Case Studies in Cost Effective Construction Waste Management

FIFTH ANNUAL CARE CONFERENCE
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esmg

Carpet America Recovery Effort

Presenter: Michael D. Buono
Director of Program Development for Environmental Service Management Group, Inc. (ESMG)

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Environmental Service Management Group, Inc.

- Environmental Waste & Recycling Consulting
- Materials & Systems Auditing
- Commodities Market Development
- Vendor Services & Contract Management
- Equipment & Service Purchasing
- Employee Training & Equipment Maintenance

ESMG is a member of the U.S. Green Building Council and Co-Founders of the New Jersey U.S.G.B.C. Provisional Chapter
2001 Builders Survey - Most common reasons for not recycling.

1. Cost Factors
   - cost more to recycle
   - adds time, labor, and management

2. Process Difficulties
   - not enough space onsite
   - subcontractor non-compliance

3. Markets for Materials
   - few recycling markets for material
   - contamination of loads
Benefits of construction waste management / recycling

1. Environmentally Sustainable
   - preserves natural resources, landfill capacity, energy consumption

2. Reduces Construction Costs
   - 60% to 80% landfill disposal fee avoidance

3. Achieves 3 LEED-NC Points
   - materials and resources credit 2.1, 2.2, innovation credit

4. Improves Safety & Workmanship
   - materials collection, shrinkage, reuse of waste
Key specification strategies for construction waste management

1. Specify Minimum Diversion Rate
   - 50% minimum 75% to 90% optional.

2. Require a Waste Recovery Plan
   - materials services, education, tracking.

3. Definitions, Regulations & Reporting
   - reuse, state laws, monthly progress reports.

4. Specify Qualified Waste Manager
   - saves time, resources, money, insures points.
Managing the three “m”s of waste recovery process

1. MATERIALS (what is being generated)
   Identification of waste generating activities and coordination of collection, separation, deposition, storage of materials onsite.

2. MARKETS (haulers, vendors, recyclers)
   Coordination of services including the removal, transportation, recovery, and reprocessing of recycled materials offsite.

3. MANAGEMENT (documentation & modification)
   Analysis, modification, and documentation of all onsite & offsite activities, recovery amounts in weight or volume and process expenditures.
Developing a strategic plan for the waste recovery process.

1. Recognize managing waste is an process that evolves during each phase of the project.

2. Develop a recovery plan that is flexible and adapts to project schedule.

3. Repeat the three “m”s of waste recovery (materials, markets, management).

4. Educate Early and Often.

5. Always Keep it Simple.
- Minimize Material Handling- Use a combination of commercial container services for waste and recycling services to eliminate double handling of waste.

- Simplify Separation Requirements- Target major categories of material for recovery including Wood, Metal, Masonry(concrete, asphalt, stone), Mixed Paper(corrugated & paper), Gypsum, Pallets, Beverage Containers.

- Weekly Management Coordination- Project should designate manager to interface with contractors, anticipate waste output, and reinforce at project meetings. (handouts, signs, early intervention).
The first public schools built in New Jersey using the U.S. Green Building Council’s LEED Rating System. (2) Elementary Schools, Size: 70,000 square foot, 500 Students Capacity, $11,400,000 Project.

Multiple Prime Contractors worked cooperatively to share waste and recycling services. Late start recycling, began at 35% Diversion Rate and finished over 75%. Recycled over 95% of gypsum scraps at both sites.

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Adelphia & Ramtown Elementary Schools
Howell, NJ

Combined Recycling of 554 tons - paper 17 tons, masonry 433 tons, metal 17 tons, wood 43 tons, gypsum 42 tons, commingled 2 tons.

$37,134 Total cost to recycle material ($67 per ton)
$80,933 Estimated cost to landfill waste (tip fee $87 per ton)
$43,799 Direct Cost Savings to Project

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The first higher education building project in New Jersey to use the U.S. Green Building Council’s LEED Rating System.

General Contractor did exceptional job recycling over 94 tons in mixed wood category (forms, lumber, land clearing). Combined recycling of 173 tons - paper 13 tons, plastic 1 ton, metal 14 tons, wood 95 tons, masonry 49 tons, commingled 3 tons, to achieve a **78% recycling rate by weight**.

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Limited site space, smaller container sizes, more frequent vendor services scheduling. Total of 6 - 30 yd. mixed waste loads on project (6.5 months without requiring a bulky waste container onsite).

$8,747 Total cost to recycle material ($51 per ton)
$22,934 Estimated cost to landfill waste (tip fee $83 per ton)
$14,178 Direct Cost Savings to Project

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The first private schools built in New Jersey using the U.S. Green Building Council’s LEED Rating System. Phase one had extensive site work, land clearing, infrastructure, roadway, parking, 13,500 square foot of classrooms, and barn renovation.

Most waste produced from demolition of barn (painted wood could not be salvaged). Project carried an 85% recycling rate - including 513 tons in wood category (trees from land clearing were recycled into furniture for school) *Totals excluded stone totals harvested from site.

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Waste Diversion Goal of 90%, received 2 Credits for construction waste management in Materials & Resource and Innovation in Design categories for significantly exceeding the current standard of 75% landfill diversion by weight.

$19,857 Total cost to recycle material ($36 per ton)
$65,384 Estimated cost to landfill waste (tip fee $68 per ton)
$45,527 Direct Cost Savings to Project

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Subcontractors Were Ready Willing and Able To Embrace Single Source Separation Requirements. Single Source Loads Were Clean, Less Expensive, Less Difficult Than Contractors Perceptions. Worker Quotation “You can’t believe how much stuff we waste on these jobs….It’s about time someone actually recycled.”

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Waste Diversion Goal of 50%, received 1 Credit for construction waste management in Materials & Resource category. Missed numerous opportunities exceeding the current standard of 50% landfill diversion by weight.

Cost Savings Data Unavailable.

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This project cost of $13,995,000 included a 27,152 square foot expansion of existing structure with 32 offices, lecture hall, 2 tiered computer labs, 11 high tech classrooms, teachers resource lounge, sky-lit atrium, stair tower, art inclusion with a 30 foot mosaic waterfall, and photovoltaic rooftop panels.

Project is seeking LEED Certification and required a 50% landfill diversion rate by weight for a single credit within the materials and resources section for construction waste management under the LEED-NC 2.1 Rating System.

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Exceeded project goal recovering over **72.5%** of all waste produced. Recycled over 453 tons of concrete and asphalt and 9 tons of wood. Contractor was content with limited recovery effort from largest two categories of anticipated materials, and could have easily exceeded 75% recycling with basic mixed paper recycling program.

$21,886 Estimated cost to recycle material ($34 per ton)
$13,999 Estimated cost to landfill waste (tip fee $79 per ton)
$8,887 Direct Cost Savings to Project.

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Natural Resources Defense Council (NRDC), Interior Demolition is the first project in NYC to Recycle to require 75% of all waste to be source separated on site. Could not use offsite MRF (material recovery facility) or Recycling Centers.

Significant challenges included change in approach from traditional interior demo to selective deconstruction or metal and used (painted) wallboard, plus over 10 tons of salvage items left inside the space (furniture, fixtures, equipment, etc.).

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Exceeded project goal recovering over 81% of all waste produced. Recycled 75% of all used wallboard to NY markets, successfully introduced polish speaking demo contractors to deconstruction process that was easier, safer, cleaner.

Sourced items & 25% of demo waste (metal studs) no cots. Cost savings from daytime demolition activities (overtime freight elevator costs eliminated, less noise, less dust).

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BASF House
Paterson, NJ

The first New Jersey Home built using the U.S. Green Building Council’s LEED for Homes Rating System (currently under development).

LEED for Homes require entire project generate less than 2 lbs. per square foot of conditioned floor space (NARHB Average Waste Generation Standard). Project generated less than 0.5 per square foot to receive 2 credits under standard.

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Project required vastly different recycling approach using weekly collection of metal, wood, plastic, paper in small two yard quantities. The only waste materials created from the building process occurred during initial land clearing, and in the final days of the project.

$7,500 Estimated cost saving from landfill cost avoidance from over 80 yards of hand collected & recycled materials.

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1. Cost Factors
   - Cost 50% less to recycle vs. landfill
   - Requires minimal time & labor

2. Recycling Process is Simple
   - Limited site space can be overcome
   - Compliance higher than expected

3. Markets for Materials
   - Commercial services are available
   - Waste contamination is avoidable
Beyond C&D - Opportunities for Existing Buildings

LEED-NC New Construction Standard
- Required (area to store recycling)
- Credits (2 points for construction waste management)
- Additional Innovation Credit(s) Possible.

*Up to 3 Credits @ 25% Savings (estimated)*

LEED-EB Existing Building Standard
- Required (storage area, conduct waste audit)
- Credits (2 points for construction waste management)
- Credits (3 points for green product purchases)
- Credits (3 points for recycling 30% to 50%)
- Additional Innovation Credit(s) 4 Possible.

*Up to 12 Credits @ 40% Savings (estimated)*

Waste materials management delivers the greatest value of all sustainable green building practices. Reduces construction cost, lowers operating expenses, and provides immediate project savings making other green technologies more affordable.
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