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Deconstruction and Salvage:

Waste Diversion in New Orleans

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Executive Summary

This research is intended to provide an overview assessment of deconstruction and salvage in New Orleans. It details deconstruction and salvage as alternative options to traditional demolition as well as the benefits and challenges to these methods. It investigates a case study of the deconstruction and historic preservation efforts by HRI Properties, Inc,. throughout the Iberville Redevelopment Project. This research also reviews a municipal deconstruction program in Portland, Oregon, as a potential model for New Orleans. Finally, the work concludes with a series of recommendations for further research and action that can be taken in New Orleans to promote deconstruction and salvage as an industry and alternative to demolition and landfill.

Introduction

Research topic

This research provides a look into the status of construction and demolition waste diversion activities (deconstruction and salvage) in New Orleans. The research provides an overview of deconstruction requirements and voluntary behaviors in New Orleans as well as an analysis of barriers and challenges for these activities. A local case study of the waste diversion activities of HRI Properties' Iberville Redevelopment project is conducted. An additional national case study investigating government mandated deconstruction in Portland, OR, is included. Final recommendations for New Orleans are outlined as next steps to encourage deconstruction and salvage and promote the possibility of a nascent industry in the city.

Client Background

HRI Properties, Inc., is a national development firm founded in New Orleans in 1982. They specialize in upscale-branded and independent hotels, luxury apartments, mixed-income affordable housing, and mixed-use properties in urban centers and focus on "creating entire neighborhoods that are Elevating the Urban Experience".[1] They are the

Deconstruction and Salvage Overview

Deconstruction is a well-defined field of building engineering which draws on several disciplines including construction, structural design, construction management, industrial ecology, and materials management. It is "the methodically planned and highly controlled process of taking

[1] (HRI Properties, Inc. 2018)

apart a building with the aim of separating components and materials to avoid down cycling, energy transformation, and deposit into landfill as much as possible"[2]. The Delta Institute stresses a triple-bottom-line understanding of deconstruction by defining it as "the process of systematically dismantling a structure in an environmentally, economically and socially responsible manner, aiming to maximize the recovery of materials for reuse and recycling."[3] Simply put, deconstruction is the manual disassembly of a built structure with the goal of reducing the amount of materials sent to a landfill and maximizing the amount of material that can be reused for another purpose.[4]

Salvage, also known as selective demolition, is the process in which specific components of a building are extracted while the rest is demolished using conventional methods. A combination of deconstruction and salvage has been found in a number of cases to be an advantageous compromise between total demolition and complete deconstruction.[5]

There is a clear need to move away from demolition and landfilling toward deconstruction and reuse. In 2014, 534 million tons of construction and demolition (C&D) debris was generated nationwide, twice the amount of municipal solid waste generated. Over 90% of this amount was demolition waste. The largest material contributors were concrete (70%), asphalt concrete (14%), wood products (7%), and all other products (9%).[6]

[2] (Thomsen, Schultmann and Kohler 2011)
[3] (Delta Institute 2012)
[4] (Leroux and Seldman 1999)
[5] (Turan 2016)
[6] (US Environmental Protection Agency 2016)

Benefits and Challenges

There are a myriad of benefits to deconstruction. It helps reduce waste sent to landfills, promote preservation through reuse of materials, create jobs through labor-intensive activities, reduce the need for new materials, and reduce greenhouse gas emissions through lower transportation and landfill emissions. Many entities benefit from deconstruction over demolition. Property owners can receive tax deductions or reduced removal costs, remodelers can access a large stream of lower-cost quality materials, and developers can improve their projects by saving money, reducing environmental impacts, and meeting green building standards. General contractors can use deconstruction as an additional revenue source, gain a competitive edge through reduced waste fees, and obtain valuable materials for resale. Government entities can reduce the load on landfills, remove vacant or blighted properties, redevelop brownfields, and increase real estate tax revenues.[7]

There are also real and perceived challenges to deconstruction. Project time requirements are a commonly cited challenge, as deconstruction requires significantly more time than traditional demolition. Salvage material and market variation is another common challenge; inconsistent amount of locally-available materials limits contractor interest in deconstructed material. Market demand is another challenge because the cost of new materials is often too low to drive purchasers to consider reused materials. Finally, mechanical properties of deconstructed materials is frequently perceived as lower quality than new materials.[8]

[7] (Delta Institute 2012)
[8] (Kibert 2000)

Uses for Salvaged Materials

"Urban mining" is a concept of material cycling within a city and is "the systematic reuse of anthropogenic materials from urban areas" and is a theory that mega-cities will eventually be able to produce enough deconstructed materials to allow for large-scale production of raw materials and will need to do so in order to avoid scarcity and shortages.[9] Today's deconstruction, reuse, and recycling efforts are not yet at this scale, however.

Four factors influence a potential reuse market for a salvaged material: the production possibilities presented by the supply of recycled material, landfill area requirements, global warming potential and costs associated with each system. Traditionally, the operational phase of a building has had the greatest environmental impact, but as buildings become more efficient, embodied energy and end-of-life impacts become more impactful.[10]

Strategies for reuse of salvaged material can vary by material type. Typically, bulk materials can be reused for future construction projects. Dimensional lumber and brickwork masonry can be deconstructed and salvaged for reuse. Building components, such as stairs, lighting fixtures, appliances, doors, sinks, windows, and cabinetry, can be salvaged whole and reused. Nonprofit organizations, such as the Deconstruction & ReUse Network, provide educational services as well as organizational infrastructure to help promote deconstruction and distribute salvaged materials to organizations in need of affordable materials. The ReUse Network, for example, partners with organizations like Habitat for Humanity to distribute salvaged materials to groups

[9] (Brunner 2011)
[10] (Turan 2016)

such as the San Francisco Unified School District or the Oakland Zoo, which have a need for the materials.[11]

Deconstruction in New Orleans

The state of deconstruction in New Orleans is typical of many cities across the United States. There is no municipal requirement to perform deconstruction instead of typical demolition in the city. The only requirements are placed on those buildings that are historic or located in a designated historic district. Typically, New Orleans' Historic District Landmarks Commission (HDLC) will not support the demolition of a historic building unless it is in a state of imminent danger of collapse. When this must occur, the HDLC recommends a "good effort" to salvage of materials such as windows, doors, hardware, shutters, bricks, and siding.[12] Typically, this results in the Preservation Resource Center directing a property owner to The Green Project which coordinates deconstruction and salvage activities with the contractor.[13]

When deconstruction does occur in New Orleans it is typically done by owner preference, to meet a green building certification, or as a condition of a funding requirement.[14] Deconstruction due to owner preference is common in New Orleans due to local interest in historic preservation.[15] However, many owners who express interest in deconstruction turn to traditional demolition due to increased cost.[16]

[11] (ReUse Network 2018)
[12] (City of New Orleans Historic District Landmarks Commission 2011)
[13] (Cromwell 2018)
[14] (Mezynski 2018)
[15] (Cromwell 2018)
[16] (Busch 2018)

Achieving a green building certification is a frequent reason for deconstruction in New Orleans. Many funding programs, such as the Choice Neighborhoods Initiative, require funded projects achieve an approved green certification.[17] Two common certifications, Leadership in Energy and Environmental Design (LEED) and Enterprise Green Communities (EGC), require construction waste diversion strategies which may include deconstruction. LEED includes a mandatory prerequisite for "construction and demolition waste management planning" which must "establish waste diversion goals for the project by identifying at least five materials (both structural and nonstructural) targeted for diversion". Additional points can be earned through "MR Credit: Construction and Demolition Waste Management" which requires recycling or salvaging construction and demolition materials by diverting at least 50% of three material streams or generating no more than 2.5 pounds of construction waste per square foot. The intent of this credit is to "reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials".[18] EGC has a similar standard in credit 6.12 Construction Waste Management. This credit mandates either 50% of construction waste diverted from a landfill, at least two materials streams diverted, or a maximum of 2.5 pounds of waste per square foot of building construction. Additional points are awarded for meeting multiple criteria. EGC's rationale states that "diverting construction debris, and recycling and reusing materials whenever possible, reduces waste and disposal costs and reduces the project's impact on landfills".[19]

The Housing Authority of New Orleans (HANO) is often involved in potential deconstruction projects. According to Emily Baughman, HANO Senior Project Manager, the choice between

[17] (US Department of Housing and Urban Development n.d.)
[18] (US Green Building Council 2018)
[19] (Enterprise Community Partners 2015)

traditional demolition and deconstruction comes down to cost. HANO must prioritize "being a good steward of public dollars and ensuring housing remain as affordable as possible for their clients". HANO's primary role is to provide affordable housing opportunities for low-income residents. As such, they do not push deconstruction as a policy and instead focus on cost effectiveness of available options.[20]

Challenges and Barriers

New Orleans faces additional challenges in addition to the commonly cited ones described above. Stephanie Mezynski, with Green Coast Enterprises (GCE), described the challenges faced by GCE and their contractor partners on projects throughout the city. General contractors in the city do not specialize in material management logistics. Subcontractors manage their own trade and will either re-use their materials on a small scale or throw away leftover material. Many contractors also feel it is easier to recycle C&D materials than try to store and reuse due to simpler logistics and less space, time, and expertise needed. In addition, it is more work to salvage and manage material logistics on a large scale due to the need to store, ship, inventory, and plan for reuse of materials. These burdens disincentive planning for deconstruction and encourage continued reliance on better understood traditional demolition. Because of these material management problems, larger deconstruction projects are often more costly than smaller projects.[21]

In addition to storage and material management logistics, the low and sporadic availability of salvaged bulk construction materials such as lumber, concrete, or brickwork, prevents

[20] (Baughman 2018)
[21] (Mezynski 2018)

construction contractors from using salvaged materials in anything but small-scale projects. Contractors must be certain of the availability of enough material to complete a construction job and the New Orleans deconstruction market cannot currently provide the amount of material or the certainty needed.[22]

Finally, deconstruction is a more manual and labor intensive activity than traditional demolition and often requires specialized training. There is no local training currently available in the New Orleans region[23] and it is unknown if training has ever been offered in the region.[24] Some local general contractors, such as Landis Construction Co., LLC, encourage and offer deconstruction as an alternative to traditional demolition and have conducted in-house staff training.[25]

There are also several critical systemic challenges for the deconstruction industry in New Orleans. These are issues faced by salvage yard operators and deconstruction crews per an interview with Catherine Cromwell, Executive Director of The Green Project, a "building materials supplier dedicated to keeping usable materials in circulation, reducing environmental toxins, and promoting environmental stewardship."[26] Ms. Cromwell identifies several key challenges including the need for large amounts of materials storage space, a lack of municipally-mandated deconstruction, and high costs of deconstruction and salvage operations. The Green Project utilizes 25,000 square feet of storage space and employs 15 full-time equivalent employees and is still understaffed. A lack of municipal minimum requirements for deconstruction creates a cycle of low demand and availability of reused construction materials. Because of the sporadic demand for deconstruction services, The Green Project is unable to

[22] (Mezynski 2018)
[23] (Mezynski 2018)
[24] (Holmes 2018)
[25] (Busch 2018)
[26] (The Green Project n.d.)

afford the cost and insurance of having a full-time deconstruction crew. Instead, staff coordinate with contractors to salvage building material before or after traditional demolition or they simply transport this material after a contractor has separated it from demolition debris themselves. Further, limited incoming material streams means that construction contractors cannot rely on having enough salvaged material available for anything but the smallest construction or rehabilitation jobs. Alternative reuse streams, other than as future construction materials, are also limited in New Orleans although some do exist. For example, The Green Project's paint recycling program is popular and often used by local artists. Other materials, such as lumber, are also used by local artisans and furniture makers. One customer base is the film industry in the city, whose set designers are often looking for unique pieces of material.[27]

[27] (Cromwell 2018)

Case Study – Iberville Redevelopment

HRI Inc.'s Iberville Redevelopment project is the transformation of the 23-acre Iberville Public Housing Development, built in 1942, into Bienville Basin – a vibrant, mixed-use, mixed-income community. The project includes reintroduction of a connected street grid and construction of new utilities and public rights-of-way throughout the site. Redevelopment will also create approximately 700 housing units with on-site parking, community spaces, fitness centers, a computer technology center, local parks, and outdoor recreation. The project began in 2013 and has completed 496 housing units, with another 186 under construction and development.[28]

This project includes funding from HUD's Choice Neighborhoods Initiative (CNI) and historic tax credit equity. In order to meet funding requirements of these programs, as well as its own organizational mission, HRI chose to deconstruct and salvage many of the existing deteriorated historic buildings and use the reclaimed materials to rehabilitate and historically preserve the remaining buildings on-site. This strategy allowed HRI to meet construction waste management criteria of the Enterprise Green Communities certification, which was a requirement of CNI funding, as well as the National Park Service historic tax credit guidelines.

HRI Properties tracked deconstructed and salvaged materials through a master salvage checklist of each building. This list tracked the percent salvaged of the following building materials: terracotta roof tiles, stone elements, existing brick, steel picket railing, cast iron filigree, cast iron column elements, cast iron boots, cast iron grills, and copper sheet metal. A total of 45 buildings

[28] (HRI Properties, Inc. n.d.)

were partially deconstructed or salvaged, 16 buildings were historically rehabilitated, and 14 buildings were demolished through traditional methods.[29]

Master Salvage Checklist	
Roof Tiles	38.3%
Steel Picket Railing	58.1%
Cast Iron Filigree	41.7%
Cast Iron Column Elements	45.2%
Cast Iron Boots	64.4%
Cast Iron Grills	16.4%
Copper Sheet Metal	95.5%
Stone Elements	0.0%
Existing Brick	2.3%

Figure 1 - Percent of Salvaged Materials from Iberville Master Salvage Checklist

The project's deconstruction and salvage strategy was described by Roger Freibert, President of HCI Architecture, Inc. Roof tiles were salvaged whenever possible and 100% of the tiles were reused on site. Stone elements and existing brick were not salvaged, other than one specific instance of brick masonry deconstruction. Steel picket railing was salvaged with the intention that it would be reused or sold as bulk scrap. However, it was determined that it couldn't be reused and it was difficult to find a buyer for the bulk scrap material. This was the only instance of salvaged material reuse that didn't go according to the reuse plan. Cast iron filigrees, column elements, boots, and grills were all salvaged when possible and reused on site. Finally, copper sheet metal was salvaged and reused on-site or sold as scrap metal.[30]

BUILDING TYPE	DIMENSION
TYPE A BUILDING	27' x 66'7"
TYPE B BUILDING	1.67x Type A
TYPE C BUILDING	3x Type A
TYPE D BUILDING	1.5x Type A
TYPE E BUILDING	2x Type A
TYPE F BUILDING	2.5x Type A
TYPE G BUILDING	0.5x Type A
TYPE H BUILDING	2x Type A

HRI Properties also provided the original Iberville Street Project Site Plan. This site plan detailed all of the original buildings, including their locations and design layouts. The original design featured a standard "Type A" building measuring 27' x 66'7" and three stories tall. All of the

[29] (HRI Properties, Inc. n.d.)
[30] (Freibert 2018)

other buildings were designed as multiple copies of this standard Type A building as described in the table to the right.[31]

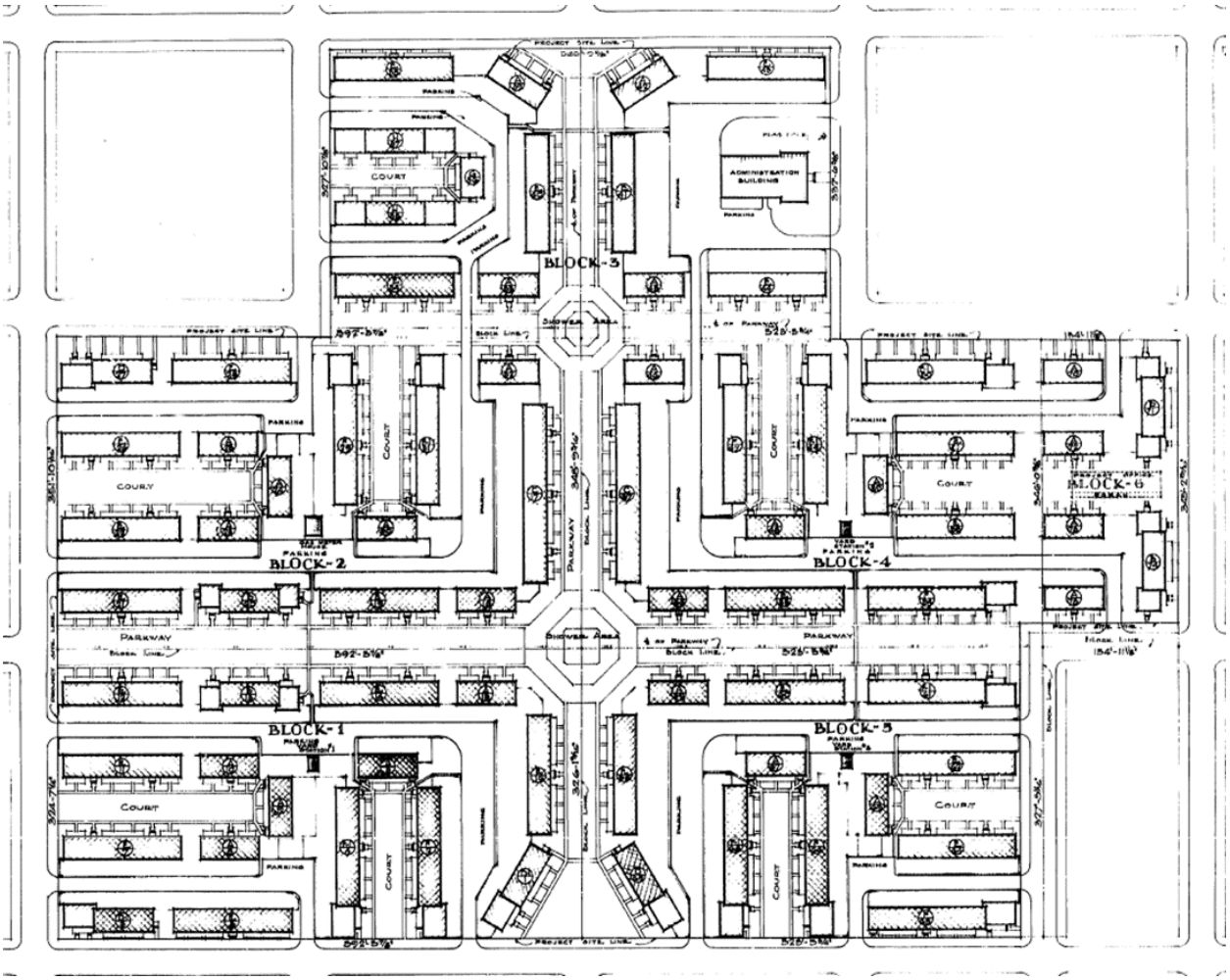

Figure 2 - Type C Building as detailed on Iberville Site Plan. Note its configuration as multiple iterations of the Type A Building

[31] (HRI Properties, Inc. n.d.)

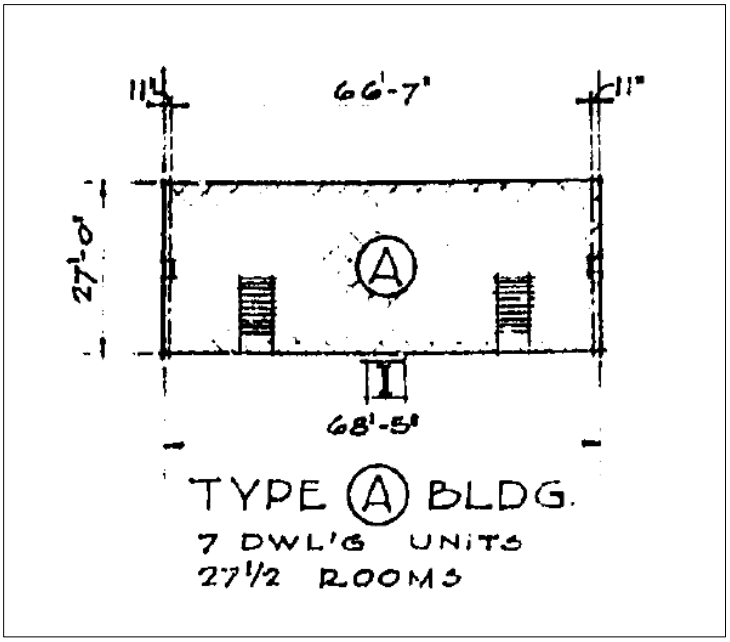

Figure 3 - Type A Building as detailed on Iberville Site Plan

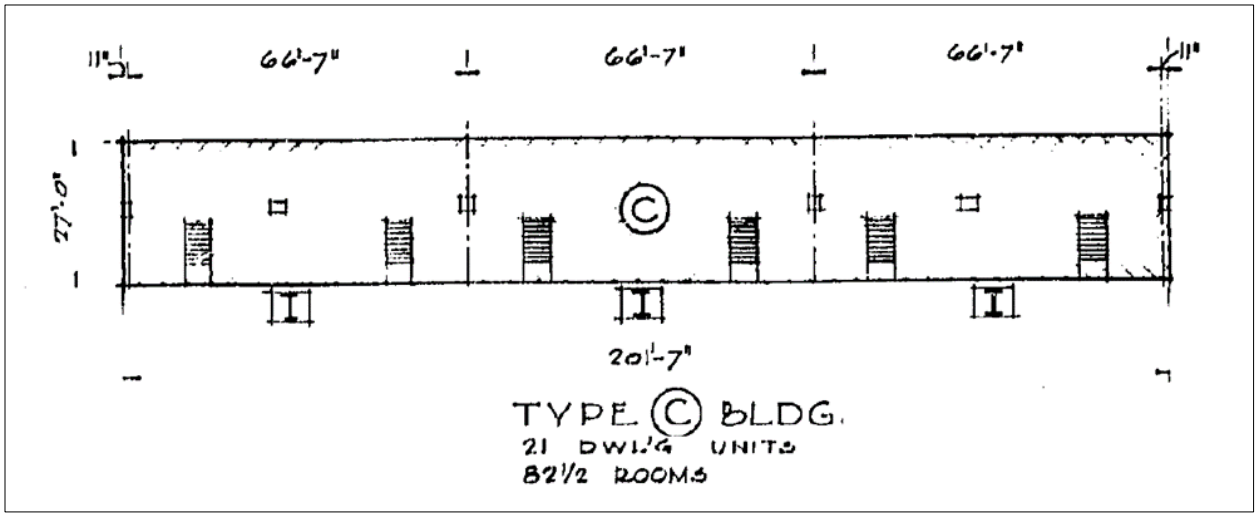

Figure 4 - Type C Building as detailed on Iberville Site Plan. Note its configuration as multiple iterations of the Type A Building

Finally, Landis Construction, HRI's general contractor for Phases V, VI, and VII of the Iberville Redevelopment, provided rough takeout estimates for the salvaged material categories in a Type A building as follows:[32]

- Roof tiles – 2,171sf of roof area
- Stone elements – 218lf of cast stone sill
- Existing brick – 5,000sf of exterior brick
- Steel picket railing – 155lf
- Cast iron filigree – 110lf including horizontal and vertical
- Cast iron column elements – 8 each at 10lf tall
- Cast iron boots – 4 each
- Cast iron grills – 4 each
- Copper sheet metal – 500sf of copper roofing/awnings

Using the above takeout estimates it was possible to extrapolate rough estimates of total bulk materials salvaged from a Type A Building. This Type A Building estimate was then used to further extrapolate to all other building types based on the Iberville Site Plan map. Finally, this site-wide estimate combined with HRI's master salvage checklist resulted in a site-wide bulk salvaged material estimate. Calculations and assumptions for this estimate can be found in Appendix A.

[32] (Allen 2018)

Material Type	Percent Salvaged	Bulk Material Estimate	
Roof Tiles	38.3%	69,501	terracotta tiles
Steel Picket Railing	58.1%	6,571	linear feet
Cast Iron Filigree	41.7%	2,551	linear feet
Cast Iron Column Elements	45.2%	252	columns
Cast Iron Boots	64.4%	176	iron boots
Cast Iron Grills	16.4%	53	iron grills
Copper Sheet Metal	95.5%	28,533	pounds
Stone Elements	0.0%	-	tons
Existing Brick	2.3%	158	tons

Figure 5 - Total Site-Wide Bulk Salvage Estimates

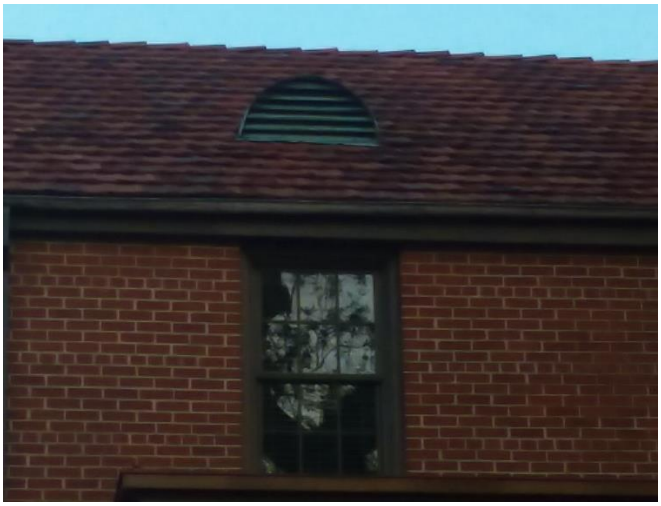

Figure 6 - Terracotta roof tiles reused to rehabilitate structure on-site
Photo Credit: Lucas Elser

Figure 7 - Cast iron filigree salvaged and reused on-site.
Photo Credit: Lucas Elser

It is important to note key strategies from HRI's approach to the deconstruction and salvage aspects of the Iberville Redevelopment project. First, on-site reuse of salvaged historic materials mitigated several challenges, such as finding a buyer for the materials or identifying some other strategy to sell or reuse them. This did, however, add a layer of complexity to the project for on-site material storage which had to be taken into account by

the general contract. Second, utilizing deconstruction and salvage together with on-site historic preservation helped HRI access multiple funding sources which improved the economic viability of this strategy over traditional demolition and landfilling.

Case Study – Portland, OR, Municipal Deconstruction

Some cities have begun considering municipal requirements for deconstruction or salvage. Portland, Oregon, became the first city in the country to "ensure that valuable materials from demolished houses and duplexes are salvaged for reuse instead of crushed and landfilled" through the adoption of an ordinance in July, 2016[33]. This ordinance requires the full deconstruction of any single family home or duplex built prior to 1916 or designated a historic resource.[34]

Prior to the passing of its ordinance, Portland City Council requested its Bureau of Planning & Sustainability to create a Deconstruction Advisory Group (DAG) to provide recommendations on how to advance deconstruction as an alternative method for removing buildings. This group made several recommendations, including providing a clear process for contractors to become deconstruction certified, providing grant funding to conduct deconstruction case studies, and passing an ordinance mandating deconstruction. The City implemented all of these recommendations.[35] It now requires contractors to become deconstruction certified and recognizes the Building Materials Reuse Association's (BMRA) training and curriculum as a certification standard.[36] The City also provided a voluntary incentive-based program to support

[33] (City of Portland 2018)
[34] (City of Portland 2016)
[35] (City of Portland 2018)
[36] (City of Portland 2018)

deconstruction which funded approximately 25 whole-house deconstruction projects. Three case studies found deconstruction cost ranging from $4.15 to $10.28 per SF, timelines of approximately 2-3 weeks, and total salvage ranging from 50 – 80%.[37]

Finally, the City published a 12-month progress report in March 2018. It found that the program impacted 25% of all house/duplex demolition permits (318 total permits requested), resulting in 80 deconstruction projects. These projects diverted an estimated 2,500 tons of material, certified 17 deconstruction contractors, reduced the hazards of traditional demolition related to lead and asbestos, and demonstrated Portland's leadership in sustainability. The report noted a need for more trained workers, difficulty for contractors in accurately bidding jobs, and a strong (but potentially saturated) market for salvaged materials. It concludes by recommending the continuation of the current ordinance, supporting additional workforce training, and identifying new market expansion opportunities.[38]

Findings and Recommendations

The Iberville Redevelopment Project case study highlight several important findings. First, it should be noted that the creative combination of deconstruction and salvage with on-site reuse for historic preservation purposes alleviated several common challenges for deconstruction on a large scale. It provided an immediate reuse option, reduced transportation needs of moving salvaged materials off-site as well as new materials to the site, and eliminated the need to find other end-uses of the materials such as other projects or purchasers. Second, we must highlight what materials were and, importantly, were not deconstructed or salvaged. The project focused

[37] (City of Portland 2018)
[38] (City of Portland 2018)

on salvaging historically significant materials, such as cast iron elements, terracotta roof tiles, and copper sheeting. All of these materials could be reused on-site to historically rehabilitate remaining structures. Salvaging these materials also met standards set forth by the Choice Neighborhoods Initiative's requirement to be certified by Enterprise Green Communities and the National Park Service's historic preservation tax credit program. Bulk construction materials, such as stone and brick elements, were largely removed through traditional demolition, landfilling, and recycling. Landis Construction stated that they recycled approximately 60 dumpster loads of material (wood or metal) between January to October, 2017.[39] Finally, this project demonstrates that deconstruction and salvage at a large scale can be accomplished in New Orleans through creative partnerships and funding sources, strategic material reuse planning, and close coordination between developer, architect, and general contractor.

Several recommendations for New Orleans can be suggested from this research. The City should consider partnering with the City of Portland to better understand their efforts to implement municipal deconstruction. New Orleans should support local training and education for contractors and laborers and consider using standards set by the Building Materials Reuse Association. The City should promote the creation of new reuse streams for deconstructed materials by analyzing market opportunities and trends, building demand through design competitions and media awareness campaigns, and connecting economic and workforce

[39] (Landis Construction Co., LLC 2018)

development to deconstruction. Finally, the City should work toward adopting an ordinance mandating deconstruction and salvage for residential and historic structures.

Additional research will also be required to support these activities. Development firms and contractors undertaking deconstruction in New Orleans should partner with the City to conduct case studies on their projects to better understand the costs and savings of deconstruction and salvage projects in the city. The Department of Sanitation should conduct a study to determine how much, and what kind, of C&D waste is generated in New Orleans. This research would provide real quantities of potential salvaged material amounts that could be introduced into markets in New Orleans and could be the underlying basis for an economic impact study detailing the growth potential of a deconstruction market. The City should also study the creation of additional commodity and reuse streams for salvaged materials in order to strengthen potential markets as the deconstruction industry grows.

Conclusion

This research project demonstrates the significant potential for deconstruction, salvage, and historic preservation activities in New Orleans as well as the opportunity to grow a local industry. Additional research will be needed to fully understand this opportunity and the challenges moving forward. While there are many real challenges and barriers for deconstruction, there are paths forward to address and overcome them. The Iberville Redevelopment Project highlights one example of a successful deconstruction and reuse strategy on a large scale in the city.

New Orleans boasts a long and rich history and the opportunity to prevent its built history from being demolished and buried in a landfill will be critical moving forward we deal with a myriad

of challenging economic, social, and environmental challenges. Deconstruction and salvage represents a new market opportunity, job creation, and historic preservation for New Orleans. Forward-thinking and planning is key for sustainability in New Orleans. Construction materials continue to increase in cost. Greenhouse gas and carbon emissions are a growing issue. Embedded energy will become an internalized cost in building materials. New Orleans has a wealth of valuable historic materials to be realized. Deconstruction, salvage, and reuse (of all kinds) is an untapped market opportunity ready to be seized by the city and its citizens.

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Appendix A - Type A Building Takeout Bulk Estimate Calculations

Building Multiplier	
A	1
B	1.67
C	3
D	1.5
E	2
F	2.5
G	0.5
H	2

Type A Measurements of Materials		
Roof Tiles		
	2,171	SF of roof
	140	square inches per tile
	312,624	square inches of tile per roof
	2,234	tiles per roof
Steel Picket Railing		
	155	LF of railing
Cast Iron Filigree		
	110	LF
Cast Iron Column Elements		
	8	columns
	10	LF tall
	80	LF per building
Cast Iron Boots		
	4	per building
Cast Iron Grills		
	4	per building (crawlspace vents)
Copper Sheet Metal		
	500	SF of roofing/awnings
	0.91	lbs per SF
	455	per building
Stone Elements		
	218	LF of cast stone sill
	3	LF of depth
	16.5	tons of stone per building
Existing Brick		
	5000	SF exterior brick
	7	bricks per square foot
	35,000	total bricks
	4.5	pounds per brick
	157,500	pounds of brick
	78.75	tons of brick per building

Sources

https://basiccopper.com/thicknessguide.html

http://www.armstrongmetalcrafts.com/Reference/SheetMetalGaugeWeight.aspx

https://www.contractors-stone.com/calculator.html

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