



## **Appendix 6-B: Immediate Post-Installation Inspection Plan**

# CHPE - Immediate Post Installation Inspection Plan – Harlem River

## Champlain Hudson Power Express

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## List of Terms and Abbreviations

<b>Term</b>	<b>Definition</b>
CHPE	Champlain Hudson Power Express
CI	Co-located infrastructure
CPS/APP	Cable Protection System/Articulated Pipe Protection (may also be referred to by its product name, UraGuard)
MBES	Multi-Beam Echo Sounder
MP	Mile Post

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## 1 Scope and Purpose

This document details the means and methodologies to be used for the post-installation inspection of the Champlain Hudson Power Express (CHPE) Harlem River submarine cable following the installation campaigns.

Assessment of the conditions in the Harlem River, geotechnical, debris, utilities etc., resulted in a decision from the Project to protect the Harlem River submarine cable using a cable protection system/articulated pipe protection (CPS/APP), refer to Appendix 1.

Actions for remediation of cable span, where determined, and details of remedial actions should damage to third party assets inadvertently occur.

## 2 Introduction

For the purposes of this EM&CP, the focus is on around six miles of submarine cables installed in the Harlem River.

Following the installation activities of the cables, verification will be made of occurrence of cable free span sections and other areas where remedial intervention work is required. This verification will measure position of the cable and the observed span location, length and height off the riverbed. Cable monitoring is executed until installation of cable protection, where applicable.

## 3 Overview

The cable installation process will be to lower the cable bundle to the riverbed using the minimum lay tension in order to reduce the possibilities of cable free span.

Post- installation surveys will occur following the cable installation works as detailed in CHPE Harlem River Installation Methodology. Survey works may not be performed immediately following installation, but should in general be performed less than 4 days following the installation works.

Data gathered from the post-installation survey works will allow definition where cable free-span lengths are determined, which are not acceptable. The following processes could be used after the installation to remove the free span:

- Riverbed jetting to lower the cable to remove span lengths;
- Remedial mattresses works, as detailed in CHPE Harlem River Installation Methodology
- Grout/rock bags; and
- Diver intervention to remove span lengths.

Post-lay correction work will be assessed and engineered using the data gathered from the post-installation survey works.

Cable monitoring will utilise unmanned remote monitoring equipment.

## 4 Methodology

### 4.1 Cable span verification method

Cable span verification methodology will involve the use of a hull-mounted multi-beam echosounder (MBES). MBES is a type of sonar that is used to map the seabed.

The MBES system can locate the top of the cable and both sides of the riverbed levels using the time it takes for the sound waves to reflect off the cable / riverbed and return to the receiver. These measurements are used to calculate the water depth. This data can then be reviewed and processed and will allow a riverbed profile to be generated. This profile will define where the cable has free spans off the riverbed.

Prior to the use of the MBES system, various calibrations need to be undertaken in order to ensure accuracy of the equipment.

### 4.2 Cable monitoring

#### 4.2.1 Introduction

Where the cable is not buried and where no cable protection system/articulated pipe protection (CPS/APP) or concrete mattresses are installed, CHPE will monitor the cable for interaction with other river users. The locations where this situation will occur are the following:

- A length of around 50' (15m) from the Harlem River bulkhead.  
The installation of concrete mattresses at this location is expected shortly after cable pull-in.
- A length of around 400' (120m) West of the Spuyten Duyvil bridge.  
This length of cable will be buried or, when this is not possible, concrete mattresses will be installed. The execution of this work is expected within 4-6 weeks after cable lay.

#### 4.2.2 Monitoring methodology

During the period that the cable rests on the Harlem Riverbed unprotected, CHPE will operate unmanned remote monitoring until the cable is buried or protective concrete mattresses are installed.

This monitoring will avoid the cable from incidental vessel interactions. The locations under review (West of Spuyten Duyvil bridge and near to the Harlem River bulkhead) are considered low-risk area for vessel interactions with the seabed.

The equipment to be used during this time will allow monitoring and deterring vessel interaction with the subsea cable to ensure that the cable is adequately protected.

CHPE has selected the unmanned remote monitoring methodology. This is methodology uses the following equipment / procedures:

- a. Remotely operated monitoring station with Pan Tilt and Zoom camera with 32x zoom, AIS, and remotely controlled VHF. The sensors will be permanently monitored and have local maintenance and high readiness coverage for unexpected occurrences.
- b. The local operations team is on 24-hour watch with local knowledge and dialect to communicate with vessels as required. This team will work either from an office or home, reducing safety issues.

Note that the cables will remain de-energized for the duration of any sections that are being monitored prior to full protection occurs.

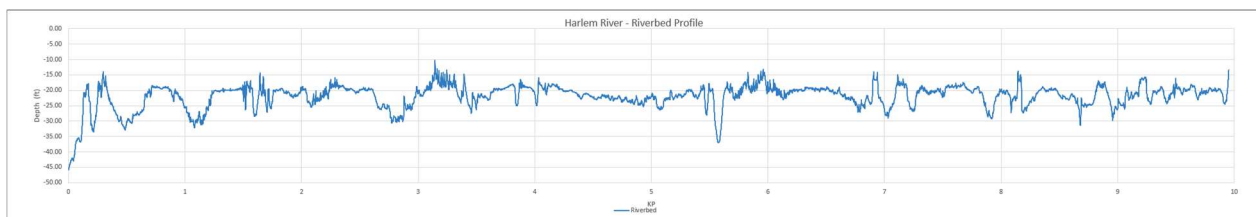
## 5 Results

The results of the MBES system survey are referred to as the as-laid survey data as this represents the final position of the cable on the riverbed following the installation works. The data collected is referenced to the distance and position along the route as Mile Posts (MPs) which is correlated to the project MPs. The results can then be graphically depicted both as sections at any given location and longitudinally along the surveyed route.

Note that the initial survey will be used to categorize the post-lay rectification works. Additional as-laid surveys must be completed following free span corrections/mattress/grout/rock bag installation to categorize and document the final as-laid/left position of the Harlem River cables.

## 6 Presentation of Results

As described in Section 5, the collected data can be represented in two ways. The first way being a section as indicatively shown in the below figure:



**Figure 1 Indicative Longitudinal Depth Profile**

In this figure, the cable can be seen as the continuous line across the figure. The difference between the depth measured of the cable and riverbed right next to it will be used to define free span locations.

The second way will be to show the cable in the Harlem River profile. This depiction will show the actual free span locations, length and height.

Following completion of all works, as-built documentation inclusive of the cable final survey results will be compiled for agency submittal. Compilation of data will be made in accordance with all permit conditions and submitted within the windows prescribed by each agency.

## **7 Cable free span correction**

Where cable free span is measured, corrective methodology will be used to mitigate the free span. Possible corrective methodologies are defined in the following sections.

Once the need for remedial burial or protection has been identified as detailed in Section 6, there are more options which can be used depending on the conditions of the free spans and equipment availability:

### **7.1 Use of jetting equipment**

Cable free span correction operations can be performed using jetting equipment. This equipment will be typically be deployed at locations at which cable has a span due to higher riverbed areas, e.g. sand waves.

The jetting equipment will be used to displace sand resulting in the cable lowering in height upon which the free span should be eliminated. When these operations are completed, a subsequent as-built survey will be performed to determine the success of remedial efforts.

### **7.2 Remedial Mattressing**

At locations at which it is impractical to use the jetting equipment (due to riverbed geology) grout/rock bags are to be placed under the free span. Surveys will then be performed of the mattresses to ensure their correct positioning with the positions being logged to be used as part of the as-built package.

### **7.3 Diver intervention**

At locations at which it is impractical to use the jetting equipment or the use of mattresses to resolve the situation, the project may use divers to correct the riverbed and / or re-position the cable to remove cable free span occurrence.



## 7.4 Alternative methodology

At locations at which it is impractical to use the jetting equipment, use of mattresses or diver intervention to resolve the situation, the project may assess alternative free span correction methodologies.

# 8 Remediation of Third-Party Asset Damage

Due to the extensive survey work performed in the locations of third-party assets, as well as the engineering and crossing agreements made, it is unlikely that any third-party asset should be impacted by the cable installation process. Extensive surveys have been completed over multiple years, including Echo Sounder, sub-bottom profiling, and magnetometer surveys, as well as diver locates, for all co-located infrastructure (CI), which minimizes the risk that any undocumented utilities exist along the alignment. Nevertheless, an additional survey will be completed immediately prior to installation to further confirm all utilities have been identified. During the extensive discovery and reconciliation process, CHPE has been unable to identify an owner for only one CI crossing in the Harlem River. It is highly unlikely that any further CI will be found during the pre-lay survey, although it is possible that additional debris may be discovered.

As the cable will be installed using surface lay, encapsulated in CPS/APP, with no trenching, there is very little potential impact, if any to CI, known or unknown. The CPS/APP provides protection to both the CHPE cable bundle and any CI, documented or undocumented, live or abandoned. Installation will adhere to the Certificate requirements concerning CI, including CCs 28 and 29(a)(7).

However, in the unlikely event of impact with a known utility crossing, or an impact with an unknown and undocumented utility, immediate notification of such event will be made to the utility owner and relevant authorities. In order to mitigate risk to the cable installation assets and cable integrity, cable installation operations will continue. Additional spreads can be mobilised to conduct an assessment of the damage to the third-party asset, and undertake repairs, as required. Necessary repairs and requirements shall be developed and agreed in coordination with the third-party asset owner.