

**CITY OF LOS ANGELES**

**INTER-DEPARTMENTAL CORRESPONDENCE**

DATE: September 5, 2023

TO: Honorable Katy Yaroslavsky, Chair

Honorable Tim Mcosker, Vice Chair  
Honorable Nithya Raman, Member  
Honorable Bob Blumenfield, Member  
Honorable Eunisses Hernandez, Member  
Energy and Environmental Committee

FROM: Barbara Romero, Director and General Manager  
LA Sanitation and Environment (LASAN)



**SUBJECT: REPORT ON FEASIBILITY OF ESTABLISHING A PILOT PROGRAM RELATIVE TO THE USE OF UNDERGROUND MECHANIZED WASTE & RECYCLABLE MATERIAL COLLECTION TECHNOLOGY ([CF 21-1208-S1](#))**

On May 02, 2022, the Los Angeles City Council adopted the following recommendations:

1. INSTRUCT the Bureau of Sanitation (LASAN), in coordination with the City Administrative Officer (CAO), to include a needs assessment on the current green waste infrastructure concentrated near multi-family dwelling units and/or densely populated areas of each Council District in their report back on a strategic plan to fulfill the compliance requirements for Senate Bill 1383.
2. INSTRUCT the LASAN to report within 45 days on the feasibility of establishing a pilot program relative to the use of underground mechanized waste and recyclable material collection technology for the efficient management of organic waste and recyclable material collection on the public right-of-way.

**Recommendations for Council action, pursuant to Motion ([CF 21-1208-S1 Rodriguez - Koretz](#)):**

In response to the Los Angeles City Council Motion 21-1208 (Motion), the Bureau of Sanitation (LASAN) has coordinated with the City Administrative Officer (CAO) and the Housing Authority of the City of Los Angeles (HACLA) and is hereby recommending to the Los Angeles City Council the following actions:

1. Direct LASAN to negotiate a pilot project with NORD Engineering, the designer of the underground system in Italy and many other cities. The system should include at a minimum an underground waste collection system with Wi-Fi capabilities that can be used to bridge the digital divide. LASAN will report to the Council on the results of the negotiations and seek Council approval prior to launching the pilot.
2. Authorize LASAN, to coordinate with the Housing Authority of the City of Los Angeles (HACLA) and launch an organic underground collection program at the San Fernando Gardens located at [10995 Lehigh Ave, Pacoima, CA 91331](#).
3. Authorize LASAN to process the organic material collected from the San Fernando Gardens at the Lopez Canyon Environmental Center and distribute the finished compost product to the surrounding communities.
4. Direct LASAN and the CAO to identify the funding needed to establish an underground mechanized receptacle waste collection system as instructed in the motion.
5. Authorize LASAN to work with CalRecycle and discuss available funding to help support an underground system.
6. Direct LASAN to report back on the performance of the underground mechanized receptacles waste collection system and its applicability to other parts of the City.

**Background**

Motion ([CF 21-1208-S1](#)) introduced by Councilmembers Rodriguez and Koretz discussed the new State of California regulation Senate Bill 1383 and referenced the solid waste management system in the historical center of the City of Florence, Italy. The motion described how the City of Florence incorporated an underground mechanized residual waste compactors and recycling receptacles. The Motion stated that the use of this technology allows for the elimination of traditional waste and recycling bins which could be considered sources of degradation and abandonment in local communities. The Motion directed LASAN to review the underground mechanized waste and recyclable material collection technology and report back of potential locations for placement and whether or not the technology can help LASAN more efficiently in the collection of organic waste and recyclable material.

**Senate Bill 1383**

In 2016, the California State Legislature adopted legislation to reduce short-lived climate pollutants (SB 1383) as another step to combat global warming and greenhouse gas emissions.

The bill sought the implementation of comprehensive short-lived climate pollutant strategies to achieve reduction in statewide emissions of methane by 40%, hydrofluorocarbons by 40%, and anthropogenic black carbon by 50% below the 2014 levels by 2030. Specific organics reduction goals were carved out in SB 1383 to reduce the statewide disposal of organics by 50% by 2020, and by 75% by 2025.

SB 1383 defines organic waste as *“solid wastes containing material originated from living organisms and their metabolic waste products, including but not limited to food, green material, landscape and pruning waste, organic textiles and carpets, lumber, wood, paper products, printing and writing paper, manure, biosolids, digestate, and sludges.”*

SB 1383 also requires that no less than 20% of edible food that is currently disposed of is recovered for human consumption by 2025. The benefits of implementing SB 1383 are creating jobs, improving soil health, generating renewable fuels, reducing greenhouse gas emissions, improving air quality, and avoiding health impacts (CalRecycle, 2021). In December 2020, CalRecycle finalized the regulations to meet the SB 1383 targets. The final regulations have prescribed programs for jurisdictions to follow, including acceptable programs, technologies, education, bin labeling, reporting, enforcement, and procurement requirements.

### **Potential Deployment Locations / Meeting SB 1383**

LASAN provides solid waste collection services to residents of single-family homes and apartment buildings with four units or less. In addition, LASAN services 6,665 public housing units owned and operated by HACLA. In 2019, LASAN initiated a pilot program, named Curb Your Food Waste LA, which allowed residents to commingle green waste and food waste into their green bin. This pilot was introduced to 18,000 households across all 15 Council districts. Per Council instructions, LASAN expanded the pilot to 40,000 households by August 2022 and officially launched it Citywide on January 16, 2023. In order to comply with SB 1383 regulations, LASAN is currently working on implementing food scraps collection at housing facilities managed by HACLA.

As stated in the Motion, LASAN has deployed above ground solar-powered trash compactors, which serve as waste receptacles on public rights-of-way. Monitoring and maintenance of these receptacles are actively conducted by LASAN staff. LASAN believes that the underground technology outlined in the Motion makes a perfect fit as a next step for multi-family units and highly dense areas. With Council approval, LASAN is confident that it can implement a pilot program for underground organics collection at multiple locations including the San Fernando Gardens located at [10995 Lehigh Ave, Pacoima, CA 91331](https://www.sanfernandogardens.com/).

The underground system will allow residents to conveniently place their food scraps into the organics bin. This program will supplement the ongoing practice of grasscycling at the HACLA

sites where grass clippings are left on the lawn to naturally mulch, reducing water requirements and providing nutrients to the soil.

LASAN will deploy ambassadors to conduct waste assessment and address contamination. LASAN recommends that the organic material collected from the San Fernando Gardens be processed at the Lopez Canyon Environmental Center and the finished compost product be distributed back to the surrounding communities.

### **Technology Description & Review**

LASAN staff in conjunction with the Mayor's Office has reached out to European cities belonging to the C40 Cities network to gain insights into their organic waste collection practices. LASAN's findings reveal a range of approaches, with cities like Milan in Italy utilizing above ground systems while others like Rotterdam in the Netherlands leverage an underground technology. Notably, Rotterdam has found that underground systems are a more suitable solution for medium and densely populated residential neighborhoods facing challenges in deploying "numerous traditional road bins." This approach aligns with the goal of reducing the number of vehicles on the road and optimizing waste management efficiency. The utilization of underground containers offers several key benefits including: 1) the enhancement of public space aesthetics and quality, 2) reduction of foul odors, 3) prevention of litter and unsanitary conditions for waste collection workers, 4) incorporation of bin heights conforming to the Americans with Disabilities Act (ADA) requirements, and 5) the suitability of the underground system for automated collection.

All cities utilize staff to conduct public awareness campaigns.

#### **Above Ground Waste Collection**

Several C40 Cities have opted for an above ground system for waste collection. The above ground system offers a flexible system and is easy to deploy. While some systems consist of traditional 30, 60 or 90 gallons utilized in residential and commercial collections, other above ground systems are designed to be aesthetically pleasing and conform to the neighborhood.



The cost of deploying an above ground container system is approximately \$4,000 to \$6,000 per unit, not including truck, system software, and staff cost to manually collect the bins.

### Underground Waste Collection Technology

LASAN staff has conducted a preliminary research on the underground waste collection technology as a potential alternative to the traditional above ground receptacles for organics collection. The underground waste containers employ four different types of technology, namely: 1) fully underground hatch containers, 2) fully underground top-loaded containers, 3) semi-underground hard containers, and 4) semi-underground bag containers. The subsequent discussion provides a comparative analysis of these four major types of technology.

#### 1. Fully Underground Hatch Containers

This technology features a metal underground rectangular container with a bottom-opening hatch, facilitating content release without the need for truck drivers to exit the vehicle to service the container. These containers are made of metal, which makes them very durable but quite heavy. Consequently, it becomes vital to incorporate fill-level detection to prevent overloading the lifting system due to the combined weight of the metal container and organic waste. Concrete casing is also commonly used, which is a heavy component that may increase shipping costs. These types of containers are very durable and have the smallest above ground footprint.

#### 2. Fully Underground Top-loaded Containers

This includes a two-stage servicing process, which involves the initial lifting and placement of the containers at the rear loading dock of a truck, followed by dumping the contents through its open top. This leads to increased labor and training costs, as it requires more steps than the usual process. Unlike the hatch containers, these containers feature a top-opening mechanism to prevent any possible leakage into the concrete casing. Similar to the hatch containers, concrete casing is required. However the main advantage of these containers lies in their plastic construction, which reduces their weight and allows for storing more organic waste without exceeding weight limits.

#### 3. Semi-Underground Hard Containers

These containers have been specifically designed for handling organic waste. These products feature bio-containers made of durable plastic with a bottom-opening mechanism for easy content release. Unlike the hatch containers, these containers have a filtered bottom to allow organic liquids to drain out, thus preventing leakage and splashback during unloading. One downside is that these containers are one-third above ground, which can increase their surface profile and take up more space. On the other hand, this drawback is balanced by the use of lighter plastic instead of concrete casing, which reduces shipping costs and simplifies the installation process.

#### 4. Semi-Underground Bag Containers

These containers use a plastic woven bag as a storage medium and feature a heavy lid for secure closure. However, the bag system may not be an optimal choice for organics due to the potential for residues to stick to the interior of the bag, which can cause odors. Furthermore, the drawstring bottom of the bag introduces the possibility of occasional leakage into the casing. In addition, the bag is not fixed in shape, making it difficult to guide it back into the casing after depositing waste. On the upside, the bags are notably lightweight and can hold more organics. The heavy lid also keeps out pests or dumpster divers. While fill-monitoring is possible as an add-on, it is a bit more challenging to work with compared to solid containers.

The research conducted has enabled LASAN staff to identify significant players in the global underground waste collection market that offer the technologies described above. Among them, the fully underground hatch container technology appears to be a better fit for the City's medium and densely populated residential neighborhoods. This technology's advantageous attributes include a decreased above ground footprint, automated collection capabilities, and durability of its metal containers, which mitigate leaching concerns. This technology is the one utilized in Florence, Italy as referenced in the Motion (CF 21-1208-S1). It has been successfully deployed in Italy, France, Spain, Slovenia, Turkey, Argentina, Peru and most recently in a number of US cities including Kissimmee in Florida, Clearwater in Florida, and Ennis in Texas.

The underground system is designed for the collection of refuse, recycling, and organics in densely populated areas. With its underground hatch container technology, this system incorporates an above ground kiosk that efficiently accepts waste materials, while simultaneously storing them in large underground containers. This dual functionality prevents overflowing above ground containers, wind-blown litter, and the presence of nuisance animals. Moreover, the subterranean placement of the containers creates a cooler environment, leading to the reduction of foul odors. Made from galvanized steel, these underground containers are completely sealed off, ensuring that they remain inaccessible to animals, thereby minimizing the risk of pests and the spread of diseases. Adding another layer of protection, the underground containers are encased in a concrete vault, mitigating the leaching of harmful substances into the ground. As shown in the photos below, this underground container is connected to an above ground kiosk that exhibits resistance to graffiti, which enhances its durability. Additionally, the inclusion of an ADA-compliant foot lever and hand lever provides accessibility for waste disposal, ensuring user convenience and inclusivity.





The underground container is hoisted out by a truck with a lifting system that empties its content directly into the roll-off compactor at the back of the truck. This underground system can also be equipped with sensors that measure the container's fill level. By using data derived from these sensors, collection frequency and truck mileage can be optimized, which in turn reduces carbon emissions and extends the operational longevity of trucks.

#### Preliminary Cost Estimate of Underground Waste Collection System

The total estimated cost of providing an underground waste collection system at the San Fernando Gardens with 448 housing units is estimated to be \$1,371,494 (see table below). This estimated cost includes the purchase of a specialized truck with a lifting system, hook lift, and compactor, three underground containers, three above ground kiosks, and the associated shipping and delivery for these equipment. The estimate also includes the cost of developing the site that includes survey, permits, design plans and specifications, construction, and other miscellaneous project related expenses.

To accommodate the estimated amount of organics to be collected from 448 housing units, three underground units are proposed to be installed. The six-month pilot using above ground containers will help true up the number of underground units needed to service all of the San Fernando Gardens residents.



Description of Item	Quantity	Unit Price	Total
Assembled underground unit (4.5-cy)	3	\$20,000.00	\$60,000.00
Assembled above ground kiosk (3-cy)	3	\$3,000.00	\$9,000.00
CNG-truck (with crane, backup crane, compactor, and hook lift)	1	\$675,000.00	\$675,000.00
Subtotal Equipment			\$744,000.00
Shipping & Delivery			\$150,000.00
Tax (9.5%)			\$70,680.00
Estimating Contingency (15%)			\$111,600.00
<b>Total Equipment Cost</b>			<b>\$1,076,280.00</b>
Permits, design, & construction	1	\$213,923	\$213,923.08
Estimating Contingency (15%)			\$32,088.46
Subtotal Construction Cost			\$246,011.54
Construction Contingency (20%)			\$49,202.31
<b>Total Construction Cost</b>			<b>\$295,213.85</b>
Estimated Total Project Cost			<b>\$1,371,493.85</b>

Variable costs related to system operation and maintenance, collection service, and organics processing are not included in this report but can be provided, if requested.

It is worth noting that the specialized truck can be utilized in other location(s) as the program expands.

### Meeting With NORD Engineering

On July 11, 2023, the Director of International Trade and Investment in the Mayor's Office and the LASAN team held a virtual meeting with NORD Engineering, a renowned Italian waste management company, recognized throughout Europe for their transformation and preservation of popular tourist destinations by collecting garbage using their underground waste collection system. The purpose of the meeting was for LASAN to gain valuable insights into the NORD system's technological innovation, operational efficiency, and commitment to sustainability. The NORD team shared their groundbreaking collaboration with Municipia, Italy's largest integrated city software company, alongside a prominent Italian telecom company. Together, they have developed a first-of-its-kind system that incorporates stainless steel "smart bins" capable of notifying garbage trucks when they are full, while also serving as air quality monitors and 5G repeaters, offering Wi-Fi connectivity to nearby structures and passersby. NORD Engineering has expressed a strong interest in establishing a strategic partnership with Los Angeles to initiate a "Smart City" pilot project and has pledged to match the City's investment dollar for dollar.

Moreover, NORD Engineering has already experimented with their system using electric vehicles and would like to partner with an important international U.S. city that wants to move into a sustainable future. By also using only stainless steel for the bins and underground waste receptacles, NORD demonstrates their commitment to sustainability, completely eliminating the use of plastic.

Furthermore, to showcase their groundbreaking solution, NORD Engineering is scheduled to present at the prestigious Smart City Conference in Washington, DC on November 28-30, 2023. Their achievements have already garnered praise from the National Park Service that has expressed interest in incorporating the NORD system into their waste collection operations.

The NORD system has the potential to bridge the digital divide, offering Wi-Fi to enhance connectivity and promote inclusivity in urban areas.

## **Conclusion**

The City is mandated by the Council, Mayor, and the State to implement an organics collection program that diverts organic waste from landfills and addresses short-lived climate pollutants. The collection of organic waste through a modular underground system with an underground capacity of 4-5 cubic yards is valuable in areas where above ground space is limited and population density is higher. Activities or infrastructures that are difficult or environmentally undesirable to be installed above ground, can be relocated underground, releasing valuable surface space for other uses and enhancing urban living conditions. Furthermore, in geographical areas where ambient temperatures frequently exceed 100 degrees Fahrenheit, the underground system proves to be optimal because the temperature gradient between above ground and subsoil can reduce the rate of food waste decomposition between collection dates. Based on these considerations, LASAN recommends that the Council authorizes the implementation of an underground system for organics collection.