AUTOMATED WASTE COLLECTION SYSTEM DETAILS

Description of Components of the AWCS

Users of the system deposit their waste into labeled waste inlets. In the case of buildings, waste would enter the system in a similar manner to what would typically be used in modern multiple story buildings. The building would be constructed with waste chutes. Occupants would deposit waste into chutes through inlets located on every floor of every building. In outdoor areas, waste deposited in street receptacles would be picked up in the normal manner by the City's permitted waste hauler. Waste deposited in park areas would be picked up by park maintenance crews using carts and bags, and taken to a central location and deposited into the AWCS system.

Once the waste is deposited into the system through the inlets, it drops into a sealed chamber located below the inlets which holds the material in place until an electronically controlled valve opens and drops the material into the horizontal underground transport pipe network. If the holding chamber fills up before the next scheduled discharge time, a photo-detector activates the valve to release the waste to make room for additional waste that has been deposited in the system. After the waste drops into the pipe, the valve closes and powerful electric fans create air pressure which propels the waste at high speed through a sealed network of underground pipes to enclosed compactors and waste containers at a centralized collection facility. Once the waste is placed in an inlet it will neither be seen nor handled again until it is unloaded from collection trucks that will pick up the waste at each collection facility and take the waste to Recology's solid waste and recycling facilities at Tunnel and Beatty Roads and Pier 96. The holding chambers will be emptied at least once every 8 hours, and as noted above, if the chamber fills up prior to the next scheduled discharge, a photo-detector will trigger the emptying of the chamber.

The first of the three central collection facilities to be built will be sited on top of the parking garage at the Candlestick Point Retail Center (CP Center). It will be located at street level and accessed by a separate entrance from the garage. Adjacent to the collection facility at CP Center, movie theatres, residences, residential life care or hotel uses are proposed. This collection facility will be approximately 6,300 square feet. The building will range in height from 16 feet to 36 feet and would comply with the height, setback and bulk requirements in the Design for Development Program under the 65-foot height limit in Candlestick Point. See plans above and schematic below. The other two central collection facilities will be located at Hunters Point Shipyard along Crisp Road, and on Spear Avenue near B Street. Both locations are in areas designated for Research and Development activities. Collection facilities at both locations would range from 16 feet to 36 feet, and would similarly comply with the Design for Development requirements under their respective height limits of 65 and 85 feet.

The main network of underground pipe is comprised of 20-inch inside diameter heavy gauge steel pipe that is welded, poly-wrapped and buried within the street rights-of way pursuant to a Major Encroachment Permit approved by the Board of Supervisors. The thicknesses of the pipe will vary from 3/8-inch to 1-inch based on pipe layout geometry of branches and bends.

Buried concrete access vaults at pipe branch locations will provide repair and maintenance access to underground piping on an as-needed basis. Air-flow isolation valves will be incorporated to shut-off branches from the main pipe network to improve efficiency and flow control.

All system components (e.g., dampers, diverters, fans) will be controlled by an electronic automated control system that continually monitors the operations of the entire AWCS system 24 hours a day. These sophisticated electronic system controls allow maintenance personnel to monitor, operate, and if needed, troubleshoot the system.

The installation of the system will be phased with the development of the Project. Accordingly, initial operations will not commence until the first Centralized Collection Facility has been completed in Candlestick Point in Sub-Phase CP-02. Prior to completion of this central collection facility, waste collection will be handled by Recology using its current waste cart and collection truck methods. Until the AWCS is fully operational, waste will be deposited in the chutes which will empty into centralized waste carts in the building, and will be periodically emptied by Recology. After the system is phased in, the waste will empty directly into the sealed chambers under each building, where the waste will empty into the pipe system and be transported to the central collection facility.

Waste inlets will be accessible 24 hours a day. The aperture of waste inlets will be smaller in diameter than chutes and transport pipes to help minimize the risk of clogs in the system. Storage chamber valves are normally closed and open only as scheduled throughout the day, but "photo eye" detectors allow the automated control system to override standard collection timing if larger than expected volumes of waste accumulate in a holding chamber. All valve assemblies have pressurized ventilation mechanisms that exchange air in the vertical chute risers and underground chambers to prevent the accumulation of odors in buildings.

During AWCS waste transport, powerful electric fans ramp up quickly and an air valve located upstream of the branch in which the waste is travelling opens to create the high-velocity airflow necessary to transport the waste directly to the appropriate enclosed central collection facility. Each type of material - landfill, recyclable, and compostable material- is piped from the waste inlets to the central collection facility into dedicated cyclone separators which slow the air and allows waste materials to drop into compactors that are tightly sealed to the cyclone separators. These compactors compress the waste into attached portable 40 cubic yard metal containers for transport by Recology. The exhaust air from the separators passes through a multi-stage, dry filtering system to remove particulates before exiting to the outside air.

When a container is full, it is disconnected from the AWCS compactor by Recology operators. Recology operators then load the full container onto a Recology truck for transportation directly to the San Francisco solid waste transfer station at Tunnel and Beatty Roads or the recycling facility at Pier 96. Once there, Recology will unload the contents of each container, wash the container, and return and reconnect it to the AWCS system. The full containers remain completely sealed during transportation to and from the transfer station and recycling facility.

At the Central Collection Facilities, the Recology trucks are programmed to cut off the vehicle's engine after five minutes to minimize idling times.

For the first central collection facility to be located atop the retail parking garage in Candlestick Point, trucks will enter and exit the site by way of a dedicated driveway at street level off Arelious Walker Drive. Trucks will leave the site by turning left onto Arelious Walker Drive from the site's driveway, on to Harney Way and then toward US 101. Trucks destined for the San Francisco solid waste transfer station at Tunnel and Beatty Roads would use Beatty Road to access the facility. Trucks destined for the recycling facility at Pier 96 would enter US 101 northbound from Harney Way, and immediately exit at the Paul Avenue/Third Street off-ramp. Trucks would travel northbound on Third Street to Cargo Way, and then east on Cargo Way to Pier 96. Trucks would enter the site using similar routes. Truck trips would typically occur between 6 AM and 11 AM, and would not affect peak period traffic conditions. A total of 14 truck trips are anticipated for this facility; seven trucks to and from the site daily.

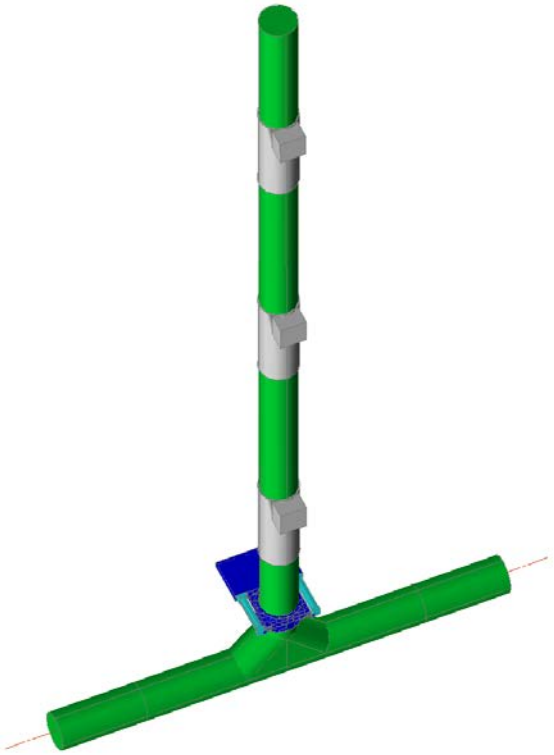


ILLUSTRATION OF BUILDING INLETS

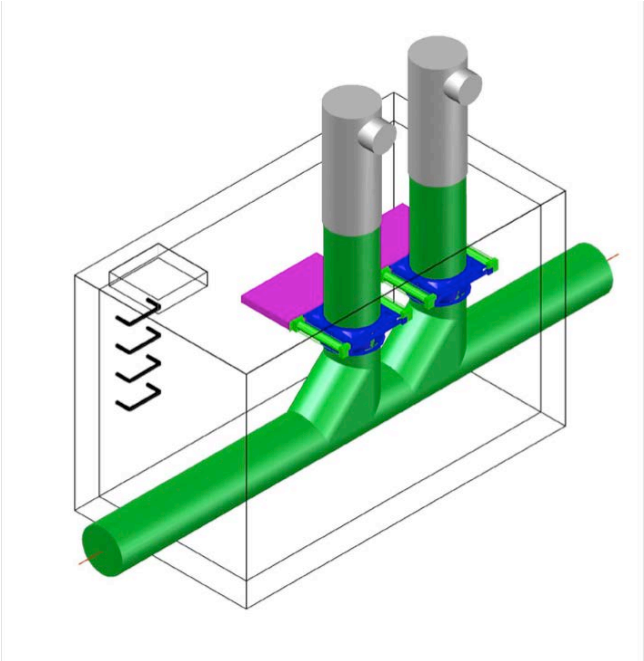


ILLUSTRATION OF STREET LEVEL INLETS

For the two additional Hunters Point Central Collection Facilities, the same number of truck trips is anticipated during the same off-peak time period. For trucks traveling between the San Francisco solid waste transfer station and the site located in Hunters Point South Parcel 1, trucks would travel along Third Street, Palou Avenue, and Crisp Road, entering the site from the diagonal road connecting Crisp Road and Fisher Street. Trucks traveling between the San Francisco solid waste transfer station and the site located in Hunters Point Research and Development Parcel 4 would use the same route, but would continue on to Fischer Street and Spear Street to the entrance located on Spear Street near "B" Street.

For trucks traveling between the recycling facility at Pier 96 and the site located in Hunters Point Research and Development Parcel 4, trucks would travel along Jennings Street, Evans Street, Hunters Point Boulevard, Innes Avenue, Donahue Street, Lockwood Avenue, and Spear Street to the entrance located on Spear Street near "B" Street. Trucks traveling between the recycling facility at Pier 96 and the site located in Hunters Point South Parcel 1 would use the same route, but would turn from Lockwood Avenue onto Fischer Street, and then to the diagonal street connecting Fischer Street and Crisp Avenue.

In an emergency situation involving the loss of power for an extended period, Recology would provide alternative garbage collection for the Project site as necessary and feasible given the emergency conditions.

<u>System Components: Loading Points/Inlets</u>

Inlets will be at a height and size that would eliminate the possibility of small children accessing the system for disposal of items or falling into the system. In buildings, the design is similar to traditional gravity chutes in San Francisco buildings. Upon receiving building plans from individual building architects, TransVac will work with them to design the gravity chutes appropriate for each building.

These chutes will connect to the AWCS and will comply with the relevant City and State code sections applicable to gravity chutes.

Inlets in public parks will have secured inlets so they are only accessible to City maintenance workers. The size of the openings on these inlets will be no more than 14 inches in diameter in order to limit the size of waste deposited into the system.

Although very unlikely, any fire that occurs in any of the system's inlets will be extinguished by the fire sprinkler system in the vertical chute. This is same protocol required by the Fire and Building Codes for gravity chutes throughout San Francisco. The risk of fire in the piping system is highly unlikely due to the negative pressure of the AWCS. Furthermore, there is very little dwell time of the waste in the piping system, making fire even more unlikely.

Recology is the owner and operator of the AWCS, and has contracted maintenance to TransVac. The control system monitors all access points. If any valve does not open or is stuck, an alarm is sent to the main control system. The rest of the system will continue to operate. To prevent clogs from slowing down the waste movement, a clog detection system will send a signal of low airflow if a clog develops. The control system will run a clog removal sequence. If that is unsuccessful, the system will be cleared manually via maintenance vaults.

Piping Network *(see illustrations above)*
Underground piping will be heavy wall mild steel with a protective poly-wrap to protect the buried pipe from subsurface soil conditions and contaminants that may be present. When piping goes above ground, lighter gauge steel may be utilized.

The primary alignment of the TransVac system is under the sidewalk area, and would be below any utilities that have lateral pipes crossing perpendicularly. The system is approximately 9-10' deep in all areas except for a short stretch at Arelious Walker where it is somewhat less deep. In all areas any service laterals will be above the TransVac line.

Air Inlets
Air inlets provide a means for air to be drawn into the piping network in sufficient quantities to allow for material transport. An air inlet may or may not include an inlet damper depending on location and orientation. Air inlets are located upstream of waste inlets and can be located at any desired location. The control system manages the opening and closing of the air inlets.

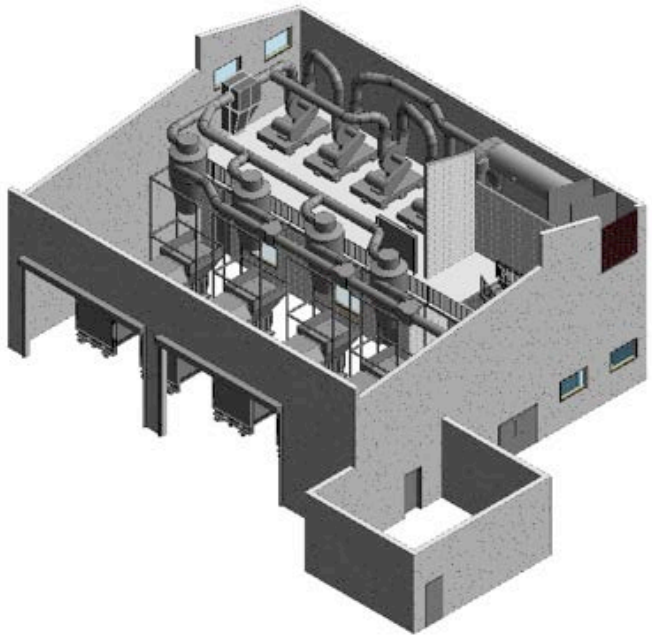
Isolation Dampers *(valves)*
Only one branch of the AWCS operates at a time. Isolation dampers are installed at branch intersections and are closed if a branch is not being actively used.

Central Collection Facilities
Each Central collection facility will house fan units, one cyclone waste separator for each waste stream, a multi-stage filtering system, compactors and containers. While specific designs for the collection facilities to be located in the Hunters Point portion of the Project Area will be completed at a later time in

accordance with the Project construction phasing schedule, they will be similar in massing and height to the Candlestick Point Collection Facility. The Candlestick Point collection facility's equipment and electric power requirements are summarized in Table 1 below. It is expected that the equipment and electricity consumption for the Hunters Point Collection Facilities would be similar. All equipment used in the central collection facilities is electric.

Table 1
Collection Station Equipment and Power Requirements

Equipment	Power Requirement
(2) 250 HP Fans	~260 kVA
(1) air compressor	~6.9 kVA
(1) air dryer	~2.8kVA
(1) compactor unit	~7.5 kVA
Controls System	~2.4 kVA
Furnace, lighting, etc.	~2.5 kVA
Collection Station Total	~280 kVA



CANDLESTICK POINT COLLECTION FACILITY RENDERING

Cyclone Separator

When waste first enters a cyclone, the waste separates from the air. Air passes through the cyclone while the waste material drops out of the bottom into the attached compactor in-feed hopper. The released air passes through a multi-stage filtering system to remove large materials such as paper and plastic bags.

All air in the AWCS is completely contained within the system and will not mix with outside air before being conveyed through the multi-stage filtering system and exhaust louvers.

Air Filtering

As mentioned above, exhaust air passes through a multi-stage filtering system to remove particulates, odor and all visible constituents. The filtration system employed by TransVac will remove at least 99.6% of particulates in the 3–10 micron range. The filtration system will achieve Bay Area Air Quality Management District's (BAAQMD) Best Available Control Technology (BACT) limit of 0.01 grains per dry standard cubic foot (gr/dscf) and achieve an emissions rate of not more than 27.2 lbs/day as discussed in the Air Quality section below. Once the AWCS is operational, Recology will conduct initial testing of exhaust air for PM10 emissions to ensure the emissions do not exceed this estimated rate. Recology will also develop an Operation Plan for the AWCS which will include a periodic monitoring schedule for testing air emissions from the AWCS. Testing results will be submitted to the San Francisco Department of Public Health (SFDPH) in its role as the Local Enforcement Agency under CalRecycle (LEA) within 30 days of receipt of final testing results.

Construction Process

Through an installation sequence coordinated with the Project Sponsor, a network of buried steel pipe will be installed in the assigned right-of-way at the same time other utility lines are installed during each phase of development. A network of streets and access lines to individual parcels throughout the Project Site has been reserved for the AWCS implementation. The Department of Public Works, with the approval from the Board of Supervisors, would issue a Major Encroachment Permit to Recology for use of those streets and prior to the commencement of construction of the AWCS. See graphics on p. 5.

Branch piping will be installed to planned end locations (e.g., on private property) and, wherever possible, branch piping stub-outs will be installed for future connections. Based on material volume projections, loading stations will be located as needed within all buildings and outdoor areas. Buried maintenance access vaults will be installed at branch locations to allow permanent access to underground piping.