# A Guide to Waste Audits and Waste Reduction Work Plans For Construction & Demolition Projects

As Required under Ontario Regulation 102/94

*Protecting our environment.* Ontario

You can view and download the regulation titled *Waste Audits and Waste Reduction Work Plans* by going to www.e-laws.gov.on.ca and entering O. Reg. 102/94 into the search box.

Please direct any questions to the Ministry of the Environment's Public Information Centre at the number listed below.

You can download additional copies of this guide from the ministry's web site at www.ene.gov.on.ca/en/publications/forms/index.php#AuditandReduction or obtain hard copies by calling the Public Information Centre:

135 St. Clair Avenue West, 1st floor
Toronto, Ontario M4V 1P5
Tel: 1 (800) 565-4923
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Il existe une version française de se document.

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*WMPB*
*Revised July 2008*

# PREFACE

This guide will help you understand the requirements of Ontario Regulation 102/94 (O. Reg. 102/94 – Waste Audits and Waste Reduction Work Plans) as it applies to construction and demolition projects.

O. Reg. 102/94 is an integral part of Ontario's efforts to encourage businesses to reduce the amount of waste they produce, to reuse whatever waste they can and to recycle the rest. Businesses need to do this if Ontario is to meet its overall goal of reducing the amount of waste going to disposal.

This guide is intended to help you understand the minimum requirements for conducting waste audits and preparing waste reduction work plans for construction and demolition projects as required under O. Reg. 102/94. The regulation is part of Ontario's 3Rs Regulations (3Rs stand for reduce, reuse and recycle).

- Note that those who are subject to O. Reg. 102/94 must implement a source separation and recycling program in accordance with O. Reg. 103/94. See A Guide to Source Separation of Recyclable Materials for Industrial, Commercial and Institutional Sectors and Multi-Unit Residential Buildings as Required under Ontario Regulation 103/94, which is available from the ministry.

The other guides in the series are:

- A Guide to Source Separation of Recyclable Materials and Leaf and Yard Waste Systems for Municipalities as Required Under Ontario Regulation 101/94
- A Guide to Approvals for Recycling Sites, Leaf and Yard Waste Composting Sites and Compost Use as Required Under Ontario Regulation 101/94
- A Guide to Waste Audits and Waste Reduction Work Plans for Industrial, Commercial and Institutional Sectors as Required under Ontario Regulation 102/94
- A Guide to Source Separation of Recyclable Materials for Industrial, Commercial and Institutional Sectors and Multi-Unit Residential Buildings as Required under Ontario Regulation 103/94
- A Guide to Packaging Audits and Packaging Reduction Work Plans as Required under Ontario Regulation 104/94

**Disclaimer: These guides are for informational purposes only and are not intended to provide specific advice or recommendations in any circumstances. Moreover, these guides are not, and should not be construed as, legal advice. Please review Ontario Regulations 101/94, 102/94, 103/94 and 104/94 and, if you have any questions about the application or interpretation of these regulations or have other legal questions, you should consult a lawyer.**

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# 1.0 INTRODUCTION

O. Reg. 102/94 applies to non-hazardous solid wastes from designated industrial, commercial and institutional (IC&I) sources. This guide focuses on the requirements for waste audits and waste reduction work plans specific to construction and demolition projects.

The implementation of waste audits and waste reduction work plans by those construction and demolition projects required to comply with O. Reg. 102/94 will contribute significantly to the efforts to promote the diversion of waste away from landfills and incinerators as the preferred approach to waste management. Construction and demolition (C&D) waste makes up a large component of the non-hazardous solid waste stream. Efforts to divert C&D waste stream, therefore, will have a large potential for reducing the quantity of materials destined for disposal and increasing the quantity put back into productive use.

Section 2.0 of this guide describes the general requirements for conducting the waste audit, preparing the waste reduction work plan and implementing it. Section 3.0 identifies the construction and demolition projects that must implement a waste reduction program and any special provisions that apply to these projects.

The appendices contain additional material to help affected parties meet regulatory requirements. Appendix B contains information on the steps you need to follow and checklists you may use for conducting the waste audit and preparing the waste reduction work plan. Examples of completed forms are also included here.

# 2.0 GENERAL REQUIREMENTS

This section outlines the general requirements for the steps needed to undertake all components of your waste audit, your waste reduction work plan and the reporting process to document your activities.

Construction and demolition projects must prepare a waste audit and waste reduction work plan before construction work begins at the site.

There are four basic steps to implementing a waste reduction program required under O. Reg. 102/94:

1. Conducting the waste audit
2. Developing the waste reduction work plan
3. Implementing the waste reduction work plan
4. Updating the waste audit and waste reduction work plan

Only certain construction and demolition projects must comply with O. Reg. 102/94 (see Section 3). To comply, the person undertaking the project (e.g., owner) or the person undertaking a project on someone else's behalf (e.g., contractor) must complete a waste audit and waste reduction work plan before construction work begins at the site.

## 2.1 Conducting Your Waste Audit

A waste audit is essentially a study relating to waste generated by all the normal activities at the site of the construction or demolition project. O. Reg. 102/94 is intended to ensure that a designated C&D waste generator takes a comprehensive approach to the study. The work you will need to complete as part of the waste audit will involve not only measuring the quantity of waste and identifying its composition, but also the manner by which the waste gets produced, including management decisions and policies that relate to the production of waste.

Under O. Reg. 102/94, all waste audits must address:

- The amount, nature and composition of the waste generated in all functional areas of the project
- How the waste is produced, including relevant management decisions and policies
- How the waste is managed

O. Reg. 102/94 requires that the waste audit be completed before construction work begins at the site. This means that a waste audit for a project will need to be done in conjunction with, and based on, other planning activities related to the project.

## 2.2 Developing Your Waste Reduction Work Plan

The information resulting from the waste audit forms the basis for developing the waste reduction work plan. The waste reduction work plan addresses 3Rs opportunities that you will pursue during the life of the project.

O. Reg. 102/94 requires that all completed waste reduction work plans include all reasonable actions that can be taken to reduce, reuse and recycle waste. These actions must be identified in a step-wise process that follows the 3Rs hierarchy:

- First - Reduce by developing actions that will stop waste from being produced in the first place.
- Next - Reuse any waste materials at your site or donate to others, e.g., a non-profit organization.
- Last - Recycle any waste materials through a recycling company.

The waste reduction work plan must encompass all administrative, warehousing or other ancillary activities or departments located on the same site and associated with the designated project.

The waste reduction work plan must also set out who will implement each part of the plan, when each part will be implemented and what the expected results are.

## 2.3 Implementing Your Waste Reduction Work Plan

O. Reg. 102/94 requires that a waste reduction work plan be developed before construction work begins at the site. The work plan must explicitly assign responsibilities and identify resources needed for its implementation and give an estimate of the expected results to be achieved. Your work plan may be structured so that some actions are given a higher priority than others. A number of factors may need to be considered to determine which actions will contribute most to meeting waste reduction objectives.

Note that those who are subject to O. Reg. 102/94 must implement a source separation and recycling program in accordance with O. Reg. 103/94. Further details are contained in A Guide to Source Separation of Recyclable Materials for Industrial, Commercial and Institutional Sectors and Multi-Unit Residential Buildings as Required under Ontario Regulation 103/94, which is available from the ministry.

## 2.4 Documenting Your Waste Reduction Program

A waste audit and waste reduction work plan must be documented in written reports as described below. In some cases, projects may have specific additional reporting requirements as specified in the regulation.

- A waste reduction work plan must set out who will implement each part of the plan, when each part will be implemented and the expected results.

- A report of a waste audit or a waste reduction work plan must be on a form provided by the ministry or another form as long as the same information is contained. Samples of completed forms are found in Appendix B of this guide. Blank forms are included at the end of the guide. The guides are available at: www.ene.gov.on.ca/en/publications/forms/index.php#AuditandReduction

- The report of the waste audit and the waste reduction work plan must be kept for at least five years after it was prepared.

- The waste reduction work plan or a summary of the work plan must be posted in places where employees will see it. An employee must also be allowed to see the entire plan where a summary of the plan has been posted.

- Note that O. Reg. 102/94 does not require automatic reporting to the ministry. The builder or demolisher subject to O. Reg. 102/94 must submit the most recent waste audit and waste reduction work plan to the Director within seven days of a request by a Director. For the purposes of the 3Rs Regulations, the "Director" is a Ministry of the Environment (MOE) Regional Director, Assistant Regional Director, District Manager, Director Waste Management Policy Branch (WMPB) or Assistant Director WMPB.

- The waste audit for a designated construction project must also address the extent to which materials or products used by the builder consist of recycled or reused materials or products.

# 3.0 WHO IS AFFECTED?

A project includes the operations normally associated with the construction or demolition of buildings. Types of projects include construction or demolition of residential, commercial, industrial and institutional buildings such as single-family housing, apartments, offices, factories and hospitals. O. Reg. 102/94 does not address renovation projects.

## 3. 1 Construction Projects

The builder of a "construction project" that consists of the construction of one or more buildings with a total floor area of at least 2,000 square metres is subject to O. Reg. 102/94 and must conduct a waste audit covering the waste generated in the construction project. The builder – a person who is undertaking the construction project on their own behalf or on behalf of another – must prepare and implement a waste reduction work plan.

For the purposes of determining when construction begins at the site, the ministry's position is that construction generally begins at the point foundations for the building(s) are being dug. Where, however, a building is going to be constructed in phases (e.g. one builder constructs the outer shell and another contractor constructs the inner shell), construction for the second phase begins when the builder begins construction on the second phase.

## 3.2 Demolition Projects

The demolisher of a "demolition project" that consists of the demolition of one or more buildings with a total floor area of at least 2,000 square metres is subject to O. Reg. 102/94. The demolisher – a person who is undertaking the demolition project on his/her own behalf or on the behalf of another – must conduct a waste audit covering the waste generated in the demolition project and must prepare and implement a waste reduction work plan.

## 3.3 Definition of Floor Area

Building floor area is to be calculated as "gross area" according to the Ontario Building Code: "the total area of all floors above grade measured between the outside surfaces of exterior walls or between the outside surfaces of exterior walls and the centre line of firewalls except that, in any other occupancy than a residential occupancy, where an access or a building service penetrates a firewall, measurements shall not be taken to the centre line of such firewall."

The total floor area should be calculated as the total area of the building. This is the area normally reported on Building Permits. Multi-story or underground parking lot areas must be included in the total building area. However, any outside areas, such as ground-level outdoor parking lots or recreation parks, are not part of the total area. For example, an apartment complex project consists of three buildings, with areas of 800, 500 and 600 $m^2$, and an outdoor ground level parking lot of 1,000 $m^2$. The sum of the three building areas, or 1,900 $m^2$, would be the total area of the project and, therefore, it would not need to comply with the regulation. However, if a building has an area of 1,700 $m^2$ and it has an underground parking area that is 400 $m^2$, it would have to comply with the regulations as the total floor area (2,100 $m^2$) would exceed 2,000 $m^2$.

# APPENDIX A – Links to Additional Information

1. **e-laws:**

   You can view and download O. Reg. 102/94 by going to e-laws and entering O. Reg. 102/94 into the search function. You can find all four of the 3Rs regulations or other acts and regulations by entering their name: www.e-laws.gov.on.ca

2. **Copies of the 3Rs Guides:**

   Additional copies of the ministry's 3Rs guides are available at: www.ene.gov.on.ca/en/publications/forms/index.php#AuditandReduction

3. **Helpful guide:**

   "The Environmentally Responsible Construction and Renovation Handbook," ***Public Works and Government Services Canada.*** This Technical Guidebook has been prepared for portfolio and asset managers, project managers and building professionals, leasing agents, accommodation users and property managers to assist them in planning and undertaking renovations in an environmentally responsible manner, and to achieve Green Office Building Plan (GOBP) status. Building operators and property managers in the private sector will also find this document useful. Although the emphasis of the handbook is on environmentally responsible renovation, many of the principles and guidelines also apply to new construction projects. Available at: www.tpsgc-pwgsc.gc.ca/biens-property/gd-env-cnstrctn/index-eng.html

4. **Ontario Environment Business Directory:**

   The Ministry of the Environment (MOE) maintains a web site for Ontario companies that provide environmental goods and services at: www.envirodirectory.on.ca

# Appendix B – A Typical Waste Reduction Program

### Getting Started

Ideally, a person who is interested in resource conservation and has sound knowledge and experience of your company's operations should manage your waste reduction program. An effective Waste Reduction Coordinator will have the greatest impact when fully involved in all aspects of the waste audit and reduction work plan program.

For larger projects, you may wish to form a Waste Reduction Committee to set up and maintain your waste reduction program. The committee could consist of the coordinator, owner, general contractor and site supervisor, representatives of various sub-trades and a waste hauler. This will allow you to generate ideas collectively and ensure that the program is designed to provide opportunities for everyone to participate.

Examples of what role(s) the coordinator/committee could play to successfully undertake a waste audit and to implement a waste reduction work plan include the following:

- Identifying and interpreting government requirements and regulations
- Securing senior management support
- Conducting and/or overseeing the waste audit
- Establishing the waste reduction goals
- Identifying funding requirements and the costs and benefits of the program
- Developing a 3Rs program and implementation schedule
- Monitoring the waste reduction, reuse and recycling activities
- Promoting and communicating waste reduction activities.

### Communicating Project Objectives

Before initiating a waste audit or waste reduction work plan, you should inform everyone involved of the objectives of the program and the importance of their cooperation. Sub-trades should be informed also. They will need to work cooperatively to characterize and measure waste streams and effectively implement waste reduction measures.

## CONDUCTING A WASTE AUDIT

### Introduction

An important factor in planning your waste audit is the level of audit detail you choose to use. The level of detail depends upon the size of the project, complexity of operations and accuracy you require for your reduction work plan.

The following waste audit process is one approach that will provide you with enough information to proceed with your waste reduction work plan and to meet the requirements of O. Reg. 102/94. This approach is intended to identify the major wastes and to provide a starting point for your waste diversion initiatives. Figure 1, Waste Audit Flowchart, provides an overview of the audit process.

## Step 1: Assemble Basic Information

### Review Operations

You should review and record the following basic information about your construction or demolition project:

- Building floor area or other indicators relevant to your projects
- Type and size of construction or demolition project
- Location
- Stages of project, e.g. excavation, structural, interior finishing
- Stages of the project that are sub-contracted to trades
- Purchasing policies.

It is also important to review all areas of your project so that you will not miss future opportunities for waste reduction. The scope of the review will include the traditional waste generation areas. This level of review, with waste reduction in mind, often leads to significant opportunities.

Here are the minimum points to review:

- Composition and quantity of all wastes directly generated within the project through all normal activities
- The extent to which materials or products used consist of recycled or reused materials
- Management decisions and policies that relate to the production of waste
- The way in which the waste is managed.

### Review Existing Waste Reduction and Disposal Activities

You should review your current waste management activities to provide start-up information for your waste audit and for later efforts in waste reduction planning. Basic questions to be asked include:

- Who is responsible for waste management and reduction?
- What are the current waste separation and recycling activities?
- What are the timing and frequency of waste collections?
- What methods of waste collection will be employed, including internal and external waste handling?
- What quantities of waste and recyclables are to be collected?
- Who are the contractor(s) for waste collection and recycling services?
- What are the responsibilities of sub-trades for their own waste disposal?
- What is the gross cost of waste collection and disposal?
- Are there recycling companies in your area?

## Step 2: Identify Wastes

The objective of this step is to estimate categories of wastes and places where they will be generated. During the review, you should note collection and storage practices and any other special considerations that should be taken into account later when you develop your waste reduction work plan.

It is your responsibility to ensure that the information that appears in the audit reflects the waste that will be generated by your project. Sources of information may include:

- Engineering estimates
- Material purchasing records
- Waste disposal invoices for similar projects
- Records of waste produced at generation points in daily operations of other projects
- Studies of similar projects.

You can identify your wastes by:

- Estimating wastes generated through each stage of a project based on building construction and demolition methods, materials and efficiencies. Staff and sub-trades may be required to submit information to the coordinator for summary.
- Conducting a walk-through review of operations on similar projects to ensure that all waste streams have been identified. Look inside waste containers, and, above all, ask questions.

Classify your wastes as follows:

- Materials that the Ministry of the Environment requires you to source separate for recycling (see "A Guide to Source Separation of Recyclable Material for Industrial, Commercial and Institutional Sectors and Multi-Unit Residential Buildings", *Appendix A for link*).
- Other materials identified within your project that could be source-separated for reuse or recycling.
- Residual material that would go for disposal.

Use **Figure 1**, Waste Sampling Record (next page) to summarize the results.

**Step 3: Identify Recycled Content of Building Materials and Products**

This step requires you to examine the current reduction activities at the front end of your operations. You should now examine purchasing specifications to identify the recycled content of purchased building products and raw materials. This will be useful for determining whether you can take steps to increase use of items with higher recycled content.

It is not necessary to examine all of your incoming materials and products. Look at your major material and product purchases and review the recycled content of each material. Approach your suppliers if the information needed is not readily available.

**Figure 1: Waste Sampling Record**

| Location | | | Date | |
|---|---|---|---|---|
| 3777 Recycle St., Anytown, ON A1B 2C3 | | | October 10, 2008 | |
| **Sample Taken** | | **Time Period** | | |
| Demolition Phase | | Oct, Nov, Dec 2008 | | |
| **Operation Characteristics** | | | | |
| Normal activities. | | | | |
| **Material** | **Characteristics** | **Volume * ($yd^3$)** | **Weight (tonnes)** | **% of Total Sample **** |
| Wood | Lumber, pallets | 60 | 9 | 16 % |
| Concrete & Masonry | Rubble from exterior walls | 120 | 40 | 71% |
| Plaster | Broken pieces from walls | 30 | 4 | 7% |
| Cardboard | Packaging | 2 | .25 | .4% |
| Drywall | Clean drywall | 2 | .25 | .4% |
| Misc | | 64 | 3 | 5.3% |
| Totals | | 278 | 56.5 | 100 % |

* Please note if you measure your waste by volume, you must convert these figures to weights. See Appendix C for Conversion Table.

** If using purchasing records, calculation of % is not applicable.

**Step 4: Complete a Waste Audit Report**

You should maintain a record of the information reviewed, assumptions made, waste samples examined (including the sample dates) and the material weights and/or volumes calculated.

You are now ready to complete the Waste Audit Report, as required by O. Reg. 102/94. See a *sample* of a completed waste audit report on the next page. A blank Waste Audit Report form is provided at the end of this guide. A Microsoft Word version of the form is available from the ministry's website (see Appendix D). You can use your own forms as long as the same information is provided.

You may want to calculate the amount of waste generated per "unit of measure." For example, by calculating the total waste generated per 100 $m^2$ floor area of the project to that of other projects, you might observe whether a change in overall waste generation is due to project size, type or other factors.

**Sample**

# Ministry of the Environment Waste Form

## Report of a Waste Audit

## Large Construction and Demolition Projects

**As required by O. Reg. 102/94**

***This report must be prepared before construction or demolition begins at the site. The waste audit must be retained on file for at least five years after it is prepared, and be made available to the ministry upon request.***

### I. GENERAL INFORMATION

| | | | | |
|---|---|---|---|---|
| **Name of Owner/Contractor Undertaking Project and Company Name:** *Mr. Bricks, 1234 Ontario Ltd.* | | | | |
| **Name of Contact Person and Company:** *Ms. Builder, 1234 Ontario Ltd.* | | **Telephone #:** *416-123-4567* | **Email address:** *builder@1234Ontario.com* | |
| **Project Type (Check One)*** | **Construction Project** | √ | **Demolition Project** | |
| **Floor Area (square metres):** *2500 m2* | | **Number of Buildings:** *20 houses* | | |
| **Street Address of Project Site (if known):** *123 Yellowbrick Road* | | | | |
| **Lot and Plan Number:** *Lot 50; Plan Number 12345* | | **Municipality:** *Anyplace* | | |
| **Estimated Start Date of Project:** *June 30, 2008* | | **Estimated Completion Date of Project:** *August 1, 2009* | | |

**** Separate reports must be made for construction and demolition projects regardless if they occur on the same site.***

### II. DESCRIPTION OF PROJECT

| Provide a brief overview of the construction or demolition project: |
|---|
| *Construction of 20 new one storey luxury brick houses with rear garages on newly developed land. Some of the main construction materials that will be used for this project will include clay brick, concrete, vinyl windows, wooden framing, drywall, hardwood floors and asphalt shingles. There will be waste diversion depot areas for reusable or recyclable materials located throughout the project. In addition, a main waste collection area will be situated on site and will include a roll-off waste container. The project is located outside of the Anyplace main retail district near a ravine area.* |

## III. CATEGORIES OF WASTE AND WASTE ITEMS

List the categories of waste the project will produce and the associated waste items for each category *(see part VI for examples of categories of waste):*

| Categories of Waste | Waste Items |
|---|---|
| *Blue Box Materials* | *Glass, cans, newspaper, plastic bottles* |
| *Brick and Concrete* | *Cut offs, broken bricks; spilled concrete, cut or broken blocks* |
| *Cardboard* | *Boxes, sleeves on side of pallet loads* |
| *Carpet* | *Cuttings/remnants* |
| *Drywall* | *Cutoffs, broken or damaged pieces, cut outs for windows/doors* |
| *Drywall Compound* | *Compound that is contaminated, old or hardened.* |
| *Insulation* | *Cuttings, damaged pieces* |
| *Metal* | *Electrical, beams, light tracks, hangers, pipe, conduit, etc.* |
| *Plastic* | *Cuttings from plastic pipe, plastic film/wrap* |
| *Roofing Shingles* | *Cutoffs, damaged shingles* |
| *Tile Flooring* | *Cutoffs, damaged tiles* |
| *Wood* | *Lumber cut-offs, damaged studs, skids* |

## IV. PRODUCTION OF WASTE

For each category of waste listed in Part III of this form, explain how the waste at the construction or demolition project will be produced. Include references to how management decisions and policies will affect the production of waste:

| How Waste Is Produced | Decisions/Policies Affecting Waste Produced |
|---|---|
| *Blue Box - Glass, cans, newspaper, plastic bottles* | *Cannot be avoided.* |
| *Bricks - Cutoffs, broken bricks*<br>*Concrete – spilled; broken blocks/cutoffs* | *Brick waste cannot be avoided;*<br>*Review how concrete is handled to reduce spillage.*<br>*Cannot avoid broken blocks/cutoffs* |
| *Cardboard - boxes, sleeves on side of pallet loads* | *Will consider reusable shipping containers.* |
| *Carpet – cuttings/remnants* | *Cannot be avoided* |
| *Drywall - cutoffs, broken or damaged pieces, cut outs for windows/doors* | *Cannot be avoided.* |
| *Drywall Compound – contaminated, old or hardened* | *Will review how compound is stored to avoid contamination/hardening* |
| *Insulation – cuttings, damaged pieces* | *Will review how insulation is stored and how to protect it from becoming damaged* |
| *Metal - Electrical, beams, light tracks, hangers, pipe, conduit, etc.* | *Difficult to avoid scrap metal or cut offs from being generated. Will review reuse.* |
| *Plastic – cut offs from piping; film wrap* | *Plastic pipe cutoffs cannot be avoided; To review shipping of materials without plastic wrap.* |
| *Roofing shingles - Cutoffs, damaged shingles* | *Will try to ensure that shingles are not damaged during storage or movement on site. Will speak to supplier if damaged shingles are received.* |
| *Tile Flooring* | *Cut offs cannot be avoided. Damage is minimal.* |
| *Wood - cut offs, damaged studs, skids* | *Review how wood is purchased, including proper lengths required. Review how skids can be returned to company.* |

## V. MANAGEMENT OF WASTE

| For each category of waste listed in Part III of this form, indicate which waste items will be disposed or reused/recycled and how each item will be managed at the project: | | |
|---|---|---|
| **Category** | **Waste to be Disposed** | **Reused or Recycled Waste** |
| *Blue Box Materials* | *n/a* | *To be recycled in Blue Boxes and Carts* |
| *Bricks - Cutoffs, broken bricks; Concrete - spilled concrete, cut or broken blocks* | *Unusable pieces of brick will be disposed; Spilled concrete or unusable broken blocks will be dumped into roll off waste container.* | *Reusable pieces of brick will be used where possible. Will look into market for crushed brick for landscaping; Useable broken blocks will be reused where possible.* |
| *Cardboard - boxes, sleeves on side of pallet loads* | *Soiled Cardboard will be disposed in waste bin.* | *Strict policy that all cardboard that is not soiled must be recycled.* |
| *Carpet* | *Small pieces will be disposed in waste bin.* | *Reusable pieces will be reused.* |
| *Drywall - cutoffs, broken or damaged pieces, cut outs for windows/doors* | *Unusable pieces will be disposed in waste bin.* | *Any reusable pieces will be used.* |
| *Drywall Compound – old/hardened* | *Contaminated or hardened compound will be disposed in waste bin.* | *n/a* |
| *Insulation – cuttings, damaged pieces* | *Unusable pieces of insulation will be disposed in waste bin.* | *Reusable pieces of insulation will be reused as insulation.* |
| *Metal - Electrical, beams, light tracks, hangers, pipe, conduit, etc.* | *Small cuttings that end up in sweepings will be disposed in waste bin.* | *All larger pieces of metal will be recycled.* |
| *Plastic – Cut offs from pipes; film wrap* | *Unusable pieces of pipe/wrap will be disposed in waste bin.* | *Will reuse pipe cut offs where possible (e.g., to protect water turn off valves during construction), Film wrap will be reused during project where possible to cover materials.* |
| *Roofing shingles - Cutoffs, damaged shingles* | *Unusable shingles will be disposed in waste bin.* | *Reusable pieces of shingle will be used.* |
| *Tile Flooring* | *Small unusable pieces of tile will be disposed in waste bin.* | *Reusable pieces of tile will be used.* |
| *Wood - cut offs, damaged studs, skids* | *Unusable pieces will be disposed in waste bin.* | *Reusable pieces will be reused for bridging/blocking, etc.* |

## VI. ESTIMATED QUANTITY OF WASTE PRODUCED

| Categories of Waste | Estimated Amount of Waste Produced (tonnes) | Categories of Waste (continued) | Estimated Amount of Waste Produced (tonnes) |
|---|---|---|---|
| Asphalt | *n/a* | Plastic (pipes, film, etc) | *50 kg* |
| Aluminum | *n/a* | Plaster *(Drywall compound)* | *50 kg* |
| Blue Box – Newspaper, cans, etc. | *25 kg* | Polystyrene Foam | *n/a* |
| Brick and Concrete | *1 tonne* | Porcelain Fixtures | *n/a* |
| Cardboard | *2 tonnes* | Roof Shingles | *200 kg* |
| Carpet | *100 kg* | Tile Flooring | *25 kg* |
| Drywall (unpainted) | *300 kg* | Wood (unpainted or untreated) | *1.5 tonne* |
| Drywall (painted) | *500 kg* | Wood (painted/treated) | *250 kg* |
| Glass | *n/a* | Other | *n/a* |
| Insulation | *10 kg* | | |
| Metal | *200 kg* | | |
| | | **TOTAL** | **~ 6 tonnes** |

## VII. EXTENT TO WHICH MATERIALS OR PRODUCTS USED BY THE ENTITY CONSIST OF RECYCLED OR REUSED MATERIALS OR PRODUCTS

Please answer the following questions:

1. Do you have a management policy in place that promotes the purchasing and/or use of materials or products that consist of recycled and/or reused materials or products? If yes, please describe.

   *Yes. Our construction company has a management policy in place to encourage the purchase of materials and products that contain recycled or reused materials. At this project we will be using aggregate/stone for constructing driveways that contains crushed concrete. The wood trim that will be used will be paint grade wood (made from finger joined scrap wood pieces). We will also be incorporating other recycled wood products in various applications. Most of the carpeting will have recycled content also.*

2. Do you have plans to increase the extent to which materials or products used consist of recycled or reused materials or products? If yes, please describe.

   *Yes, Our company does plan to increase the amount of recycled or reused material that is contained in the products or materials we use. We are currently considering a new floor tile that contains recycled material as well as paint that is recycled (remanufactured from old paint). In addition, we will be installing and testing roofing shingles that contain a high percentage of recycled material at this construction project.*

Please attach any additional page(s) as required to answer the above questions.

| **I hereby certify that the information provided in this Report of Waste Audit is complete and correct.** | | |
|---|---|---|
| **Signature of authorized official:** | **Title:** | **Date:** |
| *Mr. Bricks* | *President, 1234 Ontario Ltd.* | *March 1, 2008* |

## CREATING A WASTE REDUCTION WORK PLAN

### Introduction

Now you are ready to create your waste reduction work plan.

### Step 1: Review Waste Audit Information

To begin the process, review your Waste Audit Report and assemble information relating to 3Rs actions currently in place, including:

- Waste reduction policies
- Current waste reduction, reuse, recycling and disposal activities
- Types and quantities of materials in each activity
- Achievement of current waste reduction targets
- Operating cost impacts as a result of 3Rs activities.

### Step 2: Identify Areas of Greatest Waste Reduction Impact

A key factor in finding 3Rs opportunities for waste reduction involves examining those materials that make up a large part of the waste produced. Such a move to organize your waste audit data will highlight areas where your reduction efforts will have the greatest impact. Waste audit data can be organized in different ways by:

- Weight or volume
- Disposal cost
- Potential for source separation
- Potential to reduce, reuse or recycle
- Complexity of handling
- Current and potential regulatory requirements.

| Material Type | Volume ($m^3$) | Weight (tonne) | Waste Cost ($/tonne) | Rank by Volume | Rank by Weight | Rank by Cost |
|---|---|---|---|---|---|---|
| Wood | 60 | 9 | 110.00 | 2 | 2 | 3 |
| Concrete & masonry | 120 | 40 | 40.00 | 1 | 1 | 5 |
| Cardboard | 2 | .25 | Revenue | 5 | 5 | 1 |
| Drywall | 2 | .25 | 75.00 | 6 | 6 | 4 |
| Roofing materials | 25 | 2 | 150.00 | 3 | 3 | 2 |
| Metal | 10 | .75 | Revenue | 4 | 4 | 1 |

Note: You should also consider issues you may face in implementing 3Rs programs, including: health and safety regulations, storage space at your project, availability of recycling markets and collection services and operating costs.

**Step 3: Assess Waste Reduction Priorities**

After identifying general areas for potential waste reduction, you should look at the possible impact of other priorities on your 3Rs options. You should consider at least the following items:

- Current and potential regulatory requirements
- Costs and benefits of each waste reduction opportunity.
- Be aware of planned or anticipated landfill closures or other disposal limitations that may affect your waste materials, including waste material bans or increased tipping fees.

**Step 4: Determine Why Waste Is Generated**

In assessing your waste reduction options, you should ask the following basic question at the start: Why is this material being used? Questions such as this can stimulate thought and help you develop many other ways of dealing with the material under review.

One approach to framing the questions you might ask yourself is to use the following matrix:

| | | | |
|---|---|---|---|
| **Purpose** | Why is the material being used? | What else could be used? | What should be used? |
| **Place** | Where is it used? | Where else could it be used? | Where should it be used? |
| **Sequence** | When is it used? | When could it be used elsewhere? | When should it be used? |
| **Person** | Who uses it? | Who else could use it? | Who should use it? |
| **Means** | How is it used? | How else could it be used? | How should it be used? |

Answers to these questions may show the way to various options for reducing, reusing, and/or recycling your wastes, including:

- Where waste can be reduced by eliminating the use of certain product materials or processes in your operations
- Where other materials can be used that, in turn, can be reused or recycled
- Where less wasteful/disposable materials can be used
- Where less material can be purchased (e.g. buying in bulk versus individually wrapped items)
- Where previously recycled materials can be used

**Step 5: Identify Opportunities for Reducing, Reusing and Recycling Wastes**

This section outlines some 3Rs opportunities that are in common use. Your own situation may differ, however, and not all these possibilities will apply. In many cases the ideas are very simple yet these can often lead to more significant initiatives.

## Reducing Wastes

Workers on your project may already use various methods to reduce the quantity of waste being generated. For example, you may have replaced some disposable products with either reusable products or disposable products that can be recycled.

You should take a similar approach for each of the materials you use to support and maintain your construction/demolition projects. Focus on reducing the quantities of disposable supplies and equipment used, and on improving purchasing policies to reduce the amount of incoming packaging. You could also make changes to processes in your operation to decrease the quantity of material consumed (e.g., to reduce the amount of wood used in your project).

**State expectations in trade contracts.** Waste reduction policies and initiatives should be clearly stated in tendering and contract documents. Establish contracts with trades to supply both labour and materials. If trades supply materials, they will be fully committed regarding usage. Alternatively, establish policies that require contractors to remove and divert waste materials from disposal.

**Produce more efficient construction designs where possible.** Reducing material wastage begins at the design stage. Designers, architects, and builders should evaluate their plans for efficiency of material usage (e.g., consider standardizing room sizes and minimizing off-cuts).

**Use more prefabricated products.** Less waste may be generated on-site if more prefabricated or pre-cut products such as floor joists, trusses, and truss-joints are used.

**Purchase selected materials in bulk containers.** Purchase materials such as fasteners, paint, caulking and drywall mud in bulk containers. Stored in such containers, they are not as vulnerable to weather damage.

**Reduce illegal dumping and contamination of recyclables.** Protect waste bins and piles by covering them, securing them with locks and locating them in well-lit areas. Signs stating the company's commitment to waste reduction and dumping restrictions should be posted on-site and on bins.

## Reusing Wastes

A reuse strategy to avoid waste is common on construction sites. Forms for pouring foundations, scaffolding and other systems all lead to less waste. Also consider using wastes from one application on other projects. For example, aluminum sheet off cuts from one job may provide the raw material input to another smaller job. Although you may already reuse certain materials, there may be others who can make beneficial use of your waste. This option can also help reduce your disposal costs.

**Remove items carefully during demolition.** Disassemble items carefully during demolition to minimize damage and salvage for reuse as many items as possible. Selected residual components of construction are often relatively simple to remove for reuse and will continue to have a useful lifespan.

**Invite the public to reuse materials.** Conduct a "strip-out sale" or advertise that certain items are free-for-the-taking by the public once they are removed from the building. Items of interest to the public may include bundles of wood off-cuts, doors, windows, decorative mouldings, cabinets, plumbing and electrical fixtures and older appliances.

**Collect and store reusable materials.** Space permitting, warehouse your unused materials and salvaged items for future use or re-assembly in another project. If not, direct your reusable materials to your local "reuse" facility or salvage yard. Join other companies to collect, re-distribute, and reuse waste materials. For example, excess brick from one or several projects can be reused as part of a fireplace or chimney on another project.

**Reuse Items On-Site for Different Purposes.** Many items have reuse potential on the job site. Reuse lumber off-cuts as bridging, blocking, or forming stakes. Recover plastic vapour barrier and wrappings and reuse as protection for tools and materials when not in use. Excess insulation from exterior walls can be added to interior walls or attics.

**Recycling of Source Separated Wastes:**

Most construction/demolition projects can take advantage of opportunities for external recycling of wastes. Markets exist for many recyclable materials such as steel, aluminum, corrugated cardboard, wood, drywall, concrete and glass.

**The economics of recycling will vary with the material.** For some materials you will receive direct revenue. For others, the cost of recycling may simply be less than the cost of landfill tipping fees.

**Establish a recycling program.** The ministry requires that the construction and demolition projects identified in this guide have a recycling program in place. See “A Guide to Source Separation of Recyclable Materials for the Industrial, Commercial and Institutional Sector and Multi-Unit Residential Buildings” *(refer to Appendix A for link).*

**Source Separate Recyclables.** Several alternatives exist to source separate recyclables. Several recycling containers and bins should be provided on every site to facilitate source separation.

**Provide Adequate Training.** Workers should be provided with training in source separation techniques and supplied with adequate means to perform this task efficiently.

**Back-charge trades.** Consider charging trades for the waste that they generate and the additional labour hours the general contractor takes to clean it up. Alternatively, all trades could be required to remove all waste off site.

**Investigate waste handling techniques and equipment.** Waste handling techniques and equipment such as split-bins and split-chutes are available. They can be useful on small sites as they help to maximize use of space.

**Waste haulers or recycling companies:** Set up contracts with waste haulers or recycling companies to provide reduced costs or revenue for source separated waste. Set up incentives (e.g., bonuses) to companies that assist with diverting the most waste and have them review the types of waste materials your project will generate before it starts.

**Step 6: Assess Impact of Material Purchasing on Waste Reduction**

Many of your waste reduction opportunities will involve your material purchasing practices. In some cases, you may develop a purchasing policy to buy materials that already have a recycled content. This action has the added benefit of improving the overall market for recycled materials.

Actions to change the material used in construction may involve discussions with your suppliers. For other products, you can work with your supplier to provide you with more environmentally sound materials. Replacing non-recyclable materials with reusable or recyclable materials gives economic benefits as well as greater waste diversion.

Another important waste reduction action with suppliers involves reducing packaging and containers. Many companies, as part of their purchasing and materials management policies, set up distribution systems with their suppliers to use returnable transportation/storage containers.

On a general basis, you should also review the materials and products currently purchased from your supplier to ensure optimum "environmental friendliness". This will increase your level of reliance on your suppliers to advise your company on the availability of previously recycled or more easily recyclable materials for your own use.

**Step 7: Complete an Achievable Waste Reduction Work Plan**

Your waste reduction work plan is a compilation of the waste reduction opportunities you have identified and the actions you intend to take in reducing your wastes. At this stage you should also set waste reduction targets. Try to set *realistic* reduction targets as it is important that your work plan is achievable.

Your targets will form the basis for waste reduction actions for each waste material. These decisions reflect the benefits of accurate waste audit information. Missed targets could have negative impacts on your workers attitudes and confidence in future waste reduction work plans.

The waste reduction work plan is designed to complement the waste audit report. The waste reduction work plan focuses on the wastes for which reduction actions have been identified and reduction targets set. The format allows actions on separate waste materials to be identified as well as the total amounts of waste reduced, reused and/or recycled.

See next page for a *sample* waste reduction work plan. A blank form is included at the back of the guide. A Microsoft Word version is available through the ministry's website (see Appendix D). You can use your own forms as long as the same information is provided.

**Sample**

# Ministry of the Environment Waste Form

## Report of a Waste Reduction Work Plan

## Large Construction and Demolition Projects

**As required by O. Reg. 102/94**

***This report must be prepared before construction or demolition begins at the site. The waste reduction work plan must be retained on file for at least five years after it is prepared, and be made available to the ministry upon request.***

### I. GENERAL INFORMATION

| | | | | |
|---|---|---|---|---|
| **Owner/Contractor Undertaking Project and Company Name:** *Mr. Bricks, 1234 Ontario Ltd.* | | | | |
| **Name of Contact Person and Company Name:** *Ms. Builder, 1234 Ontario Ltd.* | **Telephone #:** *416-123-4567* | **Email Address:** *builder@1234Ontario.com* | | |
| **Project type (check one)*** | **Construction Project** | √ | **Demolition Project** | |
| **Floor Area (square metres):** *2500 m2* | **Number of Buildings:** *20 houses* | | | |
| **Street Address of Project Site (if known):** *123 Yellowbrick Road* | | | | |
| **Lot and Plan Number:** *Lot 50; Plan Number 12345* | **Municipality:** *Anyplace* | | | |
| **Estimated Start Date of Project:** *June 30, 2008* | **Estimated Completion Date of Project:** *August 1, 2009* | | | |

**** Separate reports must be made for construction and demolition projects regardless if they occur on the same site.***

### II. DESCRIPTION of PROJECT

| Provide a brief overview of the construction or demolition project: |
|---|
| *Construction of 20 new one storey luxury brick houses with rear garages on newly developed land. Some of the main construction materials that will be used for this project will include clay brick, concrete, vinyl windows, wooden framing, drywall, hardwood floors and asphalt shingles. There will be waste diversion depot areas for reusable or recyclable materials located throughout the project. In addition, a main waste collection area will be situated on site and will include a roll-off waste container. The project is located outside of the Anyplace main retail district near a ravine area.* |

## III. PLANS TO REDUCE, REUSE AND RECYCLE WASTE

For each category of waste described in Part III of "Report of a Waste Audit" (on which this plan is based), explain what your plans are to reduce, reuse and recycle the waste, including:
1) how the waste will be source separated at the project, and 2) the programs to reduce, reuse and recycle all source separated waste.

| Waste Category | Source Separation and 3Rs Program |
|---|---|
| *Blue Box Materials* | *Blue Box Recycling Program: Blue boxes will be located throughout the site for the collection of materials such as plastic, metal and aluminum drink containers and newspapers. Materials will be source separated into recycling carts for collection by recycling company.* |
| *Brick and Concrete* | *(i) Brick Recycling Program: Any broken or non-reusable bricks will be source separated in piles beside each house. Front end loader will remove waste brick at end of the construction project and place into one pile so that it can be sent for recycling or as clean fill (e.g., Leslie St. Spit.), if possible.*<br>*(ii) Concrete 3Rs Program: Source separate waste concrete, including dried spills, and recycle if quantities are significant via aggregate recycling company.* |
| *Cardboard* | *Cardboard Recycling: Will replace with reusable containers, where possible. Source separate cardboard into roll-off box for recycling company.* |
| *Carpet* | *Reuse cuttings where possible. Ensure that pieces of the same style/colour of carpet are reused in other houses/where required.* |
| *Drywall* | *Drywall 3Rs Program: Any unpainted drywall will be collected in wooden bunker. Will reuse cut pieces as much as possible. If waste drywall quantities are significant, will send for recycling through Gypsum Recycling Limited.* |
| *Drywall Compound* | *n/a* |
| *Insulation* | *Reusable pieces of insulation will be reused as insulation.* |
| *Metal* | *Metal Recycling Program: Scrap metal will be source separated and collected in box and saved for recycling by scrap metal company.* |
| *Plastic* | *Will reuse pipe cutoffs on site, e.g., to protect water shut off valves. Will reuse plastic wrap to cover materials during construction. Will look for company to recycle plastics and will recycle if possible (low quantities).* |
| *Roofing Shingles* | *Roofing Shingles 3Rs Program: Waste asphalt shingles, including cuttings, will be reused where possible. Attempts will be made to minimize waste, including minimizing the amount of overruns/unnecessary stock by accurately estimating the amount of shingles required. Will determine if recycling markets exist, if there are large quantities available.* |
| *Tile Flooring* | *Will reuse tile cuttings, where possible. Ensure that pieces of the same style/colour of tile are reused in other houses.* |
| *Wood* | *Wood Recycling Program: Reuse scrap wood where possible for bridging or blocking or any other application where it can be utilized.* |

## IV. RESPONSIBILITY FOR IMPLEMENTING THE WASTE REDUCTION WORK PLAN

Identify who is responsible for implementing the Waste Reduction Work Plan at the construction or demolition project. If more than one person is responsible for implementation, identify each person who is responsible and indicate the part of the Waste Reduction Work Plan that each person is responsible for implementing.

| Name of Person | Responsibility | Telephone # |
|---|---|---|
| *Jack Reduce* | *Inform all workers and visitors to the site about the 3Rs program and provide information sheets where necessary.* | *416-123-4567* |
| *Tim Reuse* | *Ensure that only the required amount of construction material is ordered (to decrease overruns). Review and purchase materials that are reused or have recycled content.* | *416-123-4567* |
| *Kim Recycle* | *Oversee collection of recyclables by recycling companies, search for new markets for materials that are currently not recyclable.* | *416-123-4567* |

## V. TIMETABLE FOR IMPLEMENTING WASTE REDUCTION WORK PLAN

Provide a timetable indicating when each Source Separation and 3Rs program of the Waste Reduction Work Plan will be implemented.

| Source Separation and 3Rs Program | Schedule for Completion |
|---|---|
| *Blue Box Recycling Program* | *Before project begins, (i) purchase blue boxes and recycling carts, and prepare signs. (ii) Instruct all workers to use the Blue Boxes. (iii) Set* up collection with recycling company. |
| *Brick and Concrete Recycling Program* | *(i) Before brick laying starts, instruct brick layers to place all unusable brick in piles beside each house. Determine area that will accept brick for recycling or as clean fill. Remove brick at end of project for recycling, <u>if possible</u>.*<br>*(ii) Set up contract/pricing with concrete recycling company before construction. Inform all workers to minimize spillage of concrete. Set up area for all waste concrete to be stored before construction. Send waste concrete to recycling company at the end of the project – August 2009.* |
| *Cardboard Recycling Program* | *Before construction, set up signs, bins. Bring cardboard to recycling company during and/or at the end of the project.* |
| *Drywall 3Rs Program* | *Before the project starts, (i) instruct workers about using as much scrap drywall as possible during construction, (ii) set up bin to store waste drywall, (iii) find companies that recycle drywall. At the end of project, send all drywall to recycling company.* |
| *Insulation Reuse Program* | *During construction - insulation will be reused where possible in each house. Any additional pieces will be carried over and reused in other houses.* |
| *Metal Recycling Program* | *Before project starts, (i) instruct workers about program, (ii) set up collection bin, (iii) determine recycling company. During or at the end of the project have materials collected.* |
| *Plastic Reuse Program* | *During construction. Plastic pipe will be used for various purposes as will plastic film to protect materials.* |
| *Roofing Shingles 3Rs Program* | *Before roofing begins, instruct all workers about utilizing as much of the asphalt shingles as possible. Determine if any recycling companies exist. At end of the project, recycle shingles, if possible.* |
| *Tile Flooring Reuse Program* | *Set up during construction. Tile cuttings will be reused in each house and carried to other houses with similar tile pattern for reuse, where possible.* |
| *Wood Reuse Program* | *Before construction, inform all workers to reuse as much scrap wood as possible.* |

## VI. COMMUNICATION TO WORKERS

| Explain how the Waste Reduction Work Plan will be communicated to workers at the site of the construction or demolition project: |
|---|
| *Jack Reduce will hold a meeting with all workers prior to project commencement to discuss the waste diversion programs to be followed for the project. A one page hand out entitled "waste diversion summary" will be provide to each worker or visitor to the site. Signs will be developed for each waste source separation bin. If any of the source separation bins are used incorrectly, staff will be informed about this and given proper instruction. Input from all workers will be encouraged regarding how to improve the waste diversion program.* |

## VII. ESTIMATED ANNUAL WASTE PRODUCED BY MATERIAL TYPE AND THE PROJECTED ANNUAL AMOUNT TO BE DIVERTED BY THE 3RS

| **Material Categories** *(as stated in Part III)* | **Estimated Waste Produced/Yr.*** (kgs or tonnes) | **Name of Proposed 3Rs Program** *(as stated in Part III)* | **Projections to Reduce, Reuse or Recycle Waste/Yr.** (kgs or tonnes) | | | **Estimated Waste Diversion Rate** ** **(%)** |
|---|---|---|---|---|---|---|
| | | | **Reduce** | **Reuse** | **Recycle** | |
| *Blue Box Materials* | *50 kg* | ***Blue Box Recycling*** | | | *45 kg* | *90 %* |
| *Brick and Concrete* | *(i) 1.5 tonne (ii) 2 tonnes* | ***Brick and Concrete Recycling*** | *Concrete 300 kg* | | *Bricks 1 tonne† Concrete 1 tonne†* | *66%* |
| *Cardboard* | *300 kg* | ***Cardboard Recycling*** | | | *220 kg* | *73%* |
| *Drywall* | *500 kg* | ***Drywall 3Rs*** | | *50 kg* | *250 kg†* | *60%* |
| *Insulation* | *10 kg* | ***Insulation Reuse*** | | *5 kg* | | *50%* |
| *Metal* | *200 kg* | ***Metal Recycling*** | | | *170 kg* | *85%* |
| *Plastic* | *50 kg* | ***Plastic Reuse*** | | *25 kg* | | *50%* |
| *Roofing Shingles* | *250 kg* | ***Roofing Shingles 3Rs*** | | *50 kg* | *150 kg†* | *80%* |
| *Tile Flooring* | *25 kg* | ***Tile Flooring Reuse*** | | *10 kg* | | *40%* |
| *Wood* | *1 tonne* | ***Wood Reuse*** | | *600 kg* | | *60%* |

*(† - depends on whether a company will recycle this material from our project)*

* Estimated Waste Produced = Waste Diverted (3Rs) + Waste Disposed

** Estimated Waste Diversion Rate = Amount of Waste Diverted (3Rs) ÷ Estimated Waste Produced x 100%

| **I hereby certify that the information provided in this Waste Reduction Work Plan is complete and correct.** | | |
|---|---|---|
| **Signature of authorized official:** *Mr. Bricks* | **Title:** *1234 Ontario Ltd.* | **Date:** *March 1, 2008* |

## LAUNCHING THE WORK PLAN

### Creating Awareness

Launching your waste reduction work plan needs several important actions to ensure success:

- Your Waste Reduction Coordinator/Committee should be clear about the goals and objectives of the work plan. They should assign responsibilities and authorities to appropriate personnel in all project areas.
- It is essential to make the right resources available. This may involve staff time to manage and operate your work plan and basic equipment to contain wastes. Consultation with end users or recycling service providers will help you identify what equipment is needed.
- At the same time, your coordinator/committee should develop awareness of your work plan among all staff and workers. Open display of the work plan, as required by the regulation, and explanation of its goals will help secure full participation.

Please note that the work plan must also be communicated to outside trades who come to work on the project. In these cases a short summary of the waste reduction work plan can be handed out with instructions and the locations of recycling bins.

### Staying on Course

To ensure success, you should monitor waste reduction performance against the targets established. You may find that additional waste reduction opportunities will arise, or find that more action is needed or different methods become available. You may need to adjust operating procedures and amend reduction targets, ideally upwards.

You might compare the performance of similar projects to check your reduction achievements against your targets. You can then make changes to your waste diversion targets and planned actions.

# APPENDIX C: Conversion Factors

**Metric Conversions**

1 metric ton (mt) = 1000 kilograms (kg)
1 kilogram (kg) = 2.2 pounds (lb)
1 cubic metre ($m^3$) = 1.3 cubic yards ($yd^3$)
1 metric ton (mt) = 2200 pounds (lb)

**Typical Container Sizes**

4 $yd^3$ = 3.1 $m^3$
6 $yd^3$ = 4.6 $m^3$
8 $yd^3$ = 6.2 $m^3$
14 $yd^3$ = 10.7 $m^3$
20 $yd^3$ =15.4 $m^3$
40 $yd^3$ =30.8 $m^3$

**Typical Weights of Items (kg)**

Pallet – Softwood = 9
Pallet – Hardwood = 13.6
Pallet - 1 cu. yd. (not compacted) = 45
Pallet - 1 cu. yd. (compacted) = 91
Drum - Steel, top = 18
Drum – Steel = 16
Drum - Fibre, top = 9
Drum – Fibre = 5.5
Drum - Plastic, top = 16
Drum – Plastic =14

**Example Densities ($kg/m^3$)**

Asphalt (milled, ripped) = 800-1000
Concrete, Brick & Block = 1200-2372
Mixed Demolition, noncombustible =1000-1600
Mixed Demolition, combustible = 300-400
Odd Plastic (loose) = 30
Odd Plastic (compacted) = 416
Glass (loose) = 300-357
Glass (compacted) = 595-1189
Corrugated Container (loose) = 24-27
Corrugated Container (compacted) = 241-342
Wood – pallets = 170
Wood - dimensional lumber =145
Wood - sawdust/shavings = 241-288
Wood - trimmings = 577
Wood - crates = 108
Metal Scrap – heavy = 2408
Metal scrap – light = 803
Mixed Residential Waste = 150-300

# APPENDIX D: Ministry of the Environment Forms

- **Waste Audit Report**
- **Waste Reduction Work Plan**

The blank forms included here are in PDF format. Copies of the blank forms are also available as Microsoft Word documents. This will allow you to modify the size of the tables, including the number of rows or the width of columns. The forms are available from the ministry as Word documents at:

www.ene.gov.on.ca/en/publications/forms/index.php#AuditandReduction

# Ministry of the Environment Waste Form

# Report of a Waste Audit

# Large Construction and Demolition Projects

### As required by O. Reg. 102/94

***This report must be prepared before construction or demolition begins at the site. The waste audit must be retained on file for at least five years after it is prepared, and be made available to the ministry upon request.*** (Revised July 2008)

## I. GENERAL INFORMATION

| | | | | | |
|---|---|---|---|---|---|
| **Name of Person Undertaking Project and Company Name:** | | | | | |
| **Name of Contact Person and Company:** | | **Telephone #:** | | **Email address:** | |
| **Project Type (Check One)*** | **Construction Project** | | **Demolition Project** | | |
| **Floor Area (square metres):** | | **Number of Buildings:** | | | |
| **Street Address of Project Site (if known):** | | | | | |
| **Lot and Plan Number:** | | **Municipality:** | | | |
| **Estimated Start Date of Project:** | | **Estimated Completion Date of Project:** | | | |

**** Separate reports must be made for construction and demolition projects regardless if they occur on the same site.***

## II. DESCRIPTION OF PROJECT

| Provide a brief overview of the construction or demolition project: |
|---|
| |

…/2

## III. CATEGORIES OF WASTE AND WASTE ITEMS

List the categories of waste the project will produce and the associated waste items for each category *(see part VI for examples of categories of waste):*

| Categories of Waste | Waste Items |
|---|---|
| *Example: Wood* | *Lumber cut-offs, Old Window frames* |
| | |
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## IV. PRODUCTION OF WASTE

For each category of waste listed in Part III of this form, explain how the waste at the construction or demolition project will be produced. Include references to how management decisions and policies will affect the production of waste:

| How Waste Is Produced | Decisions/Policies Affecting Waste Produced |
|---|---|
| *Example: Cut-offs and over-runs of waste shingles are produced during roofing.* | *Look at more accurate measurements for estimating amount of roofing shingles required* |
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## V. MANAGEMENT OF WASTE

| For each category of waste listed in Part III of this form, indicate which waste items will be disposed or reused/recycled and how each item will be managed at the project: | | |
|---|---|---|
| **Category** | **Waste to be Disposed** | **Reused or Recycled Waste** |
| *Example: Lumber cut-offs* | *Small pieces into roll off waste bin.* | *Larger pieces saved in piles and later reused as bridging or blocking during construction.* |
| | | |
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## VI. ESTIMATED QUANTITY OF WASTE PRODUCED

| **Categories of Waste** | **Estimated Amount of Waste Produced (tonnes)** | **Categories of Waste (continued)** | **Estimated Amount of Waste Produced (tonnes)** |
|---|---|---|---|
| Brick and Concrete | | Tile Flooring | |
| Cardboard | | Carpet | |
| Drywall (unpainted) | | Glass | |
| Drywall (painted) | | Plaster | |
| Steel | | Blue Box – Newspaper, cans, etc. | |
| Wood (unpainted or untreated) | | Other | |
| Wood (painted/treated) | | | |
| Plastic (pipes, film, etc) | | | |
| Polystyrene Foam | | | |
| Porcelain Fixtures | | | |
| Insulation | | | |
| Asphalt | | | |
| Aluminum | | | |
| Roof Shingles | | | |
| **TOTAL** | | **TOTAL** | |

**Note:** When completing this form, write "n/a" in the Estimated Amount of Waste Produced column where the project will not produce any waste for a category of waste.

…/4

## VII. EXTENT TO WHICH MATERIALS OR PRODUCTS USED BY THE ENTITY CONSIST OF RECYCLED OR REUSED MATERIALS OR PRODUCTS

Please answer the following questions:

1. Do you have a management policy in place that promotes the purchasing and/or use of materials or products that consist of recycled and/or reused materials or products? If yes, please describe.

_____
_____
_____
_____
_____
_____

2. Do you have plans to increase the extent to which materials or products used consist of recycled or reused materials or products? If yes, please describe.

_____
_____
_____
_____
_____
_____

Please attach any additional page(s) as required to answer the above questions.

| **I hereby certify that the information provided in this Report of Waste Audit is complete and correct.** | | |
|---|---|---|
| **Signature of authorized official:** | **Title:** | **Date:** |

# Ministry of the Environment Waste Form

# Report of a Waste Reduction Work Plan

# Large Construction and Demolition Projects

**As required by O. Reg. 102/94**

***This report must be prepared before construction or demolition begins at the site. The waste reduction work plan must be retained on file for at least five years after it is prepared, and be made available to the ministry upon request.***

## I. GENERAL INFORMATION

| | | | | | |
|---|---|---|---|---|---|
| **Name of Person Undertaking Project and Company Name:** | | | | | |
| **Name of Contact Person and Company Name:** | | **Telephone #:** | | **Email Address:** | |
| **Project type (check one)*** | **Construction Project** | | **Demolition Project** | | |
| **Floor Area (square metres):** | | **Number of Buildings:** | | | |
| **Street Address of Project Site (if known):** | | | | | |
| **Lot and Plan Number:** | | **Municipality:** | | | |
| **Estimated Start Date of Project:** | | **Estimated Completion Date of Project:** | | | |

**** Separate reports must be made for construction and demolition projects regardless if they occur on the same site.***

## II. DESCRIPTION of PROJECT

| Provide a brief overview of the construction and/or demolition project: |
|---|
| |

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## III. PLANS TO REDUCE, REUSE AND RECYCLE WASTE

For each category of waste described in Part III of "Report of a Waste Audit" (on which this plan is based), explain what your plans are to reduce, reuse and recycle the waste, including:
1) how the waste will be source separated at the project, and 2) the programs to reduce, reuse and recycle all source separated waste.

| Waste Category | Source Separation and 3Rs Program |
|---|---|
| *Example: Wood waste* | *Separate reusable pieces into special marked bins; non-reusable pieces into disposal bin. Larger pieces of wood will be reused for bridging or blocking.* |
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## IV. RESPONSIBILITY FOR IMPLEMENTING THE WASTE REDUCTION WORK PLAN

Identify who is responsible for implementing the Waste Reduction Work Plan at the construction or demolition project. If more than one person is responsible for implementation, identify each person who is responsible and indicate the part of the Waste Reduction Work Plan that each person is responsible for implementing.

| Name of Person | Responsibility | Telephone # |
|---|---|---|
| | | |
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## V. TIMETABLE FOR IMPLEMENTING WASTE REDUCTION WORK PLAN

| Provide a timetable indicating when each Source Separation and 3Rs program of the Waste Reduction Work Plan will be implemented. | |
|---|---|
| **Source Separation and 3Rs Program** | **Schedule for Completion** |
| *Example: Wood Reuse Program* | *Set up before construction. Ongoing during project.* |
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## VI. COMMUNICATION TO WORKERS

| Explain how the Waste Reduction Work Plan will be communicated to workers at the site of the construction or demolition project: |
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| |

## VIII. ESTIMATED ANNUAL WASTE PRODUCED BY MATERIAL TYPE AND THE PROJECTED ANNUAL AMOUNT TO BE DIVERTED BY THE 3RS

| **Material Categories** *(as shown in Part III)* | **Estimated Waste Produced/Yr.*** (kgs or tonnes) | **Name of Proposed 3Rs Program** *(as stated in Part III)* | **Projections to Reduce, Reuse or Recycle Waste/Yr.** (kgs or tonnes) | | | **Estimated Waste Diversion Rate** ** **(%)** |
|---|---|---|---|---|---|---|
| | | | **Reduce** | **Reuse** | **Recycle** | |
| *Example: Wood (unpainted)* | *600 kgs* | *Wood Reuse Program* | | *~ 360 kg* | | *60%* |
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* Estimated Waste Produced = Waste Diverted (3Rs) + Waste Disposed

** Estimated Waste Diversion Rate = Amount of Waste Diverted (3Rs) ÷ Estimated Waste Produced x 100%

***Note:*** When completing this form, write "n/a" in the Estimated Waste Produced column where the project will not produce any waste from a material category.

| **I hereby certify that the information provided in this Waste Reduction Work Plan is complete and correct.** | | |
|---|---|---|
| **Signature of authorized official:** | **Title:** | **Date:** |