SJR 30

2001 SENATE JOINT RESOLUTION 30
REMARKS OF REPRESENTATIVE MARTY REYNOLDS
SENATE COMMITTEE ON ENVIRONMENTAL RESOURCES
MAY 10, 2001

I was a member of the Joint Legislative Council's Special Committee on the Historic Building Code. Thank you for the chance to present the Joint Resolution recommended by the Special Committee.

At one of its meetings, the Special Committee heard presentations from two gentlemen who are in the business of dismantling buildings that are slated for demolition. They convinced us it is better to recycle this material rather than discard it in a landfill.

The Special Committee was given information about the work of Dr. Robert Falk, a research engineer with the Forest Products Laboratory here in Madison. Dr. Falk is involved in some very exciting research, as well as practical applications, that will allow a great deal of old-growth lumber to be saved and reused rather than discarded. The Special Committee thought Dr. Falk's work was important enough that it recommended Senate Joint Resolution 30.

Dr. Falk is here to discuss his work with your committee. Dr. Falk has been making progress since the Special Committee first made its recommendation. I understand that he will be relating some success stories to the committee and describing some of his more recent projects.

Mark Patronsky was the attorney for the Special Committee. If you have any questions, Mark and I will be happy to answer them.

WISCONSIN LEGISLATIVE COUNCIL
REPORT TO THE LEGISLATURE

Legislation Recommended by the Special Committee on the Historic Building Code

- 2001 Assembly Bill 276 and Senate Bill 122, Relating to Exempting Certain Barns and Agricultural Outbuildings From Property Taxation
- 2001 Assembly Bill 277 and Senate Bill 123, Relating to the Regulation of Historic Buildings, the Historic Building Code, and Income Tax Credits for Historic Buildings
- 2001 Assembly Joint Resolution 51 and Senate Joint Resolution 30, Relating to Memorializing the U.S. Congress to Provide Funding for Research on Recycled Lumber by the Forest Products Laboratory of the U.S. Department of Agriculture Forest Service

April 10, 2001

RL 2001-06

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LEGISLATION RECOMMENDED BY THE SPECIAL COMMITTEE ON THE HISTORIC BUILDING CODE

Prepared by:
Mark C. Patronsky and Anne Sappenfield, Senior Staff Attorney
April 10, 2001

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PART I

KEY PROVISIONS OF LEGISLATION

The proposals recommended by the Special Committee on the Historic Building Code do the following:

A. 2001 ASSEMBLY BILL 276 AND SENATE BILL 122

- Creates a property tax exemption for certain barns and agricultural outbuildings that meet criteria for age and use established in the bill. The owner must request the exemption.

B. 2001 ASSEMBLY BILL 277 AND SENATE BILL 123

Historic Building Code

- Requires the Department of Commerce (referred to hereafter as Commerce), in cooperation with the State Historical Society, to develop a pamphlet to inform owners of historic buildings about the scope and applicability of the Historic Building Code.

- Requires Commerce to interpret the Historic Building Code liberally to facilitate the preservation and restoration of historic buildings.

- Creates a process for Commerce to review decisions by local governments regarding compliance with a local ordinance or regulation, to determine if the local ordinance or regulation is in conflict with the Historic Building Code. Also, this bill provides an informal process for the State Historical Society to review decisions of Commerce and local units of government regarding historic buildings and to negotiate possible changes in those decisions.

- Allows local governments by ordinance to establish alternate standards for handrails and guardrails of historic buildings that are converted from single-family to multifamily use.

- Requires Commerce to waive plan review and inspection fees for a preservation or restoration project affecting a building that is more than 100 years old and is listed or eligible for listing on the National or State Register of Historic Places.

Other Structural Regulations

- Requires consistency under state law with current federal law for certain housing accessibility requirements for physically disabled persons in certain historic buildings.

- Requires local units of government to interpret liberally the local regulations that apply to historic structures in order to facilitate the preservation and restoration of historic buildings and structures.

Demolition of Historic Buildings

- Provides that a municipal order to raze a historic building may be appealed by representatives of a local historical society or by the owner of a historic building that is within 200 yards of the building subject to the order.

- Requires additional notice and the opportunity to request a public hearing with respect to municipal orders, permits or actions to raze historic buildings or buildings that are more than 50 years old.

Income Tax Credits for Historic Buildings

- Makes the state income tax credit that supplements the federal income tax credit for renovation of historic buildings available earlier in the renovation process, by making it available when the state historic preservation officer approves the application, rather than upon final approval by the U.S. Secretary of the Interior.

- Allows partners who share in the costs of renovating historic buildings to allocate among themselves the state supplemental income tax credit for the renovation costs.

Rural Historic Preservation

- Requests a Joint Legislative Council study of methods to promote rural historic preservation.

- Creates a grant program for the costs of renovating historic agricultural buildings or structures, with a 50% match requirement, funded in the amount of $75,000 in each year of the biennium, to be administered by the State Historical Society.

- Makes an appropriation to the State Historical Society for the purpose of entering into a contract to conduct a survey to identify and document historic properties in rural areas.

C. 2001 ASSEMBLY JOINT RESOLUTION 51 AND SENATE JOINT RESOLUTION 30

- Memorializes the U.S. Congress to fund research on recycled lumber by the Forest Products Laboratory in Madison, for the purpose of developing data to support the development of grading standards for used lumber.

PART II

COMMITTEE ACTIVITY

A. ASSIGNMENT

The Joint Legislative Council established the Special Committee on the Historic Building Code and appointed its chairperson by a June 24, 1998 mail ballot. The Joint Legislative Council directed the Special Committee to study: (1) the Wisconsin Historic Building Code and its administration to ensure that the code effectively facilitates practical, cost-effective and safe historic rehabilitation projects; and (2) related issues.

The members of the Special Committee were appointed by an August 21, 1998 mail ballot. The membership of the Special Committee consisted of two Senators, five Representative and 12 public members.

A membership list of the Joint Legislative Council is included as **Appendix 2**. A list of the members of the Special Committee is included as **Appendix 3**.

B. SUMMARY OF MEETINGS

The Special Committee held four meetings at the State Capitol in Madison on the following dates:

October 27, 1998	January 13, 1999
December 2, 1998	March 30, 1999

At the October 27, 1998 meeting, the Special Committee heard presentations by five invited speakers and engaged in a brief discussion of the substance of its assignment.

Ron Buchholz, Deputy Administrator, Division of Safety and Buildings, Commerce, described the history of legislation and regulations regarding building safety. He noted that the Historic Building Code was adopted in 1986 as an alternative to the variance process as a means of approving plans for historic buildings. He also noted that the Historic Building Code applies only to preservation or restoration of historic buildings that are public buildings or places of employment. The Historic Building Code does not apply to one- and two-family dwellings.

Jim Sewell, Senior Preservation Architect, Division of Historic Preservation, State Historical Society, Madison, described the benefits that accrue from using the Historic Building Code. He made a number of suggestions for possible improvements to the Historic Building Code.

Andy Weber, Miller Architectural Group, Milwaukee, discussed his personal experience with using the Historic Building Code and said that the code had served him well in the projects that he has completed. In particular, he noted that the point system in the Historic Building Code provides the flexibility necessary to complete projects.

Katherine Rankin, Preservation Planner, City of Madison, said that the potential complexity of using the Historic Building Code may discourage some property owners from using the code. She also suggested that many people may not be aware that the Historic Building Code exists.

Jim Mann, National Trust for Historic Preservation, Chicago, discussed some of the national efforts that are underway to develop new uniform building codes. He said that these efforts thus far have not included comprehensive provisions regarding historic buildings.

At the December 2, 1998 meeting, the Special Committee heard a presentation by Peter Godfrey, Architect and Building Recycler, Milwaukee, and Pete Gaitan, Architectural Antiques and Salvage, Grayslake, Illinois. They are in the business of removing building materials from buildings that are slated for demolition. They spoke of the advantages of recycling this material rather than disposing of it in a landfill. They noted the low cost of disposal in landfills and the resulting lack of a significant incentive to recycle these materials, even though there is a domestic and international market for old building materials. They engaged in a discussion with Special Committee members regarding possible ways the state could encourage people to use recycled building materials. The Committee concluded the meeting with a discussion of issues in Memo No. 1, Proposals to Enhance the Historic Building Code Which Could be Considered by the Special Committee (November 18, 1998).

At the January 13, 1999 meeting, the Special Committee heard a presentation by Chuck Law, Community Planning and Design Specialist and Advisor to the Wisconsin Barn Preservation Initiative, University of Wisconsin-Extension. Mr. Law described his responsibilities at University of Wisconsin-Extension related to rural preservation, including the preservation of rural structures, such as barns. He described the current barn initiative which is an ongoing effort focused on rural preservation. The Special Committee members discussed a variety of alternatives that could assist in the preservation of rural historic resources. The Committee also heard a presentation from Commerce staff regarding regulatory issues related to the ADA and the Fair Housing Act, with emphasis on how those regulations relate to the Historic Building Code and the differences between the federal and state laws. The Committee continued its discussion of Memo No. 1 and commenced its discussion of Memo No. 2, Information and Options Regarding the Historic Building Code (January 6, 1999).

The Committee agreed that Chairperson Rude send a letter to Governor Thompson urging him to allocate funding as part of his biennial budget proposal to support the efforts of Dr. Robert Falk, a research engineer with the U.S. Department of Agriculture, Forest Products Laboratory, to address issues regarding the use of recycled lumber as a structural material in new construction. The letter was sent on January 25, 1999.

At the March 30, 1999 meeting, the Committee discussed a number of individual bill drafts that were attached to Memo No. 3, Proposals for Discussion by the Special Committee (February 10, 1999). The Special Committee gave instructions to staff for modifications for these bill drafts and by consensus determined whether to include these proposals in the final drafts for approval by mail ballot.

PART III

RECOMMENDATIONS

This Part of the report provides background information on, and a description of, the proposals recommended by the Special Committee on the Historic Building Code for introduction in the 2001-02 Session of the Legislature.

[*Note:* Each of the three proposals has been introduced in both houses. For clarity, this report refers to the proposals in singular form "the bill."]

A. 2001 ASSEMBLY BILL 276 AND SENATE BILL 122

1. Background

a. Current Law

Under current law, barns and agricultural outbuildings are subject to property taxation. The current statutes provide several exemptions for structures or real property that has historical significance or that is owned by a historical society. These current statutes are as follows:

(1) Section 70.11 (4), Stats., exempts from property taxation property owned and used exclusively by incorporated historical societies.

(2) Section 70.11 (13m), Stats., exempts from property taxation archeological sites and certain limited contiguous buffer areas that are protected by a permanent easement to protect the archeological features of the property.

(3) Section 70.11 (29m), Stats., exempts from property taxation property owned or leased by a tax-exempt organization that includes one or more theaters for performing arts and the property includes one or more buildings listed on the National Register of Historic Places.

(4) Section 70.11 (31m), Stats., exempts from property taxation the right-of-way and rolling stock owned by railroad historical societies.

(5) Section 70.11 (34), Stats., exempts from property taxation any real property that is listed on the national or state register of historic places, is owned or leased by a tax-exempt organization, is used for civic, governmental, cultural or educational purposes and is subject to an easement that protects the historic features of the property.

b. Purpose of Creating a Property Tax Exemption for Barns

In general, barns of traditional wood construction were built until approximately 1950. However, it is these traditional wood barns that give the rural landscape its unique appearance and forms the basis of our individual and collective perception and understanding of the rural landscape.

The Special Committee noted that barns which where built prior to 1950 served those agricultural operations well, but often do not fit with modern agricultural practices. Many of the old barns are now used only for storage or are not used at all. However, as long as the barns have some value, they will contribute to the value of the property and are subject to property taxation. The Special Committee believes that even a modest amount of property tax, such as a few hundred dollars per year, is a burden sufficient that a farmer may legitimately prefer to remove the barn rather than continue to pay the property taxes on it. Many of these barns are burned down for practice by volunteer fire departments.

2. Description of Bill

This bill creates a property tax exemption for certain barns and other types of agricultural outbuildings. The property tax exemption applies only to the barn or agricultural outbuilding, and not to the land where the building is located.

The owner of the barn or agricultural outbuilding must submit an affidavit to the assessor to request the property tax exemption. The owner must attest in the affidavit that the barn or outbuilding was constructed prior to 1950 and that the barn or outbuilding meets eligibility requirements of the statute. The barn or outbuilding must be either used for an agricultural purpose, unused or used for a nonagricultural commercial purpose that generates less than $2,000 in gross revenue annually. It is not necessary for the barn to be located in an area that is zoned for agriculture or even that is predominately agricultural. The State Historical Society is directed to promulgate criteria to be used by the assessor in determining eligibility. These criteria will specify the age, condition, qualities, significance and contribution to the rural landscape that is necessary in order for a barn or an agricultural outbuilding to qualify for the property tax exemption. The Special Committee expects that these criteria will be clear and objective and will be easy for assessors to use.

The Special Committee expects that this property tax exemption will encourage the preservation of barns that are now in residential, commercial or manufacturing areas. The requirements related to the use of the barn or outbuilding will assure that the property tax exemption is not available for barns that have been converted to other productive uses, such as residences or retail establishments.

The Special Committee does not have information on the number of barns that may be affected by this bill or the value that property tax assessors apply to those barns. The Special Committee believes that the property tax revenues produced by these barns is modest from the perspective of the local unit of government but will make a substantial difference to the property owner.

The bill must be referred to the Joint Survey Committee on Tax Exemptions.

B. 2001 ASSEMBLY BILL 277 AND SENATE BILL 123

1. Historic Building Code; Pamphlet to Inform Owners of Historic Buildings About the Historic Building Code

a. Background

The Historic Building Code was adopted in 1986. (Prior to that time, the variance process was used to approve plans for historic buildings.) There is a concern that owners of properties which would be eligible to use the Historic Building Code are not aware of that option in renovating their properties. In addition, Commerce suggests that there is a frequent misconception that use of the Historic Building Code is mandatory for qualified historic properties. There could be further clarification of the applicability of the three options for owners of historic properties: the prevailing building code for buildings used by the public, the Existing Building Code or the Historic Building Code.

b. The Bill

The bill creates s. 101.121 (7), Stats., which requires Commerce, in cooperation with the State Historical Society, to develop a pamphlet designed to inform owners of historic buildings of the scope and applicability of the Historic Building Code and alternatives to using the Historic Building Code. The pamphlet is also intended to increase awareness of the Historic Building Code. Commerce must update the pamphlet as statutes and rules relating to the Historic Building Code are amended. Commerce and the State Historical Society are also required to distribute the pamphlets as they deem necessary to increase awareness of the Historic Building Code.

The cost of the pamphlet is expected to be minimal.

2. Historic Building Code; Liberal Interpretation to Facilitate Historic Preservation

a. Background

Commerce is authorized to promulgate the Historic Building Code under s. 101.121, Stats. The statement of legislative purpose in the statute recognizes that both historic preservation and safety must be addressed in the rules:

> [The Historic Building Code is] intended to facilitate the restoration of historic buildings so as to preserve their original or restored architectural elements and features, to encourage energy conservation, to permit a cost-effective approach to preservation and restoration and to provide for the health, safety and welfare of occupants and visitors in historic buildings. [s. 101.121 (1), Stats.]

b. The Bill

The Special Committee determined that some decisions regarding the implementation of the Historic Building Code may be unnecessarily restrictive. The statutory language created by the bill makes an express statement of the Legislature's intent that the statute is to be interpreted liberally to facilitate the preservation and restoration of historic buildings.

The intent of this provision is not to shift the balance in the Historic Building Code between preservation and restoration of historic buildings on one hand, and public health, safety and welfare on the other hand. The intent is to favor the preservation and restoration of historic buildings in questions involving close judgments.

3. Historic Building Code; Review of Certain Decisions by Local Governments

a. Background

Current s. 101.121 (4), Stats., authorizes the owner of a "qualified historic building" to elect to be subject to the Historic Building Code. A qualified historic building is a building that is listed on the National or State Register of Historic Places or a certified local register of historic property, or is within a historic district on one of those lists and has been determined to contribute to the historic significance of the district. Under the Historic Building Code, the owner of the historic building may use alternative standards that allow preservation of the historic aspects of the building while still providing for the health, safety and welfare of occupants and visitors in the building.

The relationship between the Historic Building Code and other statutes, rules and ordinances related to buildings is established by s. Comm 70.04, Wis. Adm. Code. Specifically, a person who elects to use the Historic Building Code is not required to comply with any county or municipal building code, if the local code concerns a "matter dealt with" in the Historic Building Code. Section Comm 70.04 explicitly provides that the Historic Building Code does not affect local requirements relating to land use, zoning, fire districts or other similar requirements.

b. The Bill

The statutes contain a general procedure, in s. 101.02 (7), Stats., to resolve conflicts between local standards, decisions and ordinances and the statutes and rules enforced by Commerce. The statute provides that local units of government continue to have authority to enact and enforce regulations for the protection of public health and safety. However, rules and decisions of Commerce are deemed by the statute to amend or modify conflicting local regulations. Any person who is affected by a local regulation that is in conflict with a state regulation or an order of Commerce may petition for a hearing on whether there is a conflict, and Commerce may nullify a local order that conflicts with state regulations.

The appeal process in s. 101.02 (7), Stats., focuses on conflicts between state and local safety or health regulations. This provision of the bill makes it clear that Commerce may determine the proper scope of local regulation with respect to buildings that are subject to the Historic Building Code.

4. Historic Building Code; State Historical Society Review of Decisions of Commerce and Local Units of Government Regarding Historic Buildings

a. Background

Current s. 101.02 (7), Stats., provides a formal appeals process for decisions of Commerce and local units of government acting as agents of the department with respect to building code issues. The review process involves a review within the department, followed by judicial review. The standards for judicial review require the court to uphold the decision of the department or the local unit of government if there is "substantial evidence" to support the decision, a difficult standard for a building owner to overcome. Also, judicial review is time-consuming and expensive.

b. The Bill

This provision of the bill creates a new, informal process for review of a decision of Commerce or the local unit of government. The request for review must be submitted to the State Historical Society. The State Historical Society is then required to review all information related to the decision and render an opinion on whether the decision of Commerce or the local unit of government is consistent with the Historic Building Code and whether there are other ways to meet the requirements and objectives of the Historic Building Code. The bill authorizes the State Historical Society to negotiate with Commerce, the local unit of government and the historic building owner. Commerce or the local unit of government may modify its decision based on the negotiations.

This new procedure does not change any time limits or procedures for formal review of any decisions.

5. Historic Building Code; Local Standards for Handrails and Guardrails of Certain Multifamily Historic Buildings

a. Background

The Uniform Multifamily Dwelling Code [ch. Comm 66] applies to any building or portion of a building which is converted to a multifamily dwelling after April 1, 1995 unless the building is a qualified historic building and the owner elects to be subject to the Historic Building Code. Under s. 101.971 (2), Stats., a multifamily dwelling is defined as an apartment building, row house, town house, condominium or manufactured building that does not exceed 60 feet in height or six stories and that consists of three or more attached dwelling units.

Under the Uniform Multifamily Dwelling Code the top of a handrail must be mounted between 34 and 38 inches above the nosing of the treads on stairways or above the surface of ramps. Guardrails in dwelling units must extend to at least 36 inches above the upper surface of the floor. In nondwelling unit portions, the guardrails must extend at least 42 inches above the upper surface of the floor. Modern handrails are much higher than the handrails on old buildings.

b. The Bill

The bill creates s. 101.975 (4), Stats., which permits a political subdivision to adopt an ordinance that allows it to grant a variance to the Uniform Multifamily Dwelling Code relating to handrails and guardrails of qualified historic buildings that are converted from single-family use to multifamily use. Under the bill, the ordinance must require the owner of the building who is seeking the variance to provide the political subdivision with evidence that the type, height and design of the handrail or guardrail proposed for installation is historically appropriate for the building. Upon the provision of that evidence, the bill allows the political subdivision to grant a variance to the Uniform Multifamily Dwelling Code that permits the owner to install a handrail or guardrail that is at least as protective of public safety as the historically appropriate handrail or guardrail.

6. Historic Building Code; Waiver of State Plan Review and Inspection Fees for Restoration of Certain Historic Buildings

a. Background

Commerce is required by statute to collect fees which as closely as possible equal the cost of providing various services by the agency, including plan examination and inspection of facilities to determine that construction is in accordance with approved plans and variances. [See s. 101.19, Stats.] The annual budget of the safety and buildings function in Commerce for the 1997-98 fiscal year was approximately $16 million, most of which was derived from fees.

Specific fees are established under ch. Comm 2, Wis. Adm. Code. The fees for plan review are based on a sliding scale according to the square footage of the building. Inspection fees are set at $40 per hour. Fees for the petition for variance under the Historic Building Code are set at $300 per petition.

The plan review and inspection fees are the same for historic buildings as for any other building. The variance fee of $300 is less than the normal variance fee of $490, on the grounds that most variances for historic buildings are already addressed under ch. Comm 70, Wis. Adm. Code, and that any additional variances are expected to be less complex. Section 101.19, Stats., does not include authority for Commerce to waive the requirement to collect fees for the services that it provides.

b. The Bill

The bill requires Commerce to waive the fees for a preservation or restoration project affecting a building or structure that is more than 100 years old. To qualify for the waiver of fees, the State Historic Preservation Officer must certify to Commerce that the building or structure is listed on or eligible for listing on the National or State Register of Historic Places and the plans for the preservation or restoration comply with the standards that are applicable to projects that qualify for the income tax credit for historic property renovations.

The Special Committee expects that very few projects will qualify for this fee waiver, so the fiscal effect on Commerce will be minimal. However, the benefit to a historic building

owner, particularly an owner of modest means, will be significant and will encourage the preservation of the oldest buildings in the state.

7. Structural Regulations Other Than the Historic Building Code; Structural Additions to a Bed and Breakfast

a. Background

The current statutes define "bed and breakfast establishment" for the purposes of determining the applicability of environmental health regulations, building code requirements and other regulations. The basic purpose of this definition is to set limits on the kinds of establishments that are deemed to be bed and breakfast establishments and thus are subject to those regulations. Establishments that provide food and lodging beyond the scope of the definition of a bed and breakfast establishment are subject to regulation as hotels, restaurants or other similar types of establishments, which in general means that the establishments are subject to the commercial building code and the commercial restaurant regulations.

b. The Bill

One requirement of the current statute is that a bed and breakfast establishment must be a place of lodging that has had completed, before May 11, 1990, any structural additions to the dimensions of the original structure, including by renovation.

The May 11, 1990 date is the date that this provision first took effect. An exception is provided for structural additions made to a structure that is more than 50 years old, if no other use than as a bed and breakfast establishment is proposed and if the structural addition complies with the uniform one- and two-family dwelling code. "Including a renovation" is added to make this provision consistent with the rest of the definition.

8. Structural Regulations Other Than the Historic Building Code; Housing Accessibility Requirements for Physically Disabled Persons in Certain Historic Buildings

a. Background

Commerce has adopted the Federal Americans with Disabilities Act (ADA) Accessibility Guidelines as the basic technical requirements for the Wisconsin Building Code with only a few deviations. The differences between current Wisconsin standards and the federal standards are typically rules that have been in effect in Wisconsin for a significant period of time prior to the passage of the ADA.

The Wisconsin Fair Housing Law and administrative rules are more restrictive than federal fair housing laws in several respects. The Wisconsin law applies to existing buildings in proportion to the amount of remodeling being done, while the federal law applies only to buildings first occupied after March 31, 1991. Also, the Wisconsin law requires full compliance with current rules under the Commercial Building Code when existing buildings are changed from one occupancy classification to another, such as changing a former warehouse into an apartment building.

b. The Bill

The bill provides that all rules promulgated by Commerce relating to requirements that housing be accessible to physically disabled persons, as they relate to qualified historic buildings, must comply with and not exceed the requirements of the Federal Fair Housing Law and the ADA and any regulations adopted under those acts. Under the bill, Commerce would be required to amend its rules so that: (1) if an existing qualified historic building with mixed occupancies is remodeled or added to and the gross interior area of the building after the remodeling or addition is greater than 20,000 square feet, interior circulation between floor levels would not be required; and (2) the state fair housing law would not be applicable to existing qualified historic buildings undergoing a change of use if the building is changed to a covered multifamily housing use and the building is remodeled or expanded.

The bill further provides that s. 101.132 (2) (b), Stats., relating to making housing accessible to physically disabled persons when the housing is remodeled, does not apply to qualified historic buildings. The intent of this change is to make Wisconsin statutes, as they relate to qualified historic buildings, consistent with the Federal Fair Housing Law. The Federal Fair Housing Law applies only to buildings that are first occupied after March 31, 1991.

9. Structural Regulations Other Than the Historic Building Code; Liberal Interpretation of Local Regulations That Apply to Historic Structures

a. Background

Counties, cities, villages and towns are authorized under current statutes, as part of their zoning and police powers, to adopt regulations for the purpose of preserving historic buildings and structures and the property within historic districts. Cities that contain property on the National or State Registers of Historic Places are required to have such regulations.

b. The Bill

The bill requires a county, city, village or town to interpret liberally its regulations that apply to historic buildings and structures in order to facilitate the preservation and restoration of the historic buildings and structures.

10. Demolition of Historic Buildings; Appeal of a Municipal Order to Raze a Historic Building

a. Background

Section 66.05, Stats., relates to local orders to repair or raze dilapidated buildings. The current statute includes provisions related to historic buildings that require a delay in implementation of the order and a different presumption regarding the reasonableness of the cost of repairs.

Any order under s. 66.05, Stats., may be appealed to circuit court by an "affected person." The issue in the appeal is the reasonableness of the order. The current statute does

not define who may be an affected person. This is a matter for the court to decide and there have not been any appellate court decisions on this issue. It is possible that a court would allow a person with a demonstrated interest in historic preservation to appeal a local order requiring demolition of a historic building, although there is no assurance of this under the current statute.

b. The Bill

The bill does not define "affected person," but rather provides that the term "affected person," for purposes of appealing a municipal order to raze a historic building, includes representatives of a local historical society and owners of historic buildings located within 200 yards of the historic building that is subject to the order.

The definition of "historic building" that is cross-referenced in this provision is "any building or object listed on, or any building or object within and contributing to a historic district listed on, the national register of historic places in Wisconsin, the state register of historic places or a list of historic places maintained by a municipality."

11. Demolition of Historic Buildings; Additional Notice and Opportunity for a Public Hearing With Respect to Municipal Orders, Permits or Actions to Raze Historic Buildings or Buildings That Are More Than 50 Years Old

a. Background

Section 66.05, Stats., applies to orders by a municipality (city, village or town) to demolish any building or part of a building that is so old, dilapidated or out of repair that it would be unreasonable to repair the building. If the building can be made safe by repairs, the municipality can give the owner the option to either repair the building or raze it. The order must specify the time period in which the owner must comply with the order. The statute provides that if the cost of repairs exceeds 50% of the assessed value of the building, that repairs are presumed to be unreasonable and the building is presumed to be a public nuisance.

This statute currently includes a special provision for historic buildings, which includes any building listed on or in a district listed on the National or State Register of Historic Places or a municipal list of historic places. If a municipality issues an order to raze a historic building, notice must be given to the State Historical Society and the building may not be razed for 30 days after the notice is given. During this 30-day period, the State Historical Society may have access to the building to create or preserve historic records. For historic buildings, the presumption under the statute is that any cost of repairs that is less than 85% of the assessed value of the building is presumed to be reasonable. The statute on razing buildings does not provide a requirement for public participation in the decision, either for buildings generally or for historic buildings. Under the current statute, a first class city (the City of Milwaukee) may adopt alternate or additional provisions regarding orders to demolish buildings.

Section 66.037 (4), Stats., relates to the razing of historic property owned by a city, village, town or county. Each of those political subdivisions is required to determine if any proposed action of the political subdivision will involve the razing of listed historic property

if the property is owned by the political subdivision. The political subdivision is required to notify the State Historic Preservation Officer of any proposed action, including razing, that would affect historic property owned by the political subdivision, and the political subdivision is required to negotiate with the State Historical Society under s. 44.42, Stats. This negotiation relates to efforts to reduce the effect of the action on historic property. A comparable procedure applies to property owned by school boards under s. 120.12 (21), Stats.

b. The Bill

The bill creates a new requirement related to an order or permit issued by a political subdivision (city, village, town, county or housing authority) to raze a building, or a decision by a political subdivision to raze a building that it owns, if the building is a historic building or is more than 50 years old. A political subdivision must notify the State Historical Society of the order or permit or of its intent. The bill requires a delay in razing the property to allow time for the State Historical Society to document the property and create a suitable historic record of it. Also, this delay will give time for public review of the decision to raze the building.

If the State Historical Society does not waive further review, the political subdivision must provide notice to any person who requests notice by mail and by publishing a class 1 notice (a one-time newspaper notice) under ch. 985, Stats. Thereafter, five or more residents of the political subdivision may request a hearing and the political subdivision is required either to hold a public hearing or to make written findings setting forth the reasons for denying the request for a hearing and responding to issues raised in the request for a hearing.

The time periods specified in this provision do not affect the provisions for judicial review. Under s. 68.13, Stats., any party to a proceeding that results in a final determination may seek review by a court within 30 days of receipt of the final determination.

Also, the new statute requires reuse of building materials, to the maximum extent feasible, following demolition of the building.

The bill also makes these provisions applicable to first class cities.

12. Demolition of Historic Buildings; Criterion for Municipal Order to Raze a Historic Building

a. Background

Current s. 66.05, Stats., authorizes a municipality (city, village or town) to order the owner of a building to either raze or repair the building if, in the judgment of the municipality, the building is "so old, dilapidated or has become so out of repair" that it is "dangerous, unsafe, unsanitary or otherwise unfit for human habitation, occupancy or use."

b. The Bill

The bill deletes "old" as one of the conditions on which a municipality may base its order to raze a building. The age of a building above does not determine the condition of the

building. Municipal decisions to order the razing of a building are appropriately based on the remaining conditions included in the statute: "dilapidated" and "out of repair."

13. Income Tax Credit for Historic Buildings; Earlier Availability of the State Income Tax Credit for Renovation of Historic Buildings

a. Background

Under the U.S. Internal Revenue Code, the owner of an income-producing historic building is eligible for a federal income tax credit equal to 20% of certain specified costs of rehabilitating the historic building. The building must be listed on the National Register of Historic Places or eligible for listing or located in certain national, state or local historic districts. The rehabilitation work must comply with standards that have been established by the U.S. Secretary of the Interior. Wisconsin provides a supplement to the federal income tax credit equal to 5% of the eligible costs of rehabilitation.

The property owner may commence rehabilitation work before obtaining the approval of the Secretary of Interior. The federal program requires the State Historic Preservation Officer to recommend approval of the project before the application is considered by the Secretary of Interior. Unlike the federal tax credit, the state supplement is only available if the rehabilitation was approved by the Secretary of Interior before the physical work of rehabilitation was commenced. This aspect of the state tax credit encourages developers to determine whether a project will qualify for a tax credit before beginning work, with the result that few projects are denied the federal credit.

b. The Bill

The bill makes the state supplement available upon recommendation of the State Historic Preservation Officer, rather than final approval by the Secretary of Interior, which will allow owners to commence projects sooner. Federal approval is slow while the state can approve the credit in approximately two weeks. If, for any reason, the owner is determined not to be eligible for the federal tax credit, the owner will still be eligible for the 5% state supplement based on the approval by the State Historic Preservation Officer.

The bill would have a very slight fiscal effect due to the earlier eligibility for the credit, although earlier approval would tend to result in expenditures being made for projects sooner, which would produce taxable revenue for the state.

14. Income Tax Credit for Historic Buildings; Allocation of Tax Credit Among Partners

a. Background

This provision of the bill relates to the state supplement to the federal historic rehabilitation income tax credit, as described in the previous Section of this report. The supplement is equal to 5% of the eligible costs of historic preservation.

Under current law, each partner in a partnership is allocated a portion of any tax credit for which the partnership is eligible based on the partnership agreement. The partnership agreement cannot be adopted solely to avoid taxes; it must have economic substance.

b. The Bill

The bill creates s. 71.21 (6), Stats., to provide that the state supplemental credit for historic preservation claimed by a partnership may be allocated to the partners either as permitted under current law or pursuant to an agreement executed by the partners that establishes an alternate distribution method. This will allow partners who do not have a Wisconsin income tax liability (e.g., out-of-state investors) to transfer the credit to partners who do. The bill requires the partners to notify the Department of Revenue (DOR) of the agreement within 30 days of executing such an agreement and also requires the partners to provide any additional information requested by the DOR.

The bill provides that the new statute first applies to partnership agreements for the allocation of the state tax credit executed on the first day of the third month after the effective date of the act.

15. Rural Historic Preservation; Request for a Joint Legislative Council Study of Methods to Promote Rural Historic Preservation

a. Background

Wisconsin's agrarian landscape--its scenic beauty, productive farmlands, barns and farmsteads, history and people--is central to the character of this state. Agriculture continues as a fundamental part of the state's economy and the nation's food production. Historic rural buildings and communities provide a connection with the past and an understanding of the present. Wisconsin's rural beauty is widely appreciated and draws millions of visitors annually. However, changes in the agricultural economy and agricultural technology are disrupting and transforming rural areas, resulting in the destruction of traditional farm buildings and the loss of commercial vitality in rural communities. There is an urgent need for the state and local governments to take action to assure the viability of family farms and rural communities for the benefit of this and future generations.

b. The Bill

The bill requests a Joint Legislative Council study of rural historic preservation. Rural historic preservation can and should encompass a wide variety of issues. Therefore, the study request has purposely been drafted broadly so that the study committee may consider as many rural preservation issues as possible and determine which of those issues are most in need of legislative attention.

16. Rural Historic Preservation; Grant Program for the Costs of Renovating Historic Agricultural Buildings or Structures

a. Background

Under current law, the State Historical Society is assigned numerous responsibilities related to the preservation of historic and archaeological resources in this state.

b. The Bill

The bill creates a historic agricultural building grant program to be administered by the State Historical Society. Under the program, the State Historical Society is required to award grants to owners of historic agricultural buildings to fund the restoration of such buildings. Each grantee is required to make a matching contribution equaling the amount of the grant and to agree to use the restored building in a manner that is consistent with the statutory public policy on historic preservation, as follows:

> The legislature finds that the historic, architectural, archaeological and cultural heritage of the state is among the most important assets of the state and furthermore that the social, economic and physical development of contemporary society threatens to destroy the remaining vestiges of this heritage. It is therefore declared to be the public policy and in the public interest of this state to engage in a comprehensive program of historic preservation to promote the use and conservation of such property representative of both the rural and urban heritage of the state for education, inspiration, pleasure and enrichment of the citizens of this state. [s. 44.30, Stats.]

The bill appropriates $75,000 in fiscal year 2001-02 and $75,000 in fiscal year 2002-03 for the grants.

17. Rural historic Preservation; Survey to Identify and Document Historic Properties in Rural Areas

a. Background

Under current s. 44.34 (1), Stats., the State Historical Society is required to "conduct an ongoing statewide survey to identify and document historic properties." "Historic property" is defined in s. 44.31 (3), Stats., as "any building, structure, object, district, area or site, whether on or beneath the surface of the land or water, that is significant in the history, prehistory, architecture, archaeology or culture of this state, its rural and urban communities or the nation." The Special Committee believes that there is an urgent need to document rural resources that are rapidly disappearing.

b. The Bill

The bill increases the appropriation for the State Historical Society by $75,000 in fiscal year 2001-02 and $75,000 in fiscal year 2002-03. This appropriation is intended to provide funding for the State Historical Society to contract for a survey to identify and document historic properties in rural areas of Wisconsin.

C. 2001 ASSEMBLY JOINT RESOLUTION 51 AND SENATE JOINT RESOLUTION 30

1. Background

Dr. Robert Falk of the U.S. Forest Products Laboratory in Madison is working to address technical issues regarding used lumber as a structural material in new construction. Dr. Falk states that the primary barrier to reuse of these materials for structural purposes is that standards must be developed so that lumber can be inspected and stamped to indicate its grade. Grading will allow these materials to be used to meet requirements specified by the architect or engineer for new construction.

Dr. Falk's effort involves removing timbers from older buildings and testing them to determine the structural qualities of the timber, including such factors as damage to the timber while installing it and removing it. This program is currently not funded at a sufficient level to provide comprehensive results within a reasonable period of time. Even if the project is funded, the information provided by Dr. Falk is only the first step in a process which then requires approval of the data he develops by the American Softwood Lumber Standards Committee, which publishes national grading rules, which then must be adopted by regional lumber grading agencies.

2. Description of Joint Resolution

The joint resolution provides information regarding the availability of used lumber and briefly describes how the work of the Forest Products Laboratory will lead to grading standards for used lumber and the increased potential to incorporate used lumber into new construction. The joint resolution requests Congress to fully fund this research.

APPENDIX 1

Committee and Joint Legislative Council Votes

The bills and the joint resolution described in this report were first introduced in the 1999 Legislative Session. None of the proposals passed in the 1999 Session. On March 14, 2001, the Joint Legislative Council voted unanimously to reintroduce the bills and joint resolution into the 2001-02 Legislature. The votes by the Special Committee and the Joint Legislative Council for introduction of these proposals in the 1999 Session are listed below.

The bills and the joint resolution are essentially the same as the proposals introduced in the 1999 Session. Some changes to Assembly Bill 277 and Senate Bill 123 were necessary as the result of legislation enacted in the 1999 Session.

Votes on 2001 Assembly Bill 276 and Senate Bill 122

By a May 19, 1999 mail ballot, the Special Committee on the Historic Building Code voted to recommend LRB-3132/1 to the Joint Legislative Council for introduction in the 1999-2000 Session of the Legislature. The motion to approve LRB-3132/1 passed by a vote of Ayes, 17 (Sens. Rude and Burke; Reps. Freese, Young, Owens, Plale and Reynolds; and Public Members Aulik, Boldt, Cameron, Huelsman, Lemke, Mackenzie-Smith, Pionke, Reed, Schute and Vos); and Noes, 2 (Bullermann and Meyer).

At its September 22, 1999 meeting, the Joint Legislative Council voted to introduce 1999 Senate Bill 261 (LRB-3132/2) by a vote of Ayes, 15 (Sens. Risser, Burke, Ellis, Erpenbach, Grobschmidt, Rosenzweig and Zien; and Reps. Kelso, Bock, Freese, Huber, Jensen, Schneider, Seratti and Stone); Noes, 5 (Sens. Chvala and Cowles; and Reps. Foti, Gard and Krug); and Absent, 2 (Sens. George and Robson).

Votes on 2001 Assembly Bill 277 and Senate Bill 123

By a May 19, 1999 mail ballot, the Special Committee on the Historic Building Code voted to recommend WLCS: 0110/2 to the Joint Legislative Council for introduction in the 1999-2000 Session of the Legislature. The motion to approve WLCS: 0110/2 passed by a vote of Ayes, 18 (Sens. Rude and Burke; Reps. Freese, Young, Owens, Plale and Reynolds; and Public Members Aulik, Boldt, Bullerman, Huelsman, Lemke, Mackenzie-Smith, Meyer, Pionke, Reed, Schute and Vos); and Noes, 1 (Public Member Cameron).

At its September 22, 1999 meeting, the Joint Legislative Council voted to introduce 1999 Senate Bill 371 (WLCS: 0110/2) by a vote of Ayes, 18 (Sens. Risser, Burke, Chvala, Ellis, Erpenbach, Grobschmidt, Rosenzweig and Zien; and Reps. Kelso, Bock, Freese, Gard, Huber, Jensen, Krug, Schneider, Seratti and Stone); Noes, 2 (Sen. Cowles; and Rep. Foti); and Absent, 2 (Sens. George and Robson).

Votes on 2001 Assembly Joint Resolution 51 and Senate Joint Resolution 30

By a May 19, 1999 mail ballot, the Special Committee on the Historic Building Code voted to recommend LRB-3153/1 to the Joint Legislative Council for introduction in the 1999-2000 Session of the Legislature. The motion to approve LRB-3153/1 passed by a vote of Ayes, 19 (Sens. Rude and Burke; Reps. Freese, Young, Owens, Plale and Reynolds; and Public Members Aulik, Boldt, Bullermann, Cameron, Huelsman, Lemke, Mackenzie-Smith, Meyer, Pionke, Reed, Schute and Vos); and Noes, 0.

At its September 22, 1999 meeting, the Joint Legislative Council voted to introduce 1999 Senate Joint Resolution 23 (LRB-3153/1) by a vote of Ayes, 19 (Sens. Risser, Burke, Chvala, Cowles, Ellis, Erpenbach, Grobschmidt, Rosenzweig and Zien; and Reps. Kelso, Bock, Freese, Gard, Huber, Jensen, Krug, Schneider, Seratti and Stone); Noes, 1 (Rep. Foti); and Absent, 2 (Sens. George and Robson).

APPENDIX 2

JOINT LEGISLATIVE COUNCIL

s. 13.81, Stats.

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Senate President
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Cochair
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STEPHEN J. FREESE
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Dodgeville, WI 53533-1200

This 22-member committee consists of the majority and minority party leadership of both houses of the Legislature, the cochairs and ranking minority members of the Joint Committee on Finance, and 5 Senators and 5 Representatives appointed as are members of standing committees.

HISTORIC BUILDING CODE, SPECIAL COMMITTEE ON THE

OFFICERS

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Coon Valley 54623–9801

Secretary

LEON YOUNG [1]
Representative
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Milwaukee 53212–3321

Vice Chairperson

STEPHEN J. FREESE
Representative
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Dodgeville 53533–1200

SENATOR

BRIAN BURKE
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Alexander Company
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Madison 53703–4703

STUDY ASSIGNMENT: The Committee is directed to study: (1) the Wisconsin Historic Building Code and its administration to ensure that the Code effectively facilitates practical, cost–effective and safe historic rehabilitation projects; and (2) related issues. The Special Committee shall report its recommendations to the Joint Legislative Council by May 1, 1999. [Based on a May 19, 1998 letter from Juli Aulik, on behalf of the Public Policy Committee of the Wisconsin Trust for Historic Preservation.]

Established and Chairperson appointed by a June 24, 1998 mail ballot; members appointed by an August 21, 1998 mail ballot.

19 MEMBERS: 2 Senators; 5 Representatives; and 12 Public Members.

LEGISLATIVE COUNCIL STAFF: Mark Patronsky, Senior Staff Attorney; Anne Sappenfield, Staff Attorney; and Kelly Mautz, Administrative Staff.

(1) Appointed Secretary by a September 4, 1998 mail ballot to replace Sen. Brian Burke, who declined the office.

(2) Appointed to the Committee by a December 10, 1998 mail ballot.

APPENDIX 4

Committee Materials List

Staff Materials

1. Staff Brief 98-8, The Historic Building Code (October 20, 1998).

2. Memo No. 1, Proposals to Enhance the Historic Building Code Which Could Be Considered by the Special Committee (November 18, 1998).

3. Memo No. 2, Information and Options Regarding the Historic Building Code (January 6, 1999).

4. Memo No. 3, Proposals for Discussion by the Special Committee (February 10, 1999).

5. Memo No. 4, Additional Bill Draft and Amendments (March 29, 1999).

6. Letter to Governor Tommy G. Thompson (January 25, 1999).

7. Letter to Ms. Brenda Blanchard, Secretary, Department of Commerce (April 21, 1999).

8. Letter to Representative Thomas W. Ryder (April 21, 1999).

9. Letter to Governor George E. Ryan, State of Illinois (April 21, 1999).

10. Letter to Ms. Marlene Cummings, Secretary, Department of Regulation and Licensing (April 21, 1999).

Other Materials

1. Publication, Preservation Information, National Trust for Historic Preservation (undated).

2. Handout, Chapter Comm 70 -- Historic Building Code, Background Information, submitted by Ron Buchholz, Deputy Administrator, Division of Safety and Buildings, Department of Commerce (October 8, 1998).

3. Proposal by Dr. Robert Falk, U.S. Forest Products Laboratory, to the U.S. Department of Housing and Urban Development, regarding the marketability of recycled lumber.

4. Handout, Wisconsin Barn Preservation Program, University of Wisconsin (UW)-Extension, Local Government Center (January 7, 1999).

5. Handout, ADA/Fair Housing and Archaic Material Fire Rating Issues, submitted by Department of Commerce (January 13, 1999).

6. Pamphlet, Barns N.O.W! (Network of Wisconsin) (undated).

7. Handout, Considerations for the Special Committee on the Historic Building Code, submitted by Charles S. Law, Ph.D., Community Planning and Design Specialist, UW-Extension (January 13, 1999).

8. Handout, Increasing the Marketability of Lumber Recycled from Deconstructed Buildings (February 6, 1998).

Salvaging Wood From Badger Arsenal

Alternatives to Demolition

Robert H. Falk, Ph.D, P.E.
Research Engineer

Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

Forest Products Laboratory

- USDA Forest Service
- National Lab for Wood Products Research
- Established in 1910
- In Cooperation with University of Wisconsin

Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

FPL's Mission

To improve the use of wood through science and technology, thereby contributing to the conservation and management of the forest resource.

Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

We have a vast forest resource.....

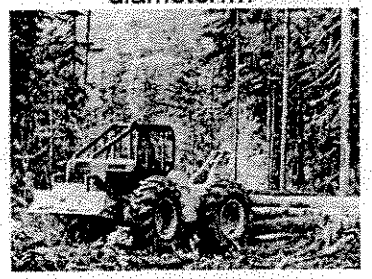
Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

However, most of our old-growth forests are gone.....

3,000,000,000,000 board feet sawn since 1900

Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

Today's trees are smaller in diameter....



Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

Lumber quality is generally higher from large diameter trees.....

Fewer knots, Higher density, More RPI

Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

Where is all that high-quality old-growth lumber?

Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

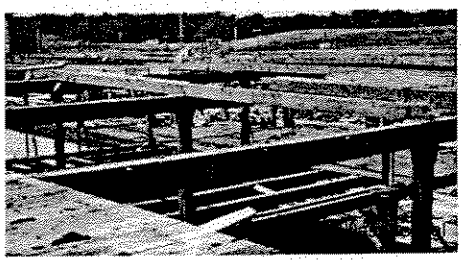
Over 250,000,000 board feet in Army buildings currently slated for disposal.

Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

Demolition and landfill waste our high-quality old-growth lumber!

Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

If we deconstruct rather than demolish we can reuse this valuable resource!

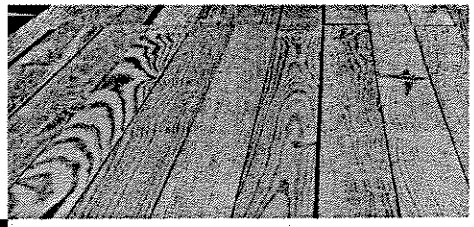


Advanced Housing Research Center
USDA Forest Service - Forest Products Laboratory

Larger timbers are in demand for Timber Framing……

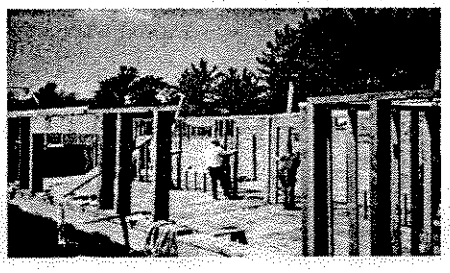
and flooring…….

Reclaimed Southern Pine $3 - $11 per sf



Our current research is developing the standards such that salvaged lumber can be reused in new construction……

Deconstruction is often cheaper than demolition!

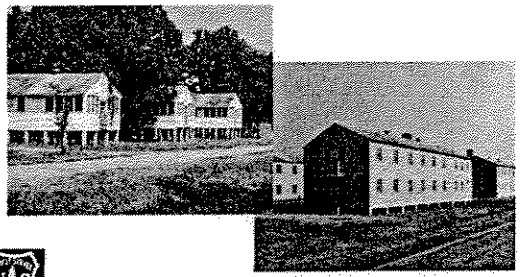


Fort McCoy, WI

Commercial Demolition: $40,000 each bldg

Building Deconstruction: $2,000 - $4,000 ea.

Fort Chaffee, Arkansas



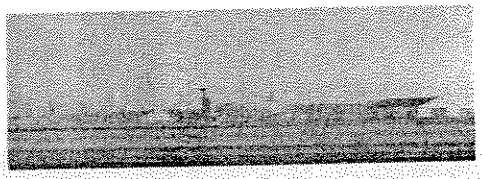
Partners

- US Army
- US Army Corps of Engineers
- Habitat for Humanity – Austin and local affiliates
- University of Florida
- USDA Forest Products Laboratory

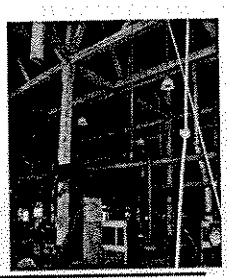
Benefits of Deconstruction at Fort Chaffee

- Solves building disposal problem in an environmentally positive way.
- Lower costs
- Habitat for Humanity generates income from material sales.
- Recovered materials are utilized by low-income families for new construction.

Can A Similar Model Work at Badger Arsenal?



Yes, but.....



Badger Arsenal

- Many different building types
- Industrial manufacture
- Several building removal methods may be required
  - **traditional demolition**
  - **deconstruction & demolition**
  - **deconstruction**

What are we proposing?

- Determine to what extent deconstruction and material salvage can be used at Badger Arsenal.
  - **Evaluate potential lumber yields**
  - **Quantify contamination**

Building Deconstruction at Wisconsin's Badger Arsenal: Salvaging Lumber for Reuse in Low-Income Home Construction

Project Overview

The Badger Arsenal in Baraboo, Wisconsin, contains a wealth of salvageable building materials. The aim of the proposed project is to use deconstruction to salvage lumber from Badger Arsenal buildings. This project will benefit the U.S. Army through solving the problem of building disposal, will help conserve the Nation's forest resource, will provide opportunities for job training and economic development, and will help create housing for low-income families.

Introduction

Like many of the U.S. Army's industrial manufacturing and infantry training facilities, Badger Arsenal was built in the early years of WWII. Because metal was in great demand for the war effort, many of the military's buildings were built wholly or partially from wood. Quite literally, the standing timber in these military structures is some of the last remaining of our Nation's once vast old-growth forests. The Badger Arsenal is rich in salvageable building materials, especially the structural lumber contained in the vast number of timber buildings.

Deconstruction is a building dismantlement method based on the separation and recovery of building materials and components for reuse and recycling. In contrast to demolition, which focuses on the mechanical reduction of the building for easy transportation and disposal in a landfill, deconstruction allows a greater degree of salvage and reuse of building materials and components. Wood-framed buildings are particularly good candidates for deconstruction because wood members are easily damaged using conventional demolition techniques.

Background

For some time, USDA Forest Service, Forest Products Laboratory (FPL) has been working with the Department of Defense to evaluate the quality of lumber and timber salvaged from buildings at several military installations, including the Twin Cities Army Arsenal in St. Paul, MN, Fort Ord in Marina, CA, and the U.S. Navy's Naval Supply Center in Oakland, CA. Currently, through its Advanced Housing Research Center, the FPL is part of a collaborative R&D team performing a pilot deconstruction project that will remove 126 excess wood-framed buildings from Fort Chaffee in Fort Smith, AR. (See attached newspaper article.) This team consists of government, university, non-profit, and private sector organizations with deconstruction, material salvage, and wood construction expertise, including the Fort Chaffee Reuse Authority, Habitat for Humanity International (HfH)–Austin, the Army Corps of Engineer's Construction Engineering Research Laboratory, University of Florida's Center for Construction and Environment, and the Army Environmental Policy Institute. HfH is serving as the contractor to remove the buildings at Fort Chaffee with assistance from other team members. HfH will either sell the salvaged lumber in their REStore outlets and/or use the lumber for construction of new low-income homes.

Proposed Project

In principle, a similar project could be performed in Wisconsin at the Badger Arsenal. However, unlike Fort Chaffee (which consists of relatively simple one- and two-story wood-framed barracks, hospital wards, kitchens, and small administration buildings), Badger Arsenal is an industrial plant with many large, complex buildings that were used for the chemical manufacture of nitrocellulose and TNT. A major issue at Badger is the potential contamination of the wood members in some buildings due to the chemical processes used in the manufacture of explosives. Both the level of contamination and the risk associated with the contamination need to be evaluated.

While there is great potential for the use of deconstruction and material salvage at Badger, we feel the best approach is a two-phase project. Phase 1 would involve a deconstruction feasibility study. Phase 2 would be executed based on the outcome of Phase 1 and would focus on the actual deconstruction of buildings.

Approach

The proposed project is a collaborative effort involving government, university, military, and community organizations. The partners are USDA Forest Service, Forest Products Laboratory; U.S. Army Corps of Engineers, Construction Engineering Research Laboratory (CERL); University of Wisconsin–Madison (UW), Civil Engineering Department; University of North Dakota, Chemical Engineering Department; University of Florida, Center for Construction and Environment (UF–CCE); and Habitat for Humanity International (HfH), Austin, Texas.

Phase 1: Deconstruction Feasibility

The partner organizations will work with Badger Arsenal staff to evaluate the potential to remove excess wood-framed military buildings using deconstruction methods. The main objective of Phase 1 is to evaluate the feasibility of using deconstruction as an alternative to building demolition. Meeting these objectives would involve the following tasks:

1. Inventory the quantity and quality of lumber and other recyclables at the Badger Arsenal.

   The volume, size, and condition of lumber in the buildings will be quantified through field surveys. To evaluate the value of the reclaimed materials and the corresponding savings in building removal costs, a complete survey of the buildings and building components needs to be conducted. This effort will be performed by UW Civil Engineering staff and students, CERL, HfH, and FPL.

2. Evaluate the extent, level, and consequence of contamination from nitrocellulose and other explosive manufacture on the salvage of lumber at Badger.

   This evaluation will be performed in cooperation with Army Corp of Engineers explosives experts, North Dakota University Chemical Engineering staff (expertise in contamination in wood), and FPL. Field sampling and analysis of suspect buildings will be performed.

3. Develop recommendations on the appropriate level of deconstruction for the buildings at Badger.

   Because of the industrial nature of the Badger Arsenal, it may not be appropriate to utilize HfH volunteer labor for the deconstruction of all building types. The larger industrial buildings may require deconstruction using heavy equipment and more traditional demolition contractors (as was done at the Twin Cities Arsenal). All options will be evaluated and recommendations developed in cooperation with CERL, UW, UF–CEE, and FPL.

Phase 2: Actual Deconstruction

Because the full scope of Phase 2 can only be described after Phase 1 is completed, only a brief description is given here. Phase 2 will encompass the actual deconstruction of wood-framed buildings at Badger Arsenal. Where possible and practical, work to be accomplished by HfH and other volunteer forces such as Americorps*NCCC. Activities and layouts for work sites will be developed. Deconstruction schedules and resource requirements, safety and quality management, waste disposal, and environmental protection plans will be developed in coordination with Badger Arsenal staff. A logistics plan for removing the recovered materials will be developed that will include defining material processing and storage areas on Badger property, establishing distribution networks, and arranging transportation. Outlets and markets for recovered and recyclable materials through HfH, local markets, and other industry outlets will be identified. A training curriculum for local HfH and other volunteer personnel will be developed. Work crews will be trained in deconstruction skills on site; instructors will also train trainers.

Roles of Partners

All participants have significant experience in deconstruction or material reuse. The specific roles of the partners are as follows.

Habitat for Humanity (HfH). In Phase 1, the Austin Affiliate of HfH International will help evaluate the feasibility of deconstruction at Badger. In Phase 2, HfH will coordinate and execute (where appropriate) building removal, under the guidance of Badger Arsenal staff and with the assistance of other project participants. HfH will obtain, coordinate, and manage the labor force required for removing the buildings.

University of Florida, Center for Construction and Environment (UF–CCE). In Phase 1, UF–CCE staff will help evaluate the actual site for deconstruction. In Phase 2, they will help with training both trainers and trainees in cooperation with HfH. UF–CCE will provide supervisory and construction management technical assistance as needed, will develop and implement data collection methods, and will assist with data analysis, preparation of final reports, and presentations.

University of Wisconsin, Civil Engineering Department. The UW Civil Engineering Department has long experience in wood engineering. Staff and students will assist in conducting material quantity surveys and performing data analysis.

University of North Dakota, Chemical Engineering Department. The Chemical Engineering Department has significant expertise in the contamination of wood building products by various chemicals. In cooperation with the U.S. Army and Badger Arsenal staff, Chemical Engineering staff will assist in Phase 1 by evaluating the contamination levels of wood products sampled from Badger Arsenal buildings.

USDA Forest Service, Forest Products Laboratory (FPL). Advanced Housing Research Center staff at FPL will provide project management, coordination of activities, and information transfer for Phase 1. Working in collaboration with lumber grading bureaus, FPL will evaluate the quantity and quality of structural lumber existing on site.

U.S. Army Corps of Engineers, Construction Engineering Research Laboratory (CERL). CERL will provide a liaison with Badger Arsenal staff for project logistics, assist in the environmental permit processes, and evaluate contracting, management, technical, and economic information for the project. This information will help CERL develop internal department of defense policies, codes, and "best practices" for the deconstruction of wood-framed military buildings.

Benefits

Deconstruction has the potential to turn the problem of building disposal into an economic opportunity. This is particularly the case for military bases closed under the Base Realignment and Closure Act (BRAC). The Badger Arsenal could provide an excellent opportunity to demonstrate a large-scale deconstruction project while disposing of excess buildings.

Using building deconstruction as a building removal method instead of demolition results in several positive environmental and societal effects. First, all recovered materials are diverted from the waste stream. Second, secondary markets (and businesses) can be created from the value of the recovered materials. Third, the reuse of these wood materials effectively reduces the amount of "new" timber that has to be cut to meet the current demand for building materials.

Together with Advanced Housing Research Center staff at FPL, the UW Civil Engineering Department recently conducted a preliminary survey of some of the larger wood-framed buildings at Badger Arsenal. Of the 1,500 buildings on site, the largest 77 contain about 4 million board feet of structural lumber. *This is enough lumber to build more than 300 new HfH 1100-ft^2 single-family wood-framed homes.* Even more lumber could be salvaged from the hundreds of smaller buildings. The salvage and reuse of the lumber at Badger will also help conserve our nation's natural resources and ease harvesting pressure on our existing forest resource. *The FPL estimates that reusing the 4 million board feet of lumber at Badger will save the clear cutting of more than 17,000 trees on 600 acres of forestland.*

Finally, we believe the collaborative approach to this project is a win–win situation for the U.S. Army, the State of Wisconsin, and HfH. First, using deconstruction removes excess Army buildings cheaper and with less environmental impact than does demolition, solving a disposal problem while saving taxpayer money. Secondly, deconstruction of the buildings by HfH will provide an opportunity for job training and economic development in accordance with the goals and objectives of Badger Arsenal staff. In addition, this effort will benefit the local community though partnerships developed with local HfH affiliates.

Finally, the materials salvaged are redirected from the landfill and used for new construction through the HfH system, helping solve a housing problem for low-income families.

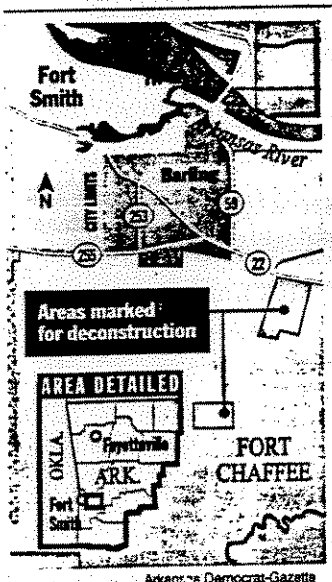
Budget

Because the costs for conducting Phase 2 are dependent on the outcome of Phase 1, they are not given here. However, we anticipate that the costs of building removal using deconstruction will be less than the costs of conventional demolition. Requested funding for Phase 1 is $475,000.

Schedule

A two-year project schedule is proposed for Phase 1.

For more information, contact: Dr. Robert H. Falk, Research Engineer, Advanced Housing Research Center, USDA Forest Service, Forest Products Laboratory (FPL), One Gifford Pinchot Dr., Madison, WI 53705, Tel: (608) 231–9255, Fax: (608) 231–9303, rfalk@facstaff.wisc.edu



Groups salvage lumber to spare from Fort Chaffee

BY DAVE HUGHES
ARKANSAS DEMOCRAT-GAZETTE

FORT CHAFFEE — A pine is a terrible thing to waste, so a partnership of public and private entities are working to save some wood as they remove obsolete buildings at Fort Chaffee.

The Army Corps of Engineers, U.S. Department of Agriculture, Habitat for Humanity and others are removing hundreds of World War II buildings from Fort Chaffee.

The coalition and the Fort Chaffee Redevelopment Authority are working on agreements that will allow Habitat for Humanity, with assistance from the University of Florida and various consultants, to disassemble the 126-building hospital complex at the fort and salvage the lumber used to build them six decades ago.

Officials have high hopes that the wood from the Fort Chaffee buildings will be reusable because of its good quality. Much of it is old-growth southern pine, hewn from virgin forests that no longer exist. Old-growth pine is stronger and cleaner than pine being produced for construction today, authorities in the field say.

"I think this is good-quality wood. There's no question we can use it again and it will perform just fine for home construction," said Robert

See **CHAFFEE,** Page 6B

Chaffee

• Continued from Page 1B

Falk, a research engineer for the Agriculture Department's Forest Products Laboratory in Madison, Wis.

Falk said he is beginning to test the wood from the Chaffee buildings so it can be graded on the lumber market. He said the quality of the wood probably will have suffered from the construction process, the 60 years it has stood and from deconstruction.

"We want to know how that affects residual strength and the ability to reuse it," he said.

Habitat for Humanity's Austin, Texas, affiliate, which has been developing deconstruction techniques elsewhere during the last 18 months, will provide the labor. It plans to sell the salvaged lumber and use the proceeds to build homes in Arkansas, Texas and the Mississippi Delta. Habitat for Humanity's productivity could go up 20 percent from the benefits gained from the Chaffee project, according to the Texas office.

"It's a project that everyone wins on, especially the depressed economic area," said Executive Director Phil Reeves of the Redevelopment Authority.

Reeves said Habitat for Humanity, using its own volunteers and those from other organizations like VISTA and AmeriCorps, will begin work on the hospital complex this spring. It could take a year to finish. The volunteers will be trained by members of the Center for Construction and Environment at the University of Florida.

If the deconstruction works on the hospital complex, the group could tackle the other 300 buildings during the next four years that the Redevelopment Authority wants to dismantle, Reeves said.

The Redevelopment Authority, also known as the Fort Chaffee Public Trust, is trying to get rid of the World War II vintage buildings so it can market the land to prospective industrial, commercial and residential developers.

The Department of Defense closed the western portion of Fort Chaffee as part of the Base Realignment and Closure Commission's effort to downsize the military. The Defense Department charged the Redevelopment Authority with devising and overseeing a redevelopment plan for the 7,100 acres of surplus Chaffee land.

One of the biggest obstacles has been the 440 buildings the Redevelopment Authority inherited. Most of them are too old to use again and they must be removed before the Redevelopment Authority can sell the land for redevelopment.

"It's key to us to get it done because it's something that will help us with the redevelopment," Reeves said.

Reeves and the Public Trust considered demolishing the buildings and sending the lumber, about 250 million board feet, to a landfill. They also looked briefly at burning the lumber.

But the Corps of Engineers, after meeting with the Austin, Texas, Habitat for Humanity chapter, suggested that disassembling the buildings and selling or reusing the salvaged lumber could be a viable, more environmentally friendly alternative.

People connected with the project are excited about the possibilities that deconstruction could offer all the parties involved.

Habitat for Humanity, which has 50 lumber resale shops in the United States and Canada, sees Fort Chaffee as a training ground for its volunteers and a source of lumber and revenue for its building program.

The Arkansas Valley Habitat for Humanity, based in Fort Smith, has not taken a role in the project yet. Executive Director Brian Fields said the chapter approves of the project and is studying how it can become involved.

Under a plan for the hospital deconstruction, the Redevelopment Authority would provide housing for workers and storage space for the salvaged wood. It also could shoulder some of the cost of removing asbestos and lead paint from the buildings. Reeves said agreements setting out each participant's responsibilities are still being negotiated.

The Corps of Engineers and Agriculture Department would provide expertise and guidance on the actual deconstruction. The two agencies also are evaluating the quality of the wood for construction grading purposes.

In addition to the need to remove buildings at bases that are being closed, the Army is planning a massive modernization program for its active bases, said Stephen Cosper, environmental engineer for the Corps' Construction Engineering Research Laboratory in Champaign, Ill.

All of the debris from demolition and construction, though, would choke the military's landfills and be a waste of potentially reusable material, he said.

"All this construction and demolition activity creates of huge amount of solid waste that could be as much as 80 percent of a fort's waste stream. It's just not good waste," Cosper said.

So, the Army is using Fort Chaffee as a test case on the pros and cons of deconstructing buildings instead of demolishing them, Cosper said. He said the Army also wants to write a handbook of deconstruction lessons learned at Chaffee that could be applied to any other post around the nation.

"The concept was: If it can work at Chaffee, it can work anywhere," Reeves said.

Advanced Housing Research Center

Forest Products Laboratory
Madison, Wisconsin

Emerging Technologies

Increasing the Marketability of Reclaimed Lumber

The United States has a vast infrastructure of buildings and other structures that have been built entirely or partially from wood. Since the turn of the century, more than three trillion board feet of lumber has been produced, much of it residing in our building infrastructure. As these structures come out of service, demolition has been the method of disposal.

Maximizing the reuse of our reclaimed lumber resource has positive environmental impacts. First, fully utilizing reclaimed lumber will reduce the volume of waste destined to landfills. Second, because these materials can be used in their existing form, the reuse of solid-wood products requires little reprocessing. Lastly, the reuse of this material would help conserve our natural resources and ease harvesting pressure on the existing forest resource.

Recent studies on the deconstruction of buildings indicate the potential value of the reclaimed lumber resource and the existing barriers to reuse. For example, in the Portland, Oregon, metro area, it is estimated that up to $1 million could be generated from the lumber (and other materials) salvaged from homes that are annually permitted for demolition and more than 900,000 board feet of wood waste could be diverted from the landfill.

Preliminary and ongoing engineering property evaluation studies have also indicated that reclaimed lumber has the potential for reuse in structural applications. However, because this material has been used in a variety of applications and under different conditions, it has often sustained damage (from a lifetime of use and the deconstruction process) and may not possess the same engineering properties as today's mill-produced lumber.

Currently, the only option is to sell reclaimed lumber for uses that do not require a grade stamp, which are usually non-engineered, low market value applications that do not fully utilize its structural capability. Using existing standards to grade reclaimed lumber typically requires that a grading certificate be issued for each batch of graded material. This certificate limits the sale of lumber to a single order, restricting marketability and acceptance. Development of a grade stamp specific to reclaimed lumber is needed to broaden its market and reuse options.

Background

An immense lumber resource exists in buildings slated for demolition. The U.S. Army has estimated that more than 250 million board feet of lumber are available for reuse from its excessed World War II buildings. If other branches of the military are considered, as well as other government agencies and the private sector, billions of board feet of lumber is potentially available for reuse.

During the past century, millions of residential homes, commercial and industrial buildings, bridges, and other structures have been built from sawn lumber and timber. Eventually, this lumber will be available for reuse through remodeling or deconstruction. Currently, 55% of U.S. housing is 29 years or older and 29% is between 14 and 28 years old; nearly 15% is 70 years old or older. More than 100 million housing units exist in the United States, most of which are wood framed.

Currently, the U.S. building industry is booming; however, reclaimed lumber is not traded as a commodity-building product. The widespread acceptance of reclaimed lumber is hampered by the lack of (1) appropriate grading rules, (2) engineering property data and approved reuse options, and (3) a grade stamp specific to reclaimed lumber.

Although existing grading rules can be used to grade all types of lumber, neither these rules nor the standards behind these rules specifically address the use of reclaimed lumber. Existing grade criteria were developed for mill-produced lumber. These criteria often limit defects, such as splits and cracks, which are commonly found in reclaimed lumber. To what extent these defects affect lumber strength has not been quantified, so limitations in the existing rules could result in reclaimed lumber being downgraded (lower economic value) or disallowed for many applications (fewer markets).

A grade stamp, and the grading criteria and rules that stand behind it, is a critical element in the trade and use of lumber products. The grade stamp on today's mill-produced lumber allows each piece to be individually sold at retail outlets and verifies its quality and adherence to grading agency rules. This allows its widespread acceptance by engineers, architects, and building officials at the building site. Engineering testing backs up the grading criteria, assuring that the lumber grades will satisfactorily perform for their intended uses.

Objectives

The objectives of this project are to establish grading criteria (rules), develop engineering property data and reuse options, and propose a grade stamp for reclaimed lumber.

Approach

Military and civilian buildings will be identified from which suitable populations of lumber for grading and testing will be extracted. Various building types in different geographic areas will be considered. Lumber of various sizes and species for grading and testing will be selected based on statistical sampling procedures. An evaluation will be completed on the effect of deconstruction damage. The reclaimed lumber will be tested to quantify the effects of defects on engineering properties. Data will be statistically analyzed to develop appropriate engineering properties and reuse options.

Expected Outcomes

This research project will result in (1) a lumber grade description and quality measure for reclaimed lumber, (2) an engineering property description of reclaimed lumber by grade, (3) submission of a grade rule amendment to recognize reclaimed lumber and include it as part of the National Grading Rule, and (4) a grade stamp specific to reclaimed lumber.

Timeline

2003—This program will be coordinated with ongoing and planned deconstruction projects across the U.S.

Contact

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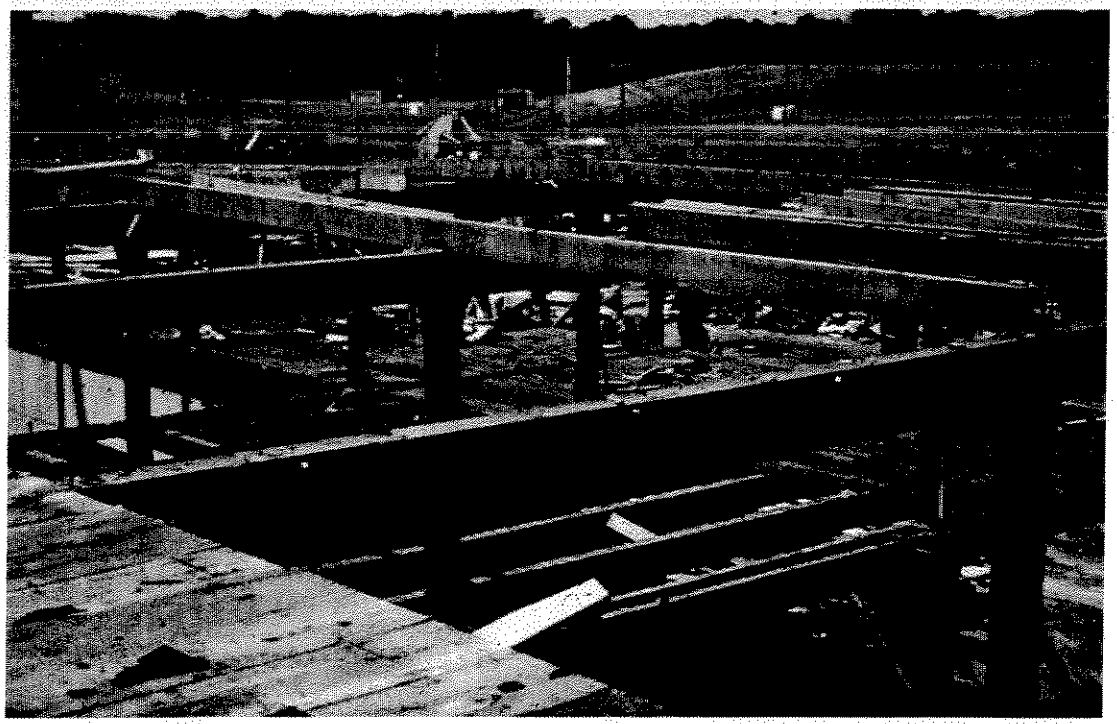

Deconstruction at the Twin Cities Army Arsenal, St. Paul, Minnesota

Wood-Framed Building Deconstruction Consortium

The Advanced Housing Research Center at the USDA Forest Products Laboratory (FPL) has initiated a new consortium to support building deconstruction as a wood-framed building disposal method. The purpose of the *Wood-Framed Building Deconstruction Consortium* is to identify and address the technical challenges, outreach opportunities, policy and standards development needs, and consumer education issues necessary to increase the salvage and reuse of lumber and timber from building removal.

Because wood members can be easily damaged using conventional demolition techniques, deconstruction (or building dismantlement) offers an opportunity to salvage and reuse the high quality old-growth lumber and timber residing in our nation's obsolete building stock. Though labor intensive compared to conventional demolition, this method of building removal can reduce the volume of materials destined for the landfill, while providing a wealth of reusable building materials. Unfortunately, available information about deconstruction is scattered, and to date there has been no established focal point for current activities, policy or standards development, and information transfer.

The *Wood-Framed Building Deconstruction Consortium* serves as a forum for private and public sector organizations interested in building deconstruction and material salvage. The focus will be on all types of wood-framed military, industrial, and residential structures in which the building materials have the potential to be reused as primary or secondary building products in new construction. In this consortium, emphasis will be placed on: 1) deconstruction as a wood-framed building disposal method and 2) the reuse and recycling of wood materials.

The mission of the consortium is envisioned to:

- Facilitate the development and implementation of needed and appropriate policies and standards for wood-framed building deconstruction and wood material reuse.
- Develop recommendations and guidelines for evaluating new technologies based on technical, economic, and market considerations.
- Develop and maintain a comprehensive assessment of research and policy needs and priorities.
- Coordinate research, demonstration, and evaluation technologies for wood-framed building deconstruction.
- Establish and maintain an Internet homepage on wood-framed building deconstruction and wood material reuse.
- Sponsor and facilitate meetings, conferences, and other forms of technology transfer.
- Provide linkages and interaction with other organizations and groups not directly involved in the consortium.
- Seek financial support for prioritized research, development, and technology transfer activities.

For more information, contact: Dr. Robert H. Falk, Research Engineer, USDA Forest Products Laboratory (FPL), One Gifford Pinchot Dr., Madison, WI, 53705, Tel: (608) 231-9255, Fax: (608) 231-9303, rfalk@facstaff.wisc.edu

GRADING RECOVERED WOOD

THE U.S. Department of Housing and Urban Development and the Department of Defense aren't the only federal agencies with an interest in deconstruction. The U.S. EPA also has contributed assistance to several pilot projects. Because so much of the material that comes from deconstruction projects is wood, another agency heavily involved is the U.S. Forest Service, particularly its Forest Products Laboratory (FPL) in Madison, Wisconsin. In the early 1990s, Dr. Bob Falk, research engineer at the FPL, started looking for uses for wood residuals in value-added products. "It didn't take long to realize that we should reuse wood in its solid form, where possible, rather than turning it into lower-value chips or mulch," says Falk.

About that time, some of the buildings at an Army ammunition facility in Minnesota were being demolished. The FPL helped the Army develop a deconstruction plan and the Army donated some of the timbers (six-by-eight to ten-by-eighteen inches in size) to the FPL so that Falk could do strength testing. "We wanted to see how damage inflicted on the timbers, such as from nail and bolt holes and splits, affected residual strength," he says. Using test results, Falk worked with the West Coast Lumber Inspection Bureau to develop a proposed amendment to grading rules that would formally recognize larger recycled timbers. The American Lumber Standards Committee, which reviews changes to the National Grading Rules, voted against accepting these changes, citing an overall lack of data. "I'm not really surprised, since to date we have only done a limited amount of testing," says Falk.

After his work in analyzing the strength of reused timbers, Falk became involved in the grading and testing of dimensional lumber (two-by-fours, two-by-sixes, etc.) that came from deconstructing residential units at Fort Ord, California. Falk believes that the work with the dimensional lumber will have broader impact than his analysis of larger timbers. "While there is a limited number of buildings constructed with larger timbers, there are large volumes of two-by lumber potentially available for reuse," he says. "And there already is a market for the larger timbers for use in timber framing, flooring, and millwork."

This is not the case for two-by lumber. Marketing of this material is hampered by the lack of a grade stamp specific to it. "An approved stamp will provide building inspectors a means to check that the material is acceptable at the job site and allow individual pieces to be sold. However, before we can propose a grade stamp for approval, we must do a lot of testing and develop reuse options that will assure that the lumber will perform safely the second time around," says Falk.

He is working to obtain funding that will allow the FPL to expand its testing efforts, with the ultimate goal of generating the data needed to gain approval for the reuse of lumber in construction. "If all goes well, I hoping that in the next few years, we will see recycled lumber approved for use in home construction," says Falk.

Since some of the buildings the company deconstructs are older, another element of the business is reselling architectural antiques. Litchfield does this through a new store (constructed with recycled building materials, of course). It also sells the antiques and general building materials through an Internet website. To further its market reach, Litchfield recently installed a sawmill to rework larger timbers into products such as flooring, laminated beams and fencing.

OTHER SOURCES

While much of the material it sells through the yard and store is from salvage work performed by Litchfield's own crews, that isn't its only source. "About 75 percent of the material is from our own projects," says Fulton. The other 25 percent is from contractors and homeowners that bring materials for salvage.

At Happy Harry's, more than 50 percent of the materials are from outside sources, with the remainder coming from crews that work for the company. The reliance on others for the bulk of its used building materials may well be rooted in the start-up of the company.

Unlike Litchfield, Harry Bohna's background wasn't in demolition, but rather in construction and building management. He developed Happy Harry's during a downturn in the construction business as a means of keeping food on the table and hasn't looked back.

The original store and yard, now closed, were located in Manitoba. Bohna moved his headquarters to British Columbia and has licensed 11 stores throughout Canada, each with individual owner-operators.

All of the operations function in a similar manner. In addition to the walk-in trade, crews work with contractors to procure material. While Harry's does salvage and sells timbers, flooring and other wood, it concentrates more on products like windows, doors, toilets and kitchen cabinets.

SPECIALIZED OPERATIONS

Many deconstruction companies specialize in specific types of projects. Bob Johnson started one such company about 12 years ago in Wisconsin. "I was looking for something different," he says.

Johnson's firm, North Coast Enterprises, focused on removing lumber from homesteads at least 75 years old. He and his crew of four to five people spend the summer months razing 20 to 30 buildings. Recently Johnson has been working on a deal with a firm that would take the bulk of the wood reclaimed each year.

Two other firms that take things a few steps further are Aged Woods of York, Pennsylvania and Mountain Lumber of Ruckerville, Virginia. Aged Woods purchases timbers and siding from barns being dismantled throughout the East. It then inspects the wood and remills it. The lumber, much of it chestnut and heart pine, is sold as premium flooring, paneling and molding. Mountain Lumber has a similar operation, but it actually salvages much of the wood it remills and doesn't deal exclusively with barns as a source of material.

FEDERAL ACTIVITY

One of the keys to renewed interest in deconstruction is the involvement of the federal government, both as a source of materials and as a catalyst. On the supply side, the Department of Housing and Urban Development (HUD) is constantly pouring dollars into renovation and demolition of the residential building stock it controls. And with the closing of military bases

Feasibility of Recycling Timber from Military Industrial Buildings

Scott F. Lantz
Robert H. Falk

Abstract

This paper discusses an alternative to the demolition and landfilling of conventional timber frame buildings—the dismantlement and recycling of lumber and timber. A case study is presented in which two large buildings at the Twin Cities Army Ammunition Plant were successfully dismantled and a substantial volume of the timber and lumber recycled. This case study illustrates several aspects of the recycling process: factors that influence the decision to recycle, regulatory and contractual challenges, labor and safety issues, economic factors that affect the emerging market for recycled timber and lumber, short- and long-term advantages and disadvantages of dismantlement as opposed to conventional demolition, and recommendations for making the recycling of timber and lumber elements of excess buildings a feasible disposal option.

Introduction

A significant number of U.S. military industrial facilities are of timber frame construction. Because many of these facilities were built during the World War II era, when steel and masonry building materials were being redirected to other parts of the war effort, timber was the common choice for the construction of industrial facilities. With the end of the Cold War era in the early 1990s, many of these facilities were classified as surplus to the nation's defense requirements.

Without mobilization missions to justify their continued maintenance, many of these buildings have been standing idle, awaiting disposal. These buildings are estimated to contain hundreds of millions of board feet of old growth timber and lumber, as well as a myriad of other components; some of these components are valuable and/or highly regulated with regard to disposal.

The current situation in the military is contrary to the past trend of adding buildings to the industrial inventory and continuing to use existing buildings. In the past, any disposal of buildings was incidental to other ongoing operations and as such was often handled on an individual basis, both administratively and with regard to disposal practices. The typical disposal practice for such facilities has been demolition, with the debris placed in a landfill.

The disposal of military industrial facilities has the potential to increase dramatically. It is timely to review disposal practices used for these assets in order to minimize costs and the potential liability associated with various practices.

This paper discusses the dismantlement of timber frame buildings and the recycling of the timber and lumber content as an alternative to conventional demolition and landfilling. A case study is presented in which two large buildings, representing more than 900,000 ft.^{2} (83,610 m^2) of manufacturing space at the Twin Cities Army Ammunition Plant (TCAAP), were successfully dismantled and a substantial volume of the timber and lumber recycled. This case study illus-

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trates several aspects of the recycling process: factors that influence the decision to recycle, regulatory and contractual challenges, labor and safety issues, economic factors that affect the emerging market for recycled timber and lumber, short- and long-term advantages and disadvantages of dismantlement as opposed to conventional demolition, and recommendations for making the recycling of timber and lumber elements of excess buildings a feasible disposal option.

The decision to recycle

The decision to dismantle buildings 501 and 503 at the TCAAP was not automatic or unanimous. In the early 1990s, this decision eventually came be regarded as the disposal option consistent with various missions and directives. The primary event that precipitated the dismantlement of these manufacturing buildings was the end of the Cold War era. Subsequently, in fiscal year 1992, the decision was made to terminate TCAAP's small caliber (5.56- and 7.62-mm) ammunition manufacturing mission and the artillery metal parts (105- and 155-mm) mission. While there were then and still are other Army missions on the TCAAP Installation, the majority of the buildings had been dedicated to manufacturing and support of the terminated missions. This is significant in that it is a violation of federal procurement law and military regulations to spend federal tax dollars to maintain facilities that are surplus to the military's needs.

With no mission to justify the continued upkeep of many of the Installation's buildings, both heating and maintenance of excess buildings were suspended. While this strategy was acceptable in the short term, it was not acceptable for the indefinite future. A phasedown plan was developed to address the long-term risk of no maintenance while the Army determined its future plans for the Installation. This phasedown plan took the shape of more than 70 projects that addressed various aspects of the manufacturing buildings and machinery and the supporting infrastructure with the intention of proactively eliminating or minimizing the potential long-term risk associated with little or no maintenance or surveillance.

In a process known locally as "killing the building," equipment, personal property, and components that could deteriorate and release hazardous or otherwise regulated substances were removed from the buildings. All utilities were positively disconnected. Finally, all exterior openings were secured and signs were posted in keeping with fire regulations. The utility infrastructure of the Installation was likewise properly abandoned if inactive, and in the case of the electric and natural gas distribution systems, sold to a local public utility company.

For most Installation buildings, this was an acceptable short-term endpoint. The large timber-frame buildings posed an exception. Containing well over a million board feet of wood materials each, these buildings represented a substantial fire hazard to active Installation facilities as well as to the neighboring community. Therefore, a choice had to be made between maintaining a multi-zone fire sprinkler system for each building or disposing of the buildings. The cost to maintain the sprinklers represented several thousand dollars per year per building, indefinitely. A decision was made to remove the buildings and the associated fire hazard.

Once this decision was made, discussion followed on how disposal was to be accomplished. Conventional disposal would have resulted in demolishing the buildings and disposing of the debris in a demolition landfill. The question then arose as to the feasibility of salvaging the timber and lumber. This possibility was met with skepticism because of lack of experience and consequent lack of knowledge about whether 1) any contractors were available who actually salvaged timber and lumber; 2) there was a market for nonvirgin wood materials; and 3) the additional effort on the part of the Army as owner would be justified.

Research on the feasibility of salvaging the timber and lumber was finally decided to be worthwhile for the following reasons. First, minimizing landfill disposal was consistent with the Army's waste minimization goals. Second, the Installation was already a potentially responsible party at several landfills and disposal site clean-up operations in the area. The financial responsibility for the associated remediation efforts at these landfills and disposal sites underscored the fact that although the disposal methods had been legal, there is a long-term risk of future liability for disposal practices that simply store discarded materials. Third, we speculated that if these materials had value, they might subsidize the overall disposal costs of the buildings, thereby lowering funding requirements.

The TCAAP contacted several wood-related organizations, including the Forest Products Laboratory of the USDA Forest Service, timber salvage companies, and timber framing contractors. As a result of discussions with these organizations, salvaging timber from the buildings appeared to be feasible. Although opinions about timber recycling were more often quantitative than qualitative, the following conclusions were reached prior to beginning timber salvage:

1. At the very least, the large timber elements were recyclable. It was unclear if there would be a ready market for the smaller timbers or the dimension lumber. Quotations on purchase price ranged from $50 to $200 per thousand board feet (MBF) for the standing timber members.
2. While there were some outlets for the large timbers through brokers, the kinds of markets were speculative to a great extent. The fact that the materials were used seemed to pose an obstacle since they would not carry a grade stamp to satisfy a building inspector for subsequent uses.
3. Those in the timber salvage business apparently were not particularly oriented to performing other kinds of disposal activities, especially those involving regulated wastes. Interestingly, metal salvage contractors and timber salvage contractors were apparently not particularly interested in the other material.

Building and disposal data

The characteristics of the buildings dismantled at the TCAAP and data generated by the dismantlement process are listed in Table 1. The range of nominal timber dimensions included 2×8 to 2×14; 3×10 to 3×14; 4×10; 6×12 to 6×18; 8×14 to 8×18; 10×18. The estimated value of the recycled timber per board foot was as follows:

- Received by owner for timber in place: $0.05 to $0.20.
- Received by dismantler—smaller dimensions: $0.40 to $0.60.
- Received by dismantlers/brokers—larger dimensions: $2.00 to $3.00.

Note that there does not always appear to be a direct correlation between some values, for the following reasons:

Table 1.—Characteristics of dismantled TCAAP buildings.

Characteristic	Building 501	Building 503
Floor space	377,000 ft.^{2}	548,000 ft.^{2}
Timber	1,250 MBF	1,875 MBF
Wood recycled	750 MBF	1,500 MBF
Transporation & tipping fees avoided	$35,000	$70,000
Future liability avoided	--	--
Estimated cost to demolish and landfill	$300,000	$440,000
Cost to dismantle	$50,000[a]	$283,000[b]

[a] Roofing disposal not part of dismantlement contract.
[b] Roofing disposal part of dismantlement contract.

- Each building had parts of a masonry-type construction, which result in a disposal cost to the owner.
- Disposal of building 503 included a built-up roof; that of building 501 did not.
- Building 501 was dismantled at higher labor rates than was building 503.
- Application of materials from building 501 into new timber framing and millwork projects created a demand for the material in building 503. As a result, the contractor recovered a greater portion of building 503's timber elements.

Regulatory challenges

Buildings 501 and 503 were used for manufacturing, and contained various building elements, equipment components, and supplies that are currently regulated in regard to disposal. The following materials were encountered on this project:

- asbestos
- polychlorinated biphenols (PCBs)
- mercury-containing instruments and controls
- mercury/cadmium fluorescent light tubes
- treated timber: creosote and pentachlorophenol (PCP)
- lead-based paint
- assorted lubricants, hydraulic oils, and quench oils
- explosives: powder, primer tracer, and incendiaries
- partial containers of paints, solvents, and preservatives

Because of the diversity of materials, a substantial and continuous effort went into evaluation and proper disposal as the materials were encountered during the decommissioning and disposal of the facilities.

Contractual issues

All activities undertaken from the time the buildings were production-ready to the time they were reduced to floor slabs on the prairie would have had to have been performed whether the buildings had been dismantled or demolished. The primary difference was that the various steps were handled through a series of contracts, each with a contractor who dealt with separate aspects of the disposal. This allowed the owner better control of the disposal process and to a great extent lifted the burden from specialty contractors. Since dismantling left the buildings devoid of anything but timber and a built-up roof, the contractual procedure gave the TCAAP an opportunity to determine if dismantling and subsequent timber recovery would lower disposal costs. For each building, competition for a disposal contract was open, with no

recycling requirement. The low bidder was chosen, one who could complete the work on time and within budget.

Two categories of contractual issues arose during this project:

1. To what extent should general, all-inclusive disposal contracts be used?
2. What aspects of a building disposal contract are important if dismantlement and recycling of the building are desired?

General versus multiple contracts for disposal

The disposal of buildings 501 and 503 was accomplished through a series of contracts, rather than one. This arrangement is similar to what construction managers refer to as "multiple prime contracts." Although the Army and its operating contractor had to prepare and manage more contracts, this was the most effective way to accomplish the project for the following reasons:

1. The disposal of personal property (production equipment) is a separate action from the disposal of real property.
2. Directly contracting with various types of contractors provided the Army with more effective and expeditious control of the overall disposal effort; they could work directly with the contractors rather through a general contractor. Since there were some instances where change in scope was probable, multiple mark-ups could be avoided if the scope were expanded.
3. It was prudent to contract directly with abatement and hazardous waste contractors. In this situation more than in any other disposal activities, it was important to have a direct relationship with these contractors to ensure compliance with the scope of work as well as better ability to verify the final disposal point of regulated materials.
4. Competition was increased by dividing the overall disposal project into smaller components by specialty or industry. Feedback from bidders indicated that it was better to avoid a contractual chain of custody for hazardous waste, which would result from subcontracting that work. Also, we attempted to frame the work by size and nature so that contracts were large enough to be of interest to bidders, but not so large or outside their primary kind of work as to create bonding or insurance problems that would inhibit bidding.

Dismantlement issues

Several contractual issues affect the feasibility of building dismantlement and subsequent recycling of the materials:

1. The contracts for the disposal of buildings 501 and 503 were just that—contracts for disposal. Recycling was not mandated because a) it was unclear what types of or how much material could be marketed for reuse; and b) under the circumstances, there was apparently no meaningful way to enforce such a requirement. The buildings were cleared of production equipment and hazardous materials prior to setting the disposal contract, making it feasible to dispose of the empty buildings either by conventional demolition or dismantlement. In a competitive bidding situation, the successful low bidder chose to dismantle significant portions of each building.
2. To make dismantlement a viable option, the contract must contain a sufficient performance period. A good rule of thumb is to allow twice the time for dismantlement as for demolition. Dismantlement is more labor-intensive than is demolition, which tends to be more machine-intensive.
3. Some contract bid forms have a subtotal line for a credit for the salvage value of building materials. The bid total is then the total of disposal items on the bid sheet less the salvage credit. It was prudent to require bonding and insurance reflecting the total price of the disposal effort, not including the salvage credit. In a default or other situation potentially involving the contractor's surety or insurance, the cost of replacing the building disposal performance should not include the salvage credit. Depending on a contractor's outlets for various materials, what is feasible to salvage may change with the contractor. This is a function of the fact that markets for some used building materials are in the process of development.
4. Specifically regarding federal and federally funded projects, the contract documents should state whether the project is a "Davis-Bacon" project. The Davis-Bacon Act is a federal labor law that when applicable to a contract significantly affects the cost of labor on that contract. Since dismantlement as a disposal option is labor-intensive, it is crucial to make a correct determination as to whether Davis-Bacon applies to a particular project. A more complete discussion of the Davis-Bacon Act is found in the next section.

Safety and labor issues

Safety

Generally speaking, dismantlement is labor-intensive. The nature of dismantlement is to separate and usually recover building materials in a condition in which they can be reused for the same or similar purpose. This process usually involves "deconstructing," that is, manually disassembling parts of the building.

Demolition, on the other hand, is an equipment-intensive operation, with a large percentage of the crew physically separated from the material being handled. Although materials may be separated during demolition (usually metals, sometimes concrete and masonry), this is usually done mechanically. Typically, it is not critical that the building elements be preserved since the recovery is for the material content. Even though dismantlement is similar to demolition in the respect that both are disposal methods, dismantlement is more like construction relative to the number of persons that may be on site, where they are likely to be located, and the activities in which they are engaged.

As such, it is imperative that for dismantlement to have a net benefit to a building owner, emphasis must be given to safety—not only in the contract document, but through active and regular oversight and enforcement in the field. Issues that recur on dismantlement projects include the following:

1. ***Awareness.*** People must be aware of what kind of activities are happening, on all levels.
2. ***Fire.*** The danger of fire should be emphasized at regular "tool box" safety meetings. Fire is a very real hazard on dismantlement sites, primarily as the result of the use of cutting torches. Wood materials are typically extremely dry and will ignite readily. A requirement that a fire extinguisher be kept with each cutting torch is extremely useful; this practice is not as common as it should be. An enforced no smoking policy, except in designated areas provided with "butt cans," will help prevent what is probably the second greatest source of fire. Finally, there should be provision in the contract that all fires be reported to the fire department and the owner, regardless of whether the contractor thinks that the fire has been extinguished. Besides the potential destruction of valuable materials, fire poses a significant danger to people on the site. When a building is being dismantled, utilities are eventually cut off. These include telephone, electricity, and water—all necessary for fire detection, alarm, and sprinkler systems. Especially in multi-level buildings, the prevention of fire is critical to the safety of workers.
3. ***Change from "inside" to "outside" work.*** As dismantlement progresses, inside work becomes outside work and potentially can become aerial work. Proper barricading, personal safety equipment, and lifting equipment pursuant to Occupational Health and Safety Administration (OSHA) and other relevant standards must be followed as applicable.
4. ***Dismantlement plan.*** A plan should precede dismantlement. This plan may be relatively simple or quite detailed, depending on whether the original construction was complex or not otherwise obvious. In some cases where buildings are small and simple in design, the dismantlement plan may be approved by in-house personnel of average technical competence. In more complex cases, it is worthwhile to have the plan developed or reviewed by a qualified structural engineer or architect. The point of this effort is to avoid collapse of the building during dismantlement. The other effort necessary to avoid collapse is to enforce the dismantlement plan.
5. ***Airborne dust.*** This may be a significant hazard or at least an irritant to workers on dismantlement projects. Precautions need to be taken if roof decking and joists are being recovered. Since older built-up roofing may contain asbestos and/or coal tar, it is prudent to sample roofing materials prior to building disposal to determine the proper method of disposal and methods or items of personal protection equipment needed to ensure worker safety. Besides protecting workers, these steps also create a record of positive steps taken to determine what constituents were contained in the roofing materials and what action was taken in light of that knowledge. Such actions are prudent given the current levels of litigation, particularly in relationship to asbestos exposure.
6. ***Housekeeping.*** Housekeeping is a very basic safety issue. Besides directly affecting the hazards described here, good housekeeping minimizes trip and puncture hazards. It also helps prevent loose debris crossing an opening in a floor to give the appearance of a solid floor. Walking across such an area can result in a serious fall.

Labor

As mentioned earlier, federal and federally funded construction projects must comply with the requirements of the Davis-Bacon Act (40 USC 276a, *et seq.*). This federal labor law requires the payment of "pre-

vailing" wages on construction-type work, including new construction, alterations, and repair of buildings and sites of new work. The U.S. Department of Labor issues wage determinations for various job classifications in a given geographical area considered for prevailing wages. In many areas, this is determined to be union wages based on union classifications.

Typically, federal construction-type contracts fall within the purview of the Davis-Bacon Act. Therefore, there is a tendency to assume that all contracts of this nature need to be certified as Davis-Bacon projects. In performing a Davis-Bacon review for applicability, we reviewed the federal regulations on labor and procurement. The Code of Federal Regulations (29 CFR 3) generally discusses labor regulations with regard to contractors and subcontractors on federally financed public works projects. More germane to this discussion is the Federal Acquisition Regulation (FAR) in part 22, *Application of Labor Laws to Government Acquisition*. In subpart 22.402, *Applicability*, paragraph (a)(1)(ii), the regulation includes dismantling, demolition, or removal of improvements **where those improvements are part of a construction contract or further construction is anticipated under a subsequent contract pursuant to Subpart 37.3.** Part 37 of the FAR, *Service Contracting*, includes subpart 37.3, *Dismantling, Demolition, or Removal of Improvements*. In paragraph 37.301 on labor standards, the regulation indicates that these activities could fall under either the Davis-Bacon Act or the Service Contract Act (41 USC 351, *et seq.*). It further indicates that the **Service Contracts Act applies if no further Federal construction or improvement is planned**. The significance is that the Service Contracts Act requires the payment of a minimum wage in contrast to the Davis-Bacon prevailing wage. This makes labor less expensive in this situation.

Thus, where there is no foreseeable follow-up on federal construction occurring on a site, the disposal contract does not have to be certified as a Davis-Bacon project. Since dismantlement is more labor-intensive than demolition, the feasibility of recovering significant amounts of materials through dismantlement is directly related to labor costs. Again, this issue applies to the federal arena. This issue may not be pertinent to all situations, but some may require the use of a prevailing wage structure to evaluate dismantlement. In instances where the exception cited above can be applied, the feasibility of recovering more material increases dramatically. It is definitely worth exploring the issue of use of prevailing wages where applicable.

Feasibility of recycling timber and lumber

For the purpose of this report, feasibility falls into two categories: material recovery and marketability.

Material recovery

The feasibility of recovering timber and lumber from buildings is dependent on both physical and economic factors, which include the following:

- condition, dimensions, and species of wood
- type and number of fasteners per element
- exposure or protection of elements
- cost of labor
- performance period allowed for building disposal
- building height and site configuration
- time allowed to store recovered materials on site

Marketability

Although the markets for some recyclable materials are well established, this has not been the case for timber and lumber recovered from building disposal projects. For the most part, traditional markets have been local in nature and speculative at best. The use of recovered timber and lumber has often not approached its potentiality. Typically, recovered timber and lumber have been used for compost, livestock pens, concrete forms, and dunnage. However, recent developments have resulted in an emerging market for recycled wood elements. Factors that favor an increase in demand for nonvirgin timber and lumber include:

- restrictions on harvesting high-quality, large-diameter old-growth timber, thereby restricting its availability at any price;
- general trend of increased prices for forest products;
- demand for high-quality large timber for exposed timber frame construction;
- demand for species-specific millwork for use in new log home construction and interior remodeling of older buildings where consistency with period building materials is desired;
- foreign demand for North American species that represent "exotic" species in those markets;
- increased familiarity of buyers, designers, and builders with nonvirgin timber and lumber.

Factors that restrict the demand for nonvirgin timber and lumber include:

- lack of grading standards and design rules specifically for nonvirgin wood materials; application of virgin material standards and rules may have the effect of downgrading nonvirgin materials;
- at the job site, lack of a specific grade stamp for nonvirgin wood elements, which designers and inspectors rely on for acceptance; unless a timber

grader is specifically hired to visually inspect material on a particular job, the material is often rejected for use;
- in general, lack of consistent supplies and markets for nonvirgin timber and lumber;
- lack of awareness by owners and their disposal contractors regarding the potential value of nonvirgin timber and lumber, with the result that no attempt is made to recover them.

Dismantlement as an alternative to demolition

All disposal alternatives have their advantages and disadvantages. Dismantlement is no exception. The decision to use dismantlement or conventional demolition as a disposal option will depend on the relative weights assigned to the various factors considered here.

Advantages

- Dismantling and subsequent reutilization of building elements result in avoidance of some landfilling costs, primarily transportation and tipping fees.
- Reduced use of landfills should result in reduced future liability, should a landfill fail and remediation costs be assigned to former landfill contributors.
- There is a demand for large old-growth timber. Properly recovered timber from older buildings is gaining acceptance to meet this demand.
- In addition to reducing disposal costs by not requiring some disposal fees, in many instances recovery of materials will generate a credit or otherwise subsidize the overall building disposal costs.

Disadvantages

- Building disposal may be more management-intensive for the building owner if multiple contracts are let for various types of abatement and disposal, in contrast to one overall disposal contract.
- Dismantlement takes longer than demolition. An owner must plan ahead and allow approximately twice as long for dismantlement as for demolition.
- Dismantlement is more labor-intensive than is demolition, which tends to be machine-intensive. Emphasis on site safety and coordination tend to increase in direct proportion to the number of workers on the same site.
- Markets for nonvirgin building materials have not fully matured. These markets are in transition from strictly local to national and international. Therefore, it is difficult to predict the type, percentage, and value of recovered materials an owner might expect with a particular disposal project if similar projects have not been performed in that area.

Recommendations

Several factors are critical when determining the feasibility of dismantlement. The following recommendations are based upon information gained in the case study described in this paper. Working with the contractor on these issues should result in benefits to the owner in decreased landfill volumes and costs, as well as increased proceeds or credits for the recovered timber.

1. Timber dismantlers and recyclers are not metal salvagers or hazardous waste abatement contractors, and they are typically not set up as a business to act as a general contractor, who can effectively subcontract other disposal activities.
   Recommendation: Building owners should prepare a building for dismantlement by contracting directly for all other necessary disposal activities.
2. Although not recyclable itself, roofing offers protection of flat assets (decking and flooring) from precipitation and subsequent buckling.
   Recommendation: Do not "help" the timber-dismantling contractor by removing the roofing materials prior to dismantlement.
3. The timber-dismantling contractor requires adequate performance time to maximize the volume of material recovered.
   Recommendation: A good rule of thumb is to allow twice as long a performance period for dismantlement as is necessary for demolition.
4. Allowing the contractor to process and store materials on site (within reason) minimizes handling and transportation costs.
   Recommendation: Provide the timber-dismantling contractor with adequate room to lower, sort, clean, and store recovered materials.

Summary of findings

The following key points summarize the findings of this case study:

1. Dismantling existing buildings and recycling timber and lumber elements reduce short-term disposal costs by reducing demolition landfill volume.
2. Dismantlement, and the resultant recycling of timber and lumber elements, reduces landfill use and should therefore reduce potential long-term liability associated with landfill contribution, should the cost of maintenance or remediation be assigned to past users.

3. Proceeds an owner can expect to receive from recycling timber and lumber may not cover the cost to completely remove and dispose of a building. However, the proceeds can provide a subsidy against those costs.
4. Recycled timber and lumber are being used where there is a demand for certain old-growth wood products, both as structural elements in new timber-frame structures and nonstructural elements such as millwork.
5. The growing market for recycled timber and lumber should result in a decision by owners and contractors to recycle rather than landfill, as outlets for these materials become less speculative. Concurrently, the price or credit owners and contractors receive in the marketplace should increase.
6. Grading standards for nonvirgin materials should be developed and adopted to facilitate the marketability and maximize the value of nonvirgin timber and lumber, which will in turn make recovery and recycling more feasible.

The Use of Recycled Wood and Paper in Building Applications

These papers were presented during a conference sponsored by the USDA Forest Service and the Forest Products Society, in cooperation with the National Association of Home Builders Research Center, the American Forest & Paper Association, the Center for Resourceful Building Technology, and Environmental Building News.

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Knock on wood: Real recycling opportunities are opening up

by Preston Horne-Brine and Robert Falk, Ph.D.

The development of grade standards for recycled timber and lumber will aid in reclaiming the value of wood.

Recycled wood represents a value-added opportunity with tremendous potential for use in a massive market — that of lumber. As it comes of age, the recovered timber and lumber industry is positioned for strong growth, kicked off by recent efforts to develop industry standards.

Six major factors set the stage for the recovered timber industry to take off in a big way:

- **A large market exists.** The North American construction industry is huge, consuming over 60 billion board feet of lumber per year. This industry has been going full bore for much of the '90s. Single-family home-building is steaming along at the fastest pace of the last decade, and current lumber pricing remains at the higher end of the five-year range (nearly $400 per 1,000 board feet).
- **Wood recycling is happening already.** Within this broad lumber market, strong niches have been carved out for recycled wood products in recent years. Demand has been stimulated because of the "sustainable development," "green building" and "sustainably harvested wood" trends. In many communities, very-high-value but very-small-volume niche markets exist for timbers and milled products.
- **Reclaimed wood has performance advantages.** Wood available in older buildings has many benefits. Much of the virgin lumber on the market today is from second- and third-growth forests that were grown faster and harvested earlier than the old-growth wood that can be reclaimed from older structures. Many candidates for demolition were built with lumber and timbers considered oversized by today's standards. Some reclaimed timbers are available in sizes (cross sectional and lengths) that are not available in virgin timbers.

  In addition, reclaimed lumber contains dense, tight-grain wood; is often remarkably free of knots and defects; and is dry and therefore dimensionally stable.
- **The supply is vast.** Since the turn of the century, over three trillion board feet of lumber and timber have been sawn in the U.S., much of it still standing in existing structures. If only 2 percent of wood buildings now standing were decommissioned each year, and 25 percent of the lumber in them were reclaimed, it would supply up to one-fourth of the overall lumber market in this country for over 50 years.
- **The recovery infrastructure is increasing.** The demolition industry is large and well established. Until recently, it downplayed materials recovery, but now is undergoing a reorientation toward recovery, reclamation and sale of concrete, metal, wood, timbers and other materials.

  In addition to demolition contractors, a new sector — the deconstruction industry — has grown steadily. The deconstruction business always has existed, but at a small scale. And, it primarily was involved in recovering hardware and specialty millwork from old buildings in

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select situations. It now is ballooning into a mainstream industry that can salvage a far higher percentage of materials in old buildings.

Also, the new-construction and remodeling sectors have expanded their capacity to recover material and to reuse them in new construction.

- **Markets are improving.** Numerous recycled wood markets are being developed (for example, see "High-value Markets for Deconstruction Wood" in the August 1998 issue of this magazine). Several of these markets are of particular importance. A number of independent lumber mills, experiencing difficulty in the last 10 years in sourcing logs, have retooled their operations to process reclaimed timbers and essentially have reinvented themselves. Creative mills have developed glue composite fabrication, fingerjointing and veneer lamination techniques to eliminate defects, enhance the value of individual pieces, and fabricate specialty shapes. In addition to the milled-timber market, some companies have discovered that small solid-wood recycled pieces can be used feasibly. A reclaim operation sources recycled wood and processes it to billets and blanks of specific size, species and quality. These then are supplied to a production plant making an engineered, prefabricated product, such as furniture, fixtures and flooring.

Moving forward

All this activity is not to suggest that reclaimed wood is without problems, particularly in the area of aesthetics. However, strategies are being developed to address such concerns.

In the open, price-competitive lumber market, much more work must be done to validate recycled wood products. Performance testing must be conducted and standards established to provide necessary market assurances. Grade standards will not only provide assurance as to structural integrity, but also are necessary for market acceptance and penetration of the commodity lumber market.

This is especially true for the largest undeveloped market for recovered wood: remilled or finger-jointed dimensional lumber, primarily in two-inch sizes. Tremendous potential exists to use reclaimed lumber again, as structural framing in new construction and remodeling. To date, however, it has remained the smallest segment of the reclaimed wood market and a minuscule segment of the overall lumber market.

Fundamental barriers remain to consumer acceptance and widespread penetration of the dimensional-lumber market at volume levels that are significant. They are:

- **Recognized assurance.** The minimum quality of grades of recycled wood products needs to be assured.
- **Cost.** Lumber is a commodity, with a fiercely competitive market in which low prices often prevail. In this market, reclaimed wood still is too expensive.
- **Inefficient distribution.** Recovered lumber markets must compete against the highly efficient distribution system established for virgin lumber, with the prevalence of very large building-products suppliers, numerous large big-box building-product retailers (such as Home Depot) and thousands of local lumberyards. This supply network does not work very well for recycled lumber because it requires grade-stamp assurances, tends to work on a very-large order basis, and is very sensitive to traditional contractor perceptions of product quality.
- **Insufficiently developed recovery standards.** Deconstruction and demolition specialists lack the necessary knowledge to optimize their reclamation efforts. They need to know which specific reuse markets are available to them, what each

market specification is, how to estimate recovered lumber value accurately in their bids, and how to utilize various recovery options to maximize yield and value.

Grading standards are needed

The lack of grading standards for reclaimed lumber products is a primary obstacle to expanded trade. Such standards include grading rules, engineering properties and a grade stamp. Creation of acceptable grading standards and a stamp for recycled wood will provide the confidence and product assurance that will allow lumber and timbers to move readily through distribution channels to market, and then through the permitting and construction process. It will significantly expand the value, volume and types of recycled wood that flows through the system. Recovery operators will have much clearer product specifications and will be able to optimize their operations. Overall unit costs will come down, while acceptance of this product by designers, builders, inspectors and consumers will rise.

Why not use existing grading standards?

Recycled timbers currently are graded according to the same criteria as virgin timbers. Existing grading rules, which were developed for virgin wood, often do not consider, or sometimes disallow, defects commonly found in recycled wood. It is not clear that these reclaimed defects, while visually apparent, significantly affect wood structural properties. As a result, much recycled timber or lumber is downgraded or disallowed.

Moreover, a grade stamp allows each piece to be sold individually. Using existing rules to grade recycled lumber typically requires that a grading certificate be issued for each batch of graded material. This certificate limits the sale of the entire batch of that lumber to a single order, a highly constrictive situation.

What needs to happen

If rational grading criteria are to be developed, the following three tasks must be accomplished:

Rules need development. Although existing grading rules can be used, they do not reflect a technical understanding of recycled wood, its particular advantages and its common defects. Rules specific to recycled wood are needed.

Engineering properties need to be determined. The grading criteria for the new rules must be based upon technical research that substantiates the effect of age, exposure and defects upon the structural integrity and performance of recycled lumber and timbers. This can be determined only by experimental testing and analytical modeling.

A new grade stamp must be approved. Efforts will be required to make the grading stamp an industry standard.

The work is underway

Technical performance testing on recovered material must be performed, and reclamation protocols must be developed.

Testing has been conducted at the U.S. Forest Products Laboratory (Madison, Wisconsin) over the last five years, with support from a wide assortment of interested parties. Reclaimed wood has been tested for structural integrity in the presence of chec splits, and bolt and nail holes. Larger t bers and smaller lumber have been test The results have been positive and are add to the accumulated body of data on recyc wood characteristics and performance in v ious applications.

Additional research needed

A first attempt at gaining approval for a re cled wood grading stamp was made in 1998 based on experimental and analyti

test results with large timbers.

Working with a variety of parties, the West Coast Lumber Inspection Bureau (Tigard, Oregon) proposed a change in grading rules to the American Lumber Standards Committee Board of Review. The board deferred action in October 1998, citing the overall lack of data on the engineering performance of recycled lumber and timber.

In response, a major research effort is underway, directed by the Forest Products Laboratory. It is funded under a White House initiative called Partnership for Advancing Technologies in Housing and is administered, in part, by the U.S. Department of Housing and Urban Development (Washington). It entails securing, selecting and transporting reclaimed lumber samples from a broad base of sites across the country, with a focus on two-inch lumber from urban and military deconstruction projects. This material will be graded by existing rules to set a baseline. The recovered material will undergo extensive testing and modeling according to established industry procedures. The data will be analyzed to substantiate recommendations on the engineering properties of reclaimed lumber and facilitate development of grading rules, reuse options and recovery protocols, including a field manual for graders and deconstruction and demolition specialists.

This collaborative, federally funded program will be coordinated with ongoing or planned deconstruction projects around the country over the next several years.

No wooden nickels here

With the completion of this new study, grade stamps for recycled lumber and reclaimed timber may be approved. For this to happen, the testing results will need to be positive, and industry players will have to agree on the appropriate role that recycled wood products then will play in this large and competitive marketplace. **RR**

Opportunities for the Woodwaste Resource

By Bob Falk

For most of us, the word *recycling* conjures up visions of curbside programs focused on collecting glass bottles, aluminum cans, plastic jugs, and old newspapers. Considerable attention has been paid to these "post consumer" waste materials, while until recently, the recycling of solid woodwaste has received relatively little attention. For many decades, waste from the wood industry's sawmills was burned in teepee burners. Today, much of this woodwaste is utilized for new product manufacture (composite products, etc.) But what about other sources of woodwaste in this country? Demolition projects, land clearing, new construction, and other sources generate millions of tons of woodwaste every year. These wastes are typically viewed as a burdensome disposal problem; however, this material has potential to become a usable resource.

The Waste Wood Resource

Our nation is blessed with a vast wood resource. Currently, about one-third of our land mass is forested, approximately 737 million acres (2.98 million km^2). From this land, we yearly harvest about 280 million metric tonnes of wood. **Figure 1** illustrates our dependency on this wood resource. Roughly one-half of all industrial materials used in this country are wood-based, far exceeding the use of all metals, cement, and plastic (on a weight basis).

A portion of these industrial resources ends up being discarded, either through manufacturing waste or product disposal. Because so much of our industrial raw material base is wood fiber, and many of the products produced are short-lived, such as newspapers, paperboard, and packaging, a rather large percentage of our waste stream contains fiber. The majority of the woodwaste generated ends up in three different waste streams: 1) municipal solid waste (MSW); 2) construction and demolition (C&D) debris; and 3) wood and paper residues from primary timber and paper processing.

Municipal Solid Waste

In 1994, about 190 million metric tonnes of MSW were generated in the United States. MSW is defined by the Environmental Protection Agency (EPA) as waste from residential, commercial, institutional, and industrial sources, and includes durable goods, non-durable goods, containers and packaging, food scrap, yard trimmings, and miscellaneous organic waste. MSW does not include: C&D waste, automobile bodies, municipal sludges, combustion ash, and industrial process waste that may or may not be disposed of in municipal waste landfills or incinerators. By EPA definition, three categories of MSW contain wood fiber: paper and paperboard, yard trimmings, and wood (**Fig. 2**).

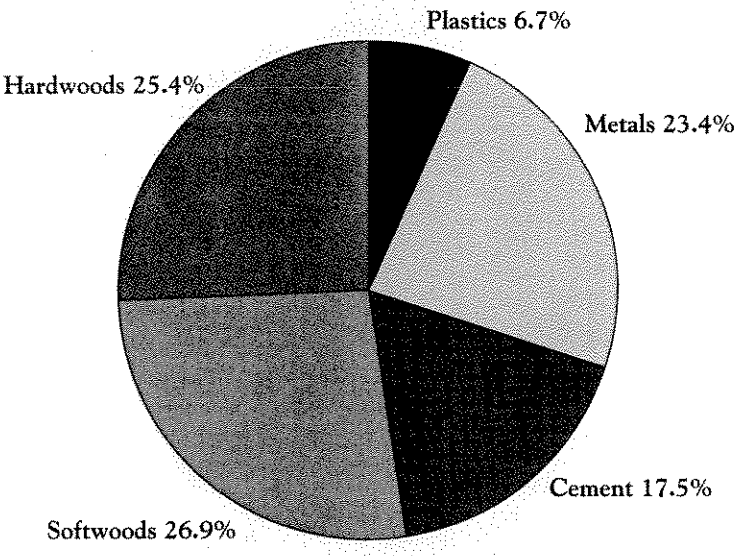


Figure 1. — Consumption of industrial raw materials, U.S. totals, percent by weight, 1995. Fuelwood is included in the total wood usage. Softwoods are assumed to have an average specific gravity of 0.45 and a dry basis moisture content of 15 percent. Hardwoods are assumed to have an average specific gravity of 0.55 and a dry basis moisture content of 10 percent.Source: J.L. Bowyer, University of Minnesota.

Paper Waste from the MSW

Although the focus of this paper is solid woodwaste, it is worth noting the progress being made in paper fiber recycling. The recovery and reuse of paper from the MSW is a recycling success story. For many years in the United States, paper and paperboard have been the most heavily recycled component of the MSW, accounting for more than two-thirds of the materials recovered. The availability of paper for recycling is in large measure a result of community-based curbside collection and the U.S. paper industry is approaching an overall 50 percent recovery level. For some grades, such as old newspapers (ONP) and old corrugated containers (OCC), that level has already been exceeded. In 1993, when the recycling rate was about 30 percent, over 38 million metric tonnes of paper and paperboard were recovered for recycling.

Solid Woodwaste from the MSW

Two EPA-defined categories of the MSW contain solid wood: wood and yard trimmings. The wood category contains such items as wood furniture and cabinets, pallets and containers, scrap lumber and panels that are not considered C&D debris, and waste wood from manufacturing facilities. Yard trimmings include leaves and grass clippings, brush, and tree trimmings and removals. Estimates made from regional and national studies suggest that about 10 percent of the wood in the MSW is currently recycled and an additional 54 percent is potentially recoverable. Currently, it is estimated that about 23 percent of the yard trimmings are recovered, and 46 percent are potentially recoverable for reuse. These sources from the MSW account for about 20 million metric tonnes of potentially recoverable solid wood material (**Table 1**).

C&D Debris

The waste generated from new construction and from building demolition is in a category by itself. Both these activities generate a significant amount of woodwaste. New construction wastes include all forms of wood used in wood frame construction (both residential and commercial), including solid wood, panels, engineered wood products, and packaging.

Nationally, the construction of residential homes alone consumes about 30 million metric tonnes of wood products. As shown in **Table 2**, almost 40 percent of the waste generated on a new home site is woodwaste, about 3,000 pounds (1360 kg). It is estimated that nationally about 6 million metric tonnes of new construction waste is considered feasible for reuse (**Table 1**).

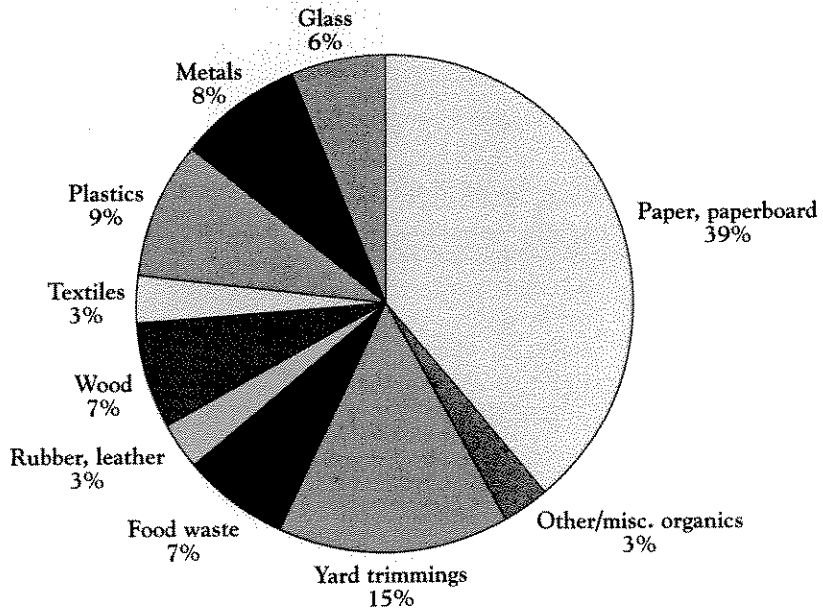


Figure 2—Percentage of municipal solid waste generated in the United States, 1994. Source: U.S. Environmental Protection Agency, Washington, D.C.

Table 1. Waste wood generated and available for recovery.

Source	Currently generated (10^6 metric tonnes)	Potentially available for recovery (10^6 metric tonnes)
Municipal solid waste[a]		
Waste wood	13.2	7.2
Woody yard trimmings	26.4	12.2
C & D debris[a]		
Construction	6.5	5.7
Demolition	22.7	6.8
Primary timber processing[a]		
Bark residues	26.7	1.4
Wood residues	80.1	4.8
Treated woodwaste[b]	4.7	Uncertain

[a] Source: McKeever, D. 1997, Resource Potential of Solid Waste Wood in the United States, The Use of Recycled Wood and Paper in Building Applications, Forest Prod. Soc., Madison, Wis.

[b] Source: Felton, C.C. and R.C. DeGroot. 1996. The recycling potential of preservative-treated wood. Forest Prod. J. 46(7/8):37-46.

Demolition waste is a much more heterogeneous mix of materials and typically contains woodwaste from framing, panels, flooring, etc., as well as aggregate, concrete, paper, metal, insulation, glass, and other building materials. About 44 million metric tonnes of demolition waste was generated in 1994. It is estimated that about 23 million metric tonnes of wood is contained in this mix. Due to the commingled nature of this waste, it is difficult to estimate the potential recovery of wood; however, if a yield of 30 percent is assumed, about 7 million tonnes of demolition woodwaste is available for recovery.[1]

Primary Timber Processing

The reuse of waste wood fiber that is a by-product of primary timber processing operations is not new. By and large, the wood industry has done a commendable job in reusing large amounts of residues (bark, sawmill slabs, sawdust, and peeler log cores) for a variety of applications. Nearly all of these residues are currently used to produce other products, primarily fiber for paper, building panels, landscape mulch, and/or fuel.

Treated Woodwaste

At this time, the recycling potential for treated woodwaste is unknown. A significant volume of treated wood is produced every year and questions regarding its disposal are being raised. Chromated copper arsenate (CCA) is the primary wood preservative used for the treatment of softwood lumber in the United States. Every year, over 8 million metric tonnes of CCA-treated lumber is produced and it is estimated that over 85 million metric tonnes of this product is in service. The feasibility of recycling treated wood is only now being investigated.

There are two major problems associated with recycling treated wood. First, the exposure of workers to preservative chemicals during the recycling process is of concern and must be investigated. Second, products made from recycled treated wood may not have the same resistance to decay and insects as the original treated wood product. This residual durability must be determined so that the recycled product can be used appropriately.

Nearly 5 million metric tonnes of preservative-treated wood is disposed of annually into landfills. If recycling methods can be developed such that health concerns are mitigated, much of this material can potentially be reused.

Waste generated at a building demolition project.

Table 2. Typical construction waste for a 2,000-ft² (189-m²) home.[a]

Waste material	Amount - lb.
Metals	150 (68.2)[b]
Drywall (gypsum)	2,000 (909.1)
Solid sawn wood	1,600 (727.3)
Vinyl (PVC)	150 (68.2)
Engineered wood products	1,400 (636.4)
Masonry (siding material assumes three sides vinyl siding and brick veneer on home's front facade)	1,000 (454.5)
Old corrugated containers	600 (272.7)
Other	1,050 (477.3)
Containers (paints, caulks, etc.)	50 (22.7)
Total	**8,000 (3636.4)**

[a] Source: National Association of Home Builders Research Center.

[b] Values in parentheses are kg.

Conventional Uses for Woodwaste

Markets for residues from primary wood processing are well established. The pulp and paper industry is by far the biggest user of this material, at about 30 million metric tonnes per year. The production of particleboard, medium density fiberboard (MDF), hardboard, and insulation board consumes another 10 million metric tonnes. Other uses, such as mulch, animal bedding, and fuel are also common.

Woodwaste generated from the MSW and from C&D debris is also marketed, but material variability and contamination often limit the use of these wastes to lower value commodity products, such as fuel and mulch. **Figure 3** illustrates the materials input/output stream at Recovery 1, a C&D waste processing plant in the state of Washington. At this plant, waste wood is obtained from land clearing/stumpage, pallets, new construction, and demolition. The land clearing/stumpage and pallet portion of this waste stream produces clean pulp chips usable for the pulp and paper industry. The remaining material produces primarily hog fuel. There is also a small percentage of fines, which can be used as a soil amendment. Scrap metal can be recycled, but other residues have no use and must be landfilled.

Other Uses for Woodwaste

Recently there has been considerable interest in increasing the use of woodwaste for higher value products. A conference focusing on this topic was held in Madison, Wis., in September of 1996.[2] Several potential material and product types were discussed.

Recycled Lumber and Timber

Millions of board feet of lumber and timber exist in old wood structures slated for disposal (especially industrial and military buildings). The U.S. Army has many wood buildings that were constructed for World War II and are now slated for demolition. It is estimated that these buildings contain over 250 million board feet of lumber and timber that could be reused. More and more, the feasibility of deconstructing buildings rather than demolishing them is being explored. Traditional demolition results in a pile of debris that is a mixture of wood, stone, carpeting, metals, and other materials. Deconstruction is the selective dismantling or removal of materials from buildings before, or instead of, demolition. It's been said that demolition is "clearing the table" and deconstruction is "saving the dishes."

In 1993, a study that evaluated the deconstruction of a two-story house in Portland, Oreg., indicated that the manual labor required to dismantle the building for salvage was competitive with the cost of conventional demolition. When the salvage value of materials from the building and the reduced disposal costs were considered, deconstruction cost several thousand dollars less than demolition. Because there are high tipping fees and well-established end-use markets for recyclables in Portland, this may be an optimistic example. It remains to be seen if deconstruction can be an economically attractive strategy nationwide.

Examples of uses of deconstructed wood materials include: 1) large timbers, which are valuable, can be removed from old structures and reused intact as structural members; and 2) wood flooring, siding, doors, and other trim, if not too damaged, can be reused in a new structure. It makes sense to strive for a "highest value use" of recycled materials where possible and reserve solid lumber and timber for uses that maintain their original form. However, the reuse of lumber and timber is hampered by the fact that guidelines on reuse do not exist and that grading rules and engineering design values currently focus on the use of virgin timber. Clarification, and to a certain extent, redevelopment of grading rules and design information specific to old lumber and timber would help its marketability. Only recently has research begun to address these problems. Considering the fact that over 3 trillion board feet of sawn lumber has been produced in this country since 1900 and much of it resides in buildings that will one day be disposed of, these reuse issues are important.

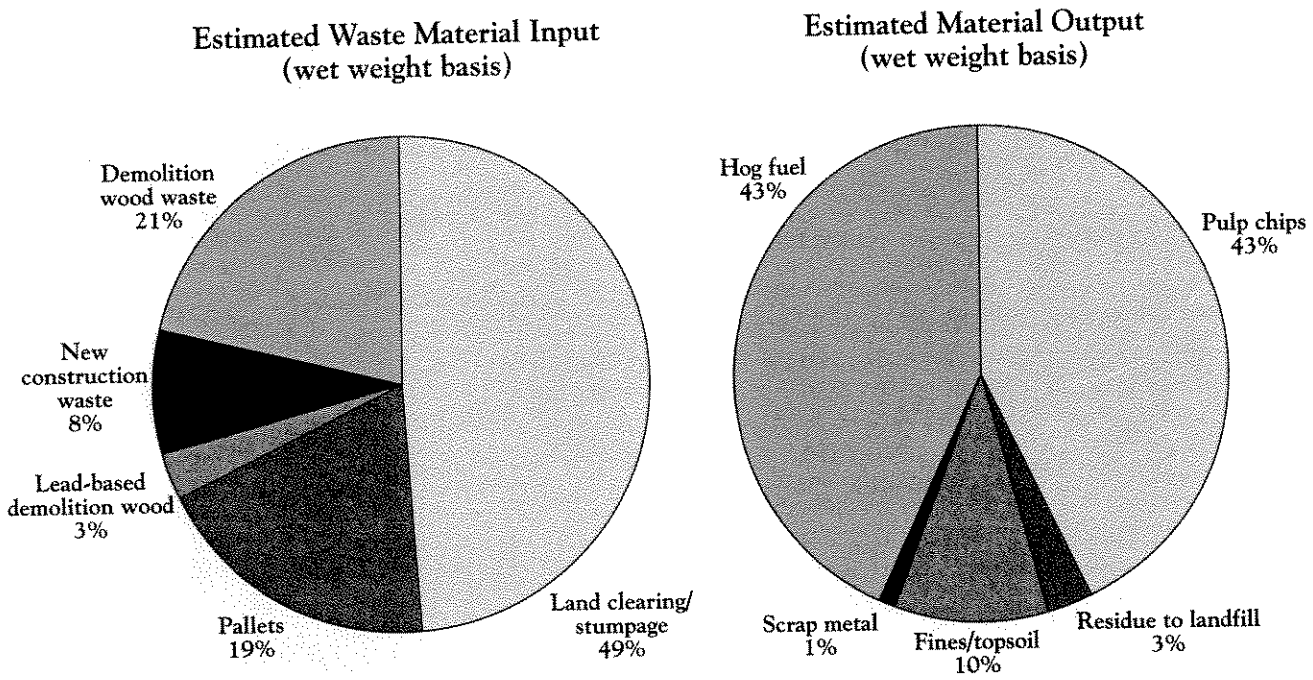


Figure 3.—Estimated material input and output for Recovery 1. Source: *Resource Recycling* magazine, November 1996.

Woodfiber-Plastic Composites

Over the past decade or so, there has been a sharp increase in the use of wood-filled polymeric composites for a variety of applications. The automotive industry manufactures interior parts (e.g., door liners) from these composites and the construction industry uses these materials for exterior applications with members made to standard lumber profiles. Most recently, window and door manufacturers are using these composites as an alternative to clear solid wood in clad components. For more details regarding these products, refer to the feature article by John Youngquist in the October 1995 issue of the *Forest Products Journal*.

Wood/Inorganic-Bonded Products

Recycled particles or fibers of wood held together with an inorganic matrix, such as Portland cement or gypsum, form a composite that can be used in a variety of building applications. These composites offer the potential to be very fire resistant and are highly resistant to attack by decay fungi and insects. These products have been used for decades as construction materials in Europe, Australia, and Japan, but acceptance and growth in the U.S. building products market is only now being realized. Traditionally, virgin fiber was used for these composites, but at least one U.S. manufacturer (Midwest Faswall, Inc., Ottumwa, Iowa) is using a combination of waste wood particles from pallets plus cement to produce a permanent wall form for building construction. James Hardie, Inc., a large Australian manufacturer, is making extensive capital investments in U.S. manufacturing plants in order to produce high density woodfiber/cement panel and roofing products for the U.S. construction market. There is certainly potential for the use of recycled material in these products.

Factors Affecting the Feasibility of Recycling Woodwaste

While it appears that there is a substantial amount of wood available for reuse, as well as a variety of products that might be produced from this wood fiber, several factors affect the feasibility of recycling this material.

Contamination

A major reason that so much of the woodwaste from primary timber processing is utilized (~95%) is that this material is clean and uniform. The primary difficulty in using other forms of woodwaste from MSW and C&D waste streams is that it is often commingled with other materials. Demolition waste is particularly dirty. A demolition waste recycling facility in Massachusetts reports that only about 15 percent of the woodwaste by weight (38% by volume) is usable for their mulch products.

For almost all products produced from woodwaste, cleanliness is an issue. Tolerance of contaminants in high value products, such as MDF and particleboard, is very limited. It's been said that a single Styrofoam coffee cup in a truckload of wood chips destined for an MDF plant is enough to degrade all the boards produced from that truckload. Lower value products, such as boiler fuel, mulch, and animal bedding have tolerance levels for contaminants as well. Most paints (lead!), preservative chemicals, metal, or other foreign materials are not tolerated.

Economics and Market Volatility

How economical it is to recycle woodwaste depends on several factors, including the type of product to be produced from the waste, availability of a nearby resource, and costs of sorting and cleaning. Most importantly, the recycled resource must compete favorably in cost with alternative raw materials.

A good example of the effect of market forces is illustrated by the experience of Willamette Industries.[3] Willamette has been a pioneer in the use of recycled woodwaste from urban sources. After purchasing a Eugene, Oreg., particleboard plant in 1991, Willamette was faced with a shortage of raw materials. With escalating prices and shrinking supplies of traditional particleboard materials, a new source of raw material was needed if the mill was to be kept operational. Between 1993 and 1995, Willamette used over 100,000 bone dry tons of urban woodwaste in its particleboard plant. Although the market demand for fiber was extremely high in 1995, by 1996 demand had softened, prices for all types of wood fiber dropped dramatically, and there was no longer an economic incentive to use urban woodwaste. In 1996, the price of woodwaste from primary processing (sawdust, planer shavings, etc.) had dropped to as little as 50 percent of the price of the urban woodwaste. As a result, Willamette discontinued business with 10 of its 12 suppliers of urban woodwaste. Although the price paid to the remaining two suppliers for their urban woodwaste is higher than the price of available primary processing woodwaste, Willamette has chosen to maintain purchasing contracts with them.

Variability of the Resource

Because waste wood is generated from a variety of sources, the quality, size, species, dryness, and contamination level can vary tremendously. This variability may necessitate more complex processing systems and can affect final product properties. The amount of sorting that is required is also an economic factor. More sorting means higher costs.

Alternative procedures that might result in the delivery of cleaner woodwaste and the ability to produce higher value products from this recycled material are needed. For example, better segregation of waste at new construction sites, i.e., putting the wood in one container and the packaging materials, etc., in other containers is one way to minimize contamination. To facilitate this procedure, the National Association of Home Builders Research Center has just published a field guide for residential construction waste management.[4] Better separation of MSW and C&D debris would certainly help produce a cleaner waste wood resource.

Dispersion of the Resource

Woodwaste exists almost everywhere. But because transportation costs are high relative to the value of this waste material, it is currently only feasible for woodwaste processing facilities to locate where there is a high volume of waste, i.e., urban areas. Obviously, waste wood processors also prefer locations where high volume users are nearby, such as solid-fuel boiler operations, and where high local landfill tipping fees encourage recycling.

Addressing the Difficulties

There are many technical and economic obstacles to overcome, but the indications are that recycled woodwaste can play an increasing role in the production of a variety of wood-based products. Two difficulties that deserve special attention are: 1) developing an infrastructure that can deliver a clean, consistent waste wood resource; and 2) developing definitions and material standards that will help manufacturers and suppliers more uniformly and consistently trade and use this resource. When progress is made in these areas, the potential of woodwaste to become a viable alternative raw material will be realized.

The author is a Research Engineer, USDA Forest Service, Forest Products Laboratory, Madison, Wis.

Accessible information is needed to encourage the use of recycled woodwaste and the following two publications are especially useful.

In cooperation with the USDA Forest Service, the American Forest & Paper Association has developed a directory that lists wood residue receivers nationwide. This document will help those who have recycled woodwaste to find a market for their residue.

The Clean Washington Center, a division of Washington State's Dept. of Community, Trade and Economic Development, has developed a "best practices" manual for woodwaste usage in cooperation with the National Institute of Standards and Technology and the Environmental Protection Agency. This manual contains about 60 best-known uses of wood and concise technical descriptions for the sourcing, handling, and processing of recovered woodwaste, as well as end-use applications, marketing, and safety issues.

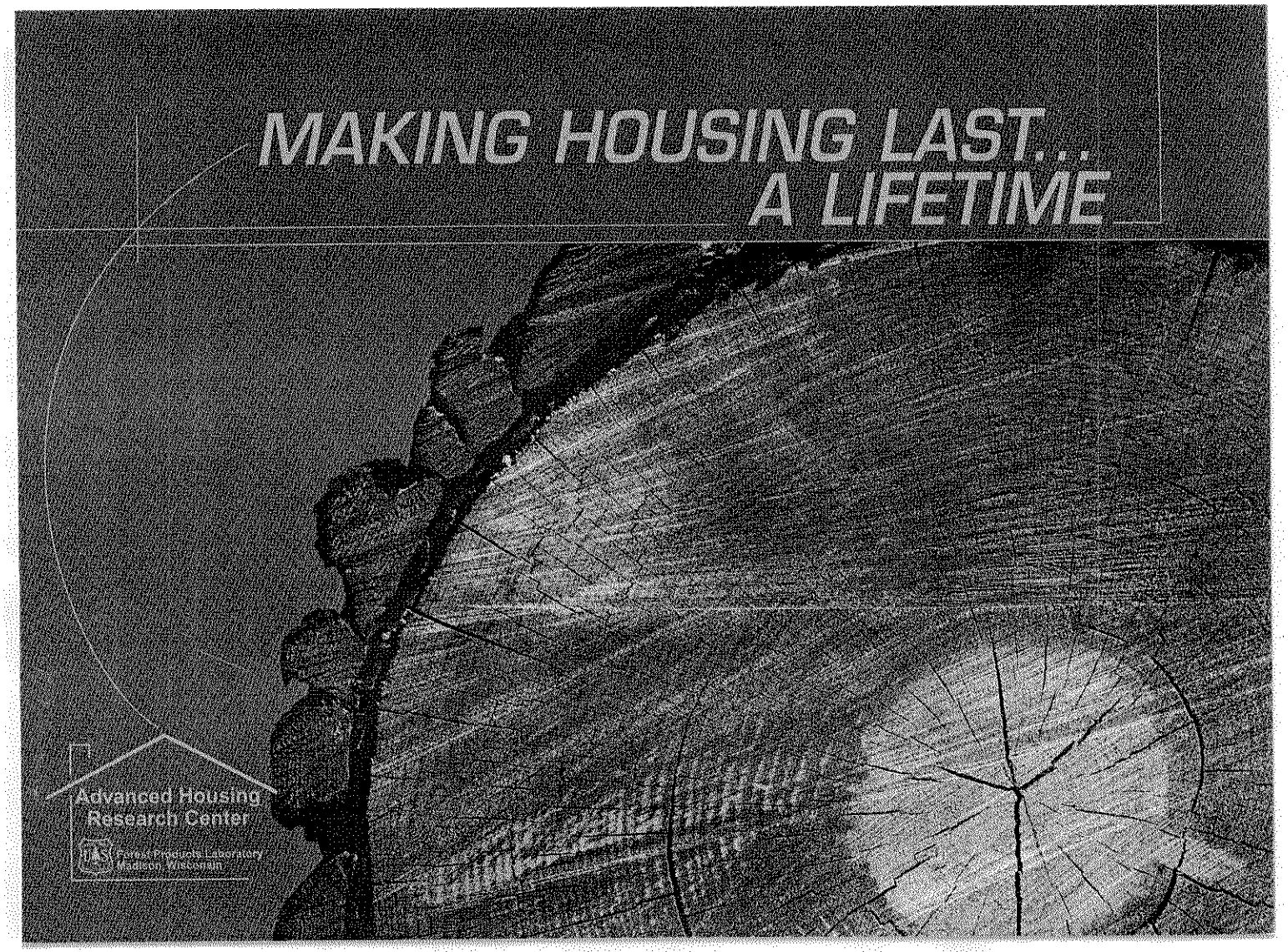
[1]McKeever, D. 1997. Resource Potential of Solid Waste Wood in the United States. *In*: Proc. The Use of Recycled Wood and Paper in Building Applications. Forest Prod. Soc., Madison, Wis.

[2]The Use of Recycled Wood and Paper in Building Applications. 1997. Proc. 7286. Forest Prod. Soc., Madison, Wis.

[3]Smith, D. 1997. Utilization of Urban Wood in the Manufacture of Particleboard and MDF. *In*: Proc. The Use of Recycled Wood and Paper in Building Applications. Forest Prod. Soc., Madison, Wis.

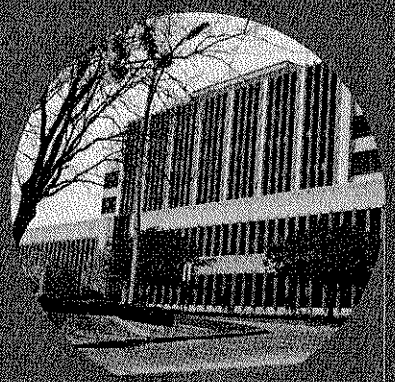
[4]Yost, P. and E. Lund. 1997. Residential Construction Waste Management: A Builder's Field Guide. National Association of Home Builders Research Center, Upper Marlboro, Md.

MAKING HOUSING LAST... A LIFETIME



Advanced Housing Research Center

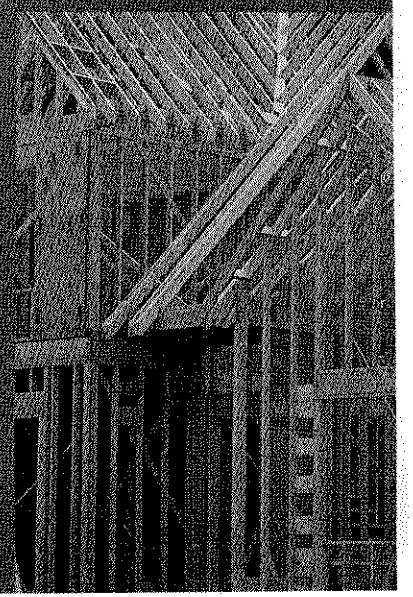
USDA Forest Products Laboratory
Madison, Wisconsin

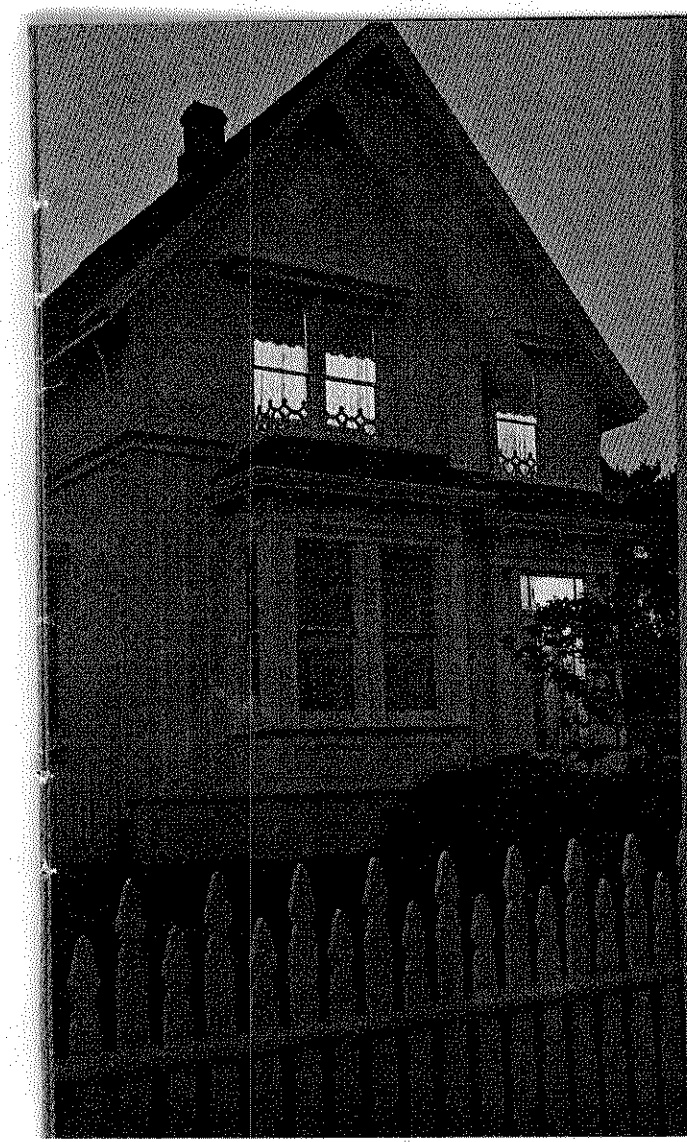


Forest Products Laboratory

TO ENSURE DURABILITY AND QUALITY IN TOMORROW'S HOMES, RESEARCH AND DEVELOPMENT ARE ESSENTIAL.

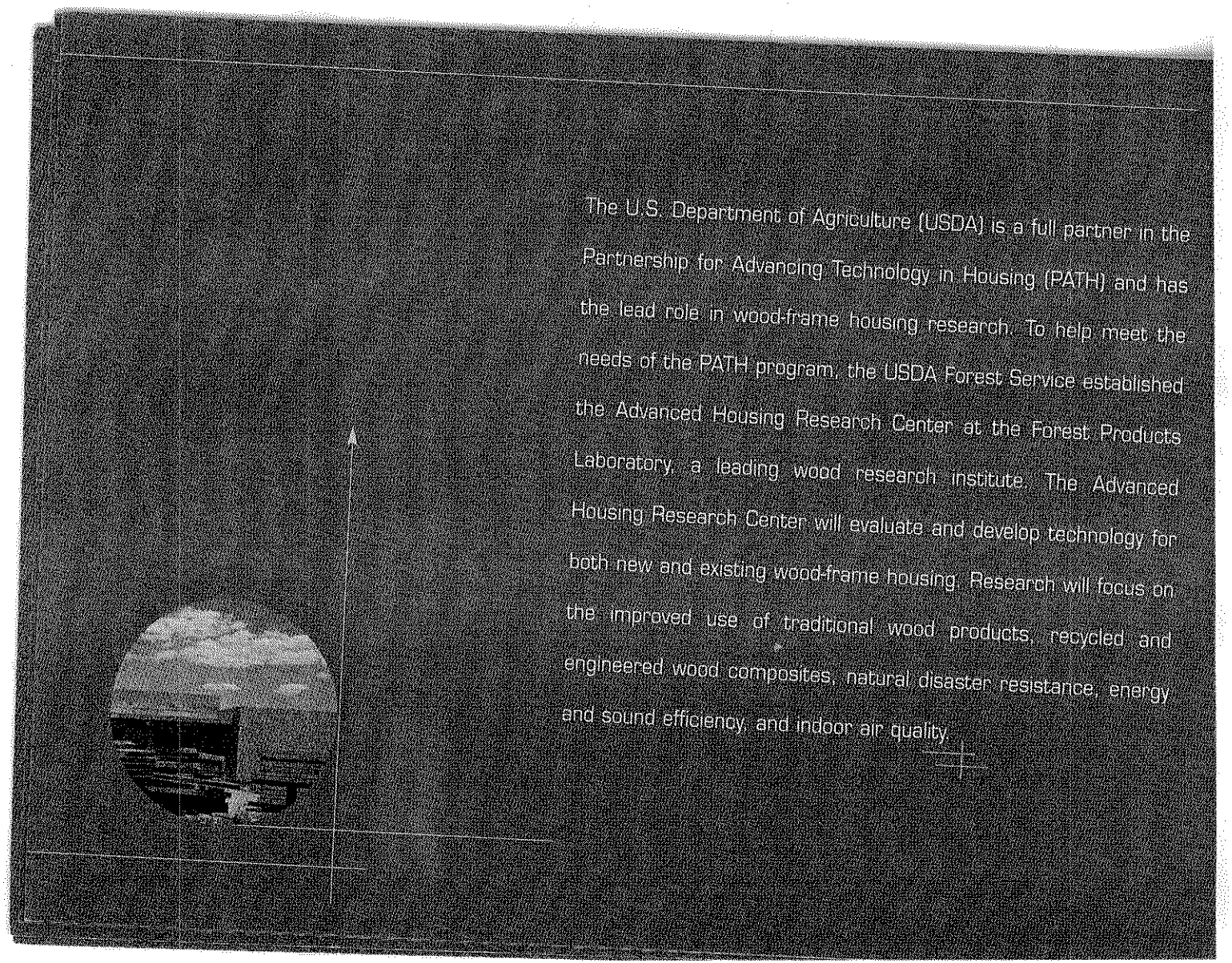
Tom Hamilton
Director
Forest Products Laboratory



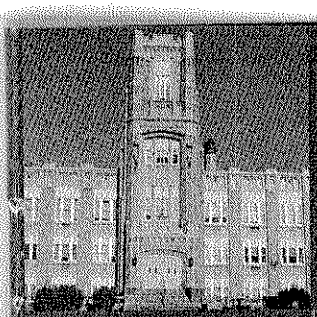


TAKING THE LEAD IN HOUSING RESEARCH

Currently, more than 100 million housing units exist in the United States, most of which are wood framed. Today, wood remains one of the most widely used natural resources to build our homes. Through research and development, wood and wood-based products in homes will become more durable, energy efficient, and affordable.



The U.S. Department of Agriculture (USDA) is a full partner in the Partnership for Advancing Technology in Housing (PATH) and has the lead role in wood-frame housing research. To help meet the needs of the PATH program, the USDA Forest Service established the Advanced Housing Research Center at the Forest Products Laboratory, a leading wood research institute. The Advanced Housing Research Center will evaluate and develop technology for both new and existing wood-frame housing. Research will focus on the improved use of traditional wood products, recycled and engineered wood composites, natural disaster resistance, energy and sound efficiency, and indoor air quality.



BUILDING A BETTER TOMORROW

Establishing partnerships with universities, industry, and special interest groups is an integral part of the Advanced Housing Research Center. Three consortiums have been established to further the objectives, effectiveness, and efficiency of the Center. The Consortium for Wood-Frame Housing, the Natural Disaster Resources Consortium for Wood Structures, and the Consortium for Advanced Engineered Wood Composites will work in partnership with the Advanced Housing Research Center to make new and existing homes more durable for generations to come.

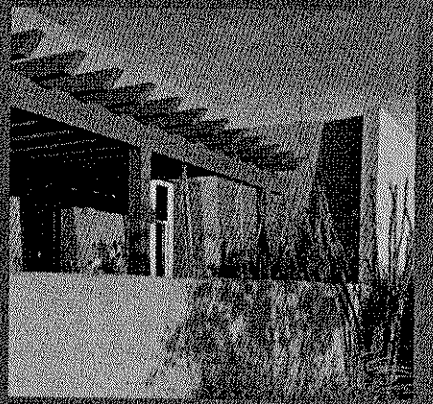
PROVIDING SHELTER FROM THE STORM

High winds, floods, fires, and earthquakes have always been a concern for builders and homeowners, and the Advanced Housing Research Center wants to ensure that tomorrow's homes are more durable and disaster resistant. Knowing firsthand the destructive force of Mother Nature, the Center is conducting research on the durability of wood by measuring the effect of high wind on residential buildings and the effect of cyclic moisture on engineered wood panel products. Right now, there is little or no research on uplift forces caused by extreme wind loads, or on the amount of moisture wood or wood by-products can withstand before decay sets in. Wind and rain testing is vital to creating procedures for load path resistance and to developing future guidelines in engineering building renovations after a devastating flood.

BALANCING THE DEMANDS OF EARTH AND INDUSTRY

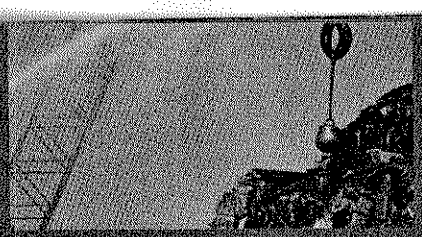
Today, homeowners are demanding low-maintenance, high-performance building products, whereas builders are looking for lower cost, labor-saving construction materials. Recognizing the demands of both the consumer and the builder, the Center is researching cutting-edge innovations in composite materials. Recycled milk jugs, wood waste, and natural fibers are being combined and tested to show how recycled materials can replace traditional construction elements.

Using everyday recycled materials in panelized roofing systems is just one example of housing innovation. The Center determined that recycled panels can be molded easily to match traditional roofing panels such as cedar shake, Spanish tiles, or slate.



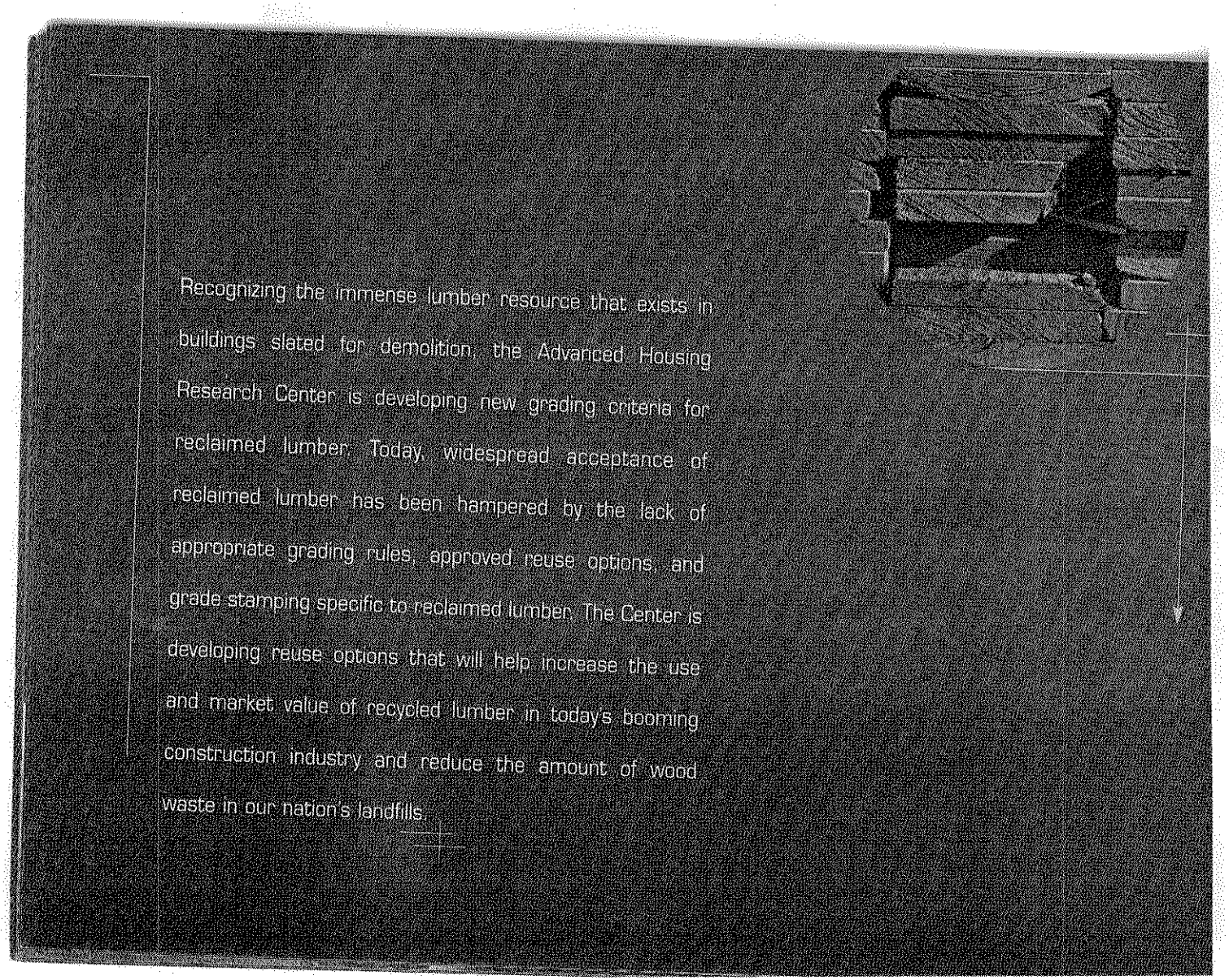
Compared with existing manufactured roofing systems, these new composite roofing panels

- Look identical to traditional materials.
- Install easily with conventional woodworking tools.
- Weigh less than clay or concrete.
- Are fully recyclable from scrap materials.



FINDING INNOVATION IN DEMOLITION

Did you know that approximately 250 million board feet of lumber are available for reuse from vacant World War II buildings, and more than 200,000 housing units are demolished each year in the United States? If the various branches of the military are considered, as well as other government agencies, billions of board feet of lumber are potentially available for new construction. As these structures have come out of service, demolition has been the method of disposal.

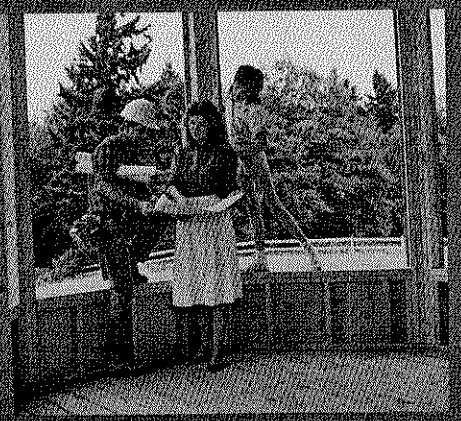


Recognizing the immense lumber resource that exists in buildings slated for demolition, the Advanced Housing Research Center is developing new grading criteria for reclaimed lumber. Today, widespread acceptance of reclaimed lumber has been hampered by the lack of appropriate grading rules, approved reuse options, and grade stamping specific to reclaimed lumber. The Center is developing reuse options that will help increase the use and market value of recycled lumber in today's booming construction industry and reduce the amount of wood waste in our nation's landfills.

MAKING HOUSING LAST... A LIFETIME

To keep up with growing demand in the building industry, construction materials must be durable and disaster resistant yet remain cost-efficient for both consumers and builders.

Technology is changing the way building materials are meeting these demands, and the Advanced Housing Research Center will be working closely with all its partners to improve the quality, durability, environmental performance, energy efficiency, and affordability of our nation's housing.



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