Composting
FACTSHEET

BRITISH COLUMBIA
Ministry of Agriculture, Food and Fisheries

Order No. 382.500-6
Agdex: 537/727
September, 1996

SITE SELECTION FOR COMPOSTING

The site selected for the collection, storage and composting of agricultural wastes must be in full compliance with the *Code of Agricultural Practice for Waste Management,* (hereafter referred to as the Code), and in a manner that prevents pollution. **The Code should be consulted before selection of a composting site.** Figure 1 shows the setbacks required by the code.

Refer to ***Regulations Affecting Composting***, Factsheet No. 382.505-12, and ***Co-Composting With Off-Farm Wastes,*** Factsheet No. 382.505-13, when non-agricultural wastes are brought onto the farm. The composting operation must meet B.C. Environment, Waste Management Requirements and may need to obtain a Waste Management Permit.

It is not feasible to transport low-value materials a long distance. Economic management of composting should minimize transportation cost. Transportation that may be involved in a composting operation include movement:

1. of raw composting material to the site, and
2. of compost to the final processing/storage area.

It is most convenient to set up the composting operation close to the source of the solid waste. Selection of the composting site is largely dependent on the existing layout of the farming operation.

Machines, such as a compost turner, front-end loader and trucking vehicle, are frequently used in composting operations and can take up considerable space. The composting site should also be selected in such a way that easy access of machinery does not interfere with existing operations and structures. Adequate space should be available for, to allow for future expansion.

SITE DESIGN

The area required for composting depends on the amount of waste to be received and the amount of bulking agents required. Generally, one_cubic metre of raw composting material will require about 0.8 square metres of ground area for a windrow setup. Detailed dimensions for different types of windrow composting are illustrated in Figure 2.

The composting site should be paved with either concrete or asphalt to avoid groundwater contamination. Floors also provide a good environment for compost quality control by preventing foreign materials from entering into windrows. After heavy rain showers, it is easy to drain the water on a concrete floor. Concrete floors may be more expensive than asphalt; however, asphalt floors deteriorate faster.

Runoff and leachate collection must be considered when site grading. The grade should be designed in such a way that the liquid leachate from compost can flow freely to a centre point for collection, and be applied to the windrow when the windrow becomes too dry.

A roof over a compost windrow/pile is likely required in B.C.'s South Coastal area during the winter rainy season. Too much rain may slow the composting process by causing anaerobic zones to develop. A roof also reduces costs of building runoff storage basins.

If the composting material is too wet, nutrient-rich liquid may leach out. This liquid should be properly collected to avoid it entering watercourses. Figure I also shows a simple runoff and leachate collection system suitable for an uncovered facility in an area with rainfall less then 600 mm (24 in). The leachate collected can be applied back to the windrow as a nutrient source. A berm around the composting site will also prevent runoff from entering a watercourse.

Composted materials may become too dry due to evaporation and water will be required to adjust the moisture content back to a suitable range. Sprinklers can be used to spread water evenly onto the composting mass.

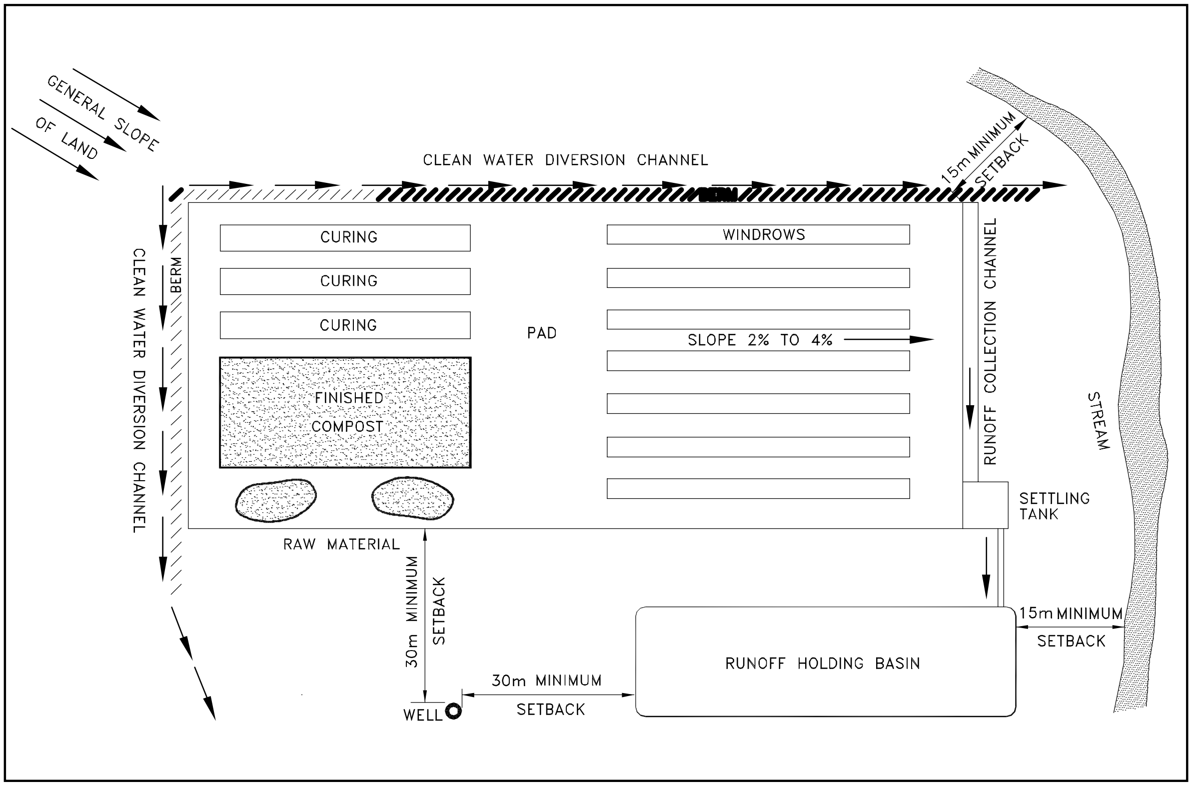

Figure 1 Site Layout Setbacks and Drainage Diagram

Approximately the same area required for the composting process should be available for curing. Curing should be done under a roof. The space required for packaging includes the area occupied by the packaging machines and temporary storage area.. Space should also be assigned for storage of the finished compost. Roofed storage is not required for finished produce packaged in plastic bags. Site planning should also account for extra storage space needed in the eventuality of slow market conditions.

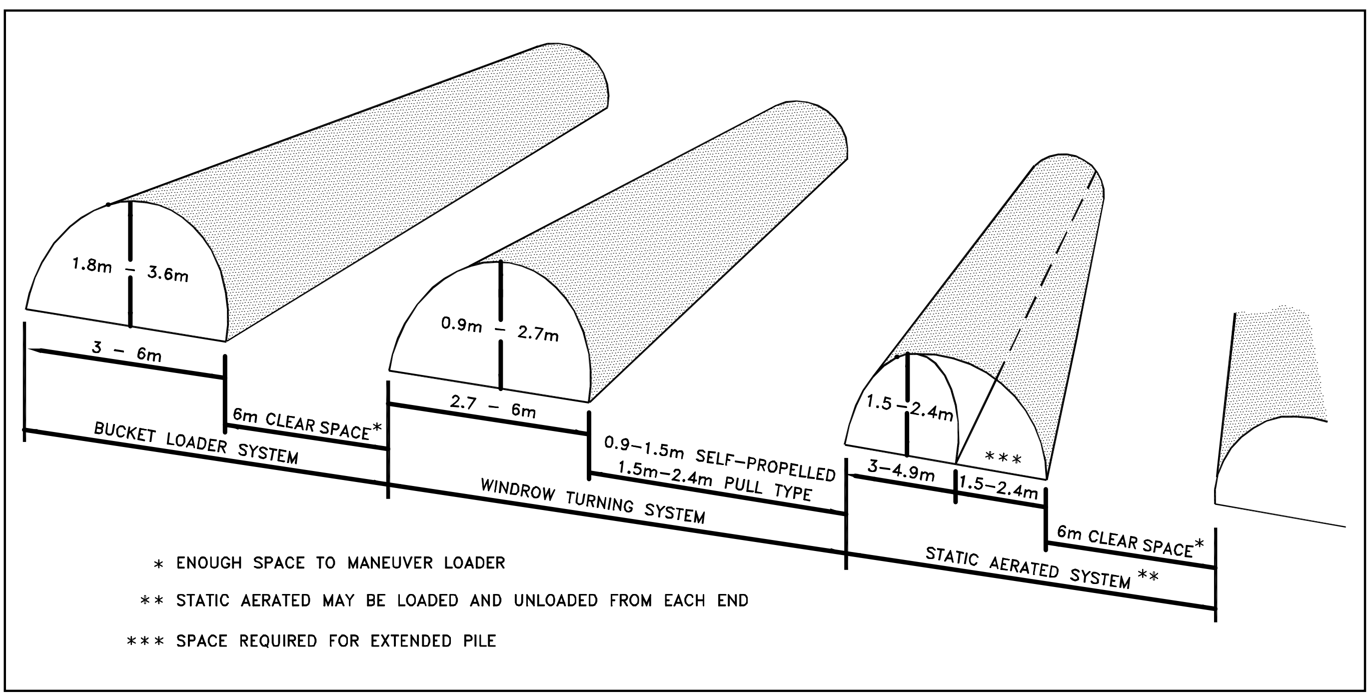

Figure 2 Typical Dimensions and Spacing for Windrows

EXAMPLE LAYOUT

Size an outdoor turned windrow facility to handle 38 tonnes/week (2000 tonnes/yr) of manure

1. Given:
   - a bulk density for solid manure equals 700 kg/m^3 (0.7 tonnes/m^3)
   - an equal volume of bulking agent and manure used to achieve the correct C:N ratio
   - 50% shrinkage after active composting
   - 6 weeks required for the active composting phase
   - windrows have a 3.7 m (12 ft) base, 1.2 m (4 ft) height, and volume of 3 m^3/m length (32 ft^3/ft)
   - 4 weeks required for curing
   - curing piles have a 5.5 m (18 ft) base, 1. 8m (6 ft) height, and volume of 6.75 m^3/m length (72 ft^3/ft)
   - up to 9 weeks storage is expected with piles 2.4 m, (8 ft) high

2. Calculate Size of Windrows:

$$\text{Volume manure handled per week} = \frac{38 \text{ tonnes}}{0.7 \text{ tons/m}^3} = 54.3 \text{ m}^3$$

Volume bulking agent required equals volume manure = 54.3 m^3

Total volume of manure and bulking agents = 54.3 m^3 + 54.3 m^3 = 108.6 m^3

$$\text{Windrow length required} = \frac{108.6 \text{ m}^3}{3 \text{ m}^3\text{/m length}} = 36.2 \text{ m (120 ft)}$$

Answer: Since 6 weeks are required for the active composting phase,
6 windrows each 36.2 m long are necessary.

3. Calculate: Size of Curing piles:

Volume to be cured = 108.6 m^3 x 50% shrinkage = 54.3 m^3 /week

Pile size: 4 wk. x 54.3 m^3 = 217.2 m^3 total

$$\text{Pile length:} = \frac{217.2 \text{ m}^3}{6.75 \text{ m}^3\text{/m length}} = 32.2 \text{ m (for the full 4 week curing stage)}$$

Answer: A single curing pile 32.2 long or two, each 16.1 m long is adequate.

4. Calculate: Size Storage Area:

Volume of compost requiring storage per week = 54.3 m^3/wk

Pile Volume: = 9 wk. x 54.3 m^3/wk = 488.7 m^3

$$\text{Pile Size:} = \frac{488.7 \text{ m}^3}{2.4 \text{ m height}} = 204 \text{ m}^2 \text{ or } 10.2 \text{ m x } 20 \text{ m}$$

Answer: A pile measuring 10.2 m by 20 m is necessary.

5. Figure 3 shows a possible layout for this size of outdoor composting facility. The total site area setbacks, work space, etc. covers 0.4 hectares.

6. Calculate: Size Runoff collection pond using the following assumptions:

- the six month rain in the worst 25 years is expected to be 500 mm (19.7 inches)
- 100% of the precipitation falling on the hard surface will run off
- about 25% of the precipitation falling on the windrows and other piles will run off

Runoff from hard surface	=	$1500\ m^2$ x 500 mm x 100%	=	$750\ m^3$
Runoff from piles	=	$175\ m^2$ x 500 mm x 25%	=	$147\ m^3$
		Total	=	$897\ m^3$

Answer: A concrete runoff basin 10 m x 5 8.5 m x 3 m deep, with 1: 1 sidewalls, will contain the $897\ m^3$ of runoff plus the $393\ m^3$ of precipitation that will fall into the basin during the worst winter six month period expected in a 25 year period. A possible layout is shown in Figure 3.

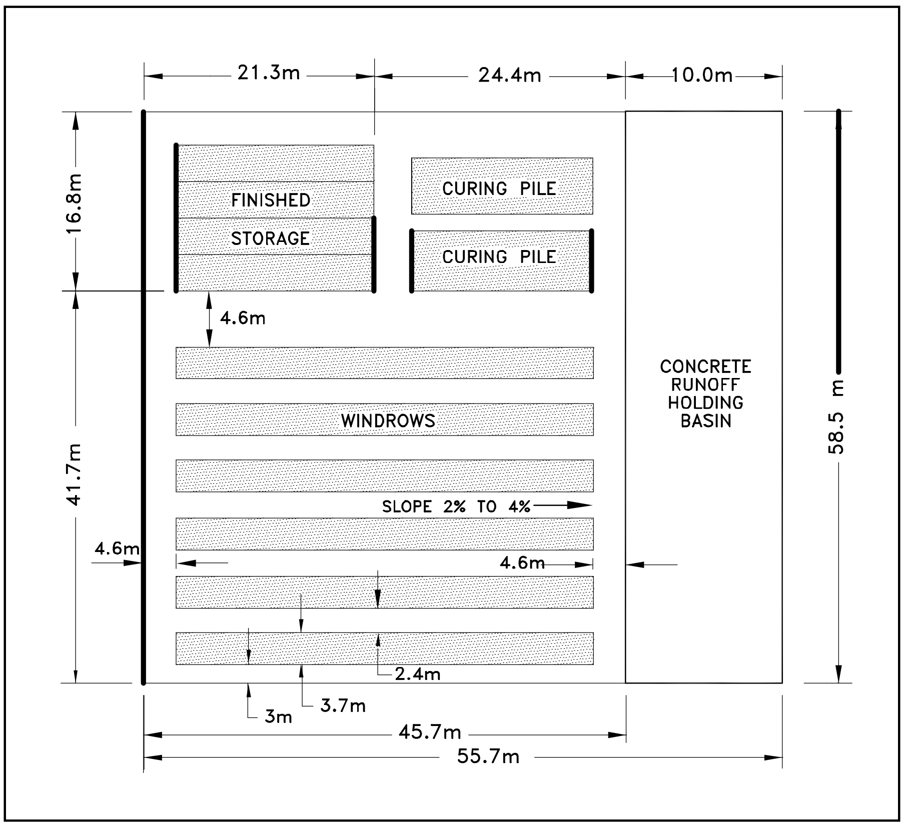

Figure 3 Outdoor Composting Facility as per Sample Calculation on Page 3

This is one of a series of Factsheets on Composting. A list of references used in producing this series is included in the Composting Factsheet "***Suggested Reading and References***."

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