

Alburg Mobile Home Deconstruction Project



Submitted to:
The Department of Environmental Conservation

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Appendix

A. Pre Deconstruction Inventory and Post Deconstruction Results

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The success of the Alburg Mobile Home Project is a result of the dedicated Alburg community members who have made significant investments of in-kind resources and who shared a collective vision and desire for progress within their town.

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Introduction

Mobile homes make up a substantial portion of the national housing stock. There are 8,717,845 mobile homes scattered throughout the nation on individual lots while others are clustered together in mobile home parks. This represents 7.1% of the total housing stock for the nation (U.S. Census Bureau, 2004). While the majority of housing structures in the U.S. are traditional one unit, unattached buildings, mobile homes are an important type of multi-unit structure that makes up the remainder of the housing supply.

In Vermont there are approximately 22,000 mobile homes dispersed throughout the landscape, representing 7.7% of the state's total housing units, according to the 2000 census (Vermont Department of Housing & Community Affairs, 2005). However, the habitable lifespan for these structures is not usually as long as traditional housing. Eighteen mobile home parks in Vermont have closed in the last five years, leaving roughly 41% of the structures behind to deteriorate or be demolished. This may result in demolition costs that can reach \$3,500 per mobile home for the responsible party of the abandoned home (Vermont Department of Housing & Community Affairs, 2005).

While there are certain obstacles to using this form of housing, the *2004 Registry and Mobile Home Parks Report* “demonstrates that manufactured housing and mobile home parks can be a good source of affordable housing for low and moderate income Vermonters” (Vermont Department of Housing & Community Affairs, 2005). They provide a practical option for a range of different housing situations. Mobile homes are used nationally as a resource for emergency housing relief, as has been demonstrated by the recent disaster caused by hurricane Katrina in 2005. At the state and community level, they fulfill normal affordable housing criteria. For the low-income individual, they are a viable, short-term option. Whether the intention is for mobile homes to be a temporary or permanent solution to quick and affordable housing, time has shown that there are some complications that arise in the long-term use of these structures

There are some problematic characteristics in the approach society takes in using them as a housing resource. The inexpensive materials and quick assembly methods used to construct these homes tends to compromise the integrity and the length that the structure will remain habitable. Thus, as they age, mobile home structures pose challenges to solid waste management as well as to the financial stability of the citizens they serve. The implications of these factors are two fold.

Mobile homes often have shorter life spans than traditional housing units and may contribute to perpetuating the cycle of poverty. By nature, the inexpensive materials used in mobile homes deteriorate faster than the more durable materials used in traditional housing. When mobile homes breakdown, replacement parts can be costly and difficult find because the market for new or used parts is less developed than that of traditional housing. Therefore, the upkeep of mobile homes is not favorable for the low-income population. Secondly, unlike a traditional house, mobile homes do not gain equity over time. They do not provide the same benefits of investment as the purchase of a traditional house. A mobile home is a quick fix for someone looking to buy an inexpensive home, but does not help the financial advancement of the owner.

In addition to being a blight and waste burden, abandoned mobile homes can have adverse societal impacts. Both Montana and Oregon have observed a rise in numbers of

abandoned mobile homes that are being transformed into methamphetamine labs. These allegations pose a public health threat and suggest that unattended deteriorated mobile homes can exacerbate nationwide societal problems.

The majority of the mobile homes that are at the point of obsolescence were manufactured prior to 1976. In 1976 the federal government established the Federal Manufactured Homes Construction and Safety Standards Act. This national program was enacted to protect the health and safety of mobile home owners by enforcing construction and safety standards. The homes manufactured prior to the enactment of these regulations have the potential to contain hazardous materials. These materials can include lead common in outdated paint, mercury from thermostats, and asbestos (Community Planning Workshop, 2005). These potentially dangerous substances found in older mobile homes exemplify the need for homeowner assistance in the deconstruction of these structures.

A variety of programs are available to provide financial assistance to citizens interested in purchasing mobile homes. There are also various efforts in developing non-profit mobile home parks to increase the self-regulation and participation of these communities. There is, however, comparably very little effort provided to assist homeowners in disposal once these structures become obsolete. The costs associated with demolition, disposal, and transportation can be exceedingly costly. Assisting current owners of deteriorated mobile homes to remove these structures, and minimize the waste, is the first step in addressing this challenge in our nations affordable housing system.

This study analyses one small community's response to managing the removal and waste of old, abandoned mobile homes from within the town borders. In addition to the community organizing components of this study, quantitative data about the amount of waste generated from mobile home structures and the ability to recycle metal components was collected. This study is intended to be used as a guide and reference for other towns or organizations interested in managing similar mobile home removal and recycling.

Literature Review

Vermont Agency of Natural Resources, Town of Bristol, and Manufacturing Housing Institute. 2000. *A Feasibility Study of Mobile Home Recycling Program*. <http://www.anr.state.vt.us/dec/wastediv/recycling/pubs/TRAILER.pdf>.

This is a study documenting the manual deconstruction of five mobile homes in 2000 that were destroyed by the 1998 flood in Bristol, Vermont. It is estimated that there are between 12,000-15,000 mobile homes that are approaching the point of becoming inhabitable in Vermont. This study found the average weight of the five mobile homes to be about 6 tons. According to this average, these mobile homes that are becoming obsolete may soon amount to 72,000 - 90,000, or more, tons of waste that will need to be managed.

In this study, the five mobile homes were transported to the Town of Bristol Landfill and were deconstructed at this central site. As most mobile homes pegged for deconstruction are no longer road worthy, transportation of the structure can amount to a significant portion of the disposal expenses. This report found that, in general, costs ranged between \$300-\$600 to transport a mobile home up to 40 miles. Landfill tipping fees range from \$60-\$85 per ton in Vermont. Salvaging materials, most notably metal components, does reduce landfill costs, however, the amount of revenue generated from salvaging materials is largely dependent on the current value of scrap metal.

On average it took 89 person hours to deconstruct a single mobile home. The percent of salvageable material of the total weight ranged from 20-37% per mobile home. The cumulative average percent of salvageable material was 29% for the five mobile homes. While it would be possible to attain salvable material rates nearing 50%, the reuse and recycling markets do not support the effort that would be necessary to do so. While the study found that manually deconstructing mobile homes was not economically profitable, the environmental benefits that result through the waste reduction are substantial. Similarly, the material salvaged supports the building materials reuse and recycling industries. Taking these non-monetary benefits into account makes the extensive process of deconstruction worth the effort.

State of Vermont HUD Consolidated Plan for Housing and Community Development Programs VOLUME 3. Action Plan for Federal Fiscal Year 2004-2005. Retrieved from <http://www.dhca.state.vt.us/Housing/ConPlan/2004%20Volume%203%20Final%20Document.pdf>.

The State of Vermont's plan for housing and community development needs follow the broad goals of four grant programs designated by the Community Planning and Development Program, U.S. Department of Housing and Urban Development (HUD). These goals include: providing and retaining decent, affordable housing; providing safe and livable neighborhoods; and expanding economic opportunities through job creation and credit opportunities.

The main coordinators of Vermont's anti-poverty efforts are the Office of Economic Opportunity (OEO), and the Agency of Human Services (AHS). OEO and Community Action Agencies collaborate to improve the self-sufficiency and living

conditions of low-income people, and to increase their ownership to their communities. AHA works with the Department of Housing and Community Affairs and other housing organizations to provide several services, particularly responding to the closure and sale of mobile home parks.

One of the demographic groups specifically targeted for affordable housing resources and activities are low to moderate income mobile home park residents. The objectives are: to preserve and improve existing mobile home parks and to assist park residents with closures or habitability insufficiencies; to encourage new mobile home, or other housing opportunities, to mobile home park residents invested in their community; and to increase financial options available to mobile home park residents for home purchases or refinancing. One general priority identified in the Action Plan is to address the deterioration of the existing housing stock. Rehabilitation and acquisition of existing mobile home parks, the construction of new mobile home parks, and the rehabilitation of owner-occupied manufactured housing units are all eligible for funding through the HOME grant program.

Vermont Department of Housing and Community Affairs, Agency of Commerce and Community Development. July 2005. *State of Vermont HUD Consolidated Plan for Housing and Community Development Programs, Volume 1: State Profile for Program Years 2000-2005*.

The Consolidation Plan states that there is a general lack of affordable housing available throughout the state of Vermont. The demand for mobile home lots is greater than the supply, leaving the vacancy rate at less than 4% statewide. The median sale price of mobile homes on private land for the state of Vermont is \$42,000, and the median sale price for mobile homes without land is \$18,900. A majority of mobile home park lots were established in the 1960's. About half of the mobile homes in the state were built before the 1976 HUD building standards for mobile homes were enacted.

Vermont Department of Housing and Community Affairs. March 2005. *2004 Mobile Home Parks Registry*.

This report states that mobile homes and manufactured housing are a useful form of affordable housing, in addition to providing information about the existing mobile home stock in Vermont. Laws that protect the rights of mobile home owners have improved the security and stability in this type of housing, however, this demographic group is still plagued by mobile home park closures, and a lack of financial assistance for mobile home purchases or home improvement. The Vermont Advisory Commission on Manufactured and Mobile homes was established in July 2004 and has prioritized the affordability of mobile homes, the prevention of mobile home park closures, and habitability problems in mobile home parks as areas of focus for any relevant legislative proposals for the 2006 legislative session. Drinking water regulations have been highlighted thus far as a major challenge for mobile home park owners, and often contribute to park closures. The difficulty of moving mobile homes, particularly older mobile homes, arises with the closure of mobile home parks, and is advised as a

consideration for determining if mobile homes should be classified as 'real property' in terms of refinancing.

Vermont had 254 mobile home parks in 2004, and the state's median monthly rent for a lot was \$246, a 7.4% increase since 2001. The state's mobile home park lot vacancy rate is low, at 3.8% in 2004. There were 734 used mobile homes sold during 2004, at an average price of about \$25,000. Twenty-nine percent of Vermont mobile home park lots are owned by non-profits or resident cooperatives. Some benefits of these types of ownership include less expensive lot rent, access to refinancing loans, and access to home improvement loans and grants.

North Carolina Department of Environment and Natural Resources, Division of Pollution Prevention and Environmental Assistance. August 2003. *Local Government Case Study: Brunswick County – Mobile Home Recycling.*

The Brunswick County Mobile Home Recycling Program began in February 2000 to remove and recycle old, dilapidated mobile homes from within the county. The program recycles metal structural components, interior fixtures, and appliances. Originally the owners were responsible for transporting their mobile homes to the landfill, however, in attempt to have a stronger impact on cleaning up the image of the county the Appearance and Code Enforcement (ACE) program was enacted. Under this program, owners of any junked items, including old mobile homes, can contact the solid waste department to arrange the free removal of the structure. The Solid Waste Department implements the demolition, transportation, recycling, and disposal of materials. Demolition and recycling of mobile homes at the landfill takes approximately 30 minutes, and costs the Solid Waste Department \$65, not including transportation, or construction and demolition waste disposal costs. The program was offered for an 18 month period. From 2000-2003 about 500 mobile homes were recycled.

North Carolina Department of Environment and Natural Resources, Division of Pollution Prevention and Environmental Assistance. December 2003. *Local Government Case Study: Scotland County – Mobile Home Recycling.*

The Scotland County Mobile home Recycling Program began in 1997 to comply with a county ordinance to remove all dilapidated mobile homes from within the county. The owner has thirty days to comply with the ordinance once it is mandated and is responsible for transporting the structure to the landfill and paying C & D disposal fees. The average cost of disposal is \$217. The Solid Waste Department provides the labor, through staff and community service workers, and equipment to dismantle and recycle the structures at the landfill. One hundred mobile homes were removed and recycled through this program, providing a successful example of an alternative model for reducing C & D landfill waste.

2005 Assembly Bill 39. Wisconsin. Retrieved from www.legis.state.wi.us/2005/data/AB-39.pdf.

This Bill makes amendments regarding the manufacturers of manufactured housing, regulation of manufactured housing installations, regulations on title fees, and administering rehabilitation and recycling of abandoned mobile homes. Under this bill the Department of Commerce can give grants to individuals or municipalities engaging in environmentally sound disposal of abandoned manufactured housing. Grants can also be given to mobile home residents who need to make critical repairs on their homes that they are not able to afford. The Department of Commerce can also contract with 501 (a) tax exempt organizations that can administer the removal and recycling, or organizations that employ people who have the technical experience with manufactured housing necessary.

Community Planning Workshop. 2005. *MMHAT Decommissioning Case Studies and Issue Assessment: Draft Report*. <http://darkwing.uoregon.edu/~cpw>.

This report provides case studies of mobile home removal and recycling operations in several states across the country and provides information about the feasibility of starting an operation in Oregon. As concluded from the diversity among the different operations, there are several different successful approaches for managing abandoned mobile home removal that depend on the circumstances of the communities where the operations are implemented.

There were case studies conducted in Michigan, North Carolina, Georgia, California, and Wisconsin. The case studies in Wisconsin and Georgia are of non-profits. The Tomorrow's Home Foundation in Wisconsin was a non-profit funded by the state and manufactured housing industry that deconstructed abandoned structures free of charge to the home owner during 2000. Deconstruction was conducted by three different companies using both manual and mechanical techniques. The high costs of asbestos testing terminated the free service after one year and the removal of 100 manufactured houses, however the organization continued to assist the removal of 200 more structures over the following two years. The Keep Liberty County Beautiful organization is an affiliate of a national non-profit. It began recycling manufactured housing in 2004 and is still in operation. It has recycled about 100 structures, through a combination of local government funding and payment from the individual owners. This program uses a combination of manual and mechanical deconstruction methods.

The three for-profit operations, Salvage King in North Carolina, CMH Mobile Homes in Michigan, and Zanker Materials Processing Facilities in California, all use a combination of mechanical and manual deconstruction methods. Salvage King uses a mostly manual process and achieves a 70-75% waste diversion rate, while Zanker's uses a more mechanized method and achieves an 80-90% diversion rate. Zanker's is the only for-profit operation that is able to run a profitable business that includes mobile home recycling, however, they appear to be a more diversified operation than Salvage King and CMH.

The major costs associated with manufactured housing removal and recycling include transportation of the structures, disposal costs, labor costs, and hazardous waste testing. This study found that disposal costs of the waste material can range from \$35-\$95 per ton. Transportation costs can range from \$2,000-\$4,000. Labor costs vary greatly depending on the method used. A manual deconstruction can take from 2-5 days to complete, while a mechanized deconstruction can be completed in a few hours. Excavators, shredders and grinders are the typical types of machinery used for the process. In some states, including Oregon, an asbestos test must be completed before any building is demolished. The average cost for asbestos testing in Oregon is \$500-700.

The materials that can be salvaged from old mobile homes include metal, wood gypsum, household appliances and fixtures. The most prevalent metals found in the structure are aluminum and steel. The resale of salvaged materials offsets some of the costs of deconstruction, but typically by a minimal amount. However, this report states that the benefits of diverging usable material from landfills is an important effort to pursue.

Heartwood ReSource is the organization that is investigating starting up a mobile home recycling operation in Douglas County, Oregon. It is considering contracting with individuals, or at the municipal level. The county landfill offers free disposal of mobile home structural waste, but does not recycle any of this large amount of waste. Heartwood will need financial assistance to subsidize their costs of removal and recycling to provide better incentive for manufactured home owners to choose their environmentally sound approach.

There are dangerous structure, nuisance, and abatement codes that would engage legal action requiring mobile home owners to remove their abandoned structures, and could be used to encourage Heartwood's services. There is a state mandated Opportunities to Recycle policy that requires recycling options to be offered with waste removal services, and also encourages recycling demonstration and research projects. Under this policy Heartwood may qualify for grant support from Douglas County.

I. Project Description

Background

The town of Alburg is located in the northwest corner of Vermont, in Grand Isle County. Alburg is a small town with a population of roughly 2,000 and a relatively low-income community with 12.8% of the population below poverty level, 3.4% higher than the state level in 1999 (*Center for Rural Studies*, 2004). The Alburg Revitalization Committee (ARC) has been working to reinstall pride within the community through various downtown revitalization projects in order to encourage economic community activity and prosperity. One project proposed by the committee in the fall of 2004 was the removal of 22 identified abandoned mobile homes from private lots in the town. This problem is not unique to this community. State and federal governments estimate that between 12,000 and 15,000 mobile homes are obsolete in Vermont (Vermont Agency of Natural Resources, 2000).

Removing mobile homes is a costly endeavor and given the demographics of Alburg's population, the costs of mobile home deconstruction would pose a burden for many residents. In response to a community expressed need to improve the town's aesthetics in the Vision-to-Action forum as well as the town profile, the Revitalization Committee has committed to financially aiding the town residents in this endeavor. This will include properly recycling all salvageable parts and thus reducing the waste burden on local landfills. During the fall of 2004, UVM students helped ARC members outline and define the project, research, and apply for funding. In December of 2004, the Agency of Natural Resources, Department of Environmental Conservation, (DEC) expressed interest in becoming involved in the project.

A meeting was held in February of 2005 to assess and organize community resources and for the ARC to listen to the interests and concerns of local Alburg residents. The meeting comprised of various stakeholders including ARC and Alburg residents, local contractors, UVM professor and students, and two representatives from the DEC. This meeting generated an influx of ideas, suggestions, and ultimately the direction in which this project would follow. It was evident that there was community support for the removal of decrepit mobile homes and two local contractors offered to donate their time and machinery to assist the ARC in removing the abandoned homes. From the original project proposal in the fall of 2004, only six of the initial 22 mobile homes targeted for deconstruction were willing to participate at first. During Phase I, four mobile homes were removed in March 2005, and a fifth was removed in July 2005.

Publicity of the deconstruction from Phase I generated enough interest among other mobile home owners within Alburg to justify the projects continuation. Phase II of the deconstruction project thus commenced in December of 2005 and was completed in February of 2006. Phase II concluded with the successful removal of five additional mobile homes, bringing the project total to 10 deconstructed homes. The data collected about waste and salvageable metal quantities from these 10 mobile homes supplements the data collected by the DEC in the *Feasibility Study of Mobile Home Recycling*.

The DEC, intrigued by the efforts put forth by the town of Alburg, were particularly interested in the data that would be collected from separating salvageable waste from each mobile home. As previously mentioned, the DEC had been involved in a

similar study in Bristol, Vermont that provided data about the feasibility and potential for waste reduction, reuse, and recycling of mobile homes through manually intensive deconstruction methods. They were willing to provide funding for UVM students' participation in data collection, related project tools, and project development through December 2005.

Justification

There have been few documented mobile home deconstruction projects conducted throughout the U.S. The most extensive available research is the feasibility study conducted in Bristol, Vermont. The Bristol study showed that deconstruction is expensive and only produces a modest amount of salvageable or recyclable material. However, despite the financial obstacles of this process, the study encourages further deconstruction as an alternative to demolition because it supports the used building supplies and scrap metal industries, reuses natural resources, and reduces the waste burden on landfills. The Alburg mobile home deconstruction project will collect data about salvaging metal in order to improve the solid waste management practices of mobile home waste. This project has the potential to be a platform for a new way to approach mobile home recycling methods that can be replicated in Alburg, throughout the State, as well as the Nation.

Goals

The overall goal of the Mobile Home Project is to assist the Alburg Revitalization Committee in improving the town's aesthetics and providing a cost efficient solution for local residents who wish to remove their old mobile homes. The immediate goal of the mobile home project was to remove a portion of the 22 identified abandoned mobile homes from private lots, given the cooperation of the owners and the community's resources. Through this process, data was gathered pertaining to the feasibility of deconstruction as an alternative to conventional demolition practices. This project seeks to evaluate the methods used and weight of salvaged material in order to contribute to the little data available on deconstruction of mobile homes, and to provide a framework and recommendations for further deconstruction practices.

Objectives

- Remove identified mobile homes
- Profile each mobile home pre-deconstruction; identify the quantity and type of recyclable components
- Document the deconstruction process of each mobile home; record all costs, methods of deconstruction, labor time, and quantities of waste and metal
- Evaluate the project success in reducing waste and costs, improving efficiency, and for its replicability
- Document Alburg's mobilization of community resources, both financial and in-kind contributions

- Publicize the project within the Alburg community to encourage participation, and publicize throughout the state to educate other communities about the option of recycling mobile homes

II. Methods

Phase I: Deconstruction on Site

Project Planning and Research

The original goal of the mobile home project in Alburg, Vermont was to remove 22 identified abandoned mobile homes from residential lots as a component of the ARC's downtown revitalization project. However, the number of abandoned mobile homes available for deconstruction changed over the course of the project due to the timeframe of removal, the financial opportunity provided by the ARC, and the interest of resident participants. One of the most important objectives and initial steps in the mobile home deconstruction project was to develop a network of community partners to participate and contribute to the project. This network gave rise during the first organizational meeting held by the ARC on February 9th, 2005. The development and feasibility of the project were discussed in accordance with local interests and concerns.

During the meeting a local contractor and selectman from Palmer Construction made a proposition to the group to donate his labor and use of machinery free of charge if the ARC was willing to pay for fuel and waste disposal. He would remove the mobile homes using a method that stressed efficiency in order to minimize overall costs. It was expected that he could remove five mobile homes in one day for the \$5,000 sum the ARC had allocated for the Mobile Home Project. Following a discussion lead by a DEC member and UVM (CDAE) Professor Dan Baker, it was agreed that Palmer would attempt to salvage metal and other recyclable components on each mobile home and document all costs, time, and methods used throughout the process. Determining the cost-share of all the participants—mobile home owners, local contractors, and the ARC—was an important result from this meeting.

After the meeting commenced, Irick Excavating offered to remove one of the mobile homes that was identified in the initial inventory, waiving the costs of labor, machinery, and fuel. Once the deconstruction contracting logistics were arranged, the ARC was able to gauge the community's interest in participating in the project by administering a telephone survey to targeted landowners who had abandoned mobile homes on their property. From the survey, it was determined which mobile homes could be removed in the spring of 2005 during the opportune time for the contractors, before the ground thawed and the busy season for construction work began.

The ARC administered the survey, which consisted of 15 questions about the mobile home and the owner's interest in participating in the project. The survey showed five interested residents with a total of six mobile homes intended for removal. A number of the citizens who declined participation were interested in the project and in removing their mobile homes, but were not able to participate at that time due to circumstantial obstacles. Results of the survey can be found in Appendix B. In addition to identifying

interested candidates, the survey made evident that this project drew interest from within the community.

UVM students Erin Makowsky and Kendall Kahl then collected a detailed inventory of the five mobile homes that would be part of the spring 2005 study. The inventory process involved documentation, photographs, size measurements, accessibility, and interior/exterior conditions for each home. The geographical location of each home was recorded via GPS and a detailed inventory of each mobile home can be found in Appendix A. Access to two of the mobile homes was questionable, and when Palmer followed up to assess the layout of each site, he concluded that they could not be deconstructed until they were moved to a more accessible location. As a result of barriers to access and unwillingness of owner participation, only four of the original five inventoried mobile homes were successfully deconstructed. However, a fifth mobile home, MH-3, was deconstructed but was not included in the initial inventory.

On March 24, 2005, Palmer Construction and Alburg Town employees deconstructed MH-1 and MH-2. Originally, the owners of MH-2 wanted to have two mobile homes removed, but on the day of deconstruction decided to only remove one. Both MH-3 and MH-4 were deconstructed and disposed of over a four-day period from March 26th-29th by Irick Excavating. On July 12th MH-5 was removed by Irick Excavating.

Data Collection

The contractors were given a worksheet as a guideline for recording their deconstruction process. The worksheet included the time spent per mobile home, technique for demolition, equipment and labor used, items and weights of recyclable materials in mobile homes, weight of waste per mobile home, contractors absorbed costs, comments and recommendations, and any unusual circumstances that they were confronted with (see Appendix C). Time and efficiency were a priority for the contractors since they were not being reimbursed for their equipment or labor.

The timing for the deconstruction followed such that the UVM researchers were unable to be present for the events as was originally planned. The contractors were provided with the information that was needed for the study and a DEC member and ARC member were present at some of the deconstruction sites to assist the research and documentation components. No DEC, ARC, or UVM (CDAE) partners were present during the deconstruction of MH-3 and MH-4. The only mobile home that was photo documented during deconstruction was MH-1 (see Appendix D). In order to obtain a more comprehensive account of the deconstruction process and outcomes, the researchers interviewed the contractors after the fact to clarify and enhance the recorded information.

The method for collecting data from the deconstruction sites was originally intended to be uniform for both contractors, however in the absence of the UVM researchers, some consistency was lost. The approach to record the weight of salvageable parts and waste; equipment used; labor hours; deconstruction methods; and recommendations varied between the two deconstruction contractors, as well as whether the data was recorded on a single mobile home basis.

Deconstruction Methods

Having two contractors participate in the project allowed for a comparison of the different approaches and methods used by each. Palmer Construction, with assistance from Town of Alburg employees, removed two mobile homes. Irick Excavating removed three.

Palmer Construction and the Town of Alburg team

Palmer Construction and the Town of Alburg worked together to remove MH-1 and MH-2 located at separate sites, approximately one mile apart. The process took a total of 6 hours to complete, and a total of 3 dump trucks and 2 excavators were used. Palmer donated the use of one excavator, one 14 CY dump truck, and a gas powered chop saw. The track excavator with a thumb, operated by Palmer Construction, was used to crush the mobile home and separate the tin roof and siding from the rest of the debris, as well as remove some appliances. The recyclable and waste components were directly deposited in the appropriate dump trucks after being removed. A rubber tire excavator with a grapple, operated by a Town of Alburg employee, was used to load debris into the designated dump trucks. Once the mobile home was stripped down to the steel frame, the frame was cut into large pieces with the gas powered chop saw in order for it to fit into the dump truck. Appliances such as a stove, water heater, and water pump were extracted from the mobile home using an excavator.

Irick Excavating

Irick Excavating removed MH-3 and MH-4, located at the same site. The process extended over a period of 4 days. Irick excavating used one excavator, two dump trucks, and a gas powered chop saw. Irick Excavating donated one of the dump trucks; the other belonged to the brother of the mobile home owner. James and Dennis Irick deconstructed MH-3, and MH-4 was removed by the owner with the use of Irick equipment.

The Iricks' method of deconstruction utilized a track excavator with a hydraulic thumb to complete the bulk of the work. James peeled off the tin siding of the mobile home with the hydraulic thumb, which he found worked quite easily. He would start by grabbing the siding at one end and stripping it from the structure along the long side of the mobile home. He noted that the siding was constructed of horizontal slabs, which might have contributed to the ease of the task for this particular mobile home. He also used the hydraulic thumb to remove the tin bathtub, which the mobile home owner had requested be saved. The remaining wall structure was crushed and put into the dump trucks with the excavator. The floor was the most difficult to separate the metal from other components. When the base structure was stripped down to the steel frame, a chop saw was used to cut the mobile home into five or six sizable pieces in order to fit in the dump trucks.

MH-5 was removed in 4.5 hours using a track excavator with a hydraulic thumb and a dump truck. The mobile home was cleared of non-structural debris and the exterior additions including the foundation and entranceway were removed prior to the day of deconstruction. The removal of MH-5 required the labor of three workers. Two laborers

completed the majority of the work by operating the excavator and driving the dump trucks. Splitting the frame using a chop saw was the predominate responsibility of the third laborer. This process took approximately 20 minutes. James Surwilo of the DEC was also present and assisted some manual removal of metal. James Irick used the same method of peeling the metal siding off, then crushing the interior structure, as he did for the MH-3 and MH-4. Two loads of debris were brought to the landfill and two loads of metal were brought to Hodgdon's. The process was slowed slightly by a hold up at the landfill. Channel 3 news was at the site and filmed part of the deconstruction in addition to interviewing researchers, the contractor James Irick, and Monica Green from the ARC.

Phase II: Deconstruction at Central Location

Project Outreach

Phase II of this project developed from the community's continued support and interest in removing more of the abandoned mobile homes from the town landscape. Through word of mouth, news of the economic benefits that this project provided was spread throughout local residents. Awareness was enhanced by various publicity efforts, including televised news coverage and articles in the local paper, causing more Alburg residents to seek assistance through the Revitalization Committee.

Data Collection

For the second phase of deconstruction, six mobile homes were inventoried on October 18, 2006, following a process similar to the one used during Phase I. This inventory included photo documentation, size measurement, GPS location, general description of the condition of the structure, and specific notes of non-metal components that were in salvageable condition. Each mobile home owner was mandated to remove all non-structural debris before the deconstruction date, which was enforced during the inventory stage. This provision of the agreement between mobile home owners and the ARC was not strongly enforced during Phase I of the project. For information pertaining to inventoried mobile homes see Appendix A.

Of the six inventoried mobile homes only five were confirmed for participating in the deconstruction scheduled for the winter of 2005-2006. In an effort to increase efficiency and decrease costs for the contractors, it was requested that all five mobile homes be deconstructed at a central location. A local resident and mobile home owner offered the use of their farm for the central site because their property has ample space and already contained three of the five homes that had been inventoried and were contracted for removal. Completing the deconstruction at a central location provides a time-efficiency comparison to the methods used in Phase I, when the mobile homes were deconstructed at the original, separate locations.

Three of the inventoried mobile homes were deconstructed on December 7th, and two were deconstructed on February 14th. The mobile homes were deconstructed in two different days because it was not possible to deconstruct more than three in one working-day. The gap between the dates reflects the challenges in the availability of the volunteer construction company, as well as constraints posed by unfavorable winter weather

conditions. As a request from the ARC, the owners of MH-6 and MH-7 were required to transport their homes from the original location to the farm site for deconstruction. These two homes were thought to be mobile, however, they proved to not be transportable and were moved across town via a neighbor's trailer.

In order to ensure proper data collection and documentation a new template was used to track the process in greater detail. Factors, such as increased costs and time efficiency, that previously contributed to uncertainty in the feasibility of deconstruction were carefully monitored and evaluated in the second phase. Additionally, while having two contractors participate in the phase I deconstruction provided a useful comparison, having only one contractor involved in phase II provided more easily measurable and consistent data on the process used and the quantity of salvaged metal.

Rather than requiring the contractors to record the process, Makowsky was present at the two deconstruction events in the second phase to oversee and monitor data collection. A worksheet was used in the second phase as a template for recording the total deconstruction time for each home as well as track weight slips that were obtained for each load of either waste or salvaged metal. General notes taken for each mobile home during the stages of removal were recorded on a worksheet, which was also used to track the time and description of each stage of removal. This included documenting the process used for siding, metal, and waste removal, the time and process used to break down the frame, and any relevant appliances that were removed from the home and placed with the structural metal. Although time and efficiency were taken into consideration, the contractors took great care in removing large quantities of recyclable materials, which slightly slowed the process.

DEC, UVM (CDAE), and ARC partners were all present for the deconstruction of the three homes removed on December 7th. News reporters from the Burlington Free Press and St. Albans Messenger were also present at this deconstruction event. The DEC and UVM (CDAE) partners attended the deconstruction of the final two homes located at the farm deconstruction site, and there was no press coverage for this event. A total of 10 mobile homes have been deconstructed to date in Alburg.

Deconstruction Methods

Irick Excavating

The deconstruction methods used for the five mobile homes removed during phase II were modified and improved according to the experience and results of the first phase of the study. The five mobile homes removed by Irick excavating included MH-6, MH-7, MH-8, MH-9, and MH-10. Irick Excavating used a gas powered chop saw, an excavator with hydraulic thumb, two dump trucks, and three laborers. All equipment and laborers were courtesy of Irick Excavating.

The Iricks excavator operator noted any complications or extra steps taken for the deconstruction of the final five mobile homes. The method used differed from the first phase. Instead of tearing off the siding and immediately placing it into the appropriate dump truck, he methodically removed all the metal and waste by separating them into two large piles on one side of the home. He noted that this procedure was more effective and less time consuming. This method allowed him to strip the metal off the sides and then double-back and break the wood struts in the siding into the middle of the mobile

home. The metal was thus intermittently removed from the roof. He applied this process to the entire structure until all of the metal siding was salvaged and the disposable waste was in a manageable pile in the center of the mobile home. Any additional metal appliances such as water tanks or refrigerators were removed from the home using the excavator and hydraulic thumb.

Once the waste was broken down it was then moved from the center of the mobile home to a pile next to the mobile home. The leftover metal frame was then cut into sections and added to the metal pile. Once each mobile home was dismantled, the piles were placed in the appropriate dump trucks. The manual assistance was necessary while the excavator operator loaded the trucks with waste or metal. The additional employee adjusted the truck in order to maximize loading efficiency and also manually loaded smaller pieces of metal. Although the on-site assistance from a manual laborer was minor, it was essential in maximizing the amount of metal salvaged from each home. Similar to the role he played in the first phase of the project, James Surwilo demonstrated his concern for salvaging the greatest quantity of materials by manually diverting every last piece of metal from the waste pile.

III. Results

The progression of the deconstruction project in Alburg began with a generalized problem that evolved into a community driven solution. The deconstruction method used in Alburg resulted in a tangible model of deconstruction and provides data that demonstrate the waste-reducing affects of using this process.

Key Findings

This project was unique because of the innovative route that Alburg took to rid the town of abandoned mobile homes, and was developed with little guidance from previous projects. For this reason the results from this project cover a broad range of the factors to be considered for a deconstruction project. The following are key findings:

- Total amount of salvageable metal per mobile home ranged from 14-39%
- Nine out of the 10 mobile homes had metal exterior siding.
- A combination of machinery and manual labor is most resourceful when salvaging metal.
- Salvaging the metal siding and frame contributes to overall monetary savings, and can be removed easily and efficiently with machinery
- There was an average landfill cost savings of \$217 for removing metal parts and including the value of the salvaged metal, not accounting for the difference in the cost of transporting materials to separate locations.
- Removing and recycling mobile homes as a community project can reduce costs to the individual owner through cost-sharing among stakeholders and through leveraging community resources.
- There is definite concern, interest, and potential for future deconstruction projects within the Vermont state community regarding this issue as has been illustrated through the response from the project's exposure.

Contracting Procedure

Phase I:

The two local contracting businesses each used slightly different methods for deconstructing the mobile homes, partly due to the circumstances of each unique mobile home location. Table 1 summarizes the deconstruction inputs for the removal of the ten mobile homes in Alburg. The number of laborers and time spent in deconstruction was different for the two volunteer contractors. The person hours and total fuel quantity for deconstructing MH-1 and MH-2 were aggregated at the time they were documented because the mobile homes were deconstructed in the same day. Palmer's person hours in Table 1 were calculated by dividing the total person hours proportionately by the difference in the timeframe for each job. The fuel was divided equally between the mobile homes, as this was Palmer's recommended estimate. The time required for transportation of materials off site is included in both the Palmer and Irick's person hours.

The fuel and person hours for Irick's deconstruction jobs are estimates made by the contractors after deconstruction. The fuel estimate includes a calculation of the

gallons used knowing the distance from the village center to the landfill and the fuel efficiency of the truck, plus the estimated gallons used by the excavator on site. The amount of fuel used for each mobile home was estimated under the assumption that MH-3 used 2/3rd the input resources, and MH-4 used 1/3rd.

Phase II:

Irick Excavating agreed to deconstruct five additional mobile homes under the conditions that the structures be relocated to one site for removal, and that they be compensated for fuel and some labor time. MH-6, MH-7, and MH-10 were deconstructed on December 7, 2005. The total person hours for each mobile home includes the transportation time for waste and metal. While these three structures were completely deconstructed in one day, it took six additional hours on December 8th to finish transporting the metal and waste to Hodgdon's Salvage Yard and the Casella Landfill, respectively. The deconstruction and removal of materials of the MH-8, and MH-9 was completed on February 14, 2006. For both deconstruction events the fuel was tracked by the total amount used for both the excavator and the dump trucks throughout the whole day. This total was divided evenly among the number of mobile homes deconstructed per day because it took an approximately equal amount of time to deconstruct each structure, and an equal amount of trips to dispose of the waste and metal per structure.

Table 1. Deconstruction Inputs: Labor and Machinery

Phase I					
	Contractor	Timeframe of Removal*	Person Hours**	Number of Laborers	Fuel (gal)
MH-1	Palmer	2.5 hours	17	6	66
MH-2	Palmer	3 hrs	21	6	66
MH-3	Irick	4 days	14	2	56
MH-4	Irick	2 hrs	2	1	28
MH-5	Irick	4.5 hrs	15	3	13
Phase II					
	Contractor	Timeframe of Removal*	Person hours**	Number of Laborers	Fuel (gal)
MH-6	Irick	1.45 hours	12	4	33
MH-7	Irick	1.5 hours	12	4	33
MH-8	Irick	1.45 hours	9	2	34
MH-9	Irick	1.45 hours	9	2	34
MH-10	Irick	1.45 hours	11	4	33

*The timeframe does not include trucking hours for disposing waste and metal.

**The amount of time for trucking waste and metal is captured in the Person Hours.

Waste and Metal Data

It was most cost efficient for the contractors to deconstruct the mobile homes in a condensed timeframe. In Phase I, MH-1 and MH-2 were removed in the same day, as were MH-3 and MH-4. While this was the most time efficient, it affected data collection because some of the data is merged for the mobile homes that were removed in pairs. This was not the ideal process for collecting data on a per-mobile-home basis, but it did provide practical information on the costs of removing mobile homes in a realistic timeframe. A timeframe in which contractors attempt to remove the maximum number of mobile homes possible in the shortest amount of time. Data that was not recorded on an individual basis was divided between the mobile homes by the proportion estimated by the contractors. The amount of salvaged metal for MH-3 and MH-4 was aggregated during the process, and the figures in Table 2 are the estimated proportions from the contractor based on the size difference of the mobile homes, $2/3^{\text{rd}}$ to MH-3, and $1/3^{\text{rd}}$ to MH-4.

In Phase II, the mobile homes were deconstructed in groups for cost-efficiency, however, the data collection process was better monitored. The metal and waste quantities were kept separate in order for the quantity to be calculated for each mobile home individually. This procedure slowed the overall process minimally.

The total weight of the mobile homes ranged from 4.74 to 15.01 tons. However, the measurement of 15.01 tons for the weight of MH-3 included a large amount of additional garbage that was being stored in it and is not an accurate measurement of the structural weight. The heaviest structure of the data set that was measured without any additional garbage weight is MH-6 which weighed 5.29 tons.

Because the total weights for MH-2, MH-3, and MH-4 includes a significant amount of weight from non-structural material, the percent of salvaged metal for these mobile homes is not a good indication of the percent of metal in older mobile home structures. Of the Phase I, MH-1 and MH-5 were the only mobile homes for which this statistic is representative of the metal-to-waste ratio of structural components, where as all of the Phase II mobile home data is representative of the structural metal-to-waste ratio. The highest percentage of salvageable metal in the structure was from MH-6, at 39%, which was also the heaviest structure of the data set (Table 2).

Table 2. Size, Waste, and Salvaged Metal per mobile home

Phase I					
Mobile Home	Size	Total Weight (tons)	Salvaged Metal (tons)	Landfill waste (tons)	% Salvaged Metal of Total Weight
MH-1	10' x 43'	4.76	1.45	3.31	30%
MH-2	10' x 42'	7.9	1.8	6.1	23%
MH-3	12' x 56'	15.01	2.13	12.88	14%
MH-4	12' x 28'	6.12	1.06	5.06	17%
MH-5	12' x 55'	5.19	1.39	3.8	29%
Phase II					
Mobile Home	Size	Total Weight (tons)	Salvaged Metal (tons)	Landfill waste (tons)	% Salvaged Metal of Total Weight
MH-6	11' x 46'	5.29	2.05	3.24	39%
MH-7	12' x 52'	5.09	1.69	3.4	33%
MH-8	12' x 57'	4.59	1.4	3.19	31%
MH-9	12' x 57'	4.52	1.45	3.07	32%
MH-10	12' x 55'	5.16	1.62	3.54	31%

Benefits of Salvaging Metal

The salvaged metal does not appear to provide a large amount of monetary savings on a single mobile home scale, though the percentage of metal in the structure reduces the amount of material sent to the landfill by a sizeable amount. If the scrap metal were sent to the landfill, the additional weight of the metal would increase the total cost of disposing all materials more significantly. Table 3 compares the landfill cost difference between disposing the complete mobile home structure at the landfill to the cost if metal is salvaged. The cost of disposing the complete mobile home structure was calculated by multiplying the total structural weight by the cost of disposing one ton of C & D waste at the Casella landfill in Highgate, VT. The cost of disposing waste rose from \$82.51 in March of 2005 to \$103.17 by December 2005. The costs of dumping the total weight of the mobile homes from the first phase of the project were estimated using the \$82.51 disposal fee, while the weight of the mobile homes from the second phase were estimated based on the current disposal fee of \$103.17.

As shown in Table 3, MH-1 had the lowest landfill cost when the metal was salvaged, at \$273.11, and MH-10 had the highest landfill cost with metal salvaged of the mobile homes that were cleared of additional garbage. Revenue from metal ranged from \$55.60 to \$82.00 as measured in the mobile homes without additional garbage.

Table 3. Reduction in Landfill Cost					
<i>Phase I</i>					
Mobile Home	a Landfill cost if complete structure was landfilled	b (-) Landfill cost with metal salvaged	c (+)Revenue from salvaged metal	a - b + c = d Total cost reduction	a - d Net landfill costs
MH-1	\$392.71	\$273.11	\$58.00	\$177.60	\$215.11
MH-2	\$651.82	\$503.31	\$78.00	\$226.51	\$425.31
MH-3	\$1,238.48	\$1,062.73	\$132.67	\$308.42	\$930.06
MH-4	\$504.96	\$417.50	\$66.33	\$153.79	\$351.17
MH-5	\$428.23	\$313.54	\$55.60	\$170.29	\$257.94
<i>Phase II (Mobile homes without additional stored garbage)</i>					
MH-6	\$545.77	\$334.27	\$82.00	\$293.50	\$252.27
MH-7	\$525.14	\$350.78	\$67.60	\$241.96	\$283.18
MH-8	\$473.55	\$329.11	\$63.00	\$207.44	\$266.11
MH-9	\$466.33	\$316.73	\$65.25	\$214.85	\$251.48
MH-10	\$532.36	\$365.22	\$64.80	\$231.94	\$300.42
Total	\$5,759.35	\$4,266.30	\$733.25	\$2,226.30	\$3,533.05

Of all 10 mobile homes in the data set, the average landfill cost with metal separated and salvaged was \$427. The average landfill costs if the metal would have been disposed of at the landfill would have been \$576. The average cost savings resulting from salvaging metal to reduce the amount of landfill waste, and including the revenue gained from the salvaged metal were \$217. However, due to the large amount of garbage included in the weight data for MH-2, MH-3, and MH-4 the weight and cost averages were calculated excluding these three mobile homes to more accurately describe the structural characteristics, and are summarized in Table 4.

Additionally, in order to analyze the true monetary benefits of salvaging metal, data from the deconstruction of these mobile homes would have to be compared to the savings that may occur in the labor cost component if the contractors took a straight demolition approach.

Table 4. Deconstruction Summary of Mobile Homes without additional stored garbage (Includes MH-1, and MH-5 through MH-10,)

Average total weight of structure	4.94 tons
Average weight of salvaged metal	1.58 tons
Average weight of landfill waste, excluding metal	3.36 tons
Average % Salvaged Metal of Total Weight	32%
Average Net landfill cost (landfill cost of complete structure, minus total cost reduction of salvaging metal)	\$260.93

IV. Total Project Costs

Community in Kind Contributions

The efforts put forth by the local Alburg community were indispensable for the success of this project. There were no overhead costs accrued by the community for managing and organizing this project because it was overseen by the ARC, a volunteer community organization. Members of this committee, in particular Monica Green, volunteered a generous amount of time to orchestrating and coordinating those involved in planning, deconstruction, and data collection. This project took on a unique form as a result of the donations of ARC members, local contractors and town employees.

The original agreement was for contractors to donate labor and machinery, and the ARC would pay for the fuel of all machinery and tipping fees at the landfill with funds previously obtained through a state grant. However, Palmer Construction donated the chief operator's time while the ARC paid for the labor hours of two other Palmer employees. The town of Alburg donated employees' labor at a discounted rate, an excavator, dump truck and pick-up truck.

Irick Excavating donated the time of two laborers and the use of an excavator, and dump truck for removing MH-3 and MH-4. The two laborers operated the machines and trucked the debris to the appropriate locations. The owner of the mobile home helped to remove MH-4 and the brother of the mobile home owner donated a second dump truck. Irick did not charge the ARC for labor or fuel for removing either of these two mobile homes.

Table 5 outlines the gross cost of the resources each contractor contributed to the project. These numbers demonstrate what the ARC would have paid if the contractors had not offered to donate part of the labor and machinery for the project. The labor and

machinery costs for Palmer include \$260 paid to Town of Alburg employees. However, labor and machinery costs do not include the actual cost for the Town of Alburg's dump truck and excavator for any of the calculations in this report. Palmer Construction donated a total of 13 labor hours, the Town of Alburg donated 3 labor hours, and Irick Excavating donated 14 labor hours free of charge. The Iricks contributed 68 additional hours at a reduced rate.

Table 5. Contractors Gross Contributions

Contractor	Labor & Machinery	Fuel Cost	Total Cost
Palmer Construction	\$2,160.00	\$315.00	\$2,475.00
Irick Excavating	\$5,472.00	\$928.00	\$6,400.00
Total Contractor Input	\$7,632.00	\$1,243.00	\$8,875.00

Alburg Revitalization Committee Costs

Table 6 summarizes the actual amount that the ARC paid for the deconstruction project. This table also highlights the difference between the ARC gross expenses (\$6,747.24) and the ARC net expenses of the project (\$4,847.24). The average cost that the ARC paid to deconstruct one mobile home \$485.

The ARC required each mobile home owner to contribute \$200 for the removal of their home, in addition to taking responsibility for cleaning their property of left over debris after the mobile home was removed. In Phase I, the landfill costs varied greatly, which was primarily a result of interior non-structural waste that was not removed prior to deconstruction. MH-5 was billed differently than the other jobs because it was deconstructed as a single contract and Irick Excavating did not charge the ARC for the total amount of fuel used.

Table 6. Actual ARC Project Cost Share

<i>Phase I</i>						
	Labor	Fuel	Net waste disposal costs*	Gross Costs	Owner contribution	Net Total
MH-1	\$243.00	\$157.74	\$215.11	\$615.85	-\$200.00	\$415.85
MH-2	\$297.00	\$157.74	\$425.31	\$880.05	-\$200.00	\$680.05
MH-3	\$0.00	\$133.40	\$930.06	\$1,063.46	-\$200.00	\$863.46
MH-4	\$0.00	\$66.60	\$351.17	\$417.77	-\$100.00	\$317.77
MH-5	\$375.00	\$25.29	\$257.94	\$658.23	-\$200.00	\$458.23
Phase I Total	\$915.00	\$540.77	\$2,179.59	\$3,635.36	-\$900.00	\$2,735.36
<i>Phase II</i>						
	Labor	Fuel	Net waste disposal costs*	Gross Costs	Owner contribution	Net Total
MH-6	\$291.75	\$85.00	\$252.27	669.82	-\$200.00	\$469.82
MH-7	\$291.75	\$85.00	\$283.18	631.53	-\$200.00	\$431.53
MH-8	\$218.75	\$86.56	\$266.11	571.42	-\$200.00	\$371.42
MH-9	\$218.75	\$86.56	\$251.48	556.79	-\$200.00	\$356.79
MH-10	\$291.50	\$85.00	\$300.42	664.52	-\$200.00	\$464.52
Phase II Total	\$1312.50	\$428.00	\$1,353.46	\$3,094.08	-\$1,000.00	\$2,094.08
Total	\$2,227.50	\$968.77	\$3,533.05	\$6,729.44	\$1,900.00	\$4829.44
ARC GROSS TOTAL EXPENSES				\$6,729.44		
ARC NET TOTAL EXPENSES				\$4,829.44		

*includes revenue from salvaged metal (see table 3. for value of salvaged metal)

Gross Deconstruction Costs without Donations

Labor and Machinery

For Palmer Construction and the Town of Alburg, the cost of labor and machinery was determined by the normal hourly rate, multiplied by the recorded labor hours per person, to represent the gross costs without donated time. Fuel was listed separately for future reference. Three town employees worked with Palmer; one operated the excavator and the other two trucked waste and assisted with general labor. The actual hourly rate for a Town excavator and operator was not included in the costs in Table 6; the cost of labor and machinery for MH-1 and MH-2 only reflects the cost of one excavator. This is a better representation of what the total cost per mobile home would be than if the cost of

a second excavator were included because Palmer stated that in future jobs he would only use one excavator. The additional eight trailers were removed with the use of a single excavator.

Irick Excavating suggested that they would charge a flat rate of \$800 to remove a mobile home regardless of size. The \$800 sum consists of \$500 for labor and machinery to take down the mobile home, and \$300 for trucking the debris to the appropriate destinations. This estimate does not include the cost of waste disposal and tipping fees. For the purposes of this study, the fuel charges were separated into a new column to provide a more detailed description of the differences in deconstruction inputs. Irick did not track fuel throughout the process of deconstructing the MH-3 and MH-4, but provided estimates afterward. Fuel used for the trucking of debris was calculated using the mileage to the landfill and scrap yard, and the fuel consumption rate of the trucks (5 miles/gal).

Tipping fees for the disposal of waste at the landfill would not be included in the costs paid to either contractors, but would be additional costs accrued by the mobile home owners.

Waste and Salvaged Metal disposal

All waste material was delivered to the Casella landfill in Highgate, Vermont, located approximately 17 miles from the Alburg village. The tipping fee at the Highgate landfill was \$82.51 per ton of construction and demolition waste during the March 2005 deconstruction events. All scrap metal was trucked to Hodgdon Brothers & Sons in Swanton, Vermont, located approximately 12 miles from the Alburg village. Hodgdon paid \$40 per ton of salvaged steel, and \$.02 per pound of tin. The C & D tipping fee at Casella had risen to \$103.17 per ton for the disposal of the Phase II mobile homes. Hodgdon's rate for salvaged metal remained the same for the metal from the phase II mobile homes.

All the mobile homes removed were within a few miles from the Alburg village center. The price of fuel during Phase I was \$2.39 per gallon. This is the rate that was used for all Phase I fuel cost calculations, with the exception of MH-5 because Irick excavating billed the ARC at a reduced rate for fuel. For the three Phase II mobile homes deconstructed on December 7, 2005, MH-6, MH-7, and MH-10, the two dump trucks used a combined total of 82 gallons of fuel priced at \$2.58 per gallon, totaling \$211.56. The excavator used 18.9 gallons of fuel priced at \$2.28 per gallon, totaling \$43.09. The total fuel cost for deconstructing these three mobile homes was \$254.65, or \$84.88 per mobile home. MH-8 and MH-9 were deconstructed on February 14, 2006 with 56 gallons used to operate the two dump trucks, costing \$146.72, and 12 gallons used for the excavator, costing \$26.40.

Gross cost per mobile home without donations or cash contributions

The actual cost-share per mobile home that the ARC paid does not reflect the gross cost of all the inputs that went into the deconstruction because of the donations of local contractors, and the mobile home owners' cost-share. Table 7 shows the gross cost of deconstructing each mobile home if each mobile home had been removed without the

donated resources from the contractors, and excluding the benefits of salvaging metal. As previously stated, the actual project cost paid by the ARC was \$4,847.24, an average of \$485 for deconstructing one home. Table 7 summarizes the gross cost of the deconstruction project. Without salvaging metal or community in-kind and cash contributions, the ARC gross expenses would have been \$14,634.83 and the gross cost for removing a single mobile home would have been \$1,463. The gross cost of disposal was significantly increased because of the excess non-structural debris in 3 out of the 10 mobile homes. Excluding these three mobile homes (MH-2, MH-3, and MH-4), the gross cost for deconstruction per mobile home would be \$1,328.

Table 7. Gross deconstruction costs per mobile home without donations or cash contributions					
Phase I					
	Contractor	Labor and Machinery	Fuel	Landfill Costs (from table 3)	Gross Cost
MH-1	Palmer	\$972.00*	\$157.74	\$392.71	\$1,522.45
MH-2	Palmer	\$1,188.00*	\$157.74	\$651.82	\$1,997.56
MH-3	Irick	\$666.80	\$133.40	\$1,238.48	\$2,038.68
MH-4	Irick	\$733.40	\$66.60	\$504.96	\$1,304.96
MH-5	Irick	\$500.00	\$300.00	\$428.23	\$1,228.23
Phase I					
Total	-----	4,060.20	\$815.48	\$3,216.20	\$8,091.88
Phase II					
MH-6	Irick	\$715.00	\$85.00	\$545.77	\$1,345.77
MH-7	Irick	\$715.00	\$85.00	\$525.14	\$1,325.14
MH-8	Irick	\$713.44	\$86.56	\$473.55	\$1,273.55
MH-9	Irick	\$713.44	\$86.56	\$466.33	\$1,266.33
MH-10	Irick	\$715.12	\$84.88	\$532.36	\$1,332.36
Phase II					
Total	-----	\$3,572.00	\$428.00	\$2543.15	\$6,543.15
Gross Project Cost					\$14,635.03

Project Cost Share Distribution

The following chart outlines the dollar value of each stakeholder's contribution. The mobile home owner contribution includes the fee paid to the ARC for participating in the project to have their mobile homes removed. The contractor donations include the amount of resources donated to the project and can be calculated by subtracting the total fuel and labor expenses as paid by the ARC (Table 6) from the gross labor and fuel costs as listed in Table 5. Minimal discrepancies of less than one dollar are a result of rounded numbers. The Town of Alburg's contributions were subtracted from the contractor donations and includes the three hours of donated labor, but does not include the value of

the donated excavator and dump truck used for deconstructing MH-1 and MH-2. The ARC contributed a large amount of time dedicated to orchestrating this project, in addition to a portion of the committee's financial resources. The ARC's cost share as listed in Table 9 does not include their additional time spent planning, coordinating, or participating in the data collection and interviews. This number reflects the amount paid for labor, fuel and disposal costs. The total landfill cost reduction reflects the monetary savings from reducing landfill waste and includes the revenue gained from the salvaged metal.

Table 8. Project Cost Share Distribution					
Mobile Home Owner	Contractor Donations	Town of Alburg Donated Contributions*	Alburg Revitalization Committee	Total Landfill cost reduction from salvaged metal	Total Project Costs
\$1,900.00	\$5,619.29	\$60	\$4,829.44	2226.30	\$14,635.03
13.0%	38.5%	0.5%	33.0%	15.0%	100.0%

* This column does not include the value of the dump truck and excavator use that was donated by the Town.

Outreach

In addition to the support from within Alburg, the results from Phase I were shared with the statewide recycling community through a few different initiatives. Makowsky and Kahl presented the results at the Vermont Recycling Coordinators meeting in October 2005. Vermont Coordinators for most state counties were present at the meeting. They were receptive to the project and recognized that it would be applicable in many communities throughout the state. They shared many encouraging suggestions and were supportive of the continuation of this study.

In November, the DEC Solid Waste Program held a conference titled *Expanding the Used Building Supply Industry in Vermont*. This conference gathered important state and industry stakeholders including: state recycling coordinators, non-profit directors from the Vermont Sustainable Jobs Fund and ReCycle North, contractors involved in green or LEED practices, used building materials resale owners, and directors from solid waste management operations. This conference showed that there are statewide initiatives in effect to improve the reuse of the building materials and reduce construction waste. Attending both of these events are steps to increase the outreach of this project and spread the findings of this study in order to encourage other communities and industry stakeholders to pursue similar projects.

V. Lessons Learned

There was some difference in the original vision for this project between the DEC, UVM, and Alburg community. While all partners were keen to developing a deconstruction method that reduced the amount of landfill waste, the Alburg community was more focused on the practicality of removing the mobile homes by local, available means. This resulted in reverting to a less in-depth study of total salvageable materials, and focused on a time-efficient method that would salvage metal components and possibly some appliances. This project provides a realistic study of possible deconstruction methods, though some accuracy in data collection was lost in efforts to increase efficiency.

Collecting data on an individual mobile home scale was difficult to achieve. From a research stand point, the information that was most critical to document for this study on a per mobile home basis could have been more clearly communicated to the contractors. It was difficult to isolate some of the information on a single mobile home basis because it was practical to remove some of the mobile homes in pairs and combine data such as weight, fuel, labor and landfill costs. It would have improved the quality of research if there had been more communication and involvement with the contractors about research objectives before the deconstruction was carried through. Many of these details were clarified before the second phase commenced.

The initial inventory collected by Kahl and Makowsky could have been altered to provide better results and outcomes. When the mobile homes were inventoried, a brief description of the interior materials was collected. However, at the time of the inventory, contractors' commitment to following salvaging guidelines had not been determined, nor was the amount of time it would take to separate salvageable parts known.

Even though it would have simplified data collection and consistencies within the study to have one contractor remove all five mobile homes in Phase I over a shorter timeframe, there were benefits to having two contractors. It provided different perspectives on the practicality of decreasing waste from deconstructing mobile homes. The Phase II data collection process was more consistent because there was only one contractor involved.

For Palmer's approach of removing the mobile homes in one day, there was more incentive to donate time and resources if the expected three mobile homes could have been removed that day. Better communication with the mobile home owners to insure that the mobile homes were ready for removal on-time would have improved the overall efficiency of the project. Removing non-structural debris from the interior of the mobile homes would have led to lower landfill costs and more useful data about the metal-waste ratio of older mobile homes.

The project in Alburg has generated local and state interest and has helped bring the problems associated with abandoned mobile homes closer to the forefront of current issues in Vermont. Articles written in local Alburg newspapers and the UVM newspaper have lured a few interested parties to Alburg's mobile home removal endeavors. The Champlain Valley of Economic Opportunity (CVOEO) is involved in a statewide mobile home project that works with mobile home owners and renters to achieve and maintain affordability and control over housing situations and mobile home park conditions. This organization became aware of the project in Alburg through an article published in the

Cynic (Appendix F) and has expressed interest in developing mobile home deconstruction in Vermont. News articles detailing the projects progress in Alburg have been beneficial in generating new interest groups and ideas for the continuation of research and future projects.

VI. Recommendations

Future Research and Pre-deconstruction preparation

- Future projects should require that the mobile homes be cleared of non-structural debris before they are removed. This will provide more accurate data collection pertaining to the metal-to-waste ratio of structural components, and also makes it easier to separate salvageable materials. Mobile home owners should follow a set of general guidelines that details waste removal requirements. Mobile home tenant associations may be able to assist with the creation of such guidelines.
- A more specific initial inventory of each mobile home will significantly increase the amount of salvaged materials. A site specific checklist that outlines the interior items to be removed and set aside for the scrap metal dealership should be developed and given to the contractors prior to deconstruction.
- Due to the volatility of metal markets, a sensitivity analyses could help predict the affects of such fluctuations, which affect the costs of deconstruction.
- Distance between various mobile homes included in projects should be considered if the costs of deconstruction are aggregated. Due to the amount of time, labor and fuel required to mobilize all the machinery, there is incentive to deconstruct numerous mobile homes in one day because it maximizes contractors' efficiency and lowers overall costs.
- Permits for transporting obsolete mobile homes to a central facility should be obtained prior to transfer and should comply with state laws.
- The financial or situation specific requirements for the homeowners that are selected to be involved in the project should be specified during the early stages of project development.
- In order to study the benefits of deconstructing mobile homes to reduce waste, it would be useful to compare the costs of deconstruction to a demolition process. Labor, transportation, and waste disposal costs may vary between different methods. Financial and environmental benefits of different methods should be analyzed as well.
- The distance of the mobile homes from landfills and scrap metal yards will affect transportation costs. Fuel costs could vary significantly between demolition and deconstruction methods if the distance to the scrap yard and to the landfill differ. This should be considered in the analysis of future projects.
- Exploring the possibility of collaboration with other organizations that provide affordable and lasting housing to low-income residents could be beneficial to mobile home owners looking to improve their current housing conditions. Deconstruction followed by alternative housing replacement could offer relief to

the perpetuation of poverty caused by the short life cycle and deterioration of mobile homes.

- It is likely that older mobile home structures contain hazardous materials such as asbestos and lead. Further research of these hazardous materials and best handling practices is highly encouraged.

Deconstruction Techniques

- Removing mobile home siding is not time consuming, nor a complicated process, and can be done by machine. Future mobile home deconstruction projects should maintain good data to further explore recycling options.
- For contractors who would charge a flat rate for deconstructing a mobile home that includes the landfill-tipping fee, there is more incentive to increase the amount of salvaged material. Salvaging metal affords monetary savings at the landfill when tipping fee's are reduced and also at the scrap-metal dealership where revenue is generated based on the weight of recyclable materials.
- Palmer construction found the use of two excavators for on-site deconstruction of one single family home to be excessive. Palmer Construction and Irick Excavating both found that one excavator per mobile home deconstruction was sufficient. Limiting machinery to the necessary amount increases efficiency.
- Both project contractors have noted that removing salvageable materials is not a complicated process and that they would not charge a customer an additional cost to do so. As was the case in Alburg, it is possible that other contractors will hold mobile home owners responsible for the cost of waste disposal. Since the overall project costs will vary according to the amount of landfill waste, there will be substantial incentives for homeowners to recommend and request for the contractors to salvage recyclable materials.
- In this study half of the mobile homes were deconstructed at their individual sites and were all somewhat centrally located within a few mile radius of the village center, while the other half were centrally located before they were removed. One benefit of deconstructing numerous mobile homes in a central location is less time spent on the mobilization of machinery, which would decrease machinery and transportation costs. Working with mobile home tenant organizations could increase the likelihood of deconstructing mobile homes in clusters, as described above, which could provide for a more affordable and efficient model of deconstruction. Removing abandoned homes from mobile home parks will increase on-site deconstruction efficiency because they are centrally located.
- An appliance salvage business for mobile home parts that would take appliances free of charge, or for a very small fee, could decrease landfill costs to the mobile home owner further by decreasing the overall weight of waste.
- Irick Excavating became more time efficient at deconstructing the mobile homes over the course of the project. Time efficiency is a challenge to deconstruction, and encouraging contractors to engage in such work through education and experience will improve the efficiency of the process over time.

VII. Conclusions

The accumulation of data from both project phases demonstrates that deconstruction is viable and has the potential to divert a significant amount of waste from mobile homes from being disposed of at state landfills. The publicity the project has produced shows that there is interest and concern from a variety of stakeholders. These stakeholders include other Vermont municipalities, individual homeowners, non-profits, and state government officials. The deconstruction in Alburg highlights the extent of the problem and risks associated with aging mobile homes and provides a practical solution.

The Alburg mobile home deconstruction project has demonstrated the success and accomplishments of a small town's unique, local solution to a state and nationwide problem. The project enhanced the sense of local pride through significant local involvement and contributions. This effort has assisted the ARC in attaining the overall goal of improving the visible appeal of Alburg. Furthermore, there was a considerable amount of knowledge gained and lessons learned from this project that will help facilitate future mobile home deconstruction. It is likely that the physical deconstruction methods used in Alburg can be replicated elsewhere and provide a framework for further research and analysis.

The community's ability to mobilize and contribute necessary resources in order to initiate the task of mobile home deconstruction proved to be imperative to the project's success. The mobile home project in Alburg leveled substantial local resources and donations, and the potential for a similar cost-share approach to be replicable will be contingent upon the characteristics of each individual community. The model of deconstruction met Alburg's needs in helping them achieve their goal and it is likely that this scenario can serve the same purpose in comparable rural communities.

An integral component of the project's success was the positive publicity generated by the circulation of numerous press releases. The project's publicity has led to new partnerships with other stakeholders in the mobile home industry, as well as in the recycling and reuse industries. The collaboration of these industry contributors is important to the continuation and development of future deconstruction projects.

As the U.S. continues to use mobile homes for affordable housing there are steps that could be taken to make them a more beneficial resource. The different venues involved in the mobile home industry, owner/resident constituency, and government departments that oversee mobile home activity could take a broader stance on addressing affordable housing to make mobile homes a better housing option. This report is a stepping stone for exploring new ways to manage the waste generated from mobile homes, and in turn will help build the basis for a change in the way our society uses mobile homes as an affordable housing solution.

Appendix A.

Pre Deconstruction Inventory and Post Deconstruction Results

Mobile Home-1

Current status: Removed

Age: 20-30

Size: 10' x 43'

Manufacturer: HomeCrest

Years vacant: 2 years

Distance from Road: 100 ft

Accessibility: Very good, no obstacles



Exterior: The area around the mobile home is clear of obstacles. The property was very well kept. The backside of the trailer faced the woods and was approximately 12 feet in distance. The exterior siding of the mobile home was metal.



Interior: The mobile home had obviously been cleared of most trash and debris. The interior was carpeted, had a wood bar unit, intact sink, linoleum floors, bathtub, toilet, bathroom sink, generator, and had intact doors.



Accessibility: The mobile home is easily accessible. The driveway led straight to the mobile home, which was very visible from the public road.

Mobile Home-1 Deconstruction Summary

MH-1 was the first trailer to be deconstructed. It was the best suited for the study because it was empty of non-structural debris and furniture in the interior, only containing normal household appliances. The deconstruction of MH-1 took two and a half hours, beginning at 8am and commencing at 10:30am. The mobilization and transportation of construction equipment to MH-1 property took approximately half an hour.

Most of the tin siding and roof were separated from the general waste, as well as the aluminum window and door frames, copper piping, cast iron piping, the water heater, well pump and tank, stove, wiring, lighting fixtures and the steel frame. The aluminum siding was separated from the wood studs with minimal difficulty. As noted by Surwillo, there was a significant amount of clean wood from the roof joists and studs that would have been burnable. In addition to the mechanical process describe above, James Surwillo from the Department of Environmental Conservation was on site assisting the operators by manually separating the metal from the piles of other debris. His manual contribution made it possible to salvage close to 100% of the metal from the trailer, which would not have been achieved if left entirely to the machinery.

The mobile home was 10' x 43', and its weight, post deconstruction totaled 4.76 tons. A total of 1.45 tons of metal was salvaged. Because this trailer was the only one in this study that was cleared of extraneous interior junk before it was deconstructed, it is the only trailer for which a percentage of metal components represent the ratio of metal to other materials in the structure. The metal salvaged from this mobile home accounted for 30% of the total weight.

Mobile Home-2

Current Status: Removed

Age: unknown

Size: 10' x 42'

Manufacturer: unknown

Years vacant: 10-15 years

Distance from Road: 300 ft

Accessibility: moderately accessible



Exterior: The siding is metal. There were no large obstacles immediately surrounding the home besides a second mobile home near by. It did not rest upon a permanent foundation. The exterior of the mobile home was made of metal siding with wood underneath.

Interior: There was some scrap plywood loose on the inside of the trailer but it was not possible to record a more detailed inventory of interior parts because of the overwhelming amount of trash covering the floors. There



was mostly large black trash bags filled with garbage thrown in heaps throughout the interior.

Accessibility: Again, the only foreseen obstacle in removing this mobile home was the distance from of this mobile home to another abandoned mobile home. It would be beneficial to remove the home in front of this one, which is closer to the access road, before attempting to remove this one. The two mobile homes, close in proximity, would minimize costs of on site deconstruction.

Mobile Home-2 Deconstruction Summary

This mobile home was the second trailer deconstructed on March 24th by the Palmer Construction and Town of Alburg team. The trailer was deconstructed by the same method as described for MH-1 with a total deconstruction time of three hours. As noted by Surwillo, who also attended the deconstruction of this trailer, the vast amount of trash in the interior of this mobile home limited the amount of metal that was salvageable. The trailer was 10' x 42' and its weight, post deconstruction was 7.9 tons; 6.9 tons of waste material, and 1.8 tons of salvaged metal. A larger quantity of metal was salvaged from this trailer than from MH-1 which was similar in size, though the metal accounted for a smaller percent of the total deconstruction weight, 23%. This is not an accurate depiction of the amount of metal in the actual mobile home structure because the excess junk was included as part of the total weight. Yet, despite the extra weight from the excess junk on the interior, the weight of the salvaged metal still accounted for a little under a quarter of the total amount of waste.

Mobile Home Not Removed-1 (NR-1)

Current Status: Not removed

Age: unknown

Size: 8' x 39'

Manufacturer: unknown

Years vacant: 10-15 years

Distance from Road: 300 ft

Accessibility: moderately accessible

Exterior: The siding of the mobile home is metal. Items such as tires and metal structures were visible from under the snow. This trailer was set behind an intact trailer. However, this would not cause problems with accessibility. There was no permanent foundation.



Interior: The kitchen area was made of wooden fixtures and the rest of the mobile home was entirely filled with trash and cardboard boxes. For this reason a detailed inventory of interior items was not kept.

Accessibility: The only foreseen obstacles in removing this trailer was the distance from of this mobile home to another abandoned home. The access route was clear and there was ample room around the mobile home for large heavy machinery.

Mobile Home-3

Current Status: Removed

Age: unknown

Size: 56' x 12'

Manufacturer: unknown

Years vacant: 3

Distance from Road: 100 ft

Accessibility: Good, some small debris



Exterior: The siding is metal, and there is a lot of large junk items and debris around the trailer, including an old car parked close by. It was lifted on cinder blocks at the near end in the above photograph, and supported on axle and wheels at the far end. Many of the

windows were broken, and a large hole extending the full height of the trailer is missing from the long side (right).

Interior: The interior was full of trash. Most of the walls appeared to be intact. There were a few old mattresses, an old tank, and junk and debris strewn throughout the interior.



Accessibility: The trailer is easily accessible from the road and has no obstacles that would prevent machinery access. The debris in close proximity to the trailer might complicate machine maneuvers from some angles during removal.

Mobile Home-3 Deconstruction Results

The Irick's removed a larger mobile home (MH-3) from their property and in addition to a smaller trailer (MH-4) from the same property lot. The Irick's deconstructed the large mobile home over a four day period. A total of 14 hours divided between 2 workers went into deconstructing and hauling waste. During deconstruction, James Irick noted that there was a lot of black insulation in the whole length of the mobile home's roofing.

A bathtub was removed from the interior, and the Irick's estimated that it only took him about 15 minutes to remove the bathtub, using the excavator and thumb. He did not find this to be much of a hassle. He predicted that it would only take one hour to remove and salvage most typical household appliances. The interior of this mobile home also contained a large amount of debris, which is reflected in the total weight of the waste (including metal), 15.01 tons.

Of the total weight of waste generated by the deconstruction of MH-3, 12.88 tons was landfill waste, and 2.13 was salvaged metal. The percent of metal of the total amount of waste was 14%. This figure was lower for this trailer most likely because of the weight of debris that was not part of the mobile home structure. All the metal salvaged from MH-3 and MH-4 was accumulated into one sum for more efficient disposal. The amount per trailer was determined by the ratio estimated by the contractors, of 2/3 to MH-3 and 1/3 to MH-4.

Mobile Home-4

Current Status: Removed

Age: unknown

Size: 14x 40

Manufacturer: unknown

Years vacant: unknown

Distance from Road: 100 ft

Accessibility: moderate, set behind a
inhabited mobile home



MH-4 was not one of the mobile homes that was originally identified for removal. Although there is no inventory or photographs which document this mobile home, data was collected pertaining to the deconstruction techniques, labor hours, and total weights of waste and salvageable parts. It took two hours to remove the trailer, though this number does not include trucking time to the landfill. The total weight of waste generated by the deconstruction of MH-4 was 6.12 tons. Of this total, 1.06 tons of metal was salvaged accounting for 16% of the total waste.

Mobile Home-5

Current Status: removed in
Summer 2005

Year: early 1980's
Size: 12' x 47'
Manufacturer: unknown
Years vacant: 1
Distance from Road: 90 ft
Access: Difficult



Exterior: The exterior siding is aluminum. There is a wooden foundation about 3 ft high around entire base of the mobile home. There is also a small porch/entrance way with 4 steps leading up to the door. This porch structure and the steps were all made of wood. There is some debris and junk along the front

side of the trailer. It appeared that it was still attached to the propane tanks and would have to be disconnected before removal.

Interior: There was a lot of junk and trash in this trailer. The walls were all still standing. The floors were carpeted, except for the kitchen which had linoleum floors. It looked more recently lived in than the other mobile homes because it was still set up as a home. There were still 2 large intact couches in the living space and the appliances were all still installed. There were 2 stools at the kitchen counter and empty food containers, a large stash of plastic bottles, and rotting food in the kitchen area. The back room, separated from the living room/kitchen area by the bathroom, was primarily empty. Appliances and other household materials/furniture: refrigerator, kitchen sink, stove, microwave, coffee machine, bathroom sink and bathtub, some carpets attached, linoleum floor, back room was fairly empty. 2 large couches, 2 stools



Accessibility: This trailer is positioned with one long side of trailer a few feet from a barn, which could make it difficult for machinery to maneuver. Also, there are narrow entrances of about 11 ft on either side of barn that the machinery would have to pass through in order to get to the trailer.

Mobile Home-5 Deconstruction Summary

MH-5 was removed in 4.5 hours using a track excavator with a hydraulic thumb and a dump truck. The contractors removed all non-structural debris using standard machinery. Three workers were used to remove MH-5. Two laborers completed the majority of the work by operating the excavator and driving the dump trucks, while the third provided on site assistance. A pile of railroad struts were used as the homes foundation and were salvaged by the contractors and sold to the neighbors.

Mobile Home Not Removed-2 (NR-2)

Status: Not removed

Year: 1962

Size: 12' x 87'

Manufacturer: Richardson Stafford
Homes Corporation

Years vacant: 1

Distance from Road: 300 ft from road

Access: Difficult



Exterior: Some of the windows were broken. The exterior siding was aluminum. There was no permanent foundation in place or any other exterior additions.

Interior: The inside was fairly open; the only full walls standing were the remnants of a small closet. There was a lot of small junk and old appliances, some intact and some dismantled. It looked as though it had been used as a child's play house at one point, which then became storage for old junk. Part of the perimeter wall had been ripped out, exposing insulation and wood studs. The kitchen had linoleum floors and the rest of the floor space was carpeted.



Appliances: Shower/bath tub, toilet unattached, washing machine, stereo/old receiver equipment, sink unattached, stove, 2 heaters (one may have been a



humidifier), microwave, bread machine. Other household materials: scrap wood (long and thin scraps, also pressure board/plywood), paint cans, tall cabinet doors unattached, carpet attached to floor and extra was rolled up, 2 stools, glass, mirrors, some windows intact.



Accessibility: This trailer was not deconstructed because of complications with access. There are plants and other landscaping elements blocking the entrance for heavy machinery from access through the driveway. There is another mobile home about 15 feet from this trailer, a bush touching on one side, and a row of trees on the other—the closest tree is about 4 ft from the trailer.

Mobile Home-6

Current status: Removed

Age: 25 yrs

Size: 11' x 46'

Years vacant: 2

Distance from Road: ¼ mile

Relocated to Howard Farm: Yes



MH-6 has been vacant for several years. The owners wanted to remove the mobile home in order for the lot to be available for rent in Alburg's local campground. The mobile home can be accessed from the road through the campground. The site surrounding the mobile home is void of any obstructions that could pose challenges to removal, and will be relocated to the a central site for deconstruction.

The siding on MH-6 is metal and there is no visible water tank. The interior is free of most non-structural debris. There is an electrical box in the rear bedroom that might hold value. The mobile home does contain a kitchen sink, stove, microwave, wooden kitchen doors, metal bedspring, a bathroom sink and toilet.

Mobile Home-6 Deconstruction Summary

MH-6 was the first of three trailers to be deconstructed on December 7th, 2005 by the Irick construction team. This trailer was relocated from its original site to the deconstruction site. Much of the material in this mobile home was rotting, which made it difficult to peel the metal from the exterior of the structure. The excavator operator, was meticulous about removing all metal components, and was able to do so mainly with the hydraulic thumb. It took approximately 30 minutes to chop up the metal frame into small enough section to fit in the trucks. Additionally, a stove, metal bed frame, and microwave were all separated with the metal for recycling or reuse.



Mobile Home-7

Current status: Removed

Age: 25-30

Size: 7' x 51'

Years vacant: >1

Distance from Road: 200 ft

Relocated to Howard Farm: Yes

MH-7 is located near the entrance of a campground in Alburg. Although the home does not contain running water or electricity it was used as housing up until last year. This mobile home is closer to the main road and entrance of the campground and there are numerous trees and shrubs that could potentially complicate removal. The home is sitting on cinderblocks but the owner is confident that he can put tires on the axels and move it across town. This property is approximately 5.3 miles from the Farm where the deconstruction will take place.



The siding on MH-7 is not metal. This is the first mobile home to be deconstructed through this project that does not contain metal siding. There is a wooden porch that is in good condition that will be salvaged. The owners have already sold it to another tenant on the campground. There is a stove, sink, and refrigerator in the kitchen along with a bathtub and toilet in the bathroom.

Mobile Home-7 Deconstruction Summary

As with MH-6, MH-7 was transported across town to the centralized deconstruction site. The homeowners anticipated putting tires on the home to enable modular transportation, but with no success, they were forced to seek other means of transportation. Instead, they used a friend's trailer to transport the mobile home.

The method of waste removal involved tearing the siding from the exterior walls with the precision of a hydraulic thumb. Following the extraction of the metal siding, the remnants of the walls were crushed into the center of the structure. The metal and waste were then separated into two piles and the remaining frame was chopped into pieces and placed in the metal pile.

The deconstruction lasted 1hr and 45 min, and the construction crew noted that of the three homes removed on February 14th this structure had the least complications. This may be attributed to the less rotted state of the structure, as compared to the other homes. This mobile home's weight was 5.09 tons; 3.4 tons of waste material, and 1.69 tons of salvaged metal. The total amount of salvageable materials accounted for 33% of the total deconstruction weight.



Mobile Home-8

Current status: Removed

Age: unknown

Size: 12' x 57'

Years vacant: unknown

Distance from Road: 50 ft

MH-8 previously housed farm laborers. The house is in severe disrepair due to lack of maintenance and irresponsible tenants. The three abandoned mobile homes located on the centralized farm are eyesores, and the owners have been unable to dispose of them because of the excessive costs.



This mobile home sits in a swampy field adjacent from the owner's house. The wet surrounding land is a challenge to deconstruction. The contractors required that the ground be frozen prior to any deconstruction activities. The exterior of this home consisted of metal siding. The home was void of all non-structural waste prior to deconstruction. The interior appliances that remained in the home consisted of a kitchen sink, stove, bathroom sink, bathtub, and toilet.

MH-8 Deconstruction Summary



MH-8 was removed on February 14th, 2006 by the Irick construction crew. This home proved to be the most challenging to deconstruct, though the entire demolition process took only 1 hour 45 minutes. The mobile home was different than the others because the roof consisted of plywood covered by tin, followed by another layer of plywood and finally an exterior layer of shingles. Although the contractor was able to remove the tin from the roof it was more time consuming. Additionally, while trying to peel and collect all metal from the exterior the walls kept collapsing in. This scenario had previously occurred in the homes that were rotting out. It was also noted that the tin did not peel off easily in strips but instead broke into small pieces. The contractors suggested that this structure might have been assembled with older, lower quality tin, making it exceedingly difficult to strip from the exterior of the walls. The total weight of MH-8 was 4.59 tons, 3.19 tons of waste material, and 1.4 tons of salvaged metal. The salvageable material amounted to 31% of this mobile home's total deconstruction weight.

Mobile Home-9

Current status: Removed

Age: unknown

Size: 12' x 57'

Years vacant: unknown

Distance from Road: 50 ft



This mobile home sat parallel to MH-9, both of which were subject to sodden ground.

This is the only foreseeable obstacle to removal since there are no physical obstacles that would inhibit vehicular access. The interior does contain additional non-structural waste that will be removed by the owners before deconstruction, as per the agreement between the ARC and homeowners.

Mobile Home-9 Deconstruction Summary

MH-9 was one of two trailers removed on February 14th, 2006. The demolition and salvaging operations took approximately 1h 45m. A water tank, stove, and bed frame were separated from the debris in addition to the sorted metal siding, roofing, and frame. Unlike the other mobile homes, the roof on MH-9 was effortlessly removed by the excavator's hydraulic thumb. Irick contracting observed that MH-9 contained less debris than the other mobile homes. The main complication in the deconstruction process was tearing up the frame that was sunken into the frozen ground. Of the home's four wheels, two were unable to be disposed of and remain frozen in the ground. MH-9's total weight was 4.52 tons; 3.07 tons of waste material, and 1.45 tons of salvaged metal. The total amount of salvageable materials accounted for 32% of the total deconstruction weight.

Mobile Home-10

Current status: Removed

Age: unknown

Size: 12' x 55'

Years vacant: unknown

Distance from Road: 50 ft



MH-10 resides on a dry section of the farm and is easily accessible. There is sufficient amount of dry and empty surrounding property, and it is likely that any mobile homes transported to the farm will be relocated to this site. The exterior consists of metal siding. The home is clear of interior junk and contains no appliances.



Mobile Home-10 Deconstruction Summary

The demolition and waste removal process for MH-10 lasted 1 hour 45 minutes. The process of deconstruction varied slightly as compared to the method used on the previous mobile homes. Unlike the method of peeling large portions of metal from each side of the home, the excavator systematically worked its way from one end of the mobile home to the other, removing metal siding in sections. The contractors noted that this method allowed for the metal to be removed with more ease. After each section of metal was removed the coinciding sections of wall was broken into the middle of the structure. A significant amount of the home contained mold and rotting wood, which slowed down the deconstruction process. In addition to metal components, a stove and water tank were sorted from the waste pile and appropriately recycled. This mobile home's weight was 5.16 tons; 3.54 tons of waste material, and 1.62 tons of salvaged metal. The total amount of salvageable materials accounted for 31% of the total deconstruction weight.



Mobile Home Not Removed-3 (NR-3)

Current status: Not Removed

Size: 10' x 57'

Years vacant: 1

Distance from Road: 100ft

Relocated to Howard Farm: No



NR-3 has been vacant for approximately one year. The mobile home is close in proximity to the central deconstruction site. The home was rolled or moved a year ago with no notable complications. The owner is confident he will be able to put wheels on it and move it to the alternative property. The siding is metal and there is a water heater that the owner wishes to keep. There is some excess non-structural debris within the mobile home, which the owner has been asked to remove of before November 11th. The

mobile home does not have a kitchen and the flooring is rotting through which made the interior inventory difficult. If the grounds are not frozen or dry by the removal date there could possible be complications with moving it to the farm.

