



## Case Study: Demolition Material Management

Location: Raleigh, N.C.

Project: Green Square Complex

Waste Reduction: 4,502.5 tons (to-date)

Cost Savings: \$359,000

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### Background

The Green Square Complex (GSC) is a two-block, multi-use sustainable development project that will bring North Carolina's state environmental offices and a nationally significant Nature Research Center (NRC) to the heart of North Carolina's capital city.

In October 2007, the pre-design phase planning process began with the implementation of the "Green Vision" for the Green Square Complex, as developed by the Department of Environment and Natural Resources and the N.C. Museum of Natural Sciences. The pre-design phase included planning, site development and early construction for a 172,000 square foot office building for the Department of Environment and Natural Resources; a 79,400 square foot building expansion to the N.C. Museum of Natural Sciences, and some underground parking spaces.



The development of this site required the removal of two existing buildings located in the development footprint. With the goal of recycling as much of the construction and demolition waste as possible, a construction and demolition materials management plan was put into place, and adopted as part of the contracting documents.

### Waste Reduction Activities

DENR developed a materials management plan. The goal of this plan was to assist in identifying materials, and the steps to be taken in each phase of deconstruction/demolition, site preparation, and construction to minimize the amount of material headed to landfills. The outcome would help meet requirements to obtain points for LEED certification, and ultimately increase the volume of scrap headed back into economic use through reuse or recycling. The materials management plan was included in the demolition specifications for Green Square.



### Waste Reduced

The goal for diversion was to meet or exceed the highest-level requirement in the LEED rating system. This requirement is to recycle or salvage at least 75% of non-hazardous C&D debris from disposal. Meeting this requirement nets 2 points, with an additional point available as an innovation credit if a project can attain 95% diversion.

Through June 2008, the demolition part of the project is complete. Monthly reporting was required by the demolition contractor, and they were supplied a reporting form by DENR. The form requires them to indicate the following information: action (recycle/salvage/landfill), material type, weight, destination, hauler name, cost of handling/transport, revenue or tip fee, and total cost.



Monthly reporting for March – May 2008:

Action	Type of material	Weight (tons)
Recycle	Wood	150.0
Recycle	Clean Concrete	878.0
Recycle	Brick/Mixed	2,834.0
Recycle	Drywall	13.7
Recycle	Mixed Metal	616.8
Recycle	Mixed Steel	4.8
Recycle	Mixed Copper	0.1
Salvage	Doors/Windows	5.1
Landfill	Mixed Misc.	53.9
<b>Total</b>	<b>All Material</b>	<b>4,556.4</b>
	<b>Recycled/Salvaged Material</b>	<b>4,502.5</b>
	<b>% Recycled</b>	<b>98.8%</b>

### Cost Savings

The cost savings for recycling the above material vs. landfilling were significant. Hauling charges to move all the material to its final destination totaled just under \$40,000. If all the above material were landfilled, the tipping fee associated with this tonnage (at \$33/ton for disposal) would be approximately \$150,000. The disposal cost plus the hauling fees would bring the total to around \$190,000.



Based on lower tip/processing fees for some of the separated materials (wood, drywall, brick, and clean concrete) as well as revenue generated from recycling the metal, the demolition of the buildings at the Green Square site generated revenue of \$209,000. Subtracting the hauling charges of \$40,000, net revenue generated from the demolition at the Green Square site was \$169,000.



The total cost saving when compared to landfilling the demo material is approximately \$359,000. Here's a breakdown of the costs and revenues of the material managed during the demolition phase for the Green Square Complex:

<b>Type of material</b>	<b>Weight (tons)</b>	<b>Cost of handling/transport</b>	<b>Cost of recycling/disposal</b>
Wood	150.0	\$625.00	\$610.00
Clean Concrete	878.0	\$5375.00	\$1,890.00
Brick/Mixed	2,834.0	\$12,875.00	\$3,380.00
Drywall	13.7	\$500.00	\$148.00
Mixed Metal	616.8	\$18,000.00	(\$215,368.00)
Mixed Steel	4.8	\$500.00	(\$907.00)
Mixed Copper	0.1	\$150.00	(\$400.00)
Doors/Windows	5.1	\$0.00	\$0.00
Mixed Misc.	53.9	\$1,125.00	\$837.00
<b>Total</b>	<b>All Material</b>	<b>\$39,150</b>	<b>(\$209,810)</b>