Sustainability – Construction Waste Management

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Real Estate Sector’s Global Impact

Buildings are responsible for 40% of world’s global greenhouse gas emissions. Buildings are responsible for 40% of solid waste generation globally. Buildings utilize 1/3 of the world’s resources. Buildings use 12% of the world’s water. Air quality in buildings typically contains up to 5x more pollutants than outdoor air.
Recycling – Why Bother?

The big clean-up

Volunteers picking up rubbish along the bank of the Klang River in conjunction with Earth Day 2020. More than 2,400 tonnes of rubbish was collected from the river bank. photo: File pic, CHIN CHONG YEN / THE STAR
**Recycling – Why Bother?**

- People are encouraged to reduce, reuse, and recycle to minimize waste.
- Recycling helps conserve natural resources and reduce the amount of waste sent to landfills.
- By recycling, materials can be repurposed and reused, reducing the need for new raw materials.
- Recycling also helps reduce greenhouse gas emissions and energy consumption.

**Waste Facts**

- **We overeat**: Eating up a storm.
- **930 tonnes of food being thrown away every day**: This is a significant amount of food waste in Malaysia.
- **Eating food waste**: The overconsumption of food leads to a lot of food going to waste, which is a huge problem globally.
- **Food waste problems**: Malaysia needs to address the issue of food waste to reduce the amount of food being thrown away.

**We can do better**

- There is a need for better food preservation techniques.
- Education and awareness campaigns can helppeople understand the importance of reducing food waste.
- Policies that encourage the use of organic waste as fertilizer can be implemented.

**Action steps**

- Reduce food waste by planning meals and consuming only what is eaten.
- Compost food waste to turn it into a valuable soil amendment.
- Support local food rescue initiatives that divert food waste from landfills.

- Malaysia can do more to reduce its food waste output and conserve resources.
Zero Waste Town

In the small town of Kanashiro, 370 miles from Tokyo, Japan, residents are working towards a goal of zero waste by the year 2020. Recycling of household waste has reached a staggering 90%, including home composting.

This admirable effort began in 2003, when the residents of this small community were forced to end their dependence upon incineration as a way to dispose of their garbage. Nowadays, the town has turned towards recycling, reusing, and composting.

The town has quit using waste collection vehicles, instead relying upon citizens to drive their recyclables to a zero-waste center. Once at the facility, they sort their trash into 34 different categories. The site can manage the typical recyclable items, such as bottles, cans, and newspapers, and also more unusual items, such as pens, razors, and Styrofoam trays.

Some critics point out that the greenhouse gases saved by recycling are negated by carbon emissions used by the need to drive to the waste site. However, optimists of the system disagree, stating that most people tie the journey into their weekly errands.

Source: ecyclegroup.com

Sg Citarum - Jakarta

www.mgbc.org.my

Source: ecyclegroup.com
Manila & Mumbai

Kuala Lumpur - The aftermath of WC 2014 Final
…..and in Petaling Jaya 1/2

…..and in Petaling Jaya 2/2
Our Health Indicators

1 Week’s Worth of Trash

www.mgbc.org.my
1 week + 1 month at my home

www.mgbc.org.my
Land Fill

Construction Waste
MR 5 – Storage & Collection of Recyclables (Non-Residential)

**INTENT**
- Facilitate reduction of waste generated during construction and during building occupancy that is hauled and disposed of in landfills:

**REQUIREMENTS**
- During Construction, provide dedicated area/s and storage for collection of non-hazardous materials for recycling, AND
- During Building Occupancy, provide permanent recycle bins.

Total = 1 Point

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MR 6 – Construction Waste Management (Non-Residential)

**INTENT**
- Develop and implement a construction waste management plan that, as a minimum identifies the materials to be diverted from disposal regardless of whether the materials will be sorted on site or co-mingled. Quantify by measuring total truck loads of waste sent for disposal:

**REQUIREMENTS**
- Recycle and/or salvage ≥ 50% volume of non-hazardous construction debris (1 point), OR
- Recycle and/or salvage ≥ 75% volume of non-hazardous construction debris. (2 points)

Total = 2 Points

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Storage and Collection of recyclables

Potential Strategies and Technologies:

Coordinate the size and functionality of the recycling areas with the anticipated collection services for glass, plastic, office paper, Newspaper, cardboard and organic wastes to maximize the effectiveness of the dedicated areas.

Consider employing cardboard balers, aluminum can crushers, recycling chutes and collection bins at individual workstations to further enhance the recycling program.

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Construction Waste Management

Potential Strategies and Technologies:

Establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals.

Consider recycling cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation.

Designate a specific area(s) on the construction site for segregated or comingled collection of recyclable materials, and track recycling efforts throughout the construction process.

Identify construction haulers and recyclers to handle the designated materials.

Diversion may include donation of materials to charitable organizations and salvage of materials on-site.

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Storage and Collection of recyclables

Construction Waste
Construction Waste Management (Non-Residential) – Ref Guide

**APPRAOCH & IMPLEMENTATION**

A waste management plan must be developed and types of construction waste identified. Excavated soil must be excluded in the calculation.

Identify construction haulers and recyclers to handle the designated construction waste and ensure that records are kept to verify that the materials diverted have been recycled or salvaged as intended.

Use of pre-cast reduces waste produced on site.

### REQUIRED SUBMISSION FOR DESIGN ASSESSMENT (DA)

1. Tabulate the anticipated diverted/recycled/landfill waste and the estimated quantity of the diverted/recycled/landfill waste.

### REQUIRED SUBMISSION FOR COMPLETION & VERIFICATION ASSESSMENT (CVA)

1. Submit verified record of truck loads of diverted/recycled/landfill waste against total truck loads, supported by copy of the construction waste management plan.
2. Describe any deviations or additions to the DA submission.

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Waste Management Plan (WMP) – Contents (Sample)

1. Project Information
2. Project Objective
3. Management
4. Distribution
5. Instructions & Training
6. Waste Management On Site
7. Segregation
8. Management of Waste
9. Ways of Minimizing Waste and Reducing Waste to Disposal
10. Measurement & Tracking of Waste Management Performance
11. Construction Waste Management Plan Implementation Checklist

Source: USGBC’s LEED
WMP – 1. Project Information & 2. Project Objective

1  Project Information
   Project Title:
   Location:
   Nature of Project:

2  Project Objective
   To fulfil GBI requirement, we are committed to implement the waste management measures stated in this plan to achieve the target of 50/75% solid waste diversion from landfill


3  Management
   A Waste Management Manager is engaged to be responsible for ensuring the instruction of workers, implementation and overseeing of the construction waste management plan. The Waste Management Manager will monitor the effectiveness and accuracy during the routine site visits. The Waste Management Manager will conduct independent site inspections and waste audit together with the Sustainability Consultant on a regular fortnightly basis.

   The Waste Management Manager will be present at the project site full time for the duration of the Project.

4  Distribution
   The Waste Management Manager shall distribute copies of this plan to the Client, Sustainability Consultant, Site Manager and each Subcontractor where relevant/applicable. This will be undertaken every time the plan is updated.
5 Instructions & Training

The Waste Management Manager will provide on-site briefing via recommendations of appropriate separation, handling, recycling, reuse and return methods to be used by all parties and at appropriate stages of the Project where applicable.

Toolbox talks will be carried out regularly on waste issues and all subcontractors will be expected to attend. This will ensure that everyone feels they are included and that their participation is meaningful.

(Please fill in here who will be the instructor and fill in the Training Log as well.)

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6 Waste Management On Site

Surplus or waste materials arise from either the materials imported to site or from those generated on site. Imported materials are those, which are brought to the project for inclusion into the permanent works. Generated materials are those, which exist on the project such as topsoil, sub-soil, trees and materials from demolition works etc.

However, there are other considerations to waste management such as waste reduction, segregation of waste, disposal of waste, financial impacts of waste disposal and recording, monitoring, education and reviewing. This plan outlines the procedures that have been put in to place and demonstrate how they benefit the environment, how we can measure the effects and how these procedures and practices are sustainable. (this need to be further illustrated here....)

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WMP – 7. Segregation

7 Segregation

A specific area will be laid out and labelled to facilitate the separation of materials for recycling, re-use and return. Recycling and waste bins are to be kept clean and clearly marked to avoid contamination of materials.

Planning need to be done to situate the skips (contractor need to plan on this-how many skips can be put now, and where?)

The workers are to be instructed to deposit the waste materials into the correct skip. Skips for segregation of waste identified currently are:

- Metal
- Domestic Waste (further segregate in glass, aluminium, paper, plastics)
- Concrete Waste

Due to constraint of space, other materials could be segregated as the work progresses, like cardboards, plastic etc.


8 Management of Waste

Waste materials on the project site basically falls into 3 categories of management:

- Re-use
- Recycle
- Landfill

A) Re-use

If surplus materials are used in the permanent works, they are classified as materials which have been re-used. If they are surplus to requirements and need to be removed from site, they can be removed and used in their present form, they are considered removed from site for re-use.

Materials that are re-used include:

i) waste concrete that could be crushed to be used as hardcore for pavement
ii) waste concrete that are used for the temporary access road

B) Recycle

If the surplus material cannot be re-used in its present form but could be used in a different form, it is sent for recycling. Materials that will be sent for recycling will be:

i) Steel re-bars  
ii) Steel/Aluminium  
iii) Timber

C) Landfill

If either of the above cannot be satisfied then the only option left is to send the surplus materials to landfill.


Table for Waste Type and Waste Management Measures

<table>
<thead>
<tr>
<th>Waste Types</th>
<th>Waste Management Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabling Works</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td>Re-use on-site</td>
</tr>
<tr>
<td>Bricks</td>
<td>Re-use on-site</td>
</tr>
<tr>
<td>Timber</td>
<td>Recycle</td>
</tr>
<tr>
<td>Metals</td>
<td>Recycle</td>
</tr>
<tr>
<td>Cardboards</td>
<td>Recycle</td>
</tr>
<tr>
<td>Construction Works</td>
<td></td>
</tr>
<tr>
<td>Plasterboard</td>
<td>Return/recycle</td>
</tr>
<tr>
<td>Bricks</td>
<td>Recycle</td>
</tr>
<tr>
<td>Timber</td>
<td>Recycle</td>
</tr>
<tr>
<td>Cardboard</td>
<td>Recycle</td>
</tr>
<tr>
<td>Metals</td>
<td>Recycle</td>
</tr>
<tr>
<td>Plastics</td>
<td>Recycle</td>
</tr>
<tr>
<td>Glass</td>
<td>Recycle</td>
</tr>
<tr>
<td>Ceramics</td>
<td>Recycle</td>
</tr>
</tbody>
</table>

The skips need to be monitored to ensure that contamination of segregated skips does not occur.

We will continually review the type of surplus materials being produced and where we can change the site set up to maximise on re-use or recycling and the use of landfill will be the last resort.

The plan will be communicated to the whole project team (including the client) at regular intervals during site meetings.

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9 Ways of Minimizing Waste and Reducing Waste to Disposal

Please describe ways that are being looked at to minimize waste produced, thus reducing waste to be removed from the project site. The actions are meant to reduce the amount of waste and surplus materials which traditionally would have been sent to landfill. This table should also include measures to re-use or recycle the waste produced during construction, identifying the facilities where the waste materials can be sent to.

The table would be updated progressively to reflect more measures to reduce waste.

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Current Action Table

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Minimize</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal formwork</td>
<td>Metal formwork instead of</td>
<td>Re-Use</td>
</tr>
<tr>
<td></td>
<td>timber formwork</td>
<td>Re-cycle</td>
</tr>
<tr>
<td>Concrete</td>
<td>Re-used on site for the</td>
<td>Disposal</td>
</tr>
<tr>
<td></td>
<td>temporary access road</td>
<td></td>
</tr>
<tr>
<td>Waste metal re-bar.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Packaging</td>
<td>Reduce/ send back</td>
<td></td>
</tr>
<tr>
<td>Wood Pallet</td>
<td>Reduce/ send back</td>
<td></td>
</tr>
<tr>
<td>Bricks</td>
<td>Re-used on site</td>
<td></td>
</tr>
<tr>
<td>Add as necessary</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### WMP – 10. Measurement & Tracking of Waste Mgmt Performance -1/2

10 Measurement & Tracking of Waste Management Performance – 1/2

The plan will be communicated across to all the workers on site and the Waste Management Manager will be in charge of ensuring the proper implementation of the Waste Management Plan. This is to ensure the successful achievement of the Waste Diversion target of 75%.

Waste collection form is to be used to record the quantity of waste and the type of waste that are being sent out of site. One person should be in charge of using the waste collection form to visually estimate the quantity of waste leaving the site in the truck to be sent for re-use on another site, recycling or to the landfill. Please refer to sample waste collection form attached in Appendix 1: Waste Collection Form.

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10 Measurement & Tracking of Waste Management Performance – 2/2

The waste collection form should also include waste receipt from the receiving facility (recycler, landfill). And if the waste is sent for re-use on another site by the sub-contractor, the sub-contractor has to endorse the form to confirm that the waste sent out is indeed re-used on another project site.

The waste data on the waste collection form should then be recorded into the excel spreadsheet provided in soft copy so that the waste data can be recorded and updated throughout the entire construction process. This waste data input in the excel spreadsheet will be summarized on a fortnightly basis to be reported to the client and sustainability consultant during the regular site progress meeting.

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WMP – 11. Construction Waste Mgmt Plan Implementation Checklist

11 Construction Waste Management Plan Implementation Checklist

<table>
<thead>
<tr>
<th>Checklist</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. For off-site or disposal, are all the waste destination details verified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Has a waste segregation/collection area been prepared?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Has the waste area been adequately labeled?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Has the CWMP document control/filing system been set up?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Have all the necessary personnel been appointed and briefed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Have the training for the staff been conducted?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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# Construction Waste Management – Data Collection

**Date:** Waste Form No.

<table>
<thead>
<tr>
<th>Person In Charge</th>
<th>Container Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. of Trips</th>
<th>Source of Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reuse Recycle Disposal</td>
</tr>
<tr>
<td></td>
<td>Onsite Offsite</td>
</tr>
</tbody>
</table>

**Percentage of Waste in the Container**

<table>
<thead>
<tr>
<th>Concrete %</th>
<th>Insulation %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wood %</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Metals %</th>
<th>Electrical %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cardboard %</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gypsum %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plastic %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Destination of waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Receipt No. / Photo No.</td>
</tr>
<tr>
<td>Sub-Contractor Signature</td>
</tr>
</tbody>
</table>

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## Construction Waste Management – Data for Menara Public Mutual, KL

- **Summary of the Waste Collection and Recycling data as of 10/04/12:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Disposed (Kg)</th>
<th>Reused (Kg)</th>
<th>Recycled (Kg)</th>
<th>Total Waste (Kg)</th>
<th>% Diverted from Landfill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Waste</td>
<td>2450Kg</td>
<td>2450Kg</td>
<td></td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>Wood</td>
<td>2119Kg</td>
<td>2450Kg</td>
<td></td>
<td>4569</td>
<td>100%</td>
</tr>
<tr>
<td>Metal</td>
<td></td>
<td>38109Kg</td>
<td></td>
<td>38109</td>
<td>100%</td>
</tr>
<tr>
<td>Concrete</td>
<td>13250Kg</td>
<td></td>
<td></td>
<td>13250</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>58378</td>
<td>95.8%</td>
</tr>
</tbody>
</table>

[www.mgbc.org.my](http://www.mgbc.org.my)
Construction Waste – Reuse/Recycle on site

Waste Facts

Recycle Now!
You can make a difference

Many of the things we throw have value and can be reused or recycled. Products that we so voraciously consume are made from resources that are fast depleting. Not only that, landfill sites are fast running out of space.

Though landfill sites are not inherently bad, they do represent a loss of land that could be used for other purposes. Landfilling is also a waste of resources, especially valuable ones that can be reused, recycled, or reused.

Suitable materials are taken from municipal solid waste and used as fill for land use from other sectors, including development and agriculture.

The most viable solution to this problem is recycling. Recycling conserves natural resources and reduces the amount of waste that goes into landfill, thus lengthening the lifespan of existing landfills.
Waste Pays

Bring Your Recyclables And Exchange With Incentives:

<table>
<thead>
<tr>
<th>What To Bring</th>
<th>Incentives (RM/Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEWSPAPER / MAGAZINES</td>
<td>0.20 / 0.10</td>
</tr>
<tr>
<td>CARDBOARD, BOXES</td>
<td>0.10</td>
</tr>
<tr>
<td>BLACK AND WHITE PAPER</td>
<td>0.25</td>
</tr>
<tr>
<td>COMPUTER PAPER</td>
<td>0.25</td>
</tr>
<tr>
<td>MIXED PAPER, BOOKS, COMICS</td>
<td>0.10</td>
</tr>
<tr>
<td>ALUMINIUM CANS</td>
<td>2.20</td>
</tr>
<tr>
<td>STEEL/TIN CANS/SCRAP METAL</td>
<td>0.05</td>
</tr>
<tr>
<td>USED PLASTICS</td>
<td>0.35</td>
</tr>
<tr>
<td>MONITOR AND CPU</td>
<td>4.00</td>
</tr>
<tr>
<td>PRINTER</td>
<td>0.50</td>
</tr>
<tr>
<td>MIXED PLASTICS</td>
<td>0.10</td>
</tr>
<tr>
<td>GLASS</td>
<td>FOC</td>
</tr>
<tr>
<td>BEVERAGE CARTON</td>
<td>0.30</td>
</tr>
</tbody>
</table>

The PJ Waste Conundrum: A Problem or an Opportunity?

- 69,000t waste (Jan-June '13) = RM 13 million to waste contractors
- 50% Organic, ie 34,500t (191.7t/day) from a population of 600,000
- 3,834 cu.m of biogas can produce 7,668 kWh of energy
- 7.7 MWh of energy can power 2,396 nos of 400W LED street lights per day
- 191.7 t of organic waste can yield 3,834 cu.m of biogas