

2007 White House Closing the Circle Award
Waste/Pollution Prevention—“Sustainable Building Removal” Fort Lewis, WA

Introduction

For more than ten years, Army installations have looked for sustainable solutions to managing the construction and demolition debris that is generated by the removal of excess buildings. While the goal is to maximize reuse and recycling, and to reduce or eliminate waste, it is not always attainable when considering budget and time constraints and available resources. Fort Lewis and the US Army Corps of Engineers Seattle District embarked on an ambitious journey into the realm of sustainable waste management creating a model in the use of alternatives to traditional demolition. In FY 2006, the installation achieved 100% diversion of construction and demolition (C&D) waste at completion of its first major building removal project under this new model, far exceeding the Army Chief of Staff for Installation Management (ACSIM) policy that calls for a minimum 50% by weight diversion of construction and demolition debris from landfill disposal.

Background

Fort Lewis is the largest Army installation in the Pacific Northwest, ranking fifth in the state in size (86,000 acres) and serving 31,000 military personnel (Active/Reserve/National Guard); 11,000 Civilians; 125,000 retirees; and 80,000 family members of active duty military in Washington State. As the only Power Projection Platform in the Pacific Rim, more than 33,000 Active, Reserve and National Guard Soldiers have deployed/mobilized at Fort Lewis in support of Operations Enduring Freedom and Iraqi Freedom in the past year.

The Fort Lewis mission and the Army mission calls for committed focus on the principles of sustainability in all areas of operation—from conducting Soldier deployments, to safeguarding our environment, to strengthening community partnerships. Fort Lewis has twelve sustainability goals designed to ensure long-term viability of the mission while minimizing impacts on the environment. One of those goals, “*Cycle all material use to achieve zero net waste by the year 2025*”, reflects our current efforts to provide quality military housing and operations facilities for the Fort Lewis force structure that has grown by more than 5,000 Soldiers between 2004 and 2006. In the past year alone, Fort Lewis has welcomed six battalion and brigade size units with one additional brigade arriving in 2007.

Army Military Construction and Whole Barracks Renewal Projects, designed to accommodate this growth, requires the removal of more than 250 World War II era wood-framed buildings. Prior to 2005, buildings on Fort Lewis were demolished and the debris disposed of in landfills. However, Fort Lewis’ Installation Sustainability Program along with Army Strategy for the Environment, and the ACSIM Construction and Demolition Waste Management policy demanded a more sustainable approach to building removal and solid waste disposal.

Innovative Solution

Fort Lewis Waste Managers established a team of representatives from the US Army Corps of Engineers (USACE) Seattle District, USACE Construction Engineering Research Laboratory (CERL), and the US Army Environmental Center to explore alternatives to the traditional demolition projects that are part of military construction (MILCON) and Facilities Reduction (FRP) Programs. The support and approval of Fort Lewis and Seattle District senior leaders empowered the team to pursue the most aggressive and creative strategies available.

In FY 2006, a MILCON contract was awarded to MCS Environmental for the removal of 12 buildings: six one-story buildings, five two-story barracks buildings, and one gymnasium covering a combined total of 48,951 square feet. USACE and Fort Lewis waste managers created a win-win solution by adding

financial incentives for reaching diversion levels above 51% as well as connecting the contractor with reuse resources designed to maximize recovery and recycling. MCS Environmental, in turn, devised a cost effective building removal strategy to recover the highest yield of reusable materials. First, the team conducted a thorough examination of the buildings to determine salvageable materials and identified markets for those materials. Second, sub-contractors were hired to remove all salvageable materials for resale in the local markets and to collect all remaining materials for recycling. Third, alternative markets were identified for the donation and reuse of materials. Finally, the contractor employed several innovative manual and mechanical techniques to improve recovery and efficiency. As a result, the project was completed on time, within budget, and with no change order or cost escalation. The total cost of the project (\$694,000) was equivalent to the costs associated with traditional demolition (crush and haul) in the Pacific Northwest. At completion, the contractor diverted 100% of the 3583 tons of potential C&D debris and realized an estimated Transportation and Disposal (T&D) cost avoidance of \$300,000.

Engaging local markets

Fort Lewis is close to resources and markets for salvaged materials, including internal markets such as its own Sequelitchew Creek EcoPark that accepts concrete, asphalt, and non-hazardous soil for reuse on installation road maintenance and repairs, running and tactical vehicle trails, and construction projects. Clean wood waste is reduced to mulch and used in creating a high-value soil amendment for installation landscaping. In

C & D Waste Management Summary				
MATERIALS	WEIGHT (lbs)	WEIGHT (tons)	PERCENT (%)	DISPOSITION
roofing, plastic, carpet, window glass	1,210,880	605	16.8	materials recycled or remanufactured
concrete, asphalt, soil, clean wood waste	5,505,079	2753	76.8	delivered to the EcoPark for reuse on installation grounds and construction projects
structural/nonstructural	328,000	164	4.6	resold or currently on the market
metal, fencing, steel	101,538	51	1.5	Available for resale
misc. structural/nonstructural	20,752	10	0.3	donated for private projects
TOTAL	7,166,249	3583	100	

addition to saving money over the purchase of new products, the potential for reuse of Fort Lewis materials on new construction can earn points toward Leadership in Energy and Environmental Design (LEED™) certification. Based on the Deputy Assistant Secretary of the Army (Installation and Housing), January 2006, Sustainable Design and Development policy, a LEED™ SILVER rating is the new standard for all military vertical building construction beginning in FY2008.

Subcontractors recovered 215 tons of structural and non-structural materials for resale in local markets. Material such as lumber, flooring, trusses, porcelain bathroom fixtures, aluminum, steel, brick and siding were segregated on-site before transport to reuse markets. Total estimated value of these products is \$207,000. By using local recycling and salvage contractors (20 mile radius), Fort Lewis preserved much of the embodied energy, or energy it took to grow, harvest, process and transport the original materials, and saved the energy spent on transporting the materials to new markets. Additionally, the use of local subcontractors created additional jobs resulting in more than \$80,000 of economic impact.



Left: Contractors prepare building for panelization, bringing the building down in partitions helped maximize recovery.

Right: Contractors remove old-growth Douglas fir flooring, historical material in the Pacific Northwest. All told 9 tons of fir flooring was salvaged and will be reused in homes and projects in the area.



“We have a need for wooden structures that we can’t purchase, so we’re reusing the materials to build and repair facilities and that way we don’t cost the government any more money,” –Maj. Andrew Fairchock, Operations Officer, 191st Inf. Brigade

While traditional demolition sites produce piles of rubble, segregating materials onsite spurred the interest of individuals who began requesting materials for special projects. An Army unit received two-by-fours, plywood, flooring materials, electrical power boxes and lights for upgrades and repairs to a detainee training facility on Fort Lewis. Maj. Andrew Fairchock, the operations officer, commented that the materials provided a substantial cost savings to the unit while

improving their training capabilities. Maj. Michael Christiansen, team chief at the unit, reduced his funds request by one quarter after collecting the solid core doors and lumber from the site and using them to complete a similar project. While undergoing treatment on Fort Lewis for injuries sustained in Iraq, Sgt. Brett Miller of G Troop 82nd Cavalry, requested vegetation and lumber to provide medical hold unit Soldiers constructive activities that would enhance their rehabilitation process. The Soldiers conducted small beautification projects around the installation including building a deck, picnic tables, and storage shelves, as well as transplanting native plants from the deconstruction site to new garden and green areas. This activity not only kept the Soldiers active during recovery, but was an effective diversion mechanism for the materials.

The switch from demolition to performance-based contracts

This project represents one of the first examples where the USACE integrated 100% achievable waste management concepts into a contract and located a contractor whose mission and expertise was compatible with Army and Fort Lewis sustainability goals. Several elements of the contract resulted in the project’s overall success:

- The contract was awarded to an environmental construction contractor experienced with the removal/demolition of WWII era structures, including associated environmental issues (hazardous materials such as asbestos, lead, and mercury; underground and aboveground fuel storage tanks, petroleum and lead contaminated soils; and items containing ozone-depleting substances).
- Planning, design, and administrative costs were reduced by treating the demolition project as a separate and distinct project and by using an existing contracting mechanism, the Multiple Award Remediation Contract.
- Contract specifications required a minimum diversion rate of 50%, with a goal of 75% for construction and demolition (C&D) debris (reuse, salvage, resale, and recycle).
- Contract specifications required detailed tracking and recording of waste removed from the project—type, quantity, and diversion mechanism—that was provided to Fort Lewis for the required Solid Waste Annual Report (SWAR) as well as providing data for future projects.

Beyond Achieving the Goal

Fort Lewis capitalized on an opportunity to maximize its diversion rate by successfully conducting a pilot study to recycle lead from lead-based (LBP) coated wood salvaged from their World War II era buildings. The U.S. Army Corps of Engineers Construction Engineering Research Laboratory (CERL) partnered with Fort Lewis, the Seattle District USACE, Washington State Department of Ecology and the EPA in evaluating the potential for reuse, reclamation, disposal and treatment of the Lead Based Paint (LBP) coated wood. CERL chose Fort Lewis to demonstrate an innovative system developed by ARI Technologies, Inc. that created a sustainable process to keep toxic lead out of landfills while successfully eliminating fugitive emissions generated by the equipment. ARI Technologies teamed with MCS Environmental, the contractor for the deconstruction project on Fort Lewis, to pull 16,000 lineal feet of lumber and send it to an off-site mill for planing (to mechanically remove the layer of LBP).

Approximately 6,000 lbs of sawdust and paint shavings were recovered and used in testing the new system. The equipment comprising a transportable, thermal unit heated the lead-containing wood shavings to 1500 degrees Fahrenheit to separate the wood from the LBP. The sawdust and paint shavings used in testing the new system were converted into a 30% lead concentrated product weighing about 180 lbs that will be recycled for other uses (i.e., for the manufacture of batteries). The 16,000 lineal feet of potentially hazardous wood—that would have been landfilled or have limited options for reuse—was recovered for resale in the local market. Ultimately, this pilot study diverted 11 tons of old growth fir siding with a market value of \$27,000 and preserved the energy, time and dollars invested in the original structures. The results from this study were used to further enhance the system as testing continues at other military installations.

Outreach and Education

The Fort Lewis team identified the need for education and outreach and responded with several communication strategies to reach a diverse audience including site visits, news media, briefings to senior leaders and community partnerships. One issue identified early on was that Fort Lewis' approach to demolition was very different from the traditional demolition practices employed by most contractors. Contractors needed more information regarding the Fort Lewis structures scheduled for removal and how they could achieve the contract diversion levels. The team facilitated a series of educational video conferences, meetings, and an alternative building removal open house designed to familiarize the contractors of the resources available to them to accomplish higher levels of C&D diversion. Contractors and reuse representatives took advantage of the open house to begin the process of developing new teams designed to provide Fort Lewis and the USACE with demolition teams experienced and capable of meeting sustainable solid waste diversion goals and, ultimately, the goals of the Army, Fort Lewis, and the USACE.

Resources provided during the open house included facilities available at the Fort Lewis Sequalitchew Creek Eco Park (concrete/asphalt/masonry reuse, petroleum-contaminated soil treatment and reuse facility, composting facility, and reuse of non-hazardous lead-contaminated soil at the training firing ranges), local salvagers and resellers, recyclers, and deconstruction specialists. Generalized means, methods and technologies were presented allowing for the contractors to develop their own approach that would combine mechanical demolition, deconstruction, salvage, and recycling, providing the highest level of diversion for the best value. The eventual partnership of our prime contractor, MCS Environmental, and Olympia Salvage was borne out of the open house/educational series. Olympia Salvage, a local non-profit organization whose mission is to promote environmental sustainability recovered more than 75% of the materials that will be resold in the local community.

Conclusion

The positive experience that Fort Lewis and the Seattle District USACE had in developing sustainable waste management practices and the promotion of alternatives to traditional demolition is helping to provide a level of confidence to the broader Army for its future plans to adjust its policy for sustainable C&D waste diversion and for the planning and design of demolition projects by other USACE districts. This project along with the LBP recycling pilot study received mainstream news coverage including a story published by the Associated Press that reached at least eight states across the nation. News of the project's success was discussed among military leaders from the Installation Management Command to the Department of the Army and the Department of Defense. A key element of that success was the personal commitment to sustainability principles, genuine enthusiasm and superior professionalism that each team member contributed to this project.