C&D MATERIALS MARKETS: IDENTIFYING OPPORTUNITIES REGIONALLY & LOCALLY

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ABOUT DELTA INSTITUTE

www.delta-institute.org
Facebook  @DeltaGreatLakes

Martin Brown
Programs Specialist

Megan Walton
Sr. Programs Associate
Delta Institute is a Chicago-based nonprofit that collaborates with communities to solve complex environmental challenges across the Midwest.

Since 1998, Delta’s been working with public and private partners.

We *design*, *test*, and *share* market-based environmental solutions that yield social, environmental, and economic benefits for communities.
MATERIAL MARKETPLACE SCALES

Region: EPA Region 5

City: St. Louis

Structure: St. Louis Warehouse
C&D MATERIAL IN REGION 5

• Construction and demolition (C&D) waste comprises a significant portion of the waste stream in the Upper Midwest.

• C&D material represents economic opportunity when it is able to enter the market as raw material.

• EPA has determined that recycling C&D material generates creates more jobs, wages, and taxes than any other material stream.

bit.ly/demystifyingwaste
## C&D Debris Generation

<table>
<thead>
<tr>
<th>Activity Type</th>
<th>C&amp;D Debris Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Construction</td>
<td>4.9 lbs. / sqft. (average)</td>
</tr>
<tr>
<td>Nonresidential Construction</td>
<td>4.34 lbs. / sqft. (average)</td>
</tr>
<tr>
<td>Residential Demolition</td>
<td>50 - 158.7 lbs. / sqft.</td>
</tr>
<tr>
<td>Nonresidential Demolition</td>
<td>36 - 358 lbs. / sqft.</td>
</tr>
<tr>
<td>Residential Renovation</td>
<td>3.31 - 72.1 lbs. / sqft.</td>
</tr>
<tr>
<td>Nonresidential Renovation</td>
<td>3 - 28.49 lbs. / sqft.</td>
</tr>
</tbody>
</table>

### C&D Debris Generation by Material

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Estimated Quantity (1,500 sq ft Home)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framing lumber</td>
<td>4,000 board feet</td>
</tr>
<tr>
<td>Standard brick</td>
<td>5,000 bricks</td>
</tr>
<tr>
<td>Asphalt shingles</td>
<td>650 sq ft</td>
</tr>
<tr>
<td>Concrete</td>
<td>37 cubic yards</td>
</tr>
<tr>
<td>Drywall</td>
<td>1,445 sq ft</td>
</tr>
<tr>
<td>Siding (80% vinyl, 15% aluminum, 5% other)</td>
<td>1,620 sq ft</td>
</tr>
</tbody>
</table>

# Material Present in Region 5

<table>
<thead>
<tr>
<th>Material</th>
<th>Estimated Quantity (1,500 sq ft home)</th>
<th>Estimated quantity in 16% of Vacant Home Region 5 homes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Framing lumber</td>
<td>4,000 board feet</td>
<td>Over 1.6 billion board feet</td>
</tr>
<tr>
<td>Standard Brick</td>
<td>5,000 bricks</td>
<td>Over 2 billion bricks</td>
</tr>
<tr>
<td>Asphalt Shingles</td>
<td>650 sq ft</td>
<td>Over 264 million sq ft</td>
</tr>
<tr>
<td>Concrete</td>
<td>37 cubic yards</td>
<td>Over 15 million cubic yards</td>
</tr>
<tr>
<td>Drywall</td>
<td>1,445 sq ft</td>
<td>Over 588 million sq ft</td>
</tr>
<tr>
<td>Siding (80% vinyl, 15% aluminum, 5% other)</td>
<td>1,620 sq ft</td>
<td>Over 658 million sq ft</td>
</tr>
</tbody>
</table>

Three distinct markets for reclaimed wood are relatively well established.

- **Old-growth lumber** recovered from older structures often used in furniture or for aesthetic interior design purposes.
- **Later-period lumber** in good condition can be lightly processed and reused for items like crates or pallets in lieu of virgin material.
- **Low quality wood** can be heavily processed to create products such as mulch, particle board, or wood pellets.

Source: Delta Institute. Reclaimed building materials market analysis for the greater Lansing area. 2015.
Source: reusewood.org
BRICK

Brick (along with wood) has the most potential for immediate reuse value, but value can vary widely depending on the age, style, and condition of the bricks. Holes and frogs, paint, and remnants of tough mortar typically make bricks less valuable for resale.

Though less common than salvaging for reuse, bricks can also be processed and recycled as aggregate at different sizes. Sioux City Brick in Iowa sells crushed recycled brick for landscaping and backfill purposes, and as baseball diamond and running track material for their most finely ground brick.
Existing end markets for recycled asphalt shingles include **addition to asphalt mixes**, **production of new roofing shingles**, and **use as aggregate**.

In 2009, IL Tollway conducted a study to determine the effect of adding RAS to roadway asphalt mixes. Adding up to 5% RAS to asphalt mixes **reduced costs and improved long term durability of pavement**. Between 2010-2015, over 24,000 tons of asphalt shingles were diverted, resulting in $21 million in cost savings.
FINDINGS
FINDINGS

Region 5 states are disposing a significant amount of C&D material and have opportunity to divert a portion of that material from landfills

Baseline waste Generation in Region 5:
14 million tons of C&D debris disposed per year
FINDINGS

Data is inconsistent

Throughout Region 5 states, counties, and municipalities, waste generation and characterization data is collected inconsistently,
**FINDINGS**

There are jobs and capital already present in industries with the potential to include reused or recycled C&D.

In Region 5, these industries employ 6,000 to over 14,000 people per state and have $2 to $3 billion in sales per state.
FINDINGS

Opportunities for reuse are not as prevalent as opportunities for recycling

Markets are generally much stronger for material recycling than reuse, and reuse opportunities typically exist at a very small scale.

Recycling material is a significant improvement over landfilling, but material reuse can avoid energy-use and costs associated with extracting materials and producing new products, while also diverting material from landfills.
ST. LOUIS DECONSTRUCTION MARKET ASSESSMENT
VACANCY & DECONSTRUCTION IN ST. LOUIS

• ~8,000 Vacant Buildings
  – 90/10 Brick/Frame
  – Most Built Prior to 1930
  – Vacant less than 10 years
  – Concentrated in areas with less access to employment

• Drain on the region
  – Quality of life and safety
  – Property tax loss
  – Costs of maintenance
ST. LOUIS DECONSTRUCTION PROGRAM

- Sep 2017: Preliminary Assessment
- Oct 2017: Kick-Off Convening
- 2018: Best Practice Research & Demolition Handbook
- 2019: Market Assessment
- March 2019: Cross City Learning with Baltimore
DECON BENEFITS

Environmental & Public Health
• Increased Waste Diversion (Reuse and Recycling)
• Increased potential for environmental abatement
• Less dust than standard ‘smash & grab’ demolition

Economic
• Job creation (requires more labor)
• Value generated through reused materials
• Opportunity for value added processing
• Opportunity to turn the vacancy challenge to a positive
DECONSTRUCTION MARKET ASSESSMENT

Goals:

• Identify national trends in Deconstruction
• Identify local and regional stakeholders in Deconstruction Market
• Assess regional demand for reclaimed building materials
• Quantify local supply of reclaimed building materials
• Estimate economic & environmental impacts
• Provide recommendations

bit.ly/STLDDecon
FINDINGS
KEY FINDING

Nationally, deconstruction and material salvage industries are growing with support from public and private organizations and agencies.
NATIONAL TRENDS: EMERGING MARKETS

Sales Volume of Key Players in US Reclaimed Lumber Market

- Pioneer Millworks
- Elmwood Reclaimed Timber
- Vintage Timberworks Inc
- Longleaf Lumber
- G R PlumeCo
- Trestlewood
- Eagle Reclaimed Lumber
- Atlantic Reclaimed Lumber
- Olde Wood LTD
- Terra Mai
- Recycling The Past
- Altruwood
NATIONAL TRENDS: POLICY

San Jose, CA (2001)
Contractors pay a deposit, refundable upon receipt of documentation that 75% of C&D debris is recovered and diverted

Madison, WI (2010)
Buildings projects with steel and concrete supports must recycle 70% of materials. New wood supported structures and remodeling projects greater than $20,000 must reuse or recycle all wood, non-toxic metals, scrap drywall, cardboard, and shingles

Cook County, IL (2012)
Minimum 70% of C&D waste from all building projects must be diverted from landfill where 5% of waste from residential projects must be reused

Portland, OR (2016)
Homes built before 1917 must be deconstructed
NATIONAL TRENDS: HISTORIC PRESERVATION

Wabash L Station, Chicago
KEY FINDING

A strong network of stakeholders for both supply and demand of reclaimed building materials exists in St. Louis, and the network has the potential to grow.
## Stakeholders

<table>
<thead>
<tr>
<th>Stakeholder Group</th>
<th>Description</th>
<th>Role</th>
<th>Benefit from Increase in Material Reuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition &amp; Deconstruction Contractors</td>
<td>Individuals and companies that generate C&amp;D debris as a byproduct of their work</td>
<td>Generate materials</td>
<td>Increased revenue from reclaimed materials</td>
</tr>
<tr>
<td>Building Material Reuse Marketplaces</td>
<td>Retail store and warehouses that sell reclaimed building materials to the public</td>
<td>Make materials publicly available</td>
<td>Increase in materials for resale</td>
</tr>
<tr>
<td>Design Build</td>
<td>Entities that incorporate reclaimed materials into building and interior design</td>
<td>Transform materials into high value items</td>
<td>Local and reliable sources of materials</td>
</tr>
<tr>
<td>Material Wholesale (Regional/National Scale)</td>
<td>Individuals and companies who purchase large quantities of commodity-level salvaged and reused building materials, like brick and lumber, to be retailed</td>
<td>Aggregate materials for large scale processing</td>
<td>More raw materials for processing</td>
</tr>
<tr>
<td>Value Added Processors</td>
<td>Entities that use reclaimed building materials to create new products</td>
<td>Transform materials into high value items</td>
<td>Local and reliable sources of materials</td>
</tr>
</tbody>
</table>
KEY FINDING

Salvageable building materials in St. Louis’ vacant structures have economic potential and are in high demand.
BUILDING MATERIAL SUPPLY

Total Potential Brick Salvage:
• 24.8 million bricks (or 49,600 pallets of brick)

Total Potential Lumber Salvage:
• 10.4 million board feet of old growth lumber
BUILDING MATERIAL DEMAND

Lumber
- Rough sawn lumber
- Old growth lumber

Brick
- Interior and exterior brick
- Quality of St. Louis bricks

Finishes / other
- Interior finishes and appliances, exterior architectural elements
KEY FINDING

Deconstruction of vacant, publicly-owned properties in St. Louis has the potential to increase the economic impacts of planned vacant structure removal programs.
ECONOMIC IMPACT: MATERIAL VALUE

Group 1: Best Condition
- 100% Salvage Rate

Group 2: Middle Condition
- 50% Brick Salvage Rate
- 25% Lumber Salvage Rate

Group 3: Worst Condition
- 25% of Brick

DISTRIBUTION OF STRUCTURE CONDITION SCORE
**ECONOMIC IMPACT: MATERIAL VALUE**

Group 1: Best Condition
• $7.9 Million

Group 2: Middle Condition
• $8.1 - $27.9 Million

Group 3: Worst Condition
• $2.1 - $3.4 Million

**TOTAL ESTIMATED VALUE:**
• $18.2 - $39.3 Million
ECONOMIC IMPACT: COST

Demolition

$4.94

Per Sq. Ft.

$11.64

Deconstruction

$7.93

Per Sq. Ft.

$15.51
**ECONOMIC IMPACT: LABOR & WAGES**

- **Ave. Crew Size**: 2-3
- **2-3 Days**
- **Ave. Crew Size**: 6-8
- **10-15 Days**

*Images of construction activities and workers.*
### ECONOMIC IMPACT: 2018 DEMOLITIONS

<table>
<thead>
<tr>
<th>Indicator</th>
<th>All Demolition (Baseline)</th>
<th>All Deconstruction (Scenario 1)</th>
<th>10% Deconstruction (Scenario 2)</th>
<th>50% Deconstruction (Scenario 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Labor Hours (Low)</td>
<td>14,336</td>
<td>215,040</td>
<td>21,504</td>
<td>107,520</td>
</tr>
<tr>
<td>Estimated Labor Hours (High)</td>
<td>21,504</td>
<td>430,080</td>
<td>43,008</td>
<td>215,040</td>
</tr>
<tr>
<td>Estimated Wages Paid (Low)</td>
<td>$243,042</td>
<td>$3,349,516</td>
<td>$334,951</td>
<td>$1,674,758</td>
</tr>
<tr>
<td>Estimated Wages Paid (High)</td>
<td>$364,564</td>
<td>$6,699,033</td>
<td>$669,903</td>
<td>$3,349,516</td>
</tr>
</tbody>
</table>
Deconstruction and building material salvage has significantly improved environmental outcomes, compared to traditional demolition.
ENVIRONMENTAL IMPACTS

• Produces significantly less dust than demolition

• Reduces risk of lead and particulate exposure

• Results in significant reductions in waste generation and GHG emissions

Reduce Waste Generation by:

126,500 Tons

Reduce Green House Gas Emissions by:

43,066 MTCO2E
### ENVIRONMENTAL IMPACTS

<table>
<thead>
<tr>
<th>Material</th>
<th>Estimated Quantity Recovered for Reuse</th>
<th>Waste Reduction Potential</th>
<th>GHG Reduction Potential (MTCO2E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bricks</td>
<td>24.8 mil bricks</td>
<td>111,700 tons</td>
<td>14,996</td>
</tr>
<tr>
<td>Lumber</td>
<td>10.4 mil board feet</td>
<td>14,800 tons</td>
<td>28,070</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>126,500 tons</td>
<td>43,066</td>
</tr>
</tbody>
</table>

Reducing 43,066 Metric tons of CO2E is equivalent to removing annual emissions from **over 9,000 passenger vehicles** or conserving over **4.8 million gallons of gasoline**.
RECOMMENDATIONS
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Policy:

SLDC and city departments should convene a local advisory committee to consider developing legislation to encourage or require building material reuse in St. Louis.

Training:

SLDC in collaboration with other city departments should consider funding and supporting deconstruction training at multiple experience levels for demolition contractors and other interested workers.

Prioritization:

SLDC should work with the LRA and Building Division to develop and use condition scoring criteria and building inspector recommendations to help prioritize building deconstruction.
RECOMMENDATIONS

Packaging Bids:

SLDC and the LRA should work with the Building Division to bid demolitions and deconstructions in larger packages to allow for significant quantities of materials to be aggregated for donation or resale.

Incentives:

SLDC should encourage real-estate developers and the private sector to salvage reclaimed building materials and incorporate deconstruction into development projects.

Brokering:

SLDC should consider a partnership with state and regional entities to help join or create an online system for brokering reclaimed building materials.
WHAT’S NEXT?

- Fall 2019: Deconstruction Training
- Fall 2019: Bid Released For Decon Pilot
- Fall-Winter 2019: Deconstruction Pilot
- Spring 2019: Deconstruction Pilot Assessment
- 2020: SCALE!
QUESTIONS + DISCUSSION

Megan Walton
Senior Programs Associate
mwalton@delta-institute.org

Martin Brown
Programs Specialist
mbrown@delta-institute.org