2016 Fall Workshop – C&D Recovery and Management: Deconstruction Options

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What is Deconstruction?

The systematic dismantling of a structure in order to preserve the building materials for reuse.
What’s the difference between recycling and reuse?

Amount of energy used to process materials

**RECYCLE**
- Melting down and recasting of structural steel

**REUSE**
- Chipping of wood for mulch
- Denailing of 2x4’s
Why Deconstruct?
Why Deconstruct?

• The planet
A Timeline of Earth’s Average Temperature Since the Last Ice Age

http://xkcd.com/1732/
Environmental Impact of Sourcing Reused Materials

Total Global Warming Potential Emissions - Cradle to Site (Including Biogenic Carbon)

- **Virgin**
- **Reclaimed**

<table>
<thead>
<tr>
<th>Material</th>
<th>Virgin (kg/m³ CO₂e)</th>
<th>Reclaimed (kg/m³ CO₂e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardwood Flooring</td>
<td>600</td>
<td>150</td>
</tr>
<tr>
<td>Softwood Framing Lumber</td>
<td>400</td>
<td>200</td>
</tr>
</tbody>
</table>

Impact of Reuse - Environmental

Global Warming Potential Emissions - End of Life Scenarios (Including Biogenic Carbon)

- Base Case (30% Wood burned to substitute coal power, 10% wood mulched, 60% C&D landfill with no CH4 capture)
- Alt #1 - 100% Wood waste burned to replace coal power
- Alt #2 - 100% Wood waste ground into mulch
- Alt #3 - 100% Wood waste into landfill with no methane capture
- Alt #4 - 100% Wood waste burned to replace natural gas power
- Alt #5 - 100% Wood waste into landfill with methane capture


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Why Deconstruct?

• The planet
• The people
Impact of Reuse - Jobs

The reuse and recycling industry produces upwards of 7 jobs per 1000 lbs of MSW, as compared to less than 1 job per 1,000 lbs of waste landfilled.

More Jobs, Less Pollution: Growing the Recycling Economy in the US.
Tellus Institute with Sound Resource Management.

![Chart: Total MSW and C&D Job Impacts Base Case and Green Economy Scenario](chart)

- **Jobs**
  - **2008**
  - **2030 Base Case**
  - **2030 Green Economy Scenario**

- **MSW**
- **C&D**
Why Deconstruct?

• The planet
• The people
• Policy Requirement
Policy Examples

• Language/law/ordinance that explicitly
  – Requires reuse and deconstruction (e.g. 5% reuse requirement, *Cook County*)
  – Restricts the use of demolition, or the landfilling of materials (e.g. Ban on C&D waste in landfills, *Massachusetts*)
  – Requires reuse and deconstruction (*Portland, OR... Gary, IN...*)
Why Deconstruct?

- The planet
- The people
- Policy Requirement
- Profit
How many times can you reuse or recycle a material?

Living Tree → Harvested Timber → Dressed Heavy Timber → Dimensional Lumber → Engineered Lumber → Mulch → Biomass Pellets → Alternative Daily Cover
Direct Economic Impact

Each year more than 17 million tons of recoverable C&D wood materials are landfilled at a cost of more than $500 million.

“Municipal Solid Waste(MSW) and Construction and Demolition(C&D) Wood Waste Generation and Recovery in the United States” Dovetail Partners
How to Deconstruct?
Deconstruction Method: piece by piece, (100% by hand)

- Labor Intensive
- Highest reclamation rate and quality
- All about access
Deconstruction Method: piece by piece, (100% by hand)
Deconstruction Method: knock down (tip and sort)

- Reduced disassembly time, almost entirely sorting and processing time
- Reduced risk by eliminating working at height
- Limited usefulness- only appropriate for certain buildings
- Strategic unbracing of the building.
Deconstruction Method: Mechanized (hybrid of machine and hand)

• Reduced hand labor, increased machine labor
• Reduced risk by minimizing working at height
• All about identifying removable units and safely extracting them
Local Resources

• BMRA Decon Project Management Training “Decon for Demo Contractors”

Next class scheduled for January, 2017
Local Resources: BMRA Members
Questions?

Additional resources are available at www.bmra.org

or

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773-340-BMRA (2672)
Working to create a vibrant materials reuse economy as part of a world without waste.

BMRA
Building Materials Reuse Association
Elevating the Issue: Outreach, Events and Advocacy
Moving the Market: Directory of Nationwide Resources

- National Deconstructor Training and Credential
- Added Value Material Manufacturing
- Material Brokers
- Online Material Sales
- Reused Lumber Warehouses
- Regional Material Exports
- Community Development
- Disaster Recovery

bmra.org/directory_map
Moving the Market: Professional Training and Resources

Introduction to Deconstruction - Workbook (Public Edition)

By Building Materials Reuse Association

Price: $165.00

Ships in 3-5 business days

Introduction to Deconstruction - A Comprehensive Textbook

This textbook is the only one of its kind, containing valuable information on deconstruction and materials reuse assembled from the best practitioners in the country and reviewed by a diverse technical advisory group. This unparalleled resource was previously available only to licensees of the BMRA curricula and BMRA members.

391 pages. Color paperback.
Inspiring the Industry: Membership

- board-up services
- engineer
- appraisal
- training
- government
- reuse store
- deconstruction services
- individual
We Need Your Support To:

- **Advocate** for materials recovery and reuse
- **Engage** the construction and demolition community.
- **Provide** public access to reliable information on deconstruction and reuse
- **Share** our educational resources through online learning, school programs, and workforce development
Why should we pay attention to building materials?

Figure 1. Measurement of the amount of raw materials consumed in the United States. WWI, World War I; WWII, World War II (5).
When should building materials recovery and reuse be included on a project?

Estimated Amount of Residential Building-Related C&D Materials Generated in the U.S. During 2003 - EPA

- Construction: 57%
- Renovation: 28%
- Demolition: 15%
What is Highest Best Use?

- Retained Material Usefulness
- Energy Footprint
- $ Value
# Non-Structural Salvage – Commonly Removed Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Skill Level</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpet</td>
<td>Medium</td>
<td>Relatively simple removal (mind the nails in wall to wall)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Markets vary significantly</td>
</tr>
<tr>
<td>Kitchen Appliances</td>
<td>Low</td>
<td>Ensure that all utilities are safely shut off, use appliance dollies to save your back. Strong market.</td>
</tr>
<tr>
<td>Service Appliances (furnace, etc.)</td>
<td>High</td>
<td>Market varies according to the age of equipment, significant safety issues on utility shut off.</td>
</tr>
<tr>
<td>Cabinets</td>
<td>Medium</td>
<td>Reusability depends on initial quality, plywood carcasses are hardier than particle board. Remove countertops first where possible.</td>
</tr>
<tr>
<td>Medicine Cabinets</td>
<td>Low-Med</td>
<td>Remove the shelves first, and internal connections to pull from wall.</td>
</tr>
<tr>
<td>Light Fixtures</td>
<td>Med-High</td>
<td>Shut off/lockout circuit breaker, loosen fixture, unfasten wire connections, protect fixture.</td>
</tr>
<tr>
<td>Finished Wood Floors</td>
<td>Low-Med</td>
<td>Remove base trim, start on tongue side, gently pry along the length. Denail.</td>
</tr>
<tr>
<td>Doors</td>
<td>Low-Med</td>
<td>Maximum value for door + jamb. Remove trim first, detach jamb + door from wall.</td>
</tr>
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</table>
### Full Deconstruction– Commonly Removed Items

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<td>Insulation</td>
<td>Medium</td>
<td>Batt or board insulation is easily salvaged following removal. Insulation is generally unrecoverable.</td>
</tr>
<tr>
<td>Ductwork</td>
<td>Med-High</td>
<td>There is a high scrap value, though reuse value is dependent on considerations to untape, and remove screws.</td>
</tr>
<tr>
<td>Roofing</td>
<td>High</td>
<td>Safety is of prime concern in removing roofing. Asphalt shingles are recyclable, while sheet, slate, and tile roofing is highly reusable.</td>
</tr>
<tr>
<td>Sheathing</td>
<td>Med-High</td>
<td>Plywood sheathing has high salvage and reuse value, while exposure is a consideration.</td>
</tr>
<tr>
<td>Lumber</td>
<td>Med-High</td>
<td>Follow the guidelines of last on/first off. Maintain integrity of (trusses) as possible.</td>
</tr>
<tr>
<td>Exterior Siding</td>
<td>Medium</td>
<td>High value siding should be protected, and then removed using the appropriate method.</td>
</tr>
<tr>
<td>Brick</td>
<td>Med-High</td>
<td>Stabilize walls and chimneys, greater reuse value is in solid volume.</td>
</tr>
</tbody>
</table>
MATERIALS; WHAT’S AVAILABLE

• Reusable & recyclable building materials
  – Concrete, asphalt, masonry
  – Lumber
  – Metals
  – Asphalt roofing
  – Carpet & pad
  – Architectural items
  – Mechanical, plumbing & electrical items
• Over 80% of a house can be reused or recycled
Non-Structural Salvage – Extraction Methods

• Simply Lift
  –  - MRF and demo site extraction
• Unplug and Pull
  –  - appliances
• Hand Tool Removal
  –  - Fixtures, flooring, cabinets, etc.
• Hand Power Tool Removal
  –  - Doors, windows,
• Team Extraction
  –  - Bathtubs, countertops, etc.
Material Sourcing Locations and Logistics

- Quantities & Quality
- Material Brokers
- Shipping & Transit
- On Site Sourcing
- Reuse Store
- Internet Sales
The Existing Market: Types of Deconstruction Operations

- **Small Scale: Non-Structural Salvage** (e.g. Habitat for Humanity, Historical Societies, Commercial Architectural Salvage)
  - *Market Share:* Highly local, distributed widely across the country, minimal impact on the C&D waste stream
  - *Trends:* These operations are growing, particularly with greater support from HfH national, and increasingly accessible market for resale of architectural salvage
- **Medium Scale: Structural and Non-Structural Salvage** (e.g. deconstruction contractors, remodeling contractors)
  - *Market Share:* Highly local, demand for services is tightly connected to sales opportunities and/or regulatory demands
  - *Trends:* These operations are growing in established regions with strong support for reuse/resale and in areas that have promoted deconstruction with regulation such as vacant home removal allowances or C&D landfill bans.
- **Large Scale: Full Building Removal** (e.g. deconstruction contractors, dismantling contractors)
  - *Market share:* These are local and national operations that are capable of addressing a consistent local demand, or traveling to take advantage of out of region opportunities
  - *Trends:* These operations fluctuate with the still inconsistent demand for whole building deconstruction. As the market grows, it is expected that demolition contractors will enter as service providers.
The Existing Market: Types of Reuse/Resale Operations

- **Retail Storefront**
  - Highly local, 1-3 stores within a region, staff can include volunteers with tasks ranging from material processing to retail.

- **On-Site Auction Sales**
  - Highly local, no storefront, though there is often warehousing. Minimal staff to facilitate sales and identify material value, little to no material handling.

- **Furniture Making / Added Value Products**
  - Ranges from highly local operations within reuse stores to national providers of flooring, etc. Staff varies by operation, ranges from material handling and finishing to sales and installation.

- **Material Brokerages / Online Sales**
  - Ranges from highly local to nationwide with craigslist and planetreasure type outlets. Little centralized staff, though there is a growing use of material shipping.

- **Large Scale Suppliers**
  - Operates in parallel to new materials sales with operations like Duluth Timber. Staff varies according to operation with suppliers typically sub-contracted.

- **In-house reuse**
  - As contractors are able to identify end uses or new installations for materials, there is an increasing retention of materials for on-site or in-house reuse. Staff varies according to operation, includes emphasis on material processing for reuse.

**Trend** – All of these resale markets are growing throughout the country, especially in those regions that have a strong demand for reclaimed materials.
Calculating the Value of Reuse

The Value of Reuse is 100% dependent on what matters to you and your client.

• First cost?
• Lifecycle cost?
• Material Quality?
• Environmental Impact?
• Community Support?
• Workforce Development?
Economic Benefits of Reuse – Quantifying your Project

Supply (Deconstruction)

Cash for goods – can you sell the materials?

Donation receipts for goods – is the owner eligible for a tax benefit?

Tipping fees – where are you located? Tipping fees can top $85/ton in some areas.

Demand (Reuse)

Low cost, high quality materials for the project – What is the available cost? What would the cost be for a comparable new product?

Material Availability – Does a comparable material exist new?
First Cost

Salvaged
$275

New
$1,250
Impact of Reuse - Environmental

Cumulative Energy Impact:

- New Framing Lumber \(6,470 \text{ MJ/m}^3\)
- Recovered Framing Lumber \(320 \text{ MJ/m}^3\)

Have you Ever Included Reclaimed Materials on a Project?

- 77%: Yes, we have in the past
- 8%: No: Aesthetics - the materials did not look right
- 5%: No: Cost - the materials ended up being way too expensive
- 5%: No: Owner - the owner was unhappy with the materials
- 3%: No: Schedule - the logistics of using these materials was incredibly difficult
- 2%: No: Quality - the reclaimed materials did not meet our specifications
Are you Currently Including Reclaimed Materials on a Project?

- Yes, we've got a project that's reusing materials: 44%
- Yes, we've used deconstruction to ensure that materials are available for reuse: 25%
- No, we haven't been able to find a way to support reused materials on a current project: 25%
- Other: 6%
Was the Inclusion of Reclaimed Materials a Success?

- Yes: 86%
- No: 14%
What Were the Factors in Selecting Reclaimed Materials for Project Inclusion?

- Aesthetics
- Affordability
- Owner's Priority
- Quality
- Reduced Material Consumption
- Schedule
- Zero Waste Project
- Rating System Compliance
- Other

What was the most important factor in deciding to include reclaimed materials on the project?

What were other factors in deciding to include reclaimed materials on the project?
What Kind of Reclaimed Materials did You Source??

- Landscaping Materials
- Furniture
- Structural Materials
- Finishes
- Non-Structural Materials

PARTICIPATION
Straw Poll

Building Materials Reuse Association
Where Did you Source your Materials?

- **On site**: 45%
- **Off site - Reuse Warehouse**: 22%
- **Off site - other**: 21%
- **Off site - Material Broker**: 8%
- **Other**: 4%
Did You Seek Certification for This Project?

- Green Globes
- Living Building Challenge
- LEED (not including MRc1 or MRc2)
- LEED (including MRc2)
- LEED (including MRc1)
General Public

Potential Actors

MRR Stakeholders

BMRA Members
National Waste Characterization 2003

- Total C&D (42%)
- Total MSW (58%)

City of Chicago Waste Characterization 2009

Figure 2. Waste Generation by Sector

City of Chicago Waste Characterization 2009

Recycling Rate of 65%

Figure 2. Waste Generation by Sector
