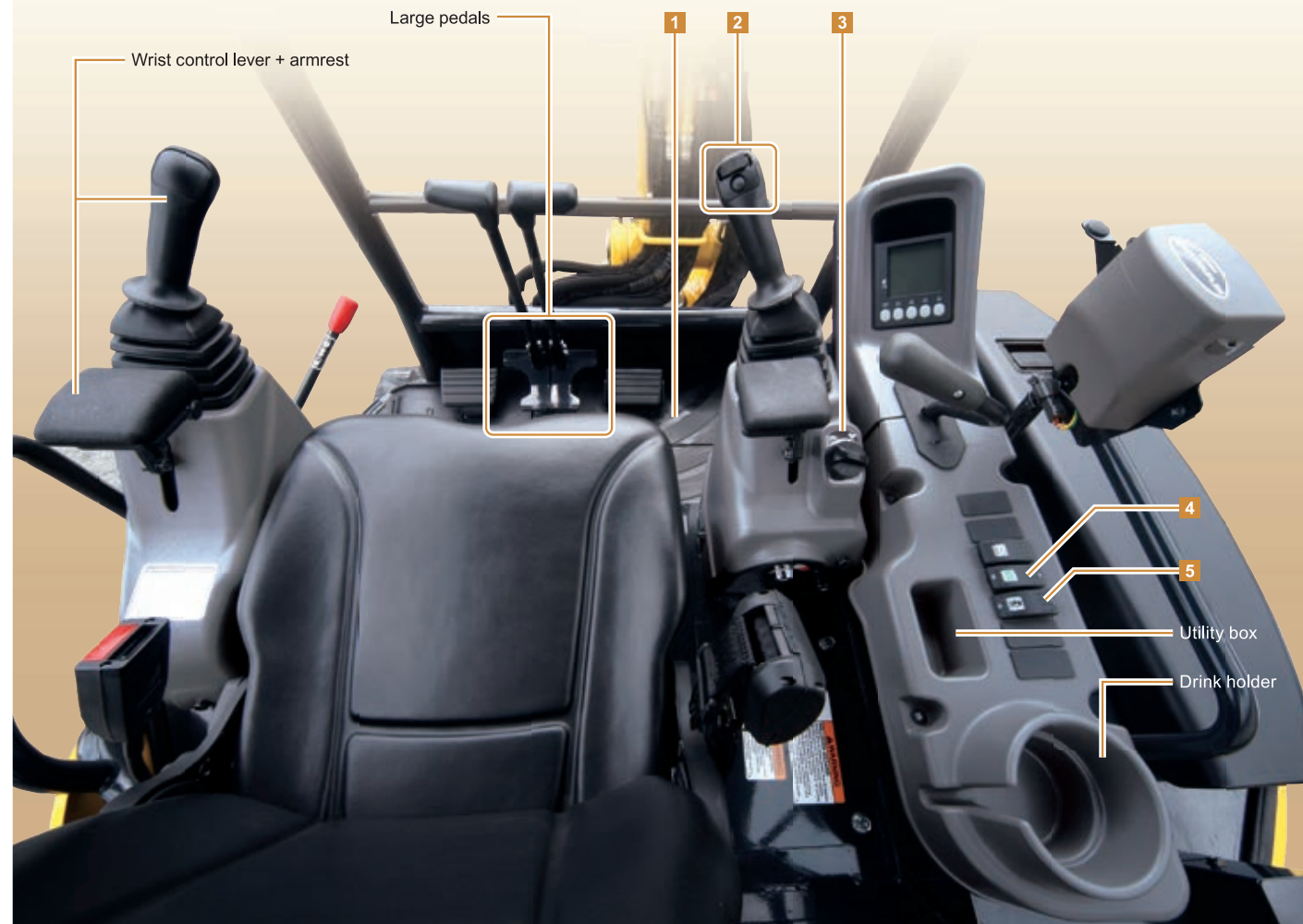


[Engine stop switch]



A Pleasant Operating Environment

Remain alert and relaxed even after hours of work
[Generous operating space]



1 Plenty of foot room to keep you comfortable
[Full-flat floor]



2 [PTO proportional dial]
3 You can easily control engine speed at your fingertips
[Dial-type accelerator knob]

4 [Eco Mode switch]
5 [Auto Deceleration switch]



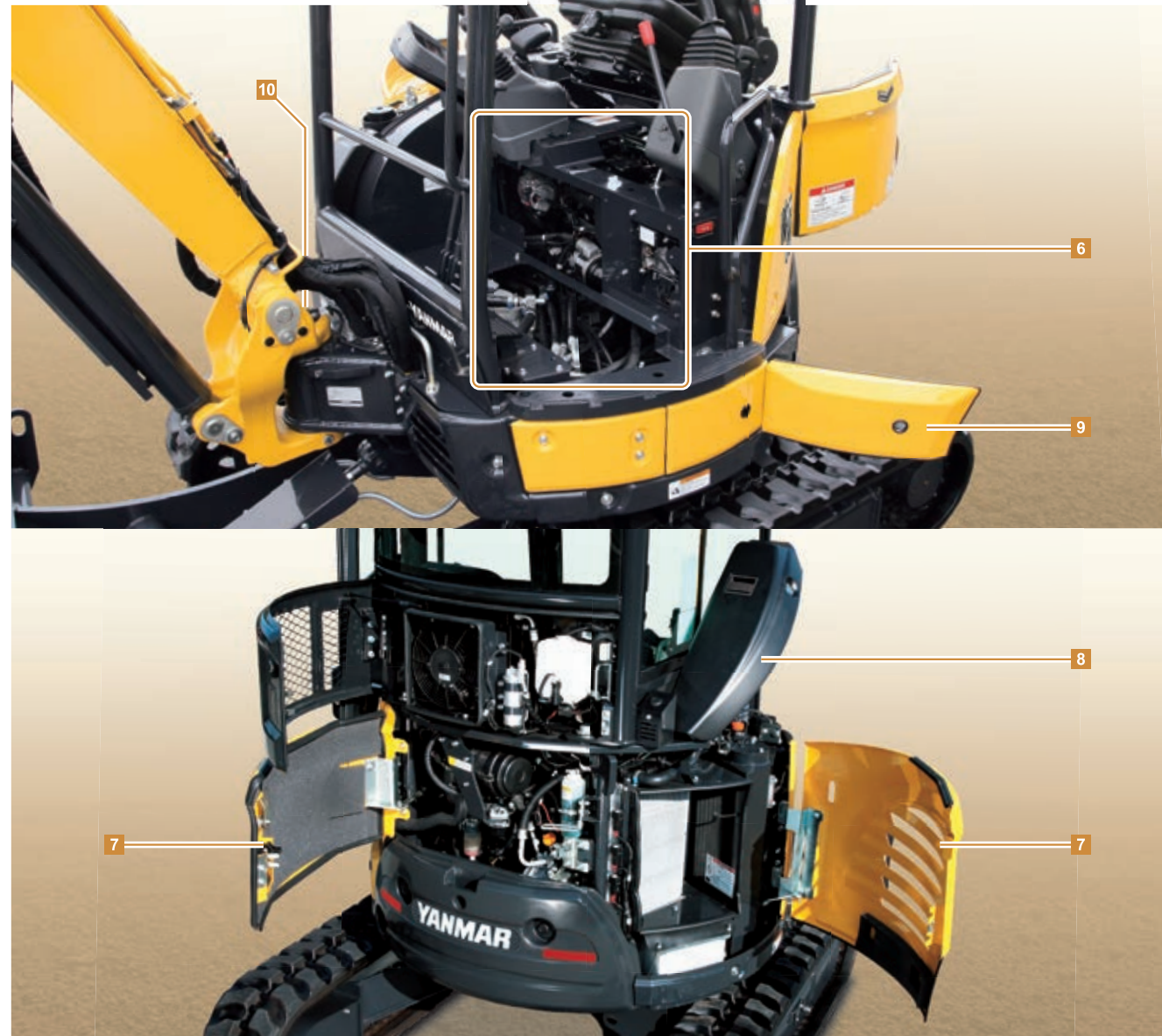
[External power socket (12V)]



[Slim satchel space behind the seat]



More Efficient Maintenance



6 [Open around the operator's seat]



7 [Rear hood, right hood open without tools]



8 [Right upper opens without tools]



9 [Toolbox]



10 [Fuel tank drain cock]



Options

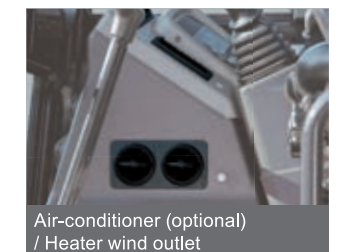
CABIN SPEC

Vi030-6B

Vi035-6B

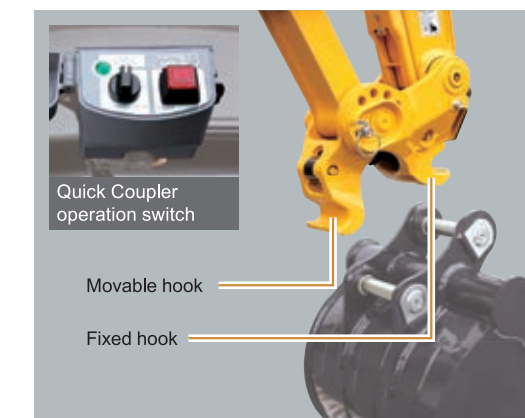


[Air-conditioner condenser]
The air-conditioner condenser is built into the cabin rear.
Hood open without tools.

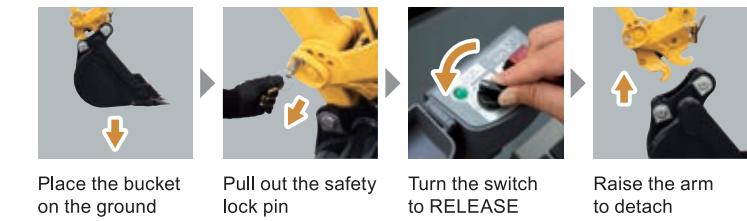


Quick Coupler

Simple and easy replacement of attachments



Bucket Removal



Bucket Attachment



AP300

Asphalt Paver



Cat® 3054C DINA

Gross Power (SAE J1995) at 2200 rpm	52 kW/71 hp
Net Power (ISO 9249) at 2200 rpm	47.4 kW/64.5 hp

Operating Weight with

AS3173 Screed	7300 kg
---------------	---------

Hopper Capacity

3.8 m³

Standard Paving Range

AS3173 Screed	1700-3200 mm
---------------	--------------

Maximum Paving Width

AS3173 Screed	4000 mm
---------------	---------

Minimum Paving Width

AS3173 Screed	650 mm
---------------	--------

AP300 Asphalt Paver: Productivity and Reliability in a Durable Package

The AP300 offers superior performance, high transfer speed, optimum maneuverability, easy transportability and job versatility to maximize productivity.

Cat® 3054C DINA Engine

The four cylinder, liquid-cooled diesel engine incorporates the proven technology from medium and large bore engines providing quiet performance, high reliability and easy servicing. The engine also meets European EU Stage II emission regulations. The high capacity cooling system provides cool intake air in order to maximize fuel efficiency and minimize emissions. **pg. 4**

Hydrostatic Drive System

A closed-loop hydrostatic propel system provides accurate control of propulsion. The propel pump provides optimum displacement enhancing servicing. The optional front wheel assist increases rimpull power providing enhanced traction. **pg. 4**

Suspension System

The AP300 is equipped with two large tread drive tyres and four front solid-rubber steering bogie wheels providing optimum ground contact and smooth operation. **pg. 6**

Operator's Station

The AP300 includes dual operator's station with sliding control console. The operator's stations can be positioned beyond the machine frame for greater visibility when precise paving control is required. **pg. 5**

Cat® Asphalt Pavers continue to lead the industry and meet your demanding job requirements.

Many easy-to-use features and technologies have been developed in order to guide your crew in producing high quality mats time and time again. Contact your Caterpillar® Dealer today for more information.



Versatility Defines the AP300

The AP300 excels in a wide range of applications where maximum flexibility is required ranging from new construction, resurfacing and maintenance works.

Material Handling System

The AP300 provides precise mix delivery with minimal operator monitoring. The independent operation of the augers and conveyors reduces component wear and minimizes the potential for mix segregation. Reversible augers and conveyors assist the crew by reducing handwork and clean-up. **pg. 7**

Generator System

The optional generator provides continuous and simple control in paving operations for ground crew usage. This integrated generator supplies simultaneous power to the electric screed heating elements, electric utility power supply and night lighting system providing high reliability. **pg. 6**

Screed

The AP300 is available with the AS3173 hydraulic power extendible asphalt screed, available with variable frequency vibrating system and with LPG or electric heating system. The AS3173 screed lays material to the desired width and depth while providing a smooth finish with initial compaction. **pg. 9**



Serviceability

The AP300 ensures excellent access to all machine parts requiring scheduled maintenance. Large service doors ensure quick and easy inspection of the main parts. The low transversely mounted engine provides optimum access to the hydraulic pumps. Wiring for the electrical system is numbered and labeled with component identifiers to simplify troubleshooting. **pg. 8**

Caterpillar® Diesel Engine

Model 3054C DINA is a four cylinder liquid-cooled diesel engine designed to provide quiet performance, high reliability, easy servicing and fuel economy.



Cat 3054C DINA Engine. The 3054C engine provides a full-rated gross power (SAE J1995) of 52 kW (71 hp) at 2200 rpm. Meets European EU Stage II engine emission regulations.

Low Transverse Engine Mounting. The low transversely mounted engine provides superior cooling performance and easy accessibility for service. Large service doors ensure easy servicing operations and access to the hydraulic pumps and external engine components.

Cooling System. The high capacity cooling system provides cool intake air in order to maximize fuel efficiency and minimize emissions. The system promotes operator comfort by drawing ambient air through the engine compartment and exhausting it on the right side of the machine, away from the operator.

Hydrostatic Drive System

Efficient hydraulic drive system eliminates chains and other mechanical linkages between diesel engine and final drive components.



Closed-loop Hydrostatic Propel System. Provides accurate control of propulsion and low-maintenance operation.

Hydrostatic Pump. The propel system of AP300 drives the rear wheels with a variable displacement pump and dual displacement axial piston motor directly splined to a servo-assisted two-speed gearbox. On demand 100% lockable differential system prevents slippage in any grade condition.

Optional Front Wheel Assist. The system adds hydrostatic propel power to two of the front bogie wheels. The front wheel assist increases rimpull power, providing enhanced traction.

Speed Control. Infinite speed selection within four propel ranges: two in paving mode and two in travel mode, to select the best speed range according to operating modes.

Propulsion Control. An electro-proportional servo-control provides machine starting and stopping (for asphalt supply, etc.) with no pre-set working speed variation.

Operator's Station

The dual operator's station with sliding control console promotes optimum comfort, visibility and ease of use.



Dual Operator's Station. The ergonomic dual operator's station incorporates a sliding control console and two adjustable suspension seats fitted on mechanically sliding semi-platforms.

Operator Visibility. The operator seats can be slid side-to-side and front-to-back on the pedestal frame, enhancing visibility and ergonomics. The stations can extend beyond the machine frame for good visibility when paving applications require precise control. With the engine mounted forward and low in frame, the operator has excellent visibility into the hopper. The operator is also positioned away from engine heat and exhaust.

Sliding Control Console. Full instrumentation package of the sliding control console allows operator to control all major systems easily. A lockable vandal cover protects console controls.

Canopy option. Two optional canopies are available: manually folding canopy or hydraulically folding canopy. Both canopies provide full width with two side extending wings for optimum comfort and protection. Canopies can be lowered for easy transportation.

Suspension System

The wheel-type asphalt paver provides optimum weight distribution, tractive effort assuring great performance.



Wheel-type Tractor. The AP300 incorporates two large tread drive tyres for propelling the machine and four bogied front steering wheels. The four front solid-rubber steering bogie wheels are mounted to the front oscillating axle rocker arms for maximum ground contact and smooth operation over high and low spots.

Wheel base. The long wheel base provides enhanced tractive effort and stability on soft base materials.

Two-speed Planetary Drive. A dual displacement motor drives two-speed planetary drive gearbox in order to provide infinitely variable speed selection.

Optional Generator System

Continuous-duty integrated design ensures peak performance and high reliability.



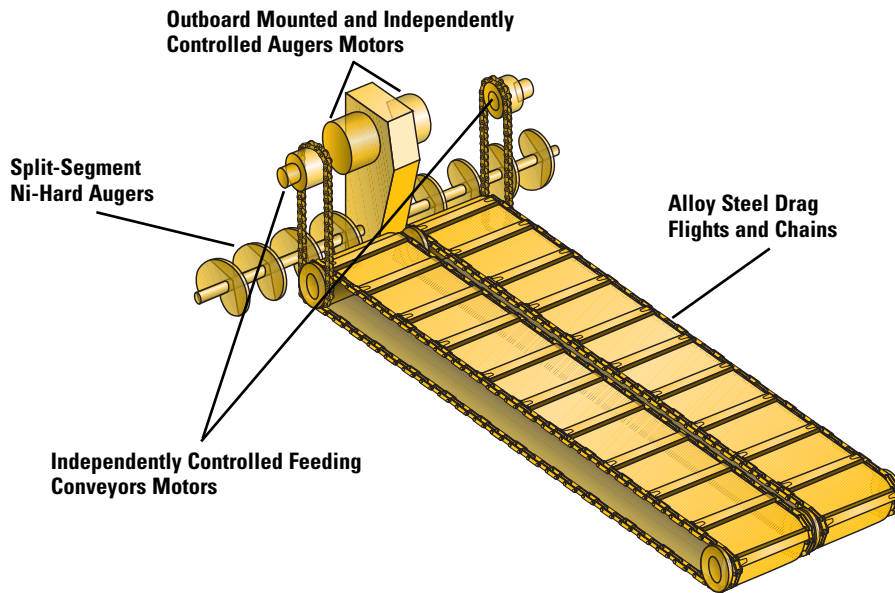
Industrial, Single-Phase A.C. Generator. The optional onboard generator provides simultaneous power to the electric screed heating elements, auxiliary lights and job site tools. The generator provides 12 kW output to power screed heating, 220 V for night lighting system and 1.5 kW electric utility power supply.

Single Control Switch. A single control switch located on the tractor's control console activates the generator.

Circuit Breaker Protection. Extend service life and internal electronic voltage regulation system provide reliability.

Material Handling System

Precise mix delivery and productivity through an advanced material handling system promote hands-free operation.



Optimum Productivity. The material handling system allows the operator to maintain an uninterrupted flow of material from the hoppers to the screed. The system is responsible for maintaining the proper head of material - the volume of asphalt in front of and across the length of the screed.

Hoppers. The independent movement of the two hoppers is provided by means of two hydraulic cylinders assuring efficient material flow. Wear-resisting steel provides conveyors and hopper bottom plate for long wear life.

Feeding Conveyors. Two feeding conveyors are independently controlled and driven by two paddle sensors. Conveyor rotation can also be inverted from either control console panel or from rear screed control boxes. Conveyors have drive chains to maximize the live conveyor area and reduce center line segregation. This design also provides greater ease of servicing the conveyor drive system. In order to control mix delivery, the operator sets a speed rate for each conveyor that will maintain the desired mix level in the left and right auger chambers.

Auger Assembly. Two independently controlled augers spread the material conveyed to both sides. Auger rotation speed can be varied automatically to ensure a homogeneous distribution of material before the screed. Two paddle wave detectors control augers movement and can be adjusted from the screed control boxes. Conveyors and augers design eliminate voids under chain case to minimize segregation. Augers have outboard mounted motors for easy serviceability.

Adjustable Push Rollers. The two adjustable push rollers provide a contact point between the paver and the truck to center the load and assist steering while unloading.



Adjustable Height Auger Assembly. Augers are reversible and hydraulically adjustable in height providing benefits to mat quality and better distribution of material in front of the screed. The ability to raise the auger assembly simplifies loading and unloading from a transport vehicle. Also, when working with larger stone mixes, segregation can often be eliminated or minimized by raising the augers to allow mix to flow unrestricted under auger assembly.

Reliability and Serviceability

Simplified service means more time spent paving and less time spent on maintenance.



The AP300 asphalt paver has been designed for easy service and maintenance with special attention given to component access.

Large Access Doors and Panels.

Ensure quick and easy inspection of the main parts. The service doors and panels also provide optimum ground level serviceability and easy access to the hydraulic pumps and external engine components.

Low Transversely Mounted Engine.

Provides optimum access to the hydraulic pumps mounted to the right side of the engine. The front service panel features a single wide hinged door that provides easy filter and traction valves serviceability.

Propel Pump Servicing. The optimum displacement of the propel pump provide enhanced servicing.

Ergonomic Operator's Station. The dual swing-out operator's station with sliding control console and adjustable suspension seats provide optimum comfort, all-around visibility and easy control during machine operations.

Hydraulic Motors Servicing. Hydraulic motors for augers are fitted outboard for improved accessibility and serviceability. The auxiliary and front power-assist drive solenoid valves blocks have been conveniently fitted centrally simplifying checking and adjustments.

Hydraulic Hoses and Electrical Wiring Harnesses. Cleanly routed and clamped to reduce wear and provide easy service.

Exposed Hoses. Provided with nylon sleeve protection to reduce abrasion.

Vibrator System Hydraulic Lines. Cat XT™ hoses provide optimum durability and resistance to damage.

Integrity of the Electrical System. Is ensured with the use of high-quality components.

The Caterpillar Electrical Standards. Enhance reliability and durability, feature numbered and color-coded wires. Nylon-braided wrap efficiently protects the electrical wires.

AS3173 Screed

Single width, power extending screed with LPG or electric heating system increases productivity and lowers operating costs.



The AS3173 screed paves from 1700 mm to 3200 mm. With mechanical extensions added to both sides, maximum paving width is 4000 mm.

AS3173 Screed. The hydraulic power extendible asphalt screed is available with variable frequency vibrating system and with LPG or electric heating system. The screed control panels include material feeding controls for easy ground crew usage.

Vibrating System. Automatically operated when the AP300 advances following a preset ramp. The AS3173 screed is equipped with electronic ignition, automatic and independent adjustment of the smoothing plate temperature for central and each mobil plate.

LPG Heating System. The system provides high efficiency burners and optimum thermostatic temperature control.

Electric Heating System. The system provides a tractor-mounted generator, replaceable heating elements and operator friendly controls providing a cleaner environment. Feature & benefits include simple operation, fast heat-up time, multi-zone heating elements and thermostatic control of all screed plates. Heavy-duty, user-friendly screed heating control unit with self-diagnostic control is positioned at the rear of the machine for easy ground crew usage.

Screed Assist. The AS3173 is equipped with the screed assist, an electro-hydraulic device maintaining a constant screed pressure on the bituminous mix, independently from the mix bearing capacity and the paving width.

Optional Equipment

Caterpillar offers many options that allow the paver and screed to be configured to your specific application. Contact your dealer for more details.

Tractor Options

- Augers Sonic Sensors Proportional
- CE Certificate
- Ecological Washdown System
- Front Wheel Assist
- Generator System
- Hydraulically Folding Operator's Station Canopy
- Italian Road Homologation
- LPG System
- Manually Folding Operator's Station Canopy
- Warning Beacon

Controls and Grade References

- Automatic Grade and Slope Control
- Non-Contacting Grade Sensor
- Contacting Grade Sensor
- Rigid Ski, 6 m
- Autoleveling Ski, 6 m

Screed Options

- Paving Width Reduction to 0.65 m
- Extensions for: 3.60 m – 4.00 m

Engine

Four cylinder Caterpillar® 3054C DINA liquid-cooled diesel engine. Meets European EU Stage II engine emission regulations.

Gross Power	2200 rpm
SAE J1995	52 kW/71 hp
Net Power	2200 rpm
ISO 9249	47.4 kW/64.5 hp
EEC 80/1269	47.4 kW/64.5 hp
Bore	105 mm
Stroke	127 mm
Displacement	4.4 liters

- All engine horsepowers are metric including front cover.
- Net power ratings are tested at the reference conditions for the specified standard.
- Net power advertised is the power available at the flywheel when the engine is equipped with alternator, air cleaner, muffler and fan.

Suspension

Four front steering bogie wheels, two per side, are mounted in tandem on bogie axles, equalizing ground pressure.

Drive Tyres (sand rib, hydroflated)	2x 365/80 R20
Steering Wheels (solid rubber)	4x 455 mm x 260 mm
Wheel base	1615 mm

Transmission

The drive system utilizes a closed-loop hydrostatic propel system. The system drives the rear wheels through a variable displacement pump and dual axial piston motor directly splined to a servo-assisted two-speed gearbox.

Features

- The propel pump is infinitely variable and electronically controlled with adjustable starting and stopping ramps.
- The optional front wheel assist increases rimpull power by two of the front steering bogie wheels.
- Self-locking differential (on demand 100% lockable differential system) and wet final reduction gears provide efficient, low-maintenance operation.

Four Speed Ranges (forward and reverse)

Paving (1 st gear)	0-40 mpm
Paving (2 nd gear)	0-85 mpm
Travel (3 rd gear)	0-10 km/h
Travel (4 th gear)	0-16 km/h

Brakes

Primary Brake Features

- A closed-loop hydrostatic system provides dynamic braking during normal operation.

Parking Brake Features

- The hydrostatic drive acts as the service brake and is hydraulically and proportionally applied via a brake pedal besides the operator's station control console.
- Safety and parking brakes are mechanical multi-disk spring-applied brakes.
- Parking brake is automatically applied with the machine in "stand-by" mode.
- When required the brakes can be released manually.

Steering

Hydraulic power-assist steering system provides smooth, low effort steering by means of a steering wheel on the control console panel.

Features

- An automotive-type steering wheel is used to control direction. The steering wheel controls the four front wheels by a modulated hydraulic cylinder.
- The four front steering wheels are mounted in pairs of oscillating bogies, providing maximum ground contact and smooth operation even on irregular terrain.
- The wide tread section of the rear tyres assures optimum maneuverability and high tractive performance on all types of terrains and slopes.

Turning Radius

Minimum	3000 mm
---------	---------

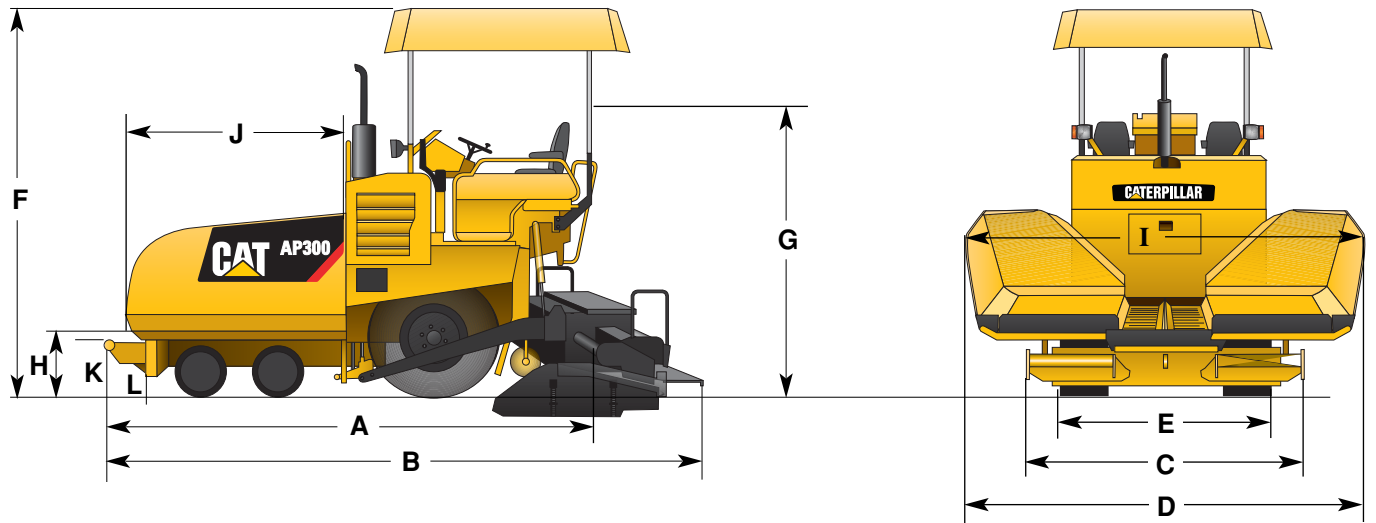
Electrical System

The 12-volt DC electrical system is designed for improved durability, reliability and ease of service. A 12-volt battery and a 14-volt, 75-amp alternator are used in the system.

Features

- Wires are loomed with vinyl-coated nylon braid to improve the overall integrity of the electrical system and to protect against abrasion.
- An optional onboard generator is fitted when the AP300 is equipped with the AS3173 electric screed. The generator provides 12 kW output to power screed heating, 220 V for night lighting system and 1.5 kW electric utility power supply.

Dimensions



	mm
A Tractor length with push roller	4200
B Length with push roller and screed	4820
C Transport width with screed end gates (hopper raised)	1730
Transport width without screed end gates (hopper raised)	1670
D Tractor operating width (hopper lowered)	3180
E Track gauge width	1620
F Operating height with canopy	3340
G Transport height with canopy and fumes stack lowered	2960

	mm
H Truck dump height (at hoppers)	570
I Truck entry width (at hoppers)	3200
J Hopper length	1700
K Push roller height	500
L Clearance	200
Hopper capacity (with conveyor tunnels) – m ³	3.8
Discharge height at center	480
Augers diameter	260

Service Refill Capacities

	Liters
Fuel tank	79.5
Cooling system (total)	15
Engine oil w/filter	8.5
Hydraulic oil tank	85
Washdown spray system	32

Weights

	kg
Operating Weights*	
AP300 with AS3173	7300
Shipping Weights**	
Tractor only	5800
Tractor with screed	7100

Weights shown are approximate and include:

* 75 kg operator, with canopy, fuel tank 50%, leveling system, standard width screed (1.70-3.20 m).

** base machine, canopy lowered, fuel tank 10%, standard screed end gates.

AP300 Asphalt Paver

For more complete information on Cat products, dealer services, and industry solutions, visit us on the web at www.cat.com

Materials and specifications are subject to change without notice. Featured machines in photos may include additional equipment. See your Caterpillar dealer for available options.

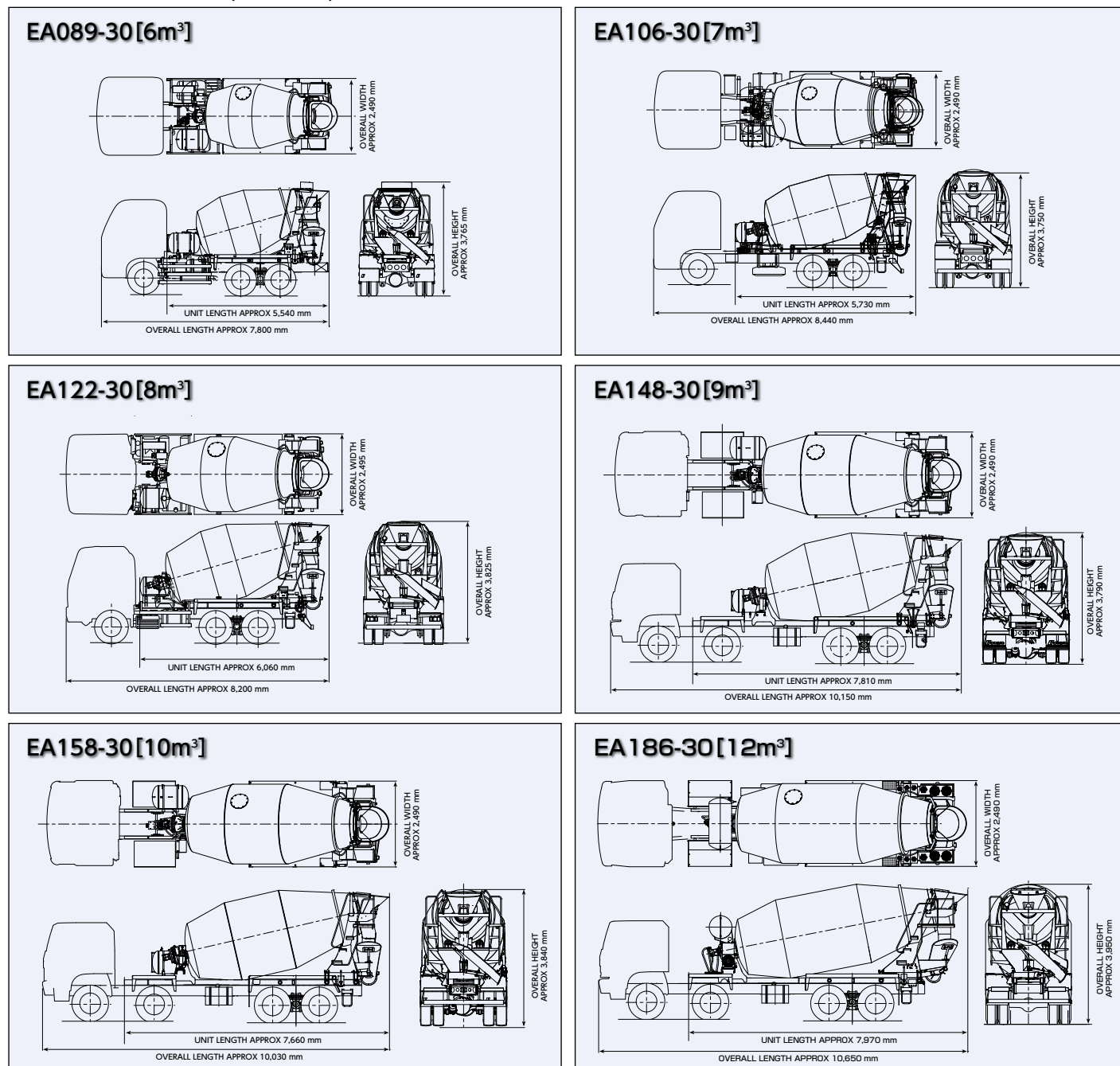
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HEHG3660 (01/2008) hr

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 **CATERPILLAR®**

■ Outside Dimensions (Reference)



Note Specifications and the other contents on this catalogue are subject to change without prior notice due to design change.
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 This product is as of January 2015.

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KYOKUTO

Concrete Mixer Truck
Series Catalogue

6m³ • 7m³ • 8m³ • 9m³ • 10m³ • 12m³

Meet your needs with excellent performance
 and fulfilling variations.
 Improved efficiency with the high performance to
 meet the needs in the field.



A wide product line-up to meet your needs: Kyokuto Kaihatsu's Concrete mixer truck series.

6m³ 7m³ 8m³ 9m³ 10m³ 12m³

Reduction Gear

Highly reliable and durable reduction gearbox fully developed by Kyokuto Kaihatsu, which have been supplied over 30 years in worldwide market.



Using the planetary differential mechanism, this product's simple structure achieves high efficiency and reduction ratio. Moreover, the gear coupling mechanisms linked to the mixer drum are fitted to the outside of the reduction gearbox, thereby reducing the load acting on its inside and ensuring high durability. In addition, a water tank can be equipped on top of the model VB99-19 reduction gearbox.

Specifications

Model	VB99-11G	VB99-17	VB99-19
Maximum Output Torque	50,000Nm	60,000Nm	72,000Nm
Reduction Ratio	-1/132	-1/132	-1/132
Maximum Revolution	Output	Approx 18rpm	Approx 18rpm
Weight(Dry)	230kg	300kg	350kg
Lubrication Oil	7ℓ	8.5ℓ	8.5ℓ
Maximum Oscillation angle	±3°	±5°	±5°
Agitating Capacity	6~8m ³	9~10m ³	12m ³



8m³
EA122-30A



9m³
EA148-30A

10m³
EA158-30A



Standard Specifications

Model		EA089-30	EA106-30	EA122-30	EA148-30	EA158-30	EA186-30
Drum	Drum Capacity	8.9m ³	10.6m ³	12.2m ³	14.8m ³	15.8m ³	18.6m ³
	Max. Agitating Capacity	6m ³	7m ³	8m ³	9m ³	10m ³	12m ³
	Max. Mixing Capacity	5m ³	6m ³	7m ³	8m ³	9m ³	11m ³
Drum Revolution	Normal Rotation	Charging	0~15rpm	0~15rpm	0~15rpm	0~15rpm	0~15rpm
		Mixing	0~15rpm	0~15rpm	0~15rpm	0~15rpm	0~15rpm
	Reverse Rotation	Discharging	0~15rpm	0~15rpm	0~15rpm	0~15rpm	0~15rpm
Normal Discharging Speed (at 6 - 8rpm drum revolution)		100~20s/m ³ (at slump value between 5 and 20cm)	100~20s/m ³ (at slump value between 5 and 20cm)	100~20s/m ³ (at slump value between 5 and 20cm)	100~20s/m ³ (at slump value between 5 and 20cm)	100~20s/m ³ (at slump value between 5 and 20cm)	100~20s/m ³ (at slump value between 5 and 20cm)
Hopper	Dimension	W1,000×L930mm	W1,000×L930mm	W1,000×L930mm	W1,000×L930mm	W1,000×L930mm	W1,000×L930mm
Chute Length	Main	1,800mm	1,800mm	1,800mm	1,800mm	1,800mm	1,800mm
	Sub	680mm	680mm	680mm	680mm	680mm	680mm
Water Tank※		300ℓ	300ℓ	200ℓ	200ℓ	300ℓ	450ℓ

※Please contact our sales representative about optional equipment.

[\(https://dynapac.com/en/\)](https://dynapac.com/en/)

COMPACTION

CC142 DOUBLE DRUM VIBRATORY ROLLERS

[MY COMPARISON \(/EN/PRODUCTS/COMPARE\)](#)

0

PICTURES

DIMENSIONS



http://pdf.dynapac.com/user_files/images/Products/Rollers/CC/Full/CC142_full.jpg

PRODUCT INFORMATION

The CC142 is a typical "town roller" for compacting asphalt compounds on streets, parking lots and industrial sites. The capacity for this type of work is adequate for following a smaller-size surface

finisher.

(<https://dynapac.com/en/>)

TECHNICAL DATA

x

Masses	
Max. operating mass	4030 kg
Operating mass (incl. ROPS)	3900 kg
Module mass (front/rear)	1900 kg/ 2000 kg
Traction	
Speed range (Dual/TC/AS)	0-10
Vertical oscillation	±10°
Theor. gradeability	41 %
Compaction	
Centrifugal force	33 kN
Nominal amplitude	0.5 mm
Static linear load (front/rear)	14.5/ 15.4 kg/cm
Vibration frequency	52 Hz
Water tank volume	200
Engine	
Manufacturer/Model	Deutz D2011 L03 I
Type	Air cooled diesel
Rated power, SAE J1995	34 kW (45.0 hp) @ 2600 rpm
Fuel tank capacity	50 l
Alternative Engine	
Manufacturer/Model	
Alternative Engine	
Manufacturer/Model	
Hydraulic system	
Driving	Axial piston pump with variable displacement and servo. 2 radial piston motors with constant displacement.

Vibration	Gear pump/motors with constant displacement.
Steering	Gear pump with constant displacement.
(https://dynapac.com/en/)	Hydrostatic in forward and reverse lever.
Parking/ Emergency brake	Failsafe brake in both drums.

OPERATIONS & MAINTENANCE MANUALS

+

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Dando Drilling International

Dando Terrier

The compact, versatile Dando Terrier rig has been designed specifically for sampling and testing for geotechnical and environmental analysis. Crawler mounted for easy site access in difficult conditions, the Terrier is simple to operate and maintain, extremely reliable and competitively priced.



Dando Terrier Features



Compact manoeuvrable crawler-mounted design ideally suited for long wheel-base transit type vans for fast mobilisation to site and secure storage of all equipment.



2-piece drop hammer for sampling and testing incorporated in mast assembly for recovery of casing and sampling tools. Mast assembly can be detached for remote operation.



Hydraulic tilting undercarriage allows operation on inclined slopes up to 30 degrees from horizontal. Deck area with storage capacity for all required drilling tools.



Rotary concrete coring head available as an option. Useful when concrete and tarmac overlie the area to be sampled.



Made in England
since 1867

Dando Drilling International Limited
www.dando.co.uk
info@dando.co.uk
tel: +44 (0) 1903 731312

Dando Terrier Specification

Chassis	A fabricated box section sub-frame incorporating drop hammer support, controls, engine mounting and tool storage.
Drop Hammer	A two-piece drop hammer runs on two guide bars. The weight is fully guarded and can be quickly changed for either SPT or dynamic probing standards.
	Next to the front mounted drilling controls a blow counter is installed which is illuminated with large digits for easy reading and an extension loom is provided when operating the mast remotely. Attached to the mast is a 1m measurement scale for the easy monitoring of progress.
	Hammer Speed: 0-50 blows pm Hammer Drop: 500mm-750mm Hammer Weight: 50kg or 63.5 kg Drilling Depth Capacity: 30m
Drill Mast Assembly	A fabricated, welded steel box section construction, hinge pin mounted to main superstructure, hydraulically raised and lowered.
	Overall Height: 2.22m-2.85m Pulldown Capacity: 1000 kgf Pullback Capacity: 7000 kgf Width: 655mm (including wheels) 1166m (jacks out)
	The entire mast assembly with wheels can be detached from the main superstructure for operation in areas of restricted access.
Carrier	A purpose built crawler chassis with rubber tracks fitted with tilt mechanism, allowing rig to operate vertically on slopes inclined up to 30 degrees from horizontal.
	Crawler Width: 800mm Overall Length (Mast Down): 2.70m Overall Height (Mast Down): 1.48m Total Weight: 1126 kg
Engine & Hydraulic PTO	Hydraulic system, powered by a 16.8HP water-cooled diesel engine, provides power for drilling, rigging and tracking Flow for PTO: 38.88 l/min Max. Working Pressure: 152 bar
Quick Connect Circuit	A quick connect auxiliary circuit is fitted as standard to the Terrier hydraulic system which runs the Terrier sampling hammer as well as other equipment, including sand guzzlers and casing jacks. The circuit is protected by a separate pressure relief valve and has a variable flow control valve fitted to the control panel for fine control.
Options	<ul style="list-style-type: none"> - Rotary concrete coring head - Remote drilling kit- the whole control panel and mast can be removed and operated up to 30m away from the main base unit - Casing extractor - Expanded tracks

ZAXIS 110

- Engine Rated Power : 63 kW (85 PS)
- Operating Weight ZAXIS110 : 10 700 kg
ZAXIS110M : 12 800 kg
- Backhoe Bucket
SAE, PCSA Heaped : 0.19-0.59 m³
CECE Heaped : 0.17-0.50 m³





on the

Zaxis blends the latest in information and heavy equipment technologies to provide the performance and operating efficiency for lower total costs. It is ready to meet the challenges and the changes facing the construction industry of today and tomorrow.



Z A X I S

All Excavating Operations in a Single Mode



&

Powerful yet Efficient Engine

Direct-Feel Control From a Refined Hydraulic System

Power to Master Tough Excavating Jobs

Dependable Travel and Swing Torque

Auto Accelerator Control Cuts Fuel Consumption





Easy-to-Monitor Instruments

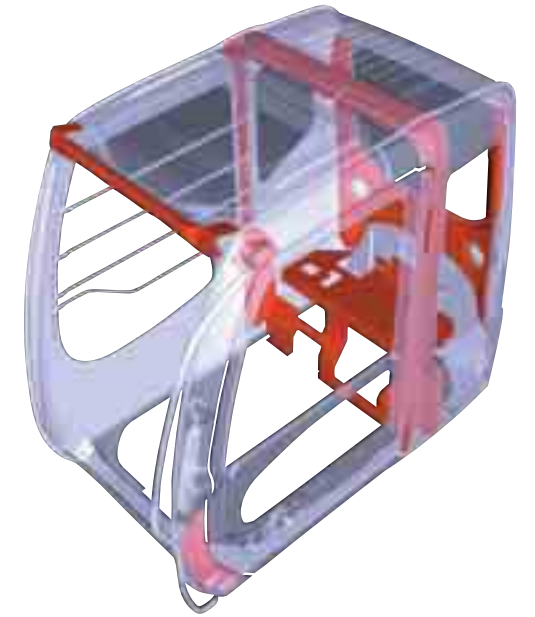
Easy-to-Reach Switches

Auto Control Air Conditioner (Option)



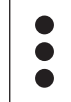
Z A X I S

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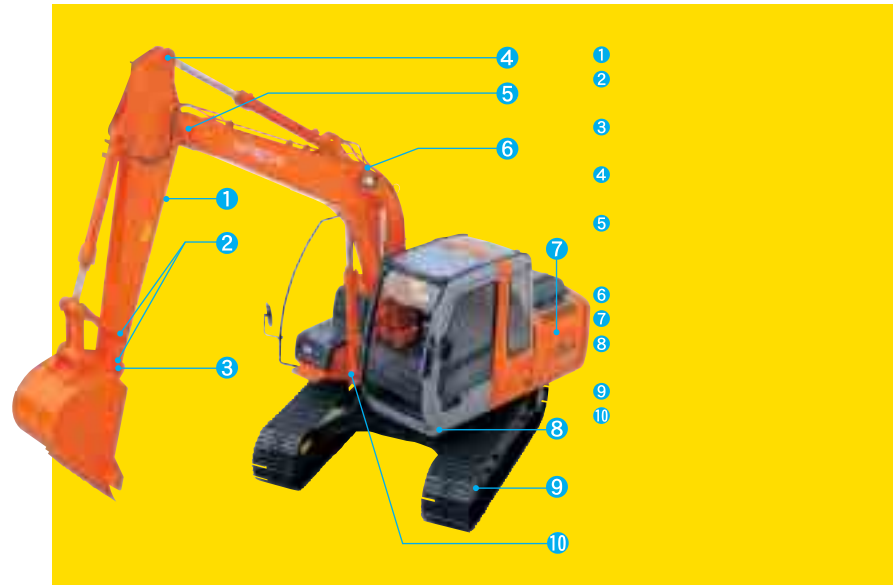
CRES (Center pillar Reinforced Structure)
I

Z A X I S



Z A X I S

&



New HN Bushing



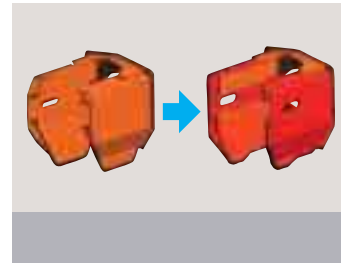
WC Thermal Spraying (Tungsten Carbide)

Used at arm end and bucket connection to increase wear resistance and reduce jerking.

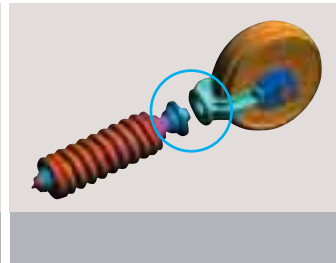


Reinforced Resin Thrust Plates

Strengthened Swing Circle



Rigid Undercarriage



M-Shaped Track Link Seals Provide High Grease Retention

Front and Bucket Components Only Need Lubrication Every 500 Hours



Engine Oil Filter and Water Separator Positioned for Easy Checking from Ground

Hydraulic Oil Filter Only Needs Replacement Every 1000 Hours



Undercarriage Designed for Easy Mud Removal

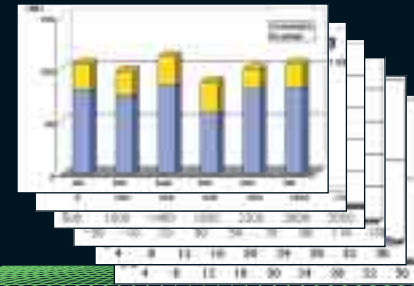
Z A X I S

Equipment Operation Status Report

Onboard ICX (Information Controller)

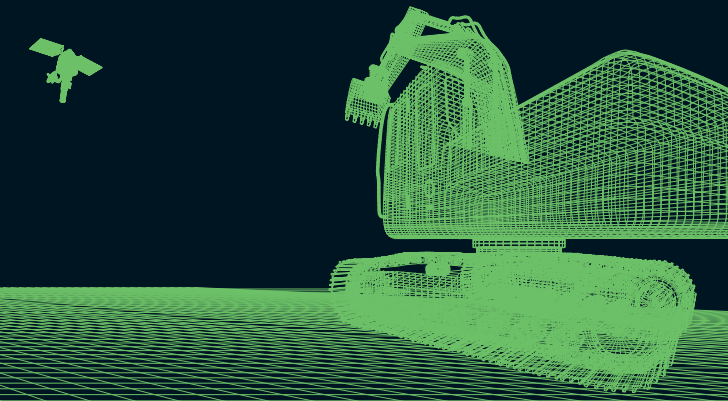
PC

Information Services for Equipment



Providing the data for making the right decisions.

Z A X I S



Z A X I S



Low Noise Operation



Emissions Control Engine

II



Labeled Plastic Parts

Lead-Free Wiring and Aluminium Radiator and Oil Cooler



WEIGHTS AND GROUND PRESSURE

Equipped with 4.27 m (14'0") boom, 2.26 m (7'5") arm and 0.45 m³ (0.59 yd³: SAE, PCSA heaped) bucket.

ZAXIS110

Triple grouser	500 mm (20")	10 700 kg (23 600 lb)	36 kPa (0.37 kgf/cm ² , 5.26 psi)
	600 mm (24")	11 000 kg (24 300 lb)	31 kPa (0.32 kgf/cm ² , 4.55 psi)
	700 mm (28")	11 200 kg (24 700 lb)	27 kPa (0.28 kgf/cm ² , 3.98 psi)
Rubber	500 mm (20")	10 800 kg (23 800 lb)	36 kPa (0.37 kgf/cm ² , 5.26 psi)
Flat	510 mm (20")	11 200 kg (24 700 lb)	37 kPa (0.38 kgf/cm ² , 5.40 psi)
	700 mm (28")	11 000 kg (24 300 lb)	26 kPa (0.27 kgf/cm ² , 3.98 psi)

ZAXIS110M

Triple grouser	700 mm (28")	12 800 kg (28 200 lb)	27 kPa (0.28 kgf/cm ² , 3.98 psi)
Single high grouser	960 mm (38")	13 700 kg (30 200 lb)	22 kPa (0.22 kgf/cm ² , 3.13 psi)
Triangular	760 mm (30")	13 700 kg (30 200 lb)	27 kPa (0.28 kgf/cm ² , 3.98 psi)
	900 mm (35")	13 400 kg (29 500 lb)	23 kPa (0.23 kgf/cm ² , 3.27 psi)

Weights of the basic machines [including 1 800 kg (3 970 lb), counterweight and triple grouser shoes, excluding front-end attachment, fuel, hydraulic oil, engine oil and coolant etc.] are:

ZAXIS110..... 8 250 kg (18 200 lb) with 500 mm (20") shoes
ZAXIS110M.....10 300 kg (22 700 lb) with 700 mm (28") shoes

Buckets

Capacity (m ³)	Capacity (yd ³)	Width (mm)	Height (mm)	No. of pins	Weight (kg)	Material suitability					
						1	2	3	4	5	6
0.19 m ³ (0.25 yd ³)	0.17 m ³	450 mm (18")	550 mm (22")	3	260 kg (570 lb)	○	○	○	○	○	○
0.30 m ³ (0.39 yd ³)	0.25 m ³	580 mm (23")	700 mm (28")	3	290 kg (640 lb)	○	○	○	○	○	○
0.40 m ³ (0.52 yd ³)	0.33 m ³	680 mm (27")	800 mm (31")	4	340 kg (750 lb)	○	○	○	○	○	○
0.45 m ³ (0.59 yd ³)	0.40 m ³	850 mm (33")	970 mm (38")	5	400 kg (800 lb)	○	○	○*	○	○	○
0.50 m ³ (0.65 yd ³)	0.45 m ³	890 mm (35")	1 010 mm (40")	5	410 kg (900 lb)	○	○	-	○	○	○
0.59 m ³ (0.77 yd ³)	0.50 m ³	950 mm (37")	1 070 mm (42")	5	430 kg (950 lb)	○	□	-	○	□	-
1 0.45 m ³ (0.59 yd ³)	0.40 m ³	850 mm (33")	970 mm (38")	5	450 kg (990 lb)	○	○	○	○	○	○
**2 0.50 m ³ (0.65 yd ³)	0.45 m ³	890 mm (35")	1 010 mm (40")	5	500 kg (1 100 lb)	○	-	-	○	-	-
*3 0.50 m ³ (0.65 yd ³)	0.45 m ³	890 mm (35")	1 010 mm (40")	5	480 kg (1 060 lb)	○	-	-	○	-	-
V-type bucket: 0.35 m ³ (0.46 yd ³ : CECE heaped)				3	370 kg (820 lb)	○	○	○	○	○	○
One-point ripper				1	320 kg (710 lb)	●	●	-	-	-	-
Clamshell bucket: 0.30 m ³ (0.39 yd ³ : CECE heaped), Width 560 mm (22")				6	690 kg (1 520 lb)	○	○	-	○	○	-
Slope-finishing blade: Width 1 000 mm (39"), length 1 600 mm (63")					430 kg (950 lb)	◇	◇	◇	◇	◇	◇

* With 700 mm (28") shoes only
*1 Reinforced bucket
*2 Level-pin-type reinforced bucket
*3 H-bucket

○ Suitable for materials with density of 1 800 kg/m³ (3 030 lb/yd³) or less
○ Suitable for materials with density of 1 600 kg/m³ (2 700 lb/yd³) or less
□ Suitable for materials with density of 1 100 kg/m³ (1 850 lb/yd³) or less
● Heavy-duty service
◇ Slope-finishing service
- Not applicable

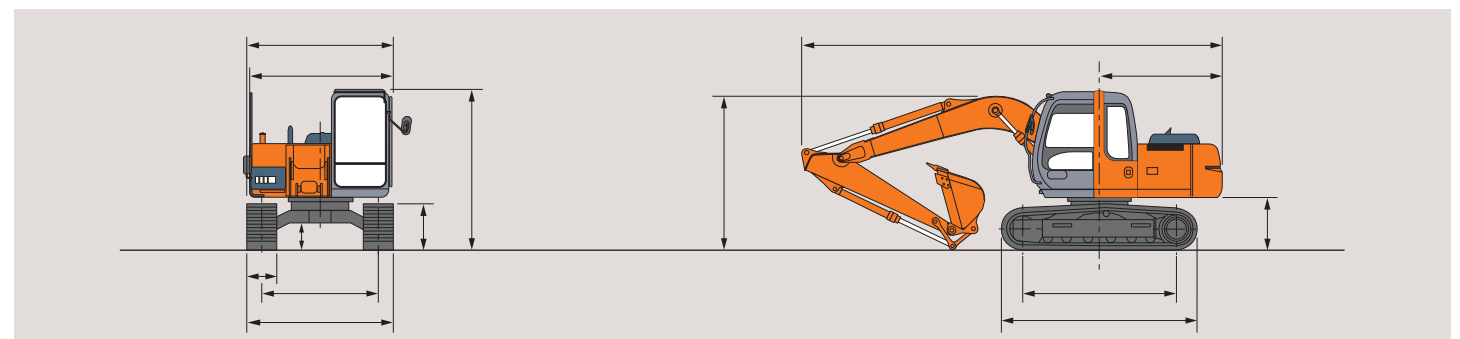
SERVICE REFILL CAPACITIES

	liters	US gal	Imp gal
Fuel tank	250.0	66.1	55.0
Engine coolant	19.0	5.0	4.2
Engine oil	15.8	4.2	3.5
Swing device	3.2	0.8	0.7
Travel device ZAXIS110	4.0	1.1	0.9
(each side) ZAXIS110M	3.5	0.9	0.8
Hydraulic system	130.0	34.3	28.6
Hydraulic oil tank	69.0	18.2	15.2

BACKHOE ATTACHMENTS

Boom and arms are of welded, box-section design. 4.27 m (14'0") boom, and 1.96 m (6'5"), 2.26 m (7'5") and 2.81 m (9'3")* arms are available. Bucket is of welded steel structure. Side clearance adjust mechanism provided on the bucket joint bracket.

DIMENSIONS



Unit: mm (ft in)

A Distance between tumbles	2 620 (8'7")				2 990 (9'10")			
B Undercarriage length	3 340 (10'11")				3 790 (12'5")			
*C Counterweight clearance	890 (2'11")				1 100 (3'7")			
D Rear-end swing radius	2 130 (7'0")				2 130 (7'0")			
D' Rear-end length	2 130 (7'0")				2 130 (7'0")			
E Overall width of upperstructure	2 460 (8'1")				2 460 (8'1")			
F Overall height of cab	2 740 (9'0")				2 950 (9'8")			
*G Min. ground clearance	440 (1'5")				595 (1'11")			
H Track gauge	1 990 (6'6")				2 040 (6'8")			
I Track shoe width	G 500 (20")	G 600 (24")	G 700 (28")	F 510 (20")	G 700 (28")	T 760 (30")	H 960 (38")	
J Undercarriage width	2 490 (8'2")	2 590 (8'6")	2 690 (8'10")	2 500 (8'2")	2 740 (9'0")	2 800 (9'2")	3 000 (9'10")	
K Overall width	2 500 (8'2")	2 590 (8'6")	2 690 (8'10")	2 500 (8'2")	2 740 (9'0")	2 800 (9'2")	3 000 (9'10")	
L Overall length								
With 1.96 m (6'5") arm	7 220 (23'8")				7 220 (23'8")			
With 2.26 m (7'5") arm	7 220 (23'8")				7 220 (23'8")			
With 2.81 m (9'3") arm	7 240 (23'9")				7 220 (23'8")			
M Overall height of boom								
With 1.96 m (6'5") arm	2 600 (8'6")				2 670 (8'9")			
With 2.26 m (7'5") arm	2 680 (8'10")				2 740 (9'0")			
With 2.81 m (9'3") arm	**2 680 (8'10")				**2 690 (8'10")			
N Track height								
With triple grouser shoes	790 (2'7")				940 (3'1")			

* Excluding track shoe lug

G : Triple grouser shoe

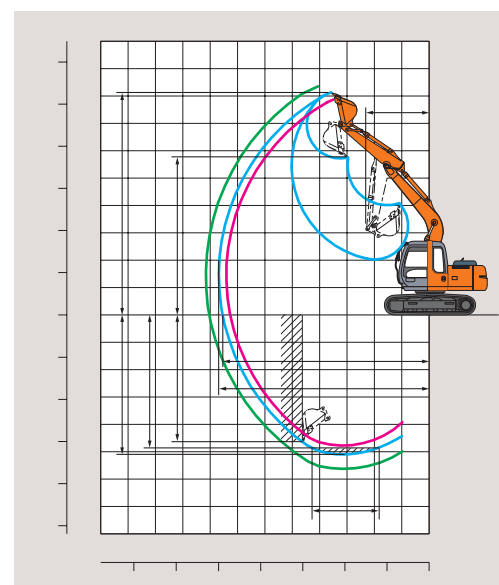
F : Flat shoe

** The dimension is shown in the transportation hole position of the arm

T : Triangular shoe

H : Triple high grouser shoe

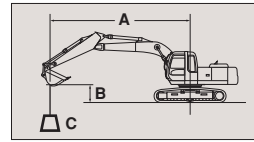
WORKING RANGES



Unit: mm (ft in)

A Max. digging reach	7 430 (24'5")	7 700 (25'3")	8 180 (26'10")	7 430 (24'5")	7 700 (25'3")	8 180 (26'10")	
A' Max. digging reach (on ground)	7 290 (23'11")	7 570 (24'10")	8 060 (26'5")	7 250 (23'9")	7 530 (24'8")	8 020 (26'4")	
B Max. digging depth	4 780 (15'8")	5 080 (16'8")	5 630 (18'6")	4 580 (15'0")	4 880 (16'0")	5 430 (17'10")	
B' Max. digging depth (8' level)	4 520 (14'10")	4 850 (15'11")	5 430 (17'10")	4 320 (14'2")	4 650 (15'3")	5 220 (17'2")	
C Max. cutting height	7 940 (26'0")	8 110 (26'7")	8 360 (27'5")	8 140 (26'8")	8 320 (27'4")	8 570 (28'1")	
D Max. dumping height	5 530 (18'2")	5 700 (18'8")	5 960 (19'7")	5 730 (18'10")	5 910 (19'5")	6 170 (20'3")	
E Min. swing radius	2 310 (7'7")	2 340 (7'8")	2 600 (8'6")	2 300 (7'7")	2 330 (7'8")	2 590 (8'6")	
F Max. vertical wall	4 320 (14'2")	4 620 (15'2")	5 140 (16'10")	4 120 (13'6")	4 420 (14'6")	4 940 (16'2")	
Bucket digging force	ISO	90 kN (9 200 kgf, 20 300 lbf)					
	SAE, PCSA	78 kN (8 000 kgf, 17 600 lbf)					
Arm crowd force	ISO	60 kN (6 100 kgf, 13 400 lbf)	55 kN (5 600 kgf, 12 300 lbf)	48 kN (4 900 kgf, 10 800 lbf)	60 kN (6 100 kgf, 13 400 lbf)	55 kN (5 600 kgf, 12 300 lbf)	48 kN (4 900 kgf, 10 800 lbf)
	SAE, PCSA	57 kN (5 900 kgf, 13 000 lbf)	52 kN (5 300 kgf, 11 700 lbf)	47 kN (4 800 kgf, 10 600 lbf)	57 kN (5 900 kgf, 13 000 lbf)	52 kN (5 300 kgf, 11 700 lbf)	47 kN (4 800 kgf, 10 600 lbf)

*Excluding track shoe lug



A: Load radius
B: Load point height
C: Lifting capacity

METRIC MEASURE

ZAXIS110

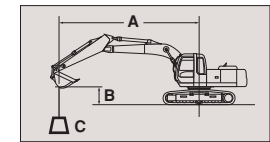
Rating over-side or 360 degrees Rating over-front Unit: 1 000 kg

	5 m																
Boom 4.27 m Arm 1.96 m Bucket SAE, PCSA : 0.45 m ³ CECE : 0.40 m ³ Shoe 500 mm	5 m					*2.40	*2.40	*2.10	*2.10					*1.16	*1.16	6.19	
	4 m					*2.63	*2.63	2.22	*2.57					*1.13	*1.13	6.69	
	3 m			*3.96	*3.96	3.15	*3.20	2.15	*2.83	1.54	2.11			*1.14	*1.14	6.98	
	2 m					2.96	*3.96	2.06	2.81	1.50	2.06			1.10	*1.18	7.10	
	1 m					2.79	3.89	1.96	2.71	1.45	2.01			1.09	*1.26	7.05	
	0 (Ground)					2.68	3.77	1.90	2.64	1.41	1.97			1.14	*1.38	6.82	
	-1 m			4.25	4.25	2.64	3.73	1.86	2.60	1.39	1.95			1.27	*1.58	6.41	
	-2 m	*6.03	*6.03	4.29	4.29	2.65	3.73	1.86	2.60					1.53	*1.91	5.76	
	-3 m	*5.80	*5.80	4.37	4.37	2.69	3.79							2.15	*2.42	4.74	

	5 m																
Boom 4.27 m Arm 2.26 m Bucket SAE, PCSA : 0.45 m ³ CECE : 0.40 m ³ Shoe 500 mm	5 m							*2.14	*2.14					*0.98	*0.98	6.50	
	4 m					*2.36	*2.36	2.24	*2.36	1.58	*1.75			*0.96	*0.96	6.98	
	3 m			*3.07	*3.07	*2.92	*2.92	2.17	*2.64	1.55	2.12			*0.97	*0.97	7.26	
	2 m			4.66	*5.06	3.00	*3.69	2.07	2.83	1.50	2.07			*1.00	*1.00	7.37	
	1 m					2.81	3.92	1.97	2.72	1.45	2.01			1.00	*1.07	7.32	
	0 (Ground)			4.25	*4.62	2.69	3.78	1.89	2.64	1.40	1.96			1.05	*1.18	7.11	
	-1 m			4.22	6.19	2.63	3.72	1.85	2.59	1.37	1.93			1.15	*1.35	6.72	
	-2 m	*5.63	*5.63	4.25	6.21	2.62	3.71	1.83	2.57	1.38	1.93			1.37	*1.64	6.10	
	-3 m			4.31	*5.58	2.65	3.75	1.86	2.61								
	-4 m			*4.17	*4.17	2.75	*3.14										

	6 m																
Boom 4.27 m Arm 2.81 m Bucket SAE, PCSA : 0.40 m ³ CECE : 0.33 m ³ Shoe 500 mm	6 m							*1.59	*1.59					*0.92	*0.92	6.40	
	5 m							*1.85	*1.85	*1.36	*1.36			*0.87	*0.87	7.05	
	4 m							*1.97	*1.97	*1.87	*1.87			*0.85	*0.85	7.48	
	3 m					*2.23	*2.23	2.21	*2.27	1.57	2.14	1.14	*1.32	*0.87	*0.87	7.74	
	2 m			*4.13	*4.13	3.08	*3.17	2.10	*2.70	1.51	2.08	1.11	1.56	0.88	*0.90	7.85	
	1 m					2.86	3.98	1.99	2.74	1.45	2.01	1.08	1.53	0.87	*0.97	7.80	
	0 (Ground)			4.27	6.25	2.70	3.80	1.89	2.64	1.39	1.95	1.05	1.49	0.90	*1.07	7.60	
	-1 m	*2.99	*2.99	4.17	6.13	2.60	3.69	1.82	2.56	1.35	1.91	1.03	1.47	0.97	*1.22	7.24	
	-2 m	*5.01	*5.01	4.16	6.12	2.57	3.65	1.79	2.53	1.33	1.89			1.13	*1.46	6.69	
	-3 m	*6.93	*6.93	4.20	*6.12	2.58	3.67	1.80	2.54					1.43	*1.90	5.87	
	-4 m	*6.82	*6.82	4.30	*5.06	2.64	3.73	1.86	2.60								

Notes: 1. Ratings are based on SAE J1097.
2. Lifting capacity of the ZAXIS Series does not exceed 75% of tipping load with the machine on firm level ground, or 87% full hydraulic capacity.
3. The load point is a hook (not standard equipment) located on the back of the bucket.
4. *Indicates load limited by hydraulic capacity.



A: Load radius
B: Load point height
C: Lifting capacity

METRIC MEASURE

ZAXIS110M

Rating over-side or 360 degrees Rating over-front Unit: 1 000 kg

	5 m																
Boom 4.27 m Arm 1.96 m Bucket SAE, PCSA : 0.45 m ³ CECE : 0.40 m ³ Shoe 700 mm	5 m					*2.42	*2.42	*2.35	*2.35					*1.15	*1.15	6.31	
	4 m					*2.72	*2.72	*2.61	*2.61	*1.51	*1.51			*1.13	*1.13	6.76	
	3 m			*4.30	*4.30	*3.34	*3.34	2.68	*2.90	1.96	*2.62			*1.15	*1.15	7.02	
	2 m					3.66	*4.11	2.58	*3.29	1.92	*2.86			*1.19	*1.19	7.10	
	1 m					3.50	*4.74	2.49	*3.65	1.87	*3.04			*1.28	*1.28	7.01	
	0 (Ground)					3.41	*5.03	2.43	*3.87	1.83	3.02			*1.41	*1.41	6.76	
	-1 m			5.43	*5.44	3.38	*5.00	2.40	*3.89	1.82	*3.01			*1.63	*1.63	6.30	
	-2 m	*6.21	*6.21	5.47	*5.98	3.39	*4.65	2.41	*3.62					*2.01	*2.01	5.59	
	-3 m			*4.95	*4.95	3.45	*3.88										

	5 m																
Boom 4.27 m Arm 2.26 m Bucket SAE, PCSA : 0.45 m ³ CECE : 0.40 m ³ Shoe 700 mm	5 m							*2.24	*2.24					*0.97	*0.97	6.62	
	4 m					*2.45	*2.45	*2.41	*2.41	*1.93	*1.93			*0.96	*0.96	7.05	
	3 m			*3.67	*3.67	*3.07	*3.07	2.70	*2.71	1.97	*2.52			*0.97	*0.97	7.30	
	2 m					3.70	*3.86	2.59	*3.13	1.92	*2.74			*1.01	*1.01	7.37	
	1 m					3.52	*4.55	2.50	*3.52	1.87	*2.95			*1.09	*1.09	7.29	
	0 (Ground)			*4.96	*4.96	3.41	*4.95	2.42	*3.80	1.82	3.01			*1.21	*1.21	7.04	
	-1 m	*3.21	*3.21	5.39	*6.75	3.36	*5.02	2.38	*3.88	1.80	2.99			*1.40	*1.40	6.61	
	-2 m	*5.65	*5.65	5.42	*6.26	3.36	*4.77	2.38	*3.72								
	-3 m	*6.84	*6.84	*5.36	*5.36	3.41	*4.15										

	6 m																
Boom 4.27 m Arm 2.81 m Bucket SAE, PCSA : 0.40 m ³ CECE : 0.33 m ³ Shoe 700 mm	6 m							*1.72	*1.72					*0.91	*0.91	6.53	
	5 m							*1.86	*1.86	*1.52	*1.52			*0.86	*0.86	7.15	
	4 m							*2.01	*2.01	*1.93	*1.93			*0.85	*0.85	7.55	
	3 m					*2.38	*2.38	*2.35	*2.35	1.99	*2.24			*0.87	*0.87	7.78	
	2 m			*4.50	*4.50	*3.34	*3.34	2.63	*2.79	1.93	*2.49			1.18	0.91	7.85	
	1 m					3.57	*4.14	2.51	*3.25	1.86	*2.75			*0.98	*0.98	7.77	
	0 (Ground)			5.41	*6.20	3.42	*4.71	2.42	*3.61	1.81	*2.97			*1.09	*1.09	7.55	
	-1 m	*3.32	*3.32	5.33	*6.90	3.33	*4.96	2.36	*3.81	1.77	2.96			*1.26	*1.26	7.15	
	-2 m	*5.48	*5.48	5.33	*6.61	3.31	*4.89	2.33	*3.79	1.76	2.94			*1.53	*1.53	6.54	
	-3 m	*7.25	*7.25	5.38	*5.95	3.33	*4.50	2.35	*3.48					2.00	*2.04	5.65	
	-4 m	*6.36	*6.36	*4.77	*4.77	3.40	*3.62										

Notes: 1. Ratings are based on SAE J1097.
2. Lifting capacity of the ZAXIS Series does not exceed 75% of tipping load with the machine on firm level ground, or 87% full hydraulic capacity.
3. The load point is a hook (not standard equipment) located on the back of the bucket.
4. *Indicates load limited by hydraulic capacity.



STANDARD EQUIPMENT

Standard equipment may vary by country, so please consult your Hitachi dealer for details.

ENGINE

- H/P mode control
- E mode control
- 50 A alternator
- Cartridge-type engine oil filter
- Cartridge-type fuel filter
- Air cleaner double filters
- Radiator and oil cooler with dust protective net
- Radiator reserve tank
- Fan guard
- Isolation-mounted engine
- Auto-idle system
- Auto acceleration system

- Adjustable reclining seat with adjustable armrests
- Footrest
- Electric double horn
- AM - FM radio with digital clock
- Auto-idle / acceleration selector
- Seat belt
- Drink holder
- Cigar lighter
- Ashtray
- Storage box
- Glove compartment
- Floor mat
- Heater
- Pilot control shut-off lever
- Engine stop knob

- Fuel level float
- Hydraulic oil level gauge
- Tool box
- Rearview mirror (right & left side)
- Swing parking brake

HYDRAULIC SYSTEM

- Work mode selector
- Engine speed sensing system
- E-P control system
- Quick warm-up system for pilot circuit
- Shockless valve in pilot circuit
- Boom-arm anti-drift valve
- Control valve with main relief valve
- Extra port for control valve
- Suction filter
- Full-flow filter
- Pilot filter

MONITOR SYSTEM

- Meters:
 - Hourmeter and trip-meter, engine coolant temperature gauge and fuel gauge
- Warning lamps:
 - Alternator charge, engine oil pressure, engine overheat, air filter restriction and minimum fuel level
- Pilot lamps:
 - Engine preheat, work light, auto-idle, auto-acceleration, digging mode and attachment mode
- Alarm buzzers:
 - Engine oil pressure and engine overheat

UNDERCARRIAGE

- Travel parking brake
- Travel motor covers
- Track guards and hydraulic track adjuster
- Bolt-on sprocket
- Upper rollers and lower rollers
- Reinforced track links with pin seals
- 500 mm (20") triple grouser shoes (ZAXIS110)
- 700 mm (28") triple grouser shoes (ZAXIS110M)

FRONT ATTACHMENTS

- HN bushing
- WC thermal spraying
- Reinforced resin thrust plate
- Flanged pin
- Bucket clearance adjust mechanism
- Monolithically cast bucket link A
- Centralized lubrication system
- Dirt seal on all bucket pins
- 2.26 m (7'5") arm
- 0.45 m³ (0.59 yd³ : SAE, PCSA heaped) bucket

CAB

CRES (Center pillar Reinforced Structure) cab

- OPG top guard fitted level I (ISO) compliant cab
- All-weather sound-suppressed steel cab
- Equipped with reinforced, tinted glass windows
- 4 fluid-filled elastic mounts
- Openable windows-upper and lower front, and lower left side
- Intermittent windshield retractable wipers
- Front window washer

LIGHTS

- 2 working lights

UPPERSTRUCTURE

- Undercover
- 1 800 kg (3 970 lb) counterweight

MISCELLANEOUS

- Standard tool kit
- Lockable machine covers
- Lockable fuel filling cap
- Skid-resistant tapes, plates and handrails
- Travel direction mark on track frame



OPTIONAL EQUIPMENT

Optional equipment may vary by country, so please consult your Hitachi dealer for details.

- Auto control air conditioner
- Suspension seat
- Hose rupture valves
- Electric fuel refilling pump
- Swing motion alarm device with lamps
- Travel motion alarm device
- Additional pump
- Auto-lubrication system

- Pre-cleaner
- Fuel double filters
- Tropical cover
- Large-capacity battery
- Attachment basic piping
- Accessories for breaker
- Accessories for breaker & crusher
- Accessories for 2 speed selector

- 200 kg (440 lb) added heavier counterweight
- Front glass lower guard
- Front glass upper guard
- Full track guard

Hitachi Construction Machinery Co., Ltd.

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KS-E342Q



Band Drain Machine is modified by the excavator