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## Deconstruction in Portland: Summary of Activity

Emma Willingham  
*Portland State University*

Peter Hulseman  
*Portland State University*

Mike Paruszkiewicz  
*Portland State University*

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# Deconstruction in Portland:

## Summary of Activity

# NeRC

Northwest Economic Research Center  
College of Urban and Public Affairs

November 2017

# NeRC

Northwest Economic Research Center

Portland State University  
College of Urban and Public Affairs  
PO Box 751  
Portland, OR 97207-0751  
503-725-2315  
nerc@pdx.edu

[www.pdx.edu/NERC](http://www.pdx.edu/NERC)  
[@nercpdx](https://twitter.com/nercpdx)

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# NeRC

NERC is based at Portland State University in the College of Urban and Public Affairs. The Center focuses on economic research that supports public-policy decision-making, and relates to issues important to Oregon and the Portland Metropolitan Area. NERC serves the public, nonprofit, and private sector community with high quality, unbiased, and credible economic analysis. Dr. Tom Potiowsky is the Director of NERC, and also serves as the Chair of the Department of Economics at Portland State University. Dr. Jenny H. Liu is NERC's Assistant Director and Assistant Professor in the Toulon School of Urban Studies and Planning. This report was researched and written by Emma Willingham and Peter Hulseman, and Mike Paruszkiewicz was the project lead.



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## Executive Summary

On October 31<sup>st</sup>, 2016, the City of Portland instituted an ordinance requiring the deconstruction of all residential homes and duplexes built prior to 1917 or possessing a historical designation. Deconstruction is a relatively new industry, and with this local regulatory encouragement, several new contractors became certified to participate in the expanded market. This report provides background on the industry, largely from the 2016 report researched and written by the Northwest Economic Research Center (NERC) in anticipation of the requirement, and an examination of what has occurred in the year following the ordinance's passage, using deconstruction and demolition permit data and interviews with certified deconstruction contractors.

In the year following implementation, construction activity, and thus deconstruction and demolition activity, fell somewhat. Permit applications subject to deconstruction amounted to 25% of overall demolition permit applications —while slightly lower than the 33% capture rate predicted in the 2016 NERC report, these deconstructions represent a clear uptick from the period preceding the city's requirement. In total, there are currently 80 permits for deconstructions in the pipeline (54 of which have been issued), out of 318 demolition and deconstruction permits combined.<sup>1</sup>

Prior to the regulation's passage, there were two firms performing essentially all full-house deconstructions in the Portland area. At the time of writing, fourteen have completed the City's deconstruction certification process, and NERC interviewed eleven of them at length by telephone regarding their experience in the industry (the remaining three had not actively participated in the industry since receiving their certification). At this time, the market remains highly concentrated, with four firms completing 80% of deconstructions. The contractors interviewed expressed three familiar challenges in nascent markets: the appropriate level at which to bid on deconstruction projects, difficulty in attracting appropriately trained labor, and difficulties clearing salvaged material in downstream resale markets (a key offset to the higher labor cost that deconstruction entails). Following a more detailed discussion of the interviews and these concerns, the report closes with recommendations for further research and factors which will inform the shape of the market going forwards.

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<sup>1</sup> As of October 30<sup>th</sup>, 2017.

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## Introduction

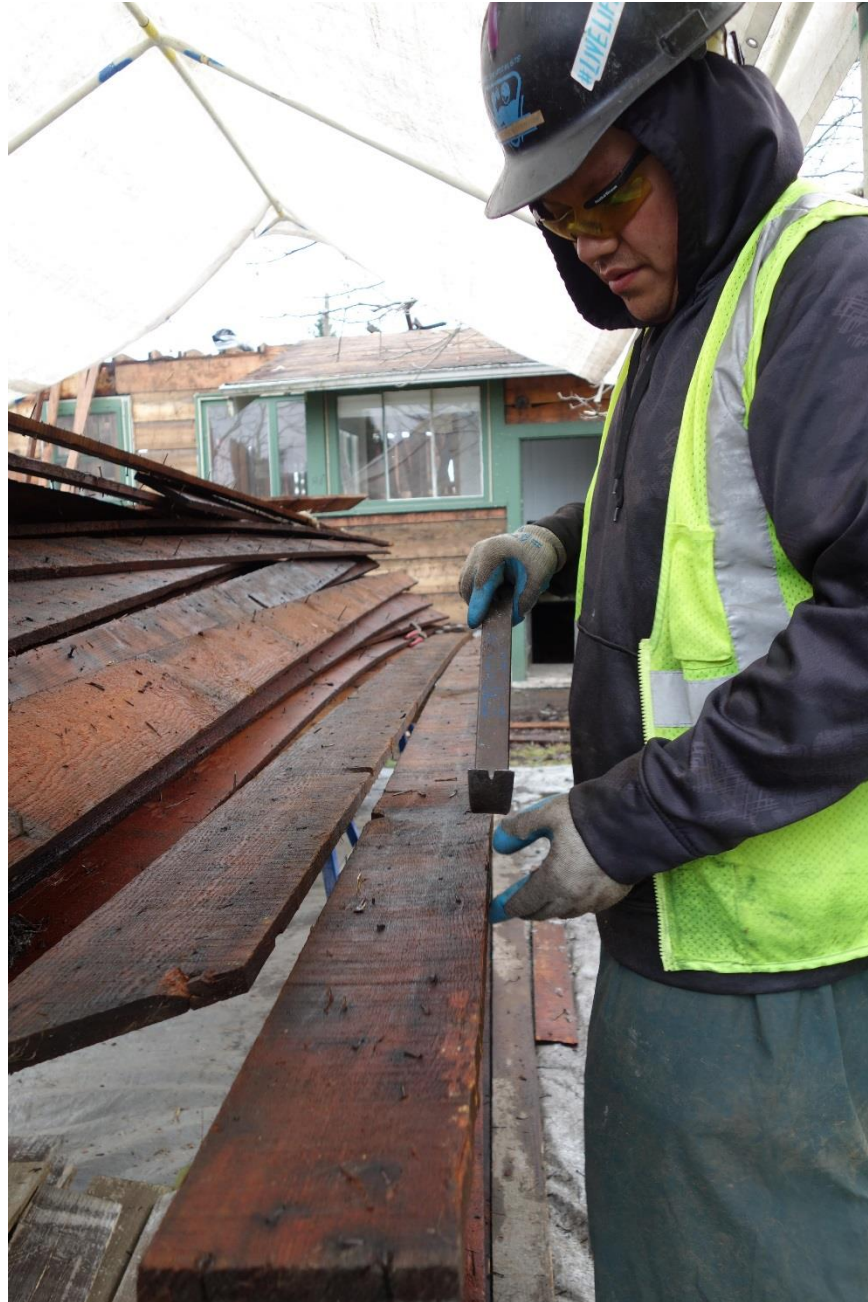
Since the financial crisis and global recession of 2008-2009, the economic recovery has brought dramatic changes to cities across the country. In the fast-growing west coast metro areas, frenetic housing markets—while indicative of growing household wealth and thriving urban communities—have been accompanied by strained infrastructure, affordability crises, and a fraught pace of development. Portland, Oregon has become widely recognized for its experiences with these issues, and local governments have responded with waves of policy changes to address them.

At the confluence of Portland's unique economic, demographic, and policy landscapes, a real estate boom has driven rapid urban redevelopment. This is particularly notable in the city's central older neighborhoods, where the corresponding uptick in residential demolitions is pronounced. Concerned with the sustainability of widespread demolitions, which produce large amounts of physical waste, hazardous materials, and resource consumption, the City of Portland introduced a requirement in 2016 that any house or duplex built before 1916 (or designated historically significant) must be deconstructed (rather than mechanically demolished) if removed.

Deconstruction methods mitigate many of the environmental concerns surrounding building removal. The practice also presents both costs and benefits to market participants and the neighborhoods in which they operate. The Northwest Economic Research Center (NERC) at Portland State University completed research into the potential economic impacts of deconstruction on behalf of the City's Bureau of Planning and Sustainability (BPS) in the year leading up to the requirement's passage. NERC's study concluded three main points. First, on average, deconstruction tends to be substantially costlier than conventional demolition, owing largely to its labor-intensive nature. Second, the higher costs of deconstruction might be offset by the resale value of salvaged building materials. And third, the city's requirement would very quickly increase the number of required deconstructions for a very small local industry. This last point invoked questions of further economic interest – much like the birth of new markets that follows *deregulation* in other industries, the city's requirement would potentially spur development of a unique cluster of businesses surrounding building removal and salvage material resale, including the growth of a labor market that both overlaps that of the area's extremely tight construction market and has the potential to improve economic opportunity for small businesses and the industries workers. To this end, the City has supported new and established deconstruction providers by providing a certification program for contractors and a workforce development program. Additionally, in 2015, city grants of up to \$3,000 were provided for roughly 25 full-house deconstructions in order to assess the characteristics of the process in contrast to traditional demolition.

Following the enactment of the deconstruction requirement, BPS and Portland State University's Institute for Sustainable Solutions (ISS) commissioned NERC to investigate the city's deconstruction market as it unfolded and matured. This study reviews what has occurred since October 31<sup>st</sup> of 2016 (the date of the deconstruction ordinance's implementation), focusing particularly on the industry's labor markets and drawing from city-distributed surveys, direct interviews with deconstruction firms, and other primary data sources. The report begins with a brief summary of relevant findings from NERC's previous report, followed by a snapshot and summary of deconstruction permit activity one year after October 2016. Next, information derived from contractor interviews is presented in aggregate,

including the challenges cited most frequently. The report closes with recommendations for further research and potential solutions to the issues raised by interviewees.



## Background

On October 31<sup>st</sup>, 2016, the City of Portland implemented an ordinance requiring the deconstruction, as opposed to mechanical demolition, of single-family residential structures built prior to 1917 or designated as historic resources. As mentioned above, prior to implementation NERC performed an impact analysis of this ordinance at the behest of BPS and the ISS. This report used interviews with two local firms specializing in deconstruction and materials reuse to create an industry profile and cost-benefit framework, and the standard computerized model IMPLAN for a static assessment of the employment and economic outcomes of an increase in residential deconstructions.<sup>2</sup> In short, the study concluded that deconstruction and demolition differ in the ways shown in Figure 1, below. For a demolition project, labor makes up a 30% share of overall costs (due to a more prevalent use of heavy machinery).<sup>3</sup> In contrast, for a deconstruction project the labor share is closer to 60-80%, according to the contractors interviewed for this report and the 2016 NERC report.

**Figure 1: Demolition & Deconstruction Comparison Table from 2016 NERC Report (pg. 3)**

|  | Demolition      | Deconstruction         |
|--|-----------------|------------------------|
| Typical project time                                     | 2 business days | 10-15 business days    |
| Typical crew size  | 2 – 3           | 6 – 8                  |
| Estimated total labor hours                              | 32 - 48         | 480 - 960 <sup>4</sup> |
| Estimated gross cost of structure removal (1400 SF home) | \$10,300        | \$14,000               |
| Estimated cost per square foot                           | \$7.40          | \$10                   |
| Estimated additional cost of foundation removal          | \$0             | \$4,800                |
| <b>Total gross costs</b>                                 | <b>\$10,300</b> | <b>\$18,800</b>        |

The ordinance was motivated in part by the external costs generated by crunch demolitions, both environmental and health-related: asbestos, lead, and other hazardous particulate matter is dispersed, and material that could find other uses is destroyed and/or sent to landfills. By obtaining the maximum possible amount of utility from building materials (thus avoiding unnecessary use of new materials), at a higher labor cost, deconstruction internalizes environmental and health costs. However, because private contractors need to “keep the lights on” and continued industry activity requires a modicum of profitability, it is typically necessary to offset some of the higher cost of deconstruction with the sale of salvaged materials. NERC found that homes deconstructed in Portland can contain \$5,000-\$10,000 in salvageable material. By selling the recovered material, the deconstruction market can ideally contain its own costs.

<sup>2</sup> Northwest Economic Research Center, 2016.

<sup>3</sup> Dantata, et al 2004; Chini, 2003; Guy and McLendon, 2001

<sup>4</sup> At least one local contractor advised that the upper bound of this estimate exceeded a local deconstruction provider’s records by up to 200 hours. Additionally, new data supports that this is high estimate; see Appendix.



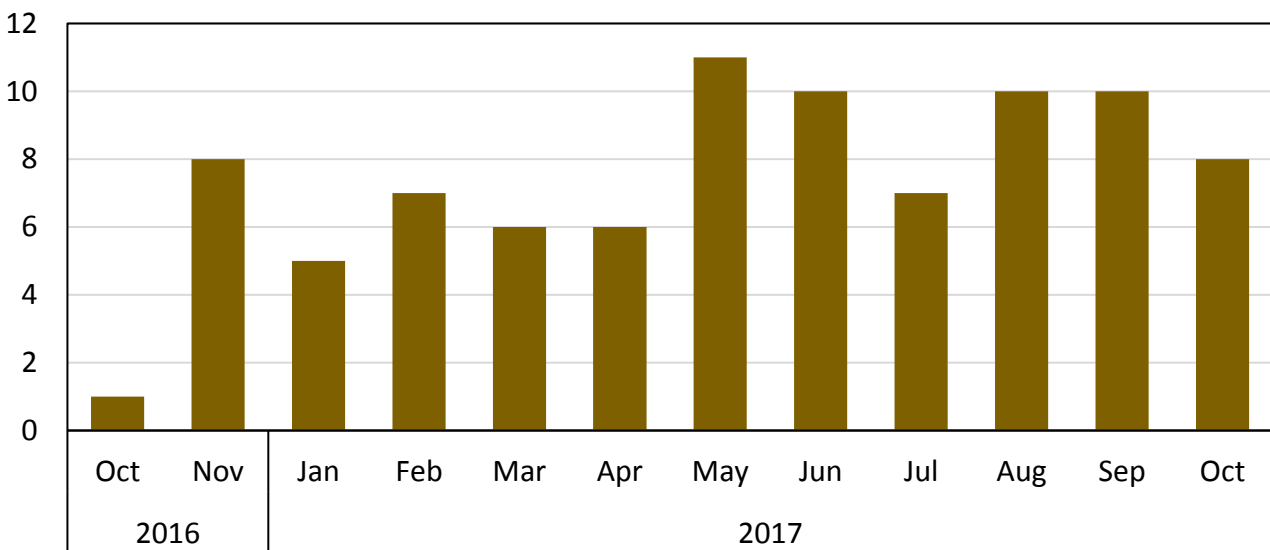
## Deconstruction Activity Summary & Snapshot: Permits and Surveys

The following sections provide a summary of deconstruction activity, estimated from both permit data and contractor surveys, for the twelve-month period since the deconstruction ordinance’s implementation on October 31<sup>st</sup>, 2016.

### Permit Data

One year in, 85 applications subject to the deconstruction requirements have been submitted, of which 54 have been issued. Of the 85 applications, five were determined to be exempt from the requirement (due to factors such as condition), and another five were for houses constructed after 1916 but designated historic (and thus subject to the ordinance as well).<sup>5</sup> Given that 318 demolition and deconstruction permits were applied for over the same period, deconstructions required by the new ordinance amount to 25% of deconstruction and demolition activity—lower than the 33% estimated in the 2016 NERC report, but not by much. Permits that entered the application phase during the year following October 31<sup>st</sup> 2016, grouped by month in which they entered the process, are shown in Figure 2.

**Figure 2: Deconstructions by Month of Permit Process Entry**

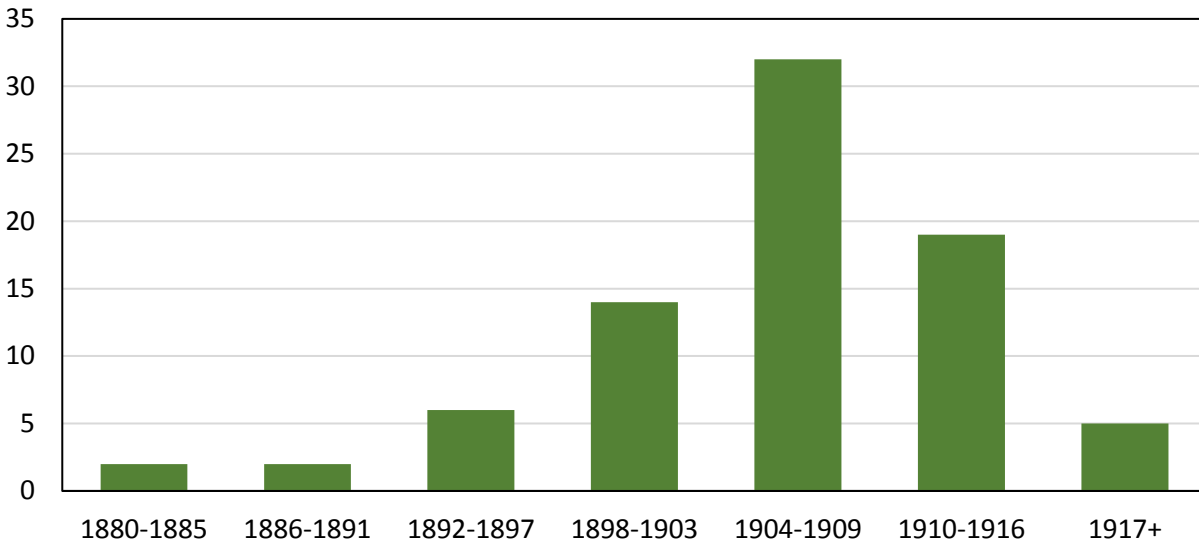


The oldest residential structure permitted for deconstruction was constructed in 1880. The youngest, constructed in 1927, was one of five dwellings deconstructed under the historic resource requirement.

<sup>5</sup> City Code Chapter 17.106.040 specifies that structures that are structurally unsound, hazardous, or do not contain sufficient salvageable material can be exempted from the deconstruction requirement.

The median year of construction is 1906, with a strong cluster of deconstructed dwellings from 1904 to 1909. Figure 3 shows the number of issued permits by year of construction, distributed into six-year cohorts.

**Figure 3: Deconstruction Permits by Year of Construction**



Two-thirds of issued permits occurred in North- and Southeast Portland, with the remaining third occurring largely in North Portland, with only five deconstructions on the west side of the Willamette River. Figure 4 shows permits by Portland region, and Figure 5 maps each permit's associated location. It is worth noting that more deconstruction than anticipated is occurring in North Portland and eastern neighborhoods west of I-205: in areas with lower real estate values like these, the cost associated with deconstruction (which does not correlate with location or property value) constitutes a higher proportion of project costs. In other words, a property owner in those areas is likely slightly more impacted by the deconstruction requirement, which could have implications for equity. (Note that development project scope (number of replacement units) plays a role in overall financial impact.)

Figure 4: Deconstruction Permits by Area

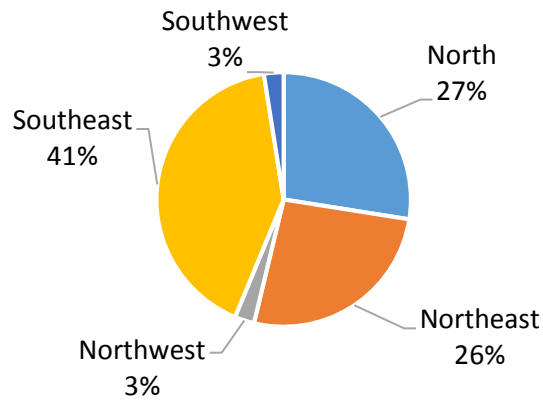


Figure 5: Map of Deconstruction Permits by Status

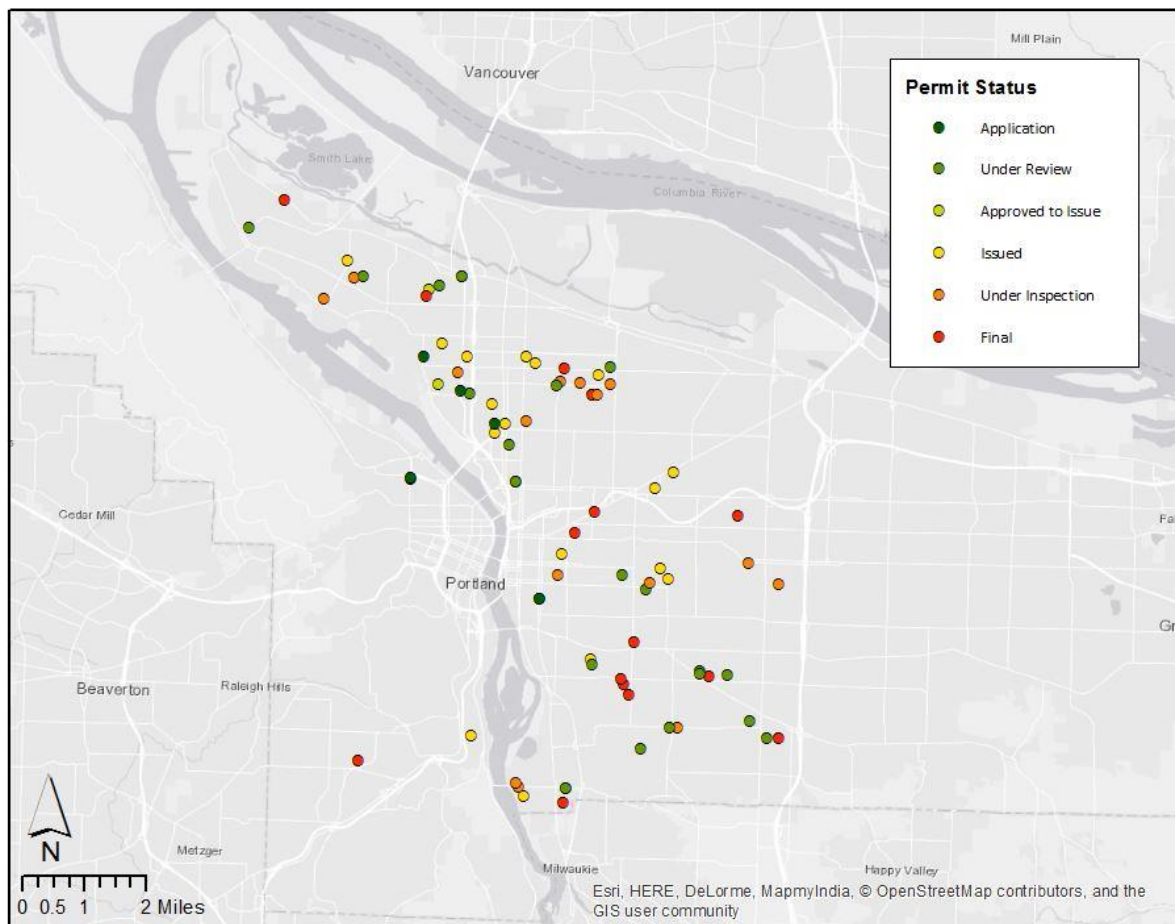
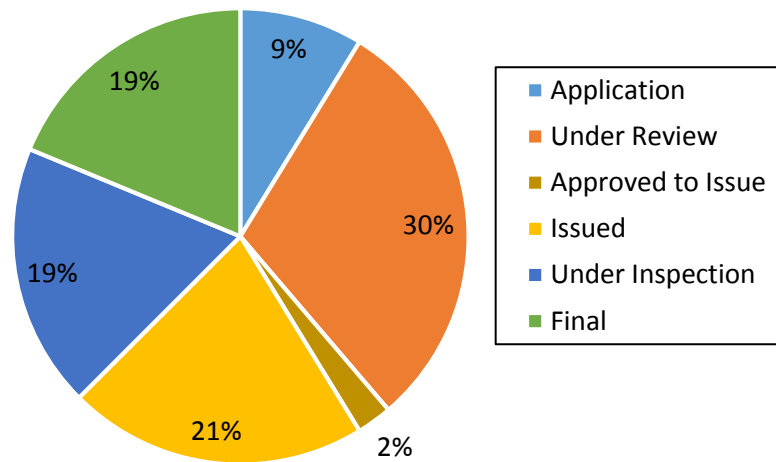


Figure 6 shows all deconstruction permits by permit status as of October 30<sup>th</sup> of 2017. The legend is arranged in accordance with the permit process (i.e., by permit status), sequentially from top to bottom.

The figures used in this report include all permits from the application stage onwards, as this is how the City sees fit to measure development activity (meaning that projects that enter the permitting process are apparently likely enough to complete it to make this a reliable metric). In other words, accounting for all permit statuses represents the total number of projects that are either completed or in the pipeline.

**Figure 6: Deconstruction Permits by Permit Status**



### Contractor Interviews

There are currently fourteen certified deconstruction contractors in Portland, and NERC gathered information from eleven of those for this project (the remaining three had not participated in any deconstruction activity as of the time of the survey, and were not interested in commenting on the industry).<sup>6</sup>

Out of the eleven firms interviewed, three had not performed a full deconstruction over the previous year, and four can be considered very active, meaning that they are currently bidding for deconstruction projects and performed six or more full deconstructions over the last year. NERC estimates that these four contractors are currently capturing over 80% of issued permits. All four attribute 80% or more of their deconstruction activity to the ordinance.

<sup>6</sup> As it was necessary to protect the individual information of the contractors that we spoke with in order to receive complete information in a competitive industry, NERC can only provide broadly aggregated information in this section. When in doubt, we erred on the side of privacy.

With such a large share of projects going to a few firms, the market is currently very concentrated. Typically, this kind of concentration is observed when a market is non-competitive (either by nature or through monopolistic power), or when it is very new. In this case, we know that the market is to some extent competitive (see below regarding bidding for deconstruction projects), and therefore believe that the concentrated market share is due to the deconstruction industry's newness on this scale. Simply put, once the costs and revenues associated with deconstruction are better understood, the supply of providers should adjust to match the demand for services, and the market will ideally display less concentration.

As many deconstruction contractors perform other services as well (for example, general contracting services, demolition, and waste management), individual workers typically move between different types of work, making it difficult to assess, even via direct interview, the number of full or part time positions sustained by the industry. NERC estimates approximately 20 FTE positions, both new and existing prior to the deconstruction ordinance.<sup>7</sup> Deconstruction crews typically consist of one lead and six to seven workers, and wages range from \$12.00 to \$40.00 per hour. While it is not possible to construct a weighted average wage without payroll data, NERC infers that the hourly compensation paid to most workers is \$15 to \$17.

#### Contractor Challenges

Several topics came up repeatedly as challenges for deconstruction contractors: bidding appropriately, the availability of skilled labor, and maximizing salvage revenue. Each is discussed in brief below.

#### *Bidding Appropriately*

Many contractors expressed difficulty in the bidding stages. Some contractors were bidding at low prices that others could not match (in fact, there was some doubt expressed about whether or not the winning bids would be profitable for the contractors who won them), and there is uncertainty associated with the deconstruction process that complicates the picture further—small differences in structural attributes or approach could make a large difference in the contractor's costs. Some contractors mentioned projects on which they finished in the red, due to erroneously low bids. Similarly, the amount of salvage of a high enough quality for resale (which is necessary to help offset the increased labor cost over demolition) can be difficult to assess. As time goes on, this problem is likely to resolve itself, because if low bidding is in fact occurring, it will not be sustainable. Secondly, increased experience on the part of the contractors will limit accidental low bids.

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<sup>7</sup> Full-time equivalent, or 2,080 hours per year. A method for converting part time jobs to full time jobs. In this case, a reported total of 42 deconstructions performed at the time of survey represents 20,160 to 40,320 hours of labor (using the range of 480-960 hours per project found in Table 1; see Appendix for why this hour range is perhaps excessive), which translates to 10-20 FTE positions. These FTE positions do not represent individuals working full-time, but rather sum the hours of individuals working part-time in the field in order to arrive at full-time equivalencies. As these individuals are trained in deconstruction and could perform said work full time on an individual basis if required; this represents an underutilized labor force. However, interviewed contractors described a skilled labor shortage, possibly because they desire increased flexibility from workers choosing between different job types.

### *Skilled Labor Availability*

Several contractors stated that they would like to hire more workers who are trained in deconstruction—labor constitutes a high percentage of costs, so increased efficiency is critical. In March of 2017, the City of Portland Bureau of Planning and Sustainability contracted the nonprofit organization Earth Advantage to plan and report on a 12.5-day Deconstruction Workforce Training program, including a skills assessment. The Bureau’s approach to recruiting candidates for this program focused on targeted outreach and cooperation with local pre-apprenticeship programs and non-profits. Fourteen individuals completed the program, and most were subsequently hired by deconstruction firms. Interviewed contractors stated that they plan to hire, in aggregate, 13 more workers over the next six months, indicating the potential for unmet labor demand in the sector (in addition to any current unmet demand). According to a report from the Oregon Employment Department published in May of 2017, the Oregon construction industry (which encompasses the deconstruction industry) is one of the industries with the greatest difficulty filling vacancies—5,097 out of 5,788, or 88%, of vacancies in the industry are classified as difficult to fill.<sup>8</sup> This unmet demand for labor is an issue not only for the deconstruction industry, but the larger construction industry as well.

### *Salvage Market Revenue*

In order to offset the higher cost of deconstructions, it is necessary for firms to maximize the revenue obtained from selling salvaged material in order to remain competitive. However, there are costs associated with that process: for example, lumber often needs to be cleaned, de-nailed, recut, and otherwise processed before being stored and finally resold. Intuitively, while each of these actions has an associated cost, spending time on them can increase the revenue obtained. For many contractors, this extra work is a burden, and some have experienced difficulties in finding buyers even after it is undertaken. There is also the possibility that there simply isn’t enough demand for salvaged lumber—NERC noted a perception that there is currently more salvaged lumber available than demanded. Easing the sale process for contractors and increasing the size of the market by expanding the use of salvaged lumber will likely prove crucial to the ultimate success of the market. Recommendations for market expansion dominate the next section.

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<sup>8</sup> Oregon Employment Department, 2017.

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## Recommendations and Further Research

The newness of the deconstruction market renders analysis of wages, employment, and pricing less meaningful than in a more developed setting. At this stage, the consideration of factors that will influence its ultimate success is vital. This section discusses three key areas of interest and proposed directions for further research, based on the contractor concerns addressed above.

### Expanding the Deconstruction Requirement

There has been some discussion of moving the cutoff year from 1916 to 1926 or later, and possibly starting to include commercial structures as well. Contractor sentiment on this appears to be mixed—while the vast majority express support for increasing deconstruction activity in this fashion, there is some doubt about the timing of a revision to the ordinance, which could be more helpful after labor is more available and salvage market concerns have been addressed. Additionally, the City is currently considering implementing special demolition practices for residences with lead-based paint, which could include full deconstruction or partial deconstruction (exterior painted materials removal) prior to mechanical demolition. If such lead abatement becomes requisite, deconstruction contractors are well-positioned to take on such projects, so the workload may increase even in the absence of an expanded deconstruction requirement. Further expert consultation to investigate the impact and desirability of increasing the cutoff year, and the appropriate timing, is recommended.

### Addressing Deconstruction Labor Market Constraints

As cited above, many contractors mentioned an interest in increasing the number of workers trained in deconstruction available for hiring. (Again, interviewed firms expect to hire around thirteen workers in aggregate over the next six months.) A trained workforce is key to enhanced efficiency, allowing contractors to trim the most substantial portion of their costs (hours of labor) and reduce uncertainty in the bidding process. Labor shortages in the larger construction market exist as well, which could possibly limit enrollment for a second training program, but given the relatively small number of workers called for in deconstruction, said shortage is likely unimportant. Research into Oregon's labor market characteristics (specifically regarding the construction industry) will improve the picture, and contractor interviews indicate that a second training session would be valuable.

### Sustainable Salvage Material Markets

The value of materials salvaged from deconstruction projects played a central role in NERC's 2016 report. That analysis found that reusable building materials offered a key offset to the higher cost of deconstruction—potentially closing the discrepancy with lower-cost demolitions entirely and containing the costs of the program. The previous report thus noted the critical importance of well-functioning salvage material markets, particularly in the face of a rapidly expanding pool of projects. Our follow up research has confirmed that the viability and sustainability of this aspect of the local industry is indeed central to its success, but by no means guaranteed at this time.

The growing deconstruction industry continues to generate materials with impressive re-use value, and two new resale outlets have opened since the requirement's passage. One contractor noted that, while local channels for finish-grade lumber exist, materials are still sometimes donated to non-profit reused building material suppliers. It is worth noting that due to mandated delays and other demo application

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review processes, roughly one-third of permit applications subject to the ordinance in the first year have not been issued, meaning the material has yet to reach the market. This means the full market impact of the ordinance may not be felt until spring of 2018. A substantial glut, if materialized, would almost certainly undermine the financial viability of upstream deconstruction projects by causing the price for salvaged materials to fall.

Like all markets, both supply side and demand side issues contribute to aggregate (and ultimately individual) outcomes. We recommend further research into, and complementary efforts to address, both sides of this market. On the supply side, the largest barriers to potential resale outlets include the difficulty and expense of transporting, storing, and processing bulky materials. Further, given the somewhat niche nature of reused materials, it is not clear that modestly-sized (i.e., numerous) outlets could generate profitable sales volumes, with the important exception of boutique selections of high-grade or artistically-desirable items. For general use materials such as framing lumber and other items, a fairly strong case for economies of scale points to larger, logistically-intense operations such as the non-profit ReBuilding Center's warehouse in North Portland has provided to date (albeit for a relatively smaller stream of materials). How a private business of sufficient scale to play this role for an expanded market would arise is beyond our expertise, but it is worth noting the value of a for-profit shop serving the regional deconstruction market. This implies that public guidance and/or support of such an enterprise may be warranted.

On the demand side of the market, there is the possibility for growth via a number of different avenues. First, increasing the reliability of the stock would likely attract more regular consumers—constant, well-organized stock, clean presentation, and fully-prepared lumber would appeal to both casual and professional buyers. This could be facilitated through the one-stop shop described above. Additionally, introducing salvaged lumber to local traditional retail outlets, like Home Depot or Lowe's, could further increase market penetration. At the time of writing, Home Depot is already selling reclaimed wood online and at certain locations; the source of this lumber is unclear (i.e., it is likely not local at this time). Creating a straightforward, predictable experience for new buyers, whether professional or amateur, is as important in this sector as in traditional retail and wholesale.



## Conclusion

This report was researched and written in order to assess and document the state of the industry one year after the implementation of a city ordinance requiring the deconstruction of all residences built prior to 1917 (or possessing a historical resource designation). The primary findings are that deconstruction activity is close to the level predicted, given the number of demolitions over the same period; the market for deconstruction services is still fairly concentrated (a few firms perform the majority of projects); and contractors have common concerns about the viability of the business. The deconstruction industry in Portland is still in its nascent stages. As the market matures, some of these concerns are likely to work themselves out: for example, uncertainty in the bidding process. Other issues might benefit from city assistance, such as the creation of a centralized facility for processing salvaged materials.

The deconstruction ordinance has many positive potential outcomes: reduced environmental damage from demolition activity, a secondary market for salvaged materials, and jobs—deconstruction requires substantially more labor hours than demolition. There are costs, as well, in the form of a higher wage bill and lengthier process when compared with traditional demolition. Both the costs and benefits are difficult to quantify and impossible to account for completely, especially at this early stage, but in the year following the ordinance's passage, activity has been close to the predicted level and industry challenges are more clearly understood and articulated.



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## Appendix

After this report was written, new data on the number of labor hours required to perform a full residential deconstruction became available. As part of the deconstruction grant program, active from September 2015 to August 2017, contractor applicants reported square footage and number of labor hours for twenty different projects performed by four different firms.<sup>9</sup> The results differ from the estimate of 480-960 hours per project fairly significantly: the average number of hours per project was just 353.5, with a minimum of 110 hours and a maximum of 531 hours. When considering the square footage of the home being deconstructed, the weighted average across firms was 0.33hrs/ft<sup>2</sup>, with large differences between the four.

NERC appreciates the expert consultation that produced the initial estimate (used in this report), but this new data is valuable as well. The factor most impacted is the number of FTE jobs sustained by the deconstruction industry exclusively. Using the same methodology described in the footnote on page 10 (namely, projects multiplied by hours and subsequently divided by the FTE of 2,080 hours), this new range of hours indicates a total of 2-11 FTE positions, distributed among a reported total of 33 workers. This implies that the average worker at one of the interviewed contractors spends one third of their time working on deconstruction projects. Of course, as the market is highly concentrated, workers at some firms can be assumed to spend all of their time in this construction subsector, while workers at others may have only worked on one or two projects over the analysis period. NERC also believes, based on interviews, that this figure is low: contractors were asked about their employees and therefore likely did not count themselves, and there may be project components beyond the scope of hours reported in the grant process. Therefore, the figure of 20 FTE positions is considered superior, and is used in this report with this appendix as a caveat.

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<sup>9</sup> There were twenty-one projects provided with grants altogether, but data is only available for twenty of those at this time.

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