

Back Bay National Wildlife Refuge

Project Objective

The purpose of this project was to design, acquire, and deliver a transportation system to move visitors to a combination federal wildlife refuge and state park located near Virginia Beach, Virginia. The transportation system incorporates three all electric trams capable of carrying up to 36 passengers each, and a specialty-beach vehicle capable of transporting 40 students with back packs and supplies for a weekend visit to the state's environmental education center at False Cape.

Team Members

- Virginia Power Company
- Georgia Power Company
- Stewart & Stevenson TUG, LLC
- National Fish and Wildlife Foundation
- Virginia Department of Conservation and Recreation
- U.S. Fish and Wildlife Service
- Maritime Applied Physics Corporation (MAPC)
- Center for Transportation and the Environment (CTE)



project overview

Three zero-emission electric trams originally developed by Georgia Power and Tug Manufacturing for use in the 1996 Olympic Village system have been placed into service along with several electric-assisted bicycles for use by the rangers who patrol the nine-mile long park and refuge between the Atlantic Ocean and Back Bay. The trams shuttle tourists and students through environmentally sensitive areas of the park. Analyses of the appropriate routes and charging systems were designed through CTE and several of the team members.

During the winter months, when the refuge is home to large numbers of waterfowl migrating along the Atlantic flyway, access to the park is provided on trips down the beach in a specially designed "beach bus" with extra wide tires built though CTE.



Project Description

The trams used in this program were secured from a fleet of all-electric vehicles developed for use in the Olympic Village during the 1996 Centennial Olympic Games in Atlanta. They were provided by Georgia Power Company. The charging infrastructure was put in place and managed by Virginia Power Company.

The beach vehicle was custom built by Maritime Applied Physics Corporation (MAPC) to transport approximately 40 people along an 8-mile stretch of Virginia Beach. The Ag-Chem model 004 chassis was chosen by MAPC for this application due to its low ground pressure and its commercial agricultural applications. MAPC fabricated a bus body, which was mounted to the rear frame rails of the existing 004 chassis. The bus cabin is approximately 20 feet long, 11 feet wide, and has the seating capacity for 36 people or 35 with 2 wheelchairs. An interior luggage compartment has approximately 72 cubic feet of space for camping equipment and bags.

Because the driver's compartment is separate from the passenger, numerous safety items and safety precautions were taken into consideration during the design of the bus body. A two-way intercom system was installed so that the driver and state representative can communicate at all times. Seats were arranged to maximize comfort, but not waste space. One seat can be removed to make room for a wheelchair tie-down in the event that a handicapped person is present on the vehicle. The setup allows for a seatbelt for each occupant of the vehicle. Emergency pop-up hatches with air vents were installed as a means of escape in the event the bus rolls on its side, and they also serve as a means of fresh air circulation. An outdoor video camera connected to a 3" monitor in the driver's compartment was mounted to the rear of the vehicle to allow the driver to see directly behind the vehicle at all times. This camera was strategically placed to cover the width of the vehicle. Different systems were employed throughout the vehicle to ensure that accidents are kept to a minimum. Anti-finger slamming mechanisms were installed at both doors to eliminate the

possibility of fingers being closed in the door. Locking mechanisms were installed to enable the doors to be kept stationary while they are open.



Next Steps

Other parks, wildlife refuges, and recreation destinations around the nation are currently assessing electric trams to help clean up their transportation systems. The zero-emission vehicles are also being evaluated on college campuses because of their ease-of-use and value in creating pedestrian-friendly corridors.

The one-of-a-kind beach vehicle can be reproduced by MAPC for similar applications as necessary. For more information on the beach vehicle, contact Mark Rice at, mrice@mapcorp.com.