Introduction

The Institution Recycling Network
7 South State Street
Concord, NH 03301
866-229-1962
www.WasteMiser.com

Contact: Matt McKinney, CWM Specialist
         Mark Lennon or Dana Draper
Construction Waste Management

- Recoverable materials & markets
- Costs of recycling versus disposal
- Barriers and solutions
- Recycling in CT & New England
- IRN Wastemiser Program
Recoverable Materials:
Pre-Demolition / Renovation

- Furniture & Furnishings
- Architectural Salvage
- Casework
- Carpet
- Ceiling Tiles
- Partition Systems
- Lighting (bulbs, ballasts, fixtures)
- Doors and Windows
- Wiring and Cable
- HVAC Equip’t
- Bathroom Fixtures
Deconstruction, Soft Strip...
Deconstruction and Salvage

Advantages

- Cost Savings - Specialized labor
- Higher recovery rates = lower waste costs
- Site prep for Abatement and Demolition
- Low noise, vibration, dust work methodology
- Source separated recycling achieves the highest recycling rates at the lowest cost
Markets...

Local
Regional
National
International

One donation load can equal up to three (3) dumpsters.
CT- Deconstruction and Building Material Reuse Centers

The ReCONNstruction Center
230 South Street
New Britain, CT 06051
(860) 597-3390
info@reconnstructioncenter.org

The Building Materials Reuse Association
www.buildingreuse.org
Online directory by State/ Type
Dorm Furniture Being Stored In Nicaragua
MA State College Building Authority and Framingham State – Dorm Furniture Donation
Donated Beds In Place At Orphanage In El Salvador
“Live Loading” Medical Supplies and Equipment At New England Baptist Hospital
Donated Wardrobe Finds New Home In Village
Removing Range Hoods For Donation – Harvard University
Unloading Donated Dorm Furniture In Nicaragua
Donated Student And Teacher Desks Put Right To Use – El Salvador
Donated Dorm Furniture Ready For Village Distribution
Dressers Used For Medical Supply Storage – Central America
Recoverable Materials:
Demolition & Renovation

- Landclearing debris
- Asphalt paving
- Concrete, brick, block
- Wood (incl. treated & painted, plywood, OSB)
- Metals (ferrous & nonferrous)
- Glass
- Asphalt shingles
- Commercial roofing
- Slate, other roofs
- Mixed debris
Recoverable Materials: New Construction

- Concrete, brick, block
- Wood (dimensional, plywood, OSB, etc.)
- Metals (structural, studs, HVAC, plumbing, elec.)
- Gypsum wallboard
- Cardboard, other packaging
- Mixed debris
Recycling Works … Again

- Concrete & Masonry
  St. Paul’s School
  *Before*

- Aggregate for Roads and Sidewalks
  *After*
And Again...

- Gypsum Wallboard
  Cambridge City
  Hall Annex
  
  Before

- Gypsum Wallboard
  
  After
And Again...

- **Old Ceiling Tiles**
  (Dartmouth College)
  Become New Ceiling Tiles

- **Old Window Glass**
  (Northeastern University)
  Becomes New Window Glass or Aggregate for Paving
Project Recycling

What’s Important?

- Early Planning
- Performance Goals
- Waste Management Plan
- Excellent Documentation
  - Weights, markets, process
- Be Thorough – Don’t Miss a Waste
  - Example: Furnishings, Landclearing
Regional Legislation
New Hampshire

- Moratorium on Burning C&D Derived Fuel
- Multiple Mixed Debris Processors
- Close proximity to other states/markets
- Deconstruction and C&D Recycling Bills in various stages of House and Senate
- Vowed not to become dumping ground for out of state waste.
- Gypsum markets
- UNH Recycled Products Laboratory
Regional Legislation

VERMONT

ACT 250

• Under State Department of Environmental Protection Groundwater Protection Act.

• All major development in VT must conduct Cost/Benefit Analysis and explore deconstruction and C&D Recycling opportunities

• UVM- Green Campus Initiative
Regional Legislation

MAINE

- Public / State funded projects must meet LEED Standard
- STEP-UP Program
- SPIRT
- Agronomic Permits- BUDS
Regional Legislation

RHODE ISLAND

- All Public / State funded projects must meet LEED Standard
- Reviewing and implementing higher standards for C&D waste recycling and deconstruction mandates
- Close proximity to other states/ markets
Regional Legislation

New York

- Agronomic Permits - BUDS
- International Wood Markets
- Mixed Processing Facilities
- Gypsum Recycling Markets
- Close to PA Markets
- NYC Pushing for more mandatory C&D recycling
Regional Legislation

MASSACHUSETTS

Public / State funded projects must meet LEED Standards

Boston - Publicly funded projects must meet LEED Standards

Collaborative for High Performance Schools

Massachusetts - DEP Waste Ban: MA CMR 310, 19.017

- Bans All: Brick, Block, Concrete, Masonry, Asphalt, Cardboard, Metal, and Wood
- Banned from landfills and Transfer Stations
Regional Legislation
CONNECTICUT

All Publicly funded projects must meet LEED Silver Standard-

- *CT DPW not DEP?*
- *UConn Med School and UConn are Exempt or do not follow mandate*
Barriers to Connecticut C & D Recycling – Markets:

Limited Markets-
1. Mixed Debris Processor with over 60%
2. Asphalt Shingle Recycler
3. Carpet Recycler
4. Gypsum
   - 1 Aggregator of Materials - High cost to transport

Robust Markets - Wood, Metal, Agg., Brick, Block
First Steps for Connecticut

- Enforce Mandates and Specifications for Publicly / State Funded Projects
  - Get UConn on board
- Promote Permitted Markets Better
  - List on Web site
- Require Cost Benefit Analysis
  - All projects over 30,000 sf or 1 Mill.
Next Steps for Connecticut

- Market Development
- Better Permitting Process
  - Change from Volume Reduction Facility to Recycling Facility
  - BUDS – Agronomic Use
  - Recycling Markets are not incinerators/landfills
- Promote Market Development- Incentives
- Cooperation with other state agencies/ departments
Promoting C&D Recycling and Deconstruction in CT.

- Deconstruction and C&D Legislation
- Promotion of C&D Markets
- Beneficial Use Determination Permits / Agronomic Use Permits
- Pilot Projects…. The more you know…. 
- Grant Funding to promote markets and services
**Costs: Recycling vs. Disposal**

<table>
<thead>
<tr>
<th>Material</th>
<th>Recycling Cost</th>
<th>Disposal Cost</th>
<th>Tip Fee Per Ton</th>
<th>Trans. Fee Per Ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gypsum Wallboard</td>
<td>$40.00</td>
<td>$32.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphalt Shingles</td>
<td>$40.00</td>
<td>$17.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metals</td>
<td>$30.00</td>
<td>$21.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td>$30.00</td>
<td>$21.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doors, Windows</td>
<td>$20.00</td>
<td>$50.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comm. Roofing</td>
<td>$20.00</td>
<td>$50.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean Wood</td>
<td>$55.00</td>
<td>$29.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom Fixtures</td>
<td>$35.00</td>
<td>$16.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete, Brick, Block</td>
<td>$10.00</td>
<td>$12.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed Debris</td>
<td>$55.00</td>
<td>$34.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C&amp;D Disposal</td>
<td>$105.00</td>
<td>$31.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cost**

- Gypsum Wallboard: $40.00
- Asphalt Shingles: $40.00
- Metals: $30.00
- Glass: $30.00
- Doors, Windows: $20.00
- Comm. Roofing: $20.00
- Clean Wood: $55.00
- Bathroom Fixtures: $35.00
- Concrete, Brick, Block: $10.00
- Mixed Debris: $55.00
- C&D Disposal: $105.00

**Tip Fee Per Ton**
- Gypsum Wallboard: $40.00
- Asphalt Shingles: $32.00
- Metals: $-18.00
- Glass: $9.00
- Doors, Windows: $-18.00
- Comm. Roofing: $50.00
- Clean Wood: $55.00
- Bathroom Fixtures: $34.00
- Concrete, Brick, Block: $10.00
- Mixed Debris: $34.00
- C&D Disposal: $105.00

**Trans. Fee Per Ton**
- Gypsum Wallboard: $32.00
- Asphalt Shingles: $17.00
- Metals: $-18.00
- Glass: $9.00
- Doors, Windows: $50.00
- Comm. Roofing: $58.00
- Clean Wood: $55.00
- Bathroom Fixtures: $29.00
- Concrete, Brick, Block: $12.00
- Mixed Debris: $34.00
- C&D Disposal: $105.00
Fulton & Carney Halls

Classroom & Office Buildings

39 Room AV Equipment Upgrades

Classroom Carpet Renovations

Carpet, Cardboard, Mixed Debris
Challenges

- Limited Space
- Weather / Moisture
- Contamination
  - Student / Public
  - Other Projects
- Long Duration
- High Profile – Image
- Sub-contractor participation
Tools applied to meet goals:

- Covered Dumpster
- Signage
- Communication with PM and Subs
- Mixed Debris
- OCC on Site
Results

- Total Waste: 28.81 Tons
- Tons Recycled:
  - Mixed Debris- 10.12
  - Carpet- 15.73
  - OCC (cardboard)- 1.17
- Recycling Rate- 94%
Boston Scientific Campus

**Description:** Complete interior demolition and reconstruction. 483,000 sq ft, three stories, three buildings (1980’s). Steel frame on slab.

**Size/Duration:** $38M, 24 months

**Location:** Marlborough (exurban)

**Contractor:** Payton (GC), SOS (demo)

**Architect:** BKA
Challenges

- Single loading dock (inbound + outbound)
- Long carries
- Large number of materials
- Oddball materials (demountable partitions, rooftop HVAC units, etc.)
- Phased construction (with employee move-in as phases completed)
# Materials Recycled

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnishings (reuse)</td>
<td>49</td>
</tr>
<tr>
<td>Building Mat’ls (reuse)</td>
<td>39</td>
</tr>
<tr>
<td>Metals, Mixed</td>
<td>430</td>
</tr>
<tr>
<td>Metals, HVAC</td>
<td>3,134</td>
</tr>
<tr>
<td>Ceiling Tiles</td>
<td>581</td>
</tr>
<tr>
<td>Total Project Reuse and Recycling</td>
<td></td>
</tr>
<tr>
<td>Total Waste Disposed</td>
<td></td>
</tr>
<tr>
<td>Project Recycling Rate</td>
<td></td>
</tr>
</tbody>
</table>

- **Furnishings (reuse)**: 49
- **Building Mat’ls (reuse)**: 39
- ** Metals, Mixed**: 430
- ** Metals, HVAC**: 3,134
- ** Ceiling Tiles**: 581
- **Total Project Reuse and Recycling**: 8,331
- **Total Waste Disposed**: 371
- **Project Recycling Rate (Through 9/20/05)**: 95.7%
Keys to Success

- Hampers and carts (indoor staging to live-load)
- Union support
- On-site presence
- Training, communications
- Flexibility from all involved
Harvard Blackstone

Description: Complete interior gut, interior reconstruction (office), exterior renovation. 40,000 sq ft in three buildings (1890s). Structural brick, concrete, wood beams.

Size/Duration: $10M, 9 months

Location: Cambridge (urban, tight)

Contractor: Consigli

Architect: Bruner-Cott
Challenges

- Tight site; Site work during construction
- Two projects on same site
- Hazardous materials (working around abatement)
- Identifying reuse options
## Materials Recycled

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
<th>Material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnishings (Reuse)</td>
<td>9</td>
<td>Brick</td>
<td>15</td>
</tr>
<tr>
<td>Fixed Assets (Reuse)</td>
<td>10</td>
<td>Concrete</td>
<td>395</td>
</tr>
<tr>
<td>HVAC Equipt</td>
<td>7</td>
<td>Asphalt</td>
<td>461</td>
</tr>
<tr>
<td>Metal</td>
<td>73</td>
<td>Gypsum Wallboard</td>
<td>25</td>
</tr>
<tr>
<td>Wood</td>
<td>61</td>
<td>Mixed C&amp;D (Net at 70%)</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total Reuse and Recycling</strong></td>
<td></td>
<td></td>
<td><strong>1,061</strong></td>
</tr>
<tr>
<td><strong>Total Disposed</strong></td>
<td></td>
<td></td>
<td><strong>4</strong></td>
</tr>
<tr>
<td><strong>Project Recycling Rate</strong></td>
<td></td>
<td></td>
<td><strong>99.6%</strong></td>
</tr>
</tbody>
</table>
Keys To Success

- Early involvement
- Recycling requirements inserted into each section of specifications
- Good waste management spec
- Use selection process to identify committed contractor
- Committed owner
- Lots of concrete and asphalt
IRN Connecticut Projects

- Institutional Projects
- Move Outs and Surplus
- New IRN Warehouse in New London
- Huge Potential in the State-Climate and Clients.

- Move Outs / Surplus
- Yale
  - +/- 6 projects in various stages of progress and scope
- Fairfield Properties
  - LEED Housing
Site Solutions
Obstacles and Challenges

- Unfamiliar Crew
- Accelerated Schedule
- Stacked Trades
- Multiple Materials
- Limited Site
- High Recycling Goals
Reasons for Success

- Specifications For Recycling
- Unilateral Support
- Smart, Trainable Workforce
- Construction Waste Management Plan
- Flexibility, Adaptability
- Capitalizing On Materials That We Can Control To Build Our Rates
- Dedicated Commitment From Crew
IRN as “Waste Manager”

Partnership

- RFP and Specification development
- Pre-bid and pre-job planning, on-site coordination and troubleshooting
- Job site training and signage
- Dedicated logistics (markets, containers, transportation)
- Complete accountability and reporting for all materials
- Waste Management Plan and LEED documentation
75-99% recycling rate
Two LEED points at a cost savings
Potential Innovation Credit
Trained Work Force
Recycling Goals Achieved
Noteworthy Marketing Tools