

Constructing a Cleaner Future

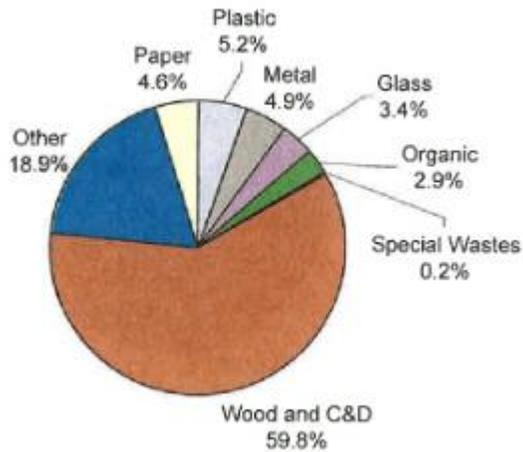
Executive Summary

As communities across the world begin to realize the importance of sustainability, efforts to reduce waste and consumption are required to move society towards a better future. Edmonds, Washington is the most recent city to come to this understanding in the form of the Climate Action Plan of 2012 and Resolution 1357 which mandates a Zero Waste program in the hopes of a more sustainable future.

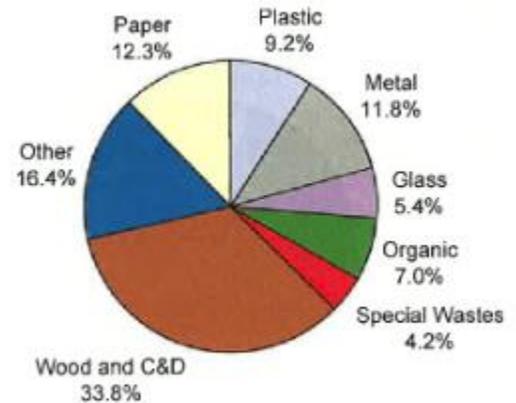
Problem

Construction waste is a problem that needs to be addressed to progress towards a greener future. Waste from construction and demolition (C&D) contains many materials that can be reused and recycled for future use. In Snohomish County, the residential self-haul wood and C&D waste constitute 33.8% of the waste stream. Since 1979, there has been a growing trend in wood waste reaching the landfill. The non-residential self-haulers (i.e. business and commercial buildings) in Snohomish County produce a vast amount of C&D waste at 59.8%. Historically, Snohomish County has witnessed local contractors bringing 10,500 tons of C&D waste in 2012, 24,400 tons in 2013, and a big jump to 75,900 tons in 2014. Currently most of the wood waste that is recovered from project sites are used as hog fuel, which contributes to more pollution to the air. ¹

Non-residential Self Haul



Residential Self-Haul



The pie charts and information above were taken from the *Materials Recovery & Use Study* by the Department of Ecology.

Solutions

What we hope to create for the City of Edmonds is a 'Construction Waste Management Plan'(CWMP). This includes specific policies and guidelines to help the city use better and cleaner methods in all construction and deconstruction projects. The plan includes the following:

1. A Construction Waste Management Plan which contains:
 - a. directions and contacts with appropriate waste haulers for project,
 - b. education on acceptable recyclables.
2. Salvage Assessment, Deconstruction Ordinance and,
3. A Waste log

Pairing the CWMP with promotion and sponsoring contractors to pursue LEED or BUILT GREEN certifications will allow for future products to align with Edmonds' Climate Action Plan.

Organization and Expertise

Based on the extensive research we have done in the past month on successful projects here in the Northwest and select locations along the West Coast, we believe our plan will effectively help Edmonds. Applying that knowledge to a city of this size and the problems they are facing, our CWMP will be applicable to the stakeholders benefitting the environment. We have looked at different methods, implementations, efficacy, costs, and results to come up with a plan.

Statement of Need

As stated before, Edmonds is working towards zero waste program and a more sustainable future. Currently the Department of Ecology ran a study in the state of Washington, which compiled information about material loss and recovery across various collection systems. Commingled C&D materials are lost at a rate of 18.7-26.0%; material utilization rates range from 74.0-81.3%. Some of these materials include metals, paper, plastics, glass and debris. In 2009, a Washington Statewide Waste characterization study of waste that is being hauled for C&D sectors has emphasized that wood waste takes up 40.9% and construction materials are constitute 43.4% of waste. ¹

Utilization means that the materials are being used to make new products or otherwise used beneficially. With the loss of materials and the inability to reuse them for

future products could only mean that they are reaching landfills and contributing to greenhouse gas emissions. Our CWMP will allow for developers and haulers to mitigate C&D waste from reaching the landfills. The CWMP will serve as the initial model for policy makers, City of Edmonds and Snohomish County councils to implement a strategy to reduce C&D waste. This CWMP will possess an acknowledgment form, construction waste management planning sheet, and a salvage assessment sheet. These forms will serve as the tools for the Edmonds to follow up and maintain contact with construction and demolition managers in how they are taking care of their waste. These documents have been selected and formulated based off of the CWMP of other cities around the United States. The city of Barstow, California has a CWMP for their population of 23,000; primarily residential, which is about half the population of Edmonds. They utilized a salvage assessment sheet, acknowledgment form and construction management plan to mitigate wastes from reaching the landfills, which will be the same forms presented for Edmonds. ²

The need to implement this CWMP stems from the agreements reached in the Climate Action Plan to reduce greenhouse gas emissions. Minimizing construction waste from reaching landfills will allow the Edmonds to begin their reductions at the core of the problem. Not only will waste be reduced but a more efficient construction paradigm will be in place. Adhering to the proposed CWMP will enable contractors with the ability and resources to get certifications from LEED and BUILT GREEN. Both focus on making homes more efficient with energy, built with reused and recycled materials in manners that produce the least amount of waste. Working with contractors to pursue

these certifications in light of following the CWMP will promote the interests of the city of Edmonds to reduce waste and become a greener society.

Project Description

Objectives

Our new CWMP for the City of Edmonds will both educate and improve the disposal and repurposing of C&D materials leaving work sites. The objective is to divert up to 75% of the C&D material away from the landfill and ensure that it is being processed in the proper facilities with trained professionals and high quality control. We plan on proposing policies that will require both Construction Management Companies and the Waste Hauling Companies to uphold a level of responsibility and environmental consciousness in reference to what is being used and disposed of on site as well as where those C&D materials are being deposited and/or recycled for future use. With the proper regulatory constraints and professionally managed facilities, we believe this CWMP could provide a sustainable solution to the large percentage of C&D materials that continue to make their way into the landfill.

Our goal is to decrease the already surmountable space that C&D material takes up within our landfills (up to 30%) in order to create a more sustainable construction management system within Edmonds. Monthly facility check-ins as well as data recordings from waste haulers and facility managers including the specifics on quantities and types of C&D materials (entering and exiting) will assist in enforcing the correct allocation for these materials that need to be repurposed instead of being tossed into the landfill.

We would like to see this plan implemented by Spring 2018 in order to allow for the allocation of grants and funds for the project to be in place. We believe this will give the construction companies, haulers, facility professionals, etc. enough time to adjust current methods to meet the requirements of our CWMP.

Methods

To achieve our goal of repurposing and mitigating up to 75% of construction waste from landfills, contractors and the government must utilize the CWMP. As stated earlier, deliverables will include a construction waste management plan, acknowledgment form and a salvage assessment sheet. Each document will allow contractors that are planning to construct or deconstruct within Edmonds to do so sustainably and with the minimal amount of waste. The CWMP will outline the rules and regulations that the project manager must abide to complete the intended project. The acknowledgment form will allow the Edmonds to know that the contractor understands the requirement of mitigating 75% of its construction waste. Finally the salvage assessment form will indicate to the contractor which materials to look for and to keep track of how much of the C&D materials are being directed out of the landfills.

These documents will be finalized once the city of Edmonds and all third-party contractors involved agree on the mitigation percentage and resources to appropriately dispose or drop off C&D materials for reuse and repurpose. These two facets of the project's methodology will allow for the Edmonds to most effectively reduce C&D waste from reaching the landfills. This has been the case for Portland, Oregon and Barstow, California. Both cities have enacted CWMPs and have been successful in mitigating C&D waste, and using those materials for future construction projects. Most importantly

what happened with these two cities, is that they agreed on a mitigation percentage such as the 50% for Barstow. This was the optimal and most efficient ways for Barstow and Portland to achieve waste mitigation without burdening the contractors to heavily. The copy of our tailored CWMP will be found in the appendix figure 1.0.

Waste Log

In our plan, we hope to implement a thorough waste log for all deconstruction and new construction. Doing so will encourage accountability amongst contractors when it comes to ensuring products go where they belong. The waste log will essentially include the material that is being reused or recycled and its relative weight. There will also be a spot to fill out how much of it was recycled and how much ended up in the landfill, more specifically the location it is taken to. This takes into consideration the materials that can be recycled because some construction waste may contain hazardous properties necessitating a separate process. An example of the Waste Log will be found in the appendix figures 2.0.

Salvage Assessment

It is vital that the construction waste is assessed and ends up in the correct destination, whether it is recycled or sent to the landfill. Our plan hopes to do this the right way by requiring a salvage assessment to construction/deconstruction sites of 750 sq. ft. or larger. Each material in the waste log will then have a specified diversion method, hauler, and receiving facility. This will help contractors find which materials are salvageable to be repurposed down the road. The city of Seattle has already used this method and it has been quite successful.

Allocation of Repurposed Materials

Along with a waste log and salvage assessment we would like to specify the allocation of repurposed materials. Places such as King County have put together a network for project owners to connect with salvage and reuse companies in the area called The Northwest Building Salvage Network. Implementing a network like this in the Snohomish County area would help promote more reuse and salvage activities. The deconstruction would apply to every aspect of the building whether it was wood from cabinets or wood from the structure's frame, it could all be salvaged and repurposed.

Education on Recyclables

By implementing our new CWMP, we will be creating a whole new market in the construction and demolition community. This will help create new jobs in the area and increase the profitability in the city of Edmonds. To do this, an education program must be introduced to train the people who are working in the deconstruction industry. With the help of grants from our State Department of Ecology, we can create a training program through the Building Material Reuse Association.

Budget

The City of Portland, Oregon provides an example of a potential project budget. They developed a waste management plan to help implement deconstruction of historical sites and houses built before 1916. Portland was able to receive all of their funding from grant programs set up in the state. They received \$100,000 in grants from Oregon's Solid Waste Management Fund and Department of Environmental Quality. The Solid Waste Management Fund contributed \$50,000 in grants which came from a

percentage of the tipping fees that are implemented at dumpsites and landfills. The Department of Environmental Quality was also able to give a grant of \$50,000 for providing education, training, and certification in the workforce so that there were professionals ready to work on the deconstruction job sites. ³

For Edmonds, we propose looking at the grant provided through the state that will not conflict with the funding from Coordinated Prevention Grants. We can do this by talking to the DOE about other grant programs that are on reserve. Our other option is to look at the grants given from the EPA. This would require extensive research but is entirely possible with an advisory group put together by the Zero Waste team. Some examples of grants that have been available in the past have been given by the Department of Housing and Urban Development that can award up to \$500,000 based on performance.⁴ The two that Edmonds could apply for are General Section to HUD's Fiscal Year 2016 Notice of Funding Availability for Discretionary Programs (CFDA 14.506) and Transformation Initiative Research Grants: Demonstration and Related Small Grants (CFDA 14.525).⁵

Conclusion

In reference to the City of Edmonds, building a Construction Waste Management Plan will bolster local construction companies while working to mitigate our impact on the environment. All parties need to be held accountable with projects that generate volumes of unwanted materials. More can be done than just disposing of these materials in a landfill. This Construction Waste Management Plan could serve as a benchmark for other industries within Edmonds to rethink and implement new

sustainable policies to take further steps toward reaching their zero-waste goal allowing for future expansion.

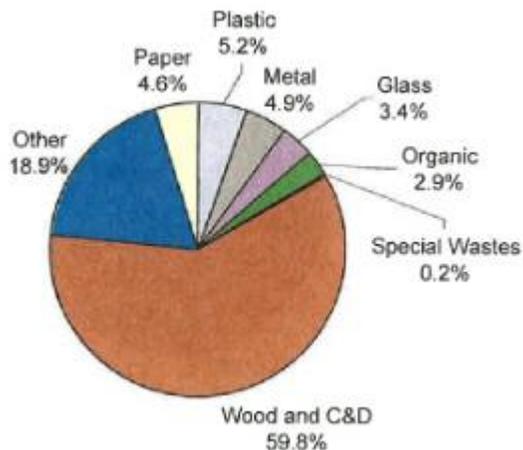
The Construction Waste Management Plan we have proposed will help redirect and recycle construction waste, educate the public on C&D waste materials and their proper disposal facilities, and hold construction companies accountable towards sustaining a cleaner construction waste management stream.

References

1. *Materials Recovery & Use Study*. Department of Ecology. August, 2016
2. "City of Barstow." : *Construction Waste Management*. N.p., n.d. Web. 08 Nov. 2016.
3. Wood, Shawn. "Deconstruction Interview." Telephone interview. 5 Oct. 2016.
4. "Transformation Initiative Research Grants: Demonstration and Related Small Grants", CFDA 14.525, Department of Housing and Urban Development.
5. General Research and Technology Activity, CFDA 14.506, Department of Housing and Urban Development.
6. *Snohomish County Waste Composition Study*, Characterization of Snohomish County's Waste Stream, Figures 5, 6 and 7, and Table 5.

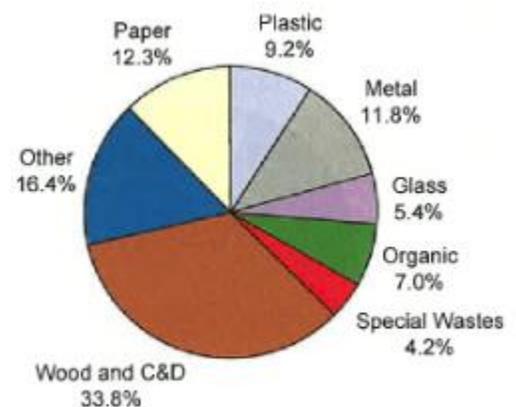
Figures

Figure 1



Residential Self-Haul Waste

Figure 2



Non-residential Self-Haul Waste

Figure 3 Breakdown of Wood and C&D Waste

	Single-Family	Multi-Family	Residential Self-Haul	Non-Res. Self-Haul	General Non-Res.
WOOD WASTE					
Pallets			0.6%	1.2%	1.1%
Natural Wood	0.2%	0.1%		1.0%	2.7%
Other Clean Wood	0.1%	0.2%	4.8%	12.2%	2.1%
Hog Fuel	0.7%	3.2%	9.7%	7.4%	7.5%
Roofing, Wood				6.5%	
Other Contaminated Wood	0.3%	3.3%	10.3%	1.2%	1.6%
Other Wood Wastes	0.002%	0.002%	0.6%	0.3%	0.3%
Wood Subtotal	1.2%	6.8%	26.0%	29.8%	15.3%
CONSTRUCTION AND DEMOLITION (C&D) WASTE					
Ceramics, Porcelain, China	0.03%	0.3%	1.9%	0.6%	0.3%
Rocks and Bricks	0.03%	0.1%	0.4%	0.2%	0.1%
Concrete	0.2%	0.1%	2.0%	1.0%	0.04%
Soil, Dirt, Non-Distinct Fines	0.2%	0.04%	0.9%	0.4%	0.2%
Gypsum Board	0.1%	0.2%	1.3%	8.8%	1.0%
Fiberglass Insulation	0.01%	0.1%	0.4%	1.1%	0.02%
Other Fiberglass				0.1%	0.9%
Roofing	0.01%	0.01%	0.4%	13.4%	0.3%
Asphalt					
Tyvek					0.02%
Other C&D	0.04%	0.4%	0.5%	4.4%	0.8%
C&D Subtotal	0.6%	1.2%	7.8%	30.1%	3.7%

Appendix

Figure 1.0 Construction Waste Management Plan



Construction Waste Management (CWM) Plan

Project Name: _____

Job# _____

Project Manager: _____

~City of Edmonds Contract Administrator/Solid Waste:

All Subcontractors shall comply with the project's Construction Waste Management Plan.
All Subcontractor foremen shall sign the CWM Plan Acknowledgment Sheet.

Subcontractors who fail to comply with the Waste Management Plan will be subject to back charges or withholding of payment, as deemed appropriate. For instance, Subcontractors who contaminate debris boxes that have been designated for construction material will be subject to back charge or withheld payment, as deemed appropriate.

1. The project's overall rate of waste diversion will be no less than 75%.
2. This project shall generate the least amount of waste possible by planning and ordering carefully, following all proper storage and handling procedures to reduce broken and damaged materials and reusing materials whenever possible. The majority of the waste that is generated on this jobsite will be diverted from the landfill and recycled for other use.
3. Spreadsheet 1, enclosed, identifies the waste materials that will be generated on this project, the diversion strategy for each waste type and the anticipated diversion rate.
4. Waste prevention and recycling activities will be discussed at the beginning of weekly subcontractor meetings. As each new subcontractor comes on-site, the Project Foreman will present him/her with a copy of the CWM Plan and provide a tour of the jobsite to identify materials to be salvaged and the procedures for handling jobsite debris. All Subcontractor foremen will acknowledge in writing that they have read and will abide by the CWM Plan. Subcontractor Acknowledgment Sheet enclosed. The CWM Plan will be posted at the jobsite trailer and/or made available along with the Building Inspection card.
5. Salvage: Excess materials that cannot be used in the project, nor returned to the vendor, will be offered to site workers, the owner, or donated to charity if feasible.
6. Certified construction waste hauling companies Industries will provide a commingled drop box at the jobsite for most of the construction waste. These commingled drop boxes will be taken to the Edmonds

Landfill where they will be weighed and qualifying material pulled out for diversion. It is the responsibility of the contractor to contact Certified construction waste hauling companies and arrange for removal and return of the bins as long as the job site is in operation.

- a. Care must be taken to not put any putriple trash, food waste, etc. in the rolloff box. This would result in having to have the rolloff box emptied no less than every 7 days.
- b. When non-putriple materials that can be recycled are collected in the rolloff box, the container needs to be emptied once every 30 days.

7. In the event that the waste diversion rate achievable via the strategy described in (6) above, is projected to be lower than what is required, then a strategy of source-separated waste diversion and/or waste stream reduction will be implemented. Source separated waste refers to jobsite waste that is not co-mingled but is instead allocated to a debris box designated for a single material type, such as clean wood or metal.

Notes:

1. Waste stream reduction refers to efforts taken by the builder to reduce the amount of waste generated by the project to below four (4) pounds per square foot of building area.
2. When using waste reduction measures, the gross weight of the product is subtracted from a base weight of four (4) pounds per square foot of building area. This reduction is considered additional diversion and can be used in the waste reduction percentage calculations.

8. Certified construction waste hauling companies and the Scale House Operator at the landfill will track and calculate the quantity (in tons) of all waste leaving the project and calculate the waste diversion rate for the project. Certified construction waste hauling companies will provide the City and Project Manager with an updated monthly report on gross weight hauled and the waste diversion rate being achieved on the project. Certified construction waste hauling companies' monthly report will track separately the gross weights and diversion rates for co-mingled debris and for each source-separated waste stream leaving the project. In the event that Certified construction waste hauling companies does not service any or all of the debris boxes on the project, the Prime General Contractor will work with the responsible parties to track the material type and weight (in tons) in such debris boxes in order to determine waste diversion rates for these materials. All receipts must be provided to the City Contract Administrator.

9. Debris from jobsite office and meeting rooms and lunch/food waste will be collected by Certified construction waste hauling companies. This must be done in barrels or bins apart from the Construction material.

Construction Recycling Requirements:



Asphalt Paving



Bricks



Cardboard



Concrete



**Gypsum Scrap
(New)**



Metal



**Wood
(Clean)**

Figure 2.0 Waste Log

Material	Diversion Method	Hauler	Receiving Facility
Individual Materials			
Asphalt Paving *	Choose Selection	Choose Selection	Choose Selection
Asphalt Shingles		Bobby Wolford Trucking and	
Brick (whole)*			
Carpet/padding			
Concrete *			
Cardboard *			
Glass			
Gypsum/Drywall *			
Land Clearing			
Metals *			
Plastics			
Plastic Film Wrap			
Rock/Gravel			
Soil/Sand			
Wood *			
Other:			
Other:			
Hazardous Waste			
Recyclable Comingled Material			
List materials to be recycled:			
Mixed Non-recyclable Debris			

Building Component	Specific Material (Use drop-down list)	Notes
Wall Covering	Choose Selection	
Wall Covering		
Insulation		
Plumbing		
Plumbing		
Lighting Fixtures		
Wood		
Wood		
Wood		
Wall Sheathing		
Wall Sheathing		
Doors		
Doors		
Flooring		
Flooring		
Carpet		
Cabinets		
Windows		
Roofing		
Siding		
Siding		
Miscellaneous		