

The Dollars and Sense of the Deconstruction and Reuse Industry: A Look Through Spartan Green Colored Glasses

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The Dollars of Deconstruction and Reuse

Demolition + Abatement

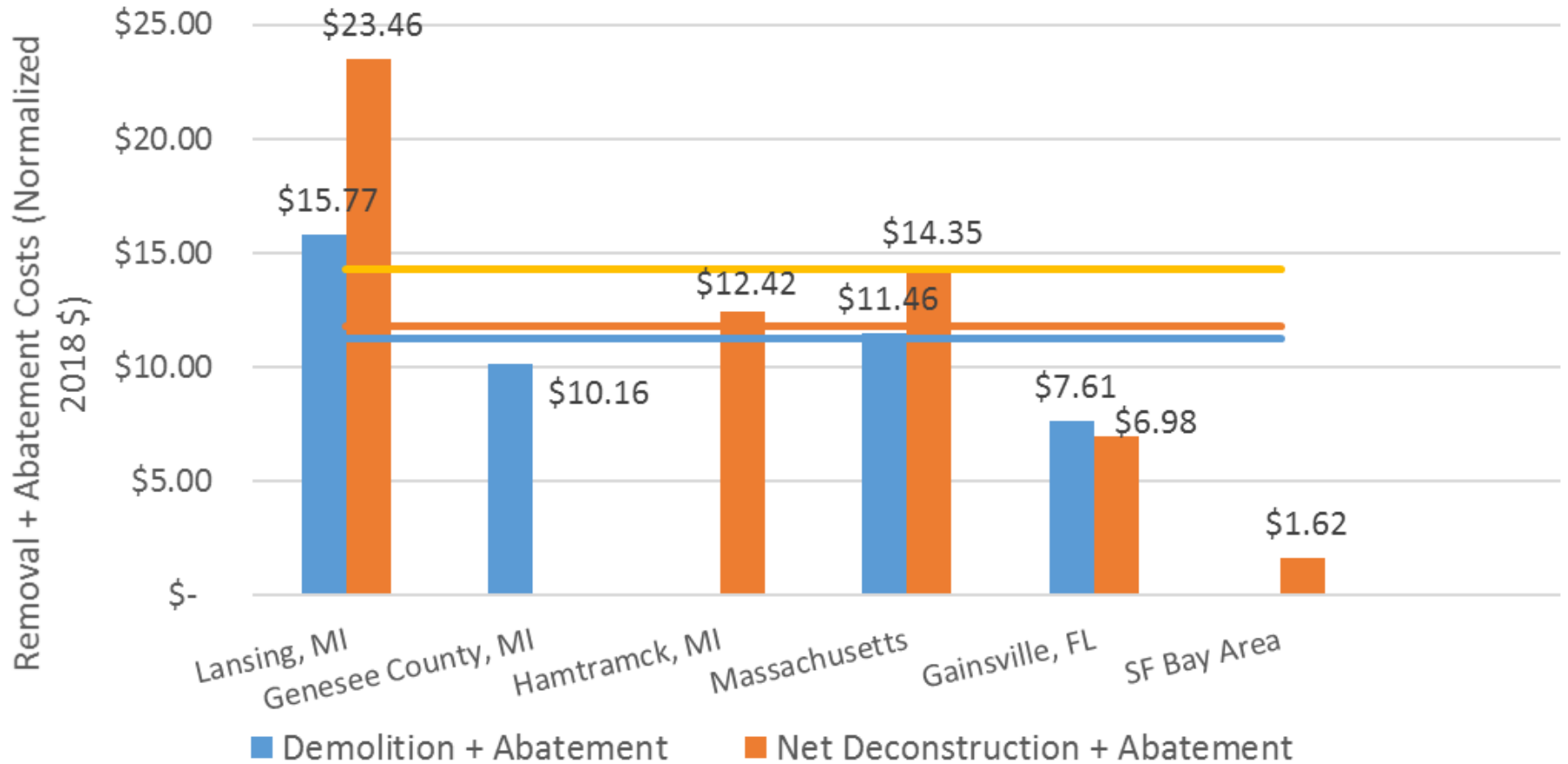
- \$15.20/sf (Lansing 2016)
- \$9.67/sf (Genesee County 2015)
- \$8.15/sf (Massachusetts early 2000s)
 - \$11.46 in 2018
- \$5.26/sf (Florida 2000)
 - \$7.61 in 2018

Deconstruction + Abatement

- \$22.61/sf (Lansing 2016)
- \$10.21/sf (Massachusetts early 2000s)
 - \$14.35 in 2018
- \$11.82/sf (Hamtramck, 2015)
- \$4.83/sf (Florida 2000)
 - \$6.98 in 2018
- \$1.02/sf (SF Bay Area 1996)
 - \$1.62 in 2018

Sources: CalRecycle n.d.; NAHB Research Center n.d.; Guy and McLendon 2000; Dantata et al. 2005; Byers 2006; Genesee County Land Bank 2015; Tatiya et al. 2017; Anuranjita et al. 2018

Relative Demolition and Deconstruction Costs 1996-2016



Sources: CalRecycle n.d.; NAHB Research Center n.d.; Guy and McLendon 2000; Dantata et al. 2005; Byers 2006; Genesee County Land Bank 2015; Tatiya et al. 2017; Anuranjita et al. 2018

The Dollars of Deconstruction and Reuse

Key lessons learned:

1. Experience counts!
2. Concentration/repetition helps
3. Skilled/trained workforce matters
4. Cost control and efficiencies change the outcome
5. Tipping fees can (dis)incentivize deconstruction
6. Markets drive success

The Sense of Deconstruction and Reuse

The Sense: Jobs

10,000 tons of waste



The Sense: Jobs

- Need to look beyond just the end-of-life disposal jobs
- Deconstruction process creates jobs at a rate of 6:1 compared to demolition
- California projections for lumber recycling – creation of 62.5 jobs per 10,000 tons
 - Currently ~100 jobs/10,000 tons
 - Includes collection, processing, manufacture, and recycle/re-manufacture – excludes deconstruction

Sources: NRDC (2014). From Waste to Jobs: What Achieving 75 Percent Recycling Means for California; ReBuilding Center, 2018



524 Baker St., Lansing - Demolition

Floor Area:	1,100 SF
Labor:	4 workers (1 excavator operator, 1 ground person, 2 truck drivers)
Time:	40 worker hours - 4 ppl x 8 hours demolition: 32 hrs - 2 ppl x 4 hours restoration: 8 hrs
Unit Time:	0.036 worker hours/SF
Job Potential:	100 1,200 SF homes = 2.08 FT jobs

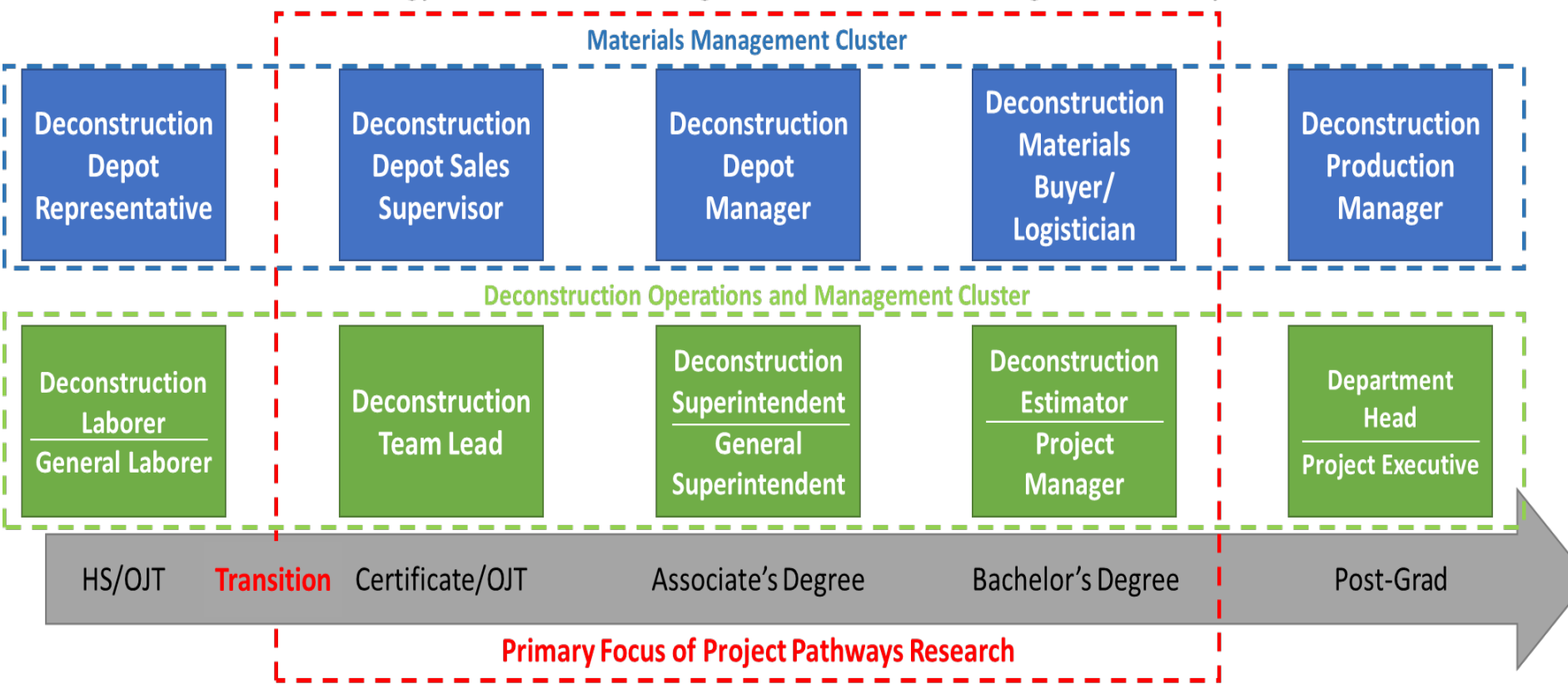
1214 Massachusetts Ave., Lansing - Deconstruction

Floor Area:	1,232 SF
Labor:	6 workers (5 workers, 1 de-nailer)
Time:	260 worker hours - 5 ppl x 3-4 days demolition: 134 hrs - 1 ppl x 126 hours de-nailing
Unit Time:	0.211 worker hours/SF
Job Potential:	100 1,200 SF homes = 12.17 FT jobs

Direct deconstruction
activity alone in a
moderate-size market
can sustain 12 FTE
jobs/100 homes

The Sense: Jobs

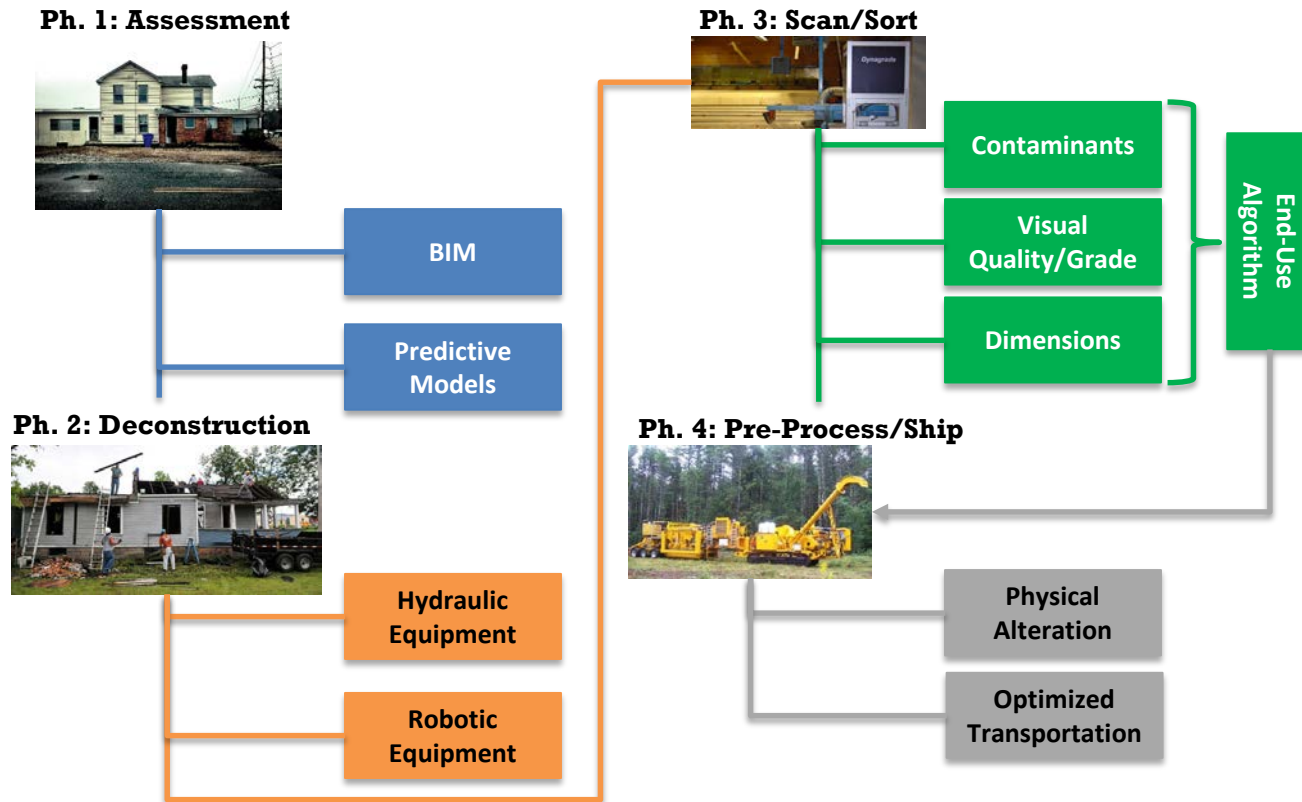
Domicology: Deconstruction Management and Materials Management Pathway



The Sense: Jobs

- Efficiency, modernization, and automation are needed
 - Change deconstruction perception
 - Reduce deconstruction costs, increase deconstruction markets
 - Create high-skill, high-wage workforce
- California example - fewer workers per 10,000 tons in 2020 compared to 2014

The Sense: Automation + Jobs



The Sense: Innovative Materials Re-Use

- MSU's work focuses on increasing the yield of high-volume, low-value materials

Location	Number of Abandoned Homes	Approximate Volume of Salvageable Lumber	Equivalent # of Trees
Michigan	225,946	903,784,000 BF	1,246,598
Midwestern US	1,379,720	5,518,880,000 BF	7,612,248
United States	5,813,286	23,253,144,000 BF	32,073,302

- Data Sources and Notes:
 - MSU Center for Community and Economic Development (2016). Muskegon, Michigan Deconstruction Economic Cluster Feasibility Study.
 - US Census Bureau (2016). American Community Survey, Vacant Housing Units.
 - BF=board foot = a piece of lumber 12"x12"x1"
 - Tree equivalent is a tree of 24" diameter producing 4 16' logs

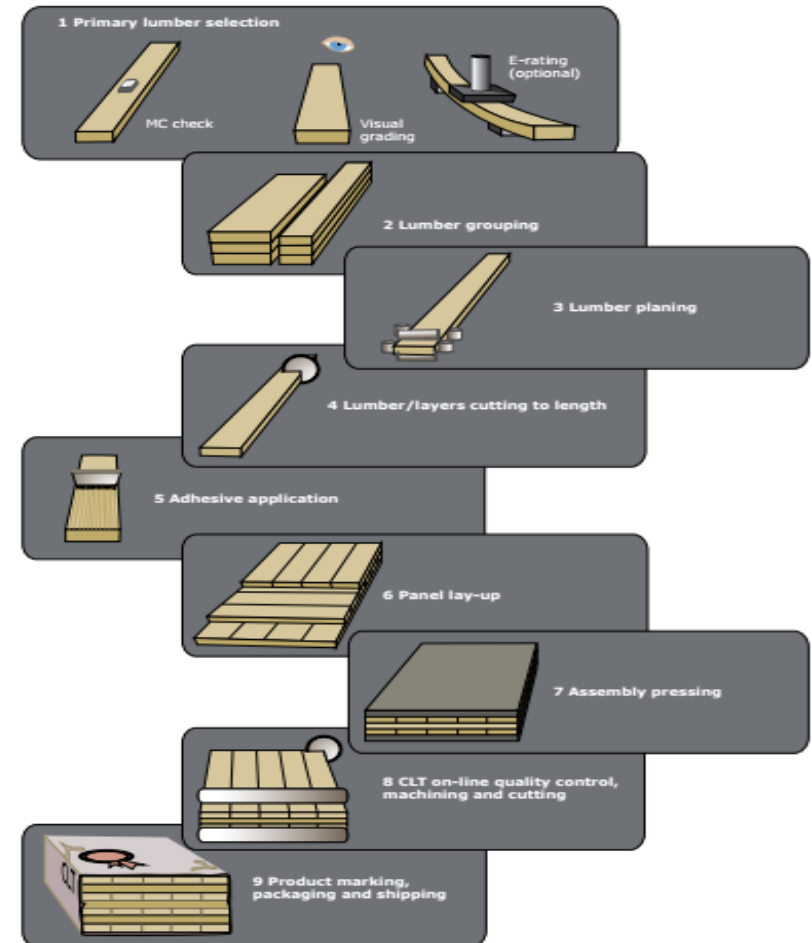
The Sense: Innovative Materials Re-Use

Key Question: Do the mechanical properties of salvaged lumber meet existing U.S. standards for inclusion in the manufacturing of cross laminated timber panels?

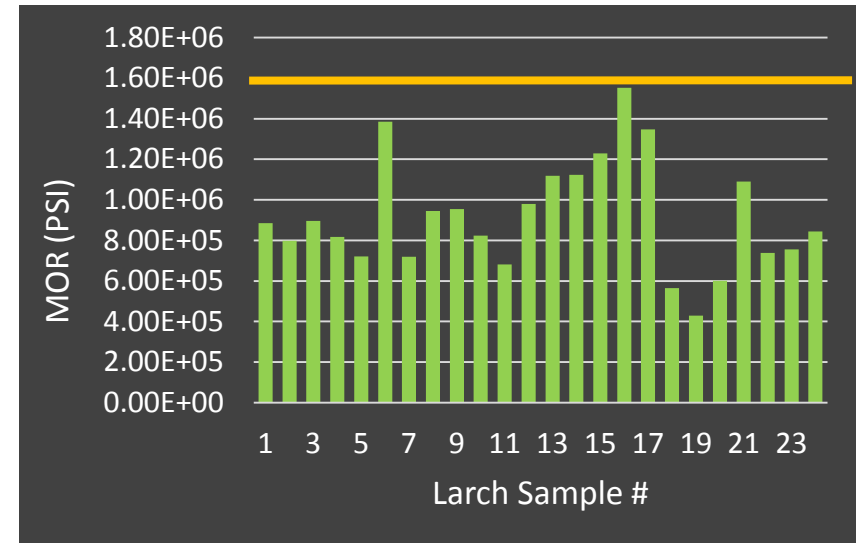
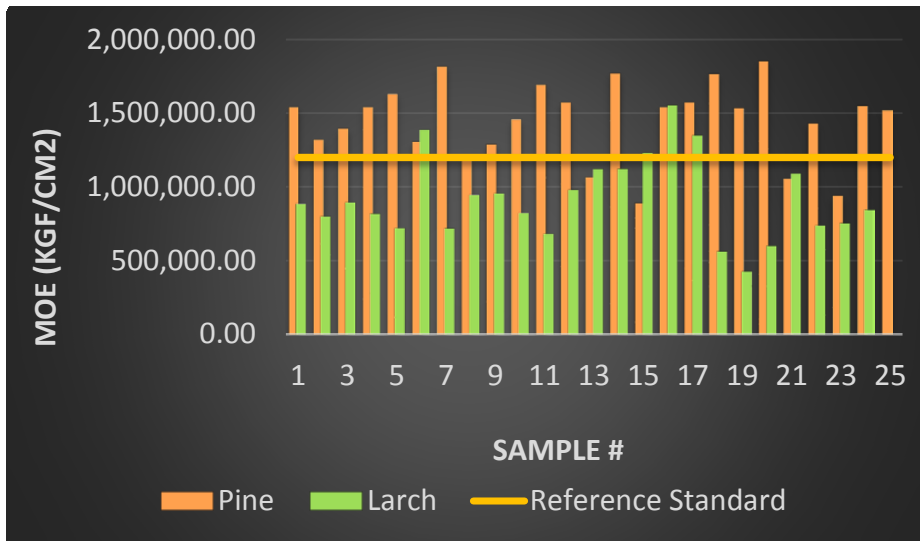
Cross-laminated Timber (CLT)



A structural panel consisting of three, five, or seven layers of dimensional lumber that are able to bear loads in and out of plane, which can be used as floor or wall system.



The Sense: Innovative Materials Re-Use



The Sense: Innovative Materials Re-Use

Short Term Work

- Increase the sample size and test other salvaged lumber species/times under load for bending and rupture properties
- Conduct a statistical analysis to determine what percentage of salvaged lumber may be used in the manufacturing of CLT panels

Long Term Work

- Manufacture a complete 3,5, or 7 layer panel assembly with an applied resin for bonding between each layer
- Test bonding line of the applied resin
- Test physical and mechanical properties of the complete CLT panel assembly

Thank You!

Questions?

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