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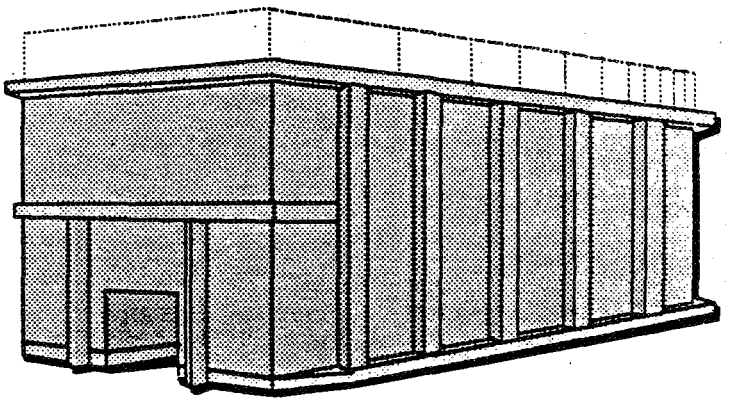
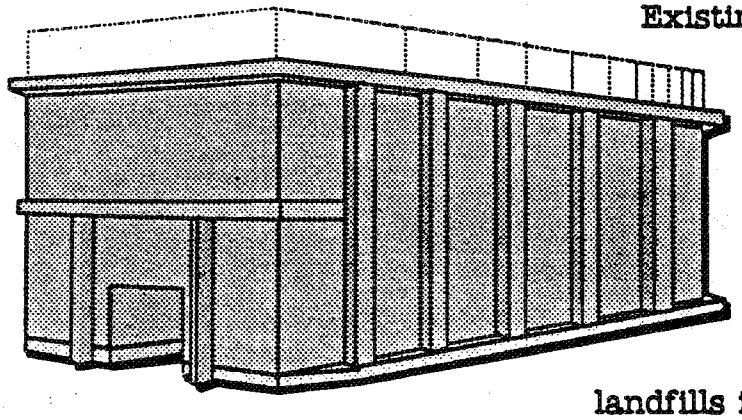
# Waste Management Action Plan



For The
Residential Building Industry

## INTRODUCTION

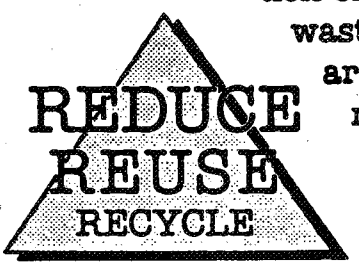
A Waste Management Action Plan (Way-MAP) makes construction activity more environmentally friendly by reducing the amount of waste sent to landfills.



Existing landfill space is quite limited in most urban centres and numerous environmental problems including water contamination and gas emissions are associated with landfills. The environmental and economic advantages which occur when wastes are diverted from landfills include: conservation of raw materials and energy, reduction in the cost of waste disposal, and in most cases any additional costs of waste management go towards employing a person on site instead of paying for materials to fill up a hole in the ground. Add to that the efficient use of materials on site and public relations value of a clean site where wastes are managed in an environmentally sound way, and it becomes difficult to ignore the importance of sound waste management.

## KEY PRINCIPLES

The main focus of this Way-MAP is to reduce waste generation on site. With careful planning, many wastes can be avoided. Any wastes which are generated are to be handled in the most environmentally sound way, according to the 3R hierarchy of REDUCE, REUSE, and RECYCLE.



## RECYCLING OF MATERIALS

Virtually all the materials generated on a construction site can be recycled. However each municipality will have different opportunities to recycle wastes depending on local economic and environmental conditions.

Wastes must be kept clean and separated to maintain their reusability or recyclability. Separation can occur after a mixed bin of wastes is taken away from a construction site; however, the efficiency of recycling and the value of materials is increased if wastes are separated at source.

The major types of construction materials are listed below, organized roughly according to market value for the recycled product.

| Material | Market Value | Recycled Products |
|---|---|---|
| asphalt shingles | low | paving material, currently few recycling facilities exist |
| gypsum wallboard | low | new wallboard |
| wood | low | fibre or fuel |
| insulation | low | difficult to recycle, possible to reuse |
| plastic | medium | plastic feedstock |
| bricks and blocks | medium | roadbase/backfill |
| building materials | medium - high | reuse |
| cardboard | low | cardboard fibre |
| metals | high | new metals |
| liquid wastes (paints and solvents) | variable | refined and remixed into new products |



## WASTE MANAGEMENT ACTION PLAN CHECKLIST

This checklist outlines the 10 steps which are necessary to re-position your company to effectively manage your construction waste stream. The checklist is to serve as a quick guide to organize your note taking and developing a plan which is specific to your company. More information is provided in the detailed list of steps which follow.

1. ▷ Designate a person to be responsible for waste management

2. ▷ Examine design details of building to ensure efficient use of materials.

3. ▷ Evaluate materials ordering and storage procedures on site

4. ▷ Evaluate site layout.

5. ▷ Evaluate waste production on site

6. ▷ Investigate Waste Disposal Options

    6.1 local landfill bans and regulations
    6.2 local waste recycling companies

7. ▷ Investigate waste separation, storage, and transportation systems

8. ▷ Develop a system of worker incentives

9. ▷ Choose a strategy for each stage of construction

    9.1 landclearing
    9.2 excavation
    9.3 foundation work
    9.4 framing
    9.5 metalwork HVAC/wiring
    9.6 plumbing
    9.7 insulation
    9.8 drywall
    9.9 paint
    9.10 exterior finishing
    9.11 roofing
    9.12 demolition

10. ▷ Count your money and time and build on your successes.

SUGGESTIONS ON HOW TO GET THE BEST Way-MAP FOR YOUR COMPANY.

The following checklist includes suggestions on how to complete each step of a Way-MAP. Different people may need to be involved at each stage and the checklist lists possible personnel to complete each step. Completing a thorough Way-MAP for a project will make future Way-MAP's easier to do and more effective.

## 1. DESIGNATE PERSON RESPONSIBLE FOR WASTE MANAGEMENT

**Action:** Designate a waste management person (WMP) to manage waste recycling and disposal. Typically the WMP would be the site manager, or an employee who's job includes site clean-up on one or several sites. He or she will need the authority or the backing of managers, in order to have an influence on site workers and waste hauling personnel. This person would have the following responsibilities:

- oversee that the waste management system is running efficiently,
- ensure that contamination is not occurring,
- ensure that the appropriate people are cleaning up their wastes, and
- coordinate the storage of materials on site so that theft and damage do not occur.

The waste management person could also be responsible for documenting all waste management activities so that accurate cost comparisons can be made between waste management alternatives. Helping with cost accounting will make the WMP more sensitive to new opportunities to reduce costs.

Set up communication links with all pertinent persons who can influence waste management. Ask these people for suggestions and input on the Way-MAP and incorporate these into waste management activities carried out on site.

**Personnel Involved:** designer, materials buyer, site workers, site waste management specialist, subtrades, client, waste haulers, recycling companies.

## 2. EXAMINE DESIGN IN TERMS OF EFFICIENT MATERIAL USE

**Action:** Review designs in terms of environmental friendliness and waste generation. During the review session, keep the following rules in mind:

- Favour designs using standard sizes (eg. 8 ft. lengths).
- Favour the use of materials which are made from recycled materials and are recyclable.
- Favour durable materials which are energy saving. (eg. low flush toilets or energy efficient appliances)
- Reuse materials from renovation or demolition sites. (eg. used fixtures).
- Look for opportunities to reuse materials on site (eg. forming lumber as sheathing).

**Personnel Involved:** designer, contractor, client, materials purchaser.

## 3. EVALUATE MATERIALS ORDERING AND STORAGE PROCEDURES ON SITE

**Action:** Identify how materials are wasted on site. Investigate storage methods in terms of preventing damage from careless handling and weather. (eg. using plastic to cover bags of mortar and careful stacking of bricks and blocks so that they are not lost in the mud and become backfill. Materials which are ordered just before they are needed are less likely to be damaged or stolen.

**Personnel Involved:** site superintendent, site labourers, materials purchaser.

## 4. EVALUATE SITE LAYOUT

**Action:** Analyze where new, reusable and waste materials can be stored on site. Design a site layout with enough room for all materials which are generated on site. The size and location of the site will significantly impact how wastes can be managed on site. If waste is to be left in piles, larger amounts of room are needed or regular pick-up of the wastes are required. What is the potential for contamination. Bins in downtown areas seem to be much more prone to contamination and therefore may need to be locked or guarded if they are to hold recyclables. It also may be advantageous to provide some piles for reusable scraps so that subtrades can easily locate them. (eg. a pile of lumber of lengths which could be used for bridging or backing, and a pile of scrap sheet metal which could be reused for patches).

**Personnel Involved:** site superintendent, site labourers, WMP.

## 5. ESTIMATE WASTE PRODUCTION ON SITE

**Action:** Estimate the amounts and types of recyclable and non-recyclable wastes which are expected to be generated on site. Go through the checklist of recyclable wastes. The proportion of the waste stream (by volume) for residential construction breaks down as follows:

| Typical Home Site | % | Estimates From Your Own Site | | | |
|---|---|---|---|---|---|
| wood | 35% | | | | |
| gypsum | 15% | | | | |
| metals | 4% | | | | |
| asphalt | 6% | | | | |
| bricks and blocks | 12% | | | | |
| plastics | 4% | | | | |
| fibreglass | 5% | | | | |
| cardboard | 10% | | | | |
| packaging | 4% | | | | |
| other | 5% | | | | |

List all the expected quantities of each type of waste. This should give an indication of what type of management activities are appropriated for the specified wastes.

**Personnel Involved:** site superintendent, waste hauler, book keeper (or someone good with numbers).

## 6. INVESTIGATE WASTE DISPOSAL OPTIONS

### 6.1 Local landfill bans and regulations

**Action:** Phone the local environmental authority to find out if any materials are banned from landfill disposal or materials which must be specially handled. Regulations change quite frequently these days, so be sure you are up to date. Ask about upcoming bans. (eg. liquid wastes, or recyclable wastes banned from landfill disposal) What are the required handling procedures for these wastes.

**Personnel Involved:** site superintendent or WMP.

### 6.2 Local Waste Recycling Companies

**Action:** Find out what the alternatives are now available for waste disposal other than landfilling. Some recycling companies only accept certain types of waste. Some will accept mixed-waste and sort it for recycling. (See local construction waste resource directory; other info sources include Provincial Departments' of environment, municipal engineering departments, local recycling groups.) Consider delegating the job of phoning recycling and waste disposal companies. Look for someone with time available for the job and who is capable of finding out specific information pertinent to your waste stream and your site. This could be an enthusiastic secretary or other worker. The individual will need to be able to ask lots of questions, and note pertinent details on your Waste Management Plan/Resource Directory.

Important questions to include in your questionnaire:

*What construction/demolition materials are you willing to accept?*
*Will you pick-up or must materials be delivered and the cost of either?*
*Is there a minimum size of load that you will pick-up?*
*Where is the depot location?*
*What are the hours of operation?*
*Will you pay for certain wastes such as cardboard or metal?*
*If the wastes are prepared in a certain way are the disposal costs reduced?*
*(eg. metal scraps less than 1meter long, gypsum wallboard kept dry).*
*Does your company supply bins for the materials?*
*What level of contaminants is permissible?*

*Will your company clean-up site or just pick-up separated wastes?*
*Where is the market for the recycled materials?*
*What do you do with toxic materials or contaminants?*
*Is it necessary for me to set up a waste account before delivering wastes?*
*When would you ideally like to be notified for pick-up? (and how much advanced notice is essential?)*
*Can you provide references?*
*Is your company certified by an association or an agency?*
*Do you employ specially trained personnel?*

**Personnel Involved:** site superintendent, WMP, a good interviewer.

## 7. INVESTIGATE WASTE SEPARATION, STORAGE, AND TRANSPORTATION SYSTEMS

**Action:** Make a list of all the options available for handling the waste stream from your construction site. Not all of these options are possible on every site. And the possibilities may vary throughout the job. For example: a separate bin for wood may make sense during the forming and framing stage; a small independent waste hauler might be hired to clean-up and remove all gypsum from the site; and a separate bin might be ordered during the finishing stage especially for cardboard.

Investigate which separation system is best for your site. Keep in mind that for materials to have a recyclable value, they must ultimately be clean and separated. At least four approaches should be considered:

| Approaches | Pro's and Con's |
|---|---|
| 1.<br>Bins or piles for separated wastes | Costlier to sort, but you benefit from lower tipping fees. Separated loads must be transported by a waste hauler or company truck to recycling depots. |
| 2.<br>Mixed bins sorted off-site | Materials are recycled, but there is generally minimal or no cost saving on disposal fee because of the sorting required off-site. Some waste hauling companies may want to do the sorting themselves or some facilities specialize in sorting mixed loads. Some of these facilities only accept mixed loads with a high-percentage of recyclable materials. |
| 3.<br>Removal of waste by sub-contractors | Subcontractors usually generate a specific type of waste, and therefore, if waste is cleaned-up and separated as it is generated, recycling should be easy. Enforcing clean-up by subs can be a problem. If the sub is to be responsible for the clean-up and removal of the waste materials which he generates, then a definite clause should be written into the contract before work begins. An example of a simple clause would be: The subcontractor is responsible for daily clean-up and removal of all waste materials created during his construction activities. If wastes must be cleaned-up by other personnel, the sub-contractor will be back-charged at the rate of $$$ per hour.<br><br>Subs not set up to haul wastes may want to negotiate with the general contractor to have waste removed. |
| 4.<br>Clean-up and removal of waste by a specialized waste hauler | Some specialized waste haulers will clean-up and sort wastes from around a site. This saves the time of on-site workers from sorting the wastes. Contamination is also minimized, because the waste hauler has direct control over what is loaded on the truck. This waste hauler could either be a sub-contractor or a company employee. |

When choosing a waste hauler, the concerns of price and service are no longer the builder's only considerations. In some municipalities, builders have been fined for the action of their haulers. Builders should work with a hauler who can provide expertise to help the builder develop a waste management strategy. The hauler should also help the builder develop a system of cost accounting for disposal.

**Personnel involved:** site superintendent, WMP, waste haulers.

## 8. DEVELOP A SYSTEM OF WORKER INCENTIVES

**Action:** Encourage workers to change their attitudes towards waste management. Workers must become aware of the environmental and economics of waste recycling. A meeting should occur to inform workers and gather their input on the proposed waste management activities. If a plan is to be successful, the participation of the workers who will actually be doing the sorting is necessary. A system of carrots and sticks usually works best. For example:

- throw a party with the money recovered from selling recyclable materials;
- reward workers who some up with environmentally friendly suggestions;
- institute a system of warnings and penalties for non-compliance with waste management programs;
- back charge any trades who fail to comply with contract requirements to clean up or manage waste; and
- suggest to contractors that you may only deal with workers who manage their waste in environmentally sound ways (see how they respond).

**Personnel Involved:** site superintendent, sub-contractors, waste hauling companies, site labourers.

## 9. CHOOSE A STRATEGY FOR EACH PHASE OF CONSTRUCTION

You should now have a good idea of what waste materials will be generated and what kind of system will be set up to deal with the various waste materials. At each stage of construction, there are specific ways to REDUCE, REUSE and RECYCLE the wastes which are produced.

### ▷▷ Phase 1 LANDCLEARING

**Materials Produced:** soil, wood, vegetation

Action:

REDUCE: Minimize disruption to existing vegetation and soils. Limit the use of large machinery which damages soils and vegetation.
REUSE: Excavated soils and trees can be used for final landscaping of site. Mulch vegetation on site for landscape materials if possible. Send trees for processing as lumber or pulp.
**Personnel Involved:** site superintendent, landscape architect, landclearing contractor, waste haulers.

### ▷▷ Phase 2 EXCAVATION

**Materials Produced:** soil, contaminated soil

Action:

REDUCE: Limit the amount of excavation needed in orderto limit soil disturbance.
REUSE: Excavated materials can be used as backfill or landscaping. If contaminated soils are a possibility, hire an engineering consultant before you start.
**Personnel Involved:** site superintendent, excavation contractor, architect, soils consultant.

### ▷▷ Phase 3 FOUNDATION WORK

**Materials Produced:** wood, metal, concrete

Action:

REDUCE: Cut forms carefully and carefully order concrete.
REUSE: Specify reusable forms. (eg. oiled ship lap) Utilize excess concrete brought to site for parking stops etc. Sell used forming lumber to other sites.
RECYCLE: Sell rebar for scrap. Send waste wood to a processing facility.
**Personnel Involved:** site superintendent, forming contractor, waste haulers.

## Phase 4 FRAMING

**Materials Produced:** wood

Action:

REDUCE: Use advanced framing techniques which require 10-15% less wood by having larger spans between studs and using 2 or 3 studs in a corner instead of 4. Design using standard sizes to reduce cutting waste. Use prefab wall, roof and floor systems. These systems mean that most of the waste is produced in a central location where it can more easily be recycled and there is less waste on site for the general contractor to haul away.
REUSE: Pile end cuts for use as bridging and backing. Organize a central cutting area so that all reusable cuttings can be easily piled and located when needed. Use timber which has been recovered from demolished buildings. Used timbers cost approximately 50% of the cost of new and are available at some old building material supply stores.
RECYCLE: Send wood to recycling facility to make chips for pulp, composite wood products, fuel pellets etc. Wood can also be ground for landscape material or compost. Another way to get rid of wood scraps is to give it away as firewood to employees or local residents.
**Personnel Involved:** site superintendent, designer, framing sub-contractor, site labourers, waste haulers.

## Phase 5 METALWORK - HVAC WIRING

**Materials Produced:** metal

Action:

REDUCE: Measure and cut carefully.
REUSE: Use second-hand materials (eg. used circuit breaker boxes from used building material supply stores) If materials are cut in a central location and reusable cuttings stored in a separate pile it makes it easy for a tradesman to locate a small piece for a repair.
RECYCLE: Send scrap materials to be remelted.
**Personnel Involved:** site superintendent, metalwork sub-contractor, site labourers, waste haulers.

## Phase 6 PLUMBING

**Materials Produced:** metal, plastics, waste solvents

**Action:**

REUSE: Fixtures from old buildings can be reused where appropriate.
RECYCLE: used fixtures, scrap metals and plastics.
**Personnel Involved:** site superintendent, plumbing subcontractor, site labourers, waste haulers.

## Phase 7 INSULATION

**Materials Produced:** various

**Action:**

REDUCE: Use prefab wall systems with insulation already included, or use blown in batt/cellulose in walls.
REUSE: Use scrap insulation to insulate attic or as sound proofing on interior walls. (Care should be taken to ensure insulation does not interfere with future electrical work.)
RECYCLE: Specify insulation made from recycled materials (eg. use cellulose insulation with recycled content where appropriate, or blown in mineral fibre).
**Personnel Involved:** designer, site superintendent, insulation contractor.

## Phase 8 DRYWALL

**Materials Produced:** gypsum wallboard, cardboard mud boxes

**Action:**

REDUCE: Design using standard sizes.
REUSE: Use scraps for patches.
RECYCLE: Send materials to a recycling depot. (In some major centres, drywall is banned from landfill disposal.)
**Personnel Involved:** designer, drywall contractor, site superintendent, site labourers, waste haulers.

## Phase 9 PAINT

**Materials Produced:** paint solvents

Action:

REDUCE: Avoid atmospheric pollution by using paints without formaldehyde or petroleum derivatives.
REUSE: Use leftover paint as undercoating on next job.
RECYCLE: Send excess paints and solvents to a recycling plant. Send non-recyclable liquid wastes to a proper disposal facility for incineration. Send empty paint cans for recycling.
**Personnel Involved:** designer, site superintendent, painter, hazardous waste hauler.

## Phase 10 EXTERIOR FINISHING

**Materials Produced:** wood, brick, masonry, vinyl, stucco

Action:

REDUCE: Cut and measure carefully. Design using standard sizes. Store materials carefully to prevent damage.
REUSE: Salvage bricks and blocks from demolition projects. Broken bricks and blocks as can be used as backfill in some cases.
RECYCLE: Send vinyl and aluminum siding, and rubble to recycling facilities.
**Personnel Involved:** site superintendent, sub contractor, waste haulers.

## Phase 11 ROOFING

**Materials Produced:** asphalt shingles, cedar shakes, cement tiles

Action:

REDUCE: Store, measure and cut materials carefully.
REUSE: Use concrete tiles as fill.
RECYCLE: Send asphalt shingles to a local recycling facility if one exists.
**Personnel Involved:** site superintendent, roofing subcontractor.

## Phase 12 DEMOLITION

**Materials Involved:** various

Action:

REDUCE: Favour renovation over demolition where appropriate.
REUSE: Strip home of fixtures, hardwoods, large dimension timbers, and anything else of resale value. RECYCLE Salvage metal plumbing, ducting and other non-reusable appliances. Separate non-reusable wood for grinding for chipping for fibre. Send concrete to be crushed and recycled as road base.
**Personnel Involved:** Demolition contractor, waste haulers, site labourers, designer, recycling companies.

## *10.* COUNT YOUR MONEY AND TIME

No plan is complete without an evaluation stage. Records of clean-up time, bin rental costs trucking costs and disposal costs and refund from recycling materials should be evaluated against previous practices. Review will likely be an ongoing procedure as new companies develop to recycle different wastes, landfill bans effect what can be disposed, and new technologies become available which influence waste production and management. A plan should be evaluated to ensure that should be an ongoing process as the markets for recyclable materials are dynamic and should be regularly monitored for new opportunities.

The table below should help to evaluate the economic benefits.

| Material | Labour Cost | Disposal Cost | Bin Rental | Trucking | Total |
|---|---|---|---|---|---|
| wood | | | | | |
| gypsum | | | | | |
| asphalt | | | | | |
| bricks and blocks | | | | | |
| plastics | | | | | |
| fibreglass | | | | | |
| cardboard | | | | | |
| used fixtures | | | | | |
| mixed waste | | | | | |
| other | | | | | |