Vacuum System to Collect Solid Wastes in New Community

The New Community of Roosevelt Island, New York, formerly known as Welfare Island, is located in the East River between Manhattan and Long Island City, extending from 50th street to 86th street. Its development is an attempt to integrate 5,000 units of family oriented housing, parks and recreation facilities totaling 40 acres, and shopping and business facilities into a modern community.

This new community will feature five new parks, five small schools, a sports complex and centers for health, day-care and senior citizens. An aerial tramway will speed residents from the island to 60th street and Second Avenue. Cars will be barred from the island but, for those who wish to keep them, storage will be available in Motorgate, the central garage. To travel on the island, there will be a fleet of electric mini-buses.

Even the newest community, combining private dwellings and parks with commercial space in an efficient and attractive manner, will generate waste that must be processed economically yet without harm to the environment. Nowhere in the plans for Roosevelt Island, however, is there a provision for garbage trucks rumbling through parks and streets or for curbside refuse collection.

Instead, Roosevelt Island has turned to Automated Vacuum Collection (AVAC) of solid wastes, marketed by Envirogenics Systems, a unit of the CHEMICO Process Plant Company, El Monte, California, exclusive domestic licensee of A.B. Centralug of Sweden. AVAC is billed as a practical, hygienic, safe and economic method of removing solid wastes from the areas where they originate.

The AVAC system on Roosevelt Island will convey loose solid wastes from the various buildings and areas served to the collection terminal at the Motorgate equipment building through several miles of underground piping. After collection, the waste will be compacted into containers for subsequent removal from the island by the Department of Sanitation of New York City.

Two separate subsystems, one for the east side of the island and one for the west, will be installed due to the amount of wastes to be collected at peak hours. Each subsystem will be capable of handling in excess of 20,000 pounds per hour. The vacuum system’s daily refuse pickups at the collection terminal will take the place of 80 garbage trucks that would have been needed for conventional collection. Each subsystem’s terminal and control arrangement can be adjusted to handle both its normal load and that of the other system during temporary emergencies. The collection capacity is made possible by a transport air velocity in excess of 60 miles per hour, resulting in average material velocities of about one-half this air speed.

Collection Procedure

Collection is accomplished by depositing waste materials into charging stations located on each floor of high-rise buildings, or into conveniently located floor-mounted stations that serve areas around the building complexes. Refuse from these stations will drop through 24-inch chutes into a section of pipe above the discharge valve, the storage section. Here it is temporarily stored until the discharge valve is actuated and the solid wastes drop into

[Diagram of Roosevelt Island’s vacuum collection system illustrating how refuse is conveyed, separated and compacted.]
The buried portion of the network utilizes 20-inch coated and wrapped steel pipes, ranging from 1/4-inch to 1-inch thick. Manholes are located at intervals of 250 to 300 feet. By 1977, when the island project is expected to be completed, the system will extend to the existing hospitals, at each end of the island, at distances of more than a mile from the terminal. Although the master plan of the project is multiphase, a fully-operational disposal system was required by the January, 1975 completion date scheduled for North Town, the first and largest phase where some 7,000 people will live and work. AVAC eliminates the need for waste storage rooms, transport corridors, elevators or trash-truck driveways and requires minimum manpower for loading, nominal maintenance or supervision. It is virtually fireproof due to the speed of the air stream. The silos and every vertical chute have their own sprinklers and the chutes are provided with a washdown and disinfecting system.

Costs

When discussing costs, Enviromatics takes a "pay me now or pay me later" tack. The company estimated that for a 20-building, 2,000-apartment complex, labor and equipment costs for manual trash collection would total $195,000 in the first year of operation. Automated vacuum collection would cost $208,000 for the same complex over the same period of time. The company claims, however, that wage inflation would soon take its toll and in three years, the vacuum system would be cheaper to operate. It is estimated that by the end of its 40-year design life, the system would have saved $13.5 million, as compared to conventional collection operations. Roosevelt Island's system will cost $7 million and on completion will be the largest combined residential, commercial and hospital AVAC system world wide.

Operating costs for AVAC are small and manpower costs are minimized or eliminated, compared to other collection methods. Since handling or transporting large, centrally located, compacted trash containers requires much less manpower and equipment than conventional collection from multiple buildings, the off-site operation costs for waste removal are also greatly reduced.

AVAC installation costs depend on the number and location of charging chutes and discharge valves; accessibility of the piping; length of piping network and distance to collection terminal; transport pipe wall thicknesses (which are dependent on the specified lifetime of the system); exhaust-air filtration requirements; degree of automation; and type of handling equipment at the terminal.

Hospitals in California, New York, Pennsylvania and North Carolina already collect solid waste with pneumatic tubes. Disney World in Florida features the first AVAC system in the U.S., and several "New Communities" are considering this method of collection. Systems can be found in Sweden, Germany, France, England and Venezuela. On Roosevelt Island, the first phase of the AVAC system has been tested and is expected to be in operation in March, collecting the island's refuse underground, out of sight, and out of mind.

- TWO VIEWS of the chute-discharge valve. When valve opens, stored refuse drops into the transport pipe system.