



## **Appendix 4-A: Methodology Statement for Pre-Lay Grapnel Runs**



## METHODOLOGY STATEMENT

Champlain Hudson Power Express  
Pre-Lay Grapnel Runs  
(Planned Burial Sections)  
(Lake Champlain Segment)

SUBMITTED TO:

**NKT HV CABLES AB.**

SUBMITTED BY:

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**DOCUMENT TITLE: Methodology Statement – Pre-Lay Grapnel Runs (Planned Burial Sections) (Lake Champlain Segment)**

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## List of Definitions

Definition	Description
Employer	CHPE, LLC. (Champlain Hudson Power Express, LLC.)
Contractor	NKT (Nordiske Kabel Traadfabriker)
Sub-Contractor	CMI (Caldwell Marine International)

## List of Terms and Abbreviations

Term	Definition
CHPE	Champlain Hudson Power Express
DGPS	Differential Global Positioning Systems
DoW	Depth of Water
DTG	De-trenching Grapnel
HASP	Health & Safety Plan
HSE	Health, Safety & Environment
ICPC	International Cable Protection Committee
LNM	Local Notice to Mariners
MCB	Mattress Crane Barge
MDR	Master Document Register
MOC	Management of Change
MP	Mile Post

<b>Term</b>	<b>Definition</b>
MWS	Marine Warranty Surveyor
OSHA	Occupational Safety & Health Administration
PFD	Personal Floatation Device
PLGR	Pre-Lay Grapnel Run
RPL	Route Position List
RT	Rough Terrain
SLD	Sea Level Datum
TBT	Tool Box Talk
VHF	Very High Frequency
WLL	Working Load Limit

## Reference Documents

<b>Document Title</b>	<b>Ref. [#]</b>	<b>NKT Doc. No.</b>	<b>CMI Doc. No.</b>
Health & Safety Plan for PLGR (Lake Champlain)	[1]	TBD	TBD
Daily Operations Report (DOR)	[2]	1AA0546185	007-01-0
Non-Conformance Report (NCR)	[3]	1AA0530273	009-01-1
ITP for PLGR (Lake Champlain)	[4]	1AA0546455	054-01-4
Personnel Transfer Procedure	[5]	1AA0545744	058-01-5
Survey Procedures – PLGR	[6]	1AA0622270	113-01-0

# 1 Introduction

## 1.1 Project Introduction

As part of the Champlain Hudson Power Express (CHPE) project, pre-lay grapnel runs of the planned burial sections of the Lake Champlain cable installation will be performed. The purpose of these runs are to remove surficial and shallow buried debris (jetsom, etc.) which might potentially impede the safe progress of the plow installation vehicle or pose risk to the installed cable project.

## 1.2 Purpose of Document

This document details the methodology to be used for the safe execution of the pre-lay grapnels run (PLGR) operations within the planned burial sections of the Lake Champlain cable installation route of the project.

This document is provided as a means and methods statement for pre-lay grapnel run (PLGR) operations that will be performed in the planned burial sections of the Lake Champlain cable installation route; no other methodology topics are addressed herein. The procedural guidelines set forth in this document will be closely followed when performing PLGR works in support of the CHPE Project. All work shall be performed in a safe and expedient manner.

## 1.3 Regulatory Compliance / Notifications / Liaison

- Local Notice to Mariners (LNM) will be issued prior to the start of the marine field operations. Daily work location, minimum passing clearance request and all other relevant information will be broadcast via marine VHF radio.
- Hours of operations as per DPS Commission's Order of Approval.
  - Operations are planned for typical daytime extended construction hours (12-hr shifts)
  - No night work is planned.
- CMI vessels will be properly registered, operational personnel will be properly trained and certified to perform their required tasks.
- CMI equipment will be tested prior to usage to ensure fitness for purpose.
- All rigging shall be certified and will be inspected prior to each use. Items that are found to have defects will be removed from service.
- All documents as indicated by the Master Document Register (MDR), methods statements etc. will be available in their latest approved revision on the Mattress Crane Barge (MCB).
- Copies of Project Permits will be available for reference aboard the MCB.
- Commercial passes will be procured for all Tugs, Barges and chartered vessels that will transit through the Champlain Canal.
- Courtesy notifications will be provided to emergency services and law enforcement that are local to project operational sites (if any).
- Daily Reports will be provided detailing pertinent events and operational progress [2].

## 2 Scope of Work

### 2.1 Pre-lay Grapnel Runs – Lake Champlain Segment

The purpose of Pre-lay grapnel runs (PLGR) is to remove surficial and shallow buried debris (jetsom, etc.) which might potentially impede the safe progress of the plow installation vehicle or pose risk to installed cable product. PLGR runs will only be performed in the planned burial sections of the Lake Champlain Route.

The International Cable Protection Committee (ICPC) recommends that PLGR operations be performed just prior to cable installation operation as this timing minimizes the risk of further route contamination in the interim period between completion of PLGR and commencement of lay.

In consideration of ICPC recommendations and standard industry practice CMI will perform PLGR operations in the permitted windows (North Lake / South Lake) of the installation season, shortly in advance of lay operations. Grapnel run planning is provided in **Table 2-1** below:

PLGR OPERATIONAL AREA	ROUTE MILE POST REFERENCES	PLGR RUN PLANNING	TOTAL PLGR LENGTHS
Lake Champlain (North) – Jet Plow operational section (DoW ≤ 150ft referenced to 93.0ft NGVD29)	<ul style="list-style-type: none"> <li>• MP0.0 – ~MP21.3</li> <li>• ~MP66 -~MP73</li> </ul>	<ul style="list-style-type: none"> <li>• 1 X Centerline pass</li> <li>• 2 x wing line passes each offset 75ft (~23m) from centerline</li> </ul>	~84.9 Statute Miles (~137km)
Lake Champlain (South) – Shear Plow operational section (DoW ≤ 150ft referenced to 93.0ft NGVD29)	<ul style="list-style-type: none"> <li>• ~MP73 – ~MP96.5</li> </ul>	<ul style="list-style-type: none"> <li>• 1 X Centerline pass</li> <li>• 2 x wing line passes each offset 75ft (~23m) from centerline</li> </ul>	~70.5 Statute Miles (~113km)
<b>COMBINED LENGTH OF PLANNED PLGR RUNS</b>			<b>~155.4 Statute Miles (~250km)</b>

**Table 2-1 - PLGR Planning for Lake Champlain Route**

**Note:** PLGR wing line passes may be restricted to the limits of NY/VT Border, water depths ≤ 10’ and exclusion zone areas of existing infrastructure such as bridge abutments, sewer outfalls and water intakes.



## 2.2 Grapnel Train Componentry

CMI will select grapnel componentry and rig / deploy 'grapnel trains' that best suit the prevailing water depth and anticipated local Lakebed conditions. Grapnel componentry will be connected using rated shackles. Photos of typical grapnel types that may be used are shown below:



*Figure 1 - Gifford Grapnel*



*Figure 2 - Rennie Grapnel*



**Figure 3 - Sliding Long Prong Grapnel**



**Figure 4- De-trenching Grapnel (DTG)**

**NOTE:** DTG's may provide Lakebed penetration of up to 3ft and can be employed if required to clear non-surficial debris

# TYPICAL GRAPNEL TRAIN

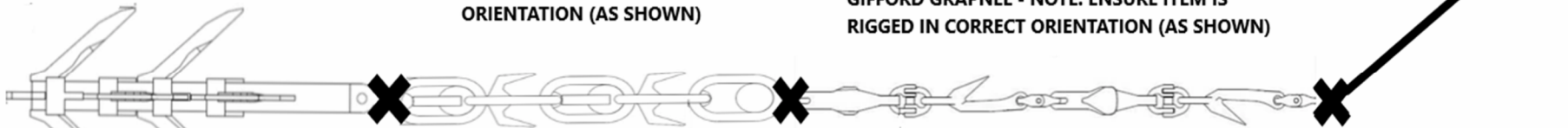
*NOTE: Grapnel componentry and order of placement in train are subject to change in accordance with lakebed / riverbed / seabed conditions*

TOW WIRE - MINIMUM DIAMETER OF 1.125 INCHES

SLIDING LONG PRONG GRAPNEL - NOTE: ENSURE ITEM IS RIGGED IN CORRECT ORIENTATION (AS SHOWN)

RENNIE GRAPNEL - NOTE: ENSURE ITEM IS RIGGED IN CORRECT ORIENTATION (AS SHOWN)

GIFFORD GRAPNEL - NOTE: ENSURE ITEM IS RIGGED IN CORRECT ORIENTATION (AS SHOWN)



RIGGING CONNECTOR WITH MINIMUM WLL RATING OF 25 TONS



SHACKLES TO BE RIGGED WITH BOW LEADING FORWARD

OR



RIGGING CONNECTOR WITH MINIMUM WLL RATING OF 25 TONS



SHACKLES TO BE RIGGED WITH BOW LEADING FORWARD

OR



RIGGING CONNECTOR WITH MINIMUM WLL RATING OF 25 TONS



SHACKLES TO BE RIGGED WITH BOW LEADING FORWARD

OR



Figure 5 - Typical Grapnel Train Configuration

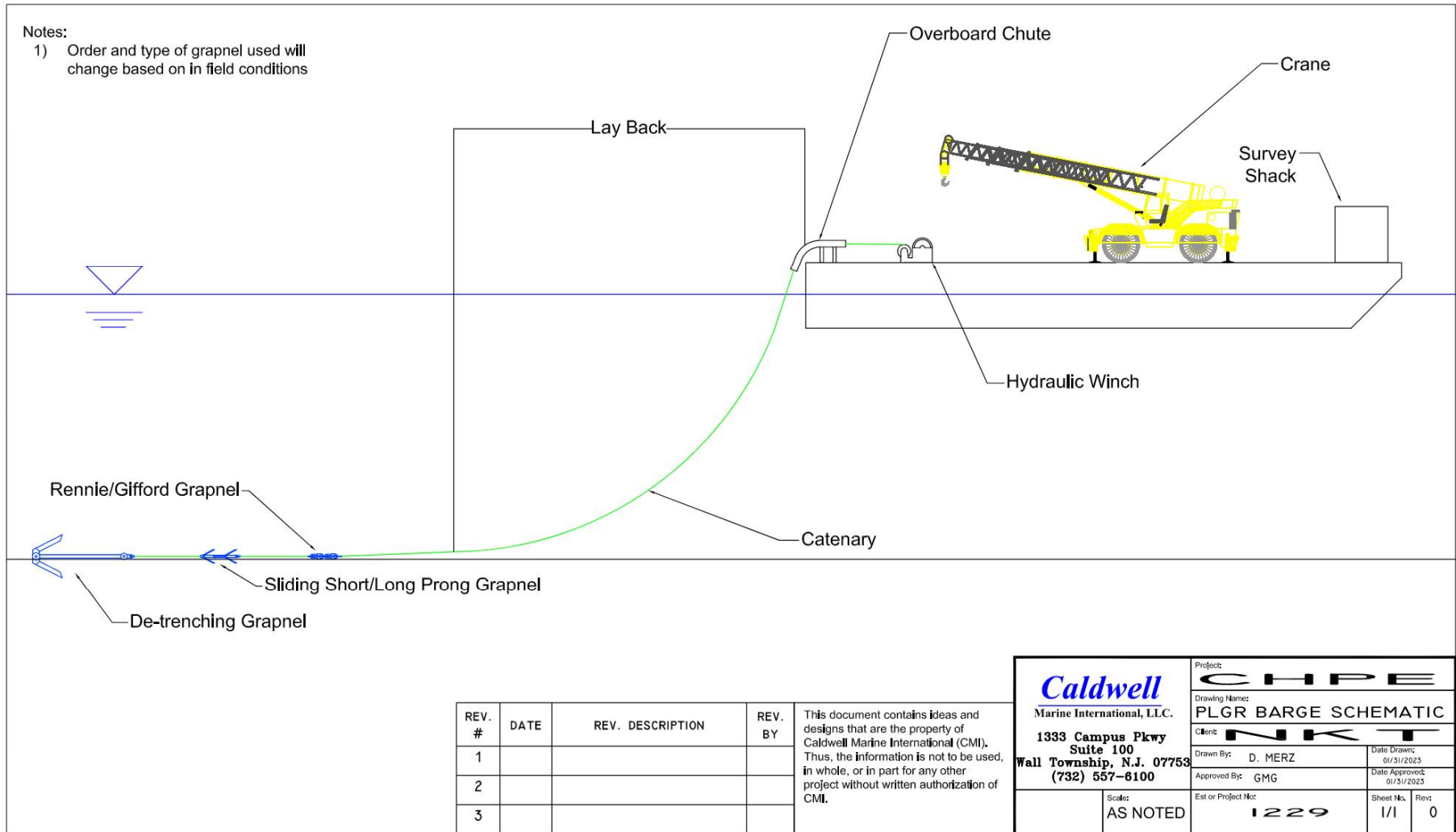


Figure 6 - PLGR Vessel Schematic (provisional)

### 3 Project Mobilization

#### 3.1 Marine Assets

A barge will be mobilized to use as the PLGR operational vessel. The barge will be outfitted with crane, survey office, grapnels, winches, cranes and other equipment necessary to perform this work. The PLGR Barge will be transported by the “Gavin” Tug (or similar vessel may be substituted) along the proposed cable route and wing lines. One (1) “Alexis” crew boat or similar, will be utilized for personnel transport & transfer. Support workboats (1-3) may also be utilized to support various aspects of the PLGR operation. Refer to **Appendix 1** for vessel specifications. The existing suite of equipment will be supplemented as required with PLGR ‘task specific’ items at Wilcox Dock Yard. All relevant documentation such as permits and manuals, will be onboard.

#### 3.2 Land Assets

CMI has selected Wilcox Dock, Plattsburgh, New York as an operational base. This facility has been used as a base for previous Lake Champlain projects.

Equipment will be mobilized to Wilcox Dock in the early phases of the CHPE Project. This location will serve multiple support functions including:

- Mobilization of & support of operational vessels for Utility Crossing Protection
- Personnel transfer staging point (primary)

**NOTE:** Other locations will be used when transit distance to / from Wilcox Dock is deemed excessive

- Emergency personnel transfer point.

**NOTE:** The Project HASP will identify other locations for use when transit distance to Wilcox Dock is deemed excessive

- Exchange / clean-out service point for sanitation equipment (Portable toilets etc.)

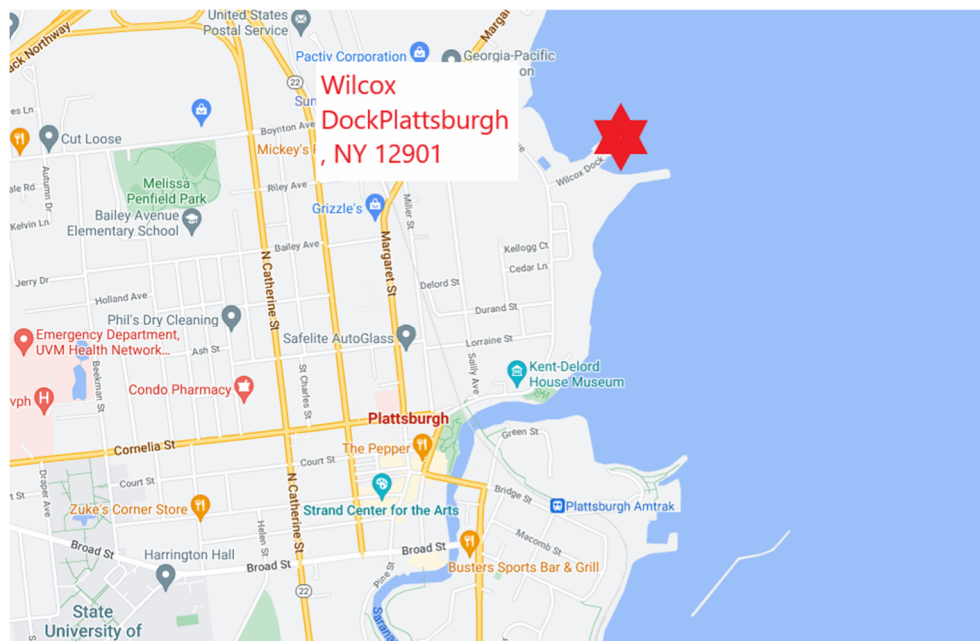


Figure 7 - Wilcox Dock, Plattsburgh, NY

## 4 Operation Methodology

In order to perform the safe and effective operation of pre-lay grapnel runs, the following methodology has been considered.

Exclusion zones will be inputted into CMI navigational system prior to commencement of this task. Exclusion zones are normally defined by reference to positions of 'sensitive features' (existing utilities, cultural resources, shallow water depths, NY/VT border, etc.). Minimum operational offset distances are typically provided by (a) permit (b) crossing agreement. If no offset distance is provided, CMI to use a 50' as minimum offset distance.

PLGR operations will be performed within ~100 ft. ("plow up") of known utility crossings, as provided by TDI Utility Crossing List, and will recommence ~100 ft. after known utility crossings ("plow down"). **NOTE: PLGR run activities that are conducted in the general vicinity of existing utilities must commence at the exclusion limit and work AWAY from subject utility, NOT TOWARDS.**

During all grapnel runs a surveyor will be monitoring position, speed, and tension in the tow wire. A dynamometer will record the tension of the tow wire. Alarms will be set for high tension and monitored both in the survey suite and on deck. CMI will closely observe tensions during the early stages of PLGR runs and based on observed tensions will select an appropriate percentage increase (typically ~20%) to trigger alarm activation. **NOTE: Tension trend provides a far more reliable indication of grapnel entanglement; this phenomenon is best identified by vigilant observation.**

When tension limits are reached, survey will notify barge super to begin grapnel recovery operations. The grapnels will be recovered and checked at regular intervals.

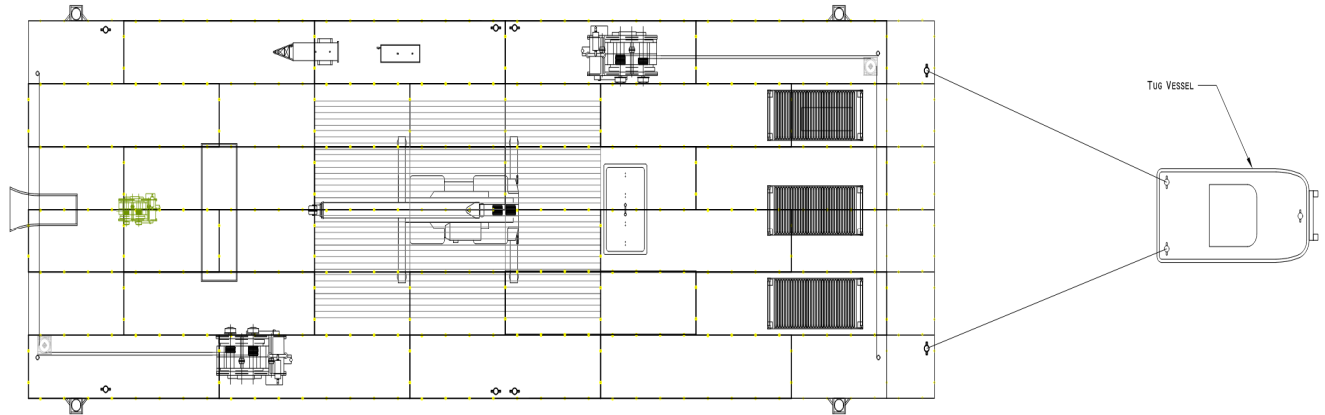
If the dynamometer display shows a spike and/or steady rise in tension, the vessel will stop movement and maintain tension on the tow line. The barge will then move back toward the grapnel, while recovering towline slack. Once the grapnel train is brought to the surface, the location and descriptions of the obstruction will be recorded and removal operations will proceed. Obstructions that may be witnessed may include natural debris such as logs, branches, derelict marine vessels, abandoned wires (power/communication/mechanical), etc.

Once the debris is removed the grapnel train will be re-deployed and its position and events recorded, resume the grapnel run. This operation will be repeated at two times at 75' offset of the proposed alignment.

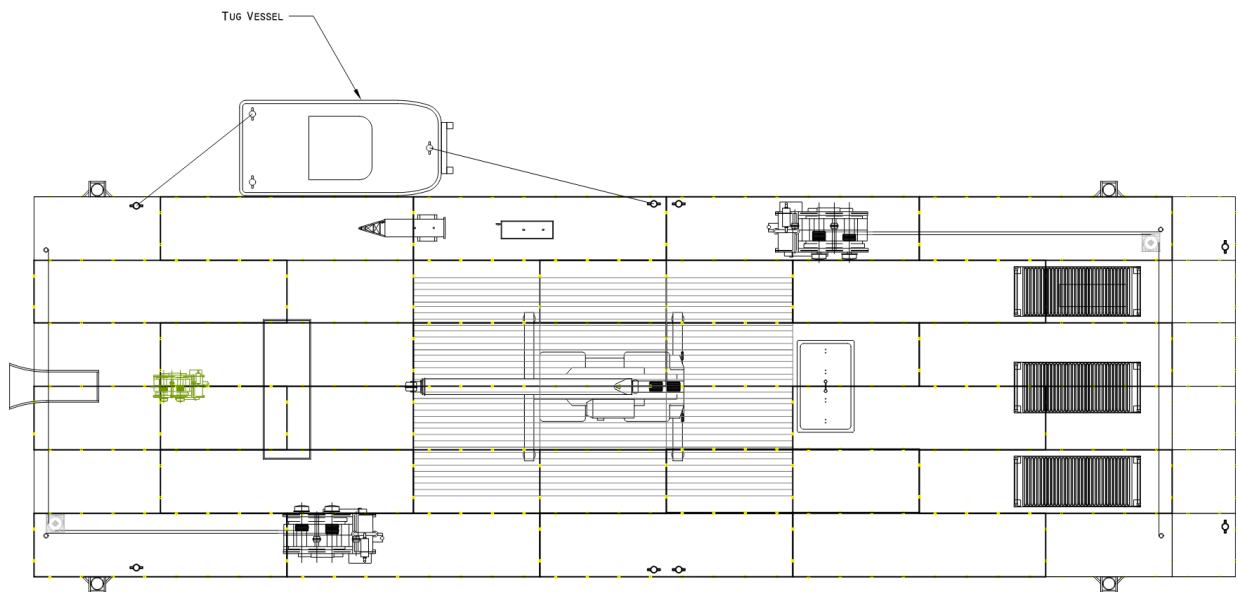
If no tension rise trend has been detected grapnels will be regularly recovered for inspection on a regular basis, typically every ~1.25 miles (~2km).

#### 4.1 Barge Movements

The PLGR Barge will be transported along the route via the “Gavin” or similar lake approved tug vessels. To achieve this the tug may tow **Figure 8** or “Hip-up” **Figure 9** to the barge to maintain barge heading. It will be under the discretion of the Tug Captain and barge superintendent to dictate Barge/Tug configuration. Factors to be considered is Route Alignment, Navigational Restrictions (shallow water, existing structures) and environmental conditions.



**Figure 8 – Tug to Barge in Tow**



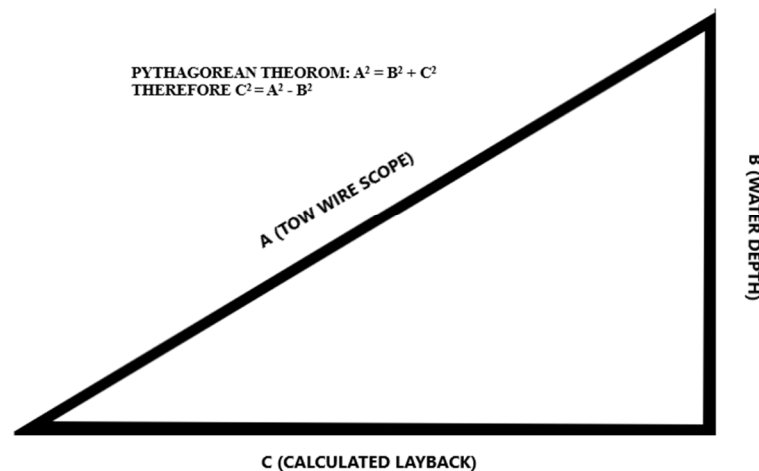
**Figure 9 – Tug to Barge in “Hip-up” Position**

## 4.2 Grapnel Deployment

The grapnel train will be constructed on the back deck of the PLGR barge. Once configured it will be attached to the deck winch and overboard the stern. It will travel in controlled descent to the lake bottom. Upon touch grapnel down the barge will progress ahead while the winch pays out to achieve appropriate tow wire scope.

CMI's deployed length for the grapnel tow wire will be dictated by:

- (a) reference to industry tables
- (b) review of anticipated site conditions & operational equipment
- (c) field observation of grapnel behavior – payout may be extended if rig is perceived to be jumping on lakebed
- (d) regular recovery and inspection of grapnels – extent of 'shiny' metal provides indication of grapnel penetration.



**Figure 10 – Spreadsheet Calculation of Grapnel Layback Distance**

After the grapnel train has been deployed, the barge spread will move ahead forward slowly (<1 knot) via anchors and/or tug motivation, until the required lay back distance for the expected depth is achieved. The sample of lay back distance chart is calculated via **Figure 10** above. As the barge continues to move, the lay back tow scope will be adjusted in accordance with the depth of water. Once designated layback distance is achieved, the barge will make efforts to maintain an average speed of ~1 knot.

## 4.3 Tracking of Lead Grapnel Position

For tracking of grapnels, a reverse heading azimuth in conjunction with a calculated layback distance (derived from payout & water depth). Navigation software will track the position of the lead grapnel by combined use of:

- a. Tow wire azimuth - derived by mathematical reversal of barge 'True' heading
- b. User input of lead grapnel layback distance– provided by reference to 'Grapnel Payout & Layback Spreadsheet'

**NOTE:** 'Grapnel Payout & Layback Spreadsheet' - See **Appendix 2** - employs Pythagorean Theorem to derive layback distance values for a range of water depths and tow wire scopes.



The CMI Survey Team will reference spreadsheet layback values to input an initial layback value into software at the start of each PLGR run. The duty surveyor will closely monitor changes in bathymetry throughout each run, and will:

- Direct the winch operator to adjust tow wire scope to suit the current water depth.
- Update the grapnel layback distance value in tracking software to reflect the revised water depth / wire scope parameters.

Scope values provided by the spreadsheet are considered to be a 'guideline', especially in shallow water areas.

During all grapnel drives the following parameters will be logged against 'local time':

- Barge position – per DGPS
- Barge heading – per Hemisphere Compass
- Barge speed – per DGPS
- Lead grapnel position (calculated)
- Towline tension – per feed from calibrated dynamometer
- Significant operational events – manual typed input into survey computers
- Nature and volume of recovered materials per reporting from working deck – manual typed input into survey computers

#### 4.4 Grapnel Recovery (Scheduled/Per Demand)

During grapnel runs, debris and obstructions may be encountered. These items will be recorded for location found, description and remedial measures (removed/relocated/etc.). When an obstruction is encountered, it will be recovered to the barge. The winch will bring in the tow line and grapnel train to the surface. Upon visual inspection of the debris, it will be decided to continue retrieving the grapnel train via winch and/or to rig the debris and employ the crane to assist in the debris recovery. The debris will be secured to the deck (as required) and removed from the grapnel train. In the event tension spike is observed, and recovery of the grapnel train to the surface yields no debris or obstruction, a diver and/or ROV may be employed to investigate and confirm obstruction. If required, the diver will rig the obstruction to the deck crane for removal from the proposed submarine cable alignment.

Grapnel recovery will be performed:

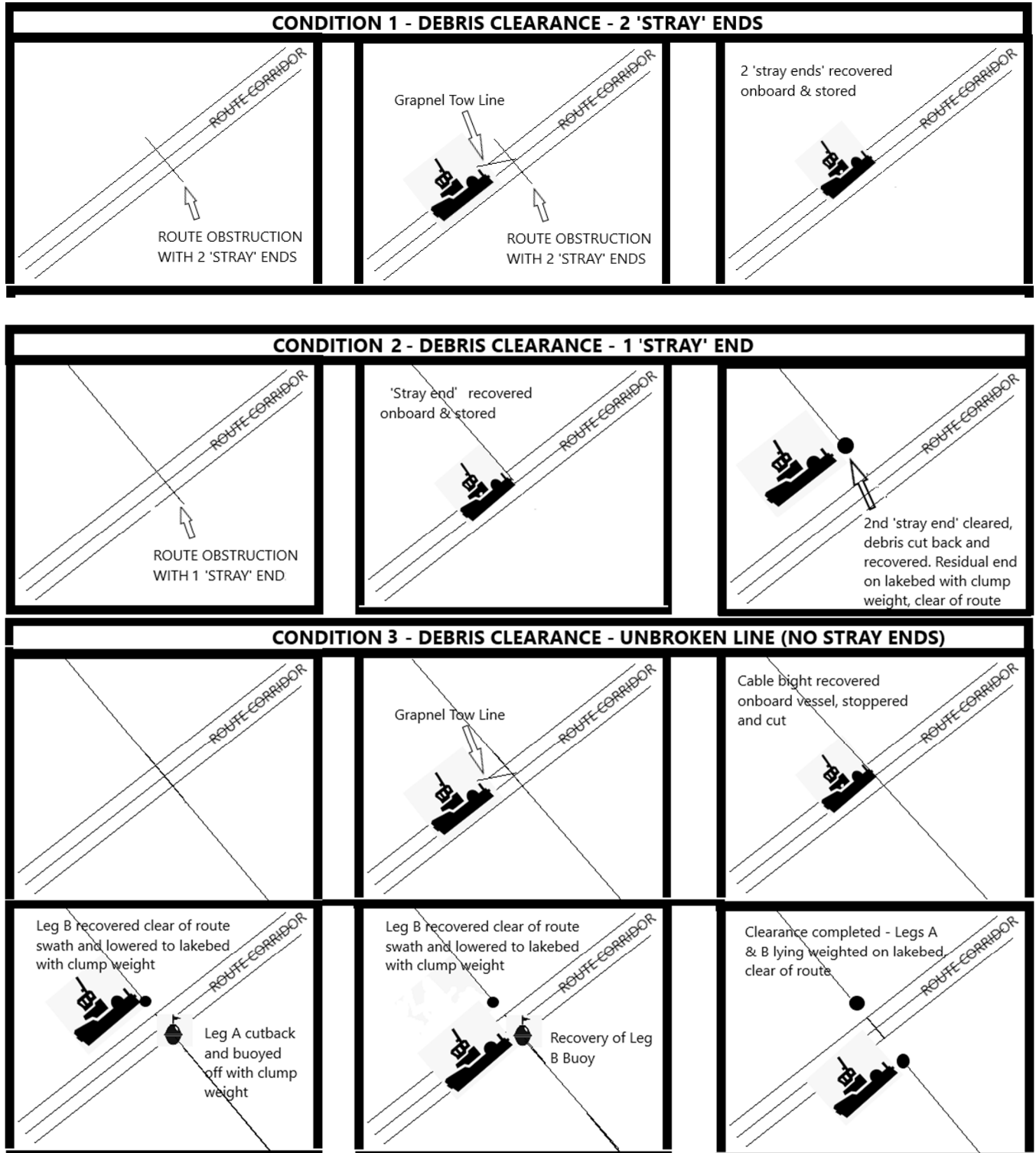
1. **On a regular scheduled basis:** In the absence of (a) anomalous grapnel behavior or (b) a clear, rising trend in tow wire tension, CMI will recover grapnels for inspection at route distance intervals of ~1.25 miles (~2km). Recovered gear will be inspected for the following:
  - General condition of towed array including rigging connections
  - Lakebed material type (if evident) – Deck crew will report observations for recording in project log.
  - Estimated lakebed penetration by grapnel gear. NOTE: Lakebed penetration estimates will be determined by extent of 'polished area' on grapnels where surficial oxidation has been abraded by contact with lakebed material
2. **On demand:** Grapnel recovery will be conducted if the tow wire tension should suddenly 'spike' or if it indicates a steady rise in tension.

The grapnel train will be visually observed from a safe vantage point when it is close to the surface to ascertain the type of entanglement and the best means of clearing it. Once the debris is removed the grapnel train will be re-deployed and its position and events recorded, resume the grapnel run. The recovered debris will be secured to the barge and disposed of in truckable containers or similar at Wilcox Dock as construction waste by a local qualified waste management contractor.

In the event than an unidentified cable crossing perpendicular to the route is discovered and found to obstruct the PLGR, the grappled cable will be slowly returned to the lakebed. The noted location shall be cross-referenced with finalized crossing agreements prior to any action being taken. If the grappled cable is confirmed to be not included with those identified in the finalized crossing agreements, the PLGR will be halted at this location pending further direction from CHPE, LLC. If further time for direction is required, the grappled cable location can be marked with a clump weight and buoy for further action once a resolution is obtained and direction provided by CHPE, LLC. Clump weight position will be recorded for project files. The grapnel train will then be re-deployed and PLGR operations will resume.

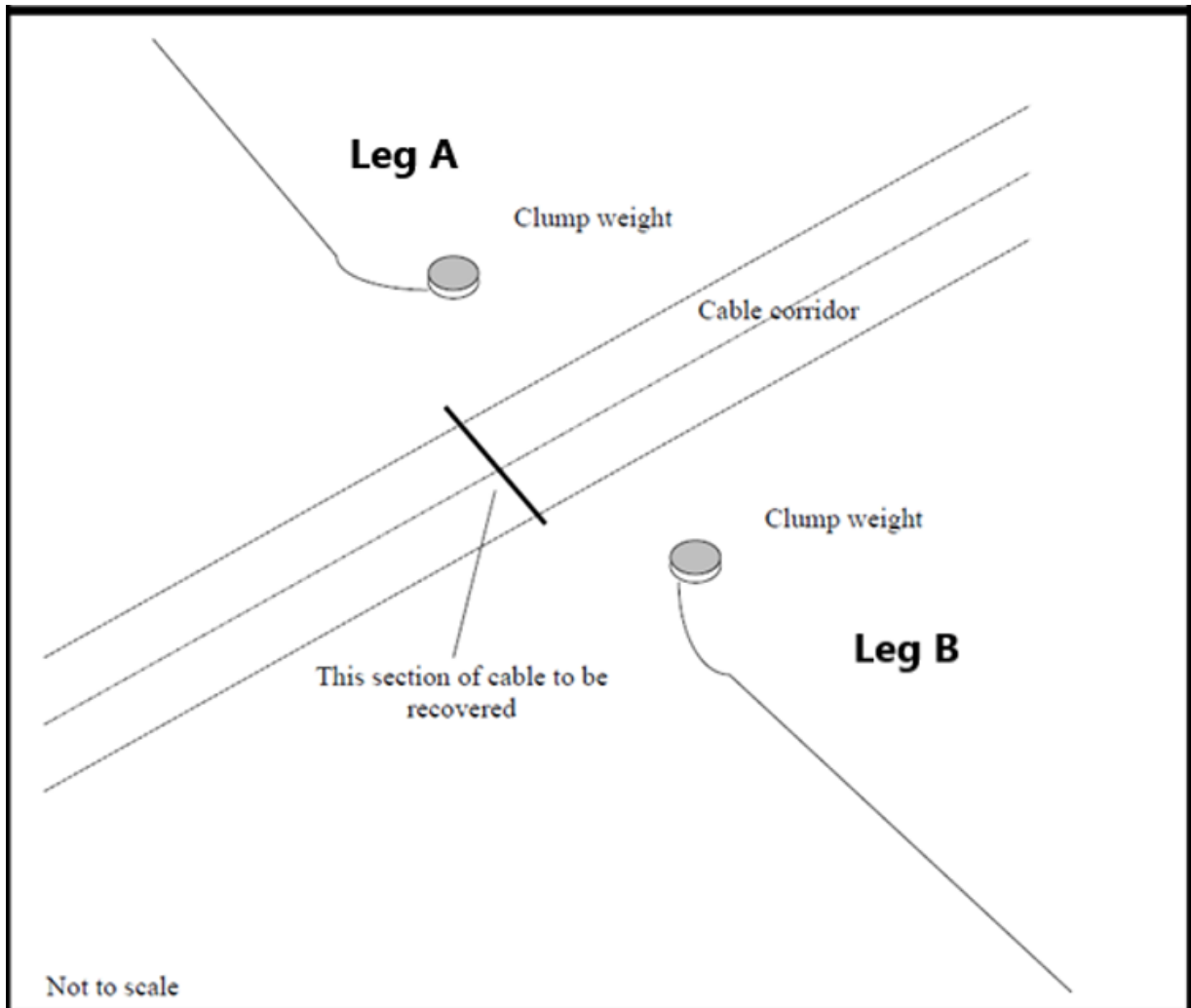
Any actions to be taken should hazardous items or items that could be deemed to be "artifacts of historic interest" be recovered by the grapnel to the vessel would be at the direction of Client Representative. Notification will be made of any "hazards" or "artifacts of historic interest" findings and operational activities paused at this location until direction on how to proceed is given. Daily reports will be used to record all pertinent details of PLGR operation including locations where debris recovered, photos, and description of debris recovered (i.e. hazardous or artifacts of historic interest). Notifications to authorities for any potentially significant recovered items will be done via CHPE.

Illustrative storyboards for three conditions of debris clearance involving cases of wire/cable entanglement are provided as **Figure 11** below:



**Figure 11 - Storyboard - Debris Clearance**

A modified illustration from ICPC Recommendation #1 for treatment of cable ends when recovering sections of out-of-service cables for pipeline or cable crossing is provided as **Figure 12** below.



**Figure 12 – Modified Illustration from ICPC Recommendation**

#### **4.5 Accidental Loss of Grapnel**

Loss of grapnels is a rare occurrence. The following measures shall be employed to mitigate the risk of grapnel equipment loss:

- Grapnel run speed will be kept to a safe minimum
- Tow tensions and grapnel behavior will be closely monitored
- Grapnel train design will incorporate suitably rated rigging and fasteners. Shackle pins will be 'moused'
- Rigging and fasteners which will be regularly inspected for damage, and replaced as required
- A spare set of grapnels will be carried

Loss of grapnel will typically be characterized by a sudden loss of tow tension. In the event of suspected equipment loss:

- The tow wire will be recovered to determine if the grapnel train has in fact been lost.
- If grapnels have been 'lost' the crew will review site conditions to ascertain the best recovery methodology.

## 5 Lake Weather Conditions / Operational Weather Limits

### Lake Weather Conditions

The following meteorological factors apply to Lake Champlain waters:

Location:	Lake waters are categorized as 'inland'. <b>NOTE:</b> The Lake does feature some comparatively large expanses of open water where wave heights may be elevated due to wind 'fetch'
Tidal effect:	No observable tidal effect, however, Lake water levels are subject to seasonal and 'wind-effect' variations.
Current strength / Direction:	Under normal conditions, Lake waters flow from south (Whitehall) to North (Richelieu River entrance). This 'general direction of flow can be temporarily affected, or even reversed, by wind effect.
Ice:	Lake water is fresh not salt. Meteorological records indicate that Lake Champlain waters are subject to freezing during colder winters.

### Monitoring of Site Weather Conditions & Forecasts

During the operational periods for the MCB, the MCB Barge Superintendent / appointed alternate will monitor the current and forecast weather conditions for operational work sites and vessel transit routes. The MCB Superintendent will notify the attending NKT Representative if a temporary suspension of project activities is required due to weather (actual, or forecast).

The MCB Superintendent's primary weather forecast resource will be NOAA Marine Weather.com (Governmental).

The MCB Superintendent will typically also review web-based, non-governmental resources which may include:

- <https://www.windy.com>
- <https://www.buoyweather.com/>
- <https://www.windalert.com>
- <https://climeradar.com>

### Recording of Site Weather Conditions

Site weather conditions will be recorded in a dedicated section of the MCB Daily Report. Recorded values will either be derived from:

- a. Local observation, or
- b. Download from a local registered NOAA weather observation station (airport or similar)

### Operational Weather Limits

Wind:	OSHA safety rules dictate a maximum wind strength of 25mph for crane Operations. All applicable crane manufacturer guidelines with respect to use of crane equipment on vessels will also be adhered to.
Current Strength:	Maximum current strength 2 knots. .... <b>NOTE:</b> As detailed above, Lake waters are non-tidal, we do not anticipate current strengths to even approach this limit
Sea / Swell Height:	<b>PLGR:</b> Work may be temporarily delayed / suspended at the discretion of MCB Superintendent / Dive Supervisor / Tug Captain / Crew Boat Captain; these parties will use a wave height of 3ft to 5ft (~1m -1.5m) as a guideline reference limit.

## 6 Environmental Protection Measures

### 6.1 Oil Pollution Prevention

Please see dedicated SOPEP document in *Appendix 4 of Lake Champlain Submarine Cable Lay Method Statement*.

An Emergency Notification Flowchart on board provides notification requirement and contact details in the event of emergency situations and incidents:

- The PLGR operational vessel will carry emergency 'spill kit(s)'
- PLGR operational vessel fuel stocks onboard will be kept to a practical minimum.
- PLGR operational vessel fuel storage vessels will feature double-wall construction.
- As an emergency contingency measure CMI has pre-arranged that US Ecology, a US based Oil Spill Removal Organization (OSRO) will be available on 'call-out' basis to provide professional clean-up support. For further details, please see: <https://www.usecology.com/>

### 6.2 Solid Waste Management

#### 6.2.1 Construction Waste Management

Disposal of waste into Lake waters is strictly prohibited by local, State & Federal law.

- Crews and contractors will be notified accordingly at the Project 'Kick-Off Meeting' and daily shift change / TBT meetings.
- New crew members/ contractors will be notified during the project and vessel familiarization processes.

The PLGR operational vessel will be mobilized with waste containment bins, these bins will feature closeable lids and heavy grade, disposable plastic liners. Bin liners will be exchanged regularly and filled bags will be transported to shore for proper disposal. Recovered debris will be verified, handled and disposed of in appropriate bins and/or containers. The debris/bins/containers/etc. will then be transported off the barge and disposed of in truckable containers, dumpsters or similar at Wilcox Dock as construction waste. It will be removed from site by a local qualified waste management contractor.

#### 6.2.2 Contaminated Waste Management

In the event of discovery of contaminated waste, CMI, in consultation with the Client Representative(s) will identify, handle, store any substances in accordance with applicable laws and regulations. All parties, including agencies, will be notified as required. Disposal will be at an approved and agreed upon facility.

For pre-lay grapnel run operations, CMI planning measures do not anticipate any requirement to handle 'contaminated' waste. CMI will additionally consult with US Ecology if this circumstance should unexpectedly arise.

### 6.3 Wastewater Management

Disposal of untreated wastewater into Lake waters is strictly prohibited by local, State & Federal law.

- Crews and contractors will be notified accordingly at the Project 'Kick-Off Meeting' and daily shift change / TBT meetings.
- New crew members/ contractors will be notified during the project and vessel familiarization processes.

The PLGR operational vessel will be equipped with portable toilet units that will be sourced from a local provider.

- Soiled / clean portable toilet units will be transferred by means of crew transfer vessel / work vessels.
- Portable toilet change-out / clean-out service will be performed by the local service provider at the operational base located at Wilcox Dock, Plattsburgh, NY.

## 7 Documentation

**Daily Report:** The Project Manager will submit a signed daily field report to Client representative within 24 hours of completion of the work on the applicable day.

- Daily reports will be used to record all pertinent details of PLGR operation including:
  - Locations where debris recovered
  - Photos and description of debris recovered
  - Locations of clump weights on periphery of swath where 'peel-back' operations were conducted
  - Record and receipts indicating 'proper disposal' of debris
  - Tool Box Talks

### **Accident and Incident Reporting:**

- Reporting to record the following:
  - There will be compliance with Federal, State & Local laws and Project Permit requirements with respect to notification of authorities.
  - Attending Client Representative(s) will be notified of an accident as soon as is practically feasible.
  - Incident investigation-data and witness statements to be gathered pertaining to the accident and a formal report will be generated.
  - Mitigation measures and recommendations resulting from the accident investigation will be implemented to prevent future occurrences.

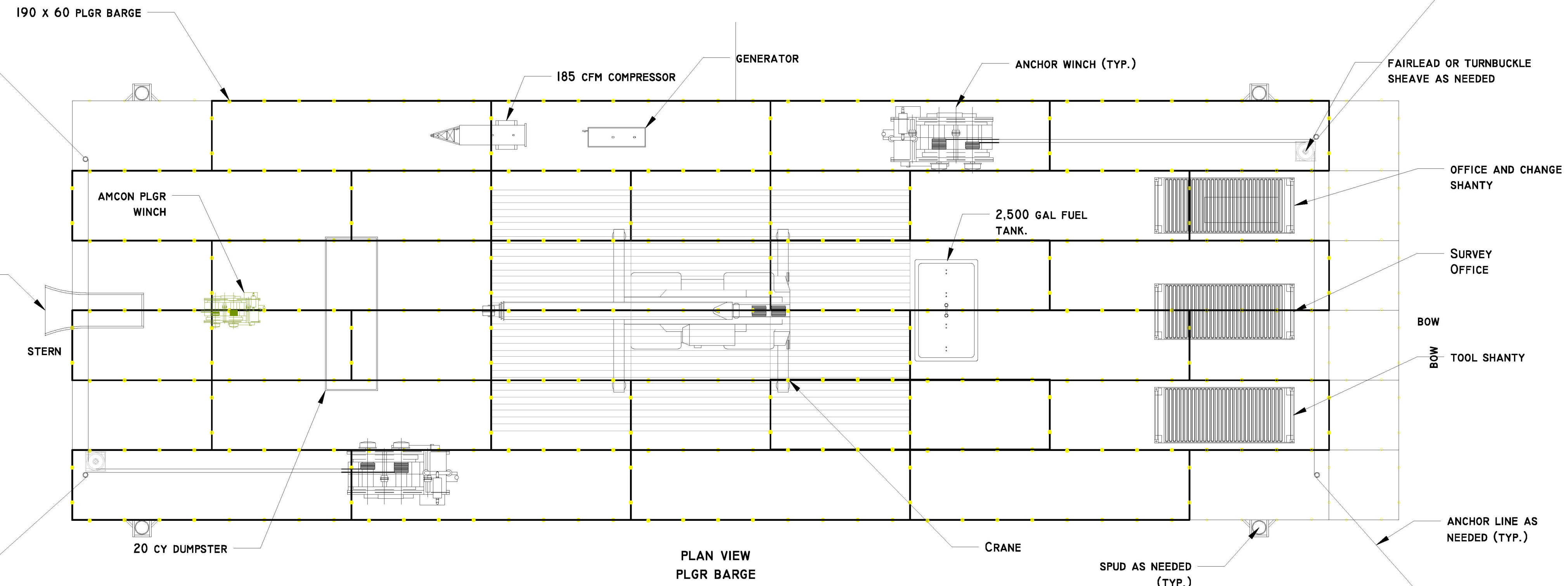
# Appendix 1 - Vessel Specifications



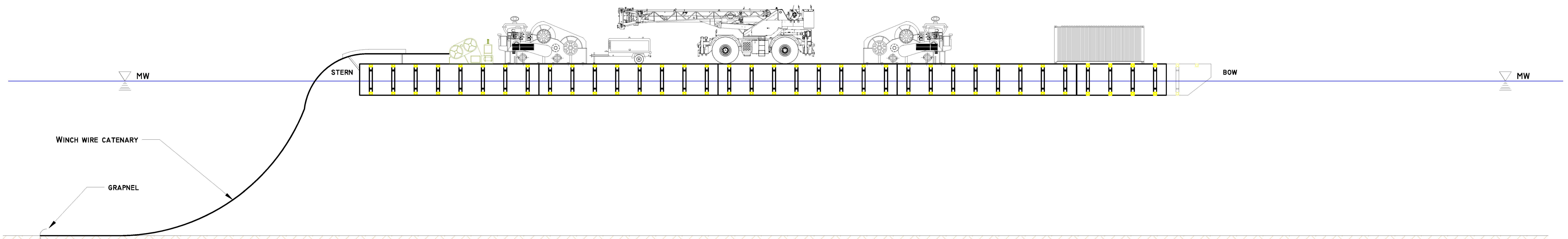
EM&CP

The depicted procedures, equipment, materials, locations, and dimensions in this drawing portray the techniques and approaches necessary for implementing the described tasks as per the current design. Nevertheless, Caldwell Marine International retains the right to modify, adjust, or replace these procedures, equipment, materials, locations, and dimensions at its discretion, if on-site conditions require such alterations during execution.

DRAFT



EQUIPMNT	APROX. WEIGHT (KIP)
CRANE	400
ANCHOR WINCH	35
ANCHOR WINCH	35
PLGR WINCH	12
TOOL SHANTY	11
OFFICE SHANTY	11
OVERBOARD CHUTE	25
GENERATOR	8
AIR COMPRESSOR	3
FUEL TANK	20
DUMPSTER	20
MISC.	5
TOTAL:	585



ELEVATION  
PLGE BARGE

No.	REVISION	DATE	BY

This document contains ideas and designs that are the property of Caldwell Marine International (CMI). Thus, the information is not to be used, in whole, or in part for any other project without written authorization of CMI.

		<b>Project:</b> CHAMPLAIN-HUDSON POWER EXPRESS	
<b>Drawing Name:</b> PRE-LAY GRAPNEL RUN BARGE		<b>Date Drawn:</b> 10-18-23	
<b>Client:</b> NKT/DTI		<b>Date Approved:</b> 	
<b>Drawn By:</b> WMP		<b>Approved By:</b> WMP	
<b>Project No.:</b> 1233		<b>Sheet No.:</b> 1	
<b>Scale:</b>		<b>Rev.:</b> 0	

# “GAVIN” TRUCKABLE WORK VESSEL



*NOTE: Photo shows same class/ design vessel*

- LENGTH:** 25'-3" LOA
- BEAM:** 14'
- DEPTH:** 5'
- AIR DRAFT:** Air draft in salt water  $\leq 16'6"$
- DISPLACEMENT:** 40,000 # (approx.)
- USCG EQUIPMENT:** Safety equipment, communications equipment, lifesaving, fire fighting, protection and suppression equipment, mooring lines and towing gear as required by the USCG.
- FUEL TANK:** Fuel tank capacity is approximately 500 gallons
- POWER TRAIN:** Two John Deere 6081 diesel engines, 300 HP each @ 2200 RPM (M2 rating)
- Two Twin Disc MG-5075 2.88:1 ratio.
  - Two 2 1/2" stainless steel propeller shafts with two 36" x 20" (34"x18") x 4 blade stainless steel propeller.
  - Two 2 1/2" Cutlass stern bearings.
  - Exhausts installed with "cowl" spiral exhaust silencers - Residential quiet.
- ENGINE COOLING:** Closed fresh water system circulated through 8" x 8.5 # channel welded to bottom of hull.
- ENGINE CONTROLS:** Single lever control head with heavy-duty 43C control cables.- electrically operated
- BILGE PUMP:** Two 12 volt 1,000 GPH pump.

FIRE DET/GEN ALARM: One fire detection and general alarm system

BLOWER: One 250 CFM 12 VDC blower for engine room

RUDDERS: Two independent flanking rudders with independent rudder angle indicators (RAI's)

HYDRAULIC STEERING: Two hydraulic pumps, one driven off each main engine. Control valve and flow regulator mounted in engine room.

ELECTRICAL SYSTEM: Two 12-volt heavy-duty 8D marine batteries mounted in Coast Guard approved engine room battery box.

NAVIGATION LIGHTS: Mast on top of pilot house has two white tow lights forward and two amber tow lights aft. Green and red side lights are installed on the sides of the pilot house. Mast light is detachable or hinged to lower

PILOTHOUSE: 4' 6" wide x 4' long x 6' 9" high

- One overhead cabin light.
- One 7" sealed beam searchlight and one single-bugle horn mounted on pilothouse top.
- Two six-gang 12 volt fused switch panels mounted in dash of pilothouse.
- Front window 4' x 3' horizontal slide
- Side windows are 3' x 3' horizontal slide
- Rear windows are 15" x 30" vertical slide with one of these mounted in 6' x 2' steel door
- All pilot house windows are tempered safety glass.

SHELL PLATING: Deck, sides, bottom, headlog and transom of 1/4" steel plate.

FRAMING: Deck framed with 3" x 3" x 1/4" angle on 24" centers  
Sides framed with 3" x 3" x 1/4" angle on 20" centers  
Bottom framed with 4" x 3" x 1/4" angle on 20" centers.

BULWARKS: Continuous all around hull. Bulwarks extend 14" above deck and flanged 2" built from 1/4" plate and brackets.

RUB BARS: 20' x 1/2" x 4" flat bar down each side of hull.

PUSH-KNEES: Constructed of 12" x 20.7 # channel extending 54" above deck. Push-knee braces are 1/4" steel plate finished with 3/8" x 2" flat bar. Pads are 2" thick rubber bonded to 1/2" x 10" steel backing plate

WINCHES: Two 5 ton manual winches shall be installed on the forward deck.

BITTS: One double towing bit, one single head bitt, and four single quarter bitts.-  
*NOTE: Double tow bit is thru deck and tied into bottom of hull*

LIFTING EYES: Four permanent eye straps welded to hull.

## CMI Equipment Crew Boat 'Alexis'

Vessel Name: 'Alexis'  
Vessel Type: USCG Inspected , mono-hull crew boat  
Propulsion: Twin screw powered by 2 x Caterpillar 3406E diesel engines  
Builder: Aluminum Boats of Virginia / Hull #102  
Year Built: 1998  
Official Number: 1073420  
Call Sign: WDA6065  
LOA: 55ft  
Beam: 16ft  
Depth: 7ft 3inches  
Gross Tonnage: 42  
Net Tonnage: 33  
Deck Space: 116 ft<sup>2</sup>  
Capacities: Persons -29 + crew  
Fuel – 2,200 US Gallons  
Hydraulic Oil – 10 US Gallons  
Nav Equipment: GPS & chartplotter, radar, AIS,  
Life Saving Appliances: Per USCG requirements



# CMI EQUIPMENT

## Truckable Work Vessel

**MAKE:** Lifeyme 30' Landing craft with Cabin (Model 30120)

### **SPECIFICATIONS:**

- \*30' LOA plus motor bracket
- \*120" Beam
- \*No bow door add front deck
- \*Fuel Capacity: 120 gallons
- \*.250" 5086-H116 bottom plating
- \*.190" 5052 side plating
- \*.190" 5052-H32 deck plating
- \*Centerline vertical keel (CVK): 3/8"X4" 5086

### **HULL PACKAGE:**

- \*30' high speed mono hull landing craft incorporating ¼" hull plating & framing
- \*Hull will have 2 structural bulkhead; forward collision bulkhead watertight; the aft bulkhead limbered for drainage via bilge pump
- \*Transom will be designed for 25" shaft outboard motors with a motor bracket
- \*1/2" aluminum double padeye will be welded on center of the bow
- \*Duel gill bracket for engines
- \*Motor cage around engines
- \*4-T-cleats
- \*4-Lifting eyes (Pick-up boat)
- \*Tow bit
- \*Anode

### **WELDING:**

- \*Hull and superstructure will be constructed of marine grade aluminum and MIG welded throughout.
- \*Weld seams in the hull will be welded 100% both interior & exterior
- \*Welding will be performed in accordance with American Welding Society D1.2-2003 procedure qualifications

### **HULL OUTFITTING:**

- \*4-2"X7" open scuppers at midship, pipe drains in the stern and 2-1" pipe drains at the bow will create a self-bailing Main deck. Drains and scuppers will be sized & Installed in accordance with ABYC deck drainage requirements.
- \*1/4"X4" beaching wear plate installed on bow forefoot
- \*DB 503 3" D-rubber fender will be installed on the gunwale, port and starboard side
- \*1-15"X24" aluminum hatch watertight
- \*Push-bumpers

### **FUEL SYSTEM:**

- \*120 gallons non-integral fuel tank installed complete with fill, vent, 12V sender and fuel level gauge on console
- \*Fuel tank will be built from ¼" plate, pressure tested to 4 psi and bolted into hull framing using doublers and stainless steel fasteners.
- \*Fuel system will comply with U.S. diurnal emission standards
- \*EPA certified fuel system
- \*Fill and Vent

\*1-Fuel gauge

\*2-Fuel filters

**CABIN:**

\*10'X9', 1-front door, 2-sliders, rubber windows

\*2-Captain seats

\*1-bench seat across back of cabin with cushions/dry storage

\*1-bench seat on starboard with cushions/dry storage

\*1-bench seat on portside with cushions/dry storage

\*Insulated cabin roof and sidewalls (Floor to bottom of windows)

\*Air conditioner with heater

\*Honda generator si3000 watts

**TRIM TABS:**

\*9"X18" Lenco Electric trim tabs

**PAINT:**

\*Anti-fouling on hull bottom

\*Non-skid tape on deck floor

**ELECTRIC SYSTEM:**

\*Vessels electrical system will be 12VDC. All electrical cable will be marine grade copper tinned boat cable and labeled for each circuit. Cables should be routed in wireways wherever possible. Wherever exposed to potential damage, cables will be protected with rubber. Electric cables will be sized in accordance with American Boat & Yacht Council. Electric cables will be marked in accordance with the markings in electrical drawings. Electrical switches will be of a heavy-duty type and properly insulated. Electrical system will be grounded. In any case the hull shall not be used as part of a galvanic feeding loop.

**RADAR:**

\*GARMIN GPSMAP 743xsv US+Canada GN+w/18HD+Bundle 010-02365-80

\*AIRMAR B60-20-MN, Bronze low profile 20 degree tilt, mix and match transducer

\*AIRMAR MM-8G, 8-Pin mix and match cable for B60MM Garmin

\*2-Standard Horizon Eclipse VHF radio with antennas

**12V DC ACCESSORIES:**

\*1-12V 8 position waterproof distribution panel installed on console

\*1-12V power receptacle will be installed with weather cover

\*1-12V 2200 GPH bilge pump auto-matic

\*2-12V self-parking windshield wiper will be installed on the front window

\*1-12V Electric horn

\*2/2Batteries/plastic cases for engine starting bank, 2-batteries selector switches

**STEERING SYSTEM:**

\*Hydraulic steering dual Teleflex, stainless steel steering wheel

**LIGHTING:**

\*Navigation Lights will be installed to USCG requirements

\*1-Dome light ( red/white)

\*2-dome light (white)

\*2-L.E.D. deck lights

\*1-Searchlight remote control

**MOTORS:**

\*2-150HP Honda, dual top mount control, dual key switch, wiring harnesses, 2-tach gauges, 2-stainless steel propellers

**TRAILER:**

\*Aluminum triple axles with brakes on two axle, CAP#15,000 lbs.,

**SEA TRAILS:**

\* Sea trails

# "JORY"



# CMI Equipment

## Cable Lay Support Vessels

**Manufacturer: Carolina Skiff**

### **FL-540 Specs**

- Length-21'2"
- Beam-98"
- Draft-6"
- Max HP-115
- Max persons-12
- Max capacity-2405lbs
- Weight-1600lbs

### **FL-541 Specs**

- Length-27'1"
- Beam-98"
- Draft-5"
- Max HP-200
- Max persons-12
- Max capacity-3405lbs
- Weight-2400lbs



## Appendix 2 - Grapnel Payout

### LENGTH OF GRAPPLING ROPE VERSUS DEPTH OF WATER

(Data from Table 5.1.3.1, Cable and Wireless Cable Working Practices, Volume 5, Part 1)

WATER DEPTH		CABLE LENGTH		CALCULATED CABLE LENGTH*		
fathoms	meters	fathoms	meters	meters	delta	delta %
12	22	42	77	81	4	5%
16	29	52	95	96	1	1%
20	37	60	110	111	1	1%
24	44	70	128	125	-3	-2%
28	51	77	141	139	-2	-1%
32	59	84	154	152	-1	-1%
36	66	92	168	165	-3	-2%
40	73	98	179	178	-1	-1%
44	80	104	190	190	0	0%
48	88	110	201	202	0	0%
52	95	118	216	213	-3	-1%
56	102	122	223	224	1	0%
60	110	126	230	234	4	2%
64	117	133	243	244	1	0%
68	124	138	252	253	1	0%
72	132	142	260	262	3	1%
76	139	148	271	271	0	0%
80	146	151	276	279	3	1%
84	154	156	285	287	2	1%
88	161	160	293	294	2	1%
92	168	165	302	301	-1	0%
96	176	169	309	307	-2	-1%
100	183	172	315	313	-1	0%

\*Calculated using the formula  $Y = -0.0041X^2 + 2.2838X + 32.784$ . Y=cable length, X=depth.

## LENGTH OF GRAPPLING ROPE VERSUS DEPTH OF WATER

(Data from Table 5.1.3.1, Cable and Wireless Cable Working Practices, Volume 5, Part 1)

WATER DEPTH		CABLE LENGTH		CALCULATED CABLE LENGTH*		
fathoms	meters	fathoms	meters	meters	delta	delta %
100	183	172	315	315	0	0%
200	366	310	567	565	-1	0%
300	549	450	823	814	-9	-1%
400	732	575	1052	1061	10	1%
500	914	700	1280	1306	26	2%
600	1097	850	1554	1549	-6	0%
700	1280	980	1792	1790	-3	0%
800	1463	1100	2012	2029	17	1%
900	1646	1250	2286	2265	-21	-1%
1000	1829	1350	2469	2500	31	1%

\*Calculated using the formula  $Y = -0.00005 \cdot X^2 + 1.4255 \cdot X + 41.605$ . Y=cable length, X=depth.