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Checklist for Assessing the Feasibility of Building Deconstruction for Tribes and Rural Communities

EPA Office of Brownfields and Land Revitalization

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Checklist for Assessing the Feasibility of Building Deconstruction for Tribes and Rural Communities

EPA's Office of Brownfields and Land Revitalization (OBLR) assists tribal and rural communities in determining which buildings are the best candidates for building deconstruction. This checklist provides a starting point in assessing the technical and economic feasibility of building deconstruction. The checklist was designed to be used by various tribes and rural communities regardless of size and geographic location. Used in conjunction with the Building Material Reuse and Recycling Estimating Tool, this checklist will assist tribes and rural communities determine potential costs and benefits of reuse, recycling, and disposal options for various types of deconstruction materials.

Several key factors affect the suitability of building deconstruction on brownfields: the condition of the building and materials, the types and quantities of potential reusable and recyclable materials, the presence of hazardous material, and access to building reuse and recycling markets. One key factor unique to tribes and rural communities is their remote location. If access to local reuse and recycling markets is lacking, the cost to transport materials long distances to these markets can have a profound effect on the feasibility of building deconstruction. Local disposal costs, timeframe to deconstruct, and labor costs are additional factors that need to be considered when assessing the feasibility of a building deconstruction project.

The checklist provides general guidance to tribe and town staff, deconstruction managers, and building owners who are planning or already conducting deconstruction projects on brownfields. The checklist was developed for use by tribes and town staff experienced in building deconstruction or by deconstruction contractors hired by the tribes and town. The checklist is not intended for use by those who are new to or unfamiliar with the deconstruction process, but rather those who are familiar with building material types, and methods for estimating and calculating material amounts, and identifying hazardous materials (e.g., lead, asbestos, biological hazards). In addition to assessing the feasibility of deconstructing buildings on brownfield sites, the checklist may be applicable in general to assisting users evaluate construction waste reuse and recycling options and other types of material recycling and reuse (e.g., salvaging materials from waste piles).

The checklist provides a three step process in assessing the technical and economic feasibility of building deconstruction – Pre-Building Assessment, Building Inventory, and Economic Assessment. Step 1 – The Pre-Building Assessment helps tribes and rural communities prepare for building deconstruction by analyzing local conditions, regulations, markets and opportunities for maximizing economies of scale. Step 2 – The Building Inventory requires a physical walk through to collect detailed information necessary for a baseline evaluation of the site, building and its materials. The inventory involves a thorough analysis and documentation of the building and its materials including type, quality, condition, and quantity of materials; space for equipment and storage/processing of removed materials; presence of hazardous materials; and site and safety constraints for deconstruction. Step 3 – Economic Assessment requires research and collection of information that affects the economic feasibility of building deconstruction including the identification of local building material reuse and recycling facilities, transportation options, disposal fees, and labor costs.

After completion of the checklist, the information collected (e.g., type, quantity, condition, and value of deconstruction materials; transportation and labor costs; regulatory considerations) is then entered into the Building Material Reuse and Recycling Estimating Tool to determine potential costs and benefits of reuse, recycling, and disposal options of the building deconstruction materials.

Assessing the Technical Feasibility of Building Deconstruction

Step 1 - Pre-Building Assessment Checklist

- ☐ ***Inform and Involve the Local Community in the Deconstruction Process***. The removal of buildings can spur a lot of attention in tribal and rural communities (e.g., history, culture, attachment, afraid of change), so understanding a community's concerns and desires up front can help the deconstruction process go more smoothly while promoting and educating the public about the benefits of building deconstruction.
- ☐ ***Assemble Appropriate Technical Team***. The economic viability of building deconstruction is largely a function of the material yield followed by access and proximity to reuse and recycling markets. Having an experienced deconstructionist perform the building assessment and prepare the estimate (yield) of recoverable materials necessary can significantly reduce the risks of deconstruction projects.
- ☐ ***Determine if the Building has a Historical Designation or Located in a Historical District, or other land use issues that may restrict building deconstruction in part or whole.*** In these cases, the local governing bodies may place restrictions on demolition or deconstruction. Review of Historical Preservation or Traditional Cultural Properties may be required in addition to a review of historical designation.
- ☐ ***Check Local Building Codes to See if they Prohibit the Use of Reclaimed Building Materials***. Local building codes may not be designed to accommodate the use of salvaged and recycled materials. If you plan to use the reclaimed materials in local construction projects, check with your local building code officials to ensure used/recycled building materials can be used.
- ☐ ***Determine Home/Building Owner Information and History.*** Determine ownership if necessary of structures located on public (e.g., contact the Bureau of Land Management (BLM), General Land Office (GLO) Records), tribal (e.g., contact the Bureau of Indian Affairs, Division of Land Titles and Records, or local Tribal governments), or private land (e.g., contact city or county registry/records office), identity contact information, address, potential disputes, permission to enter, permission to demolish, etc. from home/building owner. Research and document owner history.
- ☐ ***Determine Building Type and History and Verify Building Address:*** Document building type and previous use (e.g., residential, business, storage, abandoned building). Document and verify building address, including latitude and longitude.
- ☐ ***Review Available Information***. Reviewing blueprints, environmental site and building assessments and other available information can provide insight into the building's accessibility, complexity, and presence and location of hazardous materials.
- ☐ ***Obtain Tools Required to Perform a Thorough Building Assessment****:* Building material inventory form, camera, hand and power tools, respiratory gear, etc. *Note that if hazardous materials are suspected, a certified professional should be consulted.* Examples of building inventory forms can be found in the following documents or tools:
  - *Deconstruction Training Manual Waste Management Reuse and Recycling at Mather Field* (Appendix C: Building Materials Inventory) available at: www.calrecycle.ca.gov/Publications/ConDemo/43301027.pdf
  - Building Material Inventory Form*:* Appendix A, *Building Material Reuse and Recycling Estimating Tool*
  - *Inventory of Estimated Materials* available at: www.deq.state.ne.us/Publica.nsf/pages/WAS061
- ☐ ***Investigate Removal of Multiple Smaller Structures (e.g., less than 10,000 square feet) Concurrently to Maximize Economies of Scale***. Economic feasibility of deconstruction is largely a function of the yield, type, and condition of recoverable materials. If large commercial and industrial structures (e.g., 35,000 square feet or larger) are largely absent from the landscape of tribes and rural communities, the economic viability of deconstruction can be increased by deconstructing multiple smaller structures (e.g., 2,000 square feet) concurrently.
- ☐ ***Start Assessing the Local and Regional Reuse and Recycling Markets for Building Materials***. The cost of collection and transport of recoverable building materials to markets outside of the local or regional

area may be high. If reclaimed building materials can be sold through local or regional markets or directly from the project site, transportation costs are avoided or greatly minimized.

Step 2 - Building Inventory Checklist

✓ ***Assess the Age of the Building.*** Document the age of the building. _____

✓ ***Assess and Rate Building Water and/or Fire Damage:*** Rate each of the following conditions as a percentage of the whole building from zero to 100%.

- ☐ Water damage: Record the specific exterior/interior finishes and/or structural building components impacted by water damage. *Note that when holes in the roof and/or plumbing leaks are found, it is important to trace water pathways to assess whether other parts of the building/materials have damage in addition to just the original source.*

  _____

- ☐ Moisture induced conditions:
  - ☐ Termite and other insect infestation _____
  - ☐ Microbial (mold) growth _____
  - ☐ Other moisture related issues found _____
- ☐ Fire damage: Record the specific exterior/interior finishes and/or structural building components impacted by fire damage.

  _____

✓ ***Assess Building Dimensions:*** Record the following building dimensions which provides information on the possible total amount of salvage materials available:

- ☐ Length, width, number of stories of the building. _____
- ☐ Roof slope or degree and type (e.g., gable, hip, pitched). _____
- ☐ Potential for a subfloor or subfloor structures (this will affect the amount of lumber that is used).

  _____

➲ *The height of the building and the roof slope will affect the use of equipment and safety precautions, both measured by time and expense. Roof slope is an important consideration for worker safety and difficulty.*

✓ ***Evaluate Site/Building Accessibility factors.*** Rate each of the following site accessibility factors as high, medium, or low.

Accessibility factor	High	Med	Low
Site is accessible by existing roads			
Determine the levels of vehicle and pedestrian traffic in proposed areas of deconstruction (e.g. may impact building removal permit requirements)			
Clear access to all sides of the building			
Absence of vinyl siding			
Adequate space for material storage and material processing stations (if applicable)			
Site clear of ancillary structures, trees, etc.			
Other			

➲ *A medium to low access rating typically indicates an increase in the labor to ready the site to deconstruct, store, sort, and/or process materials onsite, thus, increasing overall project costs.*

✓ ***Assess How the Building was Constructed****:* Rate each of the following structural factors as high, medium, or low.

Structural factor	High	Med	Low
Size of structural or weight bearing members (e.g., beams, columns, walls, foundation).			
Extent, how, where weight bearing members are connected or joined to other structural members.			
Numbers of walls and corners to the exterior footprint			
Roof complexity			
Other			

➲ *A Building with a high or medium rating typically indicates an increase in the level of skill, time and planning required to safely dismantle a building, thus an increase in the overall cost.*

✓ ***Evaluate Interior Accessibility****:* Rate the extent of the following factors that may impede access to or reduce the amount of recoverable interior building materials as high, medium, or low.

Interior Accessibility factor	High	Med	Low
Drywall			
Treated Wood			
Carpet, linoleum, other materials covering hardwood floors			
Other interior finishes			
Size of structural or weight bearing members (e.g., beams, columns, walls, foundation).			
Other			

- *Buildings such as residential homes may have significant amounts of lightweight interior partitions (e.g., drywall), which impact the quantity of recoverable interior finishes. If tribes and rural communities are primarily targeting residential structures for deconstruction, the interior accessibility factor should be carefully considered.*

✓ ***Assess Electrical, Mechanical and Fire Suppression Systems:*** Rate the presence of each of the following systems within the building, and to what extent they are intertwined in walls, ceilings and attics as high, medium, or low. Any system found that is visible and accessible should be easier to separate from its source, thus, a low rating should be given.

Electrical, Mechanical and Fire Suppression System	High	Med	Low
Electrical			
Plumbing			
Mechanical (e.g.. heating and cooling system)			
Fire Suppression (e.g., sprinklers and piping system)			
Other			

- *Buildings with a medium to high rating indicate an increase in the labor and time required separating the materials from the building and from the individual pieces of materials, and possibly the use of special tools and equipment to facilitate separation.*
- *If tribes and rural communities are targeting residential structures for deconstruction, please note that high degrees of intertwinement of electrical and plumbing systems have been found in residential structures in additional to larger industrial or commercial buildings.*

✓ ***Assess Asbestos, Lead, and other Hazardous Building Materials:*** Document the location and estimate the amount of contamination suspected or confirmed (e.g., asbestos, lead, PCBs, mercury in thermostats and switches, refrigerants, various corrosive or flammable liquids, biological hazards, and other hazardous materials) as a percentage of the mass of the building for each of the major building assemblies or systems (e.g., roof, floor(s), interior partitions/finishes, exterior walls) from zero to 100%. For example, 25% lead-based paint on exterior wood wall finishes.

Location of Hazardous Material	Contaminant	Percent Suspected	Percent Confirmed

- *Some structures are likely to become unstable during the deconstruction process due to previous materials and damage (e.g. water or fire). Falls from heights are one of the most common causes of severe injury or fatality on a deconstruction site. Fall Protection Safety Information from OSHA:* www.deconstructioninstitute.com/files/learn_center/87895812_FallProtectionosha3146.pdf

- Resources:
  - These materials are commonly found in floor tiles and adhesives, asphalt shingles, insulation, lead roof flashing, lead based paint, and switches for lighting and thermostats.

    For information on common hazardous building materials and how to address them see RCRA in Focus: www.epa.gov/owow/oceans/debris/toolkit/files/rif-c&d508.pdf etc.
  - Refer to www.epa.gov or www.osha.gov for detailed information on regulations or contact your local agency representative.

✓ ***Assess the Overall Structural Integrity of the Building:*** Rate the overall exterior/interior structural integrity of a building's major building assemblies or systems (e.g., roof/ roof slope, floor(s), interior partitions/finishes, exterior walls) as high, medium, or low.

Structural Integrity	High	Med	Low
Roof			
Floor			
Exterior Walls			
Interior Walls			
Other			

✓ ***Inventory Building Materials and Recoverable Potential****:* Record the following information for all building materials:

- ☐ Type, description, quality and condition, quantity (by square foot, linear foot, board foot, weight or volume)
- ☐ Installation methods that were used
- ☐ Assign each material type to one of the following categories: reuse, recycle, hazardous disposal, C&D disposal, solid waste disposal.
- ☐ If known, record where the reusable, recyclable, hazardous disposal, C&D disposal, and solid waste disposal will go and the means to get it there.

Material	Quality	Quantity	Installation Method	Reuse, Recycle, or Disposal	Destination and Transport Method

- *Taking pictures of the building and materials, field notes, and sketching the floor plan can be helpful when estimate the salvage value of recoverable material.*
- *It is important to ascertain the conditions, quantities, and logistical requirements for the materials that might be deconstructed (e.g., minimum lengths for salvaged dimensional lumber, retaining all the hardware for doors, full versus partial sheets of plywood, and palletizing full lots of brick or stone). Having a full understanding of these conditions will help estimate the value of the potential reclaimed materials in the market.*

➢ Resources:
  - Refer to EPA's *What's in a Building? Composition Analysis of C&D Debris* for typical components of building-related C&D debris and information on what materials can be reused, recycled, and disposed: www.epa.gov/region9/waste/solid/pdf/cd1.pdf

✓ ***Assess Mobilization****:* Rate the following cost factors commonly associated with mobilizing workers and equipment to the deconstruction site as high, medium, or low:

Structural Integrity	High	Med	Low
Getting workers and equipment to the job site			
Re-mobilization of workers/equipment to the job site			
Setting up material handling and processing systems			
Roll-offs and storage trailers			
Water and power connections			
Restroom facilities			
Other			

- *The distances to a proposed deconstruction project in tribes or rural communities may be significant and/or include only one building, thus this factor could heavily impact the feasibility of deconstruction. One way to minimize or manage this factor is to deconstruct several buildings that are adjacent or at least close together, thus, mobilization costs, including sharing of more expensive heavy equipment can be spread out across all of the buildings.*
- *If you are targeting to deconstruct multiple buildings, buildings that are adjacent to each other, readily accessible from local streets, and surrounded by ample open space for staging equipment and materials would receive a higher rating.*

✓ ***Assess Distance to Other Potential Deconstruction Projects****:* Measure the distance between buildings located within the same area (cluster) that may be targeted for deconstruction. Also, measure the distance between any areas (clusters) that may have buildings targeted for deconstruction. This spatial analysis will help determine if costs can be more widely distributed across projects and material recovery increased to maximize economies of scale.

Assessing the Economic Feasibility of Building Deconstruction

Step 3 – Economic Assessment Checklist

✓ ***Assess the Building Material Reuse and Recycling Markets:*** Identify and document local and regional building material reuse and recycling processors and end markets:

- Inventory local and regional building recycling infrastructure to identify building material reuse and recycling processers and end markets.
- Collect the names, addresses, contact information, distance to facilities, fees, capacities, and accepted materials by the local and regional building material reuse and recycling processers and end markets identified. *(See table below)*

Name	Address	Contact Information	Distance to Facilities	Fees	Capacities	Accepted Materials

- Obtain current market values for building materials inventoried.

- *Market information may be available online or by contacting local demolition or construction contractors, local governing entities, state governing entities, private landfill companies, retailers, brokers, and for-profits and non-profits.*
- *Relatively low cost of landfill fees in some tribal and rural communities can discourage the development of local reuse and recycling markets. The absence of local markets may result in higher costs to transport materials to markets, which can greatly impact the economic viability of deconstruction in tribal and rural communities. When these economic conditions exist, communities can look to other alternatives such as reusing deconstruction materials in other local projects in the community (e.g., reusing wood beams in renovations or new construction, crushing brick and concrete onsite to use as fill for construction and road projects) and opportunities to create economic development by cultivating local recycling and reuse businesses.*
- *In addition, opportunities may exist to partner with other nearby tribes and local communities to create economies of scale by acquiring a critical mass of valuable recyclable material in relation to the cost to deconstruction and/or transport materials to market. Communities should contact their local council of governments (COG) or waste district to find possible partner communities.*

- Resources:
  - Global Recycling Network - www.grn.com
  - Recycler's World - www.recycle.net
  - ScrapIndex.com, http://scrapindex.com/index.html?affilid=100087
  - Construction Materials Recycling Association: www.cdrecycling.org
  - Construction Industry Compliance Center: www.cicacenter.org/index.cfm
  - Construction Waste Management Database: www.wbdg.org/tools/cwm.php
  - Inter Continental Wood Exchange (IWE) Index: www.woodfibre.com/exchange
  - Habitat ReStore Outlet: www.habitat.org/restores/default.aspx
  - Earth 911: http://earth911.com
  - Material and Waste Exchange: www.epa.gov/epawaste/conserve/tools/exchange.htm
  - Southern Waste Information Exchange (SWIX): http://wastexchange.org

✓ ***Evaluate Transportation Options/Costs:*** Two common modes of transporting recovered building materials to markets include truck and rail. Identify and document:

- Rail/freight to a processor or end user options and calculate transportation cost. **Transportation Cost = (cost to operate hauling vehicle by distance or travel time to rail) + (freight fee per ton) X (number of tons) + (other costs e.g. labor, loading and unloading deconstruction materials)**

- Hauling/trucking to a processor or end user options and calculate transportation cost. **Transportation Cost = (hauling charge per ton) + (other costs e.g. labor, loading and unloading deconstruction materials)**

- Self-hauling directly to processor or end user options and calculate transportation cost. **Transportation Cost = (cost to operate hauling vehicle by distance or travel time to processor or end user) + (other costs e.g. labor, loading and unloading deconstruction materials**)

➲ *Tribal and rural communities can be remote. In communities where building reuse retailers or brokers, recycling facilities (e.g., C&D recycling facility) do not exist, transportation can be high depending on the distance from the community to the building reuse retailers or brokers and C&D recycling facilities.*

➲ *By transporting and marketing recyclable materials yourself, direct revenues can be generated. When contracting with a private hauler, disposal savings may be realized through reduced container/service fees.*

➲ *If reclaimed building materials can be reused or recycled locally, sold directly from the project site, or in close proximity to the project site, transportation costs are avoided or greatly minimized.*

➢ Resources:

- Contact local freight/hauling companies for rates.
- Use online resources to determine rate information (e.g., Union Pacific Railroad Webpage: https://c02.my.uprr.com/pic/jas/index.jas)

✓ ***Determine Local Material Disposal Fees/Costs:*** Identify and document local disposal fees by volume (cubic yards) or by weight (tons or pounds) at local C&D, MSW, and/or hazardous waste landfills, distance or travel time to landfill, what materials they accept, how the materials should be contained, and hours of operation.

☐ *Calculate cost for commercial haul*. **Disposal Cost = (number of tons or cubic feet cubic yards) X (tip fee) + (number of loads) X (hauling fee)**

☐ *Calculate cost for self-haul*. **Disposal Cost = (travel time to disposal) X (Labor rate and/or cost to operate hauling vehicle per hour) + (tip fee by volume or ton) X (number of tons or cubic feet cubic yards)**

➲ *Generally, MSW landfill tipping fees tend to be higher than C&D landfill tipping fees. However, if building debris is presently going to open dumps, then disposing of it properly will result in additional costs.*

➢ Resources:

- Contact your state environmental department for a list of MSW, industrial, and C&D landfills in your area.

✓ ***Estimate Labor Costs****:* To determine onsite labor costs:

☐ Evaluate each project in terms of size, type (e.g. residential, commercial, or industrial), and relative proportions of hand, professional, and mechanical labor needed to determine the type (skilled and unskilled) and quantity of each labor type.

☐ Unskilled labor for deconstruction and/or onsite sorting or processing of building materials. *Calculate unskilled labor cost*. **Unskilled Labor Cost = (number of unskilled laborers) X (hours) X (wage)**

☐ Skilled labor for deconstruction and/or onsite sorting or processing of building materials. *Calculate skilled labor cost*. **Skilled Labor Cost = (number of skilled laborers) X (hours) X (wage)**

- *Calculate total labor cost*. **Total Labor Cost = (number of unskilled laborers) X (hours) X (wage) + (number of skilled laborers) X (hours) X (wage)**

> - *Labor costs may be offset by volunteer labor and efforts that recruit people to deconstruct buildings in exchange for materials they want from the site.*
> - *Larger, more complex projects that require skilled, professional labor and more mechanical labor will cost more to staff than smaller projects that require less skill and can employ volunteers.*

➢ Resources:

- Determine prevailing wage for unskilled labor in area. Contact local businesses for wage information, or use unskilled labor rates provided by US Department of Labor: www.bls.gov/ooh/Construction-and-Extraction/Construction-laborers-and-helpers.htm
- Determine prevailing wage for skilled labor in area. Contact local experienced building or deconstruction contractors for skilled labor rates, or use skilled labor rates provided by US Department of Labor: www.bls.gov/ooh/Construction-and-Extraction/Construction-laborers-and-helpers.htm
- Determine unskilled/skilled labor rates through "Green Building: Project Planning & Cost Estimating, 3rd Edition": http://rsmeans.reedconstructiondata.com/67338B.aspx. *Note that this resource must be purchased.*

✓ ***Other Potential Costs for Consideration***

- *Marketing Recovered Building Materials:* Materials can be sold to salvage retailers or brokers and advertised in various ways, including in newspapers and on the Internet. Generating advance interest is important so that they can be sold promptly for efficiency. Contact appropriate media outlets for rates or fees.
- *Engineering Survey*: OSHA Standard 1926.850(a) requires that a qualified person conduct an engineering survey of the structure to determine the condition of the framing, floors, and walls so that measures can be taken, if necessary, to prevent the premature collapse of any portion of the structure. Contact your local building department to obtain a cost estimate for conducting the engineering survey.
- *Permitting:* Deconstruction projects require a demolition permit. Contact your local building department to obtain cost information for all applicable permits.
- *Utilities*: All utility services (e.g., electrical, phone) must be removed from a building. Contact local utilities to obtain cost information.
- *Lead, Asbestos, and Mold Surveys and Abatement:* After the initial qualitative assessment, if lead, asbestos, mold, or other contaminants are suspected an environmental assessment or survey may be

required. The results of the assessment will determine if abatement is necessary, which may be costly depending on the extent of contamination.

- *Tools and Equipment:* The size and complexity of the deconstruction project will determine the need for mechanized equipment (e.g., cranes to lift/remove heavy timbers, concrete crusher to crush and remove concrete, forklifts to move large quantities of debris), the cost of which should be factored into the overall project expense. For a list of the basic tools necessary for deconstruction, go to: www.agc.org/cs/industry_topics/environment/recycling_toolkit/deconstruction
- *Cost of Onsite Sorting for Reuse or Recycling and/or Material Processing.* Labor costs and equipment costs for onsite sorting of reclaimed materials and/or material processing will need to be considered when estimating the total deconstruction project costs.
- *Project Administration/ Contractor Expense:* Deconstruction projects take time and effort to manage all aspects of the operation from start to finish. Some communities hire C&D contractors to manage their projects while others with the experience and capacity choose to provide management and oversight in-house. Both project management methods incur costs.
- *Garbage Removal:* Before deconstruction can occur, buildings need to be free of garbage or other materials that may have been stored and/or left inside. Paying for this initial cleanup is an additional cost with no return.
- *Preservation and Cultural Surveys, Testing and Remediation:* Often cultural resource and preservation surveys require additional testing and remediation or preservation, all of which have a significant cost to accomplish, if required.

✓ ***Other Potential Opportunities for Consideration***

- *Storage/Space:* Urban deconstruction projects may be challenged by space constraints due to rtg premiums associated with areas available for source separation and storage. Tribal and rural communities often have more than adequate space to conduct onsite source separation and inexpensive storage opportunities for stockpiling materials for future use in the community.
- *Time:* Deconstruction in almost all cases requires significantly more time than demolition. Building removal is generally conducted under very tight time constraints. In tribal and rural communities where developer pressure to remove buildings to make way for new development may not be as high, time may be a significant asset for deconstruction projects, allowing for the careful disassembly of valuable materials and stockpiling of materials over time that may bring revenues to the community.
- *Job Creation/Economic Development:* Recycling and reuse industries create jobs and revenue, provide small business development opportunities and job training outlets, and reduce landfill expansion needs. Deconstruction requires work crews who are trained to disassembly buildings. Green collar jobs such as these require training and offer new employment opportunities for a minimally skilled work force. In tribal and rural communities where small businesses are often the backbone of the community, new small businesses could be created to handle the deconstruction materials promoting economic development and job training.
- *Protection of Natural Resources:* Deconstruction reduces the amount of building related materials generated during site clearance entering the waste stream, therefore reducing the amount of materials disposed in landfills, incinerators, or illegally. The reuse of building materials helps reduce the environmental impacts of extracting and processing virgin materials such as cyanide leaching from hardrock mining sites, much of which is done on Native American lands and has been linked to substantial groundwater pollution.

Did You Know?

- The demolition of a typical **2,000 square foot** home can be expected to produce **127 tons** of debris such as lumber, steel, and plastics. While disposal fees can vary widely depending upon local conditions, at an average rate of $**25 per ton**, disposal costs for a residential demolition would come to **$3,175**.
- Building deconstruction methods (manual, panelized, mechanical, or a combination thereof) allows for a careful separation of building materials, maximizing the potential for recovery and recycling.
- Deconstruction of a typical **2,000 square foot** wood frame home can yield **6,000 board feet** of reusable lumber. For every 3 square feet of deconstruction, enough lumber can be salvaged to build 1 square foot of new construction.
- An average home contains about 4,700 pounds of steel and 770 pounds of recyclable plastics. If carefully deconstructed, these materials could be recycled into new products.
- At an average rate of $**25 per ton, diverting 80%** of materials from disposal, deconstruction can save **$2,540** in disposal costs over demolition, conserve landfill space, and reduce the need for new landfills and their associated costs.

Source: Deconstruction Institute, Benefit Calculator

The **Building Material Reuse and Recycling Estimating Tool** developed by EPA in conjunction with this Checklist can help tribes and rural communities determine the potential cost or benefit of building deconstruction and material recovery.