

## ***Appendix 2: Strategies - Construction Waste and Demolition Debris (C&D)***

### ***Strategies (in order of priority)***

- Institutionalize waste prevention, deconstruction, and recycling in project design; specify waste diversion in construction bid documents.
- Develop regional markets.
- Use economic incentives to build infrastructure.
- Institute a phased landfill ban of select C&D waste.
- Educate the public about C&D waste reduction.
- Collaborate with national and regional organizations.

### ***Background***

Vermonters have made considerable strides in recycling, but the focus of state and local waste reduction efforts has been the municipal solid waste (MSW) stream, often at the expense of “special” wastes, such as construction waste and demolition (C&D) debris.

The revised Vermont Solid Waste Management Plan contains the goal of 50% municipal solid waste (MSW) diversion of the waste stream from disposal by 2011. While this goal does not include C&D, these wastes are part and parcel of the waste management dilemma: too much waste, too little waste prevention. Clearly, additional reduction, reuse, and recycling of C&D waste will need to be accomplished, and the State should set a goal for its C&D waste in addition to a MSW goal.

C&D waste is also prone to improper on-site disposal, either by burning or burial. Both of these methods of disposal are illegal, and can damage the environment and threaten public health.

### **What is Construction and Demolition Debris?**

The Solid Waste Management Rules include a definition of “construction and demolition waste.” The definition has been developed from various guidance documents and certification conditions.

“Construction and Demolition Waste means, for the purpose of these rules, waste derived from the construction or demolition of buildings, roadways or structures including but not limited to clean wood, treated or painted wood, plaster, sheetrock, roofing paper and shingles, insulation, glass, stone, soil, flooring materials, brick, masonry, mortar, incidental metal, furniture and mattresses. This waste does not include asbestos waste, regulated hazardous waste, hazardous waste generated by households, hazardous waste

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from conditionally exempt generators, or any material banned from landfill disposal under 10 VSA §6621."

C&D waste, quite simply, is any waste material inherent to building construction or demolition. C&D waste also includes roadway waste, such as asphalt and concrete, although these wastes are generally managed differently than building debris, and are not included in this subchapter.

### **How Much Construction and Demolition Waste is Generated at a Single Project, and in Vermont as a Whole?**

Various studies from around the country have concluded that about four pounds of C&D waste is generated per square foot of light building construction. For example, construction of a 1500 square foot home would result in the generation of 6000 pounds, or three tons, of waste.

Additionally, it is estimated that about 50 pounds of C&D waste is generated per square foot of light building demolition. Demolishing that same 1500 square foot house would generate 75,000 pounds, or over 37 tons, of debris.

The numbers add up. In Vermont, we legally disposed 127,590 tons of building related C&D waste in 2006. This figure does not include asphalt and concrete waste generated from road projects, nor does it include illegal disposal, on-site disposal, nor legal disposal of mixed loads of municipal and C&D waste. The actual tonnage is likely much higher. For comparison, Vermont disposed or incinerated about 414,273 tons municipal solid waste in 2006.

New residential C&D waste differs from new commercial and industrial C&D waste. The residential waste stream contains more wood, more drywall, and more asphalt roofing shingles. Residential loads are smaller, which frequently works against reuse and recycling; the amount of reusable or recyclable materials generated may not be worth the hauling cost to bring them to market.

Realistically, at least for the foreseeable future, C&D wastes will continue to be generated despite our best efforts to prevent it. This is especially true for demolition and renovation waste. While current and future buildings should be sustainable, more durable, and generate less waste, the current building stock in Vermont will, invariably, become structurally obsolete and need to be managed. Demolition wastes, and new construction wastes that cannot be "prevented," may be appropriate for reuse and recycling.

While C&D waste prevention was the focal point of the subcommittee, strategies for reuse and recycling of wastes that are generated are also included in this subchapter.

## *Recommended Strategy Details*

### *1 - Institutionalize Waste Prevention, Deconstruction, and Recycling in Project; Specify Waste Diversion in Construction Bid Documents*

The greatest opportunity to prevent waste begins at the building design stage. From “Requests for Proposals” for institutional buildings, to homeowner conversations with their builder, planning for waste reduction should begin at the earliest stages of the project. For example, property owners can rehabilitate older buildings, build smaller buildings using standard dimensions, and use environmentally preferable and durable products. All of these measures equate to less waste generated.

Additionally, if waste reduction options are considered at the conception of the construction project and thoughtfully incorporated into the written documents that direct it, more of the waste generated, will end up reused and recycled. Only when the owner, designer, and contractor have a written understanding as to waste prevention opportunities through design and waste diversion, will expectations for waste prevention and waste diversion be maximized.

Waste prevention does not lend itself to formal specifications as readily as waste diversion. That is, most waste prevention occurs in the project planning and design stage, rather than during construction. Additionally, unless not performing the work is an option, demolition or renovation waste generate is difficult to prevent through specifications, and diversion of these wastes is the only logical alternative. Therefore, guidelines for waste prevention should be available, and specifications for waste diversion should be developed and incorporated.

#### **Action Steps:**

1. ANR staff to research and recommend waste prevention and waste diversion practices to incorporate into Vermont projects. ANR will work with Vermont American Institute of Architects (VT AIA), the Vermont Green Building Network (VGBN), Associated General Contractors (AGC), Construction Specifications Institute (CSI) and other relevant organizations to develop the best C&D management practices and formal specifications and promote and institutionalize them.
2. ANR will work with Vermont Department of Buildings and General Services to “lead by example” by incorporating the waste reduction guidelines and specifications, thereby providing leadership for Vermont developers, builders, and contractors to follow.
3. ANR will promote the waste prevention and diversion practices within the Natural Resources Board (Act 250) process, municipal permitting processes, and Vermont builder associations, and with the general public for building project specifications.
4. ANR will support work with the Vermont Green Building Network and other “green building” organizations. For example, ANR will work toward mandating LEED (Leadership in Energy and Environmental Design), or LEED-equivalent designs, for large publically-funded projects. LEED, which is a voluntary, consensus-based

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national rating system for developing high-performance, sustainable buildings, includes credits for waste prevention, reuse and recycling. ANR, along with these organizations, will facilitate and encourage sustainable building designs, innovative construction practices, and environmentally preferable materials.

**Timeline:** Year 1

**Partners:** Vermont American Institute of Architects (VT AIA), the Vermont Green Building Network (VGBN), Associated General Contractors (AGC), and the Construction Specifications Institute (CSI)

**Estimated Cost:** 0.05 FTE of an ANR staff person for technical assistance. Two to three ANR FTEs for general Act 250, landfill material bans, and waste stream enforcement. See Strategy 3, below.

**Funding Sources:** Solid Waste Management Assistance Fund

**Measures of Success:** Waste prevention planning and implementation becomes standard practice for commercial and industrial buildings. Specifications are uniform and accepted. Residential building waste prevention becomes common.

The following Action Steps to Develop Regional Markets; Build Infrastructure; and Developing a Phased Landfill Ban for Selected Materials are interrelated. Implementation of each Action Step will need to be simultaneous with other the steps in order to be effective.

For example:

- A landfill materials ban can not be effective without alternative markets for the banned materials,
- Incentives and technical assistance needs will need to be put in place to help develop or expand existing markets,
- ANR permitting for recycling collection and processing facilities needs to align with the low risk nature of the materials. That is, unnecessary regulatory hurdles should not hinder market development or be a needless economic disadvantage.
- Education and outreach to developers, builders, contractors, haulers, and homeowners - all of the parties involved in C&D waste management - is integral to the success of the overall program. Education will need to be comprehensive and well-coordinated between all of these groups.
- C&D recycling markets are regional, many located outside of Vermont. It is imperative that ANR keep informed of market conditions, align ourselves accordingly, and keep abreast of emerging technologies and markets.

In order to accomplish this, ANR will need to partner with the Sustainable Jobs Fund (SJF), Department of Economic Development (DED), Small Business Development Center (SBDC), VT Economic Development Authority (VEDA) and other economic development providers to help develop a sustainable materials management strategy. Funding the strategy would

come from a shift in waste management fees -- an increase in disposal costs by raising the Solid Waste Management Assistance Fund tax.

## ***2. Develop Regional Markets***

This work will need to be done in coordination with a larger sustainable materials management strategy. Partners in the strategy will need to research costs and resources needed to develop infrastructure (including capital and technical assistance)

### **2.1 Reuse markets**

The waste management hierarchy identifies reuse as a preferred waste management option to recycling. Reuse further conserves natural resources. Reuse of building materials preserves embodied energy (the energy invested to extract raw materials and manufacture the original product). A door is reused as a door; a cabinet is re-installed as a cabinet. Lumber may be reused as lumber, or may be up-cycled into a higher grade material such as trim or furniture stock.

Deconstruction of obsolete buildings, rather than demolition, is becoming more commonplace across the country. Subsequently, the resale and reuse of used building materials is also increasing, and this is a trend that the State should encourage as reuse of materials is environmentally preferable to recycling and generally more economical for the consumer. Portions of Vermont are fortunate to be served by deconstruction entities and used building material stores. Still in many areas, these services are non-existent or far from potential customers. Markets for reusable building waste have expanded and ANR can continue to increase its support for value-added options from used building materials such as by creating furniture, picture frames, sheds, and more.

### **Action Steps:**

1. ANR will work with Department of Economic Development, Vermont Economic Development Authority, and Sustainable Jobs Fund to set up an infrastructure to financially support development of collection points for used building materials (UBM) and swap sheds, and UBM retail stores themselves in all parts of the state. This would allow homeowners and commercial entities located anywhere in the state to be assured of a place to either sell or donate used building materials, and to buy UBM.
2. C&D reuse and recycling businesses are nontraditional and not well understood or deemed risky by the banking industry. Financing for these firms is often difficult to obtain. Work with financial institutions to substantiate the value from deconstruction and used building material businesses. Further, ANR and Solid Waste Planning Entities (SWPE) will educate the public about used building materials. Finally, ANR and SWPEs will promote the Vermont Business Materials Exchange<sup>26</sup> and

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<sup>26</sup> <http://vbmex.org/index.php>

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the Vermont Construction Reuse Network<sup>27</sup> as an option for buying or selling used construction materials.

3. ANR will continue to explore ways of facilitating the “harvest” of reusable materials from the C&D waste stream. Solid waste implementation plans must contain language encouraging reuse, facility certifications should contain conditions which allow, or even mandate the collection of reusable materials. Basically, ANR certification and planning processes will encourage and not hinder the reuse of C&D materials.
4. State BGS should continue to be a model for C&D reuse by, where feasible, providing used building materials from renovation projects, and using UBM in new construction.
5. Through financial, technical and marketing assistance, the State and Solid Waste Planning Entities shall promote the use of C&D materials in the manufacture of value added products.

## 2.2 Recycling Markets

The subcommittee determined that clean wood, drywall, and asphalt shingles warranted particular reuse and recycling marketing efforts. As with most wastes, stable and economic markets are crucial to successful reuse and recycling options for these particular components. Often, reuse and recycling efforts for wood, drywall and shingles are hampered by the inconsistency of material collection programs throughout the state, and the lack of collection and/or processing infrastructure. Particular priority emphasis should be given to developing statewide collection systems and secure markets. This effort could include offering technical assistance, conducting research and pilots projects, and pursuing financial assistance, such as grants and loans.

As with reuse, ANR should continue to streamline the regulatory process for recycling facilities, or for facilities that want to add C&D recycling components.

### Action Steps:

#### Clean Wood Waste

1. More and more large public and private buildings are burning biomass for fuel, and yet most clean C&D wood waste is landfilled (or burned on site.) ANR and SWDs should facilitate relationships between the sources of clean wood (transfer stations, municipal “stump dumps,” haulers) and industrial wood-fired boilers in the state (schools, industrial plants, et al...).
2. As part of the sustainable materials management strategy, assess the practicality of funding a mobile chipper for clean wood waste.
3. To consolidate materials and create economies of scale, ANR should facilitate a network of district, municipal, and/or regional private sector clean wood collection points.

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<sup>27</sup> <http://www.vcrn.org/>

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4. Because there are current markets for clean wood other than as fuel, such as for mulch and compost bulking agent, truly, no clean wood should be landfilled. This material should be the first C&D item to be banned from landfills.

### Asphalt Shingles

Asphalt shingles are recyclable. Markets in other states are strong and past ANR research has determined that asphalt shingles can be incorporated into various beneficial road products in Vermont.

Vermont needs to encourage regional private sector entities (aggregate processors, hot mix asphalt plants) to enter the marketplace by providing incentives (financial or technical assistance) for existing aggregate producers to incorporate shingles in their aggregate mix, and work with VTrans, Vermont Local Roads, and municipalities to utilize the end products.

### Drywall

Drywall recycling markets are emerging throughout the country, and do exist to some degree in Vermont. Vermont should continue to advance drywall recycling in order to create the "critical mass" necessary to establish a statewide, economical collection and transportation system. Vermont should continue to research alternative local uses of scrap drywall such as land application and as a compost ingredient.

**Timeline:** Years 1-5 (2008 - 2013)

**Partners:** Department of Economic Development, Vermont Economic Development Authority (VEDA), Sustainable Jobs Fund, VTrans, Financial Institutions

**Cost:** Unknown

**Potential Funding Sources:** commercial lending institutions, Solid Waste Management Assistance Fund, VEDA.

**Measures of Success:** By 2013, 100% of clean wood waste is recycled or burned for energy. By 2011, 75% of drywall and asphalt shingles are recycled, and by 2014, 100% of these wastes are recycled.

### ***3 - Institute a Phased Landfill Ban of Select C&D Waste***

In conjunction with education and reuse and recycling market development, certain C&D wastes should not be landfilled. These materials have existing markets, or markets are emerging, and these material are easily identified and segregated from the waste stream. Landfill bans will encourage the prevention of these wastes through more efficient building designs, product stewardship, "greener" materials, and serve to promote alternative reuses and recycling. The ban could include the following:

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### Action Steps:

1. Phase in ban. Start with materials with established recycling markets (metal, cardboard, asphalt, brick, concrete). Phase in materials such as clean wood, drywall, and tear-off asphalt roofing shingles over time.
  - a. Landfills and transfer stations must reject loads with banned materials and/or provide collection areas for marketing these materials.
  - b. Publicize successful enforcement cases to help other companies comply. Add enforcement to the landfill material bans and include who enforces and how.
  - c. ANR and SWPEs must perform job site "dumpster dives" to encourage waste prevention and reduction, and to enforce material specifications and landfill material bans.

**Timeline:** Starting year 3 (2011) for clean wood, cardboard, asphalt, brick and concrete. Starting year 6 (2014) for drywall and asphalt shingles.

**Partners:** SWPE

**Estimated Cost:** In year one, 0.10 FTE of an ANR staff person to facilitate statutory changes. Two to three ANR FTEs for general Act 250, landfill materials ban, and waste stream enforcement. See Strategy 1, above.

**Potential Funding Sources:** Solid Waste Management Assistance Fund

**Measures of Success:** By 2014, no clean wood, cardboard, asphalt, brick and concrete, drywall or asphalt shingles are landfilled.

### ***4 - Use Economic Incentives to Build Infrastructure***

(This priority action would be developed as part of the Sustainable Materials Management Strategy). Incentives could include funds for R&D, pilot projects and technical assistance.

### ***5 - Public Education***

Educate all sectors in the production of C&D wastes - from the building material manufacturer to the waste hauler - in options for waste prevention and diversion. ANR and SWPEs must promote case studies that indicated that proper C&D management could save money as compared to simple disposal.

### Action Steps:

1. Provide waste prevention, reuse, and material exchange information to ANR permit specialists, Act 250 district coordinators, and local zoning offices. (Apply for a building permit and receive waste prevention info.)
2. Give waste prevention information to haulers to put in customers' invoices.
3. Leave waste prevention information at building supply stores.

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**Timeline:** Years 1-5 (2008 - 2013)

**Partners:** Municipalities, Building Industry, SWPE

**Estimated Cost:** 0.10 FTE of an ANR staff person, 0.10 FTE of other groups' time

**Potential Funding Sources:** Solid Waste Management Assistance Fund

**Measures of Success:** construction and demolition waste prevention, reuse and recycling options are known and understood by the majority of the potential C&D generators. Information is accessible, current, and useful to all segments.

### *6 - Collaborate with National and Regional Organizations*

Strategies will be coordinated with national organizations and efforts related to reducing C&D waste. Some of these organizations include the Building Materials Reuse Association, the Construction Materials Recycling Association, the U.S. Green Building Council, product stewardship organizations and the U.S. EPA.