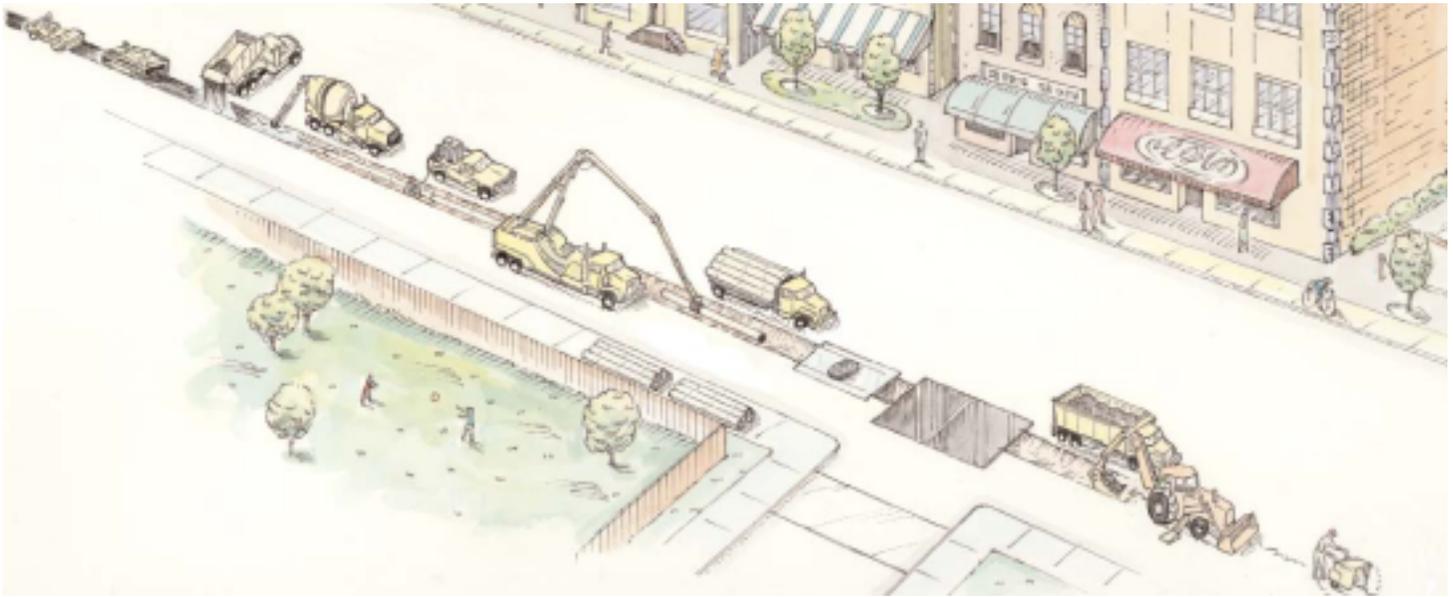




Installation of Underground/Submarine Electric Cables



Installing underground electric cables involves several steps including – conduit and manhole installation, cable pulling, and cable splicing.

This drawing (above) shows the steps performed during the conduit and manhole installation phase. The crews and vehicles move along a street in a progression, beginning with sawcutting the pavement, and ending with temporary repavement. Construction is performed using a “clean trench” technique, where excavated material is removed from the site, and returned as necessary for backfill. Excavated soil or other debris is not left on the streets.

Controlling Construction Impacts

During the conduit and manhole installation phase, temporary disruptions to vehicular traffic and parking will be unavoidable. There will also be some temporary inconveniences to pedestrians. However, we will make every effort to minimize the impacts of construction. Nantucket Electric will employ an onsite worker who will ensure that residents and businesses have access to their properties, and that parking, traffic, and safety concerns are addressed. Safety precautions include limiting access to the trench with barriers, and having workers and police details oversee the site. Nantucket Electric will also work with state and municipal agencies to develop traffic and parking plans for the work areas. Traffic patterns through the work area and alternate routes will be developed where feasible. Work areas are managed so emergency vehicles, such as ambulances, police, and fire trucks can access all streets during construction. Police details are employed as necessary to maintain traffic flow.

Cable Trench Cross Section

The drawing above shows a cross section of the cable trench. For this type of cable, the electric cables are installed within a steel pipe, and a communication cable is installed in a plastic conduit in the same trench. The conduits are encased in a low strength concrete. The remainder of the trench is backfilled with soil, and the area is repaved. The proposed trench for this project is approximately 4 feet deep, and 21/2 feet wide.

Manholes

Manholes are needed for cable pulling and cable splicing. They are required approximately every 1,500 feet along the cable route. Manholes are approximately 20 feet long, 8 feet wide, and 9 feet deep. Once manholes are installed, they are backfilled, and the road surface is restored. Upon completion, only the manhole covers are visible.

The proposed cable will be installed in a steel pipe, which provides protection from accidental dig-ins. The pipe segments are placed in the open trench, and welded together. Communication conduits are installed at the same time. The trench is excavated using a backhoe. The trench in this case will be about 2 1/2 feet wide, and 4 1/2 to 5 feet deep. Prior to excavation, a rotary saw is used to cut through the pavement.

Note that excavated soil is removed from the site, rather than left on the street. Pipes are then installed in the trench. The typical pipe installation process is spread out over about 1000 feet, and moves between 100-200 feet per day. The pipe installation process will be at any one location (such as in front of a house) for one to two weeks.



During construction, fences and concrete barriers are used for vehicular and pedestrian protection. Steel plates are used to allow vehicles and pedestrians to cross the trench

The conduits are inspected before being encased in low strength concrete. The trench is then backfilled with soil, The concrete boosts the capacity of the underground cables, and helps protect against accidental dig-ins. Barriers are used to protect pedestrians and vehicular traffic, until the trench can be refilled. If the construction is in a street, temporary repaving is installed.

Later, permanent surface restoration is performed, in accordance with city, town, or state requirements. Once the manholes and pipes are installed, the remaining construction is confined to the manhole locations. Crews first pull the cables through the underground conduits, then splice the cables together. The electric cable, which arrives on large reels, is fed into the manhole. A winch, located at the next manhole, pulls the cables through the previously installed underground conduits. This operation takes two to four days (6 to 8 hours each day) at each manhole location. Cable splicing then occurs at each manhole.

Directional Drilling

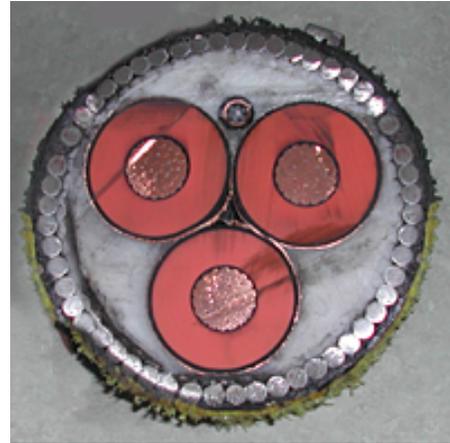
For short water crossings, or to get past obstructions on land, a technique known as “horizontal directional drilling” is sometimes used. This environmentally friendly method uses a drill to bore a small tunnel under a river, lake, or bay, leaving sediments undisturbed.

Once the tunnel has been established, the electrical conduits are installed in the tunnel, and the electrical cables are pulled through the conduits. This technique cannot be used for the main submarine cable installation due to cable pulling length restrictions. It may offer environmental and construction benefits at the cable landfalls, or to get past obstructions on land. Horizontal directional drilling was used at both cable landfalls for the original Nantucket cable.

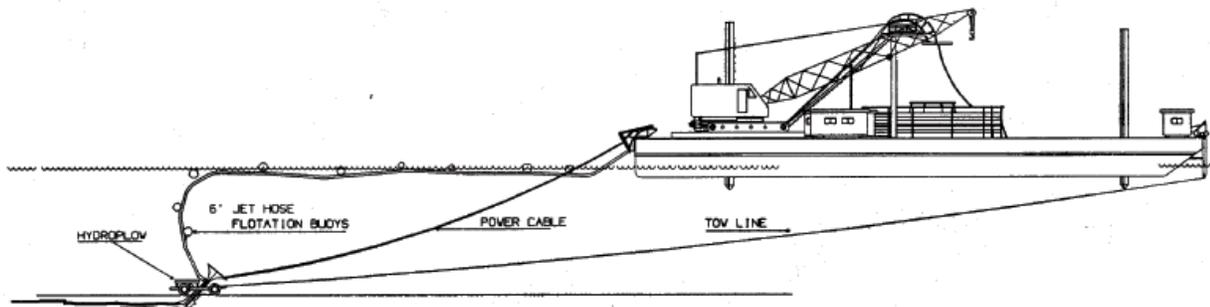
The Submarine Cable

The marine portions of the cable are encased in several layers of protective material and will be buried approximately eight feet beneath the ocean floor using a specialized jet-plow. This is the same construction method that was used for the first cable.

A barge containing the cable is set up near the shore. A marine plow is attached to the cable at or close to the shore, and begins burying the cable. The plow's water nozzles temporarily loosen the soil and create a narrow trench as the plow advances the cable is fed into the trench from the back end of the plow as it continues to move along the ocean floor.



The plow buries the cable approximately eight feet below the ocean floor. With burial at this depth, there is no effect on any uses of the seabed or marine environment. Marine sediments quickly resettle on top of the cable, closing the narrow trench with minimal disturbance to the seabed.



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Construction at the Shoreline - Horizontal Directional Drilling

Horizontal directional drilling will be used to make the transition from land cable construction to installation of the submarine cable. This technique will minimize impacts to environmental resources along the shoreline.

A drill rig will be set up on land near the shoreline and will be used to install a section of pipe below ground to a point near the high water mark on the beach or a short distance off shore.

The final step will be to excavate the endpoint of the drill hole and install a trench box at that location. The submarine cable will be then pulled through the drilled section and a jet plow, used for submarine installation, will be positioned at the trench box to start burial of the cable across Nantucket Sound.