

Executive Summary

Collecting, Processing and Building With Recycled/Reclaimed Construction Waste WDNR Grant No. 07-05 (Noble Earth Technologies, Inc., Fitchburg, Wisconsin)

Date Completed: August 31, 2008

Total Grant Amount: \$159,383 (total spent \$147,617)

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Project Objectives:

To collect construction waste from 64 different locations, process the construction waste to render it reusable and build a >61% recycled content building in close proximity to the sources of the waste construction materials.

Background/Challenges:

Construction and demolition waste is 30% to 40% of the waste that is landfilled in Wisconsin. For example, approximately 600,000 tons of wood waste are disposed of annually in Wisconsin landfills. Land-clearing debris, wood, concrete, drywall, shingles, cardboard, metals, etc. generated during construction and demolition activities are all typically sent to landfills. From 60% to 95% of construction waste, including all of the materials listed above, is readily reusable, once separated from what is not readily reusable. Typical reuse currently involves collecting, sorting and grinding up large quantities of construction waste for reuse as a commodity product (e.g. waste wood becomes mulch/compost; waste shingles become asphalt, etc.). Noble Earth supports this large scale recycling. However, the goal of this project was to efficiently collect/process enough material to build a structurally, and otherwise, code-compliant structure, in a cost effective manner. A number of challenges were encountered and overcome during this project.

Results/Knowledge Gained:

The recycled content goal of >61% was exceeded with a 75% recycled content building being completed. The construction waste was collected from >64 sites with >95% of the waste collected within 5 miles of the building site, thus limiting the need to transport materials. There were a surprising number of new building materials available that were able to be immediately reused, rather than requiring any form of processing other than, for example, cutting to size. All of the materials listed below were used and/or collected during the project. It should be noted that most of the listed materials were available in large quantities and only a fraction of what was available were used during this grant project. A majority of the material collection operations had to be slowed down and then discontinued due to the overabundance of high-quality waste building materials that were available within 5 miles of the building site. The following list shows each of the building phases and the readily reusable and recycled building materials obtained:

- **Fill Material** - Waste flood-control sand, waste gravel, crushed recycled concrete, waste fill from excavation;
- **Foundation** - Reused/reclaimed concrete block (mixed colors), recycled content concrete (5% slag & fly ash);
- **Framing** - Graded and ungraded dimensional lumber, recovered posts and beams, timbers cut from site clearing;
- **Trusses** - Ungraded dimensional lumber as web members, discarded ¾ inch plywood as gusset plates;
- **Sheathing** - Waste oriented strand board (OSB), discarded vapor barrier;
- **Roofing** - Use of older, discontinued or off-color shingles;
- **Siding & Exterior** - Recovered barn boards, recovered bricks;
- **Concrete Floor** - Recycled content concrete (5% slag & fly ash);
- **Windows & Doors** – Available as almost new to brand new and purchased from the local Habitat ReStore;
- **HVAC** - High thermal mass heat absorption beds can consist of crushed, recycled concrete fines;
- **Insulation** - Discarded foam insulation and fiber insulation;
- **Drywall** - Larger pieces of scraped drywall;
- **Interior finishing** - Discarded lumber milled for trim, lumber from milling site-clearing limbs.

Shared Knowledge:

Noble Earth Technologies (Noble Earth) believes that some or all of the above uses of normally discarded building materials could be easily adopted, on a widespread basis, by builders, contractors, subcontractors and individuals. Noble Earth rented a booth at the Building Material Reuse Association Conference to promote the reuses noted above. Noble Earth personnel have also given presentations to a number of organizations and groups regarding this project.

Summary:

Noble Earth collected waste materials from over 64 building construction and waste collection sites. The waste materials were then processed by denailing, cleaning, cutting, etc. Noble Earth used the reusable waste materials to build a 75% recycle content structure. 100% of the fill material, foundation stem wall, stud wall framing, webbing and most gussets for the mono trusses, exterior wall sheathing, roof deck sheathing, roofing and windows/doors came from the collected and processed waste materials. The cost to purchase, collect, transport and process all of the reclaimed building materials was \$20,570. The cost to purchase comparable new material was estimated to be \$34,800.