CENTRAL COMPOST FACILITY

Brookfield, Prince Edward Island, Canada

ADI International was awarded the prime contract to design, build and operate the Central Compost Facility in Brookfield, Prince Edward Island. The facility was designed to process 30,000t of source separated organics per year into Category A compost. Feedstock includes municipal solid waste and industrial organic wastes from across the province. Paramount concerns of the owner were odour control and groundwater protection. The project was constructed on a 27ha site of former farmland along Highway No. 2 approximately 15km west of Charlottetown, Prince Edward Island.

Containerized composting technology was selected as the most effective solution for compliance with the requirement for in-vessel composting and the stringent environmental requirements related to odour control and groundwater protection. The process utilizes forced ventilation with treatment of ventilation air for odour reduction. There are 52 stainless steel-lined containers with a capacity of 22t per container, making this one of the largest containerized composting facilities in the world.

RECEIVING AND PRE-PROCESSING. Source separated organic feedstock is delivered to the site by commercial haulers. Incoming organics are weighed and categorized, then directed to the Receiving Building where the organics are dumped on the enclosed tipping floor. Here the material is visually inspected and obvious contaminants are removed. The organic material is then loaded into a coarse shear shredder for size reduction and then onto a conveyor belt for magnetic removal of ferrous metals, across a star screen for removal of oversize material and past an inspection station for removal of other contaminants. The feedstock is discharged into a holding bunker. Over 90 percent of the oversized materials removed by the star screen are cardboard, box board, or wood which are conveyed to a paper shredder. The shredded materials are discharged into a separate holding bunker for use as bulking materials.

Additional bunkers for homogeneous organics and amendment materials are also provided in the Receiving Building. Leaf and yard waste received during spring and autumn cleanups and oversize tree waste are received on an asphalt pad and stored outside. These materials are periodically ground and gradually introduced in the compost process as amendment materials.

COMPOSTING. An important aspect of composting is proper blending of various feedstock to achieve the desired carbon to nitrogen ratio (C:N) and moisture content. This is accomplished by batching a blend of feedstock materials into a vertical mixer and adding leachate for moisture adjustment. The blend of feedstock is loaded into the containers by means of an automated loadout conveying system. The containers are sealed and transported to the outdoor container pads for composting.

To promote rapid composting the environment inside the containers is carefully maintained by the compost aeration and control system. The containers are connected to the aeration system and aeration for each container can be individually controlled based on the residence time and the temperature. The stainless steel floor of the containers is perforated to promote even distribution of the air flow through the compost. Periodic aeration has proven to yield the best results, with more frequent aeration early in the cycle to initiate biodegradation and reduced frequency as the temperature increases. Temperature of the compost is measured by probes inserted into the containers. Material is held in the containers approximately 10 days which is sufficient time to complete the initial phase of composting.

CURING. In the Curing Building the containers are emptied on the floor and the compost material is placed in aerated static piles to continue the composting process. The material is placed first in the Phase 1 Curing area for 3 to 4 weeks where temperatures in excess of 55°C are maintained for several days to ensure reduction of pathogens. The compost is then moved to the Phase 2 Curing area for another 3 to 4 weeks. This movement of the material provides mixing action to produce more uniform results. Aeration of the static piles is provided by floor trenches spaced at 2 metre intervals for even distribution. Water is added as required during Phase 1 Curing to maintain beneficial moisture content.

REFINING AND STORAGE. Compost is moved from Phase 2 Curing to the Storage area where the compost is screened and stored until shipped. The screening operation separates the compost into 3 size categories; 75 percent compost (less than 12mm); 20 percent mulch (12mm to 30mm) and 5 percent oversize. The compost and mulch fractions are suitable for sale as soil conditioner, or can be recycled through the process as amendment. The oversize material is sent to landfill.

ODOUR REDUCTION. Reduction of odours emitting from the facility is a critical aspect of a compost facility due to the immediate negative impact odours have on people living near the site. To provide the necessary odour reduction, air is exhausted from the Receiving Building, the containers, the Curing area, and the Storage area through two biofilters. Each biofilter is designed to treat an airflow of 32,000 CFM. The biofilters were designed using a full plenum under a 1.5m deep layer of shredded root stock media. The biofilter media requires control of both temperature and moisture to maintain efficient absorption of odourous gases.