



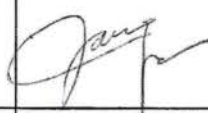
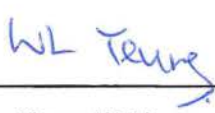

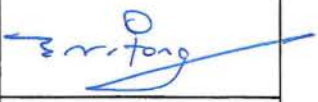




MS Reference Number:	CSHK	CET	MS	C	2024	000068
ACC Reference Number:	1701	W	000	CSC	760	000190

METHOD STATEMENT TITLE	Rev. A
Method Statement for Initial Hydrographic Survey	

	Prepared by:	Checked by:	Reviewed by:	Reviewed by:
Signature:				
Name:	Andrew Lo	C F Chan	Leung Kwok Fung / Hui Wai Kwan	MH Isa / WH Lam
Position:	Graduate Engineer	Construction Manager	SM/SO	QM/QE
Date:	3/5/2024	7/5/2024	7/5/2024	7/5/2024
	Reviewed by:	Reviewed by:	Reviewed by:	Approved by:
Signature:				
Name:	James Ma / Iris Ho	Yeung Wai Lun	Paul Freeman / Mark McGleenon	Eric Fong
Position:	EM/EO	A. Project Director	Sr. Project Director / A. Project Director	Project Director
Date:	7/5/2024	7/5/2024	07/05/2024	7/5/24



## CONTENT

1. Introduction
2. Reference Documents
3. Details of Sub-Contractor/Specialist Sub-Contractor
4. Responsibilities for Activities described within Method Statement
5. Programme and Working Hours
6. Plant, Equipment & Material
7. Construction Methods / Construction Sequence
8. Safety
9. Environmental
10. Quality Control
11. Appendices

<b>1.</b>	<b>Introduction</b> (Overview of the operation/works)																																
	<p>This method statement outlines the general method for hydrographic survey. The content mainly describes the procedure of the abovementioned survey works, as well as instrumentation and equipment required for carrying out the survey works. Risk and safety precautions are also considered.</p> <p>The objective(s) of this survey is/are:</p> <ul style="list-style-type: none"> <li>To verify and map the level of seabed in detail along the site.</li> </ul>																																
<b>2.</b>	<b>Reference Documents</b> (Identify relevant documents by name and reference number)																																
	<ul style="list-style-type: none"> <li>General Specification for Civil Engineering Works (NEC4) (MTR Corporation Limited - 2022)</li> <li>Scope for Contract 1701.</li> <li>Materials and Workmanship Specification for Civil Engineering Works.</li> </ul>																																
<b>3.</b>	<b>Details of Sub-Contractor/Specialist Sub-Contractor</b>																																
	<p>CSHK has invited the following sub-contractors / specialist sub-contractor to provide the hydrographic survey service:</p> <ol style="list-style-type: none"> <li>Concordance Engineering &amp; Surveying Service Company Limited</li> </ol>																																
<b>4.</b>	<b>Responsibilities for Activities described within Method Statement</b>																																
	<p>CSHK is responsible to inspect and carry out the construction works. The following persons, as listed in the table below, will attend the specific tool-box talk and be responsible for the activities:</p> <table border="1"> <thead> <tr> <th>Name</th><th>Position</th></tr> </thead> <tbody> <tr> <td>Yeung Wai Lun</td><td>Assistant Project Director</td></tr> <tr> <td>CF Chan</td><td>Construction Manager</td></tr> <tr> <td>Anthony He</td><td>Assistant Construction Manager</td></tr> <tr> <td>Nick Wang</td><td>Site Agent</td></tr> <tr> <td>Tim Cai</td><td>Engineer</td></tr> <tr> <td>Andrew Mak</td><td>Engineer</td></tr> <tr> <td>Charles Xu</td><td>Graduate Engineer</td></tr> <tr> <td>Andrew Lo</td><td>Graduate Engineer</td></tr> <tr> <td>Leung Kwok Fung</td><td>Safety Manager</td></tr> <tr> <td>Ernest Young</td><td>Assistant Safety Officer</td></tr> <tr> <td>Shek Hau Kim</td><td>Survey Manager</td></tr> <tr> <td>Lau Yu Tat</td><td>Senior Surveyor</td></tr> <tr> <td>Cheung Siu Kei</td><td>Superintendent</td></tr> <tr> <td>Ng Ho Lun</td><td>Senior Foreman / WPIC</td></tr> <tr> <td>Singh Nirdeep</td><td>Foreman / WPIC</td></tr> </tbody> </table> <p>(a) Assistant Project Director / Construction Manager / Assistant Construction Manager Responsible for overall administration, monitoring, controlling progress and quality of works in a safe manner.</p> <p>(b) Site Agent / Senior Engineer / Engineer Responsible for developing works procedures, controlling progress and quality of works</p>	Name	Position	Yeung Wai Lun	Assistant Project Director	CF Chan	Construction Manager	Anthony He	Assistant Construction Manager	Nick Wang	Site Agent	Tim Cai	Engineer	Andrew Mak	Engineer	Charles Xu	Graduate Engineer	Andrew Lo	Graduate Engineer	Leung Kwok Fung	Safety Manager	Ernest Young	Assistant Safety Officer	Shek Hau Kim	Survey Manager	Lau Yu Tat	Senior Surveyor	Cheung Siu Kei	Superintendent	Ng Ho Lun	Senior Foreman / WPIC	Singh Nirdeep	Foreman / WPIC
Name	Position																																
Yeung Wai Lun	Assistant Project Director																																
CF Chan	Construction Manager																																
Anthony He	Assistant Construction Manager																																
Nick Wang	Site Agent																																
Tim Cai	Engineer																																
Andrew Mak	Engineer																																
Charles Xu	Graduate Engineer																																
Andrew Lo	Graduate Engineer																																
Leung Kwok Fung	Safety Manager																																
Ernest Young	Assistant Safety Officer																																
Shek Hau Kim	Survey Manager																																
Lau Yu Tat	Senior Surveyor																																
Cheung Siu Kei	Superintendent																																
Ng Ho Lun	Senior Foreman / WPIC																																
Singh Nirdeep	Foreman / WPIC																																

	<p>in a safe manner. They also have to implement safety at works area for workers via guidance from safety officers.</p> <p>(c) Safety Manager/ Safety Officer Responsible for assessing working conditions of work areas in safety means. To prepare risk assessment before works, enforce safety works practice and environment in the workplace and work site.</p> <p>(d) Worksite Person In Charge (WPIC) WPIC is in charge of the work in the works areas, which are located at various positions of site. Site Supervisor is also responsible in implementing works control checklist.</p> <p>(e) Workers Workers who have completed RSI training and received a valid qualification.</p> <p>(f) Competent Person (CP(T)/CP(NT)) CP shall provide pre-work briefing to all workers and anyone work within the Railway Operation Area (Siu Ho Wan Depot). Briefing attendance records shall be kept on site for inspection. CP shall report to depot before works could commence.</p>
<b>5.</b>	<b>Programme and Working Hours</b> (Start & finish date of operation/works)
	<p>The tentative work commencement is scheduled in May 2024. The general working hours will be from 08:00 – 19:00 daily, from Monday to Saturday. CSHK would check internally to fulfil the Construction Noise Permit Requirement.</p> <p>As the hydrographic survey are mainly to be carried out outside depot, therefore no CP(T)/CP(NT) is needed during the approved working period.</p>
<b>5.</b>	<b>Controls &amp; GPS Check</b>
	<p>The horizontal position refers to the Hong Kong 1980 Grid System. The transformation parameters from geodetic section and Survey and Mapping Office are applied to transform the WGS84 datum into HK1980 datum. The GPS receives differential signal broadcasted from differential transmission station at Kau Yi Chau. Known and agreed control station can also be used for checking GPS.</p> <p>Government tide information would be used for tide reading which is relative to Chart Datum.</p> <p>Hong Kong Principal Datum (HKPD) which is the height datum generally used in Hong Kong and referred through the benchmarks of Lands Department.</p> <p>Chart Datum (CD) which is 0.15m below HKPD.</p>
<b>6.</b>	<b>Plant, Equipment &amp; Material</b> (Identify type, model and specification of MAJOR plant & equipment)
	<p>All plants and equipment will be inspected prior to the mobilization on site to ensure that they are in good working condition and comply with the current regulations.</p> <p>The major plants and equipment will be deployed to carry out the works are as follow: -</p> <p><b>6.1 Survey Vessel</b> A survey vessel will be equipped with a single-beam echo sounder and computer with</p>

logging software. The transducer will be mounted on a side of the vessel. An electric-power-generator/uninterruptible power source (UPS battery) is required in order to provide the power to the above hardware

### **6.2 Differential Global Positioning System (DGPS)**

Device Name: Trimble DGPS Receiver SPS356

Differential Global Positioning System (DGPS) is recommended for positioning of the sailing vessel. The differential signal broadcasts at Kau Yi Chau will be integrated with the GPS data in the device to provide a real-time positioning coordinates, and the coordinates will be transformed into the Hong Kong 1980 Coordinates System. With reference to the brochure of the DGPS, the differential position accuracy is about 1m.

### **6.3 Echo-sounder**

Device Name: Echotrac MK III

Bathymetric data will be collected by the echo sounder with a narrow beam transducer. The depth range of applied frequency (200kHz) had been 0.2m to 200m. The accuracy performance had been maintained at 0.01m +/-0.1% of depth @200kHz total depth of which depends on the accuracy of sound velocity input. The output of echo sounder had been the depth of seabed. Depth had been logged to the computer devices.

### **6.4. Software**

HYPACK will be used for integrating survey equipments, capturing survey data and data reduction.

### **6.5 Computer**

A desktop/laptop computer with recommended specification of the software will be used to run the software during the survey.

### **6.6 Government Tide Database**

Government closest tide station's data would be used for tide reading. The closest tide station is at Chek Lap Kok.



*Fig. 1 Closest Tide Station at Chek Lap Kok*

### 6.7 Bar Check Plate and Chain

The Bar Check plate is around 600mm in diameter and 3-5 mm thick with 5x100mm diameter hole evenly distributed on the plate. The bar check should be around 5kg in weight. The interval starts from the top of the plate. Every one meter there would be a marker on the chain.

7.	<b>Preparation of Survey</b>
----	------------------------------

## 7.1 Survey Area

The hydrographic survey boundary is provided from client's information. Below is the approximated survey boundary.



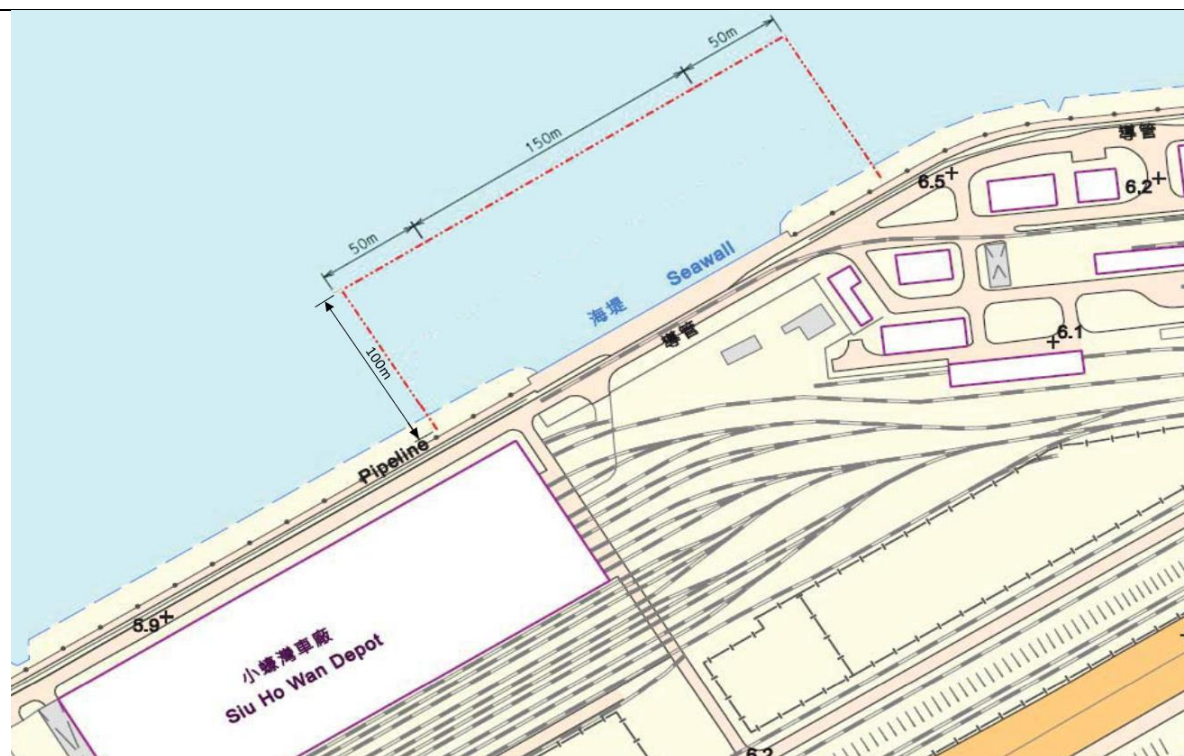


Fig. 2 Survey Layout

## 7.2 Proposed schedule of record survey

The field survey is proposed to be last for 1 working day. The subject site should be clear without blocking during the field survey. The working Permit will be also applied from Marine Department before survey if it is needed. CSHK will liaise and seek approval from HKTS / depot / C7. CSHK will check the exact date of survey works with HKTS and depot to ensure that no operations need of the barging point on that date.

## 8. Survey Methods

### 8.1 Calibration of Equipment

#### 8.1.1 Instruments

All instruments shall be calibrated by equipment certificating company once a year. Certificate will then be issued after calibration to ensure all instrument are in good condition, Instrument without calibration certificate or with expired certificate are not allowed to use within the site area and will be labelled. Calibration certificate is attached.

#### 8.1.2 DGPS

DGPS will be calibrated by setting it on known control station prior and after the sounding operation. The DGPS receiver will be mounted well. Satellite signal will be logged and computed for positioning comparison. If the position logged by the DGPS is within tolerance ( $\pm 1$  m) of the coordinates of control station, the calibration is acceptable.

#### 8.1.3 Bar Check Method

Bar check test will be followed to determine the correctness for the echo sounding equipment. A steel plate will be lowered underneath the transducer. The chain linked to the steel plate shall be marked with 1m interval. At the beginning, the plate will be lowered to 2m depth, to calibrate the draft of the transducer. The steel plate then will be lowered to the deepest section to be surveyed. Before the bar check, the sound velocity will be adjusted to eliminate the difference between reading and the depth of steel plate. After that, the steel

plate will be raised meter by meter and the reading recorded on echo roll paper will also be checked for any discrepancy. Re-adjustment of sound velocity and calibration is necessary if the reading is different from the pre-determined depth.

#### 8.1.4 HDOP of Satellites

The value of HDOP, horizontal dilution of precision, is indicating the positional precision. The meaning of HDOP value is as shown below:

HDOP Value	Rating	Description
<1	Ideal	Highest possible confidence level to be used for applications demanding the highest possible precision at all times.
1-2	Excellent	At this confidence level, positional measurements are considered accurate enough to meet all but the most sensitive applications.
2-5	Good	Represents a level that marks the minimum appropriate for making business decisions. Positional measurements could be used to make reliable in-route navigation suggestions to the user.
5-10	Moderate	Positional measurements could be used for calculations, but the fix quality could still be improved. A more open view of the sky is recommended.
10-20	Fair	Represents a low confidence level. Positional measurements should be discarded or used only to indicate a very rough estimate of the current location
>20	Poor	At this level, measurements are inaccurate by as much as 300 meters with a 6-meter accurate device ( $50 \text{ DOP} \times 6 \text{ meters}$ ) and should be discarded.

The value of HDOP of satellites received during the survey will be monitored and recorded.

#### 8.2 Preparation of Plan lines

Pre-assigned survey lines will be allocated to cover the entire sounding portion. The principle of designing the survey lines would either be 5m section intervals normal to the base line or 5m fixed intervals. In addition, reasonable check lines shall be performed normal to the survey line. The interval of check line usually adopted as 40m or minimal of 2-3 check lines to be adopted.

#### 8.3 Field Survey

Survey vessel speed will be kept in a constant speed, generally 3-5 knots will be applied which causing no intolerable distortion to the sounding records. The software will be set to mark on the data file and sounding paper in every 5m. The interval will be set in distance instead of time because the sampling rate by time had been affected by speed of the boat. The marks would be evenly distributed along the cross section if marks were taken by distance intervals. The sounding will be recorded in the computer by 0.1s intervals; it means 0.15m intervals at speed of 3 knot. A minimum of 2-3 check lines should be run for ensure the quality of the sounding data.

#### 8.4 Tide Reading

The closest government tide gauge Chek Lap Kok will be constantly booked during the period of the survey with readings being taken in 10 minutes interval throughout that period.

#### 8.5 Data reduction

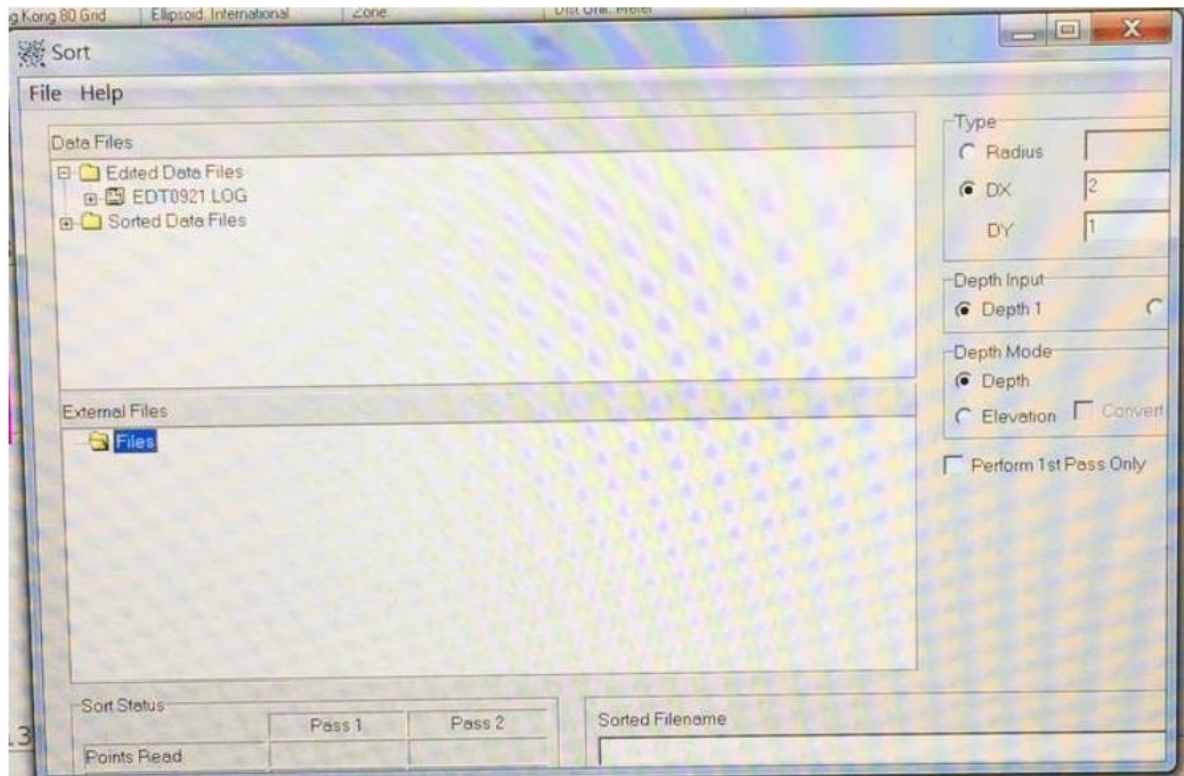
##### 8.5.1 Data reduction and Editing



A software Hypack will be used for reducing the raw data. The corrections, such as tide, will be applied to the raw data and reduced to Hong Kong Principal Datum (H.K.P.D.). After applying the corrections, the noise, such as bubbles, fishes, unpredictable errors, will be removed. Then, the data will be reduced into point-form and the outliers will be removed by comparing the data in different survey-lines.

### 8.5.2 Sorting

After the data editing, the shallowest depth points will be selected, for the scale of 1:500 using A2 paper, in their true position soundings' cell size would be DX=2 DY=1. The processing data sign should be positive within Hypack program.





### 8.5.3 Deliverables

List of common deliverables of sounding surveys for charting and engineering purposes-

- Sounding data (i.e. Northing, Easting and Depth) in ASCII format;
- Raw sounding data of time, position and depth in format readable by the common hydrographic survey packages;
- Hard copy and softcopy of sounding plan, cross-section plan and track plot of actual runlines; and
- Survey report detailing the assessment of horizontal and vertical positioning accuracies.

### 8.5.4 Presentation

A sounding plan with contour will be plotted in scale 1:500(A2) unless A2 paper is not a suitable option. A text file will be exported in order of Easting, Northing, and Depth. Soundings shown on the drawings are displayed with one place of decimal. Soundings above datum (HKPD or CD) should be shown with their values underlined. The sounding

	plotted on the sounding plan would be without negative sign. Digital copy of the sounding plan should be in format of CADD file (DGN) and PDF.
<b>9.</b>	<b>Safety</b> (Risk Assessments)
	<p><b>9.1 General Safety</b></p> <ul style="list-style-type: none"> <li>● All workers shall be equipped with life jackets and safety helmets during operation. All workers must go through a briefing by the Construction Manager / Safety Officer / Safety Supervisor before commencement of any works. All workers on site shall obtain an approved "Mandatory Basic Safety Training Certificate".</li> <li>● Toolbox talk training with reference to the recommended safety and environmental control measures after Construction Risk Assessment will be provided to the site personnel prior to commencing works.</li> <li>● A pre-meeting will be arranged before commencement of the work among Foreman / Engineer / Construction Manager, MTR's representatives and Safety Department to brief the nature of works, the safety aspects and the requirements.</li> <li>● Safety helmets fitted with chin straps, high visibility jackets / sashes, will be provided to all staff working for hydrographic survey.</li> <li>● Any emergency situation shall be reported to Subcontractor and Contractor (i.e. Construction Manager / Engineer / Foreman and Safety Department, etc.) for prompt response. The emergency contact list is shown in <b>Appendix</b>.</li> </ul> <p><b>9.2 Safety for Working in Sea</b></p> <ul style="list-style-type: none"> <li>● All workers shall be equipped with qualified life jackets during the works.</li> <li>● Workers working on a vessel shall have the qualification of the "Shipboard Cargo Handling Basic Training Course"/ "Blue Card".</li> </ul> <p><b>9.3 Risk Assessment</b></p> <p>The risk for the works shall be assessed and the Risk Assessment Analysis is shown in <b>Appendix</b>.</p>
<b>10.</b>	<b>Environmental</b> (Environmental aspect & impact identification as well as mitigation measures)
	The works shall follow relevant mitigation measures as required under the Environmental Permit (EP) / EP submission and <i>Contractor's</i> Environmental Management Plan (EMP).
<b>11.</b>	<b>Quality Control</b> (Inspection and Test Plan including hold points)
	<p>Refer to Appendix E for Inspection and Test Plan.</p> <p>To ensure the attainment of the required standard of works, the methods of working and the required works standards / acceptance criteria are defined in the method statement, inspection &amp; test plans, and are communicated to relevant staff and workers carrying out the works. Day to day routine inspections of the works will be carried out by the Construction Team Leader, Site Engineers and Foreman as appropriate, to ensure that all works are performed following the requirements of these documents.</p>

	<p>Specific quality checks shall be carried out in accordance with the approved Inspection &amp; Test Plan with “Hold Points” at critical elements for confirmation of compliance before proceeding further.</p> <p>Request for Inspection and Survey Check (RISC) shall be issued to the RSS following inspection of the works by the CSHK’s project team. The Inspection &amp; Test Plan for the works (Appendix E) will identify all Hold Points and Witness Points.</p> <p>Following the Inspection &amp; Test carried out, inspection and / or test records are to be prepared to indicate whether the specified requirements have been met. Records of Inspection and testing will be maintained and kept available for inspection and final handover as appropriate.</p>
<b>11.</b>	<b>Appendices</b> (Identify and include additional information in the submission package)
	<p>Appendix A - Specification of the Trimble DGPS Receiver SPS356</p> <p>Appendix B - Specification of Echotrac MK III</p> <p>Appendix C – Calibration Certificate</p> <p>Appendix D – Emergency Contact List</p> <p>Appendix E – Risk Assessment</p> <p>Appendix F – Inspection and Test plan (ITP)</p>

## Appendix A

### **Specification of the Trimble DGPS Receiver SPS356**





## SUB-METER ACCURACY AT AN AFFORDABLE PRICE

The Trimble SPS356 DGNSS/Beacon Receiver is an economical answer to the many demands of marine construction. It incorporates tried and tested DGNSS positioning technology in a robust package with an easy to use interface. Combined with Trimble HYDROpro™ software, it provides flexibility for a wide range of marine construction applications, including:

- Dredging
- Positioning (tugs / anchors)
- Navigation
- Rock and material placement
- Bathymetric survey

## Trimble Tough. Trimble Secure

The robust construction and modularity of the SPS356 system delivers installation flexibility as required on marine vessel installations. The receiver can be mounted in a secure environment protected from the weather and theft, leaving only the antenna outside. Trimble EVEREST™ technology improves results in high multi-path environments such as those encountered on construction vessels and port construction sites.

## Accuracy at All Times and All Places

The Trimble SPS356 receiver can achieve DGNSS positioning with sub-meter precision using RTCM DGNSS corrections either broadcast free by IALA MSK Beacon stations, via the Internet from an NTRIP source, from SBAS (satellite based augmentation systems) such as WAAS, EGNOS and MSAS or via an external radio from a local reference station. The RTCM correction stream from an MSK source can be passed to other DGNSS receivers using the Repeat RTCM function.

## Easier from Start to Finish

Serial, Ethernet, Wi-Fi and Bluetooth capability combined with standard NMEA output protocols mean that it can easily be integrated into solutions, is easier to manage remotely, and allows easy access to the data and functions of the receiver.

## A Family of Site Positioning Systems to Fit Job Requirements

The SPS356 receiver is part of the family of Trimble site positioning system products with common interface, connectors and interchangeable accessories. This system approach helps reduce product training and part stocking. For large companies managing multiple sites around the world it increases operational flexibility and reduces the need for knowledge of different systems for different applications through deployment of a common user interface.

# TRIMBLE SPS356 DGNSS/BEACON RECEIVER

## FACTORY CONFIGURATION

Type	Modular Rover
Rover position update rate	1 Hz, 2 Hz, 5 Hz, 10 Hz
Rover maximum range from base	Unlimited
Rover operation within a VRS™ network	RTCM DGNSS only
IBSS (Internet Base Station Service) Support	Rover only
Constellation tracking	GPS, GLONASS, Galileo, BeiDou, QZSS, SBAS
Signal tracking	Single frequency

## GENERAL

Keyboard and display	VFD display 16 characters by 2 rows
	On/Off key for one-button startup
	Escape and Enter keys for menu navigation
	4 arrow keys (up, down, left, right) for option scrolls and data entry
Dimensions (L x W x D)	17.5 cm (6.9 in) x 12.8 cm (5.0 in) x 5.9 cm (2.3 in) including connectors
Weight	1.15 kg (2.54 lb) receiver only

## ANTENNA OPTIONS

GA530, Rugged GA530	L1 GNSS (GPS, Glonass, Galileo, BeiDou, QZSS), MSK Beacon, L1 SBAS
GA810	L1 GNSS (GPS, Glonass, Galileo, BeiDou, QZSS), L1 SBAS
GA830	L1 GNSS (GPS, Glonass, Galileo, BeiDou, QZSS), MSK Beacon, L1 SBAS

## ENVIRONMENTAL

Operating temperature	-40 °C to +65 °C (-40 °F to +149 °F)
Storage temperature	-40 °C to +80 °C (-40 °F to +176 °F)
Humidity	MIL-STD 810F, Method 507.4
Waterproof	IP67 for submersion to depth of 1 m (3.3 ft), dustproof

## SHOCK AND VIBRATION

Pole drop	Designed to survive a 1 m (3.3 ft) pole drop onto a hard surface
Shock – Non-operating	To 75 g, 6 ms, saw-tooth
Shock – Operating	To 40 g, 10 ms, saw-tooth
Vibration	Tested to Trimble Survey profile (2.6 g RMS): 5 Hz–500 Hz: 0.15 g/Hz <sup>2</sup> 350 Hz to 500 Hz: -6 dB/octave

## MEASUREMENTS

- Advanced Trimble Maxwell™ 6 Custom GNSS chip
- L1 signal-to-noise ratios reported in dB-Hz
- Unfiltered, unsmoothed pseudo-range measurements data for low noise, low multipath error, low-time domain correlation, and high-dynamic response
- Trimble EVEREST™ multipath signal rejection
- 220-channel L1 C/A code
- 2-channel MSK Beacon
- 3-channel SBAS (WAAS/EGNOS/MSAS)

## SBAS (WAAS/EGNOS/MSAS) POSITIONING

Horizontal accuracy	± 0.50m (1.6ft)
Vertical accuracy	± 0.85m (2.8 ft)

## CODE DIFFERENTIAL POSITIONING

Correction type	DGPS RTCM v2.3, DGNSS RTCM v2.4
Correction source	Internal MSK Beacon, DGPS Base via ext. radio, NTRIP via IBSS or VRS
Horizontal accuracy	±(0.30m + 1 ppm) RMS ±(1.0 ft + 1 ppm)
Vertical accuracy	±(0.50m + 1 ppm) RMS ±(1.6 ft + 1 ppm)

## POWER

Internal 7.4 V 3900 mA-hr Lithium-ion battery (Optional)	
• Internal battery operates as a UPS in the event of external power source failure	
• Internal battery will charge from external power source when input voltage is >12 V	
• External 12 V DC to 28 V DC power input with over-voltage protection	
• 7-pin 0-shell Lemo connector is optimized for lead acid batteries with a cut-off threshold of 11 V DC	
• 26-pin D-sub connector is optimized for Trimble lithium-ion battery input (P/N 49400) with a cut-off threshold of 10.5 V	
• Receiver will automatically turn on when connected to external power	
Power consumption	3.7 to 4.95 W at 18 V

## OPERATION TIME ON INTERNAL BATTERY

Rover	7 hours; varies with temperature
-------	----------------------------------

## REGULATORY APPROVALS

- FCC Part 15 Subpart B (Class B Device) and Subpart C
- CAN ICES-3(B)/NMB-3(B), RSS-Gen, RSS-310 and RSS-210
- R&TTE Directive: EN 301 489-1/-3/-5/-17, EN 300 440, EN 300 328, EN 300 330,
- EN 60950, EN 50371
- ACMA Regulatory Compliance Mark (RCM)
- CE mark compliance
- UN ST/SG/AC.10.11/Rev. 3, Amend. 1 (Lithium-ion Battery)
- UN ST/SG/AC.10.27/Add. 2 (Lithium-ion Battery)
- WEEE and RoHS compliant

## COMMUNICATIONS

Lemo (Serial)	7-pin 05 Lemo, Serial 1, 3-wire RS-232
Modem 1 (Serial)	26-pin D-sub, Serial 2, 5-wire RS232, using adaptor cable
Modem 2 (Serial)	26-pin D-sub, Serial 3, 3 wire RS-232, using adaptor cable
1PPS (1 pulse-per-second)	Yes
USB	1 USB 2.0 (Type B) Device via multi-port adaptor (57167)
Ethernet	Through a multi-port adaptor
WiFi	Simultaneous Client and Access point (AP) modes
Bluetooth wireless technology	Fully-integrated, fully-sealed 2.4 GHz
Network Protocols	Yes
HTTP (web browser GUI)	Yes
NTP Server	Yes
TCP/IP or UDP	Yes
Ntrip	NTRIP v1 and v2, Client mode
mDNS/uPnP Service discovery	Yes
Dynamic DNS	Yes
eMail alerts	Yes
Network link to Google Earth	Yes
PPP and PPPoE	Yes
Supported data formats	
Correction Inputs	CMR™, CMR+™, CMRx, RTCM 2.x, RTCM 3
Correction Outputs	Repeat RTCM from internal Beacon source
Data Outputs	NMEA, GSOE, 1PPS Time Tags
External GSM/GPRS, cell phone support	Supported for Internet-based correction streams (VRS, IBSS) – directly using the external SNM940
Internal MSK Beacon receiver	Frequency range 283.5–325.0 kHz Channel spacing 500 Hz MSK bit rate 50, 100, and 200 bps Demodulation minimum shift key (MSK).



YOUR SITECH® HEAVY CIVIL CONSTRUCTION TECHNOLOGY PROVIDER

Trimble Heavy Civil Construction  
10368 Westmoor Drive  
Westminster, Colorado 80021 USA  
800-361-1249 (Toll Free)  
+1-937-245-5154 Phone  
construction\_news@trimble.com

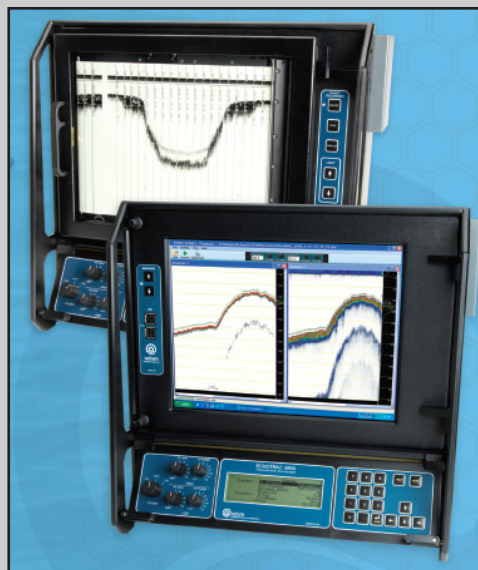


construction.trimble.com

## **Appendix B**

### **Specification of Echotrac MK III**

# ODOM ECHOTRAC™ MKIII MODEL



## GENERAL DESCRIPTION

Like to keep your options open? Then Odom's Echotrac™ MKIII is the echo sounder for you! It's the only sounder on the market offering you the choice of either a high-resolution thermal paper recorder or a full-sized high bright color LCD chart in interchangeable module format.

When it comes from Odom, you know it's durable, easy to use and backed by the best customer service in the industry. Both high and low channels feature frequency agility, enabling the operator to precisely match the transceiver to almost any existing transducer. This matching ability minimizes nearsurface noise caused by transducer ringing while increasing echo return strength.

The MKIII is capable of both shallow and deep-water operations and it features unsurpassed interfacing flexibility with four serial ports and high speed Ethernet capability for maximum efficiency. With all of these features in such a compact and portable package, it's easy to see why the Echotrac™ MKIII is such a respected echo sounder.



**Making  
technology  
work for you!**

OCEANSCAN LIMITED  
DENMORE ROAD, BRIDGE OF DON, ABERDEEN,  
SCOTLAND, U.K., AB23 8JW

TEL: +44(0)1224 707000, FAX: +44(0)1224 707001

Email: [rental@oceanscan.co.uk](mailto:rental@oceanscan.co.uk), Website: [www.oceanscan.co.uk](http://www.oceanscan.co.uk)

Accredited to BS EN ISO 9001:2000



# ODOM ECHOTRAC™ MKIII MODEL TECHNICAL SPECIFICATIONS

## Frequency

- High band: 100 kHz – 1 MHz
- Low band: 3.5 kHz – 50 kHz

## Output Power

- High: 100kHz–1 kW RMS max 200kHz–900 W RMS max, 750kHz – 300W RMS max
- Low: 3.5kHz–2kW RMS max, 50kHz–2kW RMS max

## Input Power

- 110 or 220 V AC/24 V DC 50 watts

## Resolution

- 0.01m

## Accuracy

- 0.01m +/- 0.1% of depth @ 200 kHz
- 0.10m +/- 0.1% of depth @ 33 kHz
- 0.18m +/- 0.1% of depth @12 kHz (corrected for sound velocity)

## Depth Range

- 0.2 – 200 m @ 200 kHz
- 0.5 – 1500 m @ 33 kHz
- 1.0 – 6000 m @ 12 kHz

## Phasing

- Automatic scale change, 10%, 20%, 30% overlap or Manual

## Printer

- High resolution 8 dot/mm (203 dpi), 16 gray shades
- 216mm wide thermal paper or film
- External ON/OFF switch
- Paper advance control

## Paper Speed

- 1cm/min. to 22 cm/mm
- Auto = one dot row advance for each Ping

## Sound Velocity

- 1370 – 1700 m/s
- Resolution 1 m/s

## Transducer Draft Setting

- 0 – 15 m

## Depth Display

- On control PC and LCD display

## Clock

- Internal battery backed time, elapsed time and date clock

## Annotation

- Internal – date, time, optional GPS position from built-in Rx.
- External – up to 80 ASCII characters from RS232 Serial or Ethernet port

## Interfaces

- 4 X RS232 or 3 X RS232 and 1 X RS422
- Inputs from external computer, motion sensor, sound velocity
- Outputs to external computer, remote display
- Outputs with LCD chart – video out
- Ethernet interface
- Heave – TSS1 or sounder sentence

## Blanking

- 0 to full scale

## Installation

- Desktop, optional rack mount or bulkhead mount

## Help

- The function of each parameter and it's minimum and maximum values can be printed on the paper chart. The record of settings in tabular format is available on demand, and a continuous printout of parameters is available on thermal paper models. Log files are automatically created by Echotrac Control when that software is used to control the sounder.

## Environmental Operating Temperature

- 0' – 50' C, 5 – 90% relative humidity, non-condensing

## Dimensions

- 450 mm H x 450 mm W x 300 mm D

## Weight

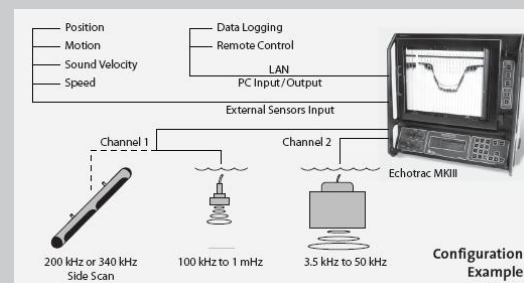
- 15.9 kg

## Options

- Remote Display
- Side Scan Transducer 200 kHz or 340 kHz
- Built-in DGPS

## Features:

- Selectable Receiver
- Bandwidth for shallow/deep water echo sounding
- Silas compatible output for sediment analysis



Making  
technology  
work for you!

Marketed By



## Appendix C

### Calibration Certificate of Echo Sounder





## 广州南方测绘科技股份有限公司检测中心

SOUTH SURVEYING & MAPPING TECHNOLOGY CO., LTD. & Testing Center

# 校准证书

Calibration Certificate

证书编号/Certificate NO: 2023091202

委托方/Client: 力群工程及测量有限公司

设备名称/Sample's Name: 双频测深仪

型号/Model: Echotrac MK III

设备编号/Serial No.: 007277



报告日期: 2023年09月12日

有效日期: 2024年09月11日



地址: 广州市天河智慧城思成路39号

邮政编码: 510655



测试项目表				
序号	试验内容	试验方法	是否适用	是否通过
1	测量范围 分辨率 盲区 准确度	<p>使用设备按要 求：</p> <p>1. 测量水温用于声速改正</p> <p>2. 在水槽的一端水下约一半水深处固定换能器使换能器发射面垂直于水面</p> <p>3. 在水槽中固定反射板使其平行于换能器发射面</p> <p>4. 用钢卷尺测量换能器至反射面的距离与测深仪测量值比较计算误差</p> <p>5. 在测深仪测量范围内选取具有代表性的测点重复进行比测比测点不得少于 10 个点。</p>	是	通过
2	水密 试验 绝缘 电阻	<p>使用设备专用水密试验设备。</p> <p>把换能器及水下收发部分放入该设备中注水加压至所需压力后保持 1h 取出后检查水下部分的内部应无漏水渗水现象换能器两信号线之间电阻应不小 5MΩ 于机壳与电源线之间电阻应不小于 1MΩ</p>	否	
3	电压 波动	根据产品技术要求, 调整电源输出电压至其额定值, 当电源电压在规定范围内变化时, 受试产品应能正常工作, 并能满足准确度要求	是	通过
4	抗干 扰性	对于侧扫测深仪, 在其室内部分输入输入频率为 50-100Hz, 幅度小于等于 3V 的正弦波信号, 观察受试产品测量结果; 频繁开关大功率电气设备 (如手电钻等) 观察受试产品测量结果; 摩擦或轻轻敲击换能器发射面, 观察受试产品结果受试产品均应能正常工作, 并满足精度要求。	否	
5	重复 性误 差	使用设备在测深仪测量范围内, 水深不变, 固定换能器, 移动反射板后, 仍移至原同一水深点的位置, 测量 5-10 次, 记录各次测量值, 选择 3-5 个不同距离的测试点重复此试验, 取各测试点中最大 (或最小) 测量值与该点重复测量的均值之差 测试结果中最大者即为重复性误差。重复性误差应不大于该测深仪准确度的 0.5 倍。	是	通过
6	再现 性误 差	使用设备在测深仪测量范围内, 水深不变, 固定换能器, 移动发射板至某一位置, 在 48h 之内, 开机 10h, 关机 2h 共进行 4 次, 记录每次测量值。测深仪测量值和约定真值之差的 最大值即为再现性误差。再现性误差应不大于该测深仪准确度的 1.5 倍	是	通过
7	实测 检验	把设备安装到船上, 在珠江上延航道中心先布一条计划线, 垂直航道中心线布反方重合的两条计划线, 船只按照计划线航行。数据后处理, 对比三条侧线的符合程度。	是	通过

QC:


日期: 2023 年 09 月 12 日

地 址: 广州市天河智慧城思成路 39 号

邮政编码: 510655

## Appendix D

### Emergency Contact List

 <b>Siu Ho Wan Depot Property Development</b> Contract 1701 - Oyster Bay Station and Associated Works	Ref No: MS/CV/0101
<b>Method Statement for Temporary Widening of SSK Drive</b>	Rev:

## Emergency Contact List - 緊急聯絡人員

Company 公司	Position 職位	Name 姓名	Contact No 聯絡電話
CSHK 中建香港	Assistant Project Director	Yeung Wai Lun 楊偉倫	9495 9399
CSHK 中建香港	Construction Manager 施工經理	Chan Chi Fat 陳志發	9668 7888
CSHK 中建香港	Assistant Construction Manager 助理施工經理	He Fengqiao, Anthony 何楓橋	6822 1099
CSHK 中建香港	Site Agent 地盤代表	Wang Si Yang 王思洋	5519 9907
CSHK 中建香港	Engineer 工程師	Mak Hoi Kiu 麥海橋	6289 0390
CSHK 中建香港	Graduate Engineer 見習工程師	Lo On Tat, Andrew 盧安達	6764 6649
CSHK 中建香港	Graduate Engineer 見習工程師	XU Wen Xuan, Charles 徐文軒	9576 7246
CSHK 中建香港	Superintendent 地盤總管	Cheung Siu Kei 張兆基	9080 3168
CSHK 中建香港	Senior Foreman 管工	Ng Ho Lun 伍浩麟	5599 5261
CSHK 中建香港	Senior Foreman 管工	Singh Nirdeep	9863 8068
CSHK 中建香港	Project Safety Manager 項目安全經理	Leung Kwok Fung 梁國峯	9683 3846
CSHK 中建香港	Assistant Safety Officer 助理安全主任	Ernest Young 楊啟榮	6055 5319
<b>Public Organization Contact No. 公共機構聯絡電話</b>			
Tung Chung Fire Station 東涌消防局			2988 1898
Tung Chung Ambulance Depot 東涌救護站			2988 8282
Hong Kong – Zhuhai – Macao Bridge Ambulance Depot 港珠澳大橋救護站			2516 0205
CLP Power Hong Kong Limited 中華電力			2678 2678
Hong Kong & China Gas 中華煤氣			2880 6999
Hong Kong Observatory 香港天文台			187 8200 / 2926 8200
Drainage Service Department 渠務投訴熱線 (24 小時)			2300 1110





## Appendix E

### Risk Assessment





## Contract No. & Title: 1701 - Oyster Bay Station and Associated Works

### Risk Assessment for Hydrographic Survey

Method Statement No.:

Location: Construction Area with Contract 1701 - Oyster Bay Station and Associated Works

Risk Assessment No.:

Date of Risk Assessment:

Revision No:

Date of Revision:

Activity	Potential Accidents	Initial Risk Classification			Control Measures	Mitigated Risk Classification			Responsible Person
		Frequency	Consequence	Risk Class		Frequency	Consequence	Risk Class	
1. Survey works on vessel	- Fall off the vessel into water	2	3	R2	- All workers shall wear life jackets. - The vessel should be equipped with a life saver ring. - At least 2 workers together when work near or over water.	1	2	R1	Engineer, Superintendent, Site Foremen
- ditto	- Vessel accidents	1	3	R2	- The vessel should be equipped with a life saver ring. - All workers shall wear life jackets. - Assign one worker to be the lookout man when carrying out the surveying works.	1	2	R1	Engineer, Superintendent, Site Foremen
2. General Work in Hot Weather	- Heat stroke	2	3	R2	- Take a break/ rest regularly - Attend training: Heat stroke - Provide shaded rest area and drinking water - Site in charge should remind workers to take more rest at abnormally hot - Provide sufficient air ventilation	2	2	R1	Superintendent, Site foremen
3. General Work in Adverse Weather (Typhoon)	- Flooding, property damage, vessel overturn or collapse, injury to public	1	4	R2	- The hydrographic survey works shall be stopped when a typhoon signal was hoisted. - When typhoon signal no. 8 or higher is hoisted during working hours, all site employees shall leave site, emergency team shall stand by in a safe place. Site shall be closed.	1	3	R1	Site Engineer, Superintendent, Site foremen







4.	General Work in Adverse Weather (Lightning)	- Serious injury, potential fatal injury	1	4	R2	<ul style="list-style-type: none"> <li>- Avoid outdoor works if lightning alert within 10km</li> <li>- Stop all works and seek shelter immediately if lightning alert within 5 km</li> <li>- Check weather forecast before conducting outdoor activities</li> <li>- Do not wear highly conductive equipment such as headsets</li> <li>- Do not stay near tall structures</li> <li>- Telegram alert was implemented, and site agent is responsible for deciding the stop work and evacuation of outdoor employees to safe area. Stop all activities when thunder is found in a distance of 5km or less once message shown in Telegram.</li> <li>- Employees shall stay indoors and do not touch the metal apparatuses such as antenna, water pipe and wire mesh etc.</li> <li>- Not to stay at area higher than the surrounding landscape such as hilltops.</li> <li>- Not to stay close to trees, lamp posts or discharging steel tower which might be struck by thunder</li> <li>- Not to lay on ground or crouch for minimizing touching the ground</li> <li>- Not to use plugged-in electrical equipment</li> <li>- Not to hold rod-like or sharp pointed long objects</li> <li>- Safety supervisor has to make judgment to resume work after the inclement weather</li> </ul>	1	3	R1	Site Engineer, Superintendent, Site foremen
----	---	--	---	---	----	---	---	---	----	---

Notes : (i) Please number activities, hazards & safeguards as illustrated

(ii) Please attach risk matrix



Prepared By: (Engineer)	Andrew Lo	Reviewed by: (Safety Manager)	W. F. Leung	Approved by: (Construction Manager)	CHAN CHI FAT
Signature:		Signature:		Signature:	
Date:	9/4/2024 	Date:	6 May 2024	Date:	9/4/2024



## Frequency

		Construction Safety	Safety – Aviation Operation
5	Frequent	≥ 10 incidents in a year	≥ 1 case in a year
4	Likely	2-10 incidents within a year	1 precedent case in past 5 years
3	Possible	1 incident within a year	1 precedent case in past 10 years
2	Unlikely	1 incident within 5 years	1 precedent case since airport in operation
1	Rare	< 1 incident in 5 years	No precedent case

## Consequence

Impact Category	Consequence				
	1	2	3	4	5
	Insignificant	Minor	Major	Hazardous / Critical	Catastrophic
Safety	0 injury	≥ 1 first aid injury(ies)	≥ 1 minor injury(ies)	≥ 1 major injury(ies)	≥ 1 fatality(ies)
Safety - Aviation Operation	Minor disruption or inconvenience	- Operating Limitations - Use of emergency procedures	- Safety margins reduced - Operating efficiency impaired	- Terminal/ Airfield operation facilities partially closed	- Airfield operation closed - Terminal operation suspended
	System Disruption < 5 mins.	System Disruption < 30 mins.	System Disruption < 1 hour	System Disruption < 24 hours	System Disruption > 24 hours

**Major injury:**

- Serious injury with hospitalization required and/or admittance to intensive care
- Unconsciousness;
- Fracture other than fingers, thumbs and toes;
- Amputation of an arm, hand, finger, leg, toe etc.
- Loss of sight;
- Crush injuries leading to internal organ damage;
- Serious burn;
- Medical treatment resulting from exposure to a pathogen

**Minor injury (incl. Serious Incident):**

- Injury not considered as a major injury
- Injuries with medical treatment but no hospitalization required
- Serious incident

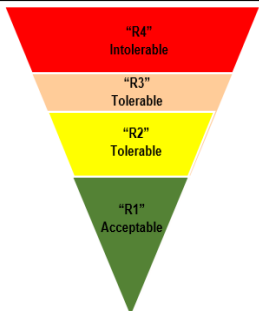
**First aid injury (incl. Minor Incident):**

- Superficial injuries with only first aid treatment required
- Minor incident

## Risk Matrix

Impact Category			Consequence				
			1	2	3	4	5
			Insignificant	Minor	Major	Hazardous / Critical	Catastrophic
Frequency	5	Frequent	R2	R3	R4	R4	R4
	4	Likely	R2	R2	R3	R4	R4
	3	Possible	R2	R2	R2	R3	R4
	2	Unlikely	R1	R1	R2	R2	R3
	1	Rare	R1	R1	R1	R2	R2


## Risk Tolerability

Tolerability Region	Assessed Risk Index	Criteria
	R4	Unacceptable under the existing circumstances
	R3, R2	Acceptable based on risk mitigation. It may require management decision
	R1	Acceptable



## Appendix F

### Inspection and Test Plan (ITP)

INSPECTION AND TEST PLAN										  China State Construction Engineering (HK) Ltd.
PROJECT :		Siu Ho Wan Depot Property Development: Contract No. 1701 Oyster Bay Station and Associated Works								
QUALITY CONTROL REQUIREMENT:		H-QUALITY HOLD POINT, C-QUALITY CONTROL POINT AND DR-DOCUMENT REVIEW								
ITP TITLE:		Method Statement for Hydrographic Survey								
NO.	ACTIVITY	ACCEPTANCE CRITERIA/ REF. DOCUMENT	FREQUENCY	VERIFICATION DOCUMENT/ RECORD	RESPONSIBLE PERSON	Q.C. REQUIREMENT			REMARK	
						CSHK	MTR			
							MTR	AP/RSE/RGE		
Section A. Pre-activities submissions (e.g. MS/ITP submission, design submission incl. temp. works, shop drawings, materials submission, etc.)										
A1	Method Statement for Hydrographic Survey	Submission Approval	100%	Method Statement	CM	DR	DR	DR		
Section B. Materials on-site inspection and test sampling (e.g. rebar, coupler, concrete, etc.)										
B1	NA	NA	NA	NA	NA	NA	NA	NA		
Section C. Construction works in sequence (e.g. setting out, rebar fixing, formwork erection, etc.)										
C1	Initial Hydrographic Survey	Working drawings, M&W or accepted by MTR	100%	RISC(SUR), Survey Record and Submission via Digital System	Foreman	H	H	H		
Section D. Completion of works (e.g. handover, as-built, termination, etc.)										
D1	Report Submission	NA	100%	CSF Submission	CM	DR	DR	DR		



China State Construction  
Engineering (HK) Ltd.