

<p>GRANT PROJECT SUMMARY: MAY 2002          Minnesota Office of Environmental Assistance          520 Lafayette Road North, Saint Paul, MN 55155          1-800-657-3843</p>		<p><i><b>Incorporating the Use of Reclaimed Materials into the Construction of Affordable Housing</b></i>          [2000-2001]</p>	
<p><b>Project Coordinators:</b>   <b>Greg Finzell</b>  <b>Julie Ann Kenney</b>  <b>Bob Alf</b>  <b>Michelle Baltus</b></p>	<p><b>GRANTEE NAME:</b>          Rondo Community Land Trust          626 Selby Ave          St. Paul, MN 55104          651-221-9884          651-221-9831 fax          Greg Finzell</p>	<p><b>Background:</b> The Rondo CLT provides quality affordable housing within two neighborhoods of St. Paul.</p>	
<p><b>Project Description</b></p>	<p>Incorporating the use of reclaimed building materials into the construction of two new single-family homes at 817 and 818 Marshall Avenue in Saint Paul.</p>		
<p><b>Project Resources</b></p>	<p><b>Money:</b>          ■ \$30,000</p>	<p><b>Collaborators:</b>          ■ Rondo CLT, Green Institute, Cermak Rhoades Architects, Neighborhood Energy Consortium.</p>	
<p><b>OEA Environmental Outcome Supported By the Project</b></p> <ul style="list-style-type: none"> <li>■ The project provided a good example of how material can be reclaimed, redressed, and delivered to new building sites and incorporated into new house construction. Materials used will provide long-term sustainability in construction.</li> </ul> <p><b>Project Outcomes</b></p> <p><b>Other Activities</b></p> <ul style="list-style-type: none"> <li>■ The Rondo CLT and other partners in the project received an award of recognition from the Saint Paul Heritage Preservation Commission and the Saint Paul Chapter of the American Institute of Architects. One of the homes was part of the Twin Cities Home Tour. Over 1,000 people toured the house before it was sold.</li> </ul> <p><b>Continuation</b></p> <ul style="list-style-type: none"> <li>■ Rondo CLT is in the process of designing and plans to build another house that will incorporate the use of reclaimed materials into its construction.</li> </ul>			
<p><b>Evaluation</b></p>	<p><b>GRANTEE:</b></p> <ul style="list-style-type: none"> <li>■ The project provided many valuable lessons. The use of reclaimed materials was a success and Rondo CLT has plans to use these types of construction strategies in the future</li> </ul>		

**RONDO COMMUNITY LAND TRUST**

**Incorporating the Use of Reclaimed Building Materials into the  
Construction of Affordable Housing**

A Pilot Project of

Rondo Community Land Trust

The Green Institute and

Minnesota Office of Environmental Assistance

**April 2002**

## **BACKGROUND**

Rondo Community Land Trust (CLT) in St. Paul and Deconstruction Services of the Green Institute in Minneapolis were awarded a partnership grant in April 2000 from the Minnesota Office of Environmental Assistance to begin a pilot project using deconstructed building materials in new home construction. The pilot project work scope involved Deconstruction Services locating and “re-dressing” (i.e.: re-milling, striping paint, etc.) reclaimed building materials and lumber that Rondo CLT would purchase as a finished product. The finished products were used in the new construction of two single-family homes that were sold as housing affordable to families with low or moderate incomes. The award from Minnesota Office of Environmental Assistance supported the Rondo CLT’s assumption that the housing industry and funders are moving towards encouraging more ecologically conscious construction. The grant came at a time when the Rondo CLT was ready to undertake a project of this nature and its Board of Directors supported that goal.

Although it could have been possible to implement the project in the absence of the State funding, Rondo CLT may not have tracked the process as thoroughly as it was able to with the funding. Not only did Rondo CLT interview and track responses of the parties involved in the development process, Rondo CLT was also able to track expenditures of reclaimed building materials and perform a cost analysis between the use of newly purchased materials and that of the reclaimed materials. Upon completion of the housing units, Rondo CLT, Deconstruction Services and the project architect received a recognition award from the American Architectural Society in St. Paul for the use of the reclaimed building materials in conventional home construction. The following report outlines the results, analysis, and recommendations that other housing developers should note as they consider the use of reclaimed building materials.

## **USING RECLAIMED BUILDING MATERIALS: RESULTS & ANALYSIS**

During the months of April and May 2000, several joint meetings occurred between Rondo CLT staff, Deconstruction Services and the project architect to ensure that an accurate and complete list of reclaimed materials was contained in the bid specifications. An introduction letter to contractors was drafted and added to the bid package that offered access to the warehouse where Rondo CLT stored its reclaimed building materials. The letter also highlighted the fact that this would be a joint venture between the Minnesota Office of Environmental Assistance, Deconstruction Services, Cermak Rhoades Architects and Rondo CLT to draw the attention of home builders towards considering the use of reclaimed building materials.

Material cost comparison data was gathered while the houses were out to bid. Three contractors were provided with bid specifications. During the bidding process, Rondo CLT had the opportunity to informally interview and obtain information from these contractors regarding the issues and concerns of working with and bidding on the three reclaimed building materials which were identified for cost comparison and analysis. These were floor joists, hardwood floors and baseboard, door and window trim.

During the project, Rondo CLT discovered that incorporating reclaimed materials in home construction is a multifaceted process. Once the decision is made to use reclaimed materials in a project, there are more detailed decisions that follow regarding materials and their ultimate usefulness. Rondo CLT decided to compare costs and interview parties about only three specific materials identified above as these three are more commonly available reclaimed building materials and have regular quantities available for sale. Rondo CLT organized material recommendations and a recommended overall process for using reclaimed materials that could be followed by other housing developers and organizations with the same goals.

## Interview Findings

As owner, the Rondo CLT dually served as a project manager and the intermediary between funders, architect, salvager, contractors and ultimate homebuyers. The role of project manager also required Rondo CLT to purchase reclaimed materials. One to two months was added to the design and planning process as compared to usual projects due to the extra detail and planning needed to properly incorporate reclaimed materials into the bid specifications. Another reason for added time was that Rondo CLT also conducted a team analysis of the house specifications that included the project architect, Rondo CLT's staff, Rondo CLT construction committee, Deconstruction Services, Saint Paul Neighborhood Energy Consortium and some funders in order to ensure very thorough planning.

The project architect, Cermak Rhoades, was one of the first parties to become involved. The architect was asked to quantify the amounts needed for building materials. Accuracy was crucial in order to purchase correct quantities and sizes from the salvager. Also, the architects were asked to make site visits to view materials. An estimated total of 25 additional hours accrued due to architect site visits, phone consultations and technical assistance at a rate of \$65 an hour. (The Minnesota of Environmental Assistance covered these additional expenses as part of the project scope.)

Deconstruction Services became involved immediately as well, identifying materials from deconstruction sites. With quantities and measurements from the bid specifications, the material identification and purchase process was streamlined for Deconstruction Services and Rondo CLT. When materials were identified at deconstruction job sites, Rondo CLT viewed the items and purchased the materials to be put into storage until they could be used. The practical decision to store reclaimed items was made early in the project. Certain reclaimed materials are more difficult to find than others are and items of quality are in high demand. In anticipation of the competitive bidding process required by all-public funders involved in the process, Rondo CLT added time to the project as well. Still, even with the added time and storage, Rondo CLT was not able to purchase a few items due

to lack of supply. Ideally, a list of materials could be handed to a salvager and with sufficient lead-time, materials could be identified, purchased and stored early if necessary.

The project appraiser conducted estimates of the property value from the architectural drawings, recent sales in the neighborhood and considered the list of reused materials to be used in homes. Before viewing the drawings, he expressed concern about marketability of the end product when using recycled materials. However, upon review of the plans, the material use, and location of the houses, the estimated values were comparable the market values, and perhaps even higher.

During the process, three different contractors were asked to bid on the houses. All bidding contractors were impressed with the itemized list of materials in the bid specifications and the fact materials were accessible for viewing. Any concerns of the contractors were centered on the quality of material for warranty purposes, building inspection, and delivery and transportation to the job site.

The following is a summary of reactions towards the selected building materials selected for analysis:

### **Floor Joists**

Strong, properly derailed, cleaned floor joists that are certified by engineer are ideal for any project. Rondo CLT had to jump on the opportunity to purchase joists once any joists were found as it was discovered that this material is rare and strong joists are in high demand. At one point, Rondo CLT had to turn down a batch of deconstructed floor joists of questionable integrity because there were too many holes were drilled through the joists for utility wires and other mechanical pieces. For the floor joists purchased, Rondo CLT paid \$250 for engineer certification on the batch. The certification insured contractors of the feasibility of their use, the fulfillment of building inspector's code and their impact on the overall integrity of homes.

### **Hardwood Floors**

A sufficient amount of flooring was purchased from Deconstruction Services to cover the first floors of both homes. One house was fitted with maple floors, the other with oak. Not only were the floors beautiful and old, they did not risk shrinkage.

Initially, contractors expressed concern about the quality of the wood and their ability to install the floors. Deconstruction Services dealt with these concerns by bundling the flooring by size for easier handling. Boards with broken tongue and grooves are not considered and Deconstruction Services eliminated excess urethane and dirt. Bob Alf of Deconstruction Services stated that his organization sells “4,000-5,000 square feet per month” out of their Minneapolis warehouse (fall 2000). Similar to the floor joists, this product is high demand.

One recommendation is that prior to purchase of hardwood floors, the project manager/owner should conduct a visual inspection of material. Purchase boards that have been cleaned, derailed, and bundled by size. Examine the tongues and grooves of the wood for breakage. The quality of the deconstruction is as important as the quality of the wood. Ask for a representative sample to show the contractor that will be installing the wood. Purchase 10% over the actual needed in anticipation of errors. Offer to buy a few extra blades for the contractor’s saws just in case a random, leftover nail destroys one. Since the floors will need to undergo extra re-sanding due to unevenness of old, reused hardwood, purchase extra sandpaper for that work crew as well.

### **Baseboard Trim, Door and Window Trim**

Rondo CLT identified a sufficient amount of Douglas fir wood to install interior baseboard trim, window trim, doorjamb and door trim for one entire home. Because the design was simple and the material was secured at a good price, Rondo CLT included sills on the windows instead of the standard picture frame window trim typically seen in new construction. Because of this detail, the project architect had to add a “Finish Carpentry Schedule” to the floor plans over and above the normal site elevation, basement, mechanical and floor plans.

Issues encountered had to do with the baseboard trim carpentry that was necessary on site and the extra equipment needed by contractors for detail work. Also, the skill of the carpenters became more important. To deal with this, Rondo CLT factored in added costs for lumber re-milling and had the lumber re-milled and cut to size by Deconstruction Services prior to delivery to the contractors.

Recommendations for using this material include that the project manager/owner researches with their general contractor to ensure they have skilled carpenters who are familiar with detail work, and to decide whether they desire to have the lumber re-milled prior to delivery to the job site.

Another issue that was created by adding a windowsill to a manufactured window was that as an alteration is made in its construction, the window's warranty becomes null and void. This matter was resolved by designing a custom sill plate that fit into the existing window frame, thus not altering the actual window itself.

### **Material Cost Analysis Findings**

Overall, the cost of purchasing reclaimed materials over new materials was less expensive. This was proved by hard cost analysis comparison data. Reclaimed lumber was readily available and of better quality than lumber available today. Other costs like transportation and storage were factored into the overall cost analysis (see attachments to this report.) Extra labor costs did not have to be added to any of the three contractors' bids, as previously anticipated. This may have been because once materials were viewed, the contractors were comfortable with the use of reclaimed materials. Unresolved is the question of whether or not their overall bids were inadvertently increased due to the inclusion of reclaimed materials in the project. Because the three overall bids were comparable to one another, evidence of this was not distinguishable from the bids themselves.

The following is a summary of the cost analysis portion of the research:

#### **Floor Joists**

Overall, the costs of the floor joists were less expensive than the I-beams and floor tress systems used in typical construction today. Exact comparisons were difficult because large wooden floor beams are no longer used in new construction. The labor bid remained constant when comparing reclaimed materials to new materials.

### **Hardwood Floors**

Once contractors viewed the hardwood flooring, their initial level of uncertainty was eased. While one contractor took a sample to show his floor-sanding sub-contractor out of concern, another contractor, who did not view the floors or other materials, stated that his labor bid would not be increased due to the use of reclaimed hardwood floors. The reused material cost was less expensive but cost of re-sanding the reused floors did add to the overall cost. This was because the older hardwood floors were more uneven than the standardized flooring available on the market today.

### **Baseboard Trim**

For the analysis of the baseboard trim, the same square footage of reclaimed lumber minus the inclusion the windowsills was used as compared to new materials. A new Douglas fir wood species was compared to that of reclaimed Douglas fir. The cost of remilling, storage and delivery was added into the cost analysis. The labor bid stayed the same when comparing reclaimed materials to new ones due to the fact the reclaimed wood was re-milled and ready for installation on site. The installation of the decorative plinths on the doorways and windowsills added only a couple of extra hours. Overall, the use of reclaimed trim board was less expensive.

### **Overall Process Recommendation for Reclaimed Material Use**

Although the overall margin in cost savings when using reclaimed materials can be quite narrow depending on the materials in question, the impact on environmental savings can not be quantified. The process of identifying reclaimed materials and the inclusion of all trade partners into the project were challenges for Rondo CLT. The pilot project identified the necessity of having a clearly defined

process to identify materials. That, along with reliable transportation and storage and the ability to secure the cooperation of all development parties involved, can make the use of reclaimed building materials cost effective for a project. Diligent project management and budget control are essential as well. The use of reclaimed materials is politically positive, can serve as an educational tool for others in the housing industry, and prevents waste. However, in the absence of a cooperative salvager, contractor or architect, there is the potential for project cost overruns and bad publicity. The project demonstrated that if the goal to use reclaimed building materials is established early in the planning stages, implementation should flow easily. While reclaimed building materials and reuse centers may be an isolated market niche today; the project shows that their popularity is increasing. Eventually the need for reuse and salvage centers may increase if housing funders continue their trend towards supporting projects using reclaimed building materials.

The Rondo Community Land Trust independently chose to incorporate reclaimed materials into new construction. The organization was awarded funds from Minnesota Office of Environmental Assistance to help. The intent of the pilot project was to prove that using recycled and reclaimed building materials does not unreasonably inflate a housing development budget. Diligent data collection showed that in the presence a cooperative development team, careful planning, and budget monitoring, the cost of identification and use of reclaimed materials is less than or comparable to the cost of using new materials. While cost savings margins may be low, the positive impact of environmental savings is difficult to quantify. Our hope is that this pilot project shows that the use reclaimed materials is entirely feasible, and that State and other housing funders should continue on this track with their initiatives. If the pilot project had proved that using reclaimed materials was a more expensive and cumbersome process, this model could still be used by other housing developers if their goal of being environmentally conscious and conserving resources took precedent over the short term cost containment of housing development.

### **Overall Process for Using Reclaimed Building Materials**

1. Identify a project manager/intermediary to work between architect, salvager, contractor, funders, and homebuyer. This intermediary will usually be the owner or developer of the project.
2. Identify a cooperative architect or other qualified professional that the project manager works with to establish a scope of work and house design. During this process the types reclaimed materials to be located are decided upon. Once the quality baseline is established, a list of quantities, sizes and measurements are itemized so that the project manager can start working with a salvager to identify materials.
3. Project manager must have an awareness of the reclaimed building material marketplace and what types of materials are readily available.
4. Project manager must be prepared to monitor costs and watch inventory.
5. Work with a cooperative salvager or deconstruction crew that is willing to communicate when materials become available.
6. Things for a project manager to bring when viewing reclaimed materials: Floor plans and lists of needed materials, quantities, sizes, colors. Tape measure, camera, notepad, cell phone, checkbook. Have a vehicle capable of transporting materials or set up arrangements for transportation and storage.
7. Work with building inspector in the project jurisdiction early on.
8. Put an itemized list of reclaimed materials in the bid specifications and make the materials available for viewing during the bidding process.
9. Select a contractor that is willing to work with reclaimed materials, bid fairly and monitor work.
10. Let others know what you are doing. Share information and the process used.