

Subsea Cable Services

North America's First



Durocher Marine

A Division of **kokosing**
INDUSTRIAL 
Lead With Safety!

Introduction to the Kokosing Group

Durocher Marine is a Division of Kokosing Industrial, which is part of the Kokosing Group. The Group is a family owned business founded in 1951 and is the largest contractor in Ohio. Kokosing offers a wide range of construction services. Below is a listing of important financial and bonding data regarding the Kokosing Group.

- In 2015 the Kokosing Group was ranked 59th by ENR.
- Annual construction revenue is over \$1 Billion
- The company has assets worth in excess of \$300 Million
- Aggregate bonding capacity is \$1 Billion +
- Single project bonding capacity is \$200 Million
- Annual employment greater than 1,500 personnel
- Kokosing Industrial is a Union Contractor

The Kokosing Group includes the following companies:



Subsea Cable Services

Throughout our history we have successfully installed over 60 subsea cable systems, including power, telecommunications, and fiber optic cables. We have worked throughout North America and the Caribbean. Our longest continuous installation is 28 miles. We've installed power cables ranging in voltage from 15kV to 230kV.

List of Services:

- Budgeting and Firm Pricing
- Pre Route Survey and Design
- Route Investigation and Clearance
- Pre Lay Grapnel Run
- As Built Final Survey
- Cable Installation
- Offshore Cable Installation
- Cable Removal
- Cable Burial
- Shore End Installations
- Cable Protection
- Cable Repair
- Cable Inspection Services
- Turn Key Installations



Subsea Cable Services

Cable Installations



We have installed High & Medium Voltage Power cables, Telecommunication cables and Fiber Optic cables throughout North America. Our cables have been installed on the East Coast, West Coast, Gulf Coast, Caribbean, Great Lakes, Inland Lakes, and Canada. Whether the cables have been delivered on reels, in tubs that require a turntable, or coiled on a lay vessel. We have the ability and experience to get the project accomplished.

Cable Burial



Our jet sleds are capable of burial to 4 meters. These sleds use high pressure water to liquefy the trench for the cable installation. The sleds cause near zero turbidity and are environmentally friendly. They are fitted with the latest underwater technology to continuously monitor the cable burial and installation in real time. These technologies include look ahead sonar, heave, pitch and roll, and GPS tracking sensors.

Cable Removal



We have removed cable for route clearance, permit requirements, and the removal of out-dated oil-filled cables. The cable materials can be salvaged for scrap, if of value, but will always be disposed of properly in an environmentally acceptable manner.

Subsea Cable Services (cont'd)

Cable Repair

Subsea cables are in a high risk environment. Over the years we have been involved in several cable repairs. Ships dragging anchor account for the majority of these repairs. Durocher Marine has completed 10+ major cable repairs in water depths exceeding 200ft.



Cable Protection

At times, subsea cables are inherently exposed to a variety of risks. We've installed a multitude of devices to protect cables from those dangers. These include installing bolt-on cast iron split pipe cable protectors in the surf zone where trenching wasn't possible and in shallow areas where trenching wasn't allowed. We have also placed articulated concrete mats to cover cables for protection and to separate cables from other utilities like pipelines.



Shore End Installations

Carefully landing the cable ends and securing them can be a critical part of an installation. We self-perform trench excavation, winching & cable pulling, backfilling, and vault installation.



Deepwater Wind Farm



PROJECT: The Deepwater Wind Farm is the first offshore wind project constructed in North America. It consists of five wind turbines which are located approximately 6 miles off the East coast of Block Island, Rhode Island and approximately 20 miles from mainland Rhode Island. The combined electric power output from the 5 wind turbines is 30 MWs which will service 17,000 homes. The 5 units are expected to be online in the fall of 2016.

This power cable project has 2 owners: Deepwater Wind and National Grid. Deepwater Wind owns and was responsible for installing the 5 offshore wind turbines, 4 - 3,200 LF array cables between turbines, and the 6 mile export cable to Block Island. National Grid owns and installed the 20 mile transmission cable between Block Island and Narragansett, Rhode Island. LS Cable was contracted to supply and install all of the power cables for the project. LS contracted with Kokosing Industrial/Durocher Marine Division to install and bury all cables.



To accomplish this project the Durocher Marine installation team designed and constructed a self-propelled, USCG approved, Dynamic Positioned Barge (DP-2) to safely and precisely lay and bury the subsea cable installations. The system utilized six 500 HP thrusters for propulsion that were mounted on a 260' x 72' x 16' ABS barge. The DP-2 guidance system, which provided precise auto pilot navigation, was purchased from and installed by Kongsberg Maritime USA. All other required specialized equipment necessary to successfully and safely load, install, bury, and monitor the installation for contract compliance were furnished and installed by the Durocher Team. Mobilization of the Cable Lay Vessel began in January of 2016 in Florida and was completed in April in Rhode Island.



Block Island, Rhode Island

The 35 KV subsea power cables were manufactured by LS Cable in South Korea. Once complete, they were shipped to Rhode Island and transloaded onto the cable lay vessel. The total 28 miles of cables weighed 3,400 metric tons and were coiled in a holding tank built on the deck of the lay vessel. Once loaded the lay vessel began installing cable. The installations began in May with the export cable and ended in July of 2016 with the installation of the array cables.

The subsea cables were installed and buried 6 feet along the pre-determined cable lay routes. The installation vessel precisely navigated the lay route while simultaneously towing the cable plow behind and burying the cable. The array cables were particularly difficult to install and required detailed maneuvering in close proximity to the wind structures. All cables were installed without damage to the required depths. Articulated concrete mats were placed over the cables in areas where full burial was not achievable due to hard bottom conditions. These mats were also installed at the entrance to each cable tower structure to prevent scouring.

Both the export and array cables required installation to the wind turbine structures for termination. To accomplish this, we installed a pulling apparatus and winch at the top of each tower to pull cable from the sea bed 90 feet below water to their termination point 90 feet above water. Once each cable was secured and terminated, the pull-in modules were dissembled and removed.



San Francisco, California

Rerouting Power through San Francisco



PROJECT: Subsea installation of three 230kV transmission and fiber optic cables between the Potrero and Embarcadero Substations in San Francisco, CA.

The 1,000 ton turntable was utilized to install the 3 cables furnished in individual tubs weighing 320 tons. Cables were installed and buried one at a time.

The lay barge winched the 5 ¹³/₁₆" diameter power and fiber optic cable to the Potrero Substation ashore through a pre-installed pipe conduit then simultaneously laid and buried to a depth of between 6 and 10 feet by the water jet plow. At the second end, 2100 linear feet of cable was floated on air bags and winched to shore through a pipe conduit to the Embarcadero Substation. This process was then repeated two more times.



Long Island Sound, New York

Rebuilding Power Infrastructure around New York City

PROJECT: Replacement of seven oil-filled single conductor cables with three 138 kV triplex power transmission cables between Norwalk, Connecticut and Northport, Long Island, New York.

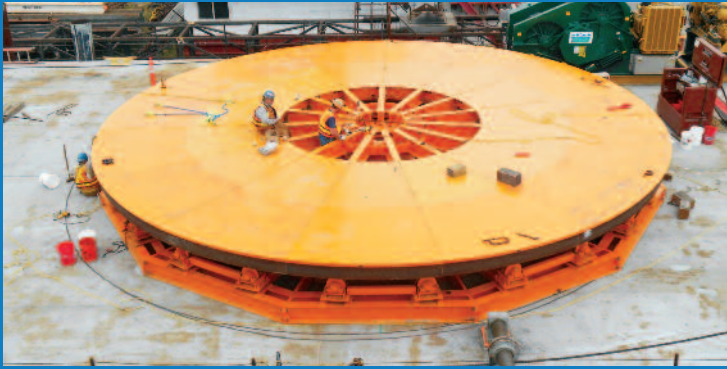
Replacement began with the removal of seven 12 mile long oil-filled single conductor cables (84 total miles). Our marine crews removed the cable and delivered it for salvage to the owner.

Inside the 3 replacement cables was a 24 fiber optic element. The 9" diameter cables weighed 70 lb/ft. The 7,000 tons of cable was delivered, handled, laid, and buried. Each cable was buried post-lay.

The North landing required crossing a small island with each cable. Our lay barge was set up with a turntable that allowed the delivery ship to offload and float 1.3 miles of cable across the island to our barge where it was loaded onto the turntable. Once loaded, each cable was laid and buried in the shallow water to shore. This process was repeated for each cable.



Special Cable Handling Equipment



Turntable

Our portable turntable has a capacity to hold 1,000 tons. The turntable can easily be trucked and assembled where needed to meet project demands. The turntable is presently 39 feet in diameter.



Dynamic Positioning System – DP2

Kokosing's "DP2 System" includes a number of propulsion units acting together to achieve accurate and reliable station keeping. The DP2 control system is a Kongsberg K-Pos DP-21. Propulsion is provided by six (6) ThrustMaster 500 horse power Modular Hydraulic Outboard Propulsion Units consisting of modular deck mounted azimuthing thrusters, with separate diesel-hydraulic power units and controls.



Cable Gantry & Coiler

The gantry and coiler system is design to safely operate in offshore ocean environments. Both the gantry and coiling arm were designed and fabricated by Durocher Marine. Each is completely modular and can be mobilized to any port for assembly. The gantry has a height of 130 feet. The coiler has a diameter of 80 feet.

Special Cable Handling Equipment (cont'd)



Jet Sleds

Our larger jet sled is portable and capable of handling a 5 meter burial tooth. The sled is equipped with digital sensors to accurately record all burial data in real time.

Our smaller jet sled is portable and capable of burial to 2 meters with similar burial recording capacity.

Both sleds are environmentally friendly because they create near zero turbidity in the water and have negligible impact to the seabed.



Linear Cable Machines

We have three portable linear cable machines. Each have remote controls and a maximum line pull of 12,000 lbs. The units can be configured as a single unit to increase line pull or synchronized to work as a single unit. The units are easily trucked to the project site.





Durocher Marine

Subsea Cable Installations

<u>Year</u>	<u>Owner</u>	<u>Location</u>	<u>Size</u>	<u>Length, ft.</u>	<u>Depth, ft.</u>
2016	Deep Water Wind & National Grid	Block Island, Rhode Island	(5) 35 KV	28 Miles	125
2015	Pacific Gas and Electric	San Francisco, CA	(3) 230KV	14,700	90
2013	Kerite Cable Company	Santa Barbara, CA	25 KV	18,000	210
2013	Kerite Cable Company	Drummond Island, MI	25 KV	6,200	110
2013	McLean's Wind Farm	Little Current, Ontario, Canada	(3) 115 KV	3,000	35
2012	Kerite Cable Company	Charlevoix, MI	25 KV	4,600	70
2011	National Grid	Captree Island	35 KV	13,268	12
2011	VIAWAPA	St. Thomas, Virgin Islands	35 KV	18,000	110
2009	Kerite Cable Company	Middle Bass Island, OH	25 KV	4,700	40
2008	Kerite Cable Company	Eleuthera, Bahamas	15 KV	16,600	35
2008	Northeast Utilities	Long Island Sound, NY, CT	138 KV	36 Miles	120
2007	Kerite Cable Company	South Bass Island, OH	(2) 35 KV	17,700	60
2006	Kerite Cable Company	Lake Tahoe, CA	25 KV	3,000	90
2005	SBC Michigan	Straits of Mackinac, MI	Fiber Optic	22,000	350
2005	Stanford Development Co. Limited	Antigua, West Indies	(2) 35 KV	13,000	40
2004	Kerite Cable Company	St. Thomas, Virgin Islands	34.5 KV	18,500	60 - 90
2003	Kerite Cable Company	Kelleys Island, OH	15 KV	21,000	70
2003	Xcel Energy Services, Inc.	Madeline Island, WI	15 KV	11,800	170
2001	Savannah Electric	Savannah, GA	(4) 15 kv	4 Miles	4 - 37
2001	Carolina Power & Light	Baldhead Island, NC	(2) 35 KV	2,800	70
2001	Edison Sault Electric	Mackinac Island, MI	24 KV	17,000	180
2000	So. Carolina Electric & Gas	Lake Murray, SC	35 KV	3,000 & 600	70
2000	Outward Bound Education Center	Thompson Island, Boston, MA	15 KV	7,900	30
1999	Edison Sault Electric	St. Ignace, MI	(3) 25 KV	18,300	300
1999	Presque Isle Electric & Gas	Bois Blanc Island, MI	15 KV	24,900	120
1999	Great Lakes Energy	Beaver Island, MI	35 KV	28 Miles	70
1999	Wolverine Power Co.	Beaver Island, MI	Repair	28 Miles	70
1998	Lee County Electric Coop.	N. Fort Myers, FL	(4) 15 KV	29,650	35
1998	USDA	Plum Island, NY	35KV	11,000	120
1997	Robins Island Preservation Group	Robins Island, NY	15 KV	5,800	70
1995	Lee County Electric Coop.	Ft. Myers, FL	25 KV	14,850	35
1995	Gulf Power	Pensacola Beach, FL	(4) 25 KV	4,350	38
1993	Cloverland Electric	Sugar Island, MI	(4) 25 KV	1,200	65
1992	Exxon Co. USA	Santa Barbara, CA	35 KV	52 Miles	1,200
1990	Michigan Bell Telephone	Straits of Mackinac, MI	Fiber Optic	22,000	350
1990	Consumers Power Co.	Straits of Mackinac, MI	(2) 138 KV	22,000	350
1990	Gulf Power	Perdido Key, FL	(4) 25 KV	1,500	70
1989	Ohio Edison	Catawba Island, OH	35 KV	18,700	60
1989	Fishers Island Electric Co.	Fishers Island, NY	15 KV	18,300	33
1988	Edison Sault Electric	St. Ignace-Mac. Is., MI	(4) 25 KV	18,700	380
1987	Texas Power & Light	Lake Belton, TX	25 KV	6,000	70
Various Cable installations from 1954 - 1990					