Summary of Feasibility Analysis of Strategic Upgrades Proposed for Automated Vacuum Solid Waste Collection System (AVAC)



Roosevelt Island NYC, NY September 2015

The ENVAC Process: A SEALED Waste Collection and Recycling System - Climate Resilient; Eliminating Dirt/Odor, Bins and Bags on Streets, Daily Collection Trucks, Manual Waste Handling, WTS*



The waste is thrown into a waste inlet.
The system can also be expanded with additional inlets for more fractions.
The computer-controlled evacuation takes 30 seconds. One fraction is emptied at a time.
All waste is sucked out through a network of pipes at a speed of 70 km/h.
Fans create the partial vacuum that sucks the waste through to the reception facility in the terminal station.
The waste is released.

* No need to take Envac containers to Waste Transfer Stations; the system compacts waste/recyclables into separate containers in its terminals.

EXECUTIVE SUMMARY

HISTORY: Upgrade study based on 2013 study by UTRC*.

PURPOSE: At the request of DSNY, Envac conducted an inspection of the 40 year old AVAC system on Roosevelt Island in December 2013, with the purpose of *extending its useful life* serving 14,000 New Yorkers living on the Island and *making operations more cost effective and efficient, including reduction of electrical consumption and staffing demands.*

FINDINGS: The 40 year old AVAC system, with an original useful life of 30 years and despite the skillful operations conducted by DSNY, has deteriorated to the point where essentially all operations must be manually initiated imposing significant staffing demands; ill fitting valves, seals and pipes further interfere with automated operations, can cause blockages and increase energy costs. Outmoded exhausters alone, inflate energy costs by some 50%. The current computer control system cannot be integrated with the new Building Automation Systems now required by DSNY. Current workplace conditions are unnecessarily unpleasant and dangerous in certain situations.

The Horizontal transport pipe can continue to function with continued maintenance.

RECOMMENDATIONS: For the total cost of approximately *1 year of DSNY's annual AVAC operating budget,* 3 phases of upgrades would extend the system's useful life to serve the existing as well as 3 more residential high rise buildings scheduled to open in the next 5 years, while reducing operating costs and approximately 60% of annual electrical costs and consumption.

Recommended upgrades approximating \$2 million include interim operating options which would *maintain service through the upgrade effort*.



Interior of a 40 year old pipe; Summit Plaza, N.J.

AVAC pipes of similar vintage and similarly maintained. Can remain functional and support upgraded and updated terminal and valve equipment.

*Urban Transportation Research Center – City University. 3

SUMMARY: AVAC UPGRADE BENEFITS

For an investment of *no more than* 1 year of operating costs proposed upgrades to the 40 year old AVAC system can yield multiple benefits, including the following:

- Extend useful life of system servicing 14,000+ NYC residents living on Roosevelt Island;
- Accommodate new residential construction;
- Substantially reduce operating costs, by:
 - ✓ Reducing electrical consumption by approximately 60% plus additional savings
 - ✓ Restoring system seals which facilitate efficient and climate resilient operations, reduce odors, etc.
 - ✓ Replacing outmoded equipment
 - ✓ Shifting some electrical consumption to non peak hours
 - ✓ Reducing staffing demands
- Improve working conditions
- Automate operations and upgrade control system, which allows for
 - ✓ Remote monitoring and operations
 - ✓ 24/7 Operations, regardless of weather, holidays/other staffing availability
 - ✓ Operating during non-peak periods
 - Modifying operations for unanticipated peaks or lulls
 - ✓ Preventive maintenance without shutting system down
 - ✓ Gathering data
 - ✓ Integration with DSNY Building Automation Specifications
- More efficient operations
- Reduced blockages and other malfunctions
- Continue as City leader in 21st C. technology/infra-structure, by
 - ✓ Improving climate resiliency
 - ✓ Advancing sustainability, SWMP, One NYC and air quality goals

Valve - Conditions



Original valves below and right no longer have a "sealed" fit. Air leaks reduce efficiency of pulls, consume more power and make the system vulnerable to flooding, odors, vermin, and spills. Modern valve on left as installed in Riverwalk buildings. 3 valves below illustrate how recycling occurs in newer systems.









Some Terminal Conditions



Old Linux Computer system on *left* – Automated operating functions failing, requiring manual intervention.

> New SCADA system on *right* allows for 24/7 operations, remote monitoring and immediate information on conditions throughout system.





6 Old Exhausters on *left* create heat and noise; require large space a cooling system and consume significant power.

4 New Exhausters on right take less space, operate at much lower heat and noise levels and consume less power.



SUMMARY: SOLUTIONS PROPOSED*

Envac recommends three phases of upgrades: The first would be to mechanical systems such as valves and chutes; the second to the electrical and control systems to make operations automated and efficient and the third to the exhausters. *Upgrades will extend useful life of system, reduce odors and mess in buildings.*

Valves and storage chutes replacement:

-Replace old disc valves with new clap valves (like those installed recently in newer development)
-Replace ill fitting storage chutes
-Install high level waste sensors in the chutes, to run system when full, rather than only as pre-scheduled. These sensors also help avoid blockages in the chutes.

Control and power system upgrading:

- Control system upgrades comply with DSNY Building Automation specifications and facilitates independent control systems for the East and West AVAC service sides, *enabling the entire system to be run from each side** *allowing for preventive maintenance while maintaining operations* and could



- Power system upgrade would facilitate optimized power conservation, particularly if Exhausters were replaced.

Exhauster upgrade:

Replace 6 existing exhauster with 4 new exhausters.

*All upgrade proposals are premised on a plan to maintain system operations throughout, providing service to Roosevelt Islands 14,000 residents.