ARCADIS Design & Consultancy for natural and built assets

City of Mesa, Arizona

FOOD TO ENERGY CO-DIGESTION FEASIBILITY STUDY

Pre-Processing Facility Concept Memorandum

FINAL

September 2019

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ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway Transportation Officials
ACM	asbestos containing materials
ACP	asbestos cement pipe
ADCCM	Anaerobic Digestion Capabilities Concept Memorandum
ADEQ	Arizona Department of Environmental Quality
ADMS	Area Drainage Master Study
ADOT	Arizona Department of Transportation
amsl	above mean sea level
ASU	Arizona State University
bgs	below ground surface
BOD	biological oxygen demand
CAN	controller area network
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
City	City of Mesa
COD	chemical oxygen demand
FCDMC	Flood Control District of Maricopa County
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FO	fiber optic
FOG	fats, oils, and grease
gpd	gallons per day
gpm	gallons per minute
GUI	graphical user interface
HHMF	Household Hazardous Materials Facility
HMI	human machine interface
HSW	high strength waste
mm	millimetre
MS4	Municipal Separate Storm Sewer System
NWWRP	Northwest Water Reclamation Plant

ACRONYMS AND ABBREVIATIONS (CONTINUED)

PLC	programmable logic controller
ppmv	parts per million by volume
RIN	renewable identification number
RSL	regional screening level
SGHHSL	soil gas human health screening level
SRPMIC	Salt River Pima Maricopa Indian Community
SSO	source separated organics
St.	street
TGC	Tempe Grease Cooperative
TPD	tons per day
TPH	tons per hour
TS	total solids
$\mu g/m^3$	micrograms per cubic meter
UPS	uninterruptable power supply
USEPA	United States Environmental Protection Agency
VA	volatile acids
VCP	vitrified clay pipe
VI	vapor intrusion
VOC	volatile organic compound
VS	volatile solids

1 BACKGROUND

The City of Mesa (City) currently operates a natural gas utility, wastewater utility, and provides solid waste collection services. These areas of operation are partnering together on a food waste to energy program that may provide financial, environmental, and economic benefits to the City. Conceptually the program would utilize solid waste collection trucks to gather food waste, termed High Strength Waste (HSW), and deliver it to a future facility located at the City-owned Center St. Yard. The HSW would undergo pre-processing to meet requirements for anaerobic digestion in the existing digesters at the Northwest Water Reclamation Plant (NWWRP). Anaerobic digestion of the HSW would occur along with digestion of municipal wastewater sludge (co-digestion), or potentially used as the sole feedstock in one digester dedicated for HSW. Either digestion method will increase current biogas production.

The NWWRP was selected as the location for digestion of HSW due to the plant's:

- Proximity to the proposed pre-processing facility at Center St. Yard and,
- Excess digester organic solids loading capacity which is not anticipated to be used long-term for municipal wastewater sludge.

The biogas has a number of potential uses, all of which are beneficial to the City. These alternatives will be studied and evaluated as part of the overall Feasibility Study to be presented in a subsequent report. This Memorandum will focus on the conceptual siting, layout and configuration of the Pre-Processing Facility located at the Center St. Yard.

1.1 Selection of Center St. Yard Location

Center St. Yard was selected as the location for the HSW Pre-Processing Facility based on the following:

- City ownership of the parcel
- Central location that is also convenient to the NWWRP
- Sufficient distance from adjacent residences and businesses
- Available space to accommodate the building and HSW hauling ingress / egress
- Existing Solid Waste Department operations onsite

1.2 Property Description

The Center St. Yard is located at 2412 North Center Street, Mesa, Arizona and is listed by the Maricopa County Assessor as Parcel Number 136-16-001A. The Parcel is somewhat square in shape and encompasses an area of approximately 1.58 million square feet. The Parcel and is bounded on the north and west by the Salt River Pima Maricopa Indian Community (SRPMIC) and to the east and south by Center Street and West Lehi Road respectively (see also paragraph 1.4).

The Parcel is comprised of generally flat terrain at an average elevation of around 1225± feet above mean sea level (amsl) with a gentle slope from southeast to northwest towards the Salt River. The

northeast corner of the Parcel appears to have been filled with the exception of the northwest corner outside of the perimeter fence which is lower and partially filled.

1.3 Zoning and General Plan Designation

The City Zoning Ordinance designates the zoning of the parcel to be Public and Semi-Public. The Mesa 2040 General Plan assigns the property a Community Character type of "Specialty District". The Specialty District character type is typically assigned to large areas greater than 20 acres having a single use, as in this case municipal use. Specialty Districts by definition have impact to surrounding developments due to traffic generated and noise associated with onsite activities. The definition for Specialty Districts carries an expectation of high-quality building design and materials. Therefore, locating a Pre-Processing Facility at the Center St. Yard is consistent with current zoning and the 2040 Mesa General Plan.

1.4 Traffic Planning

The Mesa 2040 Transportation Plan indicates no future improvements are planned along Center Street or West Lehi Road in the vicinity of the Center St. Yard. Center Street in this area is designated as a 2-lane "collector". Collectors are defined as having low to moderate traffic volume intended to collect traffic from local properties and distribute it to the major through roads termed arterials or to freeways. East Lehi Road, which intersects Center St. south of Loop 202, is also designated as a collector. West Lehi Road on the south border of Center St. Yard is undesignated in the 2040 Plan.

These planning indications and street designations favor the hauling activities associated with a Pre-Processing Facility. Low traffic volumes in the vicinity of the Center St. Yard provides ease of site ingress/egress and decreases local noise concerns.

However, Center Street south of McKellips is planned for improvements under the "Complete Streets" program which accommodates all categories of transportation users (bicycles, pedestrians, mass transit, etc.). The Complete Streets categorization beginning south of McKellips indicates this may be a corridor to avoid and should be considered in determining the HSW haul route(s) to the NWWRP.

2 CURRENT SITE USES AND FUTURE DEVELOPMENT

2.1 Uses of Adjacent Property

Uses of properties adjacent to the Center St. Yard are shown in Table 2-1. Other property uses along West Lehi Road include materials yards, a Department of Public Service office, a Community Service Center, and various tire, trucking and vehicle repair locations.

Table 2-1 Center St. Yard – Adjacent Property Use

Adjacency	Owner	Adjacent Property Use
North	SRPMIC	Salt River, floodway and floodplain
South	ADOT	Right-of-way for West Lehi Rd. & Loop 202
East	Contractors Landfill & Mark's Valley Grading 2425 N. Center St. Contractors Landfill & Recycling 2555 N. Center St.	Business office & large vehicle maintenance shop Truck rental Accept & recycle demolished concrete & asphalt Sell various soil, rock & recycled fill materials
West	SRPMIC Bureau of Reclamation ADOT	Salt River Regulatory Floodway High risk flood Zone AE (100-year event floodplain) Mesa Road Maintenance

2.2 Center St. Yard

2.2.1 Current Uses

The Center St. Yard is currently a shared-use municipal facility. The northern portion of the site is used by the Mesa Police and Fire Departments for training and also includes the Police Firing Range as well as a vehicle impound yard. The southern portion of the site is used by multiple City departments for material storage and is the location of the City's new Household Hazardous Materials Facility (HHMF). General areas of the current site uses are shown on Figure 2-1.

Site uses in the northern areas of Center St. Yard are not expected to change and are not considered as potential areas for locating the Pre-Processing Facility. Southern site areas currently used for miscellaneous storage are flexible for change of use and are available for development.

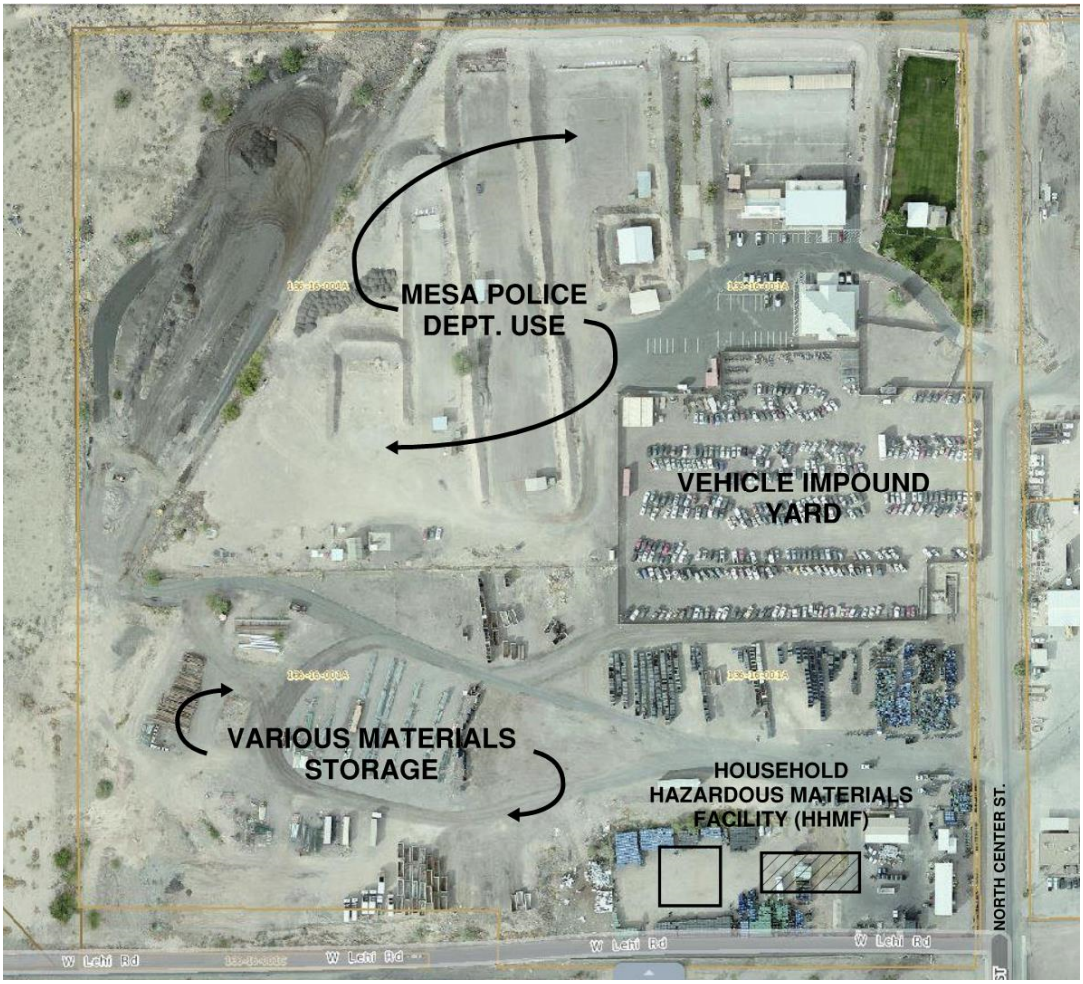


Figure 2-1. Center St. Yard - Current Uses

2.2.2 Future Planned Uses

The City's Solid Waste Division would like to add a Solid Waste Transfer Station to the Center St. Yard in addition to the food waste Pre-Processing Facility. Additionally, the City's Police Department has proposed locating an evidence storage facility in the area of the existing impound yard. In anticipation of these future uses at the site, the City has retained professional services of an architectural firm to develop a master plan for the Center St. Yard. Master plan site layout alternatives, shared with the City on March 6, 2019, were provided to Arcadis for review. In these alternative layouts, the Police evidence storage was shown to be directly east of the vehicle impound yard. Current and planned future uses of the southern site area were shown in the alternatives to be as follow.

- Storage areas for roll offs, dumpsters and trash cans
- Storage and training areas for the City's Transportation Department
- Solid waste Transfer Station
- Food waste Pre-Processing Facility

3 SITE CHARACTERISTICS

3.1 Geotechnical

The geotechnical characteristics of the Center St. Yard have been evaluated in the following two prior reports.

- Site Investigation Report, Center Street Landfill, City of Mesa, by SCS Engineers, June 2008 (SCS Report).
- Report on Geotechnical Investigation, City of Mesa – Household Hazardous Waste Center, by Speedie and Associates, October 2016 (Speedie Report). Several additional tests were performed through report addenda including:
    - Agronomic soils analysis, November 2016
    - Percolation testing, February 2017
    - Offsite pavement design (Center St.), February 2017
    - Corrosion testing, June 2017

Native soils at the site generally consist of sandy lean clay and clayey sand with subordinate amounts of gravel and cobble as would be expected in areas bordering the Salt River. In these studies, groundwater was not encountered determined not to be a factor for design of shallow foundations.

However, geotechnical challenges to the Center St. Yard identified through these studies are described in the following paragraphs.

3.1.1 SCS Report

This 2008 report investigated and evaluated the southern portion of the Center St. Yard, generally south of the police operations impound lot. This study was conducted in advance of proposed site redevelopment as a recreational baseball facility. The evaluation included a geophysical survey, excavation of soil test pits and advancing soil borings/soil vapor probe sampling to determine the location, depth, thickness and general nature of the landfilled materials. The following summarizes the findings and conclusions.

- Historic aerial photographs show that the Center St. Yard was an area previously used for agriculture, and more importantly, as a landfill. Landfill use began in the late 1940s and continued into the 1960s. The site is underlain by depths of waste varying from less than 2 feet to more than 20 feet. Soil cover over the top of the waste is also highly variable in depth ranging from 2 to over 15 feet in thickness. Wastes encountered included paper (newspaper), municipal solid waste or household trash, plastic bags and yard waste. Some carpet, glass, metal, concrete and brick were also encountered. While not specifically the focus of this investigation, no mention of asbestos containing material (ACM) or hazardous material identification or testing occurred.

- Soil vapor samples were collected at depths of 10 feet, 20 feet and 30 feet below ground surface (bgs) in three soil borings (B2/P1, B3/P2, and B5/P3) drilled during the site investigation program as shown on Figure 3-1 in Appendix A, taken from the SCS Report. Methane from decomposition of buried wastes was also identified during the site investigation program. Methane concentrations up to 30% were identified in the northwest portion of the site, which is consistent with the geophysical survey, test pitting and soil boring results as the area where the most significant volume of landfill waste was identified. At all locations monitored, the methane concentrations were reportedly higher in the shallower soils. Report recommendations were that enclosed structures where landfill gas could migrate and collect should be protected. Passive measures such as impermeable membranes and gas venting systems were stated as "probably adequate" given the low concentrations of methane at relatively low pressures. Sealing of electrical conduits and vented light poles were also suggested as mitigation measures.

Other aspects included in this report specific to site development on buried waste included the following:

- Experience at other landfills indicates a total average settlement of 6 to 24-inches.
- Differential settlement is likely based on variable waste thicknesses and distribution.
- Possible drainage issues and any increase in moisture content from irrigation, etc. can exacerbate settlement.
- Underground utilities may penetrate waste materials.

3.1.2 Speedie Report

This report investigated the specific area of the Center St. Yard identified for the City's Household Hazardous Materials Facility and provided geotechnical building design guidance and parameters. Of important note is that this specific area of the Center St. Yard was identified in the SCS Report as being undisturbed native land. Although the Speedie Report revealed aerial photos showing previous agricultural activity, this area was outside the extent of historic waste disposal. Therefore, the investigation findings and conclusions summarized below are considered to more accurately represent characteristics of native site materials.

- Field and laboratory testing indicate that the upper soils are of low density and capable of post-construction settlement. Accordingly, recommendations were made to over-excavate and re-compact a limited depth of the bearing soils to increase density and reduce the potential for collapse.
- Wetting of fine portions of upper clayey soils could result in swell. Recommendations to reduce - not eliminate - swell potential included placing 12-inches non-expansive material under building slabs and contiguous structures such as sidewalks.
- Positive drainage was recommended to keep water away at least 10 feet from the building to avoid wetting foundation soils. A list of recommendations was also included for keeping water from underlying soils from sources such as planters, roof drains, etc.
- For pavement, recommendations were made for subgrade preparation, frequent jointing and joint sealing to reduce - but not eliminate - the potential for slab movements (thus cracking) on the expansive native soils.

3.1.3 Arcadis Observations

Based on review of these geotechnical reports, Arcadis offers the following comments regarding geotechnical challenges at the Center St. Yard.

3.1.3.1 Geotechnical Considerations

The following are specific issues related to foundations for future structures and pavement.

- The low density of native soils is not ideal noting that the allowable soil bearing capacities recommended for design of the HHMF are relatively low even with over-excavation and re-compaction.
- Keeping water away from subsurface materials was emphasized in the 2016 Speedie Geotechnical Investigation and is a concern due to the presence of expansive clayey soils from 5 to 11 feet below grade. Surface water infiltration into soils is also of particular concern considering the proximity of buried waste materials. However, Arcadis noted that an unlined retention basin for the HHMF was sited west of the building towards potential areas of prior landfill.
- The prior areas of landfill are the greatest issue for site development. Additional investigation will need to be conducted for the specific site locations selected for the Pre-Processing Facility as well as for other planned site uses. Investigations should include additional subsurface investigations regarding potential remediation of buried trash in locations of permanent buildings as well as traffic areas under dynamic loads from frequent large vehicle traffic.

3.1.3.2 Landfill Gas

The United States Environmental Protection Agency (USEPA) together with the Arizona Department of Environmental Quality (ADEQ) have adopted the use of calculated soil gas human health screening levels (SGHHSLs) to evaluate the potential for vapor intrusion (VI) at sites within Arizona regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund). The VI evaluations are based on land use for residential or commercial/industrial exposure scenarios, respectively (USEPA Soil Gas Human Health Screening Levels [SGHHSLs] for Arizona Superfund Sites 2014). The calculated SGHHSLs are exposure-based soil vapor contaminant concentrations which may be left in place in the subsurface and still be protective of a resident or commercial/industrial user. The SGHHSLs are derived using the most recent (November 2018) USEPA regional screening level (RSL) lookup tables for indoor air exposures (both residential and commercial/industrial scenarios) divided by attenuation factors for the transfer of subsurface contaminants from soil vapor into indoor air space.

The soil vapor data from Table 2 of the 2008 SGS Engineers report were converted from parts per million by volume (ppmv) to micrograms per cubic meter ($\mu g/m^3$) for comparison to the USEPA indoor air RSLs and derivation of the SGHHSLs. Table 1 attached in Appendix A (revised with the SGHHSLs for the constituents) identifies that residual concentrations of five of the volatile organic compounds (VOCs) reported from the soil vapor laboratory analyses exceeded the residential use SGHHSLs (benzene, ethylbenzene, 1,4-dichlorobenzene, trichloroethene, and vinyl chloride) at one or more depths in each of the three soil boring/soil vapor probe locations. The commercial/industrial use SGHHSLs were exceeded

at locations shown on Figure 3-1 attached in Appendix A for the VOCs ethylbenzene at location B2/P1 at 20 feet bgs and 1,4-dichlorobenzene at location B2/P1 at 20 feet bgs and at B3/P2 at 10 feet bgs.

Based on the comparison of the soil vapor data with the USEPA SGHHSLs and the age of the data, it is unlikely that the residual soil vapor concentrations would prevent redevelopment of the site for the City's needs. However, because the commercial/industrial SGHHSL for 1,4-dichlorobenzene was exceeded at a depth of 10 feet bgs in soil boring/vapor probe location B3/P2, development of structures at that location (north central portion of the site) should be avoided unless the buried waste is successfully remediated. Based on the detection of methane and VOCs in subsurface soil vapor, it is recommended that additional soil vapor testing be completed to determine if the soil vapor concentrations have since attenuated or if other locations where development may occur contain elevated soil vapor constituents as a result of the historical landfilling operations. This testing, together with ACM and hazardous material screening, could be completed in conjunction with additional geotechnical testing to support new facility design efforts. ***This additional testing is recommended to better define limits and character of buried refuse and the extent of remedial work necessary for satisfactory implementation of the City's planned facilities***.

3.2 Flood Control and Stormwater Management

The Flood Control District of Maricopa County (FCDMC) is responsible for floodplain management and regulation for the City of Mesa. FCDMC is currently conducting the North Mesa Area Drainage Master Study (ADMS) which is a regional drainage study being conducted in the Mesa area north of US 60. The study encompasses the Center St. Yard within the northern boundary of the study at the Salt River.

The purpose of this study is to investigate and assess existing flooding problems including a comprehensive inventory of known flooding problems impacting the study area based on past flooding information provided by the City of Mesa as well as a review of previous drainage studies. A comprehensive hydrologic analysis will be conducted and will include current rainfall parameters and current land use conditions. This study will also review the status of previously recommended stormwater facilities, determine what has been built, and prioritize any facilities that may still be needed. FCDMC has broken the ADMS into geographical areas, or sub-watersheds, for focused analysis; however, the Center St. Yard is outside the northern limit of this detailed examination.

In 2014, the City of Mesa completed a Storm Water Management Plan that included all City owned and operated facilities in compliance with the 2010 MS4 permit. None of the City-owned facilities were determined to present a "high risk" to cause a substantial pollutant load to the City's storm sewer system or to waters of the United States.

A review of Federal Emergency Management Agency (FEMA) materials yielded the following aspects specific to the Center St. Yard.

- The parcel's north and west boundaries abut the FEMA high risk flood Zone AE (100-year event floodplain). The Zone AE designation is a result of the Salt River Regulatory Floodway as shown in Figure 3-2 below.

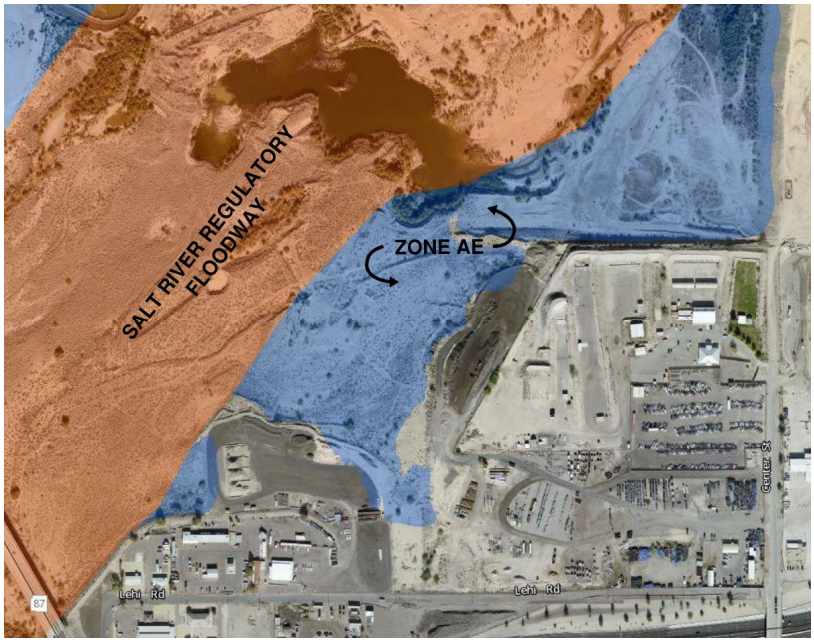


Figure 3-2. Flood Zone AE at Center St. Yard

- All but the northwest corner of the Center St. Yard parcel is designated Zone X on the FEMA Flood Insurance Rate Map (FIRM), attached as Appendix B. Zone X areas are protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
- The FIRM indicates the flood elevation in Zone AE at the location of the Center St. Yard is 1213.01 feet for a 100-year storm event. This flood elevation is 12 feet lower than the average elevation across Center St. Yard and is 5+ feet lower than the fill area on the northwest corner.

Although FEMA information currently indicates the Center St. Yard as having a low flood risk, subsurface moisture from a long duration event could impact buried waste materials on the western areas of the site.

Onsite stormwater is currently uncontrolled with the exception of the unlined stormwater retention basin on the west side of the HHMF. Depending on the location of new site development, the siting of this retention basin should be reviewed regarding subsurface moisture impacts to potential adjacent development or unidentified buried waste nearby.

Based on the recommendations from the previous geotechnical reports, any new site development should include infrastructure to quickly capture stormwater runoff and convey it to an isolated retention. All onsite stormwater facilities should follow the Uniform Drainage Policies and Standards for Maricopa County as published by the FCDMC as modified by the City of Mesa Engineering and Design Standards.

3.3 Environmental Considerations

3.3.1 Noise

The Mesa City Code has a noise ordinance that addresses offensive, excessive and prohibited noises. Although the "activities or operations of governmental units or agencies" are exempted by in this ordinance, overall good neighbor policy should be followed for a Pre-Processing Facility at the Center St. Yard. Approaches for noise control can include favorable orientation of the building, locating offloading activities in a building or similarly enclosed area, use of exterior security barriers to also serve as sound walls.

Center St. Yard is considered sufficiently distant from surrounding neighborhoods and commercial properties for noise to become a primary concern. Loop 202 also provides a barrier for noise from areas to the south. However, Pre-Processing facility layout and design should still consider the other site uses at the Center St. Yard including classroom and training activities by Police and Fire Departments. Truck ingress/egress, loading and unloading, and pre-processing activities should be located and configured for noise abatement.

3.3.2 Odor

Handling and processing of HSW will create offensive odors. Odors may be characteristic to the particular types of food waste being delivered and processed. As some odors tend to travel, positioning the building on the site and locating building access openings will be oriented to consider prevailing wind direction (See Section 5).

Systems for controlling odors from and within the building will be required in the Pre-Processing facility design. Multiple systems will be required for mitigating fugitive odors associated with delivery and HSW hauling operations as well as for controlling odors in the workspace. Odor control systems to be employed will be a combination of the following based on building area.

- Ventilation systems sized for multiple air changes per hour.
- Odor abatement system (scrubber, biofilter, etc.).
- Air curtains.
- Polyvinylchloride (PVC) strip curtains.

In addition, the process and HSW materials will be isolated as much as possible with covers and enclosed in piping and storage tanks.

3.3.3 Vector control

Facilities like the Pre-Processing Facility can attract vectors including insects, birds, rodents, etc. Therefore, the majority of facility components will be located in the building interior. Vents will be provided with mesh screens. Washdown systems will be provided including potable water supply, hose bib connections, trench drains, etc. to provide convenient means of clean up. System capacity will

consider frequent wash down. Wash down water collected will also be processed as needed for particulates and oil/grease.

3.4 Site Ingress / Egress

Proposed uses of the Center St. Yard as well as uses of adjacent properties require careful consideration of ingress / egress due to the variety of traffic types, vehicle limitations and safety considerations as described below.

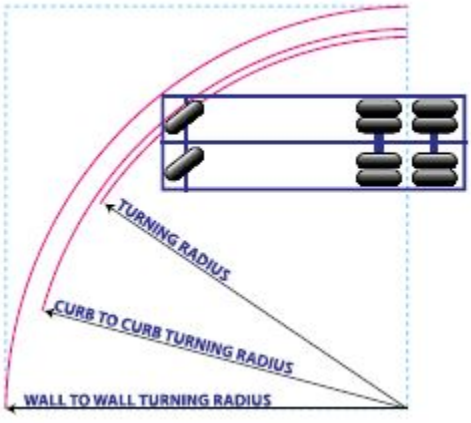
3.4.1 Traffic Types

Traffic types accessing the various activities at Center St. Yard as well as the private businesses directly to the east result in a mix of private and commercial vehicles accessing Center Street north of the 202 Loop. Traffic will consist of personal automobiles and trucks, impounded vehicle hauling, light and heavy-duty commercial vehicles (including solid waste fleet vehicles) and tractor trailer commercial haulers. Many of the vehicles are related to Police and Fire Department activities at Center St. Yard and aerial photos indicate that as many as 200 to 300 vehicles may be in the impound yard at a given time. There will also be personal vehicle traffic associated with the City's HHMF. HHMF staff indicate that as many as 60-70 vehicles per day access the HHMF for drop off. The wide variety of traffic types will dictate that improvements need to be made to N. Center Street as well as W. Lehi Road as required for ingress / egress to the Pre-Processing Facility for traffic flow and safety considerations.

3.4.2 Solid Waste Fleet Vehicles

The City indicates HSW source materials will be collected with existing solid waste fleet vehicles. Based on planned future uses, any of the solid waste fleet vehicles may come to Center St. Yard. Current solid waste fleet vehicles include automated side loaders, front loaders, roll-off trucks, and rear loaders. Important ingress / egress aspects for these vehicle types are detailed as follow.

- Turning radius: Access roads, drives and entries must allow for a geometrically large enough path in which the vehicle can comfortably navigate a turn, called the turning radius requirement. A typical turning radius for a front loader truck for a 90-degree turn is approximately 47 feet for the outside wheel, while a roll-off truck requires 65 feet.
- Unloading / Loading: Backing up solid waste vehicles is difficult and dangerous. There are many driver blind spots and areas of poor visibility. Configuring unloading and loading such that trucks can move forward rather than backwards is preferable. If backing is required, 50 feet should be allowed and should be a straight line.



- Queuing: Weighing, unloading and loading activities require adequate time to be executed safely. Therefore, space should be provided for queuing vehicles once on site. Queuing space requirements can be determined based on haul routes and times.

- Weight: Solid waste vehicles are heavy and heavier when loaded. Concrete pads should be designed to withstand single axle loadings of 20,000 pounds. Access roads should be designed to accommodate

3.4.3 Safety

As discussed above, North Center Street will have a variety of traffic and may be heavy at certain times based on activities of Police and Fire. Truck traffic from the adjacent commercial businesses and other planned solid waste uses for Center St. Yard will increase large truck traffic. For traffic safety, the posted speed limit north of Loop 202 is suitable as 25 miles per hour. Other considerations for traffic safety may include:

- Truck traffic caution signage on Center Street and Lehi Road.
- Additional speed limit signs.
- Permanent speed limit and cross-traffic warning signs on Lehi Road. (currently Lehi Road has no posted speed limit since it is not classified as a public roadway.)
- Turning lanes for Center St. Yard ingress / egress (Center Street right-of-way is 40-feet each side of centerline).

Since Center Street south of McKellips is planned for improvements under the “Complete Streets” program, “Local Traffic Only” signage could be considered for the north side of McKellips.

Site safety considerations should include:

- Onsite speed limit signage.
- Clear directional signage and designated parking areas.
- Wide access roadways and large paved areas for operations.
- Bollards and other protective barriers for building components and utilities.
- Effective stormwater control.
- Fire protection systems.

Personnel safety and operating requirements will be consistent with City of Mesa Solid Waste Department requirements for solid waste operations staff.

3.5 Utilities

The existing main utility lines serving Center St. Yard are located in Center Street as follow.

- Water. An existing 6-inch asbestos cement pipe (ACP) waterline is in Center Street but is skewed to the roadway centerline. At the Center St. Yard entry drive, record drawings for the HHMF show it 11.2-feet west of centerline. Connections to this line were made for a 2-inch service to the HHMF just north of West Lehi Road and for an 8-inch service into the site south of the entry drive. This 8-inch line was then tapped for the 6-inch HHMF fire line.

- Sewer. An 8-inch vitrified clay pipe (VCP) gravity sanitary sewer is located 23-ft west of the Center Street centerline. A 4-inch service from this line to the HHMF was installed at the Center St. Yard entry drive to the back of the HHMF building.
- Power. Overhead power is located along the south side of West Lehi Road 20.6-ft from the Center St. Yard property line and on the east side of Center Street, 34.2-ft from centerline. Power is provided by Salt River Project. The City of Mesa provides gas service to the vicinity with a 2-inch gas line just east of Center Street centerline.
- Communications. Two fiber optic (FO) communications lines are located on the west side of Center Street. A Century Link FO line is located 36.3-ft west of centerline and a City of Mesa FO line is 29-ft west. The Century Line FO also runs along the south side of West Lehi Road about 36.8-ft south of the Center St. Yard property line.

There is also an abandoned water line just west of the eastern Center St. Yard property line, as well as an 8-inch abandoned sewer on the west side of Center Street that may have been the site service prior to construction of Loop 202.

3.6 Setbacks

With a 2040 General Plan Community Character designation as a Specialty District, property line setbacks for the Pre-Processing Facility will not likely be a controlling factor. In addition, adequate clearances for safe vehicle operation and clear sight distances will likely be the aspects controlling the building location and position on the site relative to the property line and other functional areas. For example, vehicle egress from the site will require that buildings and building appurtenances are positioned far enough back from the property line to allow clear driver sight distance in both directions.

4 HIGH STRENGTH WASTE DELIVERY

4.1 Waste Characteristics

4.1.1 Food Waste

Food waste characteristic guidelines are being established for the generators by the City in the collection contracts. The City has also documenting what is received and providing feedback to generators to minimize contamination. Contamination reminders are also posted on the front of the collection containers at each generator location.

Currently, food waste is being collected in 35-gallon containers and transported to the Pre-Processing Facility with existing solid waste fleet vehicles. Pickups are currently scheduled at twice per week. Based on current operating experience with the City's pilot processing apparatus, food waste throughput in the process has the following characteristics as analyzed by ASU.

- Food waste collected: Content includes dairy, meat, bakery, and deli waste; mixed fruits and vegetables; canned goods; and cafeteria waste. Mix of waste is likely 30% total solids.
- Food waste after processing: Slurried to 15% solids.
- Pilot reactor loading and expectation for slurry for digester loading: 12% solids.

For full scale operation, the City would like to keep the collection hauling and slurry transport as dry as possible. Addition of dilution water is expected to occur at the NWWRP using waste activated sludge or reclaimed plant water. Dilution of food waste may be accomplished to some extent using fats, oils and grease (FOG), depending on the volume and characteristics of FOG available.

4.1.2 FOG

FOG will be sourced from the City of Tempe's Grease Cooperative (TGC), the partnership between Tempe and restaurants to better manage this waste material. FOG is collected by grease trap pumpers picking up grease traps and yellow grease under contract to Tempe. Based on current analysis by ASU, FOG has a moisture content of 83% and particle size in the 1-2 millimeter (mm) range. Septage or mixed loads of FOG and septage should be precluded from delivery as a contractual requirement.

4.2 Transport to the Pre-Processing Facility

As indicated above, collected food waste will be transported to the Pre-Processing Facility with the City's existing solid waste vehicles. Although currently collected in 35-gallon containers, as the Food Waste to Energy program advances, food waste will be collected similar to household refuse in solid waste vehicles or in roll off dumpsters. However, food waste may also be collected and transported in:

- milk crates for expired liquid wastes, and
- totes from food preparation generators (i.e. 64-gallon barrels, 2 and 3-yard plastic bins)

Therefore, the Pre-Processing Facility must be configured for deliveries from a potential variety of transport container types. Transport is anticipated to be primarily with side loader or front load trucks, so food waste will be dumped from the rear of the truck. Roll off transports will also need to be accommodated.

FOG may be transported to the site directly by the Tempe grease trap pumpers as a contractual requirement. Therefore, grease trap pumping trucks will also be managed on site.

4.3 Unloading

Basic component areas to be included in the Pre-Processing Facility for unloading operations include the following.

4.3.1 Site Access

Site ingress and egress for food waste transport is proposed to be from North Center Street. Although egress onto West Lehi Road would be favorable for direction of traffic flow, the travel direction and volume of traffic associated with the HHMF could present safety concerns if solid waste vehicles were exiting the site in the same traffic lane. Onsite ingress and egress will be paved and designed for American Association of State Highway Transportation Officials (AASHTO) H20 loading consisting of an axle loading of 32,000 pounds.

4.3.2 Queuing

Although high volume traffic for food waste is not expected, arrival times of trucks for unloading may vary. Additionally, Tempe grease trap pumpers will be arriving to unload as well as other occasional arrivals from third-party transport. Once through the gate, transport vehicles will enter a queuing area to await weigh-in. The queuing area will provide:

- distribution of trucks into lanes for holding up to 20% of the average volume of truck traffic on site,
- control of trucks prior to weigh-in and/or unloading, and
- a temporary place to park for driver's use of restroom facilities.

Since the City is also planning a solid waste transfer station at the Center St. Yard, this queuing area can be configured to serve both facilities.

4.3.3 Truck Scales

Truck scales will be provided to establish the weight of food waste delivered. Truck scales will be a pitless type with shallow setting depth which is gained through ramping pavement to and from the scales as shown on Figure 4-1. Trucks will drive on the scale before entering the Pre-Processing facility for unloading and then weigh again prior to exiting the site. As with the queuing area, the scale system can also support the proposed future solid waste transfer station. Scale systems come with data management software and the digital logging system will tabulate load weight as indicated in Section 7.

Figure 4-1 Pitless Truck Scale

4.3.4 Unloading

Following weigh-in, trucks will proceed to for unloading at the Pre-Processing Facility. A detailed discussion of the unloading area and the Pre-Processing Facility appears in Section 5. Unloading capabilities at the Pre-Processing Facility will include the following.

- Truck bays for rear dump vehicles.
- An outside area for offloading materials with a forklift.
- An area for offloading FOG from septage trucks.
- Area for problem or rejected materials.
- Area for cleaning out trucks.

4.3.5 Storage

Various types / areas of storage are necessary to provide the process interface between the cyclical unloading operation and the HSW processing as follows.

- Feedstock storage. Facility floor space will be needed for materials that may be delivered in transport other than normal collection means. Industry experience indicates that materials may be received (or collected) in containers such as crates or totes that are offloaded by forklift and need to be stored temporarily prior to processing. Roll off dumpsters may also be stored prior to emptying.
- Reject materials storage. Facility floor space will be needed for temporary storage of reject materials prior to haul off. In addition, space may be needed for an occasional reject load if unacceptable contamination is encountered.
- FOG deliveries. The HSW processing concept is to have FOG delivered to the Pre-Processing Facility for use in dilution of food waste to produce a slurry of around 15% solids content. This strategy allows septage drivers to transport to location designed for accessibility and offloading. This also allows the City to accept Mesa FOG in the future.

- Water Storage. Standby dilution water will be needed for instances where FOG is not available or in insufficient volume for processing to the desired solids content. More discussion of storage appears in Sections 5 and 6.

4.4 Loading

Once processing is complete, tank trunks will be loaded with the HSW for transport to the NWWRP. The Pre-Processing Facility will include a loading area where the transport vehicles will pull up and load the HSW. This area will include HSW holding tanks and transfer pumps.

4.5 Transport to NWWRP

Tank trucks will transport the HSW to the NWWRP where it will be offloaded for feeding into the digesters. Options for offloading at the plant are described in the Anaerobic Digestion Capabilities Concept Memorandum. Tank trucks will likely be between 2,500 and 5,000 gallons capacity, typical of septage hauling trucks, and equipped with appurtenances for frequent cleanout.

5 PRE-PROCESSING FACILITY OVERVIEW

General requirements and conceptual Pre-Processing Facility and ancillary facilities to be located at Center St. Yard are described in the following paragraphs and are illustrated in a concept layout on Figure 5-1 attached in Appendix E.

5.1 General

5.1.1 Governing Codes and Standards

The Pre-Processing Facility and supporting systems will be governed by 2018 International Code Council (ICC) "family" of codes and the 2017 National Electric Code produced by the National Fire Protection Association. The 2018 Codes will be in effect February 10, 2019. Specific codes governing the Pre-Processing Facility include the following as amended by City of Mesa.

- 2018 International Building Code (IBC)
- 2018 International Energy Conservation Code (IECC)
- 2018 International Fire Code (IFC)
- 2018 International Mechanical Code (IMC)
- 2018 International Plumbing Code (IPC)
- 2017 National Electrical Code (NEC)

Additional standards that apply to facility and supporting infrastructure design include:

- 2018 Life Safety Code, National Fire Protection Association (NFPA) 101
- 2018 Standard for Electrical Safety in the Workplace NFPA 70E
- Maricopa Association of Governments (MAG) Standard Specifications for Public Works Construction
- 2017 Mesa Amendments to MAG Standard Specifications
- 2017 Mesa Standard Details
- 2017 City of Mesa Engineering & Design Standards

5.1.2 Initial Requirements and Future Expansion

Pre-Processing Facility layout and equipment will consider the initial target of collecting and processing 20 tons of HSW feedstock per day and considering processing up to 50 tons per day. However, processing equipment selected may accommodate a greater daily volume than initially required since equipment manufacturers offer a limited size range for these types of machines. Details of equipment selection and sizing is covered in Section 6.

Because processing of HSW feedstock is based on collection frequency, the volume to be processed is more directly related to processing equipment size rather than building size. Accommodating future

processing needs is best accomplished by providing adequate space for future equipment upsizing or duplicating. Future needs are being evaluated based on available digester capacity under a separate memorandum. The recommendation is to provide adequate space for future processing upsizing and related additional equipment.

5.2 Architecture

As noted in Section 1, the Center St. Yard has been assigned a Community Character type of "Specialty District" by the Mesa 2040 General Plan. The definition for Specialty Districts carries an expectation of high-quality building design and materials. Although the Pre-Processing Facility will be an industrial use, it will be the first facility of this type in Arizona, so public interest and visitation are likely. Therefore, the architectural concept and character will be similar to the HHMF and meet the expectation set forth in the 2040 General Plan.

The building superstructure is anticipated to be either a pre-engineered rigid frame type metal building anchored on concrete foundation walls or a combination of masonry block and steel construction similar to the HHMF. Wall and roof panel coatings and colors can be selected to match or compliment the HHMF, depending on how the Pre-Processing Facility is positioned on the site. The operating areas of the building interior will be unfinished but will be insulated. Finished areas will include operator offices, break room, laboratory, locker and restroom facilities. Storage and loading areas will be covered, but not enclosed by permanent walls.

Unloading, loading and food waste processing areas will be robust cast-in-place concrete components designed for heavy vehicles and equipment and the impact loads associated with unloading and processing activities.

5.3 Site Orientation

As illustrated in Figure 5-1, the Pre-Processing Facility will be oriented on site to:

- Avoid areas that are the most compromised by historic landfill activities.
- Work in combination with the City's planned Solid Waste Transfer Station regarding layout and traffic management.
- Avoid crossing traffic patterns.
- Allow a minimum truck turning radius 5 feet greater than the published minimum radius for the solid waste fleet vehicle.
- Have vehicle backing only occur inside the buildings for unloading.
- Minimize the impact of the prevailing east - west wind directions to manage odor travel.

5.4 Configuration

The Pre-Processing Facility building will consist of a single-level with a stepped lower area for food waste receiving and processing. Other building area separations will be based on operating function. Separating building areas based on function will benefit facility safety, minimizing conflicts between

moving vehicles and operations staff. The building will consist of five areas as described below and shown on Figure 5-2 attached in Appendix E.

- Unloading area. The unloading area receives the solid waste vehicles and provides unrestricted space for backing up and unloading.
- Processing area. The processing area function includes food waste receiving and pre-processing waste for transport and further dilution prior to loading into the NWWRP digesters. This area provides space for receiving the dumped food waste and provides unrestricted space for managing and loading the pre-processing equipment with a front-end loader. The processing space will be sized to accommodate operation and maintenance of pre-processing equipment, storage and removal of de-packaging refuse material, and will allow for future expansion.
- Operations area. The operations area will be adjacent to the pre-processing area and include an operations office, slurry product analysis operations laboratory, staff breakroom, staff locker rooms, and restroom facilities.
- HSW loading area. The HSW loading area includes tankage for storing processed HSW and infrastructure for connection and pumping to the HSW transport truck. This area will be sized to accommodate operation and maintenance of the HSW transport activities.
- Storage area. The storage area will provide space for temporarily storing materials dropped off in vehicles other than the usual solid waste transports, as well as additional temporary storage for de-packaging refuse. This area will also accommodate the FOG receiving and storage infrastructure and dilution water tank with unloading station.

5.5 Dimensions

The building superstructure is estimated to have the following conceptual dimensions. These dimensions may change based on preferred process equipment layout and vendor input. The dimensions shown below include the HSW loading storage areas which will be covered but proposed as otherwise open.

Overall width	150’-0”
Overall length	150’-0”
Eave height	35’-0”

The building foundation walls are recommended to extend minimum 4-feet above grade, monolithic with the below grade foundation walls for protection of the superstructure from truck traffic and for housekeeping washdown considerations.

Approximate conceptual dimensions for the building areas under roof are estimated to be as follow.

Unloading area	90’-0” x 70’-0”
Processing area	130’-0” x 40’-0”
Operations area	40’-0” x 70’-0”
HSW loading area	130’-0” x 20’-0”

Storage area	130’-0” x 40’-0”

5.6 Features

The following features will be incorporated into the Pre-Processing building design. Materials of for the purposes of this Concept Memorandum are assumed to be cast-in-place concrete floor and stem walls covered by a steel building superstructure. Materials of construction for equipment appear in Section 6.

5.6.1 Unloading Area

The building entry and unloading area will accept the solid waste fleet vehicles intended to be used for food waste pickup including front loaders, side and rear loaders which are envisioned to be the typical transport vehicles. Roll-off vehicles may potentially be accepted on the unloading floor. The ceiling clearance will accommodate the maximum tipping height of 36 feet and unloading floor should be designed to accommodate the Federal Bridge Law gross weight limit of 80,000 pounds. Signalization and cameras will be placed at the facility access points to control truck entry into the unloading floor.

The unloading area will have concrete stem walls for protecting the superstructure from impact in addition to bollards. Concrete stem walls also provide stray materials containment and aid washdown.

The unloading area will be configured for trucks to back in and unload into a lowered floor bunker area on the processing floor. This configuration keeps the food waste off of the unloading floor and out of truck traffic where it can be tracked around, complicating clean-up and attracting vectors.

Building doors will be arranged to minimize or eliminate cross traffic. A low barrier concrete wall will serve as a wheel block to keep trucks from backing into the waste receiving area. Additional features will be signals for directing truck entry / exit and rolling doors for securing the facility when not in use. With the rolling doors open, air curtains will be used for isolating the building volume from outer atmosphere.

5.6.2 Processing Area

The processing area will accept food waste dumped from the solid waste vehicles in a lower floor bunker area approximately 4’-0” to 5’-0” below the tipping floor. An articulating wheel loader will be used to manage the dumped materials and load it from the dump area into the first component of the process equipment which is the de-packaging machine. Like the unloading area, the processing area will have concrete stem walls and floor to accommodate materials loading as well as an exterior door for the articulating wheel loader, processing equipment access, and processing waste collection and disposal.

The processing area will house the following components for pre-processing of food waste for storage, loading and transport to the NWWRP. A food waste pre-processing flow diagram is presented in Figure 6-1 in Section 6.

- De-packaging machine
- Secondary Screen
- Product transfer tank and pumping systems

Features of the processing area will include dumpster areas for collection of pre-processing packaging waste and other processing contaminants configured adjacent to the pre-processing equipment.

Odor control and mitigation of vehicle exhausts for the processing area will be achieved with ventilation system(s) providing at least 12 air changes per hour, conceptually discharging through a biofilter for odor treatment. Exterior access to this area may be closed during operations and equipped with an air dam when open.

Other features of the processing area will include service water and trench drains to expedite washdown of unloading bunker, floor and equipment. Pre-processing equipment will be mounted on concrete equipment pads for anchoring and housekeeping considerations. Other than local control panels, power service and supervisory control systems will be located in the operations area. Storage for processed HSW will be located in the loading area.

5.6.3 Operations Area

The operations area will be on the level of the loading floor and above the processing area. As previously indicated, this area will include the operations office, slurry product analysis operations laboratory, staff breakroom, staff locker room, and restroom facilities. The laboratory will be equipped to perform slurry product analysis for the following:

- COD (daily)
- BOD (daily)
- %TS (daily)
- VS (daily)
- pH (weekly)
- Alkalinity (4/week) – ideal VA/Alkalinity ratio of less than 0.4 ensures correct conditions for proper digester operation
- Volatile Acids (2/week)

The operations office will have windows around the room's perimeter to view the pre-processing equipment as well as the unloading area. The elevated aspect over the processing area provides enhanced operator visibility of the pre-processing equipment, as well as a location for electrical room and control systems away from the areas of frequent washdown at the unloading bunker and in the processing area. This area will be climate controlled and will provide overall facility control including:

- Pre-Processing Facility traffic control
- Building lights and alarms
- Truck scale monitoring and reporting
- Remote pre-processing equipment monitoring, control and alarms
- Storage tank level sensing and alarms
- Valve position indicators and controls
- Rolling doors
- HVAC
- Odor control

5.6.4 HSW Loading Area

The HSW loading area will be on a covered and shaded location on the building exterior. Sun screening and area cooling may also be provided for use in the summer to mitigate fermentation during storage, depending on elapsed time between production and hauling. This area will feature the HSW holding tank(s) and containment and the pumping system and controls for loading the HSW transport truck. The holding tank(s) will have external level indication visible for truck loading. This area will include a truck loading pad, with capabilities for spill control and washdown. Ancillary control features for site traffic safety will be included since HSW transport truck egress may intersect with solid waste vehicle egress.

5.6.5 Storage Area

The storage area will a covered and shaded location on the building exterior. Features will include a concrete deck for forklift operation and adequate area for:

- Holding bulk contaminants removed from the pre-processing operation prior to pick up.
- Space for temporarily holding food waste materials that may be dropped off in bulk from vehicles other than solid waste collection trucks or in roll off dumpsters.
- Tank, auxiliary heating system, spill containment, and pumping equipment for FOG receiving and injection in HSW processing. The size of the FOG tank will be determined based on projected available volume of suitable quality material. This tank and the conveyance into the HSW process may be heat traced as required to avoid congealing and reduce viscosity for conveying FOG into the process.
- Tank and pumping system for unloading and storing pre-processing dilution water. This water can also be used for washing process machines and floor washdown. Based on anticipated water use, the dilution water tank is anticipated require a volume of around 30,000 gallons.

An additional feature of the storage area will be a climate-controlled restroom for truck drivers easily accessible from the truck queuing area. This location will discourage facility use during weigh-in or unloading activities or use of operator's facilities.

5.7 Ancillary Facilities

5.7.1 Reject Load Disposal

Should a food waste load be received that must be rejected due to discovery of significant contamination with undesirable materials (i.e. glass, construction waste, etc.) space will be provided to temporarily hold the rejected load in the storage area. This reject area will be located on the concrete area pad, accessible by front end loader or roll-off container and truck.

5.7.2 Washdown and Runoff Control

Gutters and drains will be provided for capture and control of area washdown water. Certain drains maybe connected to the facility sanitary sewer. Other washdown which may contain oils or disinfectants may need to be collected and treated prior to release.

6 PRE-PROCESSING FACILITY EQUIPMENT

This section presents the pre-processing treatment train following the handling path of the food waste from initial delivery to the Pre-Processing Facility through production of the HSW product for transport to NWWRP. Descriptions of equipment, sizing requirements and recommendations of specific pre-processing equipment are provided herein.

6.1 Equipment Sizing

Sizing of food waste processing equipment is based on several factors as described below. Of important note is that equipment size offerings in the industry is currently very broad. For example, one vendor's de-packaging machines only come in the three sizes of small, medium and large. Consequently, system-specific processing requirements are developed first, followed by comparisons of these requirements to vendor equipment size offerings. The following factors were used to identify the specific processing requirements for the City's proposed concept.

6.1.1 Digester Capability

The two anaerobic digesters at NWWRP have excess organic solids loading capacity and therefore system-specific equipment sizing can be identified by working backward from the excess digester capacity available. A separate Anaerobic Digestion Capabilities Concept Memorandum (ADCCM) developed by Arcadis examined potential limiting factors to the amount of HSW that can be loaded to the NWWRP digesters. This analysis identified the following factors that influence the choice of processing equipment sizes.

6.1.1.1 Maximum Organic Loading

From the ADCCM, the maximum mass fraction of total organic load to the digesters that can be comprised of HSW as compared to the mass of sludge processed at the NWWRP is a limiting factor to avoid digester overloading. For the NWWRP, the maximum mass fraction of HSW is 35% (reference ADCCM). This is considered a safe and conservative organic load target for minimal disruption to normal digester operations. Although this limit is identified for the NWWRP, there is industry evidence that the HSW loading to the digesters could possibly be increased because there are known installations operating with greater than 50% mass fraction from imported HSW. Therefore, prudent sizing of the food waste processing equipment should recognize this potential maximum capacity to avoid limiting the food waste to energy system. This does not mean that NWWRP needs to accept the maximum amount of food waste, but it is recommended that the food waste processing system be sized to provide the greater amount of HSW if desired in the future.

6.1.1.2 Digester Operations

Another factor in selecting processing equipment size is whether one or both digesters will be receiving HSW loads. While the economic viability of this decision is highly dependent on projected future renewable identification number (RIN) pricing structures, it is considered prudent to design for the condition that both digesters will receive HSW to provide for maximum flexibility.

6.1.1.3 Material Total Solids

Another parameter governing size of the food waste processing equipment is the solids and water content of the material delivered to the Pre-Processing Facility. For equipment sizing, a value of 30% TS for incoming bulk food waste is assumed to yield a conservative machine sizing for this conceptual project stage. This assumption has been borne out by the City's food waste audits and is considered to be a conservative estimate. If material arrives at a higher %TS than the design parameter of 30%, then less tons per day (TPD) would need to be processed to meet the same organic loading targets. The food waste processing would then yield a target %TS between 12 and 15% for transport to the NWWRP.

6.1.1.4 Processing Operations

Sizing of equipment also depends greatly on the anticipated processing operations. For example, to produce a specific organic loading target, the processing throughput rate differs widely if processing is conducted over 1 or 2 work shifts or 3 days versus 5 days. For this Concept Memorandum, food waste processing is assumed to be accomplished in one 8-hour work shift, 5 days per week.

6.1.2 Recommended Food Waste Processing Equipment Sizing

Although the projected food waste loading rate is expected to be less, *the smallest viable equipment sizes available from the vendors have a much larger throughput capacity than projected for the NWWRP*. These smaller size machine offerings still allow for processing of up to 160 tons per day. This equipment size will easily accommodate the sizing criteria described above and shown in Table 6-1 below. With an assumed 8-hour workday, this translates to a nominal processing rate of 20 tons per hour.

Table 6-1 Maximized Digestion Capabilities Limitation for Pre-Processing Equipment Sizing

Parameter	Limit
Food Waste Mass Fraction of Digester VS loading	50%[1,2]
Number of Digesters Receiving Food Waste	2
Food Waste Incoming Total Solids (TS)	15%
TPD of throughput capacity for food waste processing	160 TPD[3]

1. *Theoretical maximum loading limit, initial operational limit of 35% recommended*
2. *7 days/week loading basis*
3. *5 days/week operating basis; 8 hour work shift*

6.1.3 Recommended FOG System Sizing

Although FOG has a higher biogas yield potential than food waste, it is also more dilute and does not offset landfill tipping fees. Therefore, the maximum volume of FOG estimated to be delivered to the Pre-Processing Facility is based on providing dilution for food waste to generate a slurry of approximately

12%-15% TS. This volume is estimated to be 10,000 gpd and the FOG system would be sized accordingly. If a more specific %TS of food waste arriving at the facility is determined from the bench testing, the FOG receiving sizing may be adjusted.

6.2 Process Flow Diagram

Process components were selected based on anticipated food waste quality in accordance with the City's disposal requirements. The recommended process train shall have the capability to remove common contaminants such as glass, plastics, metals, and film plastics such as garbage bags. Figure 6-1 below illustrates the conceptual process flow for the Pre-Processing Facility. For food waste, the process train is anticipated to consist of de-packaging, secondary grit removal and storage. For FOG, the process is anticipated to consist of screening and storage.

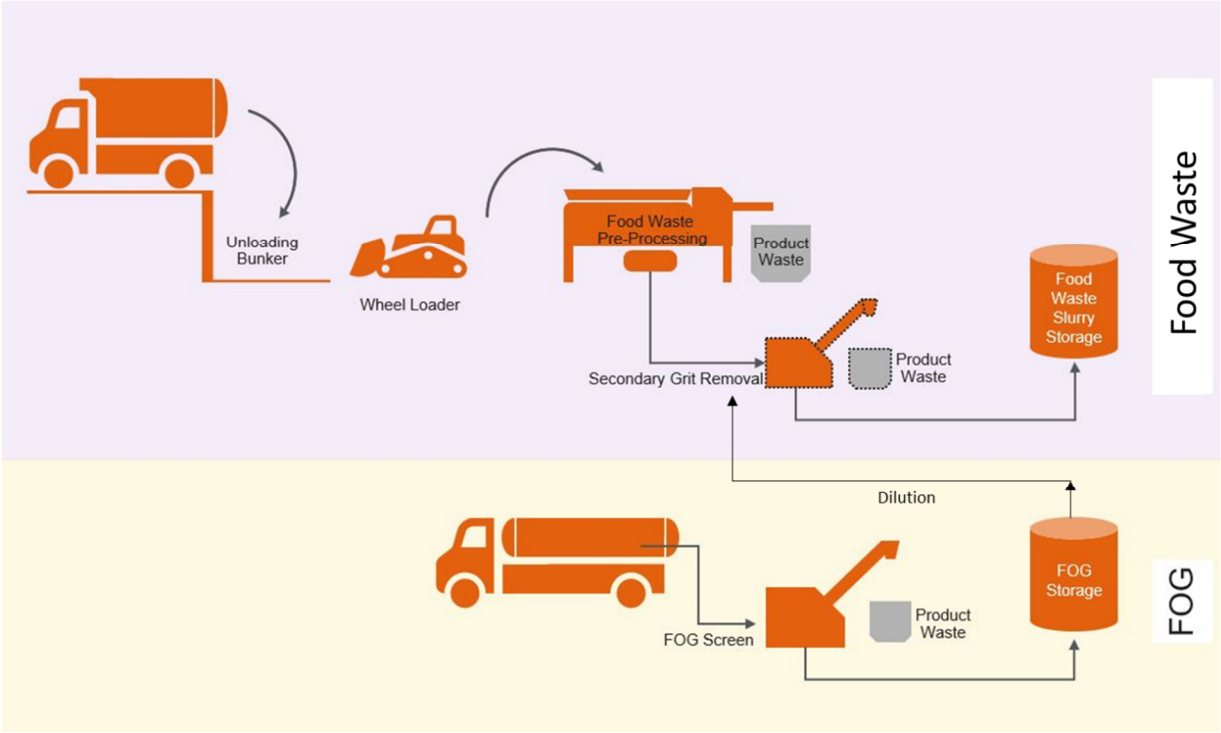


Figure 6-1 Food Waste and FOG Process Flow Diagram

6.3 Food Waste Transfer

Managing and transferring the food waste from the unloading bunker into the first piece of processing equipment is anticipated to require a wheel loader. This type of machine is comprised of a pivoted frame with the engine mounted over the rear wheels. A cab or canopy rests over the frame, and an enclosed climate-controlled cab is recommended. The machine's pivot arrangement gives the wheel loader the ability to work in small turning circles for navigating in the limited footprint of the Processing Area.

Materials of construction typical of wheel loaders in the construction industry are acceptable for this application. Loading bucket size should be coordinated with the width of receiving bay and throughput capability of the de-packaging machine described in following paragraphs.

For transferring materials delivered in bulk by vehicles other than the solid waste collection fleet, a forklift should be available to move these materials to the unloading bunker, or directly into the de-packaging machine if equipped with a rotator attachment.

6.4 Food Waste Pre-Processing

This section provides technical information and unit selection for pre-processing equipment. Equipment descriptions summarize function, approximate dimensions, materials of construction and applicable design criteria. Although several manufacturers provide similar equipment components, performance characteristics can vary depending on throughput speed and types of contamination expected.

Evaluations were conducted on the basis of providing one unit, since maintenance to the unit can be completed outside of the 8-hour daily service period. The equipment reviews also examined estimated electric usage, operational modes, and estimated contamination removal.

Equipment selected for evaluation is provided by known industry leaders for de-packaging, separating, and screening organic solid waste for anaerobic digestion. Each unit consists of the following components:

- Feed Hopper – collection and storage
- Auger – de-packaging and compacting
- Mill – food waste and product waste separation and screening
- Packaging Screw – product waste removal
- Slurry Pump – food waste slurry removal

The processing equipment alternatives are presented in the following paragraphs. Product data for this equipment is attached in Appendix C.

6.4.1 Scott Equipment THOR Separator

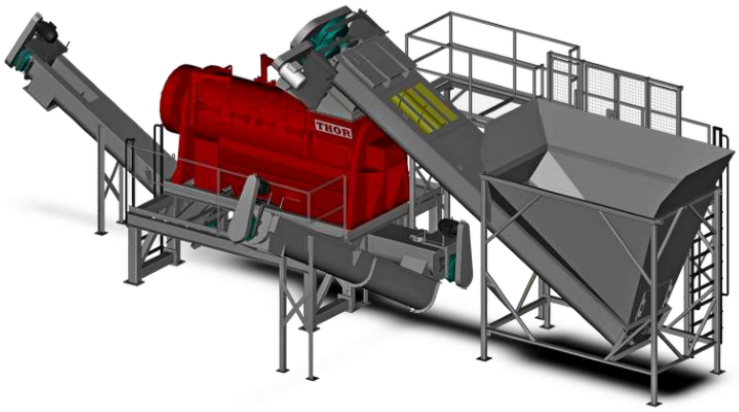


Figure 6-2 Thor Turbo Separator

The THOR Turbo Separator is manufactured and distributed by Scott Equipment company. The Turbo Separator equipment line has been in production since 1996 and over 300 systems have been furnished.

The THOR separator system consists of a hopper with a double screw auger that tears apart packaging, such as bags, boxes, aluminium cans, etc, to release as much food waste as possible prior to conveying the waste into a swing hammer mill. A swing hammer and screen mill is a high speed mechanical impact mill. Swing hammers rotate and fragment the waste. The size reduction provided by the swing hammers allows for further separation of the packaging and other contaminants from the organic waste stream. The organic waste then discharges through 1 ¼" or ¾" screens, while the contaminant product waste travels horizontally through the mill to a disposal container.

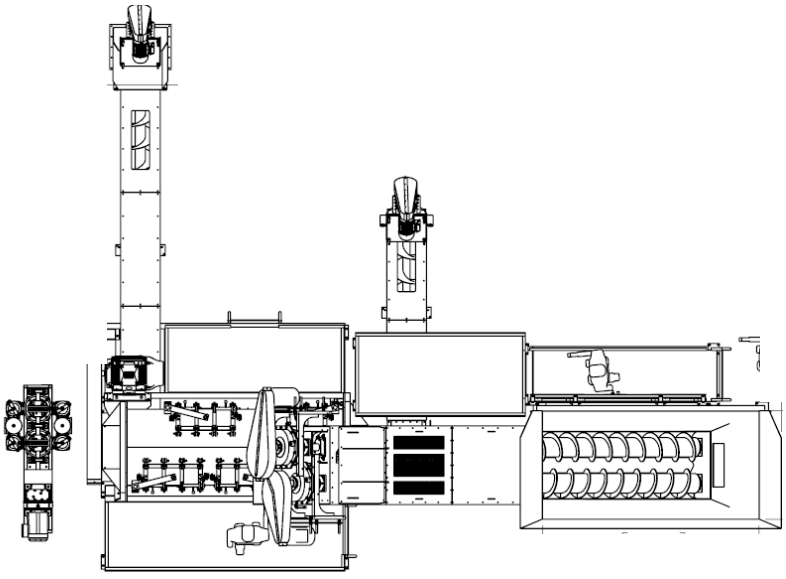


Figure 6-3 Thor Turbo Separator Plan View

The THOR unit is intended to process pre-consumer packaged, post-consumer, mixed commercial, and residential source separated organics (SSO). Swing hammer mills are highly efficient at particle size reduction. Therefore, the collected food waste from generators should not contain any contamination that may splinter or shatter. The system is not intended for glass, lumber, and polypropylene capable of fracturing, such as mop buckets or coolers. The hammer mill may cause glass to shatter into particulates smaller than the 1 ¼" to ¾ "screens used, resulting in any glass fed into the THOR entering the organics stream. This waste should be removed from the food waste feed prior to processing via the THOR.

The THOR system can process food waste at any incoming moisture content, however, dilution will still likely be necessary at the organic slurry outlet in order to reach the target %TS required for pumping. Design data for the Thor unit is presented in Table 6-2.

Table 6-2 Thor Turbo Separator Design Data

Parameter	Value
Dimensions	384" L x 314" W x 180" H
Materials of Construction	316 SS (shell)
Hopper Capacity	8 yds^3
Processing Rate	0-20 TPH
Rotational speed	1,800 RPM
% Contaminants in Organic Stream	<1%
Power Consumption	110 kW
Quoted Capital Cost	$ 432,105

6.4.2 Ecoverse Tiger HS 55

Figure 6-4 Tiger HS 55

The Tiger HS 55 is manufactured and distributed by Ecoverse. The Tiger HS 55 offers a 'plug and play' type installation with a relatively small footprint. The Tiger employs a dual screw auger to de-package the food waste. An auxiliary screw works simultaneously with the feed screw to convey the waste into a vertical separation mill. In comparison to a swing hammer mill, the Tiger separation mill utilizes gravity to separate the contamination from the organic slurry, requiring a lower power draw. The high-speed vertical paddles in the mill spin to break apart and elevate the product waste towards the product screw. The organic waste is screened through ¾" to ½" perforations. The vertical mill configuration yields rapid separation and does not aggressively fragment the packaging, reducing the risk of grit particles. Ecoverse advertises only a 0.2% contamination in the wet organic slurry.

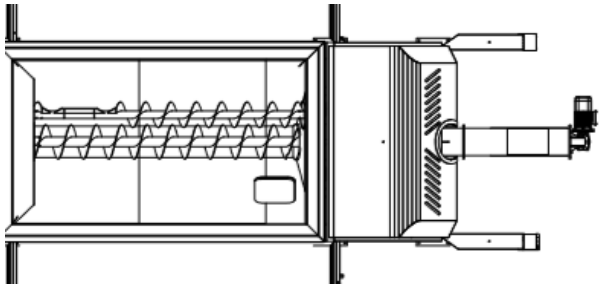


Figure 6-5 Tiger HS 55 Plan View

The Tiger system can process food waste at any incoming moisture content, however, dilution water will likely be needed for the organic slurry outlet in order to reach the target %TS required for pumping. Tiger system design data is presented in Table 6-3.

Table 6-3 Tiger HS 55 Design Data

Parameter	Value
Dimensions	291" L x 98" W x 162" H
Materials of Construction	SS hopper; ST 37 body
Hopper Capacity	7 yds^3
Processing Rate	0-20 TPH
Rotational speed	1,000 RPM
% Contaminants in Organic Stream	0.5%
Power Consumption	65 kW
Quoted Capital Cost	$ 547,700

6.4.3 Doda Bio-Separator

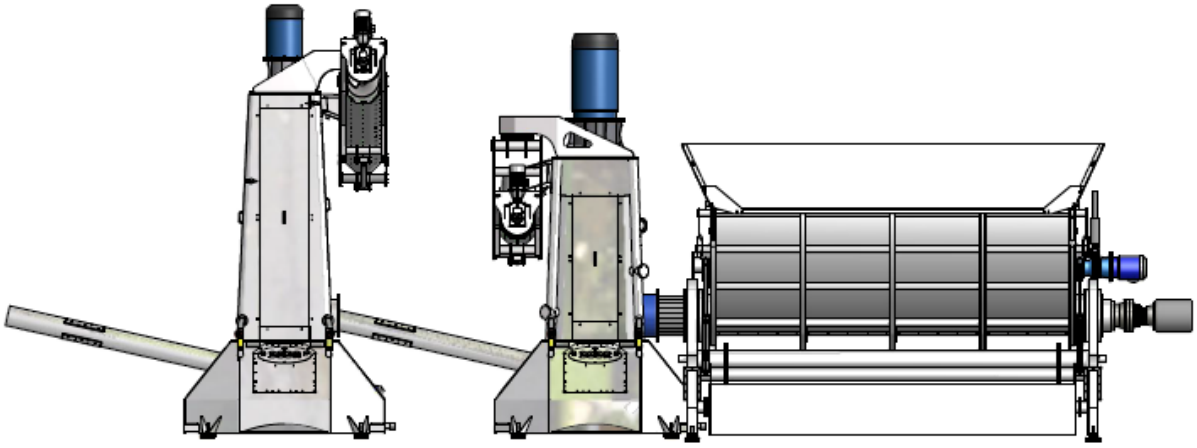


Figure 6-6 Doda Bio-Separator

The Bio-separator is manufactured and distributed by Doda Organic Waste Solutions. Doda USA primarily focuses on the agriculture and industrial organics, but also provides products capable of producing food waste slurry. Various models are manufactured with throughput rates ranging from 2 to 20 tons per hour of commingled organic and non-organic waste.

The Doda Bio-separator system has a triple screw auger feed system which de-packages the waste into small pieces before entering a hammer mill. The hammer mill macerates the organic waste and fragments and granulates contaminants in de-packaged food waste stream, similar to the Thor system. However, the Bio-Separator employs a vertical hammer mill separator which uses gravity to separate the contamination from the organic slurry. The vertical unit is equipped with cylindrical screens with 3/8” or 5/8” perforations.

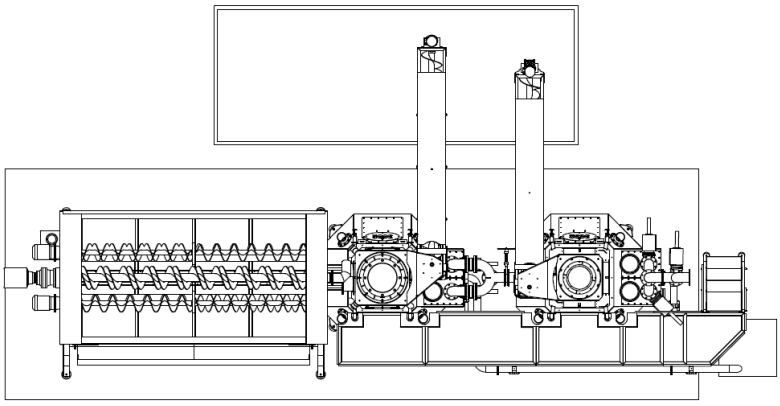


Figure 6-7 Doda Bio-Separator Plan View

The Bio-separator system can process food waste at any incoming moisture content, however, dilution water will likely be needed for the organic slurry outlet in order to reach the target %TS required for pumping. Bio-Separator design data is presented in Table 6-4.

Table 6-4 Doda Bio-Separator Design Data

Parameter	Value
Dimensions	384" L x 314" W x 140" H
Materials of Construction	304 SS; Hardox steel hammer mill; hot galvanized screen
Hopper Capacity	10 yds^3
Processing Rate	0-20 TPH
Rotational speed	1,200 RPM
% Contaminants in Organic Stream	1%
Power Consumption	207 kW
Quoted Capital Cost	$ 300,000

6.4.4 Recommendations

Each comparative unit has a processing rate of 0-20 TPH and similar contaminant removal capabilities. Although any of the three systems appear to be capable of processing the food wastes which have been identified in the City's bench testing, differences in the following parameters are important to note.

- Footprint. All systems require about the same vertical clearances, however, the Scott and Doda systems require significantly more floor space than the Ecoverse Tiger. The more compact footprint of the Tiger system, and particularly the narrower width, yields a smaller floor space requirement and more flexibility in orienting this system in the Processing Area.
- Power consumption. The Scott and Doda hammer mill machines require more power and higher rotating speed for processing than the Tiger system. The Tiger system's auger-based processing approach results in 40 to 50% lower power consumption as calculated in Appendix C.
- Grit contaminants. Glass and other small grit particulates can impact operation and maintenance of anaerobic digesters and increase wear in dewatering centrifuges. This is particularly true for glass contamination which industry experience identifies as a major contamination concern. As the name implies, hammer mills are expected pulverize the materials, so are likely to generate more small particulates in the organics stream. The Tiger dual screw auger de-packaging technique is intended to separate and screen contaminants without the pulverizing action and therefore is expected to remove glass contaminants in larger pieces.

Follow up discussions were conducted with the vendors regarding contaminants and contaminant removal. Vendor discussions all assured a contaminant capture rate of 99% or better, but there were contrasting statements specifically concerning glass contaminants. Ecoverse suggested that glass does

not present a major issue for the Tiger system and glass should be limited by the waste generator. Ecoverse confirmed that action in the vertical mill screen of the Tiger with no secondary grit removal has proven in existing installations to be adequate for anaerobic digestion. In contrast, the published contaminant capture for the Thor system is only possible when no glass is present in the food waste feed stream. Doda was not forthcoming about glass, but industry experience indicates glass is also an issue for their system.

Based on the system comparisons discussed above as well as the expected characteristics of the City's incoming food waste, the Ecoverse Tiger HS 55 is the recommended de-packaging system. While the Tiger system has the highest capital cost, the advantages of smaller footprint, lower power draw and likelihood that fewer grit/glass contaminates will be present in the organic stream should offset the additional capex long-term.

6.5 Fine Particulate Screening

As previously noted, grit and glass in the food waste slurry can impact digester and digested sludge dewatering. These materials increase abrasion, reduce capacity and increase cleaning requirements. Inevitably the HSW stream may contain a small percentage of retained glass and grit. Although indications are that the Tiger system has fewer issues with glass, additional screening is included in the pre-processing strategy for the purpose of this Pre-Processing Facility Concept Memorandum. This final screen would be positioned following dilution of the HSW just prior to HSW storage. An overview of one potential final screen type is discussed below.

The final screening device and sizing will be selected based on the total solids content determined for HSW storage and transport to the NWWRP. As with the de-packaging system, the Pre-Processing Facility would be equipped with one unit since maintenance can be completed outside of the 8-hour daily service period.

A paddle finisher is initially recommended for application in the Pre-Processing Facility. Depending on the way the machine is set up, paddle finishers can provide various functions such as breaking up feedstock or separating and screening to produce a high solids puree of uniform consistency. For the City's application, the paddle finisher would provide final screening of the diluted food waste/FOG slurry to remove remaining damaging particulates, such as glass, seeds, eggshells, etc. These machines are readily adaptable for screening applications depending on final product needs with screen hole sizing that can be anywhere from 0.375 inches to 0.010 inches. Paddle finishers are typically 'plug and play' setups with a horizontal paddle arm which presses the organic material through the screen. These systems are also equipped with built-in clean-in-place systems for internal clean up.

Figure 6-8 Brown International Paddle Finisher

As identified in the LIFT See It Trip, Central Marin Organic Waste Receiving Facility in Marin, California, operates a Brown Model 202 paddle finisher for mixed slurry screening. As HSW dilution and solids content parameters become more closely defined as the bench study advances, other fine particulate removal technologies may also be considered.

6.6 FOG Receiving

FOG receiving will be designed to process 10,000 gpd of FOG based on the initial market evaluations. FOG will be received from a FOG hauler through a screen and then pumped to a holding/recirculation tank. From the holding/recirculation tank, FOG will be pumped at a steady rate to the food waste processing flow stream for dilution of the HSW to a target solids content. When FOG is not available for dilution, stored dilution water will be available. Dilution water may also be necessary as a supplement to the FOG to achieve a target HSW solids content.

FOG receiving will consist of the following components:

- Rock Trap
- Receiving Screen
- Screened FOG Pumps
- Holding/Recirculation Tank
- Recirculation Pumps
- Transfer Pumps
- FOG System Heating

The key component of FOG receiving will be the Receiving Screen. Screening is recommended due to the potential contaminants that can be present in the grease traps where FOG is collected. Screening

systems typically come with an integral component that serves as a rock trap. Alternative screening systems are presented in the following paragraphs. As with the other processing components, only one unit would be provided, since maintenance can be completed outside of the 8-hour daily service period. Product data for FOG Receiving equipment is attached in Appendix D.

6.6.1 Enviro-Care Beast

Figure 6-9 Enviro-Care Beast

Enviro-Care Company supplies pre-treatment screens and solids/grit management equipment for water and wastewater applications. Their system for septage-FOG-sludge screening, called the Beast, is designed to remove inorganic material from FOG. This system also conveys, washes, and dewaters screenings prior to discharge. The system consists of the following components:

- Motorized inlet valve
- Beast
    - Inlet tank
    - Rotary Screen
    - Screw auger

The FOG will be conveyed through the motorized inlet valve, then to the Beast inlet tank. The FOG is then conveyed through the inlet tank and rotary screen. Any debris captured in the screen is conveyed out of the Beast by the screw auger and into an endless bagger system prior to being deposited into a dumpster.

The tank component is designed to handle up to 600 gpm of FOG which allows fast unloading times. The 6 mm screen perforations provide a high contaminant capture.

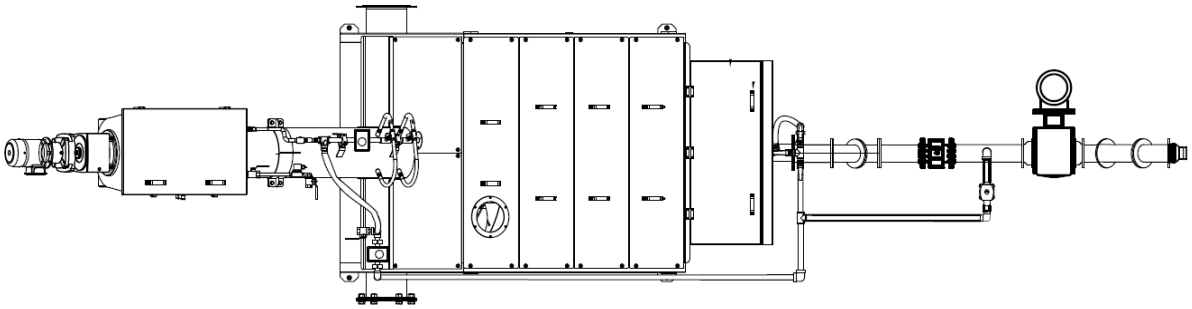


Figure 6-10 Enviro-Care Beast Plan View

A hauler access station and Flo-Logic® software management system are options also available with the Beast. These options can provide security, data logging and reporting/invoicing capabilities. With these options, permitted haulers can have unsupervised access by using simple login procedures and a key card. The software system monitors, collects and tabulates data on flow and load volumes. Design data for the Enviro-Care Beast are presented in Table 6-5.

Table 6-5 Enviro-Care Beast Design Data

Parameter	Value
Beast Dimensions	195” L x 67” W x 107” H
Main Control Panel Enclosure	36” W x 8” W x 42” H
Hauler Access Station	24” L x 14” W x 24” H
Materials of Construction	304 SS (316 SS optional)
Processing Rate	400-600 gpm
Screen Perforation Size	6 mm
% Solids Captured	99.5%
Power Consumption	65 kW
Quoted Capital Cost	$305,500

6.6.2 JWC Environmental Honey Monster

Figure 6-11 JWC Environmental Honey Monster

The Honey Monster, manufactured by JWC Environmental, is also a receiving system for screening septage, FOG or sludge from haul trucks. As with the Beast, this system is capable of providing automated (unsupervised) FOG acceptance. The Honey Monster includes the following components:

- Inlet Valve
- Rock Trap
- Grinder
- Honey Monster
    - o Perforated Screenings Trough
    - o Screw Auger

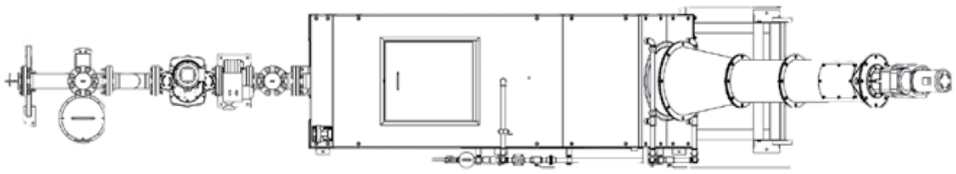


Figure 6-12 JWC Environmental Honey Monster Plan View

The FOG is conveyed through the motorized inlet valve, then to a rock trap and tank. The FOG is then conveyed through the tank and passes through a 40K series Muffin Monster grinder. Any debris captured in the tank is dewatered and conveyed out of the Honey Monster by a screw auger into an auto bagger system for dumpster deposit. Any materials passing the tank are macerated in the grinder.

The Honey Monster is designed to handle up to 400 gpm of FOG which allows fast unloading times. System automation also provides data capture and instrumentation is available for pH sensing. Design data for the JWC Environmental Honey Monster are presented in Table 6-6.

Table 6-6 JWC Environmental Honey Monster Design Data

Parameter	Value
Honey Monster	142” L x 48” W x 132” H
Materials of Construction	304 SS Pipe & Tank (316 SS optional); 304 SS casings & trough
Processing Rate	400-600 gpm
Screen Perforation Size	12 - 25 mm
% Solids Captured	99.5%
Power Consumption	5.2 kW
Quoted Capital Cost	$200,000

6.6.3 Recommendations

Typically, FOG collected from grease traps is anticipated to have contamination such as rocks, bones, and other debris washed down sinks and drains. Comparison of the two FOG screening systems reveals that physical screening of the FOG is only provided by the Enviro-Care Beast system. The Honey Monster unit relies on a larger bar screen for separating rocks and heavy debris while screening of FOG throughput is provided by grinding. Therefore, any contaminants or stringy materials that make it through the grinder (i.e. non-dispersibles) remain in the HSW. In addition, the Honey Monster requires an external cleaning system (provided by others) while the Beast comes with an integral clean-in-place system.

Therefore, the Enviro-Care Beast is the recommended pre-processing system. Although the contamination seen thus far in the bench study does not indicate a high degree of contamination in the collected FOG, the Enviro-Care Beast that screens to 6 mm is anticipated to provide the desired separation of contaminants. This system assumes that a rock trap is not required based on the screening technology, but a rock trap may be included if additional protection is determined to be needed.

7 SUPPORT SYSTEM REQUIREMENTS

This section provides basic information regarding ancillary systems required to support the Pre-Processing Facility operations. Conceptually, utility infrastructure is available to serve the facility. However, considering other future site uses, water and wastewater services may require upsizing. Requirements would need to be reviewed through use of the City's water and wastewater models.

7.1 Water and Wastewater

7.1.1 Water

Potable water supply is required for the operations area and the driver's restroom facilities. Fire protection requirements need to be identified with City's fire code official. Future site uses may require upsizing the 6-inch water main in Center Street or providing onsite storage for supply to all onsite facilities.

Much of the service water required for HSW dilution can be supplied by reclaimed water brought to Center Street Yard from the NWWRP. Once the HSW is unloaded from the transport truck, the truck can be washed out and then refilled with reclaimed water for the return trip to the Pre-Processing Facility. As indicated in Section 5, a storage tank for this dilution water will be provided in the storage area and used to supplement FOG as required to reach the target product solids content.

7.1.2 Wastewater

The existing infrastructure appears to be satisfactory to provide adequate wastewater service to the Pre-Processing Facility. Washdown water will need to be treated to acceptable industrial discharge standards in compliance with the City's industrial pretreatment program.

7.2 Power

The Pre-Processing Facility will require 480 volts, three phase power supply for motors and processing equipment. Other areas of the facility will require 120 volt and 240-volt power. Power supply will be provided through local transformers and local panels located in an electrical room in the operations area.

In addition to the above-mentioned power sources, an uninterruptible power supply (UPS) will be provided. The UPS will be located in the control room and furnish power to control systems, alarms and lighting.

7.2.1 Area Classification

Hazardous area classifications will apply to locating and designing electrical systems for the Pre-Processing Facility. As previously indicated in Section 3, ventilation for multiple air changes per hour will be required for controlling offensive odors created by handling and processing of food waste. Up to 12 air changes per hour during facility operations may be required to effectively control odors. This ventilation rate may reduce the area classification, but not declassify building areas due to the significantly large spaces / volumes in the building. Building areas will ultimately be classified by and in accordance with the requirements of the City's fire code official.

7.3 Instrumentation, Controls and Communications

The food waste processing equipment is expected to come with vendor-supplied instrumentation and controls that are local to the machine. Master system control and monitoring will be provided in accordance with City of Mesa standards consisting of a programmable logic controller (PLC) and human machine interface (HMI) system presenting operations information in graphical format (Graphical User Interface or GUI). The HMI will be located in the Pre-Processing Facility operations area along with uninterruptible power supply (UPS) and with communications infrastructure.

The master control system will interface with the vendor-supplied control panels. Vendor panels are typically designed to directly monitor and control the equipment and are often custom designed to suit owner requirements. Some vendor systems are supplied with a controller area network (CAN bus) that allows microcontrollers and devices to communicate with each other without a host computer, but the master system control may still be configured for interface with a CAN bus system.

In addition to interface with HSW processing, the master system control will collect and tabulate weigh data from the scale system. This data will be used to estimate delivery volumes and HSW processing throughput.

Traffic control monitoring will also be provided through the master control system. As previously indicated in Section 5, signalization and cameras will be placed at the facility access points to control truck entry into the unloading floor. Depending on food waste transport patterns (time of day and frequency of unloading operations) the system can be automated for appropriate intervals between incoming loads to allow for managing the materials in the processing area.

Communications to offsite locations (fire alarms, etc.) will likely be provided via the City's FO communication line on the west side of Center Street.

7.4 Emergency Systems

Fire alarms and fire protection systems will be installed throughout the Pre-Processing Facility. Specific requirements will need to be identified with the local fire code official. Supporting infrastructure for fire protection systems is expected to be similar to that installed for the HHMF.

Although not expected for this facility type, combustible gas detection may also be required in accordance with requirements of the City's fire code official.

8 OPINION OF PROBABLE CONSTRUCTION COST

An opinion of probable construction cost was developed for the recommended Pre-Processing Facility concept and recommended equipment alternatives described in this Concept Memorandum. The majority of the capital costs are based on vendor furnished equipment costs and manufacturer input on installation of similar size projects and equipment. The anticipated construction cost was calculated based on March 2019 dollars. Table 8-1 and Appendix F summarizes the capital costs associated with the Pre-Processing Facility concept, ***excluding site preparation costs to be determined based on findings and recommendations of additional geotechnical investigation as indicated in Section 3.***

Table 8-1 Opinion of Probable Construction Cost

Component	Total Cost[1]	Total Cost -30%	Total Cost +50%
Sitework[2]	$624,000	$436,800	$936,000
Pre-Processing Facility Building	$4,582,500	$3,207,800	$6,873,800
Depackaging System	$766,800	$536,800	$1,150,200
Grit Screening	$49,000	$34,300	$73,500
FOG Receiving	$427,700	$299,400	$641,600
Storage, Pumping Systems & Piping (FOG, HSW, etc.)	$250,000	$175,000	$375,000
Subtotal	**$6,700,000**	**$4,690,100**	**$10,050,100**
Indirect Costs			
General Conditions (8%)	$536,000	$375,200	$804,000
Overhead, Mob/Demob, Bond, Insurance (12%)	$804,000	$562,800	$1,206,000
Total Indirect Costs	**$1,340,000**	**$938,000**	**$2,010,000**
Other Costs			
Profit (8%)	$643,200	$450,200	$964,800
Total Other Costs	**$643,200**	**$450,200**	**$964,800**
Subtotal	**$8,683,200**	**$6,078,300**	**$13,024,900**
Contingency (20%)	$1,736,600	$1,215,600	$2,604,900
Total Estimated Probable Construction Cost	**$10,419,800**	**$7,293,900**	**$15,629,800**

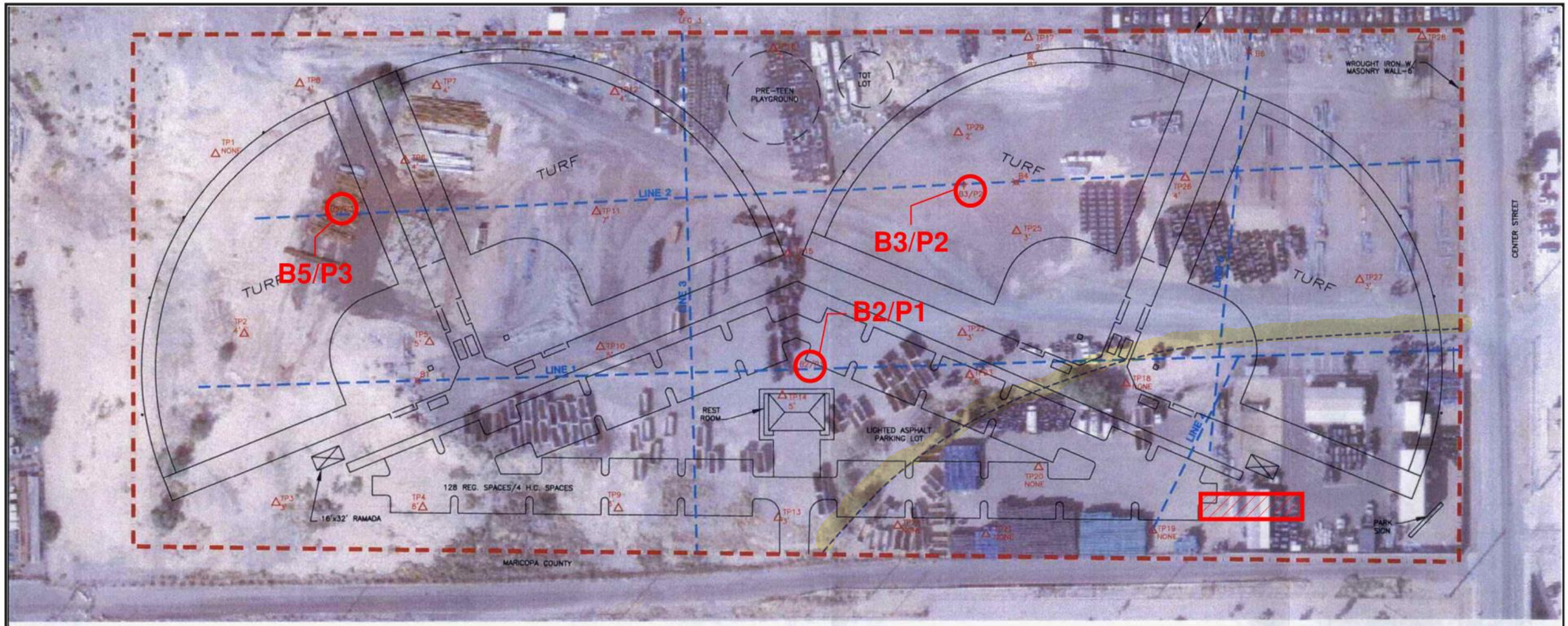
[1]The following items are excluded from the Opinion of Probable Construction Cost:

- Geotechnical Investigation & Site Remediation
- Design and Permit Fees
- Rolling Equipment, Dumpsters, and Misc. Ancillary Items
- Control System Programming

[2]Assumes only sitework for Pre-Processing Facility as stand-alone installation without adjacent similar facilities.

APPENDIX A

Soil Vapor Analysis



ARCADIS Design & Consultancy for natural and built assets

FIGURE 3-1

		Date	Probe	Depth at bottom of probe (ft)	propene	CFC12	CFC114	vinyl chloride	methanol	acetone	carbon disulfide	1,1-dichloroethane	2-butanone	cis-1,2 DCE	methyl acetate	n-hexane	THF	benzene	cyclohexane	trichloroethene	1,4-dioxane	n-heptane	4-methyl-2-pentanone	toluene	n-octane	tetrachloroethene	chlorobenzene	ethylbenzene	m,p-xylenes	o-xylene	n-nonane	cumene	a-pinene	n-propylbenzene	4-ethyltoluene	1,3,5-trimethylbenzene	1,2,4-trimethylbenzene	1,4 dichlorobenzene	1,2 dichlorobenzene	d-limonene
*Calculated SGHHSLs	Residential				1,300,000	43,000	NE	74	NE	14,000,000	320,000	780	2,300,000	NE	32,000	320,000	910,000	160	2,700,000	210	240	180,000	1,300,000	2,300,000	NE	4,800	23,000	480	43,000	43,000	9,100	180,000	NE	430,000	NE	27,000	27,000	110	91,000	NE
	Industrial				11,000,000	370,000	NE	2,300	NE	120,000,000	2,600,000	6,400	18,000,000	NE	260,000	2,600,000	7,300,000	1,300	22,000,000	2,500	2,100	1,500,000	11,000,000	18,000,000	NE	39,000	180,000	4,100	370,000	370,000	73,000	1,500,000	NE	3,700,000	NE	220,000	220,000	920	730,000	NE
	5/6/2008	P1	30	1,600	430	531	588	979	261	2,832	49	50	111	50	197	83	51	79	50	50	90	49	49	51	50	51	52	52	52	50	49	50	49	49	49	49	132	50	95
	5/6/2008	P1	20	2,236	3,806	1,118	792	1,111	1,116	560	222	224	262	223	423	324	249	224	236	223	614	901	8,662	560	224	225	6,076	12,150	4,122	3,039	688	21,717	884	737	1,032	3,144	961	355	11,138
	5/6/2008	P1	10	16,340	1,730	1,607	843	697	688	240	142	139	475	140	1,937	501	156	258	140	140	1,065	139	1,205	1,447	142	267	3,645	1,128	1,866	4,349	388	9,466	786	138	236	182	336	138	2,005
	5/6/2008	P2	30	344	6,425	2,096	1,022	358	356	591	89	71	71	72	775	71	73	213	70	72	209	74	72	191	75	97	74	95	74	73	74	111	74	74	74	74	379	72	189
	5/6/2008	P2	20	2,408	2,619	468	536	128	128	1,214	26	26	26	26	257	26	80	89	26	26	131	26	49	173	26	78	694	100	74	141	84	139	79	26	26	42	348	78	184
	5/6/2008	P2	10	1,720	642	699	143	264	261	75	53	53	123	54	387	53	169	248	53	54	315	53	53	205	53	69	608	65	65	257	79	111	54	54	54	54	3,124	53	134
	5/6/2008	P3	30	757	237	168	87	77	237	1,245	15	77	17	15	24	53	19	15	16	15	29	15	16	29	16	87	28	56	30	19	15	26	15	15	15	49	60	16	72
	5/6/2008	P3	20	4	4	13	5	60	45	14	4	9	4	4	5	4	4	4	5	6	5	5	5	4	4	5	16	15	9	5	5	8	5	5	5	17	14	5	49
	5/6/2008	P3	10	2,924	6,919	4,262	1,558	377	380	75	73	74	475	76	669	74	265	320	102	76	983	74	527	700	95	129	3,211	3,038	3,254	1,939	206	1,225	590	197	152	255	78	72	284

Exceeds Residential SGHHSLs

Exceeds Industrial SGHHSLs

NE Not Established

* Calculated Soil Gas Human Health Screeening Levels (SGHHSLs) for residential and industrial use scenarios were derived using United States Environmental Protection Agency (USEPA) indoor air Regional Screening Levels (RSLs) (November 2018) divided by attenuation factors of 2.30E-03 for residential and 1.20E-03 for industrial. The SGHHSLs are risk-based values describing residual soil vapor contaminant concentrations which may be left in the subsurface and yet still be protective of indoor air for a residential or commercial/industrial use scenario.

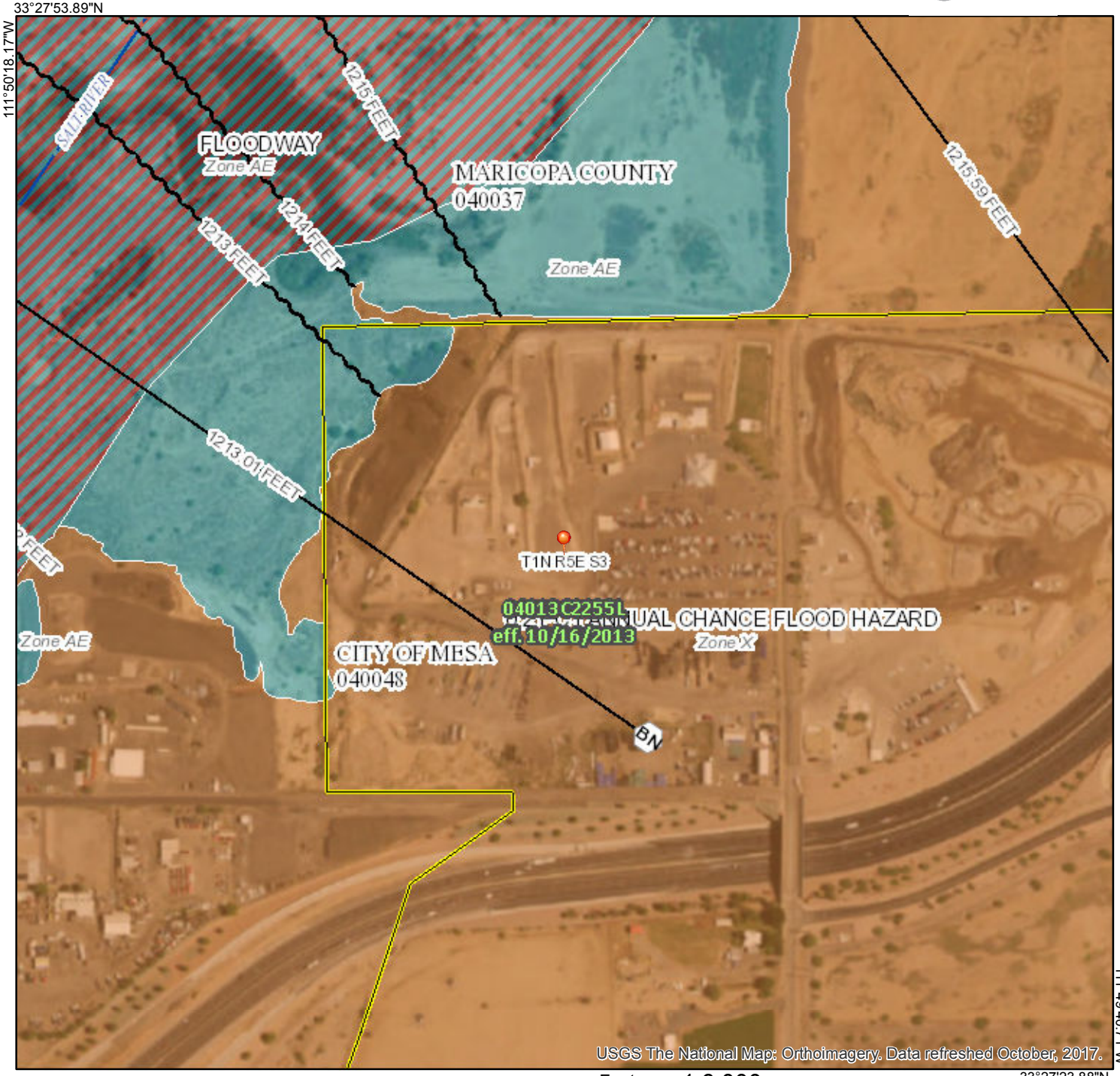
TABLE 1 - SOIL VAPOR ANALYSIS

APPENDIX B

FEMA Flood Insurance Rate Map

National Flood Hazard Layer FIRMette

FEMA



Feet

0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/16/2019 at 7:35:23 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

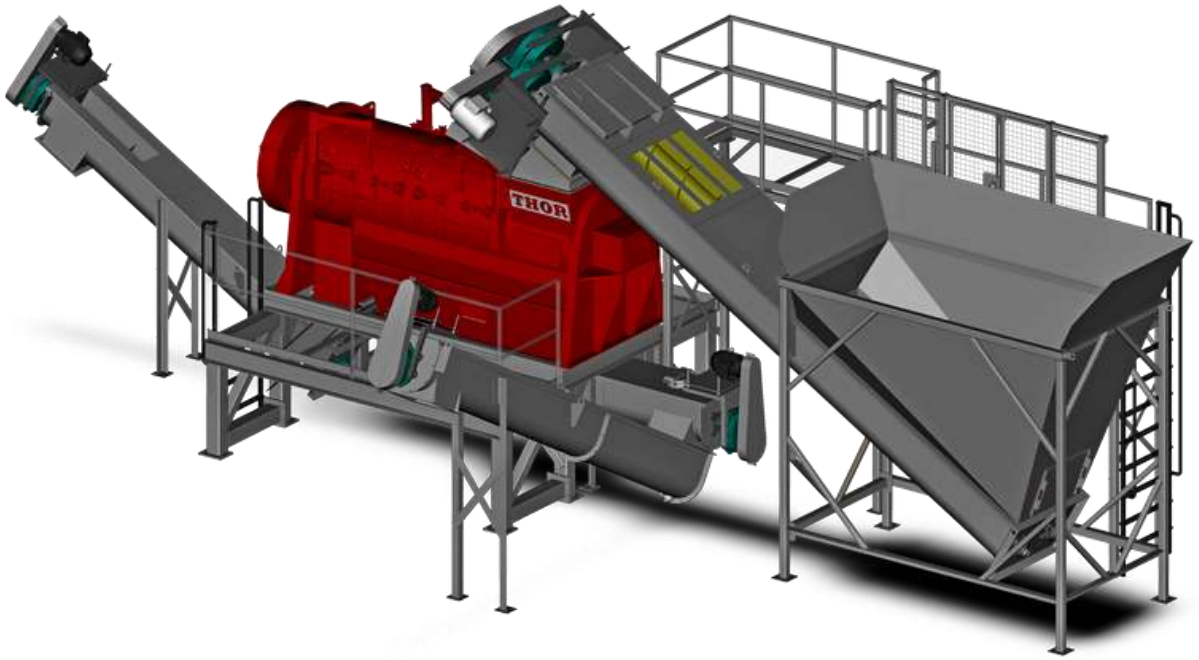
APPENDIX C

Pre-Processing Equipment Product Data

Scott Equipment Company

THOR -Turbo Separator Proposal for:

Shayla Allen
Water Resources Engineer
ARCADIS U.S., Inc.
27-01 Queens Plaza North, Suite 800
Long Island City, NY, 11101



SCOTT EQUIPMENT COMPANY
RECYCLING PRODUCTS DIVISION

Notes:

The THOR is intended to process:

- pre-consumer packaged Source Separated Organics (SSO)
- post-consumer, mixed commercial and residential SSO w. contamination

This mixed waste stream may include all forms of typical packaging materials:

- paper fiber- cartons, paper, wrappers, tetrapaks, etc.
- plastics- bags, up to 5 gal. pails, clamshells, etc.
- metal- canned goods
- Not intended for glass-will crush, not separate-glass will go into organics
- Typical grocery and restaurant organics waste streams

The system is not intended for municipal solid waste (MSW):

- No mop buckets, coolers, tires, shoes, rugs, car parts, lumber, etc.
- The system may process some of these items, but may result in damage

Customer is responsible for all mechanical and electrical installation.
Customer is responsible for all gear reducer lubrication required for machine startup.

Customer is responsible for all freight charges from Scott Equipment factory in MN (unless included)

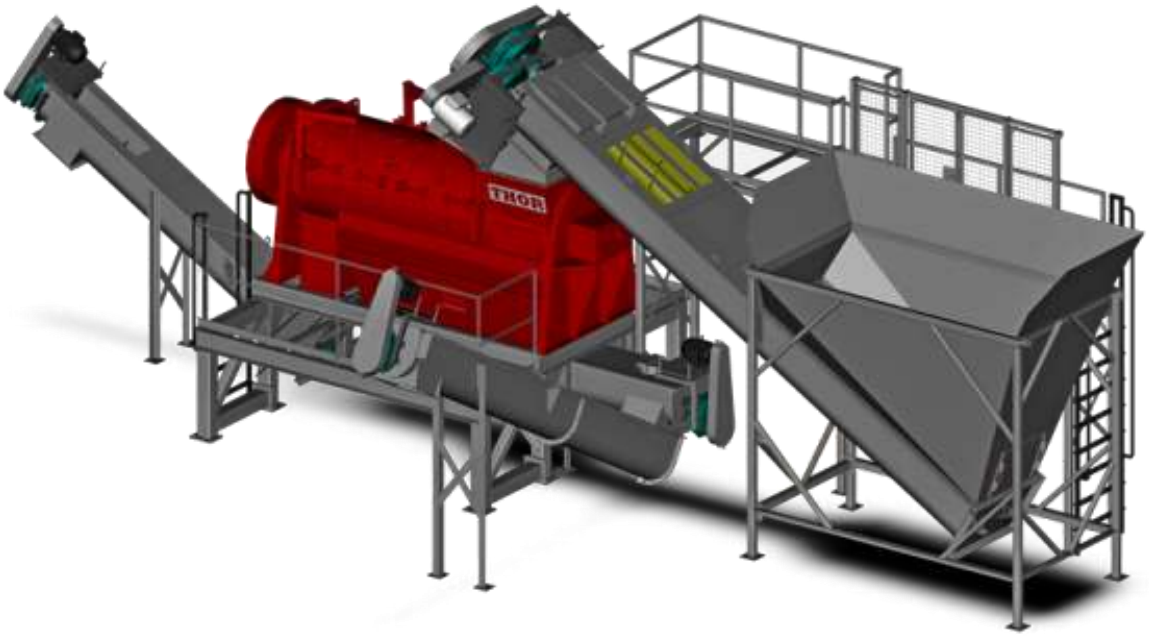
Delivery is 15 to 17 weeks, scheduled after receipt of approved construction drawings.
Approval construction drawing delivery is an additional 1 to 3 weeks from receipt of PO & Down payment from you the customer.

Operation and maintenance manuals will be electronically supplied.
Additional manuals will be billed to the customer at a rate of $65 each.

Model THOR Turbo Separator System Components Detail Listing

THOR Turbo Separator w/ Swing Hammers

1. Construction
    - 42”D X 120”L internal dimension/formed & welded shell
    - 5/8” thick 316 stainless steel/smooth mill finish/THOR red enamel paint-RAL3000
      5/8” thick 316 stainless steel endplates and bearing shelves
    - 4 qty. HD 1” thick, Scott Swing Arm door assemblies with safety slide pins
    - 8 qty. std. removable & replaceable carbon steel screens for Mega THOR
    - 12” HD carbon steel shaft w. 2 qty. Dodge (or similar) protected outbound pillow block bearings
    - 52 qty. Scott Swing Hammers
2. Motor
    - 100HP TEFC 3ph/230/460v/60hz/1800RPM
    - 1 qty.- Allen Bradley PowerFlex Variable frequency drive (see Control Panel)
3. Liquid Manifold
    - SMARTFLOW brand adjustable, ball valve style with 5 ports for optional liquid addition
4. Collection Hopper, Support Stand, And Work Platforms
    - Industrial gauge carbon steel/stand supports over 8 ton/mill finish/gray enamel paint-RAL7022
    - Slip resistant steel grating work platform with safety handrails & full stairs
    - 7 gauge stainless steel tapered organics collection hopper w/ dual access panels



Twin Screw Infeed Conveyor & Hopper w. Wet/Dry Option

1 Construction
- Twin 16”D X 20’L tubular, carbon steel auger screws
- 3/16” thick 304 stainless steel tub/smooth mill finish/gray enamel paint-RAL7022
- 2 qty. sealed, lower shaft bearings
- 10 gauge top cover with accessibility hatch
- Mating inlet flange assembly for THOR
- Observation and maintenance platform with ship style ladder(s) w. safety gate/switches
- OPTION#1: 304SS upgrade on trough & hopper; Wet Kit w. liquids management w.
    - 1HP Wastecorp MiniMudsucker pump with cart
    - 12”D x 24” Screw Auger with 2” ANSI flange drain line with T- cleanout
    - 1 qty. 2”D X 5’L Flex Hose with camlocks and ball valve shutoff (suction)
    - 1 qty. 2”D X 25’L Flex Hose with camlocks and ball valve shutoff (discharge)
    - 2” ANSI flange connection to T42

2 Motor
- 2 qty. -10HP TEFC 3ph/230/460v/60hz
- OPTION#1: 1 qty. -1HP TEFC 3ph/230/460v/60hz or 1HP TEFC 3ph/575v/60hz
- OPTION#1: 1 qty. -1/2HP TEFC 3ph/230/460v/60hz or 1/2HP TEFC 3ph/575v/60hz
- 2 qty.- Allen Bradley PowerFlex variable frequency drives (see Control Panel)

3 Gear Reducers
- 2 qty. – Heavy duty cycle Dodge (or similar) gear reducer

4 Hopper
- 5’W X 10’L 304L stainless steel construction
- 7 gauge 304 stainless steel/smooth mill finish/gray enamel paint-RAL7022
- One piece construction, 24”H, angled bolt-on flanged backsplash for hopper inlet
- Approximately 8 cu. yard capacity

Waste Packaging Conveyor

1 Construction
- Single 16”D X 16’L tubular, carbon steel auger screw
- 3/16” thick carbon steel/smooth mill finish/gray enamel paint-RAL7022
- 1 qty. sealed, lower shaft bearing
- Mating flange assembly for T42

2 Motor
- 1 qty. - 5HP TEFC 3ph/460v/60hz or 5HP TEFC 3ph/575v/60hz
- 58 RPM kit with expanded discharge and tapered screw flighting
- 1 qty.- integrated motor starter, soft start (see Control Panel)

3 Gear Reducers
- 1 qty. – heavy duty cycle Dodge (or similar) gear reducer

Recovered Organics Single Screw Conveyor-HORIZONTAL

1 Construction
- Single 16”D X 12’L tubular, 316 stainless steel auger screw
- 3/16” thick 316 stainless steel/smooth mill finish/gray enamel paint-RAL7022
- 304SS organics viewing hatch
- 1 qty. sealed, lower shaft bearing

2 Motor
- 1 qty. - 5HP TEFC 3ph/460v/60hz or 5HP TEFC 3ph/575v/60hz
- 1 qty.- integrated motor starter, soft start (see Control Panel)

3 Gear Reducers
- 1 qty. – heavy duty cycle Dodge (or similar) gear reducer

Recovered Organics Single Screw Conveyor - INCLINED

1 Construction
- Single 16”D X 12’L tubular, 304 stainless steel auger screw
- 3/16” thick 304 stainless steel/smooth mill finish/gray enamel paint-RAL7022
- 1 qty. sealed, lower shaft bearing
- Mating flange assembly for T42

2 Motor
- 1 qty. - 5HP TEFC 3ph/460v/60hz or 5HP TEFC 3ph/575v/60hz
- 1 qty.- integrated motor starter, soft start (see Control Panel)

3 Gear Reducers
- 1 qty. – heavy duty cycle Dodge (or similar) gear reducer

Engineered Control Panel For Mega THOR Turbo Separator

1 Construction

- All steel cabinet (approx. 72”H x 60”W x 12”D)
- UL listed/ Schematics provided
- Nema 12 for dust protection
- Nema 12 window kit to protect VFD keypads
- OPTION#4: Upgrade all to NEMA4X rating; 304SS enclosure; integrated air conditioning

2 Motor Controls

- 1 qty.-100 HP Allen Bradley PowerFlex Variable frequency drive w. door mount keypad
- 2 qty. -10 HP VFD’s with door mount keypad for start-stop and speed control for Twin Screw Infeed Conveyer
- 1 qty.-5 HP across the line starter for Waste Packaging Conveyor with start-stop buttons
- 1 qty.-5 HP across the line starter for Organics Conveyor (HORIZONTAL) with start-stop buttons
- 1 qty.-5 HP across the line starter for Organics Conveyor (INCLINED) with start-stop buttons
- OPTION#1: 1 qty. -1HP across the line starter for Wastecorp Mudsucker pump (hopper)
- OPTION#1: 1 qty. – ½ HP across the line starter for Wet Kit (hopper)
- OPTION#2: 1 qty.- 10 HP across the line starter for PE1142 pump with start-stop buttons
- 24VDC Power Supply

3 Safety Features

- Main disconnect with lockable handle
- Raised, Illuminated E-Stop & relay
- Digital amperage meter for Turbo Separator
- Analog service hour meter
- Light stack with red/green/strobing green indicators
- UL Listed w/ schematics

ECOVERSE

WITH THE EARTH IN MIND

January 15, 2019
Proposal for: City of Mesa, Arizona
Proposal # HS-19010-A

TIGER DEPACK

HS-55 DEPACKAGING SYSTEM

Doppstadt BACKHUS BACKERS TIGER DEPACK ECO SIFT

PROPOSAL #: **HS-19010-A**
DATE: **January 15, 2019**
TO: **City of Mesa, Arizona**
Address
CSZ
ATTN: **Name**

TIGER HS-55 DEPACKAGING SYSTEM

Dimensions

- Total length: 24’ 4”
- Total width: 7’ 2”
- Total height: 13’ 5”
- Weight: 26,790 lbs.

Functional details

- Rotational speed of separation shaft: 1000 rpm
- Three AC Motors
- Feed screw motor: 7.5 kW
- Squeezing group motor: 55 kW
- Dry fraction extraction motor: 2.2 kW

Miscellaneous

- Engine compartment: Protected but accessible
- Feed screw drive: Motor reducer
- Squeezing group drive: Direct AC
- Dyeing and paint specially designed to prevent the machine from weather and food waste corrosion

Stationary frame (chassis and single wing doors)

- Legs 4’ (Different sizes can be ordered based on site requirements)
- Anti-Vibrational Silent-block device
- The machine is completely made out of steel, ST 37 steel 6 mm thick plates for the body (3 mm for inspection doors)

Feed Compartment

- Feed hopper in stainless steel with one open side for the feeding.
- Feed screw in black steel (thickness = 10 mm)
- Inspection door
- New removal system of the main feed screw
- 7 cubic yard hopper
- Hopper dimensions: 11' 4" x 6' 5"
- Second auxiliary auger in hopper to prevent bridging

Squeezing Compartment

- ¾" Separation basket made from FE S700 Iron – basket can be changed based on material type
- High speed shaft
- Replaceable wear paddles
- Hardoxed reinforced shaft

Plastic extraction Compartment

- Dry fraction extractor screw, equipped with hoisting hooks and hood

Liquids

- Double water feeding system to accept water from the grid and from other source such as a leachate recovery or rainwater source, and a clean-water line for cleaning the mill
- Solenoid valve to regulate the process water flow

Electric devices and Software

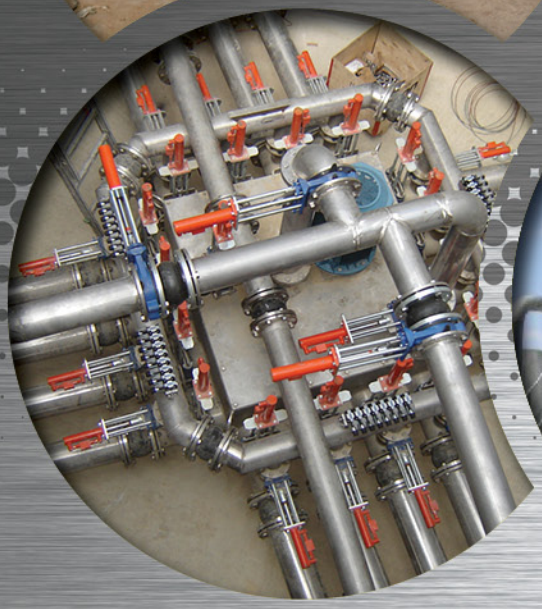
- Control panel with touch screen.
- The control panel can be remote. The choice must be declared at the order.
- The necessary wires length must be declared after the order. The price difference will be charged separately after the order.
- Soft starter for 55kW engine
- Operator panel and Electric panel
- Main Breaker
- Electric cabinet with air-conditioner
- LED light system to signal the rate of process water flow

Safety

- Safety device for the shaft that prevents any possible damages on the engine and on the belts due to accidental contaminants entrance and/or blocking.
- Rotation sensor for the 55kW engine
- Magnetic disconnection system mounted on all main doors to shut down all engines in case of accidental doors opening.
- Stairs to enter to the squeezing compartment and access to all the mechanical elements by means of wide and comfortable doors so that the personnel can enter and/or operate effectively
- Emergency stop buttons
- Safety and warning labels on all machine sides

Miscellaneous

- LED light system with green, yellow and red colors to signal the operating conditions of the machine
- Color RAL 5010 (Gentian Blue)
- Complies with all EC standards



organic waste solutions

DODA®

USA Inc.

DODA® USA Inc.
ORGANIC WASTE SOLUTIONS

255 16th Street South
St. James, MN 56081
Tel: 507-375-5577●Fax: 507-375-5578
http://www.dodausa.com

Organic and Non-Organic Bio Separators

Decomposition of food and other organic waste in landfills account for 34 percent of all methane emissions. Methane is a Greenhouse gas 21 times more damaging to the environment than carbon dioxide. The United States generate about 35 million tons of food waste annually. Doda offers various sizes of Bio Separators for separating food and other organic waste from the waste stream.

Doda Bio Separator

- Manufacture in AISI 304 Stainless Steel with Hardox steel Hammer Mill and hot galvanized Screen
- Screen sizes of 3/8" or 5/8" are standard
- Various models with throughput ranging from 2-20 ton per hour of comingled organic and non-organic waste
- Hopper sizes of 850 or 2,500 US gallons for Dry systems
- Bag openers and specially designed chopper pumps for mixing and feeding Wet system
- In store hand fed compact units for de-packaging, separation and volume reduction
- Turn Key projects, from design to startup.

Doda Bio-Separator Advantages

- Up to 20 Ton per hour throughput of food waste
- Very Robust, can treat a variety of waste streams without additional setup
- Reinforced Stainless Steel construction with few easy replaceable wear parts
- Up to 99% removal of non-organics from food waste
- Minimal use of fresh water as not to increase overall volume
- Volume reduction for Transport and Tipping fees savings
- Recycled food waste can be used as compost for fertilizer replacement
- Creation of an Anaerobic Digester waste stream with High methane production potential
- Reducing GHG (Methane) emissions from landfills and waste combustion
- Improved sanitation, public safety and health for both your facility and community

DODA® USA Inc.
ORGANIC WASTE SOLUTIONS

255 16th Street South
St. James, MN 56081
Tel: 507-375-5577●Fax: 507-375-5578
http://www.dodausa.com

Equipment List

- Hopper
- Bio-Separator
- USA made and CSA approved Control Panel
- Two 25 HP Transfer pumps
- Two 6" Gate Valves
- Hydraulic unit (for tilting the Hopper, opening and closing of Lid and Gate Valves)

Supporting equipment requirements

- Front Loader for loading the Hopper (not included)
- Storage tank (not included)
- Piping
- Odor control (not included)

Accessories

- Lid for Hopper
- Walk Path
- Piping and Valves
- Hydraulic Unit for Tilting and opening of Lid
- Distribution Box for mixing and loading of Storage tank

APPENDIX D

FOG Receiving Equipment Data

The Beast

Septage-FOG-Sludge Screening System

VFA-DM

SAVI

Patent Pending

Septage Beast Property of Devonshire Island of Bermuda

The BEAST

Enviro-Care™
A WAMGROUP® Company

WAMGROUP®

The Beast VFA-DM

Septage-FOG-Sludge Screening System

The Next Generation of Septage, FOG & Sludge Screening

FOG Beast Property of Frederick Winchester VA

Screening septage, FOG or sludge comes with a long list of problems. The two biggest complaints are the inability to process heavy solids and long truck unloading times. These problems are the result of not having the proper equipment for the application. The Beast has been engineered specifically for septage and heavy solids loading applications.

Unique Tank Design. Standard tank designs promote solids sedimentation. The Beast has a two-stage tank with a curved, sloped inlet section that directs the flow into the screen cylinder. The hopper trough extends beyond the cylinder opening which reduces screenings recycle. The screen is supported at the drive end which eliminates the need for support arms and solves the ragging problem.

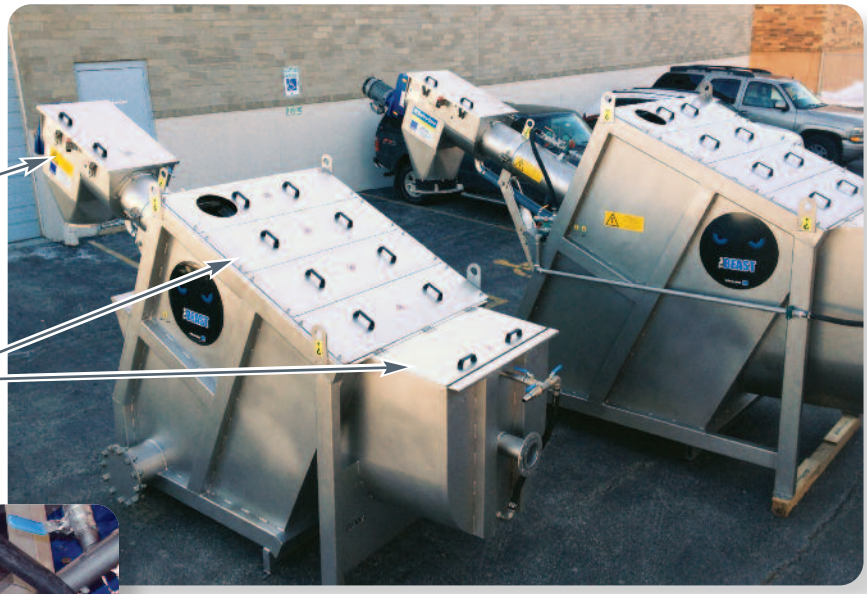
Dual Drive System. This feature enables the screen basket and auger to operate independently. The speed of the auger is increased to provide faster solids removal while the speed of the screen basket is decreased to improve capture efficiency.

Angle of Inclination. The drum screen component sits at a 25° angle inside the tank to enhance capture even further.

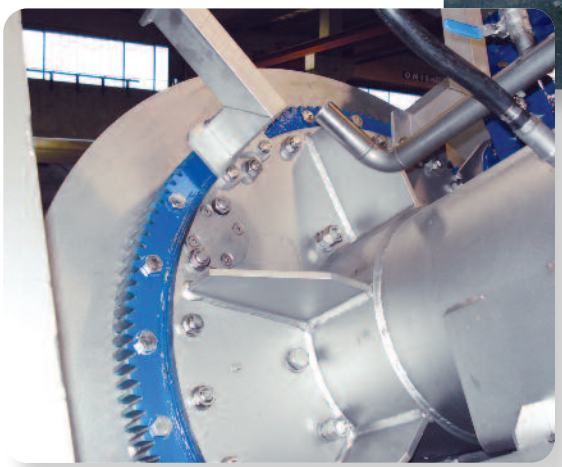
Sequence of Operation. As the pumped flow enters the tank, it is discharged directly into the rotating screen basket. As the screen rotates, solids are captured on flights or scoops that carry the solids around the basket and deposit them into the auger trough.

From the trough, solids are conveyed by the auger into the washing zone and then to dewatering. The percent of dryness achieved is dependent upon the solids concentration and the type of solids in the influent. Solids capture is 65% or greater based on the material in the flow.

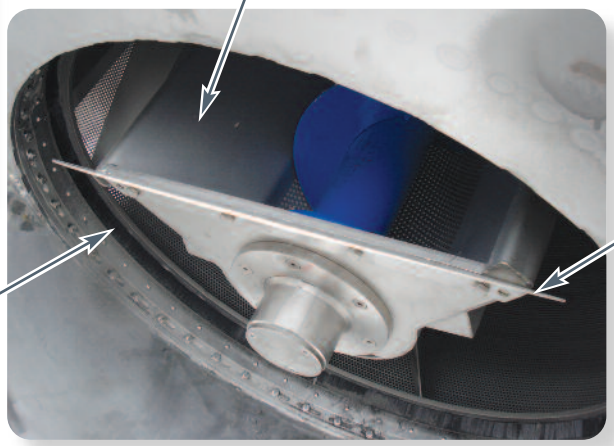
Enviro-Care
A WAMGROUP® Company



Beast 1200 & 1400 side-by-side



4 Heavy duty industrial bearing assembly



Features & Benefits

1 **Engineered for large, heavy solids loading applications requiring fast processing -** Each feature solves a specific problem associated with these applications.

2 **Proven Flo-Drum technology -** Over 300 installations worldwide.

3 **Dual drive system -** Drum and auger are driven independently to optimize solids capture and removal.

4 **Screen is mounted using a large diameter, single row, heavy duty industrial bearing assembly with a built in grease fitting -** Better resistance to axial and radial loading with fewer maintenance points.

5 **Two-stage tank design narrows the inlet -** Solids are fed directly into the screen basket which prevents sedimentation.

6 **The auger is run at a faster speed -** Removes the solid material faster.

7 **The screen cylinder is run at a slower speed -** Produces better solids capture and cleaning of the screen.

8 **Dual seal on the screen cylinder -** Prevents bypass and improves capture of fine material.

9 **Angle of inclination is 25° -** Screen handles more solids and removes them faster.

10 **Trough extends beyond the screen opening -** Reduces screenings recycle by preventing solids from dropping out of the front of the screen basket.

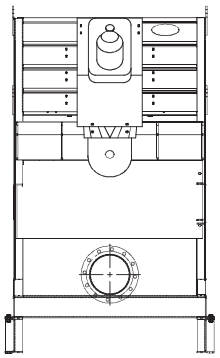
11 **No support arms on the influent side of the screen drum -** Nothing to snag and accumulate long stringy solids.

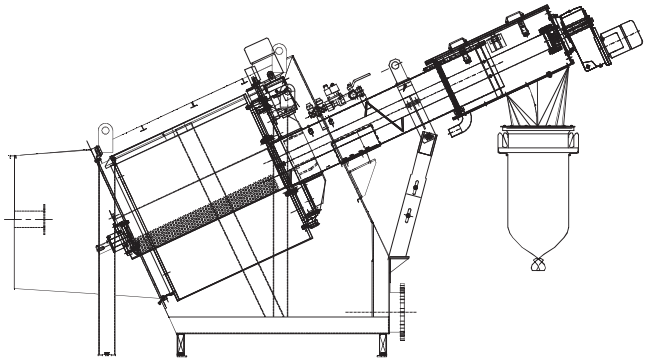
12 **Eliminates brushes inside the screen basket -** Less extrusion and manipulation of the screenings for better capture and less maintenance.

13 **Additional monitoring options and security access may be added -** Controls can be as basic or as sophisticated as required.

14 **Optional bagger is available -** Maintains a cleaner screenings area.

Phone: 815.636.8306 • Fax: 847.672.7968
E-Mail: ecsales@Enviro-Care.com • www.Enviro-Care.com





Specifications

Drum Screen OD	mm	800 Septage Only	1200 Septage-FOG-Sludge	1400 Septage-FOG-Sludge
Capacity (at 3-4% solids content)	gpm	450	660	875
Screen type		Perforated plate	Perforated plate	Perforated plate
Openings	mm	6	6	6
Angle of inclination		25°	25°	25°
Wash water	gpm/psi	30 @ 60-70	43 @ 60-80	43 @ 60-80
Drive motor - Drum Screen	Hp	1.5	2	2
Drive motor - Shafted Screw	Hp	1.5	2	2
Controls		NEMA 4X or NEMA 7	NEMA 4X or NEMA 7	NEMA 4X or NEMA 7
Voltage	V/P/H	240/480/3/60	240/480/3/60	240/480/3/60

Materials of Construction

Screen media	AISI 304 SS (316 Optional)
Transport tube	AISI 304 SS (316 Optional)
Shafted screw	High Strength Alloy Steel (304/316 SS Optional)
Tank, piping, supports, end plates	AISI 304 SS (316 Optional)
Fasteners	AISI 304 SS (316 Optional)

Enviro-Care™
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www.Enviro-Care.com

JWC Environmental®
Trust Monster Quality™

HONEY MONSTER®

Overview

The automated Honey Monster receiving and screening system quickly tracks and screens septage, grease or sludge to remove unwanted debris. Our model SRS-XE system uses an auger screw and perforated screening basket with 6mm circular openings to remove rocks, rags, plastics, silverware and other trash. It provides complete protection for downstream equipment and the treatment plant.

The unique combination of grinding, solids removal, washing and dewatering allows a typical septage truck to unload in 5 to 15 minutes. The system is completely enclosed to ensure safety, vector control and to capture foul odors.

The optional 'MonsterTrack' metering and control system uses a flow meter to track septage and provide accurate billing data for the facility and a receipt for the hauler.

Features & Benefits

Advanced Screening and Dewatering
- Auger Monster screen with 6mm perforations removes unwanted solids and trash
- Perf screen captures far more than bar screens
- Patented dual compartment compaction zone provides significant additional dewatering

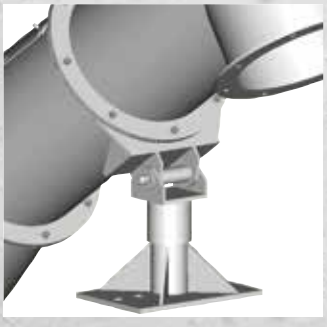
Easy Access, Pivoted Auger
- The auger is mounted to a pivot support for easy inspections and removal
- A forklift or crane can lift and swivel the screening trough and auger out of the tank

Dual-Shafted Grinder
- Muffin Monster® grinder maximizes surface area of solids for better washing and compacting

Triple-manifold Wash Water System
- Washes soft organics off of captured debris
- Ensures optimal throughput while minimizing odors

High Level Ultrasonic Sensor
- Regulates plug valve for optimum performance
- Baffles prevent overflow conditions

Optional 'MonsterTrack' System
- Records driver information and measures flow data
- PIN or card access for security
- Printed transaction receipts
- Data stored on compact flash card
- Ethernet/SCADA connection capable



Exclusive Tilt and Swivel Auger

MonsterTrack

Track Loads with MonsterTrack!

www.jwce.com

Honey Monster®

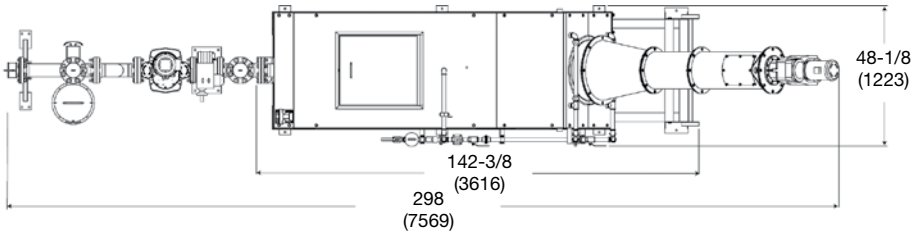
Model: SRS-XE - Septage Receiving with Automated Solids Removal

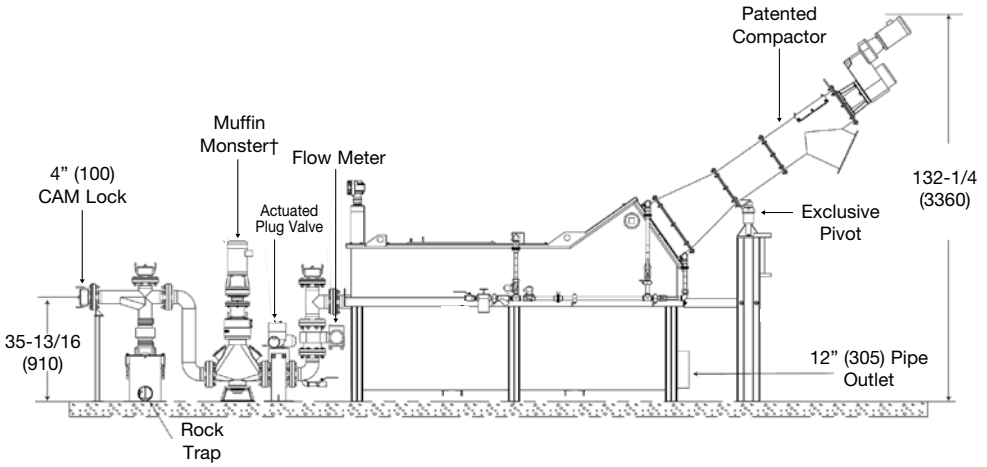
Materials of Construction

Tank, piping & Support: 304 stainless steel
Auger Assembly: Casings and trough are 304ss; rotor is 480mm Ø alloy steel
Grinder Housing: Ductile iron housings ASTM A536-77
Cutters: Hardened alloy steel
Mechanical Seal Faces: Tungsten carbide

Model	Screen Diameter	Auger Motor	Screenings Capacities	*Typical Septage Flow Capacity
SRS3235-XE	19” (480mm)	2 HP (1.5 kW)	90 ft3/h (2.55 m3/h)	400 gpm (25.2 l/s)

**Up to 63 l/s through tank screen (clean water)* **Recommended max 1 bar*





Configurations

1. Septage Screening
2. Sludge Screening
3. Grease Screening

Options

- 40K Series Muffin Monster grinder for higher-flows
- 6” (150) mm inlet pipeline
- Cold weather protection system
- Discharge bagger
- pH and conductivity sensing loop
- 316 stainless steel pipe and tank
- MonsterTrack billing controller
- Skid mounted system

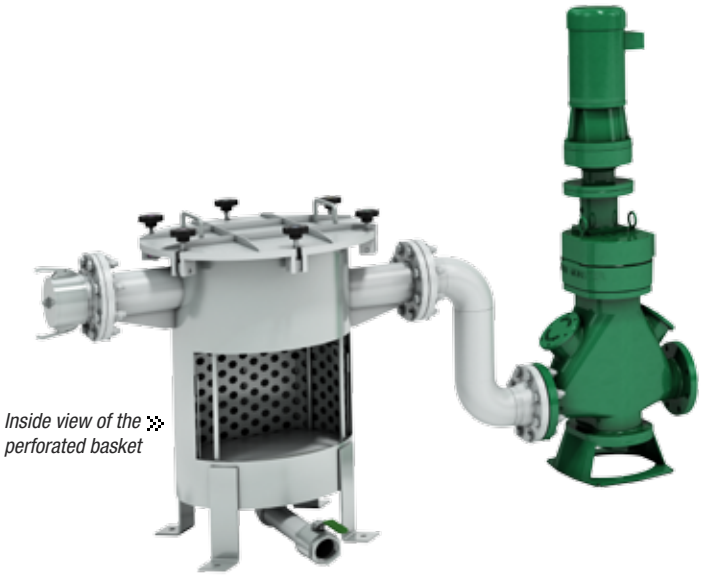
Rock Trap

Shredded Material Moving Up the Auger Screw for Disposal

Cold Weather Protection and auto bagger

800.331.2277 | jwce.com | jwce@jwce.com

Grease Receiving



Inside view of the perforated basket

Model: GRS - Heavy Object Trap + Muffin Monster

MODEL	Pipe Size - (mm)	Basket Capacity
GRS0103-1804	4 (100mm)	1.1 ft3 (0.03 m3)
GRS0103-2004	4 (100mm)	1.5 ft3 (0.04 m3)
GRS0103-2404	4 (100mm)	*2.2 ft3 (0.06 m3)
GRS0103-1806	6 (150mm)	1.1 ft3 (0.03 m3)
GRS0103-2006	6 (150mm)	1.5 ft3 (0.04 m3)
GRS0103-2406	6 (150mm)	*2.2 ft3 (0.06 m3)

**Lifting station recommended to empty basket*

Overview

This trap features adjustable bar screens to capture and direct heavy objects into the debris basket. As trucks unload grease, the silverware, rags, knives and other large debris are removed. The Muffin Monster then homogenizes the grease – breaking grease solids into an easy to pump slurry. Optional MonsterTrack billing controller, flow meter and modulating plug valve are also available.

Flow Capacity

- 4” pipe - 400 GPM (25 l/s)
- 6” pipe - 600 GPM (38 l/s)
- Flow Rate - max. 15 psi

Features

- 5HP (3.7) kW Grinder Motor
- Hot Water Wash Down (supplied by others)
- Adjustable bar spacings 1/2” or 1” (12 or 25mm)

Septage Receiving

Model: SRS3000 - Rock Trap + Muffin Monster

MODEL	Pipe Size - (mm)	Basket Capacity
SRS3000-1204	4 (100mm)	**0.18 ft³ (0.005 m³)**
SRS3000-1206	6 (150mm)	**0.24 ft³ (0.007 m³)**

Overview

This small rock trap is a good choice for small sites receiving only a few thousand gallons per day. The perforated screening basket has 1/2” (12mm) circular openings and captures rocks and silverware.

Flow Capacity

- 4” pipe - 400 GPM (25 l/s)
- 6” pipe - 600 GPM (38 l/s)
- Flow Rate - max. 15 psi

Features

- 5 HP (3.7 kW) Grinder Motor

Multiple piping configurations available to suit your location.
Contact the factory for more information.

Operation

1) Haulers connect to the cam lock inlet and start the flow of septage which first passes through the rock trap.
2) Muffin Monster grinds-up solids.
3) Ultrasonic level sensor and modulating plug valve regulate flow.
4) If the 'MonsterTrack' option is installed, the flow meter sends data to the controller.
5) Septage and solids now enter the perf screening trough. Spray wash cleans the solids and keeps the screen clear.
6) The unwanted solids are captured by the inclined auger screen and transported to the compaction zone for additional dewatering before being discharged.
7) The screened septage now safely flows into the wastewater treatment plant.


Skid Mounted System


Muffin Monster®


Optional Endless Bagger


MonsterTrack™ Billing Controller


Heat Tracing and Blanket

JWC Environmental®
Trust Monster Quality™

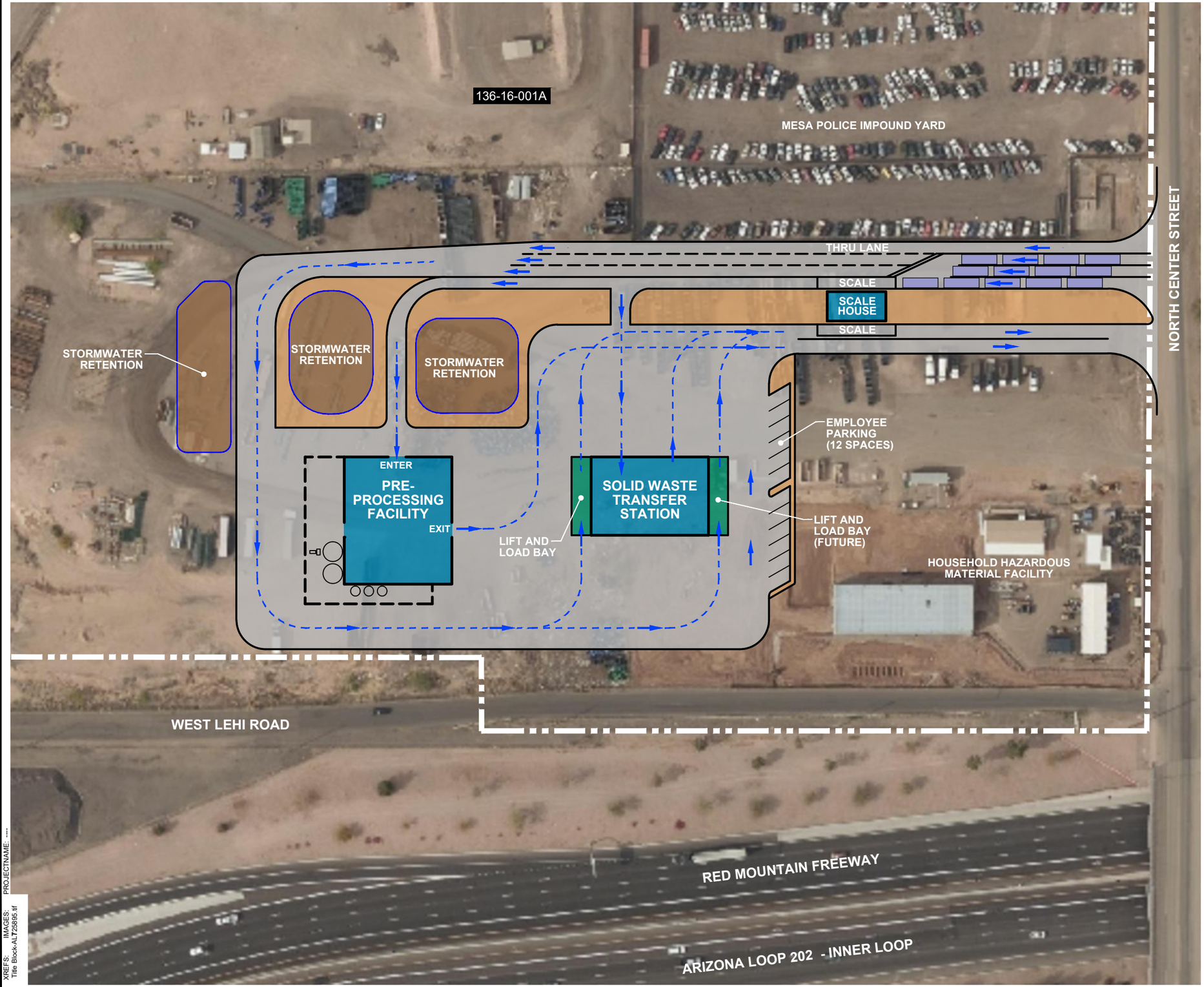
Headquarters
2850 S. Red Hill Ave., Suite 125
Santa Ana, CA 92705 USA
toll free: **800.331.2277**
phone: **949.833.3888**
fax: **949.833.8858**
email: **jwce@jwce.com**

www.jwce.com

(HoneyMonster-NA-JWCE-1216)

APPENDIX E

Site & Facility Layout Figures



LEGEND:

- PROPERTY BOUNDARY (APPROXIMATE)
- TYPICAL TRUCK ROUTE
- PROPOSED ASPHALT
- PROPOSED LANDSCAPE AREA
- PROPOSED STORMWATER RETENTION
- 36' WASTE TRUCK STACK (13)

NOTES:

1. APPROXIMATE PROPERTY BOUNDARY PROVIDED BY THE MARICOPA COUNTY ASSESSOR'S OFFICE (maps.mcassessor.maricopa.gov).
2. AERIAL PHOTOGRAPH PROVIDED BY MICROSOFT CORPORATION 2019 DigitalGlobe.
3. TURNING RADIUS AS SHOWN ACCOMODATE CITY REFUSE TRUCK (17' WHEELBASE) AND STAA-STANDARD (US) CALTRANS 2012 SEMI-TRUCK (40' TRAILER).
4. THIS SITE LAYOUT ASSUMES NO PUBLIC ACCESS.
5. SEE FIGURE 5-2 FOR PRE-PROCESSING FACILITY.
6. SEE FIGURE 5-3 FOR SOLID WASTE TRANSFER STATION.

0 100' 200'

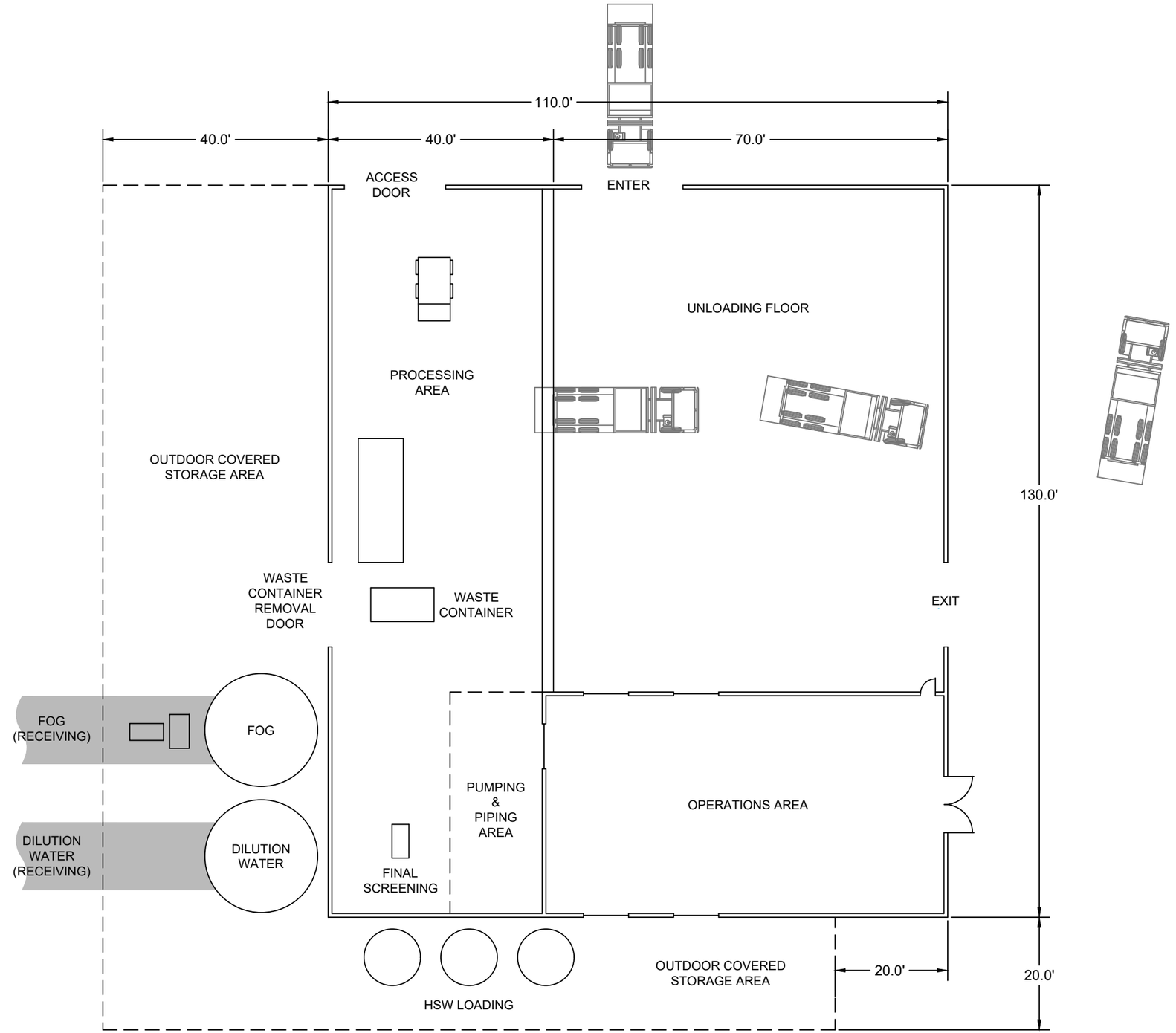
GRAPHIC SCALE

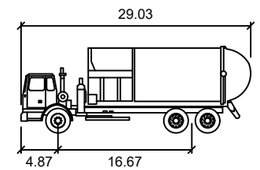
CITY OF MESA
CENTER STREET YARD
SOLID WASTE TRANSFER STATION

CONCEPT SITE LAYOUT

ARCADIS Design & Consultancy for natural and built assets

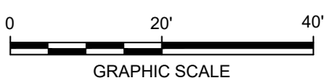
FIGURE 5-1





Wayne Curbtender

	feet
Width	: 8.00
Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 45.0



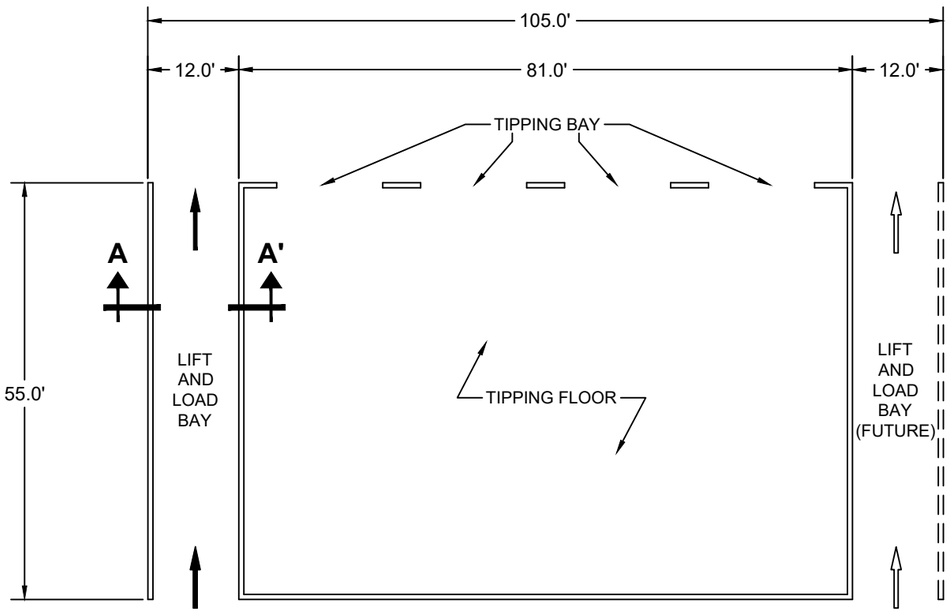
GRAPHIC SCALE

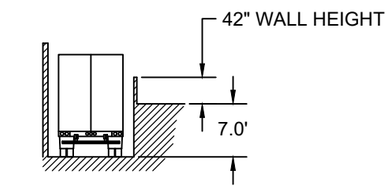
CITY OF MESA
CENTER STREET YARD
SOLID WASTE TRANSFER STATION

PRE-PROCESSING FACILITY CONCEPT FLOOR PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5-2





SECTION A-A'

GRAPHIC SCALE

CITY OF MESA
CENTER STREET YARD
SOLID WASTE TRANSFER STATION

SOLID WASTE TRANSFER STATION CONCEPT FLOOR PLAN

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5-3

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