

AGREEMENT NO. CE 42/2005 (WS)

**LAYING OF WESTERN CROSS HARBOUR MAIN AND ASSOCIATED LAND MAINS
FROM WEST KOWLOON TO SAI YING PUN**

MARINE ARCHAEOLOGICAL INVESTIGATION



Yau Ma Tei typhoon shelter in 1906 after a bad storm

PREPARED FOR MOTT CONNELL LIMITED

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1 SUMMARY

In accordance with the 1998 EIA Ordinance (Cap. 499, S16), the Antiquities and Monuments Office (AMO) requested a Marine Archaeological Investigation (MAI) for the Laying of Western Cross Harbour Main and Associated Land Mains from West Kowloon to Sai Ying Pun. The requirement is set out in the Water Supplies Department Draft Brief issued 24th October, Appendix III, Annex C (EIA Study Brief ESB-132/2005).

The project will comprise an approximately 2.1Km x 1200mm-diameter submarine water main, buried at 5m depth across Victoria Harbour: from its existing connection at Lin Cheung Road in West Kowloon to the existing Sai Ying Pun Fresh Water Pumping Station in Sheung Wan.

The aim of the investigation was to locate and assess underwater archaeological resources which may be damaged by the installation of the cross harbour mains. In accordance with AMO Guidelines, the MAI consisted of a Baseline Review and Geophysical Survey.

The desk top Baseline Review indicated a high potential for marine archaeological material within the study area. The area around Yau Ma Tei has been the focus for intense maritime activity throughout the whole of Hong Kong's history. The potential is reduced because of the seabed disturbance associated with numerous reclamations and construction of the Western harbour crossing.

The combination of the Baseline Review and Geophysical Survey combine to provide 100% coverage of the study area. The geophysical survey provided very detailed information about features on the seabed. Within the study area, the seabed is characterised by the presence of dumped materials, trawl marks, scars and other evidence of previous disturbance. There was no indication of any archaeological resources.

It is therefore concluded that there are no marine archaeological resources within the study area. It follows that there are no related constraints on the proposed development.

There is no need for any further archaeological investigation or mitigation measures.

2 INTRODUCTION

In accordance with the 1998 EIA Ordinance (Cap. 499, S16), the Antiquities and Monuments Office (AMO) requested a Marine Archaeological Investigation (MAI) for the Laying of Western Cross Harbour Main and Associated Land Mains from West Kowloon to Sai Ying Pun. The requirement is set out in the Water Supplies Department Draft Brief issued 24th October, Appendix III, Annex C (EIA Study Brief ESB-132/2005).

The project will comprise an approximately 2.1Km x 1200mm-diameter submarine water main, buried at 5m across Victoria Harbour: from its existing connection at Lin Cheung Road in West Kowloon to the existing Sai Ying Pun Fresh Water Pumping Station in Sheung Wan. The location of the study area is shown in Figure 1.

The aim of the investigation was to locate and assess underwater archaeological resources which may be damaged by the installation of the cross harbour mains. In accordance with AMO Guidelines, the MAI consisted of a Baseline Review and Geophysical Survey.

3 LEGISLATIVE FRAMEWORK FOR MARINE ARCHAEOLOGICAL INVESTIGATIONS IN HONG KONG

Since the introduction of the 1998 Environmental Impact Assessment (EIA) Ordinance CAP. 499, S16, (Hong Kong Environmental Protection Department, 1977), the Antiquities and Monuments Office (AMO) have the power to request a MAI for developments affecting the seabed. The EIA Ordinance stipulates that consideration must be given to issues associated with cultural heritage and archaeology as part of the EIA process. Annexes 10 and 19 of the EIA Technical Memoranda (TM) outline the criteria for evaluating the impacts on sites of cultural heritage and guidelines for impact assessment, respectively. The EIA TM identifies a general presumption in favour of the protection and conservation of all sites of cultural heritage and requires impacts upon sites of cultural heritage to be '*kept to a minimum*'. There is no quantitative standard for determining the relative importance of sites of cultural heritage, but in general sites of unique, archaeological, historical or architectural value should be considered as highly significant.

3.1 THE ANTIQUITIES AND MONUMENTS ORDINANCE

Legislation relating to antiquities is set out in the Antiquities and Monuments Ordinance (Chapter 53 of the Laws of Hong Kong), which came into force on January 1st 1976. The AM Ordinance provides statutory protection against the threat of development on Declared Monuments, historical buildings and archaeological sites to enable their preservation for posterity. The legislation applies equally to sites on land and underwater. The purpose of the Ordinance is to prescribe controls for the discovery and protection of antiquities in Hong Kong. A summary of the key aspects of the legislation relevant to the current study is presented below:

- Human artefacts, relics and built structures may be gazetted and protected as monuments. The Antiquities Authority may, after consultation with the Antiquities Advisory Board (AAB) and with the Chief Executive's approval, declare any place, building, site or structure which the Antiquities Authority considers to be of public interest by reason of its historical, archaeological or palaeontological significance, to be a monument, historical building, archaeological or palaeontological site or structure.
- Once declared a site of public interest, no person may undertake acts which are prohibited under the Ordinance, such as to demolish or carry on building or other works, unless a permit is obtained from the Antiquities Authority.
- The Ordinance defines an antiquity as a relic (a moveable object made before 1800) and a place, building, site or structure erected, formed or built by human agency before the year 1800. Archaeological sites are classified into three categories, as follows:
 - Declared Monument*** – those that are gazetted in accordance with Cap. 53 by the Antiquities Authority and are to be protected and conserved at all costs;
 - Recorded Archaeological Sites*** – those which are considered to be of significant value but which are not yet declared as monuments and should be either protected, or if found not possible to protect these sites then salvaged
- The Legislation sets out the procedures for the issuing of Licenses to Excavate and Search for Antiquities, the effect of which is to forbid all such activities being undertaken without such a License. It also provides for the penalties exacted for infringement of the Ordinance, including fines and imprisonment.

4 METHODOLOGY

The study was undertaken using standard MAI techniques described below which follow the Guidelines issued by the Antiquities and Monuments Office.

4.1 BASELINE REVIEW

A comprehensive review was carried out to determine the archaeological potential of the study area. This included archaeological and historical publications.

4.2 ARCHIVE SEARCH

All archives holding information on shipwrecks in Hong Kong were explored for relevant data.

4.3 GEOPHYSICAL SURVEY

The survey aim was to locate any possible marine archaeological resources on the seabed. On the instructions of the Geotechnical Engineering Office (GEO) of Civil Engineering & Development Department (CEDD), Works Order No. GE/2005/26, a

geophysical survey was conducted by IGGE. The full data set was passed to SDA Marine Ltd for analysis and interpretation.

4.3.1 SURVEY PERIOD AND LOCATION

The survey area is defined by four co-ordinated boundary points shown on each of the charts attached to this report. The survey was conducted on August 17th to 24th 2006. The survey line spacing and cross survey line spacing were set out by Mott Connell as followl:

SURVEY TYPE	MAIN SURVEY LINE SPACING	CROSS SURVEY LINE SPACING
Multi beam sounding	20m	100m
Seismic Profiler	20m	100m
Side scan sonar	20m	N/a

The track plot for each type of survey is also shown on each of the ChartFigures accompanying this report.

4.3.2 SITE SAFETY

Safety conditions on board were good and were checked by the officials of GEO and the IGGE safety officer. The crew working on the survey vessel held safety training certificates. The survey vessel stayed in contact with Port Control via marine radio during the survey. This was vital as the study area is in a very busy section of Victoria Harbour.

4.3.3 EQUIPMENT

Listed below is the equipment relevant to the archaeological assessment and not the total equipment deployed.

EQUIPMENT	MODEL
Multi beam echo sounder	Seabeam 1185
Automatic water level recorder	Valeport VLR740
Positioning system	NT-300D DGPS differential signal receiver
Marine seismic profiler	DELPH II – including power pack, boomer and hydrophone streamer
Dual channel side scan sonar	Edge Tech 560A
Computerised navigation system	Season TRACKER Navigation System
Depth measurement	Echo sounder - Hummingbird

4.3.4 EQUIPMENT CALIBRATION AND CHECK

4.3.5 TIDE GAUGE

The Valeport VLR 740 Automatic Tide Logger was calibrated at the beginning of each survey day at Tuen Mun Pier to ensure the accuracy of +/- 0.02m.

4.3.6 POSITIONING SYSTEM

The accuracy check was completed prior to commencement of the survey. The DGPS was installed and checked at a co-ordinated station at North Point. Data were 95% reliable within a 2m radius.

4.3.6 MULTI BEAM ECHO SOUNDING

Calibrations of the vessel motion sensor and the time delay of the positioning system are vital to the quality of the data collected. The calibrations were performed on August 16th, 2006. The calibration of the ELAC SEA BEAM 1185 multi beam system comprise three items: roll, pitch and yaw offset.

4.3.7 SEISMIC PROFILER

The seismic profiler comprise: Control Unit, Power Pack, Hydrophone and Boomer. It is not calibrated by the user but at the time of manufacture. However, it was checked during the survey parameter configuration test and was in good working condition.

4.3.8 SIDE SCAN SONAR

As above, the Edge Tech side scan sonar is pre-set by the manufacturers. Calibration by manual adjustment is not possible. It was checked before the survey commenced.

4.3.9 FIELD PROCEDURE

4.3.10 MULTI BEAM ECHO SOUNDER PARAMETERS

The parameters for the Multi Beam echo sounding were as follows:

Vessel speed:	4-5 knots
Source frequency:	180 kHz
Fan Subtends:	131°

4.3.11 SEISMIC PROFILER PARAMETERS

Fix interval:	1 second
Source:	Boomer
Vessel Speed:	2-4 knots
Energy source:	200J
Ping rate:	2 per second

4.3.12 SIDE SCAN SONAR PARAMETERS

Fix interval:	1 second
Scan width:	50m

Vessel speed: 3-5 knots
Source frequency 500 kHz

4.3.13 DATA PROCESSING AND ANALYSIS

4.3.14 MULTI BEAM ECHO SOUNDING

4.3.15 TIDAL CORRECTION

The permanent tide gauge station was set up on Cheung Chau pier with co-ordinates of 807428N, 820447E at elevation +3.66mPD. The tide gauge station elevation was measured by ET-02 distometer and ND3000 theodolite based on a known government trigonometric station with HK1980 grid co ordinates.

The data from the geophysical survey were corrected to Hong Kong Principal Datum (HKPD) by using a bench mark with known level in mPD. The tide data in mPD was the water column height referred to Principal Datum. The tidal correction of the geophysical data was calculated according to the corresponding time by the following formula:

$$\text{Corrected depth Datum} = \text{Survey reading} - \text{Tide Datum}$$

The seabed levels were calculated from the corrected multi beam data. The data was processed and presented as a contour plan.

4.3.16 SEISMIC PROFILER DATA

The following processing was applied to the data:

- Seismic processing software was applied to get clearer reflection interfaces by adjusting post-processing parameters
- Analysis and definition of the geological horizons
- Digitising of the reflection interfaces to get the two-way travel time profiles
- Conversion of the two-way travel time profiles into seismic-geological depth profiles
- Combining of bathymetric data and seismic data to define the elevation of each horizon
- Process with Surfer software to generate required drawings

5. RESULTS

5.1 BASELINE REVIEW

5.1.1 SHIPWRECK DATA

Practically nothing is known about the archaeological potential of the seabed deposits in Hong Kong. The only marine archaeological discovery is that of a late Sung/early Ming Dynasty (1368-1644) boat uncovered during the construction of the High Island Reservoir, near Sai Kung (Frost, 1974). Since then, no other historic shipwreck has been found. However, this is probably because there were no dedicated marine archaeological surveys until the introduction of the 1998 EIA Ordinance. Marine archaeology is therefore a relatively new area of study in Hong Kong with very little data to draw upon.

Formation of archaeological sites underwater is mainly due to shipwrecks (Muckelroy, 1978). Since these are random and haphazard events it is difficult to predict their exact location if no written references survive. The aim of this review is to examine the evidence for maritime activity within the study area to predict the shipwreck potential.

5.1.2 ARCHIVE SEARCH

The UK Hydrographic Office (UKHO) at Taunton holds a database of surveyed shipwrecks in Hong Kong, including many not shown on Admiralty Charts. The database does not contain any records of shipwrecks within the study area.

However, the Hydrographic Office only charts wrecks, which are a potential hazard to navigation. It is therefore possible that within the study area there are partially or totally buried wrecks, which are not recorded.

The Hydrographic Office also holds unpublished historical charts of the Hong Kong SAR's waters. British Admiralty Charts from 1853 and 1888 are presented as Figures 2 and 3.

5.1.3 VICTORIA HARBOUR IN PRE-BRITISH TIMES

The first reference to the sea passage and waters in what later became called Victoria Harbour are found in Cheng Ho's navigation map of the China coast dated c.1425 AD. This map was published in a book called *Mo Pei Chi* (Notes on Military Preparation), published in 1621 (Empson, 1992). The map indicates the routes taken by vessels of a 15th century Imperial Chinese fleet under the command of Admiral Cheng Ho.

Victoria Harbour is charted in a 1553 coastal map of Kwangtung appearing in a book by Ying Ka called *Chong Ng Chung Tuk Kwan Mun Chi*. It is also represented in "Map of the entire coastline" by Chan Lun Kwing in his book *Hoi Kwok Man Kin Luk* printed in 1744 (Figure 4). The Kang Hsi Emperor commissioned the Jesuit Fathers to produce a detailed map of China, which was reprinted in part in 1737. The Jesuit map is largely a compilation of pre-existing Chinese maps of the coast. Hong Kong waters are charted in his map, found in *Nouvelle Atlas de la Chine*, published in Paris. A further reference appears in the San On Yuen Chi, a cartogram from the directory of San On County (Figure 5).

The first map depicting Hong Kong's harbour in detail is an 1810 marine chart (Figure 6). Daniel Ross and Philip Maughan, Lieutenants of the Bombay Marine prepared this chart for the East India Company.

Together the aforementioned maps are particularly important; indicating that Victoria Harbour was established as a known coastal settlement from at least the 15th century. Although there is no documentary material that records what exactly took place within the harbour, the fact it merited mapping is significant.

5.1.4 1841-1860

On the signing of the Treaty of Chuen-pi in 1841, H.M.S. *Sulphur*, commanded by Captain Sir Edward Belcher, was commissioned to undertake a hydrographic survey of Hong Kong Island and the surrounding waters. Produced in the meticulous style typical of the Royal Navy, this chart is remarkable for its accuracy and detail. It takes into account depth soundings in a number of areas, and these actually form the basis of today's charts in unchanged areas (Figure 7).

5.1.5 SAI YING PUN

Sai Ying Pun was laid out in the 1860's, immediately west of Tai Ping Shan. The name means 'Western Military Camp' and was so called because the first British troops were stationed there. However, this derivation of the name is the subject of controversy; some scholars argue that the term Sai Ying Poon was originally a name used by the Ching Dynasty pirate Cheung Po Tsai from 1806. There was another area at Tsat Tsz Mui, on the eastern end of Hong Kong Island near Quarry Bay, which was known as Tung Ying Poon or "Eastern Military Camp". In both places there are no physical reminders of the 19th Century buildings, but the suitability of both sites with commanding views and strategic locations at both ends of the harbour is unquestioned (Lo, 1963).

When the British landed in 1841, there was already a narrow bridle path along the northern shore of Hong Kong Island extending from West Point to a hamlet near Causeway Bay known as Kwantailou. When the winds and tide were unfavourable, this track was used as a towpath by the crews of coastal trading junks (Eitel, 1895). By February 1841, the Royal Navy laid claim to Navy Bay (Belcher's Creek), and a number of storehouses were constructed. However, within a short time the Navy found the position too exposed to the seasonal typhoon winds and moved to the Central area where they remained for the next century and a half (Lau, 1995).

Riots in southern China in the 1850s brought an influx of mainland Chinese into Hong Kong. In order to accommodate the thousands of new immigrants, the Government had to develop the Sai Ying Pun area. Streets were opened up on the slope to the south of Queen's Road West. A market was built between First and Second Streets. Upon completion of the development project, Sai Ying Pun became a major residential area.

5.1.6 YAU MA TEI

The name “Yau Ma Tei” means Oil Sesame Ground, and at some time sesame was cultivated in the vicinity. The settlement at Yau Ma Tei grew up at the foot of a curving hill, the arms of which extended into the sea as headlands both on the north (Mong Kok Tsui, near today’s Dundas Street) and in the south (the southern headland was near what is now Battery Street). There was an old Chinese fort on this hill from about 1800, which was rebuilt in 1839 and designed to protect vessels sheltering in the anchorage. Between the two headlands, the line of the hill ran close to what is now Nathan Road, and the old excavated face of the hill can still be seen near Cliff Street. Between the two headlands was a beach opening at the southern end to the anchorage creek. On either side of a small stream a tiny agricultural village of two or three houses stood.

It was this beach and creek which attracted the boat population, who used it to repair their vessels and as a shelter against storms. In 1882, this creek was described as:

“ a sort of mud dock which dries at half ebb or a little later. This is occupied by many boats, some of which are too leaky or old to go out, and lie here permanently being used as dwellings. This causes serious nuisance”.

In 1883, the Sanitary Board condemned this creek as a nuisance. By about 1885 it had disappeared, as a consequence of reclamation in the area. After that date, it seems likely that there was no shelter for small boats in West Kowloon until the typhoon shelter opened in 1915. Figure 8 shows the layout of Yau Ma Tei in 1875.

To the north of the Mong Kok Tsui headland a stream flowed into the sea (near the present Soy Street). On either side of this stream there were cultivated fields belonging to the village of Mongkok, already over a 100 years old in 1860. Mongkok village stood to the north of the stream under what today are Mongkok Road and Fife Street.

To the south of the Battery Street Headland was another stream, which entered the sea near today’s Waterloo Road. Like the stream to the north, it had cultivated fields on both sides. In 1864, the Hong Kong Government offered land along the Yau Ma Tei shore to villagers whose homes in Tim Sha Tsiu had been removed for redevelopment. The dispossessed villagers also received “Squatters Licences” for the lots they were given. Many took advantage of the opportunity and within months a thriving new market village had developed.

The first detailed evidence that provides information regarding the settlement at Yau Ma Tei is the first Rates Schedule for British Kowloon dated 1873. It lists the premises, occupants and use of property. A detailed examination of this list with succeeding Rate Valuation Lists, makes it possible to build an idea of the layout of the settlement and the nature of its occupants.

At that time Yau Ma Tei possessed a good, safe anchorage for sampans in a shallow, but substantial creek six acres in area. The creek ran inland for some three hundred yards, in two branches. One went as far as the junction of today's Jordan Road and Parks Street, the other to the eastern side of today's Nathan Road, near Saigon Street. A breakwater protected the outer part of both branches. The present Pak Hoi Street runs close to where the northern shore of the creek used to be, and doubtless takes its name from this fact. A military post from 1800 protected it. The anchorage was thus in use well before 1860 but the growth of this anchorage into somewhere that could be called a market town began only in 1864.

It is evident from the first valuation of Yau Ma Tei that its economy was primarily dependent on the sea. Boat building yards and their auxiliary businesses such as rope-works, oar makers, blacksmiths and marine stores dominated the market society. There is no way to determine the exact extent of the floating population, but boat building, repairing and provisioning were the principal business activities. It is evident that a substantial floating population was present. The presence of the temple dedicated to Tin Hau the Queen of Heaven, the principal deity of the sea-going population of southern China is also evidence of the importance of the sea-going population to the settlement at Yau Ma Tei. Some of the Yau Ma Tei residents were boat people and fishermen, and newspaper reports of the time particularly mention shrimp fishers.

As noted above, the land was occupied principally by boat-builders and associated trades, but other general traders had moved in by the mid 1870s. In October 1876, the Surveyor General called the town a "*rising and flourishing village*", and in February 1877, the Register General, in commenting on the recent Census stated that:

"Yau Ma Tei in Kowloon has become a new town within the last few months, and it will continue to increase if facilities are afforded to the boat builders and the junk people, who will repair thither to careen and repair their vessels, for on those the trade of the place depends".

Over the years a number of small industries were established at Yau Ma Tei, with many of the products being for the export market. By the 1870s soap and bean curd were being manufactured and exported. In 1880, a match factory was opened, employing around fifty women and children as workers.

Almost inevitably, the Hong Kong Government soon became concerned with the lack of sanitation and associated issues and in 1876 the Yau Ma Tei area was completely cleared. It was extensively redeveloped and replaced with a modern town plan the outline of which remains in the pattern of modern streets.

By the turn of the century a large number of sites on the new reclamation and development areas became available for industrial use. Subsequently the number of factories in Yau Ma Tei grew very quickly. By 1910, factories in the area were producing preserved ginger, matches, walking canes, feather products, peanut oil and rice wine. The range of industries in the area continued to grow steadily until the coming of the Japanese in 1941.

By no means was all of the business activity in Yau Ma Tei lawful, and a not inconsiderable fraction of the shipping through the port was for the purpose of smuggling. Salt smuggling was particularly important and the area became a centre for transiting the goods into the Chinese mainland.

In China, salt production was a government monopoly and to avoid payment of the taxes, it was imported into Hong Kong from the salt producing areas to the west and north east of Hong Kong. It was then transferred to specially designed junks, and under an armed crew, transported up the Canton delta. In the early period of Hong Kong's history this trade flourished at East Point, later shifting to the Sai Ying Pun waterfront. By 1876, the salt merchants opened up business in Yau Ma Tei. When the new premises in the redeveloped town became available in 1978, the salt merchants moved to the new main sea front Praya.

This activity brought a criminal element to Yau Ma Tei. Some of the crews of the salt smuggling junks were alleged to have engaged in piracy on their home runs after disposing of the salt. Yau Ma Tei also had a 'thieves market'. Reported cases mention stolen coal, sandalwood, copper nails and wire being brought there for sale.

Yau Ma Tei was also the distribution point for the overland smuggling of opium. The opium was landed at Yau Ma Tei where porters conveyed it across the Sino-British border and over the Kowloon hills, eventually to Sham Chun and Wai Chow. The trick was to avoid the enforcement officers of the Chinese Customs at the border at Customs Pass where the road crossed the hills. At times informers would warn the Customs Officers of a shipment. In and around Yau Ma Tei the Chinese Customs agents tried to monitor these illegal activities.

The redevelopment of Yau Ma Tei market in 1876 and the piecemeal sale of Crown Leases from 1876 to 1900 had little impact on the character of the town. In 1900, Yau Ma Tei was still a busy and prosperous market town and anchorage. It was almost entirely enclosed within Station Street and Temple Street, close to the Tin Hau temple. It remained physically distinct from and to a degree economically independent of the City. This changed within a few years after 1900.

In 1900, a major reclamation project started in West Kowloon, from the existing waterfront to the eastern edge of Ferry Street and from near today's Jordan Road to Mongkok Road. This reclamation was completed in 1904. Down the centre of the new reclamation two major roads were laid, Reclamation Street and Canton Road, with numerous transverse streets running from the new waterfront back to Station Street.

The available land for development increased at least five fold. The northern part of this area was being distinguished from Yau Ma Tei and called Mongkok. Dozens of new streets were laid down and the first Crown Leases were sold in 1910. While the First World War slowed the development (one third was still vacant in 1924) by the late 1930s, the whole area was more or less fully developed.

At the same time communication with the rest of Hong Kong was greatly improved. In 1990, the only access to Yau Ma Tei was along Station Street from Austin Road. By 1902, it had been agreed that Nathan Road should be extended to Boundary Street. The essential work of cutting back the hill behind Yau Ma Tei was only completed in 1917. Almost as soon as the road was opened, buses were running on it. A regular ferry service was started which linked the new reclamation with Hong Kong Island.

By the First World War, the prosperous market town of 1900 had become an essential part of the main urban area. By the 1930's, the whole of West Kowloon from Tsim Sha Tsui to Yen Chow Street was approaching full development. After the Second World War, the heart of the old market town (Shanghai Street and Temple Street) was cleared by Government, as the 1876 buildings were old and dangerous. These were replaced with Yau Ma Tei Government Offices and a car park.

5.1.7 TIN HAU TEMPLE

The famous Tin Hau Temple at Yau Ma Tei has a long history, dating from well before the cession of Kowloon to Britain in 1860. An 1870 memorial tablet, which is still preserved in the temple, describes the building that stood in 1870 as "ancient". This would indicate that it had stood for at least two generations and had probably been on the same site, albeit in a smaller form than in 1870, since at least the early 1840s. The temple tablet goes on to state that while the temple was built onshore, there was very little in the area surrounding it when it was built. It must therefore have been a small temple located a little above the anchorage (Hayes, 1966).

5.1.8 TYPHOON SHELTER

In 1900, a severe storm caused a great deal of damage in Hong Kong. Following the storm, and in the years 1901 to 1902 many demands were made that the government should act to protect the boat people in Hong Kong during the typhoon season. At that time, there were none of the sophisticated techniques for plotting the course of a typhoon prior to it making landfall. The nature of the storms was not understood and in the early days of the twentieth century, typhoons would effectively strike without warning, causing extensive damage and loss of life. In Hong Kong there was only one small artificial typhoon shelter, which was constructed in 1883 at Causeway Bay.

Therefore, on the 14th December 1903, the Hon. Gershom Stewart, an Unofficial Member of the Legislative Council, rose to move the following motion:

"That in the opinion of the Council it is advisable to increase if possible the means of shelter for cargo boats and sampans during the typhoon season. The harbour is after all the reason for our existence here, from the harbour we, either directly or indirectly, all of us depend on our subsistence. We are now in the happy position of having an abundant revenue, and I have not put in a plea for a humble and hard-working section of the sea-faring population who have no means of advocating their own cause."

Mr Stewart's resolution was seconded by the Hon. C. W. Dickson, Deputy Chairman of the Hong Kong and Shanghai Banking Corporation and a partner at Jardine Matheson & Co. The Acting Colonial Secretary's response was that the government was fully aware of the problem and it was only the lack of funds that had delayed construction of a typhoon shelter. However, the subject was not mentioned again in the Legislative Council until the following September when the Finance Committee was advised that the Government regretted that it had not been possible to allocate monies for the construction of a typhoon for the coming year.

Thus, all of 1904 and most of 1905 passed without any action on the proposed shelter until Governor Sir Matthew Nathan delivered a long speech to the Legislative Council which gave an estimate of the Colony's financial position as at 31st December 1905. In his statement he listed a large number of proposed projects including the provision of a typhoon shelter for the increasing number of junks, which had to leave their work early to ensure not being shut out of the limited accommodation in Causeway Bay. Members welcomed the reference to the typhoon shelter at a subsequent meeting. However, by the early part of 1906 it was clear that the project remained on hold.

Events then took a tragic turn, and on The 20th November 1906, the Governor informed the members of the Legislative Council that:

"Hong Kong has just suffered from a calamity as calamitous, it not more so than any which had previously befallen the Colony. The loss of life and property between the hours of 9 and 11 on Tuesday morning (18th September) were, as far as can at present be judged, greater than those incurred in the great typhoon of 1874".

He went on to say:

"None of us are likely to forget the scenes of that morning. First of all we saw, when the typhoon gun was fired at about 9 o'clock, crowds of helpless shipping, then the whole scene was wiped out by the blowing sheets of rain, and an hour later, the atmosphere being again clear, we saw that the junks and small craft had disappeared, that that may of the larger junks were aground or in distress. What had happened to the Chinese boats was evidenced by the appalling scenes of desolation along the Praya of the Kowloon shore."

Figure 9 shows the damage at the Police Station following the typhoon. The typhoon occurred just after the budget for 1907 had been presented, and before the Council had an opportunity to comment on the proposed expenditure at the next sitting. The Governor suggested that construction of a typhoon shelter could not be started unless it was financed out of increased light dues.

Two months later in November 1906 the Director of Public Works presented to the Legislative Council the Report of the Proceedings of a Committee, together with a chart showing five possible locations, including Yau Mau Tei. In the following months there was much debate and dispute over the funding and location of the proposed typhoon shelter.

No works had started when another disaster struck. On the 17th July 1908, a typhoon struck Hong Kong that was more powerful than that of 19th September 1906, which had then become known as the Great Typhoon. This storm was a turning point in the long debate over construction of the typhoon shelter; on the 6th August 1908 the Governor submitted for the acceptance of the Council the following resolution:

“Be is resolved that on and from the 1st January 1909, the owner, agent or master of every ship entering the waters of the Colony shall pay the following dues to such officer as the Governor may from time to time appoint: for all river steamers 5/6ths of a cent per ton register; all other ships entering the waters of the Colony, 2 cents were ton register.”

The typhoon shelter was therefore to be financed by a tax placed on shipping entering Hong Kong, thereby resolving the debates of the preceding years. Nearly a year later, in October 1910, the Director of Public Works advised Members of the Legislative Council that a contract worth just over two million dollars had been let for the construction of the detached breakwater and that completion of the work was expected within five years.

During the period 1911 to 1914, as the papers tabled in the Legislative Council show, work on the typhoon shelter continued steadily. Europe was engulfed in the First World War, but life in Hong Kong remained largely unaffected, and work continued on the typhoon shelter without any break. Finally, on the 16th December 1915, twelve and a half years after the Hon. Gershom Stewart had proposed the project; the completion of the typhoon shelter was commemorated in the laying of a stone by Sir Francis May – the third Governor to have been involved in the project.

Fifty years later the inexorable pressure of population growth in Hong Kong, and especially the need to relieve traffic congestion in West Kowloon, led to demands for more reclamation. The first strip of reclamation was to allow Tong Mei Road to be built, closing off the direct contact between the typhoon shelter and the heart of Yau Ma Tei. This took place in the 1960s. This reclamation and the new road helped ease the traffic congestion in West Kowloon but could only give 25 years life to the old typhoon shelter. As soon as it was agreed (during 1990) that the new airport would be built on Lantau, the shelter was doomed as the new Cross Harbour Tunnel and the new Airport Railway could only be built across its site. A new typhoon shelter was therefore constructed, well seaward of the 1915 one. When it was opened on the 23rd October 1992 the old shelter was closed and quickly filled in.

5.2 GEOPHYSICAL SURVEY

5.2.1 SIDE SCAN SONAR SURVEY

The digital side scan sonar data was analysed. It showed that the seabed within the study area is mud or fine sand. There is also evidence of trawl marks, debris and dumped materials. The location and size of all these features were marked and shown on Chart Figure 2 attached. Below are examples of the actual data collected. The exact location of each of these examples is shown on ChartFigure2 attached.

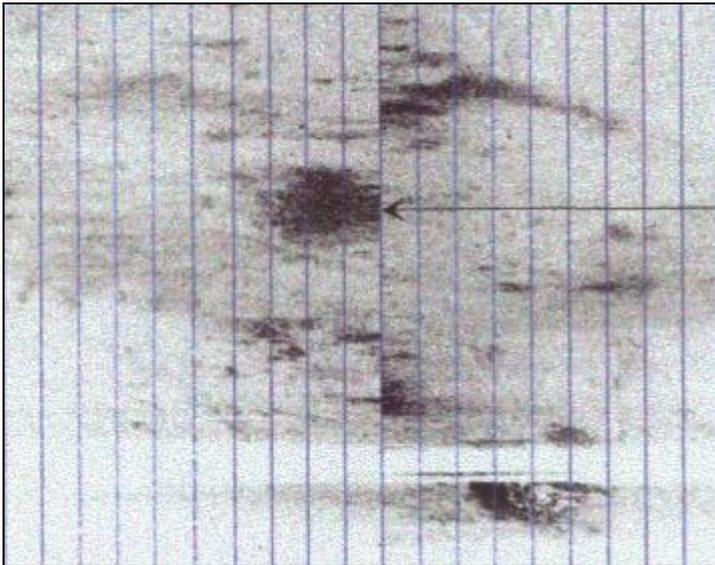


Figure 10: Side scan sonar data showing modern dumped material

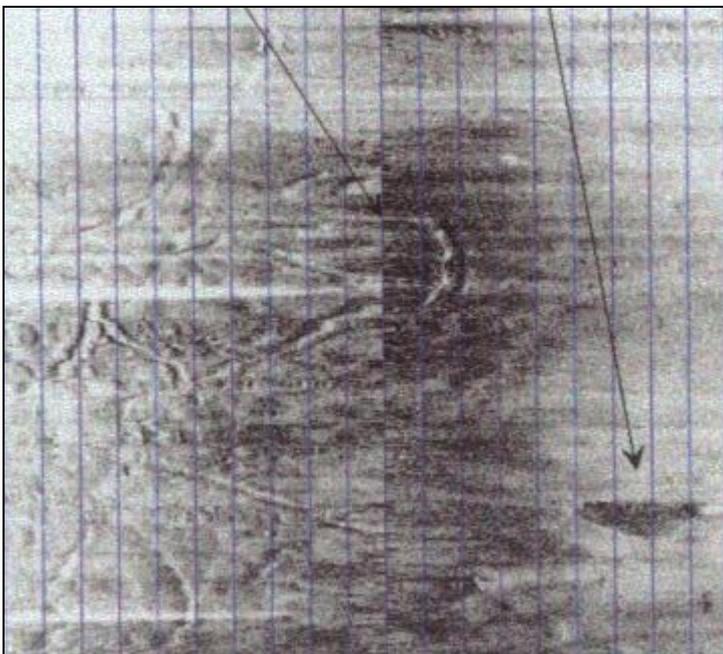


Figure 11: Side scan sonar data showing deeply incised trawl marks

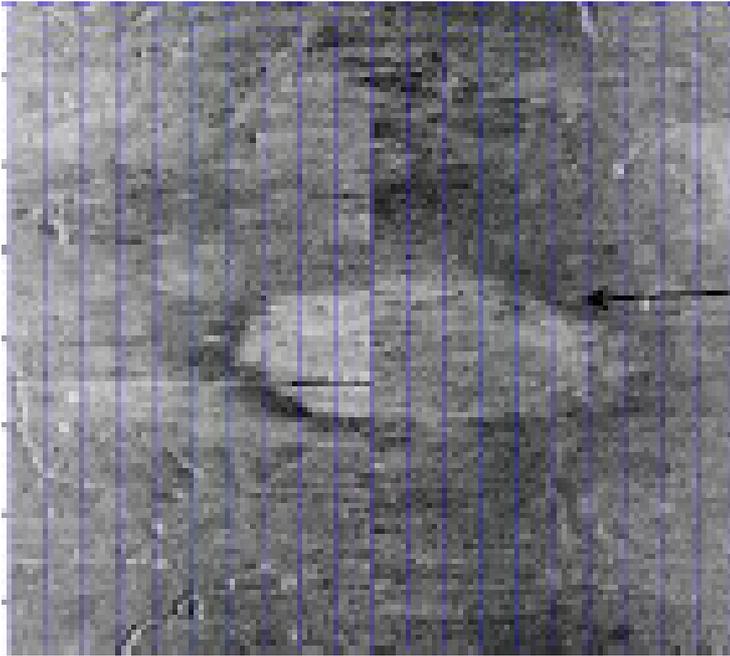


Figure 12: Side scan sonar data showing a large pit on the seabed.

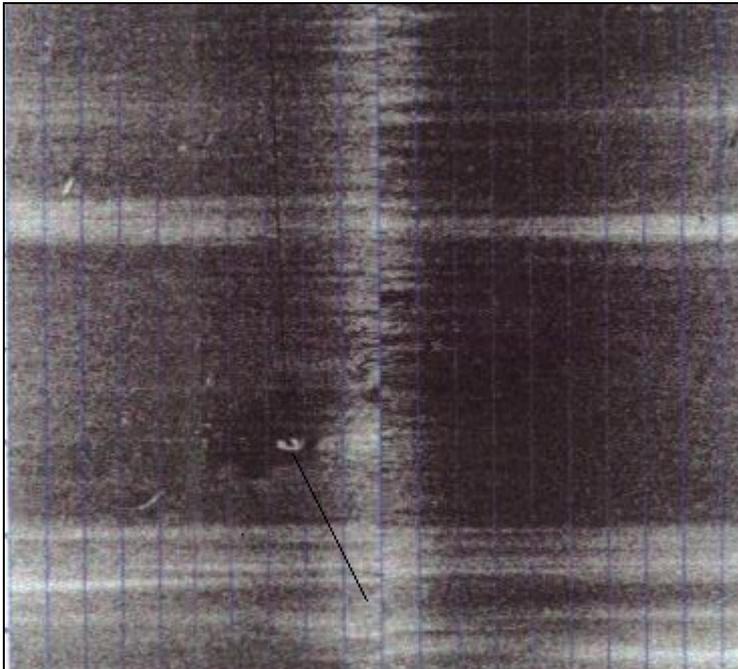


Figure 13: Side scan sonar data showing a boulder on the seabed

5.2.2 DATA OUTPUT

The side scan sonar data is summarised in the following drawings attached at the end of the report:

- Side scan sonar track plot (ChartFigure1 – SSS-1)
- Seabed features combined with side scan sonar track plot (Chart Figure 2 – SSS-2)

5.2.3 MULTI BEAM ECHO SOUNDER

The results are presented as two drawings:

- Multi beam bathymetry track plot (ChartFigure3 – MB-1)
- Contour plan of multi beam bathymetry (ChartFigure4 – MB2)

5.2.4 SEISMIC PROFILER DATA

5.2.5 DEFINITION OF SEISMIC WAVE VELOCITY

As seven drill hole logs were collected as part of the geotechnical survey, it was possible to accurately define the seismic wave velocity. The drill hole logs were made available to the engineer to calibrate the seismic data during interpretation.

The average velocity of seismic energy penetrating each layer was as follows:

- Marine deposits: 1620 m/s
- Alluvium: 1800 m/s
- Decomposed Rock (Grade V_IV): 2150m/s

5.2.6 SEISMIC PROFILER DATA OUTPUT

Following data processing, the seismic profiler data were presented in the following drawings:

- Seismic hydrophone track plot (ChartFigure 5 – S-1)
- Contour plan of interfaces between each layer (ChartFigure 6 – S-2)

5.2.7 SEABED STRATIGRAPHY

Across the study area the seabed were defined into three layers:

- Marine deposit with some mud
- Alluvium with some estuarine deposits
- Decomposed rock

6. CONCLUSION

6.1 BASELINE REVIEW

The Baseline Review indicates a high potential for marine archaeological material within the study area due to the long history of shipping activity in and around Yau Ma Tei. However, the total potential resource is reduced because of the seabed disturbance associated with numerous extensive reclamations, cable laying and construction of the western harbour crossing.

6.2 GEOPHYSICAL SURVEY

Detailed examination of the geophysical survey data enabled accurate assessment of the seabed within the study area. The area is characterised by extensive disturbance as evidence by trawl marks and modern dumped material. This is compatible with its location within one of the busiest sections of Victoria Harbour and adjacent to existing reclamation and engineering works. These activities would have a negative impact on the seabed thereby reducing its archaeological potential. It is therefore concluded that there are no archaeological resources within the study area.

7 RECOMMENDATION

Since there is no archaeological material present within the study area, it follows that there are no related constraints on the proposed reclamation work. There is no need for any further archaeological investigation or mitigation measures.

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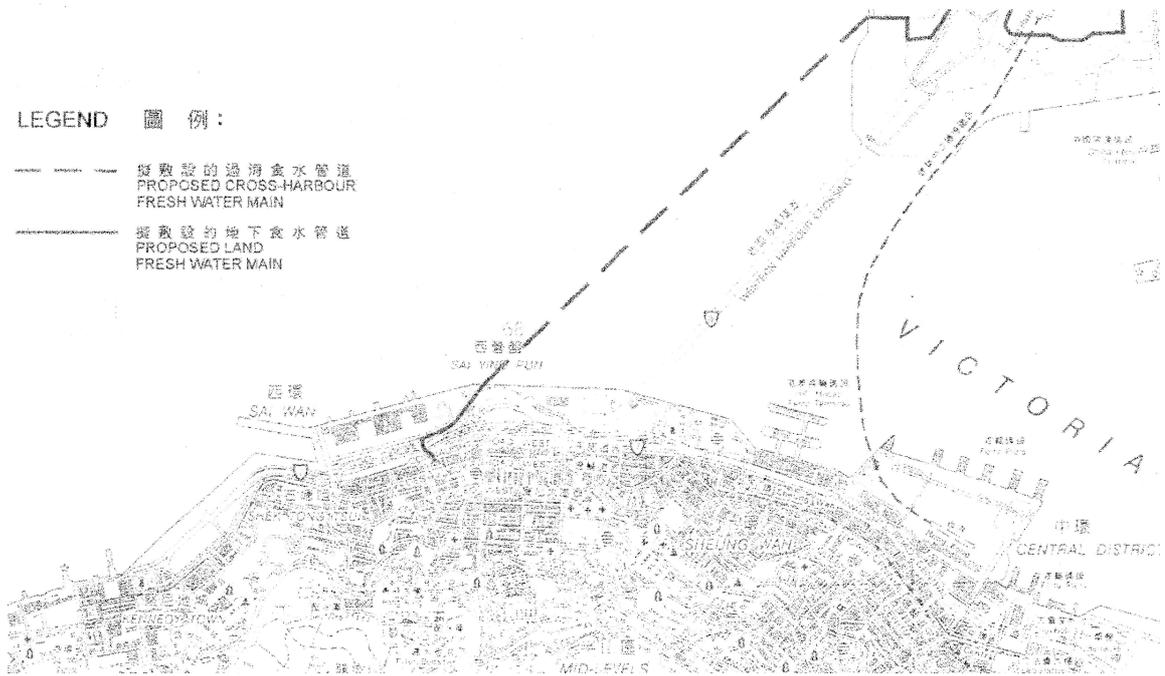


Figure 1: Location of the study area



Figure 2: British Admiralty Chart 1853



Figure 3: British Admiralty Chart 1888

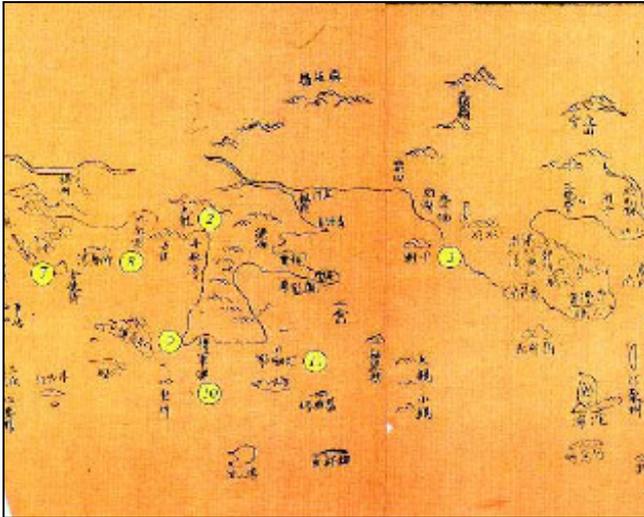


Figure 4: Section of the Map of the Entire Coastline by Chan Lun Kwing in Hoi Kwok Man Kin Luk (Record of the Countries of the Sea) printed by Ngai Hoi Chu Chan.

Key to place names

- 2 Kowloon
- 3 Ping Chau
- 7 Kap Shui Mun
- 8 Ngong Shue Chau (Stonecutters Island)
- 9 Red Incence Burner Hill (Hong Kong Island)
- 10 Tseung Kwan O
- 11 Fat Ton Mun

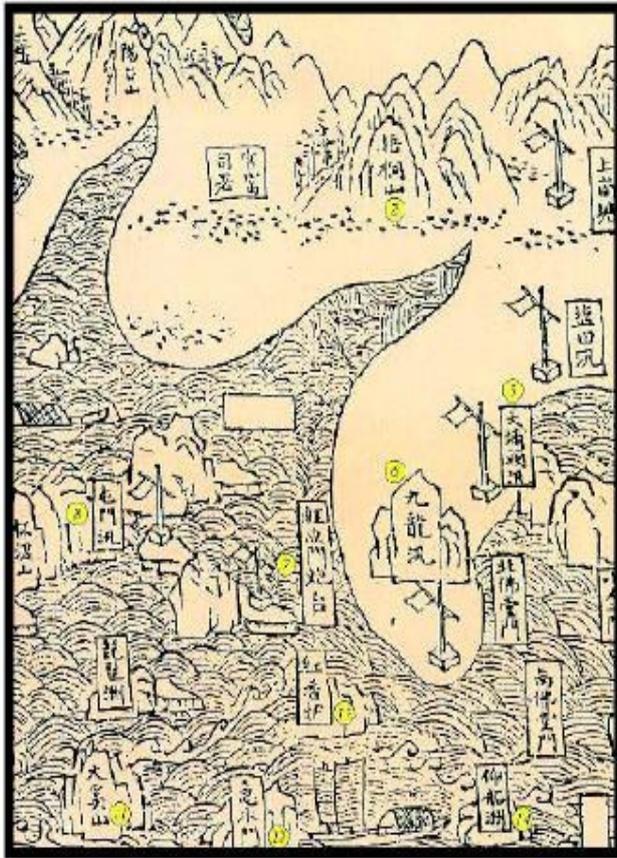


Figure 5: 1819 San On Yuen cartogram from the Directory of San On County

Key to play names

- 2 Wung Tung City
- 5 Tai Po Tai (Tai Po)
- 6 Kowloon
- 7 Lei Yue Mun
- 8 Tuen Mun
- 11 Tai Hai/Kai Shan (Lantau)
- 12 Kap Shui Mun
- 13 Red Incence Burner (Hong Kong)
- 14 Ngong Shuen Chan (Stonecutters Island)

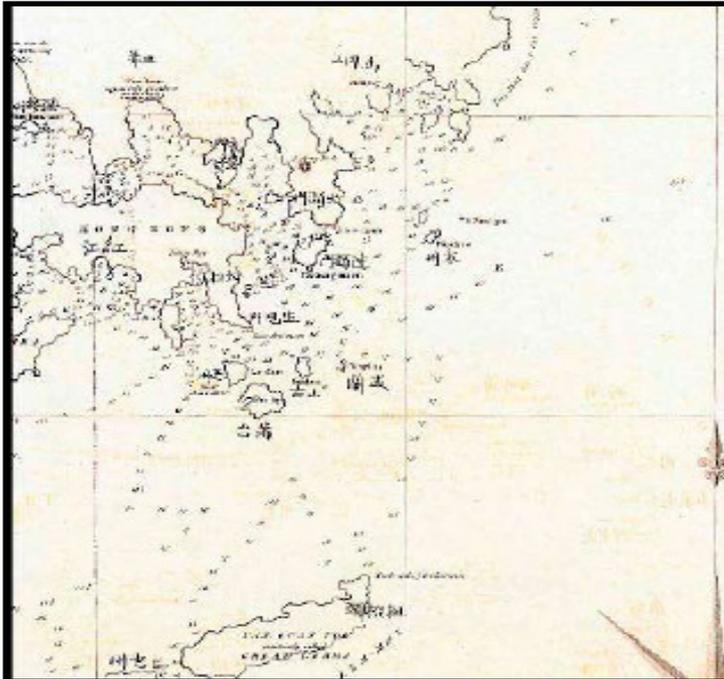


Figure 6: Section of a Marine Chart of Macau Roads prepared for the East India Company by Daniel Ross and Philip Maughan, Lieutenants of the Bombay Marine

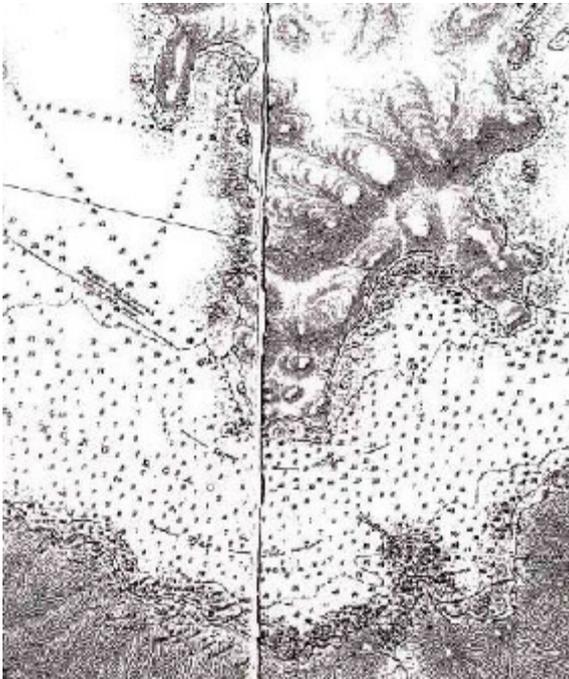


Figure 7: British Admiralty Chart Prepared following hydrographic surveys by Sir Edward Belcher in 1841

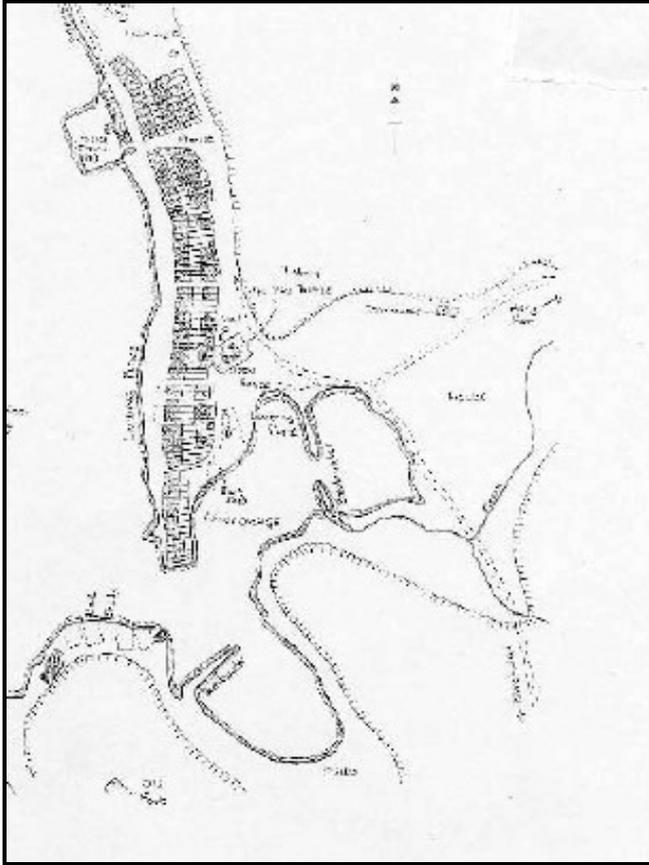
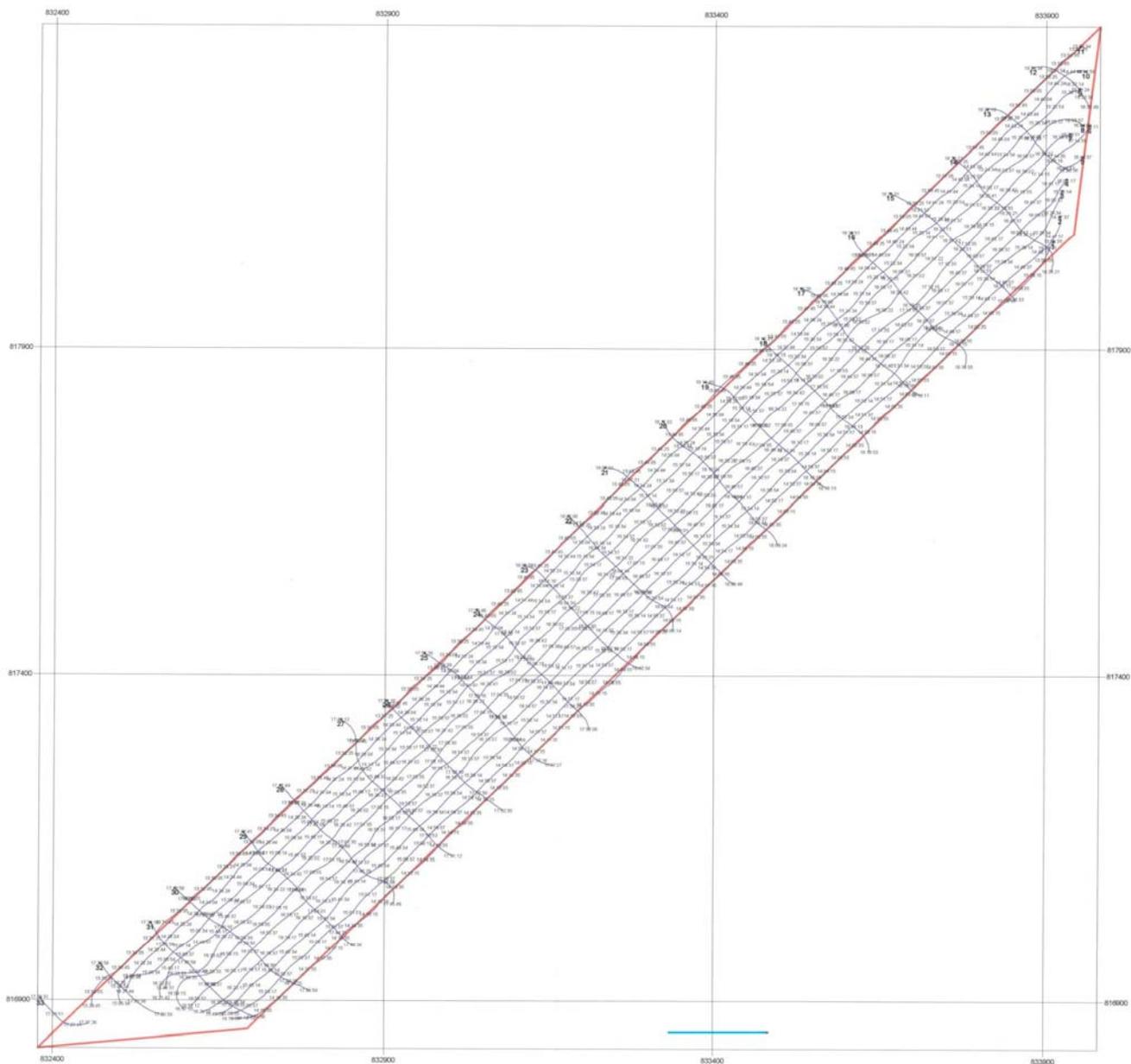


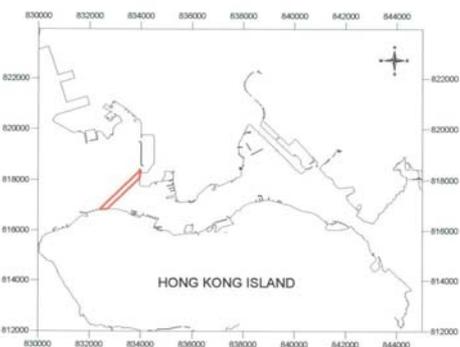
Figure 8: the layout of Yau Ma Tei in 1875



Figure 9: Yau Ma Tei typhoon shelter in 1906 after a storm



Location Plan:



Legend:

- Side Scan Sonar Survey Track with Fix Position
- Boundary

Project:

CEDD CONTRACT NO. GE/2005/26
WORKS ORDER NO. GE/2005/26.18

Agreement No. CE42/2005(W/S) Laying of Western Cross Harbour Main and Associated Land Mains From West Kowloon to Sai Ying Pung - Marine Geophysical Surveys

Area: West Kowloon to Sai Ying Pung

Drawing No.: SSS-1

Drawing Title:

SIDE SCAN SONAR TRACKS PLAN

Notes:

1. Survey Date: August 18, 2006
2. Survey Grid: Hong Kong Metric Grid
3. Survey Datum: Hong Kong Principal Datum
4. Survey Vessel: Hung Kuk
5. Equipment: Trimble DGPS
EdgeTech 560 Sonar System

Revision No.	Date(D/M/Y)	Drawn by	Checked & Approved by	Remarks
0	09/09/2006	Liu Jianxun	Xiao Du	Preliminary

Metric Scale: 1:5,000

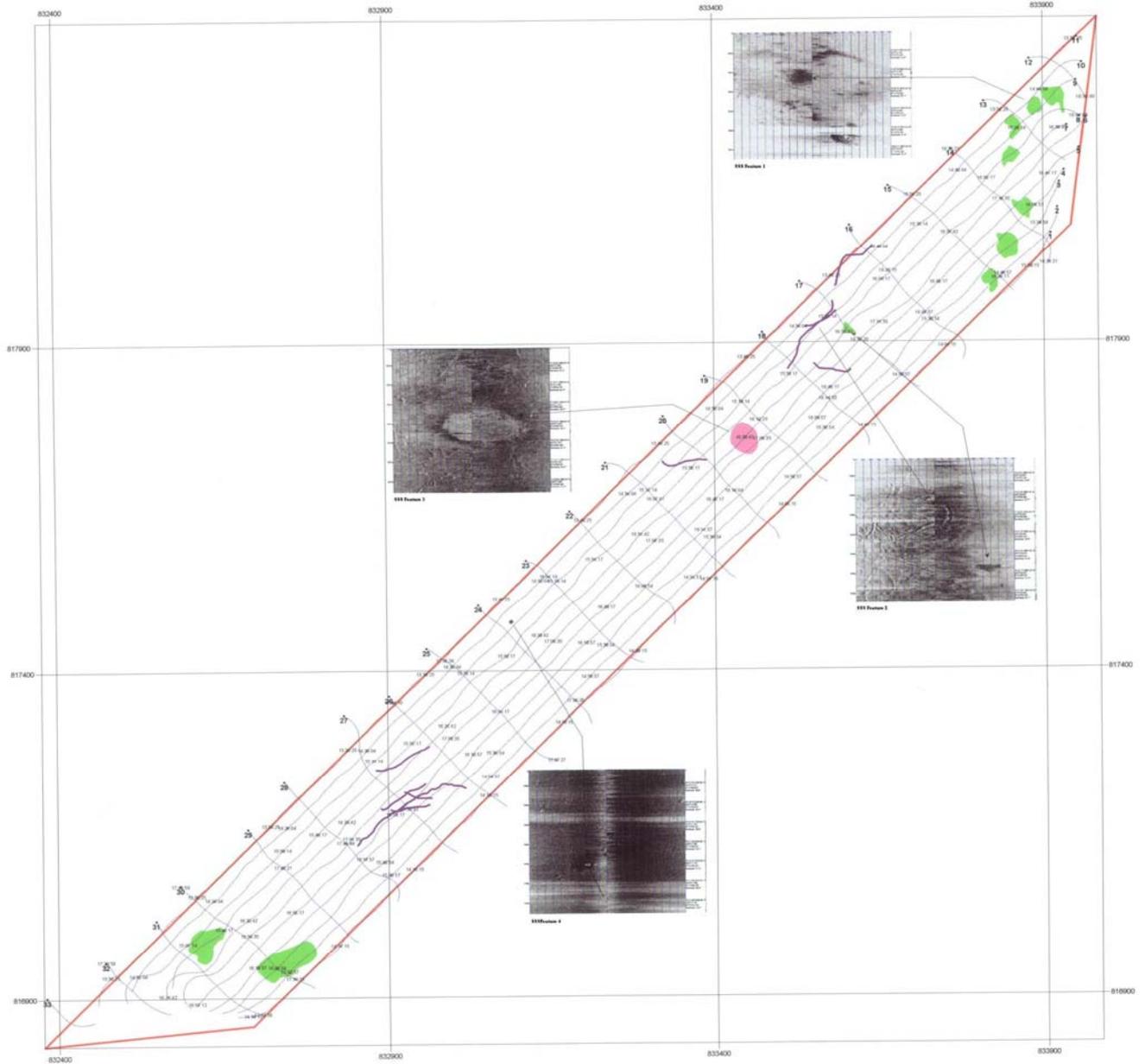


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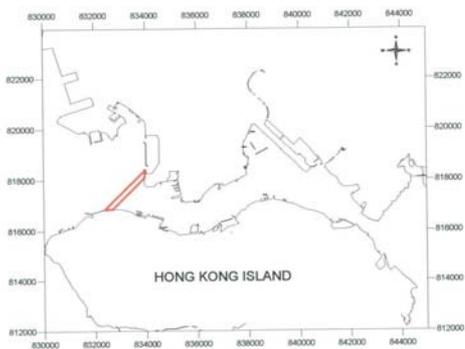
Civil Engineering and Development Department

Surveyor:

IGGE (H. K.) Engineering Geophysical Co. Ltd.



Location Plan:



Legend:

- Side Scan Sonar Survey Track with Fix Position
- Main Scar (Anchor Mark or Trawl Mark etc.)
- Boundary
- Granular Seabed/Dumped material (High Reflectivity)
- Debris/Boulder/Made Objects
- Pit
- Side Scan Sonar Image

Project:

CEDD CONTRACT NO. GE/2005/26
WORKS ORDER NO. GE/2005/26.18

Agreement No. CE42/2005(W5) Laying of Western Cross Harbour Main and Associated Land Mains From West Kowloon to Sai Ying Pung - Marine Geophysical Surveys

Area: West Kowloon to Sai Ying Pung Drawing No.: SSS-2

Drawing Title:
SEABED FEATURES WITH SIDE SCAN SONAR TRACKS

Notes:

1. Survey Date: August 16, 2006
2. Survey Grid: Hong Kong Metric Grid
3. Survey Datum: Hong Kong Principal Datum
4. Survey Vessel: Hung Kuk
5. Equipment: Trimble DGPS
EdgeTech 560 Sonar System

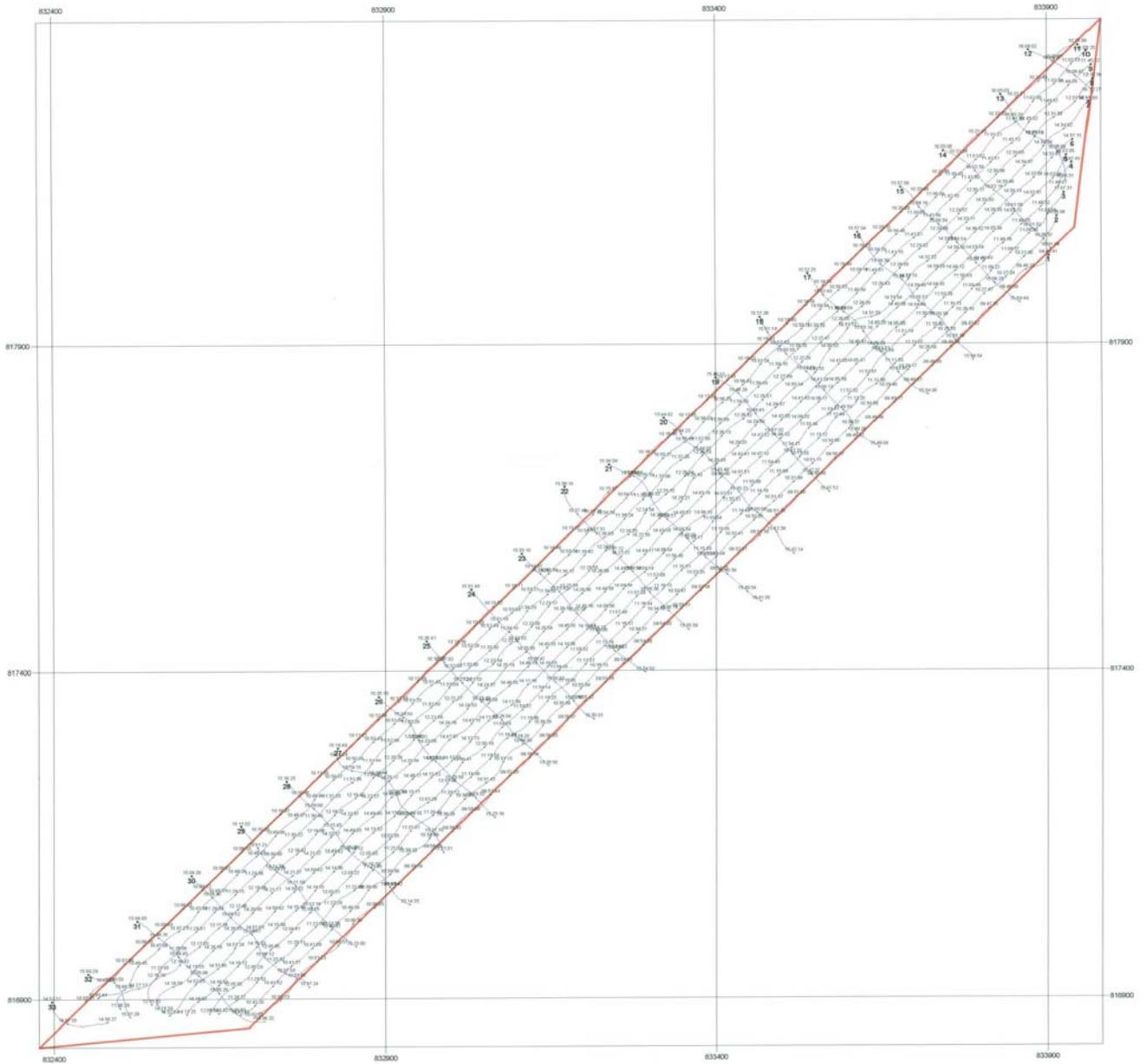
Revision No.	Date(D/M/Y)	Drawn by	Checked & Approved by	Remarks
0	09/09/2006	Liu Jianxun	Xiao Du	Preliminary

Metric Scale: 1:5,000

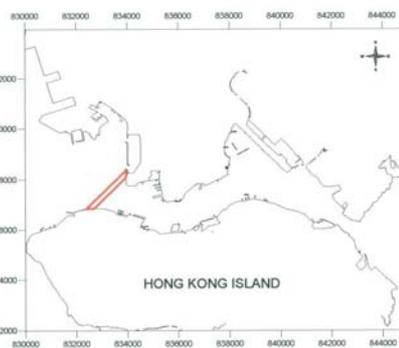


Client:
 Civil Engineering and Development Department

Surveyor:
 IGGE (H. K.) Engineering Geophysical Co. Ltd.



Location Plan:



Legend:

-  Multi-Beam Bathymetry Track with Fix Position
-  Survey Boundary

Project:

CEDD CONTRACT NO. GE/2005/26
WORKS ORDER NO. GE/2005/26.18

Agreement No. CE42/2005(W/S) Laying of Western Cross Harbour Main and Associated Land Mains From West Kowloon to Sai Ying Pung - Marine Geophysical Surveys

Area: West Kowloon to Sai Ying Pung Drawing No.: MB-1

Drawing Title:
MULTI-BEAM BATHYMETRY TRACKS PLAN

- Notes:**
1. Survey Date: August 17, 2006
 2. Survey Grid: Hong Kong Metric Grid
 3. Survey Datum: Hong Kong Principal Datum
 4. Survey Vessel: Hung Kuk
 5. Equipment: Trimble DGPS
SeaBeam 1000(1185)

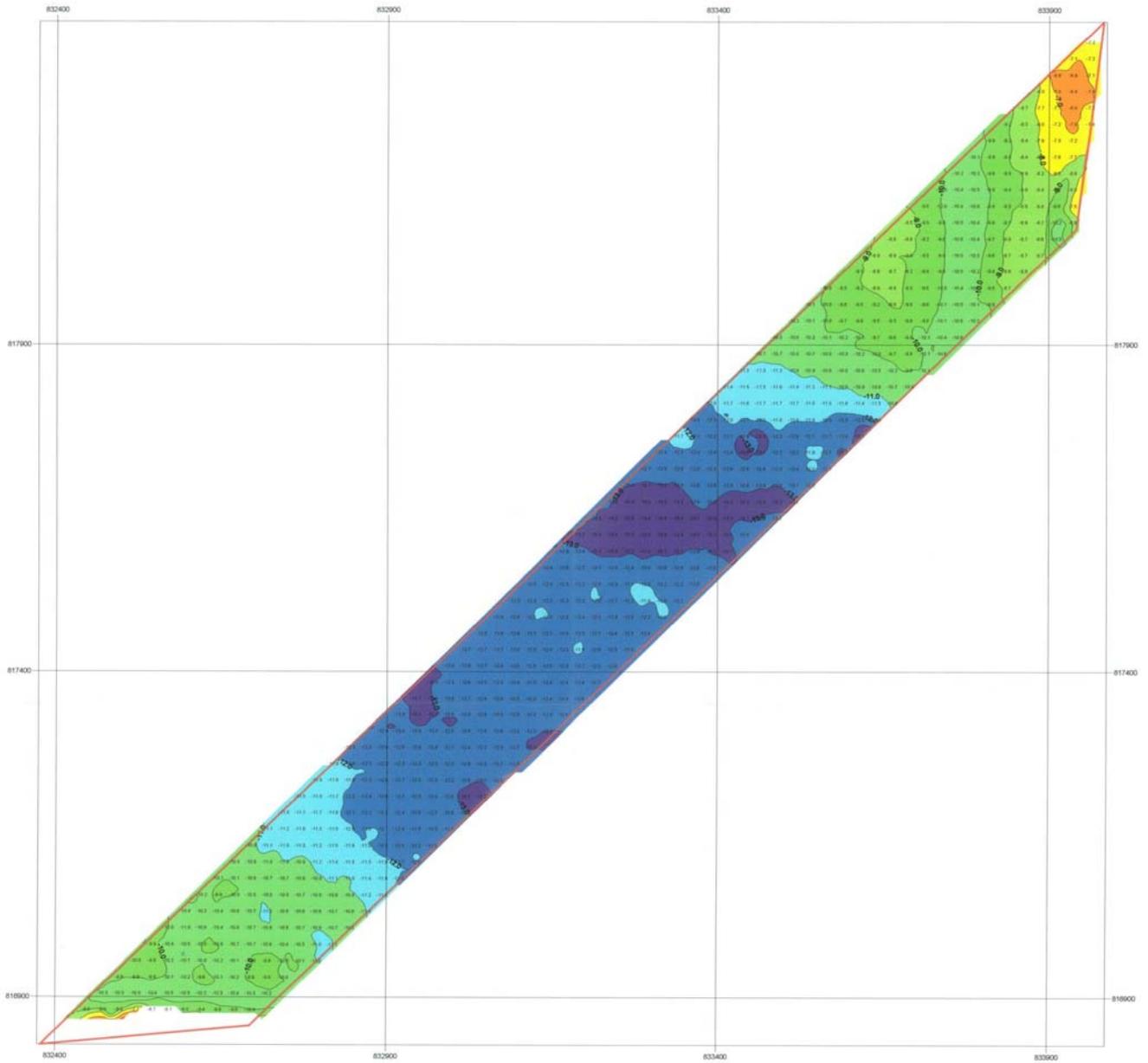
Revision No.	Date(D/M/Y)	Drawn by	Checked & Approved by	Remarks
0	09/09/2006	Mei Yanhui	Xiao Du	Preliminary

Metric Scale: 1:5,000

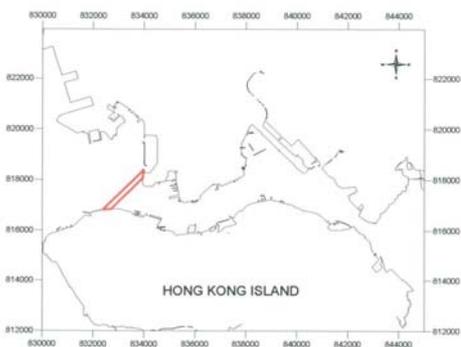


Client:
 Civil Engineering and Development Department

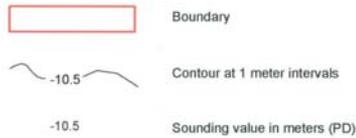
Surveyor:
 IGGE (H. K.) Engineering Geophysical Co. Ltd.



Location Plan:



Legend:



Project:

CEDD CONTRACT NO. GE/2005/26
 WORKS ORDER NO. GE/2005/26.18
 Agreement No. CE42/2005(W/S) Laying of Western Cross Harbour Main and Associated Land Mains From West Kowloon to Sai Ying Pung - Marine Geophysical Surveys

Area: West Kowloon to Sai Ying Pung Drawing No.: MB-2

Drawing Title:
CONTOUR PLAN OF MULTI-BEAM BATHYMETRY

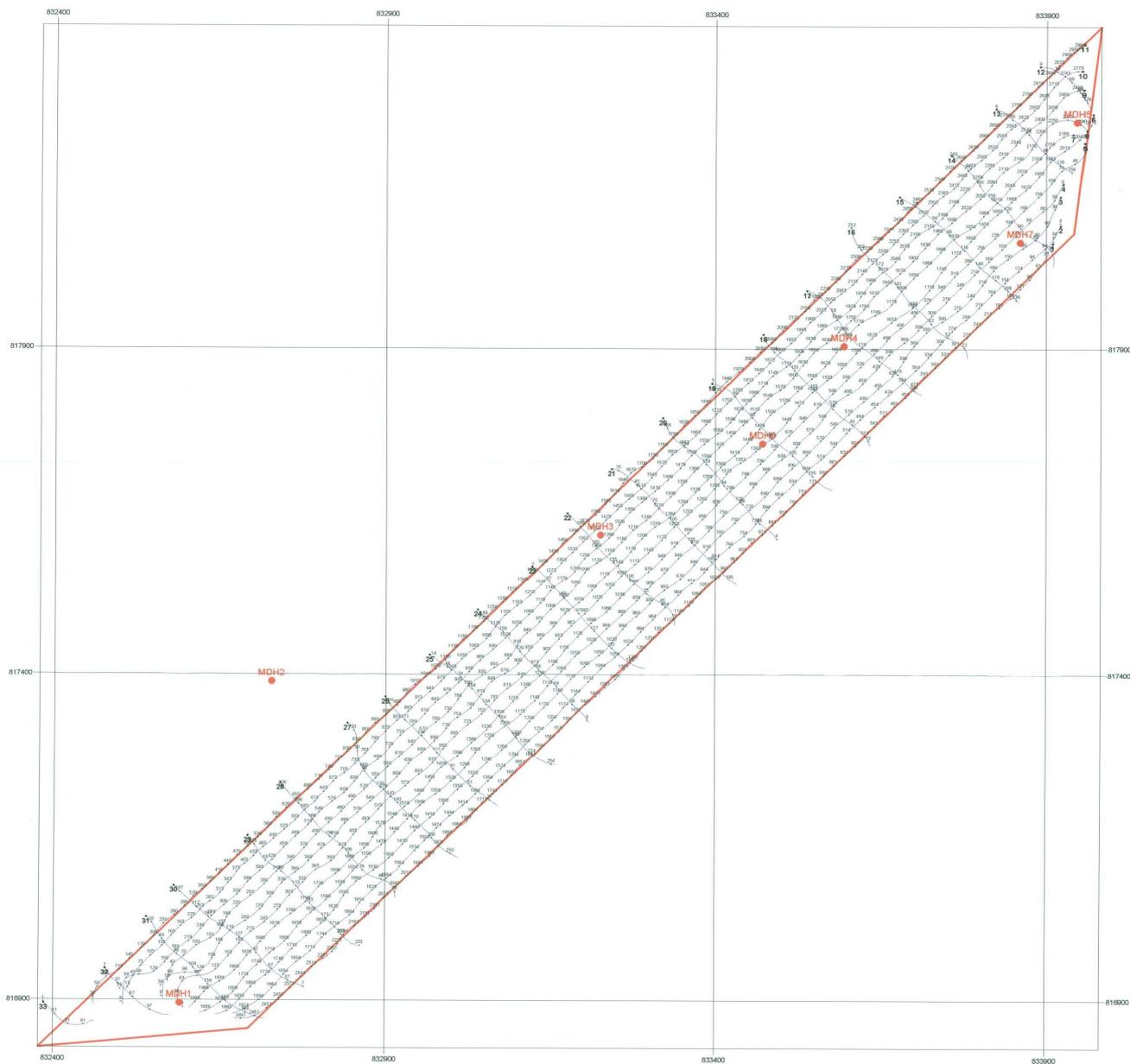
- Notes:
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 2. Survey Grid: Hong Kong Metric Grid
 3. Survey Datum: Hong Kong Principal Datum
 4. Survey Vessel: Hung Kuk
 5. Equipment: Trimble DGPS, SeaBeam 1000(1185)

Revision No.	Date(D/M/Y)	Drawn by	Checked & Approved by	Remarks
0	09/09/2006	Mei Yanhui	Xiao Du	Preliminary

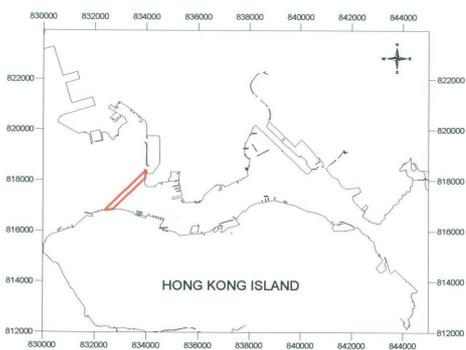


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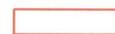
Surveyor: IGGE (H. K.) Engineering Geophysical Co. Ltd.



Location Plan:



Legend:

-  Seismic Track with Fix Position
-  Survey Boundary
-  Drillhole Record

Project:

CEDD CONTRACT NO. GE/2005/26
WORKS ORDER NO. GE/2005/26.18
Agreement No. CE42/2005(W/S) Laying of Western Cross Harbour Main and Associated Land Mains From West Kowloon to Sai Ying Pung - Marine Geophysical Surveys

Area: West Kowloon to Sai Ying Pung Drawing No.: S-1

Drawing Title:
SEISMIC HYDROPHONE TRACKS PLAN

- Notes:
1. Survey Date: August 18, 2006
 2. Survey Grid: Hong Kong Metric Grid
 3. Survey Datum: Hong Kong Principal Datum
 4. Survey Vessel: Hung Kuk
 5. Equipment: Trimble DGPS DELPH II

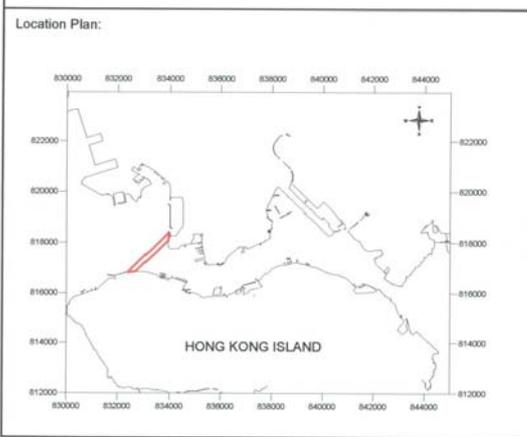
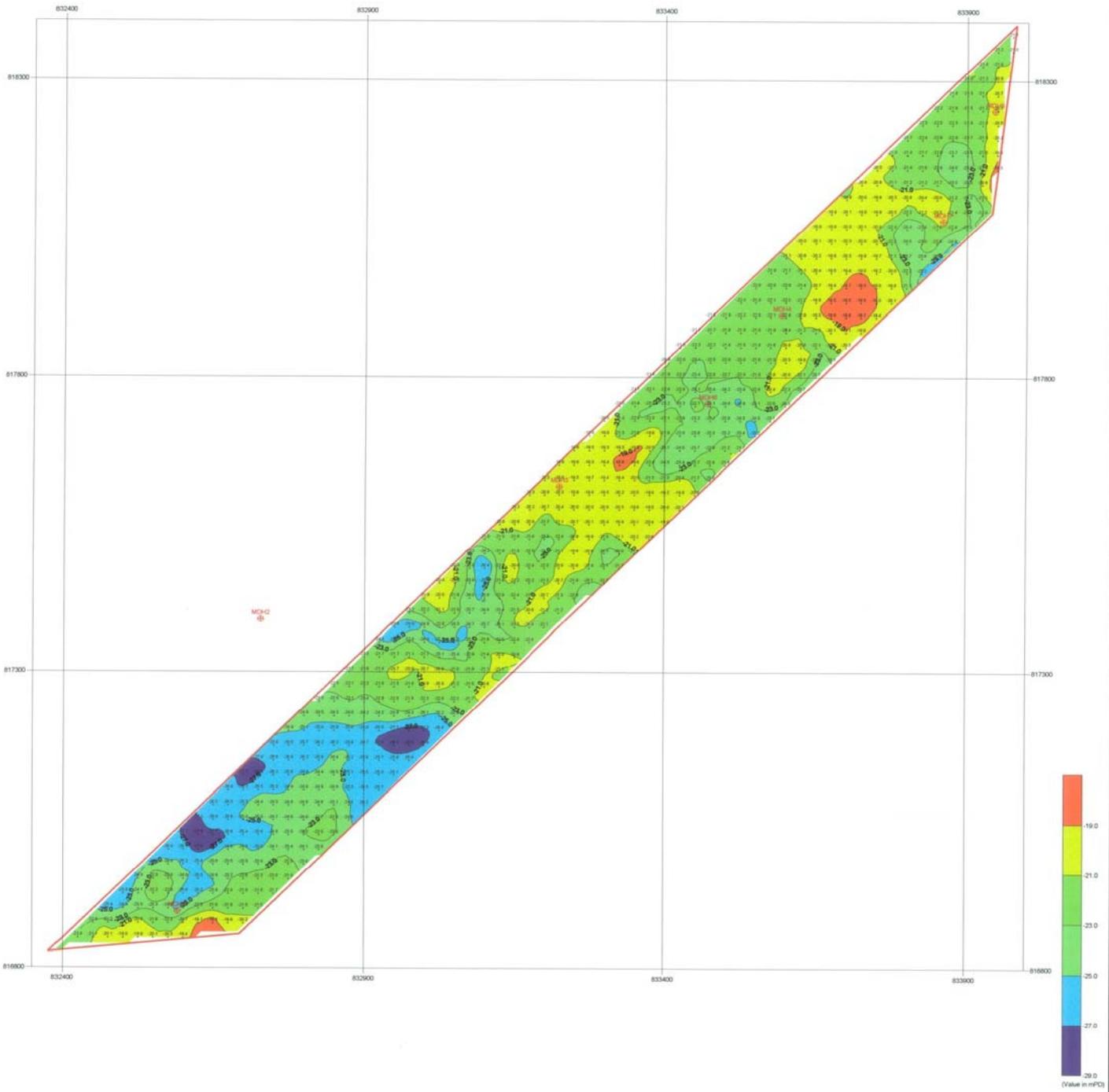
Revision No.	Date(D/M/Y)	Drawn by	Checked & Approved by	Remarks
0	08/12/2006	Mei Yanhui	Xiao Du	Preliminary

Metric Scale: 1:5,000



Client:
 Civil Engineering and Development Department

Surveyor:
 IGGE (H. K.) Engineering Geophysical Co. Ltd.



Legend:

- Contoured Levels in mPD
- Depth Value in Meters
- Survey Boundary
- Drillhole Record

Project:

CEDD CONTRACT NO. GE/2005/26
 WORKS ORDER NO. GE/2005/26.18

Agreement No. CE42/2005(W/S) Laying of Western Cross Harbour Main and Associated Land Mains From West Kowloon to Sai Ying Pung - Marine Geophysical Surveys

Area: West Kowloon to Sai Ying Pung **Drawing No.:** S-2

Drawing Title:
 Contour Plan of Base of Marine Deposit

Notes:

- Survey Date: August 18, 2006
- Survey Grid: Hong Kong Metric Grid
- Survey Datum: Hong Kong Principal Datum
- Survey Vessel: Hung Kuk
- Equipment: Trimble DGPS DELPH II

Revision No.	Date(D/M/Y)	Drawn by	Checked & Approved by	Remarks
0	08/12/2006	Mei Yanhui	Xiao Du	Preliminary

Metric Scale: 1:5,000

Client: Civil Engineering and Development Department

Surveyor: IGGE (H. K.) Engineering Geophysical Co. Ltd.