

# TRANSFORMING THE 21ST CENTURY BUILT ENVIRONMENT: SELECTED STUDENT PAPERS IN DOMICOLOGY

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# INTRODUCTION

Dear Readers,

For several decades, many U.S. cities have experienced significant economic and population decline that has resulted in large amounts of structural abandonment. This abandonment has pervasive social, environmental, and economic consequences that disproportionately affect already struggling communities. In response to this problem, scholars at Michigan State University have focused their efforts on understanding the complex circumstances that have led to blight, as well as a number of potential solutions. One such research area has focused on altering our perceptions of the built environment as a cyclical system, rather than in the traditional linear sense. Coined as the study of structural life cycles by Dr. Rex LaMore in 2015, Domicology examines the continuum from the planning, design, and construction stages through to their end of use, abandonment, deconstruction and reuse.

The following primer was developed during a Spring 2018 special topics course in the School of Planning, Design & Construction at MSU entitled “Transforming the 21st Century Built Environment: Advancing the Science of Domicology.” The course was co-taught by Dr. Rex LaMore, faculty in the Urban and Regional Planning Program and Director of the MSU Center for Community and Economic Development as well as Dr. George Berghorn, faculty in the Construction Management Program. The primer seeks to expand on the existing knowledge surrounding structural abandonment, explore various implications of “design for deconstruction” principles, as well as the social, environmental, and political considerations for adopting domicological practices. This primer and a primer developed in 2017 can serve as introductory readings for those seeking to explore the various concepts and considerations of the life cycle of structures and sustainable development. The research contained in this primer is by no means a complete work; as the built environment is a multifaceted area of study, so too are its implications.

Contributors to the primer include selected students of the special topics course, and represent several disciplines in the built environment including planning, construction management, finance, work and other disciplines. Special thanks to our editing team: Madison Kraus and Lauren Ross. For more information on the study of Domicology, we invite you to visit <https://domicology.msu.edu/>. We also welcome external research on the subject of the life cycle of structures, which can be submitted via the website.

We hope that you find these selected writings stimulating and informative as we seek to transform our understanding of the built environment.

Yours for stronger communities,

Rex L. LaMore, Ph.D. & George Berghorn, Ph.D.  
Faculty, MSU School of Planning, Design and Construction

**The statements, findings, conclusions, and recommendations expressed herein are solely those of the respective authors, and do not necessarily reflect the views of Michigan State University.**

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# MARKETING AS A TOOL TO AID IMPLEMENTATION OF DOMICOLOGY IN REDEVELOPMENT

By: Madison Kraus

B.S. Neuroscience

Lyman Briggs College

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## Introduction: The Need for Sustainable Redevelopment

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Cities across the nation persistently struggle with vacant and blighted structures in neighborhoods, and a desire for redevelopment has unfolded in response to this epidemic (Schilling and Pinzón, 2016). Legacy cities experienced dramatic job losses in the industrial sector, resulting in socioeconomic and physical degradation of communities; attention drawn to this issue attracts various researchers studying the impacts, causes and futures of these suffering regions (Mallach and Brachman, 2013; Schilling and Pinzón, 2016). Experts such as Emilie Evans, preservation specialist for the Michigan Historic Preservation Network, and Dr. Aaron McCright, a professor in the Michigan State University Department of Sociology view vacancies as opportunities for growth and improvement (McCright, 2018; Vacant Not Blighted..., 2014). The development sector provides an example for how progress can more effectively incorporate sustainability, which has become a major focus across the world.

Experts define sustainability in many ways, due to its broad, complex nature. The most common definition specific to development originates from the United Nations World Commission on Environment and Development (WCED), "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs," (The Brundtland Report..., 1987). The WCED has illustrated how sustainable development relies on encouragement of the values which underlie sustainability while regarding the importance of social and cultural determinants in the perception of societal needs (The Brundtland Report..., 1987). Redevelopment strategies will heavily rely on societal laws, ethics, needs and demands of the American public. Domicology studies methods for development through a sustainable framework to understand the life cycle continuum of structures in order to mitigate negative impacts of current development issues such as abandonment (Transforming..., 2017). Domicological practices echo the basic needs of a sustainable society by analyzing structures in communities while inherently considering the three main pillars of sustainability: economics, environment, and social equity. We are faced with an opportunity to create a more sustainable future, where communities demand viable new options for redevelopment. Numerous

factors influence what specific strategies cities or organizations utilize to build structures and/or eliminate vacancies within the affected cities; nevertheless, blight remediation unifies the various stakeholders (Schilling and Pinzón, 2016).

There are various domicological considerations to make during redevelopment which could increase the sustainability of our built environment, such as enhancing cyclical material flow and deconstruction of select structures. Sustainability marketing applied to conventions such as innovative new green buildings and materials salvaged from old buildings could greatly enhance the prevalence of these practices and drive the demand for sustainable options. We could continue to build wastefully, without considering the sustainability of the community or the lifecycle of the buildings we erect, but this would likely be a detriment to future generations and leave them with the same issue we currently face in many cities across the nation: blight and abandonment. By using marketing strategies and the adept opinions of domicologists, we can prepare for a more sustainable and healthy future. This paper will examine sustainability marketing as a mechanism for increasing the prevalence of domicological practices in development.

*“Sustainability marketing applied to conventions such as innovative new green buildings and materials salvaged from old buildings could greatly enhance the prevalence of these practices and drive the demand for sustainable options.”*

## Sustainability Marketing and Domicology

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Nearly 50 years ago, Nobel Prize recipient Milton Friedman published a well-known and often critiqued article about the interests of businesses, stating they have a responsibility to maximize profit while conforming to society’s laws and ethics (Friedman, 1970). While the US has evolved since then to accept and promote more ethical models, the main profit motive remains prominent,

and though the market has experienced an increase in companies releasing sustainability reports, many organizations still do not account for sustainability within their business plan (Bridges and Willhelm, 2008). Larger companies experience more pressure to achieve a Triple Bottom Line, which accounts for the three dimensions of sustainability (Elkington, 1998); however, they may face a greater challenge achieving sustainability goals (Ritala et al., 2018). Domicology could point stakeholders of development in a beneficial and regenerative direction, but businesses motivated by profit require economic gain, so their methods will reflect that prime directive. Using sustainability marketing enhances market opportunities in an increasingly green world and can encourage corporate environmentalism (Cheah and Phau, 2011).

Over the past three decades, sustainability marketing research has accelerated, and various definitions exist (McDonagh, 2014). The general concept of marketing, to communicate with consumers to satisfy their wants and needs, still applies (McDonagh, 2014). By definition, sustainability marketing equally considers the environmental, economic and social impacts of the organization in strategic development (Bridges and Willhelm, 2008; McDonagh, 2014). The broadening research on sustainability marketing methods ranges from fundamental challenges, to specifics such as supply-chain management (McDonagh, 2014). Its increasing prevalence has helped organizations and consumer behavior evolve towards sustainability in a time where we desperately need change (McDonagh, 2014).

In development, sustainability marketing concepts may be applied in various ways and subsequently achieved through reorientation of the market, which involves diverting consumers towards sustainable decision making (Bridges and Willhelm, 2008). Both for- and non-profit organizations can acknowledge their economic objectives by communicating how their growth and/or profit objectives align with sustainable development (Bridges and Willhelm, 2008). Sustainable development implies physical growth of communities through both residences and commercial structures which support organizations. Stakeholders involved with successfully developing green buildings experience economic gain, and the regional economy benefits from the arrival of new organizations operating in more sustainable structures. Sustainability marketing may address equity through the lens of resource distribution or by enhancing

community well-being; demonstrated in Domicology through the erection of more sustainable housing (Bridges and Willhelm, 2008). Environmental objectives of an organization may include ecological restoration and stewardship or resource productivity (Bridges and Willhelm, 2008). Domicology reflects both social and environmental notions through the support of cyclical material flow, restoration of brownfields and abandoned lots within blighted communities, and by implementing deconstruction (Bridges and Willhelm, 2008).

*“Prioritizing education as opposed to persuasion in marketing aids in consumer ecoliteracy...”*

In addition to providing an analysis of which concepts of sustainability marketing apply to development, Bridges and Willhelm also outline examples of how to reform traditional marketing practices. Transition to sustainable development begins with the willingness to shift markets to appeal to consumers of sustainable products by enforcing cyclical material flow and inherently sustainable products. Marketing strategies should focus on the product benefits through a

sustainable lens instead of appealing to frivolous consumption. Prioritizing education as opposed to persuasion in marketing aids in consumer ecoliteracy, or ecological knowledge; achievement of this goal may require standards to legitimize sustainability in the form of third-party labels and certifications. Additionally, instead of emphasizing price, sustainability marketing acknowledges the total cost of developments, including social and environmental costs. Altering these traditional practices will aid the transition into sustainability marketing across the US. (Bridges and Willhelm, 2008)

Aside from the previously mentioned WCED, other stakeholders involved in development could utilize sustainability marketing to expand the implementation of domicological practices to benefit current and future generations. Pressure from social movements and media motivates organizations to achieve a triple bottom line (TBL) may increase the likelihood of organizations exploiting these marketing methods (Elkington, 1998). Stakeholders including material suppliers, builders, financiers, policy makers, consumers and local governments all have a prominent effect on redevelopment and could all utilize or benefit from sustainability marketing.

By shifting marketing away from traditional strategies, sustainable development would benefit by enhancing their market presence and correctly targeting their consumer base. An increase in implementation for domicological practices could occur following the widespread use of sustainability marketing strategies, as this would optimize connection with consumers enhancing both the satisfaction of the consumer and the market for these sustainable practices (Villarino and Font, 2015).

## LEED as a Case Study for Sustainability Marketing

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Leadership in Energy and Environment Design (LEED) buildings provide an example for how sustainability marketing influences development by introducing a third party to legitimize the sustainability standard (Bridges and Willhelm 2008). The most recognizable system for assessing green buildings is the LEED assessment certification system established by the US Green Building Council (Boschmann and Gabriel, 2012). Commercial buildings with LEED certifications can lead to higher rent and occupancy rates; having the certification provides a marketing benefit which attracts consumers willing to pay more for the environmental benefits (Matisoff et al., 2014). LEED certifications remain under scrutiny by domicologists for their limited lifecycle consideration or points awarded for salvaged materials (Transforming..., 2017). Structures built with their end of life in consideration may also benefit from a sustainable brand like LEED and command a higher value in the marketplace thus advancing a more sustainable built environment. Regardless of these perceived limits, LEED provides a legitimized platform for developers to market their sustainability achievements in a way which consumers better understand, providing a market advantage for buildings with these certifications. The brand appeal of voluntary LEED certification benefits organizations while successfully educating and promoting sustainable development to consumers (Boschmann and Gabriel, 2012).

## Future Research in Sustainable Marketing and Domicology

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Multiple aspects of Domicology research are still required to fully grasp the effects of sustainable development on society. Although research on optimal sustainability marketing strategies exist for various sectors (McDonagh, 2014), there is a lack of data in Domicology and the development industry. As we embark on redevelopment of blighted communities across the US, it is crucial we understand the most efficient methods of marketing more sustainable development in order to reorient the market and bridge the gap between consumer attitudes and redevelopment strategies.

Additionally, there needs to be a more effective way to legitimize sustainable development brands by creating an easily identifiable and trusted third-party verification system. As previously mentioned, LEED is one method; however, shortcomings of the program exist such as limited consumer awareness and others noted by Boschmann and Gabriel (2012). LEED condones incremental solutions and the most commonly earned credits represent the easiest objectives (Boschmann and Gabriel, 2012). Domicology would suggest a practice which more highly considers the lifecycle of the building, from planning and design to construction through removal.

As the market sector targeted by Domicology grows, it will require increasing public education of domicological issues and practices. Various stakeholders such as potential homeowners and business owners in redeveloping areas affected by blight would benefit from an awareness program which promotes the sustainability of new or remodeled structures. Broadening public awareness would further enrich the market and inform consumers of the legitimate third-party verification systems previously mentioned to guide their redeveloping decisions.

Finally, data collection in areas with high demand for redevelopment would benefit domicologists. Regional data collection provides crucial information to domicologists by informing availability of materials, considerations necessary for climate conditions, culturally and historically significant structures, and the demographic of consumers (Boschmann and

Gabriel, 2012). For example, it is important to understand the type salvaged materials available in the redeveloping region, as limited access to these materials may hinder the ability to incorporate them in the design of the structure. By assessing regional culture, climate, supply, and demand, domicologists can make more effective recommendations for redevelopment, and sustainability marketing can optimally target the consumer base.

## Conclusion

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Sustainability marketing would help communicate how domicological practices enforce social equity by positively impacting communities, especially those affected with blight. Ecologically, sustainability marketing would promote a cyclical lifecycle approach to material use, which diminishes the need for extracting natural resources. Lastly, sustainability marketing would advertise the lasting economic benefits of using domicological conventions within communities.

All of these aspects could combine to create a vibrant market for companies employing Domicology by enhancing their market orientation, educating consumers and therefore increasing their prospects. We must learn from the mistakes of past generations and progress in a more sustainable fashion while redeveloping blighted cities to suit the needs of our current and future communities. We have the technology necessary to transform the industry, but in order for this to occur, demand for recommended Domicology practices must increase and research must continue. We have an opportunity to enhance environmental remediation tactics and taking full advantage of that would result in a more regenerative society and a safer future for the human race.

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# URBAN GROWTH BOUNDARIES AND BLIGHT ELIMINATION

By: Ross Lamerson

Bachelor of Finance

Eli Broad College of Business

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## Introduction

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Since the most recent recession, blight and abandonment have been a problem in society more than ever. Cities from across the country have seen rising abandonment; including Detroit, Baltimore, and Cleveland (Greater New Orleans Community Data Center, 2012). While abandonment across the country has decreased in recent years, some municipalities have not recovered. In 2016, Flint, Michigan had 9,800 vacant homes, accounting for 16.5% of all residential properties. Detroit had 53,000, accounting for nearly 20% of residences (Abbey-Lambertz, 2016). Even with the policies, incentives, and regulations that are in place today, blight and abandonment are still large problems in communities. In the search for policies that can help combat this problem, Urban Growth Boundaries (UGB's aka Urban Containment Policies) provide cause for optimism.

These policies aim to incentivize the investment in city cores and help prevent suburban sprawl by restricting development to within a certain boundary. In their infancy, such programs have had positive effects. Analysis looking at foundation cracks, sagging roofs, holes in roofs, broken windows, and other symptoms of blight across 107 cities (36 with UGBs and 71 without) showed that on average, cities with UGBs have less blight than their non-UGB counterparts (Hortas-Rico, 2015). Another study looked at the impact that UGBs had on new construction. In 21 contained cities vs. 123 uncontained cities, 57% more units per 1,000 people were built in the contained cities in the 10-year span of 1985-1995. For the purpose of this paper, the same 12 cities (six pairs) studied in *Urban Containment American Style: A Preliminary Assessment* (Nelson A. , 2004) will be compared across various statistics in order to analyze UGBs' ability to

fight blight and abandonment. The findings of this paper are by no means meant to be portrayed as statistically significant, but are preliminary and intended to show that there is reason to pursue further research of Urban Growth Boundaries as a tool to reduce blight and abandonment.

## Urban Growth Boundary Types

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According to Nelson, there are three types of Urban Growth Boundaries that encompass containment in the United States: Submetropolitan, unbounded metropolitan, and bounded metropolitan.

- Submetropolitan: “Occurs where one local government, usually in a rapidly growing region, wishes to shape development coming to it in ways different than is occurring there and elsewhere.” This form of growth boundary is smaller than the following metropolitan boundaries. It also deals with development that is spreading to an area, as opposed to development that is occurring from inside the UGB. For example: Petaluma, California was at the edge of San Francisco, California and wanted to control the kinds of development it would allow as San Francisco expanded. Only development meeting its criteria (such as mixed-use and mixed-income (Smartvoter.org, 2017)), can be developed within its boundary.
- Unbounded Metropolitan: This type of Urban Growth Boundary is metropolitan-wide. The first and most prominent boundary is in Minneapolis-St. Paul, where water and wastewater service is restricted to within the boundary. The reason this type of boundary is considered ‘unbounded’ is because certain kinds of developments are allowed outside the boundary. In this case, outside the UGB residential single-family homes are very

common. The boundary only applies to developments with connections to public water and wastewater services and not other forms of low density development.

- **Bounded Metropolitan:** The poster child for this type of containment is Metro Portland, Oregon. This boundary is a hard line that separates developed and undeveloped land. In this case, outside of Portland’s boundary is rural farmland. The designated boundary line is designed to accommodate growth for about 20 years, where at the end of that timeframe the boundary will be expanded if needed. Since it was enacted in the late 1970’s, the boundary has actually changed very little.

| Pair     | Contained/.. | Containment Ty..       | City                               |
|----------|--------------|------------------------|------------------------------------|
| <b>1</b> | Contained    | Submetropolitan        | Lexington-Fayette Urban County, KY |
|          | Uncontained  | Submetropolitan        | Knoxville, TN                      |
| <b>2</b> | Contained    | Submetropolitan        | Nashville, TN                      |
|          | Uncontained  | Submetropolitan        | Memphis, TN                        |
| <b>3</b> | Contained    | Unbounded Metropolitan | Minneapolis-St. Paul, MN           |
|          | Uncontained  | Unbounded Metropolitan | Kansas City, KS/MO                 |
| <b>4</b> | Contained    | Unbounded Metropolitan | Sarasota, FL                       |
|          | Uncontained  | Unbounded Metropolitan | Daytona Beach, FL                  |
| <b>5</b> | Contained    | Bounded Metropolitan   | Portland, OR                       |
|          | Uncontained  | Bounded Metropolitan   | Charlotte, NC                      |
| <b>6</b> | Contained    | Bounded Metropolitan   | Sacramento, CA                     |
|          | Uncontained  | Bounded Metropolitan   | Bakersfield, CA                    |

Figure 1

## Cities Analyzed

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As in Nelson's paper, the cities analyzed for this paper are divided into six different pairs; two for each containment type (as seen in Figure 1). Each contained city had the most similar uncontained city selected for comparison purposes. The pairs were selected based upon their similarity in size, growth rate during the 1990's, landscape, and location within the same state or region (when possible).

### **Pair 1: Lexington-Fayette, KY and Knoxville, TN**

These cities were chosen because they both home to major universities (University of Kentucky and University of Tennessee, respectively), have similar landscapes due to being west of the Appalachians, and had somewhat similar growth rates in the '90s (21.1% and 30.5%).

### **Pair 2: Nashville, TN and Memphis, TN**

These cities are both within the same state and also had growth rates larger than the national average (33.4% and 17.1%, respectively)

### **Pair 3: Minneapolis-St. Paul and Kansas City**

These metro areas are among the largest in upper Midwest, and both spill over into neighboring states. Both landscapes are flat and both their growth rates were similar in the 1990's (40.9% and 49.5%, respectively).

### **Pair 4: Sarasota, FL and Daytona Beach, FL**

These metros are coastal areas in the same state, that also share similar landscapes and growth rates in the 90s (40.9% and 49.5, respectively).

### **Pair 5: Portland, OR and Charlotte, NC**

Portland and Charlotte are both the largest metro areas in their states. Because Portland's neighboring cities often had containment policies in place, the best control area is on the other side of the country. The landscapes are similar, and their growth rates were also similar in the 1990's (32.0% and 38.8%, respectively).

**Pair 6: Sacramento, CA and Bakersfield, CA**

Sacramento and Bakersfield are both within the same agricultural region in the same state, and also had similar growth rates in the 1990’s (45.7% and 44.4%, respectively).

**Urban Growth Boundaries and Vacancy**

When using these paired and examining their vacancy rates, the impact of UGB’s appears consistent, as seen in Figure 2. Every contained city had a lower vacancy rate than its uncontained peer, except for Sacramento in Pair 6.

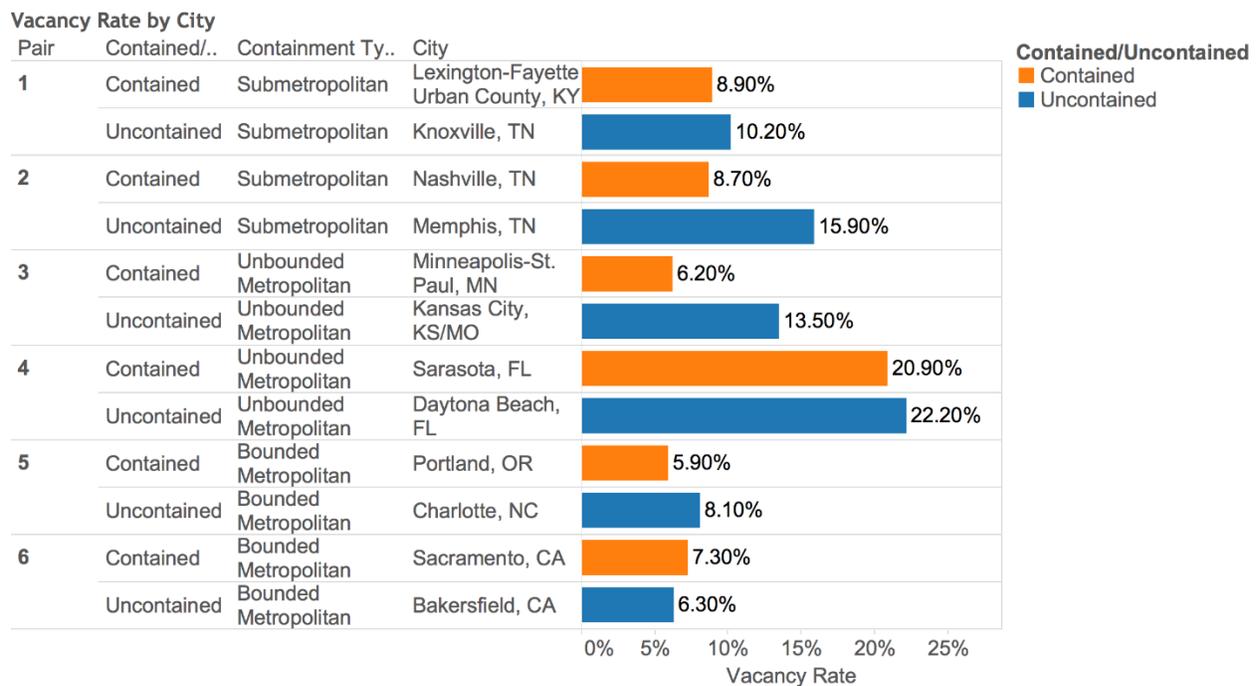


Figure 2  
Source: (U.S. Census Bureau, 2016)

When comparing each pair against each other, every contained city has a lower vacancy rate than its uncontained comparison, save for Sacramento, CA and Bakersfield, CA. The largest

difference is between Minneapolis-St. Paul and Kansas City where the vacancy in Kansas City is over 100% higher than in Minneapolis-St. Paul.

When averaged together (as seen in Figure 3), one can see that this relationship holds true across all containment types as well. Bounded Metropolitan cities had the lowest average vacancy, while Submetropolitan was second. Unbounded metropolitan had the highest vacancy rate out of all three containment types.

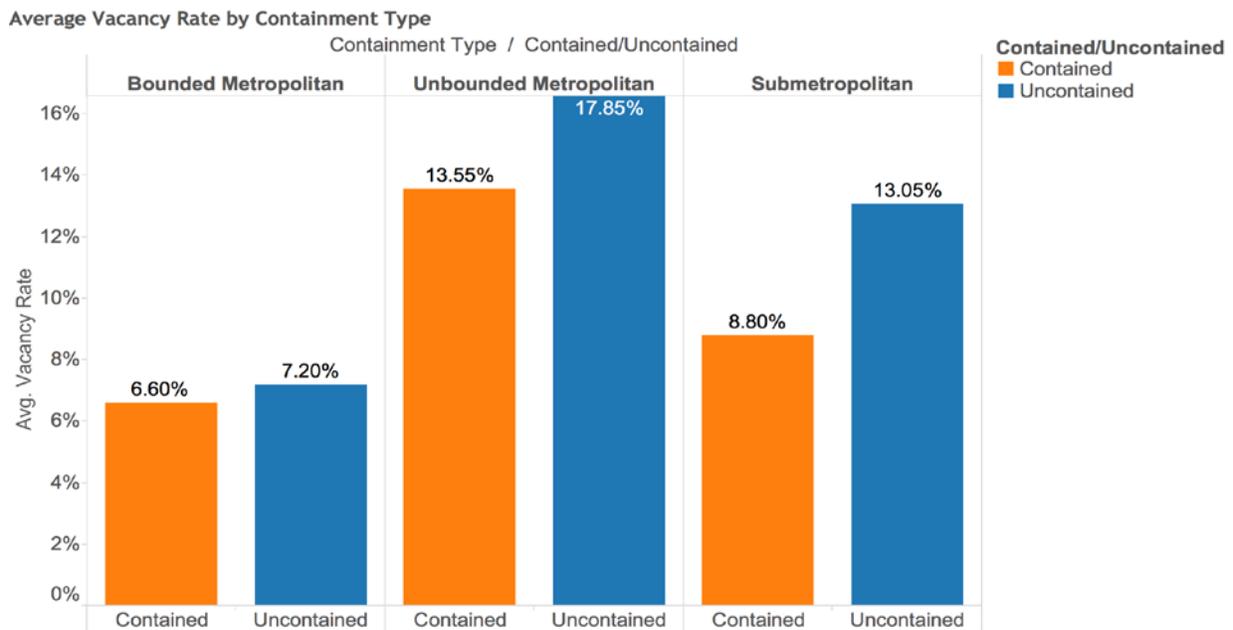


Figure 3  
Source: (U.S. Census Bureau, 2016)

## Urban Growth Boundaries and the Cost of Housing

The main concern with Urban Growth Boundaries usually centers around the cost of housing. The concern is that the same market forces that makes land in the UGB more attractive for investment and development could also make housing less affordable. When asked about the topic, former East Lansing City Planner Mr. James Van Ravensway said, “[Urban Growth Boundaries] sounded great to planners and academics, but the impact on consumers in

[communities with UGBs] was huge. By limiting the amount of land for development and turning it into a scarce resource ... the cost for development skyrocketed and existing home prices went through the roof ... huge cost impact for consumers” While this is undoubtedly a factor, the question is how material is the impact that these policies have on the affordability of housing?

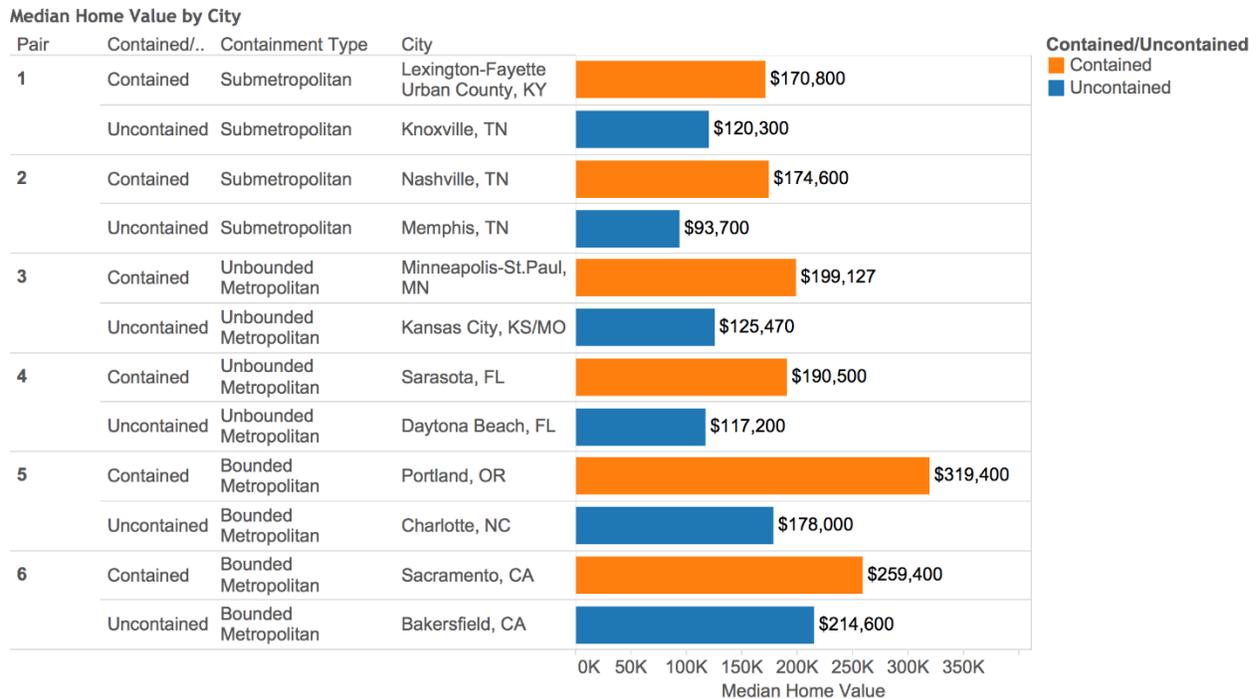


Figure 4  
Source: (U.S. Census Bureau, 2016)

When looking at Median Home Value for the same cities in Figure 4, every city with a UGB had a higher median home value than its uncontained counterpart. While this is not overly encouraging at first glance, with a deeper analysis it is not as troubling. The concern with UGBs is that the UGBs will make housing too expensive for the area’s residents. Because renters are generally less wealthy on average (Lansner, 2017) then logically they should be the most impacted by UGBs. In order to try and isolate the impact that UGBs had on affordability, the variable Rent Burden is used in lieu of traditional measures like Median Gross Rent. Rent Burden represents the percentage of household income spent on rent. Anything 30% and above

is considered burdensome (Housing for Urban Development, n.d.). In Figure 5, the rent burdens are shown by containment type. In our Unbounded Metropolitan set, the uncontained cities actually had a higher rent burden. In the two types where the Contained cities had a higher rent burden than the Uncontained ones, the magnitude of difference was slight. For Bounded Metropolitan, the contained cities had 32.5% average Rent Burden, compared to 30.7% for the uncontained cities (a difference of 1.8%). In Submetropolitan, the difference was even smaller at 30.2% to 29.51%, respectively (0.69%). When looked at through this lens, the impact of UGBs on affordability seems tempered.

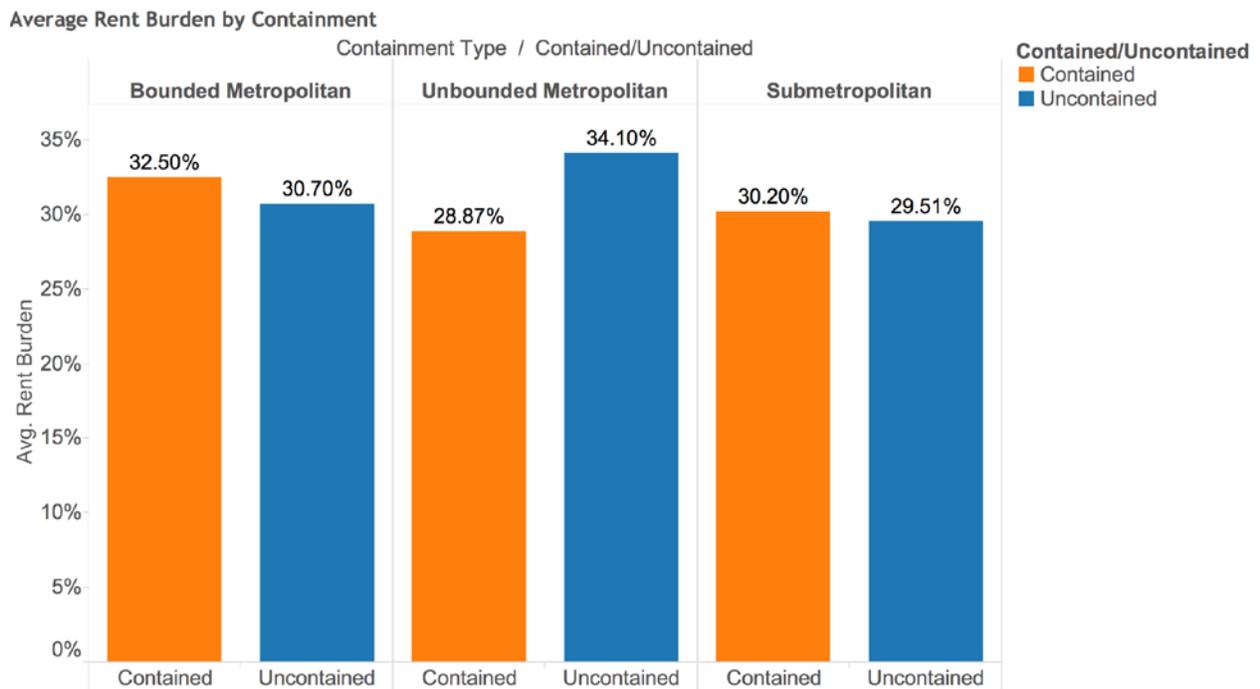


Figure 5  
Source: (Eviction Lab, 2018)

## Conclusions and Caveat

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Taking into account just the information put forth thus far, the impact of UGBs on both vacancy and price is intriguing. Across all containment types, the contained cities had lower rates of vacancy. When comparing housing prices, the contained group had higher values across the board. However, because renters are generally less wealthy than homeowners, they can serve as a measure the negative impact that UGBs would have on affordability of housing. When taking this into account, the Rent Burden of contained cities is not substantially higher than the uncontained cities. While these results are somewhat encouraging, there are a few caveats: the impact population growth has on vacancy and affordability, as well as the small sample size. *Figure 6* illustrates the relationship between the Population Growth Rate from 2000-2010 (most recent Census data) and the vacancy rate average from 2012-2016 (also the most recent Census data). The contained group had an average vacancy rate of 9.7% and an average Population Growth Rate of 9.6%. This is compared to the uncontained group which had an average vacancy rate of 12.7% and an average growth rate of 12.8%. However, the uncontained group has two outliers in Charlotte, NC as well as Bakersfield, CA had growth rates of 35.2% and 40.6%, respectively. This arguably makes the median value a better indicator of the data. The median growth rate for the Contained group is 10.4% and the Uncontained group is 3.1%, which could be a contributing factor for the trends seen in vacancy rates. When looking at Pairs 5 and 6, the uncontained cities had substantially higher growth rates than their contained counterparts but the contained cities still had lower vacancy rates.

# Recommendations for Future Research

Moving forward, more research needs to be done into the impacts that Urban Growth Boundaries have on the vacancy and affordability of cities. Since vacancy is a precursor to blight and abandonment, UGBs could potentially be part of the solution. The preliminary analysis put forth in this paper shows that in a small sample size, UGBs seem to have a positive impact on vacancy without drastically impacting the affordability of a region. Studies need to be done with more city pairs and in cities with differing cultures and industries in order to truly judge the impact that UGBs may have.

Population Growth vs. Vacancy Rate

| Contained/Un.. | Pair | City                               | Pop Growth Rate (2000-2010) | Vacancy Rate (2012-2016 Average) |
|----------------|------|------------------------------------|-----------------------------|----------------------------------|
| Contained      | 1    | Lexington-Fayette Urban County, KY | 13.5%                       | 8.9%                             |
|                | 2    | Nashville, TN                      | 10.0%                       | 8.7%                             |
|                | 3    | Minneapolis-St.Paul, MN            | 10.4%                       | 6.2%                             |
|                | 4    | Sarasota, FL                       | -1.5%                       | 20.9%                            |
|                | 5    | Portland, OR                       | 10.3%                       | 5.9%                             |
|                | 6    | Sacramento, CA                     | 14.6%                       | 7.3%                             |
| Uncontained    | 1    | Knoxville, TN                      | 2.9%                        | 10.2%                            |
|                | 2    | Memphis, TN                        | -0.5%                       | 15.9%                            |
|                | 3    | Kansas City, KS/MO                 | 3.2%                        | 13.5%                            |
|                | 4    | Daytona Beach, FL                  | -4.8%                       | 22.2%                            |
|                | 5    | Charlotte, NC                      | 35.2%                       | 8.1%                             |
|                | 6    | Bakersfield, CA                    | 40.6%                       | 6.3%                             |

Figure 6  
Source: (U.S. Census Bureau, 2016)

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# COOPERATIVE COMMUNITY LAND TRUST: A DOMICOLOGICAL PATHWAY TO INCLUSIVE REDEVELOPMENT

By: Joshua Weidenaar

B.A. Environmental Studies and Sustainability

College of Agriculture and Natural Resources

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## I. Introduction

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The landscape of the urban environment is shifting once more and the social fabric that holds urban communities together must remain strong. Building capacity in neighborhoods through economic development initiatives is an important step to maintaining and improving upon the integrity of a community. However, these initiatives cannot entirely mitigate displacement effects felt from the redevelopment and reinvestment into a community. These efforts must move in tandem with investment that embodies a new attitude towards reinvestment in a community. Cooperative business models and Community Land Trusts embody this new Ideology towards protecting the character of a community through safeguarded responsible investment on behalf of community residents and with these residents. Allowing for environmentally sustainable growth in communities experiencing blight and abandonment is a core principle of Domicology. This situates domicological practices in a way that will undoubtedly have an effect on the communities these practices interact in. As stewards of sustainability, domicologists must structure the practice in such a way that is conscious of its environmental, social, and economic effects on the community it is working in. This research is well situated due to the nascent nature of the structural material salvage & reuse industry, offering an opportunity to establish an equitable domicological business model, before another business structure is considered the normative practice. Domicological business models must be structured in a way that sustains the original occupants of a community and mitigates displacement pressures, it is argued that through a cooperatively structured Community Land Trust, this may be possible.

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*“Cooperative business models and Community Land Trusts embody this new Ideology towards protecting the character of a community through safeguarded responsible investment on behalf of community residents and with these residents.”*

## II. Future Forecast: Domicological Practice

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Research shows that there is already a spatial settlement shift back towards urban environments happening throughout the world (Pinnegar, 2010; Hochstenbach, 2018; Siedentop, 2017; Salvati & Carlucci, 2014; Sturtevant, 201; Hyra, 2015). This will create pressure on an aging urban housing stock and necessitate the redevelopment of inner-urban structures. Under the assumption of a more positive attitude towards operating sustainably within a resource constrained world, domicological practices will become economically prosperous and come into popular practice within redeveloping urban communities. This changing settlement pattern will also naturally lead to displacement pressures in communities that have experienced disinvestment and abandonment. There are four common types of displacement pressures often felt by communities experiencing gentrification. 1) Residential Displacement 2) Commercial Amenity Displacement 3) Political Displacement 4) Cultural Displacement (Rankin, 2014; Choi, 2017; Hyra, 2015; Anguelovski, 2015; Howland, 2007; Checker, 2011). It is the ethical duty of domicologists to mitigate the displacement pressures of this impending spatial shift, by engaging in equitable business practices as these practices gain widespread popularity given this spatial settlement shift and purposed adoption of a more sustainable paradigm.

## III. Cooperative Business Model

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Cooperative business structures differ in many ways from the common investor-owned business structure. A cooperative business structure is member owned and business decisions are decided through democratic processes. Most cooperatives engage in profit sharing activities by either sharing some small percentage of profits with members according to amount of business interaction or by taking top profits and reinvesting capital into additional areas of the cooperative network (Petersen, 2016). The latter profit sharing activity could be the avenue used in a domicological cooperative business structure. There are seven cooperative principles as outlined by the international Co-operative Alliance: 1) voluntary and open membership 2) democratic member control 3) member economic participation 4) autonomy and independence 5) education, training, and information 6) co-operation among co-operatives 7) concern for community

(Guidance Notes, N.D). The cooperative business model in Michigan does not necessitate a separate cooperative business designation, and is usually licensed as a corporation. The actual designation of a cooperative corporation is done through explicit language in the governing documents, such as the cooperatives bylaws (Hoppe, 2013). The Evergreen Cooperative in Cleveland, Ohio has served as one inspiration for the domicological cooperative community land trust model. The Evergreen Cooperative network began as a way to help create a more localized economy that benefits the underserved neighborhoods around Cleveland, Ohio. It started as a creation of a for profit business that produced environmentally friendly linen services for the hospital in Cleveland, with labor needs satisfied by residents of the underserved neighborhoods of the area. All employees are members of the cooperative and there are now three different businesses under the Evergreen umbrella, all service a needed input for the anchor institutions of the area (Fillion). The evergreen cooperative businesses include, Evergreen Cooperative Laundry, Evergreen Energy Solutions, & the Green City Growers. This environmentally focused for profit cooperative business structure is a success story and example of what the Domicological Cooperative Community Land Trust could be.

## IV. Community Land Trusts

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Community Land Trusts are defined as “A private, nonprofit corporation created to provide secure affordable access to land and housing for the benefit of the community. The CLT enables people who would otherwise be priced out of the housing market to own a home” (Michigan Community Resources, 2017). The mechanism through which a CLT does business is generally through the purchase of developed land, the structures on the purchased land are then sold to an individual or group of individuals through a purchase and financing of the “improvements” and a longterm ground lease of the land. A ground lease is typically 89 years in length in Michigan, a lessee will engage in this financial mechanism with the CLT such that the CLT remains control of the land and the home cannot be resold at an unreasonably high price. This protects the prices of structures in areas experiencing re-investment pressures from going so high that low-income original residents are priced out of the area. The price of CLT’s are usually 20-30% lower than the market rate due to the absence of land ownership costs (Michigan Community Resources,

2017). Purchasers of CLT structures generally meet certain income requirements decided on by the CLT.

There has been recent momentum in the CLT industry to begin the acquisition of commercial properties (Rosenberg, 2012). This is done in the hope that commercial amenity and commercial corridor character can be maintained given a change in investment pressures. This also allows for entrepreneurial activity among those who would normally be priced out of owning a small business. The legal method for the commercial investment of a CLT follows a relatively generic lessor lessee scenario of a typical commercial real estate company. Unlike residential CLT mechanisms, the commercial CLT would be a lease of the structure not a purchase. Where commercial CLT mechanism drifts from a typical commercial real estate company is through mission driven commercial lease agreements. Commercial lease agreements are used 1) to control the cost of rent for the lessee 2) help hold down operating costs 3) restricting non-desirable business types (as decided by CLT members) (MICHIGAN COMMUNITY RESOURCES CLT LEGAL TEAM, 2017). The shorter period of time that lease agreements generally take on is also advantageous, in a way that allows for the CLT to revise lease agreements as the community grows and adapts, being able to legally declare what kind of amenity is required in the commercial property the CLT manages. This CLT as a master lessor model does however disallow business owners from experiencing the benefits of appreciation of the price of the real estate itself (Greater Frogtown Community Development Corporation, 2012). This however may not necessarily be a large dis-incentive since it is stated by the Michigan Community Resources article that “for-profit retail businesses typically do not want to own the property in which they operate because rent is a deductible against income taxes and tends to exceed the value of depreciation (which a property owner can take on its tax return).” (MICHIGAN COMMUNITY RESOURCES CLT LEGAL TEAM, 2017) This suggests that this real estate incentive is non-issue. This Community Land Trust business model in conjuncture with a cooperative business structure is the basis for the equitable domicological business model theorized here.

## V. Domicological Business Model

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Both the cooperative business model and the community land trust model, pose as very strong community oriented business structures. These business models separately create a solid backbone on which the actual business practice rests, with a great focus on community welfare and social equity. To implement a domicological business practice within an amalgam of these two business models, would perfectly situate the domicological practice as a community driven business.

First, this practice would need investment and capital like any other startup, however with its cooperative nature it should be financially autonomous after a period of time, in order to sustain operation. Two areas are theorized to make this business structure financially autonomous. 1) The purchase of light industry parcel to be created into a cooperatively owned Cross Laminated Timber processing plant and deconstruction firm 2) the purchase of commercial parcels in disuse for redevelopment and leasing to underrepresented entrepreneurs. The former business venture would create a for-profit cooperative business centered around the deconstruction of blighted and abandoned structures for structural material resale or processing of non-virgin lumber into cross laminated timber. The placement of such a firm would be within or nearby a low-income community experiencing blight and abandonment, this would also be done in tandem with the purchase of a swath of commercial land in disuse in need of deconstruction. Collaboration with community organizations and economic development agencies in the area would be of paramount importance, such that community support and consensus is had. Collaboration between these entities and community stakeholders would take place to also create a training program for the work going on within the cross laminated timber processing and deconstruction activities. This creates a system where local labor can be used to help build capacity and offer employment opportunities to residents of the community. This type of business in tandem with creation of a land portfolio for the community land trust is integral to the success of this business model. The second area of focus that would help realize financial autonomy is the purchase of

commercial parcels in disuse for redevelopment and leasing to underrepresented entrepreneurs. An action such as this would create a foundation for the cooperative business network this domicological practice would hope to establish. Within the community land trust lease agreements would be a requirement that businesses lessees be a part of this cooperative business network. This would establish a revenue stream by skimming off the top of businesses profits to go into other community land trust endeavors or other coops, always decided on through a democratic process, to further entrench the cooperative nature of the business model. In addition to lease agreements necessitating cooperative participation, they could require certain amount of reused materials go into any improvements made or even require a percentage of inputs in business activity be sourced locally. One example of a commercial endeavor could be a material salvage store. Through a creation of for-profit businesses resting heavily on a community focused mission, a financially autonomous social enterprise could be realized.

Financial stability within this business model should also be given thought. The cross laminated timber processing would permeate far beyond local structural material needs, which would diversify the spatial allocation of revenue streams. Having a diverse set of commercial amenity available may also help create a financial safety net. Cooperative business structures also help create financial stability for each individual business in the cooperative umbrella. However, more thought must be given to how greater financial stability might be realized in this business structure.

If financial autonomy is realized and capital accumulates, the purchase of residential land by the cooperative community land trust would be put to a democratic vote. This would further diversify the network's investment portfolio and help further stabilize the community in which it would serve.

The cooperative business model would also allow for widespread availability for membership in the cooperative business network. Not only would all employees be mandatory members, community residents would be allowed and encouraged to become members for the sake of their participation in the democratic decision making process. Community consensus and close

partnership with community organizations is crucial in helping maintain and grow the sense of community within the area. Certain incentive systems could also be put in place that many cooperative businesses utilize, such as reduced prices for goods and services at establishments within the cooperative umbrella. This would also help capitalize on non-member patronage of cooperative businesses, as well as give the low-income residents an incentive to become cooperative members. Through familiarity and active practice by members in the cooperative network, greater political discourse outside the cooperative, among otherwise fringe residents may be realized. Greater participation from members will also help create pathways for other community services, possibly including varied workforce training, personal finance education, and other programs available through the cooperative network, or other community partners.

## VI. Domicological Principles & Mitigation of Displacement

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*“...this model attempts to rid communities of blight through creating a financially autonomous blight removal mechanism that can outpace and underprice... the traditional land bank model.”*

Section VI aims to further elucidate how this type of business model approaches the principles of Domicology and how it might mitigate displacement pressures. Blight and abandonment plague Rust Belt cities, this model attempts to rid communities of blight through creating a financially autonomous blight removal mechanism that can outpace and underprice (through resale and processing of cross laminated timber) the traditional Land Bank model. It also mitigates residential and commercial displacement pressures, by maintaining the land rights of parcels after purchase and creating a financial system to maintain those parcels at a value available to the original occupants of the community. The parcels purchased by the business model can be redeveloped in a way that uses non-virgin material and is designed for deconstruction. This

adds value in the present and reduces economic burden that will fall on the community land trust after a structures useful life is over, this is particularly true with commercial properties given the use of a master lessor model. The cooperative business model helps create investment portfolio diversification ensuring the longevity of the cooperatives lifespan, creating a higher likelihood of

planning for the eventual end of useful life of its structures. The cooperative model also helps mitigate political and cultural displacement, through integrating democratic processes within the business model itself.

## VII. Conclusion

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As domicologists, necessary thought must be given to the impacts that a domicological business practice might have on the community it is interacting within. The changing settlement patterns and forecast of the future of this practice highlights the immediate need for understanding how these practices will be incorporated and what ethical foundation they will embody. Sustainability is of paramount importance in Domicology and a cooperative community land trust situates itself perfectly to embody these principles and maintain the character of a community at risk of displacement pressures.

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# RECYCLING OPPORTUNITIES OF CONSTRUCTION AND DEMOLITION WASTE IN THE UNITED STATES

By: Hannah Bryant

Master in Urban and Regional Planning

School of Planning, Design, and Construction

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## Introduction

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An important aspect to Domicology is how the construction industry examines the life cycle continuum of buildings and infrastructures. Contractors and designers have to look at demolition/deconstruction and the material reuse that goes into buildings. The United States has a lot to learn from other countries on recycling and methods of handling construction material waste. European countries have been leading the way for reusing construction waste and sending waste somewhere other than landfills. It will help the field of Domicology to compare with other countries ways of handling recyclable materials, which can improve United States methods of material reuse, recycling, and handling waste from construction.

*“It is important for domicologists to examine construction materials to begin reanalyzing the life cycle of buildings from the beginning.”*

The construction industry in the United States uses more material by weight than any other industry (Horvath, 2004). It is important for domicologists to examine construction materials to begin reanalyzing the life cycle of buildings from the beginning. Since construction is one of the largest users of energy, material resources, and water, it is a clear polluter to the environment (Akadiri et al. 2012). About 251 million tons of consumer solid waste is generated annually in the United States. As much as 40 percent of this waste comes from construction projects (Service Contract on Management, 2011). Since every country is different, rather than looking at the countries that are over excelling in the recycling industries, this paper examines countries that are a little above United States. On average, France, Luxembourg, and Slovenia

recycle rate is 40 to 60 percent (Service Contract on Management, 2011). The United States recycling rate is 34% (Municipal Solid Waste, 2016). This will allow us to compare and contrast the tools these countries are doing to handle their construction and demolition waste. After looking at their methods this paper makes suggestions on how the United States can try to implement similar efforts on handling waste.

## France

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France reports high quantities of construction and demolition waste, over 2 tons per year per capita generation levels in all member states and generate 47.9 million tons of construction and demolition waste (“Service Contract on Management...”, 2011). France views demolition as a failure unlike other countries that see demolition as a positive contribution to the development of cities. France has several targets to become sustainable in their waste and reuse market, for example the country wants to increase the amount of used furniture put back into the market by social enterprises (Hollins et al, 2017).

Concrete is a large proportion of France’s waste that could be recycled but typically is not. A solution to make recycling of concrete easier is to recycle the materials that result from demolition on construction sites. The issue with it is waste sorting centers and recycling plants are located outside of cities, which increases road transportation cost to these facilities. An ideal solution proposed is the reuse of inert materials that were from demolitions, but can be used to produce the concrete of a new building, on the same or nearby site, which is referred to as a short loop in production of concrete. Their goal is to recycle 70% of construction and engineering waste by 2020 while about 60 percent of construction and demolition waste are currently reused, recycled, or recovered (Maio et al. 2017). France has launched a national project called Recybeton, which is aimed at reusing all the materials of deconstructed concrete (Waldmann and Thapa, 2015). The Recybeton has three main subjects that are being focused on:

1. Technologies and Processes which will focus firstly on “sorting” aiming to separate the various inert materials generated by deconstruction and hence avoid mixing them with other materials.
2. Materials and Structures which will focus on the process of recycled aggregates to control the parameters, research durability of recycled concrete, and fire resistance of concrete will be studied.
3. Sustainable Development which will focus on the development of recycled concrete which needs a socio-economic study completed.

The Recybeton project website is <http://www.pnrecybeton.fr/en/> which provides more details of the project.

## Luxembourg

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Luxembourg reports high quantities of construction and demolition waste, over 2 tons per year per capita generation levels in all member states (Service Contract on Management..., 2011). This high ranking is because of the high percentage of excavation material, such as soil and rocks, which is included in construction and demolition waste. Concrete has a tendency of down cycling the waste stream to road construction, foundation, and substructure. The target for recycling is to reach a minimum of 70 percent, by weight, of construction and demolition waste by 2020. This is for the preparation for reuse, recycling, and material recovery, which will include nonhazardous waste (Waldmann and Thapa, 2015).

## Slovenia

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The article, “The rebirth of construction waste in Slovenia”, is an interview with a leader of the European Project Rebirth, which is a campaign aimed at reusing waste. The site engineer discusses that concrete will be reused in construction for the base layer, while rebar will be processed and turned into a new product. The leader of the project in Slovenia from 2011 to 2014, Alenka, stated that there is a 10 percent higher rate of recycling of construction waste and a 1.5 percent savings in natural resources (2017). Project Rebirth has raised awareness of the opportunities that are possible with recycling for industrial waste and building rubble in the construction industry. A key to it was looking at the best practices through practical demonstrations and useful administrative measures and tools, such as green public procurement. There were four on-site recycling and reuse demonstrations that focused on:

- Cold in-place recycling for reconstruction of pavements supported by life cycle assessment;
- Recycling construction and demolition waste;
- Recycling and using building rubble from illegal dumping sites;
- Using industrial waste supported by life cycle assessment (Leban, 2014).

This project can be easily replicated and has been a good case study to raise awareness about environmental management of construction and demolition waste. The projects methodology has already been transferred to other countries. To receive more information on this project contact the Slovenian National Building and Civil Engineering Institute, the email to use is ‘info@re-birth.eu’.

## Finland

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Finland’s recycling rate is lower than 40 percent, according to the European Commission. They also state that Finland has high quantities of construction and demolition waste, alongside other countries such as France and Luxembourg (“Service Contract on Management...”, 2011). Finland has created a product called Destaclean® Puukivi (wood stone). This product can be used for a variety of uses such as for yard and environmental construction. Wood stone is a composite of recycled wood fiber, rock minerals, cement, and water. The wood fiber is from wood waste (Rinne, 2017). This could be implemented in the United States by using the wood construction waste from blighted buildings or demolished buildings.

## United States

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The United States tries to implement similar tools of other countries by focusing on diverting construction and demolition materials by reduction, salvage, recycling, and reusing existing materials, and buying used and recycled materials (Sustainable Management..., 2018). Another

practice is deconstruction seeks to maintain the highest possible value for materials in existing buildings by dismantling buildings in a manner that will allow the reuse of the materials.

Green buildings affect how sustainable materials are installed and used in structures. Leadership in Energy and Environment Design (LEED) is the global market leader in the rating systems for green buildings. A common starting point in construction is the materials being used on the project but there is no consideration given to the life cycle performance of the material (Sinha et al. 2013). Green building materials should not always be the first choice when designing a building for deconstruction. Even though wood is viewed as a durable material, the natural durability has proven to be a great building material for centuries. It does have its negatives since it is vulnerable to decay and insects. It also can be difficult to reuse after deconstruction because it loses its strength. It also has issues because of the number of nails in the lumber since it has been used in construction. It takes time to remove all the nails for proper recycling. Also depending on the method that was used, there could be leftover glue and drywall on the pieces of wood being deconstructed. In the “Service Contract on Management of Construction and Demolition Waste” report, it states that, in Europe 65% of wood waste was generated therefore estimated to be recovered as material or for energy (2011).

## Implementation in the United States

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Job site waste reduction could be solved by a variety of ways by contractors. About 10 to 12 percent of a project’s construction waste stream could be from cardboard alone. Ways around this for example, when possible order materials in bulk, use returnable containers, reuse non-returnable containers on the job side, and once done with non-returnable containers, donate the containers. Tell subcontractors and trades to collect and keep scraps at cutting and fabricating locations. Working in smaller batches will reduce the need to throw out spoiled materials, recycle damaged components, products, and materials. Establish a return or buy-back arrangement with suppliers, if this is not possible donate to a non-profit outlet, which usually is tax-deductible. Contractors may contract with a construction and demolition recycling firm that accepts debris, these sites will take concrete and masonry rubble, and turn it into aggregate

products. Contract with other recycling firms for separate waste haulers have individual dumpsters for metal and wood for example (Napier, 2016).

The United States already recycles concrete, but typically that concrete will be moved and used on another site. It would be useful when the concrete is demolished, it then could be used on the same site when construction begins. This would have to be calculated in the beginning phases of construction with the owner and contractor. This helps reduce transportation costs and utilizes the material right away. The United States could implement a similar project like France and advocate the reuse of construction in projects. Demolition is inevitable sometimes but if owners can think of other methods before demolition, materials can be diverted from the landfill and reuse of the structure can utilize the materials.

Another project the United States could mimic is the Project ReBirth. Other countries have already followed its lead and it has made a difference on how the community looks at waste in the construction industry. The United States could create a campaign around informing stakeholders in the construction industry about techniques that could benefit recycling waste. This type of campaign can raise awareness of the positives and negatives of construction and demolition waste. A similar project can teach stakeholders useful tools and demonstrate improved practices for construction demolition practices. Having contractors and planners be aware of the actual waste they are creating and teaching the stakeholders ways to handle the waste in an environmentally friendly way can increase the percent of construction waste that is recycled. This has been proven in Slovenia which created this campaign to teach the community of reusing waste.

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*“...teaching the stakeholders ways to handle the waste in an environmentally friendly way can increase the percent of construction waste that is recycled.”*

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The United States has created some products from utilizing waste. The United States needs to support businesses and researchers to identify other useful goods reused from waste. This can create a market for recycled materials and create a bonus to recycle material rather than the latter

of throwing away the waste. Researching techniques to create other products is beneficial for the construction industry because it can create improved material to use on the construction site, possibly for the same site the material came from.

## Conclusion

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European countries are attempting to solve the issue of construction material waste. The impact of landfills comes from the use of space for the storage of this waste. Countries where land is scarce and disposal costs are high can really hurt the environment and economy (Service Contract on Management..., 2011). Domicologists are trying to decrease the waste that end up in landfills. There are many options that the United States could begin to implement, finding the right fit and cost range will be important for success in the U.S. This research is to see what the United States could implement to improve their recycling efforts in construction and demolition waste.

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# WORKFORCE TRAINING AND EDUCATION IN ADVANCING DOMICOLOGY PATHWAYS FOR DECONSTRUCTION IN THE MIDWEST

By: Nathaniel Hooper  
Masters of Social Work  
School of Social Work

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## Introduction

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Increasingly high levels of structural abandonment (residential, industrial, commercial) in the United States can be attributed to a number of factors, including but not limited to the loss of ‘blue collar’ industrial Jobs via outsourcing, and the foreclosure crisis which accompanied with the housing market crash. (LaMore, 2013) This trend of abandonment and blight is not ‘felt’ equally by all across this country, but instead can be found to disproportionately impact the Midwest / Rust Belt. In 2012, the Midwest had over 3 Million vacant housing units, with the highest concentrations in Detroit, Chicago, and Cleveland. (U.S. Census, 2012; MSU CCED 2017) Over 40% of the countries abandoned structures can be found within only 10% of census tracts. (LaMore, 2013) Within the region, the State of Michigan stands as profoundly impacted by blight and abandonment, and is home to the two most blighted (and quite frankly, notoriously so) cities in the country: Flint and Detroit. (CityLab, 2012)

Blighted and Abandoned structures are in many ways a drain and hinderance on the communities within which they are located. The presence of these structures is associated with: barriers to neighborhood revitalization, higher rates of crime, higher rates of unemployment, economic disinvestment, de facto racial segregation, and overall “disenfranchisement from middle class society [and] the private economy”. (Mallach, 2012; LaMore, 2017; Orfield, 1997) Overall, the presence of blighted structures makes for a myriad of negative social, environmental, and financial impacts - all of which burden and drain resources from the public sector. The proliferation of blight and abandonment, and the degree to which it can be seen overrepresented in disadvantaged communities and the Midwest as a whole is indicative of a series of shortcomings within the current built environment paradigm. In recognition of these shortcomings, a new field of study is being developed - Domicology- which takes into account the environmental, social, and economic context of the built environment. Included in this newly developing profession are the following three guiding statements:

1. Examine the lifecycle continuum of building and infrastructure use and abandonment from planning, design, construction, building use, abandonment, demolition/deconstruction, and material reuse.
2. Identify potential innovative tools, models, policies, practices and programs that can sustainably address structural abandonment
3. Conduct research on the technical, economic and policy challenges present in structural abandonment and seek to reduce the negative social, economic and environmental impacts associated with structural abandonment.

(Source: <https://domicology.msu.edu/>)

It is within this framework, and in acknowledgement of the realities of blight and structural abandonment that the following information is being discussed and presented. As a newly developing profession, domicologists are concerned with examining both proactive (before a structure becomes blighted) and reactive (after a structure becomes blighted) tactics to both prevent and remediate blight and structural abandonment. One such reactive strategy that is gaining momentum within the ‘green building’ movement and other environmental sustainability oriented communities is the practice of deconstruction. Deconstruction is defined by the Building Materials Reuse Association as “the systematic disassembly of a building or its parts in order to recover the maximum economic and environmental value of materials through reuse and recycling.” (BMRA, 2018) As a means to completely remove structures, or even used in conjunction with traditional demolition activities, deconstruction provides a pathway for furthering principles of environmental responsibility and sustainability, and as such is in alignment with principles laid out within the field of Domicology.

## Regional Barriers to Deconstruction

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The struggle for advancing the practice of deconstruction and material reuse in the United States is in part characterized by regional differences. In areas such as Portland, OR and Oakland, CA, these practices are well established, and viable recycling / reuse markets are established. Some causes for this are: policies which incentivize green building and material reuse and the presence

of higher value commodity materials - such as redwood paneling. (USDN, 2018) Portland, OR, for example, has recently enacted a city ordinance which requires that structures completed before 1916 be completely deconstructed, as opposed to demolished. As such, the practice of deconstruction is becoming a staple of the construction/renovation industry within the city. (City of Portland, 2016) The city of Portland asserts that the anticipated increases in deconstruction will result in the increased diversion of 8 million pounds of material for reuse annually, and that the new industry will create additional Jobs, and training opportunities for individuals looking to get into the building trades. In Portland, as well as in other large metropolitan areas within the same region, a number of deconstruction certification programs are being created and piloted. The Reuse People of America (Oakland, CA), for example, have trained over “71 contractors and 500 laborers” coming from both for-profit and non-profit firms. (TRP, 2018)

Compared to the growing deconstruction industries of the West Coast, the Midwest features several barriers to the economic feasibility of deconstruction. For example, the state of Michigan features some of the lowest waste disposal fees in the country, an average of 36 cents per ton of waste disposed. (Mlive, 2018) Such low fees greatly incentivize the practices of demolition and landfilling. Michigan also lacks much of the political capital necessary to help stimulate the types of recycling and reuse economies that can be seen established in other parts of the country; though Governor Rick Snyder is currently backing a proposal to increase the tipping fees in the state to \$4.75 per ton disposed. This proposal, if adopted, could mark a substantial step towards increasing the viability of deconstruction practices in the state, though as it stands, the barriers to the widespread adoption of these practices are many. Considering the unique challenges to advancing deconstruction practices in Michigan, the development of a model which can simultaneously make deconstruction financially viable and create a positive social impact is of the highest concern to Domicologists. With the unique barriers faced by the Midwest, a model which finds success could likely be replicated in other areas of the country that are already experiencing higher rates of deconstruction and subsequent reuse and recycling.

## Problem Statement

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In light of this, the following problem statement arises: What is a service delivery model that can make deconstruction economically viable in the Midwest while simultaneously creating positive social, environmental, and economic impact (in alignment with the principles of Domicology)?

### Proposal

Workforce training and Vocational Rehabilitation can be used as a service delivery model which can simultaneously create positive social impact, and make deconstruction economically viable.

## Workplace Training and Education Programs

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Workplace Training and Education Programs and Vocational Rehabilitation Programs are service delivery models which create opportunities for individuals to gain valuable hands-on experience and transferable job skills specific to the field in which they are working. Workplace training is a more broadly defined term, which entails hands-on skills training related to a profession or multiple professions, whereas Vocational Rehabilitation refers to services which enable persons with a disability to prepare for, obtain, and maintain employment. (USDOL, 2018) With this noted distinction, for convenience, and for the purpose of this paper, these two concepts will be referred to as VRT, or Vocational Rehabilitation and Training. Though this is the case in this paper, these two concepts should be understood to be distinct from one another as explained above. VRT programs have been implemented successfully in a wide variety of fields, including but not limited to: shipping and distribution, manufacturing, call-center and technology services, culinary arts, and construction / skilled labor. Populations served by such organizations can vary widely, and include but are not limited to: persons with cognitive or physical impairment, veterans, individuals with criminal histories which are a barrier to work, low-income individuals, unemployed or underemployed persons, at-risk youth, etc. (USDOL, 2018)

Typically, these programs are operated through nonprofit organizations, and as such qualify for grant funding opportunities from a wide variety of sources. One of the largest funders of such programs is the United States Department of Education, and additional funders are plenty and subject to change depending on the nature of the work being completed. The United States Department of Labor (USDOL) oversees a number of major regulatory bodies which work to ensure the inclusion of persons with disabilities in to the workforce, and even creates preferential contracting systems and other incentives for organizations which employ individuals with disabilities and/or barriers to employment. (USDOL, 2017) Depending on the population being served, and the nature of the work being accomplished, additional funding sources become available. For example, qualifying veterans can gain employment through the VA Vocational Rehabilitation and Training program, which partners with organizations to subsidize the costs of employment. (VA, 2017; ANC Personal Communication, 2017)

## Deconstruction and Vocational Rehabilitation and Training

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Deconstruction has arisen as an alternative method to demolition of structures, and allows for substantially higher material reuse and recycling opportunities. The process “closes the loop of linear use of resources, reduces dependence on new materials, and decreases waste disposals in landfills” (Echarri and Brebbia, 2006; Zhao et. al, 2017). Substantial waste is created by the process of demolition, estimated to be about 20 to 30 times the amount of waste created in the construction process, most of which ends up in a landfill (Zhao et. al, 2017). As opposed to demolition, which typically utilizes heavy machinery and is accomplished over a short time scale, deconstruction utilizes largely manual labor to systematically take apart structures, and as such, entails substantially higher labor costs than demolition does. Because deconstruction does not depend on the use of heavy machinery, as does demolition, the cost of labor can potentially be offset by the lower equipment costs. (Calrecycle, 2001) One case study examining two comparable structure removed in Lansing Michigan found that demolition took 4 persons a total of 40 hours, while deconstruction took six persons a total of 260 hours. (Anuranjita, Berghorn, Bates, Syal, 2017) In the deconstruction case, one denailer worked a total of 126 hours to

complete the process. In the deconstruction example, the salvaged materials recovered were valued at \$4,500, whereas the demolition did not produce any salvage value.

The aforementioned case study is emblematic of some of the core barriers to the widespread adoption of deconstruction. Primarily, that the labor costs (and associated risks) of deconstruction greatly disincentivize its widespread application. VRT arises as a means through which these factors can be potentially mitigated. From a for profit perspective time spent is an expense to be borne by the contractor. However, from a VRT perspective, the amount of time to be spent on a project can be conceived of as an asset. Being that these organizations are funded to provide skills training, projects which entail higher amounts of labor can be framed as an opportunity to provide skills training, and as such can be leveraged as a means to obtain funding from grantees. The United States Home Builders Association has stated that Deconstruction is a well suited for training youth and low-skill workers who have “an interest and aptitude” in the building trades. (NHBA, 1997)

## Points of Consideration

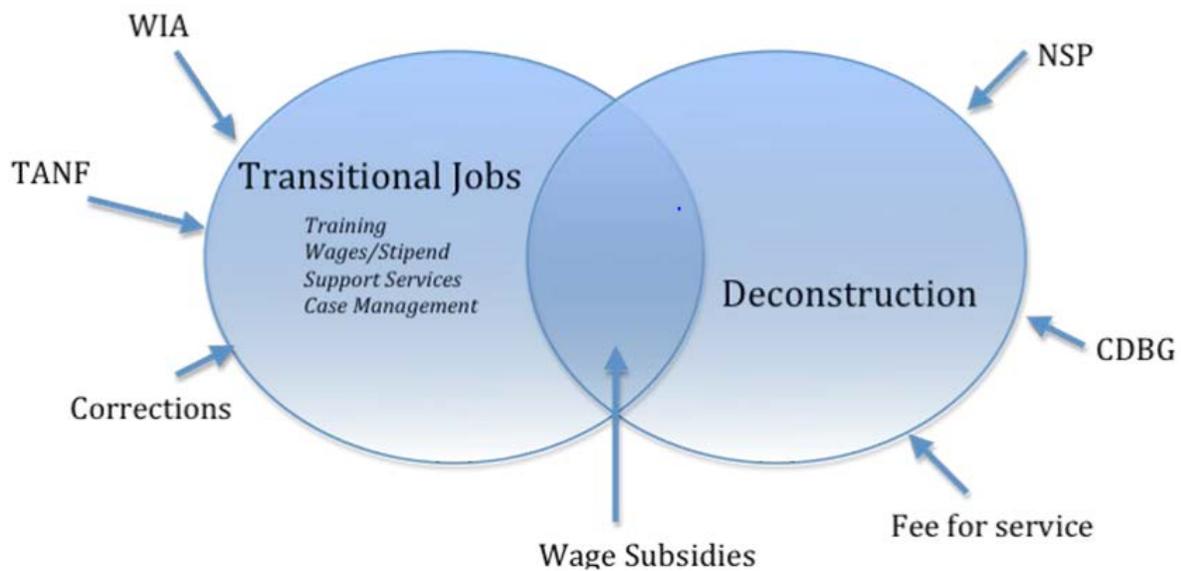
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The following considerations for the development of a deconstruction oriented non-profit VRT organization are based on a review of the existing literature, and a previously completed case study of a construction oriented workplace training program currently being piloted in Allegan County, called the Dual Community Development Program (DCDP). Community Action Allegan County (CAAC) is the organization that is overseeing the creation of this pilot program, and has partnered with a number of other organizations to distribute responsibility for certain tasks, and the risks associated. Though the DCDP currently does not complete deconstruction activities, it has been studied as a useful analog to conceive of the creation of a similar model to create a deconstruction VRT program in Michigan.

## Funding and Program Design

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At the center of the discussion of VRT and Deconstruction is the acknowledgement that the creation of a workforce training non-profit organization would allow for the use of various funding mechanisms to subsidize the cost of labor to a point of economic viability. There are a myriad of factors to consider in the design of such a program. Just one aspect to consider would be the desired service population - as this will have immense impacts in both the ways in which the program can be funded, and the degree to which additional supports must be integrated into program design. The following graphic provides an example of the ways which the components of a deconstruction training program can be utilized to achieve financial support from a variety of sources.



*Andrea Phillips, Local Initiatives Support Coalition, 2010*

The first circle, 'Transitional Jobs' represents the workforce training / vocational rehabilitation aspects of program design, and details a few of the services that workforce training and vocational rehabilitation organizations typically are funded to provide. The arrows extending out from this circle represent a sampling of potential funding sources that could be utilized to deliver these services. These funding sources will change depending on the populations served and the

services offered the organization in consideration. The second circle, labeled ‘Deconstruction’ can be conceptualized as the proposed tasks completed by this program; with the arrows extending out representing potential funding sources that could be utilized to fulfill and by the fulfillment of these outcomes. The overlap between these spheres represents the ability of these sources to subsidize the wages of individuals receiving training through such a program.

## Lessons from DCDP

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The CAAC conducted a needs assessment in Allegan County, and noted a substantial amount of individuals within the county that qualified under the United Way ALICE designation, and high levels of persons living in poverty. ALICE stands for Asset Limited, Income Constrained, Employed; and is used to describe populations who are earning enough to be above the federal poverty level, but are not earning enough in order to ensure stable quality of life. In order to better understand the nature of the poverty in Allegan county, the CAAC needs assessment worked to reveal two core factors relating to poverty and limited financial mobility in Allegan county: “lack of employable skills and housing issues”. Housing issues is explained to entail lack of access to affordable housing, energy efficient homes, and unsafe/unsuitable living conditions. (CAAC, 2017) In an effort to simultaneously address both social problems, the CAAC assembled a network of community partners to develop an initiative which could simultaneously work towards increasing employment training opportunities for ALICE populations and creating safe, affordable, and environmentally responsible housing stock.

By adopting and integrating a dual emphasis into the DCDP program, CAAC and their partners are able to diversify their potential sources of revenue and funding, not only citing workplace training opportunities, but also the creation of affordable, energy efficient housing as outcomes. In this same vein, and as illustrated in the above graphic, a VRT deconstruction program could be developed similarly with a dual/multiple emphasis that would allow for a diverse array of funding opportunities and partnerships. Some examples of proposed outcomes for the program could be: creation of workforce training opportunities, the removal of blighted structures, the

furthering of environmentally sustainable practices such as recycling and material reuse, etc. The more diverse and numerous the proposed outcomes for such a program, the more flexibility an organization would have in crafting partnerships and accessing diverse funding sources.

## Skills Training Opportunities

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There are a number of skills training opportunities that could be utilized in the creation of a proposed deconstruction VRT program. In the interest of maximizing the employability and transferability of skills that trainees will gain access to, the integration of existing certification training programs may be crucial.

The following is an examination of the recommendations of the Miami Valley Regional Planning Committee (MVRPC) in the steps necessary to develop a deconstruction workforce. The MVRPC was involved in several deconstruction related projects in Dayton, Ohio; and has compiled information regarding the certification process that is recommended for the completion of deconstruction tasks. Based on the experiences of the MVRPC, the following certification programs are just one estimation of the potential benefit that a VRT program in deconstruction could offer to trainees. The degree to which each of these training programs could be implemented using a deconstruction site as a point of instruction is a vital point of emphasis for further research.

In addition to the completion of these certification programs, deconstruction projects can be used as a means through which to offer other construction industry training and certification options. One example of this is the Pre-Apprenticeship Certification Program (PACT), which utilizes the Home Builders Institute construction skills standards, and the National Association of Homebuilders Green Building Standards. (NOCTI, 2018) Programs such as PACT certify that trainees can demonstrate aptitude in a variety of topics that are valuable to construction employers, and necessary worksite efficiency and safety. Topics include but are not limited to: safety and first aid, green building requirements, construction math, blueprint reading, tools and material use, transferable language and terminology, etc. (NOCTI, 2018) Combined with the

trainings listed in the above table, graduating trainees would be able to integrate into a wide variety of construction related positions.

Currently, there are multiple deconstruction specific curricula that are used in deconstruction training programs across the country. The Reuse People of America (TRP) and the Laborers International Union of North America (LIUNA) are two organizations that provide such training programs using their own unique training manuals. In some cases, as is true with TRP, the completion of these programs allows trainees and organizations to earn deconstruction certifications. Such a certification is useful in negotiating contracts in areas where deconstruction is more commonplace. Similarly, the City of Portland has developed its own certification process that enables contractors to be in adherence with the cities deconstruction ordinances. The degree to which the possession of such a certification in the Midwest would be of practical benefit to contractors is a topic that needs further investigation. Regardless of this, the presence of multiple curricula and numerous organizations which offer deconstruction training present a multitude of opportunities for partnership – whether it be an agreement which allows for the use of an existing curriculum, or through collaboration on the creation of a hybrid curriculum which could be coupled with other more widely applicable certification programs (such as the PACT program, mentioned above).

*Table 1:*

*Recommended Deconstruction Workforce Certifications, Costs, and Associated Wages*

| Certificate   | Skills  | Cost /Time Investment  | Prerequisite | Associated Wages   |
|---|---|--|--------------|--|
| OSHA 10 or 30   | Safety and health hazard and recognition. Trainings are geared to specific trades.                              | OSHA10<br>10 Hours over 2 days<br>\$195 a student - online<br><br>OSHA 30<br>30 Hours over 4 days<br>\$295 a student - online<br>\$750 a student in person | None         | <i>Average Wages of Individual with Certification:</i><br><br>OSHA 10<br>\$14 - \$26 an hour<br><br>OSHA 30<br>\$20 - \$32 an hour |
| Asbestos Contractor/ Supervisor (EPA or AHERA certified instructor) | Personal Protection Equipment, Best work practice, air monitoring, regulatory overview, insurance and liability | 40 Hours (5 days)<br><br>\$295 a person  | None         | <i>Average Wages of EPA Certified Surveyor:</i><br>\$20 an hour<br><br><i>Remediation Worker:</i><br>\$16 an hour                  |
| Lead Safety (EPA certified instructor)                              | Best practice, minimizing worker exposure, PPE  | 8 Hours<br><br>Varies from \$175 to \$400 a person   | None         | <i>Average Salary of Lead Surveyor:</i><br>\$47,237 a year   |

## Additional Partnership Opportunities

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There are a number of additional partnership opportunities that could be integrated into the design of a deconstruction VRT that could further increase the market viability of deconstruction in the Midwest as a whole by virtue of diversifying funding opportunities and minimizing costs associated with deconstruction.

- Partner with Land Banks and negotiate preferential contracting for structural removal projects that have been found to be viable for deconstruction. (Revive Pontiac, a deconstruction training program, featured a similar partnership with the county treasurer's office in order to gain access to a number of structures that needed removal.) (NACO, 2016)
- Partner with demolition contracting firms to negotiate opportunities for partial deconstruction prior to structural demolition. This can distribute the risk and cost of permitting and processing of materials, and can decrease or offset the costs borne by demolition contractors (removal of material, tax deductible donation)
- Partner with institutes of higher education in order to incorporate elements of participatory research design. Disciplines that could benefit from studying various processes associated with deconstruction VRT: Urban Planning, Construction Management, Architectural Design, Material Science, Social Work, Vocational Rehabilitation/Workforce Development, Community and Environmental Sustainability, etc.
- Partner with institutions of higher education or service programs (such as Americorps) in order to develop internship opportunities to further offset the labor costs associated with managing and implementing such a program.
- Partner with organizations that recycle or buy/sell building materials to aid in the processing and distribution of diverted materials. Additional workplace training opportunities may be present in the processes of recycling and warehousing of materials, as well as in retailing of materials.

## Conclusions

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As a structural removal practice, deconstruction provides an environmentally responsible avenue through which the reuse and recycling of materials can be maximized. Due to a multitude of factors, this practice is presumed to be less economically viable in the Midwest - despite a higher prevalence of blighted and abandoned structures. As a means to subsidize labor costs, the development of a workforce training or vocational rehabilitation training program should be considered. As a platform for instruction, deconstruction activities can be used to provide education in a number of valuable certifications and skills which are highly transferable to other building related trades. The financial viability of the creation of such a program is a complex point of analysis, as differing funding sources become available depending on the populations worked with, nature of partnerships and strategic alignment with other organizations, and the ability of the program to demonstrate positive outcomes in multiple facets.

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