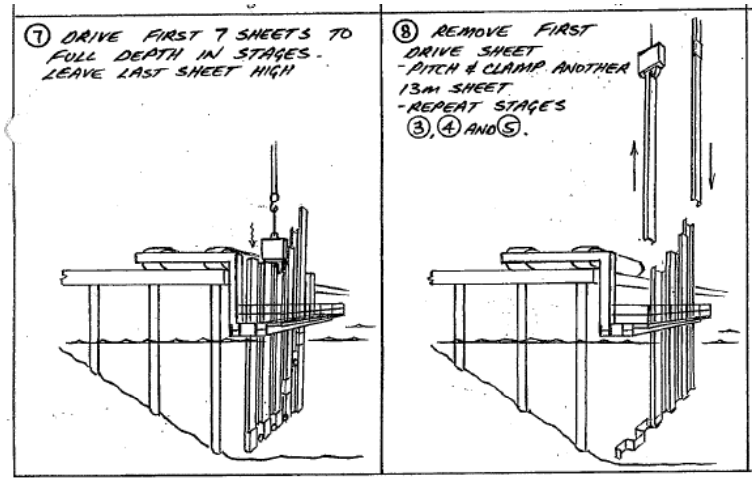
Project Next Generation
Construction Management Plan

Daniel Smith Industries Ltd

Sheetpiling of Container Berth



Prepared by

Andy Pullar (Port Otago Ltd)
Lincoln Coe (Port Otago Ltd)

April 2015

Printed 24-Apr-15		Author		Approval for Issue		
Rev	**Purpose**	**Name**	**Sign**	**Name**	**Sign**	**Date for Issue**
1	Consultative Groups Issue					23/04/2015

1. Introduction

This document is to be read in conjunction with the Environmental Management Plan (EMP) for the Next Generation dredging project. This document details a portion only of the overall development works, being the ***"Sheetpiling of Container Berth"*** to be undertaken by ***Daniel Smith Industries*** during the period July 2015 to November 2015.

The berth sheetpiling is required prior to any deepening, by dredging, of the container berths at Port Chalmers. The sheetpiling is required to maintain slope stability of the rock revetment beneath the wharves. This Contract Management Plan (CMP) does not relate to any of the dredging aspects associated with deepening of the berths.

2. Summary

PROPOSED COMMENCEMENT	29th June 2015
ESTIMATED COMPLETION DATE	13th November 2015
CONSTRUCTION PLANT PROPOSED (See attached spec sheets)	Piling Crane Hitachi KH500 (100t) Sheet pile pitching crane IHI CCH300 (30t) Vibro ICE 52B Hydraulic pile hammer BSP 3-5
SHEET PILE and LENGTHS	JFE Steel Sheet Piles – JFESP-3W Length of pile **13m** Total sheet pile wall area 3,820m² (520t)
CONTACT PERSONS – PORT OTAGO	Andy Pullar Port Otago Limited Direct Dial: +64 3 472 9798 Mobile: +64 21 2298 777 Email: apullar@portago.co.nz
CONTACT PERSON – DANIEL SMITH INDUSTRIES	Daniel Smith Ph.: 03 313 9902 Mobile: 021 336 623 Email: Daniel@danielsmith.co.nz

2.1 Development & Updating of the CMP

This construction management plan (CMP) has been developed by Port Otago Ltd in accordance with Otago Regional Council resource consent condition number 6 of 2010.197.V1, and the requirements within the EMP.

As with the development of the design & execution of the capital dredging works, this CMP will also be an iterative and evolving process. This CMP document will be a "live" document - ever developing in response to changes and findings.

The three areas discussed as follows will be the key drivers for change or alteration of the CMP:-

1. additional dredging & disposal, or construction activity. This will include the specific input from the Contractors(s) with respect to their equipment & methodology.
2. comments or input from Technical Group members and / or Otago Regional Council;
3. input resulting from changes to construction methodology etc… resulting from monitoring and reporting undertaken as part of daily / weekly works.

All revisions of the D&DP will be issued directly to consultative group members, and the most recent versions being displayed on the POL website.

2.2 Key Personnel

As required by the EMP and consent conditions the following are key personnel for the project and contact details:

Role	Company	Name	Phone	Email
GM Infrastructure	Port Otago Ltd	Lincoln Coe	DDI 03 472-9884 Cell 021 2298884	lcoe@portotago.co.nz
Project Manager	Port Otago Ltd	Andy Pullar	DDI: 03 472 9716 Cell 021 627 188	rmcgrouther@portotago.co.nz
Managing Director	Daniel Smith Industries	Daniel Smith	Ph 03 313 9902 Cell 021 336623	*email address*
Harbour Control (24hrs)	Port Otago Ltd		DDI: 03 472 9882	*harbourcontrol@portotago.co.nz*
Otago Regional Council	ORC	Pollution Hotline	0800 800 033	To report oil or fuel spills in the harbour.

3. Project Construction Activities

3.1 Introduction

The installation of a sheet pile retaining wall is required on the berths at Port Chalmers to ensure deepening of the berth pockets does not cause instability of the existing rock revetment beneath the wharves. The work to be undertaken is common construction practice.

The driving of sheet piles shall be completed by working from the existing wharf structure with no water based plant to be utilised. Daniel Smith Industries will be the lead contractor on these works with steel to be supplied by JFE.

3.2 Location of Works

The proposed works are to be undertaken in the Port Chalmers Container Terminal (PCCT) located at 15 Beach Street, Port Chalmers, Dunedin. The PCCT has three main wharf areas; the container wharf area; the multi-purpose wharf area; and the Beach Street wharf area.

The first stage of work, and that related to this CMP, incorporates works on the container wharf **only** and is shown below. It is planned to complete the sheet piling works on the multi-purpose wharf in 2016.

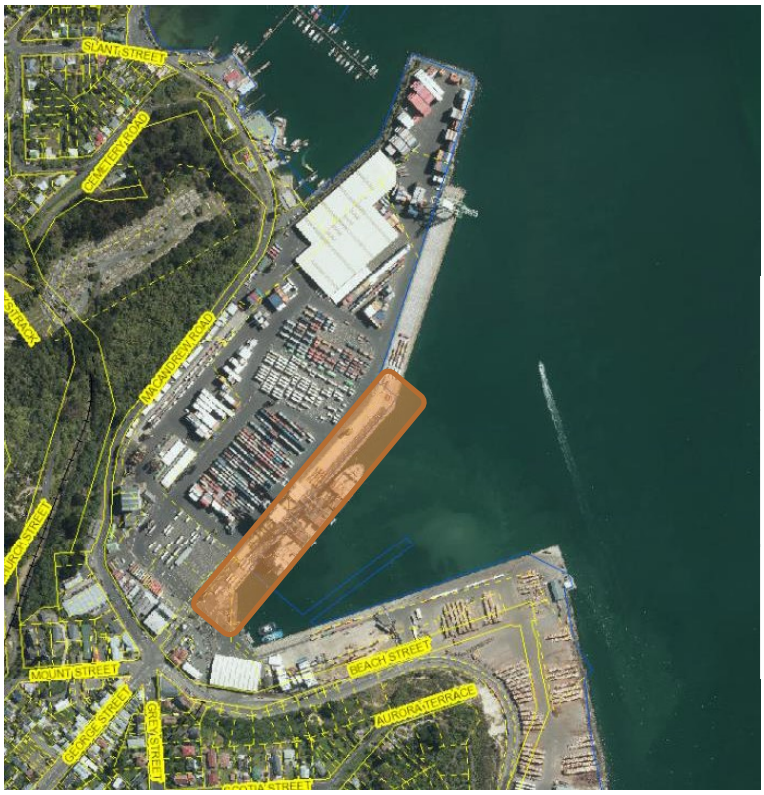


Figure 1 Site Location: Container Wharf Port Otago

The seabed conditions in this area are comprised of marine silts with an underlying foundation of breccia rock. The sheet piles will be driven to a set depth unless the bedrock is encountered.

3.3 Equipment and Materials

The following equipment is proposed to be used, with details of cranes and hammers included as Appendix A :-

- One Hitachi KH500 (100t) crawler crane: used for driving the sheets with the hydraulic hammer attached;
- One IHI CCH300 (30t) crawler crane: used for sheet pile pitching and positioning;
- Vibro ICE 52B;
- Hydraulic pile hammer BSP 3-5 and power pack;
- One purpose built mobile pile gate;
- One purpose built mobile pitching sleeve.

The following materials are proposed to be used:

- 390 No. 13m long JFESP-3W permanent sheet piles;
- 10 No. 17m long JFESP-3W temporary driving sheet piles;
- 30 No. QuayQuip rubber element fender units including steel fender panel and fixings

3.4 Methodology

The proposed methodology involves the installation of a sheet pile wall utilising a 30 tonne crawler crane for pitching and placing the piles and a 100 tonne crawler crane with a vibratory hammer to drive the piles. The piles are to be driven through a frame or pile gate from the existing wharf structures to ensure the correct alignment.

A schematic of the operation and following described methodology are included in Appendix 2 of this CMP.

1. The current wharf fenders are removed to allow pile driving to take place;
2. The driving gate and a pitching sleeve (to ensure piles are vertical allowing connection) are positioned to locate and guide the piles as they are being driven;
3. The pile gate attaches to the edge of the wharf and extends approximately three metres onto the wharf deck. It has a depth of approximately six metres and has provision for ten piles, three locating and seven fully driven. The pile gate acts as a stable securing system and is designed to minimise the positional error at the bottom of the pile;
4. A permanent 13m long sheet is placed into the pitching sleeve;
5. The temporary 17m driving sheet is attached to the permanent sheet with a hydraulic clamp;
6. The combined 30m sheet is lifted from the pitching sleeve and is placed into the pile gate with the sheet clasp connecting to the previous sheet already in place;
7. The combined sheet is driven 3-4m into the seabed with vibro to fix in place;

8. Next nine sheets are placed and partially driven;
9. First seven sheets are then fully driven with last sheets left high for next set;
10. Driving sheets are removed then pitched and clamped onto next permanent sheet;
11. The pile gate is repositioned as sheet pile wall progresses;
12. The new wharf fenders are replaced as the wall is completed.

This sequence is repeated along the length of the wharf working from north to south.

4. Construction Programme

An indicative programme has been prepared by Octa Associates in conjunction with Port Otago and Daniel Smith Industries. This programme is attached in Appendix 3. The contract duration is shown as xx weeks and is based on a productivity of 6 piles per day over a 5 day working week. This is a conservative productivity with the duration expected to be less.

The following are key dates form the Octa Associates programme:

- Site possession 29 June 2015
- First 100m handed back 7 August 2015
- Second 100m handed back 21 September 2015
- Piling complete 11 November 2015
- Disestablish 20 November 2015

Fortnightly project meetings will be held once the physical works are underway with frequent programme reviews completed based on actual productivity.

5. Environmental Aspects

5.1 Relevant Consents

The following consents are applicable to the sheetpiling works.

- RM 2010.197.V1 – Disturb foreshore & sea-bed.

5.2 Environmental Restrictions

There are no explicit environmental restrictions associated with these works.

5.3 Consent Condition 6 & EMP Performance Monitoring

The following condition 6 from Consent 2010.197.V1 is relevant to these works.

Performance Monitoring

6. The consent holder shall include in the Environmental Management Plan prepared for Coastal Permit 2010.200 the following details for the works authorised by this consent. The disturbance component of the Environmental Management Plan shall incorporate industry best practice and include but not be limited to the following:

   (a) a description of how the disturbance occurs;
   (b) a description of the sources and sizes of rock to be used;
   (c) construction methods to be implemented to minimise the disturbance and associated plumes of sediment laden water; and
   (d) methods to be implemented to relocate resident crustaceans from the site and remove any mammals, birds or fish from the site before and during works.

   Any changes to the Environmental Management Plan shall be made after consultation with the consent authority and shall be submitted to the consent authority for review and certification prior to those changes being implemented.

The following discussion addresses each of the points as follows.

- 6(a) describing disturbance.
  - The only disturbance of the seabed is a maximum 1m wide strip along the full length of the sheet-pile wall. This is where the sheet-piles themselves penetrate the sea-bed.

- 6(b) description of rock
  - The Daniel Smith Industries scope of work DOES NOT include any rock work or associated disturbance.

- 6(c) methods to minimise disturbance and associated plumes.
  - The construction method and design of the sheet-pile wall, by its sheer nature minimises the disturbance of the sea-bed. It avoids any excavation of the underwharf slope and placement of rock back on the excavated slope. The only disturbance that will occur and plume will be in the immediate vicinity of the pile that is being vibrated at that time, which is a very local disturbance at 13m within the berth pocket.

- 6(d) relocate crustaceans, remove mammals, birds or fish
  - A dive survey along the line of the sheet-pile wall will be undertaken to establish whether there is any impediments or obstructions to driving. This survey will identify whether there is any crustaceans in the immediate of the sheet-piling that will require relocation. Relocation would be by diver to an existing wharf where there is a known existing & resident population.
  - Prior to the first sheet-piles being driven an underwater walk survey will be undertaken. Any mammals or birds noted as being present will be assisted or encouraged to sites remote or away from the work area.

5.4 Noise

Condition 5 of Consent 2010.197.V1 requires compliance with the Construction Noise Standard NZS 6803 (1999).

In order to achieve compliance with this standard, work hours will be restricted.

No pile driving will be undertaken between the hours of 2000hrs (8:00pm) and 0630hrs (6:30am) Monday to Saturday.

The existing Scotia St noise monitor is situated well to receive noise from the construction activity, and review of this monitoring data could be used to ensure compliance with the construction noise standard.

5.5 Operation of Machinery

Condition 11 of the consent is relevant, and is addressed in the following manner.

On Wharf

The cranes, as well as the power-pack will all be on the wharf, and over the marine environment. Prevention and treatment of particularly oil and fuel spills is of high importance. In order to reduce the chance of spillages the following will be considered:

- Store the absolute minimum amount of fuel required for day-to-day operation of quarry plant on site;
- Storage of this fuel and oil should be well away from creeks or watercourses and where available within an earth bund;
- Refuelling of machines will be undertaken by trained personnel in a designated refueling location and manner;
- Spill kits shall be kept in known locations on site and within 100m of any working machinery;
- Spill kits will contain as a minimum:
  - Sawdust (or equivalent absorbent material);
  - An absorbent boom;
  - Absorbent matting;
  - Disposable overalls, gloves and boot covers;
  - A designated container for the disposal of contaminated equipment and soil.
- Spill kits must be checked regularly to ensure they are fully stocked.

If a spill to ground occurs:

- The source and nature of the spill must be identified and isolated to prevent any further discharge;
- Contain the spill using materials from the spill kit in the first instance and / or other suitable available material.
- Clean up and dispose contaminated material in an approved disposal facility, under no circumstances is this material to be disposed on site.

- A review of refueling procedures and locations will be undertaken and remedial measures implemented.

If a spill to harbour waters :-

- Immediately contain the spill using the absorbent boom or matting as contained in the spill kit;
- Identify and isolate the source of the spill;
- Clean up and dispose absorbent matting or boom and dispose of in an approved disposal facility. Chemical dispersants are not to be used;
- In the case of substantial spills (>50litres) the Otago Regional Council must be contacted;
- A review of refueling procedures and locations will be undertaken and remedial measures implemented.

Regular maintenance as well as operator inspection of equipment being used should be undertaken to identify any potential areas of risk, and any item requiring attention or remedial action undertaken with the highest priority.

Over and On Water

The only machinery or equipment that is operating over and within the harbour waters will be :-

1. Vibrating hammer (ICE 52B) which attaches to the top of the driving sheet and is out over the water whilst sheets are being driven.
2. The hydraulic clamp on the 17m driving sheets. This is at the bottom of the driving sheet and connects hydraulically onto the top of the 13m pile that is being driven.

The key risk is to identify is any hydraulic leak that may occur which could cause hydraulic oil to enter the harbour water.

A methodology should be incorporated into the daily work flow to ensure visual inspections and of the key areas of risk, particularly associated with the hydraulics on the driving sheets. In addition assessment of how a potential failure will be identified should be undertaken, with these methods adopted as part of the standard work procedures.

An absorbent floating boom should be installed around the perimeter of the driving gate in order to contain any hydraulic oil that could float to the surface from leaking or burst hydraulics under the water. Any spills to be dealt with as above.

APPENDIX 1: CONSTRUCTION EQUIPMENT

Daniel Smith Industries Ltd
315 Flaxton Road, Rangiora, 7400
Canterbury, New Zealand.
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Fax: 0064 (0) 3 313 9904
Mobile: 0064 (0) 21 33 66 23
Email: daniel@danielsmith.co.nz

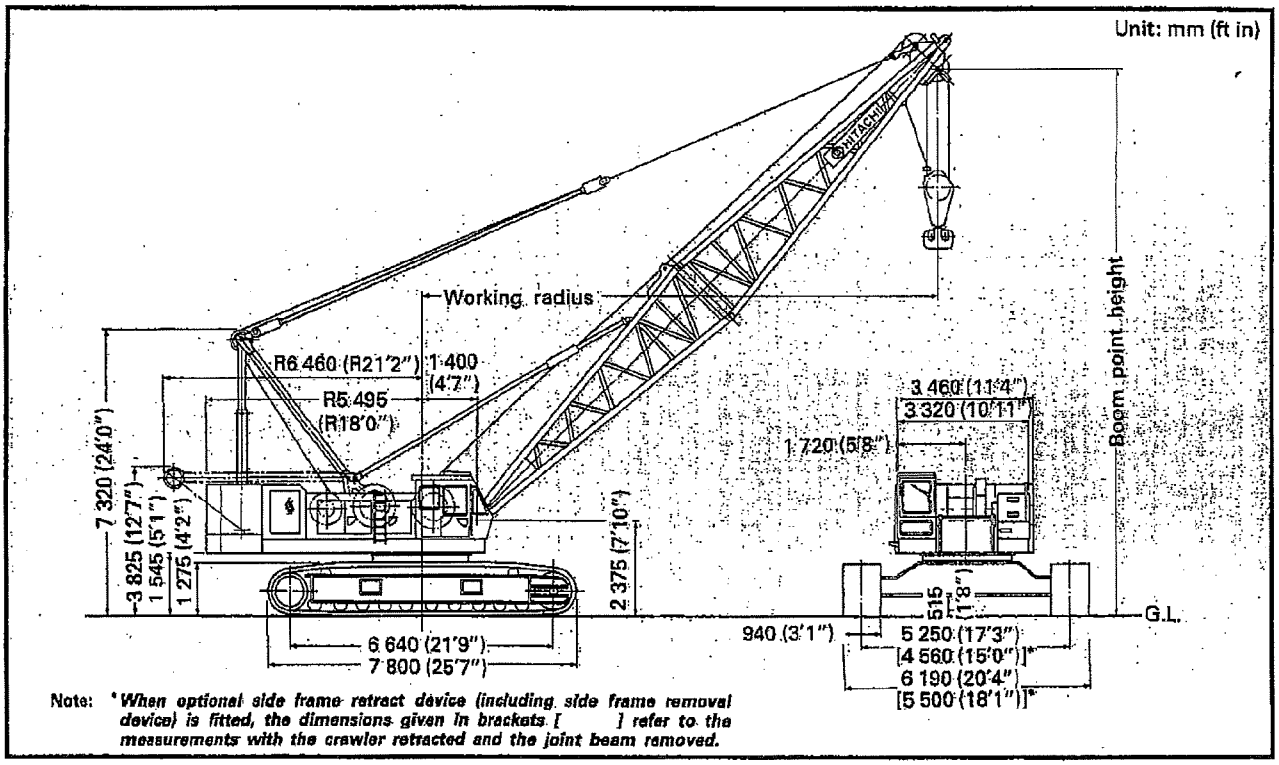
HITACHI

KH 500-3

100 Ton Crawler

Dimensions

Unit: mm (ft in)



Note: **When optional side frame retract device (including side frame removal device) is fitted, the dimensions given in brackets [ ] refer to the measurements with the crawler retracted and the joint beam removed.*

Specifications

Maximum rated load			100 000 kg (220 500 lb) at 5.5 m (18'1") working radius
Boom	Basic boom length		16.0 m (52'6")
	Max. boom length		73.0 m (239'6")
	Jib length		9.0 m (29'6") to 22.5 m (73'10")
	Max. boom with jib length		83.5 m (273'11") [61.0 m (200'2") + 22.5 m (73'10")]
Swing speed		High	0 to 2.3 min^{-1} (0 to 2.3 rpm)
		Low	0 to 1.4 mm^{-1} (0 to 1.4 rpm)
Travel speed*		High	0 to 1.3 km/h (0 to 0.81 mph)
		Low	0 to 0.9 km/h (0 to 0.56 mph)
Gradeability			17° (30%)
Ground pressure			0.77 bar (0.77 kgf/cm^2, 10.9 psi)
Operating weight	Equipped with basic boom, 100 000 kg (220 500 lb) capacity hook and 33 400 kg (73 600 lb) counterweight		103 000 kg (227 100 lb)
Engine	Model		ISUZU 6RB1T
	Rated horsepower		206 kW (280 PS) at 2 000 min^{-1} (2 000 rpm)

**Speeds may vary with load*

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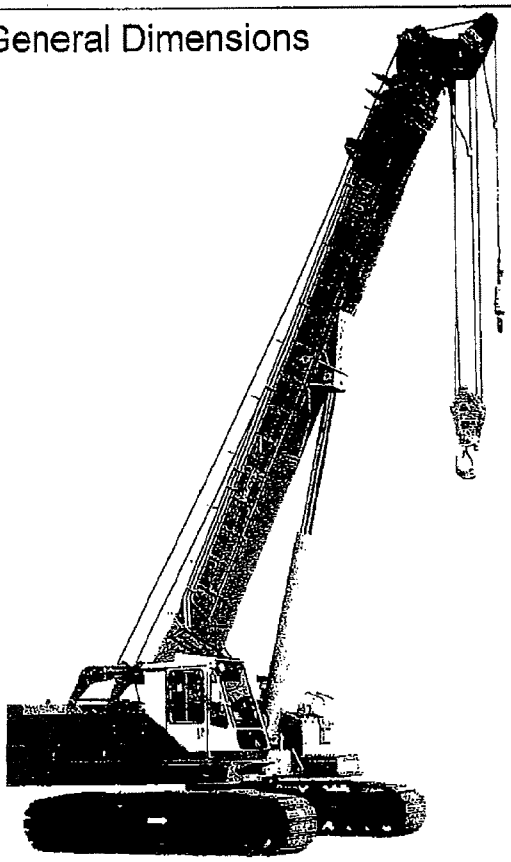
IHI

CCH 300T

30 Ton Telescopic Crawler

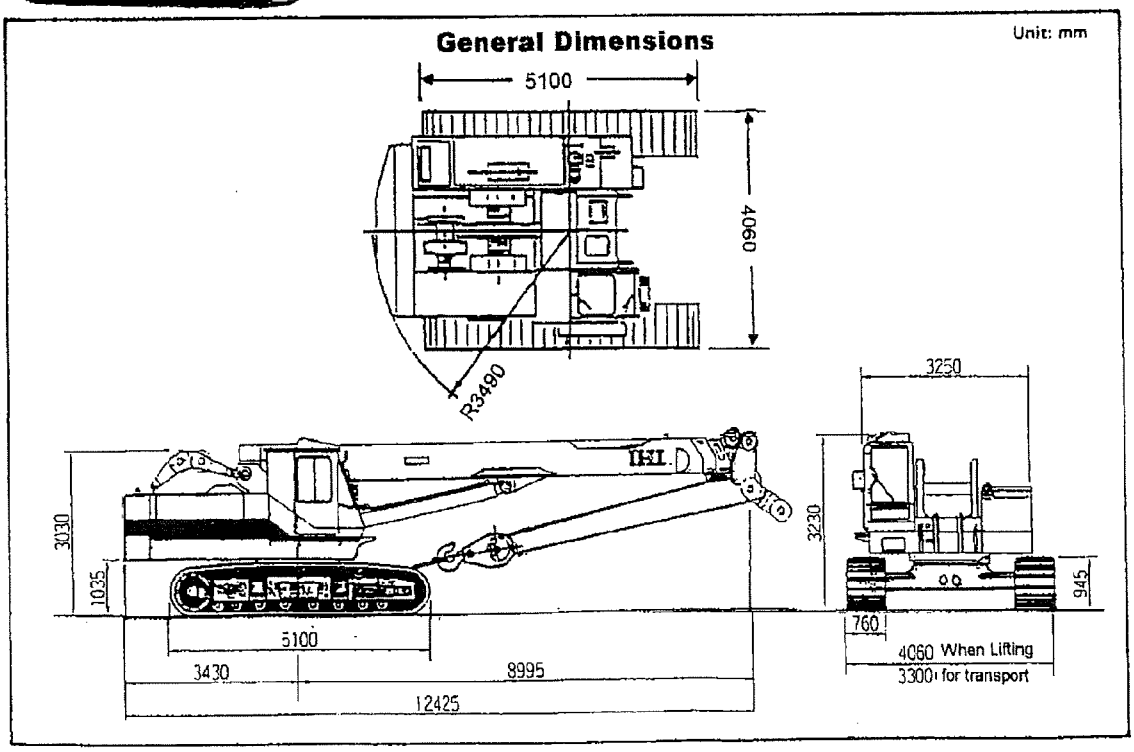
General Dimensions

Unit: mm



Utilizing advantages provided by the telescopic boom and crawler drive design with lift and move capability.

Designed for quick set up, general purpose lifting and heavy duty cycle foundation work.



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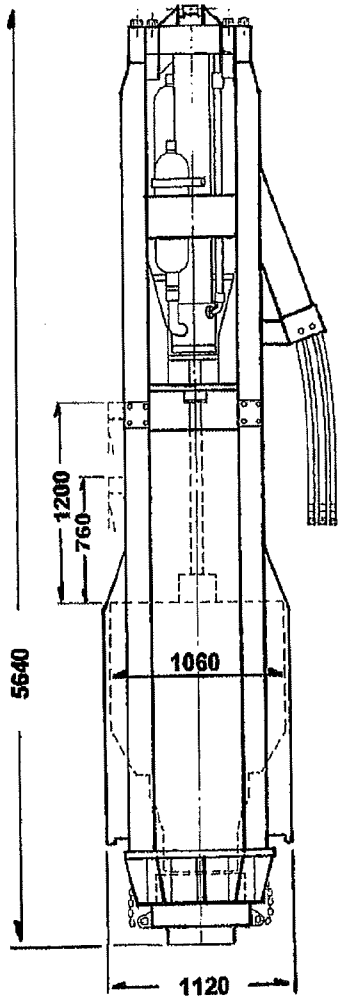
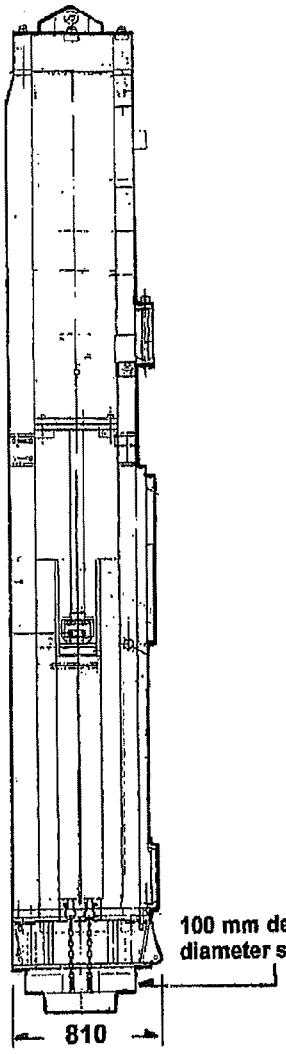
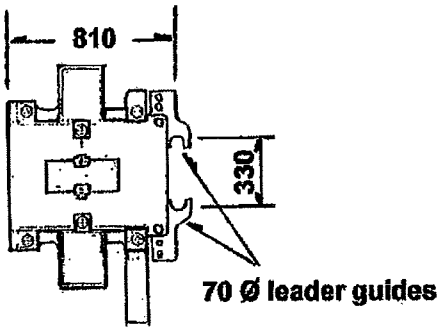
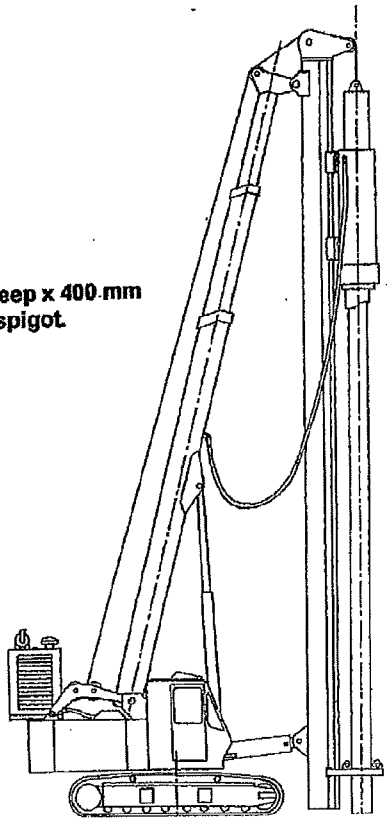
H3
Hydraulic Hammer





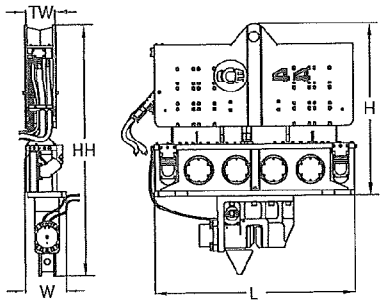




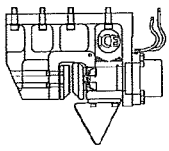
Ram weight	3000 kg
Cap & dolly weight	520 kg
Driving energy @ 1.2m max. stroke	3600 kgm
Blow rate @ max. driving stroke	46 bpm
Extracting force @ 0.76m max stroke	80 tonne
Min. tamping energy	450 kgm
Blow rate @ min. tamping	110 bpm
Weight of hammer	6100kg
Hose weight (full)	10 kg/m
Max. oil flow	180 l/min
Hydraulic pressure required	240 bar

ICE® Model 52B
Hydraulic Vibratory Driver/ Extractor with Model 595G Power Unit

Dimensions

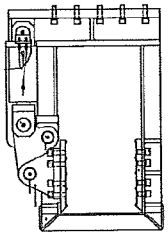


Clamps & Accessories



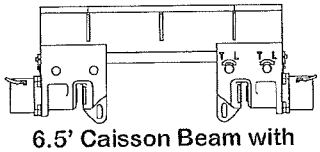
Model 140C Sheeting Clamp

Clamping force
140 tons, 1245 kN
Weight
2,200 lbs, 1000 kg



Model 85 Wood, Concrete & Pipe Clamp

Clamping force
85 tons, 756 kN
Weight
6,500 lbs, 2950 kg



6.5' Caisson Beam with Model 100BH Caisson Clamps

Clamping force
220 tons, 1975 kN
Weight
4,610 lbs, 2090 kg

Other Model 52B Accessories

- 12' Caisson beams
- 10' Clamp extension
- 90° Turning plate
- Bias weights
- 26" leads sled
- Low-headroom suppressor
- Vibrator stand
- Wireless remote

Model 52B Vibrator Specifications

Eccentric moment	51 kg-m
Maximum frequency	1800 vpm
Centrifugal force	1789 kN
Amplitude (free w/o clamp)	28 mm
Standard line pull for extracting	600 kN
Maximum line pull for extracting	900 kN
Weight (no clamp or hoses)	5650 kg
Non-vibrating weight	2070 kg
Height without clamp (H)	2135 mm
Length (L)	2485 mm
Width (W)	530 mm
Throat width (TW)	362 mm
Hydraulic hose length	46 m
Hydraulic hose weight	705 kg
Height with sheeting clamp* (HH)	3096 mm
Weight with sheeting clamp & 1/2 hoses*	7000 kg
Height with beam & caisson clamps* (HH)	2784 mm
Weight with beam & caisson clamps*	8090 kg

* See "Clamps and Accessories Manual" for in-depth description

Model 595G Power Unit Specifications

Engine	CAT C15
Power	444 kW
Operating speed	1800 rpm
Max. motors pressure	380 bar
Motors flow (no load)	600 lpm
Clamp pressure	310 bar
Clamp flow	21 lpm
Weight (w/ full fluid & 1/2 fuel)	7420 kg
Length	4040 mm
Width	1855 mm
Height	2540 mm
Hydraulic reservoir	1630 liters
Fuel capacity	570 liters

International Construction Equipment, Inc.
301 Warehouse Drive
Matthews, NC 28104 USA
888-ICE-USA1 / 704-821-8200
sales@iceusa.com / www.iceusa.com

Constant improvement and engineering progress make it necessary that ICE®, Inc reserve the right to make specification changes without notice. Please consult ICE® for the latest available information.

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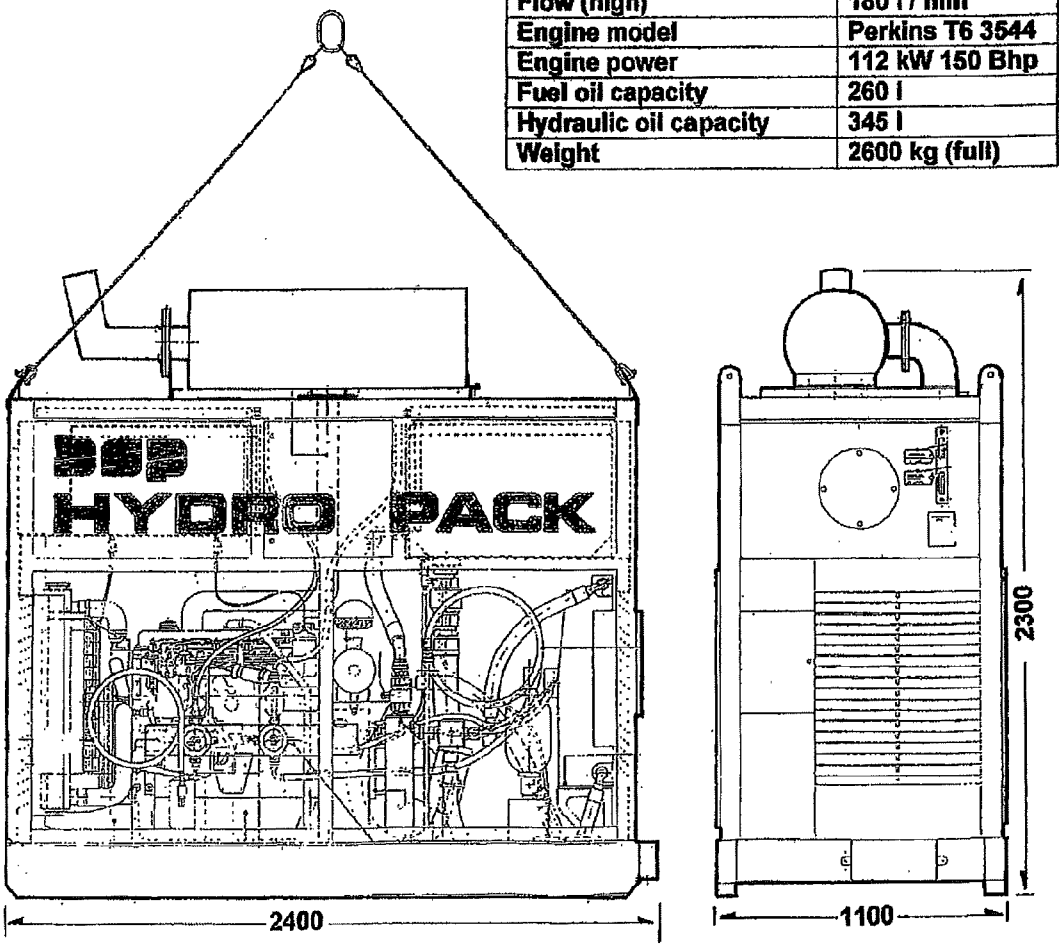
H3
Hydraulic Hammer

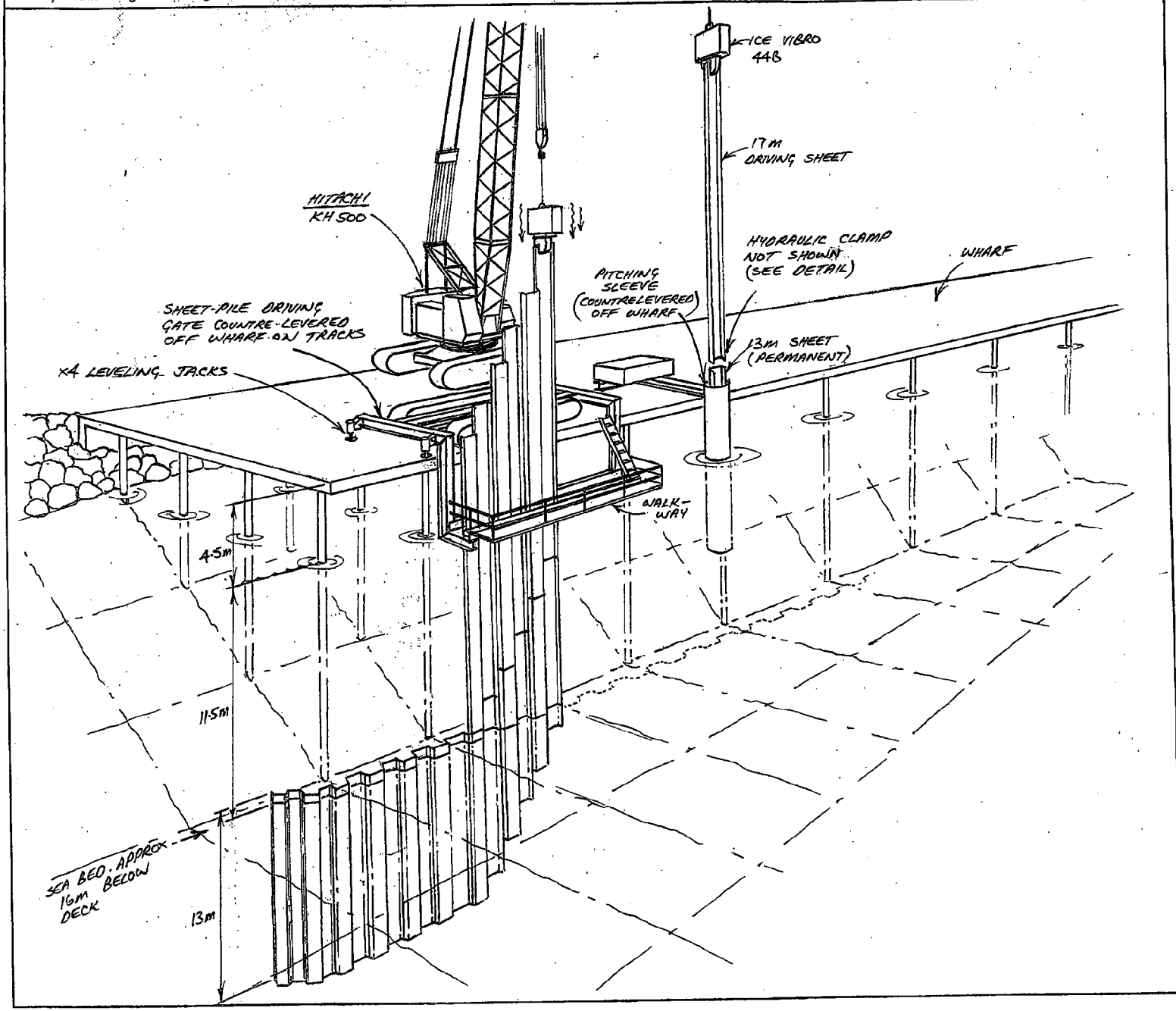
BSP H3 POWER PACK

Operating pressure (high)	240 bar
Flow (high)	180 l / min
Engine model	Perkins T6 3544
Engine power	112 kW 150 Bhp
Fuel oil capacity	260 l
Hydraulic oil capacity	345 l
Weight	2600 kg (full)



APPENDIX 2: CONSTRUCTION METHODOLOGY SCHEMATICS

Specialising in: Bridges & Marine Structures, Piling and Foundations, Concrete Construction, Heavy Haulage, Plant Hire, Cranage



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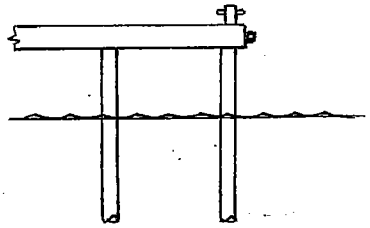
PORT CHALMERS
CONTAINER WHARF

INSTALATION METHOD OF 13m SHEET PILE WALL AT FOOT OF WHARF

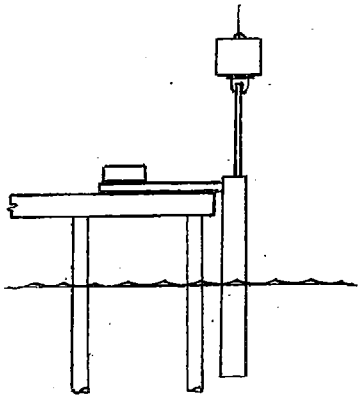
B1

DATE	16-3-15
SCALE	——
DRAWN	LUKE COOKE
JOB No.	PORT CHALMERS
PLAN No.	
SHEET	1 OF 2 SHEETS

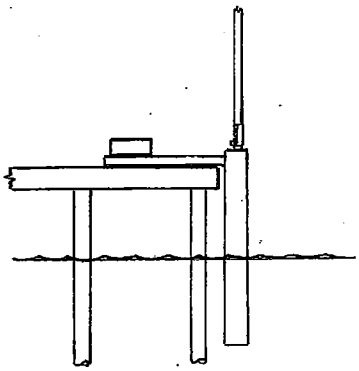
① - REMOVE BOLLARDS AND FENDERS
- POSITION DRIVING GATE AND PITCHING SLEEVE.



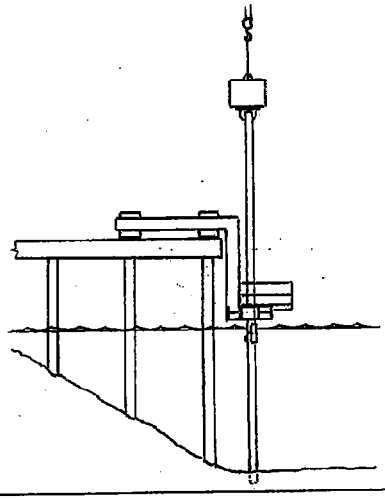
② PITCH 17m DRIVE EXTENSION SHEET INTO PITCHING SLEEVE. THEN CLAMP AND LIFT WITH VIBRO JAW ON HITACHI KH500.



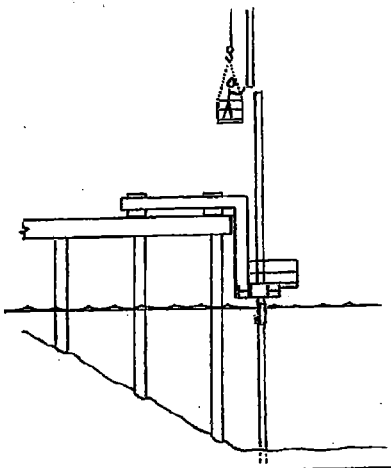
③ PITCH 13m SHEET INTO PITCHING SLEEVE WITH AUXILARY CRANE. THEN CLAMP AND LIFT WITH DRIVE SHEET CLAMP



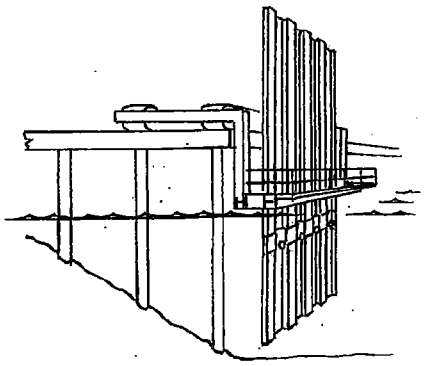
④ PITCH SHEET PILE THROUGH GATE INTO POSITION. VIBRO INTO APPROX 3 OR 4m



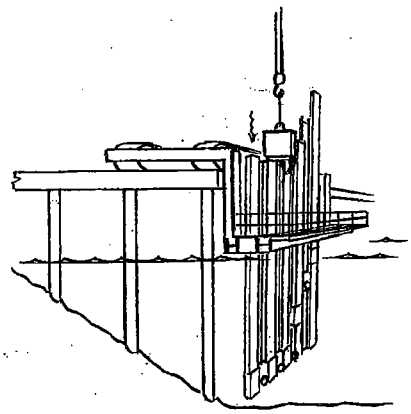
⑤ REPEAT STAGES ① AND ②. THEN GUIDE SHEET INTO CLASP OF PREVIOUS SHEET FROM MAN-CAGE OR ACCESS PLATFORM.



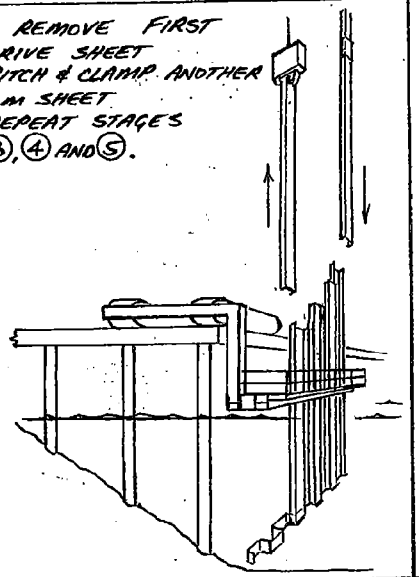
⑥ REPEAT PROCESS UNTIL 10 SHEETS ARE PITCH AND PARTIALLY DRIVEN



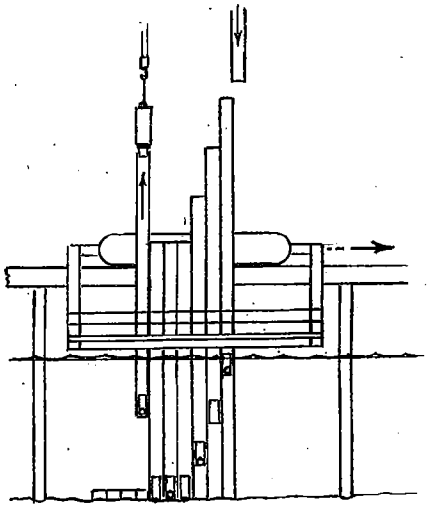
⑦ DRIVE FIRST 7 SHEETS TO FULL DEPTH IN STAGES. LEAVE LAST SHEET HIGH



⑧ REMOVE FIRST DRIVE SHEET
- PITCH & CLAMP ANOTHER 13m SHEET
- REPEAT STAGES ③, ④ AND ⑤.



⑨ REPOSITION GATE AS SHEET PILE PROGRESSES.



Specialising in: Piling and Foundations, Concrete Construction, Heavy Haulage, Plant Hire, Cranage

DATE	15-3-15
SCALE	——
DRAWN	LUKE COOKE
JOB No.	PORT CHALMERS
PLAN No.	PROCEDURE.
SHEET	OF SHEETS

PORT CHALMERS
CONTAINER WHARF
SHEET PILE INSTALLATION PROCEDURE.

DANIEL SMITH INDUSTRIES LTD
315 Flaxton Road
Rangiora, New Zealand
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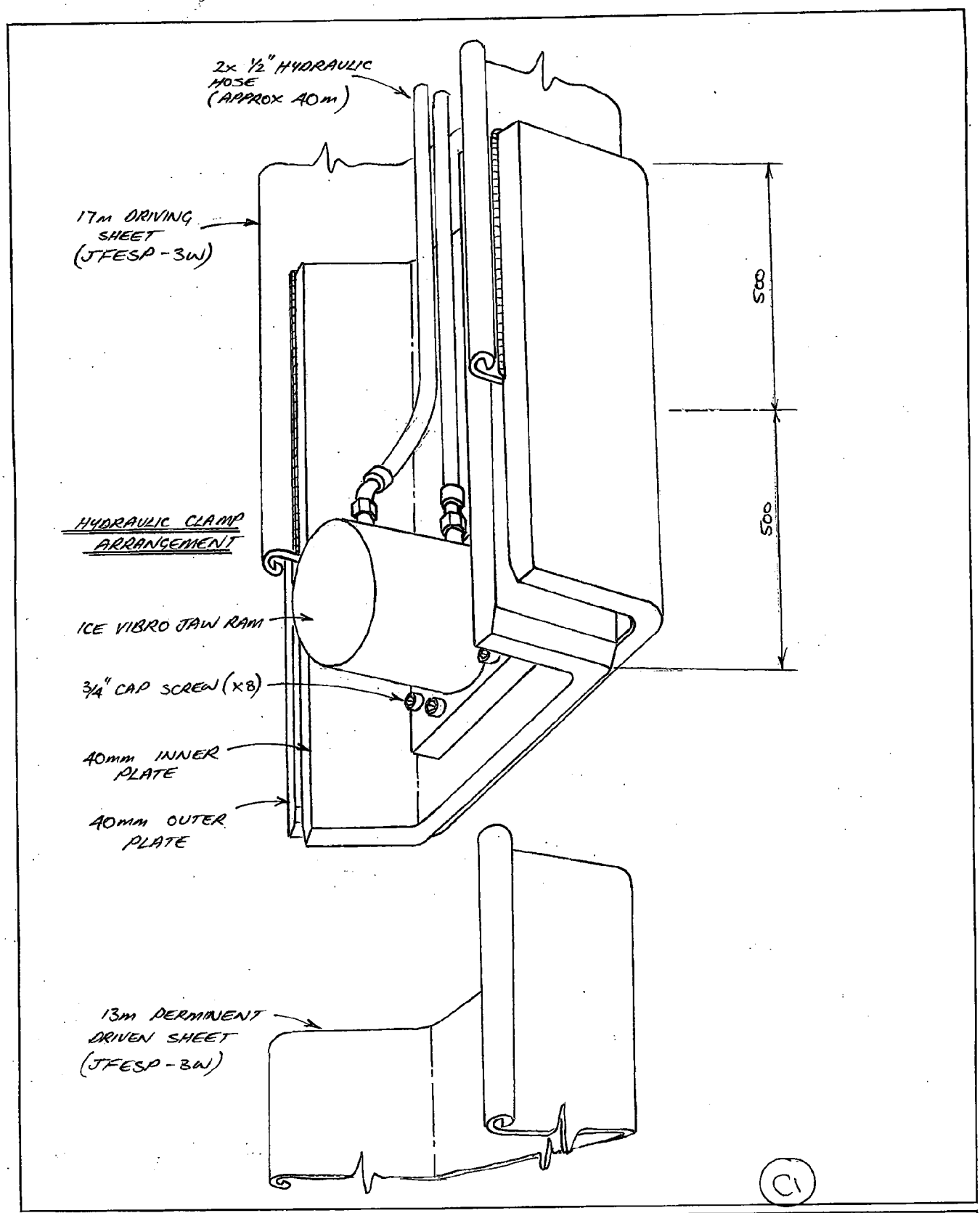
B2



C1

Specialising in: Piling and Foundations, Concrete Construction, Heavy Haulage, Plant Hire, Cranage

DATE	17-3-15
SCALE	—
DRAWN	LUKE COOKE
JOB No.	PORT CHALMERS
PLAN No.	
SHEET	2 OF 2 SHEETS

PORT CHALMERS
CONTAINER WHARF
HYDRAULIC CLAMP ARRANGEMENT ON 17M DRIVE EXTENSION SHEET

DANIEL SMITH INDUSTRIES LTD
315 Flaxton Road
Rangiora, New Zealand
Telephone: (03) 313 9902
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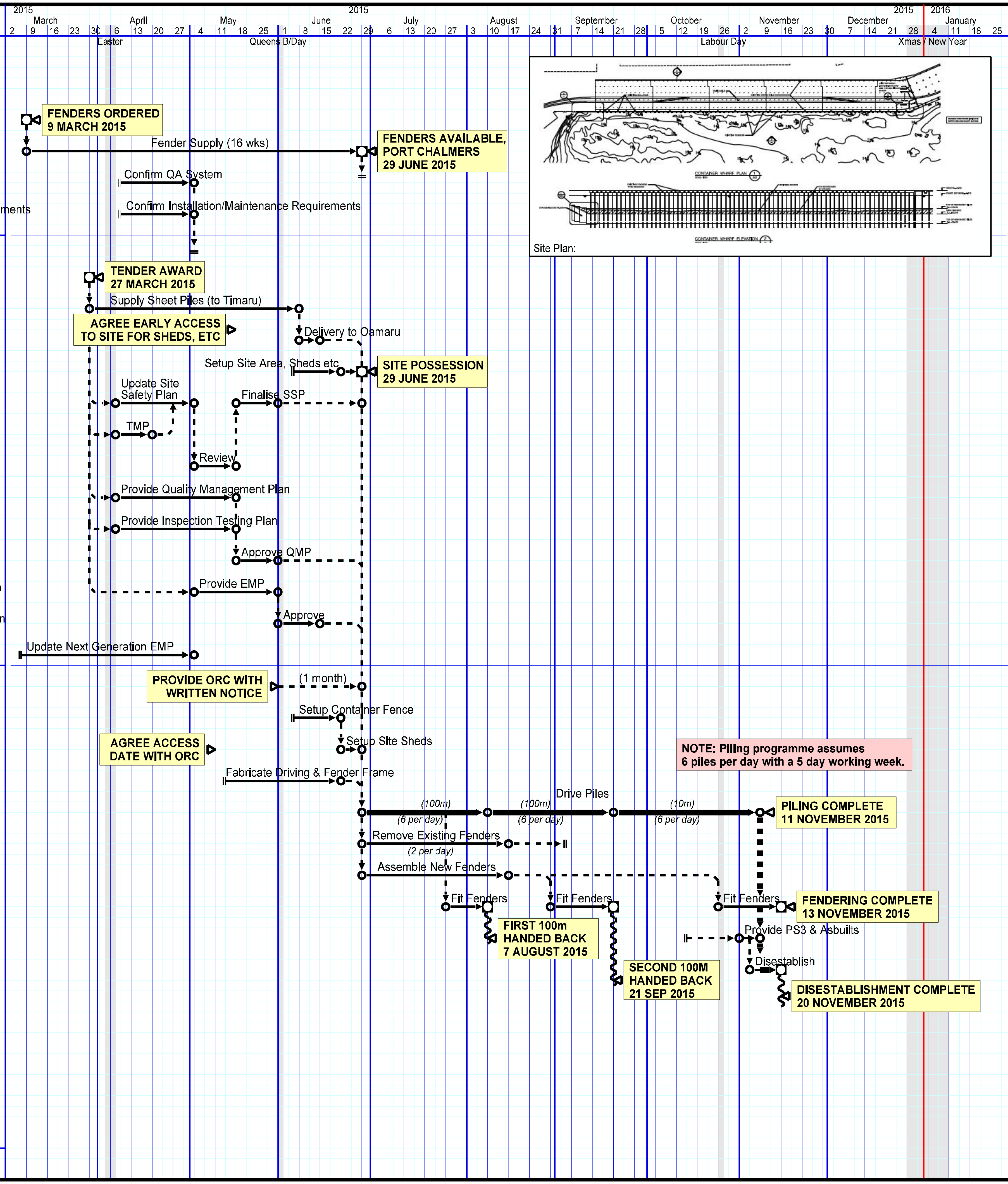
Mobile: 021 33 66 23
Email: daniel@danielsmith.co.nz
Web: www.danielsmithindustries.co.nz

APPENDIX 3: OCTA – CONSTRUCTION PROGRAM

Section	Responsibility	Activity
FENDER SUPPLY	PORT OTAGO	Supply Fenders
		Confirm QA System
		Confirm Installation/Maintenance Requirements
PRELIMINARY	PORT OTAGO	Tender Award
	DSI	Supply Sheet Piles (to Timaru)
		Delivery to Port Chalmers
		Setup Site Area, Sheds etc
		Update Site Safety Plan
		Provide Traffic Management Plan
	PORT OTAGO	Review SSP
	DSI	Provide Quality Management Plan
		Provide Inspection Testing Plan
	HADLEY & ROBINSON	Approve QMP
	PORT OTAGO / OSI	Provide Environmental Management Plan
	PORT OTAGO / ORC	Approve Environmental Management Plan
	PORT OTAGO	Update Next Generation EMP
CONSTRUCTION	PORT OTAGO	ORC Notice of Contract Starting
		Setup Container Fence
	DSI	Setup Site Sheds
		Fabricate Driving & Fender Frame
		Drive Piles
		Remove Existing Fenders
		Assemble New Fenders
		Fit Fenders
		Provide PS3 & Asbuilts
		Disestablish



Programme Format

Activity Description — Activity Starts Working Day — Activity Ends Working Day — Float — Milestone Event Symbol — Critical Path

means the same as

Indicates activity start time is established much earlier in the programme, but dummy has been ommitted for clarity

EST - Earliest Start Time
EFT - Earliest Finish Time
LST - Latest Start Time
LFT - Latest Finish Time

PORT OTAGO LIMITED

BERTH DEEPENING

Coordination Programme

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	Date: 01 Apr 2015
File No. 1764	Sheet No. CP03
File Ref. ...programmes/1764/cp03.dgn	Revision: