Appendix F

Horizontal Directional Drill Installation Manual

Caldwell

Marine International, LLC.

INSTALLATION MANUAL
FOR SEGMENT 1 EM&CP
HORIZONTAL DIRECTIONAL DRILL (HDD)
AT STONY POINT

ON THE
CHAMPLAIN HUDSON POWER EXPRESS
SUBMARINE CABLE SYSTEM
01 SEP 2022

Caldwell

Marine International, LLC.

CALDWELL MARINE INTERNATIONAL LLC. 1333 Campus Parkway Wall Township, New Jersey 07753 **PROJECT CORRESPONDENCE**	**Type:** Project Correspondence **Prepared By: Greg Horn and Shane Libbey** **Document #:** 1229-01 SP HDD IM_01 **Date**: 0 1 Sep 2022 **Revision No: 1**

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Caldwell

Marine International, LLC.

INSTALLATION MANUAL
FOR SEGMENT 1 EM&CP
HORIZONTAL DIRECTIONAL DRILL
AT STONY POINT

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1.0 LIST OF ACRONYMS

ABS	American Bureau of Shipping
AC	Alter Course
AIS	Automatic Identification System
CD	Chart Datum
CHPE	Champlain Hudson Power Express Project
CMI	Caldwell Marine International, LLC
DGPS	Differential Global Positioning System
DP	Dynamic Positioning
DWT	Deadweight Tonnage
ECI	Environmental Crossing Inc. (d.b.a. Huxted Trenchless, LLC)
ECR	Equipment Calibration Record
EM&CP	Environmental Management & Construction Plan
EPP	Environmental Protection Plan
ERP	Emergency Response Plan
GA	General Arrangement
HDD	Horizontal Directional Drill
HDPE	High Density Polyethylene
HPU	Hydraulic Power Unit
HT	Huxted Trenchless, LLC
IMO	International Maritime Organization
ITP	Inspection and Test Plan
KP	Kilometer Point (along cable route)
LBE	Linear Belt Engine
LCE	Linear Cable Engine
LLW	Lower Low Water
MOP	Method of Procedure
OB	Over Board
PLC	Programmable Logic Controller (computer system)
QA	Quality Assurance
RLM	Running Line Monitor
ROV	Remote Operated Vehicle
RPL	Route Position List
SDO_2	Surface Decompression Oxygen
SOW	Scope of Work
UPS	Uninterruptible Power Supply
USBL	Ultra Short Baseline
USCG	United States Coast Guard
VBS	Virtual Base Station
VHF	Very High Frequency
VTC	Vessel Traffic Control
WAAS	Wide Area Augmentation System

2.0 EXECUTIVE OVERVIEW

The work to be undertaken is associated with State of New York Public Service Commission Case 10-T-0139 for the Champlain Hudson Power Express project for the construction of a 1250 MW high voltage direct current circuit from the Canadian Border to New York City. The cable route extends approximately 330 miles over land and marine pathways.

For informational purposes, the EM&CP process for this project will be divided into multiple segments to allow for approvals of work supporting the overall project schedule for completion. This document is part of the quality plan and is an appendix to the Segment One Environmental Management & Construction Plan (EM&CP) submittal to NY Public Service Commission (NYPSC) pursuant to the Article VII permit for the Stony Point Horizontal Directional Drill (HDD).

This document describes the methods and materials to be used prior to the cable installation in New York State, specifically:

- **Horizontal Directional Drilling at Shoreline Crossings - Segment One EM&CP (Stony Point)**

A comprehensive quality assurance program has been developed to ensure that all phases of the program, from cable construction to installation and burial, are conducted in a controlled and predictable manner in full conformance with standard industry practice.

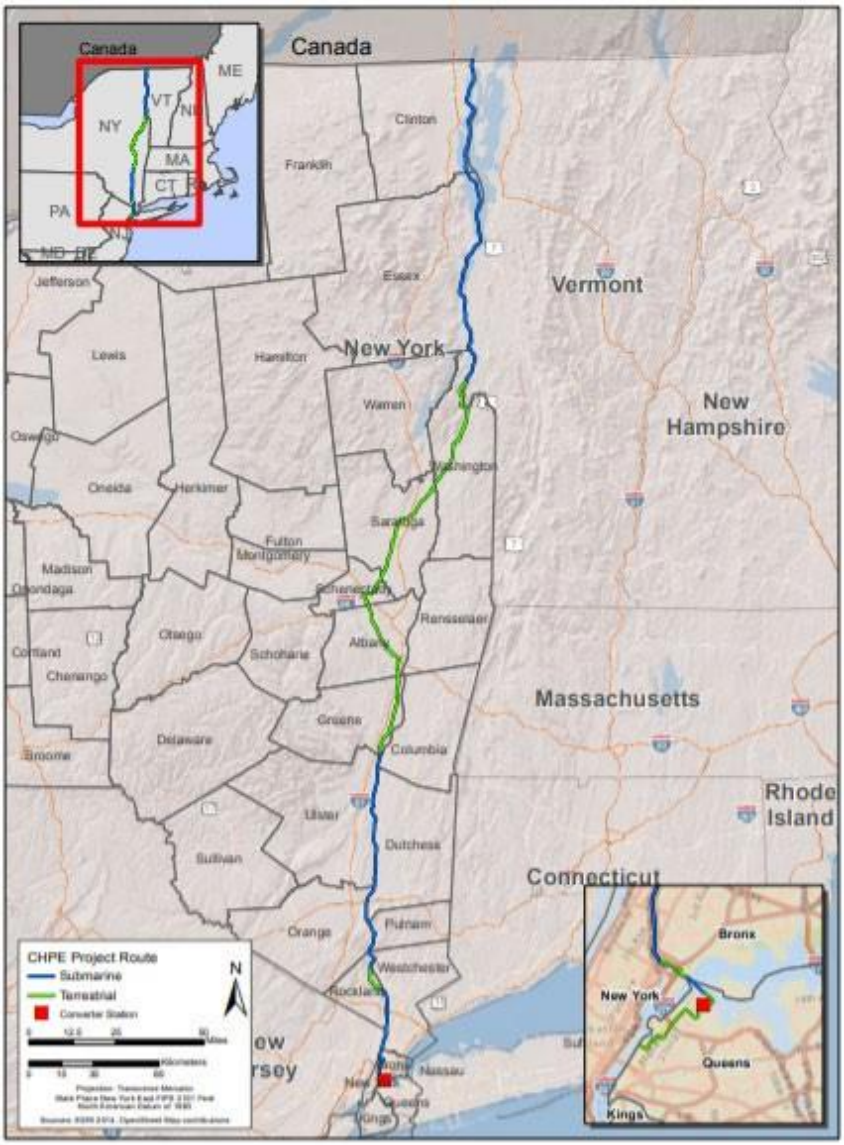
3.0 SYSTEM OVERVIEW

In support of the Champlain Hudson Power Express Project, *Caldwell Marine International LLC.* (*CMI*) has contracted with NKT Inc. to install 1250 MW HVDC submarine transmission cables. The transmission cables will connect New York City with Hydroelectric Power from the Canadian Border, see Figure 2-1. Transmission supply route. The transmission cables are divided into segments and will be spliced into one continuous length concurrent with their installation. The HDD locations are summarized below. This Installation Manual will address the procedures and installation for Stony Point, NY. A subsequent installation manual will address the HDD activities at the other HDD locations.

- **HDD Location**
    - Shoreline Crossing in Stony Point, NY to transition the submarine cable laid in the Hudson River to the approved underground route. Underground cable installation outside of the HDD on land side will not be by CMI and will be covered in a separate EM&CP submitted by others.

- **Protection Strategies**
    - Submarine Cable installation procedures are to be covered in the Submarine Cable Installation Manual – Segments 3 through 5 furnished at a future date under separate cover respectively.

Figure 2-1. Transmission supply route.



4.0 SCOPE OF WORK – HDD

This installation manual provides a comprehensive description Horizontal Directional Drill to be performed as part of the infrastructure construction to be done in New York State, and is an appendix to the NY, EM&CP plan for Stony Point. The document was prepared in accordance with the permits and plans that regulate this project including

- NY Public Service Commission (Article VII) Permit for Case 10-T-0139 and all relevant Appendices.
- Water Quality Certificate – Section 401
- USACE Section 10/401 Permit Conditions

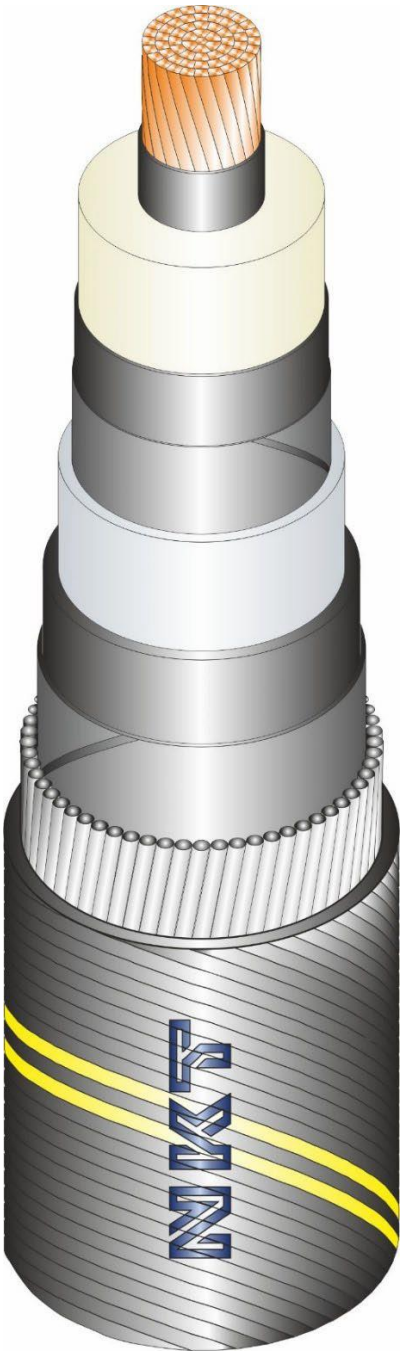
This document is intended to explain the methods and procedures used to install two (2) 12" DR-9 High-Density Polyethylene (HDPE) pipes, approximately 2,400 lineal feet (LF) each. Construction is expected to take place during the late Fall of 2022. Caldwell Marine International, LLC (CMI) will assist Huxted Trenchless, LLC (HT) with all offshore activities.

5.0 TRANSMISSION CABLES

The installation procedures and equipment are designed to comply with the mechanical and electrical characteristics of the transmission cable to be installed; therefore, a discussion of methods and materials is not complete without a description of the characteristics of the transmission cables.

5.1 Submarine Cable

Figure 5-1. Submarine Cable



DC Voltage	±400 kV	
Conductor	Profiled wires	
Type / material	Copper, Compound Water-Blocked	
Cross-section	4935 kcmil	2500 mm2
Water blocking	compound	
Diameter	2.28 in	57.8 mm
Conductor binder		
Material	semi-conductive swelling tape	
Thickness	22 mils	0.6 mm
Conductor shield		
Material	semi-conductive polymer	
Thickness	59 mils	1.5 mm
Insulation		
Material	cross-linked DC polymer	
Thickness	839 mils	21.3 mm
Insulation shield		
Material	semi-conductive polymer	
Thickness	55 mils	1.4 mm
Longitudinal water barrier		
Material	semi-conducting swell-able tape	
Thickness	26 mils	0.7 mm
Metallic sheath		
Type / material	extruded / lead alloy	
Thickness	118 mils	3 mm
Inner sheath		
Material	high-density polyethylene	
Thickness	98 mils	2.5 mm
Tensile armour		
Type / material	wire / steel	
Thickness	197 mils	5 mm
Outer serving		
Material	polypropylene yarn, 2 layers	
Thickness	157 mils	4 mm
Complete cable		
Diameter	5.44 inches	138.1 mm
Weight in air	36.4 lbf./ft.	54.2 kg/m
Weight in water	26.9 lbf./ft.	40.1 kg/m

Note: All data shall be considered nominal

5.1.1 Submarine Cable Electrical Environmental and Installation Data

The submarine cable has the following electrical properties:

5.1.1.1 Electrical Data

Rated continuous DC voltage, U_0	400 kV
Switching impulse withstand level (SIWL) started from U_0	900 kV
Subtractive SIWL started from U_0 to voltage at opposite polarity	400 kV
Rated continuous current under the installation conditions	1,638 A
Maximum conductor temperature in normal operation	70 °C
DC resistance at 20 °C	0.0022 ohm/1,000 ft. (0.0072 ohm/km)
DC resistance at maximum conductor temperature	0.0026 ohm/1,000 ft. (0.0086 ohm/km)
Losses at rated current	7.6 W/ft. and cable (25.0 W/m)
Capacitance	0.081 μF/1,000 ft. (0.265 μF/km)
Inductance (between conductor and metallic sheath)	0.040 mH/1,000 ft. (0.132 mH/km)
Surge impedance	22.3 ohm

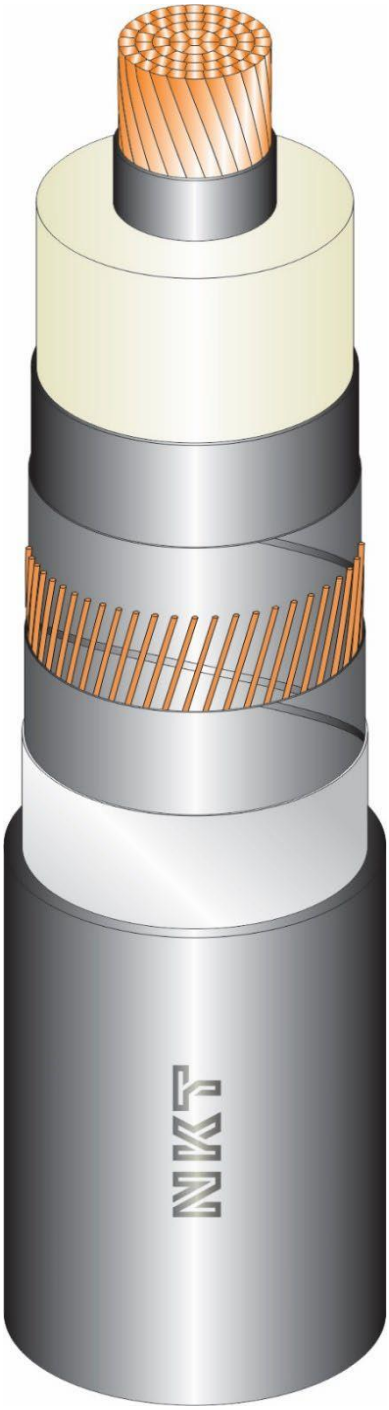
5.1.1.2 Mechanical Cable Properties

Maximum Water Depth	400 feet (121.92 m)
Minimum bending radius	
- at laying (tension less than or equal 20 kN)	5.9 feet (1.8 m)
- at handling (tension greater than 20 kN)	6.9 feet (2.1 m)
- installed	5.9 feet (1.8 m)
Minimum bending radius for Chute	13.8 feet (4.2 m)
Minimum bending radius for turntable	6.9 feet (2.1 m)
Minimum coiling diameter 200 meters away from factory flexible joint	83 feet (25.3 m)
Minimum coiling diameter within 200 meters of a factory flexible joint	83 feet (25.3 m)
Maximum pulling force in conductor	
Straight Pull with conductor weld	54853lbs. (244kN)
Max permissible tension during bending MBR = 4.2 meters	47210lbs. (210kN)
Maximum side wall pressure $SWP = \frac{PullingForce}{BendingRadius}$	11240 lbs./ft. (50kN/m)

Full Technical Specifications for the Submarine Cable are illustrated in Appendix C

5.2 Land Cable

Figure 5-2. Land Cable



DC Voltage	±400 kV	
Conductor		
Type	Profiled Wire	
Material	Cu, Water-Blocked	
Cross-Section	4935 kcmil	2500 mm2
Diameter	2.28 in	57.8 mm
Conductor Shield/Screen		
Material	Semiconducting PE	
Thickness	59 mils	1.5 mm
Insulation		
Type	Triple Extruded, Dry Cured	
Material	XLPE	
Thickness	839 mils	21.3 mm
Diameter	4.11 in	104.5 mm
Insulation Shield/Screen		
Material	Semiconducting PE	
Thickness	55 mils	1.4 mm
Diameter	4.22 in	107.3 mm
Metallic Shield/Sheath		
Material	Semiconducting Swelling Tape	
Thickness	51 mils	1.3 mm
Type	Round Concentric Wires	
Material	Copper	
Cross-Section	150 kcmil	75 mm2
Longitudinal Moisture Barrier		
Material	Semiconducting Swelling Tape	
Thickness	53 mils	1.35 mm
Radial Moisture Barrier		
Material	Al-laminate	
Thickness	8 mils	0.2 mm
Jacket/Outer Sheath		
Material	HDPE	
Thickness	197 mils	4.8 mm
Conductive Layer	8 mils	.2 mm
Complete Cable		
Diameter	4.94 in	125.6 mm
Weight	20.9 lbs/ft	31.4 kg/m

All values should be considered indicative!

5.2.1 Land Cable Electrical Environmental and Installation Data

The Land cable has the following electrical properties:

Rated continuous DC voltage, U_0	400 kV
Switching impulse withstand level (SIWL) started from U_0	900 kV
Subtractive SIWL started from U_0 to voltage at opposite polarity	400 kV
Rated continuous current under the installation conditions.	1,638 A
Maximum conductor temperature in normal operation	70 °C
DC resistance at 20 °C	0.0022 ohm/1,000 ft. (0.0072 ohm/km)
DC resistance at maximum conductor temperature	0.0026 ohm/1,000 ft. (0.0086 ohm/km)
Losses at rated current	7.6 W/ft. per cable (25.0 W/m)
Capacitance	0.081 μF/1,000 ft. (0.27 μF/km)
Inductance (between conductor and metallic screen)	0.040 mH/1,000 ft. (0.131 mH/km)
Surge impedance	22.2 ohm

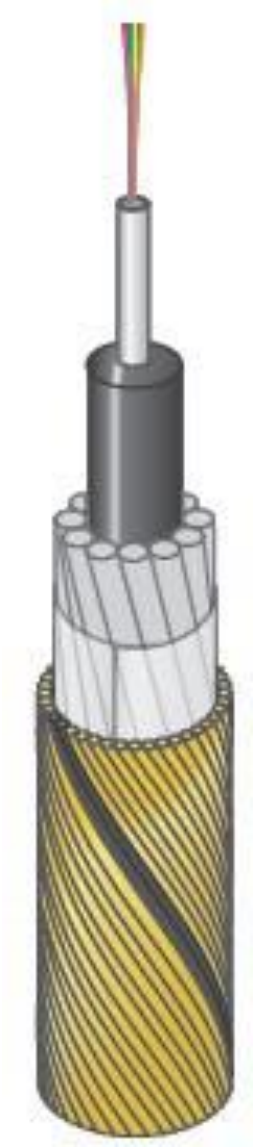
5.2.2 Mechanical Properties of Land Cable

Weight of cable	
- in air	≈ 20.9 lbs/ft(31.4 kg/m)
Minimum bending radius	
- at laying	7.4 feet (2.27 m)
- at handling (low tension)	5 feet (1.51 m)
- installed	5 feet (1.51 m)
Maximum pulling force	39342 feet (175 kN)
Maximum side wall pressure[1)]	1200 lbs./ ft.(17.5 kN/m)
[1)] SWP = Pulling Force / Bending Radius	

Full Technical specifications for the land cable are illustrated in Appendix C

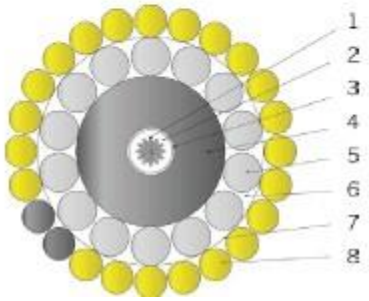
5.3 Submarine Fiber Optic Cable

Figure 5-3. Submarine Fiber Optic Cable



Design

1. Primary coated fiber ..... Silica, acrylate
2. Filling compound ..... Thixotropic compound
3. Tube ..... Stainless steel
4. Sheath ..... Polyethylene, black
5. Armoring ..... Galvanized steel wires, single layer 14 x ø3.0 mm
6. Filling compound ..... Bitumen
7. Wrapping ..... Polyester tape
8. Wrapping ..... Polypropylene yarns or HDPE sheath



Typical Data

Temperature range
Operation ..... -30 till +60°C
Storage ..... -40 till +70°C
Installation ..... -15 till +40°C

Maximum water depths
..... 3000 m

Bend radius
No tensile load ..... ≥ 0.5 m
With tensile load ..... ≥ 1.5 m
Coiling ..... ≥ 1.5 m

Dimensions
Diameter ..... 22 mm

Weight
In air ..... 1.1 kg/m
In seawater ..... 0.8 kg/m

Tensile force
UTS ..... ≥ 130 kN
FBL ..... ≥ 130 kN
NTTS ..... 100 kN
NOTS ..... 70 kN
NPTS ..... 50 kN

Crush resistance
..... ≤ 10 kN/10 cm

Impact resistance
..... ≤ 200 J

Mechanical and environmental test in accordance with IEC 60794-1-21 and IEC 60794-1-22

Electroding conductor
Electrical resistance ..... 7 Ω/km

6.0 HORIZONTAL DIRECTIONAL DRILLING

Horizontal Directional Drilling is part of the Marine Cable Installation for CHPE. This method statement contains a written interpretation of the construction methods and procedures planned by HT to be endorsed prior to and during this project.

The drilling spread will be on land for the Stony Point installation. This drill will exit into a Conductor Casing, underwater, and exit onto the support barge.

6.1 HDD Overview

To facilitate the initial landing of the submarine cables, Horizontal Directional Drilling (HDD) will be employed to install two separate conduits commencing from the transition vault(s) and ending in the Hudson River.

- Drill 1 – Putnam Station 2 Ea. @ 900 LF HDD 12" DR9 HDPE Conduits
- Drill 2 – Cementon 2 Ea. @ 800 LF HDD 12" DR9 HDPE Conduits
- Drill 3 – Stony Point 2 Ea. @ 2,400 LF HDD 12" DR9 HDPE Conduits
- Drill 4 – Congers 2 Ea. @ 2,500 LF HDD 12" DR9 HDPE Conduits

The drilling aspect of the operation will be performed by Huxted Trenchless, LLC (HT). Caldwell Marine International, LLC (CMI) will provide marine support, permanent materials, supervision, and management of the operation. This installation manual is written for Drill #3 – Stony Point. The methodology for drill number(s) 1, 2, and 4 will be provided in a separate Installation Manual.

6.2 Pre-Installation Procedures, Site Logistics, Environmental Considerations

6.2.1 Pre-Installation Procedures

As per the Marine Traffic Management Plan, prior to any marine activity, a Notice to Mariners will be issued to the US Coast Guard. This will be accomplished by submitting to the US Coast Guard a narrative description along with a drawing of intended vessel/barge layout, together with details of the work including but not limited to work hours, safety lighting plan, anchor plan, etc. Work barges to be utilized are intended to have spud anchor systems. Upon notice of start of work to the US Coast Guard, the NY Port – District 1 will issue a Notice to Mariners for the specified duration of the work.

Caldwell Marine International shall post standard day shapes & lighting in accordance with the USGC regulations concerning vessels limited in their ability to maneuver and or

vessels at anchor. Furthermore, CMI vessel crews shall maintain daily communications with Vessel Traffic Control and all commercial vessels in the area.

Prior to the start of operations all existing utilities will be marked and mapped on the site plan. One Calls per 16 NYCRR 753 (Protection of Underground Facilities) and contact with private landowners will be used to ensure all existing utilities are well marked. The drill entry and exit locations will be staked out. The need for some clearing, grading and grubbing for preparation of the site is anticipated. The immediate area occupied by the HDD spread will be surrounded by a silt fence per the approved SWPP plan. Silt fence material to meet NYSDEC standards and to be installed per manufacturer's instructions.

Clearing of existing overgrowth and vegetation in the temporary easement area shall proceed while considerations are made for protection of visual resources, where applicable.

6.2.2 Site Logistics

- Access to the site(s) will be via the public Roads and ROW's, and defined access roads. If any crossing of private property is required permission easements will be provided by Owner.

- No topsoil stripping will be allowed. The access road will be constructed from ¾" clean stone – 6" thick placed over a bed of filter fabric. The access road follows the path of an existing driveway, therefore terrain is favorable and no earth grading is needed to prepare same.

- Parking, if not provided on site will be provided as shown on the drawings or at an acceptable location nearby to the work site.

- The site will be secured by temporary construction fencing furnished by CMI, and the access gate(s) will be locked, rendering the site inaccessible to the general public.

- Construction Traffic during Mobilization is expected to be:

    - Approximately 6-8 Standard over the road Tractor and Trailers. The Tractor and Trailers are anticipated to arrive over the course of 3 days.
    - The Drilling Rig and Mud System will require over the road permits, special Permits are not anticipated for additional loads. CMI will handle permits associated with transportation of our equipment.
    - Approximately 9 Pickup/Utility trucks approximately 2-3 trips each day
    - No disruption to local traffic is expected

- Maintenance and Protection of Traffic (MPT) protection is not expected for the Stony Point HDD. If required please refer to Appendix R – NYSDOT Standard Work Zone Traffic Control Drawings for drawings that will be followed. All signage to be in accordance with NYSDOT and MUTCD regulations.

- Construction Traffic during Operations is expected to be:
  - Workers coming to and from the site each day
    - Approximately 9 Pickup/Utility trucks approximately 2-3 trips each day
  - Inspectors visiting the site
    - Anticipate one car one round trip per day
  - Fuel delivery by tandem axle truck one round trip every two days
  - Disposal of HDD Cuttings by tandem axle truck one round trip every two days
  - Miscellaneous unexpected deliveries and or inspections with passenger car / pickup.
  - No disruption to local traffic is expected
  - MPT is not expected for the Stony Point HDD.

- Nighttime Construction Provisions
  - Operations are expected to be during daylight hours
  - In case of unexpected nighttime operations, generators and area lighting will be used.
  - For noise sensitive areas, a sound barrier will be utilized.

6.2.3 Environmental Considerations for HDD

- Fugitive Dust and Airborne Debris Control measures are not anticipated to be required
- HDD entry pit will be stabilized with earthen berms and straw bales
- Work area will be surrounded by a silt fence
- Soil Management Plan, abide to plan created by Owner.
- Stockpiled Soils (drill entry pit & Deadman anchors)
    - Small stockpiles approximately 3 yd^3 each will be located adjacent to entry pits
        - Material will be protected from run-off
        - Approval / Acceptability: Appendix M describes the criteria used to determine which location the excavated material will be transported to for processing and possible reuse.
            - Material must meet acceptability criteria at the facility and comply with local, state, and federal regulations as well as facility permit requirements. Contractor will provide a completed non-hazardous profile sheet, sampling diagram, appropriate analysis per facility permit requirements and additional certifications as required.

- HDD Cuttings
    - HDD cuttings will be separated from the drilling fluid and stored in 20 yd^3 containers. Since the cuttings are wet the 20 yd^3 container will be filled with 10 yd^3 of material so that the weight is manageable without the need for special permits.
        - Installation of a 1,000 foot crossing of 12-inch pipe will produce approximately 65 cubic yards of drill cuttings. There will be two containers on site at all times for storage and removal of the drill cuttings. The maximum volume of cuttings to be stored on site at any time will be 40 cubic yards.
    - Material will be disposed of accordingly.
        - Approval / Acceptability;
            - Material must meet acceptability criteria at the facility and comply with local, state and federal regulations as well as facility permit requirements.

- Drilling Fluids
    - Drilling fluids will be kept on-site during the entire drilling operation, as they are continuously being re-circulated and processed for re-use in the boreholes using a closed loop system.
- Groundwater Dewatering is not anticipated
- Nuisance control measures are not anticipated

    - The site will be kept in a neat and orderly manner and all trash and debris will be removed as appropriate transported and disposed of by an approved trash service provider.
- Site Restoration
    - Site is to be restored in kind. Disturbed areas to receive topsoil and seed per NYS Soil Erosion and Sediment Control standards.
- Site restoration to consider invasive species control.
- Karner blue butterfly impact is not anticipated at Stony Point.
- Site Clean up
    - The site shall be returned to a clean state
- Please refer to the following Appendixes
    - Appendix F – Drilling Fluid Containment Plan and Erosion/Mud Control Plan (Inadvertent Returns)
- Fuel Storage & Refueling
    - All fuel will be stored in the machineries built in tanks
    - Machinery will be refueled from a fuel supplier
        - Fuel will be transferred in accordance with the fuel supplier's plan
        - Contractor will ensure that at least two of its people will participate/ observe the fueling operation.
        - At least one person will man the pumps shut off valve at all times
        - All hose joints (if used) will have buckets and be observed during fueling
        - Spill response kits will be on site and readily available
        - Fire extinguishers will be on site and readily available

6.2.4 HDD Personnel and Equipment

6.2.4.1 Personnel

The supervisory personnel proposed by HT on this project have an average 20 years' experience in HDD. All of the supervisory personnel have worked on underwater exits in the HDD industry.

A list of the personnel, including key personnel and resumes will be provided as part of this installation manual prior to all drilling.

Drill Crew (per shift):

Superintendent 1
Driller 1
Mud Operator 1
Heavy Equipment Operators 2 - 4
Drill hands 2 - 4

Driver 1
Steering Engineer 1

6.2.4.2 Equipment

1. Drilling Rig (500,000 lb push/pull)
2. Power Unit
3. Mud Systems (147 BBL capacity each)
4. Mud Pumps 446 (325-350 gpm)
5. Control Cab (10' x 8')
6. Vac. Trailer
7. Excavator & Track Hoe
8. Frac-Tanks
9. Tool Van
10. 6-inch transfer pumps

6.2.5 Typical HDD Construction

6.2.5.1 Pre-Construction Survey

A surveyor, on behalf of Huxted Trenchless LLC will arrive on site prior to the arrival of the equipment. He will layout the centerline(s) of the crossings and install the surface tracking system for all drills.

6.2.5.2 Rig Up

The drilling spread will arrive on site in a predetermined order and will be assembled and set up according to the site layout**.** A small 6'x6'x4' pit will be excavated at the drill entry; the excavated soil (approximately 3 yd^3) will be stockpiled (adjacent to the entry pit) and or used to build a berm surrounding the drill entry pit, additionally straw bales will surround the drill entry pit, followed by orange safety fencing.

To secure the drill rig temporary Deadman anchors will be placed and consist of steel I-Beams driven in the ground.

6.2.5.3 Pilot Hole

The bottom hole assembly for the pilot hole will consist of a tri-coned Drill Bit connected to the jetting assembly. The entire length of the bottom hole assembly is about forty feet. The jetting assembly will be connected to the Non-Magnetic Drill Collar that houses the downhole steering probe. The Non-Magnetic Drill Collar will be connected to the steel drill pipe utilizing the bolt-on connector. Soil borings collected (Appendix T) have determined a harder formation and rock and mud motor will be utilized.

The pilot hole will enter the ground at the predetermined entry point and will follow the design path in both the profile and plan view. This will be accomplished by utilizing the surface tracking information established by the surveyor along with the calculated information received from downhole steering equipment.

Prior to exiting in the river bottom, the drill stem will be flushed with fresh water to eliminate mud exposure on punch out. Once the bit and steering tool has exited, a dive crew will assist in bringing the drill stem up to the working barge using a winch and tag line. The pilot hole assembly is removed, and the drill pipe is re-attached to the winch line. A 30" diameter steel conductor casing will be placed over the exit hole and pushed into the river bottom to capture any residual drill fluid that might escape. The conductor casing pipe will exit onto a marine support barge that contains equipment to handle the drill steel/equipment.

6.2.5.4 Transition Pilot Hole to Ream/Pullback

The drilling crew will be installing a reamer onto the drill string at the rig allowing us to ream from the land side or drill side towards the barge. This scenario is commonly called forward reaming. The reason forward reaming has been chosen for this procedure is to force the majority of mud circulation at the drill entry. This will prevent having a large volume of mud to be contained offshore and reduce exposure to environmental concerns.

6.2.5.5 Reaming

While reaming, the drill rig will exert minimum push pressure on the reamer allowing the rotary torque to dictate the penetration rate. As the drill rig rotates, the winch will be engaged and apply the pull forces on the cable, coordination with the driller and the winch operator will be maintained at all times. As each new section of drill pipe is installed on the drill rig, and the reamer is advanced, a crew will be taking a section of drill pipe from the drill string on the barge.

6.2.5.6 Swabbing

The reamer will be removed from the drill string on the barge and a swab barrel reamer) will be attached.

The swab is pulled through the reamed hole from exit to the entry location. The swab pass is used to clean out the bored hole and make sure it is conditioned properly to accept the proposed HDPE product pipe. This might include multiple passes, making sure the reamed hole is free of any obstruction before pullback.

6.2.5.7 Ream/Pullback

During the drilling and reaming process, a separate crew will be fusing and pre-testing the HDPE product pipe onshore. A marine support crew will tow the assembled product pipe offshore, and line it up with the exit location. The coast guard will be notified prior to launching the HDPE conduit string.
When the product pipe reaches the exit location, it will be mechanically connected to a swivel and lifted above the barge to be pulled back into the bore hole. The marine support at this time will be on constant patrol of the floating HDPE pipe.

Pullback will continue, uninterrupted, as drill pipe is removed on the drill rig. Once the product pipe has reached the entry pit, the pulling assembly will be removed, and the pipe allowed to relax. The product pipe will be proofed and pull line installed for future cable pulling operations.

6.2.5.8 Rig Down/Demobilization

Once the product pipe has been successfully installed, all equipment, mud, cuttings, and debris will be removed from the work site. The used drilling fluid and cuttings will be hauled to an approved disposal facility. The work area will be returned to pre-drill conditions for final restoration.

6.3 HDD Marine Support

The marine support for the HDD operation will consist of the following activities:

- Support Barge with a crane
- Dive support for recovery of the down hole tooling
- Affix the HDPE conduit string to the reamer assembly
- Connect the reamer/HDPE assembly to the drill string
- Support for the reaming operation
- Handling and feeding of the HDPE conduit(s) into the HDD bores
- Clean up & disposal of surplus offshore drilling fluids

6.3.1 Marine Support Equipment

- Deck Barge with Spuds
  - 150–200-ton Crane
  - ICE 416 & HPSI 400 Vibratory Driver / Extractor
  - Environmental Clamshell Bucket
  - Generator
  - Tool Room
  - SDO2 Dive Spread
  - Broco Underwater Burning Rig
  - Diesel Welder
  - Deck Lighting
  - Emergency Spill Response Kit
  - Porta-John
  - Office Trailer
  - Lunchroom
- Materials Deck Barge – as required
- Scow Barge – as required
- Tugboat - as required
- Work Skiffs

6.3.2 Fusing Support Equipment

- HDPE Fusion Machine
- Generator
- Excavator

6.3.3 Land Support Equipment

- HDPE Fusion Machine
- Generator
- Excavator

6.3.4 Permanent Materials

- 12” DR 9 HDPE Pipe (conduit) in 50’ lengths

6.3.5 Procedures for Marine Support

6.3.5.1 Recovery of Down Hole Tooling

After the drill string has penetrated the gravity cell the down hole tooling will be disconnected by divers. Divers will connect the tooling to the crane, the crane will take up the load until the tool connection point is relaxed. Divers will then remove the fasteners and instruct the crane to take up. With the load supported by the crane, the diver will move to a safe vantage point and the tooling will be recovered to deck.

6.3.5.2 Reamer

At HT’s direction CMI will assist with the connection of the HDPE conduit string to HT’s reamer assembly. With the conduit affixed to the reamer the assembly will be lowered into the gravity cell by the crane. With the reamer in close proximity to the drill string divers will enter the gravity cell and direct the crane so that the assembly can be bolted to the drill string.

6.3.5.3 Navigational Considerations

No navigational buoys are expected to be moved by CMI’s operations.

6.3.6 Procedures for Land Support

6.3.6.1 HDPE Fusion

The HDPE conduit will be delivered by truck in (50’ lengths) and stored at each staging yard local to the respective drill site. Our intention is to fuse the conduit on at the staging yard in one continuous length. Each of the HDPE strings will be ~2,400’ long for Drill #3 at Stony Point. The fusion machine and generator will be staged in a strategic location in each staging area and the HDPE segments will be moved to the machine for fusion. CMI will have the HDPE manufacturer supply a representative to QC the operation. After the pilot hole has been drilled the HDPE pipe will be launched and towed to the HDD drill exit location for pull into the HDD drill entry. The coast guard will be notified prior to launching the HDPE conduit string and movement of the same, waterside, to site.

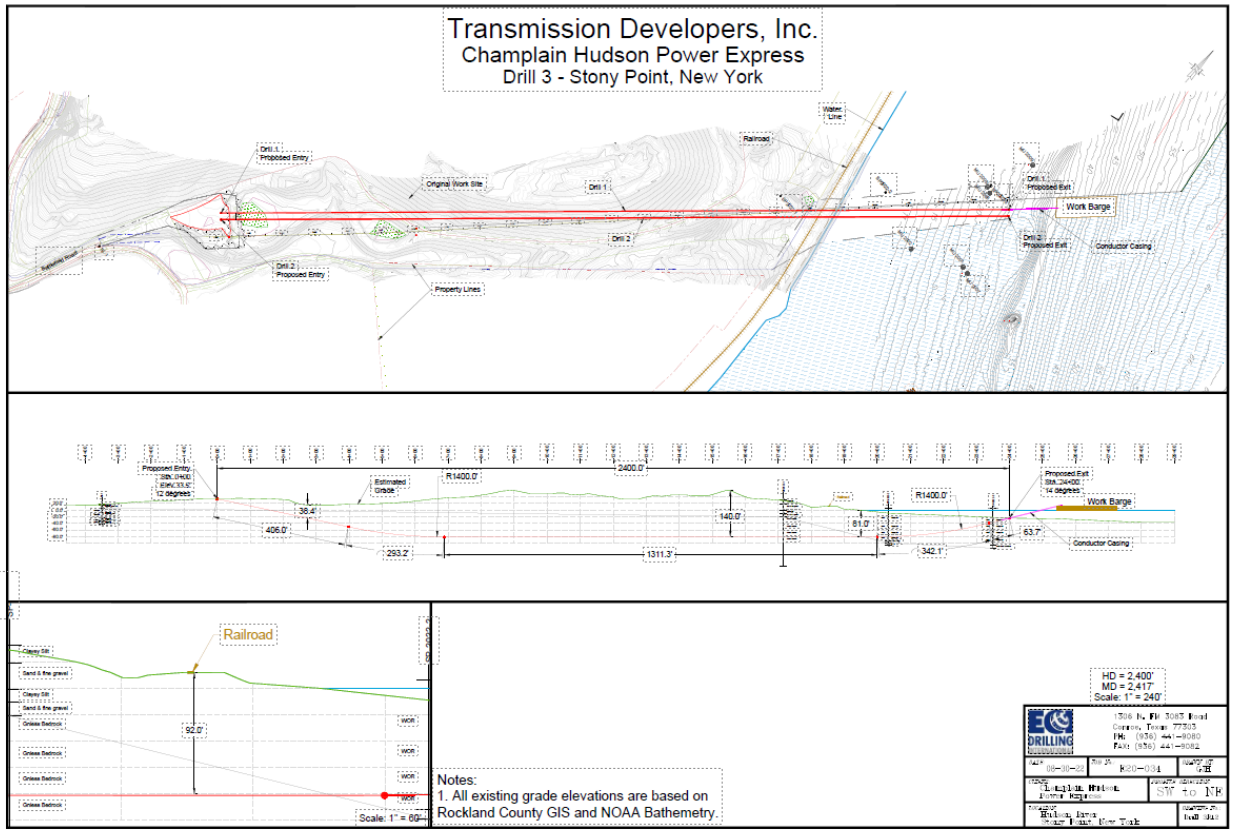


Figure 6-1. HDD Plan and Profile Drill #3 – Stony Point, NY

7.0 INSTALLATION QUALITY ASSURANCE

This section describes *CMI*'s quality assurance system, from project organization to task-oriented Inspection and Test Plans (ITP's), calibration methods and reporting procedures.

7.1 HDD Shoreline Crossings Project Organization

The *CMI* organizational chart for the HDD Shoreline Crossing Work is shown in **Figure 7-1**. The responsibilities of each key member of the installation team are described below in Table 7-1. *CMI* Organizational responsibilities.

Position	Responsibility
General Manager *James B. Yuille*	Reports to the Executive Vice President, and oversees the management, execution, and financial aspects of the project.
Project Executive *Thomas F. Ulisse*	Reports to the General Manager and is responsible for the overall management of the project. The Project Manager is in charge of and controls the performance of the work. He is responsible for project coordination, liaison with the Client, and for all financial, logistic, quality assurance and safety aspects of the work.
Equipment Manager *John S. Gutierrez*	Provides project support, and coordinates directly with the Project Manager and Superintendent. The Equipment Manager is responsible equipment resources.
Operations Manager *Ed Phillips*	Provides project support and is responsible for the performance of the work. The Operations Manager reports to the General Manager.
Cable Division Manager *Brett Bailey*	Provides project support and reports directly to the General Manager.
Cable Superintendent *Paul Larrabee*	Provides project support and reports directly to the Cable Division Manager.
HDD Operations Manager *John Langford*	Provides project support for HDD operations and reports directly to the CMI Operations Manager.
Project Engineer *Dominic Palermo*	Provides project support and reports directly to the Project Executive.
Brett Bryant *Adam Brown*	Responsible for the daily work and reports directly to the Superintendent
Health & Safety Officer *Lucky Abernathy*	The Health & Safety Officer is tasked with ensuring that all aspects of the *CMI* Safety Plan are followed. He reports directly to the Project Superintendent.

Table 7-1 CMI Organizational Responsibilities

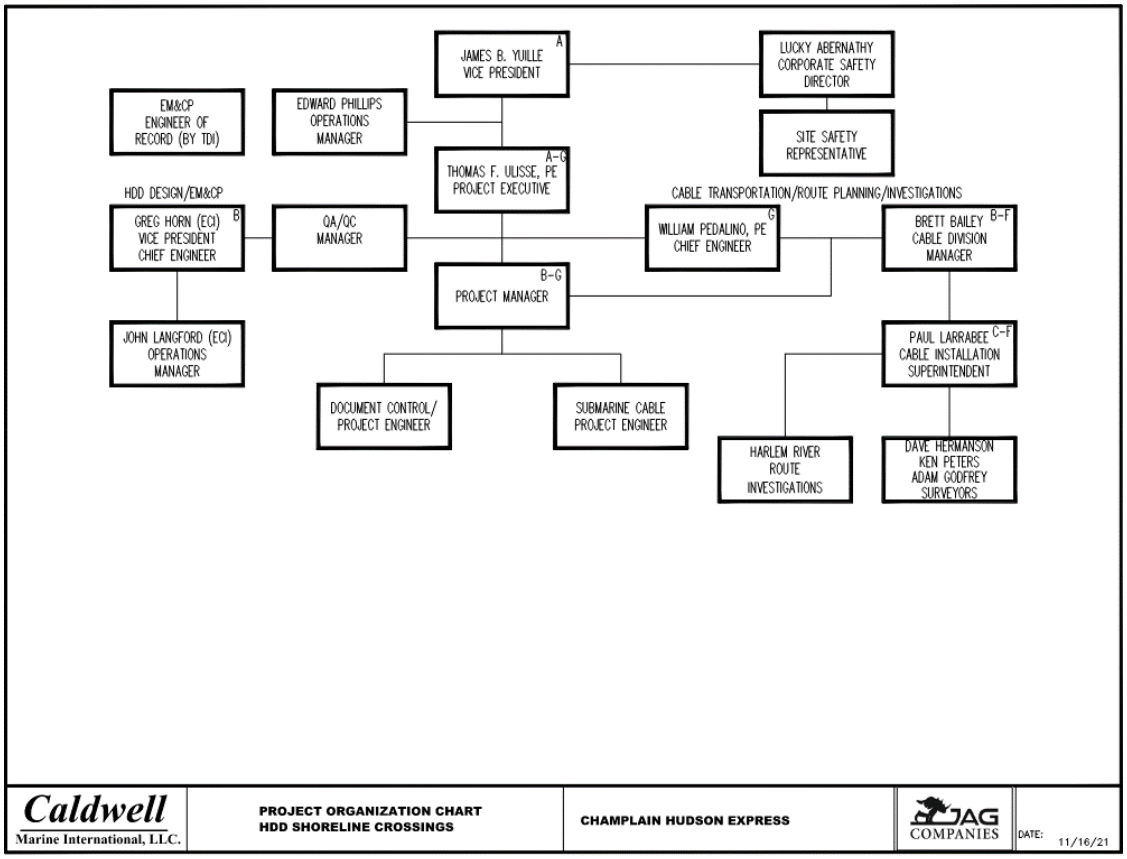


Figure 7-1. CMI Project Organizational Chart

7.2 Daily Reporting

CMI Field Superintendent Brett Bryant (732) 620-4214 is the point of contact for all field operations, subject to change as conditions dictate. Updated contract information for CMI Superintendent to be provided prior to start of construction. A sample Daily Operations Report (DOR) format is included in Appendix A. A copy of this report will be submitted for signature to the on-site representative daily by the *CMI* Field Project Superintendent. A second DOR will be completed when concurrent work is being done and the logistics make one report impractical. The signed reports will then be e-mailed to the respective project parties daily, after operations are completed, or at the soonest opportunity.

7.3 Milestone Meetings

Periodic meetings will be held by the *CMI* Project Manager at specific milestones in the operation. These meetings will be held to review procedures for the specific task to be accomplished and, if the task is repetitive, to review previous procedures with the aim of improving the procedure.

7.4 Installation Inspection and Test Plans (ITP)

Installation and Test Plans (ITP) are part of the quality control monitoring system. ITP's are included in Appendix I.
Inspection plan to include verification of depth of HDD conduit following installation to prove that it mees the required burial depth of submarine cable of 7’ for this segment of the Hudson River.

7.5 Calibration Methods

The gyro will be calibrated prior to use in the HDD work.

7.6 Contingency Plans

The best contingency plan is to plan ahead to avoid emergency situations. Planning includes following a thorough equipment maintenance plan, monitoring weather forecasts and planning activities accordingly, and reliance on past experience to avoid situations that could require the use of a contingency plan. The following section describes the options available in the event of specific system failures.

7.7 Non-conformance Reporting Process

CMI has developed a non-conformance report format to document non-conformances to the specifications. The non-conformance report includes proposed disposition and/or corrective actions taken to remedy the non-conformance. A sample non-conformance report is attached in Appendix G.

7.8 Marine Traffic Management Plan

Standard *CMI* policy is to issue a Notice to Mariners prior to commencement of any marine work at each respective HDD marine support location. *CMI* guidelines for marine work follow standard industry practice.

8.0 ENVIRONMENTAL ASPECTS

8.1 Weather Operational Limits

CMI will consult the publicly available weather forecasts on a daily basis for the operation. Estimated operational limits for specific phases are shown in Table 7-1, maximum operating limits for wind speed at wave height will vary depending on the direction of the wind and waves. These are only estimated operating windows and the actual maximum wind speeds and wave heights are highly dependent on the location of the site relative to the wind and wave direction.

Should conditions exceed the operating windows the course of action will be decided on-site by the supervisor in charge of each task.

PHASE	SUPERVISOR	ESTIMATED MAXIMA	
		Wind (kts)	Wave Ht (m)
Marine Work	Superintendent	15 - 20	<2.5ft
Land Work	Superintendent	20-25	NA

Table 8-1. Estimated operating windows for the marine installation.

8.2 Environmental Considerations

CMI will ensure that all work is completed in accordance with the permits, the forthcoming Environmental Monitoring and Construction Plan (EM&CP), the USACOE permit, and common industry practice.

8.3 Environmental Monitoring and Sampling

Environmental monitoring and sampling where required by any operation, permit, or regulatory authority will be completed by other third parties with the understanding that the results of analysis generated from any sample collection will be made available within a timely manner.

8.4 Cultural Resources

Archaeological work is not anticipated during this project, however, should archaeological materials, including human remains, be encountered during construction, CMI will stabilize the area and cease construction activities in the immediate vicinity and contact the CMI and NKT Project Managers and the CMI General Manager.

8.5 Spill Prevention

CMI has developed a comprehensive spill prevention plan designed specifically to prevent spills in marine operations. The plan can be found in Appendix E.

9.0 APPENDICES

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Marine International, LLC.

Appendix A – Daily Operations Report

1229 – Champlain Hudson Power Express
Daily Operations Report
DOR: 10
Tuesday, January xxth 20xx
Client: NKT

CMI Representative	CMI	Email address
CMI Representative	CMI	
CMI representative	CMI	
CMI Representative	CMI	
CMI Representative	CMI	
CMI Representative	CMI	
NKT Representative	NKT	

A. Summary of Activities to Date:

- Support of Manholes 7 & 8

B. Today's Activities:

- Welding of Manhole Covers

C. 5- Day Look Ahead:

1/16/19	Demobilization

D. Safety:

	Today	Cumulative	
Incidents	0		
Accidents	0		
Near Miss Events	0		
Safety Meetings	0	0	

E. Weather:

Time	Wind Dir.	Speed MPH	Vis (mi)	Temp	Conditions/ Remarks
0600	S	8	10	34	Partly Cloudy
1200	S	6	10	37	Partly Cloudy
1800	S	6	10	34	Partly Cloudy

F. Diary of Events:

Time	Activity
0800	Start of Shift
0830	Setup at Manholes
830-1930	Support of Manholes
2000	End of Shift

G.CMI Personnel on Site:

	Name	Title	ST	OT	DT	
1						
2						
3						
4						

H. Equipment:

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Marine International, LLC.

EQ #	Description	Location	Owner
	1997 Ford F-800 22’ Box Truck		NRC
	(50) Traffic Cones		NRC
	(2) Manhole protection rails		NRC
	(2) 16’ extension ladders		NRC
	Powerwasher		NRC
	(2) portable generators, one with light stand attached		NRC
	(3) 2” submersible pump		NRC
	(1) 300 gallon empty water tank		NRC
	Windmaster signs: (2) arrows, (4) Road Work Ahead, (2) Merge Right, (2) Merge Left, (1) Flagman Ahead		NRC
	(2) Stop/Slow traffic paddles		NRC
	(30) Traffic Cones		CMI
	(2) 2” Trash Pumps		CMI

Contractor Comments: Welding of Manholes

Client Comments:

CMI Representative ***Client:*** _____

Caldwell Marine Int.OCUA

Appendix B– HDPE Specifications

Table 9-1. Typical Sizes and Dimensions HDPE

FORTILINE
HDPE FUSION GROUP
a MORSCO brand

Iron Pipe Size (IPS) and Dimension Data **PE4710**

Pipe for Municipal and Industrial Applications

Pressure Ratings are calculated using 0.63 cesign factor for HDS at 73°F as listed in PPI TR-4 for PE 4710 materials. HDPE can accomodate up to 1.5 times the pipe pressure rating for a recurring surge and up to 2.0 times the pipe pressure rating for an occasional surge. Temperature, Chemical, and Environmental use considerations may require use of additional design factors.

Pressure Rating		335 psi DR 7.0			250 psi DR 9.0			200 psi DR 11.0			160 psi DR 13.5			
Nominal Pipe Size	IPS OD (in)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Minimum Wall (in)	Average ID (in)	Weight (lbs/ft)	Nominal Pipe Size
1 1/4"	1.660	0.237	1.158	0.46	0.184	1.270	0.37	0.151	1.340	0.31	0.123	1.399	0.26	1 1/4"
1 1/2"	1.900	0.271	1.325	0.61	0.211	1.453	0.49	0.173	1.533	0.41	0.141	1.601	0.34	1 1/2"
2"	2.375	0.339	1.656	0.95	0.264	1.815	0.77	0.216	1.917	0.64	0.176	2.002	0.53	2"
3"	3.500	0.500	2.440	2.06	0.389	2.675	1.66	0.318	2.826	1.39	0.259	2.951	1.16	3"
4"	4.500	0.643	3.137	3.40	0.500	3.440	2.75	0.409	3.633	2.31	0.333	3.794	1.92	4"
6"	6.625	0.946	4.619	7.37	0.736	5.065	5.96	0.602	5.349	5.00	0.491	5.584	4.15	6"
8"	8.625	1.232	6.013	12.50	0.958	6.594	10.11	0.784	6.963	8.47	0.639	7.270	7.04	8"
10"	10.750	1.536	7.494	19.42	1.194	8.219	15.70	0.977	8.679	13.16	0.796	9.062	10.93	10"
12"	12.750	1.821	8.889	27.31	1.417	9.746	22.08	1.159	10.293	18.51	0.944	10.749	15.38	12"
14"	14.000	2.000	9.760	32.93	1.556	10.701	26.63	1.273	11.301	22.32	1.037	11.802	18.54	14"
16"	16.000	2.286	11.154	43.01	1.778	12.231	34.78	1.455	12.915	29.15	1.185	13.488	24.22	16"
18"	18.000	2.571	12.549	54.43	2.000	13.760	44.02	1.636	14.532	36.89	1.333	15.174	30.65	18"
20"	20.000	2.857	13.943	67.20	2.222	15.289	54.34	1.818	16.146	45.54	1.481	16.860	37.84	20"
22"	22.000	3.143	15.337	81.32	2.444	16.819	65.75	2.000	17.760	55.10	1.630	18.544	45.79	22"
24"	24.000	3.429	16.731	96.77	2.667	18.346	78.25	2.182	19.374	65.58	1.778	20.231	54.49	24"
26"	26.000				2.889	19.875	91.84	2.364	20.988	76.96	1.926	21.917	63.95	26"
28"	28.000				3.111	21.405	106.51	2.545	22.605	89.26	2.074	23.603	74.17	28"
30"	30.000				3.333	22.934	122.27	2.727	24.219	102.47	2.222	25.289	85.14	30"
32"	32.000				3.556	24.462	139.12	2.909	25.833	116.58	2.370	26.976	96.87	32"
34"	34.000				3.778	25.991	157.05	3.091	27.447	131.61	2.519	28.660	109.36	34"
36"	36.000				4.000	27.520	176.07	3.273	29.061	147.55	2.667	30.346	122.60	36"
42"	42.000							3.818	33.906	200.84	3.111	35.405	166.88	42"
48"	48.000													48"
54"	54.000													54"

This size and dimension chart is intended for reference purposes. It should not be used in place of the advice from a licensed Professional Engineer. Pipe weights are calculated in accordance with PPI TR-7. Average inside diameter is calculated using IPS OD and Minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary. When designing components to fit the pipe ID, refer to pipe dimension and tolerances in the applicable pipe manufacturing specification.

High Density Polyethylene

TYPICAL PROPERTIES

HDPE CHARACTERISTICS
TYPICAL PROPERTIES
CHEMICAL RESISTANCE CHART
SIZE AND DIMENSION CHARTS BY APPLICATION
CALCULATION PROGRAMS

HIGH DENSITY POLYETHYLENE PIPE
Typical Physical Properties***

Property	Specification	Unit	Nominal Value
Material Designation	PPI / ASTM		PE 3408
Material Classification	ASTM D-1248		III C 5 P34
Cell Classification	ASTM D3350-99		345464C
-Density (3)	ASTM D-1505	gm/cm3	0.955
-Melt Index (4)	ASTM D-1238 (216 kg/190iC)	gm/10 min.	0.11*
-Flex Modulus (5)	ASTM D-790	psi	135,000
-Tensile Strength (4)	ASTM D-638	psi	3,200
PENT (6)	ASTM F-1473	Hours	>100
-HDB @73i F (4)	ASTM D-2837	psi	1,600
-HDB @ 140 Deg F	ASTM D-2837	psi	800
-U-V Stabilizer (C)	ASTM D-1603	% C	2.5
Hardness	ASTM D-2240	Shore "D"	65
Compressive Strength (yield)	ASTM D-695	psi	1,600
Tensile Strength @ Yield (Type IV Spec.)	ASTM D-638 (2"/min.)	psi	3,200
Elongation @ Yield	ASTM D-638	%, minimum	8
Tensile Strength @ Break (Type IV Spec.)	ASTM D-638	psi	5,000
Elongation @ Break	ASTM D-638	%, minimum	750
Modulus of Elasticity	ASTM D-638	psi	130,000
PENT (6)	ASTM F-1473	Hours	>100
(Cond. A, B, C: Mold. Slab)	ASTM D-1693	Fo, Hours	>5,000
(Compressed Ring - pipe)	ASTM F-1248	Fo, Hours	>3,500
Slow Crack Growth	Battelle Method	Days to Failure	>64
Impact Strength (IZOD) (.125Ó Thick)	ASTM D-256 (Method A)	In-lb / in notch	42
Linear Thermal Expansion Coef.	ASTM D-696	in / in/iF	1.2x10-4
Thermal Conductivity	ASTM D-177	BTU-in/ft2/ hrs/ degreesF	2.7
Brittleness Temp.	ASTM D-746	degrees F	< -180
Vicat Soft. Temp.	ASTM D-1525	degrees F	257
Heat Fusion Cond.	ASTM D-1525	@ psi degrees F	75 @ 400

*** This list of typical physical properties is intended for basic characterization of the material

Table 9-2. Typical Properties HDPE

(ISCO Industries)

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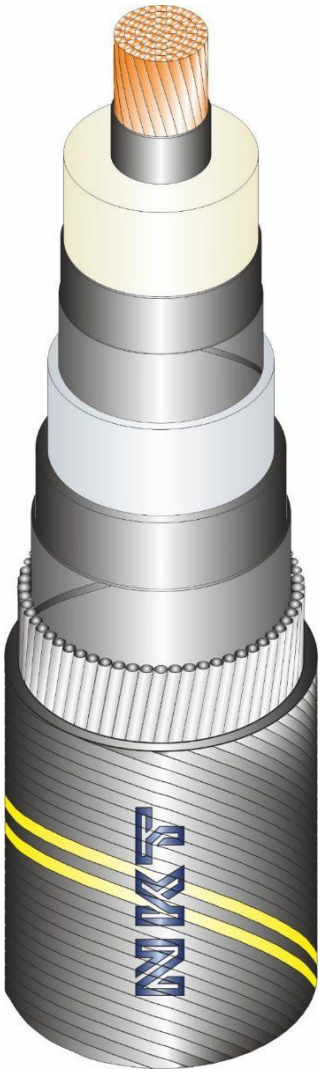
Appendix C– Submarine Cable Technical Specifications

Submarine Cable Design Sheet – 1,250 MW



DC Voltage	±400 kV	
Conductor	Profiled wires	
Type / material	Copper, Compound Water-Blocked	
Cross-section	4935 kcmil	2500 mm2
Water blocking	compound	
Diameter	2.28 in	57.8 mm
Conductor binder		
Material	semi-conductive swelling tape	
Thickness	22 mils	0.6 mm
Conductor shield		
Material	semi-conductive polymer	
Thickness	59 mils	1.5 mm
Insulation		
Material	cross-linked DC polymer	
Thickness	839 mils	21.3 mm
Insulation shield		
Material	semi-conductive polymer	
Thickness	55 mils	1.4 mm
Longitudinal water barrier		
Material	semi-conducting swell-able tape	
Thickness	26 mils	0.7 mm
Metallic sheath		
Type / material	extruded / lead alloy	
Thickness	118 mils	3 mm
Inner sheath		
Material	high-density polyethylene	
Thickness	98 mils	2.5 mm
Tensile armour		
Type / material	wire / steel	
Thickness	197 mils	5 mm
Outer serving		
Material	polypropylene yarn, 2 layers	
Thickness	157 mils	4 mm
Complete cable		
Diameter	5.44 inches	138.1 mm
Weight in air	36.4 lbf./ft.	54.2 kg/m
Weight in water	26.9 lbf./ft.	40.1 kg/m

Note: All data shall be considered nominal

Electrical Cable Properties

The submarine cable has the following electrical properties:

Rated continuous DC voltage, U_0	400 kV
Switching impulse withstand level (SIWL) started from U_0	900 kV
Subtractive SIWL started from U_0 to voltage at opposite polarity	400 kV
Rated continuous current under the installation conditions	1,638 A
Maximum conductor temperature in normal operation	70 °C
DC resistance at 20 °C	0.0022 ohm/1,000 ft. (0.0072 ohm/km)
DC resistance at maximum conductor temperature	0.0026 ohm/1,000 ft. (0.0086 ohm/km)
Losses at rated current	7.6 W/ft. and cable (25.0 W/m)
Capacitance	0.081 μF/1,000 ft. (0.265 μF/km)
Inductance (between conductor and metallic sheath)	0.040 mH/1,000 ft. (0.132 mH/km)
Surge impedance	22.3 ohm

Caldwell

Marine International, LLC.

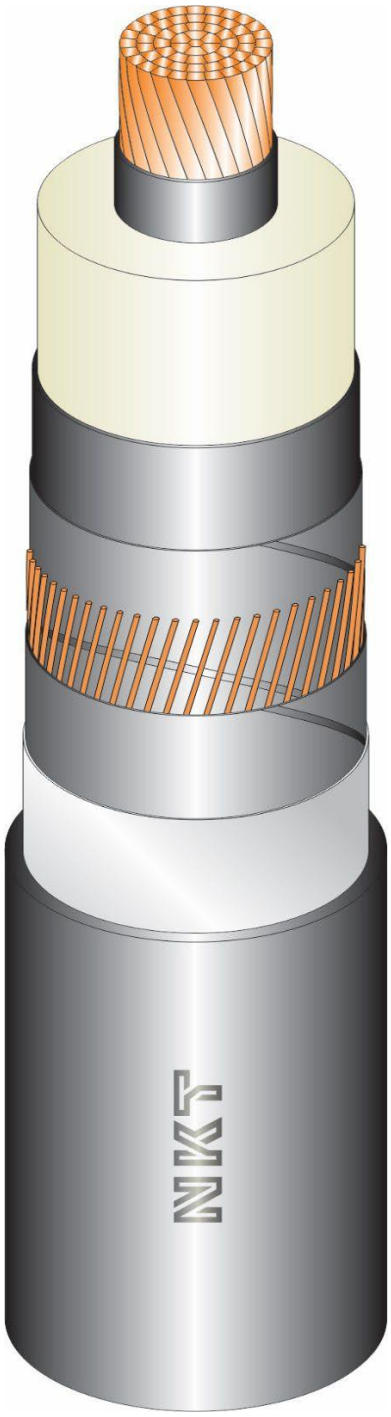
Mechanical Cable Properties

Maximum Water Depth	400 feet (121.92 m)
Minimum bending radius	
- at laying (tension less than or equal 20 kN)	5.9 feet (1.8 m)
- at handling (tension greater than 20 kN)	6.9 feet (2.1 m)
- installed	5.9 feet (1.8 m)
Minimum bending radius for Chute	13.8 feet (4.2 m)
Minimum bending radius for turntable	6.9 feet (2.1 m)
Minimum coiling diameter 200 meters away from factory flexible joint	83 feet (25.3 m)
Minimum coiling diameter within 200 meters of a factory flexible joint	83 feet (25.3 m)
Maximum pulling force in conductor	
Straight Pull with conductor weld	54853lbs. (244kN)
Max permissible tension during bending MBR = 4.2 meters	47210lbs. (210kN)
Maximum side wall pressure $SWP = \frac{PullingForce}{BendingRadius}$	11240 lbs./ft. (50kN/m)

Caldwell

Marine International, LLC.

Land Cable Design Sheet – 1,250 MW



DC Voltage	±400 kV	
Conductor		
Type	Profiled Wire	
Material	Cu, Water-Blocked	
Cross-Section	4935 kcmil	2500 mm2
Diameter	2.28 in	57.8 mm
Conductor Shield/Screen		
Material	Semiconducting PE	
Thickness	59 mils	1.5 mm
Insulation		
Type	Triple Extruded, Dry Cured	
Material	XLPE	
Thickness	839 mils	21.3 mm
Diameter	4.11 in	104.5 mm
Insulation Shield/Screen		
Material	Semiconducting PE	
Thickness	55 mils	1.4 mm
Diameter	4.22 in	107.3 mm
Metallic Shield/Sheath		
Material	Semiconducting Swelling Tape	
Thickness	51 mils	1.3 mm
Type	Round Concentric Wires	
Material	Copper	
Cross-Section	150 kcmil	75 mm2
Longitudinal Moisture Barrier		
Material	Semiconducting Swelling Tape	
Thickness	53 mils	1.35 mm
Radial Moisture Barrier		
Material	Al-laminate	
Thickness	8 mils	0.2 mm
Jacket/Outer Sheath		
Material	HDPE	
Thickness	197 mils	4.8 mm
Conductive Layer	8 mils	.2 mm
Complete Cable		
Diameter	4.94 in	125.6 mm
Weight	20.9 lbs/ft	31.4 kg/m

All values should be considered indicative!

Electrical Cable Properties

The land cable has the following electrical properties:

Rated continuous DC voltage, U_0	400 kV
Switching impulse withstand level (SIWL) started from U_0	900 kV
Subtractive SIWL started from U_0 to voltage at opposite polarity	400 kV
Rated continuous current under the installation conditions.	1,638 A
Maximum conductor temperature in normal operation	70 °C
DC resistance at 20 °C	0.0022 ohm/1,000 ft. (0.0072 ohm/km)
DC resistance at maximum conductor temperature	0.0026 ohm/1,000 ft. (0.0086 ohm/km)
Losses at rated current	7.6 W/ft. per cable (25.0 W/m)
Capacitance	0.081 μF/1,000 ft. (0.27 μF/km)
Inductance (between conductor and metallic screen)	0.040 mH/1,000 ft. (0.131 mH/km)
Surge impedance	22.2 ohm

Land Cable Mechanical Cable Properties

Weight of cable	
- in air	≈ 20.9 lbs/ft(31.4 kg/m)
Minimum bending radius	
- at laying	7.4 feet (2.27 m)
- at handling (low tension)	5 feet (1.51 m)
- installed	5 feet (1.51 m)
Maximum pulling force	39342 feet (175 kN)
Maximum side wall pressure[1)]	1200 lbs./ ft.(17.5 kN/m)
[1)] SWP = Pulling Force / Bending Radius	

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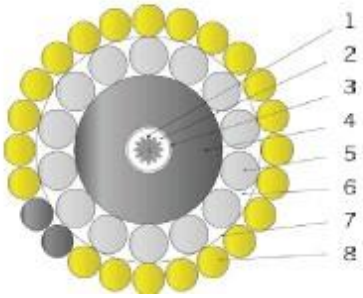
Submarine Fiber optic cable

Design

1. Primary coated fiber ..... Silica, acrylate
2. Filling compound ..... Thixotropic compound
3. Tube ..... Stainless steel
4. Sheath ..... Polyethylene, black
5. Armoring ..... Galvanized steel wires, single layer 14 x ø3.0 mm
6. Filling compound ..... Bitumen
7. Wrapping ..... Polyester tape
8. Wrapping ..... Polypropylene yarns or HDPE sheath



Typical Data

Temperature range
Operation .....-30 till +60°C
Storage .....-40 till +70°C
Installation .....-15 till +40°C

Maximum water depths
.....3000 m

Bend radius
No tensile load.....≥ 0.5 m
With tensile load .....≥ 1.5 m
Coiling .....≥ 1.5 m

Dimensions
Diameter.....22 mm

Weight
In air.....1.1 kg/m
In seawater.....0.8 kg/m

Tensile force
UTS.....≥ 130 kN
FBL .....≥ 130 kN
NTTS.....100 kN
NOTS .....70 kN
NPTS .....50 kN

Crush resistance
.....≤ 10 kN/10 cm

Impact resistance
.....≤ 200 J

Mechanical and environmental test in accordance with IEC 60794-1-21 and IEC 60794-1-22

Electroding conductor
Electrical resistance .....7 Ω/km

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Appendix D – Emergency Response Plans

Emergency Response Plan

Fire Project: Installation of the CHPE Transmission Cable System:
Emergency: Fire on Board Floating Plant.

Overview

This Emergency Response Plan (ERP) has been developed specifically to support the Caldwell Marine International, LLC (CMI) marine operations. The purpose of this plan is to provide a precise set of procedures and protocols that will be used by CMI during a fire on board floating plant. Most fires start small and can be extinguished quickly. The crew must stay alert for smoke at all times. Keep flammable materials in the proper storage containers, maintain good housekeeping, and know the location of the on-board fire extinguishers.

Organization	Phone Number	Alternate
US Coast Guard	212-668-7000	VHF channel 16
Fire Department	911	
Ambulance	911	
Corporate Safety Director Lucky Abernathy	732-557-6100	908-433-3755 cell
CMI Superintendent Brett Byrant		732-620-4214

Procedure

1. Alert the rest of the crew to the fact that there is smoke and or fire.
    a. Location of fire
    b. Type of fire A,B,C,
    c. Size of fire
    d. Source of fire
2. The barge superintendent/vessel master will quickly muster the crew, get a head count, and then provide help to the first responder.
3. Locate the nearest fire extinguisher and attempt to put out the fire.
4. Establish communications with local rescue agency (if necessary).
5. If the fire can not be contained the barge superintendent/vessel master will evacuate the crew to safety.

After Action Report

Provide the Caldwell Marine International with a detailed chronological situation report ASAP. The formal report must be to the Health and Safety Officer within 24 hours of the incident, no exceptions.

Make a full detailed entry of the incident and all actions taken in the Daily Logs. (It is impossible to provide too much detail.)

Interview all crew and have them prepare and sign witnessed statements attesting to or denying knowledge of particulars of incident.

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Emergency Response Plan - Injury

Project: Installation of the CHPE Transmission Cable System:

Emergency: Crewmember Injury

Overview

This Emergency Response Plan (ERP) has been developed specifically to support the Caldwell Marine International, LLC (CMI) marine operations. The purpose of this plan is to provide a precise set of procedures and protocols that will be used by CMI during an injury of a crewmember.

Organization	Phone Number	Alternate
US Coast Guard	212-668-7000	VHF channel 16
Fire Department	911	
Ambulance	911	
Corporate Safety Director Lucky Abernathy	732-557-6100	908-433-3755 cell

Procedure

First Responder provide First Aid to the victim and notify the barge Superintendent. When the superintendent is notified of an injury of a crewmember IMMEDIATELY:

- Begin chronological documentation.
- Log head count.
- Contact local rescue agency (If necessary).
- Start arranging for transportation to the dock. (If necessary)
- **Monitor stages of patients condition and update the local rescue agency and Caldwell Marine International if they have been notified.**
- **Release the victim to the EMT with as much information about the accident as possible record what Hospital the victim is taken to.**

After Action Report

Provide the Caldwell Marine International with a detailed chronological situation report ASAP. The formal report must be to the Health and Safety Officer within 24 hours of the incident, no exceptions. Ensure the report includes not only how the incident occurred,

but also “WHAT WAS DONE FOR THE CREWMAN AND HIS RESPONSES TO ATTEMPTED TREATMENT”

Make a full detailed entry of the incident and all actions taken in the Daily Logs. (It is impossible to provide too much detail)

Interview all crew who knew where the crewman was at the time of injury and have them prepare and sign witnessed statements attesting to or denying knowledge of:

- What the crewman was doing and any statements he made before, during, and after the incident.
- What took place around and for the crewman before, during and after the incident.
- What safety gear the person was or was not wearing.
- Did the witness believe the person knew he was in a hazardous situation and why did the incident occur.
- Were all available preventable measures attempted by the crewman before the incident occurred?

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Emergency Response Plan – Man Overboard

Project: Installation of the CHPE Transmission Cable System:

Emergency: Man Overboard

Overview

This Emergency Response Plan (ERP) has been developed specifically to support the Caldwell Marine International, LLC (CMI) marine operations. The purpose of this plan is to provide a precise set of procedures and protocols that will be used by CMI during a Man Overboard Incident.

Organization	Phone Number	Alternate
US Coast Guard	212-668-7000	VHF channel 16
Fire Department	911	
Ambulance	911	
Corporate Safety Director Lucky Abernathy	732-557-6100	908-433-3755 cell

Procedure

IF A PERSON IS WITNESSED FALLING OVER THE SIDE:

Spotter notifies barge superintendent of the incident immediately by any means so as not to lose sight of victim. Spotter designated and has visual contact of person in water and has no other assigned task that would require him to ever lose visual contact.

If the barge is spud down or the vessel anchored and the victim is able to help themselves back to the vessel assist them in the up and over process.

If underway turn stern hard over away from the side the person fell over.
Flotation devices and light markers thrown overboard.
Begin a written chronological record of the event. Record latitude and longitude

If victim does not give the "OK" signal, begin establishing communications with the nearest rescue facility to standby for medical evacuation.

Rescue Crew:

Complete a head count of all personnel aboard. (Ensure only one person missing.)

Rescue boat and boat crew rigged and ready to launch.

One member of rescue boat crew outfitted as rescue swimmer, rigged with retrieval harness and retrieval line.

Medical equipment standing by ready to treat for hypothermia and/or possible blunt trauma from the fall.

Utilize rescue swimmer to bring victim to ladder mounted on beam.

No matter the rescued victim's verbal description of his/her medical condition, perform primary and secondary medical survey.

Update the rescue facility it they were initially called. If they are already enroute to your position, have them continue to take the person to a medical facility.

Provide the Caldwell Marine International with a detailed chronological situation report ASAP. The formal report must be to the companies Health and Safety Officer within 24 hours of the incident, no exceptions.

IF PERSON IS ASSUMED MISSING OVERBOARD:

Immediately establish contact with, and provide detailed chronological situation report with the nearest search and rescue agency.

Begin search as advised by assisting rescue agency.

Call for any vessels in the vicinity to assist in search if willing. Determine water temperature, water current direction and speed.
Interview crew under witness, have them prepare and signed witnessed statements attesting to or denying knowledge of following:

- Last area person was seen.
- Last time the person was seen.
- What the person was wearing.

- Any preexisting medical or mental condition.
- What task the person was last assigned to.
- His/her perceived mental state.

Provide the Caldwell Marine International with a detailed chronological situation report ASAP. The formal report must be to the companies Health and Safety Officer within 24 hours of the incident, no exceptions.

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Appendix E – Spill Prevention Plan

Project: Performing HDD for the CHPE Transmission Cable System:

Overview

Caldwell Marine International (CMI) recognizes that reducing the risk of hazardous material spills is the most appropriate strategy for minimizing impacts to the environment. The purpose of this plan is to provide a description of the Best Management Practices (BMP) that will be followed by CMI marine personnel to reduce the risk of spills.

Should a spill occur, despite the best efforts of the CMI management and crew, the response will follow the Emergency Response Plan for Spills, under separate cover.
Procedure
The most likely operational spill will result from fueling operations, consequently, the focus of this plan is to prevent spills during fueling. Additional procedures discuss the BMP's for storage and handling of hazardous materials.

Fueling

The following practices will be used to minimize the potential for spillage during fuelling.

- CMI will ensure that re-fuelling activities are monitored at all times
- During re-fuelling oil/fuel absorbent pads will be placed under the filling port to mitigate spillage
- All containers, hoses, and nozzles will be in good condition with no loose covers, cracks, kinks, soft spots, or bulges, free of leaks, and visually inspected prior to fuelling
- All fuel nozzles will be equipped with functional automatic shut-off devices
- Hoses will be long enough to allow vessel movements within the limits of the mooring
- Before filling a fuel tank, its available capacity will be verified by the operator
- In the event of a leak, all fuelling operations will be halted until the cause of the leak has been identified and the leak repaired
- CMI will ensure that all employees involved in fuel handling have the appropriate training in transfer and emergency spill response procedures.

Hazardous material storage and disposal

In addition to the above measures for fuel and oil handling, CMI will follow the following measures for storage and disposal of hazardous materials.

- Site personnel will be adequately trained in the handling and transportation of hazardous materials
- Material Safety Data Sheets (MSDS) for hazardous materials used on the project will be made available on site
- Hazardous materials will be labelled and stored in a secure area
- Hazardous materials used or generated in the course of the project will be disposed of in compliance with relevant acts and regulations
- A adequate number of members of the installation crew at all sites will be trained in Workplace Hazardous Materials Information System (WHMIS)

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Appendix F – Sample Fraction Mitigation Contingency Plan for Directional Drilling

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FRAC-OUT CONTINGENCY PLAN (FCP)

1.0 Introduction and Purpose

Directional bore operations have a potential to release drilling fluids into the surface environment through frac-outs (A frac-out is the condition where drilling mud is released through fractured bedrock into the surrounding rock and sand and travels toward the surface.) Because drilling muds consist largely of a bentonite clay-water mixture, they are not classified as toxic or hazardous substances. However, if it is released into water bodies, bentonite has the potential to adversely impact fish and invertebrates.

While drilling fluid seepage associated with a frac-out is most likely to occur near the bore entry and exit points where the drill head is shallow, frac-outs can occur in any location along a directional bore. This Frac-Out Contingency Plan (FCP) establishes operational procedures and responsibilities for the prevention, containment, and clean- up of frac-outs associated with the proposed directional drilling utility project of _____. All personnel and Sub- Contractors responsible for the work must adhere to this plan during the directional drilling process.

The specific objectives of this plan are to:

1. Minimize the potential for a frac-out associated with directional drilling activities;
2. Provide for the timely detection of frac-outs;
3. Protect the environmentally sensitive riverbed and associated riparian vegetation;
4. Ensure an organized, timely, and "minimum-impact" response in the event of a frac-out and release of drilling bentonite; and
5. Ensure that all appropriate notifications are made immediately to the customer, management and safety personnel.

2.0 Description of Work:

The proposed project consists of: *(Explain work task in detail to crew members.)*

Drilling operations will be halted by the drill rig operators immediately upon detection of a drop in drilling pressure or other evidence of a frac-out. The clean-up of all spills shall begin immediately. Management & safety department shall be notified immediately of any spills and shall be consulted regarding clean-up procedures. A spill kit shall be on-site and used if a frac-out occurs. A vacuum truck and containment materials, such as straw bales, shall also be on-site prior to and during all operations. The Site Supervisor will be immediately notified. In the event of a frac-out, the on-site foreman/supervisor will conduct an evaluation of the situation and direct recommended mitigation actions, based on the following guidelines:

a. If the frac-out is minor, easily contained. has not reached the surface and is not

b. threatening sensitive resources, drilling operations may resume after use of a leak stopping compound or redirection of the bore;

c. If the frac-out has reached the surface, any material contaminated with Bentonite shall be removed by hand to a depth of 2-feet, contained and properly disposed of, as required by law. The drilling contractor shall be responsible for ensuring that the bentonite is either properly disposed of at an approved disposal facility or properly recycled in an approved manner. The Site Supervisor shall notify and take any necessary follow-up response actions in coordination with agency representatives. The Site Supervisor will coordinate the mobilization of equipment stored at off-site locations (e.g., vacuum trucks) on an as needed basis;

3.0 Site Supervisor/Foremen Responsibilities:

The Site Supervisor/Foremen has overall responsibility for implementing this FCP. The Site Supervisor/Foremen will ensure that all employees are trained prior to all drilling. The Site Supervisor/Foremen shall be notified immediately when a frac-out is detected. The Site Supervisor/Foremen will be responsible for ensuring that the safety department is aware of the frac-out, coordinating personnel, response, cleanup, regulatory agency notification and coordination to ensure proper clean-up, disposal of recovered material and timely reporting of the incident. The Site Supervisor/Foremen shall ensure all waste materials are properly containerized, labeled, and removed from the site to an approved disposal facility by personnel experienced in the removal, transport and disposal of drilling mud.

The Site Supervisor/Foremen shall be familiar with all aspects of the drilling activity, the contents of this Frac-out Contingency Plan and the conditions of approval under which the activity is permitted to take place. The Site Supervisor/Foremen shall have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The Site Supervisor/Foremen shall assure that a copy of this plan is available (onsite) and accessible to all construction personnel. The Site Supervisor/Foremen shall ensure that all workers are properly trained and familiar with the necessary procedures for response to a frac-out, prior to commencement of drilling operations.

4.0 Equipment:

The Site Supervisor shall ensure that:

- All equipment and vehicles are be checked and maintained daily to prevent leaks of hazardous materials;
- Spill kits and spill containment materials are available on-site at all times and that the equipment is in good working order;
- Equipment required to contain and clean up a frac-out release will either be

- available at the work site or readily available at an offsite location within 15-minutes of the bore site; and
- If equipment is required to be operated near a riverbed, absorbent pads and plastic sheeting for placement beneath motorized equipment shall be used to protect the riverbed from engine fluids;

5.0 Training

Prior to the start of construction, the Site Supervisor/Foremen, shall ensure that the crew members receive training in the following:

- The provisions of the Frac-out Contingency Plan, equipment maintenance and site specific permit and monitoring requirements;
- Inspection procedures for release prevention and containment equipment and materials;
- Contractor/crew obligation to immediately stop the drilling operation upon first evidence of the occurrence of a frac-out and to immediately report any frac-out releases;
- Contractor/crew member responsibilities in the event of a release;
- Operation of release prevention and control equipment and the location of release control materials, as necessary and appropriate; and
- Protocols for communication with agency representatives who might be on-site during the clean-up effort.

6.0 Drilling Procedures

The following procedures shall be followed each day, prior to the start of work. The Frac-out Contingency Plan shall available on-site during **all** construction. The Site Supervisor/Foremen shall be on-site at any time that drilling is occurring or is planned to occur. The Site Supervisor/Foremen shall ensure that a Job Briefing meeting is held at the start of each day of drilling to review the appropriate procedures to be followed in case of a frac-out. Questions shall be answered and clarification given on any point over which the drilling crew or other project staff has concerns.

Drilling pressures shall be closely monitored so they do not exceed those needed to penetrate the formation. Pressure levels shall be monitored randomly by the operator. Pressure levels shall be set at a minimum level to prevent frac-outs. During the pilot bore, maintain the drilled annulus. Cutters and reamers will be pulled back into previously-drilled sections after each new joint of pipe is added.

Exit and entry pits shall be enclosed by silt fences a nd straw. A spill kit shall be on-site and used if a frac-out occurs. A vacuum truck shall be readily available on-site prior to and during all drilling operations. Containment materials (Straw, silt fencing, sand bags, frac-out spill kits, etc.) shall be staged on-site at location where they are readily available and easily mobilized for immediate use in the event of an accidental release of drilling mud (frac-out). If necessary, barriers (straw bales or sedimentation fences) between the bore site and the edge of the water source, shall be constructed, prior to drilling, to prevent released bentonite material from reaching the water.

Once the drill rig is in place, and drilling begins, the drill operator shall stop work whenever the pressure in the drill rig drops, or there is a lack of returns in the entrance pit. At this time the Site Supervisor/Foremen shall be informed of the potential frac-out. The Site Supervisor/Foremen and the drill rig operator(s) shall work to coordinate the likely location of the frac-out. The location of the frac-out shall be recorded and notes made on the location and measures taken to address the concern. The following subsections shall be adhered to when addressing a frac-out situation.

Water containing mud, silt, bentonite, or other pollutants from equipment washing or other activities, shall not be allowed to enter a lake, flowing stream or any other water source. The Bentonite used in the drilling process shall be either disposed of at an approved disposal facility or recycled in an approved manner. Other construction materials and wastes shall be recycled, or disposed of, as appropriate.

6.1 Vac-Truck:

A vacuum truck shall be staged at a location from which it can be mobilized and relocated so that any place along the drill shot, can be reached by the apparatus, within 10 minutes of a frac-out.

6.2 Field Response to Frac-out Occurrence:

The response of the field crew to a frac-out release shall be immediate and in accordance with procedures identified in this Plan. All appropriate emergency actions that do not pose additional threats to sensitive resources will be taken, as follows:

a. Directional boring will stop immediately;
b. The bore stem will be pulled back to relieve pressure on frac-out;
c. The Site Supervisor/Foremen will be notified to ensure that management and the safety department is notified, adequate response actions are taken and notifications made;
d. The Site Supervisor/Foremen shall evaluate the situation and recommend the type and level of response warranted, including the level of notification required;
e. If the frac-out is minor, easily contained, has not reached the surface and is not threatening sensitive resources, a leak stopping compound shall be used to block the frac-out. If the use of leak stopping compound is not fully successful, the bore stem shall be redirected to a new location along the desired drill path where a frac-out has not occurred;
f. If the frac-out has reached the surface, any material contaminated with Bentonite shall be removed by hand, to a depth of 2-feet, contained and properly disposed of, as required by law. A dike or berm may be constructed around the frac-out to entrap released drilling fluid, if necessary. Clean sand shall be placed and the area returned to pre-project contours; and
g. If a frac-out occurs, reaches the surface and becomes widespread, the Site Supervisor/Foremen shall authorize a readily accessible vacuum truck and bulldozer stored off-site to be mobilized. The vacuum truck may be either positioned at either end of the line of the drill so that the frac-out can be reached by crews on foot, or may be pulled by a bulldozer, so that contaminated soils can be vacuumed up.

6.3 Response Close-out Procedures:

When the release has been contained and cleaned up, response closeout activities will be conducted at the direction of the Site Supervisor/Foremen and shall include the following:

a. The recovered drilling fluid will either be recycled or hauled to an approved facility for disposal. No recovered drilling fluids will be discharged into streams, storm drains or any other water source;
b. All frac-out excavation and clean-up sites will be returned to pre-project contours using clean fill, as necessary; and

6.4 All containment measures (fiber rolls, straw bale, etc.) will be removed, unless otherwise specified by the Site Supervisor/Foremen.**Construction Re-start:**

For small releases not requiring external notification, drilling may continue, if 100 percent containment is achieved through the use of a leak stopping compound or redirection of the bore and the clean-up crew remains at the frac-out location throughout the construction period.

For releases requiring external notification and/or other agencies, construction activities will not restart without prior approval from the safety department.

6.5 Bore Abandonment:

Abandonment of the bore will only be required when all efforts to control the frac-out within the existing directional bore have failed.

7.0 Notification:

In the event of a Frac-out that reaches a water source, the Site Supervisor/Foremen will notify safety department so they can notify the appropriate resource agencies. All agency notifications will occur within 24 hours and proper documentation will be accomplished in a timely and complete manner. The following information will be provided:

1. Name and telephone number of person reporting;
2. Location of the release;
3. Date and time of release;
4. Type and quantity, estimated size of release;
5. How the release occurred;
6. The type of activity that was occurring around the area of the frac-out;
7. Description of any sensitive areas, and their location in relation to the frac-out;
8. Description of the methods used to clean up or secure the site; and
9. Listing of the current permits obtained for the project.

7.1 Communicating with Regulatory Agency Personnel:

All employees and subcontractors will adhere to the following protocols when permitting Regulatory Agency Personnel arrive on site. Regulatory Agency Personnel will be required to comply with appropriate safety rules. Only the Site Supervisor/Foremen and the safety department are to coordinate communication with Regulatory Agency Personnel.
Documentation:

The Site Supervisor/Foremen shall record the frac-out event in his or her daily log. The log will include the following: Details on the release event, including an estimate of the amount of bentonite released, the location and time of release, the size of the area impacted, and the success of the clean-up action. The log report shall also include the: Name and telephone number of person reporting; Date, How the release occurred; The type of activity that was occurring around the area of the free-out: Description of any sensitive areas, and their location in relation to the frac-out: Description of the methods used to clean up or secure the site; and a listing of the current permits obtained for the project.

8.0 Project Completion and Clean-up:

a. All materials and any rubbish-construction debris shall be removed from the construction zone at the end of each workday;
b. Sump pits at bore entry and exits will be filled and returned to natural grade; and

All protective measures (fiber rolls, straw bale, silt fence, etc.) will be removed unless

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Appendix G – Drilling Fluid Containment Plan and Erosion/Mud Control Plan

INADVERTENT RETURN AND CONTAINMENT OF BENTONITE DRILLING FLUIDS MATERIALS

In the HDD industry, the ability to respond and handle inadvertent returns must be a part of the construction procedures. Huxted Trenchless, LLC (HT) is experienced and completely prepared for their responsibility in regards to eliminating or reducing the possibility of an inadvertent return to surface.

Huxted Trenchless's standard procedure for containment of an inadvertent return of bentonite drilling fluids during drilling operations:

- **Cease drilling operations immediately**
- **Notify Site Inspector**
- Contain any surface release
- Place pump or vacuum equipment
- Document
- Review options with on-site inspectors
- Implement procedures
- Resume drilling

During drilling operations should HT experience partial loss of mud returns or a visible inadvertent return is encountered, HT will immediately cease pumping of drilling fluids and commence placing containment barriers around the release. If necessary, pumps or vacuum trucks will be positioned at the location for transfer of mud back to the recycling system or to a pre-approved disposal site. During this operation the client's site inspector or engineer will be notified. The drilling superintendent will then provide all necessary documentation as to time, location, pump and bit pressures and estimated volumes of the inadvertent return to the proper authorities. Once contained, ECI will review the situation and provide all options to the client for approval.

Equipment and hand tools will be present on site to assist in any clean-up that might be necessary. Vac-trailers and pumps will be on site along with various hand tools (ie. Shovels, rakes, brooms, silt fence and hay bales.

Along with our standard inadvertent return procedures, other methods can be implemented to avoid or reduce a surface release. The design of the crossing should be reviewed for sufficient depths in various soil and rock conditions. In addition, some loss circulation materials (LCM) and special drilling techniques can provide the contractor some assistance in reducing inadvertent returns and or loss circulation down hole.

HT considers any inadvertent return as priority and will ensure that there are protective measures in place to contain or quickly recover any bentonite drilling fluids that may migrate to the surface. In addition, HT will make every effort during the drilling operations to prevent the possibility of a release. However, when drilling in subsurface conditions with limited geotechnical data, no drilling contractor can guarantee that inadvertent returns will not occur.

Erosion & Mud Control Plan

1.0 Erosion Control

Prior to drilling operations, ECI Drilling International, LLC (HT) will implement erosion control procedures and containment for disposal of rainwater, drilling fluids and alluvial soils.

1.1 Erosion Control

On the operations site, earthen berms are constructed for containment and flow direction of any fluids back to the containment pit which is located in front of the drilling rig. Silt fencing is installed around all possible contamination areas. The containment pit is approximately 6 foot wide, 6 foot long and 4 foot deep. This fluid can be pumped back to the mud system for recycling down hole.

If excessive amounts of rainwater are encountered, hay bales, straw and silt fencing can be placed on or around the erosion site to provide some stabilization of the ground. Should heavy runoffs occur, a deflection or containment berm or shallow pit can be constructed, and any fluids pumped back to holding tanks or our mud system.

Should drilling fluids create any erosion along the drill path, ECI will cease pumping drilling fluid down hole and notify our client for immediate consultation.

1.2 Disposal of Materials

Prior to commencement of drilling operations, an HT superintendent will arrive on site to meet with our client, contact vendors and establish a method for transportation and

disposal of drilling fluids and cuttings. In addition, vacuum trucks and holding tanks are identified which can be put on notice for containment and disposal assistance.

2.0 Drilling Mud

2.1 Introduction

The following paragraphs describe the drilling fluid handling and containment procedures typically practiced by ECI. These procedures have been implemented to minimize the potential for environmental disturbance during the directional drilling process.

The drilling fluid is an essential element of any directionally drilled pipeline installation.

Amongst other benefits, the fluid serves many purposes including:

- Removal of the drilled cuttings from the borehole.
- Maintaining the integrity of the borehole.
- Lubricating and cooling the drill bit.

The drilling fluid typically used by HT in completing directionally drilled installations is a naturally occurring non-toxic, colloidal clay called sodium montmorillinite, or bentonite that is mined principally in Wyoming. Bentonite swells in water by absorbing the water, thus providing a viscous fluid to carry cuttings. The desired viscosity of the non-toxic bentonite fluid will vary with differing formations. By monitoring the mud, the HDD contractor can determine the correct properties needed for drilling in the different types of formations, i.e. maximum cleaning, loss circulation and inadvertent return control.

2.2 Drilling Mud Standards

Two concerns develop from the use of drilling fluids at a given location. These are the handling of the fluid on-site and the disposal of the excess fluid at the completion of the job. Both of these concerns are simplified if the products entering the mud system are of a non-toxic nature.

To ensure that the drilling fluid meets the required disposal and environmental standards, ECI adopts the following guidelines:

- HT identifies in advance of drilling, the proposed drilling fluid products and the local water source to be used.
- HT will not add any other products to the mud system without prior approval.
- Under no circumstances will HT use petroleum-based products.

- HT ensures that petroleum products such as hydraulic oil, used oil or fuel will not migrate into the mud fluid system.
- HT produces and maintains daily reports showing the amount and type of products used.
- HT tests the drilling fluid on a regular basis to identify the mud properties such as, viscosity, water content, gel strength, solids content, hydrogen ion content (P.H.)
- HT purchases all mud products from a reputable supplier who will supply Material Safety Data Information that adheres to all regulations and assures the products are non-toxic.

The Material Safety Data Sheets will further describe these products.

2.3 Drilling Fluid Handling Equipment and Containment

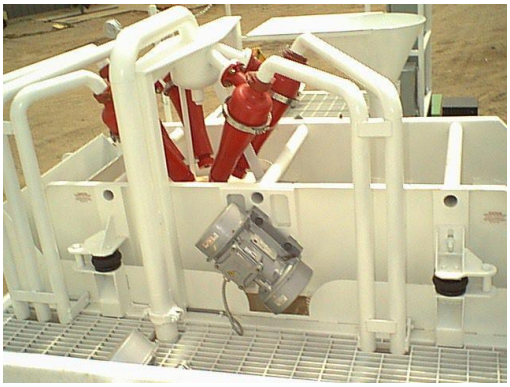
HT utilizes a **closed loop** drilling fluid system whereby the fluid exiting the borehole is cleaned and re-circulated. The **closed loop** system offers a number of advantages including reducing the amount of fluid that must be made up to complete a project and reducing the amount of fluid to be disposed of upon conclusion of the pipeline pull-through.

A typical **closed loop** system begins with drilling fluid being prepared to desired viscosity and stored in a mud mixing tank. The fluid is then pumped, via mud pumps, at

desired pressure and flow to the drill rig and down the drill pipe. The mud pumps are controlled either by the driller from the operations cab at the rig or from the mud mixing tank.

The mud is pumped down the drill string, through the downhole motor, if employed, and then released through the nozzles of the bit or jet. The fluid then returns along the annulus between the borehole and drill string carrying, in suspension, the drilled cuttings. The fluid then flows into a sump prepared at surface at the borehole entry point. From this sump, the fluid is pumped to desanders and shakers where the drilled cuttings are removed. The cuttings are contained within metal roll-off dumpsters alongside the cleaning unit and transported to an approved disposal site. The size and particulars of the desanders and shakers will be subject to the particulars of the project. Following removal of the drilled cuttings, the clean fluid is pumped to the mud storage tank to be re-used.

HT does not believe any additional procedures, other than prudent operating practices, will be necessary for the control of drilling fluids at the entry locations. The drilling fluid will be contained at all times within surface tanks and sumps. Consequently, there should not be any drilling fluid elsewhere on the location.



The drilling fluid hoses, transfer lines and pumps will be carefully laid out and regularly inspected to avoid any failures and inadvertent release of fluid. The mud tanks and cleaning units will be of appropriate sizes to ensure adequate capacities. Cuttings will be contained within on-site metal roll-off containers. Through careful planning and attentive operations, HT is able to maintain a clean and environmentally responsible working area.

2.4 Drilling Mud Disposal

Prior to commencement of drilling operations, the drilling superintendent will establish a landfill or off-site facility for disposal of all excess drilling fluids and cuttings.

Solids Disposal

During the pilot hole and reaming operations, bentonite drill fluids will carry the solids from the formation back to the entry pit. The fluids and cuttings will be pumped back to the recycling system for separation and containment. The solid materials (maximum of

50% water by volume) will be placed in a metal roll-off dumpster and prepared for hauling to an approved site.

Bentonite Disposal

The bentonite drilling fluids are continually being cleaned and recycled back down hole to reduce drilling costs. If multiple drills are planned at the same location or in close proximity, the bentonite will be either stored or transported to the next site. After the project is completed, the drilling fluids will be sucked up in a vacuum truck to be transported to the approved site for disposal.

The vendor that supplied the roll-off containers is equipped with special haul trucks for loading and unloading of the containers. Unless other arrangements are made, HT will contract the vendor to supply and haul solid materials and remaining drilling fluids to the disposal site.

3.0 Avoiding Environmentally Sensitive Areas

The most appropriate method to avoid fluid migration to environmentally sensitive areas is through careful design of the borehole profile, careful attention to drilling progress and fluid pressures, and through environmentally responsible working practices.

HT endeavors to avoid drilling fluid migration by designing an appropriate borehole profile well removed from the stream and maintaining fluid pressures within acceptable limits while drilling the initial portion of the pilot hole.

4.0 Environmental Responsibility

HT will also implement procedures to minimize the potential for environmental disruption within other areas of the project. These areas include site preparation, site restoration, and attentive material handling/storage of fuels, including noise abatement. The following paragraphs further describe procedures which may be implemented to limit environmental disruption in these areas.

4.1 Site Preparation/Site Restoration

The layout of equipment and materials at the entry and exit locations must be carefully prepared to limit the required working area. In this way, the amount of site preparation and the resulting environmental disturbance can be minimized. Spill kits will be present on-site during drilling activities. These kits will contain at a minimum, absorbent pads and socks, disposable bags, gloves, safety glasses, etc. With the proposed crossing, it is likely that certain site preparations will be required at the proposed entry and exit locations. Further site restorations will be performed as required.

4.2 Containment and Disposal of Fuels and Other Materials

HT has reviewed the potentially hazardous materials that may be on-site. The oil-based products to be used on-site consist of:

* Diesel fuel
* Gasoline
* Lube Oil Products
* Bearing Grease
* Pipe Lubricant
* Hydraulic Oil
* Used Oil Products
* Garbage
* Used Filters, Rags etc.

Diesel Fuel

Required to fuel drill rig motor and heaters, will be transported by approved bulk trucks. To ensure spillage does not occur, all engines are connected to one fuel supply with approved hoses or steel lines. Limited amounts of fuel will be stored on-site. Refueling operations will not be permitted any closer to water courses than the entry location.

Gasoline

Will be required for remote water pump engines, including other support pumps and/or generators. This will be supplied and transported in barrels or other approved containers. The transfer of gas from barrels to the engines will be carried out with barrel pumps that fit solidly into the barrel opening.

Lube Oil

Will be required for all engines to maintain oil levels and oil changes. Oil will be supplied in approved containers or cans, in case lots, or pails. This reduces the chance of sizable spills and makes handling easier. Used oil will be caught in containers designed to fit below the drain opening. The used oil will then be placed in a barrel which can be sealed. The contained used oil will be removed from the site at the end of the project and disposed of in an approved manner.

Bearing Grease

This will be required in very limited amounts. The packaging of the product will be in container tubes which are placed directly into the grease guns.

Pipe Thread Lubricant

Required for the lubrication of the drill string connections to eliminate thread galling and excessive joint tightening. As any excessive lubricant on the drill string threads can be washed into the water, HT recommends the use of a lubrication that is comprised of a bentonite-based material and other non-toxic material. This lubricant is used extensively on water well drilling or other areas where foreign substances of a toxic nature cannot be allowed to mix with the local water sources.

Hydraulic Oil

Will be required on a limited basis for the drill rigs hydraulic system. This system is used for drill pipe rotation, pull and push capacity and the break-out or make-up of drill pipe. Again, limited quantities will be required and will be transported in sealed containers or barrels. The initial filling of the rigs reservoirs will be required on-site once the rig is assembled. Filling will only be required in the remote event that a leak develops.

HT will ensure that there are protective measures in place to contain or quickly recover any oil that may leak from the units by ensuring that all hydraulic hoses and fittings are in good shape and designed for cold weather applications. All hydraulic pump bearing seals will be checked for leaks and repaired as necessary.

Absorbent oil spill padding will be on-site and will be placed under areas of the drill rig where the possibility of an oil leak might occur. This will absorb any oil that may escape before the leak is discovered and repairs can be made.

Used Oil

The handling and containment of used oil is always a potential problem at any temporary work site. In this case the short duration required for each drill will reduce to a very minimum, the volume of used oil. However, even in this case, used oil will accumulate throughout the project and must be accommodated.

HT will provide sufficient containers on-site to hold all used oil accumulated. These containers will have openings that can be sealed shut when full. This will allow them to be transported without any possibility of leaking enroute.

Used oil should be taken to a proper treatment plant where it can be disposed of in an approved manner.

Garbage

Any construction or drilling site will accumulate a reasonable amount of garbage that requires disposal. HT will collect all garbage of a non-toxic nature in approved dumpsters that will be supplied by and removed by an authorized collection company within the general area.

Used Filters, Oily Rags of a Toxic Nature

To transport this material safely, HT recommends containers that can be sealed against leakage once they are filled. These containers will be identified by clearly marking on the barrel, the nature of the contents within. Once filled, they will be taken to an approved licensed disposal area.

The handling of waste during this project will adhere to all applicable regulations.

5.0 Responsibility for Reporting & Responding to Spills

In undertaking a directional drilled pipeline installation, the ability to respond and handle spills is an important part of the work procedures. HT is fully knowledgeable of our responsibility in ensuring that spills do not occur. However, should a spill occur, the impact must be limited by rapid containment of the product, by minimizing the amounts of fluid on-site, by ensuring the availability of clean-up products/equipment on-site to immediately contain, control, and clean-up the spill and by notifying immediately the proper authorities.

The quantity of fluid on a directional drilling site shall be kept to a minimum. Fuels and lubricants are contained in appropriate containers that reduce any single quantity to minimal amounts. Diesel fuel tanks are part of the equipment housing module and could amount to two or three separate tanks, again reducing the quantity in any one container. Lube oils are delivered to the sites in their marked containers, which might be barrels, pails, or cans.

Drilling fluids on surface, although not of a toxic nature, cannot be ignored if a spill occurs. The containment surface equipment consists of steel tanks that are divided into three or more compartments. These mud containment tanks are part of the total enclosed re-circulating drilling fluid process, which is used successfully on drilling rigs worldwide without major spills occurring.

An excavated containment pit is dug directly adjacent to the drilling fluid surface tanks. This pit is designed to catch all drilled cuttings, desander overflows and whatever drilling fluid that adheres to the solid particles.

Both the entry and exit sites will have shovels, pickaxes, containers, and absorbent materials available that will immediately be put to the task of containing and recovering any fluids that might escape from the equipment or storage containers.

The entire drill crew will be aware of their responsibility to maintain a spill free environment. The crew will also be aware of the required response should a spill occur. The crew will have responsibility to report spills of any size to their immediate supervisor, who in turn will advise the Client.

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Marine International, LLC.

Appendix H – Non-Conformance Report

Caldwell Marine International	CHPE SUBMARINE CABLE INSTALLATION NON-CONFORMANCE (NC) CORRECTIVE ACTION AND CLEARANCE REPORT (NCR)	Project: CHPE Location:Ny, Job #

NC Report No:		Date:	
Location:			
Project phase:			

PART 1: DESCRIPTION OF NON-CONFORMANCE				
NC Importance		Major Minor	Relevant requirement:	
Signature - NKT representative:				Date:
Name/Title - NKT representative:				
Signature - CMI representative:				Date:
Name/Title - CMI representative:				

PART 2: PROPOSED CORRECTIVE ACTION

PART 3: COMPLETED CORRECTIVE ACTION

PART 4: CORRECTIVE ACTION VERIFIED AND CLEARED	
Signature - NKT representative:	Date:
Name/Title - NKT representative:	
Signature - CMI representative:	Date:
Name/Title - CMI representative:	

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Appendix I – Equipment Calibration Documentation

Equipment calibration of gyroscope documentation to be submitted upon completion of calibration operations.

Appendix J – Inspection and Test Plans

Caldwell Marine International 1333 Campus Parkway Wall Township, NJ 07727 732-557-6100	**CHPE SUBMARINE CABLE INSTALLATION INSPECTION & TEST PLAN** **HDD Shore Crossings**	Project: CHPE Location: NY Job # 1229 Prime: NKT Inc.

SEGMENT: **LOCATION:**

Material/Parameter to be Controlled/Checked	Control Method/Equipment	Control Frequency	QC By	Reference Document	QA Record	For External Use						
						R/W/H		Code				
						Int	Ext	A	B	C	D	E
HDPE Pipe	Visual	Upon Delivery	PS		Daily Ops Log							
HDPE Pipe	Dimension	Upon Delivery	PS		Daily Ops Log							
HDPE Pipe	Quantity	Upon Delivery	PS		Daily Ops Log							
HDPE Pipe	Supplier Certificate	Upon Delivery	PS		Daily Ops Log							
HDPE Fusion	Visual Inspection	Prior to start of ops-each segment	PS		Daily Ops Log							
HDPE Fusion De-Beading	Visual Inspection	Post fusing of pipe	PS		Daily Ops Log							
HDPE Fusion Dat Logging	Automated Report	Post fusing of pipe	Fusing Technician		Daily Ops Log							
Verify HDD Pipe Depth for Proper Cable Burial Depth	Visual Inspection	Post Pipe Pull-In	PS		Daily Ops Log							

PM-Project Manager. PS-Project Superintendent. PE-Project Engineer. BS-Barge Superintendent. BC-Barge Captain. BM-Beach Master.

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Marine International, LLC.

Caldwell Marine International 1333 Campus Parkway Wall Township, NJ 07727 732-557-6100	**CHPE SUBMARINE CABLE INSTALLATION INSPECTION & TEST PLAN** **HDD Shore Crossings**	Project: CHPE Location: NY Job # 1229 Prime: NKT Inc.

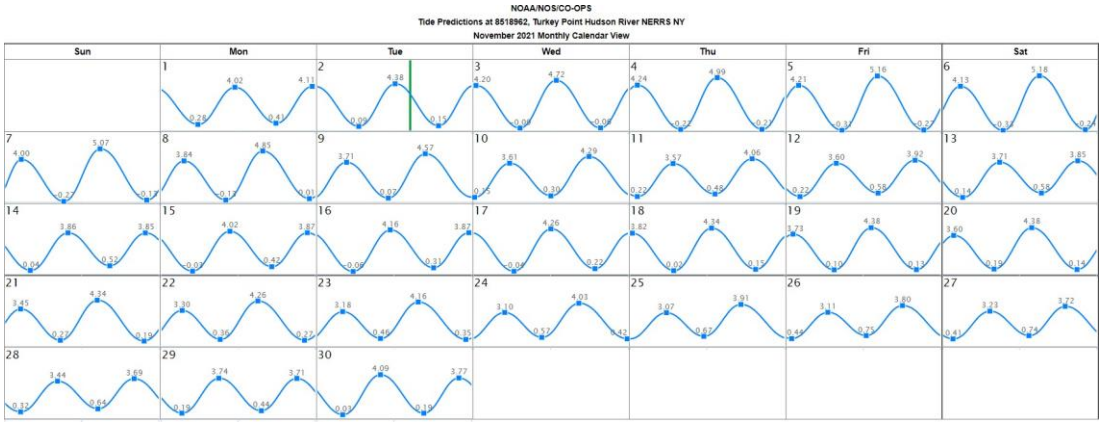
R: REVIEW - document and records shall be available for verification at any time by the QA representative (QAR) / Purchaser Representative (PR).
W: WITNESS - a critical step in installation or testing where it is desirable for the QAR/PR inspect the material/equipment/activity/operation in order to ascertain compliance with the project requirements. The operation may proceed without the presence of the above representatives, as long as they have been informed prior to the start of operations.
H: HOLD - a critical step in installation or testing where it is essential for the QAR/PR inspect the material/equipment/activity/operation in order to certify compliance with the project requirements. The operation may not proceed without the presence of the above representative. A HOLD point may not be waived unless this has specifically been confirmed in writing.
QA By: Indicates the designated inpsector/auditor within the manufacturer/supplier/contractor's organization responsible for the QA activity.
Int: Indicates R/W/H points internal to the Manufacturer/Supplier/Contractor.
Ext:

Code	Description	Code	Description
A	Place where task/activity is to be performed 1: At NKT Facility 2: At installation site 3: At contractor facility 4: At manufacturer/supplier facility 5: Other customer or end-client facility	B	Person to be present for the activity, inspection, audit, witness review, or hold point 1: NKT QAR 2: BEC Design Representative 3: 3rd Party Inspector/Consultant 4: Other customer - end client's representative 5: Hold point with no specified external witness
C	Report required by/for 1: NKT QAR 2: BEC Design Representative 3: 3rd Party Inspector/Consultant 4: Other customer - end client's representative	D	Project specific use
		E	Scope for which the task/activity applies F: First piece inspection R: Random check to be detemined by the inspector S: Sample inspection, as per NKT accepted plan X: Full scope

Prepared and submitted by Caldwell Marine International.	Accepted by:	Received by:
Date:	Date:	Date:
Project Manager: Caldwell Marine Int.	QA Manager - TBD	Project Manager: NKT Inc.

Appendix K – Tidal Forecast

Typical tidal range during a full moon.



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Appendix L – Navigation & Positioning Systems

- Total Station

Appendix M – Equipment Specifications

ENVIRONMENTAL CROSSINGS, INC.
RIG NO. 7

AMERICAN AUGERS DD-210 (1999)
EQUIPMENT LIST

American Auger DD-210

AMERICAN AUGERS DD-210:

RATED TO 210K PUSH AND PULL
RATED TO 30K TWO SPEED ROTARY TORQUE
3306 CAT POWERED
CONTROLS SAUER SUNSTRAND JOYSTICKS
OPEN BREAK OUT TRAVEL VISES
ROTARY BRAKES
HYDRAULIC OIL HEAT EXCHANGER
TRAILER LOW BOY (45 FT) PERMIT LOAD
HYD. 8,000 LB CAPACITY CRANE

ECI MUD SYSTEM:

ECI DESIGN AND BUILT
147 BBL CAPACITY
3406 CAT POWERED
285 KW GENERATOR
3 - 5" X 6" (50 HP) CHARGE AND MIXING PUMP
DE-SILTERS (1000 GPM)
DE-SANDERS (1000 GPM)
LINEAR THREE PANEL SHAKERS
3 - 3.5' X 7.5' SCALPER, DESANDER, DESILTER SHAKERS
200 GALLON FUEL CAPACITY
TRAILER MOUNTED (48 FT) NON PERMIT LOAD

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Marine International, LLC.

Mud System

ECI MUD PUMP: ELLIS WILLIAMS 446 MUD PUMP (CAPACITY 460 GPM)
DROPDECK TRAILER
POWERED BY 3406 CAT
REMOTE CONTROL CONSOLE
FUEL CAPACITY 400 GAL.
MISC. MUD LINES

CONTROL UNIT: ECI. BUILT 10' FT X 8 FT CONTROL UNIT
MOUNTED SAUER SUNSTRAND DRILLER CONTROLS
STEERING EQUIPMENT

TOOL VAN: 20'X 8' CONTAINER
LUFKIN FLATBED TRAILER (40 FT)

MISCELLANEOUS EQUIPMENT:
TENSOR STEER PROBE (SUPER PROBE)
2-30 FT MONEL DRILL COLLARS
JETTING ASSEMBLIES
ASSORTED FLY CUTTERS (REAMERS)
ASSORTED BARREL REAMERS
9000 FT S-135 (19.5 LB PER FT) **NEW DRILL PIPE**
PIPE TRAILERS
FLAT MUD HOSE (1500 FT) AND CAM LOCK FITTINGS
EXTRA HYD HOSES AND FITTINGS
EXTRA HYD PUMPS AND FITTINGS
EXTRA HYD MOTORS AND FITTINGS
SUBS
TONGS
HAND TOOLS
MISC SPARE PARTS: PUMP, HYD
(ESTIMATED $30K SPARES)
WELDER/UTILITY TRUCK (CREW CAB) CHEVY
¾ TON EXT. CAB TRUCK
6" CENTRIFUGAL PUMP GORMAN–RUPP
4" CENTRIFUGAL PUMP GORMAN-RUPP

ALL ENVIRONMENTAL CROSSINGS' EQUIPMENT IS MAINTAINED IN EXCELLENT OPERATIONAL AND COSMETIC CONDITION.

ECI Drilling International, LLC
RIG NO. 9

ECI 330,000 LB RIG (1999)
EQUIPMENT LIST

ECI DD-330

Manufactured By:
AMERICAN AUGERS DIRECTIONAL DRILL:

THRUST - PULL BACK FORCE: 476,139 FT. LBS OF FORCE AT 6,000-PSI MAXIMUM HYDRAULIC PRESSURE.

ROTARY TORQUE: 50,419 FT LBS OF FORCE AT 4,500-PSI MAXIMUM HYDRAULIC PRESSURE.

RACK AND PINION THRUST/PULLBACK, TWO PINION DRIVE

PIPE SUPPORTS, HYDRAULICALLY OPERATED

INDEPENDENT CONTROLS AND HYDRAULIC CIRCUITS FOR THRUST/PULLBACK, TORQUE AND AUXILIARY OPERATIONS PERMITS SIMULTANEOUS FULL POWER OPERATION.

ADJUSTABLE TORQUE LIMITER FOR ROTARY AND MAKE UP FORCE.

CATERPILLAR DIESEL POWER

ADJUSTABLE FORCE LIMITER FOR THRUST AND PULLBACK

WRENCH/CLAMP SEPARATION 0-12 INCHES (0-305 MM) TRAVELS FULL LENGTH OF RACK

TRAILER MOUNTED ON AIR RIDE SUSPENSION, HIGH LEGAL LOAD.

WIRELINE COMMUTATOR FOR SPEEDY HOOKUP WIRELINE GUIDANCE EQUIPMENT WITH TERMINALS AT DRILL CONSOLE.

ESILOK LOCKOUT SYSTEM.

DRILLER'S CABIN WITH HEAT AND AIR CONDITIONING.

Mud System

ECI MUD SYSTEM:

E.C.I. DESIGN AND BUILT
200 BBL CAPACITY
3408 CAT POWERED
ALLISION TRANSMISSION (5 SPEED)
5 4" X 5" (50 HP) CHARGE AND MIXING PUMPS
ELLIS WILLIAMS 446 MUD PUMP (CAPACITY 460 GPM)
DE-SILTERS (1000 GPM)
DE-SANDERS (1000 GPM)
4 LINEAR TWO PANEL SHAKERS
150 GALLON FUEL CAPACITY
TRAILER MOUNTED (52 FT) NON PERMIT LOAD

DRILL PIPE: 31 FT AVG. S135 5" DRILL PIPE PREMIUM DOUBLE WHITE
4 ½ I.F. CONNECTION

CONTROL UNIT: WITH HEAT AND AIR CONDITIONING, POWER DISTRIBUTION PANEL WITH CIRCUIT BREAKERS, SURVERYOR'S TABLE. EXTERIOR STEEL SIDING. INSULATION 3-1/2" IN WALLS. EXTRA LARGE WINDOWS WITH VANDALISM SHIELDS. LIFTING EYES FOR JOB SITE MOBILITY.

TOOL VAN: 20' CONTAINER
AIR COMPRESSOR
MECHANICS SHOP
PARTS HOUSE

ROTARY DRIVE:

PINION AND GEAR DRIVE INFINITY VARIABLE TORQUE.
50,419 FT-LB (65,000 NM) @ 0-45 RPM ROTARY (HIGH TORQUE). 24,000 FT-LB (32,000 NM) @ 0-90 RPM ROTARY LOW TORQUE.
90 RPM MASIMUM ROTARY SPEED.

CARRIAGE DRIVE: MAXIMUM THRUST/PULLBACK - 476,139 FT-LBS AT 6,000 PSI MAXIMUM HYDRAULIC PRESSURE. RACK AND PINION, TWO PINION DRIVE, WITH ADJUSTABLE FORCE LIMITER CARRIAGE SYSTEM. 150 FT (45.7 M)/MIN MAXIMUM CARRIAGE SPEED.

PROTECTIVE EQUIPMENT:

DRILL COMES WITH SAFETY MATS AND ELECTRICAL GROUNDING RODS. A ZAP-ALERT SYSTEM IS STANDARD EQUIPMENT. EMERGENCY SHUT DOWN SWITCH AT DRILLER" CONSOLE AND AT REMOTE CONTROL CONSOLE. CARRIAGE OVER RIDE SWITCH DISABLES CARRIAGE DURING WIRELINE HOOKUP, MAINTENANCE, ETC. DRILL IS EQUIPPED WITH ES!LOK EXIT SIDE LOCKOUT SYSTEM.

MISCELLANEOUS EQUIPMENT:

TENSOR STEER PROBE (SUPER PROBE)
2-30 FT MONEL DRILL COLLARS
JETTING ASSEMBLIES
ASSORTED FLY CUTTERS (REAMERS)
ASSORTED BARREL REAMERS
9000 FT S-135 (19.5 LB PER FT) NEW DRILL PIPE
PIPE TRAILERS
6" CENTRIFUGAL SUMP PUMP

MISCELLANEOUS EQUIPMENT CONTINUED:

FLAT MUD HOSE (1500 FT) AND CAM LOCK FITTINGS
EXTRA HYD HOSES AND FITTINGS
EXTRA HYD PUMPS AND FITTINGS
EXTRA HYD MOTORS AND FITTINGS
SUBS
PIPE TONGS
HAND TOOLS
MISC SPARF, PARTS: PUMP, HYD
(ESTIMATED $30K SPARES)
CHEVY PICK UP (E.C.I. CREW CABS)
CHEVY PICKUP (WELDING TRUCK)
CATERPILLAR 3412 12-CYLINDER TURBO DIESEL, ENGINE AFTERCOOLED. RATED 740 HP (552 KW) CONTINUOUS DUTY. 300 U.S. GALLON (1135 LITRES) FUEL CAPACITY.
TRIAXLE TRAILER WITH AIR RIDE SUSPENSION, FIFTH WHEEL HITCH. [APPROXIMATE SHIPPING WEIGHT: 81,500 LB (37.00 KG).
WEIGHT WITHOUT WRENCHES: 74,650 LB (33,890 KG)].

ALL ECI EQUIPMENT IS MAINTAINED IN EXCELLENT OPERATION AND COSMETIC CONDITION.

SlimDril International, Inc. • Brookshire, Texas • Phone: 281-391-5800 • www.slimdril.com

SLIMDRIL INTERNATIONAL Drillguide GST GYRO STEERING TOOL

Technical Specifications –

Tool OD	6-5/8-inches	*	8-1/2-inches
API Tool Joint Connection (Box Up x Pin Down)	4-1/2 IF	*	6-5/8 FH
Maximum Allowed Torque (on Tool Housing)	18,000-ftlb	*	22,000-ftlb
Maximum Allowed Push/Pull (on Tool Housing)	75,000-pounds	*	105,000-pounds
Hole Size	8-1/2 – 9-7/8	*	10-5/8 – 12-1/4
Tool Weight	750-lbs	*	1,200-lbs
Tool Length (Shoulder to Shoulder)	8.7-ft		
Annular Pressure Sensor Position (From Pin Shoulder)	8.0-ft		
Electric Power (Input on Surface)	110-Volts AC / 60 Hz		
Electric Power (Output to Downhole Tool)	48 or 56-Volts DC		
Maximum Allowed Temperature (on Tool)	150-f		
Maximum Allowed Shock (on Tool)	50-g (half sine wave)		
Maximum Allowed Vibration (on Tool)	20-g up to 200-Hz		
Maximum Allowed Inner Mud Pressure (on Tool)	1250-psi		
Maximum Allowed Side Load (on Tool Housing)	33,000-pounds		

Sensor(s) Accuracy –

Azimuth	0.04°
Inclination	0.01°
Tool Face	0.02°

Tool Joint Recommended Makeup Torque –

6-5/8 GST	Housing = 18,000-ftlb	4-1/2 API Regular = 21,000-ftlb	4-1/2 API IF = 22,000-ftlb
8-1/2 GST	Housing = 22,000-ftlb	6-5/8 API Regular = 50,000-ftlb	6-5/8 API FH = 66,000-ftlb

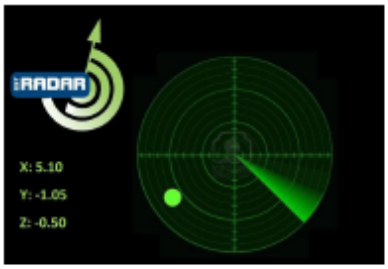
For additional information - http://www.drillguide.com

SlimDril International, Inc. • Brookshire, Texas • Phone: 281-391-5800 • www.slimdril.com

RADAR INTERSECT ASSEMBLY

The Drillguide GST guidance system is now expanded with the RADAR system. With this new system directly behind the GST it's possible to drill from both sides to make an underground intersect.

When the assemblies approach each other, the RADAR systems are activated. The systems determine their position relative to each other within tenths of feet. This makes it possible to drill one system to the borehole of the other, until the intersect is completed and both trajectories match.



Technical Specifications –

Tool OD	6-5/8-inches	*	8-1/2-inches
API Tool Joint Connection (Box Up x Pin Down)	4-1/2 IF	*	6-5/8 FH
Maximum Allowed Torque (on Tool Housing)	18,000-ftlb	*	22,000-ftlb
Maximum Allowed Push/Pull (on Tool Housing)	75,000-pounds	*	105,000-pounds
Hole Size	8-1/2 – 9-7/8	*	10-5/8 – 12-1/4
Tool Weight	750-lbs	*	1,200-lbs
Tool Length (Shoulder to Shoulder)	8.7-ft		
Electric Power (Input on Surface)	110-Volts AC / 60 Hz		
Electric Power (Output to Downhole Tool)	48 or 56-Volts DC		
Maximum Allowed Temperature (on Tool)	150-f		
Maximum Allowed Shock (on Tool)	50-g (half sine wave)		
Maximum Allowed Vibration (on Tool)	20-g up to 200-Hz		
Maximum Allowed Mud Pressure (on Tool)	650-psi		
Maximum Allowed Side Load (on Tool Housing)	33,000-pounds		

Tool Joint Recommended Makeup Torque –

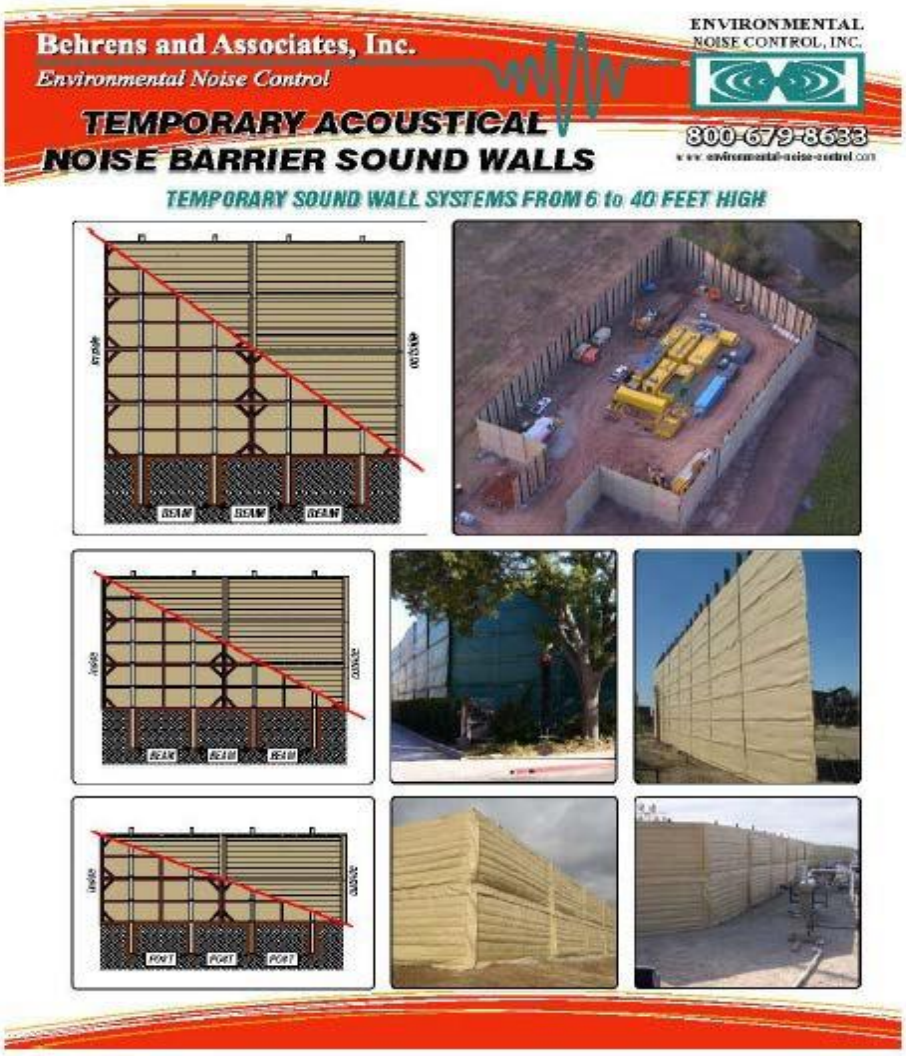
6-5/8 GST	Housing = 18,000-ftlb	4-1/2 API Regular = 21,000-ftlb	4-1/2 API IF = 22,000-ftlb
8-1/2 GST	Housing = 22,000-ftlb	6-5/8 API Regular = 50,000-ftlb	6-5/8 API FH = 66,000-ftlb

For additional information - http://www.drillguide.com

Behrens and Associates, Inc.
Environmental Noise Control

ECI Drilling Intl.
April 20, 2017
Page 4

Attachment 2 – Product Specification Sheet

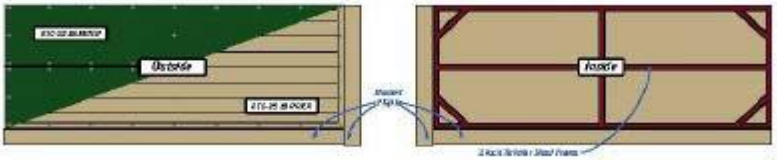


Attachment 2 – Product Specification Sheet (Continued)

TEMPORARY ACOUSTICAL NOISE BARRIER SOUND WALLS

800-679-8633
www.environmental-noise-control.com

SOUND WALL SYSTEMS IN STC-25 AND STC-32



ENC Style Temporary Noise Barrier sound wall systems are designed to provide optimum sound control in blocking and absorbing unwanted noise. At the heart of our sound wall systems are our ENC acoustical noise barrier blankets which are manufactured using state-of-the-art acoustical composite materials. The sound blankets are fabricated with polyvinyl-chloride coated outer shells, two layers of noise absorbing and blocking material; a specially developed inner core and septum barrier.

The modular design of ENC's temporary sound wall systems allow for quick and easy delivery, installation and removal of the temporary noise wall while meeting or exceeding structural code design requirements. The modular design of the temporary noise walls allows us to install noise barrier walls with heights ranging from 6 foot high to 40 foot high with gates, doors and emergency exits.

An independent acoustical laboratory has conducted tests in accordance with ASTM E-90 and ASTM E-413 requirements, to measure sound transmission loss and validating the Sound Transmission Class rating of STC-25 and STC-32.

The ENC composite barrier/absorber blankets, which are laboratory tested and certified, meet or exceed the specifications in the following tables:

BARRIER BLANKET SPECIFICATIONS

Oil resistant, UV resistant and anti-fungal, self-drying Poly-vinyl-chloride outer shells

Flame retardant to California Fire Marshall F-41.9.01 specifications

Conforms to California Construction Codes

After flame: 2 seconds

Length of char: 3.5

Working temperature: -40 °F to +200 °F

Sound Transmission Class rated at STC-25 and STC-32 in accordance with ASTM E-413

SOUND TRANSMISSION LOSS DATA (dB)

⅓ Octave Band Center Frequency	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	
Transmission Loss	8 dB	10 dB	11 dB	10 dB	7 dB	7 dB	11 dB	17 dB	23 dB	28 dB	STC 25
⅓ Octave Band Center Frequency	630 Hz	800 Hz	1000 Hz	1250 Hz	1600 Hz	2000 Hz	2500 Hz	3150 Hz	4000 Hz	5000 Hz	
Transmission Loss	33 dB	35 dB	39 dB	41 dB	41 dB	40 dB	41 dB	44 dB	46 dB	50 dB	
⅓ Octave Band Center Frequency	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	
Transmission Loss	16 dB	20 dB	18 dB	16 dB	16 dB	17 dB	19 dB	23 dB	26 dB	32 dB	STC 32
⅓ Octave Band Center Frequency	630 Hz	800 Hz	1000 Hz	1250 Hz	1600 Hz	2000 Hz	2500 Hz	3150 Hz	4000 Hz	5000 Hz	
Transmission Loss	34 dB	35 dB	35 dB	36 dB	36 dB	36 dB	37 dB	39 dB	40 dB	43 dB	

PRINCIPAL OFFICES
TEXAS | COLORADO | CORPORATE OFFICE

SATELLITE OFFICES
PENNSYLVANIA | LOUISIANA | CALIFORNIA

(800) 679 8633

Please visit our web site: www.environmental-noise-control.com

For more information on applications or any of our quality controlled products and services that we offer, please see our web site or call and speak to one of our ENC representatives. Rapid deployment to US and International.

ENVIRONMENTAL NOISE CONTROL, INC.

Caldwell

Marine International, LLC.

Appendix N – Marine Traffic Management Plan

CHPE SUBMARINE CABLE INSTALLATION
Marine Traffic Management Plan

Notice to Mariners
Prior to the start of operations CMI will issue a Notice to Mariners to the following agencies:

- Port Authority
- Vessel Traffic Control (VTC)
- US Coast Guard

The Notice to Mariners will include the following information:

- Vessels and equipment on site
- Work areas
- VHF contact channels for project vessels
- Nature of the work
- Identification and position of temporary can buoys at anchor locations

At the completion of the project an ending notice will be sent to the above agencies.

Automatic Identification System (AIS)
The support tug and the lay barge will both be equipped with AIS systems registered to each individual vessel.

Marine Communications
During the cable installation the support tug will be on the site at all times, and will be responsible for communication with other marine traffic and the VTC. At a minimum, daily reports will be made to the VTC regarding the schedule and nature of planned activities.

The support tug will maintain a radio watch on VHF Channels 16, 13, and the project working channel. The lay barge will maintain a radio watch on the working channel.

Ferries
Ferries will be advised daily of activities along the job site. Radio contact will be established with the ferries prior to crossing the ferry traffic lanes.

Caldwell

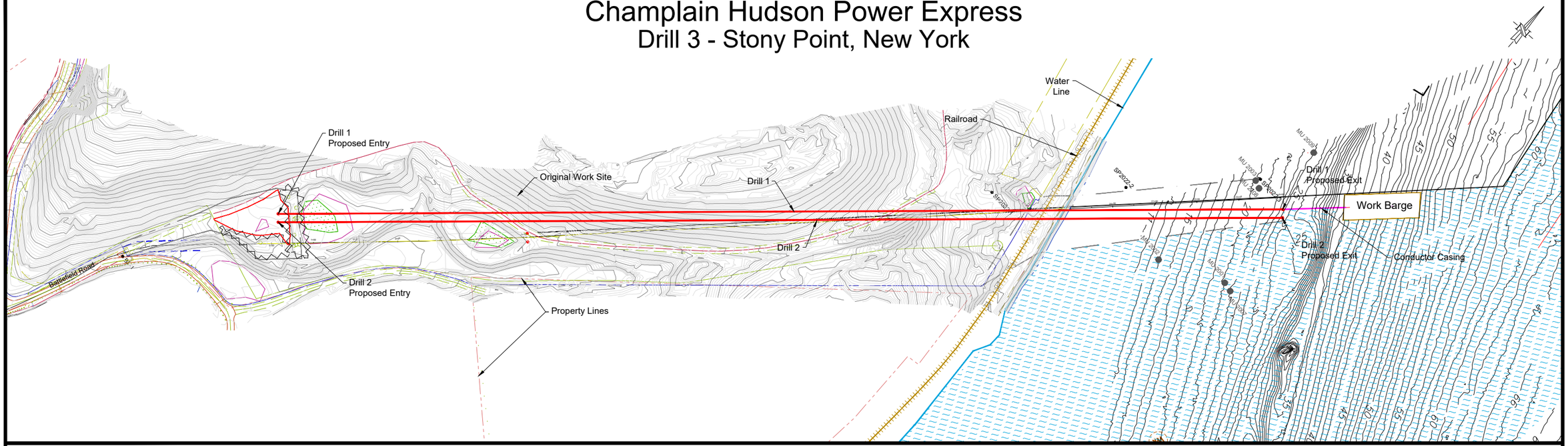
Marine International, LLC.

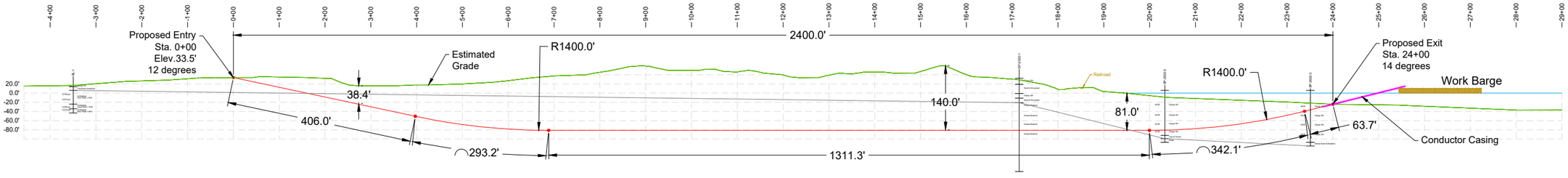
Appendix O – HDD Plan and Profile/Site Access Plan

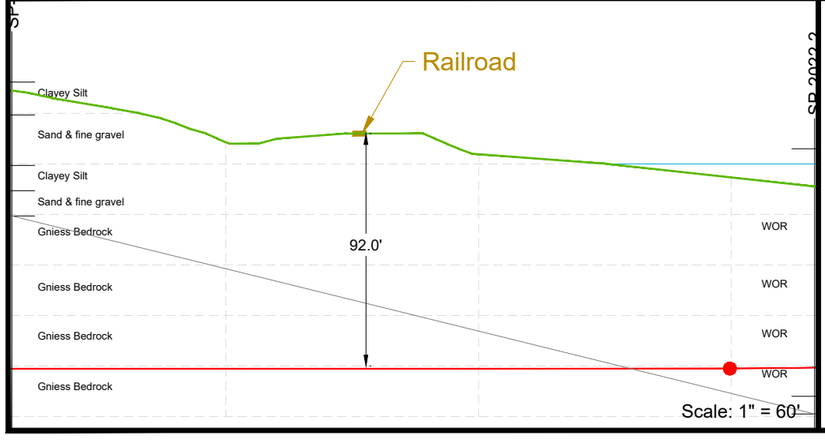
Transmission Developers, Inc.

Champlain Hudson Power Express

Drill 3 - Stony Point, New York







Notes:
1. All existing grade elevations are based on Rockland County GIS and NOAA Bathemetry.

HD = 2,400'
MD = 2,417'
Scale: 1" = 240'

DRILLING INTERNATIONAL
1306 N. FM 3083 Road
Conroe, Texas 77303
PH: (936) 441-9080
FAX: (936) 441-9082

DATE:	JOB No.:	DRAWN BY:
08-30-22	E20-034	GJH

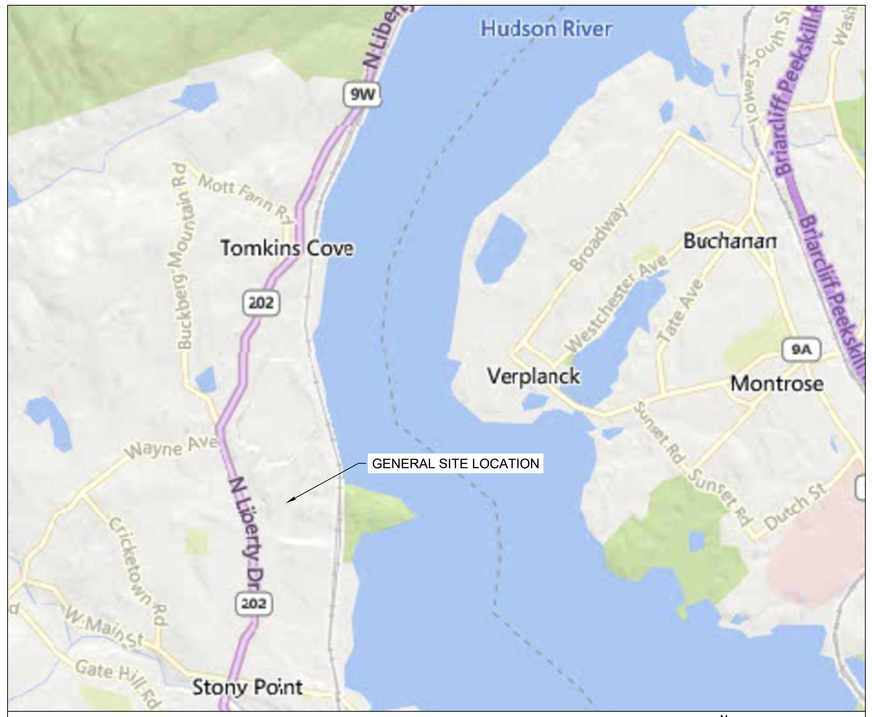
CLIENT:	PROFILE DIRECTION:
Champlain Hudson Power Express	SW to NE

LOCATION:	DRAWING No.:
Hudson River Stony Point, New York	Drill 3R12

CHAMPLAIN HUDSON POWER EXPRESS
STONY POINT HDD PLAN & PROFILE DRAWINGS

PROPERTY OWNER TABLE

LANDS NOW OR FORMERLY OF	BOOK, PAGE NO.	TAX MAP ID NO.
TILCON NEW YORK, INC.	1061, 797	15.02-4-59
CSX TRANSPORTATION, INC.	NA	7.00-1-3



LOCATION MAP
SCALE 1"=2000'

N

PREPARED FOR:

HUXTED TRENCHLESS
1306 N. FM 3083 ROAD
CONROE, TEXAS 77303

SEPTEMBER 19, 2022

PREPARED BY:

TRC

FIRM REGISTRATION NO.:
NY 0010187

STATE OF NEW YORK
KEVIN CHARLES BODENHAMER
093543
LICENSED PROFESSIONAL ENGINEER

9/19/22

DRAWING INDEX

SHEET NUMBER	DRAWING NUMBER	SHEET TITLE
1	-	COVER
2	HDD-001	12" HDPE CONDUIT (1)
3	HDD-002	12" HDPE CONDUIT (2)
4	HDD-003	LAYOUT PLAN
5	HDD-004	HDD EQUIPMENT LAYOUT PLAN
6	HDD-005	CSX RAILROAD CROSSING PLAN
7	HDD-006	CONDUCTOR PIPE/ GOAL POST/ GRAVITY CELL INSTALLATION
8	HDD-007	DETAILS
ATTACHMENTS		
BOUNDARY AND TOPOGRAPHIC SURVEY PREPARED BY C.T. MALE ASSOCIATES, DATED JUNE 2, 2022		

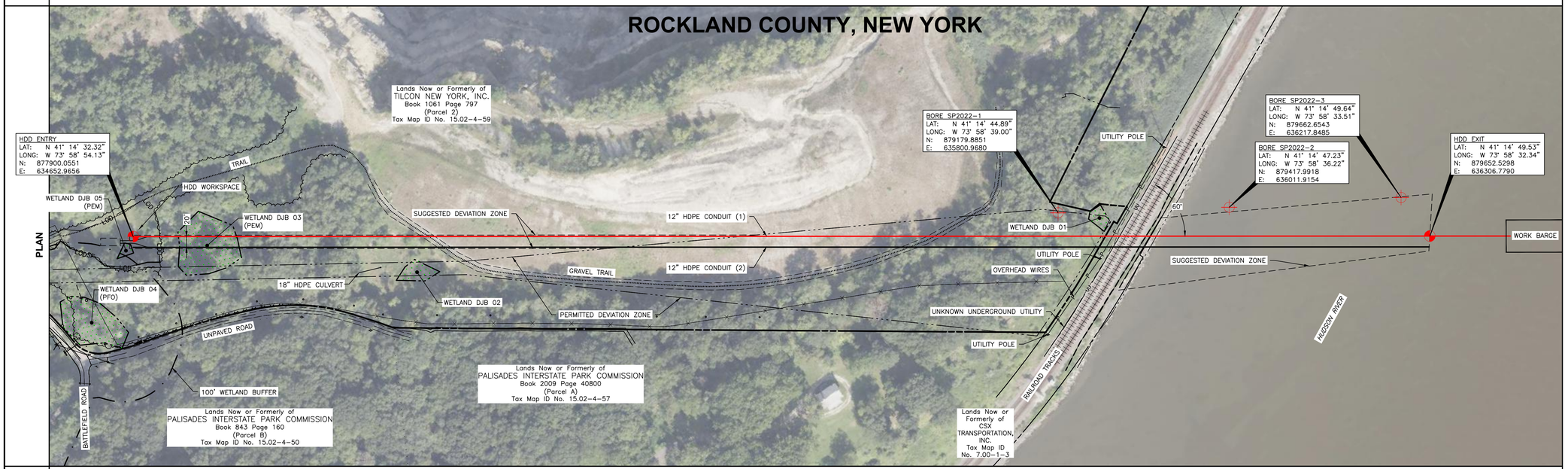
WE ARE!!! (1-800) 962-7962

PIPE STATIONING

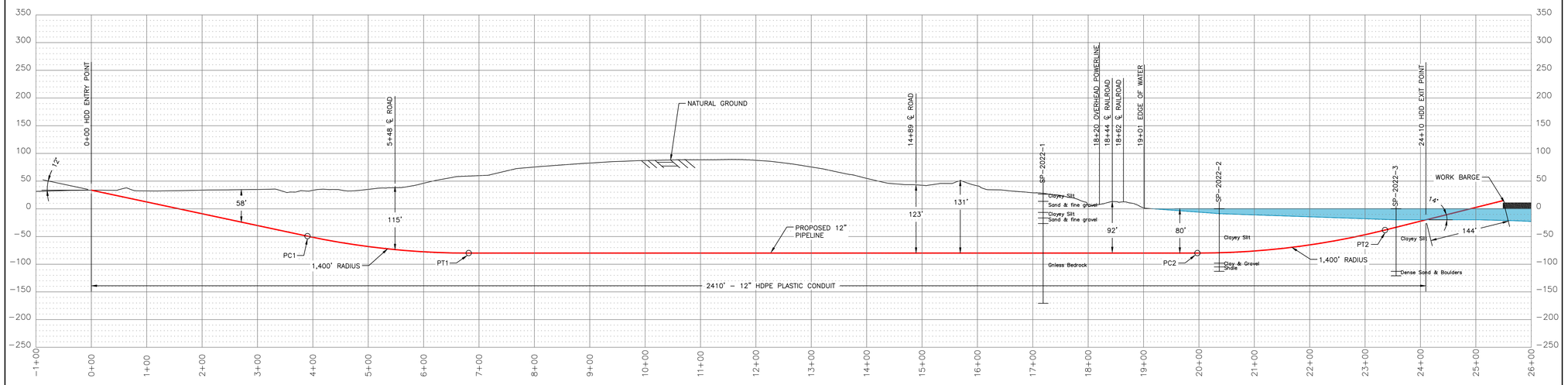
0+00 HDD ENTRY POINT | 1+00 | 2+00 | 3+00 | 4+00 | 5+00 | 5+48 ℄ ROAD | 6+00 | 7+00 | 8+00 | 9+00 | 10+00 | 11+00 | 12+00 | 13+00 | 14+00 | 14+89 ℄ ROAD | 16+00 | 17+00 | 18+00 | 18+20 OVERHEAD POWERLINE | 18+44 ℄ RAILROAD | 18+62 ℄ RAILROAD | 19+01 EDGE OF WATER | 20+00 | 21+00 | 22+00 | 23+00 | 24+10 HDD EXIT POINT

PLAN

ROCKLAND COUNTY, NEW YORK



PROFILE



LEGEND:

- HDD ENTRY/EXIT POINTS
- GEOTECH BORE HOLE LOCATIONS
- FENCE
- OVERHEAD WIRES
- UNDERGROUND UTILITY
- RAILROAD TRACKS
- EXISTING TREE LINE

GENERAL NOTES:

1.) IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE NECESSARY ARRANGEMENTS IF TRAFFIC CONTROL PLANS AND/OR RAILROAD REPRESENTATION ARE REQUIRED.

2.) CONTRACTOR TO LOCATE, MARK AND POTHOLE FOREIGN LINES AS NECESSARY PRIOR TO EXCAVATION (AND MONITOR DURING DRILLING).

3.) CONTRACTOR TO MAT OVER ANY FOREIGN PIPELINES CROSSED WITH DRILLING EQUIPMENT.

4.) LOCATIONS OF EXISTING FACILITIES SHOWN ARE APPROXIMATE. CONTRACTOR TO LOCATE AND/OR CONFIRM THE LOCATIONS AND DEPTH OF ALL UTILITIES, PIPELINES OR OTHER OBSTACLES PRIOR TO EXCAVATION. CONTRACTOR TO INFORM ENGINEER OF ANY UTILITY FOUND THAT MAY AFFECT HDD DESIGN.

5.) CONTRACTOR TO SUPPORT EXISTING UTILITIES, PIPELINES AND/OR OTHER FEATURES.

6.) CONTRACTOR TO GRADE EXCAVATION AREA AND RESTORE TO ORIGINAL CONDITIONS.

7.) CONTRACTOR TO CONTACT STATE ONE CALL SYSTEM AT LEAST 72 HOURS PRIOR TO DRILLING.

REFERENCE NOTES:

1. BASE PLAN REFERENCES BOUNDARY AND TOPOGRAPHIC SURVEY PREPARED BY C.T. MALE ASSOCIATES.
2. WETLANDS WERE DELINEATED AND FLAGGED BY TRC IN MAY OF 2022.
3. EXISTING TREE LINE WAS APPROXIMATED BY TRC FROM NEW YORK STATE GIS CLEARINGHOUSE FOR ROCKLAND COUNTY EARLY SPRING (MARCH OR APRIL) 2021 ORTHOIMAGERY.
4. 2022 MICROSOFT CORPORATION BING IMAGERY

PROJECTION SYSTEM:

NAD83 / NEW YORK EAST (U.S. SURVEY FEET)

INSTALLATION NOTES:

1.) ACCESS: ALL EQUIPMENT MUST ACCESS THE SITE ALONG THE CONSTRUCTION RIGHT-OF-WAY FROM PUBLIC OR APPROVED PRIVATE ROADS.

2.) WORK SPACE: WORK SPACE LIMITS ARE DEPICTED. NO TREE CLEARING IS REQUIRED FOR HDD OPERATIONS AND VEGETATION REMOVAL WILL BE LIMITED TO PRUNING OF LIMBS AND TRIMMING OF UNDERGROWTH AS NEED ON THE LIMITS OF THE THE HDD OPERATIONS AREA. CLEARING BETWEEN THE ENTRY AND EXIT POINTS IS NOT ANTICIPATED.

3.) WATER SOURCE: DRILL WATER AND PRE-INSTALLATION HYDRO-STATIC TEST WATER SHALL BE OBTAINED FROM AN APPROVED SOURCE.

4.) HYDROSTATIC TEST: ABOVE GROUND PRE-INSTALLATION HYDROSTATIC TEST SHALL BE CONDUCTED IN ACCORDANCE WITH PERMIT REQUIREMENTS. THE CONTRACTOR SHALL DISCHARGE HYDROSTATIC TEST WATER IN ACCORDANCE WITH PROJECT PERMITS.

5.) SPILL-PREVENTION: ALL PUMPS SHALL BE SET IN SECONDARY CONTAINMENT AND IN ACCORDANCE WITH THE SPILL PREVENTION AND RESPONSE PROCEDURES (SPRP). EQUIPMENT AND PUMPS OPERATING WITHIN 100 FEET OF ANY WATER BODY OR WETLAND SHALL BE OPERATED AND REFUELED IN ACCORDANCE WITH THE SPCC PLAN. EQUIPMENT REFUELING AND STORAGE OF HAZARDOUS MATERIALS, FUELS, ETC. SHALL BE CONDUCTED AT LEAST 100 FEET FROM WATER BODIES AND WETLAND. EACH CONSTRUCTION CREW SHALL HAVE ON HAND SUFFICIENT TOOLS AND MATERIALS TO STOP LEAKS AND HAVE SUPPLIES OF ABSORBENT AND BARRIER MATERIALS TO ALLOW RAPID CONTAINMENT AND RECOVERY OF SPILLED MATERIALS.

6.) EROSION AND SEDIMENT CONTROL: CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES IN ACCORDANCE WITH CONTRACT DOCUMENTS. CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL STRUCTURES AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

7.) MUD DISPOSAL: CONTRACTOR SHALL DISPOSE OF EXCESS DRILLING MUD AS DIRECTED BY THE COMPANY REPRESENTATIVE IN ACCORDANCE WITH PERMIT CONDITIONS. UNDER NO CIRCUMSTANCES SHALL DRILLING FLUID BE DISPOSED OF IN WATER BODIES OR WETLANDS. ANY DRILLING MUD WHICH INADVERTENTLY EXITS AT POINTS OTHER THAN THE ENTRY AND EXIT POINTS SHALL BE CONTAINED AND COLLECTED TO THE EXTENT PRACTICAL AND DISPOSED OF AS DIRECTED BY THE COMPANY REPRESENTATIVE IN ACCORDANCE WITH PERMIT CONDITIONS.

8.) CLEANUP/STABILIZATION/RESTORATION: ALL DISTURBED AREAS SHALL BE RETURNED TO THE ORIGINAL CONTOURS. DISTURBED AREAS SHALL BE SEEDED AND TEMPORARY EROSION/SEDIMENT CONTROL DEVICES SHALL BE REMOVED ONCE THE CONTRIBUTING DISTURBED AREAS ARE STABILIZED AND APPROVED BY THE QUALIFIED INSPECTOR.

9.) CONTRACTOR SHALL USE A GYROSCOPIC DRILL HEAD ON THE PILOT DRILL TO ENSURE ACCURATE EXIT LOCATION WITHIN THE TEMPORARY MODULAR GRAVITY CELLS.

HORIZONTAL DIRECTIONAL DRILL DATA

DESCRIPTION	STA.	ELEV.
ENTRY ANGLE @ 12°	0+00	33.5'
POINT OF CURVATURE (PC1) (1,400 FT. RADIUS)	3+90	-49.4'
POINT OF TANGENCY (PT1)	6+81	-80.0'
POINT OF CURVATURE (PC2) (1,400 FT. RADIUS)	19+97	-80.0'
POINT OF TANGENCY (PT2)	23+36	-38.5'
EXIT ANGLE @ 14°	24+10	-20.0'

HORIZONTAL DIRECTIONAL DRILL PARAMETERS

1.) PIPE: 12" O.D. x 1.417" W.T. — HDPE SDR 9.0
DESIGN FACTOR: 0.63

2.) LENGTH OF CROSSING: 2,410' HORIZONTAL DISTANCE

3.) TYPE OF PIPE JOINT: BUTT FUSION
LENGTH OF PIPE: 2,426' L.F.

4.) ESTIMATED PULL FORCE: 22,921 LBS.
ALLOWABLE PULL FORCE: 54,395 LBS.

STATE OF NEW YORK · KEVIN CHARLES BODENMILLER · 093543 · LICENSED PROFESSIONAL ENGINEER

9/19/22

REFERENCE DRAWINGS

DWG. NO.	TITLE
HDD-002	12" HDPE CONDUIT (2)
HDD-006	CONDUCTOR PIPE/GOAL POST/GRAVITY CELL INSTALLATION

REVISIONS

NO.	DESCRIPTION	DATE	DRAWN	CHK	APPR

DRAWING APPROVALS

DRAWN	DATE
AWF	06/28/22
CHECKED	DATE
GJR	09/19/22
ENGINEER	DATE
KCB	09/19/22

TRC FIRM REGISTRATION NO.: NY 0010187

SCALE PLAN: 0
SCALE PROFILE H: 0
SCALE PROFILE V: 0

STONY POINT HDD
12" HDPE CONDUIT (1)

SCALE	PROJECT NO.	DRAWING NO.	SHT. NO.
1"=100'	496182	HDD-001	2

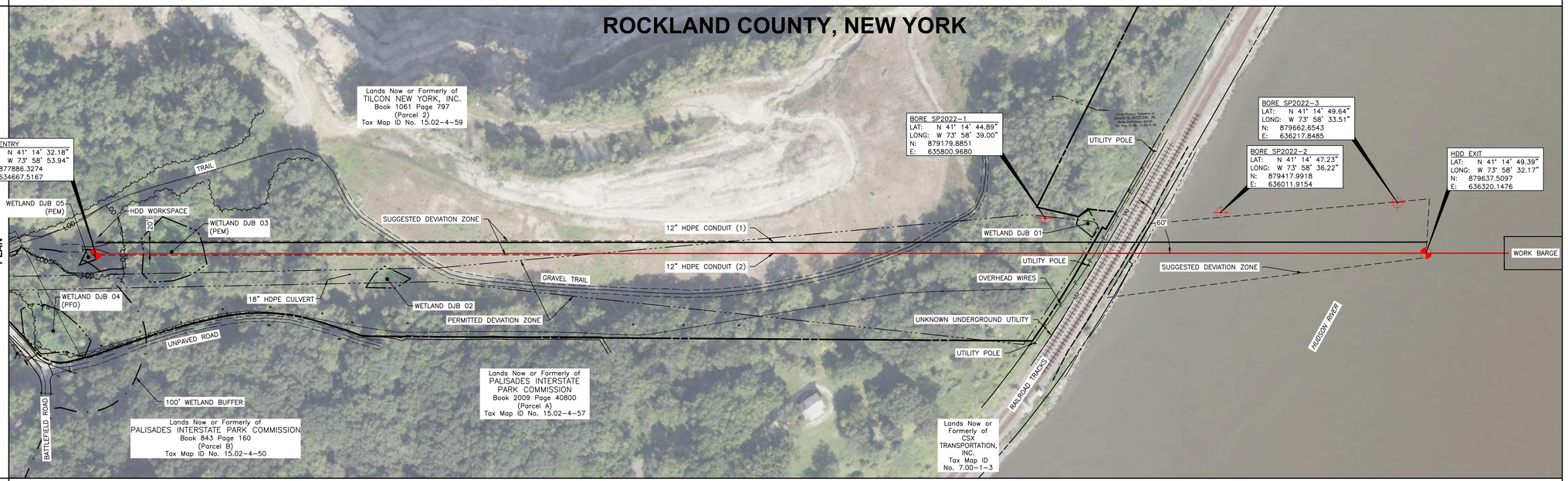
WE ARE!!! (1-800) 272-4480

PIPE STATIONING

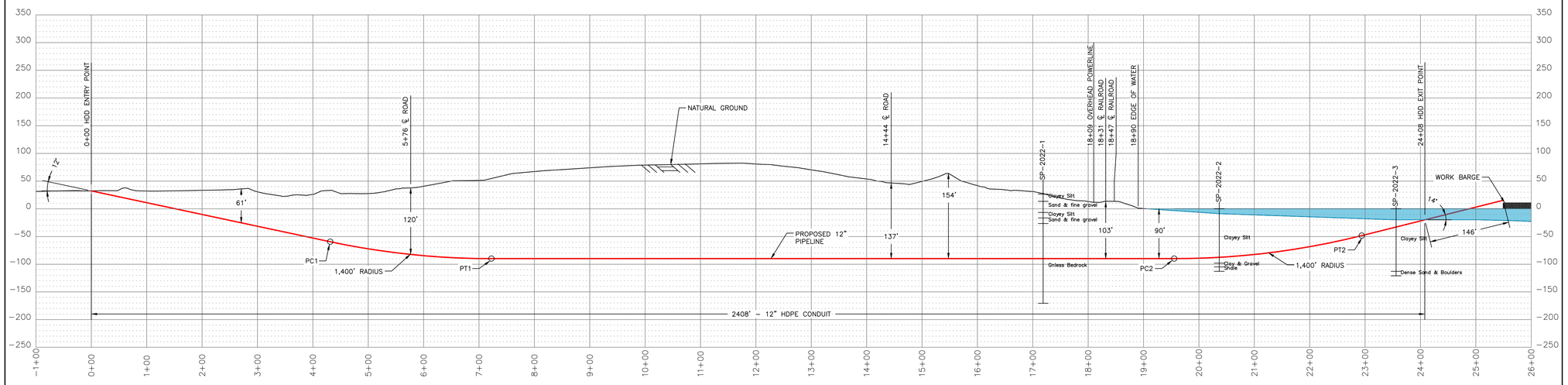
0+00 HDD ENTRY POINT | 1+00 | 2+00 | 3+00 | 4+00 | 5+00 | 5+76 ℄ ROAD | 6+00 | 7+00 | 8+00 | 9+00 | 10+00 | 11+00 | 12+00 | 13+00 | 14+00 | 14+44 ℄ ROAD | 15+00 | 16+00 | 17+00 | 18+00 / 18+09 OVERHEAD POWERLINE | 18+31 ℄ RAILROAD | 18+47 ℄ RAILROAD | 18+90 EDGE OF WATER | 20+00 | 21+00 | 22+00 | 23+00 | 24+08 HDD EXIT POINT

PLAN

ROCKLAND COUNTY, NEW YORK



PROFILE



LEGEND:

- HDD ENTRY/EXIT POINTS
- GEOTECH BORE HOLE LOCATIONS
- FENCE
- OVERHEAD WIRES
- UNDERGROUND UTILITY
- RAILROAD TRACKS
- EXISTING TREE LINE

GENERAL NOTES:

1.) IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAKE NECESSARY ARRANGEMENTS IF TRAFFIC CONTROL PLANS AND/OR RAILROAD REPRESENTATION ARE REQUIRED.

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3.) CONTRACTOR TO MAT OVER ANY FOREIGN PIPELINES CROSSED WITH DRILLING EQUIPMENT.

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REFERENCE NOTES:

1. BASE PLAN REFERENCES BOUNDARY AND TOPOGRAPHIC SURVEY PREPARED BY C.T. MALE ASSOCIATES.
2. WETLANDS WERE DELINEATED AND FLAGGED BY TRC IN MAY OF 2022.
3. EXISTING TREE LINE WAS APPROXIMATED BY TRC FROM NEW YORK STATE GIS CLEARINGHOUSE FOR ROCKLAND COUNTY EARLY SPRING (MARCH OR APRIL) 2021 ORTHOIMAGERY.
4. 2022 MICROSOFT CORPORATION BING IMAGERY

PROJECTION SYSTEM:

NAD83 / NEW YORK EAST (U.S. SURVEY FEET)

INSTALLATION NOTES:

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2.) WORK SPACE: WORK SPACE LIMITS ARE DEPICTED. NO TREE CLEARING IS REQUIRED FOR HDD OPERATIONS AND VEGETATION REMOVAL WILL BE LIMITED TO PRUNING OF LIMBS AND TRIMMING OF UNDERGROWTH AS NEED ON THE LIMITS OF THE THE HDD OPERATIONS AREA. CLEARING BETWEEN THE ENTRY AND EXIT POINTS IS NOT ANTICIPATED.

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6.) EROSION AND SEDIMENT CONTROL: CONTRACTOR SHALL SUPPLY, INSTALL AND MAINTAIN SEDIMENT CONTROL STRUCTURES IN ACCORDANCE WITH CONTRACT DOCUMENTS. CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL STRUCTURES AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

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9.) CONTRACTOR SHALL USE A GYROSCOPIC DRILL HEAD ON THE PILOT DRILL TO ENSURE ACCURATE EXIT LOCATION WITHIN THE TEMPORARY MODULAR GRAVITY CELLS.

HORIZONTAL DIRECTIONAL DRILL DATA

DESCRIPTION	STA.	ELEV.
ENTRY ANGLE @ 12°	0+00	32.4'
POINT OF CURVATURE (PC1) (1,400 FT. RADIUS)	4+31	−59.3'
POINT OF TANGENCY (PT1)	7+22	−90.0'
POINT OF CURVATURE (PC2) (1,400 FT. RADIUS)	19+55	−90.0'
POINT OF TANGENCY (PT2)	22+94	−48.3'
EXIT ANGLE @ 14°	24+08	−20.0'

HORIZONTAL DIRECTIONAL DRILL PARAMETERS

1.) PIPE: 12" O.D. x 1.417" W.T. DESIGN FACTOR: HDPE SDR 9.0, 0.63

2.) LENGTH OF CROSSING: 2,408' HORIZONTAL DISTANCE

3.) TYPE OF PIPE JOINT: BUTT FUSION
LENGTH OF PIPE: 2,426 L.F.

4.) ESTIMATED PULL FORCE: 22,921 LBS.
ALLOWABLE PULL FORCE: 54,395 LBS.

STATE OF NEW YORK · CHARLES BOURNIVAL · 093543 · LICENSED PROFESSIONAL ENGINEER

9/19/22

REFERENCE DRAWINGS

DWG. NO.	TITLE
HDD-001	12" HDPE CONDUIT (1)
HDD-006	CONDUCTOR PIPE/GOAL POST/GRAVITY CELL INSTALLATION

REVISIONS

NO.	DESCRIPTION	DATE	DRAWN	CHK	APPR

DRAWING APPROVALS

DRAWN	DATE
AWF	06/28/22
CHECKED	DATE
GJR	09/19/22
ENGINEER	DATE
KCB	09/19/22

TRC FIRM REGISTRATION NO.: NY 0010187

SCALE PLAN: 0
SCALE PROFILE H: 0
SCALE PROFILE V: 0

STONY POINT HDD
12" HDPE CONDUIT (2)

SCALE	PROJECT NO.	DRAWING NO.	SHT. NO.
1"=100'	496182	HDD-002	3

PROPOSED WORK NOTES:

1. ALL HDD CONSTRUCTION OPERATIONS, LAYDOWN, AND PARKING WILL BE CONTAINED WITHIN THE LIMITS OF DISTURBANCE. TREE CLEARING AND SIGNIFICANT LAND GRADING IS NOT ANTICIPATED. VEGETATION REMOVAL IS ANTICIPATED TO BE LIMITED TO PRUNING OF LIMBS AND TRIMMING OF UNDERGROWTH ALONG THE PERIMETER OF THE HDD WORKSPACE, NO HERBICIDE USE IS PERMITTED. ALL DISTURBED AREAS SHALL BE RESTORED AND RE-VEGETATED AFTER CONSTRUCTION.
2. THE EXISTING ACCESS TO TILCON PROPERTY SHALL BE RE-SURFACED AND WIDENED AS NECESSARY TO SUPPORT HDD CONSTRUCTION OPERATIONS AND PREVENT SEDIMENT-LADEN RUNOFF TO FLOW OUTSIDE OF THE LIMITS OF DISTURBANCE. SECTIONS OF EXISTING ACCESS TO BE IMPROVED SHALL BE A MAXIMUM OF 12-FOOT IN WIDTH AND SHALL BE CONSTRUCTED WITH ¾" CLEAN STONE, 6 INCHES THICK PLACED OVER A BED OF FILTER FABRIC.
3. THE 455 SQUARE FEET OF WETLAND RESTORATION WORK SHALL BE SUPERVISED BY A QUALIFIED WETLAND SCIENTIST, RETAINED BY THE OWNER AND EXPERIENCED IN WETLAND MITIGATION CONSTRUCTION. EXISTING WETLAND SOILS SHALL BE STRIPPED, STOCKPILED AND RE-USED FOR WETLAND RESTORATION TO THE EXTENT PRACTICAL. PRIOR TO WETLAND RESTORATION ALL DEPOSITED SEDIMENT SHALL BE REMOVED AND PROPERLY DISPOSED OF AND THE STOCKPILED WETLAND SOIL SHALL BE TESTED TO ENSURE THAT IT CONTAINS 12-PERCENT ORGANIC CARBON CONTENT BY WEIGHT. WETLAND SOILS SHALL BE SUPPLEMENTED AS NECESSARY TO RESTORE EXISTING CONDITIONS ELEVATIONS. "FINE SANDY LOAM" OR "SANDY LOAM" SHALL BE USED TO SUPPLEMENT EXISTING WETLAND SOIL AND SHALL BE OF A UNIFORM MIXTURE FREE OF SUBSOIL, STONES, LUMPS, PLANTS, ROOTS, DEBRIS, OTHER EXTRANEOUS MATTER OVER 1-1/2 INCH IN DIAMETER AND TOXIC SUBSTANCES HARMFUL TO PLANT GROWTH. THE WETLAND RESTORATION AREA SHALL BE SEEDED WITH A NATIVE AND NATURALIZED WETLAND SEED MIX APPROVED BY THE QUALIFIED WETLAND SCIENTIST.
4. INVASIVE SPECIES CONSISTING OF COMMON REED, MUGWORT, JAPANESE HONEYSUCKLE, JAPANESE BARBERRY, MULTIFLORA ROSE, AND GARLIC MUSTARD WERE DOCUMENTED IN THE VICINITY OF THE PROJECT AREA DURNG THE MAY 2022 WETLAND DELINEATION. REFER TO SECTION 8.3 OF THE ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN DOCUMENT FOR ADDITIONAL INFORMATION RELATED TO INVASIVE SPECIES MANAGEMENT.
5. TEMPORARY 'CONSTRUCTION TRAFFIC AHEAD' WARNING SIGNS WILL BE INSTALLED 100-FEET FROM THE CONSTRUCTION ENTRANCE/EXISTING ACCESS TO TILCON PROPERTY ON BOTH BATTLEFIELD ROAD APPROACHES. FINAL SIGN TEXT AND LOCATIONS TO BE APPROVED BY THE OWNER AND COORDINATED WITH THE PALISADES INTERSTATE PARK COMMISSION.

REFERENCE NOTES:

1. BASE PLAN REFERENCES BOUNDARY AND TOPOGRAPHIC SURVEY PREPARED BY C.T. MALE ASSOCIATES.
2. WETLANDS WERE DELINEATED AND FLAGGED BY TRC IN MAY OF 2022.
3. EXISTING TREE LINE WAS APPROXIMATED BY TRC FROM NEW YORK STATE GIS CLEARINGHOUSE FOR ROCKLAND COUNTY EARLY SPRING (MARCH OR APRIL) 2021 ORTHOIMAGERY.

LEGEND:

- P — OVERHEAD WIRES
- -30- — MAJOR CONTOUR
- -28- — MINOR CONTOUR
- UTILITY POLE

LIMITS OF DISTURBANCE / TEMPORARY EASEMENT
0.44± AC

HDD WORKSPACE
SEE PROPOSED WORK NOTE 1

OPEN TRENCHED CONDUITS FROM HDD CONDUIT TO STUB-UPS AT TRANSITION VAULT (TYP.) (BY OTHERS)

HDD TRANSITION VAULT (CONNECTIONS TO CONDUIT STUB-UPS BY OTHERS)

EXISTING ACCESS GATE TO BE IMPROVED AS NECESSARY
COORDINATE ANY NECESSARY ACCESS GATE IMPROVEMENTS WITH PROPERTY OWNER

8-FT WIDE GRAVEL TRAIL TO BE RE-SURFACED AND WIDENED AS NECESSARY
COORDINATE ACCESS ROAD IMPROVEMENTS WITH PROPERTY OWNERS
SEE PROPOSED WORK NOTE 2

CONSTRUCTION ENTRANCE / EXISTING ACCESS TO TILCON PROPERTY
(COORDINATE CONSTRUCTION ENTRANCE WITH PROPERTY OWNERS)

'CHPE STONY POINT WORKSITE ENTRANCE' SIGN
SEE PROPOSED WORK NOTE 5

HDD ENTRY CONDUIT (1)
N:877900.05
E:634652.97

HDD ENTRY CONDUIT (2)
N:877886.33
E:634667.52

N:877854
E:634614

N:877880
E:634639

N:877844
E:634624

N:877871
E:634649

TERRESTRIAL ROUTE (BY OTHERS)

TERRESTRIAL ROUTE (BY OTHERS)
EXISTING OVERHEAD WIRE CROSSING LOCATION

100-FOOT WETLAND BUFFER

SILT FENCE

PERMITTED DEVIATION ZONE

SUGGESTED DEVIATION ZONE (HDD)

12-IN HDPE CONDUIT (1)

12-IN HDPE CONDUIT (2)

20'

25'

RESTORE EXISTING WETLAND (455 SQUARE FEET)
SEE PROPOSED WORK NOTE 3

WETLAND DJB 03
(PEM)

WETLAND DJB 04
(PFO)

WETLAND DJB 05
(PEM)

NYSDEC WETLAND
HS-2

EXISTING TREE LINE

GRAVEL TRAIL

APPROX. UP LOC.

BATTLEFIELD ROAD

PROPERTY LINE

BOULDERS (TYP)

UNPAVED ROAD

6' CHAIN LINK FENCE

Lands Now or Formerly of
TILCON NEW YORK, INC.
Book 1061 Page 797
(Parcel 2)
Tax Map ID No. 15.02-4-59

Lands Now or Formerly of
PALISADES INTERSTATE PARK COMMISSION
Book 843 Page 160
(Parcel B)
Tax Map ID No. 15.02-4-50

REFERENCE DRAWINGS	
DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	DATE	DRAWN	CHK	APPR

DRAWING APPROVALS	
DRAWN	DATE
GJR	08/11/2022
CHECKED	DATE
PRW	08/25/2022
ENGINEER	DATE
KCB	09/19/2022

STATE OF NEW YORK
KEVIN CHARLES BOEHNEMER
093543
LICENSED PROFESSIONAL ENGINEER
9/19/22

TRC FIRM REGISTRATION NO: NY 0010187

SCALE PLAN: 0 20'

STONY POINT HDD LAYOUT PLAN

SCALE	PROJECT NO.	DRAWING NO.	SHT.NO
1"=20'	496182	HDD-003	4

GRogowski : K:\496182- JAG Companies- EM&CP Dwgs Stony Pt NY Directional Drill\04 GRAPHICS\CAD\Drawings\496182 CHPE Stony Point HDD Plans Layout.dwg
12-Sep-2022 - 2:14 PM

REFERENCE NOTES:

1. BASE PLAN REFERENCES BOUNDARY AND TOPOGRAPHIC SURVEY PREPARED BY C.T. MALE ASSOCIATES.
2. WETLANDS WERE DELINEATED AND FLAGGED BY TRC IN MAY OF 2022.
3. EXISTING TREE LINE WAS APPROXIMATED BY TRC FROM NEW YORK STATE GIS CLEARINGHOUSE FOR ROCKLAND COUNTY EARLY SPRING (MARCH OR APRIL) 2021 ORTHOIMAGERY.
4. HDD EQUIPMENT LAYOUT PROVIDED BY HUXTED TRENCHLESS IN AUGUST 2022.

LEGEND:
- SF — SILT FENCE
- P — OVERHEAD WIRES
- 30 — MAJOR CONTOUR
- 28 — MINOR CONTOUR
- UTILITY POLE

LIMITS OF DISTURBANCE / TEMPORARY EASEMENT
0.44± AC

Tool Trailer
Hoe
HDD ENTRY CONDUIT (1)
Cuttings
Cuttings
Cleaning System
Mud Pump
WETLAND DJB 03 (PEM)
SUGGESTED DEVIATION ZONE (HDD)
12-IN HDPE CONDUIT (1)
Pipe Trailer
Hoe
20'
25'
12-IN HDPE CONDUIT (2)
SUGGESTED DEVIATION ZONE (HDD)
EXISTING TREE LINE
GRAVEL TRAIL
100-FOOT WETLAND BUFFER
Drill Rig
WETLAND DJB 05 (PEM)
HDD ENTRY CONDUIT (2)
6' CHAIN LINK FENCE
Office Trailer
Crew Trailer
Control Cab
Frac Tank
PERMITTED DEVIATION ZONE

REFERENCE DRAWINGS	
DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	DATE	DRAWN	CHK	APPR

DRAWING APPROVALS	
DRAWN	DATE
GJR	08/24/2022
CHECKED	DATE
PRW	08/25/2022
ENGINEER	DATE
KCB	09/19/2022

KEVIN CHARLES BORDNAMER — STATE OF NEW YORK — 093543 — LICENSED PROFESSIONAL ENGINEER
9/19/22

TRC — FIRM REGISTRATION NO.: NY 0010187

SCALE PLAN: 0 10'

STONY POINT HDD
EQUIPMENT LAYOUT PLAN

SCALE	PROJECT NO.	DRAWING NO.	SHT.NO.
1"=10'	496182	HDD-004	5

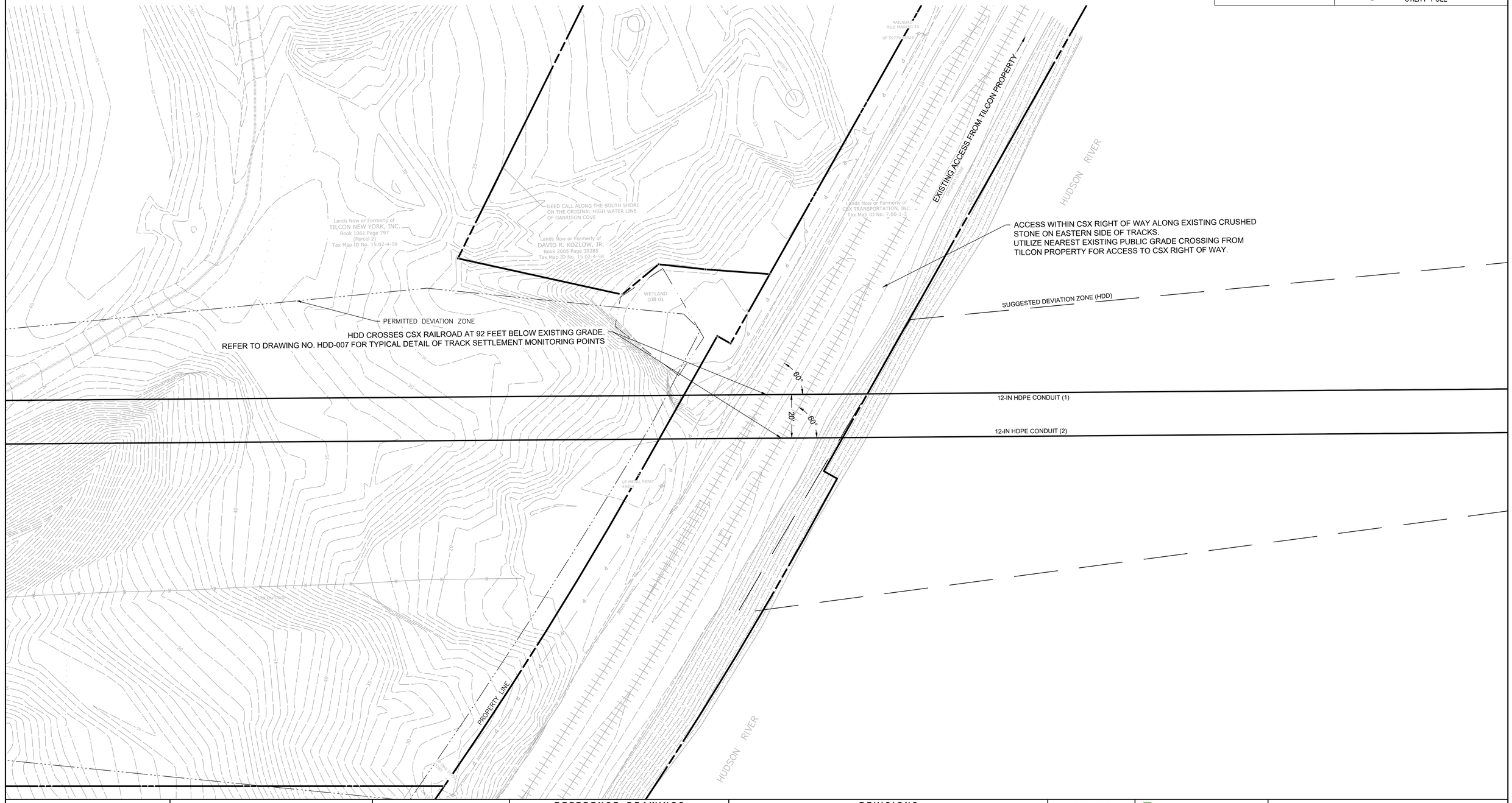
9-Sep-2022 2:31 PM

GRogowski : K:\496182- JAG Companies- EM&CP Dwgs Stony Pt NY Directional Drill\04 GRAPHICS\CAD\Drawings\496182 CHPE Stony Point HDD Plans Equipment Layout.dwg

REFERENCE NOTES:

1. BASE PLAN REFERENCES BOUNDARY AND TOPOGRAPHIC SURVEY PREPARED BY C.T. MALE ASSOCIATES.
2. WETLANDS WERE DELINEATED AND FLAGGED BY TRC IN MAY OF 2022.
3. EXISTING TREE LINE WAS APPROXIMATED BY TRC FROM NEW YORK STATE GIS CLEARINGHOUSE FOR ROCKLAND COUNTY EARLY SPRING (MARCH OR APRIL) 2021 ORTHOIMAGERY.

LEGEND:
- CSX RAILROAD TRACKS
- P — OVERHEAD WIRES
- UU — UNDERGROUND UTILITY
- 30 — MAJOR CONTOUR
- 28 — MINOR CONTOUR
- UTILITY POLE



REFERENCE DRAWINGS	
DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	DATE	DRAWN	CHK	APPR

DRAWING APPROVALS	
DRAWN	DATE
GJR	08/11/2022
CHECKED	DATE
PRW	08/25/2022
ENGINEER	DATE
KCB	09/19/2022

STATE OF NEW YORK · KEVIN CHARLES BORNEMANN · 093543 · LICENSED PROFESSIONAL ENGINEER

9/19/22

TRC FIRM REGISTRATION NO.: NY 0010187

SCALE PLAN: 0 20'

STONY POINT HDD
CSX RAILROAD CROSSING PLAN

SCALE	PROJECT NO.	DRAWING NO.	SHT.NO.
1"=20'	496182	HDD-005	6

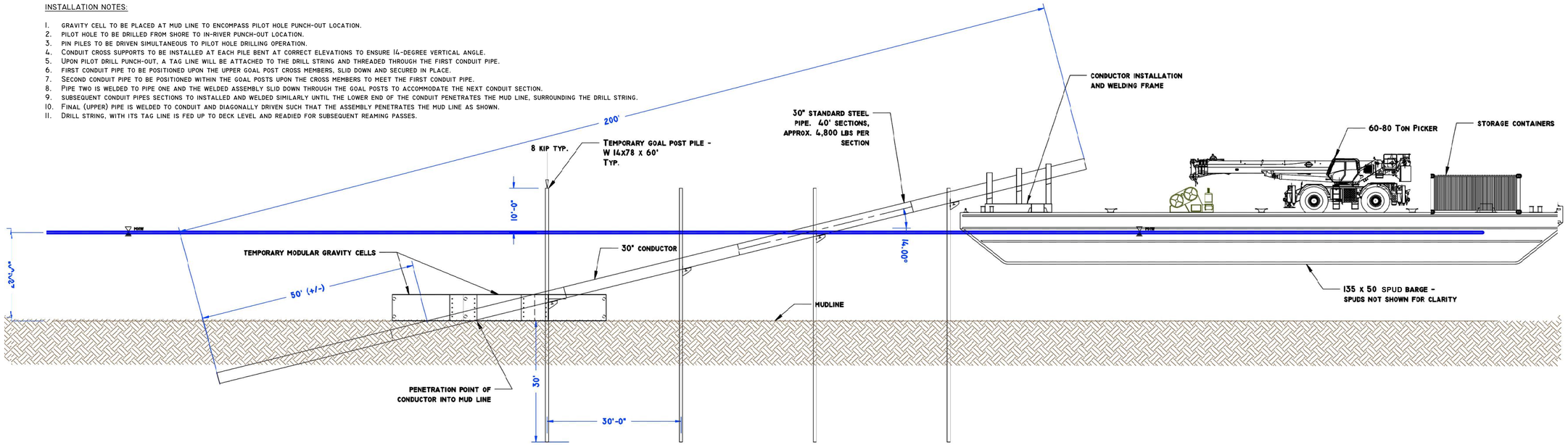
GRogowski : K:\496182- JAC Companies- EM&CP Dwgs Stony Pt NY Directional Drill\04 GRAPHICS\CAD\Drawings\496182 CHPE Stony Point HDD Plans RR Crossing.dwg

09-Sep-2022 2:31 PM

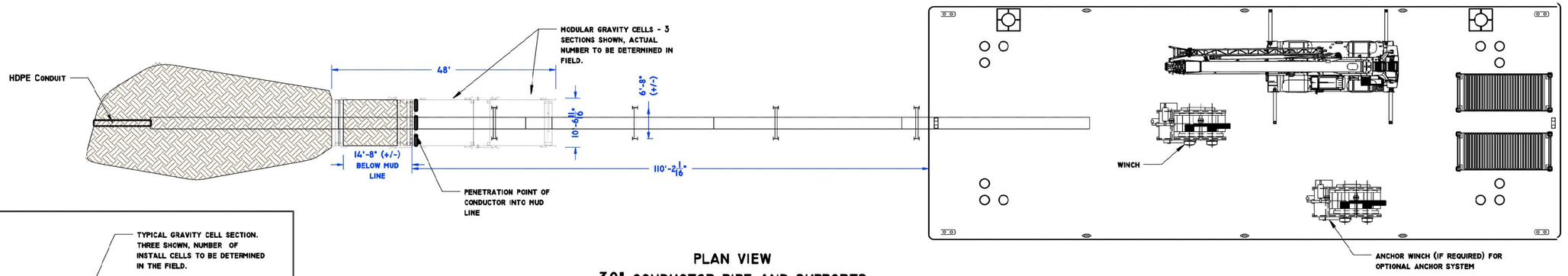
WE ARCH B (24x36)

INSTALLATION NOTES:

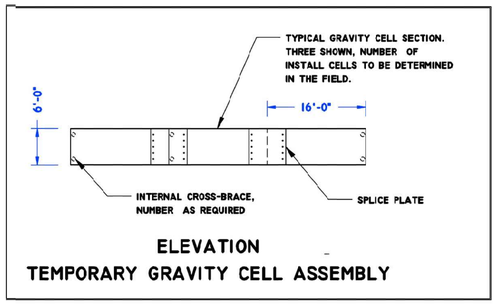
1. GRAVITY CELL TO BE PLACED AT MUD LINE TO ENCOMPASS PILOT HOLE PUNCH-OUT LOCATION.
2. PILOT HOLE TO BE DRILLED FROM SHORE TO IN-RIVER PUNCH-OUT LOCATION.
3. PIN PILES TO BE DRIVEN SIMULTANEOUS TO PILOT HOLE DRILLING OPERATION.
4. CONDUIT CROSS SUPPORTS TO BE INSTALLED AT EACH PILE BENT AT CORRECT ELEVATIONS TO ENSURE 14-DEGREE VERTICAL ANGLE.
5. UPON PILOT DRILL PUNCH-OUT, A TAG LINE WILL BE ATTACHED TO THE DRILL STRING AND THREADED THROUGH THE FIRST CONDUIT PIPE.
6. FIRST CONDUIT PIPE TO BE POSITIONED UPON THE UPPER GOAL POST CROSS MEMBERS, SLID DOWN AND SECURED IN PLACE.
7. SECOND CONDUIT PIPE TO BE POSITIONED WITHIN THE GOAL POSTS UPON THE CROSS MEMBERS TO MEET THE FIRST CONDUIT PIPE.
8. PIPE TWO IS WELDED TO PIPE ONE AND THE WELDED ASSEMBLY SLID DOWN THROUGH THE GOAL POSTS TO ACCOMMODATE THE NEXT CONDUIT SECTION.
9. SUBSEQUENT CONDUIT PIPES SECTIONS TO INSTALLED AND WELDED SIMILARLY UNTIL THE LOWER END OF THE CONDUIT PENETRATES THE MUD LINE, SURROUNDING THE DRILL STRING.
10. FINAL (UPPER) PIPE IS WELDED TO CONDUIT AND DIAGONALLY DRIVEN SUCH THAT THE ASSEMBLY PENETRATES THE MUD LINE AS SHOWN.
11. DRILL STRING, WITH ITS TAG LINE IS FED UP TO DECK LEVEL AND READIED FOR SUBSEQUENT REAMING PASSES.



PROFILE
30" CONDUCTOR PIPE AND SUPPORTS



PLAN VIEW
30" CONDUCTOR PIPE AND SUPPORTS



ELEVATION
TEMPORARY GRAVITY CELL ASSEMBLY

STATE OF NEW YORK
KEVIN CHARLES BOEHNLEIN
093543
LICENSED PROFESSIONAL ENGINEER
9/19/22

REFERENCE DRAWINGS	
DWG. NO.	TITLE
HDD-001	12" HDPE CONDUIT (1)
HDD-002	12" HDPE CONDUIT (2)

REVISIONS					
NO.	DESCRIPTION	DATE	DRAWN	CHK	APPR

DRAWING APPROVALS	
DRAWN	DATE
AWF	06/28/22
CHECKED	DATE
GJR	09/19/22
ENGINEER	DATE
KCB	09/19/22

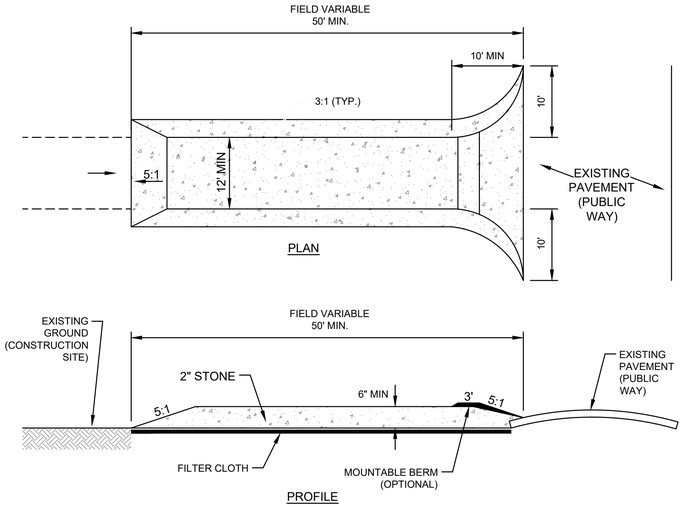
TRC FIRM REGISTRATION NO.: NY 0010187

SCALE PLAN: 0 N.T.S.
SCALE PROFILE H: 0 N.T.S.
SCALE PROFILE V: 0 N.T.S.

STONY POINT HDD
CONDUCTOR PIPE/GOAL POST/ GRAVITY CELL INSTALLATION

SCALE	PROJECT NO.	DRAWING NO.	SHT. NO.
N.T.S.	496182	HDD-006	7

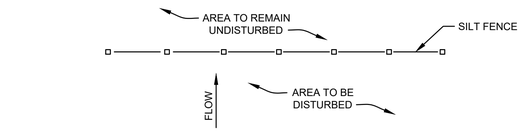
USER_DWGNAME
SAVE_DATE

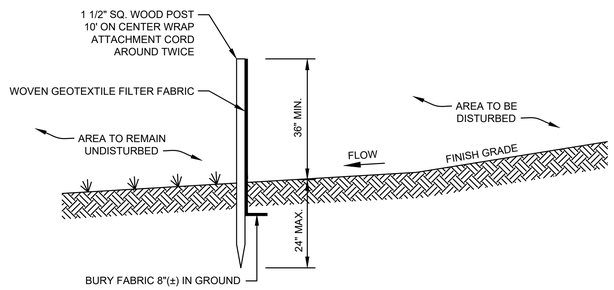


CONSTRUCTION SPECIFICATIONS:

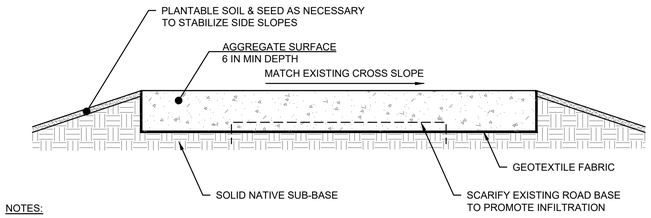
1. USE 2" DIAMETER STONE OR RECLAIMED/RECYCLED CONCRETE EQUIVALENT.
2. RECOMMENDED LENGTH GREATER THAN 50 FEET WHERE PRACTICAL.
3. THICKNESS NOT LESS THAN 6 INCHES.
4. 12-FOOT MINIMUM WIDTH, BUT NOT LESS THAN FULL WIDTH AT POINTS WHERE INGRESS AND EGRESS OCCUR.
5. FILTER CLOTH SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. EGRESS SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND, AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
7. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED BY THE CONTRACTOR.

1/6 TYPICAL CONSTRUCTION ENTRANCE
SCALE: NTS





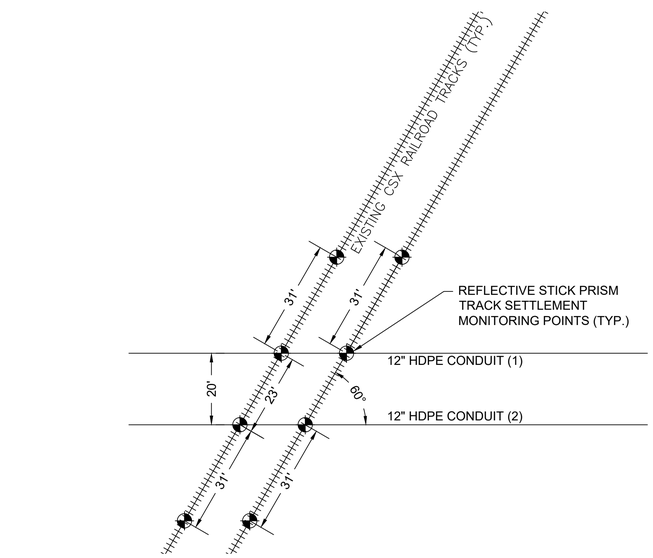
2/6 TYPICAL SILT FENCE
SCALE: NTS



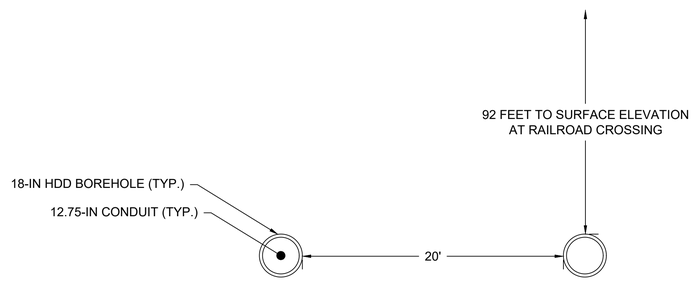
NOTES:

1. WIDTH OF THE ACCESS ROAD WILL BE 12 FEET.
2. EXISTING TOPSOIL WILL BE REMOVED AS NECESSARY UNTIL A SOLID NATIVE SUB-BASE HAS BEEN REACHED.
3. A GEOTEXTILE FABRIC WILL BE INSTALLED ON TOP OF THE SOLID NATIVE SUB-BASE BEFORE THE AGGREGATE SURFACE IS INSTALLED.
4. THE AGGREGATE SURFACE SHALL BE A MINIMUM OF 6 INCHES IN DEPTH AND CONSTRUCTED COMPLETELY OUT OF $\frac{3}{4}$ INCH ANGULAR GRAVEL BORROW OR WELL-GRADED CRUSHED STONE.
5. AGGREGATE COMPACTION SHALL BE A MINIMUM OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY COMPACTED IN 6 INCH LIFTS.
6. MAXIMUM GRADE SHALL BE NO STEEPER THAN 8%.

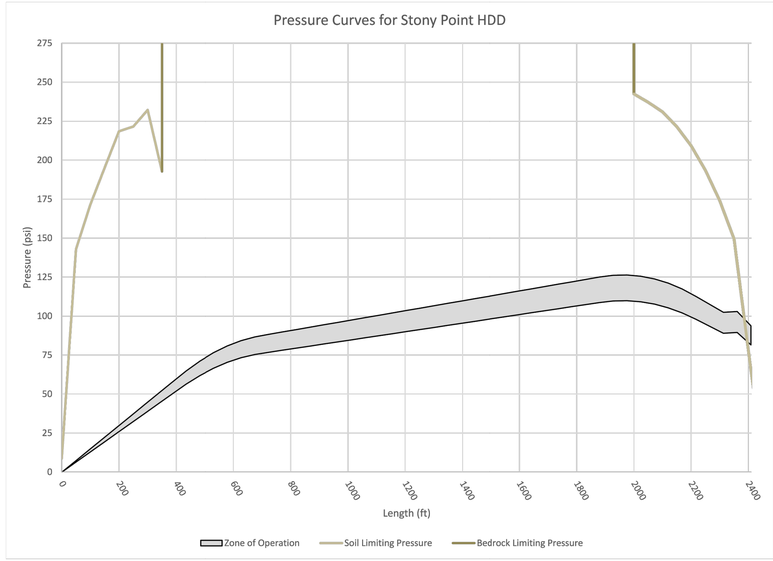
3/6 TYPICAL ACCESS ROAD
SCALE: NTS



4/6 CSX RAILROAD CROSSING MONITORING LOCATIONS SCHEMATIC
SCALE: NTS



5/6 TYPICAL HDD CROSS SECTION
SCALE: NTS



6/6 TYPICAL HDD PRESSURE CURVE
SCALE: NTS

REFERENCE DRAWINGS		REVISIONS					
DWG. NO.	TITLE	NO.	DESCRIPTION	DATE	DRAWN	CHK	APPR

DRAWING APPROVALS	
DRAWN	DATE
GJR	08/24/2022
CHECKED	DATE
PRW	8/25/2022
ENGINEER	DATE
KCB	9/19/2022

STATE OF NEW YORK · KEVIN CHARLES BOSENBERGER · 093543 · LICENSED PROFESSIONAL ENGINEER
9/19/22

TRC FIRM REGISTRATION NO: NY 0010187

STONY POINT HDD
DETAILS

SCALE	PROJECT NO.	DRAWING NO.	SHT.NO.
NTS	496182	HDD–007	8

GRogowski - K:\496182– JAG Companies– EM&CP Dwgs Stony Pt NY Directional Drill\04 GRAPHICS\CAD\Drawings\496182 CHPE Stony Point HDD Plans Details.dwg
19-Sep-2022 10:17 AM
WE ARCH B (24x36)