



俊和 - 中國中鐵聯營

CHUN WO - CRGL JOINT VENTURE

Contract No. HK/2009/02

Wan Chai Development Phase II

Central - Wan Chai Bypass at Wan Chai East

Noise Management Plan - Revision A

Noise Management Plan

(Pursuant to the Further Environmental Permit - No. FEP-03/356/2009)

(Revision A)

Revision: A

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1.0 Purpose of this Plan

Pursuant to the Further Environmental Permit (No. FEP-03/356/2009), Special Conditions, Part C, Clause 2.17, Noise Management Plan (NMP) is developed by Permit Holder (Chun Wo - CRGL Joint Venture (CW-CRGL)) to demonstrate clearly the management of construction noise nuisance generated in the execution of works for the Project. The mitigation measures specified in this NMP will be implemented on site to reduce and/or minimise the nuisance to the publics and nearest noise sensitive receivers.

2.0 Project Description

The key purpose of Wan Chai Development Phase II (WDII) is to provide land at Wan Chai North and North Point for construction of the Central-Wan Chai Bypass and Island Eastern Corridor Link (CWB). Land formed under the project will be developed as a world-class waterfront promenade joining that at the new Central waterfront for public enjoyment.

Wan Chai Development Phase II - Central - Wan Chai Bypass at Wan Chai East (Project Number: HK/2009/02) is one of the major sub-project of the above mentioned Development. This project was commenced on 28 January 2010 and its project period will be last for 80 months.

2.1 Scope of Works

The major scopes of works comprise but not limited to the following:

- Reclamation and Central - Wan Chai Bypass (CWB) tunnel structure from the east of Fleming Road to the west edge of the former Wan Chai Public Cargo Working Area (ex-PCWA);
- Re provisioning of Wan Chai ferry pier;
- Re provisioning of submarine sewage outfall;
- Re provisioning of the WSD salt water pumping station at Wan Shing Street and its salt water intake culvert;
- Re provisioning of the cooling water pumping stations and the associated intake pipes for the China Resources Centre, Great Eagle Centre / Harbour Centre and Sun Hung Kai Centre and discharge pipes for Sun Hung Kai Centre;
- Construction of drainage box culvert and drainage mitigation works;



- Junction improvement works at junctions of Harbour Road / Tonnochy Road and Fleming Road/Gloucester Road;
- Permanent government helipad, public toilet and associated road works in Expo Drive East;
- Demolition of existing Wan Chai East Ferry Pier, existing WSD salt water pumping station, existing superstructure of Expo Drive East Pier, existing Sun Hung Kai cooling water pumping station, temporary government helipad;
- Provision of assistance to the Employer in emergency incident; and
- Other works which are shown on the Drawings or Specified or which may be ordered in accordance with the Conditions of Contract.

3.0 Environmental Legislation, Policies, Plans, Standards and Criteria

Environmental Impact Assessment Process (EIAO) and Noise Control Ordinance (NCO) provide the statutory framework for noise control. Pursuant to Technical Memorandum of EIA, noise standard for daytime construction activities as list in Table A:

Noise Sources	0700 to 1900 hours on any day not being a Sunday or general holiday	1900 to 0700 hours or any time on Sundays or general holiday
Noise Standards	Leq (30 mins) dB(A)	
Uses		
All domestic premises including temporary housing accommodation	75	The criteria laid down in the relevant technical memoranda under the Noise Control Ordinance for designated areas and construction works other than percussive piling may be used for planning purpose. A Construction Noise Permit (CNP) shall be required for the carrying out of the construction work during the period.
Hotels and hostels	75	
Educational institutions including kindergartens, nurseries and all others where unaided voice communication is required	70 65 (During examinations)	

Table A: Noise Standard for Daytime Construction Activities



4.0 Noise Sensitive Receivers

The nearest Noise Sensitive Receiver (NSR) as identified in the EIA report of the Project would be N2 - Causeway Centre. Also, Society of the Prevention of Cruelty to Animals (HK) (SPCA) would be regard as a NSR after consultation with Environmental Protection Department (EPD). Pursuant to TM of EIA, the noise standard for N2 and SPCA shall be 75 Leq (30mins) dB(A) during 0700 to 1900 hours on any day not being a Sunday or general holiday. **Appendix A** shows the shorted distances between the worst affected NSRs and the work areas of each construction working schedules of the Project.

5.0 Identification of Environmental Impacts

Potential construction impacts of the Project might arise from the following activities:

- Dredging works and seawall construction;
- Filling behind seawall;
- Re provisioning of ferry pier;
- Road formation, earthworks and pavements;
- Tunnel construction; and
- Drainage culvert construction.

6.0 Prediction and Evaluation of Environmental Impacts

The combined sound power level of Powered Mechanical Equipments (PME) (without and with mitigation measures implemented) for different construction tasks during normal day time working hours are shown as below Table 1 - 18.

Table 1: Dredging

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Grab Dredger	CNP 063	1	112	112
Tug Boat	CNP 221	2	110	113
Barges	---	2	0	0
(Without Mitigation Measures) Combined Sound Power Level = 115.5 dB(A)				



Table 2: Seawall Construction

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Derrick Barge	CNP 061	1	104	104
Tug Boat	CNP 221	1	110	110
Crane	CNP 048	1	112	112
Barge	---	2	0	0
(Without Mitigation Measures) Combined Sound Power Level = 114.5 dB(A)				

Table 3: Filling Behind Seawall

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Derrick Barge	CNP 061	1	104	104
Barge	---	2	0	0
Tug Boat	CNP 221	2	110	113
*Bulldozer	CNP 030	1	115	115
(Without Mitigation Measures) Combined Sound Power Level = 117.5 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 115 dB(A)				

*QPME with 110 dB(A) from EPD's Inventory

Table 4: Drainage Culverts

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Concrete Lorry Mixer	CNP 044	1	109	109
Excavator	CNP 081	1	112	112
Poker Vibrator	CNP 170	1	113	113
Roller	CNP 186	1	108	108
Air Compressor	CNP 002	1	100	100
(Without Mitigation Measures) Combined Sound Power Level = 117 dB(A)				

Table 5: Cooling Intake Chamber

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Crane	CNP 048	1	112	112
Tug Boat	CNP 221	1	110	110
Barges	---	1	0	0
(Without Mitigation Measures) Combined Sound Power Level = 114 dB(A)				



Table 6: Pipeline Works

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
*Crane	CNP 048	1	112	112
#Excavator	CNP 081	1	112	112
Concrete Lorry Mixer	CNP 044	1	109	109
#Poker Vibrator	CNP 170	1	113	113
#Air Compressor	CNP 002	1	102	102
Compactor	CNP 050	1	105	105
(Without Mitigation Measures) Combined Sound Power Level = 118 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 113 dB(A)				

*QPME with 101 dB(A) from EPD's Inventory

Use of Movable Noise Barrier with a negative correction of 5 dB(A)

Table 7: Diaphragm Wall

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
*Crane	CNP 048	1	112	112
#Excavator	CNP 081	1	112	112
Concrete Lorry Mixer	CNP 044	1	109	109
#Bentonite Plants	CNP 162	1	105	105
#Bar Bender	CNP 021	1	90	90
#Diaphragm Wall Rigs	CNP 164	1	115	115
(Without Mitigation Measures) Combined Sound Power Level = 119 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 113.5 dB(A)				

*QPME with 101 dB(A) from EPD's Inventory

Use of Movable Noise Barrier with a negative correction of 5 dB(A)

Table 8: Excavation

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Excavator	CNP 081	1	112	112
#Dump Truck	CNP 067	1	117	117
(Without Mitigation Measures) Combined Sound Power Level = 118 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 115 dB(A)				

Use of Movable Noise Barrier with a negative correction of 5 dB(A)



Table 9: Construction of Slabs

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
*Crane	CNP 048	1	112	112
Concrete Pump	CNP 047	1	109	109
#Poker Vibrator	CNP 170	1	113	113
#Bar Bender	CNP 021	1	90	90
#Air Compressor	CNP 002	1	100	100
(Without Mitigation Measures) Combined Sound Power Level = 116.5 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 112 dB(A)				

*QPME with 101 dB(A) from EPD's Inventory

Use of Movable Noise Barrier with a negative correction of 5 dB(A)

Table 10: Backfill

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
#Excavator	CNP 081	2	112	115
*Bulldozer	CNP 030	1	115	115
Roller	CNP 186	1	108	108
#Dump Truck	CNP 067	1	117	117
(Without Mitigation Measures) Combined Sound Power Level = 120 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 116 dB(A)				

*QPME with 110 dB(A) from EPD's Inventory

Use of Movable Noise Barrier with a negative correction of 5 dB(A)

Table 11: Piling for Ferry Pier

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Piling Rig	CNP 164	1	115	115
Generator	CNP 102	1	100	110
Water Pump	CNP 281	1	88	88
Crane	CNP 048	1	112	112
Concrete Lorry Mixer	CNP 044	2	109	112
Barge	CNP 061	1	104	104
Bar Bender	CNP 021	1	90	90
Air Compressor	CNP 002	1	100	100
(Without Mitigation Measures) Combined Sound Power Level = 118 dB(A)				

Table 12: Deck Construction and Superstructure for Ferry Pier

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Generator	CNP 102	1	100	100
Crane	CNP 048	1	112	112
Barge	CNP 061	1	104	104
(Without Mitigation Measures) Combined Sound Power Level = 113 dB(A)				



Table 13: Demolition of Structure

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Group A				
#+Breaker	CNP 027	1	122	122
(Without Mitigation Measures) Combined Sound Power Level = 122 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 112 dB(A)				
Group B				
#Excavator	CNP 081	1	112	112
#Dump Truck	CNP 067	1	117	117
(Without Mitigation Measures) Combined Sound Power Level = 118 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 113 dB(A)				
(With Mitigation Measures) (Group A+B) Combined Sound Power Level = 115.5 dB(A)				

Use of Movable Noise Barrier with a negative correction of 5 dB(A)

+ Enclosed Breaker Tip (with 50mm rockwool) with a negative correction of 5 dB(A)

Table 14: Reprovisioning at HKCEC

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Breaker	CNP 027	1	122	122
Excavator	CNP 081	1	112	112
Dump Truck	CNP 067	2	117	120
Generator	CNP 102	1	100	100
Water Pump	CNP 281	1	88	88
Crane	CNP 048	1	112	112
Concrete Pump	CNP 047	1	109	109
Concrete Lorry Mixer	CNP 044	2	109	112
Barge	---	1	0	0
Poker Vibrator	CNP 170	2	113	116
Bar Bender	CNP 021	1	690	90
Air Compressor	CNP 002	1	100	100
Combined Sound Power Level = 125 dB(A)				

Table 15: Marine Section

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Tug Boat	CNP 221	1	110	110
Crane	CNP 048	1	112	112
Dredger	CNP 063	1	112	112
Barges	---	1	0	0
(Without Mitigation Measures) Combined Sound Power Level = 116 dB(A)				



Table 16: Land Section

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Crane	CNP 048	1	112	112
Breaker	CNP 027	1	122	122
Excavator	CNP 081	1	112	112
Dump Truck	CNP 067	2	117	120
Concrete Lorry Mixer	CNP 044	1	109	109
Poker Vibrator	CNP 170	2	113	116
Compactor	CNP 050	1	105	105
Air Compressor	CNP 002	1	100	100
(Without Mitigation Measures) Combined Sound Power Level = 125 dB(A)				

Table 17: Construction of New Pumping Station

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
Group A				
*Crane	CNP 048	1	112	112
(Without Mitigation Measures) Combined Sound Power Level = 122 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 101 dB(A)				
Group B				
##Concrete Pump	CNP 047	1	109	109
##Concrete Lorry Mixer	CNP 044	1	109	109
++Poker Vibrator	CNP 170	1	113	113
(Without Mitigation Measures) Combined Sound Power Level = 115.5 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 105.5 dB(A)				
(With Mitigation Measures) (Group A + B) Combined Sound Power Level = 107 dB(A)				

*QPME with 101 dB(A) from EPD's Inventory

Noise enclosure (minimum 100mm thick sound absorbing lining and 10mm thick plywood (or 1mm thick steel) backing) with a negative correction of 10 dB(A)

++ Use of Movable Noise Barrier (minimum 100mm thick sound absorbing lining and 10mm thick plywood (or 1mm thick steel) backing) with a negative correction of 10 dB(A)

Table 18: Road Works

Powered Mechanical Equipment (PME)	TM ID Code	No. of Items	Sound Power Level dB(A)	Total SPL dB(A)
#Dump Truck	CNP 067	1	117	117
#Excavator	CNP 081	1	112	112
Vibratory Roller	CNP 186	1	108	108
*Road Roller	CNP 185	1	108	108
*Asphalt Paver	CNP 004	1	109	109
(Without Mitigation Measures) Combined Sound Power Level = 119.5 dB(A)				
(With Mitigation Measures) Combined Sound Power Level = 115 dB(A)				

*QPME with 104 dB(A) from EPD's Inventory

Use of Movable Noise Barrier with a negative correction of 5 dB(A)



The predicted sound power level after correction of distance attenuation of noise levels at the identified NSRs for the different construction tasks at different stages are shown as below Table 19 – 23, works activity with same notation can be refer to Appendix A

Predicted Noise Level = Total Sound Power Level – Correction of Distance Attenuation – Correction of Facade Effect

Table 19: Stage 1 of Working Schedule

Works Activity	Construction Tasks (Table No.)	Total Sound Power Level dB(A)	Slant Distance (m) to SPCA	Predicted Noise Level dB(A) to SPCA	Slant Distance (m) to N2	Predicted Noise Level dB(A) to N2
A1	12	113.0	66	72.0	194	62.0
A2	1	115.5	80	72.5	200	64.5
	2	114.5	80	71.5	200	63.5
A3	3	115.0	90	71.0	200	64.0
A4	7	113.5	70	71.5	210	62.5
A5	8	115.0	68	73.0	210	64.0
	9	112.0	68	70.0	210	61.0
	10	116.0	68	74.0	210	65.0
A6	4	117.0	76	74.0	210	66.0
	5	114.0	76	71.0	210	63.0
	6	113.0	76	70.0	210	62.0
B1	2	114.5	150	65.5	242	61.5
	17 (A+B)	107.0	150	58.0	242	54.0
B2	17 A	101.0	19	70.0	306	47.0
	17 B	105.5	19	74.5	306	51.5
B3	17 (A+B)	107.0	46	69.0	340	53.0
B4	6	113.0	58	73.0	190	62.0
B5	15	116.0	150	67.0	294	62.0
B6	11	118.0	230	66.0	252	65.0
B7	14	125.0	460	71.0	430	71.0
B8	14	125.0	470	71.0	428	71.0
C1	18	115.0	510	61.0	420	61.0
C2	13 (A+B)	115.5	458	61.5	410	61.5
C3	18	115.0	470	61.0	400	61.0
C4	18	115.0	170	66.0	84	71.0
C5	13 (A+B)	115.5	460	61.5	430	61.5
C6	13 A	112.0	56	72.0	310	58.0
	13 B	113.0	56	73.0	310	59.0
C7	13 (A+B)	115.5	122	68.5	420	61.5
D1	(No PME)	---	---	---	---	---



Table 20: Stage 2 of Working Schedule

Works Activity	Construction Tasks	Total Sound Power Level dB(A)	Slant Distance (m) to SPCA	Predicted Noise Level dB(A) to SPCA	Slant Distance (m) to N2	Predicted Noise Level dB(A) to N2
A1	12	113.0	226	61.0	150	64.0
A2	1	115.5	74	73.5	150	66.5
A3	3	115.0	74	73.0	150	66.0
A4	7	113.5	150	64.5	180	62.5
A5	8	115.0	66	74.0	180	65.0
	9	112.0	66	71.0	180	62.0
	10	116.0	66	75.0	180	66.0
B1	12	113.0	114	67.0	340	59.0
B2	1	115.5	80	72.5	150	66.5
B3	3	115.0	80	72.0	150	66.0
B4	7	113.5	136	65.5	440	59.5
B5	7	113.5	60	72.5	188	63.5
C1	11	118.0	230	66.0	256	65.0
D1	(No PME)	---	---	---	---	---
D2	13 (A+B)	115.5	186	65.5	148	67.5
D3	13 (A+B)	115.5	138	67.5	160	66.5
E1	(No PME)	---	---	---	---	---
E2	13 (A+B)	115.5	118	69.5	420	61.5
E3	13 A	112.0	60	71.0	320	58.0
	13 B	113.0	60	72.0	320	59.0
E4	18	115.0	94	70.0	340	61.0
E5	13 (A+B)	115.5	150	66.5	440	61.5

Table 21: Stage 3 of Working Schedule

Works Activity	Construction Tasks	Total Sound Power Level dB(A)	Slant Distance (m) to SPCA	Predicted Noise Level dB(A) to SPCA	Slant Distance (m) to N2	Predicted Noise Level dB(A) to N2
A1	7	113.5	66	72.5	180	63.5
	8	115.0	66	74.0	180	65.0
	9	112.0	66	71.0	180	62.0
	10	116.0	66	75.0	180	66.0
A2	18	115.0	220	63.0	144	67.0
B1	7	113.5	98	68.5	400	59.5
B2	8	115.0	98	70.0	400	61.0
	9	112.0	98	67.0	400	58.0
	10	116.0	98	71.0	400	62.0
B3	7	113.5	128	66.5	260	60.5
C1	11	118.0	230	66.0	256	65.0
D1	7	113.5	118	67.5	420	59.5
D2	9	112.0	120	65.0	420	58.0
D3	9	112.0	60	71.0	340	58.0



Contract No. HK/2009/02

Wan Chai Development Phase II

Central - Wan Chai Bypass at Wan Chai East

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D4	13 (A+B)	115.5	114	69.5	414	61.5
D5	18	115.0	98	70.0	340	61.0
D6	18	115.0	70	73.0	354	61.0

Table 22: Stage 4 of Working Schedule

Works Activity	Construction Tasks	Total Sound Power Level dB(A)	Slant Distance (m) to SPCA	Predicted Noise Level dB(A) to SPCA	Slant Distance (m) to N2	Predicted Noise Level dB(A) to N2
A1	1	115.5	126	68.5	240	62.5
	2	114.5	126	67.5	240	61.5
A2	3	115.0	74	73.0	150	66.0
A3	7	113.5	60	72.5	192	62.5
A4	8	115.0	180	65.0	234	63.0
	9	112.0	180	62.0	234	60.0
	10	116.0	180	66.0	234	64.0
B1	8	115.0	60	74.0	290	61.0
	9	112.0	60	71.0	290	58.0
	10	116.0	60	75.0	290	62.0
C1	(No PME)	---	---	---	---	---
D1	13 (A+B)	115.5	254	62.5	154	66.5
D2	13 (A+B)	115.5	104	70.5	340	61.5
E1	18	115.0	68	73.0	354	61.0
E2	13 (A+B)	115.5	118	69.5	420	61.5
E3	2	114.5	118	68.5	340	60.5

Table 23: Stage 4A of Working Schedule

Works Activity	Construction Tasks	Total Sound Power Level dB(A)	Slant Distance (m) to SPCA	Predicted Noise Level dB(A) to SPCA	Slant Distance (m) to N2	Predicted Noise Level dB(A) to N2
A1	8	115.0	222	63.0	180	65.0
	9	112.0	222	60.0	180	62.0
	10	116.0	222	64.0	180	66.0
A2	11	118.0	200	67.0	340	64.0
A3	7	113.5	374	59.5	216	61.5
A4	8	115.0	340	61.0	200	64.0
	9	112.0	340	58.0	200	61.0
	10	116.0	340	62.0	200	65.0
A5	(Operate Inside the Tunnel)	---	---	---	---	---
B2	2	114.5	72	72.5	340	60.5
B3	2	114.5	84	70.5	340	60.5
B4	(Operate Inside the Tunnel)	---	---	---	---	---



7.0 Mitigation of Adverse Environmental Impacts

In order to reduce the excessive noise impacts at the affected NSRs during normal daytime working hours, mitigation measures such as implementing quiet powered mechanical equipment, movable noise barriers, good site practices and multi-phased construction schedules are recommended.

7.1 Quality Powered Mechanical Equipment (QPME)

For the following construction tasks of the Project, it is considered necessary to adopt quiet PME:

- Temporary seawall construction, filling behind seawall, for whole of WDII construction;
- Diaphragm wall, excavation, construction of slabs and backfilling in CWB tunnel construction;
- Drainage culverts construction;
- Ferry pier reprovisioning, including construction of new ferry pier and demolition of existing structure;
- WSD's salt water pumping station construction; and
- Road works construction.

Availability of QPME in the market will be sourced out based on EPD QPME's Inventory. The following types of QPME will be considered to be used for the Project during different construction tasks:

- Bulldozer, wheeled
- Excavator, wheeled/tracked
- Asphalt paver
- Road roller
- Vibratory roller
- Power rammer (petrol)
- Compactor, vibratory
- Crane, mobile
- Generator



7.2 Movable Noise Barrier

To alleviate the construction noise impact on the affected NSRs, movable noise barriers are proposed to be provided for particular items of plant and construction works. It is anticipated that a movable noise barrier comprised of minimum 50mm thick sound absorbing lining and 10mm thick plywood (or 1mm thick steel) backing with a cantilevered upper portion located within 5m from any static or mobile plant, that PME will be totally screened when viewed from the NSR, a negative correction of 5 dB(A) noise reduction would be achieved. The actual transmission loss of moveable noise barrier would be measured on substantiate site condition. **Appendix B** illustrates the general layout of the proposed movable noise barrier with section and plan views to be positioned with respect to the PMEs on site. "Guide on Design of Noise Barrier" from EPD would be one of the references during the design of the movable noise barriers.

The following items of plant will be suitable for implementing the movable noise barriers during operation:

- Excavator;
- Air Compressor;
- Bentonite Plants;
- Concrete Pump;
- Poker Vibrator;
- Hand-held Breaker;
- Diaphragm Wall Rigs;
- Breaker; and
- Generator.

7.3 Good Site Practices

The following good site practices should be adopted to further ameliorate the noise impacts:

- Only well-maintained plant shall be operated on-site and plant shall be serviced regularly during the construction program;
- Silencers or mufflers on construction equipment shall be utilized and shall be properly maintained during the construction program;
- Mobile plant, if any, shall be sited as far away from NSRs as applicable;
- Machines and plant (such as trucks) that may be in intermittent use must be shut down



between works periods or shall be throttled down to a minimum;

- Plant known to emit noise strongly in one direction shall, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and
- Material stockpiles and other structures shall be effectively utilized, wherever practicable, in screening noise from on-site construction activities.

7.4 Multi-Phase Construction Schedules

Appendix A and Table B demonstrate that multi-phase construction schedules will be implemented for the project. Proactive planning of working sequences could minimize the total sound power levels generated by PME during normal daytime working hours.

Item	Working Sequence	Duration	Main Construction Elements
1	Wan Chai Reclamation Area of WCR1 and Associate Area	Jan-2010 to May-2012	Dredging, Sewalls and Filling Drainage Culverts Cooling Water System CWB Tunnel (WCR1)
2	Wan Chai Reclamation Area of WCR2, WCR4, TWCR4 and Associated Area	Feb-2010 to Oct-2012	Dredging, Sewalls and Filling CWB Tunnel Promenade
3	Wan Chai Reclamation Area of WCR2, WCR4, TWCR4 and Associated Area	Sept-2012 to Jan-2014	Dredging, Sewalls and Filling CWB Tunnel Promenade
4	Wan Chai Reclamation Area of WCR2, WCR4, TWCR4 and Associated Area	Aug-2013 to May-2015	Dredging, Sewalls and Filling Drainage Culverts CWB Tunnel Promenade
5	Wan Chai Reclamation Area of WCR3 and Associated Area	May-2015 to Jan-2016	Dredging, Sewalls and Filling CWB Tunnel Promenade

Table B: Main construction elements in different phases of construction schedule



8.0 Impact Monitoring during Construction

8.1 External Monitoring

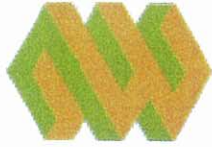
Environmental Monitoring and Audit (EM&A) Manual will serve as a guideline to set up of an EM&A programme to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action.

The Environmental Team Leader and his team member will be responsible for the set up, implement and maintain of EM&A system.

Enhances remedy mitigation measures will be immediately implemented once the construction noise level exceeded the limit and action levels under the Manual's requirement.

8.2 Internal Monitoring

Daily and weekly site monitoring, inspections and audits will be conducted in order to ensure the effectiveness of implemented noise mitigation measures and construction noise levels generated are fully complied with requirements.



俊和－中國中鐵聯營

CHUN WO－CRGL JOINT VENTURE

NOISE MANAGEMENT PLAN

Appendix A

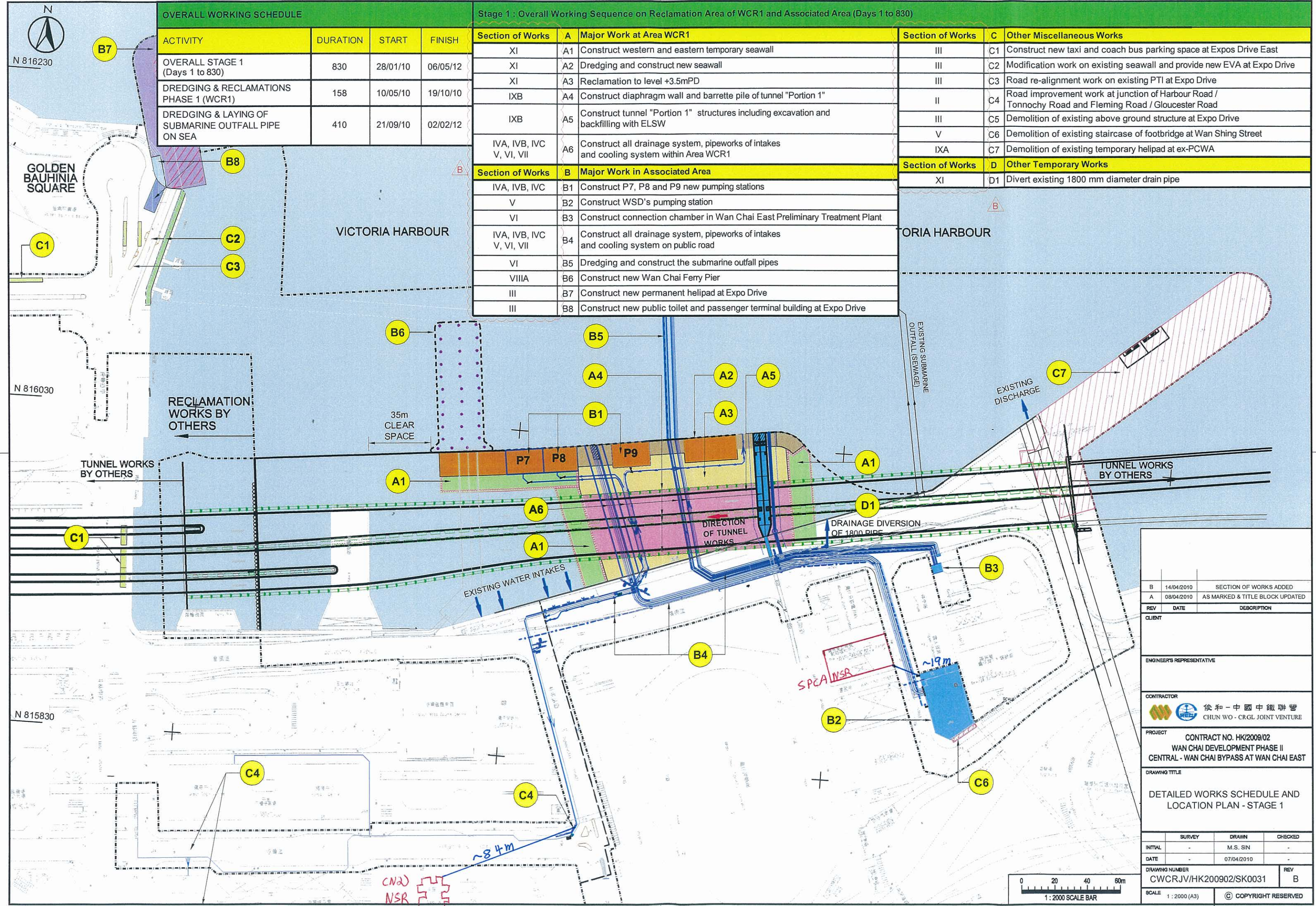
Location Plan of Noise Sensitive Receivers And Different Working Schedules

OVERALL WORKING SCHEDULE

ACTIVITY	DURATION	START	FINISH
OVERALL STAGE 1 (Days 1 to 830)	830	28/01/10	06/05/12
DREDGING & RECLAMATIONS PHASE 1 (WCR1)	158	10/05/10	19/10/10
DREDGING & LAYING OF SUBMARINE OUTFALL PIPE ON SEA	410	21/09/10	02/02/12

Stage 1 : Overall Working Sequence on Reclamation Area of WCR1 and Associated Area (Days 1 to 830)

Section of Works	A	Major Work at Area WCR1	Section of Works	C	Other Miscellaneous Works
XI	A1	Construct western and eastern temporary seawall	III	C1	Construct new taxi and coach bus parking space at Expos Drive East
XI	A2	Dredging and construct new seawall	III	C2	Modification work on existing seawall and provide new EVA at Expo Drive
XI	A3	Reclamation to level +3.5mPD	III	C3	Road re-alignment work on existing PTI at Expo Drive
IXB	A4	Construct diaphragm wall and barrette pile of tunnel "Portion 1"	II	C4	Road improvement work at junction of Harbour Road / Tonnochy Road and Fleming Road / Gloucester Road
IXB	A5	Construct tunnel "Portion 1" structures including excavation and backfilling with ELSW	III	C5	Demolition of existing above ground structure at Expo Drive
IVA, IVB, IVC, V, VI, VII	A6	Construct all drainage system, pipeworks of intakes and cooling system within Area WCR1	V	C6	Demolition of existing staircase of footbridge at Wan Shing Street
IXA			IXA	C7	Demolition of existing temporary helipad at ex-PCWA
Section of Works	B	Major Work in Associated Area	Section of Works	D	Other Temporary Works
IVA, IVB, IVC	B1	Construct P7, P8 and P9 new pumping stations	XI	D1	Divert existing 1800 mm diameter drain pipe
V	B2	Construct WSD's pumping station			
VI	B3	Construct connection chamber in Wan Chai East Preliminary Treatment Plant			
IVA, IVB, IVC, V, VI, VII	B4	Construct all drainage system, pipeworks of intakes and cooling system on public road			
VI	B5	Dredging and construct the submarine outfall pipes			
VIIIA	B6	Construct new Wan Chai Ferry Pier			
III	B7	Construct new permanent helipad at Expo Drive			
III	B8	Construct new public toilet and passenger terminal building at Expo Drive			



REV	DATE	DESCRIPTION
B	14/04/2010	SECTION OF WORKS ADDED
A	08/04/2010	AS MARKED & TITLE BLOCK UPDATED

CLIENT

ENGINEER'S REPRESENTATIVE

CONTRACTOR
 俊和 - 中國中鐵聯營
 CHUN WO - CRGL JOINT VENTURE

PROJECT
 CONTRACT NO. HK/2009/02
 WAN CHAI DEVELOPMENT PHASE II
 CENTRAL - WAN CHAI BYPASS AT WAN CHAI EAST

DRAWING TITLE
 DETAILED WORKS SCHEDULE AND
 LOCATION PLAN - STAGE 1

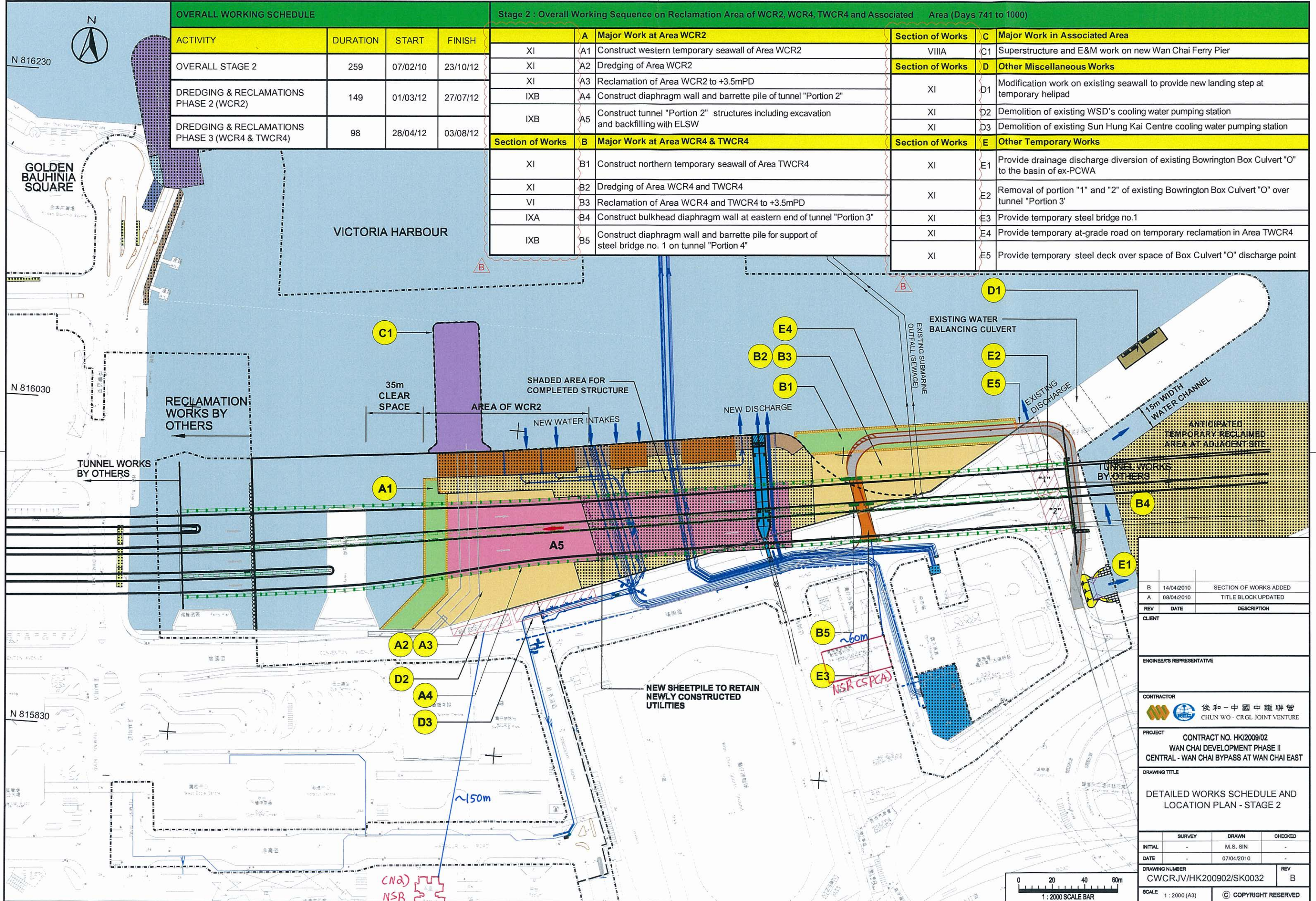
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DATE		07/04/2010	

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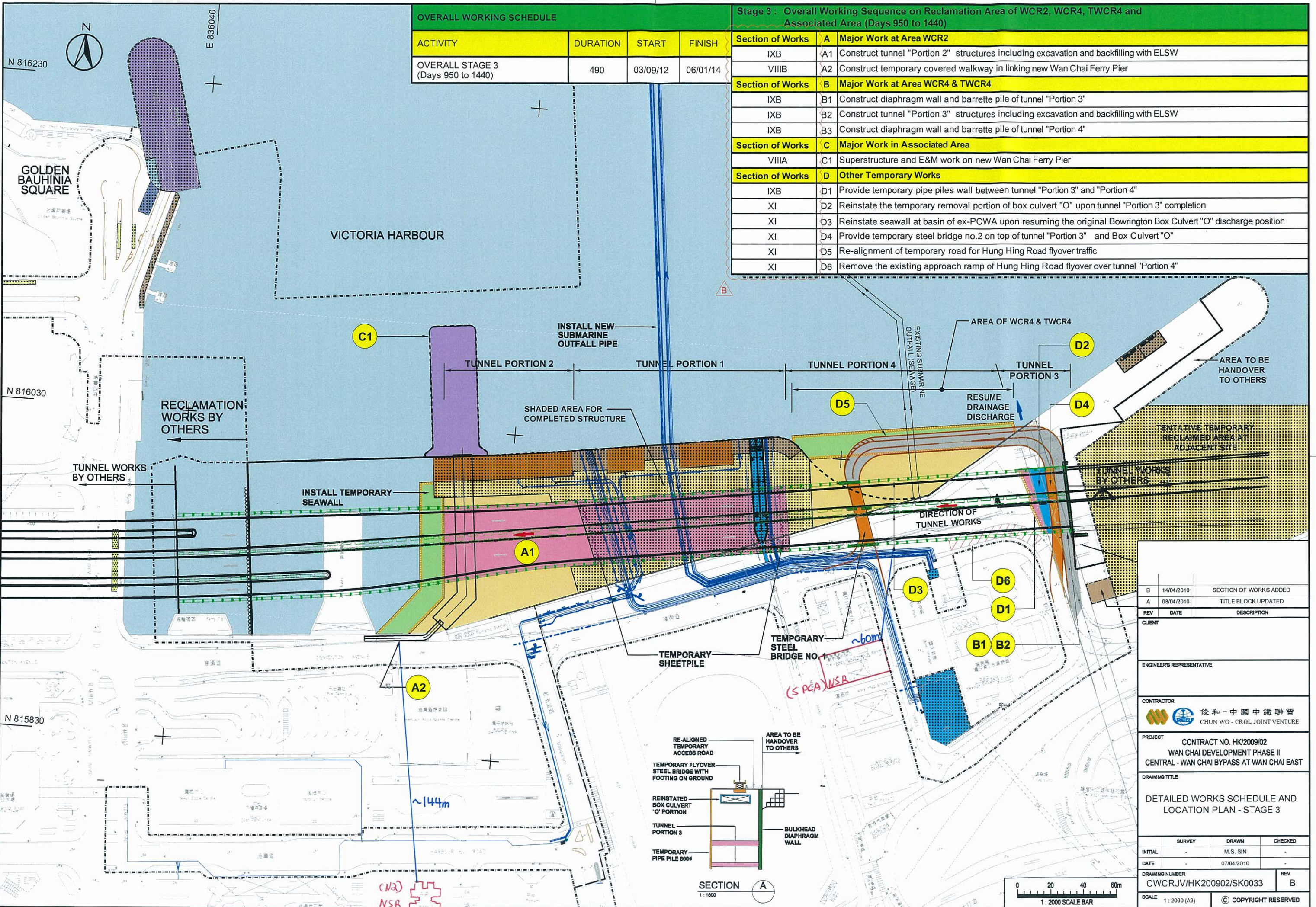
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OVERALL WORKING SCHEDULE			
ACTIVITY	DURATION	START	FINISH
OVERALL STAGE 2	259	07/02/10	23/10/12
DREDGING & RECLAMATIONS PHASE 2 (WCR2)	149	01/03/12	27/07/12
DREDGING & RECLAMATIONS PHASE 3 (WCR4 & TWCR4)	98	28/04/12	03/08/12

Stage 2 : Overall Working Sequence on Reclamation Area of WCR2, WCR4, TWCR4 and Associated Area (Days 741 to 1000)						
	A	Major Work at Area WCR2	Section of Works	C	Major Work in Associated Area	
	XI	A1 Construct western temporary seawall of Area WCR2	VIIIA	C1	Superstructure and E&M work on new Wan Chai Ferry Pier	
	XI	A2 Dredging of Area WCR2		D	Other Miscellaneous Works	
	XI	A3 Reclamation of Area WCR2 to +3.5mPD	XI	D1	Modification work on existing seawall to provide new landing step at temporary helipad	
	IXB	A4 Construct diaphragm wall and barrette pile of tunnel "Portion 2"	XI	D2	Demolition of existing WSD's cooling water pumping station	
	IXB	A5 Construct tunnel "Portion 2" structures including excavation and backfilling with ELSW	XI	D3	Demolition of existing Sun Hung Kai Centre cooling water pumping station	
	Section of Works	B	Major Work at Area WCR4 & TWCR4	Section of Works	E	Other Temporary Works
	XI	B1	Construct northern temporary seawall of Area TWCR4	XI	E1	Provide drainage discharge diversion of existing Bowington Box Culvert "O" to the basin of ex-PCWA
	XI	B2	Dredging of Area WCR4 and TWCR4	XI	E2	Removal of portion "1" and "2" of existing Bowington Box Culvert "O" over tunnel "Portion 3"
	VI	B3	Reclamation of Area WCR4 and TWCR4 to +3.5mPD	XI	E3	Provide temporary steel bridge no.1
	IXA	B4	Construct bulkhead diaphragm wall at eastern end of tunnel "Portion 3"	XI	E4	Provide temporary at-grade road on temporary reclamation in Area TWCR4
	IXB	B5	Construct diaphragm wall and barrette pile for support of steel bridge no. 1 on tunnel "Portion 4"	XI	E5	Provide temporary steel deck over space of Box Culvert "O" discharge point

REV	DATE	DESCRIPTION
B	14/04/2010	SECTION OF WORKS ADDED
A	08/04/2010	TITLE BLOCK UPDATED
CLIENT		
ENGINEER'S REPRESENTATIVE		
CONTRACTOR		
俊和 - 中國中鐵聯營 CHUN WO - CRGL JOINT VENTURE		
PROJECT		
CONTRACT NO. HK/2009/02 WAN CHAI DEVELOPMENT PHASE II CENTRAL - WAN CHAI BYPASS AT WAN CHAI EAST		
DRAWING TITLE		
DETAILED WORKS SCHEDULE AND LOCATION PLAN - STAGE 2		
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INITIAL	M.S. SIN	-
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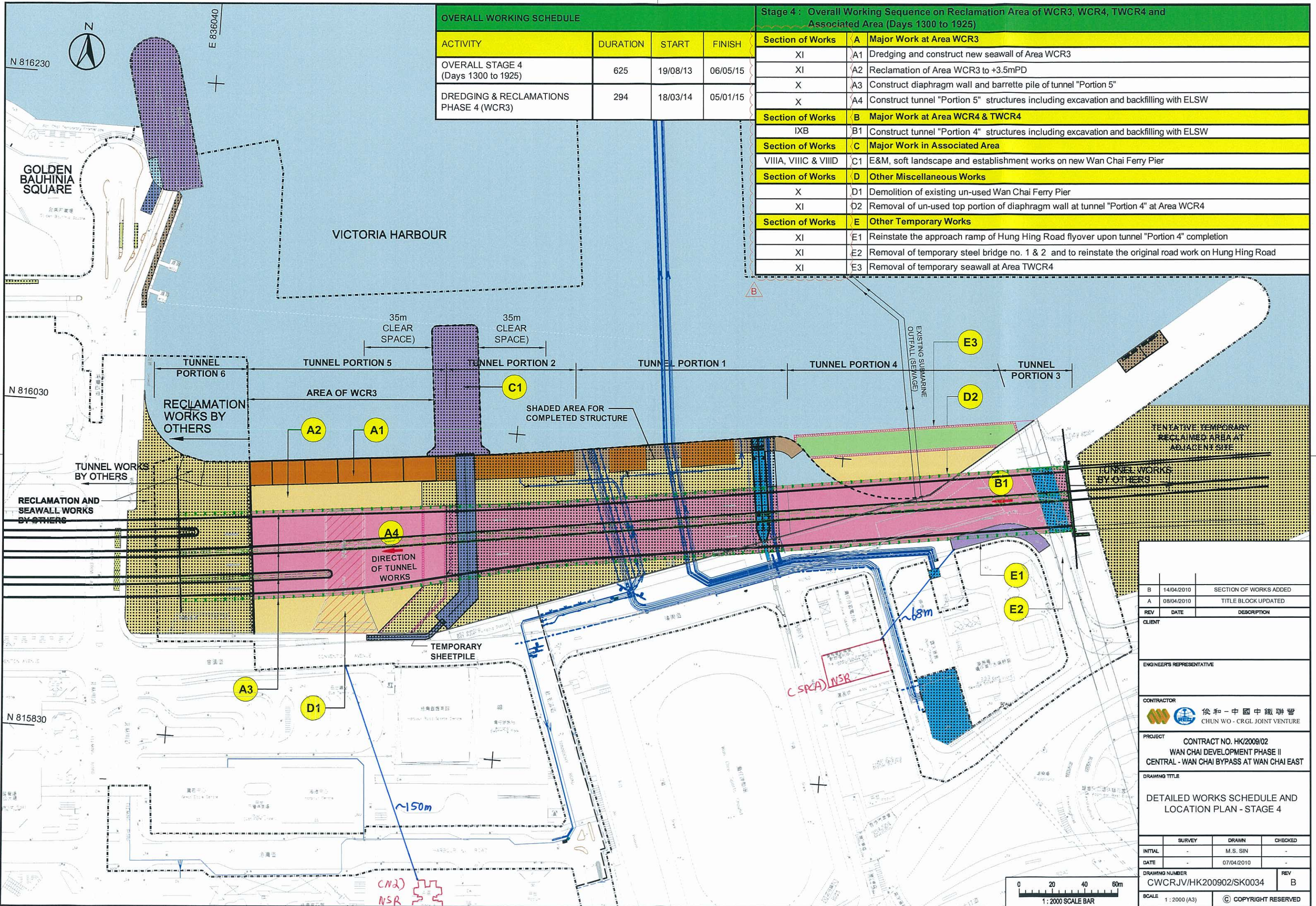


OVERALL WORKING SCHEDULE			
ACTIVITY	DURATION	START	FINISH
OVERALL STAGE 3 (Days 950 to 1440)	490	03/09/12	06/01/14

Stage 3: Overall Working Sequence on Reclamation Area of WCR2, WCR4, TWCR4 and Associated Area (Days 950 to 1440)		
Section of Works	A	Major Work at Area WCR2
IXB	A1	Construct tunnel "Portion 2" structures including excavation and backfilling with ELSW
VIIIB	A2	Construct temporary covered walkway in linking new Wan Chai Ferry Pier
Section of Works	B	Major Work at Area WCR4 & TWCR4
IXB	B1	Construct diaphragm wall and barrette pile of tunnel "Portion 3"
IXB	B2	Construct tunnel "Portion 3" structures including excavation and backfilling with ELSW
IXB	B3	Construct diaphragm wall and barrette pile of tunnel "Portion 4"
Section of Works	C	Major Work in Associated Area
VIIIA	C1	Superstructure and E&M work on new Wan Chai Ferry Pier
Section of Works	D	Other Temporary Works
IXB	D1	Provide temporary pipe piles wall between tunnel "Portion 3" and "Portion 4"
XI	D2	Reinstate the temporary removal portion of box culvert "O" upon tunnel "Portion 3" completion
XI	D3	Reinstate seawall at basin of ex-PCWA upon resuming the original Bowrington Box Culvert "O" discharge position
XI	D4	Provide temporary steel bridge no.2 on top of tunnel "Portion 3" and Box Culvert "O"
XI	D5	Re-alignment of temporary road for Hung Hing Road flyover traffic
XI	D6	Remove the existing approach ramp of Hung Hing Road flyover over tunnel "Portion 4"

REV	DATE	DESCRIPTION
B	14/04/2010	SECTION OF WORKS ADDED
A	08/04/2010	TITLE BLOCK UPDATED

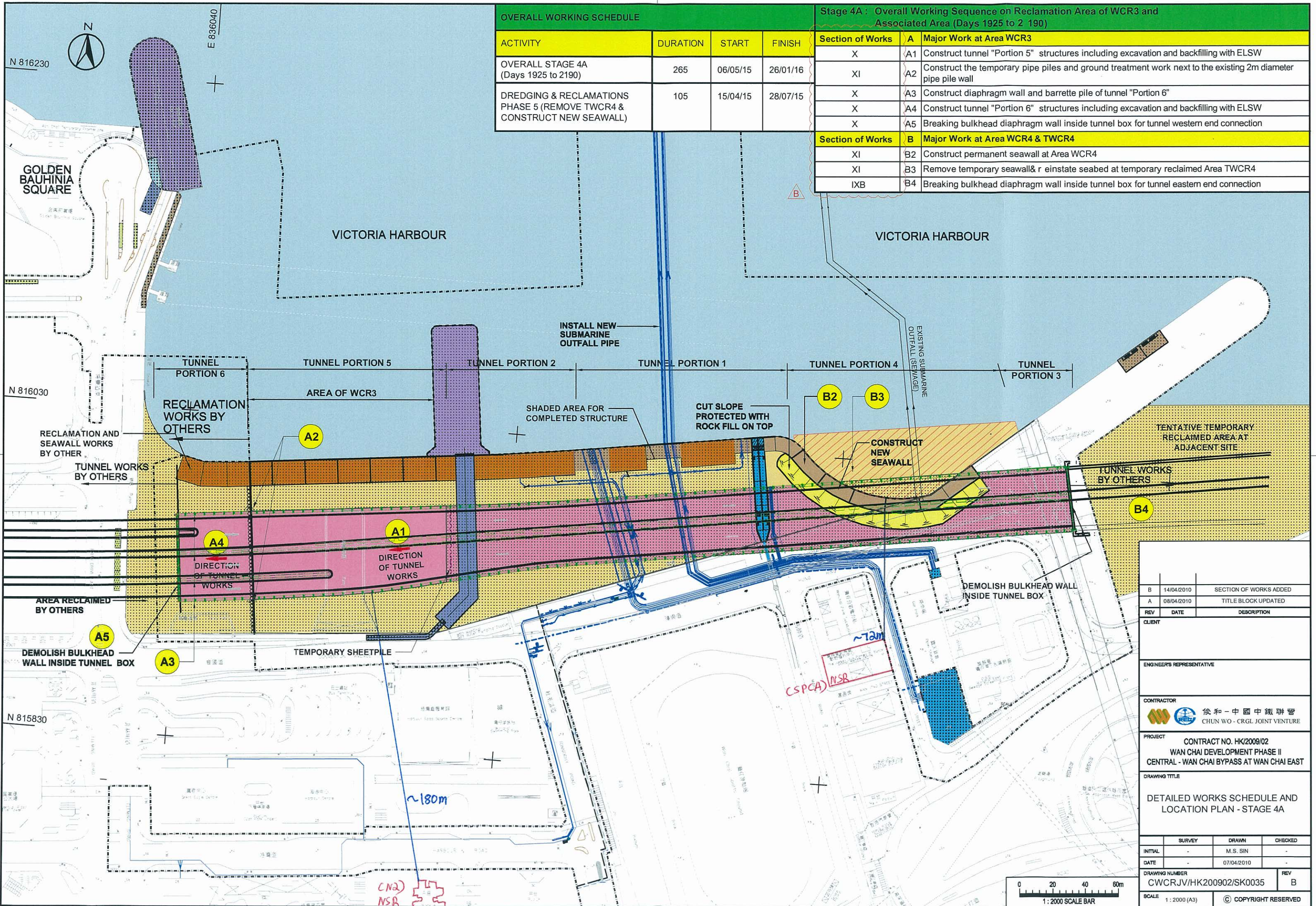
CLIENT			
ENGINEER'S REPRESENTATIVE			
CONTRACTOR	俊和 - 中國中鐵聯營 CHUN WO - CRGL JOINT VENTURE		
PROJECT	CONTRACT NO. HK/2009/02 WAN CHAI DEVELOPMENT PHASE II CENTRAL - WAN CHAI BYPASS AT WAN CHAI EAST		
DRAWING TITLE	DETAILED WORKS SCHEDULE AND LOCATION PLAN - STAGE 3		
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OVERALL WORKING SCHEDULE			
ACTIVITY	DURATION	START	FINISH
OVERALL STAGE 4 (Days 1300 to 1925)	625	19/08/13	06/05/15
DREDGING & RECLAMATIONS PHASE 4 (WCR3)	294	18/03/14	05/01/15

Stage 4 : Overall Working Sequence on Reclamation Area of WCR3, WCR4, TWCR4 and Associated Area (Days 1300 to 1925)		
Section of Works	A	Major Work at Area WCR3
XI	A1	Dredging and construct new seawall of Area WCR3
XI	A2	Reclamation of Area WCR3 to +3.5mPD
X	A3	Construct diaphragm wall and barrette pile of tunnel "Portion 5"
X	A4	Construct tunnel "Portion 5" structures including excavation and backfilling with ELSW
Section of Works	B	Major Work at Area WCR4 & TWCR4
IXB	B1	Construct tunnel "Portion 4" structures including excavation and backfilling with ELSW
Section of Works	C	Major Work in Associated Area
VIIIA, VIIIC & VIIID	C1	E&M, soft landscape and establishment works on new Wan Chai Ferry Pier
Section of Works	D	Other Miscellaneous Works
X	D1	Demolition of existing un-used Wan Chai Ferry Pier
XI	D2	Removal of un-used top portion of diaphragm wall at tunnel "Portion 4" at Area WCR4
Section of Works	E	Other Temporary Works
XI	E1	Reinstate the approach ramp of Hung Hing Road flyover upon tunnel "Portion 4" completion
XI	E2	Removal of temporary steel bridge no. 1 & 2 and to reinstate the original road work on Hung Hing Road
XI	E3	Removal of temporary seawall at Area TWCR4

REV	DATE	DESCRIPTION
B	14/04/2010	SECTION OF WORKS ADDED
A	08/04/2010	TITLE BLOCK UPDATED
CLIENT		
ENGINEER'S REPRESENTATIVE		
CONTRACTOR	俊和 - 中國中鐵聯營 CHUN WO - CRGL JOINT VENTURE	
PROJECT	CONTRACT NO. HK/2009/02 WAN CHAI DEVELOPMENT PHASE II CENTRAL - WAN CHAI BYPASS AT WAN CHAI EAST	
DRAWING TITLE	DETAILED WORKS SCHEDULE AND LOCATION PLAN - STAGE 4	
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OVERALL WORKING SCHEDULE			
ACTIVITY	DURATION	START	FINISH
OVERALL STAGE 4A (Days 1925 to 2190)	265	06/05/15	26/01/16
DREDGING & RECLAMATIONS PHASE 5 (REMOVE TWCR4 & CONSTRUCT NEW SEAWALL)	105	15/04/15	28/07/15

Stage 4A : Overall Working Sequence on Reclamation Area of WCR3 and Associated Area (Days 1925 to 2 190)		
Section of Works	A	Major Work at Area WCR3
X	A1	Construct tunnel "Portion 5" structures including excavation and backfilling with ELSW
XI	A2	Construct the temporary pipe piles and ground treatment work next to the existing 2m diameter pipe pile wall
X	A3	Construct diaphragm wall and barrette pile of tunnel "Portion 6"
X	A4	Construct tunnel "Portion 6" structures including excavation and backfilling with ELSW
X	A5	Breaking bulkhead diaphragm wall inside tunnel box for tunnel western end connection
Section of Works	B	Major Work at Area WCR4 & TWCR4
XI	B2	Construct permanent seawall at Area WCR4
XI	B3	Remove temporary seawall & reinststate seabed at temporary reclaimed Area TWCR4
IXB	B4	Breaking bulkhead diaphragm wall inside tunnel box for tunnel eastern end connection

REV	DATE	DESCRIPTION	
B	14/04/2010	SECTION OF WORKS ADDED	
A	08/04/2010	TITLE BLOCK UPDATED	
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ENGINEER'S REPRESENTATIVE			
CONTRACTOR			
俊和 - 中國中鐵聯營 CHUN WO - CRGL JOINT VENTURE			
PROJECT			
CONTRACT NO. HK/2009/02 WAN CHAI DEVELOPMENT PHASE II CENTRAL - WAN CHAI BYPASS AT WAN CHAI EAST			
DRAWING TITLE			
DETAILED WORKS SCHEDULE AND LOCATION PLAN - STAGE 4A			
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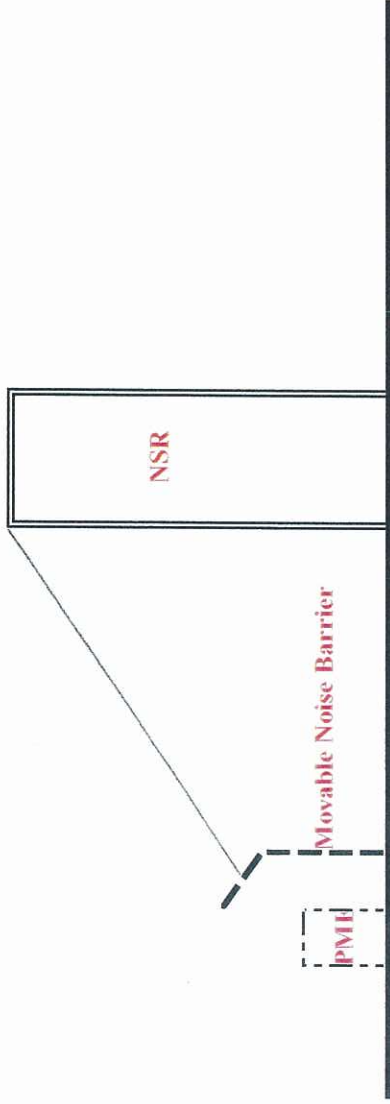
CHUN WO - CRGL JOINT VENTURE

NOISE MANAGEMENT PLAN

Appendix B

Layout Plan of Movable Noise Barrier

Section View of Movable Noise Barrier



Movable noise barrier comprised of minimum 50mm thick sound absorbing lining and 10mm thick plywood (or 1mm thick steel) backing with a cantilevered upper portion located within 5m from any static or mobile plant that PME will be totally screened when viewed from the NSR

Plan View of Movable Noise Barrier



Any static or mobile plant that PME will be totally screened when viewed from the NSR



Lam Geotechnics Limited

Ground Investigation & Instrumentation Professionals

華益土力有限公司

Ref : G1001/CS/L083/FEP-03/356/2009
Date : 6 May 2010

Chun Wo – CRGL Joint Venture

5C, Hong Kong Spinners Industrial Building, Phase I,
602 – 603 Tai Nan Street,
Cheung Sha Wan
Kowloon

Attn: Project Manager

Dear Sir,

Contract No. HK/2009/02

Wanchai Development Phase II – Central –Wan Chai Bypass at Wan Chai East Noise Management Plan (Revision A) under FEP-03/356/2009

Referring to the Chun Wo – CRGL Joint Venture submission dated 4 May 2010, we have reviewed your submitted details and hereby certified this submission in accordance with Condition 2.17 of FEP-03/356/2009.

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

Yours faithfully,

Raymond Dai
Environmental Team Leader

C.C.

CEDD	- Mr. Patrick Keung	(By Email)
AECOM	- Mr. David Kwan	(By Email)
ENVIRON	- Mr. David Yeung	(By Email)



Ref.: AACWBIECEM00_0_0191L.10

6 May 2010

Chun Wo – CRGL Joint Venture
5C, Hong Kong Spinners Industrial Building Phase 1
601-603 Tai Nan West Street
Cheung Sha Wan
Kowloon

By Post and E-mail

Attention: Mr. Cecil Cheng

Dear Sir,

Re: FEP-03/356/2009
Contract No. HK/2009/02
Wan Chai Development Phase II – Central-Wan Chai Bypass at Wan Chai East
Noise Management Plan (Revision A)

Reference is made to Chun Wo – CRGL Joint Venture's submission of Noise Management Plan (Revision A) dated 4 May 2010 for our review and comment.

Please be informed that we have no adverse comments on the captioned submission. We also write to verify the captioned submission in accordance with Condition 2.17 of FEP-03/356/2009.

Thank you for your kind attention.

Yours sincerely,



David Yeung
Independent Environmental Checker

c.c.	CEDD	Mr. Patrick Keung	by fax: 2577 5040
	AECOM	Mr. David Kwan	by fax: 2587 1877
	AECOM	Mr. Kelvin Cheng	by fax: 2691 2649
	LAM	Mr. Raymond Dai	by fax: 2882 3331

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