



# A Sustainable Waste Management Strategy Drives Life-Cycle Building Benefits

Owners and building professionals consider waste management one of the most important green building practices, second only to energy efficiency. In fact, an increasing number of owners are calling for innovative and integrated waste management and environmental strategies that begin in the planning and design phase of a project, extend into construction and throughout occupancy and facility management.

In a 2012 Construction Waste Management paper for the National Institute of Building Sciences ([www.wbdg.org/resources/cwmgmt.php](http://www.wbdg.org/resources/cwmgmt.php)), Tom Napier, a research architect and principal investigator with the U.S. Army Corps of Engineers (USACE) Construction Engineering Research Laboratory, stated, "Waste management should be an integral part of a project's development. Each of the principal project participants—the owner, their architectural and engineering (A/E) services (or construction management consultant), the contractor, and subcontractors—will engage in waste management to some degree throughout the project."

Napier goes on to say that the waste reduction goals should be defined by the owner and architect/engineer in the earliest phases of a project, taking into account regulatory and green certification waste management requirements.

Studies show that life-cycle waste management planning can reduce environmental impact on landfills, drive economic value in the reduced production of new materials and the reuse and recycling of building materials, and even cultivate sustainable, social behaviors.

## The closed-loop approach

Today, of the almost 143 million tons of building-related construction and demolition (C&D) debris generated in the U.S., only about one-quarter are reused, recycled or sent to waste-to-energy facilities, while the remaining materials are sent to C&D landfills, MSW (municipal solid waste) landfills and other means of disposal.

Clearly, the U.S. needs to improve waste management practices. Whether a new construction or renovation, a lean approach to waste management will help assess an owner's waste management overall objectives, define the requirements of the project team during the construction/renovation, anticipate the needs of the building occupants and outline the goals for operations and maintenance.

Daniel E. Mills, LEED® AP BD+C, sustainability manager for

HOK, says, "So many times, the contractor is tasked with the development of a waste management plan. We as an industry are missing a valuable opportunity to drive a more dynamic sustainable waste management strategy. Extrapolating the waste management plan to programming, design and even occupancy provides long-term benefit to all stakeholders from the owner to the occupants."



A proactive waste management plan begins with understanding the owner and project team objectives.

Jim Halter, vice president of construction solutions for Waste Management, says, "Increasingly, our environmental specialists are asked to sit with architects and building owners during the design phase to develop the optimal location for waste devices that meet objectives throughout the building life cycle. We work with planners and schedulers to fulfill the waste management needs during construction to lean out the process from optimal container sizes, innovative solutions and specific material management, much like line items for labor and material supply."

The waste management plan sets specific goals and

strategies to facilitate and coordinate the design, construct and deconstruct phases of a structure—in effect, a closed-loop approach to sustainable waste management.

HOK's Mills says, "We believe a closed-loop approach to sustainable waste management can provide value at every phase of a project. A waste management provider understands materials and the life-cycle impacts of those materials in terms of recycling and reuse. They can help inform the material selection process for projects on the front end and provide a better understanding of how products can be disposed of in a more sustainable manner on the back end."

The first phase of a closed-loop approach begins during programming and planning where the design and construction team assesses selected and specified building materials for high post-consumer recycled content, rapidly renewable materials, extracted and manufactured locally sourced materials, and if the specified excess construction materials can be diverted locally. Other considerations may include an assessment of potentially hazardous material components during construction and occupancy, the product recyclability challenges created during the manufacturing process of building materials, as well as cost and environmental footprint created by transportation of new materials.

For post-build activities, a comprehensive pre-design waste management plan builds in a waste recycling process that encourages recycling behavior, making it easy for future occupants to move segregated, recyclable material horizontally and vertically in a building.

Finally, every structure will likely undergo renovations, demolition or expansion. A sustainable waste management plan includes considerations of more resource-friendly materials so that as renovations occur, these materials can be recycled. This can all be accomplished in a holistic way with a single waste management plan strategy.

### C&D management on the job

At every construction site, contractors have an opportunity to divert a variety of C&D materials, such as wood, rock, metal, cardboard, plastic, shingles, concrete, fiberboard and paneling.

A contractor's waste management requirements during construction go well beyond containers and hauling of waste materials. In fact, one of the most commonly missed recycling opportunities lies with the job site trailer.

Along with consideration for environmental aspects of recycling, reuse and reduction, a contractor's waste management plan for material separation, recycling, disposal and diversion must align with site safety practices to prevent contamination.



Proper communication and clear signage are important. Everyone on the job site should receive clear guidelines and training on how to identify and separate recyclables.

Oftentimes, the contractor must also track disposal and recycling of waste materials. Waste diversion tracking systems that measure and improve waste recycling performance can help. Waste management tools allow contractors to track specific material diversion tonnage and the total percentage of material recycled based on volume or weight of a project's overall waste. A waste diversion tool could also include green waste management metrics to support green certifications such as LEED.

Halter says, "With a waste diversion tracking system, contractors and architects can really zero in on what they are diverting and where there is opportunity to improve. With it, they can track performance on a current project, set benchmarks for future projects and directly impact social behavior and understanding about sustainability."

For instance, if a contractor diverts 75% of construction waste, the waste diversion tracking system translates those savings to the amount of landfill space saved, or the number of trees saved from paper recycling, or the amount of electricity saved that is now available to power homes and businesses.



## An operational edge

The end of construction is just the beginning of the opportunities to improve waste management on a structure. Diverting waste from disposal through recycling, reuse and reduction of materials brought into a building provides an opportunity to achieve operational cost savings.

An owner of a 19-story, 384,000-sq-ft office building in Portland, Ore., reduced its waste stream by 83% through the introduction of a recycling program that reduces waste from 279 metric tons per year to 47 metric tons per year. The owner estimates that the operational CO<sub>2</sub> footprint of the building is reduced by 128 metric tons per year. On another project, the building manager for a three-story, 9,720-sq-ft multi-tenant building in Pittsburgh, Pa., convinced many of his vendors to reduce their packaging. He also switched from using disposable hand towels to hand dryers for the adults and microfiber, washable towels for the children. The building manager stated that while the upfront cost was greater, the investment quickly paid off and now is a source of operational cost savings.

## A seat at the IPD table

Today's more collaborative project delivery mechanisms, such as integrated project delivery (IPD), bring a wide range of participants to the table in the planning and design phase of a project that often includes subcontractors, suppliers, manufacturers—and should also include environmental specialists.

A comprehensive life-cycle waste management plan is a critical part of sustainable design strategies for progressive firms like HOK. Mills says, "A waste management partner brings important expertise to the table, asking the right questions at a time when the design team can create the most benefit. It's a great opportunity to develop plans and procedures for the life cycle of the building."

Halter concludes, "The lean approach to sustainable waste management practices begins in the earliest phases of a project. With a seat at the table during the planning and design phase of a project, look to your waste management provider to develop a systematic, lean approach that meets the owner's objectives through construction, into operation and finally to renovation/demolition."

## Top 5 ways to leverage waste management services in the early phases of a project

1. Benchmarking and goal setting. Your waste management organization can provide valuable benchmarking data that can help inform the development of waste diversion goals.
2. Better understand occupant behaviors. Waste management organizations have a lot of experience with optimizing a facility's waste management activities, developing ways to engage occupants and creating more convenient recycling programs. Brought in early to a design process, a project



team can leverage this knowledge to develop creative design solutions that improve recycling behavior.

3. Manufacturer connections. A waste management organization works regularly with manufacturers and can offer pointers to the design team about ways to engage manufacturers to reduce packaging and the amount of waste delivered to the site.
4. Inside look at the local recycling market. Your waste management company should be able to identify those materials that might be a challenge to recycle today and down the road. For instance, gypsum board can be difficult to recycle in some markets. If the project team knows that upfront, then perhaps they can identify alternate materials that are more readily recyclable.
5. Emerging recycling/reuse opportunities. This applies not only to construction but occupancy. For instance, are there emerging programs to efficiently collect waste associated with food services? What about landscaping? Having a thorough understanding of these opportunities can allow the design team to better plan for and accommodate these programs upfront.