Empire Offshore Wind LLC

Empire Wind 1 Project Article VII Application

Exhibit 5 Design Drawings

June 2021

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ACRONYMS AND ABBREVIATIONS

EM&CP Environmental Management & Construction Plan

Empire, the Applicant Empire Offshore Wind LLC

EW 1 Empire Wind 1

ft foot

HVAC high-voltage alternating-current

km kilometer kV kilovolt

Lease Commercial Lease of Submerged Lands for Renewable Energy

Development on the Outer Continental Shelf OCS-A 0512

Lease Area Bureau of Ocean Energy Management-designated Renewable Energy

Lease Area OCS-A 0512

m meter mi mile

nm nautical mile

NYISO New York Independent System Operator, Inc.

NYSPSC or Commission New York State Public Service Commission

OCS Outer Continental Shelf

POI Point of Interconnection at the Gowanus 345-kV Substation

Project EW 1 Project transmission facilities in New York

SBMT South Brooklyn Marine Terminal

SSBMT Sustainable South Brooklyn Marine Terminal

EXHIBIT 5: DESIGN DRAWINGS

5.1 Introduction

Empire Offshore Wind LLC (Empire, or the Applicant) proposes to construct and operate the Empire Wind 1 (EW 1) Project as one of two separate offshore wind projects to be located within the Bureau of Ocean Energy Management-designated Renewable Energy Lease Area OCS-A 0512 (Lease Area). The proposed transmission system for the EW 1 Project will connect the offshore wind farm to the point of interconnection (POI), and will include 230-kilovolt (kV) export and 345-kV interconnection lines traversing a total of approximately 17.5 miles (mi) (15.2 nautical miles [nm], 28.2 kilometers [km]) within the State of New York. An electric transmission line with a design capacity of 125 kV or more, extending a distance of one mile or more, is subject to review and approval by the New York State Public Service Commission (Commission or NYSPSC) as a major electric transmission facility. This application is being submitted to the Commission pursuant to Article VII of the New York Public Service Law for the portions of the EW 1 Project transmission system that are located within the State of New York (collectively, the Project).

The Project will interconnect to the New York State Transmission System operated by the New York Independent System Operator, Inc. (NYISO) at the Gowanus 345-kV Substation (the point of interconnection, or POI). The Gowanus 345-kV Substation is owned by the Consolidated Edison Company of New York, Inc. The Project's onshore facilities, including the onshore cable route, onshore substation, and the POI, are located entirely within Brooklyn, Kings County, New York.

The Article VII components of the EW 1 Project include:

- Two three-core 230-kV high-voltage alternating-current (HVAC) submarine export cables located within an approximately 15.1-nm (27.9-km)-long, submarine export cable corridor from the boundary of New York State waters 3 nm (5.6 km) offshore to the cable landfall in Brooklyn, New York;
- A 0.2-mi (0.3-km)-long onshore cable route and substation including:
 - Two three-core 230-kV HVAC EW 1 onshore export cables buried underground from the cable landfall either directly to the cable terminations or to a vault within the onshore substation;
 - An onshore substation located at the South Brooklyn Marine Terminal (SBMT), which will increase the voltage to 345 kV for the onshore interconnection cables; and
 - o Two 345-kV cable circuits, each with three single-core HVAC onshore interconnection cables, buried underground from the onshore substation to the POI.

This Exhibit addresses the requirements of 16 New York Codes, Rules and Regulations § 86.6 to provide design, profile and architectural drawings for the proposed facilities, including the length, width and height of any structure; the material of construction, color and finish; and a profile of the centerline of the right-of-way at exaggerated vertical scale.

5.2 Description of Design Drawings

From the Lease Area, two 230-kV submarine export cables will be installed within a single submarine export cable corridor traversing the New York Bight into New York Bay and continuing to the cable landfall located in Brooklyn, New York. The Project cable corridor for this application begins where the submarine export



cable route crosses the New York State boundary 3 nm (3.5 mi, 5.6 km) offshore, approximately 3.9 mi (6.2 km) southeast of Rockaway Point at the southwestern corner of Long Island, New York and 5.5 mi (8.8 km) east of the tip of Sandy Hook, New Jersey. From there, the corridor enters Lower New York Bay and continues under the Verrazzano-Narrows Bridge between Brooklyn and Staten Island, and north to the cable landfall at SBMT in Sunset Park, Brooklyn, New York, on the east side of Upper New York Bay, in Gowanus Bay.

The submarine export cable corridor length is approximately 15.1 nm (17.3 mi, 27.9 km) from the New York State waters boundary offshore to the cable landfall. The assessed submarine export cable siting corridor in New York State waters is variable in width to allow the Applicant flexibility to micro-site the cables based on environmental and seabed conditions identified prior to installation. Further route micro-siting within the cable corridor will be provided as part of the Project's Environmental Management and Construction Plan (EM&CP).

The Project's submarine export cable route will make landfall directly to the west of the onshore substation. The cable landfall will be located at SBMT in Sunset Park in Brooklyn, New York. SBMT is located adjacent to 2nd Avenue between 29th and 39th Streets in Brooklyn, along Gowanus Bay. The parcel is owned by New York City and leased to the New York City Economic Development Corporation, which subleases to the Sustainable South Brooklyn Marine Terminal (SSBMT) for operations.

The preferred method for cable landfall installation is to pull the cable through conduits in the bulkhead along the shoreline at SBMT. The Applicant will replace the currently existing bulkhead at the cable landfall as part of site preparation activities and will install the conduits for cable landfall. Temporary sheet piling will be installed in the water at the conduit openings during the bulkhead replacement activities, which will then be removed following installation of the cable landfall. **Exhibit E-3: Underground Construction** provides additional information on cable landfall installation methodology and associated activities. Conceptual drawings for the bulkhead replacement and cable landfall indicate some site conditions (e.g. high level pile supported platform) that are understood to be planned by the port facility, outside of and adjacent to the Project site.

On the upland side of the cable landfall, the submarine export cables will be pulled directly to a cable termination or a vault within the onshore substation at SBMT. The onshore portions of the submarine export cables, called the EW 1 onshore export cables, will be a continuation of the two 230-kV three-core HVAC cables for approximately 263 feet [ft] (80.0 meters [m]) from the cable landfall to their termination within the onshore substation site.

The Applicant is planning to install gas-insulated switchgear. The onshore substation facility will be designed to comply with applicable New York building codes, electrical standards, and environmental conditions to the extent practicable (see **Exhibit 7: Local Ordinances** for compliance information and requested waivers). Additional detail on substation design is provided in **Exhibit E-2: Other Facilities**. Final layout and design details will be further developed during the design process through execution contracts as part of the NYISO interconnection process and will be provided in the Applicant's EM&CP.

The onshore substation site will be contained within an up to 10-ft (3-m) high perimeter fence, constructed of chain link, welded wire, or similar material, with an up to 2-ft (0.6-m) tall barbed wire extension, for a total height of 12 ft (3.6 m). The onshore substation site will have an operational footprint of approximately 4.8 acres (1.9 hectares). Enclosed buildings and/or walled structures will contain various equipment, such as switchgears, control equipment, batteries, reactive compensation equipment, and harmonic filters, and a designated outside area will house outdoor equipment like transformers and shunt reactors. The maximum height is anticipated to be 49 ft (15 m). Buildings will be a combination of cladded steel frame and concrete buildings, designed to match the style and visual character of the surrounding urban landscape, and are proposed to be painted a light

gray or white color. The Applicant will continue to work with local stakeholders throughout the permitting process and will submit final exterior design details in its EM&CP for the Project.

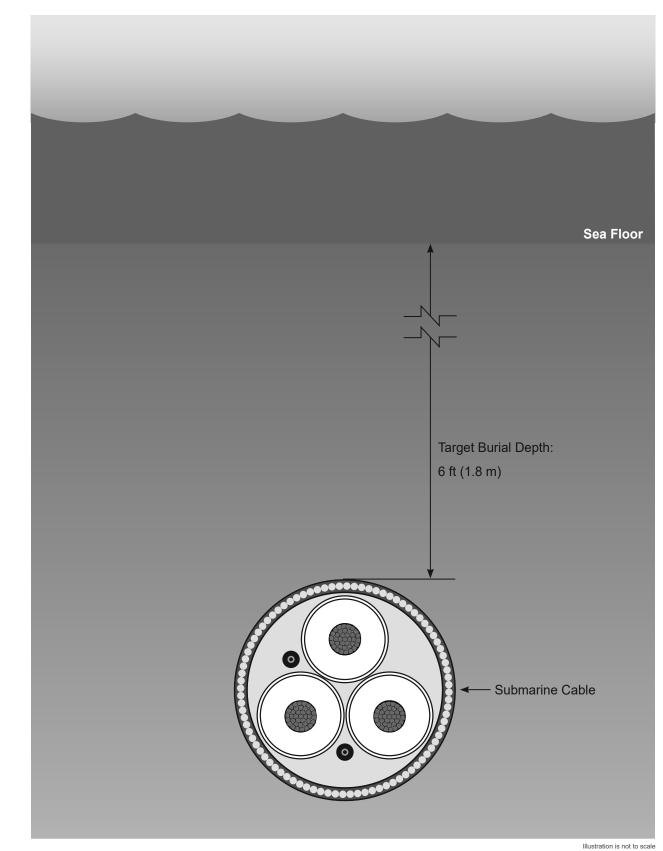
The onshore interconnection cables will be installed beneath pavement along an existing road corridor between the onshore substation and the POI. The entire onshore cable route length is approximately 0.2 mi (0.3 km).

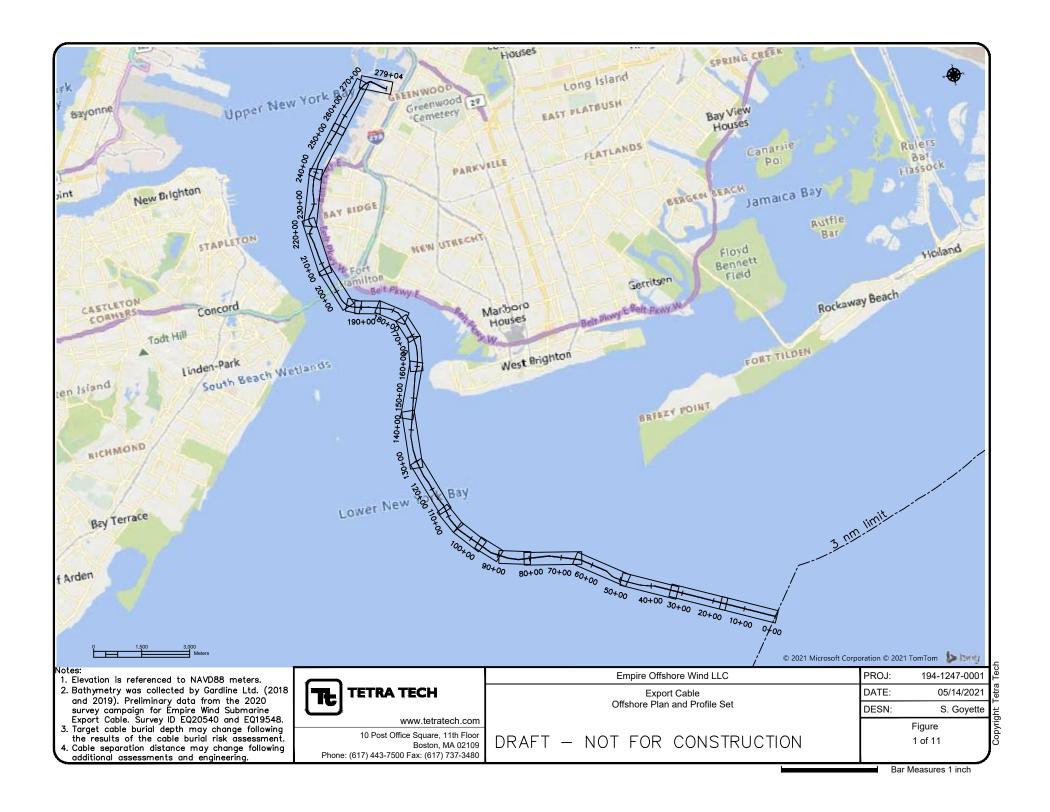
Table 5.2-1 provides a list of the design drawings in this Exhibit associated with the proposed facilities, including submarine export cables, cable landfall, onshore substation, and onshore export and interconnection cables. Design drawings provided in this Exhibit are preliminary and conceptual; updated design drawings will be provided as part of the Applicant's EM&CP.

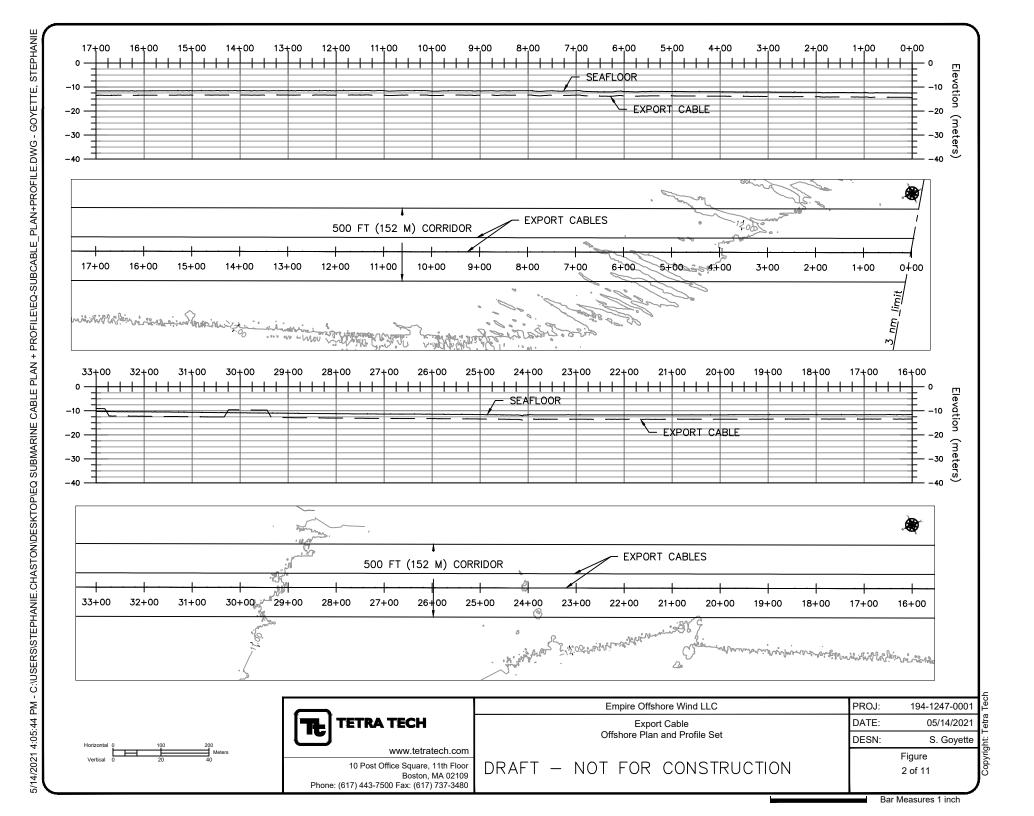
Table 5.2-1 Exhibit 5 Design Drawings

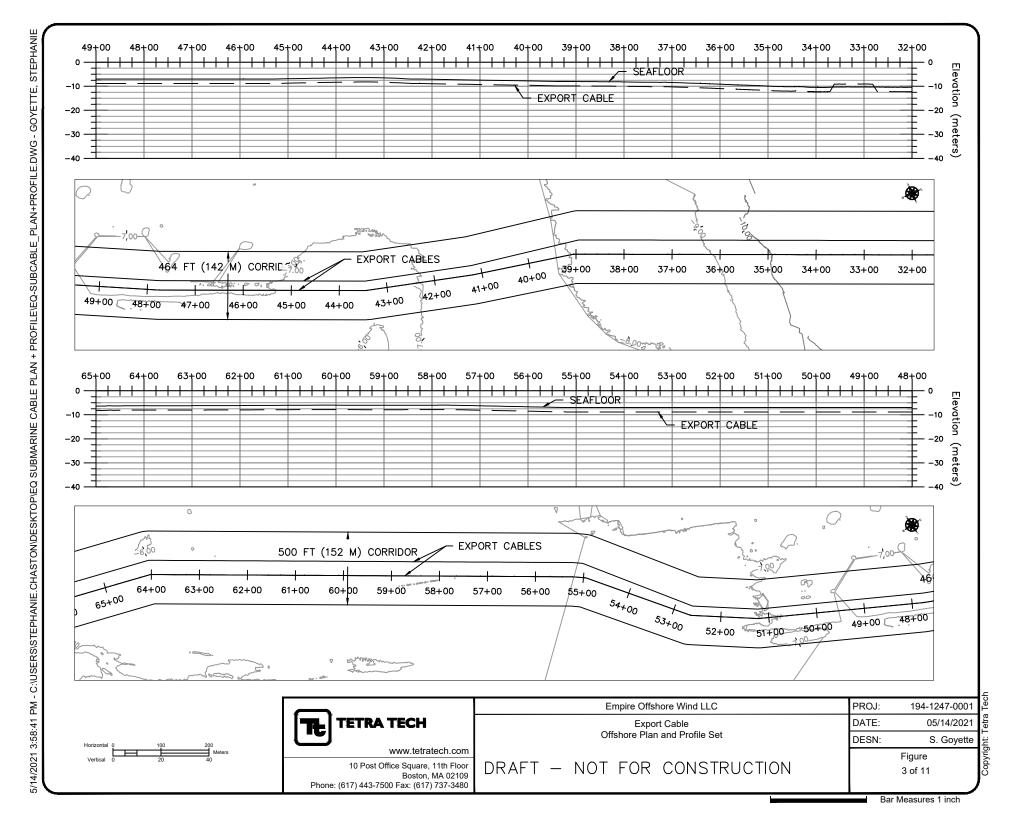
Facility	Drawing Number	Name	
Submarine Export		Submarine Cable Buried Under Sea Floor	
Cables		Offshore Plan and Profile Set	
Cable Landfall	VERTICAL J-TUBE (OPTION 2)	Landfall Concepts	
	PM710-AE-Q-XF-00006	Bulkhead 31-33 Replacement Plan, Northern Section Concept	
Onshore	SITE PLAN CONCEPT	Site Plan Concept	
Substation	5-1	Substation Layout (1 of 3)	
	5-2	Substation Layout (2 of 3)	
	5-3	Substation Layout (3 of 3)	
Onshore	C101-103	Plan and Profile	
Interconnection Cables	SKETCH-EE-607A-2	Conduit Section - 2 Circuit (Trefoil Config)	
Cables	SKETCH-EE-607B-2	Conduit Section - 2 Circuit (Flat Config)	
	SKETCH-EE-603-A	Cable Transition Vault	
	SKETCH-EE-602-A	Cable Transition Vault (2 Circuits)	
	Sketch-EE-605-A	Cable Vault (2 Circuits) Buried Alternative	
	Sketch-EE-604	Cable Vault (1 Circuit)	
	Sketch EE-606	Link Box 48"x30"x18" Handhole	
	Sketch-EE-611	Typical Crossing Road Bore	
New York Cable Route		Exaggerated Profile	

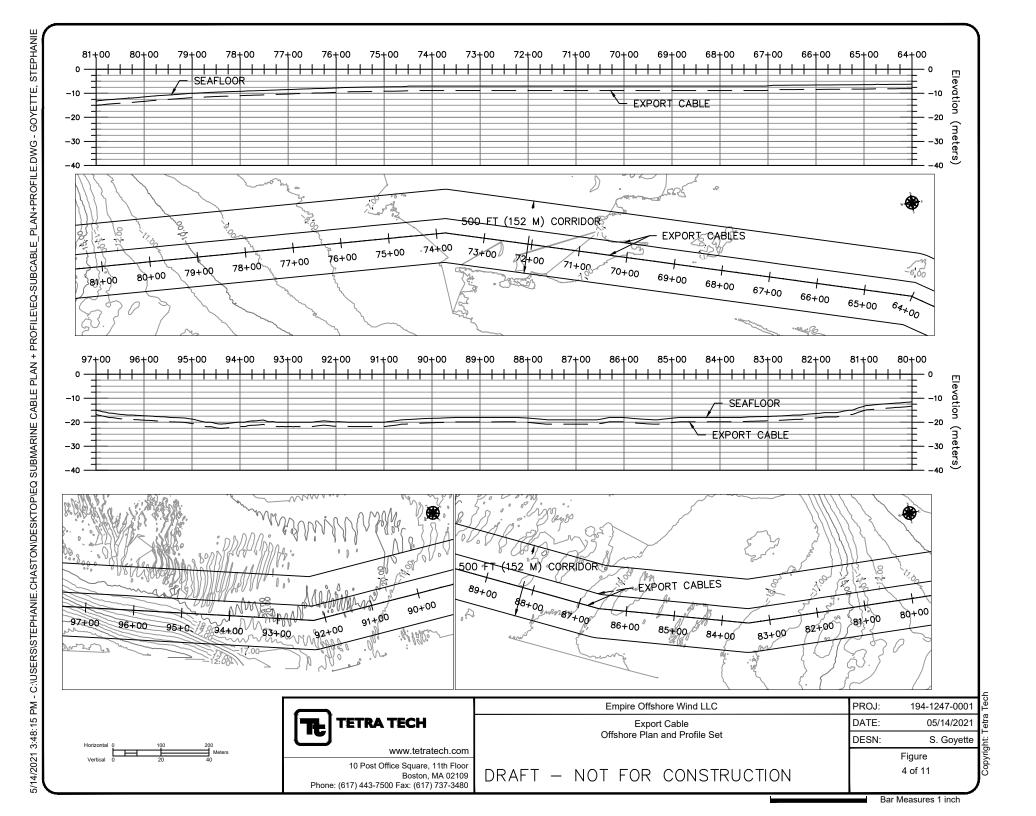


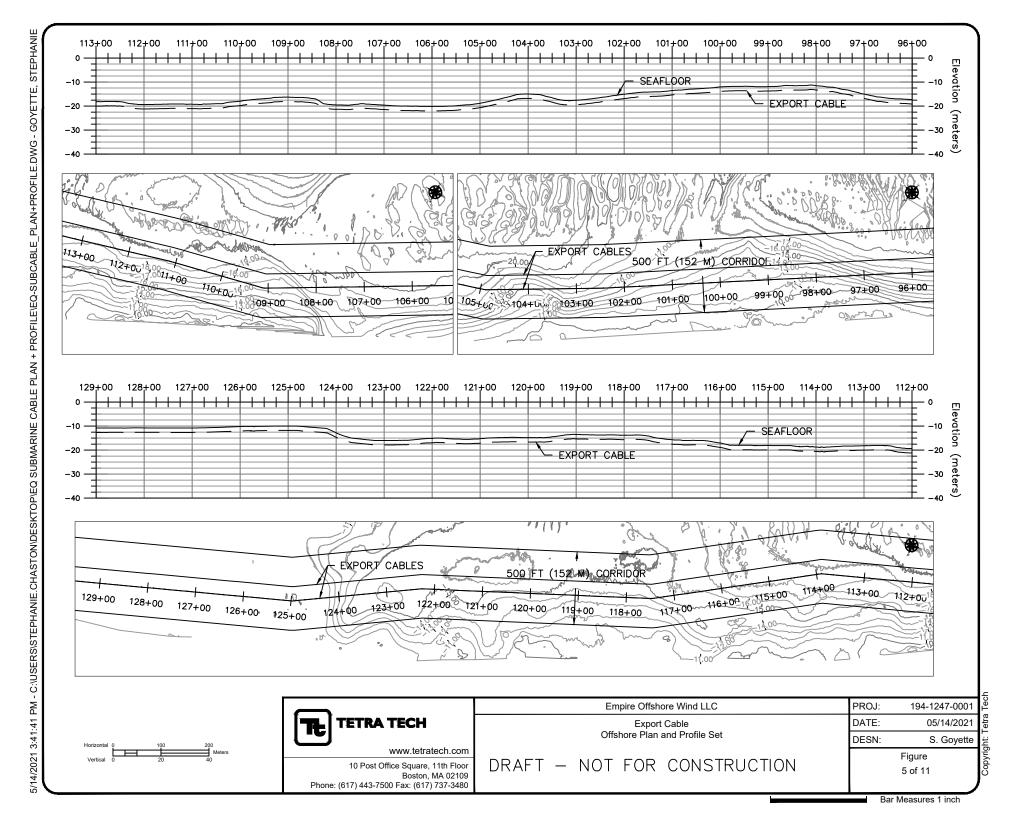


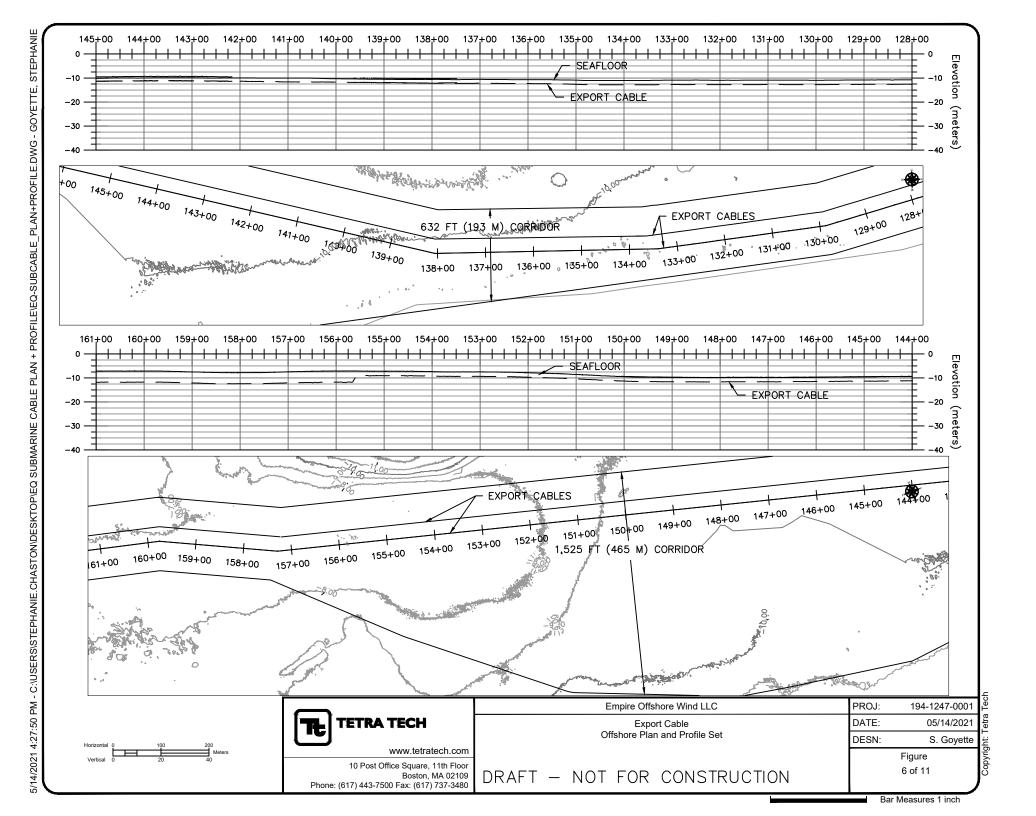


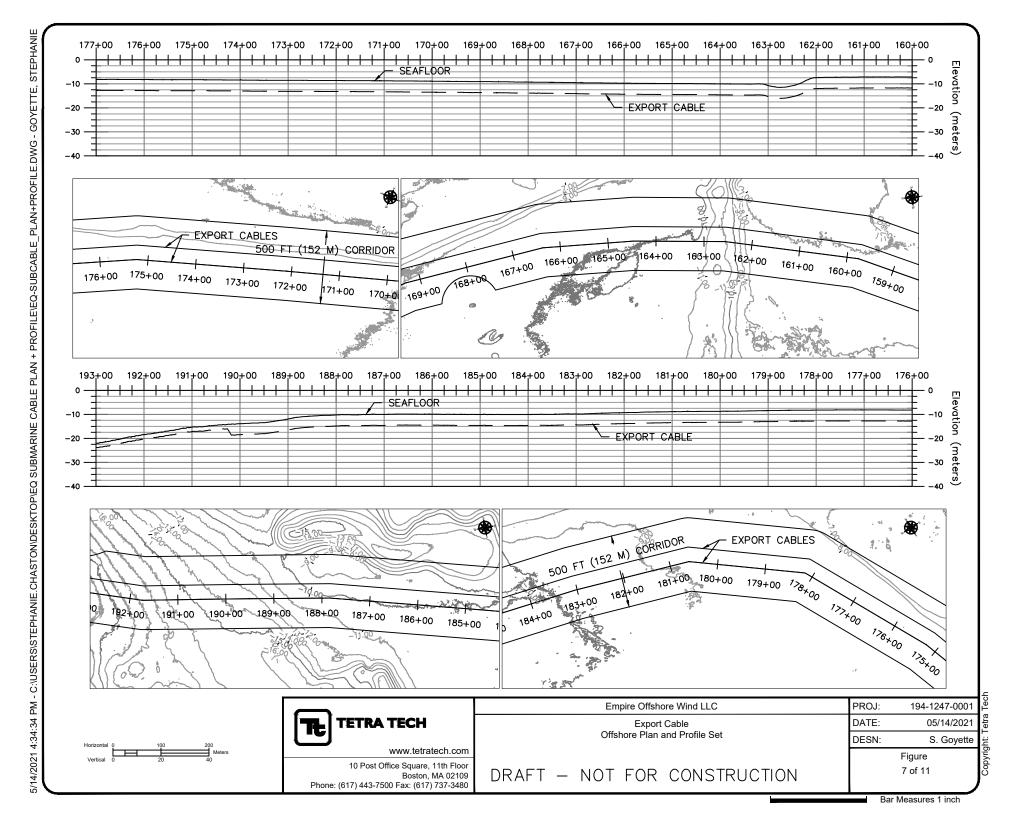


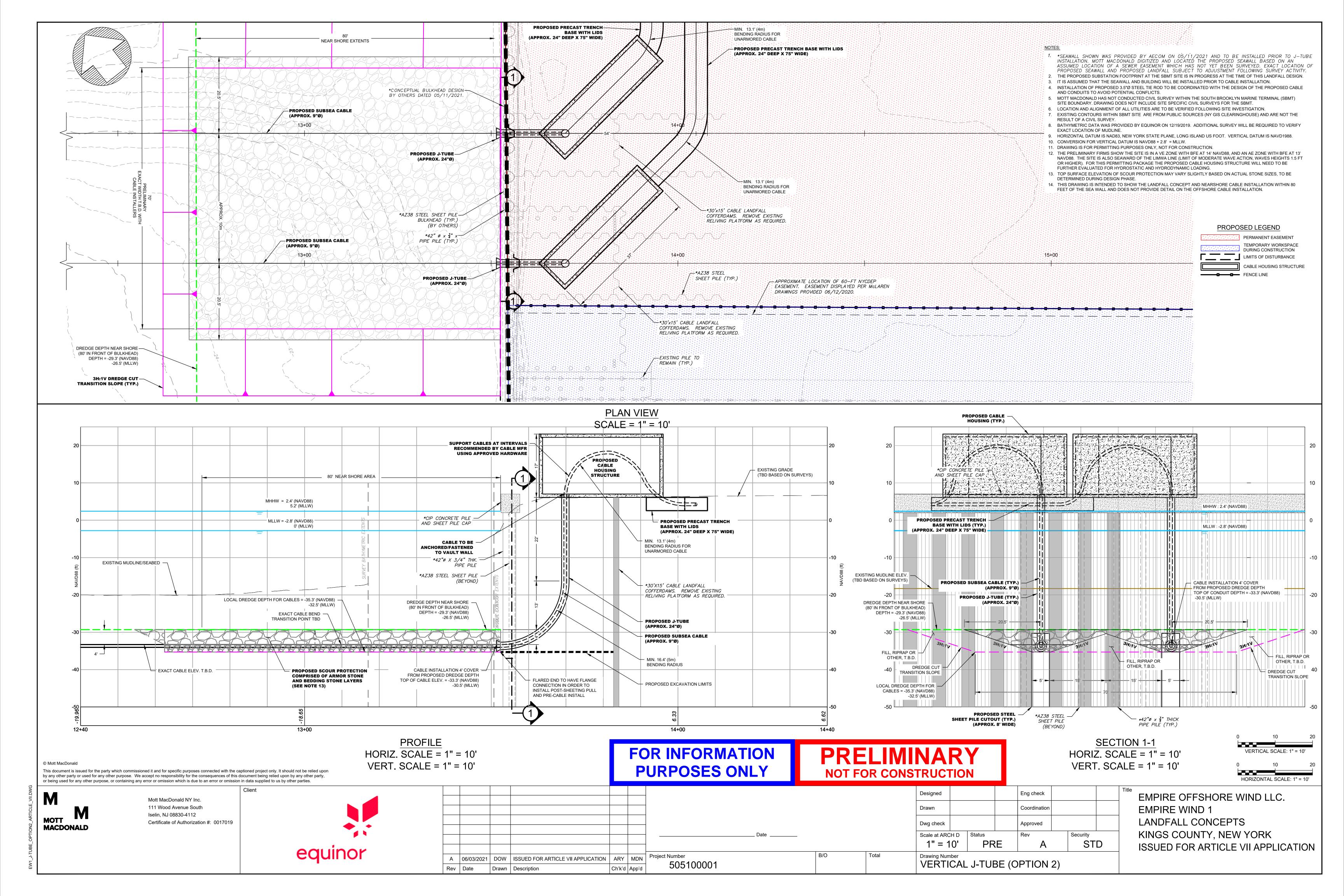


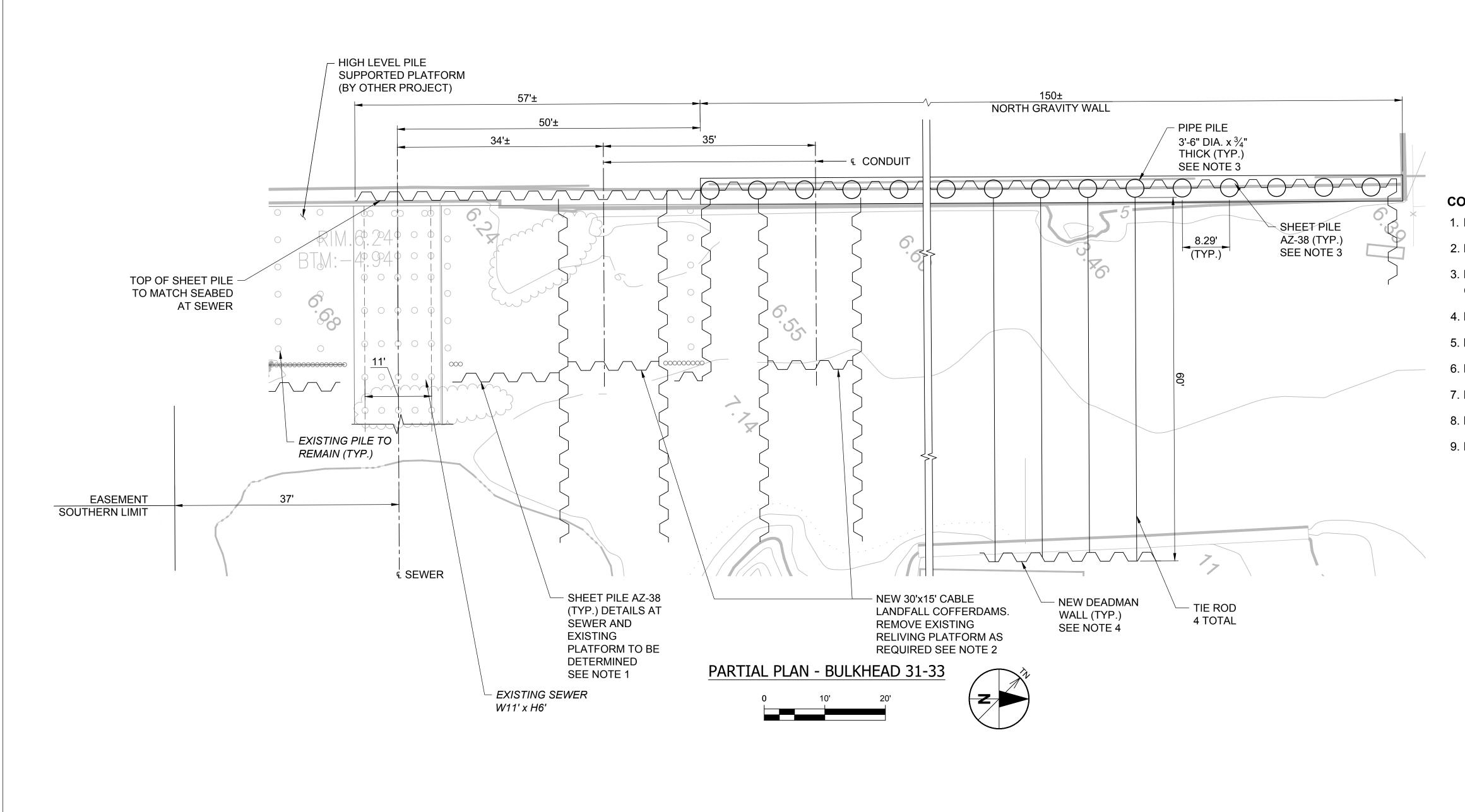












CONSTRUCTION SEQUENCE

- 1. INSTALL SHEET PILES AROUND EXISTING SEWER TUNNEL.
- 2. INSTALL CABLE LANDFALL COFFERDAMS.
- 3. INSTALL BULKHEAD FROM SEWER TO END OF EXISTING NORTH GRAVITY WALL.
- 4. INSTALL TIE RODS AND DEADMAN SHEET PILES.
- 5. DREDGE CABLE PIT.
- 6. INSTALL CONDUITS.
- 7. INSTALL CABLE SYSTEM.
- 8. BACKFILL TO DESIGN ELEVATIONS.
- 9. INSTALL FINAL PAVING.

NOT FOR CONSTRUCTION

INFORMATION CONFIDENTIAL: IT IS A VIOLATION OF TITLE VIII ARTICLE 145, SECTION 7209.2 OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER IN ANY WAY, PLANS, SPECIFICATIONS, PLATS		DESIGNED BY: Q. HUANG DRAWN BY: A. RYNEARSON	EQUINOR WIND, US, LLC	SOUTH BROOKLYN MARINE TERMINAL (SBMT) INFRASTRUCTURE IMPROVEMENTS GOWANUS BAY, NEW YORK HARBOR	PROJECT NAME: PROJECT NO. DRAWING NO.	
OR REPORTS TO WHICH THE SEAL OF A PROFESSIONAL ENGINEER HAS BEEN APPLIED. IF AN ITEM BEARING THE SEAL OF A PROFESSIONAL ENGINEER IS	05/11/2021 ISSUED FOR ARTICLE VII APPLICATION	CHECKED BY: L. CHEN APPROVED BY:	PREPARED BY: AECOM USA INC. NAME OF CONSULTANT	EMPIRE WIND 1 BULKHEAD 31-33 REPLACEMENT PLAN, NORTHERN SECTION CONCEPT	PM710-AE-Q-XF-00006 DISCIPLINE SHEET NO. 1 OF).
THE NOTATION "ALTERED BY" FOLLOWED BY HIS/HER SIGNATURE, THE DATE, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.	V. DATE DESCRIPTION B	M. MOODY SUBMITTAL DATE:	SIGNATURE	KINGS COUNTY, NEW YORK BLOCK 662, LOT 1 ISSUED FOR ART VII APPLICATION	SCALE DATE: AS NOTED JANUARY 4.	4. 2021



Project Number

Ch'k'd App'd

Drawn Description

505100001

Coordination

Approved

Security

STD

Dwg check

Scale at ARCH D Status

SITE PLAN CONCEPT

AS SHOWN

Drawing Number

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EMPIRE WIND 1

SITE PLAN CONCEPT

KINGS COUNTY, NEW YORK

ISSUED FOR ARTICLE VII APPLICATION

V1_SBMT_SITE_PLAN_ARTICLE_VII.DW

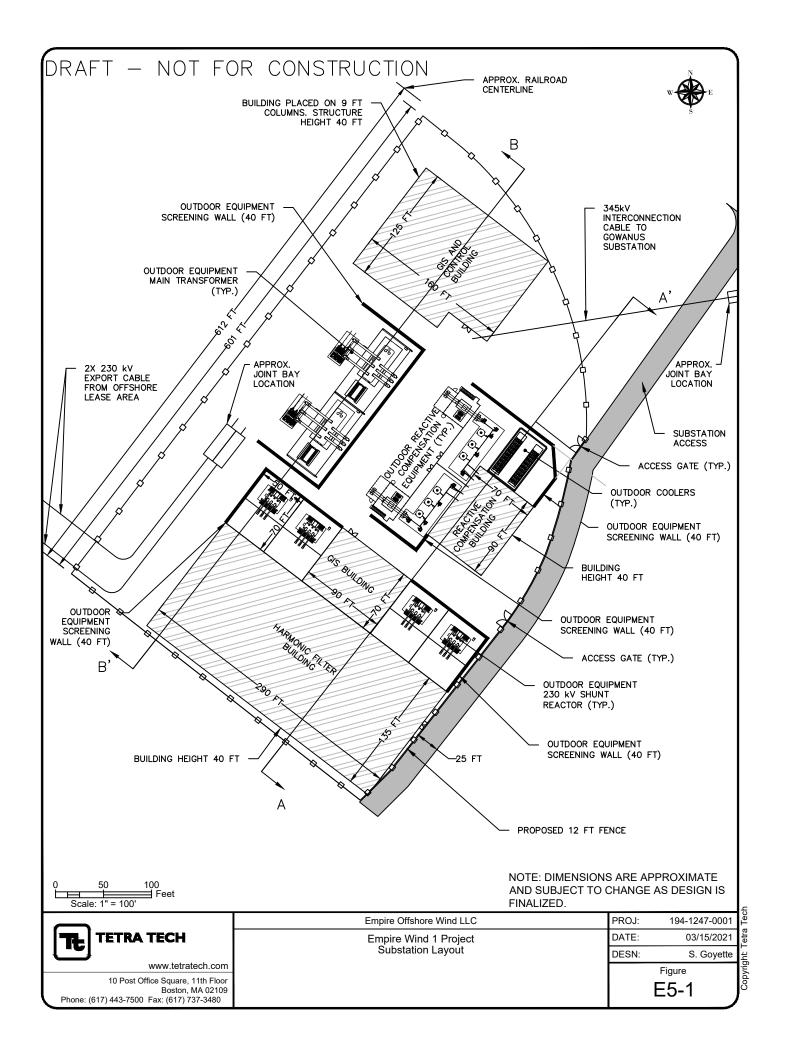
MACDONALD

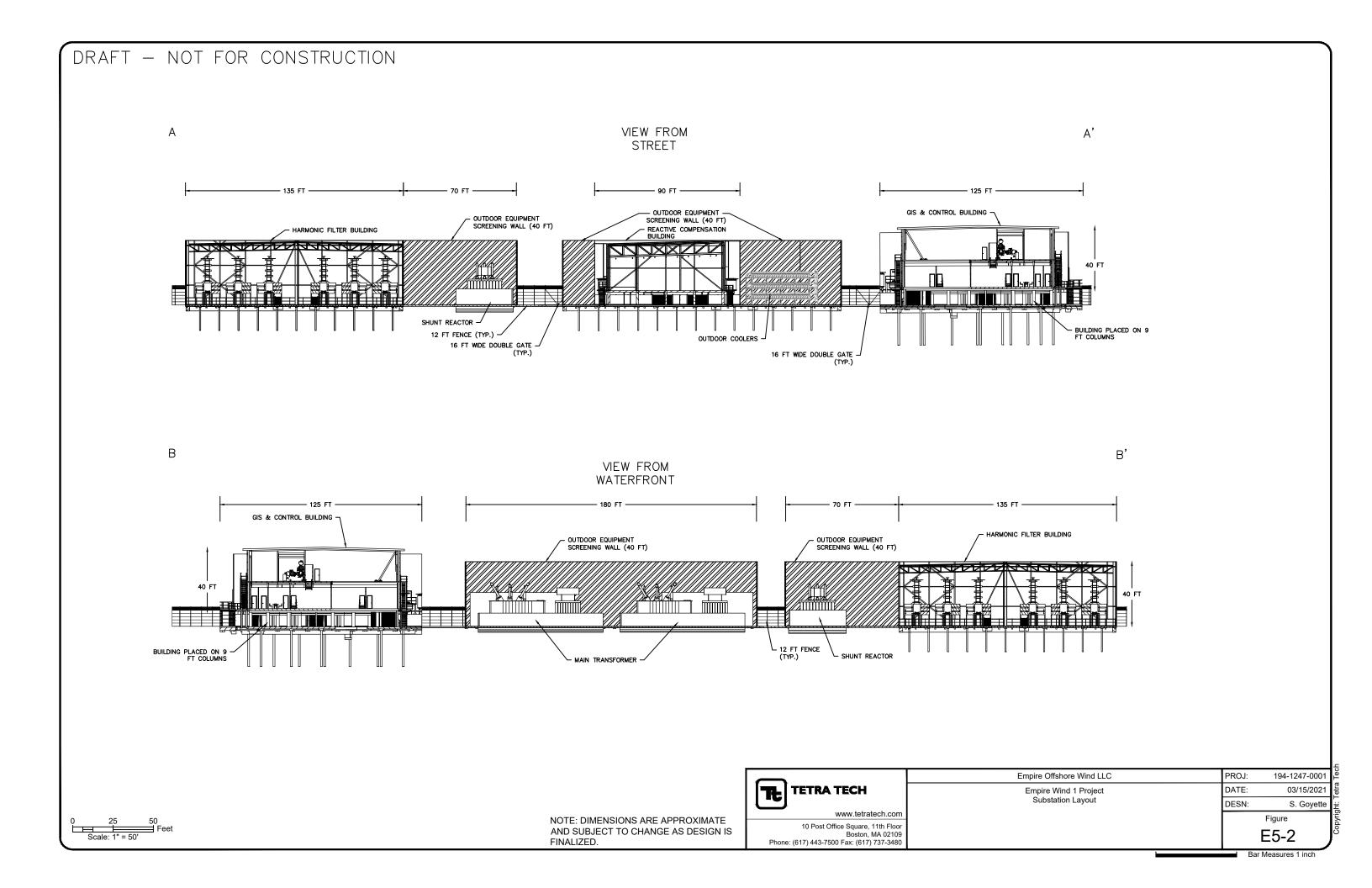
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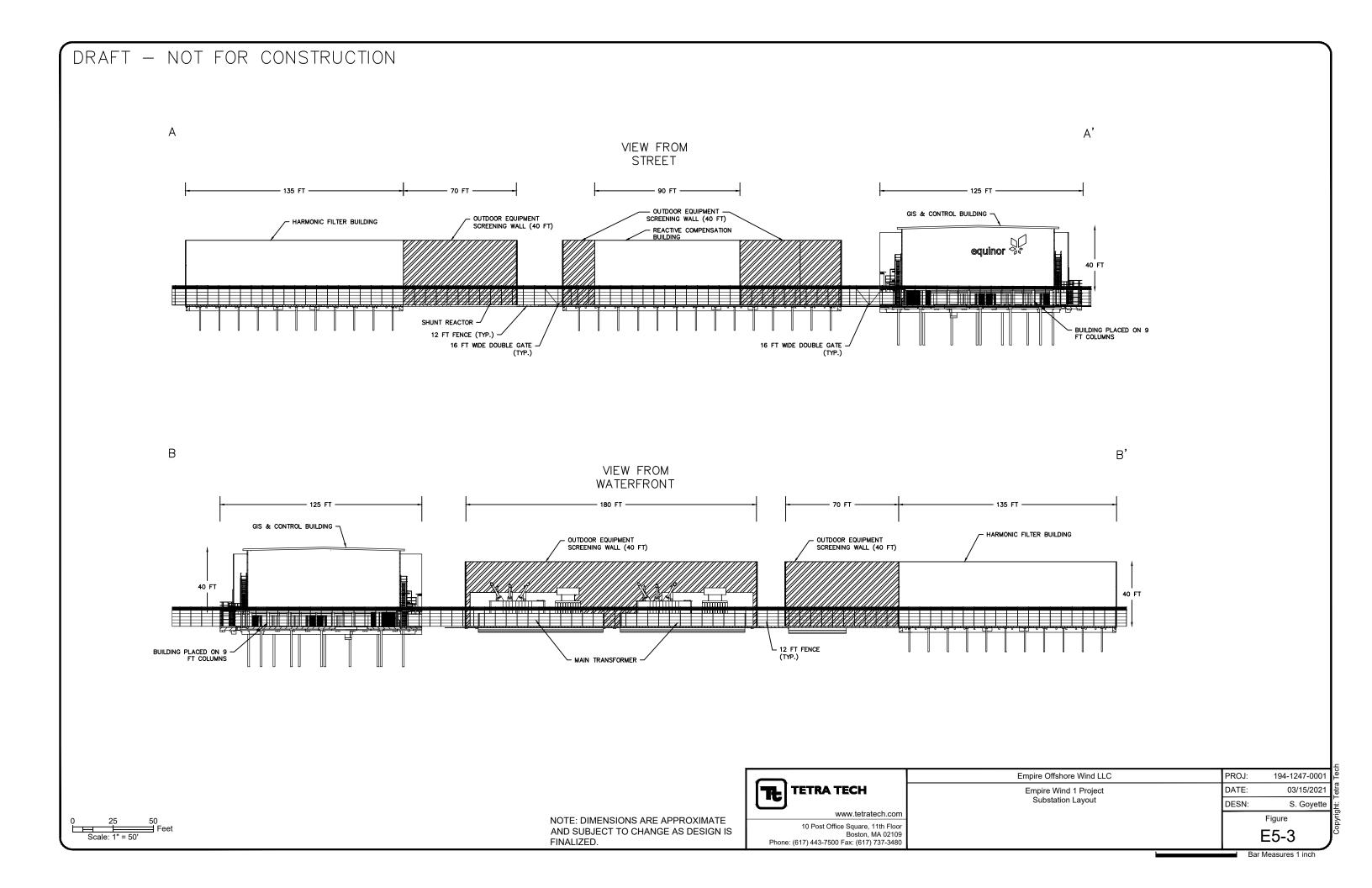
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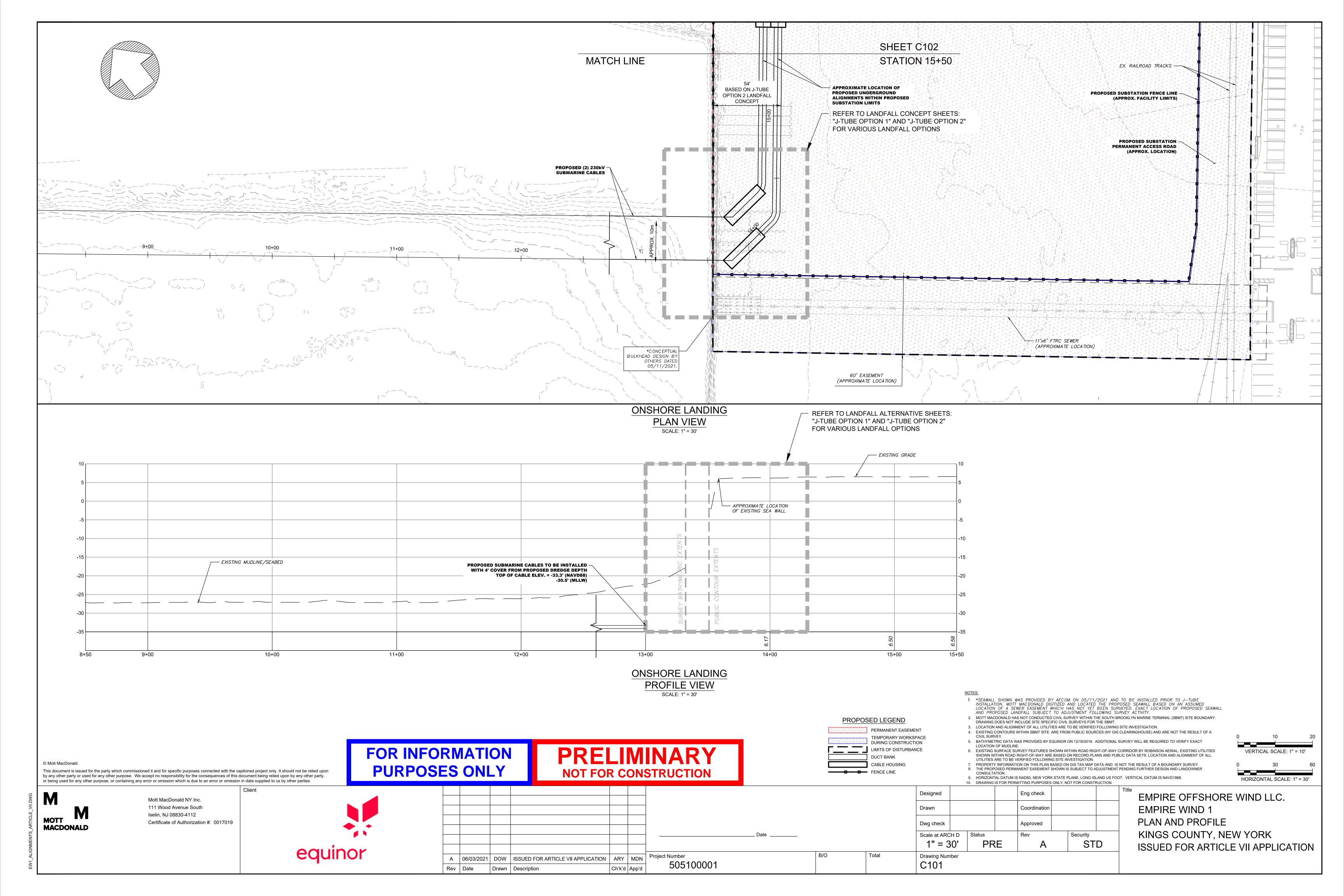
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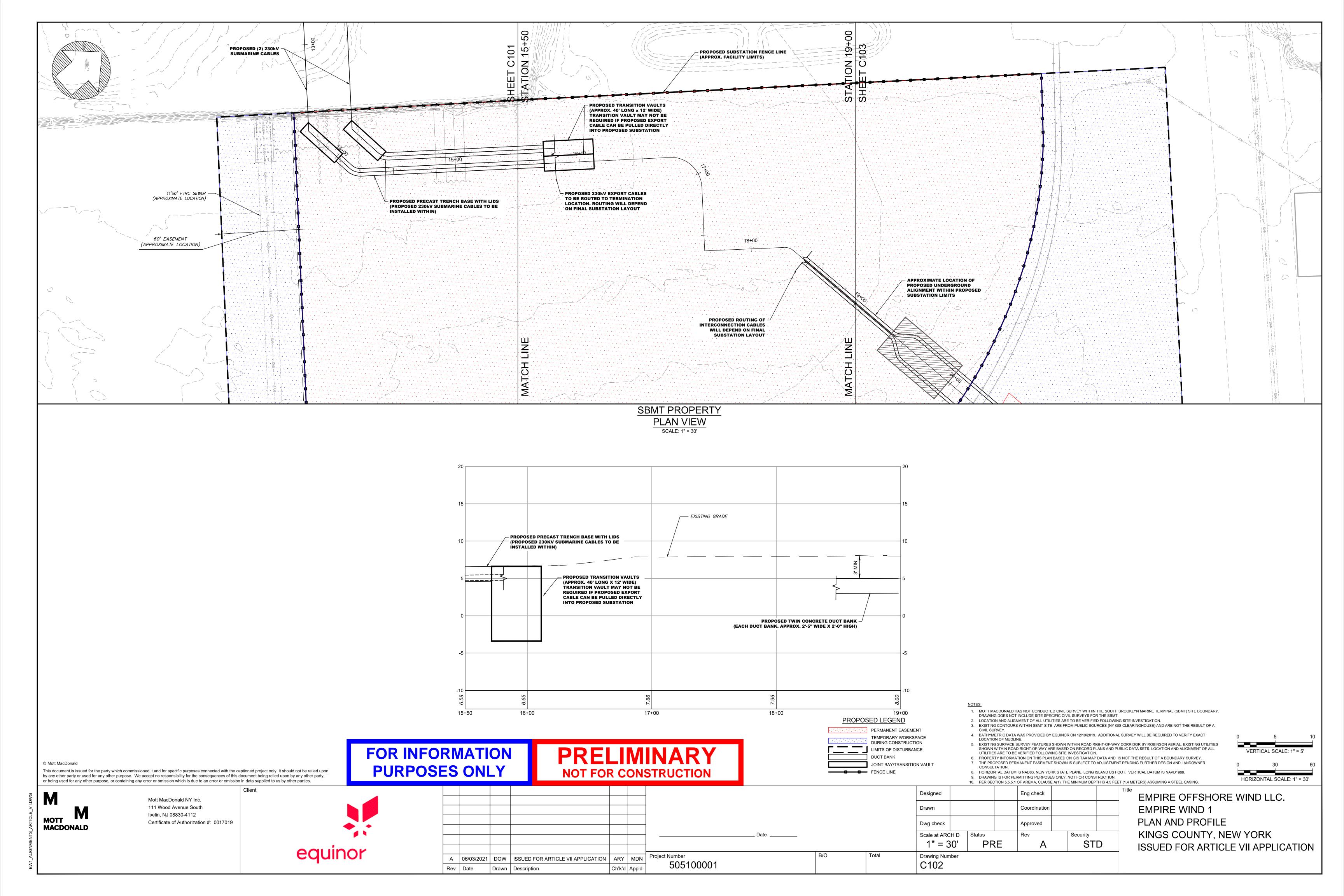
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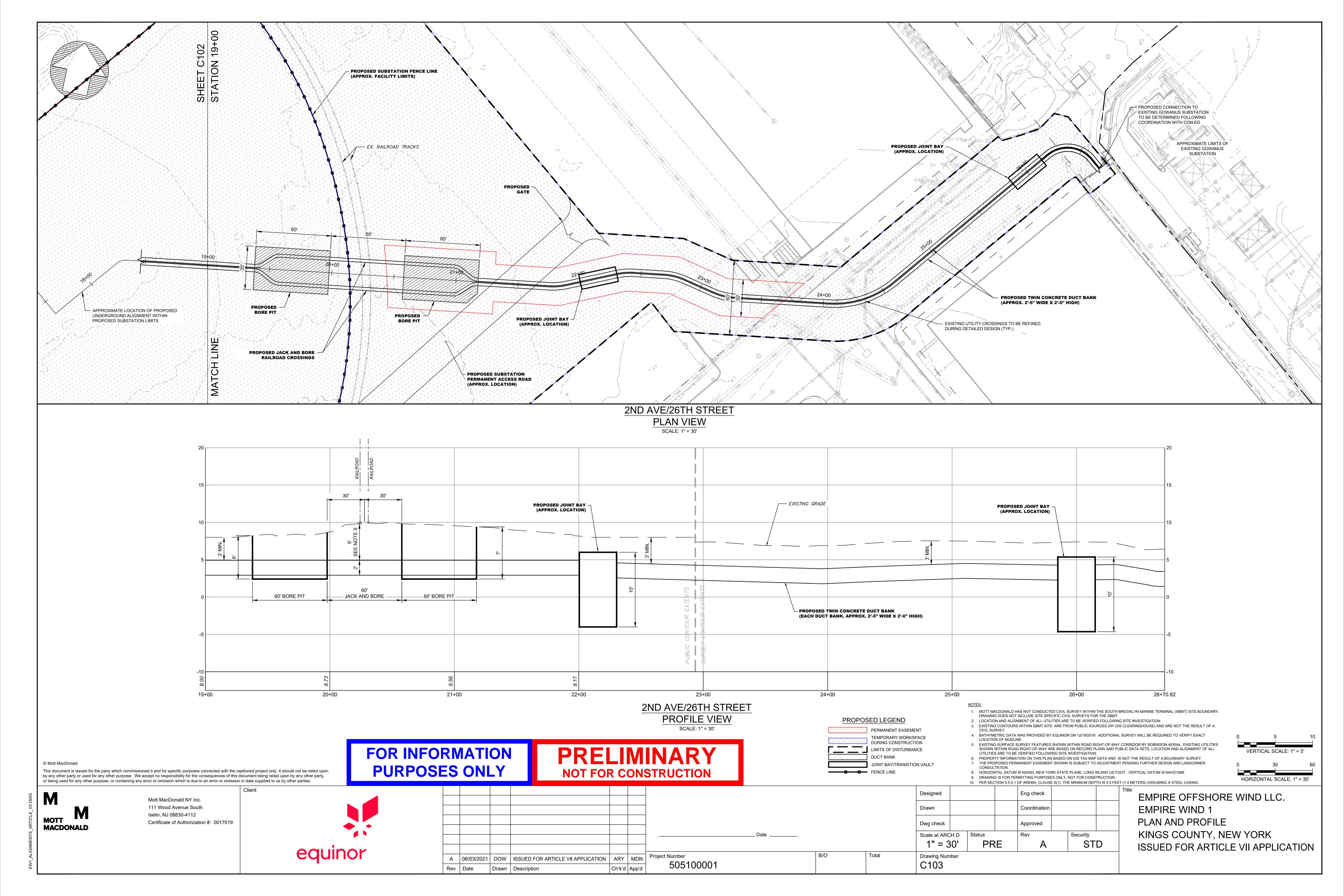


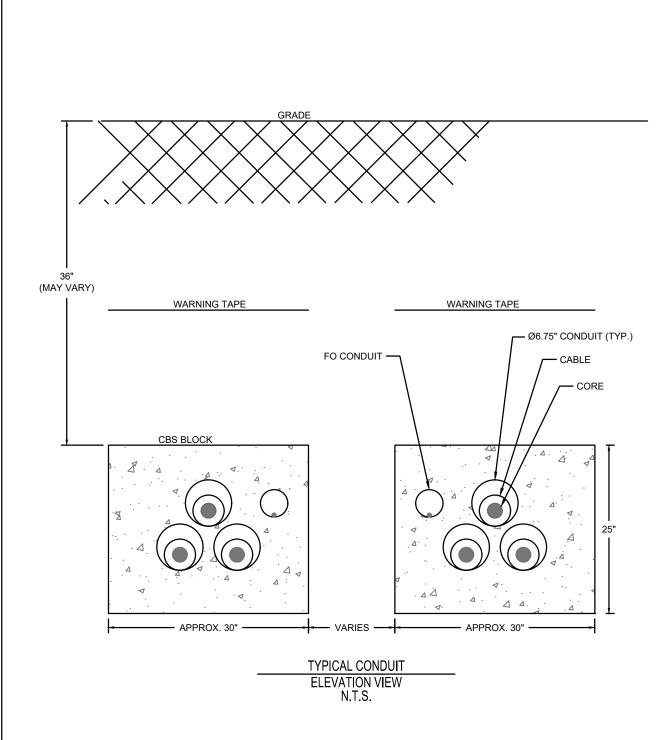










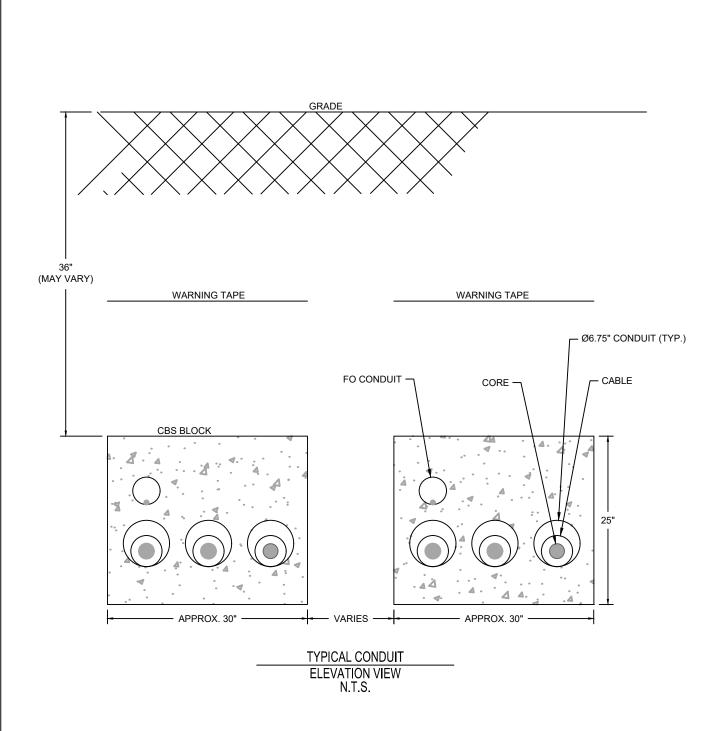


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Title

EMPIRE OFFSHORE WIND LLC. ONSHORE CABLE ROUTE **CONDUIT SECTION - 2 CIRCUIT** (TREFOIL CONFIG) **ISSUED FOR ARTICLE VII APPLICATION** **MACDONALD**

Date	Drawn	Checked	Approved	Scale at ANSI A	Drawing Number	Status	Rev
06/03/2021	DOW	MDN	MDN	AS SHOWN	SKETCH-EE-607A-2	PRE	Α



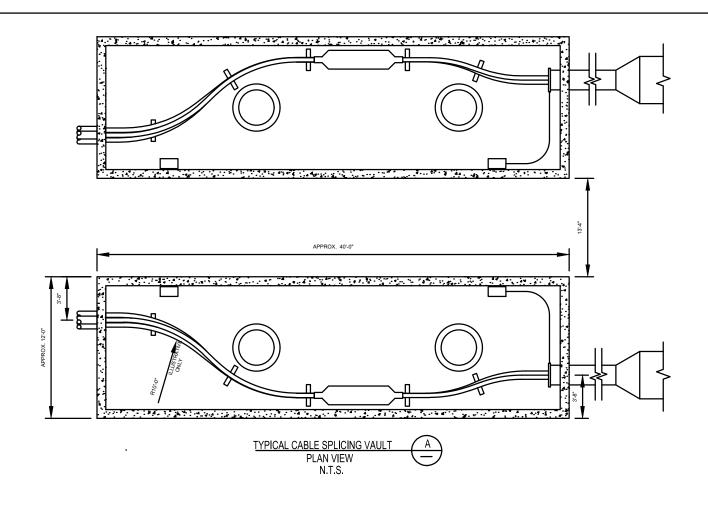
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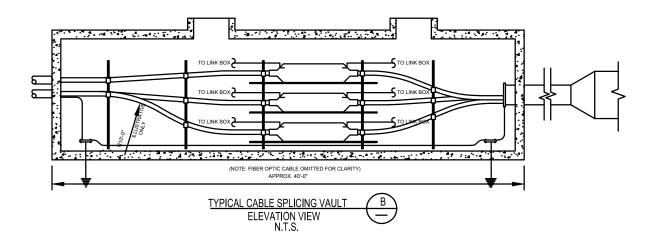
Title

EMPIRE OFFSHORE WIND LLC.
ONSHORE CABLE ROUTE
CONDUIT SECTION - 2 CIRCUIT
(FLAT CONFIG)
ISSUED FOR ARTICLE VII APPLICATION

M MOTT MACDONALD

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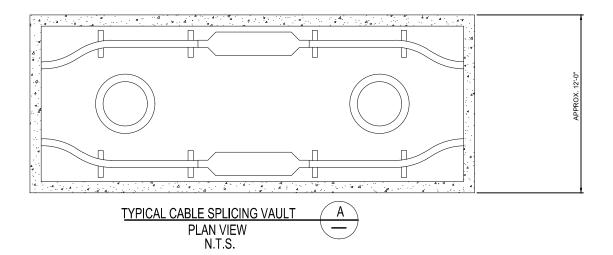


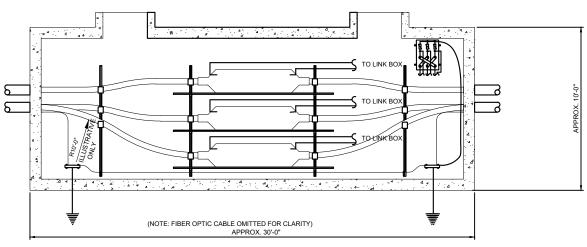
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Title

EMPIRE OFFSHORE WIND LLC. **ONSHORE CABLE ROUTE** CABLE TRANSITION VAULT **PLAN & ELEVATION** ISSUED FOR ARTICLE VII APPLICATION **MACDONALD**

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TYPICAL CABLE SPLICING VAULT ELEVATION VIEW N.T.S.

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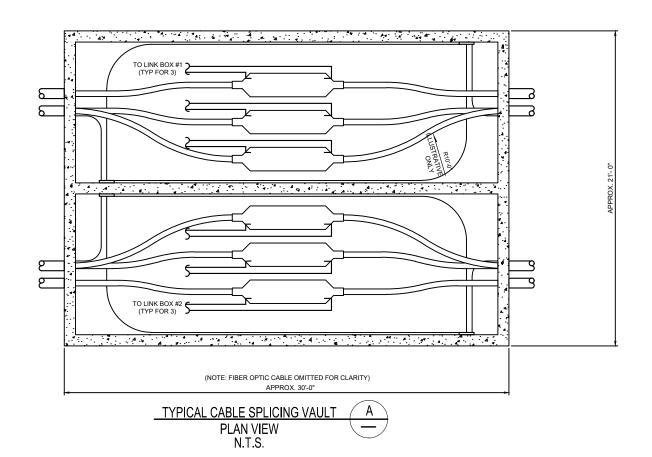
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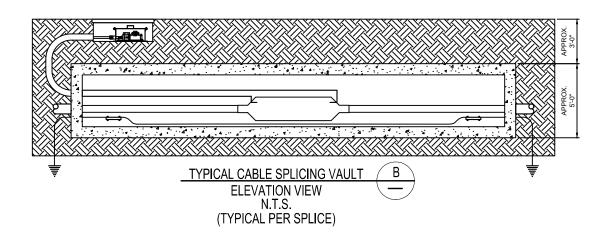
Title

EMPIRE OFFSHORE WIND LLC. **ONSHORE CABLE ROUTE CABLE VAULT (2 CIRCUITS)** PLAN & ELEVATION ISSUED FOR ARTICLE VII APPLICATION

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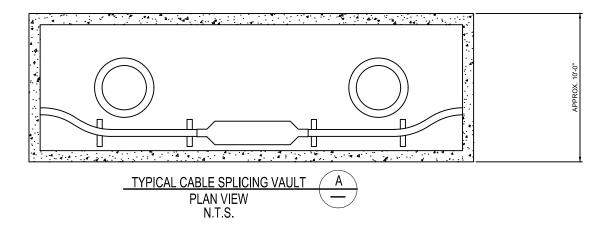
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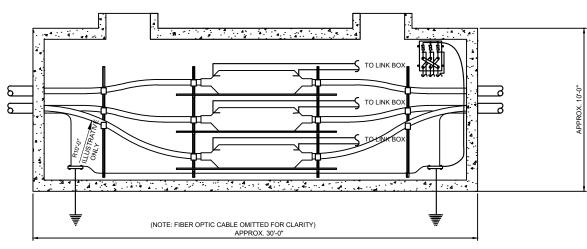
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EMPIRE OFFSHORE WIND LLC. **ONSHORE CABLE ROUTE** CABLE VAULT (2 CIRCUITS) **BURIED ALTERNATIVE PLAN & ELEVATION** ISSUED FOR ARTICLE VILAPPLICATION

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TYPICAL CABLE SPLICING VAULT

ELEVATION VIEW

N.T.S.

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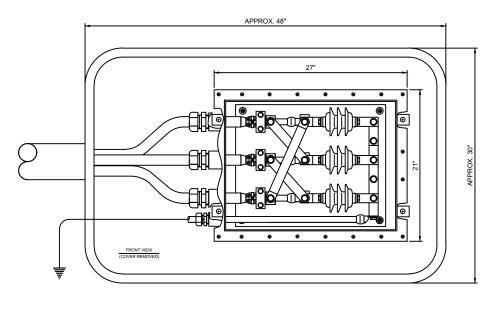
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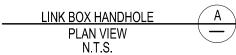
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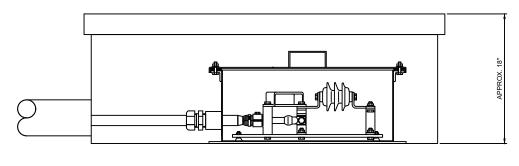
EMPIRE OFFSHORE WIND LLC.
ONSHORE CABLE ROUTE
CABLE VAULT (1 CIRCUIT)
PLAN & ELEVATION
ISSUED FOR ARTICLE VII APPLICATION

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LINK BOX HANDHOLE **ELEVATION VIEW** N.T.S. (TYPICAL PER SPLICE)

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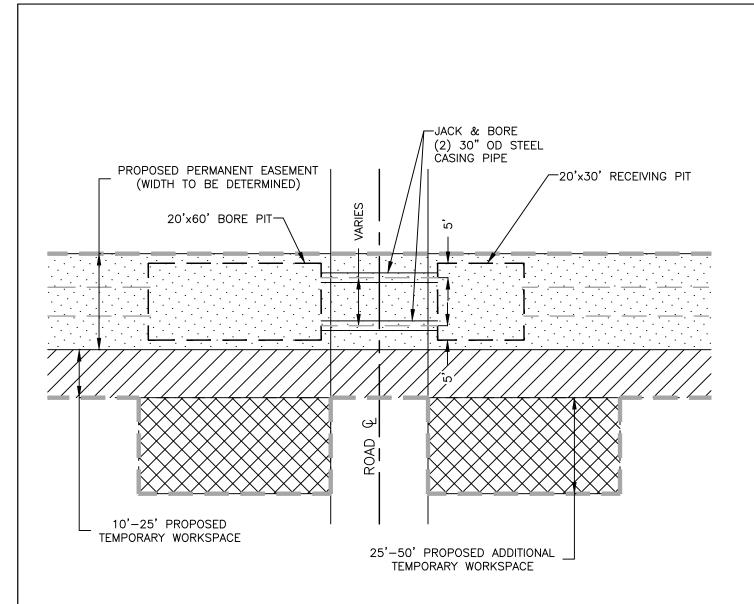
EMPIRE OFFSHORE WIND LLC. **ONSHORE CABLE ROUTE** LINK BOX 48"x30"x18" HANDHOLE **PLAN & ELEVATION** ISSUED FOR ARTICLE VII APPLICATION

MOTT MACDONALD

Mott MacDonald NY Inc. 111 Wood Avenue South Iselin, NJ 08830-4112

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Title

EMPIRE OFFSHORE WIND LLC. ONSHORE CABLE ROUTE TYPICAL CROSSING ROAD BORE

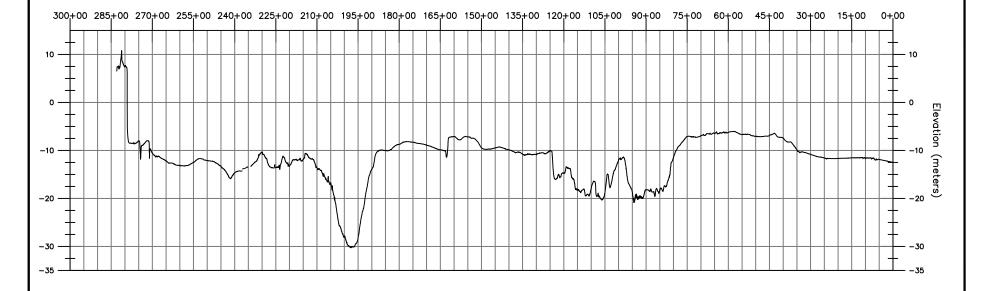
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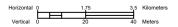
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111 Wood Avenue South
Iselin, NJ 08830-4112

Certificate of Authorization #: 0017019

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06/03/2021	DOW	MDN	MDN	N.T.S.	SKETCH-EE-611	PRE	Α





- 1. Elevation is referenced to NAVD88 meters.
- 2. Bathymetry was collected by Gardline Ltd. (2018 and 2019).Preliminary data from the 2020 survey campaign for Empire Wind Submarine Export Cable. Survey ID EQ20540 and EQ19548.
- Topography data source: NYC DoITT, Parks, and ORP 2017.



Boston, MA 02109 Phone: (617) 443-7500 Fax: (617) 737-3480

Empire Offshore Wind LLC **Export Cable Exaggerated Profile**

DRAFT - NOT FOR CONSTRUCTION

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PROJ:	194-1247-0001	l
DATE:	05/14/2021	l
DESN:	S. Goyette	
	Figure	ľ
	11 of 11	ļ
		,

Bar Measures 1 inch