

out think the box

Preliminary I CBeS Dry Toilet Compost Processor Implementation Feasibility

Prepared for the Tue, 23 September 2025 Zoom Meeting Oakland, CA, USA

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Approved 26 June 2025 | City of Oakland iSupplier Number | 2016004153 |
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- 2010 | Tiny dwelling on wheels movement
- 2013 | Unable to pay high rents (laid off)
- 2014 | Laney College SMUD Tiny Dwelling Team
- Reveal and provide solutions others do not realize that stand the test of time



intro - there is a solution

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There are far too many citizens, just like me, requiring affordable housing in Oakland. While they wait 6-12-24-36-48 months for truly affordable housing, where are they to go for dignified access to sanitation and showers?

The Solution: An agile, adaptable, dignified, safe Container-Based eco-Sanitation (CBeS) Dry Compost Toilet Processor System

DEFINITION: Ecological sanitation (eco-san) - Safely close the loop between sanitation and agriculture.



intro - there is a solution

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Simple, clear reason #1 this is a good idea:

- Safe & Sanitary

Simple, clear reason #2 this is a good idea:

- Affordability & Scalability

Simple, clear reason #3 this is a good idea:

- Low environmental impact

While Oakland works on solving its housing crisis, start with Safe Car Parking supported by a CBeS Dry Compost Toilet System pilot model that could work for many other urban communities. Let's put Oakland on the map as a leader of this innovative effort!



CITY OF OAKLAND

intro - there is a solution

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A properly managed CBeS System:

- Safely decomposes humanure
- Safe & completely destroys pathogens
- Does not pollute the environment
- Takes stress off the municipality water infrastructure
- Conserves water & retains nutrients
- Free of odors & vermin
- Is low cost
- Carbon sequestration opportunity
- Revenue generating opportunity

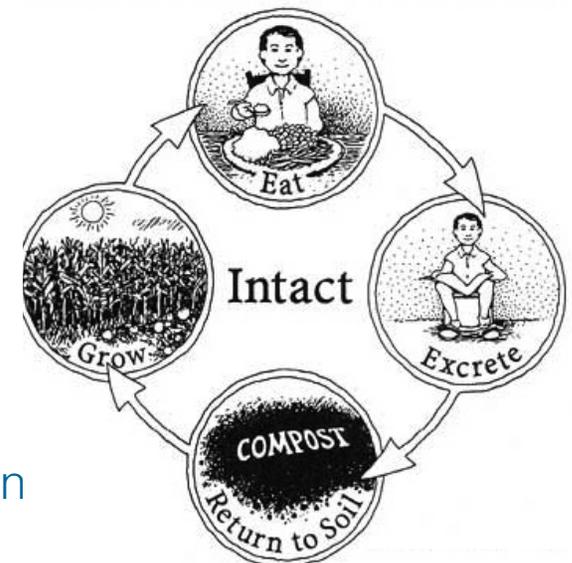


IMAGE: Jenkins, J., 1998. The Humanure Handbook, 2nd Edition
http://weblife.org/humanure/chapter2_1.html

problem definition

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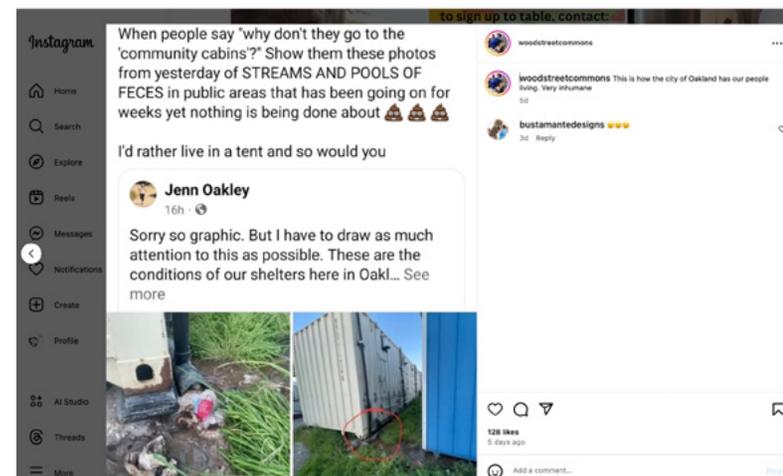
Too many curbside community inhabitants:

- Lack access to dignified, safe, accessible sanitation
- Choose open defecation
- Open defecation creates a human health issue for the curbside community, neighborhood and environment

PHOTO | 7 April 2025 Raw sewage discharge from the unserviced sanitation service containers at the Wood Street Community Cabins in W. Oakland.

REFERENCE:

<https://www.instagram.com/woodstreet-commons/>



Provide a training program so citizenry learn how to safely manage and process humanure.

Two options contingent on the physical site location and site geographical predisposition:

- **Option 1** - Single User System for a Tiny Dwelling on wheels sited on a tax defaulted lot
- **Option 2** - Safe Parking Car Lot for 50 Users (to start), eventually up to 100 Users e.g. Caltrans Lot Mandela Parkway between 32nd St -34th St in W. Oakland

project goals

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Option 1 & 2 will include:

- Joe Jenkins Loveable Loo[™] Toilets
- Thermophilic (Hot) Composting Processor Bins
- Potable water for hand washing
- Grey water management
- Stored water (gravity fed) filtered for drinking
- Atmospheric Water Generation (water offset)
- Regular testing for pathogens
- Data acquisition using IoT (payment solution)
 - Manage humanure load flow
 - Participants' toilet use and handwashing use frequency
 - Electricity use exceeding solar PV installation generation capacity

Thermophilic (Hot) humanure decomposition performance goals:

- Regulatory target of <0-200 coliform forming units/gram (cfu/g) fecal/faecal coliforms
 - This system exceeds US EPA Part 503 Biosolids Rule & ANSI/NSF* 41
- Reduce open defecation —> improve the health of the:
 - Safe parking curbside community
 - Adjacent host neighborhood
 - City
- Carbon resource recovery and utilization rubric

***DEFINITION** | ANSI/NSF - American National Standards Institute/National Sanitation Foundation

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Prospective Project Plans

- Single User Pilot
- Year One | 50-100 (tentative) Safe Car Parking
- See historical examples:
 - [2/2/2022 City of Oakland Notification of Qualification](#)
 - [Single-user Sanitary Compost System Feasibility Proposal](#)
 - [RFQ | Single Occupancy Tiny Dwelling Equipped w/Renewable Energy Systems Technologies, Eco-Sanitary Dry Compost Toilet System, Atmospheric Water Generator](#)

Pilots will adhere to 2023 Water Efficiency and Sanitation Standard for the Built Environment ([WE-Stand](#)) Chapter 6.

feasibility implementation

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Scope

- One-to-Three year project
 - Utilize salvaged construction materials
 - Pricing inventory for materials includes labor and reflects the cost of new materials (based on mid-2019 & late-2024 cost estimates)
- To start, service up to 50-100 inhabitants at a single site:
 - 18 toilet stalls (includes 2 ADA units)
 - 6 hand washing sinks
 - Up to 20 CBeS onsite processors

Big Sur, CA
Six person 2-bin ecosan processor



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Scope (cont'd)

- Determine financial viability - economic, technical and environmental cost benefits
 - CBeS compared to Conventional Waste Treatment (See next slide)
- Technical viability to effectively treat ETPA*
 - Effectiveness meeting performance goal of < 0-200 cfu/g
 - > completely destroy pathogens
 - Safely manage using aerobic decomposition
 - Meet or exceed US EPA Part 503 Biosolids Rule Class A
 - Meet or exceed NSF/ANSI 41 Water and Waste Water Standard

***DEFINITION** | ETPA - Excreta, Toilet Paper, Additive (AKA Carbon cover material)
DEFINITION | CBeS - Container-based ecoSanitation

feasibility implementation

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Scope (cont'd)

CBeS Toilet compared to Conventional Flush Toilet

Loveable Loo™ Toilet	Conventional Flush Toilet
Advantages	Advantages
Lower upfront costs	Simple 'flush and forget' operation
Few components to maintain, low maintenance	Low maintenance required
Water conservation	Installation simple and familiar
Nutrient recycling	
Off-grid and remote use	
Reduced waste	
No clogging since no plumbing	
Disadvantages	Disadvantages
Regular hands-on maintenance	High water consumption
Odor/Insects potential if improperly maintained	Reliance on infrastructure (sewer or septic systems connections needed for proper function)
Direct handling of humanure	Prone to clogging --> Costly repairs
Policy and regulation challenges	No nutrient recycling or resource recovery
	Environmental impact (contributes to burden and chemical use of sewage treatment plants)

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Guidelines & Regulations National Sanitation Foundation (NSF) recommends:

- Toilet seat & riser
- (In some cases) Removal when tank ~75% full
- Continuous ventilation
- Health endangerment avoidance
- US EPA Part 503 Biosolids Rule (extended to composting)



Deliverables

- Single User System
- 50-100 User System
- Both systems above:
 - CBeS Loveable Loo™ Toilets
 - Within Vessel Compost Processor Bins
 - Bin Volume to achieve thermophilic temperatures (131°F-140+°F)
 - Proposed Bin Volume 1.8m³ (4 ft x 4 ft x 4 ft) (Minimum 1m³)
 - Scale to service 100s-1,000s of inhabitants (Windrow access needed)
 - Thermophilic (Hot) Humanure Composting End product → Humus*



***DEFINITION** | Humus - Organic component of soil created by the decomposition of plant material by soil microorganisms

DEFINITION | CBeS - Container-based ecoSanitation

feasibility implementation

Budget - Year 1

CAPEX 5.46% OF \$18,324,702.87	\$1,000,528.78
Salaries (Collaborating Entities & Contractors)	
1st year Collaborating Entities	\$548,000
1st year Contractors	\$219,256.34
Training First Year (12 Technicians)	\$95,573.33
Labor Salaries	
8 Entry Level Technicians (FTE)	\$493,688
2 Supervisor Level (FTE)	\$137,339.80
2 Manager Level (FTE)	\$150,010
Other Wrap-around Support Service Staff	\$608,646.85
Subtotal 1st Year Expenditures	\$3,253,043.10

NB: Original budget determination was for a 3-year project with the aim of scaling to service ~5,490 curbside community inhabitants by year 3 based on Alameda County 2024 PIT Count.

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Manage, Execution, Monitor & Control

Year 1 | Milestone tasks completion schedule

Milestones (M#)	Timeframes & Duration
Task 1. Project Management and Reporting	Months 1 - 12
M1. Project work plan completed	Month 1
M2. Contracts for Collaborating Entities executed	Month 1
M3. Reports completed	Months 4, 8, 12
Task 2. Green(er) Workforce Training (Interview, Select, Train CBeS Ecosan Operators) and Engage Minority and Disadvantaged Business Enterprises	Months 1 - 12
M4 Contracts with 1-2 CBOs executed	Month 2
M5 Two Inaugural CBO CBS ecosan trainings completed	Month 7
M6 At least 6-12 Community trainees complete CBeS ecosan training per year (2-4 trainees/session)	4, 7, 10
M7 CBO Ecosan network meetings	Months 3, 6, 9, 12
Task 3. Engage Neighborhood & Community Stakeholders	Months 1 - 3, 12
M8 Plan, logistics, and updates shared with neighborhood community conducted	Month 1, 2, 3
M9 Annual community engagement activities completed	Month 12
M10 Neighborhood surveys conducted; data collected	Months 6, 11

***DEFINITION** | CBO - Community Based Organization

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Manage, Execution, Monitor & Control

Year 1 | Milestone tasks completion schedule (cont'd)

Task 4. Install, deploy and tune a geographical appropriate and Operate CBeS Ecosan Dry Compost Toilet System	Months 3 - 12
M11 Install and tune CBeS ecosan processor system	Months 3, 4
M12 Develop and tune web/mobile app to track usage load flows	Months 1-6, 9, 11
M13 Collect usage/load flow data, costs, expenditures, and end user survey feedback into a database/repository	Months 3-11
Task 5. Safe Parking Schema Implementation	Months 4 - 12
M14 Participants apply, interview, vetted, receive approval and orientation	Months 3-11
M15 Develop and tune web/mobile app to authenticate users, and track user arrival/departure traffic	Months 1-6, 11
M16 Participant surveys conducted; data collected and input into database/repository	Months 3-11
Task 6. Knowledge Transfer and Dissemination	Months 12
M17 Final report to Authority Having Jurisdiction (AHJ) completed	Month 12

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[MORE] Monitor & Control

- Track Progress (ongoing throughout project)
- Control changes
- Report to stakeholders
- Communications to share and replicate approach
 - Monitoring methods
 - Environmental impact
 - Community impact
 - System performance
 - Compliance
 - Project management includes outputs and outcomes

Data monitoring led by Bree Taylor, Chemist | Quality Assurance | Data Quality | Data Management | ISO 8000 Master Data Quality Manager (MDQM)

Project Schedule (TBD)

See Milestone tasks completion schedule {SLIDES 18 & 19}

Once funding is awarded, some tasks include:

- Obtaining permits and permissions
- Prepare approved site
 - Purchase work vehicle and tools
 - Police, manicure and prepare grounds
 - Repair/Install new fence and egresses & tune/install security systems & solar PV
 - Install compost processors and build toilets
 - Purchase monitoring equipment
 - Set up data acquisition systems
 - Shipping container delivery (storage for supplies, comfort perks e.g. picnic tables, canopies, bicycle racks, safety lighting, etc)
 - 3-4 month lead time for toilet & hand washing trailers delivery
 - Develop web site, implement onboarding, vetting process schema (knowledge transfer, monitoring, etc.)
- Train onsite technicians for 24/7/365 deployment
- Accept onsite car park lodgers

Identification of Resources

- Measure W Funds
- Donations & Crowdfunding
- Once Safe Car Park is online, invoke affordable "Pay to Use" income stream generation schema



Assess Risks

Once the pilot project is implemented and executed, contingencies include:

- Wrap-around services support (Housing referrals, etc.)
- Address scalability —> off-site windrows location
- Logistics of supply resource deliverables (int'l tariffs flux)
- Workforce training
- Community engagement
- Revenue generation to recover costs
-



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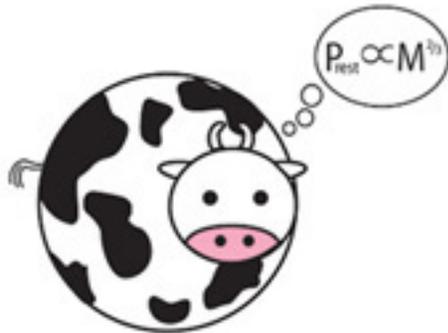
Closure

- Finalize deliverables
- Conduct post-project review



Submit your questions in the Zoom Chat

- Meeting is being recorded
- Questions & Responses will be captured & uploaded to
 - <https://ecosanoakland.blogspot.com>
- Blogspot is Invitation Only



[Ecosan Oakland Blogspot](https://ecosanoakland.blogspot.com)

Support needed to execute this project

- Transformative vs. Transactional approach
- Access to Alameda County Measure W funds
- Sites that meet design criteria to ensure success
- Updates to state & federal compliance policy:
 - Thermophilic decomposition of humanure needs to be added to US EPA Part 503 Biosolids Rule
 - Humanure treated by any process determined to be equivalent to a PRFP* by permitting authority and requirements in Table 5-2 are met i.e pathogen reduction for all Class A alternatives
 - See Table 5-4 pp. 125 US EPA Part 503 Biosolids Rule

***DEFINITION** | PRFP - Process to Further Reduce Pathogens

Stakeholder buy-in

- Not difficult at all to get people to use CBeS toilet
- Bigger challenge - training to safely manage humanure

Policy (Safety)

- Requires an Authority Having Jurisdiction (AHJ)
- Updated policy language needed
 - Humanure is in a **grey area** in US EPA Part 503 Biosolids Rule
 - Humanure is not municipal sewage or sludge
 - Municipalities, Environmental Health Departments, Waterboards are challenged to adopt until policy is updated

Disaster preparedness

- Knowledge transfer to citizenry - What will you do?

next steps?

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Out think the box.
Prepare. Respond. Adapt.

We want this project to go forward. How do we make this happen?

*People who compost humanure are recycling—
there is no waste in nature...*

