BOMA BEST® Building Environmental Standards

BOMA BEST Sustainable Buildings 3.0
Waste Auditing Requirements

This document provides the requirements for completing an audit compliant with the BEST Practice.

For a more comprehensive description of the requirements and for additional suggestions (not required) on performing a meaningful waste audit, download the Waste Auditing Guiding Principles.

Pre Audit:
1. Selecting an audit team
The audit must be performed by a person with adequate qualifications as well as suitable training and experience.
2. Create an auditing plan
The audit plan should be developed by the audit team leader in agreement with the audit client. The audit plan describes the activities and arrangements for the audit. The methodology selected must **always be adapted to the needs and particular characteristics of each client and each site**. Sound methodology takes into account the specific nature of the site assessed in order to obtain precise, consistent results that correspond to the building manager's requirements. The audit plan must include the following considerations.
1. Audit profile
Provides an overview of the current waste management program and the activities, products and services being performed at the site. The profile should consider the number of operational days at the site, the size of the facility, and other sector-specific data that may impact the amount and nature of waste being generated.
2. Audit scope
Describes the sampling time period, activities and geographic locations to be included in the audit. Defined by the audit client and confirmed by the audit team leader. Includes: • **Scope of materials**: Determine which materials will be included in the audit and which will not be included. a. Include: Any solid waste generated at the site during regular activities. If a material is included in the annual diversion rate calculation, it must be included in this audit. Generally speaking, include materials such as hazardous waste and durable goods. b. Do not include: Any material that is generated through temporary or atypical activities. Materials generated through atypical activities should have their own audit (not part of the BOMA BEST compliant audit scope). Generally speaking, exclude materials generated through construction, renovation and demolition (unless you intend to include it in the annual diversion rate

calculation).

- **Sample Size and Date:** Determine an appropriate sample size and date (determined by the audit client and verified by the auditor as being sufficiently representative). Determine a typical time period of operation, preferably avoiding time periods of surges or lulls in solid waste generation (such as holidays, shutdowns, etc.). To be compliant with BOMA BEST, there is no minimum requirement for duration of the audit. Ensure that the sample size captures at least 10% (minimum) of the facility's daily waste generation based on typical operations.
- **Tracking requirements:** Determine the tracking requirements appropriate to the site. In all cases, the date of collection as well as the collection stream must be recorded. Areas that are deemed out of scope should be identified with a rationale as to why they were out.
- **Records:** Determine how reliable records will be obtained for each of the materials included in the scope. This is especially important for materials that are not collected through the regular collection points (such as hazardous materials, durable goods, wood pallets, etc.). Materials diverted through tenant-led initiatives (e.g. paper shredding) should be included in the audit (and consequently the diversion rate calculation) if the landlord is actively supportive of the initiative (i.e. providing resources to assist).
- **Ensuring reliability:** The auditor should confirm that the sampling period for the audit will not have any changes in operations that will significantly affect the quantity or composition of the waste sample. Any anomalies encountered or suspected should be confirmed and recorded in the audit report.
- **Communicating the plan:** Detailed instructions should be supplied to the building team in advance through a written communique and/or an opening meeting. Ensure instructions are supplied to any contractors that are involved with solid waste, such as maintenance contractors or night cleaning staff. Outbound waste containers should be locked or taken out of use for this period.

3. Audit objective

The key objective of an audit is to verify annual service reports and diversion claims. It is the key document upon which is based, and which supports, future management decisions.

4. Audit criteria

The waste audit must be conducted to meet the requirements of the relevant municipal, provincial or federal regulation.

5. Acceptance criteria

Discuss and review what is expected in terms of process for staging the audit as well as acceptable levels of contamination for all materials reused, recycled and disposed. If commingling of recycled materials is performed, discuss the implications here.

3. Prepare sampling area

Identify a sample inspection area that is protected from the elements. The sample should be stored in a dry, cool (not freezing) sheltered area.

In consultation with the building's cleaning staff, the audit team leader should determine how much waste and recycling is typically generated over the sample time period. For example, if material is collected in bags, the audit team should determine an estimate of the number of bags of waste and recycling typically generated in each functional area and create labels or tags for each of these bags.

On-Site Activities

4. Qualitative activities

Through on-site interviews or a pre-audit questionnaire, auditors should obtain the following information:

- Operational days: How many days per year does the facility operate?
- Other materials: Which materials will not be included in the waste audit sample? Obtain records for these. For example, temporary bins or materials sent out for external reuse.
- A profile of each solid waste stream generated:
    - The name of the material, product or waste stream. (e.g. fine paper, PET drink containers, glass, etc.)
    - A description of how the waste is generated.
    - A description of the management decisions and policies that affect the generation of this material.
    - A description of the acceptance criteria for this stream.
    - A description of the source separation program for this stream.
    - Determination if the waste stream is divertible in current viable markets and a related explanation if the material is deemed not divertible.

5. Quantitative activities

- **Calibrating the scales**: It is the auditor's responsibility to ensure that the scales used for weighing the waste are properly calibrated (should be verified or calibrate scales at least once per audit day and keep records). Auditors must ensure that the scale is placed on a level surface and is reset each time the scale used. Auditors must ensure that consistent units are used as appropriate and that the final report is made using SI units (metric tonnes).
- **Sampling method:** The auditor must document the most appropriate sampling method used (such as bulk sorting or sorting per container or bag), or a combination of each.
- **Contamination rate**: If materials destined for reuse or recycling are deemed too highly contaminated as per the pre-determined acceptance criteria, auditors must note the non-conformity in the sampling notes, and the mass of all of the materials in the contaminated sample must be categorized as disposed.
- **Records:** Auditors should obtain waste and recycling records of the past year from the auditee. Auditors should also obtain calibration records of the waste transfer station, hauler, processors, etc., from the auditee. These can be included in an appendix in the audit report. The auditor may use the records to compare against the audit sampling quantitative findings and to determine an annualized total of solid waste generated for disposal, reuse and recycling along with any temporary bins from atypical operations (such as disposal of hazardous waste, durable goods).

6. Data analysis

The analysis must, at the very least, establish an overall picture of the building's performance by providing a summary of waste generated for each of the different measured sub-categories (a and b), the resulting diversion rate (c) and the capture rate (d).

Determine the **mass** of all waste materials and the corresponding destination. This should be calculated for each category waste stream (i.e. cardboard, fine paper, steel) and each **method of disposition** (reuse, recycle,

and disposal).

This is done using an **annualization method** enabling a calculation of the mass of materials generated for an entire year based on any sample size.

In the formulae describing annualization methods, the following variables are used:

Ts is the total material generated in a specific category found in the audit sample.

Tc is the total mass of all materials found in the audit sample with a specific method of disposition (reuse or recycling or disposal.) For materials analyzed during the audit, there will likely be a different value of Tc for all materials sent for disposal, for all materials sent for reuse, and for all materials sent for recycling during the sampling period.

Tr is the annual mass per category of materials of items not found in the audit sample for which there are records or reasonable estimates. These would be materials that would not have been found in the audit sample but are a regularly generated waste stream, such as furniture or wood pallets offered for external reuse. This is quantified and substantiated by records kept by the auditee. These materials should be accounted for in the final calculation.

T*t* is the total annual mass of material, substantiated by records, per container. For example, a site may have records for each haul of a 40-yard bin of waste. Therefore, Tt for this container would be the sum of the mass of all hauls that year for that container.

m is the total annual mass of each material. Note that this should be calculated for each category of waste and for each method of disposition (reuse, recycling and disposal.)

N is the number of operational days per year.

S is the sample size measured in number of days.

a. Extrapolation method of annualization

If annual waste and recycling records are not available or are deemed inaccurate or not verifiable, and if the sample is representative (there are very few fluctuations in the day to day operations of the facility) then the extrapolation method may be used. For each material generated, the total annual mass is:

$$m = \left(\frac{N}{S}\right)(T_s) + T_r$$

b. Mass ratio method of annualization

This method is useful and preferred if the annual waste and recycling records are deemed accurate and verifiable. For each material and for each method of disposition, the total annual mass is:

$$m = \left(\frac{T_s}{T_c}\right)(T_t) + T_r$$

c. Performance indicators: Diversion Rate (D)

The Diversion Rate is the proportion by mass of all waste diverted from disposal (i.e. landfill or incineration) to the total weight of all waste material generated, expressed as a percentage. This number must not include contaminated waste.

The following activities are considered diversion actions: actions to prevent waste materials from being generated, actions to reduce material generation, reuse (internal or external), source-separated recycling, composting (on-site or off-site.) Materials that are treated with thermal applications (incineration or EFW) are

not considered diverted.

The diversion rate can be determined through various methods and combinations such as hauler records, waste audit, etc.

Determine the building's diversion rate based on the following calculation:

[**A** / (**A**+**B**)] x 100

A = Annual mass of all materials currently diverted from disposal
B = Annual mass of all materials currently sent for disposal (includes landfill, incineration and EFW)

Express the mass in metric tonnes or kilograms.

The diversion rate must be based on 12 months of data. Data cannot be older than the past three (3) years.

Only include materials for which there is an established market in the calculation.

Annual mass of all materials currently diverted from disposal includes daily generated waste, but also all other materials diverted from building activities such as e-waste, batteries, lamps, scrap metal, wood debris, etc., that may not be captured by the waste audit.

Annual mass of all materials currently sent for disposal does not include hazardous waste such as hazardous industrial waste, chemicals, PCBs, or waste that is ignitable, corrosive, reactive, pathological, leachate or radioactive. It can include construction, renovation and demolition project waste if it was also included in the waste audit.

d. Performance indicators: Capture Rate (C)

The Capture Rate is the proportion by mass of all waste *currently* diverted from disposal (i.e. landfill or incineration) to the total mass of all waste material that *could have been* diverted, expressed as a percentage. This number must not include contaminated waste. Capture rate calculations are based on all existing opportunities to divert waste materials available in your region, not just the materials collected in the building.

The following activities are considered diversion actions: actions to prevent waste materials from being generated, actions to reduce material generation, reuse (internal or external), source-separated recycling, composting (on-site or off-site.) Materials that are treated with thermal applications (incineration or EFW) are **not** considered diverted.

Determine the building's capture rate based on the following calculation:

[**A** / (**A**+**C**)] x 100

A = Annual mass of all materials *currently* diverted from disposal
C = Annual mass of all materials that *could have been* diverted from disposal, but were found in the stream headed for disposal

Express the annual mass in metric tonnes or kilograms

The capture rate must be based on 12 months of data. Data cannot be older than the past three (3) years.

Only include materials for which there is an established market in the calculation.

Annual mass of all materials currently diverted from disposal includes daily generated waste, but also all other materials diverted from building activities such as e-waste, batteries, lamps, scrap metal, wood debris, etc., that may not be captured by the waste audit.

Annual mass of all materials that could have been diverted from disposal includes the same as the above however these materials were found in the stream headed for disposal.

Post-Audit Activities

7. Audit Report

The audit report must address the amount, nature and composition of the waste; the manner by which the waste is generated including management decisions and policies that relate to the generation of waste; and the way in which the waste is managed.

Audit reports must include:

- A description of the audit sampling method used;
- The sample size;
- The sample date;
- The method of annualization;
- Highlights of observations (annotated and/or photographs);
- Qualitative findings;
- Quantitative findings;
- Recommendations (if in the scope of the audit);
- Waste Reduction Work Plan; and
- Waste audit summary forms or equivalent in in accordance with municipal, provincial and federal regulations.

The report must also include a description of any anomalies and a statement of sampling limitations. The auditor should confirm that the sampling period for the audit did not have any changes in operations which would have significantly affected the quantity or composition of the waste sample.

Frequency

To be compliant with the BEST Practices, the waste audit described here must be completed every three (3) years. However, a yearly audit is recommended along.