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Asbestos Exposure in Demolition: an Analysis of Abatement Practices and Alternatives to Demolition

Allison Woolverton
Portland State University

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HONORS 403 THESIS

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HONORS 403 THESIS

Research Question: How effective is abatement in preventing exposure to hazardous materials in the demolition of homes?

Abstract

The purpose of my paper is to examine the effectiveness of the abatement process on homes in Portland, Oregon through the analysis of asbestos surveys conducted by The City of Portland. It evaluates the levels of hazardous materials that are left in homes after the abatement process which can be disbursed into the air and soil during demolition and thus create significant health hazards for demolition crews and surrounding residents.

The research methods employed for this paper include the analysis of asbestos surveys on homes provided by The Rebuilding Center of Portland (The Rebuilding Center) to see what materials contained asbestos. The surveys were used to compile data on the number of homes deconstructed that were found to have additional asbestos after abatement. This data was examined for trends.

The results show that 52% of homes examined by The Rebuilding Center had additional asbestos found after abatement. This was commonly found in materials like flooring and vinyl tiles which can be hard to find during surveys if they are hidden underneath other materials such as carpet.

Both material surveys and abatement procedures are required for all homes that are to be demolished in Portland, but many hazardous materials remain after this process, making demolition unsafe. This paper contends that deconstruction is a much safer alternative since no debris is created and hazardous materials can be disposed of properly

when found. These findings contributed to new regulations in Portland, Oregon that require deconstruction rather than demolition for homes built before the year 1916.

Introduction

The practice of demolition is becoming more common as homes get older. When land values increase, many home buyers consider demolishing the existing structure, which is to tear them down completely, to rebuild newer modern homes. Older homes tend to contain significant amounts of hazardous materials, such as lead and asbestos, which create potentially hazardous conditions during the demolition process. The debris from demolition carries these hazardous materials which makes exposure to workers and residents more likely to occur. For example, lead dust fall is common in the demolition debris of older homes because lead was commonly used in paint before building policies prohibited its use in the year 1978. If older homes are not well maintained, demolition debris containing high amounts of lead can also permeate the soil for both that property and neighboring properties. (Mucha et al., 2008).

There are numerous hazards that people can be exposed to during demolition, such as heavy metals that stay in the soil (Gao et al., 2015) and materials such as hexabromocyclododecane (HBCDD). These hazards have negative impacts on the health of humans and other animals that aren't protected from demolition waste (Nie et al., 2015). The debris from these materials can be found in the soil of the property where the home was demolished and can also end up in landfills which then leach into groundwater due to inadequate liners (Powell et al., 2015). This leads to contaminated drinking water for some communities, making it a health hazard.

Another commonly found hazardous material in older homes is asbestos. This is a

natural mineral that has many different uses today. Asbestos can be found in materials such as insulation, roofing, siding, and vinyl floor tiles (EPA, 2016). Asbestos still has many uses today because of the benefits it offers such as heat resistance and strength. It is not completely banned and it is still used in construction and other industries (EPA, 2016). Asbestos use in home materials was phased out in the late 1970's to early 1980's. This leaves many older homes with potentially high amounts of asbestos. Exposure to asbestos fibers over time can lead to adverse health effects such as mesothelioma, asbestosis, and lung cancer, which is why today the use is more controlled and limited, notwithstanding exposure during demolition (Kakooei et al., 2012).

When it comes to the practice of demolition, there is a high health risk for homes that are not properly abated. During the abatement process, all hazardous materials are removed from the building before demolition takes place so that workers and nearby residents aren't negatively affected by the debris. However, many homes that are demolished still contain hazardous materials because of incomplete abatement processes.

Abatement must be conducted to remove hazardous materials such as lead and asbestos so that these materials aren't released in the air or left in the soil after demolition. In the case of this study, someone who contracts with the city will conduct a survey of hazardous materials in the home. They will go through the home and take samples of materials that appear to be hazardous or that they suspect are hazardous. These samples are then sent to a lab for identification. After the results are provided, it is then the responsibility of the demolition company to make sure those materials are removed before any demolition

takes place. This is when abatement begins, either by the demolition company themselves, or by another contracted company. However, in many cases some of the hazardous materials are only partially removed, particularly if the survey is not thorough enough and is missing materials, which can then create unsafe work environments and surrounding areas for neighboring homes (Lange et al., 2006). Asbestos concentration can vary within structures depending on where it is found. There are six different types of asbestos but only three are commonly found in homes. The most common is chrysotile, or white asbestos, which is a curly fiber. The second is amosite, or brown asbestos, which is a needle like fiber. Lastly, crocidolite, or blue asbestos, can also be found and is similar to amosite. When only partial abatement is carried out it is not uncommon to find additional concentrations of asbestos left in homes that are higher than 0.1 fibers per cubic centimeter (f/cc), which is the legal exposure limit (Dufresne et al., 2009). Anything higher than that created dangerous levels of exposure and the asbestos must be removed.

The purpose of my paper is to examine the abatement process through asbestos surveys conducted by The City of Portland to see what additional amounts may remain in homes. The homes surveyed were set to be deconstructed rather than demolished, but they demonstrate the effectiveness of the abatement process. I also intend to review the alternative option to demolition, which is deconstruction, to evaluate its potential to resolve this particular problem of hazardous material exposure.

Methods

The research methodology in this paper began with the analysis of secondary asbestos surveys provided by The City of Portland that were collected by The Rebuilding Center in their deconstruction services department. These surveys show where additional asbestos is found in homes before demolition or deconstruction occurs and what materials in the homes contain the asbestos. The surveys also contain the levels and type of the hazardous material found to assess how potentially dangerous they are.

Initially, surveys are conducted on any building that is going to be demolished or deconstructed to see what hazards are present. Then the abatement process takes place to remove the hazardous materials from the home. For the homes in this study, deconstruction was carried out by The Rebuilding Center. Once abatement was complete, deconstruction employees from The Rebuilding Center followed up on the homes, conducting an additional walk through to see what materials were left in the homes that appeared to be hazardous. After finding potentially dangerous materials, additional surveys from The City of Portland were requested to assess the level and type of hazardous materials still present in the homes. These additional surveys were the ones analyzed for this project. They were accessed through The Rebuilding Center from their deconstruction database.

The secondary surveys conducted after abatement were examined to look specifically at additional asbestos content. They allowed us to see what materials in homes contained asbestos and to determine how much of each type, chrysotile containing materials (CCM)

and amosite containing materials (ACM), was found. These surveys allowed us to identify which asbestos containing materials were commonly missed and to see the amount of friable asbestos (defined as anything higher than 1% in weight by area) for both ACM and CCM that is still in homes.

With this information we are able to discuss the further implications of abatement due to improper removal of hazardous materials. We can determine where asbestos is found commonly in homes, but more importantly, how many homes were not properly abated. This information can help us determine how hazardous materials are missed during surveys, while also looking into alternatives to demolition that can eliminate the risk altogether of exposure to hazardous materials.

This paper also includes review of peer reviewed journal articles to provide insight into the demolition field and information about hazardous materials found in older homes that can be dangerous if not properly removed. These sources are also used to examine the chief alternative to demolition, called deconstruction, which is the process of taking apart buildings piece by piece to eliminate the release of demolished hazardous materials into the air. The references that were used to help demonstrate the hazards of demolition and benefits of deconstruction came from many different sources by searching the Portland State University library database using key words such as “demolition hazards”, “negative aspects of demolition”, and “deconstruction benefits” which led to several peer reviewed journal articles that are cited in the bibliography. In addition, other cited articles were referred for this paper by the Portland State architecture department on the safe reuse of building

materials.

Lastly, I was able to conduct some field work with The Rebuilding Center of Portland by conducting a couple of walk throughs with staff and assessing the benefits of deconstruction. I worked with the manager of the Deconstruction Services department to view homes that requested a quote on deconstruction. We visited these homes to take counts of the salvageable, or reusable, materials such as cabinets, windows, and doors. We took these counts and made calculations on an application called the Deconstruction Calculator that was designed to show the positive environmental impacts of deconstructing a home versus demolishing it. Once all the information was put into the calculator we were able to see statistics that show how many jobs were created, how much energy was saved, and how many materials were reused instead of being taken to a landfill.

During these visits we also took note of possible hazardous materials such as old chipping paint that could contain lead, and of insulation that could contain asbestos. This helped me to see how common hazardous materials are found in homes.

Results

The tables below show results from the asbestos surveys reviewed through The Rebuilding Center. Table 1 shows the total number of homes deconstructed by The Rebuilding Center by year, with data from 2013, 2014, and 2015. This is provided to give an idea of how many homes are viewed by staff from The Rebuilding Center. This is then compared to how many of those deconstructed homes were abated and still had additional asbestos found by staff from The Rebuilding Center that was reported and reviewed again by The City of Portland through an additional survey. The table below show that roughly half of homes each year that The Rebuilding Center agreed to deconstruct had additional asbestos found after the initial survey and abatement was conducted. This then lead to a second round of abatement before work could be completed to deconstruct the home.

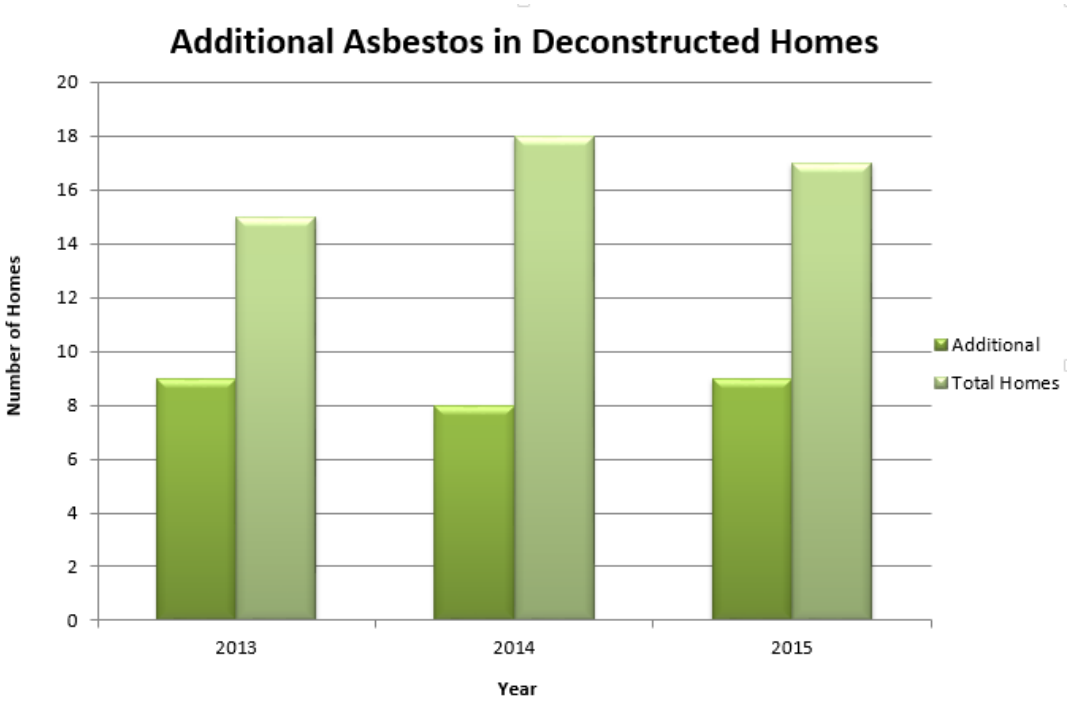

Table 1

Table two is a pie chart showing the average proportion of homes from the last three years that The Rebuilding Center has deconstructed which contained additional asbestos. This visually helps show how many homes overall were viewed and that slightly over 50% of homes had additional asbestos found after the initial survey and abatement.

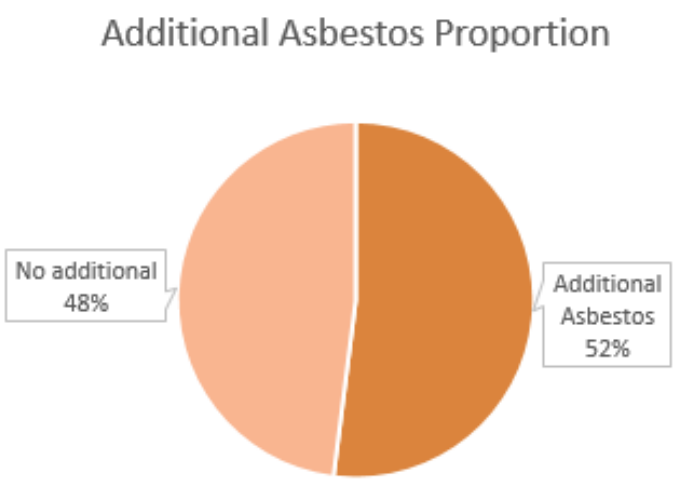

Table 2

Table 3 shows the total number of homes that The Rebuilding Center has deconstructed and the years that those homes were built. This gives insight into the year of homes that have high demand for either demolition or deconstruction in the Portland area.

The ranges shown were how the data was organized by The Rebuilding Center for a proposal created to The City of Portland on deconstruction practices. To correlate with their proposal, the same ranges were used for this paper. Most homes that were deconstructed by The Rebuilding Center were built in the year range of 1912-1937 with a total of 48 homes. This is then compared with table 4 that shows how many homes in each year range had additional asbestos. The same trend of having additional asbestos in homes found for the year range 1912-1937 is shown to match the high trend of deconstructed homes in total for that year range.

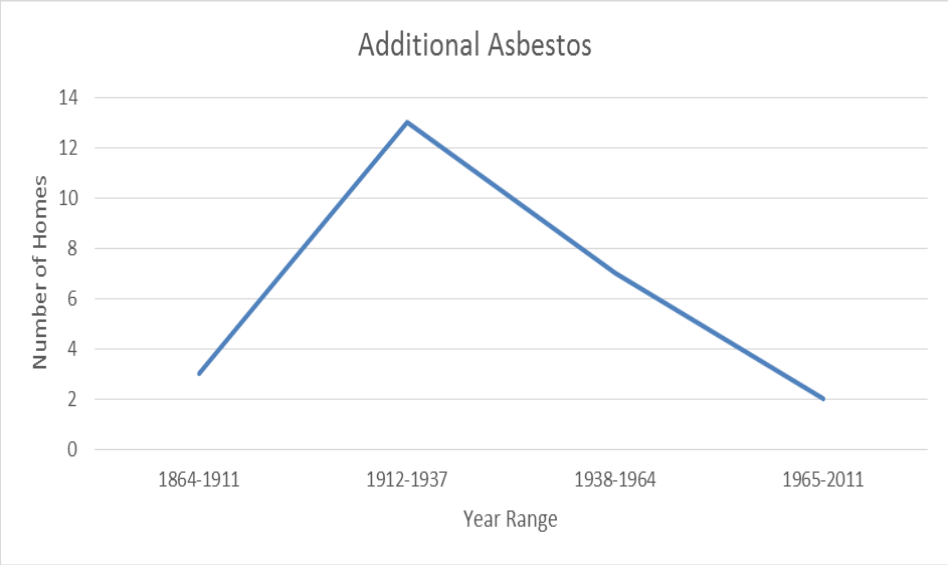

Table 3
See appendix A for raw data.

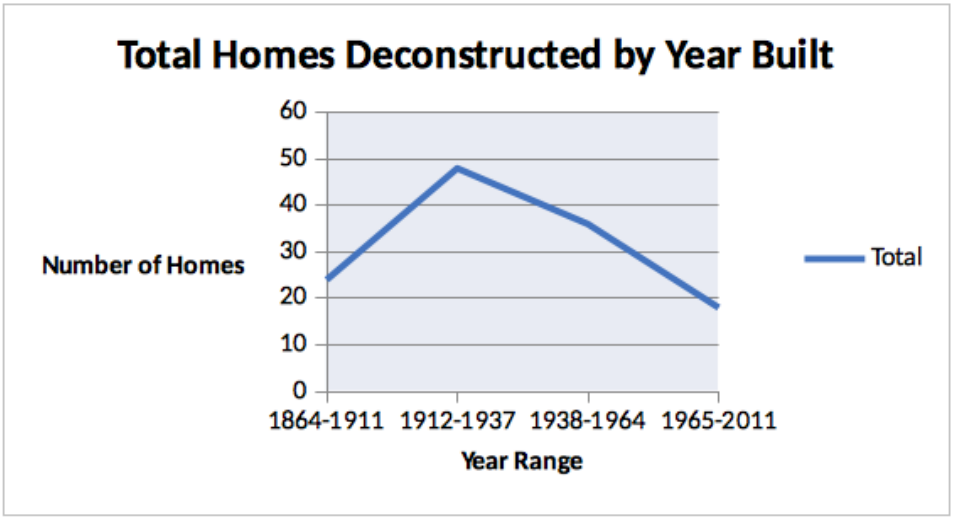

Table 4
See appendix B for raw data.

Some asbestos surveys were viewed, but for the most part this data was compiled by

staff of The Rebuilding Center. Of the surveys that were viewed, CCM and ACM were found in various areas throughout homes such as insulation, piping, and flooring (See appendix D for example survey). These surveys note that samples are taken randomly per EPA regulations which mean that materials can still be missed throughout the home, leaving hazardous materials in place. This also is only the survey that is conducted, and not the report of what was removed through abatement. See appendix C for the Incident Report from The Rebuilding Center.

Discussion

The results of this research point to the need to re-evaluate the survey and abatement process for hazardous materials in the City of Portland. The data from The Rebuilding Center gives insight into the effectiveness these processes since approximately half of homes included in the surveys still contained additional asbestos that can be hazardous to staff and neighbors. This high proportion is very concerning from a public health standpoint and it begs the question, what other hazards could be present that aren't seen even after a second walk through? If there are so many hazards present, than a much more thorough process is needed, especially before demolition takes place. The data is consistent with regards to additional asbestos which indicates a hazardous trend.

The current EPA guidelines stem from the Clean Air Act. It states that homes are to be "thoroughly inspected" if they are to be demolished (2016). When asbestos is found, the proper state entity is contacted and removal is scheduled. Removal consists of wetting down asbestos containing materials, sealing them in leak tight containers, and disposing of them properly (Environmental Protection Agency, 2016). The downside to this is that there is an exception to the regulation. The Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP) states that if the total amount of asbestos found is less than 35 cubic feet of the structure in which it is located, than it is not required to be removed before demolition (Environmental Protection Agency, 2016). This leaves a significant amount of asbestos unabated, which means that if deconstruction takes place, workers can still be

exposed to this hazard.

The spike in homes shown in table 3 between the years 1912 and 1937 that were deconstructed can be explained by the ease of the demolition process. Once homes reach the age of about 80-100 years, there can be many needed improvements, and for some home owners it is much easier to demolish the entire home and build a new one. In this case, demolition is relatively easy to file for in Portland. However, there is a sharp decline in homes viewed before this time period since many of them are considered historic. Once a home surpasses 100 years, it is more likely considered historic and will require a much longer process for demolition including longer delays before beginning the process and historic inspections (Spencer-Hartle, 2016). The opposite it seen on the other end of the scale for homes built after the year 1937. Homes in that range and newer may not have as many renovations or are easier to repair, leaving less requests for demolition.

The correlation between number of homes built and asbestos found can be connected to the higher demand in demolition for that time period. This can also relate back to the frequent use of asbestos in homes at that time. For example, spray applied asbestos for fireproofing was not banned until the year 1973, soon followed by other regulations to limit to use of asbestos (Environmental Protection Agency, 2016). This left a lot of use in the early 1900's for asbestos around the home. Appendix D shows an advertisement for vinyl floor tiles from the magazine American Home. The issue is from May of 1970 and showcases the ease of peel and stick vinyl floor tiles. At the time, asbestos was a selling point for products like this. The woman in the advertisement is shown placing the tiles over

hard wood flooring. The renovation is simple and easy which is similar to how people commonly put carpet over vinyl flooring rather than removing the existing material.

Asbestos became popular for use in materials such as vinyl flooring and even wall paper in the early to mid-1900's (Mesothelioma Center, 2015). These materials were convenient to use and didn't pose any risk since the asbestos was not considered friable, making the toxicity low and thus not requiring the material to be banned. The use of asbestos in home materials was phased out in the late 1970’s to early 1980’s, but since most of the homes deconstructed are older, they pose a risk for having asbestos and other hazardous materials. If demolition were to take place on these older homes, even with durable asbestos floor tiles, they are crushed and become debris which makes them hazardous.

Many products that contain asbestos are not banned today. These include materials like cement shingles, roof coatings, and vinyl floor tiles. These products are considered safe when undisturbed but can be hazardous when turned into debris during demolition.

After reviewing a handful of asbestos surveys it was clear that asbestos was commonly found in duct work, insulation, and flooring. What makes abatement difficult is that these materials are difficult to find if they are not already exposed. Commonly, home owners would install carpet over vinyl asbestos flooring, leaving it unknown to the surveyor. Then if demolition takes place, the debris can be very hazardous. The analysis of the surveys indicates that other materials are also suggesting that homes may have multiple hazards.

This work organized by The Rebuilding Center staff was used to support a proposal

requiring that all homes built before the year 1920 be deconstructed rather than demolished, including all historic homes. The proposal was made on the basis of this evidence showing that hazardous materials are frequently missed by surveyors and abatement companies. We were able to present these findings to the Deconstruction Advisory Group of Portland to show how concerning this exposure is and to propose a solution that eliminates the risk altogether. When we deconstruct homes, there is no hazardous debris to worry about for staff and neighbors. This is because any hazards found can still be removed safely as the entire home is being taken apart piece by piece. Very little debris is created. This proposal was reviewed by the mayor of Portland, and was passed in February 2016 to go into effect October 2016. The new regulation requires that all homes built before the year 1916 that are to be torn down, to be deconstructed rather than demolished. The code can be reviewed in appendix E.

The question at hand is why do people choose demolition over deconstruction? Demolition is a fast process since a single family residence can be demolished in approximately one or two days. Deconstruction can take much longer depending on the size of the home, lasting about 1-2 weeks. Depending on the project, deconstruction may also cost more than demolition. This makes the decision harder for some home owners since cost and time are important factors. However, the value of materials salvaged can affect the deconstruction costs often making it more cost efficient in the long run. Regardless of demolition or deconstruction, most homes in Portland are subject to a 30 day delay after submitting for a demolition permit. There are cases where contractors buy homes to

demolish so that they can rebuild multiple homes on the land for profit. In these situations time and money are both important which is why demolition usually wins.

The deconstruction calculator was an invaluable tool for my field work. It was useful during walk throughs when clients were still deciding whether to do demolish or deconstruct. In one case we took the calculator with us to see what could be saved. We had to finish inputting all the information after the walk through, but had the opportunity to show the client the benefits of deconstructing their home versus demolishing it. We tried to use these benefits to outweigh the factors of cost and time such as energy saved, jobs created, and materials reused. See appendix F for an example of results shown from the deconstruction calculator.

Another benefit of deconstruction is that no water is used in the deconstruction process. During demolition, water must be used to control the debris, but this is not typically monitored or measured in any way. The use of water does not contain all of the debris, and since it is not regulated, not all demolition jobs may be using this process properly. In deconstruction there is no worry of debris and it saves water.

Most of the homes that we viewed that were deconstructed were in neighborhoods in Portland that had many surrounding residents. Air-born debris is something important to consider, especially with possible asbestos, lead and other hazardous materials that can be inhaled.

Deconstruction was viewed by residents positively because of its benefits to local communities. Over the Summer I was able to assist volunteers on deconstruction sites by

taking nails out of wood and organizing materials. As we worked, neighbors would walk by and ask about our project. We told them about deconstruction and how the materials were donated to The Rebuilding Center so that they could be reused by the public. This left a positive impression on residents who could see that the home being taken down would supply the materials for other homes, along with a new home to be built in its place. Not very many of the residents were familiar with deconstruction since demolition is more common so this allowed us to explain more of the benefits and to spread the word.

Conclusion

The abatement process is based on the findings of the surveys that are conducted prior to the demolition on deconstructed homes in Portland. The surveys determine which materials need to be removed. The findings of this research show that abatement is often incomplete due to incomplete surveys, or due to the fact that many hazards are not exposed. Hazardous materials that are not exposed are harder to detect. These conditions lead to the unnecessary and dangerous exposure of workers and neighbors to hazardous material debris that is created during demolition. The deconstruction rather than demolition of older homes greatly reduces or eliminates that exposure.

The results of this research contributed to the passage of legislation in the City of Portland that will require all homes built prior to the year 1916, that are to be torn down, be deconstructed rather than demolished to avoid this exposure. This will not only limit asbestos exposure, but also other hazardous materials that could have been missed during abatement. Deconstruction is the safest way to remove older homes and is also the more sustainable option so that materials can be reused and kept out of the landfill.

This research suggests that there is much left to be accomplished in this area. I believe more should be done to understand how current home owners are removing hazardous materials, whether they are doing it themselves, and when the documentation should be required. It would also be important to investigate survey and abatement practices in other cities to find potential models for great effectiveness.

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Appendix

A. Raw data for Table 3:

Year Range	Additional Asbestos Found
1864-1911	3
1912-1937	13
1938-1964	8
1965-2011	2

This table shows the year ranges used by The Rebuilding Center and how many homes from each range had additional asbestos found. This is only from homes that were deconstructed from 2013-2015.

B. Raw data for Table 4:

Range	Number of Homes
1864-1911	24
1912-1937	48
1938-1964	36
1965-2011	18
Total	126

This table shows the year ranges used by The Rebuilding Center and how many homes from each range in total were used in the data. This is the total number of homes deconstructed from 2013-2015.

C. Report from The Rebuilding Center for additional asbestos found:

Asbestos Incidence Report

The intent of this analysis is to determine the rate if incidence wherein whole structures (including houses, commercial buildings and barns) had asbestos containing materials (ACM's) discovered within the structure after the abatement process was conducted in accordance with an asbestos survey provided by a certified lab or an environmental consulting firm.
The following data has been compiled by reviewing the following sources over a three year period (January 2013 through November 2015): asbestos surveys supplied by the owner or general contractor; additional lab results derived from possible asbestos containing materials (PMAC's) discovered during the disassembly process; the Portland Maps online information service; and daily project log entries.

- 2015 (YTD) – disassemb333led 17 structures – discovered 9 with additional ACM's (constructed in: 1907(2), 1908, 1917, 1924, 1928, 1930, 1943, and 1965).

- 2014 - disassembled 18 structures – discovered 8 with additional ACM's (constructed in: 1917, 1925, 1926, 1929, 1939, 1949, 1950, and 1957).

- 2013 - disassembled 15 structures – discovered 9 with additional ACM's (constructed in: 1912, 1913, 1925(2), 1937, 1938, 1950, 1963, and 1965).

Conclusion – we discovered additional ACM's in 26 of the 50 structures we disassembled over this three year period of time.

D. Example Asbestos Survey:

ASBESTOS SURVEY

For the house located at:

[redacted]
PORTLAND, OREGON

Prepared for:
Everett Custom Homes

CERTIFIED ENVIRONMENTAL CONSULTING, LLC
615 SE CHKALOV DRIVE SUITE 12
VANCOUVER, WASHINGTON 98683-5280

Prepared by:
[redacted]

CERTIFIED ENVIRONMENTAL CONSULTING, LLC

EXECUTIVE SUMMARY

Dear Mr. [redacted]

Enclosed are the results of the asbestos survey report conducted by C.E.C., LLC, for the house located at, [redacted], in Portland, Oregon. This survey was coordinated with you and conducted on June 11, 2015, by [redacted], an AHERA certified inspector.

All samples were taken in a random manner as required by EPA AHERA rules and analyzed using polarized light microscopy with dispersion staining according to EPA and OR-OSHA Methodology.

Asbestos was identified in the floor tile and sheet vinyl (See sample data sheet attached). The gypsum wallboard with tape and mud contains a trace amount (less than one percent) chrysotile asbestos. As it is a trace amount it is not required to be treated as asbestos containing. Please note: the quantities and/or amounts listed within (Summary Data, Assessment of Materials sections) are estimates only and are not to be relied upon for estimating the removal costs. All quantities and/or amounts should be field verified by the responsible parties for the true amounts and removal costs.

The following survey is divided into the following sections:

- ◊ Summary sheet - details the type and construction of the building with approximate amounts of asbestos in the building.
- ◊ Sample result sheet - contains sample numbers and results, description of materials and homogeneous areas of material.
- ◊ Assessment of materials - contains an assessment of asbestos materials.
- ◊ Response actions recommended - contains the response actions we recommend.
- ◊ Laboratory analysis sheet - contains the results of our laboratory analysis.
- ◊ Inspector's certifications.

C.E.C. has investigated accessible areas of this facility in locating suspect ACM. The current extent and condition of the ACM was detected through on-site observation and physical determination.

NOTE: This asbestos survey report is available to Everett Custom Homes, and not to be reproduced in total or part without written consent of Everett Custom Homes.

We appreciate the opportunity to have worked with you. If you have any questions or if we can be of any further service, please contact our office.

[redacted]

615 SE CHKALOV DRIVE SUITE 12 VANCOUVER, WASHINGTON 98683-5280
PORTLAND (503) 221-7904 VANCOUVER (360) 254-9385 Fax (360) 891-9633

CERTIFIED ENVIRONMENTAL CONSULTING, LLC

SUMMARY SHEET

Owner or Representative: [redacted]

Address: [redacted]

City: Portland **State:** Oregon

Owner's Representative: Everett Custom Homes
[redacted]
735 SW 158th Avenue Suite #180
Beaverton, Oregon 97006

Owner/Rep. Telephone Number: [redacted]

Surveyed by: [redacted] Accreditation Number: [redacted]

CONSTRUCTION DATA:

Year Built: Approx: 1890's **Size:** Approx. 2,600 SQ FT

Construction Type: Wood

Roof Construction: Asphalt Shingle

Heating System: Oil Stove

Attic Insulation: Cellulose

Pipe Insulation: Foam

3

615 SE CHKALOV DRIVE SUITE 12 VANCOUVER, WASHINGTON 98683-5280
PORTLAND (503) 221-7904 VANCOUVER (360) 254-9385 Fax (360) 891-9633

CERTIFIED ENVIRONMENTAL CONSULTING, LLC

SUMMARY DATA

[redacted], PORTLAND, OREGON

PRODUCT	AMOUNT	FRIABLE	CONDITION	SAMPLE #	RESULTS
FLOOR TILE	APPROX. 120 SQ FT	NO	GOOD	8	**2% CHRYSOTILE**
SHEET VINYL	APPROX. 140 SQ FT	YES	GOOD	11	**20% CHRYSOTILE**

Please note: the quantities and/or amounts listed within (Summary Data, Assessment of Materials sections) are estimates only and are not to be relied upon for estimating the removal costs. All quantities and/or amounts should be field verified by the responsible parties for the true amounts and removal costs.

Certified Environmental Consulting, LLC, warrants that the findings contained herein have been prepared in general accordance with accepted professional practices as applied by similar professionals in the community at the time of this report preparation. Changes in the state of the art or in applicable regulations cannot be anticipated and have not been addressed in this report. The field and laboratory results reported herein are considered sufficient in detail and scope to determine presence of asbestos containing materials in or around the area(s) requested at the time of the inspection. Test results are valid only for the materials tested.

There is a distinct possibility that conditions may exist that could not be identified within the scope of the inspection or that were not apparent during the site visit. This inspection covered only those areas that were exposed or physically accessible to the inspector. The inspection is limited to the information available from the client at the time of the inspection was conducted.

615 SE CHKALOV DRIVE SUITE 12 VANCOUVER, WASHINGTON 98683-5280
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CERTIFIED ENVIRONMENTAL CONSULTING, LLC

SAMPLE RESULTS

[redacted], PORTLAND, OREGON

SAMPLE #	SAMPLE DESCRIPTION	SAMPLE LOCATION	HOMOGENEOUS AREA	ASBESTOS CONTENT
1	WINDOW GLAZING COMPOUND	FRONT WINDOW	THROUGHOUT	NONE DETECTED
2	WHITE SHEET VINYL	TOP LAYER BACK ENTRY		NONE DETECTED
3	BEIGE FLOOR TILE AND MASTIC	BOTTOM LAYER BACK ENTRY		NONE DETECTED
4	FLOOR TILE AND MASTIC	TOP LAYER UNDER CARPET KITCHEN		NONE DETECTED
5	FLOOR TILE AND MASTIC	BOTTOM LAYER UNDER CARPET KITCHEN		NONE DETECTED
6	FLOOR TILE AND MASTIC	TOP LAYER BATHROOM BY ROOM WITH OIL STOVE AND LAUNDRY		NONE DETECTED
7	SHEET VINYL	BOTTOM LAYER BATHROOM BY ROOM WITH OIL STOVE AND LAUNDRY		NONE DETECTED
8	FLOOR TILE AND MASTIC	UNDER CARPET ROOM WITH OIL STOVE AND LANDRY		**FLOOR TILE: 2% CHRYSOTILE** MASTIC: NONE DETECTED
9	GYPSUM WALLBOARD WITH TAPE AND MUD	ROOM WITH OIL STOVE AND LAUNDRY	SELECTIVE THROUGHOUT	TRACE <1% CHRYSOTILE
10	INSULATION	ATTIC		NONE DETECTED
11	SHEET VINYL	FIRST FLOOR NORTHEAST BATHROOM		**20% CHRYSOTILE**
12A	PLASTER	FIRST FLOOR NORTHEAST BATHROOM	SELECTIVE THROUGHOUT	NONE DETECTED
12B	SKIM COAT	FIRST FLOOR NORTHEAST BATHROOM	SELECTIVE THROUGHOUT	NONE DETECTED
13A	SPRAYED ON CEILING TEXTURE	FRONT ROOM WITH FIREPLACE		NONE DETECTED
13B	SPRAYED ON CEILING TEXTURE	FRONT ROOM WITH FIREPLACE		NONE DETECTED

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CERTIFIED ENVIRONMENTAL CONSULTING, LLC

SAMPLE RESULTS

[redacted], PORTLAND, OREGON

SAMPLE #	SAMPLE DESCRIPTION	SAMPLE LOCATION	HOMOGENEOUS AREA	ASBESTOS CONTENT
13C	SPRAYED ON CEILING TEXTURE	FRONT ROOM WITH FIREPLACE		NONE DETECTED
14	COVE BASE MASTIC	FIRST FLOOR BATHROOM		NONE DETECTED
15A	WALL TEXTURE	FRONT ENTRY		NONE DETECTED
15B	WALL TEXTURE	FRONT ENTRY		NONE DETECTED
15C	WALL TEXTURE	FRONT ENTRY		NONE DETECTED
16A	ASPHALT SHINGLE	TOP LAYER ROOF	ENTIRE ROOF	NONE DETECTED
16B	ASPHALT SHINGLE	SECOND LAYER ROOF	ENTIRE ROOF	NONE DETECTED
16C	ASPHALT SHINGLE	BOTTOM LAYER ROOF	ENTIRE ROOF	NONE DETECTED
17	SHEET VINYL	SECOND FLOOR BATHROOM		NONE DETECTED
18A	SHEET VINYL	TOP LAYER SECOND FLOOR KITCHEN	TOP LAYER OTHER SECOND FLOOR KITCHEN	NONE DETECTED
18B	SHEET VINYL BACKING	BOTTOM LAYER SECOND FLOOR KITCHEN	BOTTOM LAYER OTHER SECOND FLOOR KITCHEN	NONE DETECTED
19A	WALL TEXTURE	SECOND FLOOR HALLWAY		NONE DETECTED
19B	WALL TEXTURE	SECOND FLOOR HALLWAY		NONE DETECTED
19C	WALL TEXTURE	SECOND FLOOR HALLWAY		NONE DETECTED

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CERTIFIED ENVIRONMENTAL CONSULTING, LLC

ASSESSMENT OF MATERIALS

Building: [redacted], PORTLAND, OREGON

Sample #'s	Functional Space	Asbestos Type	%	Material And Condition	Comments	Sq. Ft. And/Or Linear Footage
8	UNDER CARPET ROOM WITH OIL STOVE AND LAUNDRY	CHRYSOTILE	2%	FLOOR TILE (GOOD)	SEE RESPONSE ACTIONS	APPROX. 120 SQ FT
11	FIRST FLOOR NORTHEAST BATHROOM	CHRYSOTILE	20%	SHEET VINYL (GOOD)	SEE RESPONSE ACTIONS	APPROX. 140 SQ FT

Please note: the quantities and/or amounts listed within (Summary Data, Assessment of Materials sections) are estimates only and are not to be relied upon for estimating the removal costs. All quantities and/or amounts should be field verified by the responsible parties for the true amounts and removal costs.

Inspector: [redacted] - Accreditation Number: [redacted]

Signature: [redacted] **Date:** June 29, 2015

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CERTIFIED ENVIRONMENTAL CONSULTING, LLC

RESPONSE ACTIONS RECOMMENDED

Building: [redacted] PORTLAND, OREGON

MATERIAL	LOCATION	RECOMMENDED RESPONSE ACTIONS
FLOOR TILE	UNDER CARPET ROOM WITH OIL STOVE AND LAUNDRY	Floor tile is a non-friable material currently in good condition and poses no health hazards in its present state. Do not drill through, sand on, tear, remove, or otherwise disturb material. Must be removed prior to renovation or demolition.
SHEET VINYL	FIRST FLOOR NORTHEAST BATHROOM	Sheet vinyl is a friable material currently in good condition and poses no health hazards in its present state. Do not drill through, sand on, tear, remove, or otherwise disturb material. Must be removed prior to renovation or demolition.

Management Planner: [redacted] - Accreditation Number: [redacted]

Signature: [redacted] **Date:** June 29, 2015

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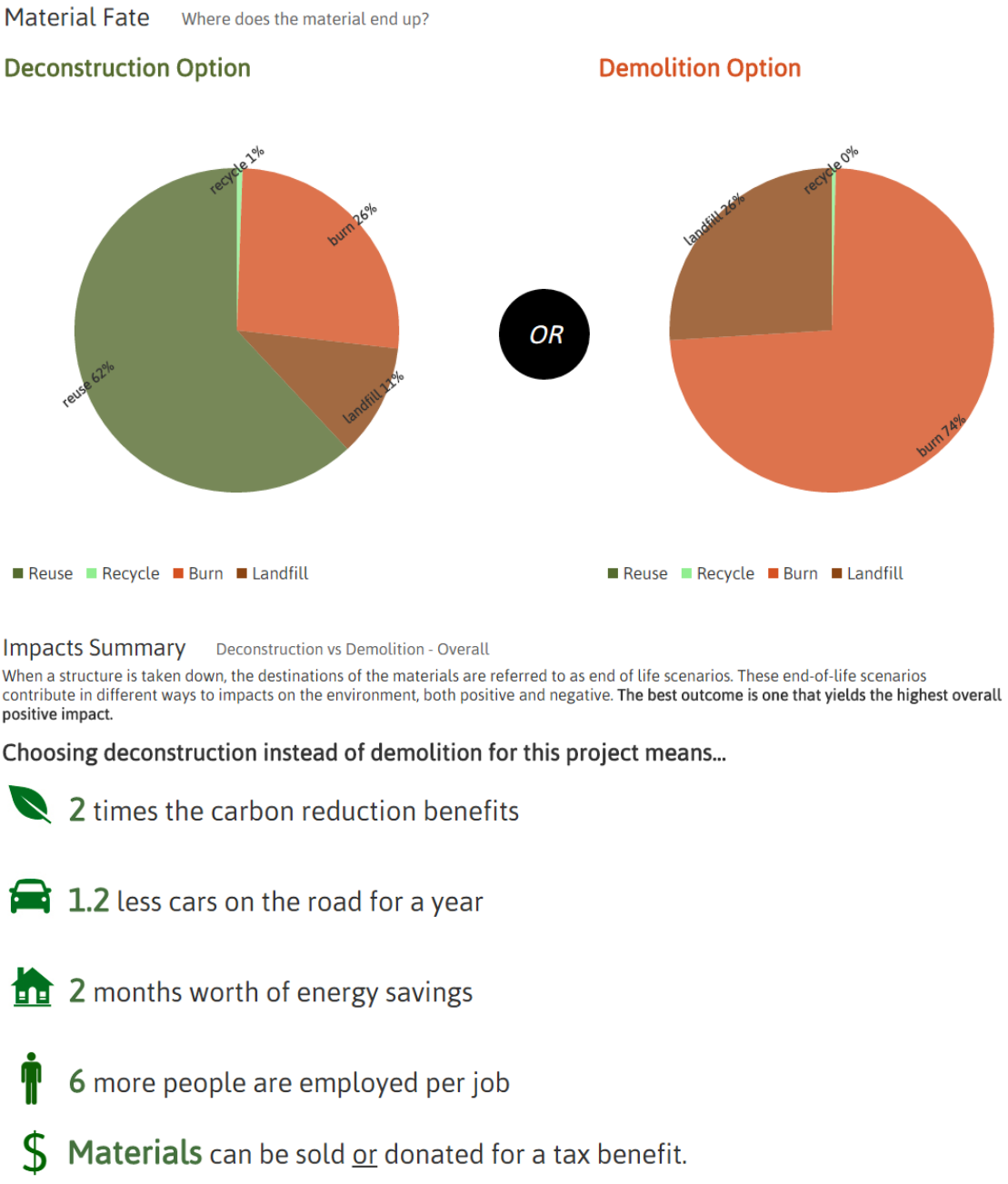
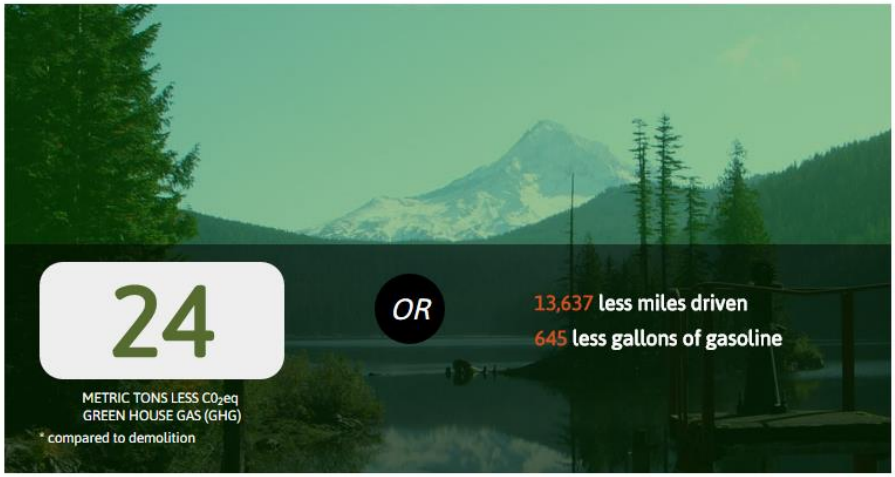
E. American Home Vinyl Tile Advertisement:

F. Deconstruction Calculator Result Example:



Deconstruction Net Benefits*
CARBON

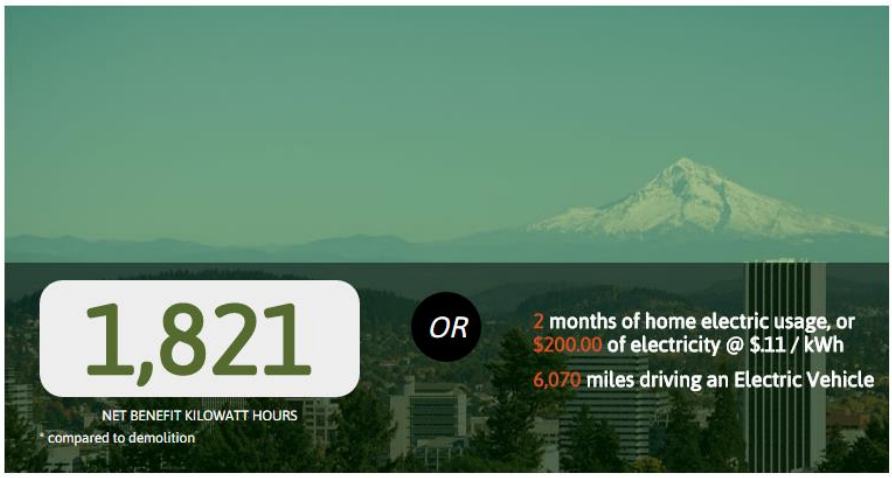


Why Carbon?

Taking actions to reduce greenhouse gas emissions yields important economic benefits. These benefits are from the reduced risk to human health and welfare that results from lower emissions of greenhouse gases and less global warming and climate change.

More Information

Deconstruction Net Benefits*
ENERGY



Reduce Energy Impact

Reusing materials reduces the energy needed for extracting, manufacturing, and transporting virgin materials. By reducing energy use, you can help reduce greenhouse gas emissions, as well as air pollution, water use, and the amount of natural resources (fossil fuels) being extracted from the earth. All of these actions help protect human health and our environment.

Clean Energy Facts

Detail Summary

A statistical summary of this project.

Project Totals

Weight (Tons) **15.79**
Weight (Metric Tons) **14.32**
Weight (Pounds) **31,573.19**
Volume (Cubic Yards) **78.93**

Retail Value of Materials **$106,100**

Demolition Option Summary

Greenhouse Gas Impact **9,329.36**
Energy Impact kh/hrs **26,727**
Tipping Fee (Disposal Cost) **$1,501**
Disposal Weight **31,592**

Deconstruction Option Summary

Greenhouse Gas Impact **-15,063.40**
Energy Impact kh/hrs **28,548**
Tipping Fee (Disposal Cost) **$280**
Disposal Weight **20,245**
Disposal @ 25 a ton **4**
Disposal @ 90 a ton **2**

G. Deconstruction Requirements Code Language:

Deconstruction Requirements Code Language

Comments **due by May 18, 2016**. See inside cover for more information on how to submit your comments.

Public Review Draft

April 20, 2016

Bureau of Planning and Sustainability
Innovation. Collaboration. Practical Solutions.

The Bureau of Planning and Sustainability is committed to providing equal access to information and hearings. If you need special accommodation, please call 503-823-7700, the City's TTY at 503-823-6868, or the Oregon Relay Service at 1-800-735-2900.

Background

In Portland, there are over 300 single-family homes demolished each year. This produces many thousands of tons of waste – a majority of which could be salvaged for reuse. Deconstruction is a method for removing structures that keeps valuable materials out of the landfill, protects health, creates pathways to construction careers and generates affordable reusable building materials. Currently, less than ten percent of houses that are removed use deconstruction.

For the past several years, the City of Portland Bureau of Planning and Sustainability (BPS) has been working to increase deconstruction activity through outreach, education and grants. BPS convened a Deconstruction Advisory Group (DAG) in April 2015 that includes representatives from the community, development firms, builders, demolition contractors, historic preservation agencies and the salvage industry.

Based on the DAG input, BPS brought a resolution to City Council for consideration on February 17, 2016. The resolution was unanimously approved by City Council. The resolution directed BPS to develop code language that requires projects seeking a demolition permit for a one or two-family structure (house or duplex) to fully deconstruct that structure if it was built before 1917 or is a designated historic resource.

After BPS makes revisions from the public comment period, City Council will consider the code language on June 29, 2016. The code language provides a framework for deconstruction and salvage requirements as well as enforcement. Administrative rules for procedural components of the requirements will follow later this summer. The new deconstruction requirements go into effect on **October 31, 2016**.

For more information or to provide comments on the Deconstruction Requirements Code Language please contact:

Shawn Wood, Construction Waste Specialist
Mail: Portland Bureau of Planning and Sustainability
1900 SW 4th Avenue, Suite 7100
Portland, Oregon 97201-5380
Phone: 503-823-5468
Email: shawn.wood@portlandoregon.gov

A copy of this document and additional information on deconstruction can be found at: www.ExploreDecon.com

Chapter 17.105 Deconstruction of Buildings Law

17.105.005 Short Title

Chapter 17.105 of the Portland City Code shall be known as the Deconstruction of Buildings Law.

17.105.010 Purpose

This Chapter provides deconstruction requirements for the removal of Portland's older and more historic primary dwelling structures. The Deconstruction of Buildings Law seeks to:

A. Maximize the salvage of valuable building materials for reuse;

B. Reduce carbon emissions associated with demolition;

C. Reduce the amount of demolition waste disposed of in landfills; and

D. Minimize the adverse impacts associated with building removal.

17.105.020 Definitions

The terms used in Chapter 17.105 are defined as provided in this section or in Administrative Rules adopted under Section 17.105.030:

A. "Certified Deconstruction Contractor" means a contractor licensed with the Oregon Construction Contractors Board (CCB) that has successfully completed a deconstruction training and certification program recognized by the Bureau of Planning and Sustainability. A firm will be considered certified if at least one person employed by the firm is trained and certified. *[Note: Administrative Rules will detail what a recognized certification program is]*

B. "Deconstruction" means the systematic dismantling of a structure to maximize the salvage of reusable materials, in preference over salvaging materials for recycling, energy recovery, or sending the materials to the landfill.

C. "Director" means, unless otherwise stated, the Director of the Bureau of Planning and Sustainability or his or her authorized representative, designee or agent.

D. "Primary Dwelling Structure" means one and two-family structures (detached and attached) based on current permitted occupancy. Primary Dwelling Structures do not include accessory structures such as garages or accessory dwelling units.

E. "Recycling" means the processing of waste materials into new products or material feed stock for products.

F. "Responsible Party" means any owner, owners, person, partnership, or corporation who violated the provisions of this Chapter.

G. "Reusable Materials" means building materials than can be reused such as cabinets, doors, hardware, fixtures, flooring, siding, and framing lumber. Reusable Materials does not include hazardous materials, concrete and masonry elements such as foundations, flatwork, or chimneys.

17.105.030 Authority of Director to Adopt Rules

A. The Director is hereby authorized to administer and enforce provisions of this Chapter.

B. The Director is authorized to adopt rules, procedures, and forms to implement the provisions of this Chapter.

1. Any rule adopted pursuant to this Section shall require a public review process. Not less than 10 nor more than 30 days before such public review process, notice shall be given by publication in a newspaper of general circulation. Such notice shall include the place, time and purpose of the public review process and the location at which copies of the full set of the proposed rules may be obtained.

2. During the public review, the Director shall hear testimony or receive written comment concerning the proposed rules. The Director shall review the recommendations, taking into consideration the comments received during the public review process, and shall either adopt the proposed rules, modify or reject them. Unless otherwise stated, all rules shall be effective upon adoption by the Director and shall be filed in the Office of the Director and with the City Auditor's Portland Policy Documents repository.

17.105.040 Regulations

A. Scope. The deconstruction requirements of this Chapter apply to demolition permit applications under Chapter 24.55 of the City Code for Primary Dwelling Structures that:
   1. Were built in 1916 or earlier according to building permit records on file with the Bureau of Development Services, or if no such permit records exist, then County tax assessor information; or
   2. Are designated as a historic resource subject to the demolition review or demolition delay review provisions of Title 33.

B. Requirements. Primary dwelling structures must be fully deconstructed in accordance with the provisions of this Chapter and associated Administrative Rules. Salvaged material can be sold, donated, or reused on site. Deconstruction is most often accomplished by hand; however, heavy machinery can be used as allowed by this Chapter and administrative rules.
   1. Demolition Permit Application. An application for a demolition permit under Chapter 24.55 for any primary dwelling structure shall not be considered complete unless it is accompanied by a completed Pre-Deconstruction Form provided by the Director. *[Note: Administrative rules will detail what is required on this form]*
   2. Certified Deconstruction Contractor. Deconstruction work must be performed by a Certified Deconstruction Contractor. A Certified Deconstruction Contractor shall be assigned to the project throughout the course of deconstruction. Certified Deconstruction Contractors operate under the requirements of this Chapter and applicable Administrative Rules. The Bureau of Planning and Sustainability will maintain a list of current Certified Deconstruction Contractors in good standing and the list will be on file and available for public viewing.

3. Site Posting. On the first day of active deconstruction a yard sign provided by the Director when the permit is issued must be posted at the site. The sign explains that the structure is being deconstructed and provides City of Portland contact information for questions or concerns.
    a. The sign must remain in place throughout the course of deconstruction.
    b. The sign must be placed on each street frontage of the site.
    c. Signs must be posted within 5 feet of a street lot line and must be visible to pedestrians and motorists. Signs may not be posted in a public right-of-way. Signs are not required along street frontages that are not improved and allow no motor vehicle access.
4. Heavy Machinery. Heavy machinery may be used to assist in the salvage of materials for reuse or to remove material not required to be salvaged. Machinery may not be used to remove or dismantle components of buildings in such a way as to render them unsuitable for salvage.
5. Documentation. Receipts for donation, sale, recycling, and disposal of all materials must be maintained until the demolition permit is finaled and may be requested by the City at any time. Materials intended for reuse on site must be documented with photographs.
6. Demolition Permit Final. A completed Post-Deconstruction Form and all documentation required in Paragraph 5 above must be submitted to the Bureau of Planning and Sustainability before a demolition permit can be finaled by the Bureau of Development Services.

C. Additional Regulations. The demolition of buildings may be subject to additional requirements and enforcement in Title 11 Trees, Title 24 Building Regulations, Title 33 Planning and Zoning, or associated Administrative Rules.

D. Exemptions. The following are exempt from the requirements of this chapter:
    1. A building permit to move a structure;
    2. A structure where the Bureau of Development Services requires demolition due to an immediate danger to the health, safety, or welfare of the occupants, the owner, or that of the general public, as stated in Section 29.40.030 of Title 29, Property Maintenance Regulations; or
    3. A structure determined by the Bureau of Planning and Sustainability to be unsuitable for deconstruction. Requirements for requesting an exemption are found in Subsection E below.

E. Requests for an Exemption. An exemption from the requirements of this Chapter may be requested by the applicant as part of the demolition permit application. A request for an exemption must

include a salvage assessment by a Certified Deconstruction Contractor documenting the conditions of the structure and resulting limited salvage opportunity. Conditions such as substantial fire, rot, or mold may be causes for limited salvage opportunities. An inspection of the structure by the Bureau of Planning and Sustainability may be required to confirm conditions and unsuitability prior to a final determination and issuance of the demolition permit. Should the applicant disagree with the final determination by the Bureau of Planning and Sustainability the determination may be appealed by the applicant as allowed in Section 17.105.060. *[Note: Administrative Rules will detail information needed for the request]*

17.105.050 Enforcement and Penalties

A. It will be a violation of this Chapter for any responsible party to fail to comply with the requirements or to misrepresent any material fact in a document or evidence required to be prepared or submitted by this Chapter. The Director may impose penalties on any responsible party that violates this Chapter as follows:
   1. A first violation of this Chapter may be subject to a penalty of up to $500.
   2. A second violation of this Chapter by the same person may be subject to a penalty of up to $1,000.
   3. Third and subsequent violations of this Chapter by the same person may be subject to a penalty of up to $1,500.
   4. Penalties may be imposed on a per month, per day, per incident, or such other basis as the Director may determine as appropriate based upon the nature of the infraction.
   5. Any person receiving a notice of violation shall, within ten (10) days of issuance of the notice, either pay to the City the stated amount of the penalty or request an appeal as provided in Section 17.105.060.

B. Mechanical Equipment. Improper use of mechanical equipment in violation of this Chapter may be subject to a penalty of up to $10,000. Any person receiving a notice of violation shall, within ten (10) days of issuance of the notice, either pay to the City the stated amount of the penalty or request an appeal as provided in Section 17.105.060.

C. Additional Enforcement Actions for Certified Deconstruction Contractors. The Director may impose the following additional actions for Certified Deconstruction Contractors.

1. A first violation of this Chapter may result in suspension of certification for up to six (6) months.
2. A second violation of this Chapter may result in suspension of certification for up to twelve (12) months.
3. Third and subsequent violations may result in revocation of certification whereby a contractor may not apply for recertification for a period of eighteen (18) months.

D. Stop Work Orders. When necessary to obtain compliance with this Chapter, the Director may issue a stop work order requiring that all work, except work directly related to elimination of the violation, be immediately and completely stopped. If a stop work order is issued, activity subject to the order may not be resumed until such time as the issuing Director gives specific approval in writing. The stop work order will be in writing and posted at a conspicuous location at the site. When an emergency condition exists, a stop work order may be issued orally, followed by a written stop work order within 24 hours. It is unlawful for any person to remove, obscure, mutilate or otherwise damage a stop work order.

E. The Director will consider the following criteria in determining the amount of penalties or actions to be imposed under this Section:
   1. The nature and extent of the person's involvement in the violation;
   2. Whether the person was seeking any benefits, economic or otherwise, through the violation;
   4. Whether other similar prior violations have occurred;
   5. Whether the violation was isolated and temporary, or repeated and continuous;
   6. The length of time from any prior violations;
   7. The magnitude and seriousness of the violation;
   8. The costs of investigation and remedying the violation;
   9. Other relevant, applicable evidence bearing on the nature and seriousness of the violation.

F. When a responsible party meets the conditions for charging an enforcement penalty as described in this Section, the Director will file a statement with the City Auditor that identifies the property, the amount of the penalty, and the date from which the charges are to begin. The Auditor will then:
   1. Notify the property owner of the assessment of enforcement penalties;
   2. Record a property lien in the Docket of City Liens;

3. Bill the property owner monthly for the full amount of enforcement penalties owing, plus additional charges to cover administrative costs of the City Auditor; and
4. Maintain lien records until the lien and all associated interest, penalties, and costs are paid in full; and the Director certifies that all violations listed in the original or any subsequent notice of violation have been corrected.

G. Inspections. The City may conduct inspections whenever necessary to enforce any provisions of this Chapter, to determine compliance with this Chapter or whenever the City has reasonable cause to believe there exists any violation of this Chapter. If the responsible party is at the site when the inspection is occurring, the City will first present proper credentials to the responsible party and request entry. If such entry is refused, the City shall have recourse to any remedy provided by law to obtain entry, including obtaining an administrative search warrant.

17.105.060 Right of Appeal

A. Whenever the responsible party has been given a written notice or order pursuant to this Chapter or has been directed to make any correction, pay a penalty or to perform any act and the responsible party believes the finding of the notice or order was in error, the responsible party may have the notice or order reviewed by the Director. If a review is sought, the responsible party will submit a written request to the Director within 10 days of the date of the notice or order. Such review will be conducted by the Director. The responsible party requesting such review will be given the opportunity to present evidence to the Director. Following a review, the Director will issue a written determination. Nothing in this Section shall limit the authority of the Director to initiate a code enforcement proceeding under Title 22.

B. A responsible party may appeal the Director's written determination to the Code Hearings Officer in accordance with Portland City Code Chapter 22.10. The filing of an appeal request will remain the effective date of a penalty until the appeal is determined by the Code Hearings Officer. If, pursuant to said appeal hearing, payment of a penalty is ordered, such payment must be received by the Director or postmarked within 15 calendar days after the order becomes final.