

Recycling Of Construction And Demolition Waste Ia A

When you throw something away, where is away? The infrastructure to support the built environment is a big consumer of energy and valuable natural resources. The waste managers' sustainability battle-cry 'reduce, reuse, recycle' is becoming more popular within the construction industry however more research and data are necessary to provide proof of success. Recycling C&D waste is relatively easy to achieve on construction sites, but difficult to track and quantify. Waste generated from construction and demolition (C&D) activities are rich in salvageable, reusable, and recyclable content. Determining the material fractions present in waste flows, stocked materials, and secondary markets is critical to understanding the value of these resources and extending their use in the economy by refurbishment, recycling or new use. Construction waste management (CWM) has a cross section of designers, contractors, and decision makers and we need to make the life cycle pathway of materials in construction/demolition processes more transparent to construction industry stakeholders. Providing better transparency in these materials may motivate these individuals to recycle and reuse demolished materials, reduce consumption of virgin materials and to begin to document this progress regionally. This dissertation provides three papers with the goal of quantifying and evaluating environmental and resource management aspects of materials that are: 1) stocked in place, 2) present in waste flows, and 3) retired and installed during renovation activities. This research informs the waste management industry on building material movement and strategies for their reuse and recycle in Philadelphia. The first study shows that characterizing buildings by land use type is a viable means for determining materials stocked in place in buildings located in the city of Philadelphia. The method could be applicable to other cities in the US with similar patterns of development and urban form as Philadelphia, the city tested herein. The second study conducts data acquisition from unconventional sources including United States Green Building Council (USGBC) completed projects database, private industry waste reclamation facility (WRF) annual waste diversion data as a means to qualify materials found in C&D waste flows. We provide a contemporary C&D waste MFA dataset and find major fractions present in the WRF flows. The last study demonstrates atypical methods for sampling C&D waste data in the city of Philadelphia through publicly available data. We sample data from local governments that have not been previously used in industrial ecology research in order to characterize waste that is generated during permitting activities. The method could be applied in other urban centers in the US. The thesis demonstrates that industrial ecology tools, when combined with private data and alternative and publicly available data sources can describe and potentially quantify waste materials that are being diverted from landfills.

A pre-demolition audit is a tool that can be used to both identify hazardous substances and assess the materials to be removed from the building or

infrastructure, and consequently their potential value, prior to the demolition or renovation activity can be established. Audits are essential since they enable all stakeholders involved to get information on the composition of waste and make it easier to find markets for different waste types. It is likely that the European Commission will recommend all Member States to make this pre-demolition audit mandatory to increase high quality recycling of construction and demolition waste. The report presents the current pre-demolition audit systems and existing guidelines in Denmark, Finland and Sweden. The report gives recommendations on key elements to be included in audits for improving the quality of the construction and demolition waste.

An Introduction to Recycling Construction and Demolition Waste

Recycling of construction and demolition waste 1986 - 1995

Progress of Recycling in the Built Environment

Construction and demolition waste recycling

14. Concrete with construction and demolition wastes (CDW)

Construction and Demolition Recycling Companies

The need to establish material cycles in the building industry is undisputed.

Knowledge on this topic is available in many places: In this book it is summarised and systematized. After a general overview of the quantities generated, recovery rates and areas of application of recycled building materials, the current processing steps on which recycling is based and the possibilities for influencing the product properties are discussed.

Furthermore, recycling building materials are characterized and their fields of application are presented. The starting point is always the original building material, which is later found in the construction waste. The focus is on the structural properties. The environmental aspects, which have determined the discussion for years, are shown to the necessary extent. The book concludes with a chapter that presents new developments in processing technologies and analyses the potential of construction waste as a source of raw materials.

This publication provides introductory technical guidance for professional engineers and construction managers interested in recycling construction waste.

Resource Guide to Recycling Construction and Demolition Debris in the Northeast

A Guide for Architects and Contractors

Eco-efficient concrete

EFFECTIVE RECYCLE PLANNING FOR CONSTRUCTION AND DEMOLITION WASTES

Final Report

Construction Demolition Waste : Proceedings of the International Conference Organised by the Concrete and Masonry Research Group and Held at Kingston University - London on 14-15 September 2004

Finally, a case study was performed for waste concrete in Florida to determine the amount that is generated (40 - 61 x 106 Mg), the market availability, the management option with the fewest environmental impacts, and the best policy to encourage concrete recycling. Sufficient market

exists to recycle all concrete in Florida. Recycling was found to have the fewest environmental impacts in most areas of the state. Policies that required contractors to recycle a percentage of their waste stream were the best for Florida.

The civil engineering sector accounts for a significant percentage of global material and energy consumption and is a major contributor of waste material. The ability to recycle and reuse concrete and demolition waste is critical to reducing environmental impacts in meeting national, regional and global environmental targets. Handbook of recycled concrete and demolition waste summarises key recent research in achieving these goals. Part one considers techniques for managing construction and demolition waste, including waste management plans, ways of estimating levels of waste, the types and optimal location of waste recycling plants and the economics of managing construction and demolition waste. Part two reviews key steps in handling construction and demolition waste. It begins with a comparison between conventional demolition and construction techniques before going on to discuss the preparation, refinement and quality control of concrete aggregates produced from waste. It concludes by assessing the mechanical properties, strength and durability of concrete made using recycled aggregates. Part three includes examples of the use of recycled aggregates in applications such as roads, pavements, high-performance concrete and alkali-activated or geopolymer cements. Finally, the book discusses environmental and safety issues such as the removal of gypsum, asbestos and alkali-silica reaction (ASR) concrete, as well as life-cycle analysis of concrete with recycled aggregates. Handbook of recycled concrete and demolition waste is a standard reference for all those involved in the civil engineering sector, as well as academic researchers in the field. Summarises key recent research in recycling and reusing concrete and demolition waste to reduce environmental impacts and meet national, regional and global environmental targets Considers techniques for managing construction and demolition waste, including waste management plans, ways of estimating levels of waste, the types and optimal location of waste recycling plants Reviews key steps in handling construction and demolition waste

Designing Sustainable Technologies, Products and Policies

Rethinking Debris

Recycling of Construction Materials in Construction and Demolition of Buildings

Systematic Approach of Characterisation and Behaviour of Recycled Aggregate Concrete

Recycling Construction and Demolition Waste

Requirements for pre-demolition audit

Concrete is the most used man-made material in the world since its invention. The widespread use of this material has led to continuous developments such as ultra-high strength concrete and self-compacting concrete. Recycled Aggregate in Concrete: Use of Industrial, Construction and Demolition Waste focuses on the recent development which the use of various types of recycled waste materials as aggregate in the production of various types of concrete. By drawing together information and data from various fields and sources, Recycled Aggregate in Concrete: Use of Industrial, Construction and Demolition Waste provides full coverage of this subject. Divided into two parts, a compilation of varied literature data related to the use of various types of industrial waste as aggregates in concrete is followed by a discussion of the use of construction and demolition waste as aggregate in concrete. The properties of the aggregates and their effect on various concrete properties are presented, and the quantitative procedure to estimate the properties of concrete containing construction and demolition waste as aggregates is explained. Current codes and practices developed in various countries

to use construction and demolition waste as aggregates in concrete and issues related to the sustainability of cement and concrete production are also discussed. The comprehensive information presented in *Recycled Aggregate in Concrete: Use of Industrial, Construction and Demolition Waste* will be helpful to graduate students, researchers and concrete technologists. The collected data will also be an essential reference for practicing engineers who face problems concerning the use of these materials in concrete production.

A Complete Reference on Construction Waste Recycling This GreenSource guide offers comprehensive information on how to recycle as much as 95 percent of new construction and demolition waste, reuse existing materials, and comply with U.S. Green Building Council (USGBC) LEED waste management guidelines. *Recycling Construction & Demolition Waste* provides the strategies and tools you need to develop and implement a successful jobsite waste management plan. This practical resource also covers other programs that promote sustainable construction, such as the International Code Council's ICC-ES program, the National Association of Homebuilders (NAHB) Green Building Program, the Green Building Initiative Green Globes Program, BREEAM, and more. FIND OUT HOW TO: Manage construction and demolition waste on the jobsite Set up an efficient jobsite recycling center Recycle new construction waste Conduct an on-site audit to assess demolition waste Reuse existing materials, including asphalt, brick, concrete, insulation, structural steel, wood, glass, and more Develop a comprehensive waste management plan Comply with LEED standards to earn waste management credits Get details on other green certification and code programs Document waste management compliance Include appropriate specifications in construction documents Market your jobsite recycling program Downloadable forms, templates, spreadsheets, and checklists available at www.mhprofessional.com/rcadw.

Recycled Aggregate in Concrete

Reducing Construction and Demolition Waste

Methods, Markets, and Policy

Construction & Demolition Recycling Publications

a feasibility study for Austin, Texas

Generation - Processing - Utilization

Construction and Demolition Waste (CDW), from the construction, maintenance, renovation and demolition of buildings and structures, represents a large proportion of the waste in industrialized societies. Compared to other forms, such as household waste, more than 90% of CDW can be used as a resource and a substitute for construction materials, especially for primary, natural raw materials. Reuse, recovery and recycling depends on the quality and market for the materials, and the environmental impact of the processes for conversion of CDW from old structures to its use in new structures. However, the utilization today of CDW products as secondary resources is marginal. Most CDW is deposited or used as fill material, and the opportunities of high quality recycling are generally neglected. This book presents the opportunities for the sustainable and resource efficient utilisation of CDW, focusing on recycling of concrete and

masonry as the major forms of CDW. The recycling of gypsum, timber, mineral wool, asphalt and other types are also described. Its aim is to present a chain of value and material streams in the transformation of obsolete buildings and structures into new buildings and structures. It takes a holistic view, focusing on the lifecycle economy (the circular economy) and integrated management aspects of various scenarios ranging from high industrial urban renewal to debris removal and management after disasters and conflicts. It is based on the author's 35 years of research and development combined with practical international experience within the demolition and recycling area. It addresses students, architects, civil engineers, building owners, public authorities and others working in urban planning, demolition and resource management in the building and construction sector and in the reconstruction of damaged buildings after disasters and wars.

This book focuses on the utilisation of construction waste material as coarse aggregate in making concrete. It discusses in detail the behaviour of recycled aggregate under impact load along with other structural applications, and explains the various quality-improvement techniques for recycled aggregate and recycled aggregate concrete (RAC). The first chapter describes the importance of recycling construction and demolition waste and the status quo of global construction and demolition waste recycling. The second chapter examines the recycled aggregate production methodology. Subsequent chapters address the physical and mechanical characteristics and different research findings, as well as the engineering properties of recycled aggregate concrete. Further, the interrelationships among the mechanical properties of recycled aggregate concrete are discussed. The book also explores long-term properties like shrinkage and creep, durability properties, and microstructural characterisation. It will serve as a valuable resource for researchers and professionals alike.

The Industry : Construction and Demolition : Waste Reduction and Recycling Tips

Construction, Demolition and Disaster Waste Management

Sustainable Waste Management and Recycling

Recycling Construction and Demolition Waste in Vermont

Handbook of Recycled Concrete and Demolition Waste

An Integrated and Sustainable Approach

Advances in Construction and Demolition Waste Recycling: Management, Processing and Environmental Assessment is divided over three parts. Part One focuses on the management of construction and demolition waste, including estimation of quantities and the use of BIM and GIS tools. Part Two reviews the processing of recycled aggregates, along with the performance of concrete mixtures using different types of recycled aggregates. Part Three looks at the environmental assessment of non-hazardous waste. This book will be a standard reference for civil engineers, structural engineers, architects and academic researchers working in the field of construction and demolition waste. Summarizes key recent research in recycling and reusing concrete and demolition waste to reduce environmental impacts Considers techniques for managing construction and demolition waste, including waste management plans, ways of estimating levels of waste, and the types and optimal location of waste recycling plants Reviews key steps in handling construction and demolition waste

Introductory guidance for professional engineers and construction managers interested in recycling construction and demolition waste.

Management, Processing and Environmental Assessment

Recycling Construction & Demolition Waste: A LEED-Based Toolkit (GreenSource)

Recycling of Building Materials

Construction Demolition Recycling

Advances in Construction and Demolition Waste Recycling

Organizations, Publications List

This chapter discusses the recycling of construction and demolition wastes (CDW) and the use of recycled aggregates in concrete. Classification and characteristics of recycled aggregates, physical and mechanical properties, and durability of recycled aggregate concrete are also discussed.

This report is a useful tool for countries starting to recycle aggregates or construction and demolition waste. It contains the latest developments in this field, introduces a completely new approach to the procedure of proportioning concrete mixtures with recycled aggregate, references recent publications, opinions and discrepancies in relation to the durability of recycled concrete, such as freeze-thaw standards, studies of chloride penetration and diffusion, and sulfate attacks, the use of the fine fraction

This volume will be of interest to recyclers, researchers and consumers.

Use of Industrial, Construction and Demolition Waste

A Guide to Waste Reduction & Recycling on Construction Sites

From Science to Innovation

Final report of the RILEM Technical Committee 217-PRE

Concepts for Reuse and Recycling of Construction and Demolition Waste

Construction and Demolition (C&D) wastes are materials produced in the process of construction, renovation, or demolition of structures (buildings and roads). It also includes materials generated as a result of natural disasters (EPA, 2009). Preliminary estimates from the U.S. Environmental Protection Agency (EPA) show that the nation generated more than 160 million tons of building related C&D wastes in 2003. Also, Pennsylvania Department of Environmental Protection (PADEP) estimated that in 2005, Pennsylvania disposed over 2.25 million tons of C&D wastes in its municipal and C&D landfills (PADEP, 2009). Though previous studies have shown that it is cost-effective and environmentally friendly for contractors or construction managers to recycle C&D wastes rather than disposing them in landfills, these previous studies, however, paid little or no attention to detailed cost of recycling C&D wastes in a particular geographical area or region as compared to the availability of market for recycled materials or monetary value of the recycled materials. Hence, the objective of this study was to develop a mathematical model that helps stakeholders in construction business to evaluate the potential cost of recycling C&D waste components in their geographical area or region, and the potential revenue from the recycled materials. The model developed in this thesis will enable private companies or individuals to identify, invest and participate in the recycling of C&D waste components that yield good profits in their region or area. It will also enable Government to identify, sponsor or provide incentives for the recycling of C&D waste components that yield no or less profit in order to reduce environmental pollution and generate jobs. A case study is conducted in

Pennsylvania to test the model developed in this thesis and the test has been successful. Based on the mathematical model and logic structure for selecting C&D waste components for recycling, drywall, roofing shingles and wood are identified as the components whose recycling will yield good profit and thus may not need government's support or incentives. Moreover, C&D waste components such as concrete, brick, block and asphalt, have been identified as components whose recycling will not be profitable enough and therefore would require government's support or incentives. The result of the case study also shows that the quantity of non-ferrous metals in C&D wastes are very small and their recycling will not yield any significant profit.

The three volumes from part of the Proceedings of the two-day International Conference organised by the Concrete and Masonry Research Group within the School of Engineering at Kingston University, held in September 2004. The Conference deals with issues such as the regulatory framework, government policy, waste management, processing, recovery, the supply network, recycling opportunities, sustainable ways forward and the economics of sustainability.

Improving quality of construction & demolition waste

Construction & Demolition Debris Guidebook

Through Planning, Job Site Reuse and Recycling

Construction and Demolition Recycling Guide

Construction and Demolition Recycling Program

An Evaluation of Material Stocks and Flows Found During Construction and Demolition Activities in the Philadelphia Region of the United States

This open access book provides insight into the implementation of Life Cycle approaches along the entire business value chain, supporting environmental, social and economic sustainability related to the development of industrial technologies, products, services and policies; and the development and management of smart agricultural systems, smart mobility systems, urban infrastructures and energy for the built environment. The book is based on papers presented at the 8th International Life Cycle Management Conference that took place from September 3-6, 2017 in Luxembourg, and which was organized by the Luxembourg Institute of Science and Technology (LIST) and the University of Luxembourg in the framework of the LCM Conference Series.

Construction and Demolition Waste Recycling Guide

Report 22: Sustainable Raw Materials: Construction and Demolition

Waste - State-of-the-Art Report of RILEM Technical Committee 165-SRM

Construction & Demolition Debris Recycling Program

Construction and Demolition Debris Recycling

Recycling Construction and Demolition Wastes

County of San Diego Construction and Demolition Recycling Guide