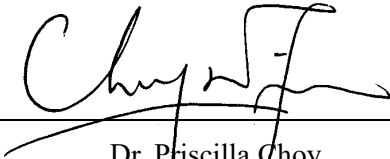


Penta Ocean – China State Joint Venture

Shatin to Central Link – Contract 1121 NSL Cross Harbour Tunnels

Silt Curtain Deployment Plan (Version 5.0)

January 2018

Certified By	 _____ Dr. Priscilla Choy (Environmental Team Leader)
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REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties.

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1 INTRODUCTION

Background

1.1 The Shatin to Central Link (SCL) Project comprises of two sections:

- Tai Wai to Hung Hom Section which is an extension of the Ma On Shan Line (MOL) via East Kowloon to connect West Rail Line (WRL) at Hung Hom; and
- Cross Harbour Section which is an extension of the East Rail Line (EAL) at Hung Hom across the harbour to Admiralty.

On completion of the SCL, the above rail lines would be re-organized to two operational lines: an East West Line (EWL) from Wu Kai Sha to Tuen Mun; and a North South Line (NSL) from Lo Wu / Lok Ma Chau to Admiralty.

1.2 The SCL scheme was authorised under the Railway Ordinance in March 2012. The reference design of the Cross Harbour Section, which comprises an approximate 1.8km cross harbour tunnel and its associated works, has been carried out under Consultancy Agreement No. C1107 – Construction Scoping and Sequencing for NSL Cross Harbour Tunnels. Construction of the cross harbour section is anticipated to commence in end of 2014.

1.3 Penta Ocean – China State Joint Venture was commissioned by MTR Corporation Limited as the Contractor of Works Contract 1121 – NSL Cross Harbour Tunnels (the “Project”) which was awarded on 15 December 2014.

1.4 Pursuant to Environmental Permit (EP) Condition 2.10, a Silt Curtain Deployment Plan (SCDP) shall be submitted by the Permit Holder to the Environmental Protection Department (EPD) for deposit at least two weeks before commencement of the marine works.

Purposes of the Submission

1.5 To fulfil the requirements as stated in the Environmental Permit, silt curtain will be installed for:

- Marine works area at Hung Hom Landfall (Condition 2.17);
- Removal of breakwater at CBTS under the Reduced Reclamation Scheme (Optimised Scheme) (Condition 2.18(II) (b));
- Immersed Tube Tunnel (IMT) Construction within Causeway Bay Typhoon Shelter (CBTS) (Condition 2.18.1 (a), (c) & (h)); and
- Immersed Tube Tunnel (IMT) Construction and Dredging in the Harbour outside CBTS (Condition 2.19 (d) & (e)).

1.6 As no underwater blasting will be conducted under this Project, the use of silt curtain to fence off and isolate the lethal zone of the underwater blasting will not be required under EP Condition 2.13.

1.7 Installations, operation and maintenance of silt curtain during marine activities for the SCL cross-harbour tunnel works between Hung Hom Landfall and Causeway Bay Typhoon Shelter (CBTS) have been covered under the “Silt Curtain Deployment Plan for Hung Hom Landfall and Victoria Harbour (version 4.0)”. This Silt Curtain Deployment Plan (version 5.0) is to update the arrangement of silt curtain for reinstatement of fender pile and re-provision of finger pier in Hung Hom Landfall (HUH) under Work Contract 1121.

2 INSTALLATION OF SILT CURTAIN

Area of Application

Frame-type silt curtain

2.1 Frame-type silt curtain will be provided during the followings:

- the entire course of trial trenching and bulk dredging works for IMT installation in Victoria Harbour; and
- dredging works within and outside the temporary seawalls in CBTS; and
- Filling works within and outside the temporary seawalls in CBTS (in case of using closed grab dredger).

Floating-type silt curtain

2.2 Floating-type silt curtain will be installed to

- surround the works area to minimize the release of sediment due to removal and reinstatement of fender piles of Hung Hom Bypass, minor marine piling works and advanced dredging works;
- surround the works area of breakwater removal in CBTS;
- shield any gaps in the seawalls that may need to be provided for marine access during dredging or filling works in the CBTS; and
- Filling works outside the temporary seawalls in CBTS (in case of using down pipe).

2.3 The locations of the works area in Hung Hom Landfall, Victoria Harbour and the CBTS under Works Contract 1121 are shown in **Appendix A**.

Material and Fabrication Details

2.4 The silt curtain will be manufactured of woven polypropylene geotextile fabric ‘Bontec SG110/110’, as manufactured by Bonar Technical Fabrics nv/sa and supplied by G and E Company Ltd.

2.5 Full particulars and specification of the material is attached in **Appendix B**. The key technical data is summarized in the following table: -

Table 2.1 Properties of Geotextile Fabric

	<u>Unit</u>	<u>Value</u>	<u>Test Method</u>
Mechanical Properties			
Tensile strength (md/cd)	kN/m	110/110	ISO 10319
Elongation (md/cd)	%	12/8	ISO 10319
CBR puncture resistance	kN	12.5	ISO 12236
Dynamic perforation	mm	10.0	ISO 13433
Hydraulic Properties			
Water permeability	l/m ² /s	25	ISO 11058
Characteristic opening size	μm	230.0	ISO 12956
Physical Properties			
Mass per unit area	g/m ²	464	ISO 9864
Thickness (under 2kPa)	mm	1.53	ISO 9863-1

Frame-type Silt Curtain

- 2.6 The silt curtain system will comprise of a rectangular-shaped prefabricated steel floating frame, woven geotextile fabric and ballast steel chains.
- 2.7 The rectangular floating frame will be of approximately 16m by 16m in plan size. It will be fabricated by 600mm diameter steel circular hollow sections with closed ends to maintain the frame in floating condition throughout the course of the works.
- 2.8 The top end of geotextile fabric will be fixed to the floating frame, while its bottom end will be tied with ballast steel chains to maintain the silt curtain in upright position under current and tidal flows. Pieces of geotextile fabric will be seamed by heavy-duty rope ties to form a continuous silt curtain. The geotextile curtain will be trimmed to suitable length which would allow it to extend from the sea surface to the seabed under the varying tidal levels.
- 2.9 The dredging works under the Project will be carried out by a closed grab dredger and the frame-type silt curtain will be mounted adjacent to the dredger barge such that the whole operation is confined inside the enclosed water column. The frame-type silt curtain will be deployed in similar manner in case of using closed grab dredger for filling works within and outside the temporary seawalls in CBTS.

Floating-type Silt Curtain

- 2.10 The silt curtain system will principally comprise of floaters, woven geotextile fabric and ballast steel chains.
- 2.11 Pieces of geotextile fabric will be seamed by heavy-duty rope ties to form a continuous silt curtain. The silt curtain is to be trimmed to suitable length which would allow it to extend from the sea surface to the seabed under the varying tidal levels.
- 2.12 Floaters of 300mm diameter and ballast steel chain will be tied to the top and bottom end of the geotextile fabric, respectively, to maintain the silt curtain in upright position.

2.13 The typical detail of silt curtain system is enclosed in **Appendix C**.

On-site Installation Procedure

Frame-type Silt Curtain

- 2.14 The fabrication and preparation of the silt curtain system will be substantially completed in off-site workshop before mobilizing to the site for installation.
- 2.15 For installation of the silt curtain, the steel floating frame will be firstly placed into water by the lifting arm of grab dredger before the geotextile curtain with ballast chains is slowly unfolded. Yellow flashing lights will be installed at the corners of the floating frame as required by Marine Department.
- 2.16 Geotextile fabric of different lengths will be prepared in advance for replacement in order to suit the varying seabed levels and ensure it extends from the sea surface to the seabed throughout all stages and at different sub-areas of the works. For CBTS, the silt curtains shall be extended from water surface to seabed, as far as practicable.

Floating-type Silt Curtain

- 2.17 The fabrication and assembly of the silt curtain system will be substantially completed in offsite workshop before mobilizing to the site for installation.
- 2.18 A derrick lighter barge will be deployed for transportation of the pre-assembled silt curtain to site. The barge will slowly place the floaters, geotextile fabric with ballast chains slowly into water, while a work boat will assist to align the silt curtain properly for fully enclosing the works area. At both of the longitudinal ends, land-based anchor in the form of precast concrete block or the like will be installed on the shore to fix the whole silt curtain system in secured condition.
- 2.19 To cater for possible strong current at the works area, concrete sinkers where necessary, will be installed on the seabed and chained onto the buoys of the silt curtain to enhance its anchorage. Divers will be deployed for the operation such that the concrete sinkers are placed onto seabed slowly and carefully to minimize any disturbance to seabed.
- 2.20 The configuration of the silt curtains will be deployed in stages according to the works programme. The configuration of the silt curtains is enclosed in **Appendix C**.

Daily Operation for Marine Access

Hung Hom Landfall

- 2.21 For enabling access by working vessels, a marine access opening of approximately 60 metres will be allowed in the silt curtain. When the access opening is at the ‘closed’ position, a length of about 10 meters of overlapping silt curtain will be provided. A work boat will be deployed for daily operation of the access opening. When marine access through the silt curtain is needed, the anchoring at one of the longitudinal ends will be manually detached such that the silt curtain can be temporarily ‘opened’ to allow passage of vessels.
- 2.22 When the silt curtain is temporarily opened to allow passage of working vessels, no marine

construction works will be carried out until the opening is entirely closed up in order to prevent the escape of sediment to water column outside the silt curtain.

- 2.23 Before the silt curtain is opened, visual inspection will be conducted by site supervisor to ensure that there is no marine traffic which would cause significant sediment plume and no sediment plume or floating debris in close proximity.

CBTS

- 2.24 For enabling access by working vessels, a work boat will be deployed for daily operation of the access opening. When marine access through the silt curtain is needed, the land-based anchoring at one of the longitudinal ends will be manually detached such that the silt curtain can be temporarily ‘opened’ to allow passage of vessels.
- 2.25 Before the silt curtain is opened, visual inspection will be conducted by site supervisor to ensure that there is no sediment plume or floating debris in close proximity.

3 INSPECTION OF SILT CURTAIN

Regular Inspection

- 3.1 Diving inspection of the silt curtain system will be carried out after installation and prior to commencement of the marine works to ensure it has been satisfactorily installed and is functionally properly as intended. The inspection will, in particular, cover the underwater portions including the ballast chains, and ensure that the geotextile curtain is fully intact and extended to the seabed level.
- 3.2 Daily visual inspection will be carried out by site supervisors prior to commencement of the works in each working day. The scope of inspection shall include but not limited to the following items:
 - Condition of floaters;
 - Condition of steel floating frame and its structural integrity;
 - Condition of flashing lights;
 - Condition of geotextile fabric and tying ropes;
 - Presence of dispersion of sediment plume;
 - Presence of floating refuse trapped by silt curtain.
- 3.3 A sample checklist for diving inspection and daily visual inspection of silt curtain is enclosed in **Appendix D**. All completed checklists should be kept on site for record purpose.

Adverse Weather

- 3.4 In the event of adverse weather or marine condition, visual inspection will be conducted to the silt curtain by on-board supervisors upon the hoisting of Typhoon Signal No. 1 or Strong Monsoon Signal by Hong Kong Observatory
- 3.5 When Typhoon Signal No. 3 is hoisted, all the marine works will be suspended immediately. The dredger barge for the marine works shall then retreat to nearby Typhoon Shelter and the silt curtain will be removed off the site as well. After Typhoon Signal No. 3 is lowered, visual inspection will be carried out to ensure the integrity of the silt curtain before the works resume. If any damage to the silt curtain is suspected, divers will be deployed for further inspection as necessary.

Rectification Works

- 3.6 In the event that any malfunctioning of the silt curtain system is observed or suspected, it will be reported to the Engineer accordingly. If considered necessary, diving inspection will be carried out for detailed investigation and identifying the nature and extent of damage or defect of the silt curtain.
- 3.7 If the floating-type or frame-type silt curtain is damaged and repairing works are necessary, the respective marine works in Hung Hom Landfall, CBTS and Victoria Harbour will be suspended immediately. Repairing of silt curtain, whenever necessary, will be carried out at a timeframe to be agreed with the Engineer on a case-by-case basis. The works will be resumed only after the repairing works are satisfactorily completed and accepted by the Engineer.

- 3.8 A minimum of 1m lapping length shall be provided if a new piece of geotextile is to cover at any damaged location. Heavy-duty nylon ropes or similar material shall be used to stitch up the lapping of new and existing geotextile.
- 3.9 If the extent of the damage is substantial that the silt curtain cannot be lifted up without causing further damage, the entire damaged section will be removed and replaced with a new piece of silt curtain complete with all associated components.
- 3.10 At least 20m length of spare geotextile material will be available on site at all time for emergency repairing of silt curtain.

4 REMOVAL OF SILT CURTAIN

Upon Completion of Works

- 4.1 Silt curtain will only be decommissioned and removed off-site upon completion of the whole trial trenching or bulk dredging works in Victoria Harbour, marine works at Hung Hom Landfall and CBTS as required by Works Contract 1121.
- 4.2 Visual inspection will be conducted prior to removal of the silt curtain, to ensure there is no muddy water, floating rubbish or debris enclosed inside the floating frame.

Frame-type silt curtain

- 4.3 The floating frame together with the geotextile silt curtain and ballast chains will be retrieved from water by the lifting arm of grab dredger. All components will then be de-mobilized off the site with the dredger barge.

Floating-type silt curtain

- 4.4 The bottom of silt curtain will be detached from the concrete sinkers by divers. Concrete sinkers (where installed) will be removed from the seabed by derrick lighter. Divers will be deployed to assist in the operation such that the sinkers are removed slowly and carefully to minimize the disturbance to seabed and release of sediment into water.
- 4.5 The floaters together with the geotextile silt curtain will then be retrieved from water and transported off the site by a derrick barge.

5 DEPLOYMENT SCHEDULE

Deployment Schedule

5.1 **Table 5.1** below shows the anticipated deployment schedule of silt curtain.

Table 5.1 Deployment schedule

Works Activity / Location	Anticipated Completion of Installation	Anticipated Decommissioning
<u>Hung Hom marine works area</u>		
Hung Hom Landfall	March 2015	July 2020
Re-provision of Finger Pier	December 2017	March 2019
<u>Victoria Harbour</u>		
Trial Trenching ^[1]	April 2015	May 2015
Bulk Dredging ^[1]	November 2015	July 2017
<u>CBTS</u>		
Removal of Breakwater in Reduced Reclamation Scheme (Optimised Scheme) ^[2]	April 2016	June 2016
Dredging and Filling Works within temporary seawalls	September 2016	July 2018
Dredging and Filling Works outside the temporary seawalls	July 2017	July 2018

Note [1]: The trial trenching works and bulk dredging works in Victoria Harbour has been completed in May 2015 & July 2017 accordingly.

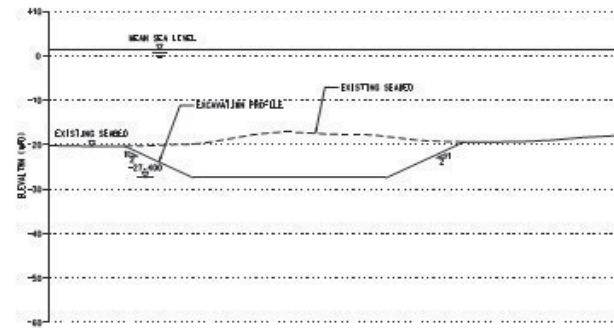
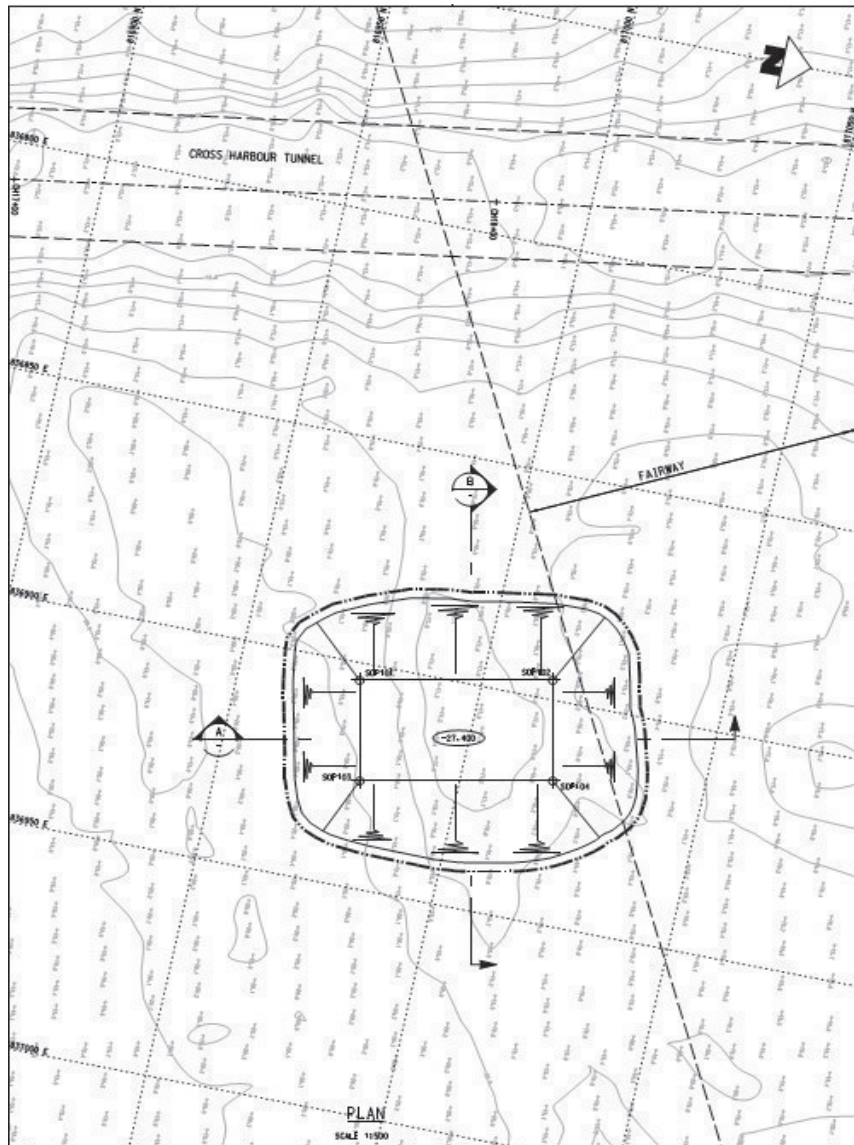
Note [2]: Removal of Breakwater in Reduced Reclamation Scheme (Optimised Scheme) has been completed in June 2016 accordingly.

5.2 Anticipated construction programme enclosed in **Appendix E** shows the breakdown of activities.

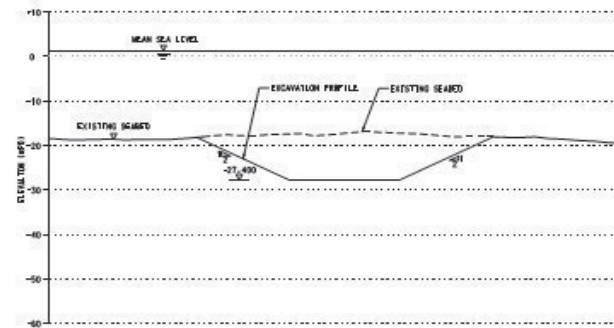
5.3 All works in connection with the deployment of silt curtain system, including installation, inspection, maintenance and removal, will be undertaken by the Contractor of Works Contract 1121, i.e. Penta Ocean – China State Joint Venture.

APPENDIX A

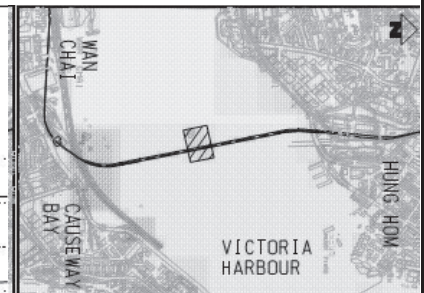
**LOCATION PLAN AND GENERAL
LAYOUT OF MARINE WORKS**



SECTION A
SCALE 1:1500



SECTION B
SCALE 1:1500



KEY PLAN

NOTES:

1. UNLESS NOTED OTHERWISE, LEVELS ARE SHOWN IN METRES RELATIVE TO HONG KONG PRINCIPAL DATUM (mPD).
2. HYDROGRAPHIC SURVEY RESULTS SHOWN ON THE DRAWING ARE INDICATIVE ONLY.

LEGEND:

- WORKS BOUNDARY
- CROSS HARBOUR TUNNEL CHAINAGE
- TRIAL TRENCHING SIDE SLOPE
- EXCAVATION LEVEL
- SETTING OUT POINT
- HYDROGRAPHIC SURVEY RECORD (mPD)

SETTING OUT POINT

SETTING OUT POINT	COORDINATES	
	EASTING	NORTHING
SOP101	836903.922	816975.092
SOP102	836895.669	817014.231
SOP103	836926.072	816979.763
SOP104	836917.819	817018.902

Title

Contract 1121
NSL Cross Harbour Tunnels
Trial Trenching in Victoria Harbour

Scale

N.T.S

Project

No. MA14047

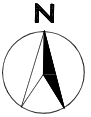
Date

Jan-15




Appendix

A1

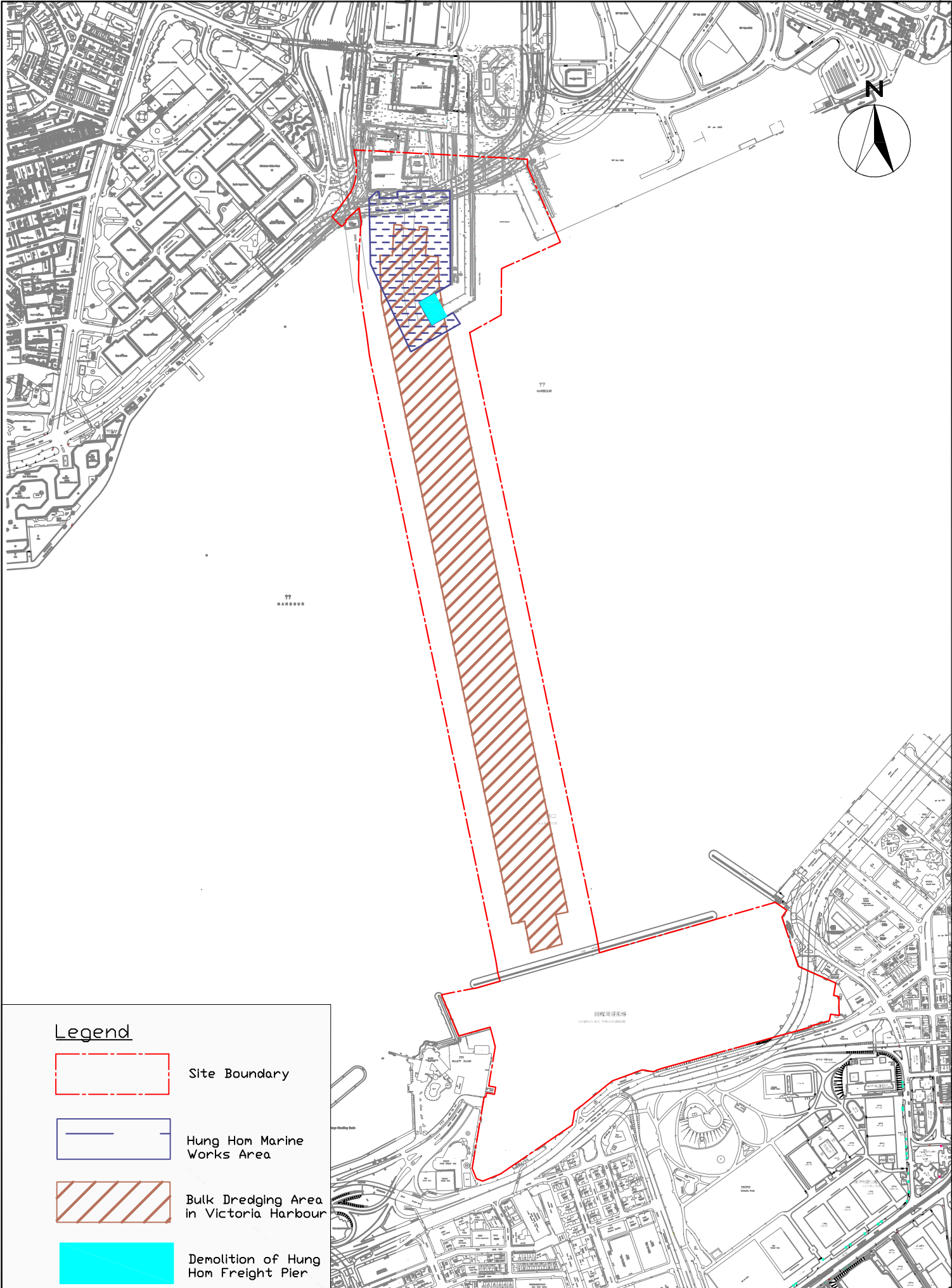
CINOTECH







Legend

-  Gazette Boundary
-  Hung Hom Marine Works Area
-  Demolition of Hung Hom Freight Pier

SCALE	N.T.S.	DATE	FEB 16
CHECK	JF	DRAWN	JW
JOB No.	MA14047	APPENDIX No.	A2
		REV	-



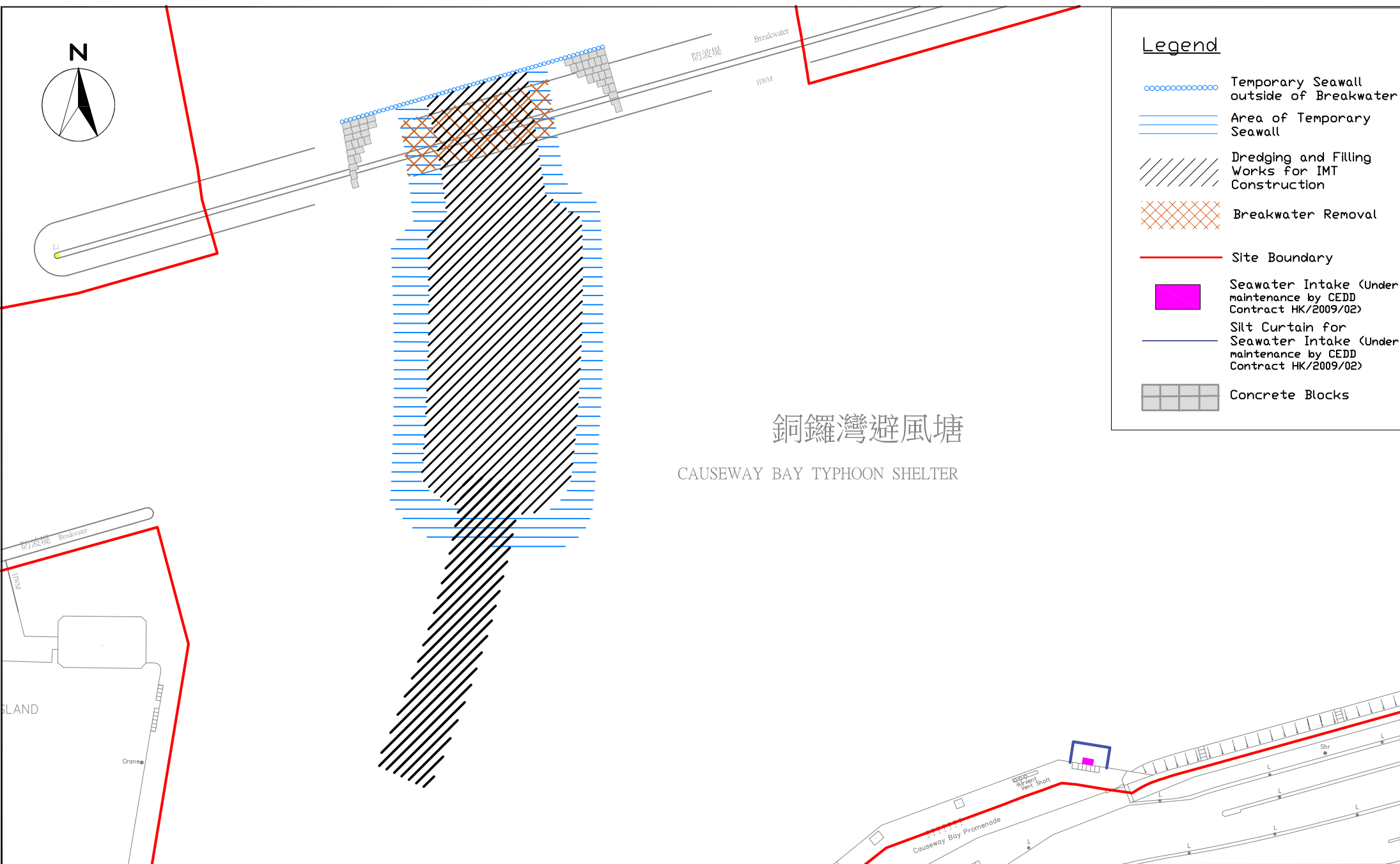
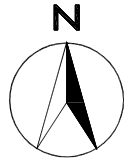
Legend

-  Site Boundary
-  Hung Hom Marine Works Area
-  Bulk Dredging Area in Victoria Harbour
-  Demolition of Hung Hom Freight Pier



SCL 1121 - NSL Cross Harbour Tunnels
 Location Plan of Bulk Dredging Works in Victoria Harbour

SCALE	1:220	DATE	FEB 2016
CHECK	JF	DRAWN	VW
JOB No.	MA14047	APPENDIX NO.	A3
		REV	-



Legend

- Temporary Seawall outside of Breakwater
- Area of Temporary Seawall
- Dredging and Filling Works for IMT Construction
- Breakwater Removal
- Site Boundary
- Seawater Intake (Under maintenance by CEDD Contract HK/2009/02)
- Silt Curtain for Seawater Intake (Under maintenance by CEDD Contract HK/2009/02)
- Concrete Blocks

銅鑼灣避風塘

CAUSEWAY BAY TYPHOON SHELTER

SCALE	NTS	DATE	JAN 2016	
CHECK	PC	DRAWN	JF	
JOB No.	MA14047	Appendix	A4	REV -

APPENDIX B

**PRODUCT CATALOGUE AND
SPECIFICATION**



WE UNDERCOVER THE WORLD

bontec

woven and nonwoven geotextiles

A TOTAL RANGE OF GEOTEXTILES

WHY CHOOSE BONTEC® GEOTEXTILES ?



bontec
woven and nonwoven geotextiles



Fibre Extrusion



Non woven geotextiles



Woven geotextiles



State of the art laboratory



First class customer service

Bonar Technical Fabrics is Europe's premier manufacturer of woven and nonwoven geotextile products. Through our continuous commitment to **quality, product development and production improvement**, we have earned our position as a major player in our markets. Today, with over 30 years experience in the geosynthetics industry, and the full backing of our parent company, we are confident that we will continue to grow our business and remain at the forefront of our markets for many years ahead.

Manufactured under the brand name **Bontec®**, using state of the art **geotextile production technology**, our woven and nonwoven geotextile ranges offer product solutions for the functions of Separation, Filtration, Drainage, Erosion Control, Reinforcement and Protection.

■ In-house Fibre Production

Fibre production involves the extrusion of continuous filaments that are then cut into short staple fibres. Through the careful identification of fibre formulation, filament density and staple fibre length, we can ensure that the mechanical and hydraulic properties are maximised for each of our nonwoven product ranges.

■ Nonwoven Geotextile Production

Using ultra modern needle punching looms and a unique thermal bonding process, our nonwoven geotextile production involves the processing of a uniform web of staple fibres that are orientated and bonded to form a finished sheet product.

■ Woven Geotextile Production

Polypropylene tapes are manufactured in our slit film extrusion department prior to being woven on Sulzer looms. The warp tapes (machine direction) are beamed into the loom and the weft tapes (cross-machine direction) are threaded over and under alternate elements. The woven product that emerges offers very high mechanical strengths per unit weight.

■ Quality and the Environment

All plants operate in accordance with an ISO 9001:2000 Quality Assurance System and ISO 14001 Environmental Management System. Products are tested internally in our fully equipped geosynthetics laboratory in accordance with the latest European and International standards.

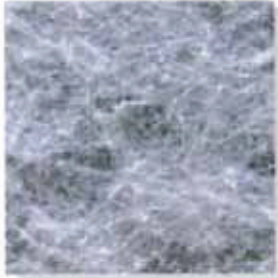
■ First Class Customer Service

At Bonar we believe the customer should be able to purchase the most appropriate product for his task. As such our staff are readily available to offer a full service package from the initial product selection phase, through to final delivery and the provision of after sales support.



BONTEC®: A TOTAL RANGE OF GEOTEXTILES

NON-WOVEN GEOTEXTILES



■ NW: Thermally Bonded Non Woven Geotextiles

Produced using mechanical and thermal bonding processes, the NW range is primarily used for lightweight separation and filtration. Their excellent hydraulic properties result in their preferred use in filtration applications. Typical uses include as a filter to encapsulate a trench drain or a granular drainage blanket.



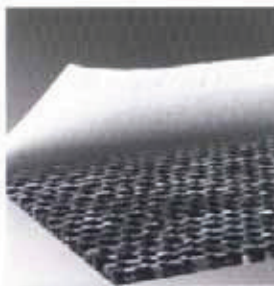
■ SNW: Superior Needle-punched Nonwoven Geotextiles

Made from white high tenacity fibres the SNW range offers maximum performance per unit weight and is ideal for use in applications where both strength and elongation are key parameters of the geotextiles' performance.



■ VNW: Coloured Needle-punched Nonwoven Geotextiles

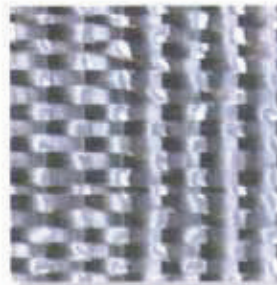
Produced using multi-coloured staple virgin fibres, products range from 200 to 1800g/m². VNW grades offer a felt like appearance and are used in the functions of protection, drainage and erosion control. Areas of application include membrane protection in landfill and reservoirs, or for erosion control on riverbanks and coastlines.



■ LG: Geocomposites

Produced via a combination of woven and nonwoven technology, the LG range offers the best of both product types in a single layer. The resulting products are ideally suited to uses where a high demand is placed on the geotextiles' strength, protection efficiency and physical robustness.

WOVEN GEOTEXTILES



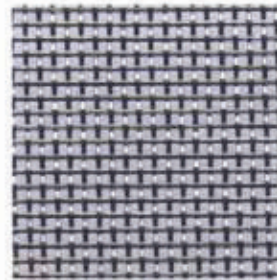
■ SG: Standard Grade Light weight Woven Geotextiles

Increasing from 70 to 200g/m² SG lightweights are used primarily for separation to prevent good quality granular fill intermixing with the poorer soil below. Typical uses include in new highways, car parks, airport runways, under stone foundation layers for new buildings etc.



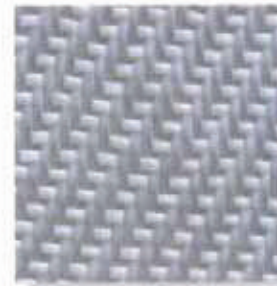
■ SG: Standard Grade Heavy weight Woven Geotextiles

With possible tensile strengths in excess of 200kN/m, SG heavyweight geotextiles are used in applications where the loadings are severe. Uses include short term basal reinforcement, coastal erosion schemes or areas requiring general soil stabilisation.



■ HF: High Flow Woven Geotextiles

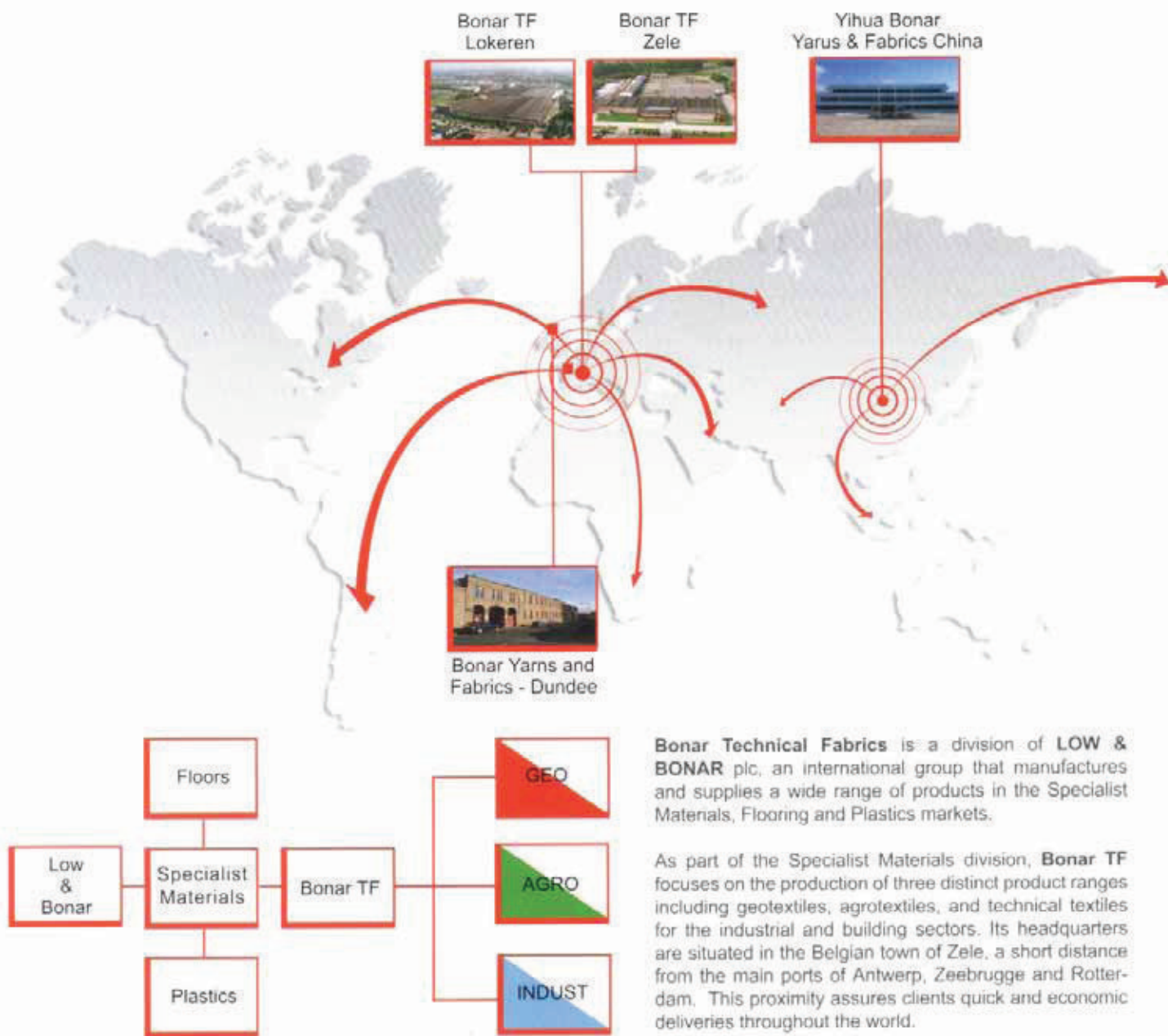
Used where there exists a requirement for the quick escape of excess water, HF fabrics are used primarily in erosion control applications e.g. under concrete revetment blocks or between dissimilar layers of quick draining granular fill e.g. a coarse sand and rounded gravel.



■ HS: High Strength Woven Geotextiles

Produced from high tenacity polyester yarns, the HS products offer tensile strengths up to 600kN/m combined with low extension and excellent creep characteristics. Applications include the reinforcement of vertical walls, steep slopes and embankments over soft soil with long term design lives.

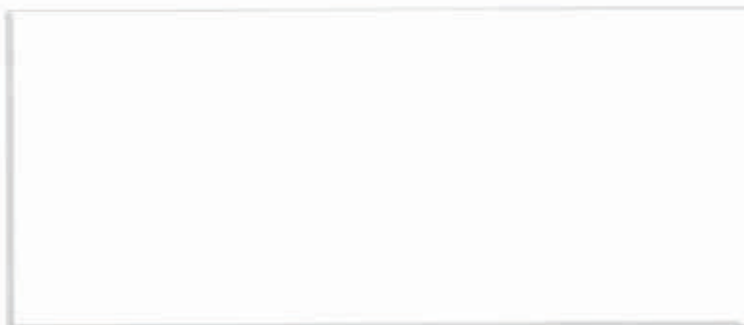
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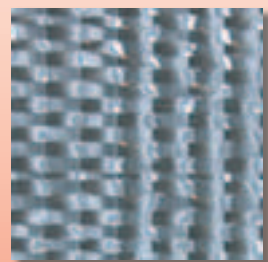
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website: www.bonartf.com





SG WOVEN GEOTEXTILES



we under^{cover} the world

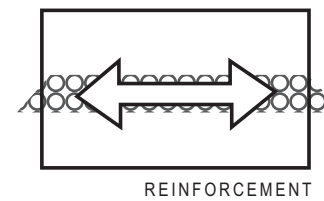
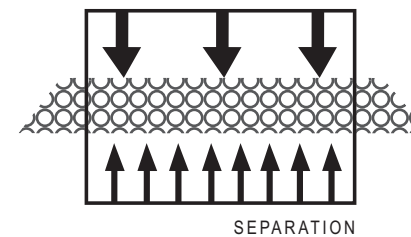
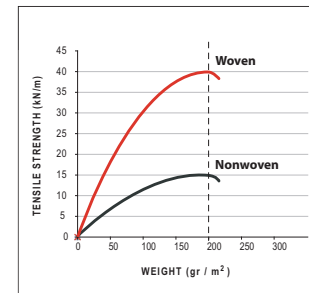
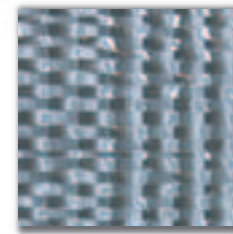


A TOTAL RANGE OF GEOTEXTILES

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T.: +44 (0)1382 346102
F.: +44 (0)1382 229238
E-MAIL: geotextiles@bonaryarns.com

website: www.bonartf.com



Other geotextiles available within the Bontec range include Highflow, High strength Wovens and Thermally Bonded & Needle-punched Nonwovens

Visit us at our website:
www.bonartf.com

For UK and Ireland: BONAR YARNS & FABRICS Ltd
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T.: +44 (0)1382 346102 | F.: +44 (0)1382 229238
E-MAIL: geotextiles@bonaryarns.com

"An exciting range of Standard Grade geotextiles that offer the perfect solution to your Separation requirements. With tensile strengths ranging from 10 to 300 kN/m you can be certain that an SG fabric will be available with the performance that you are looking for."

DAILY SEPARATION, SOIL STRENGTHENING
OR GROUND REINFORCEMENT?

Bontec SG woven geotextiles are manufactured from polypropylene tapes & yarns, and exhibit an excellent chemical resistance to commonly encountered acids and alkalis at ambient temperatures. Available in a lightweight range with products from 80 to 200g/m², and a heavyweight range from 200 to 800g/m².

Bontec SG facts include:

- Tensile strengths up to 300 kN per metre (kN/m) width
- CBR Puncture Strengths ranging from 1.800 N to 12.500 N

SG Mechanical Properties that offer maximum strength at minimal cost and ensure the products survivability both against installation damage and in the longer term.

Lightweight woven geotextiles typically offer greater mechanical strengths per unit weight than comparable nonwoven grades. This makes lightweight woven geotextiles the ideal choice for separation

- Waterflows normal to the plane that are generally several times more than that required by design
- A range of consistent opening sizes suited for use in soils ranging from clay to coarse granular fill.

SG hydraulic properties that are suited to the demands of everyday separators.

Available ex-stock in 4.5m and 5.25m wide rolls or other widths to order

Typical applications for SG woven geotextiles include:

- As a general purpose separator for use under site access roads and areas of hardstanding.
- As a separation and strengthening layer under new roadways, car parks, industrial units etc.
- As an erosion control layer under heavy rock armour in coastal defence projects.
- For any separation application where there exists a need to prevent the intermixing of soft foundation soils with good clean granular fill.



SG Woven Geotextiles have been manufactured as a cost effective solution to your soil separation and stabilisation applications. They are manufactured from highly durable polypropylene polymer and have a long life expectancy when used in permanent structures.

For further product information, be it a technical data sheet or to discuss your project with one of our in-house geotextile experts please do not hesitate to contact one of our offices listed below.

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SG 110/110

Woven polypropylene geotextile made of slit film tapes

Technical data sheet according to internal specifications Bonar TF: version 06 dd. 05/01/10
 Accompanying documents CE marking: version 04 dd. 05/01/10



1137-CPD-615
10

separation	filtration	reinforcement	protection	drainage

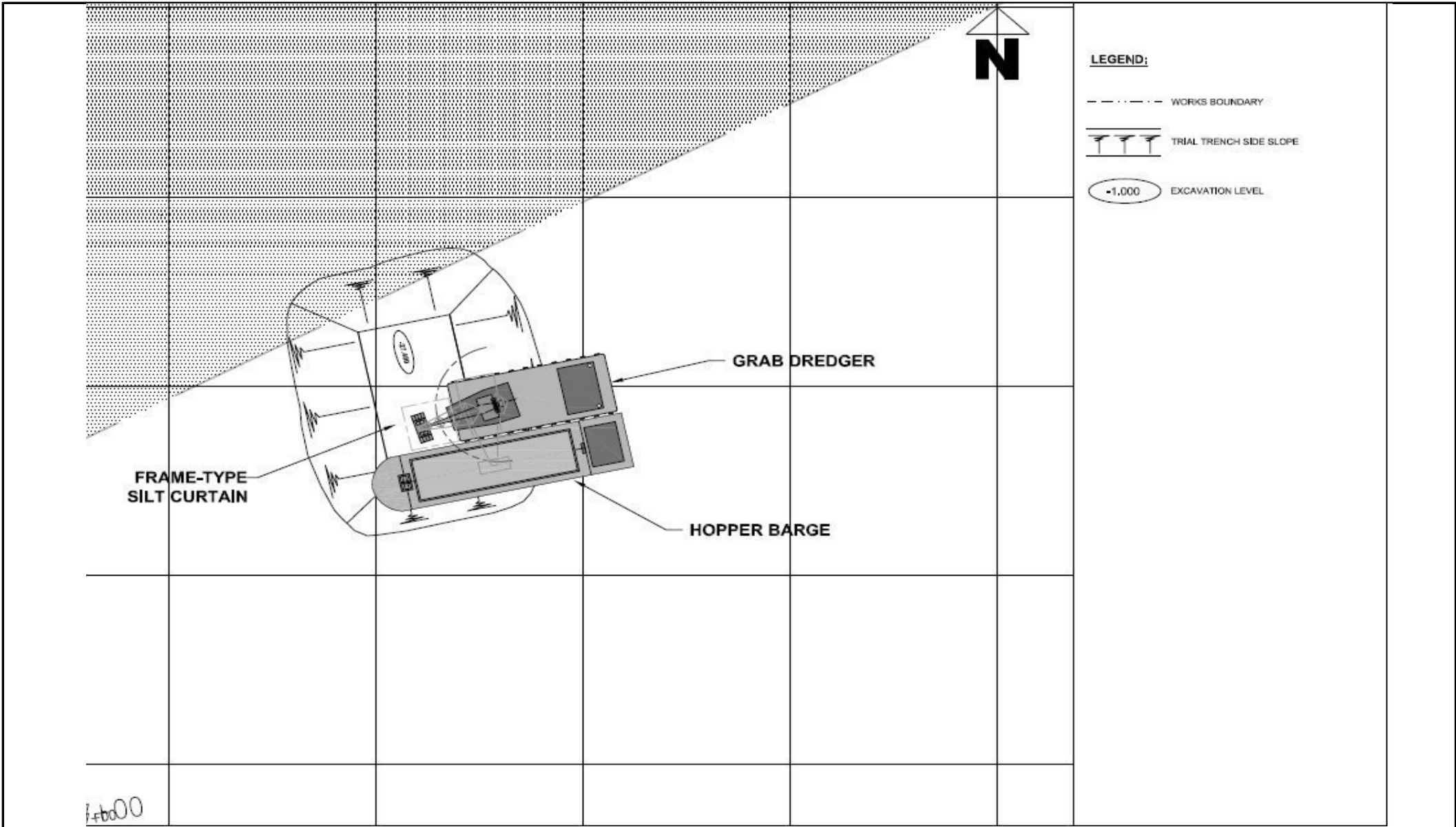
	test method	value	tolerance
Mechanical properties			
Tensile strength MD		110,0 kN/m	-9,9 kN/m
Tensile strength CD	EN ISO 10319	110,0 kN/m	-9,9 kN/m
Elongation MD		12,0 %	+/-2,8 %
Elongation CD	EN ISO 10319	8,0 %	+/-1,8 %
Static puncture resistance – CBR	EN ISO 12236	12,50 kN	-2,50 kN
Dynamic perforation resistance – cone drop	EN ISO 13433	10,0 mm	+2,0 mm
Hydraulic properties			
Water permeability normal to the plane		25x10⁻³ m/s	-8x10 ⁻³ m/s
Water flow normal to the plane (*)	EN ISO 11058	25 l/m².s	-8 l/m ² .s
Characteristic opening size (AOS)	EN ISO 12956	230,0 µm	+/-69,0 µm
Physical properties			
Thickness under 2 kPa (*)	EN ISO 9863-1	1,53 mm	+/-0,31 mm
Weight (*)	EN ISO 9864	464,0 g/m²	+/-46,4 g/m ²
Composition	100 % polypropylene woven geotextile		
Durability	predicted to be durable for a minimum of 25 years in natural soil with 4 < pH < 9 and soil temperatures < 25° C		

roads	railways	foundations & retaining walls	drainage systems	erosion control systems
EN 13249:2000	EN 13250:2000	EN 13251:2000	EN 13252:2000	EN 13253:2000
reservoirs & dams	canals	Tunnels & underground structures	solid waste	liquid waste
EN 13254:2000	EN 13255:2000	EN 13256:2000	EN 13257:2000	EN 13265:2000

1. This geotextile is intended for use in both functions & applications highlighted with a bold border.
 2. It is the responsibility of all users to satisfy themselves that the above data is current.
 3. Roll dimensions are 5,25 m x 100 m. Other dimensions on demand.
 4. Bonar Technical Fabrics reserves the right to alter product specifications without prior notice.
 5. Although not guaranteed, these results do to the best of our knowledge offer a true and accurate record of the product's performance.
 6. Bonar Technical Fabrics cannot accept responsibility for the performance of these products as the conditions of use are beyond our control.
 7. Geotextile has to be covered within 2 weeks after installation
- (*) Not mandated characteristics for CE marking.

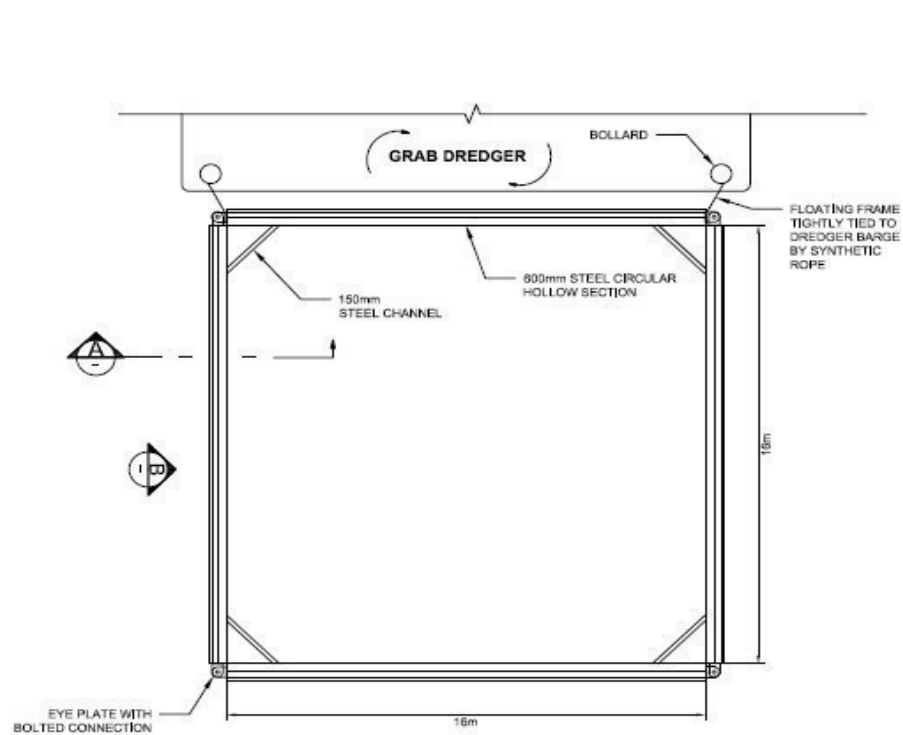
APPENDIX C

**TYPICAL DETAILS OF SILT
CURTAIN**

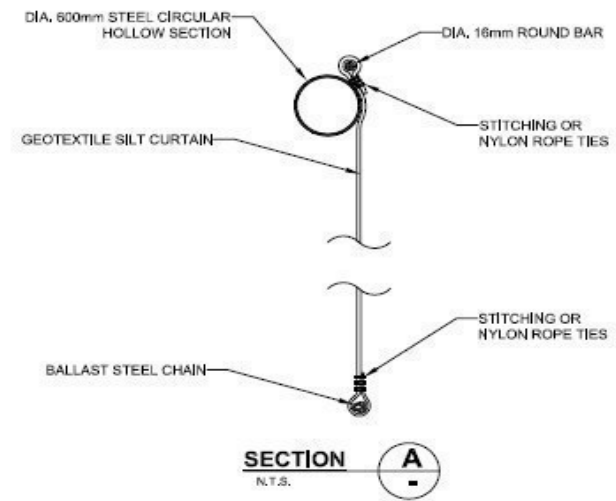


Title	SCL1121		Scale	Project
	NSL Cross Harbour Tunnels		N.T.S	No. MA14047
	Typical Details of Frame-Type Silt Curtain		Date	Appendix
			Jan-16	C1

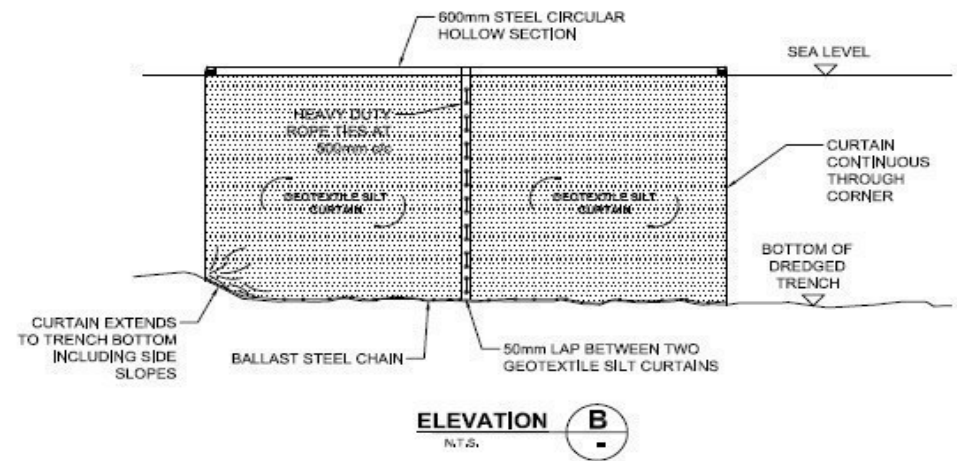




PLAN VIEW OF FRAME-TYPE SILT CURTAIN
N.T.S.

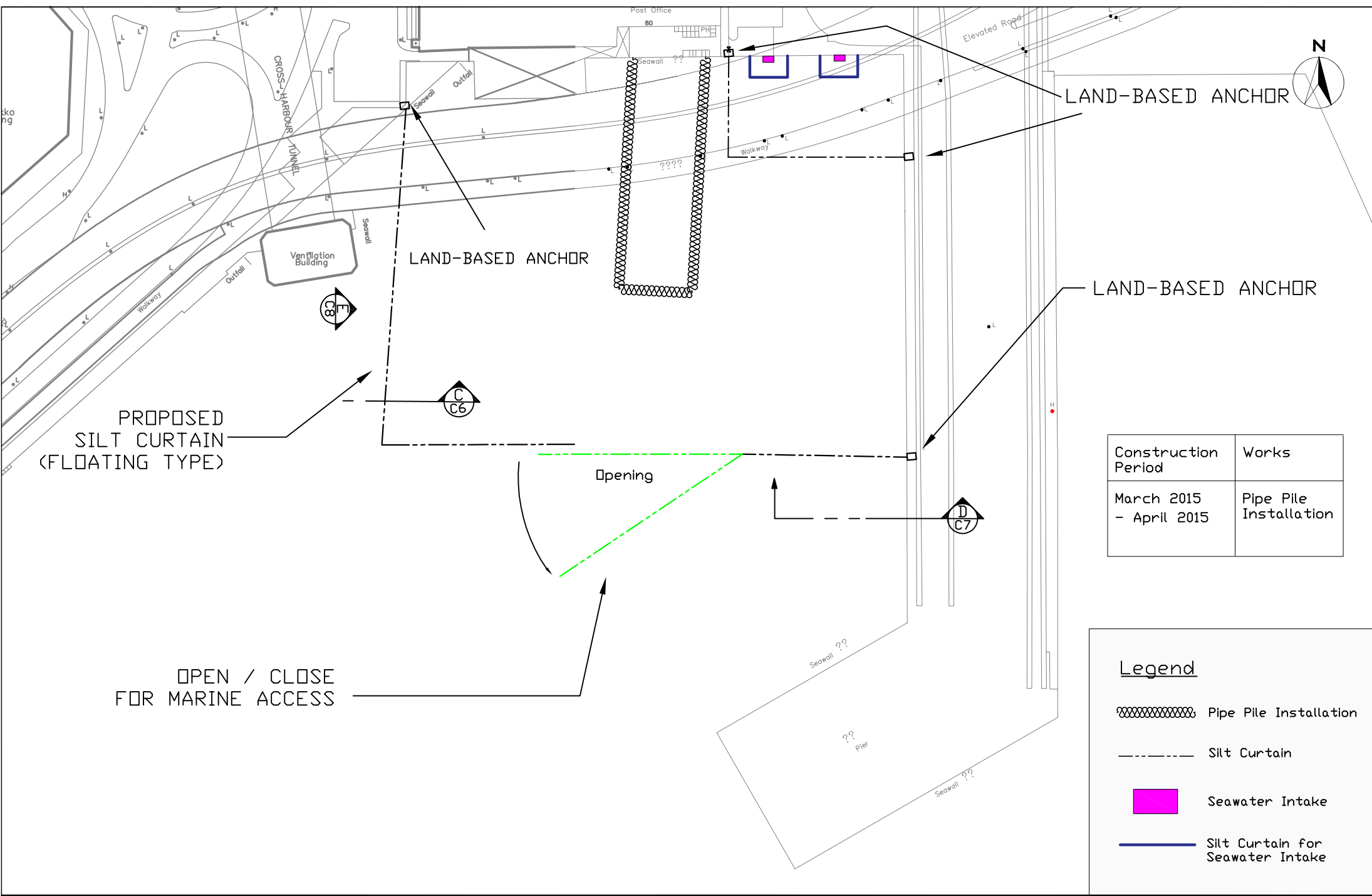


SECTION A
N.T.S.



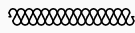



ELEVATION B
N.T.S.

Title	SCL1121		Scale	Project	CINOTECH		
	NSL Cross Harbour Tunnels					N.T.S	No. MA14047
	Typical Details of Frame-Type Silt Curtain					Date	Appendix
			Jan-16	C2			

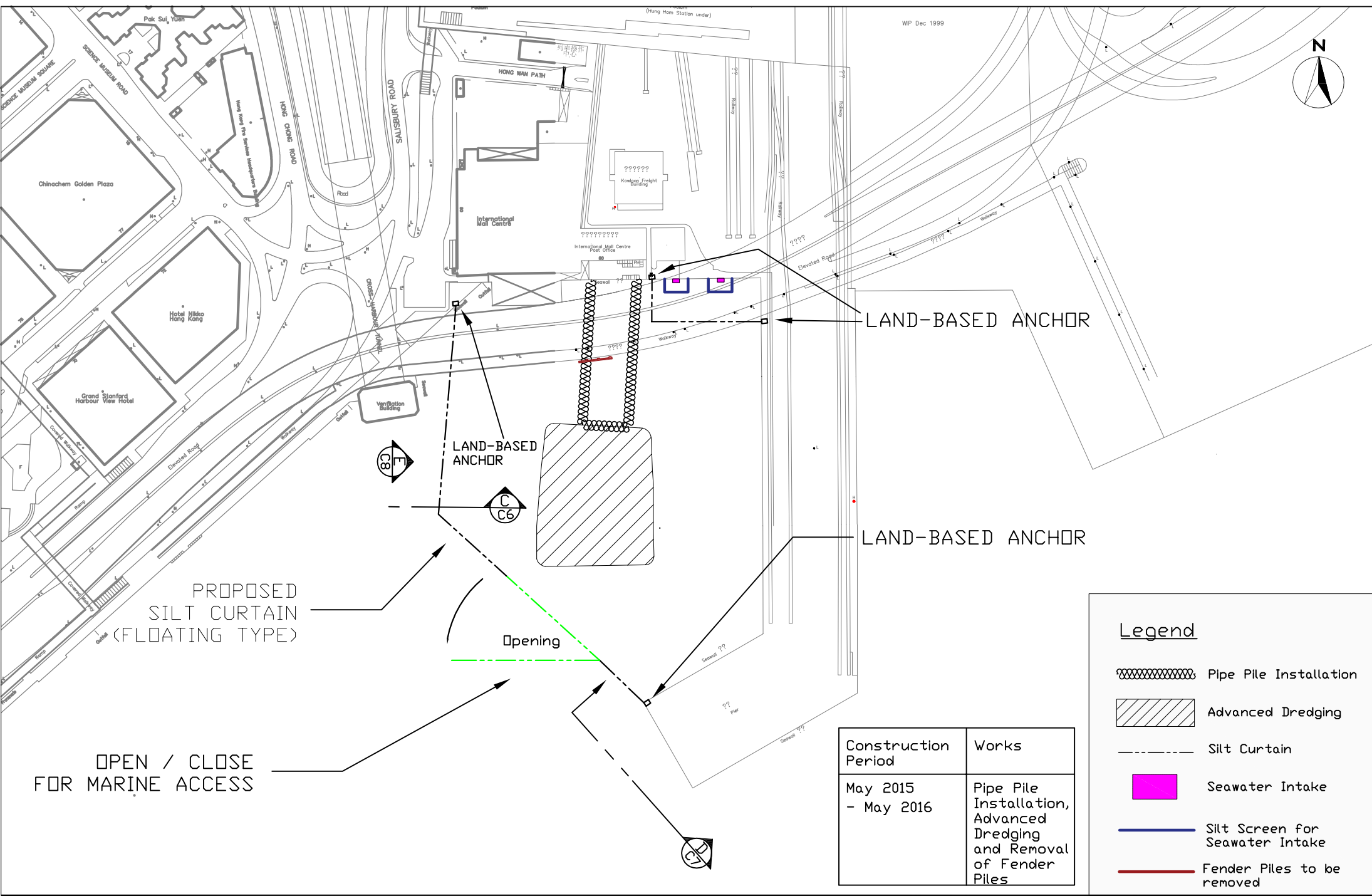


Construction Period	Works
March 2015 - April 2015	Pipe Pile Installation

Legend

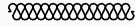

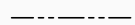



-  Pipe Pile Installation
-  Silt Curtain
-  Seawater Intake
-  Silt Curtain for Seawater Intake

SCALE	N.T.S.	DATE	MAR 15
CHECK	JF	DRAWN	JW
JOB No.	MA14047	APPENDIX	C3
		REV	-

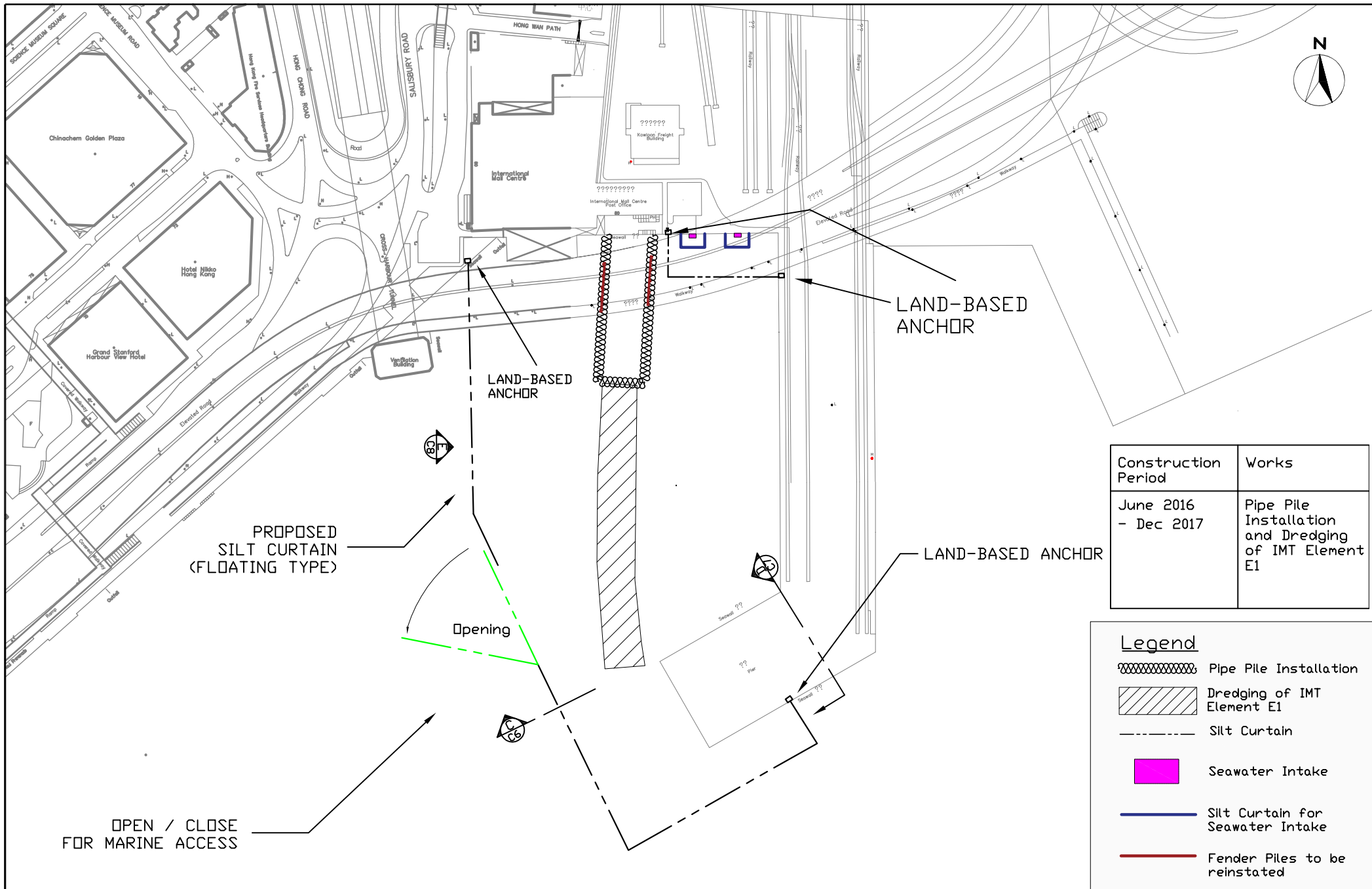


Construction Period	Works
May 2015 - May 2016	Pipe Pile Installation, Advanced Dredging and Removal of Fender Piles

Legend

-  Pipe Pile Installation
-  Advanced Dredging
-  Silt Curtain
-  Seawater Intake
-  Silt Screen for Seawater Intake
-  Fender Piles to be removed

SCALE	N.T.S.	DATE	FEB 16
CHECK	JF	DRAWN	JW
JOB No.	MA14047	APPENDIX	C4
		REV	-



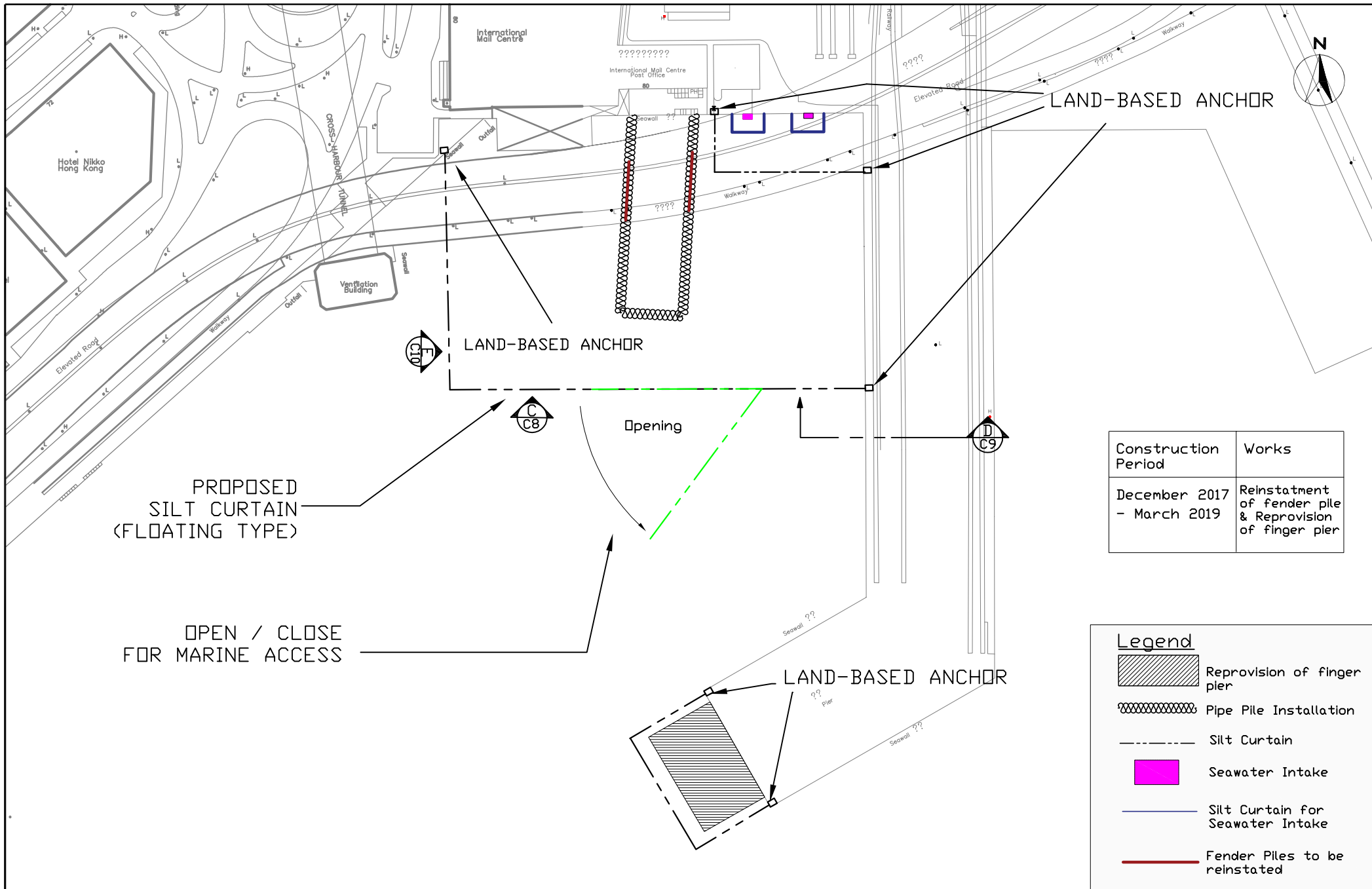
Construction Period	Works
June 2016 - Dec 2017	Pipe Pile Installation and Dredging of IMT Element E1

Legend	
	Pipe Pile Installation
	Dredging of IMT Element E1
	Silt Curtain
	Seawater Intake
	Silt Curtain for Seawater Intake
	Fender Piles to be reinstated



SCL 1121 - NSL Cross Harbour Tunnels
 Typical Details of Silt Curtain at Hung Hom Landfall (Stage 3)

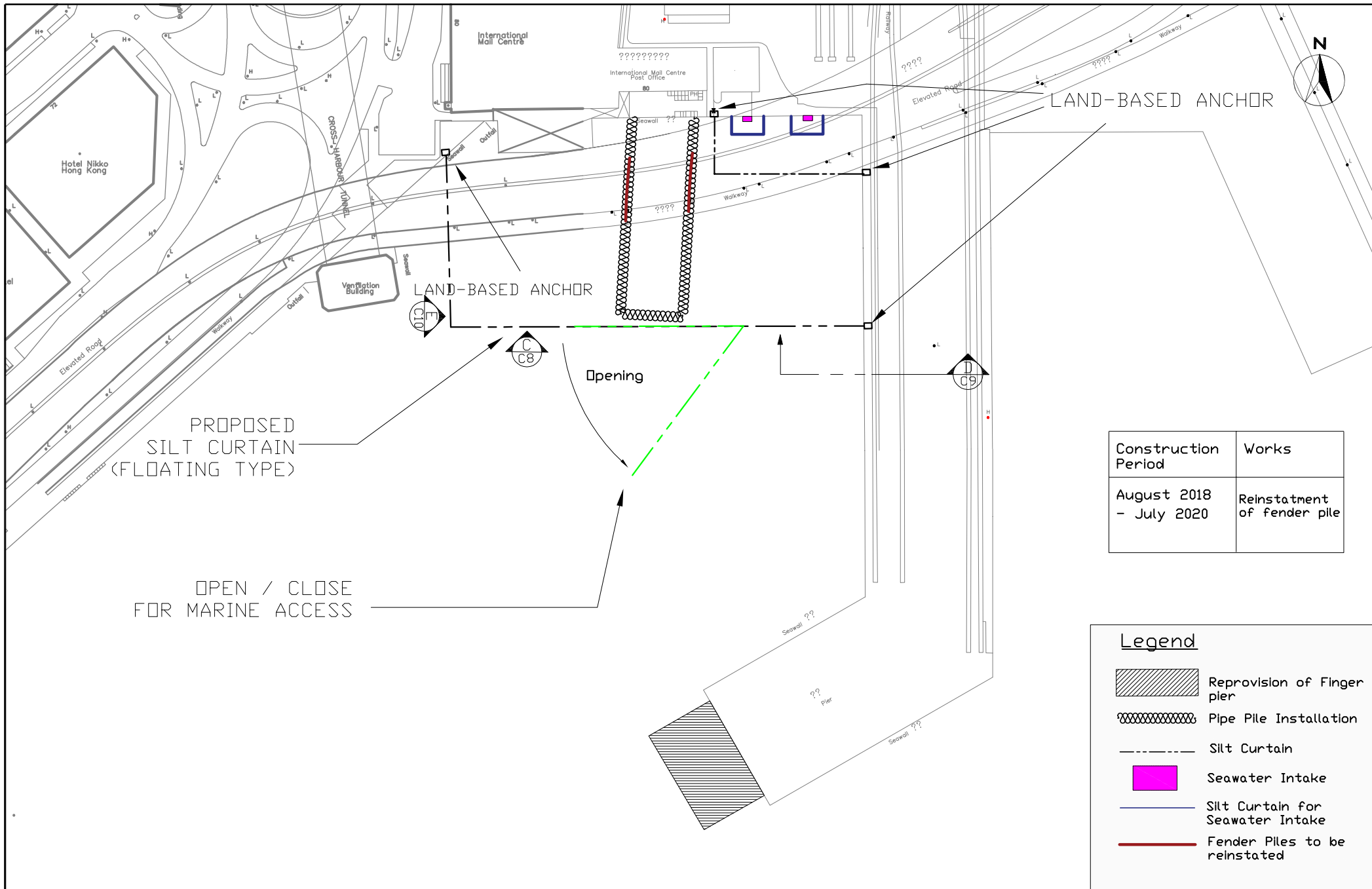
SCALE	N.T.S.	DATE	NOV 17
CHECK	JF	DRAWN	AC
JOB No.	MA14047	APPENDIX	C5
		REV	-

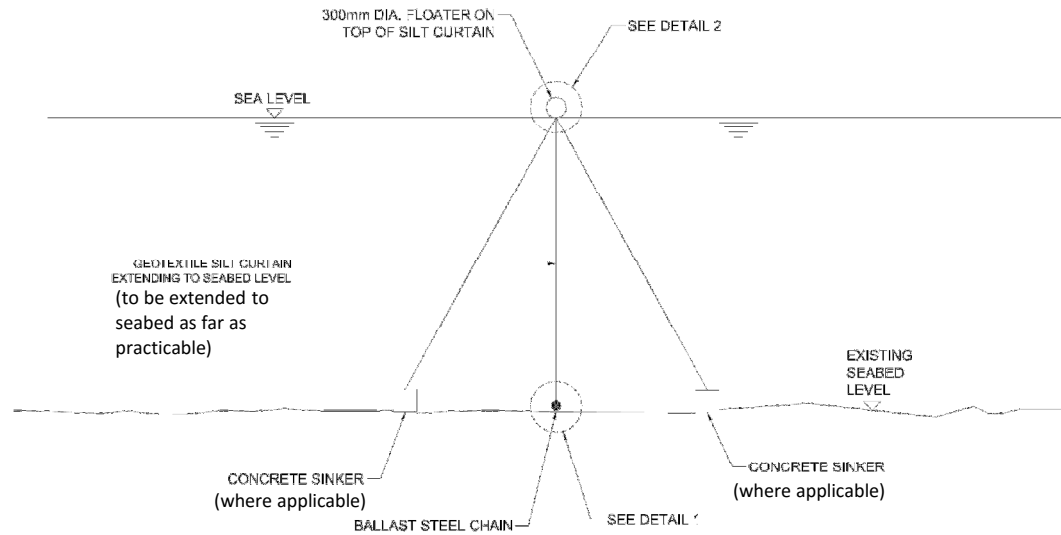


Construction Period	Works
December 2017 - March 2019	Reinstatement of fender pile & Reprovision of finger pier

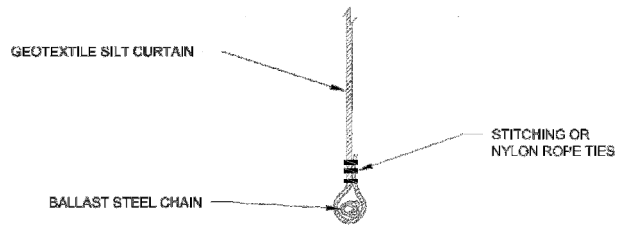
Legend	
	Reprovision of finger pier
	Pipe Pile Installation
	Silt Curtain
	Seawater Intake
	Silt Curtain for Seawater Intake
	Fender Piles to be reinstated

SCALE	N.T.S.	DATE	NOV 17
CHECK	JF	DRAWN	AC
JOB No.	MA14047	APPENDIX	C6
		REV	-

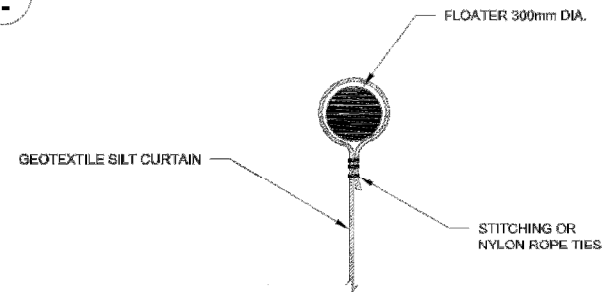




SECTION C
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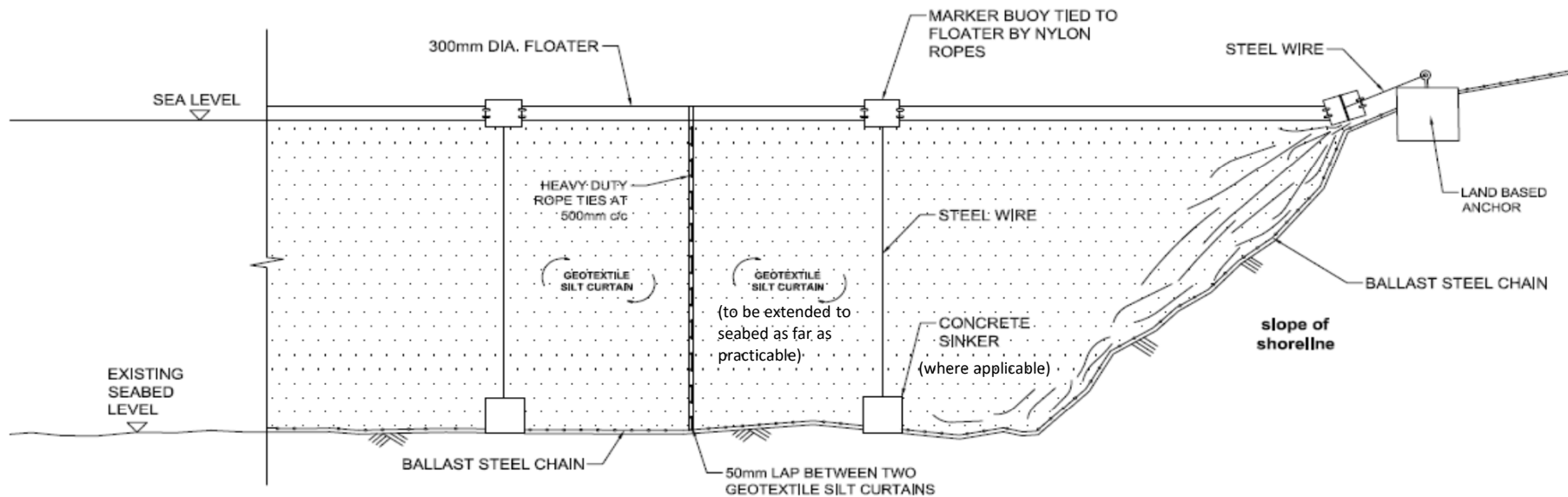


DETAIL 1 (BALLAST STEEL CHAIN)
N.T.S.



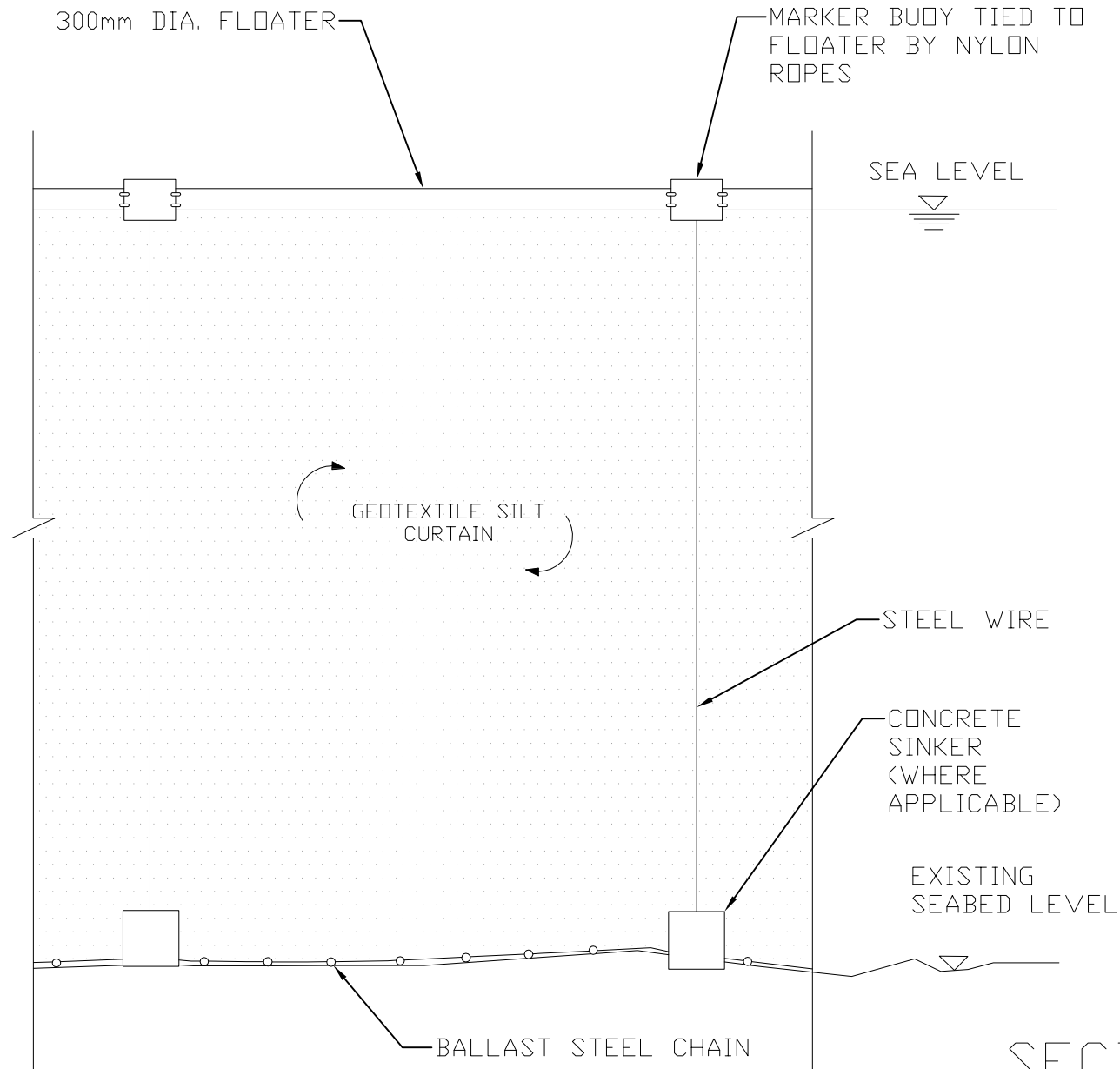
DETAIL 2 (FLOATER)
N.T.S.

Title	SCL1121 NSL Cross Harbour Tunnels Typical Details of Silt Curtain	Scale	Project	CINOTECH
		N.T.S.	No. MA14047	
		Date	Appendix	
		Jan-16	C8	



SECTION D
N.T.S.

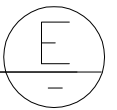
Title	SCL1121 NSL Cross Harbour Tunnels Typical Details of Silt Curtain	Scale	Project	CINOTECH
		N.T.S.	No. MA14047	
		Date	Appendix	
		Jan-16	C9	



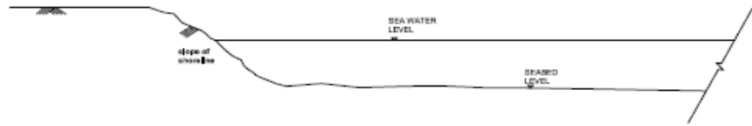
REMARKS: SILT CURTAIN TO BE EXTENDED TO SEABED AS FAR AS PRACTICABLE

SECTION

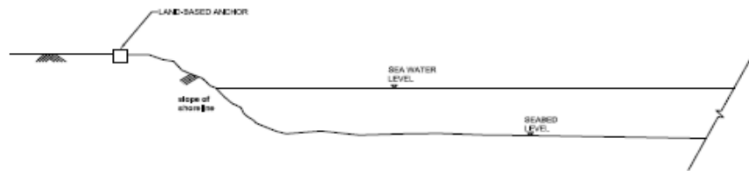
N.T.S.



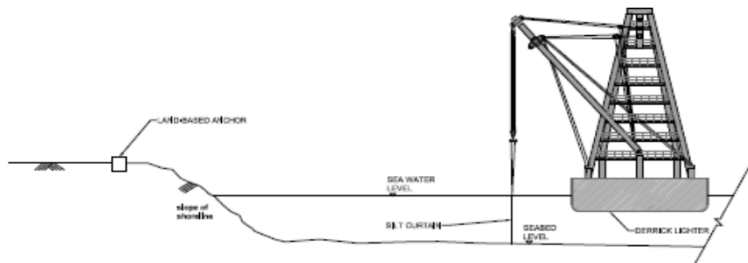
SCALE	NTS	DATE	JAN 2016	
CHECK	PC	DRAWN	JF	
JOB No.	MA14047	Appendix	C10	REV -



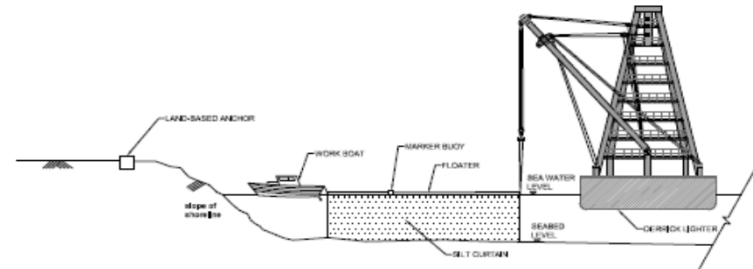
Stage 1:
Fabricate and assemble the silt curtain system in off-site workshop.



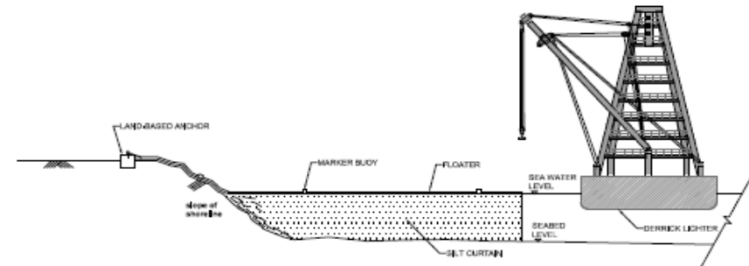
Stage 2:
Install land-based anchors on shore.



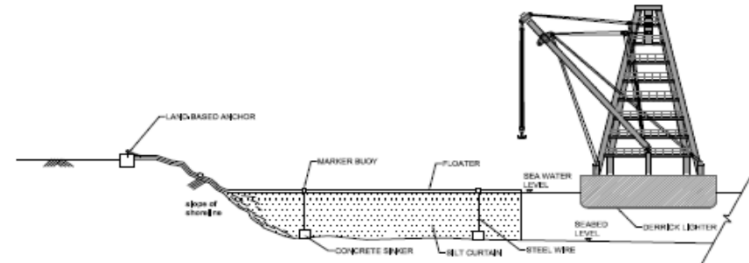
Stage 3:
Transport the pre-assembled silt curtain to site and place into water by derrick lighter.



Stage 4:
Install and align the silt curtain in position by work boat.



Stage 5:
Fix both ends of the silt curtain to land-based anchors on shore.



Stage 6:
Position concrete sinkers on seabed and chain onto the buoys of silt curtain. Divers shall be deployed to assist in the operation and conduct final inspection. (where applicable)

Title

SCL1121
NSL Cross Harbour Tunnels

Typical Details of Installation Procedures of Silt Curtain at CBTS

Scale

N.T.S

Date

Jan-16

Project

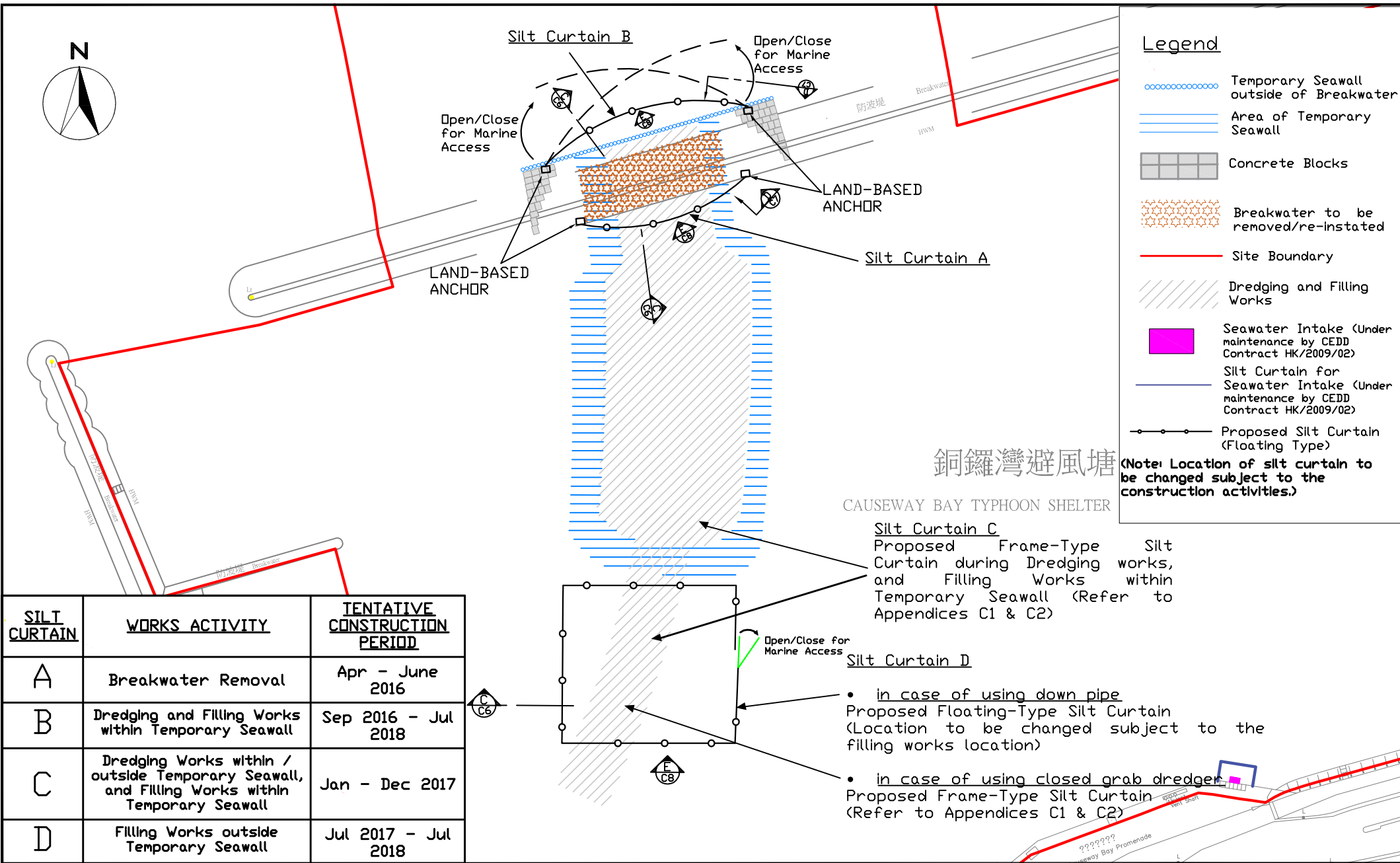
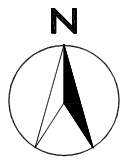
No.

MA14047

Appendix

C11

CINOTECH



Legend

- Temporary Seawall outside of Breakwater
- Area of Temporary Seawall
- Concrete Blocks
- Breakwater to be removed/re-instated
- Site Boundary
- Dredging and Filling Works
- Seawater Intake (Under maintenance by CEDD Contract HK/2009/02)
- Silt Curtain for Seawater Intake (Under maintenance by CEDD Contract HK/2009/02)
- Proposed Silt Curtain (Floating Type)

(Note: Location of silt curtain to be changed subject to the construction activities.)

SILT CURTAIN	WORKS ACTIVITY	TENTATIVE CONSTRUCTION PERIOD
A	Breakwater Removal	Apr - June 2016
B	Dredging and Filling Works within Temporary Seawall	Sep 2016 - Jul 2018
C	Dredging Works within / outside Temporary Seawall, and Filling Works within Temporary Seawall	Jan - Dec 2017
D	Filling Works outside Temporary Seawall	Jul 2017 - Jul 2018

銅鑼灣避風塘
CAUSEWAY BAY TYPHOON SHELTER

Silt Curtain C
Proposed Frame-Type Silt Curtain during Dredging Works, and Filling Works within Temporary Seawall (Refer to Appendices C1 & C2)

Silt Curtain D

- in case of using down pipe Proposed Floating-Type Silt Curtain (Location to be changed subject to the filling works location)
- in case of using closed grab dredger Proposed Frame-Type Silt Curtain (Refer to Appendices C1 & C2)



SCL 1121 - NSL Cross Harbour Tunnels
Typical Details of Silt Curtain within CBTS

SCALE	NTS	DATE	NOV 2017
CHECK	JF	DRAWN	AC
JOB No.	MA14047	Appendix	C12
		REV	-

APPENDIX D

**SAMPLE CHECKLIST FOR
INSPECTION OF SILT CURTAIN**

Daily Visual Inspection Checklist for Floating-Type Silt Curtain

Date: _____

Weather: _____

Location: Hung Hom Landfall / CBTS

Category	Inspection Items	Results (Satisfactory / Unsatisfactory)	Rectification	
			Target Completion Date	Actual Completion Date
Geotextile	Geotextile curtain remains intact and without gap	Satisfactory / Unsatisfactory		
	Geotextile curtain in upright position	Satisfactory / Unsatisfactory		
	Silt curtain has no flapping or dislocation	Satisfactory / Unsatisfactory		
	No floating refuse trapped by the silt curtain	Satisfactory / Unsatisfactory		
	No sediment plume dispersed through the silt curtain	Satisfactory / Unsatisfactory		
Ancillary Facilities	Floater in good working conditions	Satisfactory / Unsatisfactory		
	Flashing lights in good working conditions	Satisfactory / Unsatisfactory		
	Wire ropes in good working conditions	Satisfactory / Unsatisfactory		

Checked By: _____

Daily Visual Inspection Checklist for Frame-Type Silt Curtain

Date: _____

Weather: _____

Location: Hung Hom Landfall / Victoria Harbour / CBTS

Category	Inspection Items	Results (Satisfactory / Unsatisfactory)	Rectification	
			Target Completion Date	Actual Completion Date
Cleanliness	Floating debris or refuse within the silt curtain cleaned up	Satisfactory / Unsatisfactory		
	Dispersion of sediment plume	Satisfactory / Unsatisfactory		
Floating Frame	Structure of floating frame remains intact	Satisfactory / Unsatisfactory		
	Floating frame stays above sea surface	Satisfactory / Unsatisfactory		
Geotextile	Geotextile fabric remains intact and in upright position	Satisfactory / Unsatisfactory		
	Geotextile fabric is securely attached to floating frame	Satisfactory / Unsatisfactory		

Checked By: _____

Diving Inspection Checklist for Floating-Type Silt Curtain

Date: _____

Weather: _____

Location: Hung Hom Landfall / CBTS

Category	Inspection Items	Results (Satisfactory / Unsatisfactory)	Rectification	
			Target Completion Date	Actual Completion Date
Geotextile	Geotextile curtain remains intact and without gap	Satisfactory / Unsatisfactory		
	Geotextile curtain is securely attached to floaters	Satisfactory / Unsatisfactory		
	Silt curtain extends from sea surface to seabed level	Satisfactory / Unsatisfactory		
	Ballast chain at bottom of silt curtain remains in position	Satisfactory / Unsatisfactory		
Ancillary Facilities	Marker buoys and flashing lights in good order	Satisfactory / Unsatisfactory		
	Concrete sinkers is securely attached to bottom of silt curtain	Satisfactory / Unsatisfactory		

Checked By: _____

Diving Inspection Checklist for Frame-Type Silt Curtain

Date: _____

Weather: _____

Location: Hung Hom Landfall / Victoria Harbour / CBTS

Category	Inspection Items	Results (Satisfactory / Unsatisfactory)	Rectification	
			Target Completion Date	Actual Completion Date
Floating Frame	Structure of floating frame remains intact	Satisfactory / Unsatisfactory		
	Floating frame stays above sea surface	Satisfactory / Unsatisfactory		
Geotextile	Geotextile curtain remains intact and in upright position	Satisfactory / Unsatisfactory		
	Geotextile curtain is securely attached to floating frame	Satisfactory / Unsatisfactory		
	Silt curtain extends from sea surface to seabed level	Satisfactory / Unsatisfactory		
	Ballast chain at bottom of silt curtain remains in position	Satisfactory / Unsatisfactory		

Checked By: _____

APPENDIX E

**ANTICIPATED CONSTRUCTION
PROGRAMME**

SCL Contract 1121
 NSL Cross Harbour Tunnels
 Penta Ocean-China State JV
 Victoria Harbour - Tentative Works Program

Description of Works	2015												2016												2017												2018											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Install silt curtain ^[1]																																																
Trial Trenching in Victoria Harbour ^[1]																																																
Maintenance of silt curtain ^[1]																																																
Remove silt curtain ^[1]																																																
Install silt curtain																																																
Bulk Dredging in Victoria Harbour ^[1]																																																
Maintenance of silt curtain																																																
Remove silt curtain																																																

Note [1]: The trial trenching works and bulk dredging works in Victoria Harbour has been completed in May 2015 & July 2017 accordingly.

