



Used Building Materials & More

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Case Study Report #1, 6153 Portal Way Ferndale WA, circa 1940 Barn

Site Description:

Case Study #1 was a relatively small and simple project, covering a footprint of 1,292 square feet. It was chosen as it represents many of the all-wood, rural structures demolished to make way for urban growth. This project should clearly highlight the ability of deconstruction to exploit the salvage potential of a building that would yield little to no salvageable material if demolished in a conventional manner.



The project was built nearly entirely of wood, utilizing balloon-frame construction. The bulk of the salvageable material was found in the main area (the central 480 square feet) of the two-story barn. The two attached shed roofs to the north and the west were considered valueless from a salvage perspective. Even in the best parts of the structure, there was some unsalvageable material due to rot or pest damage.

Roof: The roof of the structure was composed of 382.6 linear feet of 2" x 6" rafters, 16" on center, 814.83 linear feet of 1"x 6" sheathing, 8" on center, and 611.12 square feet of cedar shingles. The total surface area of the roof was 1,427.12 square feet. The roof showed a great deal of wear, light being visible in many areas, and was estimated to be only 10% salvageable.

Exterior: The exterior of the building was sheathed with 1,488.5 square feet/ 2965.1 linear feet of 1x6 "drop siding." The walls were also clad with 805.5 square feet/ 2,761.8 linear feet of 1"x 3.5" tongue and groove "utility sheathing," which can be easily salvaged and reused as flooring or wall paneling. The walls contained an additional 636 linear feet of 2"x 4" lumber. The wall material was estimated to be 85% salvageable.

Interior: The wood floors of the lower level were composed of roughly 480 square feet of the same utility sheathing that was found in the walls, and was 65% salvageable. The flooring was resting on 240 linear feet of 2"x 4" sleepers, 480 square feet of shiplap and roughly 300 linear feet of 2" x 6" joists of negligible salvage value. The sub floor had suffered extensive damage

and was not deemed salvageable. The upstairs floor contained an additional 270 linear feet of 2” x 6” lumber estimated to be 80% salvageable. The floor in the rest of the structure was comprised of 476 square feet dirt and 336 square feet indistinguishable, partially decomposed wooden floor of unknown volume. There were only 4.5 cubic feet of concrete apparent.

The following report will quantify all material salvaged as well as provide comparisons to estimated salvage potential. Note that a small amount of salvageable material is always lost due to market fluctuations, deconstruction methodology, or damage. The salvaged material was quantified according to volume/quantity, weight and market value. The debris remaining after salvage and due to deconstruction was sorted and recycled in the best manner that the industry allows, or placed in a landfill as necessary.

Comparisons to Conventional Demolition:

Local demolition contractors, *T n T Recovery* and *Silver Rain, Inc.*, projected costs, labor, and disposal fees— under a traditional, machine-based demolition scenario— to amount to the following:

	<u>Labor</u>	<u>Disposal</u>	<u>Total Service</u>
• <i>T n T Recovery:</i>	\$1,200	\$2,000	\$3,200
• <i>Silver Rain Inc.:</i>	\$2,000	\$3,200	\$5,200
• <i>The RE Store:</i>	\$3,620	\$750	\$4,470

In either of the above machined-based scenarios, the bulk of the debris would have been recycled locally as “clean wood.” Please note that the term ‘recycle’ in this case denotes burning chipped wood debris as “hog fuel.”

As can be seen, *The RE Store’s* deconstruction service was 39% higher than the lowest bid and 14% lower than the highest bid.

Disposal

The estimated yardage of construction and demolition (C&D) debris was as follows:

- *T n T Recovery*: 140 cubic yards.
- *Silver Rain Inc.:* 200 cubic yards.
- *The RE Store*: 70 cubic yards (actual yardage).

T n T Recovery proposed to haul the C&D debris to a regional recycling site, estimating 180 cubic yards to be recycled, the remaining estimated yardage to be placed in a landfill.

Silver Rain Inc. proposed using a local wood recycler, *RDS Inc.*, who would have placed two 100-yd. boxes on site, with an unknown quantity of C&D debris to be recycled, and the remaining debris to be land-filled.

The RE Store contracted *T n T Recovery* to haul 70 cubic yards to local recycling sites, estimating 66.5 cubic yards to be recycled, the remaining yardage placed in a landfill. *The RE Store* also hauled 2,200 lbs. of concrete to a local recycler.

Labor

T n T Recovery proposed the use of an equipment operator for one day and a laborer for half of a day, as well as an unknown number of drivers for transporting waste/ recycling.

Silver Rain Inc. would have employed an equipment operator for one day.

The RE Store employed three deconstruction laborers for a total of 125.5 hours.

Fuel

Both *T n T Recovery* and *Silver Rain Inc.* estimated the use of 24 gallons diesel fuel for their excavators, and an unknown quantity of fuel for transportation of debris, equipment, and laborers.

The RE Store used 15 gallons of diesel fuel for its excavator, and 13 gallons of gasoline to transport laborers and materials approximately 132 miles.

Description of Process:

The first stage in the deconstruction process involved salvaging all reusable and high-value items from the interior and exterior of the property. In the specific case of 6153 Portal Way, this included: removing all antique electrical switches, removing several craftsman style windows, pulling and denailing all trim, salvaging the old-growth fir stair treads, and removing the barn doors from their wall openings.

Since a large portion of the structure— the attached shed roofs on the west and north of the main barn structure— were considered to have little to no salvage potential, and a track hoe was incorporated into deconstruction at later stages, the shed roofs were collapsed, the remains of the north roof placed in a pile atop the remains of the west roof. To collapse the attached shed roofs, deconstruction workers cut the roofs at their upper most connections and pulled them from the main structure, utilizing cables and a four-wheel drive pickup. At the end of the entire deconstruction process, a track hoe was used to break up the large pile of debris and compact it into the on-site recycling bins.

Once the interior was stripped and the attached roofs were down, the deconstruction crew then began removal of the main roof structure. The cedar roofing and ship lap was cut into roughly four foot wide strips, knocked and pried from the rafters from inside the structure, and sent to the debris pile. The rafters themselves were then cut from the walls and the ridge, inspected for quality, and either sent down to be de-nailed or placed in the debris pile.

- Note that every effort is made to keep like lengths of materials together throughout the deconstruction process to maintain de-nailing, loading, and measuring efficiency. When de-nailing, it is best to de-nail the longest lengths first, and then load them directly onto the waiting truck or trailer, ensuring the most neat and stable load.

The deconstruction team then began removal of the upper flooring by prying it from the joists with long bars. This exposed the upper floor/ ceiling joists, which were then cut from the walls, inspected for quality, and either sent to the de-nailing station or placed in the debris pile.

The RE Store crew then collapsed the exterior walls. This was done by cutting the top plate of each wall from its connection to the adjoining exterior wall and inwardly collapsing the cut section of wall, employing supports fashioned from salvaged lumber, ropes and cables to prevent remaining walls from falling unexpectedly and harming members of the deconstruction team. All exterior walls were collapsed in the same fashion. Once the four walls were on the ground, the siding was pried loose and the walls were knocked/ pried apart with bars and heavy hammers, each stud board assessed for value and then sorted for de-nailing and load-out or placed in the C&D debris pile.

When the bottommost section of flooring was exposed, the remaining tongue and groove flooring was pried from the sub floor, inspected for quality and sorted accordingly. The remaining sub-floor was left for the track-hoe, as it had no salvage value.

The rest of this “hybrid” approach to demolition/ deconstruction is similar to conventional, machine-based demolition practices. One person operates the machine, while the remaining laborers work on the ground to rake what small debris the machine cannot pick up. After the sub-floor and poured concrete foundation were removed, the deconstruction crew was ready for final sight cleanup— the exposed earth within and around the building’s footprint was raked clean.



- Note that the deconstruction crew also carries out daily clean-up operations to prevent debris from being blown into neighboring property.
- Note that approximately four yards of poured concrete was hauled by members of *The RE Store* field staff to a local concrete recycler.

It should also be noted that several extra steps were taken during the load out/ measuring process in order to satisfy the terms of the case study. Each item or group of items needed to be carefully weighed and measured as it was unloaded and priced at *The RE Store*'s retail outlet, requiring additional labor from members of the field crew. Special forms, used to document the weight of the material, were used in addition to those normally used to document material's volume and value, requiring more time for paperwork.



Findings:

Materials Recovered

(Complete details of materials saved can be seen in project spreadsheets.)

The “actual salvage value” of materials differs from estimated salvage potential due to the loss of material from damage incurred by deconstruction methodology, impossibility of salvage due to the manner in which the building was constructed, and loss of estimated value due to poor salability. By incorporating deconstruction practices into the demolition of this structure, The RE Store saved from the landfill 5,413 lbs. of reusable material, valued at \$2,647. Under the scenario presented by *T n T Recovery*, 0% would have been saved for re-use, up to 95% recycled, and the remaining debris placed in a landfill.

The total real volume of the building should be seen as the combined volumes of the salvaged materials and the C&D debris. **The total real volume of 6153 Portal Way was estimated around 110 cubic yards.** This real value can be compared with the bid estimates, and industry standard weight to volume conversion ratios. This estimate shows that 36.4% of the original volume was saved directly for re-use, 60.5% recycled, and 3.1% placed in a landfill.

At the project’s end, it was shown that 68% of the 2 x 6 lumber, 65% of the siding, and 71% of the “utility sheathing” was saved directly for re-use. Unfortunately only 4% of the “ship-lap” sheathing was saved for local use, as this type of material is often hard to market.

Summary of Results

- *Square footage of structure’s footprint: +/- 1292 sq. ft.*
- *Total volume of structure: 110 cubic yards*
- *Total weight of structure: 15921 lbs.*
- *Combined weight of salvaged materials: 5523 lbs.*
- *Percentage salvaged: 34.6%*
- *Combined weight of recycled materials: 9711.6 lbs.*
- *Percentage recycled: 64%*
- *Weight land-filled: +/-1483.26 lbs.*
- *Percentage land-filled: 3.1%*
- *Estimated value of recycled material: \$2647.47*
- *Value per square foot: \$2.05*
- *Weight per square foot: 12.32 lbs*
- *Value per pound of salvaged materials: \$.48/ lb.*

Expenses

The main expense incurred during deconstruction was labor. Four skilled deconstruction laborers were paid approximately \$2,208.80 for 125.5 hours of labor, not including benefits or accounting for L&I expenses and taxes. The RE Store consumed roughly 16 gal. of gasoline over a combined total of 132 miles. Fuel consumption proved to be higher for deconstruction than for the proposed fuel use in a conventional scenario, due to transportation of material and laborers. The only significant tool cost was for the rental of the track hoe, and amounted to approximately \$580.

It should be noted that using a “hybrid” method of deconstruction, by incorporating a track hoe to handle marginal materials and debris, helps maintain economic viability and minimizes labor costs.

The RE Store, due to its status as a 501(c) 3 non-profit, offers the client the added benefit of a tax deduction for the total value of their donation of salvaged building materials. In the case of 6153 Portal Way, this donation carried an estimated value of \$2,647.

Further Findings

In almost all demolition scenarios, salvage and/or deconstruction methods can be incorporated to varying degrees. Throughout the building/demolition industry, deconstruction methods are gaining support due to growing costs of disposal, and ethics shifting towards sustainability. Hopefully we will soon see a time when salvage practices are mandated industry-wide.