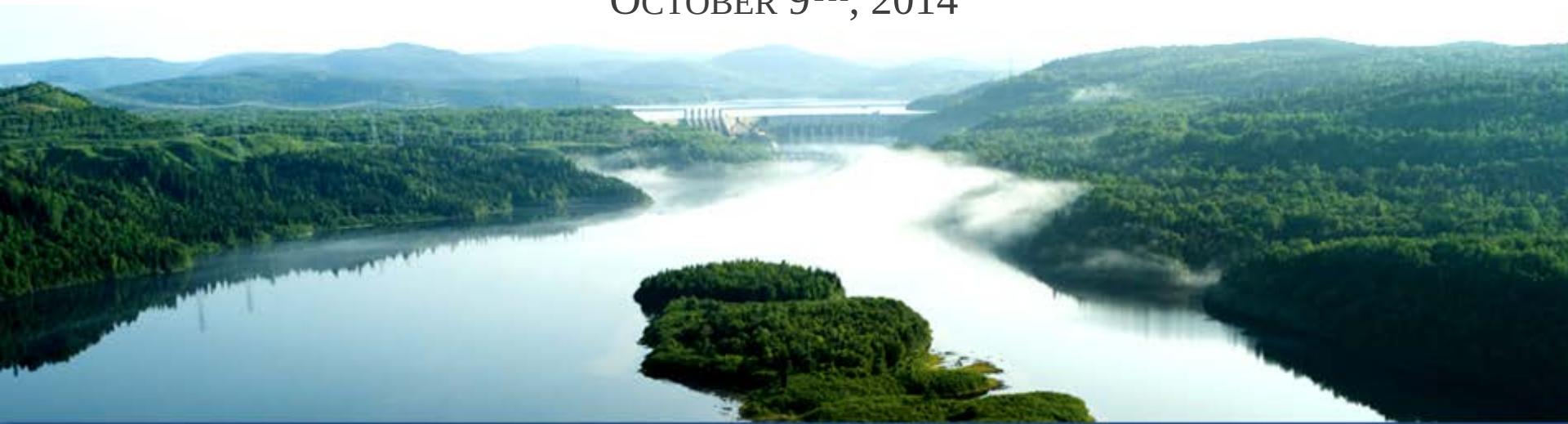
TDI New England

A Blackstone Portfolio Company

NECPL SUBMARINE CABLE INSTALLATION

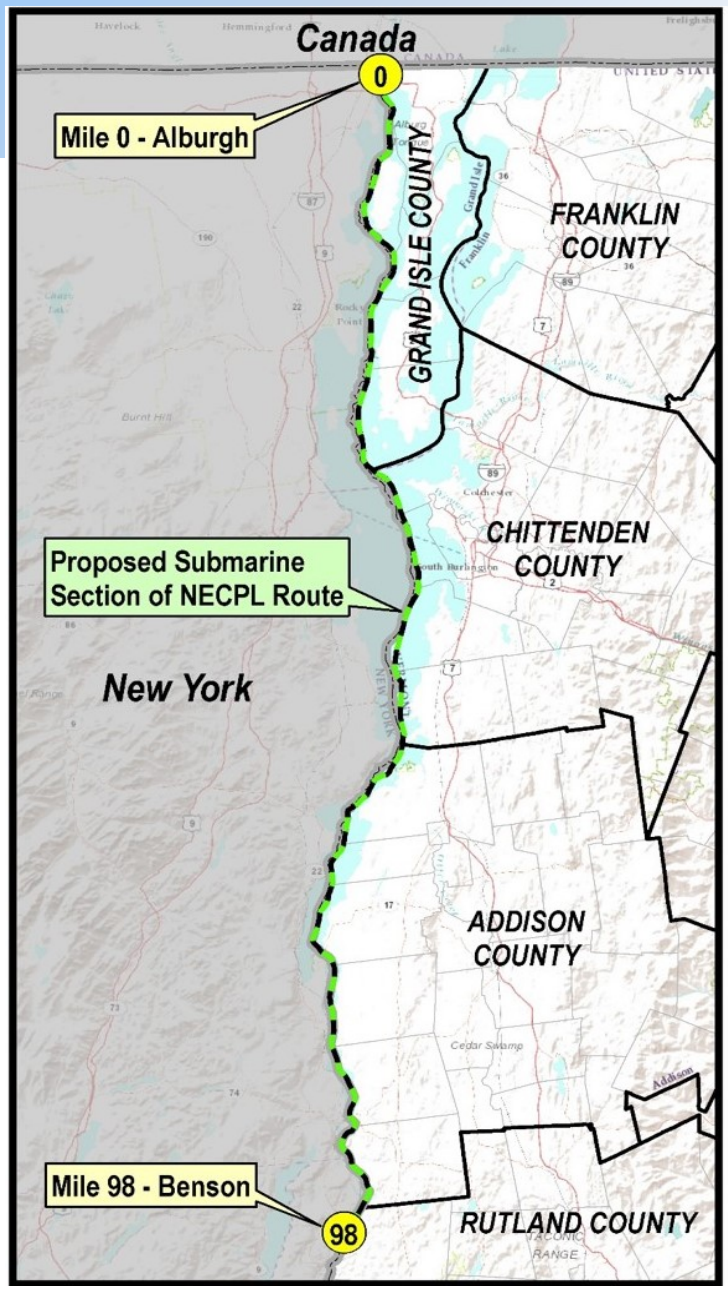
LAKE SYMPOSIUM

OCTOBER 9TH, 2014



Route Considerations

- Identify Potential Marine Utilities
- Define Bottom & Sub Bottom Conditions
- Avoid Navigational & Installation Challenges
- Mitigate Risks of Encountering Cultural Resources
- Address Logistics
- Minimize Impacts:
  - Means & Methods
  - Avoid Archaeological resources
  - Avoid Fisheries



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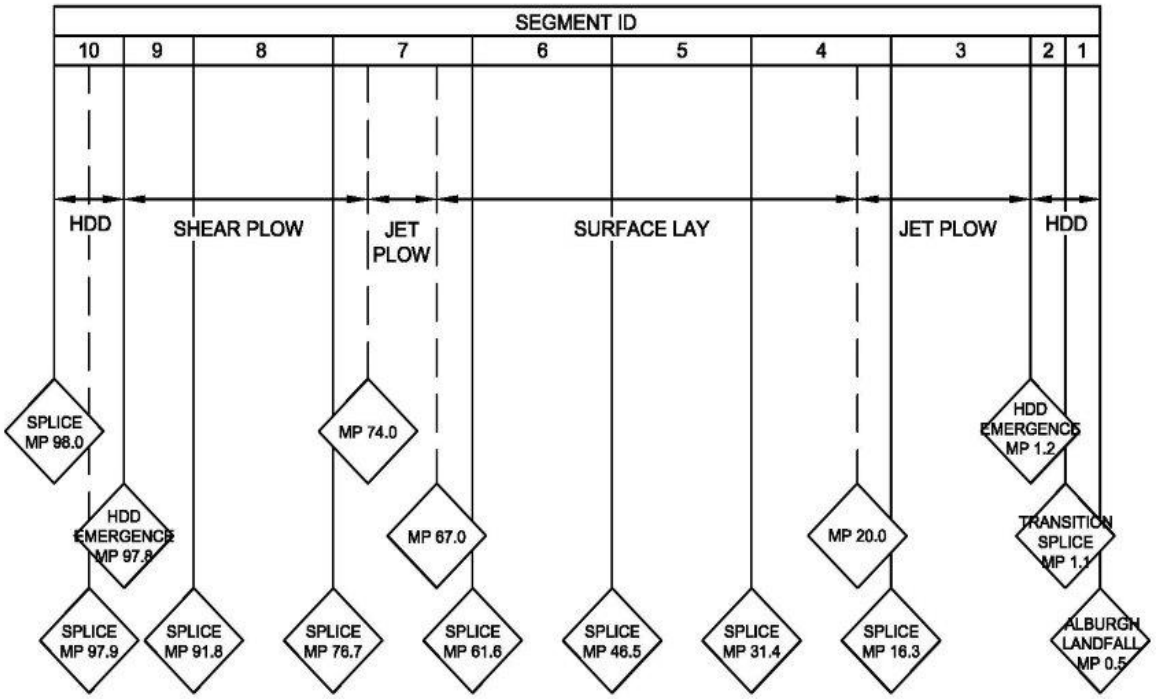
Route Overview

- 97.5 Miles- Alburgh, VT ⟹ Benson VT
  - Within the deeper waters of Grand Isle, Chittenden, Addison and Rutland Counties
- (2) Submarine Cables and Control Fiber
- 10 Installation Segments
- Segment Lengths Approximately 15 Miles
- Cable Burial at Depths Less Than 150 Feet
- Surface Lay at Depths Greater Than 150 Feet

SEGMENT ID	APPROX. LENGTH (MILES)
1	0.6
2	0.1
3	15.1
4	15.1
5	15.1
6	15.1
7	15.1
8	15.1
9	6.0
10	0.2



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Cable Overview

Marine cable - manufactured in Karlskrona, Sweden

DC Voltage	±320 kV	
Conductor		
Type / material	profiled strands / copper	
Cross-section	2,500 mm^2	
Water blocking	compound	
Diameter	2.27 inches	(57.6 mm)
Conductor binder		
Material	semi-conductive swelling tape	
Thickness	24 mils	(0.6 mm)
Conductor shield		
Material	semi-conductive polymer	
Thickness	59 mils	(1.5 mm)
Insulation		
Material	cross-linked DC polymer	
Thickness	709 mils	(20 mm)
Insulation shield		
Material	semi-conductive polymer	
Thickness	55 mils	(1.4 mm)
Longitudinal water barrier		
Material	semi-conducting swell-able tape	
Thickness	24 mils	(0.6 mm)
Metallic sheath		
Type / material	extruded / lead alloy	
Thickness	114 mils	(2.9 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	5.31 inches	(135 mm)
Weight in air	35.2 lbs./ft.	(52.4 kg/m)
Weight in water	25.6 lbs./ft.	(38.1 kg/m)

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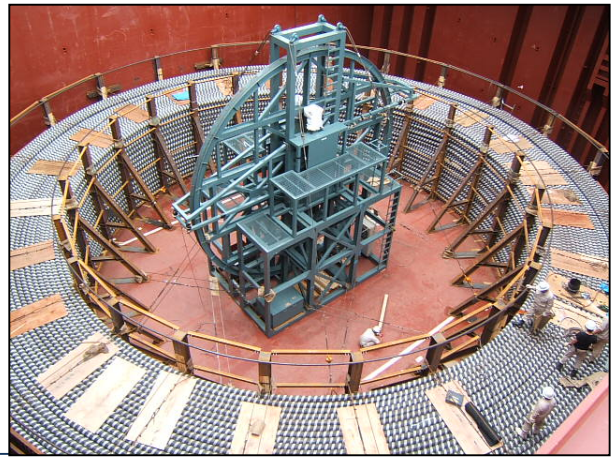
Cable Sourcing

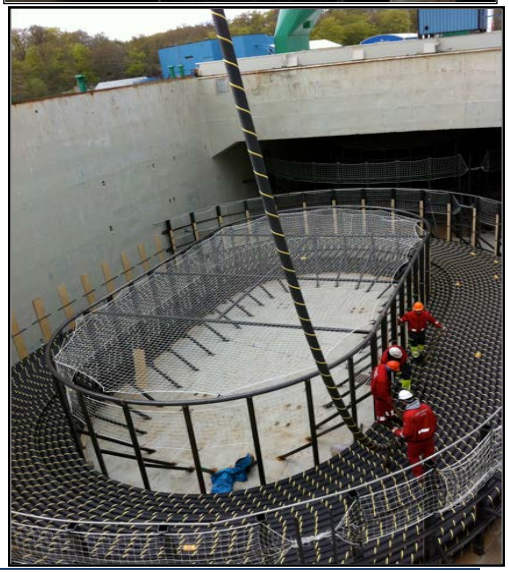
- Trans-Atlantic Transport
  - Karlskrona, Sweden to Port of Elizabeth, NJ
- Specialized Freighter
  - With cable transfer handling gears
  - Oval static cable tanks
  - 6,000 DWT
- Cable spooling
  - 4 lengths of cable – each approx. 15.15 miles



Cable Sourcing

- Cable Transfer from Port Elizabeth to Lake Champlain
  - Shipped using deck barges and tugs built specifically for the project
  - Access into Lake Champlain via the Canal

- Canal Transport Limitations
  - 1, 159 tons maximum cable batch weight
  - 15.15 miles of single core cable



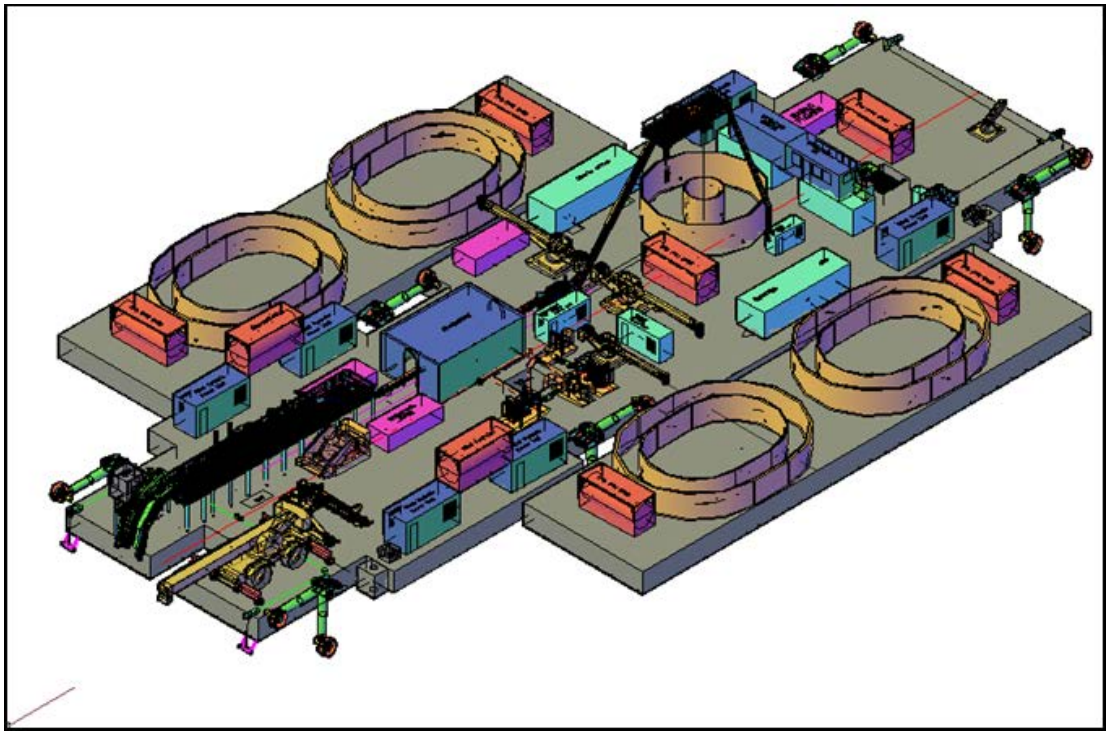
Lake Champlain Installation Parameters

- Environmental Conditions
  - Champlain Canal access is restricted by:
    - Vertical clearance of 17 ft.
    - Controlling depth of 9.5 ft.
    - Usable width of 44.5 ft. with vessels limited to 43.5 ft. beam
    - Purpose built tugs and barges will be used to transit the canal.
  - Max water depth approximately 400 feet
  - Shallow near the Canadian Border and Benson
- Installation Vessel
  - Splicing Accommodations
  - Towed Plow
  - Surface lay in deep water
  - Navigate to +/- 3 ft. of proposed route
  - Precise speed control for cable lay operations
  - ROV

Lake Champlain Installation Parameters

Lay Barge:

- Custom built for Lake Champlain
- Shear Plow: 3,000 ft./ day
- Jet Plow: 4,000 ft./ day
- Bottom Laid: 6,000 ft./ day
- Dynamic positioning
- 3000 HP thrusters
- 6 thrusters
- 2 Supply barges with 15.15 miles of cable per tub



Work Phases

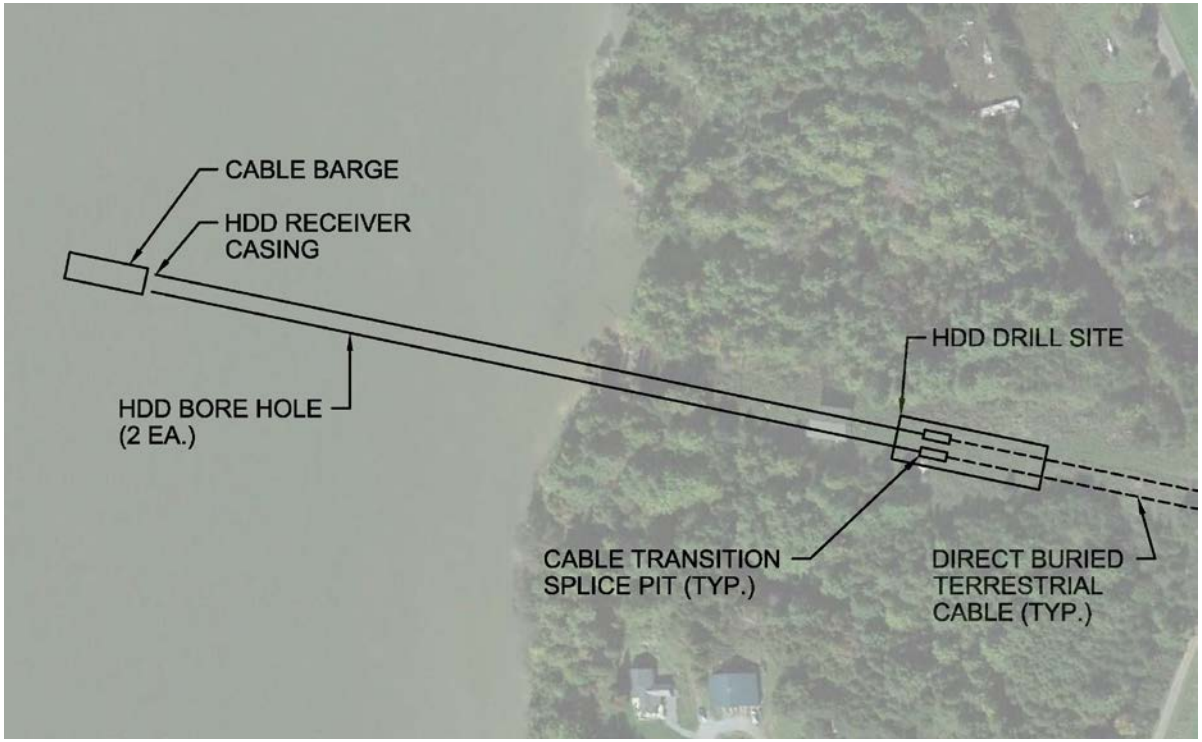
- Proposed Construction Windows:
  - MP 0-73: May to August
  - MP 73-98: September to December

- 2017 Route Clearance
- 2017 Supporting Infrastructure
  - Cofferdams/Receiver Casing
  - HDD
- 2018 Submarine Cable Installation

Tools: HDD Example - Benson

Benson

- 1000 ft. HDD
- Drill from the high bluff to the lake
- Emerge into a receiver casing installed in the lake bottom
- Alternative, install cofferdam



Tools: Horizontal Directional Drilling

1,000,000 lb force Drill Rig “Big Gun”

HDPE Casing Pull-Back

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Tools: Jet Plow/Shear Plow Burial

- 4 foot burial depth
- Jet Plow uses high pressure water to assist in trench excavation
- Shear plow cuts sediment using tension in tow cable from cable lay vessel
- Install both cables simultaneously in a single trench

Cable Protection

- Utility crossings
- Bridging existing utilities
- Exposed ledge
- Anchor protection
- Scour
- Beach transition

Articulated matts

Split pipe segments