

TREASURE IN THE WALLS



Reclaiming Value Through Material Reuse in San Antonio

Prepared for the City of San Antonio Office of Historic Preservation
Completed by PlaceEconomics | February 2021

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Photo: Flooring reclaimed during a City of San Antonio Certified Deconstruction Contractor Training, set aside for de-nailing by participants. Courtesy Office of Historic Preservation staff.

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Executive Summary

As a major city in the quickly expanding Sunbelt, San Antonio has become a magnet for growth and opportunity. However, like in almost every other city in the country, the economic recession caused by the COVID-19 pandemic has intensified pre-existing challenges, like housing affordability and climate resiliency. San Antonio needs a new plan going forward that will address these compounding crises, and the solution lies in policies that advance a circular economy.

Transitioning from a linear economy model, whereby materials are manufactured, used, and discarded, to a circular economy, where rather than discarded, materials are recycled and reused will allow the City to recover and leverage existing assets to meet its stated economic, equity, sustainability, waste diversion, and housing goals. The adoption of a deconstruction ordinance would be a major step in this transition. As the findings within this report illustrate, jumpstarting and scaling a deconstruction program will create positive economic and environmental outcomes for local residents and businesses. This report outlines the economic and environmental cost of demolition, the impact of a deconstruction ordinance, opportunities and retail impact of deconstruction, and proposes strategic next steps for implementing a deconstruction program in the San Antonio.

Key findings include:

- A deconstruction ordinance would help achieve and advance the objectives of the City's strategic plans related to housing, environmental sustainability, economic development, and equity.
- There are currently nearly 130 private businesses in San Antonio that are part of the reclaimed building material supply chain.
- Material reuse industries are expected to grow at a faster pace than the U.S. economy as a whole.
- The current policies in San Antonio support a linear waste stream and have sent approximately \$1,470,706 worth of salvageable materials to landfills annually since 2009.
- Demolitions carried out in 2020 alone could have potentially salvaged structural framing for over six hundred 1,500 square foot houses.
- A circular economy offers more employment opportunities. Reuse/refurbishment produces 300 jobs per 10,000 tons of waste compared to 1-6 jobs in the traditional landfilling/incineration process.
- In a national survey of the deconstruction industry conducted for this report, respondents specified that the total labor income (direct, indirect and induced) from deconstruction is nearly four times that of demolition.
- Numerous examples of public private partnerships from across the country supply precedents upon which San Antonio can build. Phoenix started an incubation hub that has had a direct impact on its reuse/refurbishment market over the course of 6 years, including: the launch of 19 companies, filing of 14 patents, and development of 15 products.
- Mechanical demolition is hazardous to the health of local residents. In San Antonio, low-income Hispanic residents have been disproportionately impacted by demolitions in the last 15 years.

Priorities and Recommendations

The recommendations build upon efforts the City has already undertaken to provide deconstruction job training, knowledge sharing, and community input. In addition, these recommendations were informed by a national survey of experts in the field of deconstruction and in-depth interviews with subject matter experts.

As the City formulates its next steps, priorities should include:

1. Bring a recommendation forward to the Culture and Neighborhood Services Committee to proceed with the City-Ordered Demolitions Pilot Project, whereby all City-ordered demolitions follow the draft deconstruction ordinance.
2. Pass the proposed deconstruction ordinance, to include the adoption of Phase I and Phase II with Council direction to revisit expansion into commercial structures by 2023.
3. Develop incentives to encourage and increase deconstruction activity for all building types in San Antonio, to potentially include a micro-grant and reporting program; expedited permit review for deconstruction projects; and other cost-neutral considerations, as advised by the Deconstruction Advisory Committee.
4. Identify barriers to reusing reclaimed building materials and remedy them by developing a Salvage-to-ADU Program in conjunction with the evaluation of existing local building codes. Priority considerations include the relaxation or revision of select local building codes to make the reuse of existing materials in restoration or small-scale new construction easier; and tying the Salvage-to-ADU concept into ongoing affordable housing strategies as outlined in the City's Opportunities at Risk Affordable Housing Study and Housing Policy Framework.
5. Establish workforce development programs aligning with the Ready to Work SA initiative that focus on increasing of the local pool of service providers offering skills and services that aid in the repair, reclamation, reuse, creative upcycling, or innovation of building materials. Programs will also align with the City's adopted Climate Action and Adaptation Plan (CAAP) in an effort to build a local workforce that advance's San Antonio as a hub for circular economy jobs.
6. Identify a facility for City-Incubated Reuse Warehouse and begin recruiting a partner to operate it.



Photo: Shiplap reclaimed from the site of a City of San Antonio Certified Deconstruction Contractor Training, Courtesy Office of Historic Preservation staff.

Forward by Carl Elefante, FAIA, FAPT

Past President of the American Institute of Architects (AIA)



As an architect, I have devoted much of my career to rescuing and renewing existing buildings. Nothing society produces requires such a staggering investment of material, energy, and economic resources.

As cities around the globe awaken to the rapidly unfolding consequences of the looming climate crisis – including a global pandemic – the building sector as both cause and cure is becoming a priority. Building re-use is the most carbon-positive approach, extending benefits of actions taken decades, even centuries, ago while avoiding greenhouse gas emissions today and into the future. Of course, buildings can and do reach an end to their useful service life. Replacement may be necessary and can contribute to community smart-growth objectives. Tried-and-true “deconstruction” practices have been developed to harvest high-quality construction materials, handcrafted articles, irreplaceable hardware, and other re-usable items. Reclaimed building materials and components are an affordable alternative to newly-manufactured products and avoid their “embodied” greenhouse gas emissions.

Potential emissions reductions can be significant. On average, embodied emissions from constructing a building is equivalent to twenty or more years of emissions from its operation.

Salvaging and re-using building materials and components is an essential part of any comprehensive building-sector climate action plan.

Introduction

San Antonio, as the 7th largest city in the U.S., is seen as a leader in many respects, including climate change readiness, celebrating and safeguarding living heritage, and participatory practices in preservation and waste management. However, San Antonio's rapid growth has made meeting the City's environmental and sustainability goals challenging. This growth has also complicated meeting the City's housing goals. With the housing supply limited, it is difficult to align households with housing they can afford. In addition to these challenges, the COVID-19 pandemic has brought about widespread economic hardship. The problems that cities face today are unprecedented. San Antonio must balance community vision, data, and fiscal resources to drive progress through policies that meet the needs of its people. This will not be easy. To address these problems, the City must pivot, based on new evidence, to reach its policy goals and deliver on its promises.

San Antonio's growth can bring transitional opportunities and COVID-19 recovery necessitates a new roadmap. A shift to the circular economy - an economic development approach that is waste free and regenerative by design - can capitalize on San Antonio's multi-faceted economy to enable high yield recovery. The systematic approach employs reuse, sharing, refurbishment, and recycling to maximize the life and productivity of products and materials. Adopting a circular economic mindset can ultimately tap alternate business models, change consumer behavior patterns, and support renewable practices. This results in positive impacts across a triple bottom line - people, planet, profit.



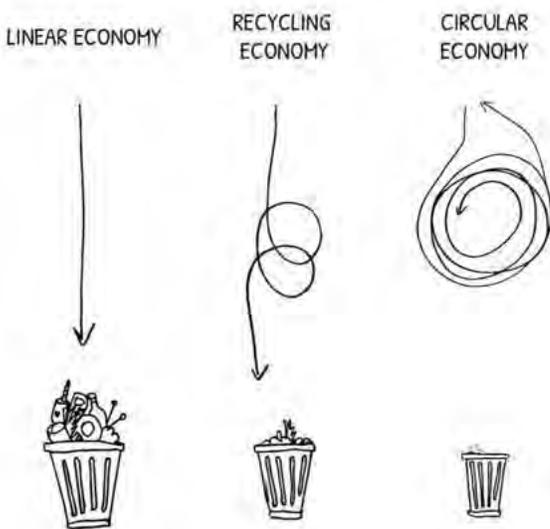
Circular Economy - An economic system where products and services move in closed loops or circles by employing reuse, sharing, refurbishment, recycling, and remanufacturing, with the goal of keeping products in use longer and thus increasing the productivity of a resource.

Addressing the current linear approach in the construction industry, including changing how buildings in San Antonio are built and treated, is one way to jumpstart the shift to a circular economy. This transformation can be accomplished by promoting, supporting, and enabling the practice of deconstruction, the process of dismantling a building piece by piece. Deconstruction is not only labor intensive (i.e. more jobs), but also keeps building materials out of landfills and preserves the embodied energy of the product. San Antonio's Climate Action and Adaptation Plan identified Advancing the Circular Economy as one of its six priorities, with deconstruction explicitly named as a municipal policy lever. Additionally, the Solid Waste Management Department's Recycling and Resource Recovery Plan, as well as SA Tomorrow, have an overall vision of making San Antonio a zero waste city.



Deconstruction - The process of dismantling structures component by component in order to harvest materials to be salvaged.

The transition to a green, circular economy will likely include growing pains – workforce training, skill building, and education. However, San Antonio’s local businesses, such as demolition contractors, home builders, and designers, are well poised to make this transition under a deconstruction ordinance. Changes imposed by a deconstruction ordinance wouldn’t put these companies out of business, but would allow them to adapt to add additional services and increase sales volume.



The current linear economy of the City of San Antonio misses out on the economic, employment, and equity potential of a circular economy. These can be thought of as foregone opportunity costs: less jobs, unrealized retail sales, cost to the environment, continued detrimental impacts to vulnerable populations. Continuing on the business as usual of a linear economy is short-sighted and puts the city behind in meeting the needs of its residents. Deconstruction brings new sources of value that can create alternative pathways to achieve San Antonio’s stated goals and help lead the City through COVID-19 recovery by creating a new economic engine for the City.

Purpose of the Study

The purpose of this study is to conduct a technical analysis of the feasibility of implementing a deconstruction ordinance and assessing its potential impacts on the marketplace, waste and construction industries, workforce development, sustainability goals, and COVID-19 recovery efforts. Additionally, as part of the in-depth technical analysis, a national survey of those in the deconstruction industry as well as one-on-one phone interviews were conducted. This study also includes a strategic plan that may be used as a roadmap for implementing a phased ordinance. There are numerous models and potential resources that can inform San Antonio’s deconstruction program and this study attempts to identify and present those options.

The Marketplace in San Antonio

In order for any deconstruction initiative to be successful, there must be a marketplace that can support it. This marketplace consists of supply (building materials) and demand (wholesale and retail market) but is controlled by the waste policies of San Antonio. Currently, the City's largely linear waste policies do not capitalize on the potential demand and economic benefits of salvage and reuse. The existing salvaged materials marketplace in San Antonio consists of a small group of demolition contractors, professional pickers, and often, clients with higher financial means both locally and regionally.

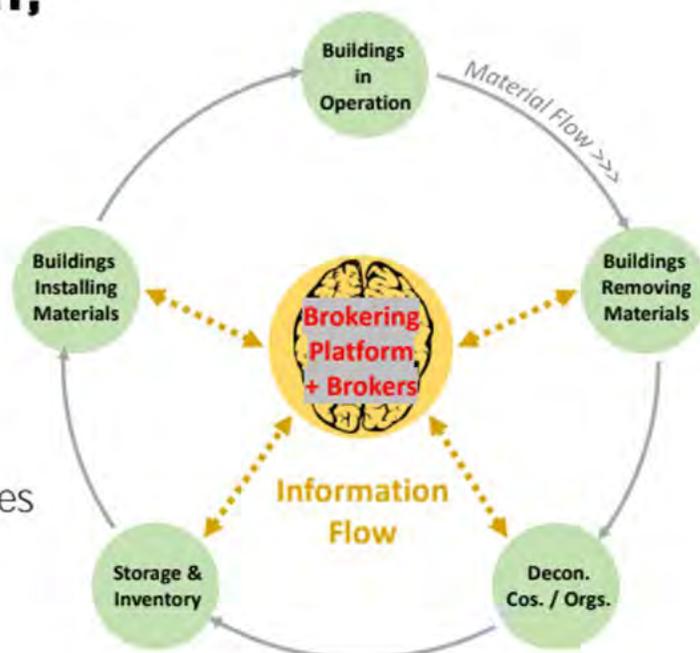
If a deconstruction policy were enacted in San Antonio, there would be numerous opportunities for expanding businesses, new wholesale and retail operations, and consumer sales potential. The circular economy concept is not yet mainstream in the building industry, thus efforts to expand the information flow and connect resources will be required. The potential, however, is robust. A City-supported information campaign would be necessary to scale the deconstruction marketplace.

CIRCULAR ECONOMY,

MEET...

MULTI-LISTING SERVICE

- Connecting Assets
- Foster New Enterprises
- Create Jobs



Supply Chain Participants

There are various types of businesses that would directly benefit from deconstruction activity. These businesses can be divided into three categories: 1) Generators of Building Materials, 2) Generators & Users of Reclaimed Building Materials, 3) and Users & Sellers of Building Materials.

Following a methodology developed by the Delta Institute, PlaceEconomics conducted a deconstruction market overview for the City of San Antonio.¹ Using information from Data Axle (previously ReferenceUSA), Standard Industry Classification Codes (SIC Codes) were used to identify businesses located in San Antonio that classify themselves in an industry that could either generate, sell, or use reclaimed building materials. Overall, there are nearly 130 private businesses in San Antonio whose primary SIC code situates them as part of the reclaimed building material supply chain.

The SIC codes used to conduct the search are as follows:

Generators of Building Materials:

- Demolition Contractors (179502)

Generators & Users of Reclaimed Building Materials:

- Home Builders (152112)
- Contractors (179977)
- Building Contractors (154213)

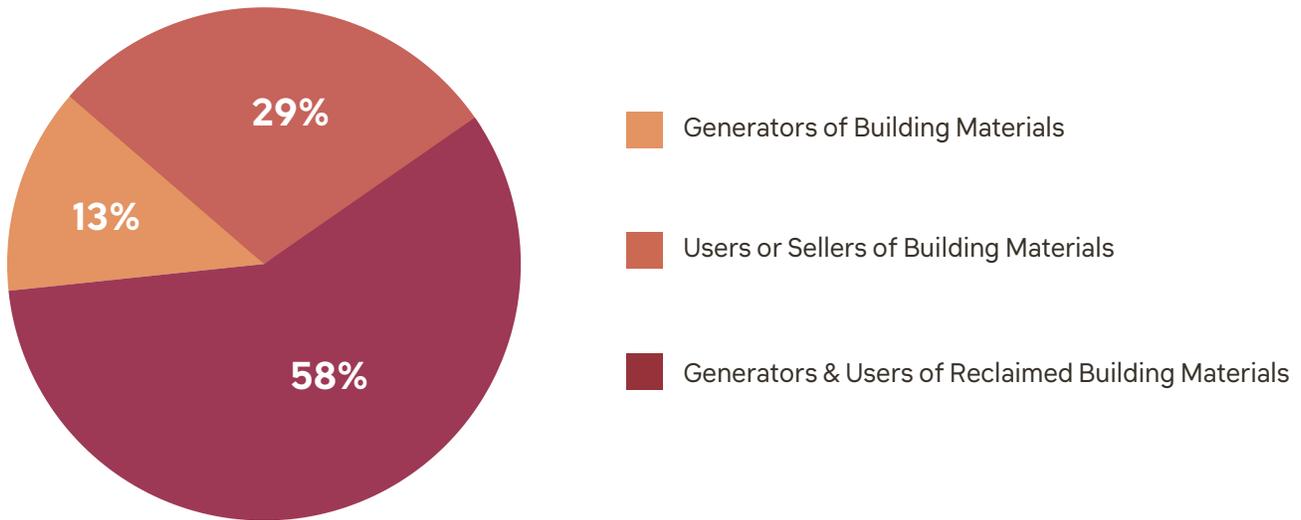
Users or Sellers of Building Materials:

- Woodworkers (175106)
- Salvage, Architectural (154101)
- Furniture, Designers & Custom Builders (571217)
- Design & Build (871201)
- Building Material, Used (593207)
- Salvage & Surplus Merchandise (561102)
- Brick, Used (521123)²

[1] The Delta Institute is a Chicago, IL-based nonprofit dedicated to solving legacy environmental and economic issues at the community level. Their 2019 report, "Demystifying Potential Midwestern Building Material Markets," lays out a groundbreaking methodology for estimating the deconstruction market. [2] Note: there are no businesses with this SIC code in San Antonio.

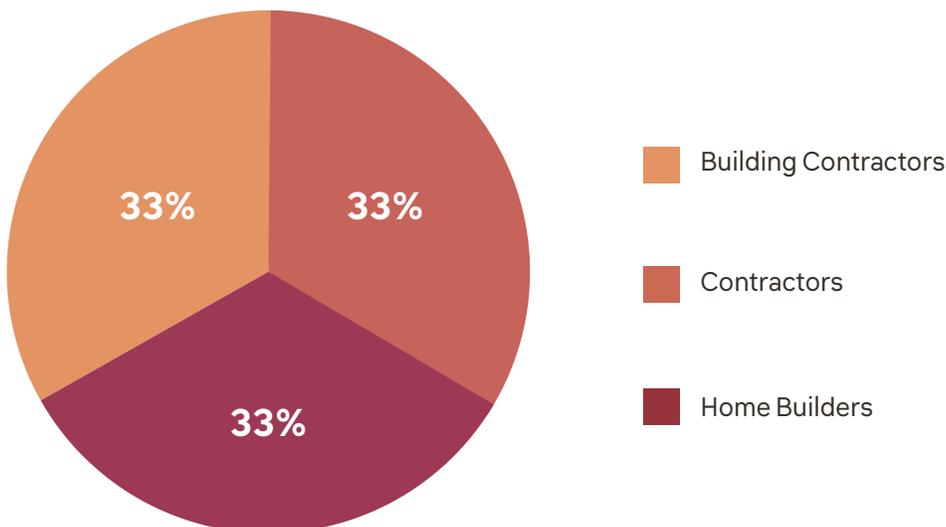
In total, there are currently 17 businesses identified as generators of building materials, 75 businesses that function as both a supply of reclaimed building materials and users of reclaimed building materials, and 37 businesses that are either selling reclaimed building materials or could potentially use reclaimed building materials.

San Antonio's Deconstruction Industry Overview

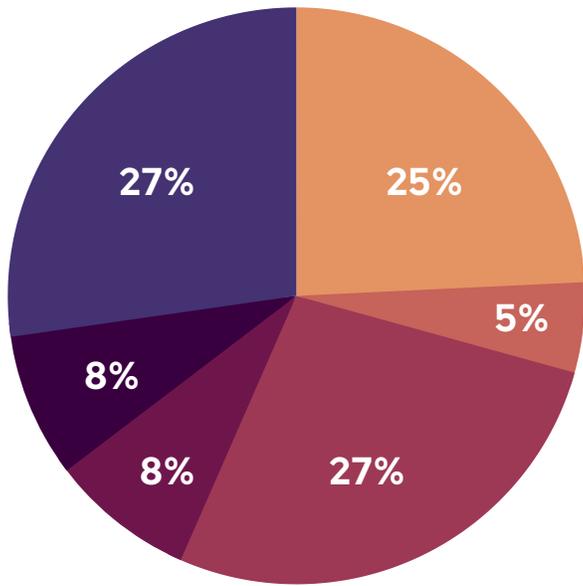


As noted previously, all businesses that fall into the “Generators of Building Materials” category are classified as Demolition Contractors per their SIC Code. However, below is a breakdown of the other categories that make up San Antonio’s Reclaimed Material supply chain. “Generators & Users” are equal parts Contractors, Building Contractors, and Home Builders. Businesses in the Building Restoration & Preservation and Woodworking industries make up the largest share of businesses in the “Users & Sellers” category, while Building Designers make up nearly 25%.

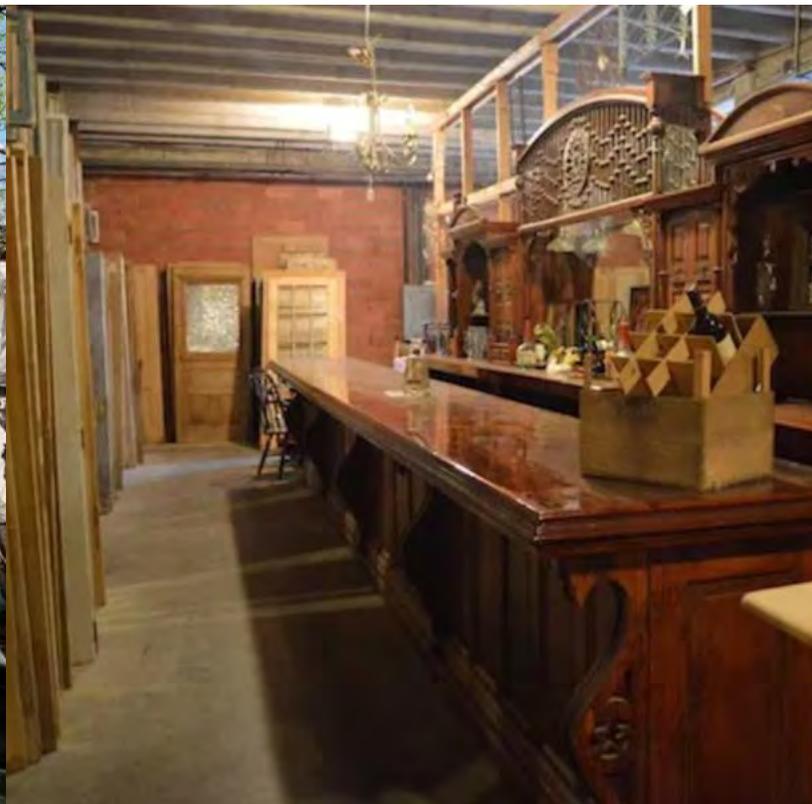
Generators & Users of Reclaimed Building Materials



Users or Sellers of Building Materials



- Building Designers
- Building Materials - Used
- Building Restoration & Preservation
- Furniture: Designers & Custom Builders
- Salvage & Surplus Merchandise
- Woodworkers



Photos: Some of the key businesses in San Antonio's existing building material reuse retail marketplace. Left: Pickers Paradise on Fredericksburg Rd; Right: Architectural Antiques in the Dignowity Hill neighborhood. Photos courtesy Yelp (left) and Angel Lopez (right).

Building Material Supply

There is robust potential for a reclaimed building materials marketplace in San Antonio because of the high volume of materials that can be salvaged. It is estimated that deconstruction can keep at least 80% of building material waste out of landfills,³ which means that most building materials can be salvaged for either reuse or recycling.

The table on the following page outlines the kinds of materials that can enter the reclaimed building material supply chain as the result of deconstruction.⁴ It's important to note that while not all of these materials can be reused, many can be recycled, advancing circular economy goals.



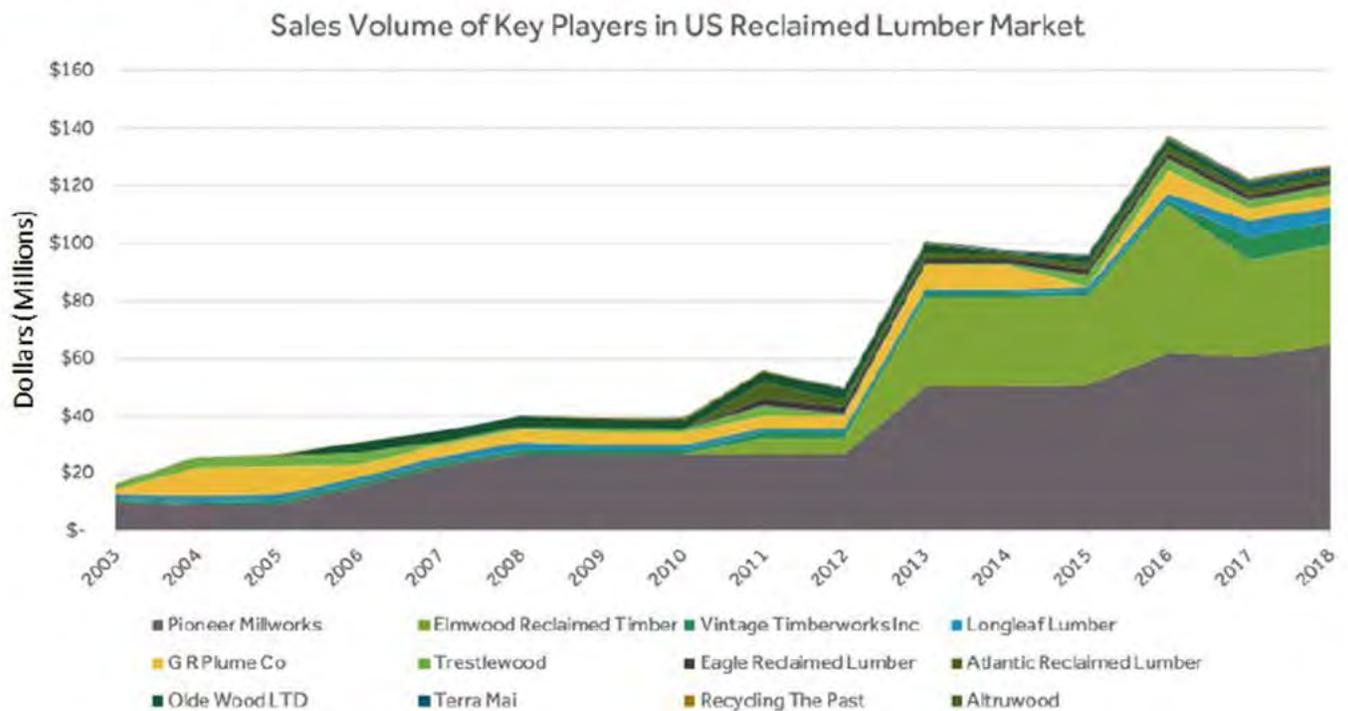
[3] Metro Vancouver, Construction and Demolition Waste, <http://www.metrovancouver.org/services/solid-waste/wte-and-disposal/construction-waste/Pages/default.aspx>. [4] Adapted from Metro Vancouver, Construction & Demolition Waste.

Image: A portion of the reclaimed flooring and shiplap from the City's second Certified Deconstruction Contractor Training. Courtesy Office of Historic Preservation staff.

Material Type	Examples	Reuse	Recycling
Appliances	Fridges, stoves, washers, dryers	✓	✓
Architectural details	Columns, fireplaces mantels, mouldings	✓	✓
Bricks/blocks	Clay bricks, concrete precast, aerated blocks, stone blocks	✓	✓
Carpet	Carpet, carpet underlap	✗	✓
Concrete/Asphalt/Aggregates	Structural concrete, cinderblocks, asphalt pavement, washout from mixer trucks	✓	✓
Drywall	New gypsum wallboard off-cuts, asbestos-free used gypsum wallboard	✗	✓
Electrical equipment	Circuit breakers, breaker boxes, switches	✓	✓
Finished goods	Doors, windows, cabinets, countertops	✓	✓
Gates and railings	Security gates, decorative gates, handrails	✓	✓
Glass	Windows, structural glass, mirrors	✓	✓
Heating/cooling	HVAC ducts, AC units, furnaces	✓	✓
Lighting	Light fixtures, tracks	✓	✓
Metals	Piping, aluminum siding, banding, wire, cable, rebar, frames, metal shelves & cabinets	✓	✓
Wood	Forming lumber, dimensional lumber, painted wood, pallets, flooring	✓	✓
Paper	Cardboard, office paper, newspaper	✓	✓
Plastics	Pails & containers, plastic film, pipes	✗	✓
Plumbing	Sinks, faucets, tubs, shower stalls, fixtures	✓	✓
Land clearing debris	Stumps, branches, yard waste	✓	✓
Existing vegetation	Shrubs, small trees, plants, sod	✓	✓

Some materials, such as wood, steel, stained glass, concrete, and architectural details and finishes, are in higher demand for reuse than others. Finished goods like doors, for example, are great reuse candidates as they are often in very good condition, come in standard sizes and finishes, and have high reuse value. Nationally, the popularity of rehabilitation shows on HGTV and real estate podcasts like BiggerPockets have brought rehabilitation and reclaimed building materials into the American household lexicon. In Texas specifically, the popularity of reclaimed lumber for use in applying a shiplap wall feature has been made popular by Waco-based designer Joanna Gaines. As such, the market for reclaimed lumber is growing nationally.

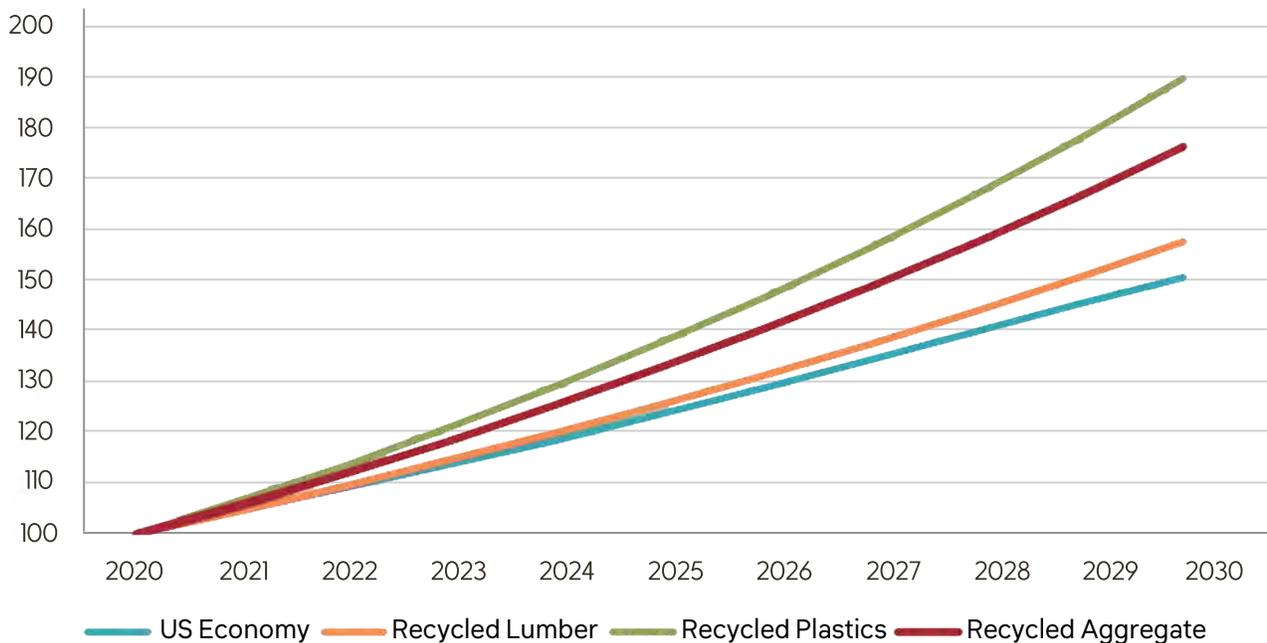
National Trends: Emerging Markets



Since 2003, the marketplace for reclaimed lumber has grown nationally. Source: Delta Institute

In fact, when compared to the U.S. economy as a whole, material reuse industries are expected to grow at a faster pace. In the next 10 years, growth in reclaimed lumber, aggregate, and plastics are projected to outpace the U.S. economy overall.⁵

**Demand Growth
Recovered Materials vs US Economy
2020 = 100**



Hyperlocal Demand

One missed opportunity when a building is demolished and materials head straight to the landfill is the chance for resale on site. While looking at other cities, conducting interviews, and undertaking the national survey for this report, it was clear that there is a demand from homeowners for materials from houses built nearby, which is likely to be similar in San Antonio. Resale on site would allow nearby property owners who are performing rehabilitation to “replace like with like.” Oftentimes the quality materials found in older homes are irreplaceable and a homeowner cannot simply buy a matching material at a big box store. This sentiment has often been corroborated by residents of San Antonio’s Historic Districts, Neighborhood Conservation Districts, and communities with older housing stock at deconstruction initiative public input meetings and during local design review processes.

[5] Sources: Congressional Budget Office; Plastics Today (<https://www.plasticstoday.com/mechanical-recycling/solid-growth-projected-recycled-plastics-market>); Grand View Research (<https://www.grandviewresearch.com/industry-analysis/reclaimed-lumber-market>); and AMCS (<https://www.amcsgroup.com/newsroom/blog/global-aggregates-market-is-on-the-rise/>).

REUSE SPOTLIGHT

Carla Bruni, Preservation & Resiliency Specialist; Former Communications Director, Evanston Rebuilding Warehouse

 Location: Chicago, IL  Industry: Nonprofit

Entering into the world of deconstruction and reuse as a preservation professional was an intentional industry leap for Carla Bruni, who had been focused on work at the intersection of historic preservation and green building since 2007. Most of her earlier work with environmental organizations had focused on weatherization techniques and increasing energy efficiency in older (historic) homes, but Carla wanted to know more about the materials side of sustainability, specifically in regards to material supply and demand and affordability in regards to restoration work. In 2014, she took a job at a non-profit just outside of Chicago called the Evanston Rebuilding Warehouse (ERW).

Two years prior to this, the Demolition Debris Diversion Ordinance (3D) was passed in Cook County, the most populated county in Illinois, requiring demolition contractors to recycle 70% by weight of debris for all demolition projects - excluding sheds and garages - and that residential properties also demonstrate that 5% of materials by weight are being diverted for reuse. The idea was that once contractors became familiar with the steps and understood the advantages of deconstructing a portion of buildings for reuse, they would be inclined to go beyond the 5% requirement. These advantages would include a reduction in tipping fees and tax benefits for material donations, as well as advantages for homeowners and neighbors, who will avoid the effects of lead dust and other pollutants released into the air during mechanical demolition. "Guilt reduction" was another phenomenon that many homeowners expressed as they didn't like the idea of all of the materials being thrown away. Unfortunately, due to a lack of ordinance enforcement, the exclusion of Chicago from the Cook County ordinance (the largest city with the most construction in the county), and confusion around tax code changes in terms of assessing the value of materials on deconstruction sites, 3D didn't rise to the hopes of those who fought hard to create and pass the ordinance.

While this was unfortunate, the ERW has continued to grow its deconstruction workforce training program, which hires individuals with barriers to employment who have been recommended by other local organizations based on their personal interests. The ERW's 13,500-square-foot warehouse is perpetually packed with reclaimed flooring, vintage architectural features, high-end appliances, built-in hutches, interior and exterior doors, and pretty much anything non-structural in good condition. While some brick and other structural components are sold at the warehouse, a large percentage of the structural materials dismantled on the sites were, until recently, sold directly from a site to for-profit companies specializing in reclaimed lumber. This saved the ERW from having to load, transport, and unload these heavier materials, and with retail space constantly filling up, lumber can quickly take up a large portion of that valuable space. Recently, there has been more experimentation with selling the lumber from the warehouse.

Carla's interest in retail was a desire to understand what it takes to make materials more affordable for restoration projects. For many years, the idea of "replacing like with like," as encouraged by preservationists, was simply a luxury many could not afford. Antique shops and online auction sites were the primary go-to when looking for old doorknobs, light fixtures, stair rails, etcetera. Because the ERW is a nonprofit, materials donated to the warehouse are tax deductible for those donating them – many are contractors with a regular supply of materials they are looking to get rid of but don't want to throw away – and the warehouse does not have to spend any money purchasing these materials, which of course increases profits. So, they can charge what they want, and that works in favor of the customer. In addition to this, Evanston is part of an area adjacent to Chicago called the North Shore, which also happens to be the wealthiest area of the state, so the items coming in tend to be high quality.

With the exception of kitchen and bath appliances, hardware, and some newer lighting fixtures, a large percentage of the materials at the warehouse come from 1910s and 20s homes undergoing renovations and deconstruction. Those decades marked peak construction in the Chicago area, so while many of these century-old homes are being updated, many others remain intact and are being restored to varying degrees. In terms of supply and demand, this works out very well. Materials are sold at about 50% of retail, and prices are based on internet research for equivalents on sites like Ebay.

The ERW warehouse is open to the public and holds regular business hours, so perusing is easy for those looking for ideas or specific items. In addition to becoming a regular hot spot for contractors, homeowners, woodworkers, and artists, materials are advertised on Facebook, Instagram, Craigslist, and increasingly Ebay, which alone brought in about \$4,000 in September 2020. There is also a push to work with Free Cycle to divert any potential waste created when items don't sell for long periods of time and need to be cleared to make room for "new" materials. Thanks to a massive fundraising campaign, the ERW is in the process of moving to a much larger 28,000-square-foot space, located just two minutes from the current warehouse location. This new space will allow for a much larger and more organized retail space, which means keeping more materials out of the landfill, in addition to more room for workshops and events that promote education in repair and carpentry, space for small event rentals, and better learning spaces for the workforce training program, which provides paid transitional employment opportunities, marketable certifications, and support to help individuals build careers in the building trades.

The deconstruction workforce training crew is now completing around two-to-three roof-to-foundation home deconstructions each year, in addition to over 15 partial deconstruction projects, and the number of workforce trainees is up from six during the first year of the program in 2014 to, ideally, ten by the end of 2020. The training, which pays the trainees an hourly wage, has expanded to include not just deconstruction, but also warehousing and logistics, injecting the mission of career development into all of the ERW's operations while recognizing the shift in job opportunities. The workforce training program is the result of several partnerships with other local organizations, and one of the first SNAP to Success programs in the state, which leverages a new federal funding stream to ultimately help thousands of additional SNAP participants find employment, advance in their careers, and achieve self-sufficiency.

The Economic and Environmental Cost of Loss

If the business of generators and users of building materials continues as usual, the foregone opportunity cost to San Antonio's economy is high. The current linear waste stream misses opportunities for diversion of materials necessary for the city to hit their environmental and sustainability goals and ignores economic opportunities.



For the purposes of this study, the term "cost of loss" refers to the value of salvageable materials lost to demolition.

It is important to quantify the scale of the problem. In the U.S., construction and demolition (C&D) debris accounts for approximately 30% of all solid waste produced.⁶ Just in 2018, C&D debris accounted for more than twice the amount of municipal solid waste in the U.S.⁷ Recent estimates say the current building material reuse rate is less than 1% of all C&D waste.⁸ A large majority of this debris ends up in landfills, which have detrimental effects on the environment and community health.

[6] https://www.chicago.gov/city/en/depts/streets/supp_info/construction_anddemolitionsites.html

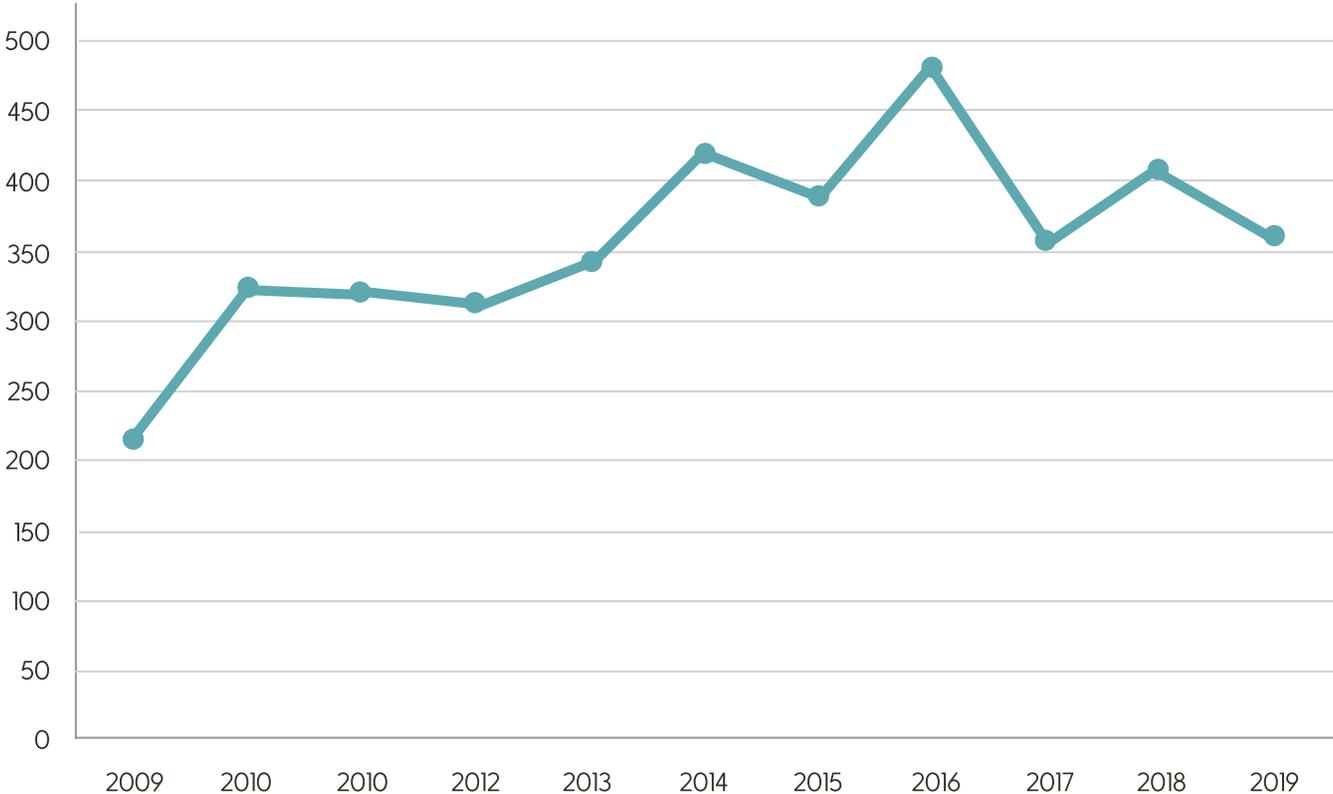
[7] <https://www.epa.gov/smm/sustainable-management-construction-and-demolition-materials>

[8] McCarthy, Tina. Deconstructing the culture of demolition: exploring deconstruction as a strategy for historic preservation. Masters Thesis. Boston Architectural College. 2018, 22.

Longitudinal Loss to Demolition

San Antonio’s growth and annexation policies have had a large impact in the volume of material ending up in the landfill. This makes it difficult for the City’s Solid Waste Management Department (SWMD) to meet their zero waste goals. Because most of the landfills in San Antonio are privately-owned, and detailed construction debris data was not available, this technical analysis took the approach to model the impact of demolitions over the past 10 years based on city permits. Between 2009 and 2019, San Antonio approved just over 3,900 demolition permits. The number of demolition permits in 2019 was nearly double that what it was in 2009.

All Demolitions By Year (Permits Pulled)



Sixty-nine percent of permits over the last 10 years were for the demolition of residential structures. This analysis found that those residential demolitions introduced approximately 338,262,288 pounds (or 169,131 tons) of debris into San Antonio’s waste stream. Once these materials reach the landfill, their useful life has come to an end. Incentivizing change in consumer behavior and business practices in the C&D industry will be key to the shift to a circular economy.

Previous campaigns to change consumer behavior and increase household recycling have been successful. But the reduction in the volume of waste from household recycling is negligible compared to the volume of debris that could be kept out of landfills by building material reuse.

When a building is deconstructed, roughly 80% of the materials can be reused or recycled on average.⁹ Having not salvaged these materials over the last ten years has meant significant foregone opportunity costs. These residential demolitions represent approximately \$16,177,762 in retail salvage value that was lost to the landfill. This means that on average, the current linear waste stream policies in San Antonio has thrown away approximately \$1,470,706 worth of salvageable materials annually since 2009.



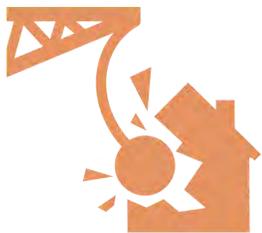
On average, approximately \$1,470,706 worth of salvageable materials has been landfilled annually since 2009 due to linear waste stream practices & policies in San Antonio.

[9] Metro Vancouver, Construction and Demolition Waste, <http://www.metrovancouver.org/services/solid-waste/wte-and-disposal/construction-waste/Pages/default.aspx>. Photo: Demolition in progress in San Antonio, taken by OHP staff in 2020.

A Shift in Waste Policy is Needed

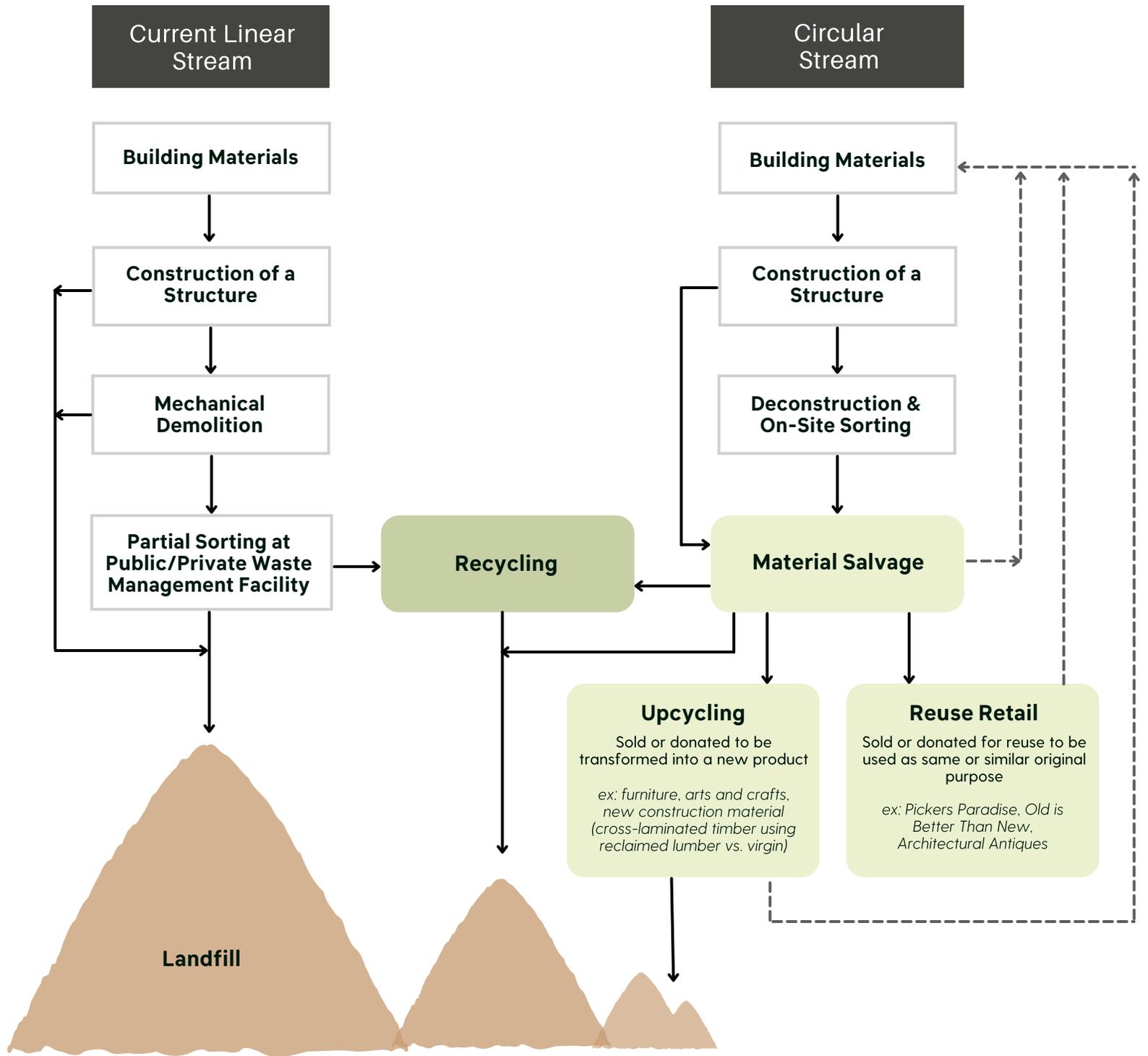
As part of the technical analysis, review of actions taken by other municipalities provides a good foundation. Municipalities across the country are beginning to realize the additional environmental, social, and economic benefits that deconstruction offers for their communities as compared to demolition. San Jose, CA (2001), Madison, WI (2010), Cook County, IL (2012), Portland, OR (2016), and Palo Alto (2020) have all implemented deconstruction or waste diversion programs. St. Louis, MO, is in the gathering research phase, and Charlotte, NC, has published a broad reaching effort to pivot to a circular economy. The program launched in Portland was deemed so successful that the city recently expanded the regulations to include the capture of newer structures, up from 1916 to 1940.

In the national survey of the deconstruction industry conducted as part of this analysis, respondents indicated that only 1 in 4 municipalities they operate in have regulations regarding deconstruction. However, respondents did state that many municipalities support deconstruction in other ways - through funding, incentives, job training, collaboration through demonstration projects, and providing facilities. The role the municipality plays depends on the marketplace, partner opportunities, stakeholder feedback, and political will. San Antonio has many options within the waste stream to insert itself.



Sixty-nine percent of demolition permits over the last 10 years were for residential structures. Those residential demolitions introduced approximately 338,262,288 pounds (or 169,131 tons) of debris into San Antonio's waste stream.

As the graphic on the following page demonstrates, San Antonio's current linear waste stream means products that were once crafted with care end up in a landfill missing the opportunity to extend its useful life. Demolition also dismisses many environmental impacts and the economic value of the reclaimed materials is forfeited.



On a deconstruction job site, materials are sorted on site as the structure comes apart piece by piece. Sometimes those materials are left on site and sold directly to consumers, while others are brought to off site warehouses where they are resold to other builders or other users. Materials can also be donated to nonprofit organizations, like Habitat for Humanity's Restore.



22 Photo: Reclaimed doors from the early hours of a City of San Antonio Certified Deconstruction Contractor Training, set aside prior to transfer to a reclaimed materials warehouse. Courtesy City of San Antonio Office of Historic Preservation staff.

REUSE SPOTLIGHT

Max Wechsler, Operations Manager, Urban Ore

 Location: Berkeley, CA

 Industry: Private

Urban Ore does not do salvage work in a typical way, in that it doesn't do architectural salvage or deconstruction jobs. Instead, they salvage what has already been thrown away – which is to say they salvage at the dump. They have a contract with the City of Berkeley, who owns and operates the regional transfer station, and Urban Ore's crew pulls an average of three tons of materials a day out of the station to bring back to their warehouse, where it is cleaned and resold for reuse or recycling. Last year, they salvaged 826 tons of material. Max Wechsler joined Urban Ore in a managerial role four years ago. He had been doing salvage work for years before, but once he learned about the work being done at the transfer station, he knew it was his mission to continue this legacy and eventually expand it. Being permitted to salvage in this way is highly unusual because in addition to the numerous safety concerns that come with hauling and disposal work, this kind of access is usually blocked by the unions that operate at the transfer stations. Berkeley is unique due to an extremely progressive municipal code from 1976 that mandated this form of salvage.

"This June, the City of Berkeley renewed our contract, but an important change happened – we are now being paid a salvage service fee of \$47.74 per ton by the City, which is what they pay Waste Management, Inc. to send these materials to the landfill," explained Max, "They recognize that recycling and reuse services aren't free... they involve a lot of labor. We create 30-40 jobs out of what would otherwise just require a handful of people using heavy equipment. There are also important economic, environmental, social, and community benefits." The city did pay Urban Ore in the past, but less money per ton, and that arrangement ended in 2012.

In addition to the collection of materials at the transfer stations, Urban Ore accepts drop-offs at their retail location, which is a 30,000 square-foot warehouse with an additional three acres of land. They pay out both cash and store credit for items in good condition to incentivize the supply of high-quality goods—this is at the discretion of the receiving department. "We pay out about \$100,000 per year for these items, which includes store credit. So, in terms of measuring economic multiplier effects, that money is going back into the economy.



Urban Ore's crew pulls an average of three tons of materials a day out of the city's transfer station to bring back to their warehouse, where it is cleaned and resold for reuse or recycling. Last year, they salvaged 826 tons of material.

This also helps to increase the profit margins on jobs for small contractors who want affordable lumber or hardware. Our prices are the lowest around because that's part of our mission/niche." Every socioeconomic class of people shop at Urban Ore and, according to Max, it is likely that some customers depend on them for affordable goods.

The business brings in about \$2.6 million per year in gross sales. COVID-19 slowed business down for a while this year, but things began to normalize again in June. This, in part, is because Urban Ore is considered an essential business because they sell hardware and household supplies, as well as provide disposal services to the public. People looking to do home improvement work or creative projects have been coming to them for supplies.

At the same time, the uptick in moving and business closures due to COVID-19 has meant that people need a place to drop off what doesn't fit their new space and to get new items for their next place. Many also appreciate the option to get rid of whatever they are clearing out without having to pay to dispose of it at the transfer station. Max explained, "It's an interesting dance between supply and demand since we're working both sides. When we price an item, we price it depending on a range of factors: how quickly you want to sell it, who is the target audience, do we have space for it, could it break easily, etcetera. Our basic approach is that we'll take in anything we think we can sell. We're saving the world one lava lamp at a time."

REUSE SPOTLIGHT

Maybo AuYeung, Environmental Program Manager,
Zero Waste Palo Alto; Public Works Environmental
Services, City of Palo Alto

 Location: Palo Alto, CA



Industry: Government (Municipal)

California has some of the strictest green building codes in the country, and those include a state-wide requirement to divert 75% of construction and demolition debris from construction projects. Palo Alto has been pushing beyond the state percentage and requires a minimum of 80% construction waste reduction from all covered projects. Maybo AuYeung, Environmental Program Manager with the City of Palo Alto, explained, “By implementing deconstruction requirements, not only will it help projects to reach the diversion goals, it will also contribute to the new city-wide goal to divert 95% of all materials from entering the waste stream by 2030.”

“We’ve done a lot of research, public meetings with stakeholders in the construction industry, and waste characterization studies to help us update our 2019 Zero Waste Plan,” said Maybo. What the City of Palo Alto’s research and outreach has uncovered is that when a whole house is demolished, even if 80% of the materials are diverted from the site, once the materials are sent to a facility that recycles, only around 60-70% of that material is able to be kept out of the landfill after sorting. Maybo explained, “The reality has been that there is a maximum of only around a 70% recycling rate if all of the waste is mixed together. So, the only way to move forward is to do source separation ahead of time, which requires deconstruction and then source separation at the site.

By separating at the site, it is possible to capture salvageable and reusable building materials that would be otherwise damaged by demolition and increases the recycling rate of building materials such as sheetrock and concrete, which can reach over 90% if they are separated from the rest of the mixed C&D materials.”

As of July 1, 2020, all of the Palo Alto building permit applications submitted for the removal of structures were subject to new requirements. The top of a flyer that the City distributed simply states: “Demolition will no longer be allowed.” All residential and commercial projects requiring the complete removal of structures have to deconstruct the building, salvage materials, and separate the materials on site. The ordinance does not include accessory dwelling units (ADUs), structurally unsound buildings, or remodeling or additions projects. “We’d like to expand the program to include more, but we don’t want to rush it,” Maybo explained.

Before applying for a building permit, a salvage survey by a city-approved reuse organization must be completed, and that will be part of the permit application. Once the permit is issued, the structure must be carefully deconstructed and the materials separated into materials that will be reused and materials that will be recycled, then placed into separate containers that will be delivered to one of the city-approved materials recovery facilities. Before the final inspection for the building permit, a certification must be sent to show that all materials indicated on the salvage survey were properly salvaged by a city-approved reuse organization and include the weight of these materials. All of this information should be uploaded into Green Halo, an online waste recovery and recycling tracking system, to verify that goals are being met in terms of diversion requirements.

The City did a lot of outreach before the ordinance and secured partners. They work closely with The ReUse People, a non-profit that does salvage surveys and takes in construction materials to resell, and GreenWaste of Palo Alto, the city-contracted waste hauler that handles material removal. Since the new requirements were put into motion, the City has been receiving more questions from homeowners and contractors asking for clarification. Some are resistant to these new measures, but Maybo is confident that any pushback will smooth out once people get used to the new protocol: "That's just part of the challenge when managing any kind of change. We're still in the outreach and education stage in terms of implementing this new ordinance. We'll get there."

"By implementing deconstruction requirements, not only will it help projects to reach the diversion goals, it will also contribute to the new city-wide goal to divert 95% of all materials from entering the waste stream by 2030."



Photo on this page and following page: City of San Antonio Certified Deconstruction Contractor Training in progress. Courtesy Office of Historic Preservation staff.



The Impact of an Ordinance

In response to neighborhood concerns regarding the increasing pace of demolitions, in San Antonio, the City Council recommended the Office of Historic Preservation explore deconstruction as an alternative to demolition in 2017. A Deconstruction Advisory Committee was created in 2018 that spans numerous City departments, nonprofits, local businesses, academic institutions, and community advocates to guide the efforts. The fact that so many different stakeholders were involved in this process demonstrates the broad reaching nature of demolition policies. A deconstruction ordinance is necessary because:

1. The City and residents have placed a high priority on diverting materials from landfills; and
2. Current City policies incentivize tearing down and building new and residents felt a change is needed to slow the pace of demolitions; and
3. The status quo tear down-and-rebuild new is hindering the supply of affordable housing, as data shows rehabilitation is usually the most cost-effective way. The City needs to lead by example.

A proposed deconstruction ordinance was formulated by the Office of Historic Preservation with Deconstruction Advisory Committee input to be implemented in phases, subject to change based on ongoing policy development and stakeholder feedback, as noted below:

POTENTIAL PHASING

Phase I

- Residential single family + multifamily 4 units or less built in 1920 or earlier
- Residential single family + multifamily 4 units or less in Historic Districts, landmarks, or NCDs, regardless of age
- **Estimated per year: 70 - 90**

Phase II

- Residential single family + multifamily 8 units or less built in 1940 or earlier
- Residential single family + multifamily 8 units or less in Historic Districts, landmarks, or NCDs, regardless of age
- **Estimated per year: 120 - 140**

Phase III *

- Any structure built in 1940 or earlier
- Any structure in Historic Districts, landmarks, or NCDs
- Requirement or incentive to utilize salvaged materials in exterior of new construction receiving City incentives or in design overlays
- **Estimated per year: 170 - 190**

**Not to be adopted as part of initial ordinance; to be reconsidered by City Council for potential expansion at a future date*

Economic and Environmental Impacts

Housing built before 1960 usually contains higher quality building materials and more character-rich architectural features. A review of San Antonio demolition permits in 2020 alone showed 62% of permits issued were for buildings constructed prior to 1960. These would have been prime candidates for deconstruction, allowing for high yield material salvage and resale potential.

To put these phases into context, an analysis of 2020 demolition data was undertaken.¹⁰ The table below demonstrates the volume of materials that would go to a landfill and value of materials that could have been salvaged had a deconstruction ordinance been in place in 2020.

	Number of Permits	Salvageable Volume (lbs)	Salvageable Value
All 2020 Demolition	475	180,233,828	\$8,677,873
Phase 1	54	5,689,740	\$340,148
Phase 2	144	16,100,644	\$962,539
Phase 3	161	18,558,944	\$1,071,576



2020 demolitions alone could have potentially salvaged 5.8 million board feet of lumber via deconstruction. This could have been reused to provide structural framing for six hundred and eighteen (618) 1,500 square foot houses. The amount of board feet that potentially went into the landfill is the equivalent of 7,700 mature trees.¹¹

Additionally, there is approximately 41.3 tons of embodied energy¹² in a 1,500 square foot house that is lost when it is razed. According to the EPA Greenhouse Gas Equivalencies Calculator, 41.3 tons of embodied energy is equivalent to:



Greenhouse gas (GHG) emissions from:

- 8.1 passenger vehicles driven for one year, or
- 92,970 miles driven by an average passenger vehicle



CO2 emissions from:

- 4,216 gallons of gasoline consumed, or
- 3,680 gallons of diesel consumed, or
- 41,283 pounds of coal burned, or
- 4.3 homes' energy use for one year, or
- 6.3 homes' electricity use for one year, or
- 86.7 barrels of oil consumed, or
- 1,532 propane cylinders used for home barbeques, or
- 4,778,215 number of smartphones charged

When considering the current state of the climate crisis, other environmental threats, and the City of San Antonio's own sustainability goals, a linear economy that prioritizes demolition over deconstruction proves to be one of the most wasteful policies that San Antonio has on the books.

[11] This is based on the assumption that stick-frame homes require 6.3 board feet of lumber per square foot of house. [12] According to the EPA, embodied energy is "the amount of energy consumed to produce a product, in this case building materials. This includes the energy needed to mine or harvest natural resources and raw materials, and manufacture and transport finished materials."

REUSE SPOTLIGHT

Local Project Highlight: Deconstruction of 123 Locust St

 Location: San Antonio, TX

 Industry: Private

 Duration: 15 days total

 Salvage Rate: Approx. 90%

In February 2020, the San Antonio Office of Historic Preservation held their Deconstruction Think Tank at Eco Centro, a community outreach center for environmental sustainability operated by San Antonio College. In the summer of 2020, San Antonio College undertook a deconstruction and salvage project of a structure located adjacent to Eco Centro. The structure was a 2-story, wood framed, 3,400 square foot property that had been built circa 1940. The property was located directly adjacent to Eco Centro's public garden, which raised concern over the negative public health impacts that full mechanical demolition would have. In alignment with their mission to foster sustainability, San Antonio College enlisted the expertise of local City-certified deconstruction contractors Emily Lowry and Gator Dodson, who began work in late June. In total, the project took three workers 15 days to complete over the span of about three weeks. Overall, the project was able to:

- Salvage framing, including shiplap and rafters, for reuse within the community or sent to a local lumber mill to be re-planed for engineered flooring.
- Salvage and reuse oak, pine, and fir floorboards in local projects, including flooring for an addition to a historic home in the nearby Tobin Hill neighborhood that closely matched the original flooring in the primary home. Floor joists were also sent to a local lumber mill, WoodCo, to be re-planed.
- Provide wall studs to friends, family, and community members that were repurposed or used to build other buildings nearby, including chicken coops and small sheds.
- Recycle almost all of the concrete.
- **Achieve a material salvage rate of approximately 90% - only two dumpsters were filled and asphalt shingles were the only individual product not reused or recycled.**

Overall, the project was a success, with important lessons learned by all stakeholders involved: the College was able to explore deconstruction and keep hazardous particles out of the air for their community; the City was able to gather more data on materials salvaged due to deconstruction; and the Contractor was able to secure a contract for a large-scale deconstruction project with a high material reclamation rate. In addition, the Contractor team learned that prep work is key: having a remediation contractor remove the lead, asbestos, and stucco before the deconstruction team came on site increased the project's overall salvage rate. Had that step not been taken to strip the building beforehand, the salvage rate would have likely fallen from around 90% to around 50%.

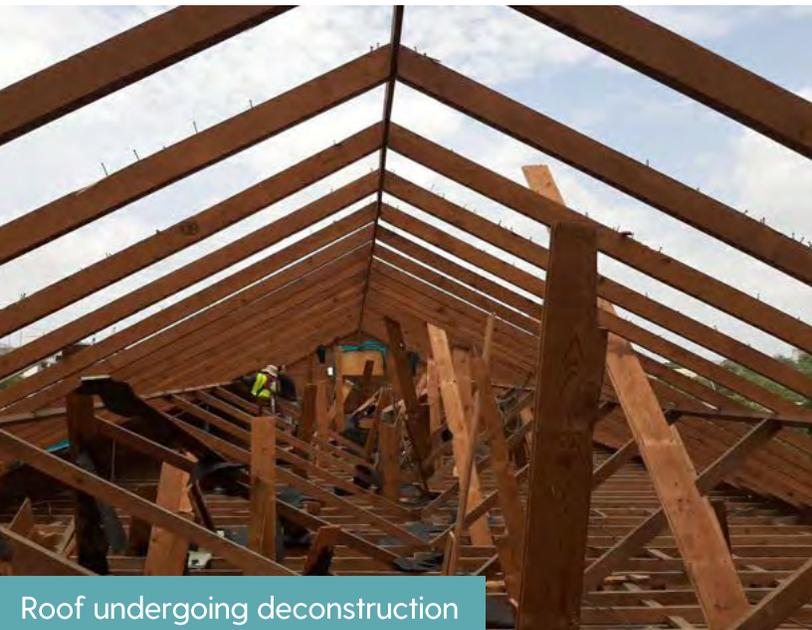
The data and lessons learned through this project will play an instrumental role in future deconstruction efforts and advocacy.



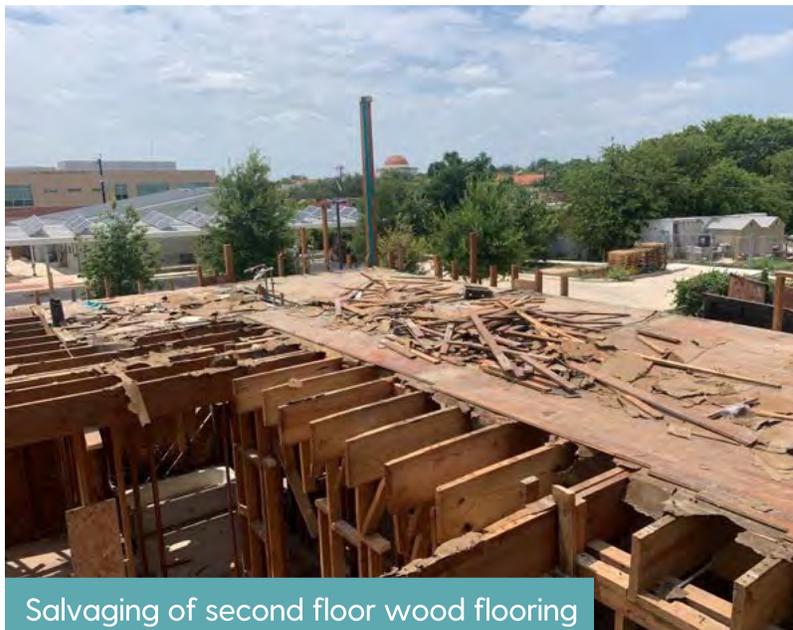
Prior to abatement and remediation



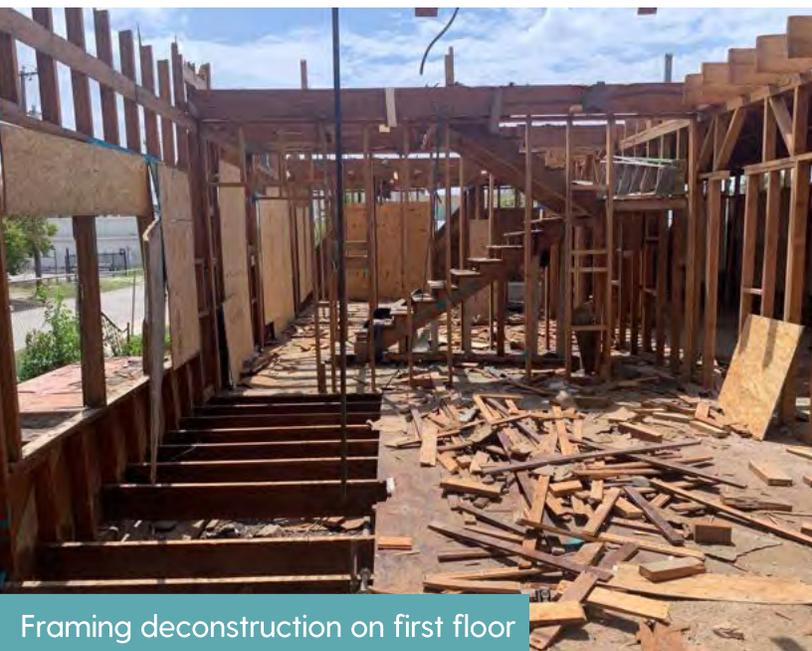
After abatement and remediation



Roof undergoing deconstruction



Salvaging of second floor wood flooring



Framing deconstruction on first floor



Salvaging of joists and beams

Retail Impact

Businesses that fall into the “Users and Sellers” of reclaimed building materials category are the primary beneficiaries of end-of-supply-chain profits. These are the businesses that either utilize salvaged materials in a product that ultimately gets sold or sells salvaged materials untouched. Either way, their profits are dependent on the supply of materials that come into their possession. The current sales volume of businesses in San Antonio in these categories is as follows.¹³

Business Type	Sum Sales Volume	Share of Sales Volume
Building Designers	\$7,099,000	\$7,099,000
Building Materials: Used	\$14,167,000	\$14,167,000
Building Restoration & Preservation	\$19,443,000	\$19,443,000
Furniture: Designers & Custom Builders	\$4,534,000	\$4,534,000
Salvage & Surplus Merchandise	\$2,658,000	\$2,658,000
Woodworkers	\$3,679,000	\$3,679,000
TOTAL	\$51,580,000	\$51,580,000

If a deconstruction ordinance were to be put in place, the supply of salvageable materials that these “Users and Sellers” have access to would increase significantly. When taking into account the proposed phasing of the deconstruction ordinance, even a conservative estimate taken in the table below demonstrates that the sales volume of the “Users and Sellers” would increase.

Cumulative Sales Volume Increase by Proposed Implementation Phase

Implementation Phase	Sum Sales Volume
Current	\$51,580,000
Phase 1	\$51,920,148
Phase 2	\$52,542,539
Phase 3	\$52,651,576

A deconstruction ordinance would not only have an impact on the retail potential for businesses that are within the supply chain. The increased sale of salvaged building materials would also generate additional sales tax for the City and State. In addition, the larger crew sizes for deconstruction mean more workers and more labor wages – those workers spend that money, circulating it in the local economy and generating more tax revenues for the City and State.

A Local Impact

Switching to a circular economy entails a shift in business models. Transforming San Antonio's construction and demolition industry to facilitate a deconstruction ordinance will support these existing businesses. Unlike the switch from coal power to clean energy, deconstruction will not put the demolition contractors out of work. Instead, demolition contractors can be supported to expand services to fill the deconstruction demand and needs of clients. There is precedent in other cities that enact a deconstruction ordinance that not only do existing businesses expand, but new businesses are started as a result of the burgeoning market.

As demonstrated earlier in the marketplace analysis, the nationwide market demand for reclaimed materials is huge. This is not likely to subside soon as the population growth in San Antonio leads one to assume that demand locally will increase as more homes are built. According to the American Housing Survey, homeowners in San Antonio spend over \$2.05 billion annually on home repairs and remodeling, including costs for materials and labor. With more locally sourced reclaimed materials available, it is safe to assume that more dollars will circulate in the local economy. Additionally, virgin lumber prices in the United States are higher than pre-pandemic levels, and are projected to remain steady at these prices for several years. Rather than looking to forests for lumber shortage relief, we can maximize the reuse of locally-available materials from deconstructed or renovated building stock, which can also aid in minimizing housing affordability issues.

Those businesses in the “Building Restoration & Preservation” sector are poised to see the most increase in sales and demand. This will directly benefit existing City programs, such as the Under 1 Roof program, used to further affordable housing supply. Data from the Under 1 Roof program has demonstrated that rehabilitation is often more cost effective than building new. If the contractors executing the work for the city funded project have access to more “like” materials at salvage resale stores, this would make rehabilitation work on these projects more affordable, as well as a better use of scarce public resources.



Businesses in the "Building Restoration & Preservation" Category are poised to see the most increase in sales and demand.

REUSE SPOTLIGHT

David Greenhill, Good Wood

 Location: Portland, OR

 Industry: Private

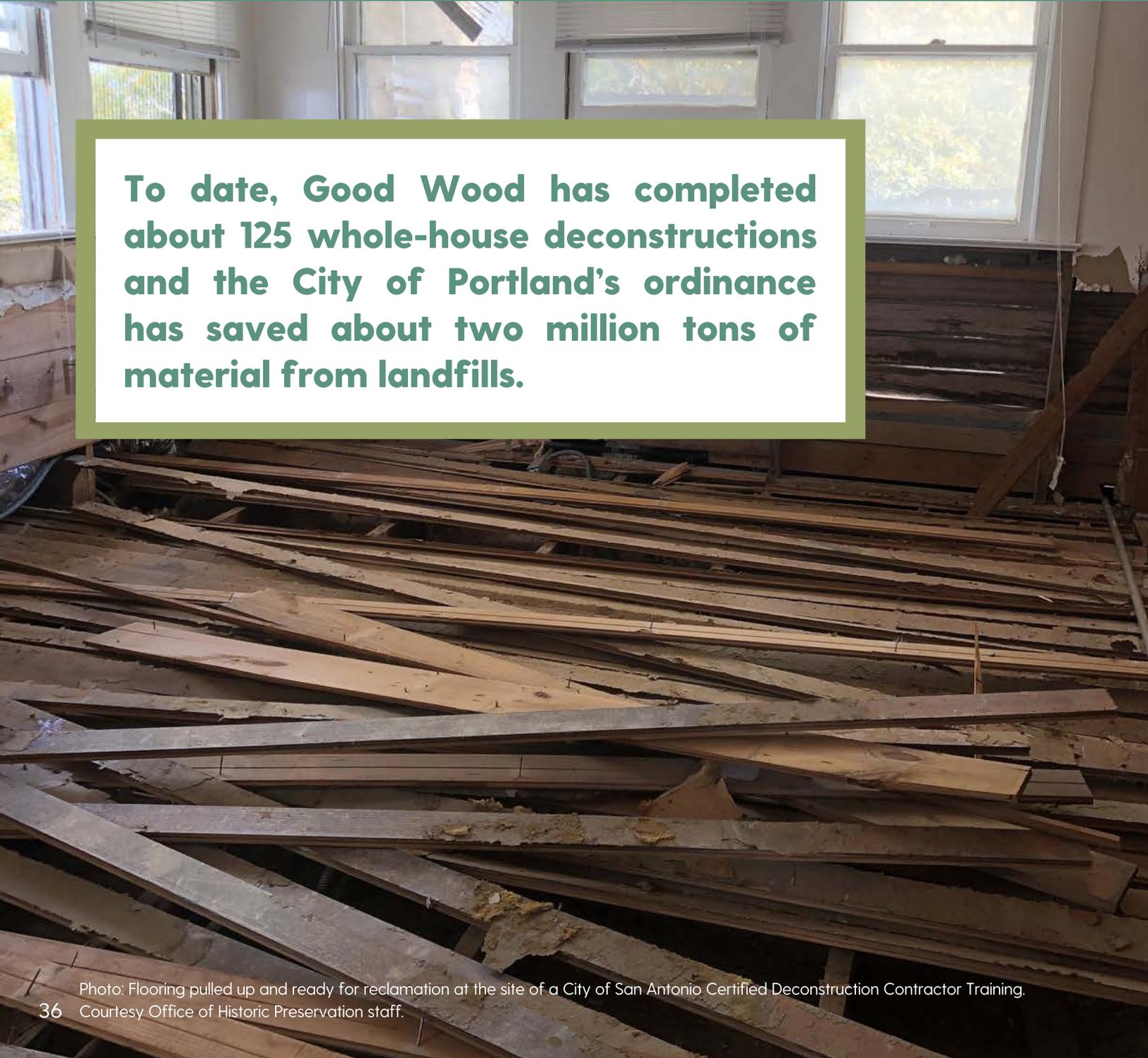
Before the implementation of Portland's Deconstruction Ordinance (2016), David Greenhill and his partner Emily Christensen had never worked in the reuse industry. They had a steep learning curve right out of the gate, but also the advantage of being completely open to ideas. David, the founder of Good Wood, a deconstruction and salvage company in Portland, Oregon, explained, "Emily and I didn't have the bad habits that wouldn't have served us, being new to the industry. We just put in a lot of hard work, knew it was important to be flexible and innovative, and knew that the old models didn't make sense anymore, so we were basically inventing this thing. We just thought, whatever works, we'll do it!"

Good Wood does whole-house deconstruction, but the actual deconstruction of homes has never been a big money maker - they mostly broke even - but they loved the work and the mission and quickly learned that by diversifying income streams, they could grow the business. Once the deconstruction had been completed, there was still much to do on the site in terms of excavation. "People wanted us to add basements, backfill, sewer caps, etcetera to our list of services, so we started an excavation company on the side, and that gives us a competitive advantage. We can do everything, which means we can add more to the budget. People expect to pay more for machine work."

Good Wood also has a retail space for all of the materials they recovered and has begun remilling 2x4s for things like siding, flooring, and cladding, and they also make furniture. Emily is a designer by trade and has used her skillset to design small houses using all reclaimed material, similar to a kit house. There may not be sufficient reclaimed wood to construct a large building, but the amounts salvaged are perfect for smaller buildings like ADUs and backyard studios.

Support from the city was also key. David explained, "while we're a busy city in terms of development, Portland can't sustain that many deconstruction contractors. Our ordinance currently goes to 1940, so that captures two-thirds of the demolitions. What's key is that you have to be certified with the City to do the work. Quality control is important. You want something new like this to go well, so even though it takes a lot more time and energy to follow all of the protocol, it's a good thing. We want to be there; we want to do a good job. It also gives the contractors a way to succeed because there aren't as many of us competing for business - only those who were willing to put in the time and work to be certified and follow all of the protocols.

David also gives credit to those who treaded these waters before him and the legacy of education around salvage and reuse in Portland. “We were fortunate to already have a population attuned to reusing materials. In other parts of the country, people think of these materials as old and junky, but we already had a customer base that understood the value.” In addition to already having a supportive public, there were already people doing deconstruction and salvage in Portland before the ordinance, working out many of the kinks. “They laid the groundwork for us, It’s the only reason we’re in business-- others had already found a way to make salvage cost effective.” To date, Good Wood has completed about 125 whole-house deconstructions and the City of Portland’s ordinance has saved about two million tons of material from landfills.



To date, Good Wood has completed about 125 whole-house deconstructions and the City of Portland’s ordinance has saved about two million tons of material from landfills.

Workforce Development

Capitalizing on a circular economy model will allow San Antonio to recover faster from the COVID-19 pandemic and economic recession, partly because it is a proven job generator. There are simply more employment opportunities in a circular economy. A recent report entitled "[Circular Charlotte: Towards a zero waste and inclusive city](#)," notes that the linear waste stream is a shortsighted model that results in considerable unrealized employment potential.

Waste Stream Process	Jobs Per 10,000 Tons of Waste
Landfilling/Incineration (Linear)	1-6 jobs
Recycling (Partial Circular)	36 jobs
Reuse/Refurbishment (Circular)	300 jobs

A deconstruction ordinance is one measure in establishing a circular economy that the City might undertake. Because of San Antonio's hot real estate market and building boom, a deconstruction ordinance is an easy place to start, and one that may have a quick impact on job growth during COVID-19 recovery.

Deconstruction creates more jobs than demolition.

Deconstruction, compared to mechanical demolition, is labor intensive. Rather than one individual operating a wrecking ball or bulldozer, deconstruction requires a team of individuals with specialized knowledge taking care to remove and sort salvageable components. Mechanical demolition of a 1,400 square foot house requires a crew of 2-3 workers, as opposed to 6-8 if that same structure were deconstructed.¹⁴ Any city looking to decrease unemployment by growing jobs in skilled labor would be wise to invest resources in deconstruction workforce development, rather than prioritizing demolition.

Deconstruction presents a huge opportunity for workforce development.

As previously stated, deconstruction requires more workers per project, and these workers require specialized knowledge. Currently, the labor pool for deconstruction contractors or demolition contractors who have the skillset to deconstruct is uncultivated. The benefits of deconstruction training/workforce development are two-fold: 1) the more certified deconstruction contractors there are, the more competition there will be amongst them (driving the cost of deconstruction work down), and 2) workforce development programs can help various at-risk populations gain valuable skills that can be applied in a variety of different fields. Therefore, workforce training and development is necessary to support any successful deconstruction initiative.

Deconstruction is an employment multiplier.

The workforce potential of deconstruction does not end at the direct jobs on the job site. The deconstruction field offers a higher employment multiplier than demolition. There are more indirect jobs that emerge related to deconstruction as salvaged materials are transported offsite. These include warehouse jobs, retail and sales jobs, and value-added manufacturing jobs as a result of “upcycling” of the salvaged materials. Additionally, these indirect industries provide additional workforce development and training opportunities. The combined direct and indirect offer more induced jobs that are a result of the direct/indirect wages spent in the local economy.



[14] The Economics of Residential Building Deconstruction in Portland, OR, Northwest Economic Research Center College of Urban and Public Affairs, April 2016. Graphic Source: "Deconstruction & Building Material Reuse," Delta Institute, May 2018.

The workforce potential of deconstruction does not end at the direct jobs on the job site. The deconstruction field offers a higher employment multiplier than demolition. There are more indirect jobs that emerge related to deconstruction as salvaged materials are transported offsite. These include warehouse jobs, retail and sales jobs, and value-added manufacturing jobs as a result of “upcycling” of the salvaged materials. Additionally, these indirect industries provide additional workforce development and training opportunities. The combined direct and indirect offer more induced jobs that are a result of the direct/indirect wages spent in the local economy.

The total labor income associated with deconstruction as opposed to demolition is substantial. In a recent national survey of the deconstruction industry, the total labor income (direct, indirect and induced) from deconstruction is nearly four times that of demolition. Based on survey responses, the average cost to demolish a 1,500 square foot house is \$11,000, whereas deconstruction is \$18,500. So while demolition is cheaper, it has a much weaker ripple on the local economy.

Labor Income from Deconstruction vs. Demolition of a 1,500 square foot house¹⁵

	Demolition	Deconstruction
Direct Labor Income	\$3,322	\$12,358
Indirect & Induced Labor Income	\$3,093	\$11,507
Total Labor Income	\$6,415	\$23,865



Models for Workforce Development

In the national survey of the deconstruction industry (Appendix 1), fewer than a quarter (24.2%) of all deconstruction programs have a corresponding job training component. However, municipalities and nonprofits around the country have realized the benefits that deconstruction workforce development and training opportunities bring to the communities. In fact, San Antonio's Office of Historic Preservation has already undertaken numerous hands-on training and workshop programs and is considered a national leader in this space, including courses that have focused on training deconstruction contractors with the help of national and local trainers.

The City's Office of Historic Preservation maintains a partnership with local nonprofit The Power of Preservation Foundation (PoP) to offer free or low-cost training in preservation trades. From wood window repair to porch restoration, this popular program rewards participants with a certification offered by OHP's Rehabber Club initiative. The Living Heritage Trades Academy, currently under development, aims to expand that pool and allow master craftspeople to share their skills with future generations. These successful hands-on training programs to date have been largely by relying upon a small pool of skilled local and regional craftspeople who dedicate their time and expertise to training others. If San Antonio wished to expand these opportunities and add additional components, there are numerous examples of successful deconstruction training programs that it can look towards as models to be part of this burgeoning industry.¹⁶

[16] Additionally, the Michigan State University Domicology Research Team has developed a deconstruction workforce development curriculum building template to help guide future programs.

www.domicology.msu.edu/upload/Pathways%20in%20Domicology%20Deconstruction%20Workforce%20Development.pdf

North Fork Community Development Council Deconstruction Project¹⁷

When the Old Mill closed in Eastern Madera County, California, the site was donated to the County's Redevelopment Agency for the North Fork Community Development Council (CDC). In 1998, a master plan was developed to address the reuse of the site and identified two critical issues: 1) The need to create long-term local employment opportunities to replace more than 100 jobs lost due to the Mill closure, and 2) the need to clean up the Old Mill site to eliminate safety hazards and prepare the site to be marketed for redevelopment.

The North Fork Deconstruction Project grew out of these needs. Using \$300,000 in funds and/or in-kind support from three county and federal government agencies and the Carpenters Union, the program trained 45 economically distressed participants in basic deconstruction skills during the 16 month-long initial project. Eligible participants were drawn from CalWORKS and Madera County Private Industry Council programs. The CDC partnered with Carpenters Local Union 701 and the Northern California Carpenters Training Committee to provide training to participants. Eligible participants were also enrolled in Local 701's apprentice program. Participants received training in worker safety, hand tool skills, lead abatement, and regular apprentice training prior to starting work.

Initially, the program called for 5 weeks of classroom training and seven weeks of on-site training. However, after the first round of participants finished the program, all training shifted on-site. Participants were certified in safety training, tool handling, scaffold erection, forklift operation, welding, lead abatement, large equipment rigging and hazardous materials training. Several participants were placed in jobs after less than six weeks on the project and numerous others had been placed in construction-related employment by the end of the project. Overall, the project partially deconstructed one building and completely dismantled another.

Vancouver Deconstruction Training For At-Risk Youth¹⁸

In 2011, a pilot project in the City of Vancouver, British Columbia, combined youth training and deconstruction into a workforce development program. Services Canada provided \$200,000 through the Youth Skills Link initiative to create the "Creating a Sustainable Tomorrow (CAST) Youth Skills Link Project." CAST targeted youth that were between the ages of 15 and 30, unemployed or underemployed (working less than 20 hrs/week), had been identified as a youth "at-risk, and had a high standard of physical health and stamina suitable for full time work.

Twenty participants acquired 11 weeks of employability and life skills, as well as concepts of environmental responsibility and stewardship. This innovative green project to deconstruct homes provided green and social benefits for the City of Vancouver, including creating jobs while keeping over 90% of material out of the landfill. The program also furthered regional and provincial objectives to reduce waste and carbon emissions. Former Mayor Gregor Robinson affirms that programs such as this "will help us meet our 2020 zero waste targets."

[17] <https://19january2017snapshot.epa.gov/www3/region9/waste/archive/solid/projects/pdf/lnorthfork.pdf>

<https://vimeo.com/216944216>; [18] www.rew.ca/news/vancouver-aims-to-recycle-debris-from-demolished-houses-11342426

REUSE SPOTLIGHT

Jeff Carroll, Senior Consultant, Urban Wood Economy

 Location: Baltimore, MD  Industry: Private

"That's really what it takes to make this work - you need a coalition."

In 2012, Jeff Carroll joined Humanim, a non-profit human services organization. Under the umbrella of Humanim, Jeff started Details Deconstruction and began doing residential deconstruction. With Details, Jeff quickly grew his crews, who were completing whole-house deconstructions from New England to Florida. These teams lived on location for one-to-three weeks with pay, benefits, paid room and board, and a per diem. This worked well under the non-profit model because the tax incentives allowed Details to acquire a fee which covered all of the costs and overhead. Subsequently, tax laws changed and the IRS was reevaluating its rules around appraisals for these deconstructed homes. Details stopped doing residential deconstruction in April of 2018 as a matter of ethical obligation because of too much ambiguity in the valuation process, creating concern that there could be issues or penalties for the building owners.

Four years after the housing crash of 2008, the City of Baltimore got about \$10M to spend on demolition. Jeff, who had recently started a deconstruction enterprise at Humanim, and his colleague Cindy Truitt wondered if there was an option to deconstruct homes with this money. They came up with a model for large scale urban deconstruction that got close to the price of demolition by using various incentives and the sale of salvaged materials. They wanted to prove that in addition to diverting huge amounts of usable materials from the waste stream, they could have a big social and environmental impact without the necessity of philanthropy. They approached the City of Baltimore and presented this model. The City, in turn, put out a competitive RFP, and Humanim's deconstruction enterprise, Details Deconstruction, won it. From there, they then went on to deconstruct around 85 houses in one year, and 90 the next - enough to prove that deconstruction could be done at a much faster scale and pace than in the past. There was no tax incentive for this work because the City owned the properties that were being deconstructed, but even without this incentive, Jeff and his crew managed to break even the second year.

Part of the mission of Humanim and Details was to provide employment opportunities to those who needed them most because despite nationwide unemployment rates as low as 3.5% in 2018-19, there were still parts of Baltimore that saw unemployment rates of 20-25%. Jeff explained, "You're really doing a lot more than just taking down houses. We were able to hire a bunch of people who nobody wanted to hire from the toughest neighborhoods in Baltimore; people who were facing significant barriers to employment such as long-term unemployment, minimal training, former incarceration, and the overall impact of structural racism. We were taking the buildings down in a healthier way and also a more respectful way. We weren't just throwing things away, we were carefully saving them."

They salvaged mostly brick and lumber and built a mill shop to turn the reclaimed wood into dimensional lumber. By doing this, the demand was much higher: "Different manufacturers are going to want those materials at different levels of finish. So, to provide this in the way that the consumer wants it is important; the ability to satisfy that need and to make it easy for the consumer is important." Brick and Board was the name of the warehouse that sold the reclaimed materials, a separate entity from Details, but also under the Humanim umbrella. This arrangement was another crucial spoke in the wheel.

The mill shop and warehouse space also provided more job training opportunities where employees could be on a warehousing track, learning how to drive skid steers, front end loaders, and other heavy machinery. Employees could also be on a "leadership" track that prepared them to eventually move into a foreman position running a crew. The tracks and the program worked for these formerly incarcerated individuals. The recidivism rates in Baltimore were around 48%, whereas the recidivism rates of employees at Details were around 2%.

Deconstruction work can employ 6-8x more people than traditional demolition, and the employees left their training with a better skillset, partly due to the fact that deconstruction work is considerably more dangerous and challenging than new construction work. Jeff explained, "You're using a lot of the same tools –sawzalls, circular saws, power drills, crowbars, etcetera. The employees have worked with it all and are using these tools to solve problems on site. You can't predict the issues you'll encounter when dismantling an old building. They also have to work off of generators and have to check to see if electricity is live or if there's gas on in the house. They have to complete OSHA 10 training, fall protection training, lead in construction, asbestos recognition, silica awareness, and more. Those skills and trainings translate to almost any construction-related job. They could roll into a carpenter's union and start an apprenticeship right away."

“We were taking the buildings down in a healthier way and also a more respectful way. We weren't just throwing things away, we were carefully saving them.”

The State of Maryland saw the employment benefits, the decreased recidivism rates, and the viable market for these materials, and they liked what they saw and supported the efforts. At the same time, the U.S. Forest Service field office had a mission to figure out what to do with urban wood. The local head scientist at the Forest Service met with Jeff, and the two of them worked together to determine how to create a local urban wood economy. "That's where things began to evolve. We had a relationship with the city and one developing with the state, but this relationship with the Forest Service, on a federal level, greatly expanded our reach." Details also developed a relationship with Room and Board, a national, for-profit furniture chain, and other local for-profits, which took things to another level in terms of supply and demand.

In the world of COVID 19, things have continued to evolve and adjust. Details Deconstruction's contract with the City of Baltimore has expired and a new RFP is yet to be released. A decision has been made to let the deconstruction business go back into the hands of for-profit companies. Brick and Board has split off and become its own, separate for-profit. Jeff launched a new non-profit to provide coaching and guidance to other organizations and for-profits who want to pursue opportunities in the urban wood sector. The non-profit, Urban Wood Economy Inc. (UWE), will provide services to cities across the country and partner with nonprofits and for-profits such as Cambium Carbon, a Yale start-up, and Quantified Ventures, an impact investing firm.

The key to the rapid success for Details was to have support at the city, state, and even federal level. This, combined with the for-profit partnerships creating demand for supply, and the extensive training programs for those who needed work the most. "That's really what it takes to make this work - you need a coalition. There are a lot of these smaller initiatives where people have passion for the industry but aren't connected to larger networks and they don't participate well with the rest of the economy. The irony is that they see all of these people as competition when they need to start seeing them as members of the same food court."



Photo: Participants of City of San Antonio Certified Deconstruction Contractor Training stacking reclaimed flooring and shiplap for transport to off-site warehouse for redistribution. Courtesy Office of Historic Preservation staff.

Incubation Hub

In addition to changing municipal waste policies, drafting a deconstruction ordinance, crafting a workforce training program – a City-led innovation center could help facilitate the development of the deconstruction industry in San Antonio. Just as the City supports incubation hubs, such as UTSA's Cyber Manufacturing Innovation Institute and PortSA Technology Innovation Center for information and technology jobs, they should invest resources to advance a more circular economy. There are numerous examples of public private partnerships from across the country that provide a starting place for San Antonio to build from.

RISN Incubator, Phoenix, AZ¹⁹

Understanding that the effort to divert 40% of the city's waste away from the landfill by 2020 could not be achieved through municipal efforts alone, the City of Phoenix turned to Arizona State University to establish a network focused on creating value and economic development opportunities from solid waste streams. Consequently, in January 2014, the Phoenix City Council approved funding for \$2 million to initiate the Resource Innovation and Solutions Network. In partnership with the Walton Sustainability Solutions Initiative at ASU, RISN brings together university, government, business and non-governmental partners to transform the relationship between resources, the environment, and the economy. The goal is to make urban areas healthier, resilient, and more efficient by creating a resource-focused circular economy platform. One way in which this is achieved is through the RISN Incubator, the first circular economy incubator of its kind, where startups, researchers, and scholars work together to test concepts, build and scale businesses, and develop innovative ways to reuse material waste.

The RISN Incubator provides participants with:

- Dedicated expert mentors to guide advancement
- Strategic advisement
- Introductions to industry stakeholders
- Access to technical experts in the fields of material reuse, technology, and the circular economy
- Business trainings on topics related to building a cost and revenue model, operations, value proposition, understanding your customers, and more
- Waste from the City of Phoenix for use in the development, testing, and activation of a product or service
- A process for entrepreneurs and their ventures to be continuously evaluated and pre-qualified for funding opportunities

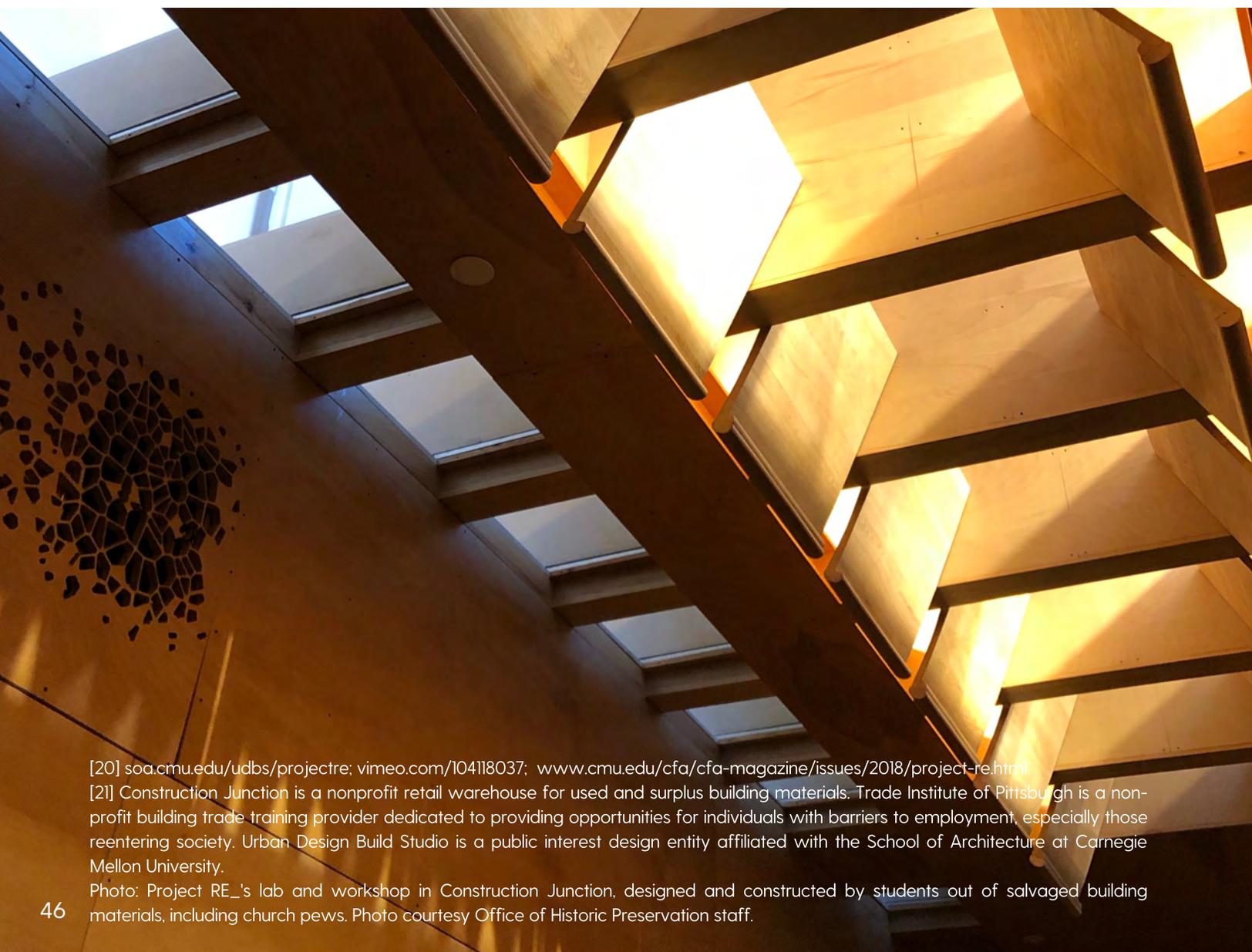
As of June 2020, 19 companies have been created, 14 patents have been filed, and 15 products have been launched from the RISN Incubator.

[19] <https://sustainability.asu.edu/resourceinnovation/risnincubator/>
<https://sustainability.asu.edu/resourceinnovation/>

Project RE_, Pittsburgh, PA²⁰

Project RE_ is a partnership between the Pittsburgh-based nonprofit Construction Junction, the Urban Design Build Studio (UDBS) at the University of Arkansas (formerly at Carnegie Mellon University), and the Trade Institute of Pittsburgh (TIP).²¹ Project RE_ is a learning laboratory with a mission to “reuse materials, rebuild communities, and restore lives.” Both foundation and private donors have helped sustain the operation, including Goodwill of Southwestern Pennsylvania, AFFECT Program, The Heinz Endowments, Colcom Foundation, Laurel Foundation, Ford Motor Company, and Autodesk Foundation.

The 10,000 square foot space, adjacent to Construction Junction’s warehouse, includes a community room, design studio, gallery and workshops for wood, metal, masonry, and digital fabrication. Students collaborate with trades apprentices, many of whom are part of a formerly incarcerated reentry path, to learn in the laboratory setting. Using salvaged materials from Construction Junction, design services from USBS, and construction services from TIP, the collaboration produces value-added products ranging from housing prototypes to art installations.



[20] soa.cmu.edu/udbs/projectre; vimeo.com/104118037; www.cmu.edu/cfa/cfa-magazine/issues/2018/project-re.html.

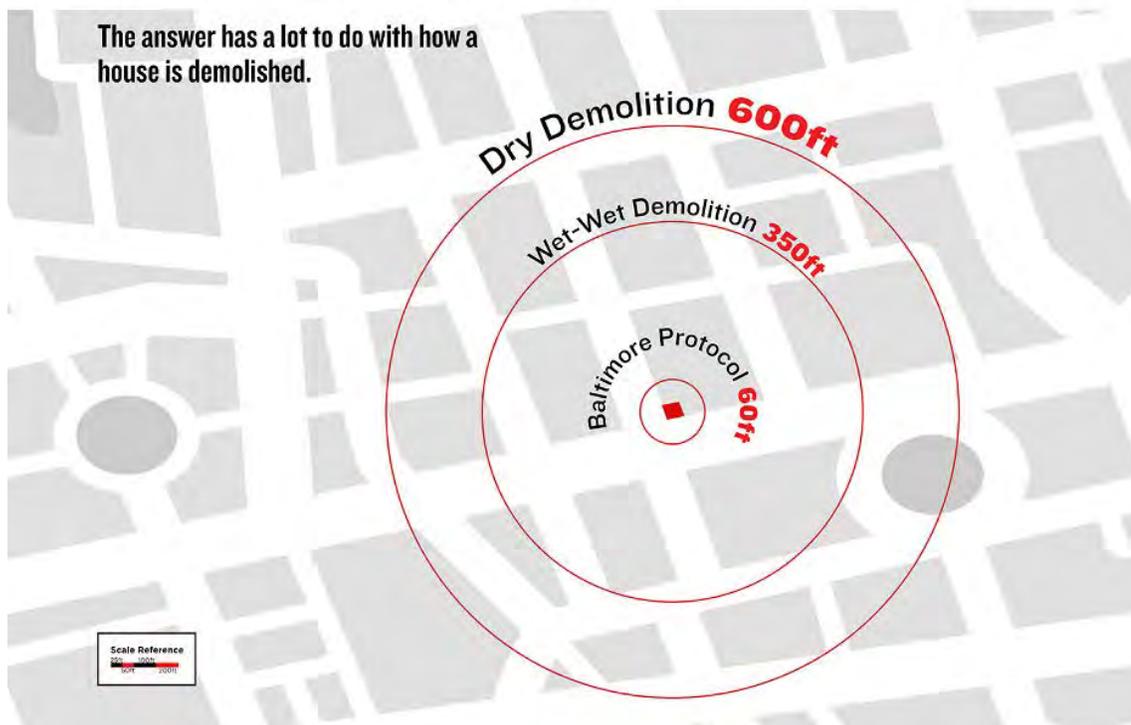
[21] Construction Junction is a nonprofit retail warehouse for used and surplus building materials. Trade Institute of Pittsburgh is a nonprofit building trade training provider dedicated to providing opportunities for individuals with barriers to employment, especially those reentering society. Urban Design Build Studio is a public interest design entity affiliated with the School of Architecture at Carnegie Mellon University.

Photo: Project RE_'s lab and workshop in Construction Junction, designed and constructed by students out of salvaged building materials, including church pews. Photo courtesy Office of Historic Preservation staff.

Demolition and Public Health

When a mechanical demolition occurs, hazardous particles are released into the air, disproportionately impacting the surrounding neighborhoods. Best practices dictate that demolition contractors take measures to decrease the airborne particulate matter by spraying water on the building during demolition and properly disposing of runoff. However, enforcement of such best practices is often spotty, if not non-existent, for small projects, resulting in the uncontrolled release of airborne and other environmental hazards.²² Furthermore, spraying the materials as they are mechanically pulverized just redirects the hazards to the soil contributing to long-term contamination.

How Far Can Lead Dust Travel?



The above graphic by Eilis O'Neill shows the potential for blooms of hazardous dust to travel far distances. The cheapest way to remove a structure is to dry demolish; a more expensive route involves spraying water continuously as demolition occurs. The Baltimore Protocol developed in 2004 involves covering a structure in plastic and keeping the structure wet during demolition to minimize dust travel.²³

[22] "What's with the Demolition Dust?" City Bureau, <https://www.citybureau.org/stories/whats-with-the-dust>

[23] <https://www.thenation.com/article/archive/are-we-doing-all-we-can-to-prevent-lead-poisoning/>

Prolonged exposure to poor air quality is especially harmful and is responsible for more than 100,000 deaths each year from heart attacks, strokes, lung cancer, and other diseases nationally. Lead, as well as other chemical pollutants from construction sites, such as asbestos, crystalline silica, mercury, and arsenic, can also soak into the surrounding soil. This has the potential to contaminate groundwater supply and drinking water which can cause serious health issues, including cancer, if ingested.²⁴

Deconstruction offers a way of mitigating these hazards. Removal of building parts piece by piece means hazardous materials remain largely intact. Processes like planning to remove lead paint and de-nailing are done at a warehouse in a controlled environment, avoiding contamination at the building site. Contact with hazardous materials occurs in building removal no matter what, but studies show less risk for airborne and ground seeping hazards when homes are deconstructed rather than demolished.²⁵

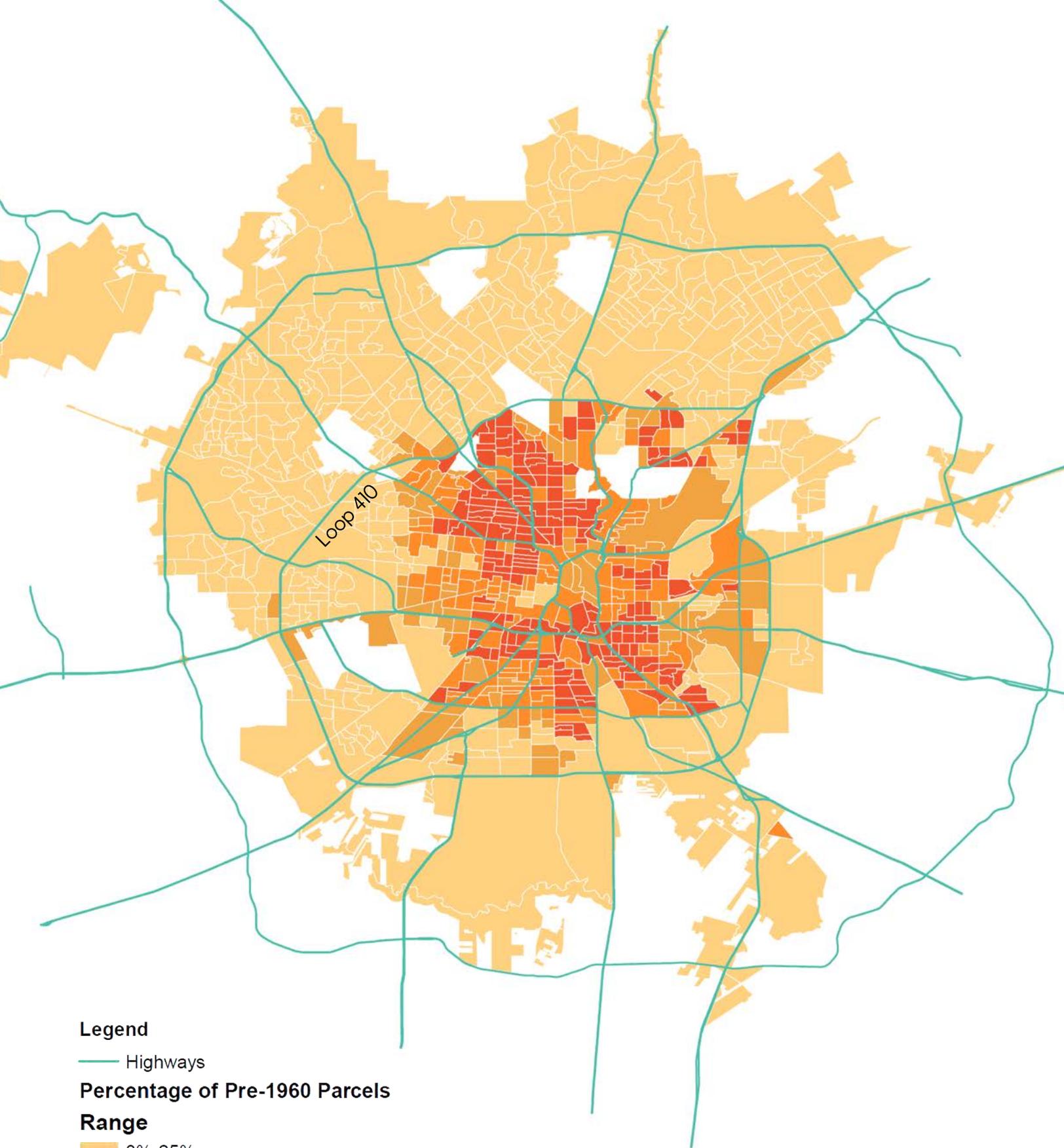
The surrounding neighborhoods are most at risk.

Due to San Antonio's rapid growth and demand for infill close to downtown, certain neighborhoods are feeling the burden of the environmental impacts of demolition more than others. A deconstruction ordinance offers a way for the City of San Antonio to minimize these public health disparities to advance their stated equity goals.

Poor air quality is the largest environmental health risk in the United States, however, not everyone is equally exposed to poor air quality. Black and Hispanic communities bear a disproportionate burden from air pollution caused mainly by non-Hispanic white Americans.²⁶ This is a result of past government policies such as redlining and racial discrimination. San Antonio's marginalized communities are feeling the impacts of these environmental and public health disparities.

In 2019, PlaceEconomics completed a study for the City of San Antonio on the contribution of older housing stock to affordable housing. The study also looked at demographic patterns within areas with concentrations of housing stock built prior to 1960. Analysis showed that older housing stock tended to be concentrated near downtown, within the loop of Interstate 410, as shown on the map on the following page. These neighborhoods are in flux, some experiencing disinvestment (the lasting impacts of redlining), others are now hot market neighborhoods where property values are rising rapidly (putting displacement pressure on residents). Market patterns analyzed in San Antonio's permit data show older homes are demolished and higher-priced housing is built in its place. On either end of the investment spectrum, the results show that low-income Hispanic households are disproportionately impacted.

[24] "Pollution from Construction: What Are the Types & How Can We Prevent It?" <https://www.highspeedtraining.co.uk/hub/pollution-from-construction/> [25] "Spread the Word, Not the Dust: Building Removal for Health," Reclaiming Vacant Properties Conference 2016 http://www.reclaimingvacantproperties.org/wp-content/uploads/2016/10/Breaking-it-Down_ALL.pdf. [26] "US black and Hispanic minorities bear disproportionate burden from air pollution," University of Minnesota, Proceedings of the National Academy of Sciences (PNAS), March 2019.



Legend

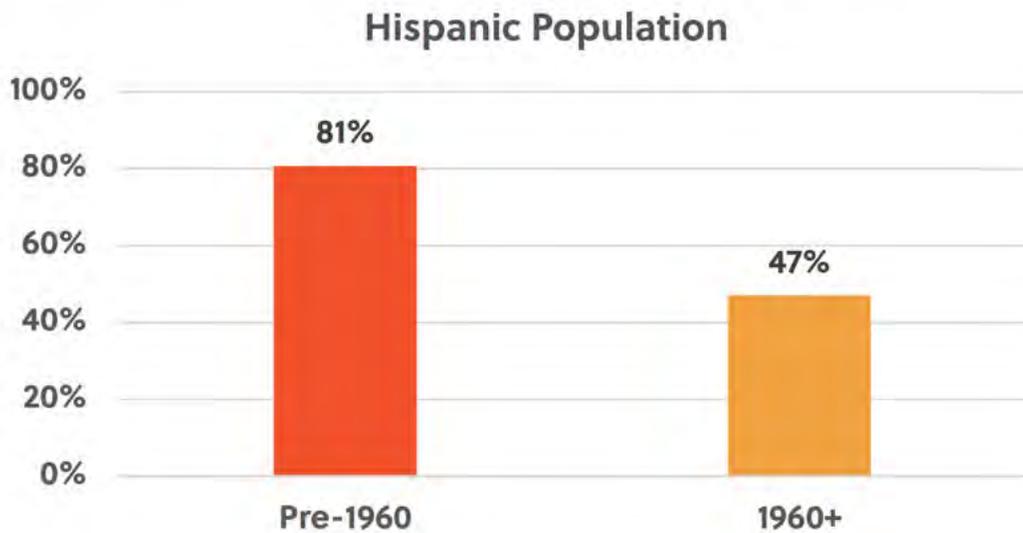
— Highways

Percentage of Pre-1960 Parcels

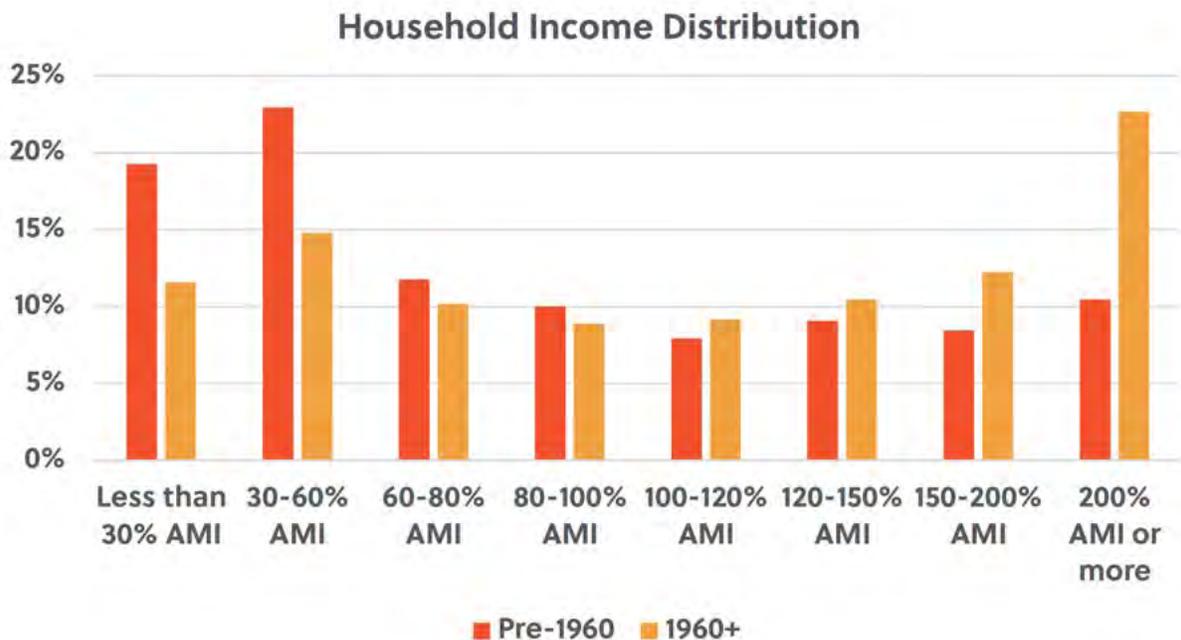
Range

- 0%-25%
- 25%-50%
- 50%-75%
- 75%-100%

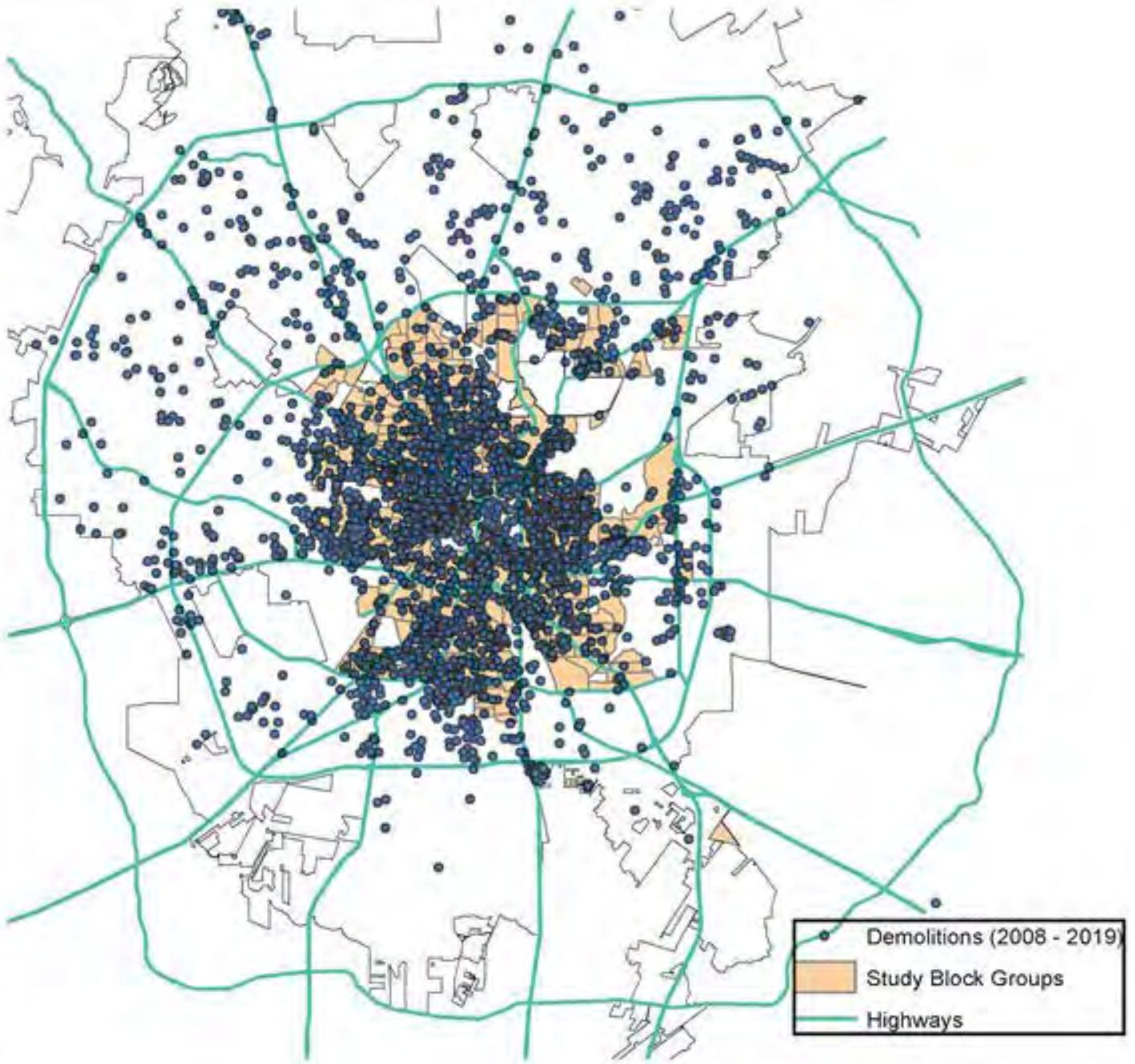
Hispanic households are most likely to live in pre-1960 homes.



Households on the lower-end of the income spectrum are more likely to live in pre-1960 housing as opposed to households on the higher-end who tend to live in newer housing.



The previous analysis of pre-1960 homes, low-income and Hispanic residents is important baseline information, as these are the areas of the city where demolitions have been most prevalent in the last 15 years.



As noted earlier, City Council has listened as residents have voiced their concerns and the data is alarming, making this an important policy area for the City to address. The Office of Historic Preservation has taken the lead on the Deconstruction Advisory Committee and undertaken stakeholder engagement with advocates and residents of older residential districts. Through this engagement, residents have articulated priorities they want the City to tackle first regarding deconstruction. Some of those that fell into the “High Priority” category include:

- Train a local workforce in heritage trades and deconstruction
- Divert high quality materials from the landfill
- Increase the affordability of high quality, salvaged materials

While a deconstruction ordinance can most certainly address the community priorities voiced above, it can also have a positive impact on reaching the health and equity goals of the city.

REUSE SPOTLIGHT

Shawn Wood, Construction Waste Specialist,
City of Portland Bureau of Planning & Sustainability

 Location: Portland, OR



Industry: Government (Municipal)

After the great recession, there was an uptick in mechanical demolition in Portland, Oregon, and residents were voicing their concerns about the loss of character in their neighborhoods as they watched McMansions replacing the older, “historic” homes. They were also upset about the lead dust and asbestos being released into the air. The city knew that they couldn’t stop all of the new construction, but they could at least take action to try and save some of the materials that were being lost.

“We convened an advisory group of nonprofits, for-profits, deconstruction contractors, historic preservation advocates, retailers, builders, and neighborhood representatives, said Shawn Wood, the Construction Waste Specialist at the City of Portland Bureau of Planning and Sustainability. With a large group of stakeholders on board, they decided to start with an incentives-based approach. It was a voluntary, phased approach that offered grant funding to help offset the costs of deconstruction. “This softened everyone up and got them used to the idea and the process,” Shawn explained, “it allowed us to normalize things and gain community support over a period of time.” There was signage in front of each project explaining the work that was being done. When people would come by a site, upset that the house was coming down, it was an opportunity to explain what was happening, how the materials would be saved, and how the air pollution would be reduced by using this method versus mechanical demolition. This seemed to work well. According to Shawn, “One day, a neighbor came by, really angry that a house was coming down. The crew talked with him a while, explained where everything was going, why they were doing things this way. The neighbor eventually came back to the site with a cake for the crew!”

The grant program and initial, phased approach kicked off in 2015, but it was so successful that it soon became clear the city needed to take it to the next level. In 2016, the full ordinance kicked in, requiring all buildings built in 1916 or before to be deconstructed, not demolished. There were still grant funds available in 2016, and that overlap of additional funding helped new contractors who hadn’t done this during the trial phase. Some used this leftover funding to help them rent equipment they would need for this kind of work; some used it to offset bids. To obtain the funds, contractors had to learn the ropes in terms of submitting pre-deconstruction forms that listed out what was being salvaged, collecting receipts, and other requirements, so there was an incentive to learn the process. Additionally, contractors had access to all of the recently gathered data from the trial phase on what things cost, and guidance on how things worked in regards to deconstruction. “This really helped us streamline the process and see what was holding things up. We didn’t want to have too much paperwork or to make things cost-prohibitive for contractors, so they were helping us learn as they went through the process, and we were helping them directly, in every way we were able,” Shawn explained.



Shawn also spent a year lobbying to shorten the review timeline for deconstruction permits as an added incentive to deconstruct vs. mechanically demolish a house. “There was originally resistance because the cost to do deconstruction was higher, but now we deconstruct two-thirds of all houses coming down, so there is increased competition and everyone is on a level playing field. Also, some contractors have come to realize that if they sell the reclaimed materials at retail prices in a showroom, they can lower their bids.” At the same time, the cost to mechanically demolish structures has gone up, so these two options are now close to being the same cost.

Things were going so well that the City Council suggested that the City do even more, and mechanical demolition is now held to a higher standard that protects neighbors from dust in the same way that deconstruction does. Mechanical demolition sites are now required to cover the surrounding ground in plastic and to hand-remove all exterior, painted materials. They must also have mandatory asbestos surveys and hose materials down prior to demolishing them due to dust concerns, making materials heavier and increasing the tipping costs on a site. Overall, this adds around \$3,000 or more in additional labor. “At this point,” Shawn said, “why wouldn’t you just deconstruct?”

REUSE SPOTLIGHT

Olivia Cashman, Environmental Protection Specialist,
Hennepin County Environment & Energy

 Location: Greater Minneapolis, MN  Industry: Government (County)

Hennepin County, Minnesota, launched its deconstruction grant program in February of this year. They don't currently have an ordinance, but are working with the Minnesota Pollution Control Agency, which is putting together an ordinance template that cities can adopt across the state. "Hennepin County's strategy is to begin with an incentive rather than enforcement," explained Olivia Cashman, an Environmental Protection Specialist with the Hennepin County Environment & Energy department, "The idea is to get people thinking about deconstruction in general – to make it more of a household term, to get them familiar with it before there's a requirement to do it. We wanted to help build the market in a voluntary way and offer funds to get things moving and see how things go."

The county has been implementing its outreach strategy to bring the 42 cities in Hennepin County on board. "We have a parallel pre-demo inspection process that checks for hazards before demolition, so when a city becomes enrolled in that kind of inspection, the residents are eligible for deconstruction grants as well," said Olivia. Currently, 14 cities are interested in being a part of this initiative. To engage and educate homeowners and contractors, the county has been using social media, local newsletters, public events, and local news coverage. It has also been working to create lists of salvage organizations in the area, as well as contractors who are available to do the deconstruction work or will accept building materials for reuse. When Olivia schedules pre-demolition inspections, information about the deconstruction grants is shared with the demolition contractor or property owner so they can evaluate deconstruction as an alternative to mechanical demolition.

The grants are available for a range of deconstruction projects, including a full-house dismantling, alterations, or renovations. Up to \$5,000 is available per project, and the property owner must be the one who applies. The funds are limited to residential projects, covering mostly single-family homes, but also buildings with up to four units. The county wanted to include mid-century materials, so homes built in 1970 or before can qualify.

Another key eligibility requirement for the grant funds is proof that a substantial amount of material will be saved. "The county broke down the process for homeowners into two separate categories," explained Olivia, "The first category is focused on interior fixtures like cabinets, crown molding, doors, and windows, with a minimum of five different material types. The second category is focused on things like wood flooring and dimensional lumber, with a minimum of 550 pounds from this second category." Olivia works with the applicant to make sure that they have an outlet for the materials, and to help them find a contractor who can do the work.

One applicant did some of the deconstruction work himself and used the grant funds to cover the work time he lost. “We require the work start after the agreement has been reached; people can’t be reimbursed retroactively with grant funds. But we don’t have a list of certified contractors that must be used – anyone can do the work if they prove they have kept all of those materials out of the landfill.”

The county has received 25 applications so far. Seven projects have been completed, six are in progress, and the county is reviewing several more. The program began with \$100,000 in funding and about \$40,000 remains, which Olivia hopes will be spent by the end of 2020. Another \$100,000 has already been requested for 2021. If a homeowner wants to take advantage of a tax deduction, it is their responsibility to work with an organization that will assess the value of the materials. They can also sell the materials to a for-profit. “We’ve had really good feedback so far,” said Olivia, “COVID-19 slowed things down in the spring, and since March, all site visits with grantees have been virtual. But, the work has picked up again this summer. We’ve tried to make this setup as quick and easy as possible for everyone, which has been appreciated. One grantee said this was her best interaction with a government agency she’s ever had! We feel very positive about the waste diversion, and are also trying to figure out how to save even more materials by encouraging the full preservation of buildings.”



Photo: City of San Antonio Certified Deconstruction Contractor Training in progress, October 2019. The training was held in partnership with the National Park Service (NPS), on whose property this circa 1930s structure was located. Some of the reclaimed materials went to the NPS "boneyard," or storage location for materials used to repair other buildings in their portfolio, including the San Antonio Missions.

Meeting Strategic Goals

The triple bottom line - environmental, economic, community - benefits of deconstruction is well documented. According to the Delta Institute, deconstruction can offer several environmental, economic and community benefits for communities with high vacancy rates and unemployment. Those benefits include:

Environmental benefits

- Reduced toxic dust from job sites
- Reduced heavy metal leaching into soil
- Reduced waste to landfills
- Reduced consumption of virgin material

Economic benefits

- Jobs from removing structures via deconstruction versus demolition
- Jobs for the hard-to-employ
- Resale of building materials
- Sale of value-added products

Social benefits

- Removal of blight
- Potential workforce development partnerships
- Potential for workforce training and contractor training
- Potential for local reclaimed materials to be used in restoration and preservation of older and historic structures²⁷

San Antonio has set out to achieve some lofty goals in the next 10 to 20 years. These goals are the result of plans developed by numerous municipal departments and agencies to respond to the needs of a growing region. While each of these strategic plans may represent the objectives of different interests – housing, the environment, etc. – a deconstruction ordinance is one tool that can help all of them achieve their stated goals.

A number of strategic plans were analyzed in order to understand how enacting a deconstruction ordinance in San Antonio could help better achieve other citywide goals and advance cross-departmental priorities. These plans included SA Climate Ready: Climate Action and Adaptation Plan (Office of Sustainability), the Housing Policy Framework (Mayor’s Housing Policy Task Force), the Recycling and Resource Recovery Plan (Solid Waste Management Department), and the Regional Solid Waste Management Plan (Alamo Area Council of Governments).

[27] “Deconstruction & Building Material Reuse: A Tool for Local Governments & Economic Development Practitioners,” Delta Institute, May 2018. <https://2ob80mdcn83q0w4fdbp1fvz2-wpengine.netdna-ssl.com/wp-content/uploads/2018/05/Deconstruction-Go-Guide-6-13-18-.pdf>

Goal/Priority/Vision	Aided by Deconstruction Ordinance
SAN ANTONIO RECYCLING AND RESOURCE RECOVERY PLAN 2010-2025	
Ensure that all residents of single-family and multi-family structures have access to convenient recycling	
Commercial goal: improve recycling opportunities for local businesses	
Residential goal: recycle 60% by the year 2025	
Improve recycling education and outreach to establish a culture where discarded materials are viewed as resources instead of waste	
Create waste reduction and recycling incentives so residents and businesses can benefit from reducing waste and recycling used materials	
Expand programs and revise City code to increase recycling	
SAN ANTONIO HOUSING POLICY FRAMEWORK	
Prioritize housing and neighborhoods in the COSA organizational structure	
COSA should take a leadership role in coordinating a community-wide housing system with housing and service providers	
Develop a 10-year funding plan for affordable housing production and preservation	
Stabilize the HOMEOWNERSHIP rate in San Antonio by increasing production, preservation, and rehabilitation of affordable homes	
Increase rehabilitation, production, & preservation of affordable RENTAL units	
Create housing opportunities for the most vulnerable residents (including but not limited to homeless, seniors, youth aging out of the foster care system, and people with disabilities)	
Remove barriers to housing production	
Address the impact of rising taxes on housing affordability	
Prevent and mitigate displacement	
Reduce housing discrimination and expand opportunity	
Create a governance structure for oversight and public engagement	

Goal/Priority/Vision	Aided by Deconstruction Ordinance
SAN ANTONIO CLIMATE ACTION AND ADAPTATION PLAN (CAAP)	
Make San Antonio carbon neutral by 2050	✓
Increase carbon free energy	✗
Reduce building energy consumption	✓
Reduce transportation energy consumption	✗
Advance the circular economy	✓
Material Reuse & Circularity: Support the development of a local circular economy to extend product lifespan through improved design and servicing and relocating waste from the end of the supply chain to the beginning	✓
Reduce Landfill Construction: Building on COSA's Deconstruction Pilot Program, accelerate the acceptance of low-waste construction projects through education, incentives and partnerships, and continue to pursue zero-landfill waste practices for all construction projects	✓
Promote biodiversity and healthy ecosystems	✗
Educate and empower	✓
REGIONAL SOLID WASTE PLAN (AACOG/TCEQ)	
Provide for recovery of material resources by emphasizing reuse, reduction (waste minimization), and recycling	✓
Improve the recovery of landscape resources by halting illegal dumping	✗
Maintain proper and safe disposal of remaining waste with adequate landfill capacities and promotion of the development of alternative technologies which are economically feasible	✓
Utilize both public and private financial resources to achieve optimum results in the best practices of integrated solid waste management in the AACOG region	✓

Recommendations

The findings of this report clearly show that continuing on with business as usual in a linear economy presents a wasted opportunity. Current mechanical demolition policy is not only costing the City valuable landfill space but is also shortchanging job opportunities and business growth. Most strikingly, these policies have thrown approximately \$1.4 million worth of salvageable material away annually. The following recommendations demonstrate how the Office of Historic Preservation, other City departments, and private organizations can come together to scale up a deconstruction program and strengthen the reuse market. These actions lay the groundwork for funding, collaborations, and policies that will help the City recover from COVID-19, move towards a circular economy, and achieve objectives for housing, development, sustainability, waste reduction, and equity visions.

Financial Incentives / Disincentives

GRANTS FOR DECONSTRUCTION

To ease the transition away from demolition, it may be helpful to provide a financial incentive to help get residents of San Antonio further accustomed to the concept of deconstruction. As discussed previously, Hennepin County, Minnesota, has instituted [such a program](#), offering grants of up to \$5,000 for the deconstruction of residential buildings under four units that were built prior 1970. A program such as this not only provides an incentive that offsets the difference between demolition and deconstruction costs but also raises awareness about the practice of deconstruction. San Antonio should consider allocating funds for a grant program that encourages the use of deconstruction.

RAISE DEMOLITION PERMIT FEE

The permit fee for demolition in San Antonio is nominal - only \$75 for residential properties. This clearly does not constitute a financial discouragement for razing and landfilling a building. Charging a high amount for demolition permit - say, \$5,000 to \$10,000 - and retaining the nominal fee for deconstruction would have two impacts. First, the cost would constitute a significant variable in the decision to demolish or remove a structure at all, and if necessary, would make deconstruction more financially viable for a majority of structure removals, even factoring in the increased cost of labor and indirect cost of time. Second, the fees when paid could be placed in a specifically designated Deconstruction Trust Fund or Affordable Housing Repair Fund to help pay for deconstruction grants, affordable housing programs, or material reuse innovation initiatives. This fee would only apply to complete demolition, not to minor demolition related to rehabilitation, relocation, adding an addition, etc.

CONSTRUCTION AND DEMOLITION (C&D) TIPPING FEE SURCHARGE

The current process of demolition and the disposal of C&D waste in landfills produces multiple costs, including pollution, human health costs, and environmental degradation. By imposing a surcharge on the local tipping fee for C&D debris at landfills, the City has the opportunity to better recoup the true costs to communities of how both demolition and a lack of recycling and reuse affects the residents of an area. Surcharge fees collected could be placed in a dedicated Deconstruction Trust Fund that can be used to cover deconstruction-related initiatives, including staffing, administrative costs, grants, deconstruction workforce training programs, material reuse innovation initiatives, etc. Because the landfills that service San Antonio are privately owned, imposing a surcharge would require strategic coordination with landfill owners Waste Management of Texas, Republic Services, and Texas Disposal Systems. The City could approach this partnership through shared environmental, resiliency, and community health initiatives.

TIPPING FEE WAIVER

While a tipping fee surcharge increases the cost of doing business for demolition contractors, there should also be an incentive that encourages these businesses to divert C&D debris from even entering the landfill. A tipping fee waiver could be issued when a demolition or deconstruction contractor demonstrates that they have salvaged, recycled, or donated a certain percentage, say 50%, of a building's C&D materials. An incentive such as this not only encourages contractors to keep waste out of landfills, but it could also help introduce them to deconstruction. Because the landfills that service San Antonio are privately owned, this waiver would require strategic coordination with landfill owners Waste Management of Texas, Republic Services, and Texas Disposal Systems.

Arts & Creative Reuse

SALVAGE-TO-ADU PROGRAM

Accessory dwelling units (ADUs) are additional living units added to an existing single-family or multi-family property. These include basement units, in-law suites, or carriage homes that provide smaller, more affordable housing units that can help homeowners offset the cost of owning their home. Many cities are adopting policies and programs to make the construction of ADUs simpler and more cost effective as part of a comprehensive affordable housing strategy. For an average sized home, the lumber salvaged from one deconstruction project would be sufficient to construct one ADU at minimum. The City should develop a Salvage-to-ADU program that utilizes reclaimed building materials for the construction of new affordable housing units. Such a program would advance multiple goals simultaneously: create affordable housing, promote the circular economy, and raise awareness on the importance of combating both these crises. This would be an opportunity not only to educate homeowners on how to finance, build, and manage an ADU, as is done in [Washington DC](#), but also an opportunity for education on building with reclaimed materials. A partnership could be developed with local designers and architects to develop a [pattern book or design guidelines](#) for ADU construction. A Salvage-to-ADU program could be incorporated into the Living Heritage Trades Academy curriculum to teach students how to build new construction with reclaimed materials. To further incentivize property owners, the City could streamline the permit process for the construction of ADUs with salvaged materials.

PARTNERSHIPS WITH LOCAL CREATIVE REUSE ORGANIZATIONS

As noted previously, San Antonio has over 130 private businesses in San Antonio whose primary Standard Industry Classification Code (SIC Code) situates them as part of the building material supply chain. Additionally, San Antonio's private and nonprofit ecosystem focused on reuse, broadly, is growing, as is a sustainability and reuse ethic. The City could build upon and expand their creative use events held in the past that focused on creatively upcycling reclaimed building materials, such as turning wood into painted coasters or reclaimed shingle siding into [holiday decorations](#). Local nonprofit Spare Parts, for example, is San Antonio's first Center for Creative Reuse that focuses on giving art supplies and other household items new life through resale. Excess small-scale salvaged building materials, such as board ends that are too short for reuse, could be diverted for creative upcycling events, partnerships, use by local artists, and more to bring awareness to the inherent value and creative possibilities of material reuse, as well as broaden the public understanding of deconstruction and salvage as a practice.

Workforce Development

LIVING HERITAGE TRADES ACADEMY

For years, the San Antonio Office of Historic Preservation has engaged in programming initiatives aimed at providing training in the “traditional trades” to students, contractors, homeowners, and community members. These programs include the Rehabber Club, window repair workshops, Donuts & DIY, the S.T.A.R. Program, and the Kelso House Learning Lab. Their most recent endeavor is the Living Heritage Trades Academy, a series of course offerings that, if completed in full, would result in the participant being granted a degree or Master Craftsperson certification. The program would offer multiple “tracts” of expertise, one of which being training in deconstruction and building material reuse. The full implementation of the Living Heritage Trades Academy would make San Antonio among the first cities in the country to provide city-led preservation training in the traditional trades, including deconstruction and reuse. This program could be done in collaboration with local university programs, such as the Historic Preservation Program at the University of Texas at San Antonio College of Architecture, Construction, and Planning. The City should consider the Office of Historic Preservation’s plan and work with them on implementing and scaling the Living Heritage Trades Academy in the near future.

TRAIN THE TRAINERS

In October 2019, the San Antonio Office of Historic Preservation hosted a 3-day deconstruction training event for City-licensed general and demolition contractors, with curriculum and training provided by The ReUse People. In November 2020, a smaller 3-day training was conducted by local certified deconstruction contractors Emily Lowry and Gator Dodson of Dodson House Moving. The City should continue to pursue funding, either through grants or a dedicated allocation stream, in order to conduct these training sessions regularly, as well expand into workforce development models.

Civic Engagement

CREATE A DECONSTRUCTION OR CIRCULAR ECONOMY POSITION

As San Antonio begins to implement policies related to deconstruction, it would be useful to create a new position within the City to oversee the rollout of a deconstruction initiative. This position would be the point person on all things related to deconstruction, as well as the interface between the public, other City agencies, and partner organizations. This position could be housed in the Office of Historic Preservation, the Office of Sustainability, or the Solid Waste Management Department. Primary responsibilities would include instituting public awareness campaigns, coordinating contractor training programs, overseeing grants and the associated Deconstruction Trust Fund, supervising inspections, networking, engaging associated sectors and affiliated City agencies, and overseeing the collection of data related to the deconstruction program. Portland, Oregon, has such a position, the job description for which is included in the below sidebar. In the near and long term, funding should be prioritized in the City's annual budget to build out the City's capacity to support ongoing circular economy initiatives, including a reuse innovation hub for multiple sectors, scaling up repair programs, and more to meet Climate Action goals. A scaled [Circular Economy Program](#) can be found in Austin, Texas.

FUND THE CREATION OF A COMMUNITY SALVAGE APP

As part of their deconstruction and salvage initiative public input, the City has realized that there is a missed connection between the availability of high-quality salvaged materials and the people that need them. In early 2020, the Office of Historic Preservation participated in the Office of Innovation's CivTechSA program, a partnership with Geekdom, to attempt to resolve these information asymmetries by connecting those who need building materials with those who have materials to sell or donate utilizing a digital platform. A local team from UTSA developed a tool under guidance from OHP staff as a "client" that included geolocation and image hosting to enable crowd-sourced aggregation and sharing of data for materials; a map that showed all of the drop-off or pick-up resources in San Antonio, like antique shops or salvage yards; locations where deconstructions are happening or have happened; and educational resources to guide users on how to harvest materials and unlock their potential for reuse. The project was temporarily tabled after the semester ended due to COVID-19 and financial limitations.

The City should divert funding to finish this innovative technological product. On the back end, this type of service has the potential to provide data on where materials are going and how they're being used, which can help inform the location(s) where building material storefronts or organizations are needed. This data would help the City understand where the need for these materials is most great. Additionally, this tool could also help inform a program on using salvaged materials as a disaster precovery and recovery strategy for older properties damaged by climatic events.

Sidebar: Construction Waste Specialist Job Description, Portland, OR

The Construction Waste Specialist for the Bureau of Planning and Sustainability (BPS) is responsible for developing programs that support the City's goals for construction waste prevention, reuse and recycling. The position will perform research, collect and interpret data, develop compliance strategies, draft outreach materials and expand program resources. The position also represents BPS in regional construction waste workgroups, project meetings and at outreach events. Prior experience with construction waste prevention methods and techniques is highly desirable.

Duties and Responsibilities:

- Convenes and staffs an advisory group of private sector contractors, neighborhood representatives, non-profit organizations, government agencies, and developers.
- Provides technical assistance and advice to City bureaus seeking information about construction waste reductions and deconstruction.
- Develops policy recommendations for consideration first by BPS Director and then by City Council, including developing ordinances, code language, and administrative rules.
- Manages multiple contracts, IGAs, and grant awards.
- Develops and administers a grant program to support private-sector deconstruction activities, including convening a weekly review committee made up of public officials and business representatives.
- Builds and maintains relationships with other public agencies and nonprofits to leverage those agencies work and resources to advance the City's goals and policies.
- Regularly responds to media and neighborhood association inquiries related to construction waste policies and accessory dwelling units.
- Tracks, maintains, and analyzes data related to demolitions, accessory dwelling units, and other green building trends.
- Maintains and develops content for multiple City-run web pages, including multi-jurisdictional meetings and presenting at national conferences.

Qualifications:

- Knowledge of and experience with resource conservation and/or waste prevention methods, practices, and techniques.
- Knowledge of and experience with principles, practices, and concepts of program planning and management, including evaluation principles, methods, and techniques.
- Ability and experience interpreting, explaining and applying local laws, regulations and programs related to resource conservation.
- Ability and experience communicating clearly and effectively, orally and in writing including the ability to prepare clear, concise and accurate reports and other written materials.
- Ability and experience analyzing issues and problems using a variety of inputs and data sources, developing alternatives, and making sound, appropriate recommendations.
- Ability and experience maintaining effective working relationships with managers, staff, community and industry groups, customers and others encountered in the course of work.

Local and Regional Partnerships

CONTINUE TO DEVELOP & SCALE PARTNERSHIPS

Effective partnerships are necessary to make a deconstruction program successful. As demonstrated in previous sections, the marketplace for reclaimed building materials is large and contains many different groups of stakeholders, but that is not where the partnerships should end. Below is a list of stakeholders that the City should continue to engage in partnerships as a deconstruction program takes shape in San Antonio:

- Private, nonprofit, and economic and community development corporations: Habitat for Humanity, LISC, Westside Development Corporation, Weston Urban, San Antonio for Growth on the Eastside (SAGE), local Chambers of Commerce, and others
- Sustainability and Waste Reduction Advocates: Sierra Club, Environmental Defense Fund, Texas Solid Waste Association of North America (TXSWANA), State of Texas Alliance for Recycling (STAR), Build Reuse, and others
- Green Building Organizations and Advocates: Build San Antonio Green, local and regional United States Green Building Council (USGBC) chapters, American Institute of Architects (AIA) San Antonio Chapter, and others
- Tech Startups, Accelerators, and Advocates: Geekdom, 80/20 Foundation, EPIcenter, Joint Base San Antonio, CivTechSA program, and others
- Artisans, Craftspeople, Tradespeople, Architects, and Designers
- Demolition, Deconstruction, Salvage, and House Moving Contractors
- Reuse-Focused Retailers and Startups, both in the building material reuse sector and additional reuse categories, such as art supplies, furniture, refilling stations, and others
- Home Builders and Contractors Associations: Associated Builders and Contractors South Texas Chapter, Greater San Antonio Builders Association (GSABA), National Association of the Remodeling Industry (NARI) San Antonio Chapter, and others
- Neighborhood Associations and Community Advocates
- Academic Institutions: Trade schools, K-12 school programs, various academic departments at universities, including construction science, sustainability, art, architecture, technology, entrepreneurship, nonprofit and business management, and industrial design
- Trade Unions
- Workforce Development Agencies and Related Organizations: Project Quest, Family Service, NXT Level Youth Opportunity Center, Goodwill San Antonio, and others
- Government Departments and Agencies: Solid Waste Management Department, Office of Sustainability, Office of Innovation, Development Services Department, Neighborhood and Housing Services Department, Metro Health, County of Bexar, Alamo Area Council of Governments, Texas Commission on Environmental Quality, Environmental Protection Agency, and others
- Affordable housing advocates and providers

City-led, Incubated, or Supported Warehouse Model

SHORT-TERM: CITY INCUBATED REUSE WAREHOUSE

Many of the necessary pieces for a thriving deconstruction and salvage industry are already in place in San Antonio: public approval, strong demand for high quality building materials, steady supply of valuable materials being lost to landfills, savvy contractors, and more. Yet the City lacks the infrastructure to connect these pieces in a way that would accelerate a deconstruction industry at scale. By making an initial investment to create a City-owned, independently operated salvage warehouse, the City has the opportunity to further develop this industry, create new jobs and businesses, support affordable housing initiatives and targets, and advance the creation of a circular economy in San Antonio.

The City should incubate a reuse warehouse to catalyze and grow the salvage and deconstruction industry in San Antonio. The City should acquire a warehouse facility for this purpose or make use of underutilized or vacant city-owned property. The Office of Historic Preservation has already identified a potential City-owned facility that meets this description. Currently, the property is not producing any income. The facility could be leased to a non-profit or a private operator in partnership with the City. While this is not a long-term solution, the property would be able to serve as a critical revenue source for the City in the interim while final plans for the property are being developed. At the same time, the partnership can incubate a local organization or business, reducing initial risk for the operator and providing an in-demand resource to the community. A similar incubation model is [being explored in Vancouver](#), and a decades-long successful model continues to thrive in Berkeley, CA, via Urban Ore (pages 22-23).

This warehouse will accept salvaged materials from deconstruction contractors, as well as drop offs and donations from the public. The operator of this facility will be responsible for the day-to-day management of the salvage warehouse, including intake, sorting, and selling of materials. This facility could also serve as a space for workforce development programs in retail sales and warehouse management. The operator would work in collaboration with the City on data tracking, public outreach, and to develop strategies to expand the market for salvaged building materials.

LONG-TERM: REUSE INNOVATION HUB

Once the incubated reuse warehouse grows into a sustainable and profitable endeavor, the City can expand the mission of the site or consider relocation for expansion, either through the incubation model or via a City-owned and operated venture. The warehouse could continue to serve its function as a storage and retail space, but it could develop into an innovation hub for contractors, architects, students, and small businesses to explore the possibilities of material reuse. This approach blends the existing models in Phoenix ([RISN Incubator](#)) and Houston ([ReUse Warehouse](#)).

In the long term, the innovation center could:

- Source and distribute materials for the City's affordable housing programs, such as the [Shotgun Pilot Project](#);
- House a learning lab for trades education, contractor skill development, or retail sales and warehouse management;
- Serve as a workshop space for local construction science and architecture students to learn how to design and build with reclaimed materials;
- Incubate and accelerate small businesses focused on material reclamation and reuse; and
- Serve as an innovation hub for transforming salvaged or excess building materials into new uses.

Other

PASS THE ORDINANCE

Over the last three years, the San Antonio Office of Historic Preservation has worked with an advisory committee and community stakeholders to develop a draft deconstruction ordinance. While it has not been formally proposed to the City Council beyond the committee level, it should be considered and adopted in the near future in order to further San Antonio's long-term sustainability goals. A deconstruction ordinance is necessary because:

1. The City and residents, as well as regional and state strategic plans, have placed a high priority on diverting materials from landfills; and
2. Current City policies incentivize tearing down and building new and residents felt a change is needed to slow the pace of demolitions; and
3. The status quo tear down-and-rebuild new is hindering the supply of affordable housing, as data shows rehabilitation is usually the most cost-effective way to achieve affordable housing goals.

TRAINING IN PROFESSIONAL PRACTICES FOR THE APPRAISAL OF RECOVERED MATERIALS

As was noted in several of the case studies in this report, one of the components of an effective deconstruction program is the ability to receive donations of materials from property owners who subsequently take a tax deduction on the value of the gift. However, in recent years the Internal Revenue Service has been rejecting some donation deductions based on what it sees as inappropriate valuation approaches used by some appraisers. The donor needs to feel confident that the deduction he/she is taking is based on an appraisal that will withstand IRS scrutiny. While there are many fully qualified appraisers in San Antonio, few currently have the specific expertise to establish the value of donated materials. There is a private sector firm – Green Missions, Inc. – that specializes in the appraisal of deconstructed materials. They do appraisals themselves and provide training in the specialty for other appraisers. The City should commission Green Missions (or a similarly qualified organization) to provide training to San Antonio appraisers interested in expanding their practice to this emerging field.

CITY-LED DECONSTRUCTION PILOT PROJECTS

As San Antonio transitions from demolition to deconstruction, it is important that the City leads by example. Pilot project programs are a common tool to demonstrate the need, complexity, costs, procedures, etc. of a venture. For instance, if the City orders an unsafe structure to be demolished, the enforcement order should be used as an opportunity to demonstrate and raise awareness for the practice of deconstruction. In this case, the City would deconstruct the unsafe structure as part of a public/private partnership (PPP) with local nonprofits in the construction, development, and job training fields. A government-led demonstration project such as this could be used as an opportunity to train a deconstruction workforce, while also developing more thorough and robust procedures to demonstrate the effectiveness of deconstruction to the public.

DECONSTRUCTION ECONOMIC DEVELOPMENT SUBSIDIES

Whether initial formalization of one or more businesses to sell reclaimed materials are housed in a publicly owned warehouse or other quarters, it is likely that during the start-up phase and early years, it will be necessary to subsidize a share of the operational costs. This should be seen, in part, as an economic development initiative. In attracting new or relocated businesses, early year subsidies are a frequent tool in economic development efforts. Given that this initiative will have positive impacts on both economic and environmental priorities of the City, early year subsidies should be seen as a prudent public activity.

Sidebar: Essential Elements of Deconstruction Pilot Projects

Each deconstruction pilot project should be seen as a laboratory, where the aim is to learn lessons and retrieve information that will be applicable to future projects. This should include:

1. Each deconstruction pilot project should be seen as a laboratory, where the aim is to learn lessons and retrieve information that will be applicable to future projects. This should include:
 - a. Total time spent on project
 - b. Total money spent on project
 - c. Number of worker hours used
 - d. Payroll as a share of total costs
 - e. Amount of materials reclaimed, by category
 - f. Resale value of materials reclaimed
 - g. Tons of material the did NOT go into the landfill and tipping fees that would have otherwise been paid
 - h. Tons of materials that still needed to go into landfill
 - i. Any characteristic of the building or the process that increase time and/or money expended
 - j. Any recommendations for overcoming characteristics mentioned above
 - k. Description of how reclaimed materials were stored
 - l. Description of how reclaimed materials were sold or otherwise disposed of
 - m. If possible, a profile of the buyers/users of reclaimed materials
2. The structure being deconstructed needs to be typical of other buildings that may face deconstruction in terms of size, materials, condition, and environmental problems
3. The process and lessons learned should be replicable
4. The information learned from each pilot project should be made widely available and, when sufficient projects have been undertaken, aggregated so that the marketplace can establish "rules of thumb" for future projects
5. Photo documentation of each step of the deconstruction process

Source: Delta Institute, "Deconstruction & Building Material Reuse: A Tool for Local Governments & Economic Development Practitioners," May 2018.

REFORM BUILDING CODE FOR RECLAIMED MATERIALS

The shift to prioritizing rehabilitation and reclaimed materials will not only require a change in attitudes but also in the regulatory practices of cities. A city's building code is one such regulatory system that ensures structures are built or rehabbed according to strict safety standards, yet they often prioritize new construction with new materials. However, there is precedent for buildings codes that are sensitive to building material reuse. Throughout the US, various municipalities have included language that specifically addresses reclaimed materials. For instance, Portland, Oregon, allows for the reuse of salvaged materials in certain types of building construction, as well as allowing for salvaged materials to be [sold, donated, or reused onsite](#). The [Los Angeles Green Building Code](#) goes even further, specifying that 2.5% of the project's estimated material cost must be put towards the purchase of salvaged materials. The Green Building Code calls out materials that can be easily salvaged and reused, and states that the salvaged materials must be in compliance with the current building standards requirements.



Photo: Flooring, shiplap, doors, and frames reclaimed from the site of a City of San Antonio Certified Deconstruction Contractor Training, loaded for transport to off-site warehouse for redistribution. Courtesy Office of Historic Preservation staff.

Recommendations Matrix

Potential Tool	Effectiveness	Complexity	Cost to City	Stakeholder Approval
FINANCIAL INCENTIVES				
Grants for Deconstruction	Moderate	Low	Moderate	High
Raise Demolition Permit Fee	Moderate to High	Low	Low	Low
C&D Debris Tipping Fee Surcharge	Moderate	Moderate	Low	Moderate
Tipping Fee Waiver	Moderate	Moderate	Low	Moderate
ARTS & CREATIVE REUSE				
Salvage-to-ADU Program	Moderate	Moderate	Low	Moderate
Partnerships with Creative Reuse Orgs	Moderate	Low	Low	High
WORKFORCE DEVELOPMENT				
Living Heritage Trades Academy	Moderate	High	High	Moderate
Train the Trainers	High	Moderate	Moderate	High
CIVIC ENGAGEMENT				
Create a Deconstruction or Circular Economy Position	High	Moderate	Moderate	High
Fund the Creation of a Community Salvage App	High	High	Moderate	High
LOCAL & REGIONAL PARTNERSHIPS				
Develop & Scale Partnerships	Moderate	Moderate	Low	High

Potential Tool	Effectiveness	Complexity	Cost to City	Stakeholder Approval
CITY-LED, INCUBATED, OR SUPPORTED WAREHOUSE MODEL				
City Incubated Reuse Warehouse	High	High	Moderate	High
Reuse Innovation Hub	High	High	Moderate	High
OTHER				
Pass the Ordinance	High	Moderate	Moderate	Moderate
Training in Professional Practices for the Appraisal of Recovered Materials	High	Low	Low	High
City-Led Deconstruction Pilot Projects	High	High	Moderate	High
Deconstruction Economic Development Subsidies	High	Moderate	High	High
Reform Building Code for Reclaimed Materials	Moderate	High	Low	Moderate

Next Steps

Taking these recommendations into consideration, the City should begin to formulate its next steps. In order to meet strategic goals set out by various City departments, and advance towards a more circular economy through deconstruction, the following steps should be high on the list of priorities for the City:

1. Bring a recommendation forward to the Culture and Neighborhood Services Committee to proceed with the City-Ordered Demolitions Pilot Project, whereby all City-ordered demolitions follow the draft deconstruction ordinance.
2. Pass the proposed deconstruction ordinance, to include the adoption of Phase I and Phase II with Council direction to revisit expansion into commercial structures by 2023.
3. Develop incentives to encourage and increase deconstruction activity for all building types in San Antonio, to potentially include a micro-grant and reporting program; expedited permit review for deconstruction projects; and other cost-neutral considerations, as advised by the Deconstruction Advisory Committee.
4. Identify barriers to reusing reclaimed building materials and remedy them by developing a Salvage-to-ADU Program in conjunction with the evaluation of existing local building codes. Priority considerations include the relaxation or revision of select local building codes to make the reuse of existing materials in restoration or small-scale new construction easier; and tying the Salvage-to-ADU concept into ongoing affordable housing strategies as outlined in the City's Opportunities at Risk Affordable Housing Study and Housing Policy Framework.
5. Establish workforce development programs aligning with the Ready to Work SA initiative that focus on increasing of the local pool of service providers offering skills and services that aid in the repair, reclamation, reuse, creative upcycling, or innovation of building materials. Programs will also align with the City's adopted Climate Action and Adaptation Plan (CAAP) in an effort to build a local workforce that advance's San Antonio as a hub for circular economy jobs.
6. Identify a facility for City-Incubated Reuse Warehouse and begin recruiting a partner to operate it.



Conclusion

The current linear economy in San Antonio is not only having detrimental effects on the environment and resident health, but is also wasting economic, employment, and equity opportunities. Currently, an average of \$1.4 million in salvageable building materials are heading to San Antonio landfills annually, amounting to approximately 338,262,288 pounds (or 169,131 tons) of debris over the past ten years. In 2020 alone, over 5.8 million board feet of lumber could have been salvaged by utilizing deconstruction as the primary building removal method instead of demolition, which is equivalent to 7,700 mature trees. In addition to the strain on San Antonio's waste stream, the air quality implications of demolitions are disproportionately affecting minority and low-income neighborhoods. Due to the price of virgin lumber increasing during COVID-19, valuable building materials are being landfilled when they could be reclaimed for reuse and resale at a discounted price in the local retail market, which could help contribute to the City's affordable housing repair and production targets, in addition to contributing positively to the local economy.

Shifting to a circular economy is something that San Antonio is well poised to undertake. A necessary move the City must make to advance building material reclamation and reuse is to pass a deconstruction ordinance. Deconstruction creates new sources of value, which can be measured in potential jobs, retail sales, new businesses, and advancement in building materials innovation. It also presents an opportunity to save valuable, high-quality building materials from entering the waste stream and ending up in already-stressed landfills. With a deconstruction ordinance in place, the City of San Antonio San Antonio Office of Historic Preservation can work in partnership with other City agencies, public partners, and private organizations to develop a robust deconstruction and salvage program that supports a healthy local reuse industry. These efforts will aid the City in COVID-19 workforce recovery, move towards a circular economy, and achieve affordable housing, sustainability, waste reduction, public health, and equity goals.

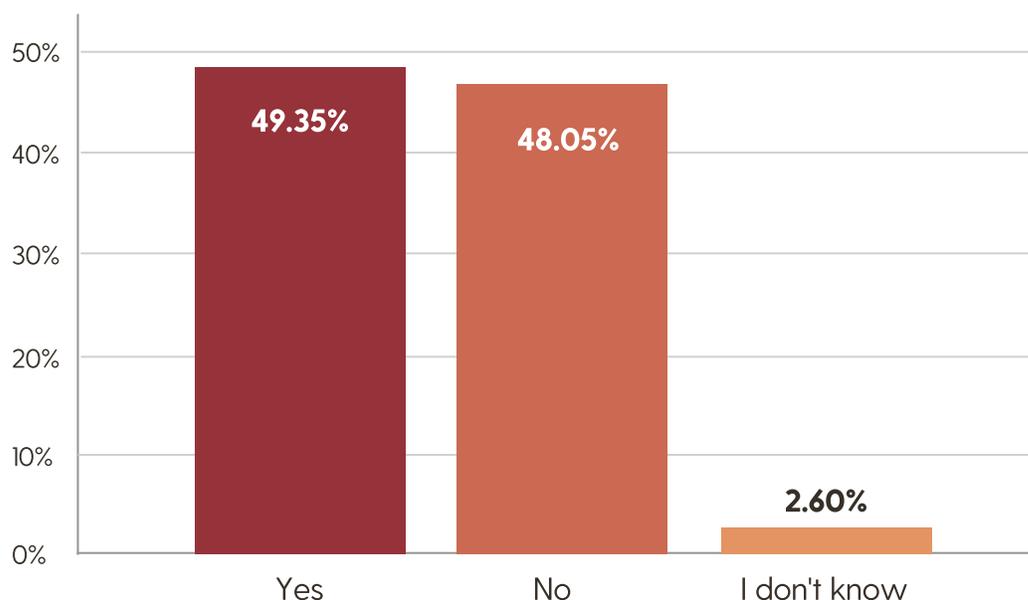
Appendix

Appendix 1: National Deconstruction Survey

As part of this study, PlaceEconomics conducted an online survey of experts in the field of deconstruction, which included experts, practitioners, and advocates. Emails containing a link to the survey were sent to names provided by national nonprofit Build Reuse.²⁵ The survey was open from October 21 to November 17, 2020. A total of 77 responses were received from across the country. The breakdown of the characteristics of the responders is included below. Based on the number of responses and the expertise of the respondents, there can be considerable confidence that these survey results represent the current state of deconstruction actions and policies as of late 2020.

Question 1: Is there a deconstruction program in your city?

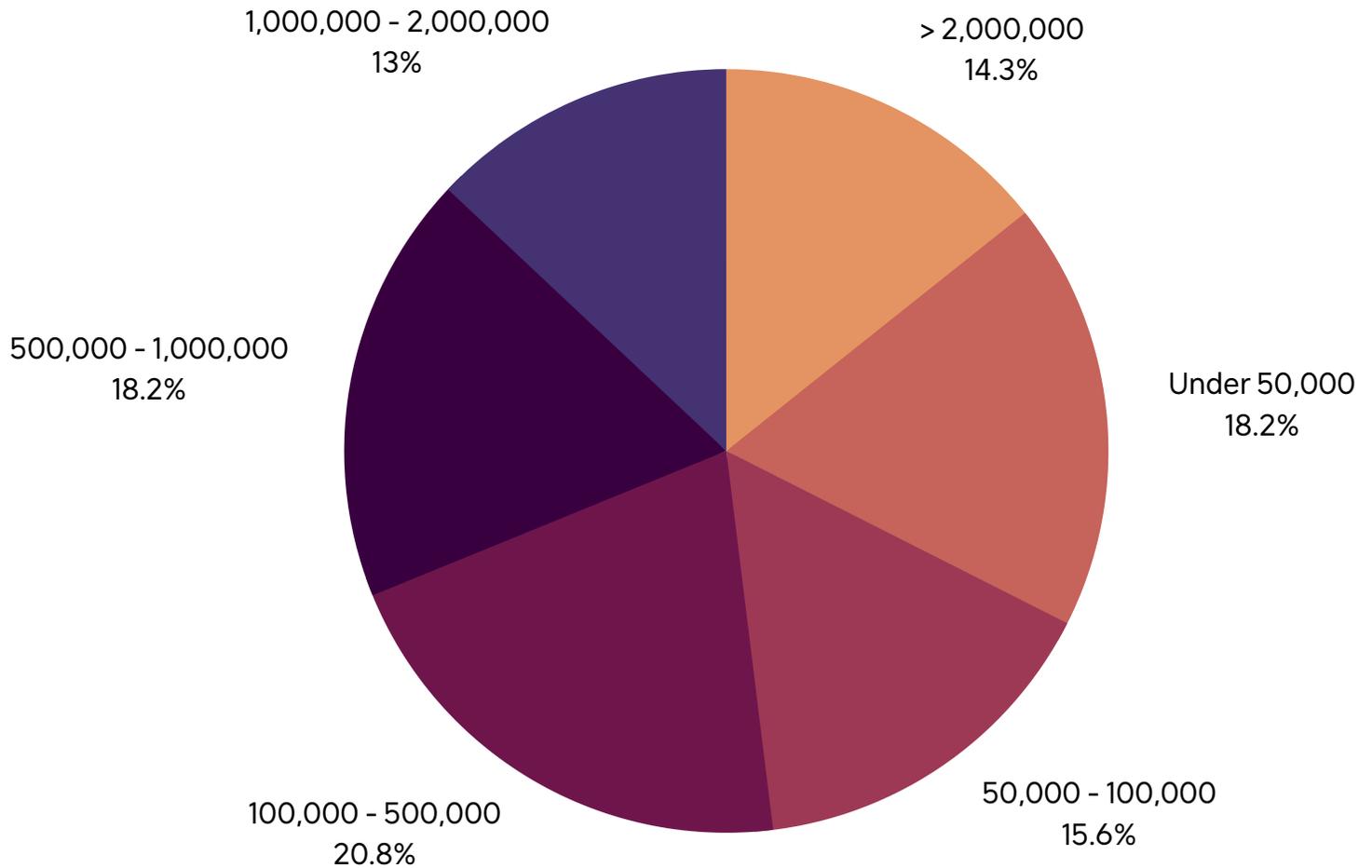
Almost exactly half of survey respondents said there was a deconstruction program in their city. However, even the responses to those who answered “no” should not be discounted, as nearly every respondent was knowledgeable about the subject, through their work in multiple communities, their advocacy for deconstruction, or through an academic focus on deconstruction.



[13] Build Reuse is a national 501(c)3 nonprofit that was founded in 1994 and exists to "empower communities to turn construction and demolition waste into local resources." www.buildreuse.org

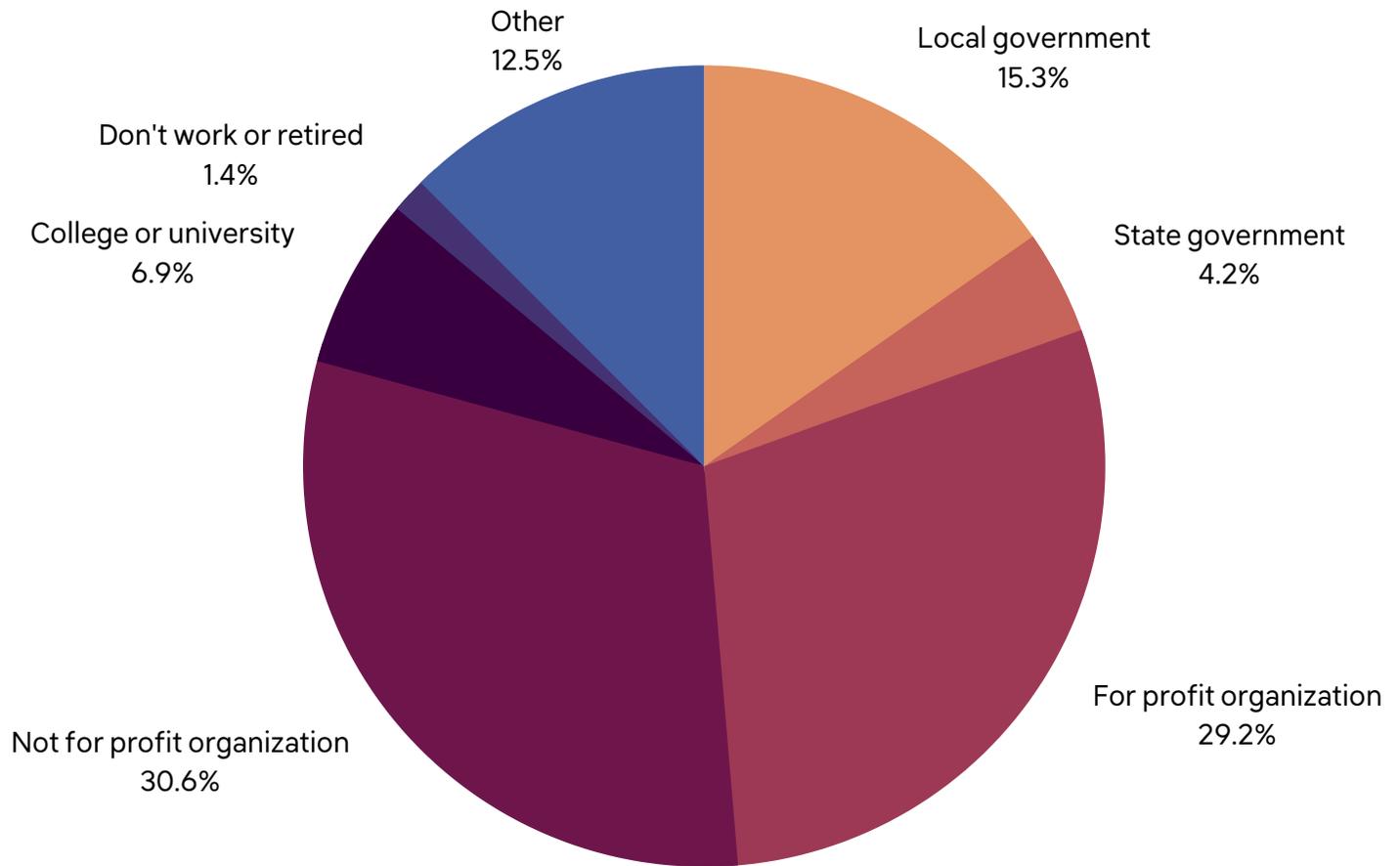
Question 2: What is the size of your city?

There was a wide distribution of city sizes of survey respondents as can be seen below. Over a quarter of the responses came from cities larger than 1,000,000 which may be most comparable to San Antonio.



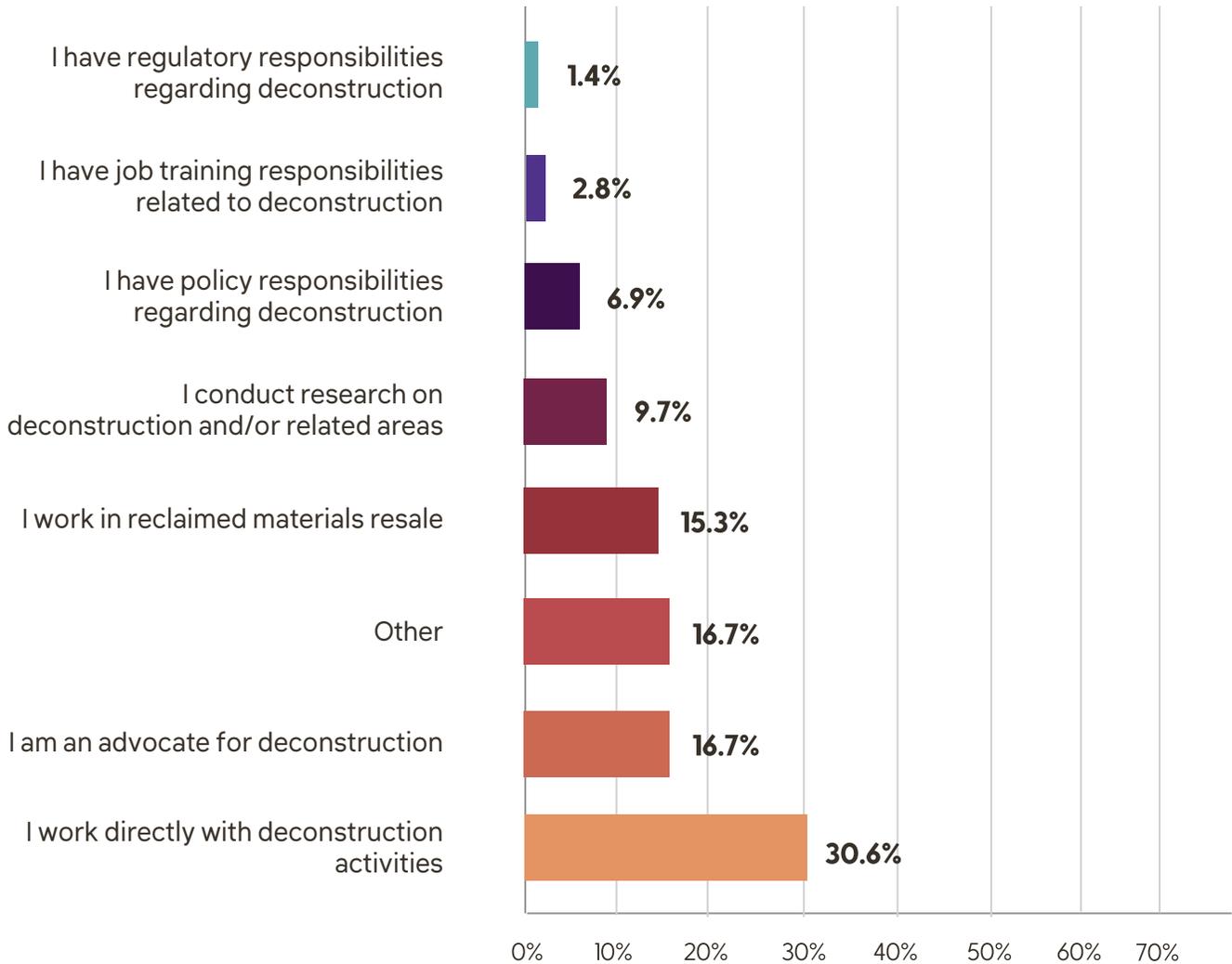
Question 4: In which sector do you work?

All sectors of the economy - public, private for-profit, non-profit, as well as academia - were represented among the survey respondents and in generally balanced numbers: government (19.5%), private for-profit (29.2%); non-profit (30.6%) and academia (6.9%). Those responding "Other" included appraisers, investors, transportation, and construction. But what is clear is that the nonprofit sector plays a critical role in the deconstruction industry.



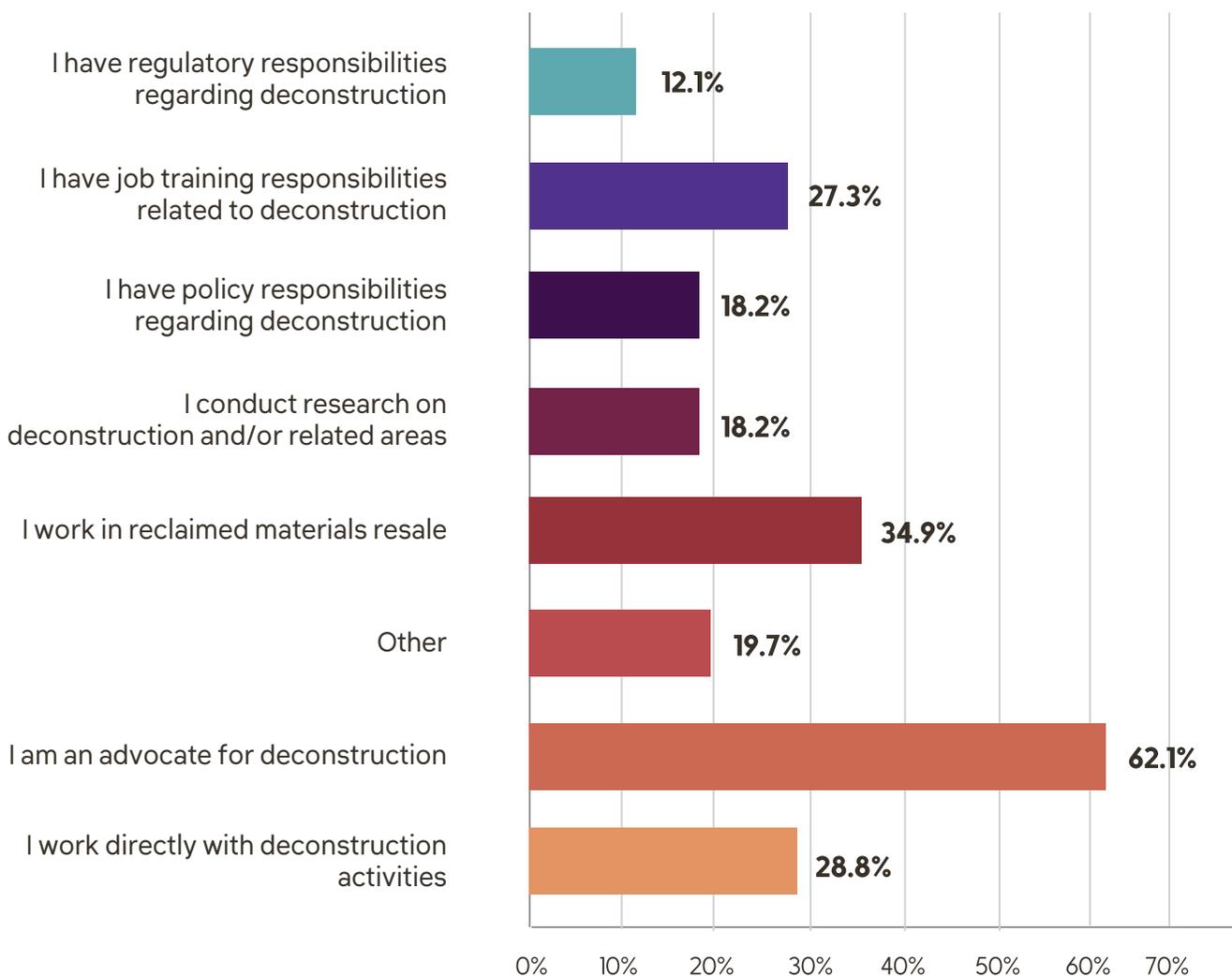
Question 5: What is your PRIMARY role in deconstruction efforts?

As will be seen in Question 6, most of those involved in deconstruction are actually involved on multiple levels. But when allowed only one response, nearly a third (30.6%) responded “I work directly with deconstruction activities” followed by “I am an advocate for deconstruction” (16.7%) and “Other” (16.7%). “Other” responses included those who identified their role as appraiser, job training and supervision, education, solid waste administrator, operating recycling facility, and “all of the above.”



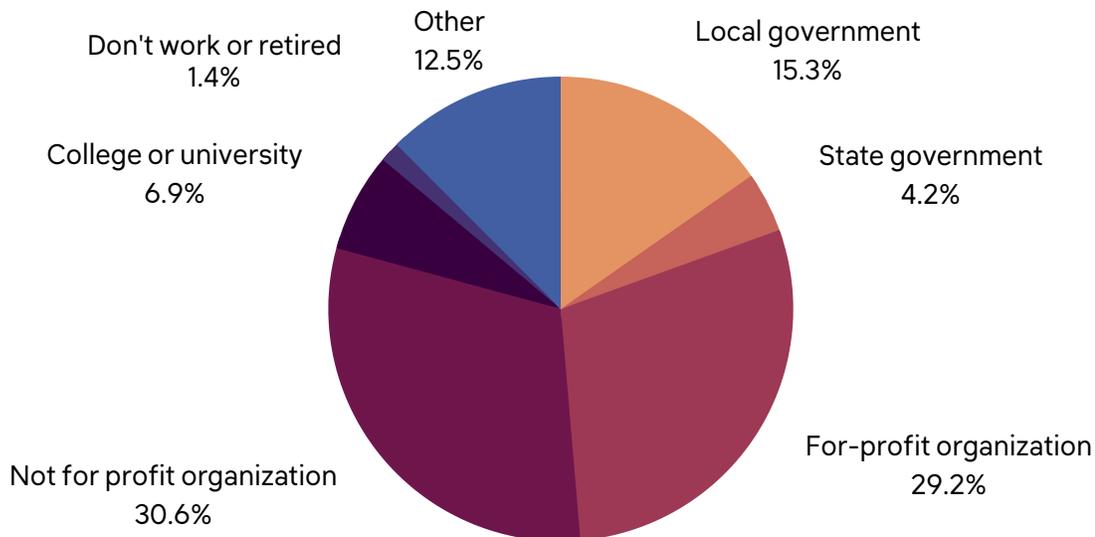
Question 6: If you have roles beyond your primary role, what are they?

It is evident that those involved in deconstruction efforts are wearing many hats. For Question 6, respondents were allowed to mark as many roles as they thought applicable. Eighty-six percent of all respondents (66 of 77) identified a role they played beyond their primary role. While only 16.7% of respondents identified “advocate” as their primary role, nearly two-thirds (62.1%) played the additional role of advocate for deconstruction.



Question 7: If your city has a deconstruction program, how is it organized?

For this question respondents were able to choose more than one answer, and many did. In a plurality of cases the deconstruction program was handled by the private sector, followed closely by one or more non-profit organizations. Because more than one answer could be selected, some cities have programs within both the private and non-profit sectors. Less than 1 in 5 deconstruction programs was run directly by the city government.

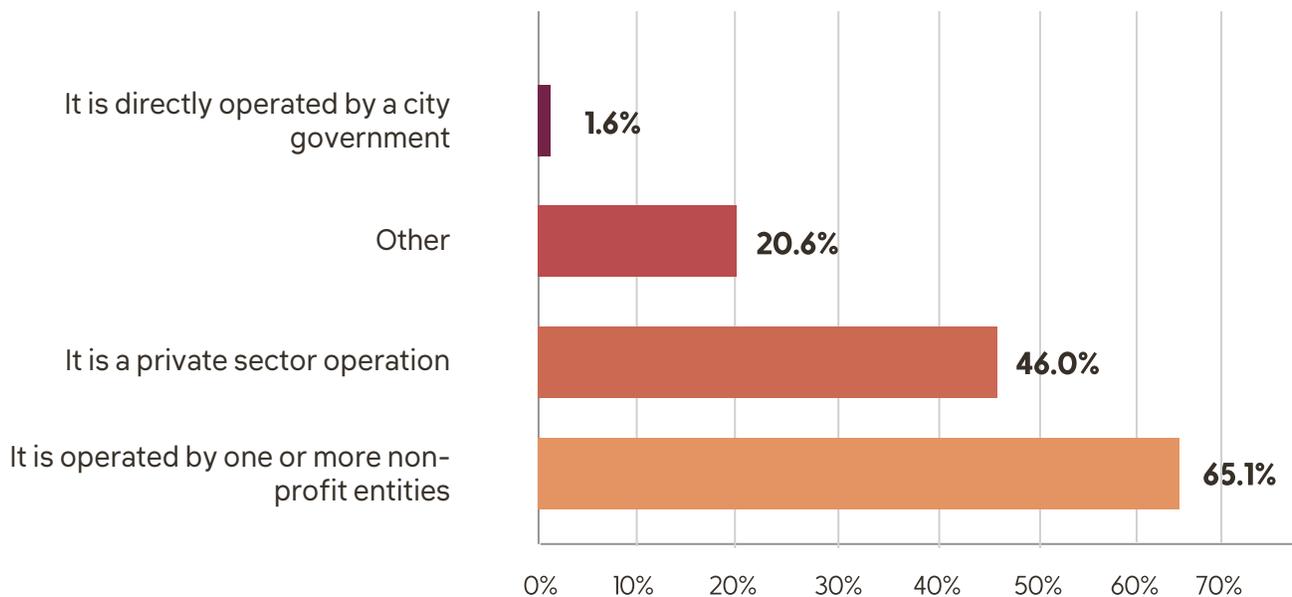


Not included in the answer distribution above were those who answered "Other." Among the comments in that category were:

- A local city (Palo Alto) has the first complete deconstruction ordinance for all buildings: residential, commercial and government which we assisted in drafting
- A previous deconstruction unit was operated by a Non-Profit
- City has deconstruction regulation that applies to private sector contractors.
- City of Berkeley has C&D requirements on certain types of jobs, but no voluntary or mandated deconstruction policy.
- City passed local laws related to deconstruction
- County grant program to incentivize residential deconstruction
- Deconstruction program in collaboration with resource shop
- No formal program, but one department is advocating deconstruction as an alternative in some building removals.
- The deconstruction program is facilitated by the city government via issuance of waste diversion permits. Physical deconstruction is performed by private entities
- There are companies who do deconstruction in the city, but the City itself does not have an ordinance or formal program.
- There are none I've been approved to begin operations but have had no community support.
- There is no formal municipal program but the city has previously offered a shorter turnaround time for permit approval for demolition activities that plan to recycle or reuse a significant percentage of debris generated (this does not exclusively apply to deconstruction projects - more traditional demolition projects with a commitment to sorting and recycling also qualify).
- There is some support from local government, but the main driver is the existing for-profit deconstruction and salvage/deconstruction companies
- Very loosely... less than 5% of demolition activities

Question 8: If your city has a marketplace for the sale of recovered materials, how is it organized?

For this question as well, respondents were allowed to choose more than one response, and many did. It appears that some communities have more than one marketplace for the resale of recovered materials. Based on Question 7, the most common organizational form of the deconstruction process itself is a private sector company, but for the sale of the recovered materials, a non-profit entity is most likely to be involved.

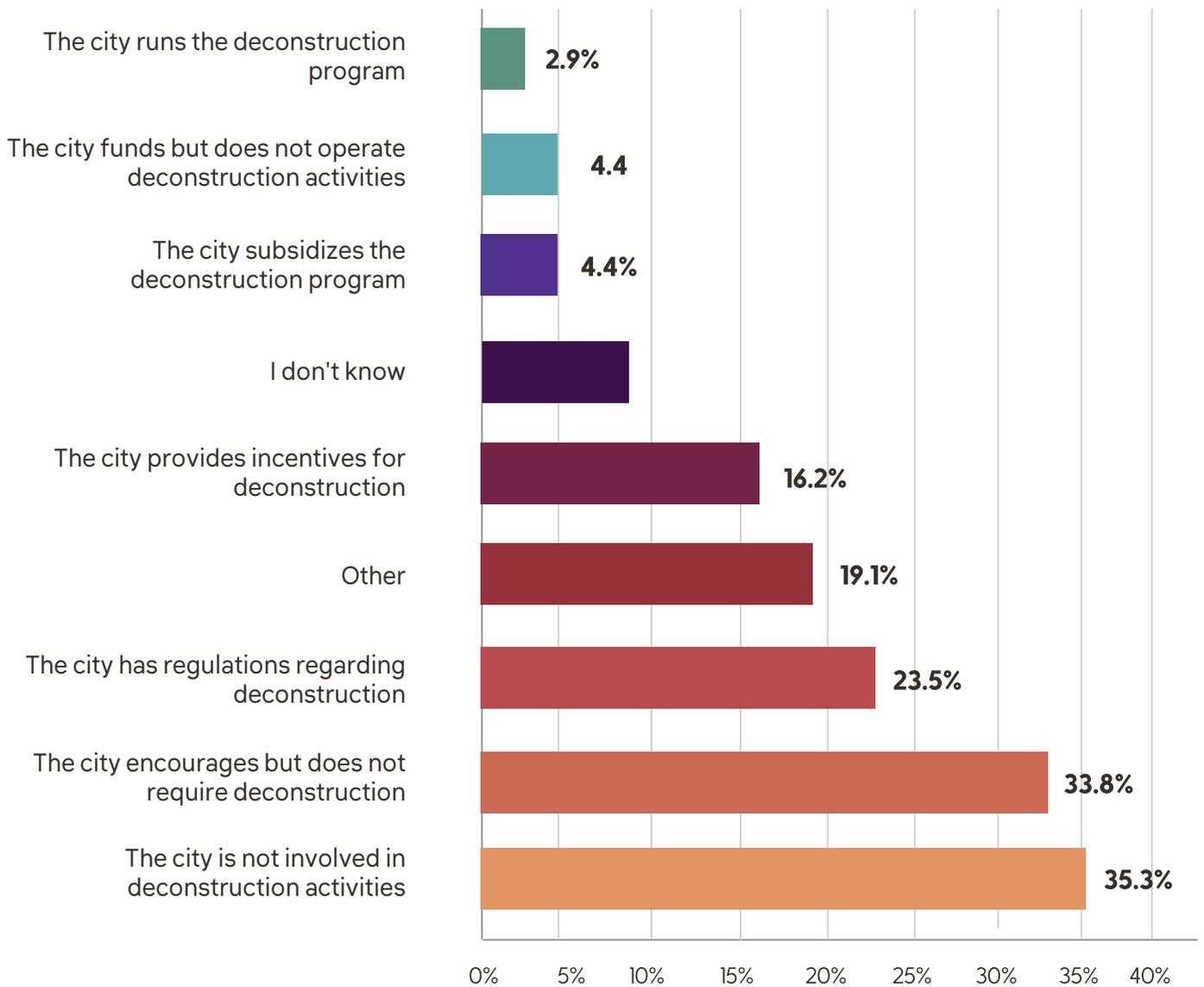


Among the "Other" responses were:

- A previous reuse store operated by a non-profit plans to re-open.
- Deconstruction program in collaboration with resource shop
- It is a combination of for-profit and non-profit enterprises, what we call an "ecology of reuse". Government supports both types with contracts.
- Many of the deconstruction companies are non-profits and they have their own resale stores.
- Multiple for- and non-profit marketplaces for recovered materials.
- Myself and recovery shop
- We are a for-profit business not located in city limits. The department we work with advocates for us in an effort to ensure our successful sale of materials we recover from their projects

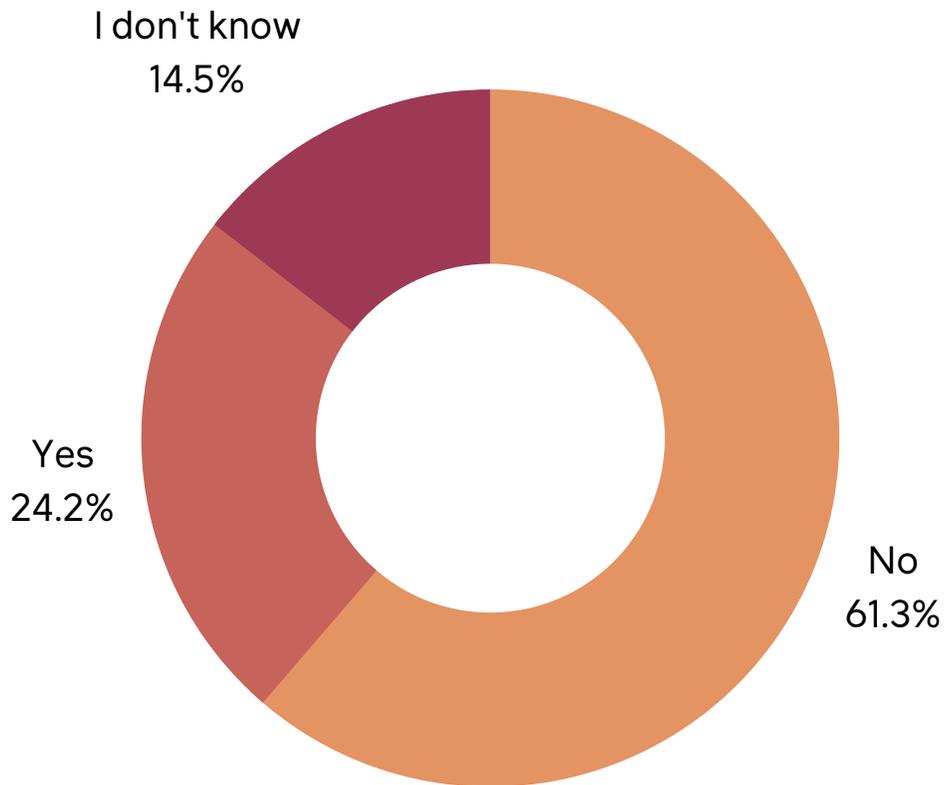
Question 9: What is the role of the city government in local deconstruction efforts?

It is at the city level that demolition permits are issued, and in most places the solid waste landfill is operated directly or indirectly by the local government. So, one might assume that the city would have a major role in the deconstruction process. That apparently is not the case. In less than 3% of time does a city directly run the deconstruction program; in more than a third (35.3%) of the cases the city is not involved at all. About one in four cities (23.5%) have regulations regarding deconstruction.



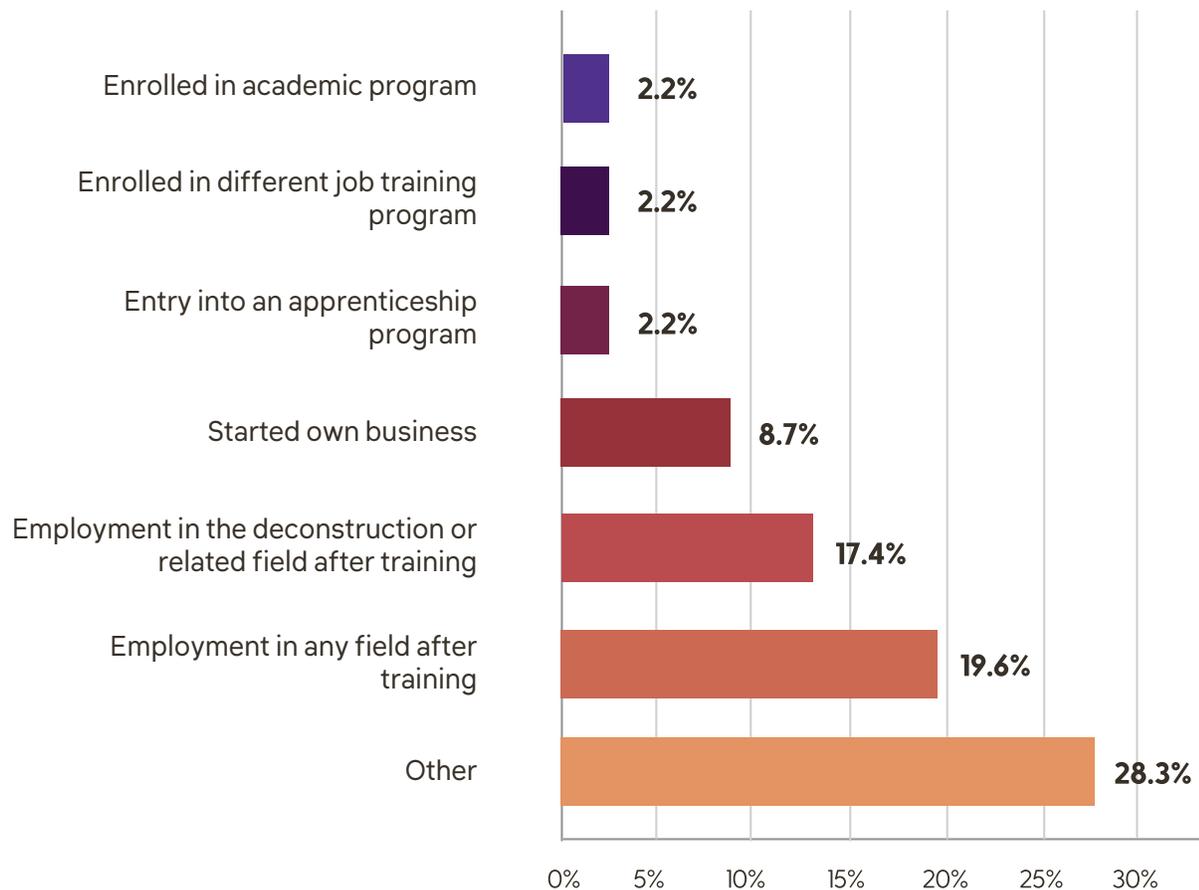
Question 10: Does the local deconstruction program have a job training component?

One of the benefits of deconstruction is that it is significantly more labor intensive than is demolition. Nearly every city needs more jobs, particularly for those without advanced formal education. This, then, would seem to be a natural fit – tying job training to a deconstruction program. Fewer than a quarter (24.2%) of deconstruction programs have a corresponding job training component.



Question 11: If there is a job training component, how is success measured?

Given that very few deconstruction programs seem to have a job training component, it is not surprising that this question had a much lower response rate than did the others. Respondents were allowed to choose more than one answer for the question, and their responses are below.

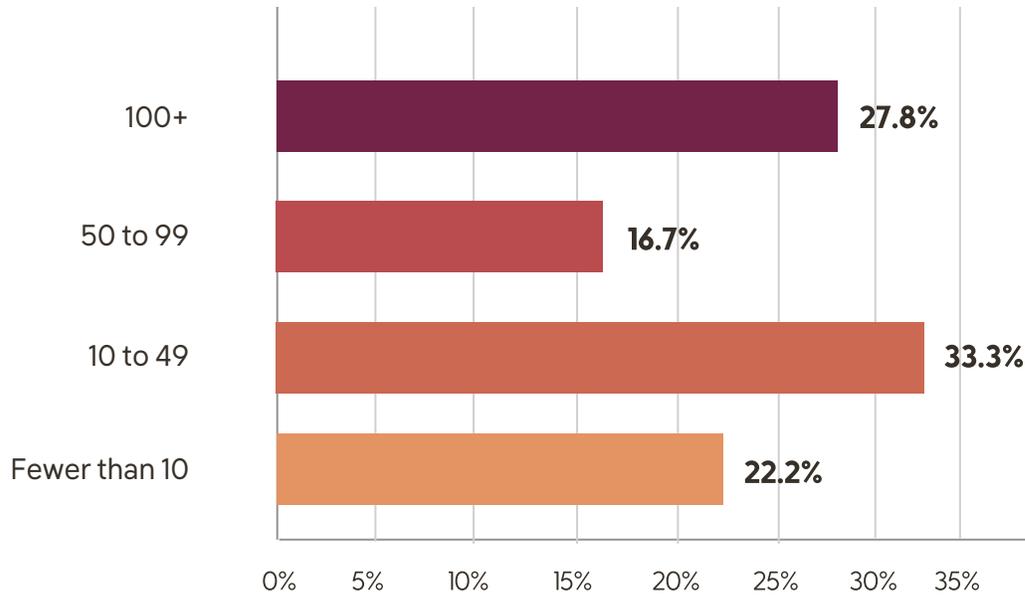


The response garnering the most common mention was “Other”. If respondents checked “Other” they were asked to specify. Among the volunteered comments were:

- Our program is centered around a community benefit cooperative (recovery of natural resources and human potential), where new recruits (homeless and disadvantaged) have an opportunity to become sober and earn a full or part-time employment.
- Plans and discussions with State Dept of Corrections for training program
- Some of the non-profits have job training
- Success is measured in graduation and job acquisition after the fact
- The City of Portland has done a deconstruction workforce training and a contractor training-- one cohort each
- Architects and contractor
- Building traction but not yet implemented
- Deconstruction is done with subsistence-level waged workers
- Job acquisition and retention
- My program would offer employment for 6 months to build experience
- Our non-profit has a jobs training program which includes one or more salvage / deconstruction trainee or intern positions. Many of our organization's new hires come through that program. Employment is not guaranteed upon completion of the program
- The job training is only for employees of the private company

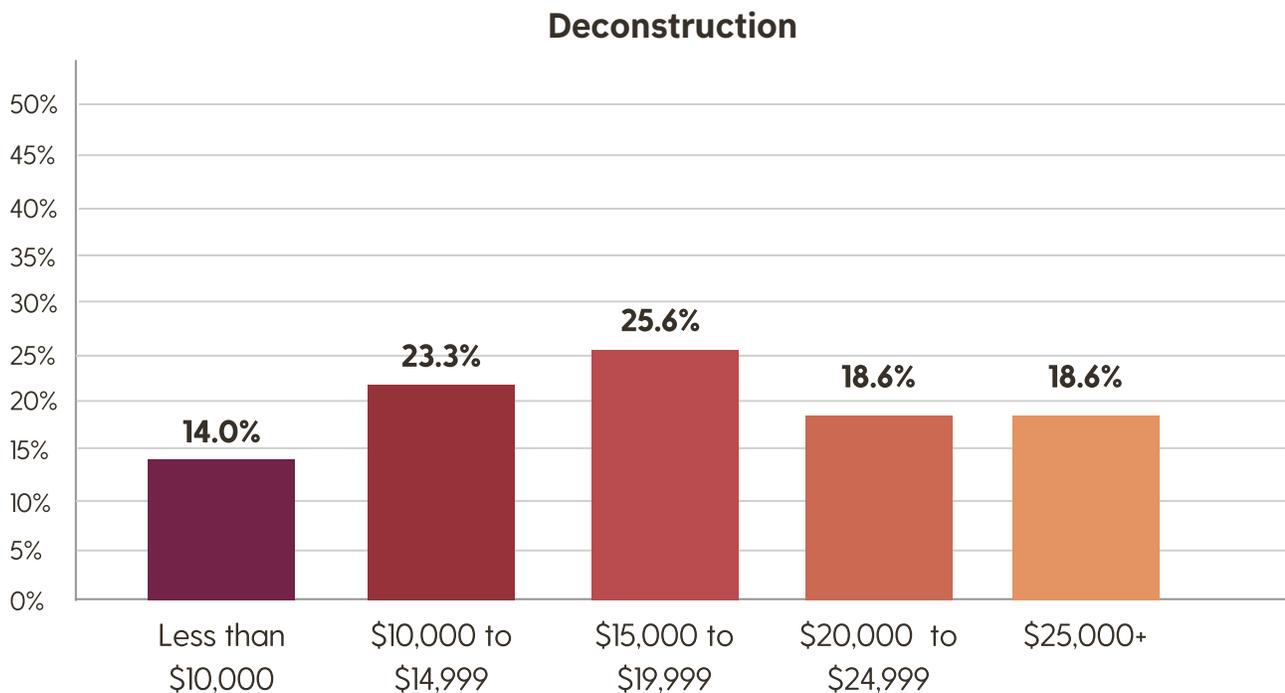
Question 12: If your city has a deconstruction program, approximately how many buildings are deconstructed each year?

Most of the respondents either did not know the number of deconstructions per year or their city did not have a deconstruction program. Of those willing to make an estimate, a third reported between 10 and 49 per year, with just over a quarter (27.8%) saying there were more than 100 per year and just under a quarter (22.2%) reporting fewer than 10.



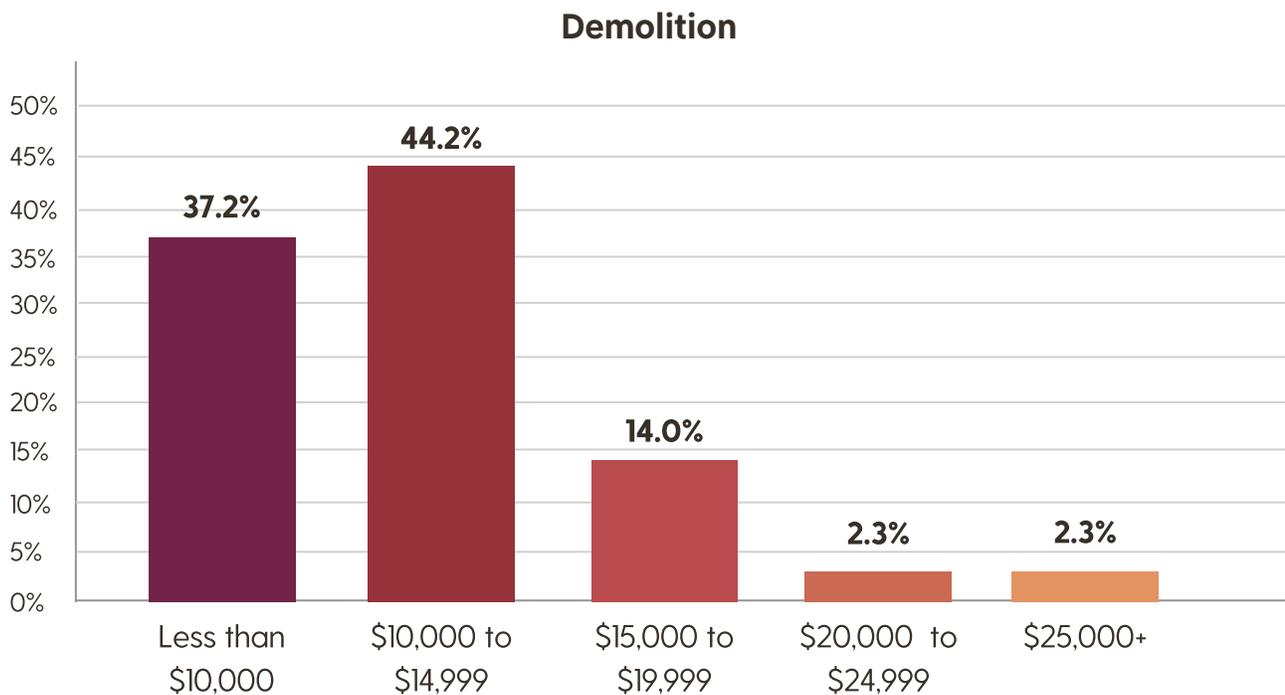
Question 13: Excluding basement and/or foundation removal, what would be the typical cost for DECONSTRUCTION of a 1,500 square foot house?

For this question respondents could either enter a single number or a range. A 1,500 square foot house was used for the estimate as that is close to the average size of a house being demolished in San Antonio. The costs for demolition of the basement or foundation were excluded in that in most cases that cost would be largely the same whether the rest of the house were deconstructed or demolished. Around half (48.8%) of estimates were between \$10,000 and \$19,999. The average of all estimates was \$18,499 and the median was \$15,000.



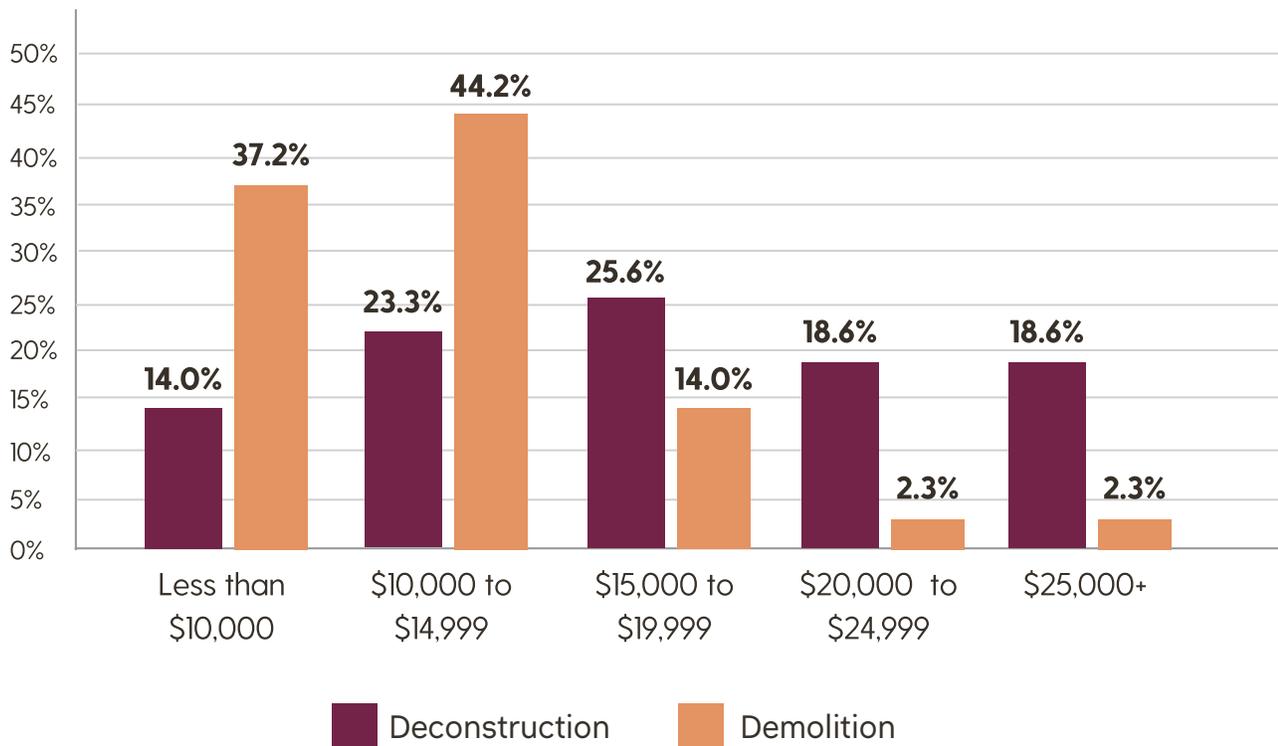
Question 14: Excluding basement and/or foundation removal, what would be the typical cost for the DEMOLITION of a 1,500 square foot house?

Survey respondents were then asked the same question, but regarding demolition rather than deconstruction. Demolition is the cheaper option with slightly more than 95% of all estimates being less than \$20,000. The average demolition estimate was \$11,012 and the median \$10,000.



The graph below compares the share of estimates within each cost bracket. Not included in these estimates are: 1) the recovery of costs through the sale of reclaimed materials; and 2) the indirect impact of more of the total budget going to labor and that subsequent impact on the local economy.

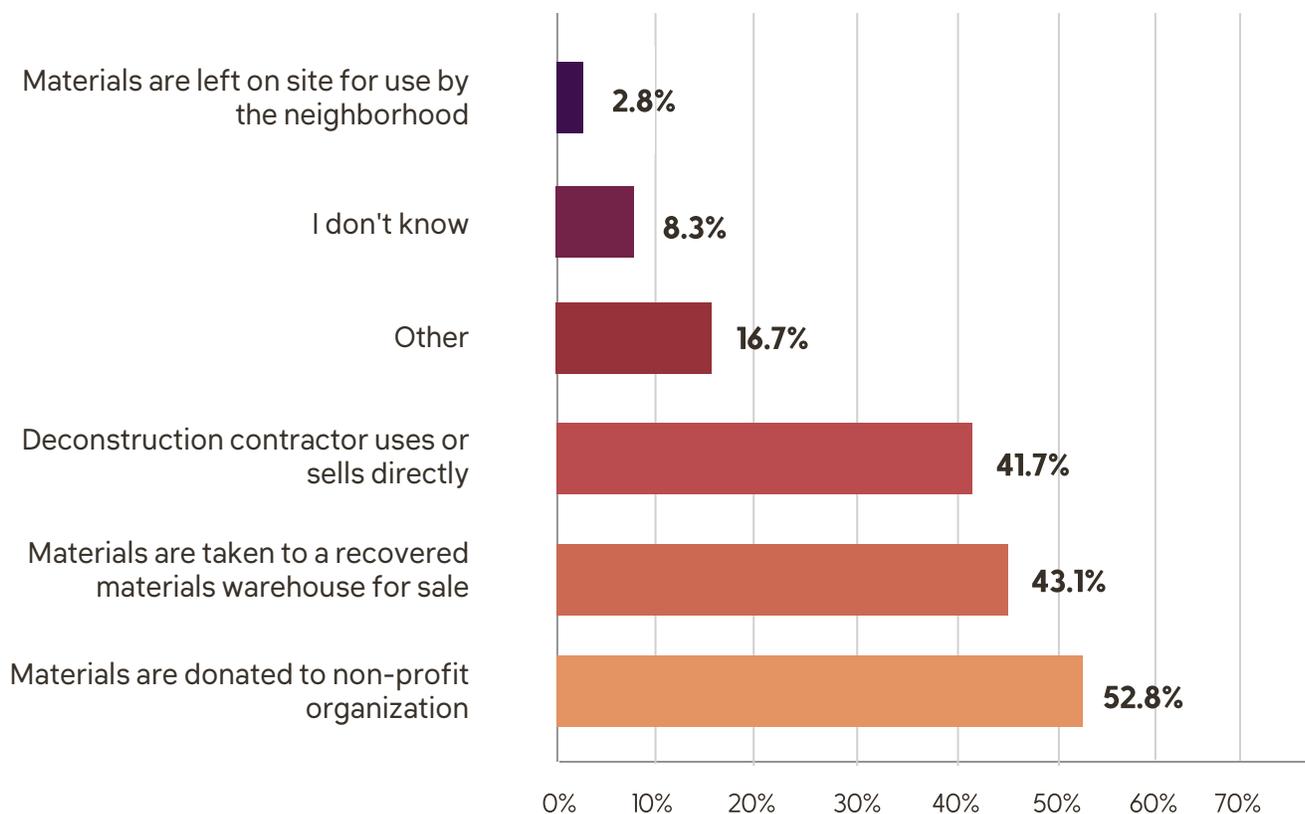
Estimated Costs of Deconstruction vs Demolition 1,500 Square Foot House



Comparing each respondent's set of estimates, the average additional cost of deconstructing a 1,500 square foot house is \$7,487. This represents the difference between approximately \$12.33 per square foot for deconstruction versus \$7.34 per square foot for demolition.

Question 15: How are the recovered materials from deconstruction projects disposed of?

Once a building is deconstructed something must be done with the materials. It appears that in most communities there are multiple avenues to dispose of recovered materials. In more than half (52.8%) the cases, however, the materials are donated to a non-profit organization.

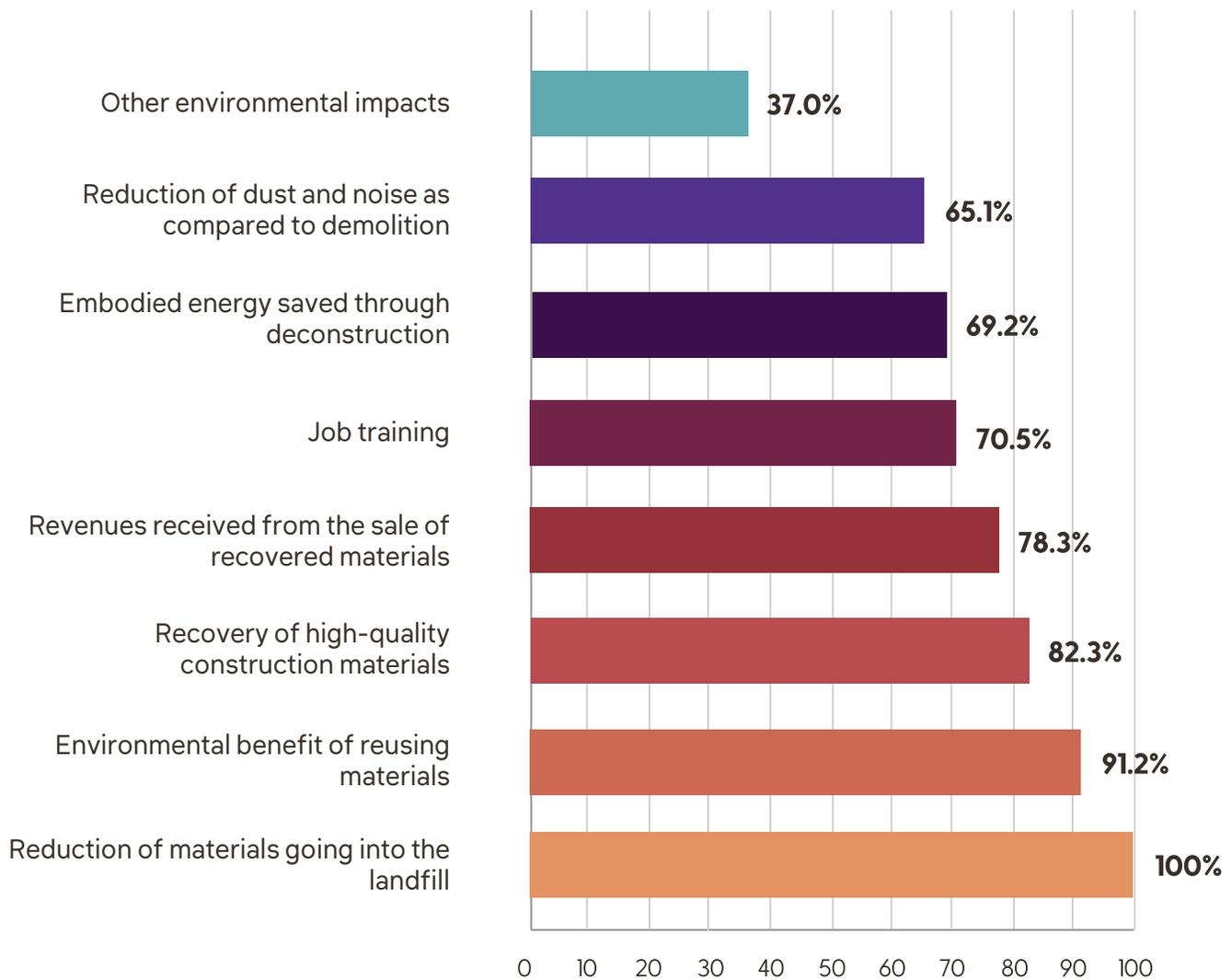


"Other" answers to this question included:

- Companies or non-profits that do deconstruction in the city often have their own resale shops.
- Contractor (us) repurposes materials into accent wall, flooring, furniture, decor, etc. and sells a user-friendly product and sells "raw materials" directly to consumer.
- Demolished material scavenged by company; remaining landfilled.
- I sell the materials to various markets
- Metals and concrete are commonly recycled; the rest is landfilled
- Our non-profit operates a retail store and conducts fee-for-service deconstruction work as a licensed contractor. We sell our own recovered materials.
- Plans will locate deconstruction materials into reuse store
- Privately owned construction waste sorting facility
- The company I work for buys saleable building materials from a local deconstruction company.
- There is also a local entity that accepts consignments of reclaimed materials

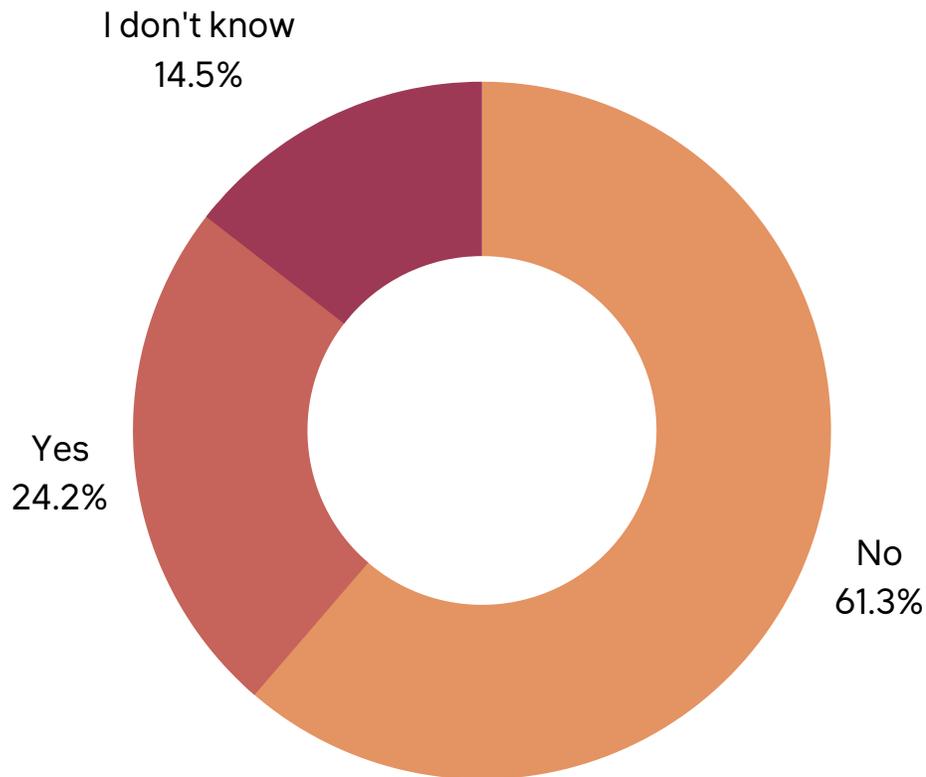
Question 16: How important are the following in measuring the success of a local deconstruction program?

Deconstruction advocates argue that there are multiple benefits, so these experts in the field were asked what they thought were the most important measures of success of a deconstruction program. Respondents were asked to rank from 1 to 8 the relative importance of each reason. Those answers were then weighted and ranked with the highest response receiving a score of 100 and subsequent answers scored relative to the top response. The most favored measure of success was the reduction of materials going into the landfill, followed closely by the environmental benefit of reusing materials and the recovery of high-quality construction materials.



Question 17: Do you have a formal process (checklist, for example) to determine whether a building is a good candidate for deconstruction?

While deconstruction is often a positive alternative to demolition, some structures are more suitable than others. Survey respondents were asked if they had a formal process to help them make that decision. Around a third (32.4%) said yes, while two thirds either had no formal process or did not know if such a process existed.



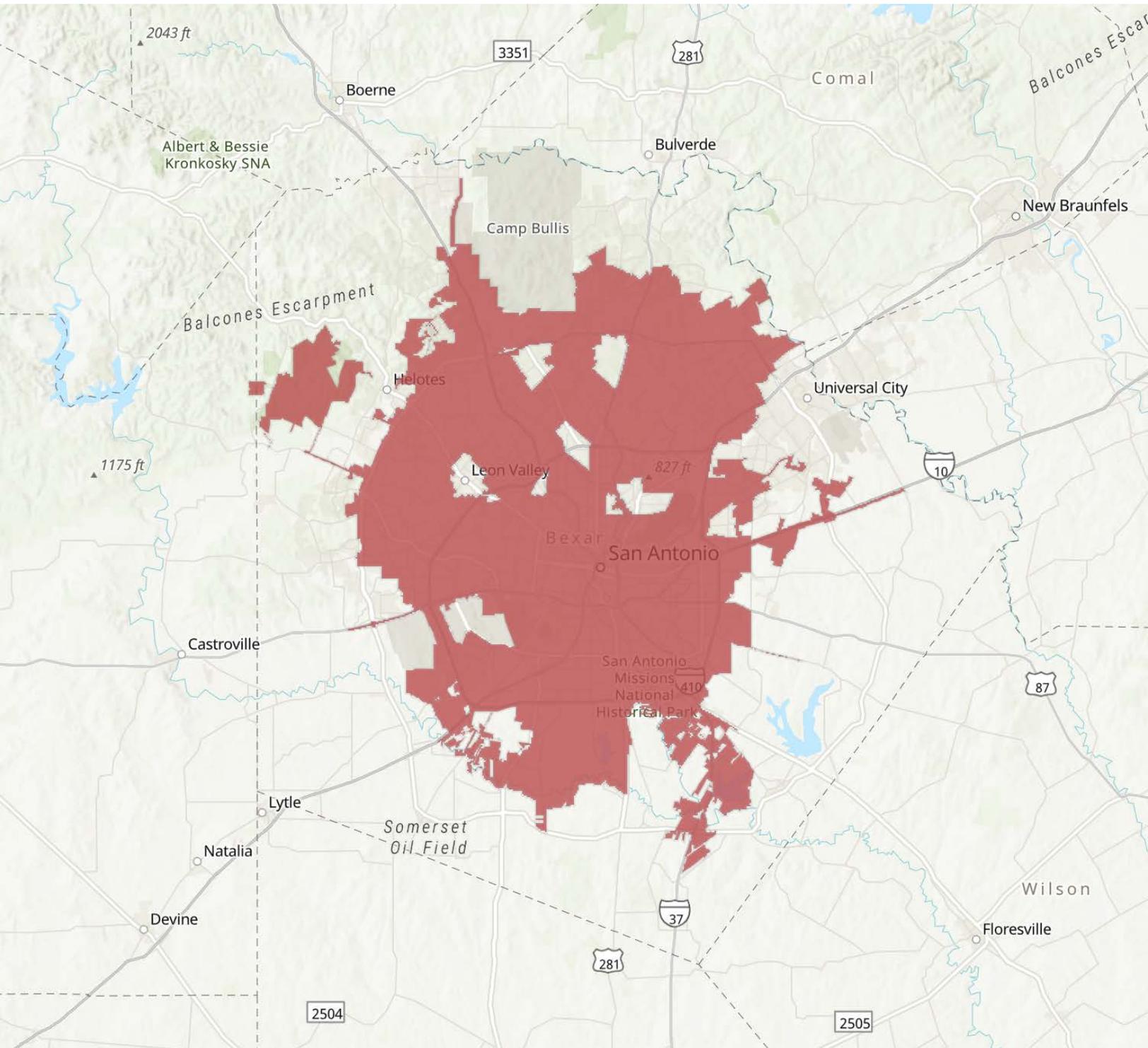
Question 18: If you answered Yes to the above, can you provide a link to the criteria you use?

The final question in the survey asked those who had a formal process if they would share a link to that process. The answers to this question included the following:

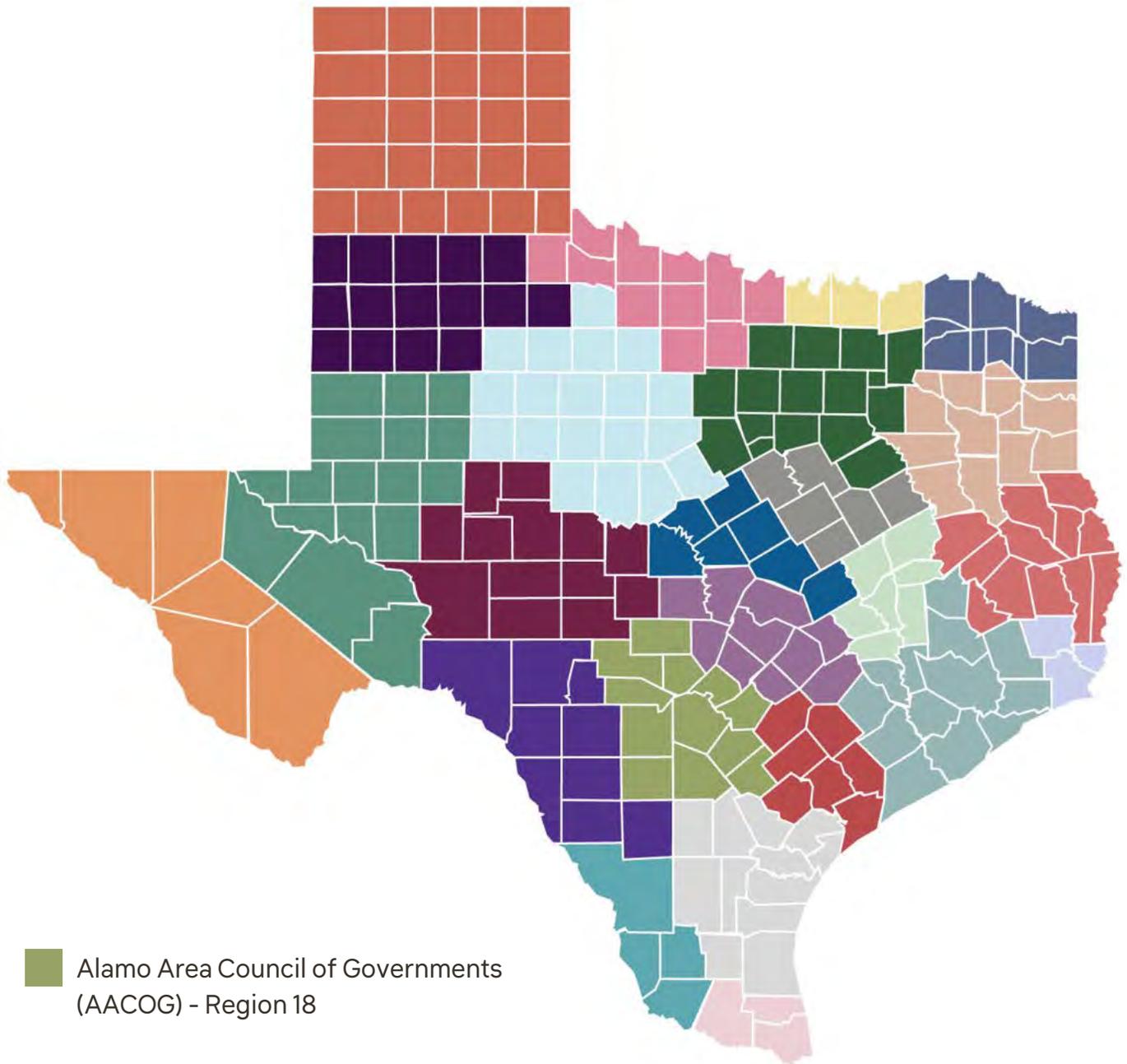
- Note that we require deconstruction based on age of building - knowing that all buildings within that bracket have old growth lumber as framing as is thus worthwhile to deconstruct and salvage
- Each structure is different.
- Formal third-party appraisal of value
- <https://ohias.org>
- <https://www.lifecyclebuildingcenter.org/material-donation>
- I do preliminary estimates of fair market value for IRS
- My brain
- My own, based on restoration/remodel experience
- I use BMRA (Build Reuse)'s Introduction to Deconstruction book and created a spreadsheet with questions I should ask the homeowner and myself
- No - generally all buildings are candidates for either partial deconstruction, hybrid or full deconstruction depending upon their age and economics of project
- Project information form developed by us
- Some of the questions we start with: Timeline? Used as residence? Year built? Permits issued? Asbestos survey? Disposal included? Load out situation? Utilities interference? Roofing - how many layers? Drywall/plaster - how many layers? Insulation? Lead paint present in work area?
- The process consists of physically going through the structure to inspect materials condition. We do not use a check sheet. It is based on 25 years of experience in the construction industry.
- We do, but it is copyrighted

Appendix 2: Study Area Information

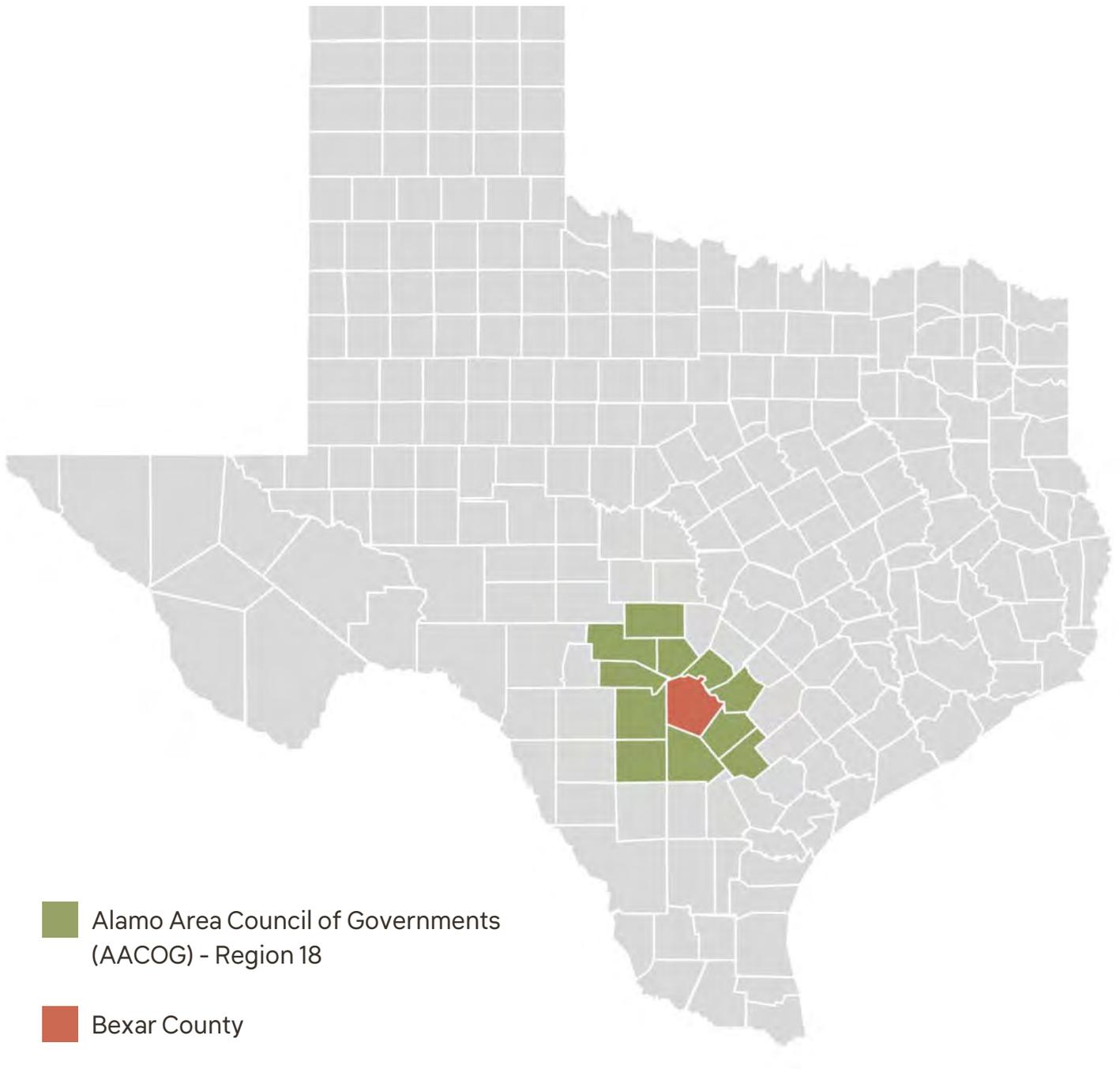
Map of San Antonio City Limits (Principal Study Area)



Map of COG Regions in the State Texas



Map of Alamo Area Council of Governments (AACOG) and Bexar County



Acknowledgements

We would like to thank everyone who contributed their time and expertise to this report. We especially thank the current Board members of Build Reuse for their assistance in the development and distribution of a national survey of deconstruction professionals:

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