

Construction, Renovation and Demolition Waste Reduction Education and Communication Information

Prepared for:
ALBERTA ENVIRONMENT
and
THE CRD WASTE REDUCTION ADVISORY COMMITTEE

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April 2000

Executive Summary

This report presents results of a construction, renovation and demolition (CRD) waste reduction education and communication study conducted by CH2M Gore & Storrie Limited (CG&S). The overall objective of the study was to obtain existing information on CRD waste reduction programs and to compile a database that can be used to develop an Alberta education/communication program for both the CRD industry and the public. This was achieved through a literature review and informal telephone interviews of North American organizations that have undertaken CRD waste reduction programs. A total of 128 documents ranging from factsheets and guides to newsletters and videos were collected and compiled into an Excel® database. Of the 26 organizations contacted during the interviews 11 are highlighted with brief summary descriptions, this includes the Greater Vancouver Regional District, BC and King County, WA. Recommendations to Alberta Environment and the CRD Waste Reduction Advisory Committee centre on developing a CRD waste reduction education/communication strategy. Options that should be considered include peer-to-peer seminars, how-to guides, case studies and websites.

Keywords: construction, CRD, demolition, education programs, job site recycling, renovation, salvage, waste reduction

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1. Introduction

Waste generated by the construction, renovation and demolition (CRD) sector is believed to account for approximately one-quarter of the total waste stream disposed of in Alberta's landfills. This suggests that any programs developed to reduce the total quantity of waste being landfilled in the province will need to address the CRD waste stream.

Recognising that the reduction of CRD waste disposed of in Alberta will require the combined efforts and co-operation of industry and government, a joint government/industry CRD Waste Reduction Advisory Committee (Committee) was formed in the Fall of 1999. The mandate of the Committee is to explore methods of reducing the amount of CRD waste being disposed of in Alberta, and its efforts are being directed into the following three subject areas:

1. Policy Guidelines and Specification,
2. Communications and Education, and
3. Products and Markets.

This study is one component of the Communications and Education area. The results of this study will be used by the Committee to develop a communication and education strategy to promote greater acceptance and use of sustainable CRD practices by improving public and industry awareness of the benefits and opportunities for CRD waste reduction.

Objectives

The overall objective of this study was to obtain information on existing CRD waste reduction programs and to compile it in a database that can be used to develop an education and communication program for both the CRD industry and the public in Alberta. Specific objectives of the study included:

- Collecting CRD waste reduction education and communication documents and other information sources that are readily-available in North America;
- Cataloguing the materials and compiling it in a database program; and
- Conducting interviews with governments and public and private organizations in North America in order to obtain information regarding their CRD waste reduction education programs.

Scope of Work

- To achieve the study objectives, the Committee proposed the following scope of work:
- Conduct a literature search to identify North American organizations that have undertaken industry and/or public education and communication programs on CRD waste reduction.

- Contact and interview organizations identified above to gather information on the nature and success of their program and to compile examples of the waste reduction education/communications materials they have generated and used.
- Gather a comprehensive inventory of CRD waste reduction education/communication materials that include guidance documents, training manuals and videos, factsheets, web sites, newsletters, posters, presentations, case histories, advertisements (print and electronic media), and other forms of communication material.
- Compile these materials and catalogue them into a database for future reference by the CRD Committee.
- Prepare a report summarizing the details of the education/communication programs used by other organizations and providing an assessment of the perceived relative effectiveness of the various elements of the program and the overall success of the program in achieving actual waste reduction goals.
- Present the results of the study to the CRD Waste Reduction Advisory Committee.

Contents of Report

Section 2 provides a description of the methods used to collect, classify and catalogue the existing CRD information. This section includes a description of the database structure and program selection.

Section 3 presents the results of the literature search and describes the information included in the database, while Section 4 discusses CRD waste reduction and education programs in North America.

Section 5 summarises the findings of the study and provides recommendations for implementation of a CRD waste reduction program.

Supporting data, such as a printout of the database, selected program summaries and a contact list of the governments and municipalities that were interviewed, and detailed abstracts of the most relevant documents in the database, are presented in Appendices A through C.

2. Methodology

Literature Search

The primary information source for the literature search was the Internet. This allowed a large number of organizations to be identified and contacted for information relating to CRD waste reduction publications. Websites for various levels of governments (e.g., federal, provincial/state, county, municipal) were located along with websites for home builders' associations, demolition contractors' associations, non-profit organizations, universities, and other CRD and 'green' building associations. Approximately one-third of the publications collected were downloaded directly from the Internet, while the remainder of the publications were ordered from selected organizations via telephone orders or Internet order forms.

To find information published by organizations that are not listed on the Internet, searches of the following library catalogues and publication databases were conducted:

- International Construction Database (ICONDA, the database of the International Council for Building Research, Studies and Documentation)
- Calgary Public Library
- University of Calgary Library
- U.S. Environmental Protection Agency
- U.S. Department of Commerce National Technical Information Service
- NEOS Library Consortium

The annual indices for the trade journal *Biocycle - Journal of Composting and Recycling* were also reviewed in order to find recent articles on North American CRD waste reduction programs and case studies. Articles published on similar topics in other journals were also obtained via the Internet.

Documents collected during the literature search were organized alphabetically by title, and each document was assigned an identification number. Identification numbers began at 001, the number assigned to the first document, and continued in numerical order to 128, which is the number of what is currently the last publication listed in the database. The documents were then catalogued in a searchable, spreadsheet-based database.

Database Program Selection and Structure

The CRD education and communication database was created in Microsoft Excel®. Alberta Environment selected this program since it is relatively simple, user-friendly, and commonly used by government, industry and the public. Each entry in the database consists of seven datafields which contain the following information:

- publication identification number,
- item title,
- author,
- publication date,
- media type (e.g., printed guide, video),
- brief description of the information contained in the item, and
- the availability of the item as of January 20, 2000, and a contact source for obtaining the document.

The database can be easily searched by keyword (e.g., shingles, demolition) or by datafield (e.g., author, document title) using Excel®'s *Find* function.

Interviews With Governments and Organizations

Informal telephone interviews were conducted with government departments and organizations located throughout North America. The list of organizations initially selected for inclusion in the interviews was based on contact information obtained from the Internet during the literature search; however, this list was expanded to include additional contact references that were obtained during the interview process.

In total, 17 provincial, state, county and municipal solid waste departments or boards and 9 public and private CRD organizations were interviewed. A list of the organizations that were contacted during the telephone interviews is given in Table 2-1, and contact information for selected organizations is presented in Appendix A.

Table 2-1
LIST OF GOVERNMENTS AND CRD ORGANIZATIONS INTERVIEWED

Governments	
Canada	U.S.A.
Capital Regional District (British Columbia)	City of Austin (Texas)
City of Edmonton (Alberta)	California Integrated Waste Management Board
Regional Municipality of Halifax (Nova Scotia)	King Country (Washington)
Ontario Ministry of Environment and Energy	City of Los Angeles (California)
Regional Municipality of Ottawa-Carleton (Ontario)	Metro Portland (Oregon)
Regional Municipality of Peel (Ontario)	New Hampshire Department of Environmental Services
Metro Toronto (Ontario)	Triangle J Council of Governments (North Carolina)
Greater Vancouver Regional District (British Columbia)	Washtenaw County (Michigan)
Region of Waterloo (Ontario)	
Organizations	
Canada	U.S.A
Calgary Home Builders Association	Community Environmental Council (California)
Canada Mortgage and Housing Corporation	National Association of Demolition Contractors
Edmonton Home Builders Association	National Association of Home Builders
Ontario Home Builders Association	North Carolina Cooperative Extension
Used Building Materials Association	

During the interview, each organization was asked if a CRD waste reduction program existed in their jurisdiction. Organizations that currently have CRD waste reduction programs, or that once had programs, were then asked to provide information regarding:

- the type of CRD waste reduction program;
- the relative success of the program;
- the difficulties they encountered during the implementation of the program;
- suggestions they had to improve the success of a CRD waste reduction program; and
- the existence and availability of CRD waste reduction publications.

Copies of all publications identified during the interviews were requested for inclusion in the database.

3. CRD Waste Reduction Education and Communication Documents

Database

A total of 128 publications, which ranged from factsheets and guides to newsletters and workshop notes, were collected during the literature search and catalogued in the database. Since the majority of these items were published post-1995, the information compiled in the database is relatively current and reflects the present state of CRD waste reduction, education and communications in North America. A printout of the database is presented in Appendix B.

Four educational videos, ranging in length from 9 to 25 minutes, were also obtained during the literature search. One of the videos, produced by the Construction, Demolition and Landclearing (CDL) Council of Washington state and entitled *CDL Council Job Site Recycling Workshop*, provides information regarding workshop structure and potential guest speakers.

Many of the guides obtained during this study were informative, how-to documents that provided detailed information for a specific audience. Some guides were oriented toward members of the CRD industry and provided an overview of job site waste reuse and recycling options, while others provided information for government agencies and program organizers such as instructions on developing and presenting CRD waste reduction workshops. A short list of guides suggested for review and consideration by the CRD Waste Reduction Advisory Committee is as follows:

1. *Hosting a Waste Reduction Event: A Kit for Local Home Builders' Associations*
2. *How Home Builders and Renovators Can Build a Green Future*
3. *Lower Costs Through Waste Reduction: Practical Ideas for Ontario Home Builders*
4. *Recycling Plus Program Manual: A Best Practices Manual for Construction Job Site Recycling*
5. *Residential Construction Waste Management: A Builder's Field Guide*
6. *Residential Construction Waste Management: A Coordinator's Guide to Conducting Workshops at the Local Level*
7. *Waste Management and Recovery: A Field Guide for Residential Remodelers*

A brief summary of each of these guides can be found in Appendix C.

Internet Resources

A number of organizations with CRD waste reduction information were located during the Internet literature search. Organizations that have CRD website resources that differ from those mentioned in the CRD education and communication database are listed in Table 3-1.

Table 3-1
Summary of Internet CRD Waste Reduction Resources

Organization/ (Sponsor)	Description	Website Address
C&D Waste Web	Information for Canadian C&D waste management and 3Rs	http://www.cdwaste.com
Clean Washington Center (Pacific Northwest Economic Region, USEPA, Manufacturing Extension Partnership)	Construction material recycling, green building, case studies and job site recycling program information	http://www.cwc.org/briefs/construction.html
Environmental Building News (Private company)	Leading newsletter on environmentally responsible design and construction – extensive list of books, periodicals and videos	http://www.ebuild.com
Green Building Information Council (Non-profit organization)	Information on energy and environmental issues in the building sector - good international links	http://www.greenbuilding.ca
INFORM (Non-profit organization)	Identifies practical ways of living and doing business that are environmentally sustainable	http://www.informinc.org
Smart Growth Network (International City/County Management Association, USEPA, Florida A&M)	Good selection of resources on deconstruction	http://www.smartgrowth.org
State of Michigan Department of Environmental Quality (Government)	Website links for reuse and recycling of CRD waste and green building practices	http://www.deq.state.mi.us/ead/recycle/c%26d.html
Triangle J Council of Governments (Government)	WASTESPEC - specifications and case studies	http://www.tjcog.dst.nc.us/cdwaste.htm
United States Green Building Council (Southern California Gas Company, Bank of America, Edison International, Carrier and Turner Construction)	Assists with green building practices	http://www.usgbc.org
Used Building Materials Association (Non-profit organization)	Represents salvage contractors and used building material yards	http://www.ubma.org
Washington State Department of Ecology (State University)	Information for CDL and sustainable building	http://www.wa.gov/ecology/swfa/cdl/cdlframe.html
Wastenot (Royal Architectural Institute of Canada, Environment Canada, Industry Canada, Public Works and Government Services Canada)	Quarterly publication on cost effective sustainable construction and demolition	http://www.raic.org/wastenot/

4. CRD Waste Reduction Education and Communications Programs in North America

Information collected during this study is presented below in two subsections. The first subsection summarises the results of the telephone interviews, and the second subsection evaluates the performance of CRD waste reduction education and communications programs that have been implemented elsewhere in North America.

Interview Results

Of the 26 organizations that were contacted regarding CRD waste reduction education programs, 11 presently have or once had waste reduction education programs available. The majority of these programs included workshops and a variety of publications; a list of these organizations, along with a sample list of the publications they offered, is presented in Table 4-1.

Table 4-1
CRD Waste Reduction Education Programs that Include Seminars/Workshops and Publications

Organization	Year	Seminar/Workshop	Publications/Videos
California Integrated Waste Management Board	1995 – ongoing	New in 2000	<ul style="list-style-type: none"> Asphalt Pavement Recycling Job Site Source Separation
City of Edmonton	1994 – 1996	Held kickoff conference	<ul style="list-style-type: none"> PICC UP Waste for a Healthier, Cleaner Community Waste Edmonton, Partners in Clean Construction (Video)
Community Environmental Council, CA	1997 – ongoing	Yes, in past	<ul style="list-style-type: none"> Constraints and Opportunities: Expanding Recovery in the Demolition Industry
Greater Vancouver Regional District	1997 – ongoing	Yes	<ul style="list-style-type: none"> Demolition and Salvage: A Guide for Developers and Renovators Job Site Recycling: a Guide for Builders and Developers
King County	1993 – ongoing	Yes	<ul style="list-style-type: none"> Construction Recycling Directory - 1999/2000 Contractors' Guide to Preventing Waste and Recycling
METRO Portland	1991 – ongoing	Yes, in past	<ul style="list-style-type: none"> Construction Site Recycling Guide 2000 Resource Efficient Building: a Handbook for Building Owners, Designers and Project Managers
METRO Toronto	1991 – 1993	No	<ul style="list-style-type: none"> Recycling Markets Directory - Industrial, Commercial and Institutional
Region of Waterloo	1994 – 1996	Yes	<ul style="list-style-type: none"> Publications no longer available
Regional Municipality of Ottawa-Carleton	1993 – 1996	Yes	<ul style="list-style-type: none"> Publications no longer available
Regional Municipality of Peel	1996 – 1997	Yes	<ul style="list-style-type: none"> Environmentally Conscious Construction: A Practical Guide for the Construction and Demolition Industry
Triangle J Council of Governments	1993 – ongoing	Yes, in past	<ul style="list-style-type: none"> Don't Trash it! Reducing Residential Construction Debris (Video)

Thirteen of the organizations that were contacted did not have structured CRD waste reduction education program that included components such as seminars or workshops. However, many of these organizations distribute CRD waste reduction literature to industry and the public. A summary of the information distributed by these organizations is presented in Table 4-2.

Table 4-2
Organizations that Distribute CRD Waste Reduction Publications

Organization	Publications/Videos
Calgary Home Builders Association	<ul style="list-style-type: none"> • Success in Residential Construction Recycling, Rocky Ridge Recycling Pilot Project
Canada Mortgage and Housing Corporation	<ul style="list-style-type: none"> • How Home Builders and Renovators Can Help Build a Green Future • Making a Molehill Out of a Mountain (Video)
Capital Regional District, BC	<ul style="list-style-type: none"> • What to do With Home Renovation Waste: a 3R's Guide to Home Improvement
City of Austin, TX	<ul style="list-style-type: none"> • Sustainable Building Source Book
City of Los Angeles, CA	<ul style="list-style-type: none"> • Construction and Demolition Waste Recycling Guide • Solid Resources Management Specification: Contractor Guidelines and Requirements of Construction, Demolition, and Landclearing Materials • Wood You Recycle? A Guide to Wood Re-use and Recycling in the Los Angeles Area
New Hampshire Department of Environmental Services	<ul style="list-style-type: none"> • Managing Demolition/Construction Debris
National Association of Home Builders	<ul style="list-style-type: none"> • Carpet Padding: Reuse and Recycling Opportunities • Deconstruction: Building Disassembly and Material Salvage, the Riverdale Case Study
National Association of Demolition Contractors	<ul style="list-style-type: none"> • Demolition...the First Step of Reconstruction, a Continuum of Choice
North Carolina Cooperative Extension	<ul style="list-style-type: none"> • Managing Construction and Demolition Debris: a Guide for Builders, Developers and Contractors • Old Buildings Don't Have to go to Waste (Video)
Ontario Home Builders Association	<ul style="list-style-type: none"> • Hosting a Waste Reduction Event: a Kit for Local Home Builders' Associations • Lower Costs Through Waste Reduction: Practical Ideas for Ontario Home Builders
Ontario Ministry of Environment and Energy	<ul style="list-style-type: none"> • Keeping C&D Materials Out of Landfills: Conserving Resources and Minimizing Waste in the Construction Industry
Regional Municipality of Halifax, NS	<ul style="list-style-type: none"> • Materials Which Cannot be Landfilled
Washtenaw County, MI	<ul style="list-style-type: none"> • Waste Reduction and Recycling Opportunities for Construction and Demolition Debris

Two organizations, the Used Building Materials Association and the Edmonton Home Builders Association, do not offer workshop or publication oriented CRD waste reduction programs.

The results of this study suggest that a number of CRD waste reduction education programs were implemented in the early to mid-1990s; some of these programs have evolved over time and are still functioning today (e.g., King County) whereas others have been discontinued. One example of a program that was discontinued is the Partners in Clean Construction program that took place in Edmonton from 1994-1996. This job site recycling project focussed on a 40-house

subdivision, but, after completion of the project, the program was discontinued. Reasons cited by one development company for the discontinuation of this program were

- 1) that it was economically unfeasible for developers to continue to use this construction approach, and 2) the lack of markets for CRD materials.

Summary of CRD Waste Reduction Programs

Of the 26 organizations contacted during the interviews, the programs implemented by the Greater Vancouver Regional District (GVRD) and by King County have been the most successful. Brief summaries for 11 of the programs are presented below in separate subsections, and a more detailed account for each program can be found in Appendix A. It is noted that the level of detail available for each of the programs varied significantly; lack of information for many of the programs was due to staffing changes that have occurred at the organizations since the inception of programs in the mid-1990s.

Various methodologies have been used to assess the effectiveness of CRD education programs. The GVRD collected baseline data before the implementation of their program, and they continue to collect CRD data on a yearly basis in order to determine annual CRD waste diversion tonnages. Some organizations used general indicators to measure the success of a program; for example, the Regional Municipality of Ottawa/Carleton did a brief follow-up with major construction companies that participated in its program to determine which of the firms had developed recycling programs. Several organizations have never assessed the success of their programs (e.g., Region of Peel and METRO Toronto), and others lack the baseline data necessary to evaluate their programs (e.g., the California Integrated Waste Management Board).

Greater Vancouver Regional District (GVRD), British Columbia

GVRD started their CRD waste reduction education program in May, 1997. The program has a full-time program advisor and an operating budget for education programs. Several documents have been created to support this program, including *Demolition and Salvage for Developers and Renovators* and *Job Site Recycling for Builders and Developers*. A telephone hotline is available to answer questions from industry or the public, and a website with direct links to program documents has been established on the Internet. A video on deconstruction and designing with salvaged building materials is scheduled for release in April 2000.

Rather than distributing publications or presenting seminars that provide a general overview of CRD waste reduction to a large audience, the GVRD program tailors information and presents it separately to specific industry associations. Seminars of one to one-and-a-half hours in duration are presented to specific groups such as home builder associations, demolition contractors or designers. The materials presented in each seminar are specific to each group and tend to use local case studies to demonstrate CRD reduction ideas and opportunities. This unique feature has contributed to the overall success of the GVRD program.

The GVRD has the best quantitative data available for the assessment of program success. A 1998 GVRD survey revealed that 60% of builders use some type of recycled material for construction; this is primarily wood, drywall and cardboard. Surveys conducted in 1996, 1997 and 1998 suggest that there has been a significant increase in the amount of clean wood waste that is diverted to recycling facilities since the diversion program was initiated in 1997 (see

Table 4-3). A decrease in wood diversion quantities is noted from 1997 to 1998, but this is attributed to a strong decline in the Vancouver area construction industry during this period.

Table 4-3
GVRD Clean Wood Waste Diverted to Recycling Facilities

Year	Tonnage
1996	32,000
1997	53,000
1998	41,000

King County, Washington

This program started in 1993 and has evolved to include a variety of regular seminars and workshops. These range in duration from two hours to a full day, and are held approximately four times a year. Two documents have been published to assist this program, Construction Recycling Directory and Contractors' Guide to Preventing Waste and Recycling. The Green Works business recycling hotline is available to answer questions, and the program's website provides information on a wide variety of case studies and publications. One of this program's strengths is the number of local case studies that it has published.

King County's Construction Works Recognition Program (1997) promotes and publicly recognizes construction companies that recycle, reduce waste and use recycled products on their job sites. This program has two membership levels available to construction companies: Basic Membership and Distinguished Membership (see Table 4-4). The program currently has three basic members and 15 distinguished members.

Table 4-4
Construction Works Program Requirements and Rewards

Construction Works Program King County, WA	Requirements	Rewards
Basic Construction Works Members	<ul style="list-style-type: none"> Recycle 40% of its waste Practice at least 3 waste reduction strategies Use at least 3 recycled projects 	<ul style="list-style-type: none"> Listing in Construction Works newsletter Listing in Green Business Directory Certificate signed by King County Executive Ron Sims
Distinguished Construction Works Members	<ul style="list-style-type: none"> Recycle 60% of its waste Practice at least 6 waste reduction strategies Use at least 6 recycled products Be involved in 3 additional activities that promote recycling, waste prevention and buying recycled to your company, your customers or the public 	<p>In addition to the rewards listed under "basic" the organization receives:</p> <ul style="list-style-type: none"> Recognition in the Construction Works advertising campaign, including The Puget Sound Business Journal's special construction issue and/or The Daily Journal of Commerce Written case study highlighting its successes Automatic nomination for the King County Department of Natural Resources Green Globe Awards Hard hat decals

King County uses the following qualitative indicators to determine the degree of its program's success: (1) wood salvage and reuse processors are still in business and doing well, and are believed to be profitable, and (2) commercial building owners are asking for recycled CRD materials to be used in their requests for proposals. The latter indicator is believed to be the result of a recent campaign to increase public awareness of recycled-content CRD materials.

California Integrated Waste Management Board (CIWMB), California

The CIWMB has developed an extensive list of CRD waste reduction documentation published since 1995. A significant portion of this work focuses on CRD material markets (e.g., carpet, drywall, and wood). A telephone hotline has been established to answer questions from industry and the public, and the Board's website provides information on CRD publications.

A one-day workshop that targets design professionals will be offered by the Board in 2000; the workshop will discuss recycled material reliability, function and cost.

METRO Portland, Oregon

The CRD waste reduction education program began in 1991 and originally focussed on waste reduction options available to builders. A green building workshop was held in 1995, but the waste reduction component of the workshop received little attention. No workshops are planned in the near future.

Education of builders is occurring by distributing CRD waste reduction literature with building permit applications. Support publications for this program include *Resource Efficient Building - a Handbook for Building Owners, Designers and Project Managers*, and *METRO Construction Site Recycling Guide*. METRO is currently evaluating the merits of enforcing CRD landfill bans sometime in the year 2000.

Regional Municipality of Ottawa-Carleton, Ontario

The Municipality's CRD waste reduction education efforts peaked between 1993 and 1996. Target groups included construction firms, home builders groups, waste haulers and permitting agencies. The Municipality hosted job site waste audit and CRD overview workshops, and they participated in several deconstruction case studies.

The Ottawa/Carlton region is in a unique economic and geographic position: CRD landfill tipping fees are only \$10/tonne in neighbouring Hull, Quebec, which results in the export of a significant quantity of CRD waste; and the region is surrounded with abundant natural resources (e.g., quarries and lumber) which results in readily available, low-priced new building materials. Given these circumstances, it would not be effective for the Municipality to implement a CRD program at this time. However, the Municipality may retain a consultant to identify barriers to CRD waste recycling and to determine what can be done to decrease CRD waste disposal in the future.

City of Edmonton, Alberta

The City of Edmonton facilitated the Partners in Clean Construction Program from 1994-1996; this included an 8-house waste audit and a 40-house subdivision job site recycling project. Builders, developers and design professionals all participated in the program, and Partners in Clean Construction published a video, audit report and a best practices manual based on these

case studies. Lack of support from both the City and industry lead to the program's cancellation, and there are no future plans to revive it.

Region of Waterloo, Ontario

The Region operated a CRD waste diversion education program from 1994 to 1996. Casual presentations were made by Region members at CRD association meetings, and these were followed by full-day workshops. The Region also developed several documents, including a CRD recycling directory, and participated in several local case studies to promote the program. The Region has no plans to implement another CRD waste reduction education program in the future.

Community Environmental Council (CEC), California

A previous project titled *Constraints and Opportunities: Expanding Recovery in the Demolition Industry* examined the barriers to recovering CRD waste. This work focused on timeline constraints, design and demolition, while a stakeholder workshop assisted in identifying potential concerns.

The CEC is currently exploring options for CRD waste diversion. Areas of interest include higher CRD landfill tipping fees, the creation of a bond program, and marketing of recycled CRD materials by private waste haulers. No outreach programs are in place at this time.

METRO Toronto, Ontario

From 1991-1993, METRO Toronto assisted with a variety of CRD waste audits. METRO had planned to expand their program to include breakfast and luncheon seminars, but was unable to implement these program components due to a decrease in staff and funding. No seminars or workshops are offered at this time.

In order to reduce the amount of CRD waste disposed of in landfills, clean wood, drywall, asphalt, concrete and rubble have all been banned from City landfills. To assist builders and construction firms with the recycling or reuse of these materials, a local CRD market directory that lists recycling processors is available. A telephone hotline is also available for support.

Triangle J Council of Governments, North Carolina

A task force consisting of both government and industry members was developed in 1993 to initiate, encourage, and coordinate efforts to reduce, reuse and recycle CRD waste. This task force developed *WasteSpec*, a model specification on waste reduction and recycling for owners and architects, ten case studies of projects using *WasteSpec*, a *CRD Local Directory*, and two CRD waste reduction videos. A workshop on Green Building Policies took place in December, 1998. No future seminars or workshops are planned at this time. The original task force has not met for over a year since local task forces have assumed responsibility for the program.

Regional Municipality of Peel, Ontario

The Regional Municipality of Peel focused on CRD waste diversion during 1996 and 1997. Breakfast seminars for industry were scheduled several times a year, and peer-presenters were an integral component of these seminars. The Regional Municipality published an *Environmentally Conscious Construction Manual* for industry and a smaller document for

homeowners. A telephone hotline is available for public and industry questions. At this time no future seminars have been planned.

Implementation Strategies and Suggestions

Problem areas and issues encountered during the implementation of CRD programs in other areas were identified during the interviews. Many of the interview respondents also provided suggestions and insights that may prove useful in developing a CRD waste reduction program for Alberta; their comments are listed below.

- 1) Industry leaders should be invited to participate in the development of the program. If they decline the invitation, efforts should be made to include them on survey lists and to periodically communicate with them to determine what types of projects they are working on, what recycling methods they are using, and if they require any assistance.
- 2) An industry-driven program has the best chance to succeed. Government should act as a silent partner, and government logos should be in small print on workshop advertisements and publications. Give industry public recognition for program successes since this will encourage further industry participation.
- 3) It can be difficult to locate all building contractors since there is approximately a 30% turnover rate in the industry. Tax rolls from previous years, telephone books and flyer advertisements can be used to locate these individuals. It should be recognized that with this high turnover rate there is a constant need for ongoing CRD waste reduction education.
- 4) Seminar/workshop speakers must have industry experience. Peer speakers are extremely effective since they can discuss their own personal CRD experiences. In addition, audiences are generally more receptive to a speaker they regard as their peer.
- 5) Offer information on presentation structure to speakers. Power Point® luncheons have proven very effective for King County by increasing the quality of presentations and, in turn, increasing audience interest. King County has a Power Point® template available for speaker presentations, and they also provide guidance regarding what should be covered in the presentation and potential questions that may be asked by the audience.
- 6) Schedule seminars for design professionals in the early morning or in the evening to maximize attendance. This will allow professionals to attend the seminars without detracting from their work day.
- 7) Limit seminars to a maximum of two hours. Audience loses interest during longer seminars.
- 8) Consider charging a nominal fee for seminar registration. This will give importance to the seminar and will help deter no-shows.
- 9) Popular guest speakers are individuals that make decisions regarding the tendering process and contractor selection. Builders like to know what potential customers want.
- 10) If CRD waste reduction is part of a larger program (e.g., Green Building, Specifications) be aware that it may be of secondary interest relative to other topics.
- 11) Consider invoking landfill bans or surcharges in order to divert CRD materials. This, in turn, will assist with market development.

- 12) Consider implementing incentives that will divert CRD materials to recycling processors or will encourage source-sorting of CRD materials (e.g., a lower tipping fee).
- 13) Provide funding opportunities for industry case studies, and utilize government buildings for case studies.
- 14) Ensure efforts and resources are simultaneously devoted to market development. Without a market for materials a CRD waste reduction program will not succeed.
- 15) Encourage donations to non-profit organizations (e.g., Salvation Army, Habitat for Humanity). Individuals can receive a tax credit in lieu of payment.

5. Recommendations

A wide variety of CRD waste reduction education programs are currently in place or have previously been used in regions throughout North America. The literature search and telephone interviews conducted during this study obtained and reviewed information regarding several of these programs. Based on the results of this study, it is recommended that the CRD Committee develop an overall CRD waste reduction education/communication strategy. This will entail identifying the target audience(s) (e.g., public, industry, and trade organizations) and defining the desired message(s). Communication and education vehicles that have proven particularly successful in other CRD waste reduction education programs and should be considered for Alberta include:

- peer-to-peer seminars/workshops,
- how-to guides,
- case studies, and
- websites.

APPENDIX A

**CRD WASTE REDUCTION PROGRAM SUMMARIES AND
CONTACT INFORMATION**

Contact

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 CANADA

Program Overview

The GVRD program started in May 1997 and is ongoing. It maintains a full-time program advisor and an operating budget for education programs. The GVRD acts as a facilitator between CRD industry members and promotes this program at trade shows. Specific groups (e.g., home builders association, architects/designers, and demolition contractors) are targeted directly with seminars (1 - 1 1/2 hours) that cover essential material for each specific group. There is no charge for seminars at this time, however a nominal fee (\$20.00) is being considered to increase importance and decrease no-shows. In February 1999, the University of British Columbia hosted a two day seminar (\$350.00) which covered resource-efficient building construction, demolition and design.

Education Materials

- Demolition and Salvage: A Guide for Developers and Renovators (1999)
- Job Site Recycling: A Guide for Builders and Developers (1999)
- Case studies
- Hotline: (604) 437-4873
- Website: <http://www.gvrd.bc.ca/waste/bro/dlccde.html>
- Video on deconstruction and designing with salvaged building materials (April 2000)

Nature of Success

- Greater Vancouver Homebuilders Association 1998 survey - 60% of builders recycled material for construction (mainly wood, drywall and cardboard)
- Clean wood waste has increased at local recycling facilities

GVRD Clean Wood		Waste Diversion
Year		Tonnage
1996 (Baseline Data)		32,000
1997		53,000
1998		41,000

A significant increase (21,000t) of clean wood waste is noted in 1997. The decrease from 1997 to 1998 is attributed to the strong down turn in the Vancouver area construction

industry. Even with the down turn the 1998 tonnage is greater than the baseline data, therefore it can be concluded that the program is successful with clean wood recycling.

- Drywall landfill ban initiated in 1989, approximately 95% diversion
- Incentive to divert cardboard, January 1, 1997 instituted a 50% tipping fee surcharge for truck loads that have over 10% cardboard

Lessons Learned/Suggestions

- Keep seminar relevant to specific group
- Above all what people want to know is how they can save \$\$\$\$
- Have seminars in the early morning (7:00am - 8:30am) or in the evening so design professionals can attend
- Use case studies that are specific to group and the city or surrounding area

Contact

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Program Overview

This program started in 1993 and is ongoing. King County is a facilitator who assists with partnership development through soliciting building and demolition contractors to do workshop presentations.

Workshops/seminars (e.g., 2 hours, 1/2 day, and full day) take place 4 times a year. King County presents a CRD waste reduction overview while industry peers describe their own experiences. Documents have been developed to assist with CRD material recycling.

The Construction Works recognition program started in 1997 and highlights construction companies that recycle, reduce waste and use recycled products on the construction job site. Two membership levels are available, presently there are 3 Basic Members and 15 Distinguished Members. Interested companies that meet required criteria can apply for membership at http://dnr.metrokc.gov/swd/bizprog/rec_prog/cons.htm.

Education Materials

- Construction Recycling Directory - 1999/2000
- Contractors' Guide to Preventing Waste and Recycling - 2000
- Construction Works Program and case studies
- Green works business recycling hotline: (206) 296-8800
- Website: http://dnr.metrokc.gov/swd/bizprog/sus_build/susbuild.htm

Nature of Success

- Do not have quantitative data, instead have indicators that show the program is doing well
 - 1) Wood salvage and reuse processors are still in business and doing very well.
 - 2) Building owners are asking for recycled CRD materials to be added in request for proposals. This has resulted from a recent push for public awareness of recycled-content CRD materials.

Lessons Learned/Suggestions

- Currently offering speaker luncheons. King County assists presenters with a Power Point presentation template, information on what should be covered in the presentation, and potential audience questions. This has proven to be an effective way to increase the quality of presentations and in turn audience interest.
- Government agencies should not be shy about taking a leadership role, however at times it may be best to be a silent partner (let industry have the publicity)
- Do not be afraid about making partnerships with associations, government can help fulfil the associations environmental mandate while meeting industry leaders

Contact

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Program Overview

The CIWMB has a long list of documents published since 1995. No workshops/seminars on CRD job site waste reduction have taken place in the past. A significant portion of work has occurred in the area of CRD material markets (e.g., carpets, drywall, and wood). The Board eventually hopes to see recycled materials in future site specifications.

New in 2000 is a free one day workshop, targeting design professionals, centring on the topic of recycled material acceptance for the construction industry. The workshop will discuss recycled material reliability, function, cost, and local case studies.

Workshop structure

Morning:	Presentations and lectures by industry members
Afternoon:	Break-out sessions
	1) Green team building for state agencies
	2) Costing for green products
	3) Green product requirements and specifications

Education Materials

- Case studies (e.g., Presidio of San Francisco)
- Database of 500+ sites in California that receive CRD materials for recycling and reuse
- Database of 450+ manufacturers of recycled-content construction products sold in California
- Factsheets on aggregate, asphalt pavement and shingles, carpet, drywall, job site source separation, lumber, and urban wood
- Market status reports on ferrous scrap, pavement, recycled inerts (aggregate, asphalt pavement and shingles and drywall), and urban wood
- CIWMB recycling telephone hotline: (916) 255-2296
- Website: <http://www.ciwmb.ca.gov/ConDemo/>

Nature of Success

- Do not know program effectiveness as the CIWMB does not follow up or have any baseline data for comparison; once the educational material is distributed they have no means of determining program success

Lessons Learned/Suggestions

- Assist with drywall and asphalt shingles markets
- Allow companies to voluntarily remove CRD materials for reuse and recycling, let them keep all monies received from the sale of these materials
- Various groups would be more than willing to implement reuse and recycling programs if they could be subsidized by the state/county/city; it is not economically feasible for companies to do it on their own
 - CIWMB is offering \$200,000 in funding for deconstruction projects
 - Funding must be applied for through a Request for Proposal process
 - CIWMB expects a report covering the techniques used, quantitative data on specific materials, potential problems and project successes at the end

Contact

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Program Overview

METRO started a CRD education program in 1991 focussing on waste reduction options for builders. A green building workshop was held in 1995; discovered that the waste reduction component was overridden by other green building issues. No workshops/seminars are planned in the near future. Presently educating builders by distributing literature with building permit applications. METRO is currently exploring the possibility of enforcing CRD landfill disposal bans this year.

Education Materials

- Metro Construction Site Recycling Guide (2000)
- Resource Efficient Building - a Handbook for Building Owners, Designers and Project Managers (1994)
- Website: <http://www.metro.dst.or.us/rem/rwp/constrcy.html>

Nature of Success

- Increase in the number of builders that recycle (statewide survey)
- Increase in the number of companies that accept recycled materials (90 locations)

Lessons Learned/Suggestions

- Set up an advisory group; important to make sure it is representative of the building industry (if individuals do not want to participate send them surveys and talk to them on the phone)
- Important to divert cardboard and wood
- Test market ideas ahead of time
- Develop creative educational programs

Contact

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Program Overview

The main CRD waste reduction efforts peaked between 1993 and 1996. Target groups included construction firms, home builders groups, haulers and permit agencies. One day workshops were organized centring on a CRD overview (green purchasing, design, proper disposal), along with a 2-4 hour job site waste audit workshop and several deconstruction studies.

The Regional Municipality is in a unique situation regarding CRD waste reduction:

- 1) Quebec has low CRD landfill tipping fees, \$10/t, which results in a good 50,000t of CRD waste exported to Quebec
- 2) The surrounding area is abundant with natural resources (e.g., 82 sand pits, 70 quarries, and lots of lumber); builders will use virgin material as it is accessible and inexpensive

Given these circumstances it would not be effective for the Municipality to implement a CRD waste reduction program at this time. In 2000 the Municipality is hoping to retain a consultant to study CRD barriers and determine what can be done to decrease CRD waste in the future.

Education Materials

- Information pamphlet (not available)

Nature of Success

- No quantitative data, but follow up with companies found that major players (e.g., MINTO and PCL) developed recycling programs

Lessons Learned/Suggestions

- Multi-media is best approach for workshops
- Audience more willing to listen if speaker has industry experience
- Individuals that make the decisions regarding the tendering process and contractor selection were popular speakers

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Program Overview

After a 1991 CMHC Waste Management Seminar, the City of Edmonton facilitated a study examining waste management in the CRD industry. The Partners in Clean Construction Program took place from 1994-1996; this included an 8-house waste audit and a 40-house job site recycling project. Before the latter program started there was a large project roll-out meeting involving builders, developers, architects and designers. A Partners in Clean Construction document and video were produced that discussed the "3 R's" options for CRD waste diversion.

Once the 40-house subdivision project was completed industry did not continue with the program. From the viewpoint of one developer, the programs demise resulted from (1) not being economically feasible for developers to continue the program, and (2) lack of CRD markets at the time. There are no future plans to revive this program.

Education Materials

- Partners in Clean Construction..for a healthier cleaner community (1994)
- Residential Construction Waste Management Audit Report - an Edmonton Case Study (8 houses)
- Video for Partners in Clean Construction Program (1994)

Nature of Success

- Approximately 80% of CRD waste diverted on 8 house waste audit

Lessons Learned/Suggestions

- Ideas and concepts were good but not sure about program implementation
- Unrealistic recommendations regarding house design; it is hard to simplify house design
 - Homeowner drives demand for builder, if homeowner wants a bay window or alcove that is what is built, even if it wastes wood

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Program Overview

The Region operated a CRD waste diversion education program from 1994-1996, targeting asphalt shingles, cardboard, drywall, electrical components, metal and wood. Casual presentations by Region members took place at association meetings, this helped to find out who provides what type of service and determine the key players. A conference was held to launch the program. Full day workshops followed; centred on peer speakers who could relay personal experiences. This proved to be very effective. No future plans for CRD waste reduction at this time.

Education Materials

- Developed a step-by-step guide covering design to clean up; section dedicated to job site recycling (no longer available)
- Created a recycling directory (no longer available)
- Co-funded C-2000 Greenhousing pilot project and the Canada Center for Mineral and Energy Technology (CANMET) Advanced House site in Kitchener-Waterloo

Nature of Success

- C-2000 Program showed an 80% diversion rate (not realistic as this was a hand held project)
- Problem today, CRD tipping fees decreased from \$90/t to \$45/t, now more CRD in landfill than recycled

Lessons Learned/Suggestions

- Difficult to find all building contractors (approximately 30% turn over rate); use previous years tax rolls, telephone books and flyers
- Important to involve industry leaders
- Province could oversee market development (drywall and asphalt shingles); could even partially subsidize markets
- Must have financial incentive, e.g., charge 30% less for "disposal" of clean source separated CRD materials
- Keep government logos in small print on workshop advertisements and publications; it is better to do social marketing and advertising through industry leaders

- Encourage reuse by donating fixtures to non-profit organizations (e.g., Salvation Army and Habitat for Humanity), individuals will receive a tax credit

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Program Overview

No outreach programs at this point in time.

A past project researched the barriers to recovering CRD waste; centered on timeline constraints, design, and demolition. Three steps were completed before this document was published, (1) recycling guide, (2) appropriate techniques, and (3) three pilot projects (construction, renovation, and demolition/deconstruction). A focus group stakeholders workshop also took place in order to discuss potential concerns. It was determined that deconstruction proved to be more economically favourable than demolition, especially if the building is pre 1970 (brick is excellent quality and can be easily recovered).

The current project is exploring possible guidelines for CRD waste diversion by increasing CRD landfill tipping fees, implementing bond programs (must get permit), allowing local waste haulers privately marketing CRD materials and reducing CRD tipping fees by \$10.00 at transfer stations.

Education Material

- Constraints and Opportunities: Expanding Recovery in the Demolition Industry (1997)

Nature of Success

- No follow up

Lessons Learned/Suggestions

- CRD markets will develop if landfill bans are in place

Contact

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Program Overview

From 1991-1993 METRO Toronto assisted with a variety of CRD waste audits. METRO had planned to expand their program to include breakfast and luncheon seminars, but was unable to due to a decrease in staff and funding. No workshops or seminars are offered at this time.

In order to reduce the amount of CRD waste disposed of in landfills, METRO implemented bans on clean wood, clean drywall, asphalt, concrete and rubble.

The Province of Ontario is currently rewriting waste regulations so that construction sites, 10,000 m² or larger, must complete a waste audit and have a job site recycling program in place.

Education Materials

- Creating a CRD waste diversion brochure for distribution at building permit centres
- CRD Market Directory
- Telephone Hotline

Nature of Success

- No follow up

Lessons Learned/Suggestions

- Invoke CRD material landfill bans (will assist in the development of CRD material markets)

Contact

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Program Overview

The Triangle J Council of Governments Construction and Demolition Waste Task Force convened in 1993, representing both government and industry. The Task Force's mission is to initiate, encourage, and coordinate efforts to reduce, reuse, and recycle construction and demolition waste in the Triangle area through education publications.

In December 1998 the Task Force had a Green Building Policies workshop, however, no future workshops are planned.

The original task force has not met for over a year as local task forces have taken over.

Education Materials

- WasteSpec, model specifications on waste reduction and recycling for owners and architects (1995)
- Ten case studies of projects that used WasteSpec (1997)
- CRD Directory of construction and demolition recycling processors (1997)
- Don't Trash it! Reducing Residential Construction Debris Video (1995)
- Old Buildings Don't Have to go to Waste Video (1996)

Nature of Success

- No follow up

Lessons Learned/Suggestions

- Public awareness and education is critical

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Program Overview

The Regional Municipality of Peel focused on CRD waste diversion during 1996 and 1997. Peer presentations were an integral component of industry breakfast seminars (7:30 - 10:00am) that were scheduled several time a year. No seminars are taking place at this time, instead the Region is distributing a booklet on CRD waste reduction to industry and homeowners.

Education Material

- Environmentally Conscious Construction (1997)
- Wasteline (hotline): (905) 791-9499

Nature of Success

- No follow up

Lessons Learned/Suggestions

- No comments, Ontario is on downward slope with regards to waste diversion at the moment

APPENDIX B

CRD EDUCATION AND COMMUNICATION DATABASE

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
OO1	Asphalt Pavement Recycling	California Integrated Waste Management Board	1998	Factsheet	Recycling asphalt pavement back into asphalt pavement including recycling methods, specifications, organizations and siting considerations in California	http://www.ciwmb.ca.gov/ConDemo/factsheets/Pavement.htm
OO2	Asphalt Roofing Shingles in Aggregate Base	California Integrated Waste Management Board	1998	Factsheet	Recycling ground asphalt roofing shingles into aggregate base	http://www.ciwmb.ca.gov/ConDemo/factsheets/ShinglAb.htm
OO3	Asphalt Roofing Shingles in Asphalt Pavement	California Integrated Waste Management Board	1998	Factsheet	Recycling ground asphalt roofing shingles into asphalt pavement	http://www.ciwmb.ca.gov/ConDemo/factsheets/ShinglAc.htm
OO4	Asphalt Roofing Shingles in Cold Patch	California Integrated Waste Management Board	1998	Factsheet	Recycling ground asphalt roofing shingles into cold patch for potholes, sidewalks, ramps, utility cuts, driveways bridges and parking lots	http://www.ciwmb.ca.gov/ConDemo/factsheets/ColdPtch.htm
OO5	Asphalt Roofing Shingles Recycling: Introduction	California Integrated Waste Management Board	1998	Factsheet	Processing asphalt roofing shingles into aggregate base	http://www.ciwmb.ca.gov/ConDemo/factsheets/ShinglIn.htm
OO6	Big Diversion From C&D Debris	Robert Steuteville	1995	Journal Article	Private facility operators are finding a wealth of material in the construction and demolition debris fraction	Biocycle - Journal of Composting and Recycling
OO7	Building Deconstruction and Material Reuse in Washington, D.C.	Industrial Economics, Incorporated	1999	Report	Overview of the state of deconstruction in the District of Columbia	http://www.smartgrowth.org/library/DCdeconreport.html
OO8	Building for the Future: Strategies to Reduce Construction and Demolition Waste in Municipal Projects	Bette K. Fishbein	1998	Book	Identifies strategies that have been used successfully around the United States to reduce C&D waste during the design, construction and demolition phases of municipal building projects	http://www.informinc.org/cdreport.html
OO9	CANMET Advanced Houses Program	CANMET Building Group	1998	Case Study	Showcases the reuse of recycled-content building materials and C&D practices that reduce waste in the building of residential homes in Canada	http://www.ciwmb.ca.gov/ConDemo/Pubs.htm
O10	Carpet	California Integrated Waste Management Board	1999	Factsheet	Carpet reuse and recycling practices and lists California facilities that take used carpet	http://www.ciwmb.ca.gov/ConDemo/factsheets/Carpet.htm
O11	Carpet and Padding: Reuse and Recycling Opportunities	National Association of Home Builders Research Center	1999	Brochure	Characterizes the waste stream, the recycling process, benefits of recycling, issues which recyclers face and current industry programs	National Association of Home Builders Research Center, (301) 249-4000
O12	Carpet Reuse and Recycling - Carpeting Floors, Not Landfills	King County Solid Waste Division	1998	Factsheet	Options available in King County for unwanted carpet	King County Solid Waste Division, (206) 296-8480

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
O13	C&D Recycling in the Home Court	Marnie McPhee	1996	Journal Article	Large amounts of demolition debris are being recovered in Portland, Oregon, as the city moves to meet its 60 percent recycling goal by 1997	Biocycle - Journal of Composting and Recycling Vol 37, No 3, pp 30-32
O14	CDL Council Job Site Recycling Workshop	Construction, Demolition and Landclearing Council	1998	Video (VHS)	Homemade video of CDL Council job site recycling workshop(90 minutes)	Paige Sorensen, Department of Ecology, P.O. Box 47775, Olympia, Washington, 98504-7775, Tel: (360) 407-6352
O15	Constraints and Opportunities: Expanding Recovery in the Demolition Industry	Josh Fox and Jill Zachary, Community Environmental Council and Brian Runkel, California Environmental Business Council	1998	Report	Analyzes economic, technical and regulatory factors explores strategies for encouraging recovery and identifies policies and programs that can be implemented by local and state agencies.	Community Environmental Council, (805) 963-0583
O16	Construction and Demolition Recycling	Southern California Council on Environment and Development	1999	Seminar Outline	Seminar agenda and notes	
O17	Construction Companies Become Versatile Recyclers	Jay Freeborne	1994	Journal Article	Two firms in Washington State's Puget Sound region are positioning themselves to handle many different materials	Biocycle - Journal of Composting and Recycling Vol 35, Vol 8, pp 37-38
O18	Construction and Demolition Waste Recycling Guide	City of Los Angeles, Bureau of Sanitation	1999	Guide	Listings for inert material recycling processors, corrugated cardboard facilities, metal scrap dealers and salvage yards in the Los Angeles area	City of Los Angeles, Solid Resources Citywide Recycling Division, (213) 847-1444
O19	Construction Recycling Directory, 1999-2000	King County Solid Waste Division	1999	Guide	Job site recycling outline, case studies and local construction recycling listing	King County Solid Waste Division, (206) 296-8480
O20	Construction Site Recycling at Circuit City Project	King County Solid Waste Division	1995	Case Study	Over 52% of waste recycled on project - saved \$1,300	King County Solid Waste Division, (206) 296-8480
O21	Construction Site Recycling Guide 2000	METRO Portland, Regional Environmental Services	2000	Guide	Outlines numerous businesses that accept CRD materials for reuse and recycling	METRO Portland, Regional Environmental Management (503) 797-1650
O22	Construction Site Recycling: Save Money By Recycling	METRO Portland, Regional Environmental Management	1997	Report	Outlines construction, demolition and remodeling salvage; illegal dumping prevention and non-recyclable C&D debris is also discussed	http://www.metro.dst.or.us/rem/rwp/constrcy.html
O23	Construction Waste and Demolition Debris Recycling....a Primer	Gershman, Brickner and Bratton Inc.	1993	Guide	An educational tool for communities and private sector interests, this document focuses on the planning issues and implementation options associated with recycling C&D debris	Solid Waste Association of North America, (301) 585-2898

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
O24	Construction Waste Management - A Guide for Municipalities	United States Environmental Protection Agency, Policy, Planning and Evaluation	1997	Brochure	Basic overview of construction waste recycling	National Association of Homebuilders Research Center, Peter Yost, (301) 430-6442
O25	Construction Waste Management Handbook	National Association of Home Builders Research Center	1996	Guide	Discusses waste reduction, reuse and recycling of common construction waste materials, section on education and information dissemination	http://www.smartgrowth.org/library/constwastemgmt_hndbk.html
O26	Construction Works Postcards	King County Solid Waste Division	1999	Postcards	Postcards that highlight local companies who recycle CRD materials	King County Solid Waste Division, (206) 296-8480
O27	Construction Works: Recycling Programs for the Construction Industry	King County Solid Waste Division	1998	Newsletter (Winter)	Examples of construction waste recycling programs in King County	King County Solid Waste Division, (206) 296-8480
O28	Construction Works: Recycling Programs for the Construction Industry	King County Solid Waste Division	1999	Newsletter (Fall)	Examples of construction waste recycling programs in King County	King County Solid Waste Division, (206) 296-8480
O29	Contractors Guide to Preventing Waste and Recycling - 2000	King County Solid Waste Division and Seattle Public Works	2000	Guide	How-to's for reducing waste, recycling and using recycled-content building products; includes worksheets and instructions to help contractors determine the cost-effectiveness of job site salvaging and recycling	http://www.dnr.metrokc.gov/swd/bizprog/rec_assist/pubs1.htm
O30	Cost Effective Management of Construction and Demolition Waste and Green Building Procurement	University of Western Ontario and Environment Canada	1995	Seminar Outline	Discusses construction and demolition infrastructure, economics and practices	University of Western Ontario, Boundary Layer Wind Tunnel Laboratory, Faculty of Engineering
O31	Cutting the Scrap: Houses with Less Waste	King County Solid Waste Division	1998	Case Study	Residential home construction job site recycling saves nearly \$15,000	King County Solid Waste Division, (206) 296-8480
O32	Deconstruction: Building Disassembly and Material Salvage	National Association of Home Builders Research Center	1999	Brochure	Explains the benefits of deconstruction, favourable building characteristics, planning steps and references; includes a case study	National Association of Home Builders Research Center, (301) 249-4000
O33	Deconstruction: Building Disassembly and Material Salvage, the Riverdale Case Study	National Association of Home Builders Research Center	1997	Case Study	Deconstruction of a 2,000 square foot multi-family residence is used to evaluate the issues of feasibility and cost-effectiveness; contains detailed analysis of costs and salvage values	National Association of Home Builders Research Center, (301) 249-4000

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
O34	Deconstruction: Giving Old Buildings New Lives	North Carolina Cooperative Extension Service, North Carolina State University	1998	Report	Discusses deconstruction as a viable alternative and details the advantages, challenges and the market for salvaged materials	http://www.smartgrowth.org/resources/deconstruction_res.html
O35	Deconstruction of a Residential Home - Ontario	Construction and Demolition Waste Website	1996	Case Study	Overview of the deconstruction of an early 19th century house, a barn and a detached garage	http://www.cdwaste.com/english/cases/renres2.htm
O36	Deconstruction: Smart Demolition	Robin Snyder	1998	Report	Deconstruction yields economic and environmental when compared to demolition	http://www.smartgrowth.org/library/deconst_smart_demol.html
O37	Defence Construction Canada's Harvey Barracks Decommissioning: 90% Diversion of Demolition Waste	Alberta Environmental Protection, Action on Waste	1998	Case Study	Outlines the planning and operation a successful waste diversion demolition project	Alberta Environmental Protection, (403) 297-8255
O38	Demolition and Salvage: A Guide for Developers and Renovators	Greater Vancouver Regional District	1999	Guide	Step-by-step approach to successful salvage and recycling of building materials on demolition sites; case study illustrates what materials can be recycled without raising project costs	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O39	Demolition Contractor Becomes Recycler	Nora Goldstein	1992	Journal Article	With up to \$750,000 per year in landfill disposal costs, a Denver area demolition firm decided to turn a problem into an opportunity	Biocycle - Journal of Composting and Recycling Vol 33, No 1, pp 76-77
O40	Demolition Materials Diversion Symposium	Dovetail Consulting Inc. and SALASAN Associates Inc.	1998	Report	Explores deconstruction as a possible strategy, the economic value for building materials, and the importance of a provincial demolition material diversion strategy	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O41	Demolition...the First Step of Reconstruction, a Continuum of Choice	Gershman, Brickner and Bratton Inc.	1999	Report	Answers common questions regarding deconstruction; case studies throughout the northern United States	National Association of Demolition Contractors, (215) 348-4949
O42	Difficult Logistics Lead to an Environmental Solution	King County Solid Waste Division	1998	Case Study	Hand demolition enabled over three-quarters of residential home to be either salvaged or recycled	King County Solid Waste Division, (206) 296-8480
O43	Display Barns Deconstruction Reaches 79% at the PNE	Greater Vancouver Regional District	1999	Case Study	Deconstruction process; salvage and recycling summary	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O44	Don't Trash It! Reducing Residential Construction Debris	North Carolina Cooperative Extension Service	1995	Video (VHS)	Gives workers tips for preventing construction debris, as well as for reusing and recycling scrap metal (12 minutes)	Department of Communication Services North Carolina State University, (919) 513-3111,

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
O45	Drywall Recycling	California Integrated Waste Management Board	1997	Factsheet	Drywall recycling, including existing and potential markets, drywall processors in California and a list of reports	http://www.ciwmb.ca.gov/ConDemo/factsheet/Drywall.htm
O46	Environmentally Conscious Construction: A Practical Guide for the Construction and Demolition Industry	Region of Peel	1997	Guide	Overview of the CRD industry; discusses issues for the owner, architect and contractor; identifies 3R's options for construction materials	Region of Peel, (905) 791-7800
O47	Flexibility Saves \$6,500	King County Solid Waste Division	1997	Case Study	Remodeling of construction company's new corporate office recycles 42% of materials	King County Solid Waste Division, (206) 296-8480
O48	From Roofs to Roads...Recycling Asphalt Roofing Shingles into Paving Materials	National Association of Home Builders Research Center	1999	Brochure	Characterizes the waste stream, presents benefits of recycling, lists potential end uses for recycled shingles and lists resources and equipment manufacturers	National Association of Home Builders Research Center, (301) 249-4000
O49	Good Defences Make Good Lumber	Fine Homebuilding Magazine	1996	Journal Article	U.S. military discovers that the lumber used to build old military structures is worth something	http://www.smartgrowth.org/library/good_defenses.html
O50	Green Building Practices at Work: Deconstruction and Building Materials Reuse	Greater Vancouver Regional District	1998	Seminar Outline	Seminar agenda	Greater Vancouver Regional District, (604) 436-6818
O51	Greening Your Practice: Minimizing Waste in the Design Industry	Susan Morris Specification Ltd. and Penner and Associates Interior Design	1998	Seminar Outline	Provides an overview of what architects and designers can do to be more resource-efficient in building design	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O52	Gypsum Wallboard Waste	Washington State Department of Ecology	1996	Factsheet	Alternatives to landfill disposal for gypsum wallboard	http://www.wa.gov/swfa/gypsum.html
O53	Hosting a Waste Reduction Event: A Kit for Local Home Builders' Associations	Habitat Associates	1997	Guide	Assists local home builders' associations with holding an event that focuses on waste reduction	Ontario Home Builders' Association, (416) 443-1545
O54	Housing Deconstruction Project: 1659 Kilborn Avenue, Ottawa, Ontario	by dEsign consultants	1996	Case Study	Deconstruction can provide an environmental benefit and has positive economic potential to divert C&D waste	Canada Mortgage and Housing Corporation, 1-800-668-2642
O55	How Home Builders and Renovators Can Help Build a Green Future	Canada Mortgage and Housing Corporation	1993	Guide	Outlines "3 R's" for building materials, building and renovating to preserve and conserve, and a waste management action plan	Canada Mortgage and Housing Corporation, 1-800-668-2642
O56	How to Clean-up in the Construction Waste Business	National Association of Home Builders	1997	Brochure	Explains how to clean-up service operates, why builders are interested, the required equipment and personnel, and lists other resources	National Association of Home Builders Research Center

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
O57	Innovators in C&D Recycling	Robet Steuteville	1994	Journal Article	Recyclers in Colorado, Massachusetts and New York show how creative thinking can be a factor in the successful processing of wood waste and other construction materials	Biocycle - Journal of Composting and Recycling Vol 35, No 1, pp 30-33
O58	Job Site Recycling: A Builder's Blueprint - Putting a Lid on Waste Removal Costs	United States Environmental Protection Agency, Policy, Planning and Evaluation	1997	Brochure	Basic overview of job site recycling	National Association of Home Builders Research Center, Peter Yost, (301) 430-6242
O59	Job Site Recycling: A Guide for Builders and Developers	Greater Vancouver Regional District	1999	Guide	Steps involved in setting up effective construction site recycling programs; case studies highlight how other builders recycled on their site and saved money	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O60	Job Site Source Separation	California Integrated Waste Management Board	1995	Factsheet	Steps a contractor should consider that might enhance the likelihood of recycling wastes generated from C&D activities	http://www.ciwmb.ca.gov/ConDemo/JobSite.htm
O61	Keeping C&D Materials Out of Landfills Conserving Resources and Minimizing Waste in: the Construction Industry	Ontario Construction and Demolition Waste Reduction Strategy Team	1993	Report	Summarizes current solid waste management and waste diversion activities in construction projects, identifies barriers to greater diversion and describes proposed Action Plans to address these barriers	Ontario Ministry of the Environment and Energy (416) 325-4440
O62	Killarney Community Center: 95% Recycled	Greater Vancouver Regional District	1999	Case Study	Demolition process; salvage and recycling summary	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O63	Lower Costs Through Waste Reduction: Practical Ideas for Ontario Home Builders	Habitat Associates	1997	Guide	Benefits of being waste-wise, offers a number of strategies that builders have proven effective	Ontario Home Builders' Association, (416) 443-1545
O64	Lumber Waste	California Integrated Waste Management Board	1996	Factsheet	Options and current practices being employed to reuse whole or re-milled lumber generated from C&D activities	http://www.ciwmb.ca.gov/ConDemo/factsheets/Lumber.htm
O65	Making a Molehill Out of a Mountain	Canada Mortgage and Housing Corporation	1991	Video (VHS)	Provides reduction, reuse and recycling ideas for the C&D industry (9 minutes)	Canadian Mortgage and Housing Corporation, 1-800-668-2642
O66	Making a Molehill Out of a Mountain II	REIC Limited	1991	Report	Companion guide to "Making a Molehill Out of a Mountain" video	Greater Toronto Home Builders' Association, (416) 391-3445
O67	Managing Construction and Demolition Debris: A Guide for Builders, Developers and Contractors	Rhonda L. Sherman, North Carolina Cooperative Extension Service	1996	Guide	Discusses source reduction, reuse of scrap materials and recycling C&D wastes	http://www.bae.ncsu.edu/bae/programs/extension/publicat/wqwm/ag473_19.html
O68	Managing Demolition/Construction Debris	New Hampshire Department of Environmental Services	1999	Factsheet	Managing C&D waste at the project site and at off-site locations in New Hampshire	http://www.des.state.nh.us/sw-6.htm

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
128	Materials Which Cannot be Landfilled	Halifax Regional Municipality	1999	Factsheet	Describes materials that are not allowed at the Otter Lake Facility, lists alternate diversion sites	Halifax Regional Municipality, (902) 490-7136
O69	Meeting the Challenge of Earthquake Recycling	Robert Steuteville	1994	Journal Article	Los Angeles firm has geared up operations to recover materials from demolished buildings and help save landfill space	Biocycle - Journal of Composting and Recycling Vol 35, No 11, pp 55-57
O70	Microsoft Office Remodel Recycles 60%, Saves \$38,443	King County Solid Waste Division	1996	Case Study	Remodeling consisting of electrical, communications and mechanical upgrades, and ceiling and floor coverings	King County Solid Waste Division, (206) 296-8480
O71	Minnesota Sustainable Design Guide	University of Minnesota, College of Architecture and Landscape Architecture	1999	Guide	Overview of sustainable building design and use, covers pre design, design, construction, occupancy and next use	http://www.sustainabledesignguide.umn.edu
O72	NAS Alameda Deconstruction	Environmental Protection Agency Region 9 and Materials for the Future Foundation Inc	1999	Case Study	Discusses funding, licensing, employee training, salvaged materials, and lessons learned	http://www.smartgrowth.org/casestudies/NASAlameda.html
O73	Old Buildings Don't Have to go to Waste	North Carolina Cooperative Extension Service	1996	Video (VHS)	This video shows how to carefully dismantle old structures and use the materials to build new houses (23 minutes)	Department of Communication Services, North Carolina State University, (919) 513-3111
O74	On-Site Separation of Residential Construction Waste in the Triangle Region of North Carolina	Melanie A. Floyd	1994	Case Study	Evaluation of the cost-effectiveness of on-site separation of residential construction wastes in the Triangle region	Triangle J Council of Governments, Judy Kincaid, (919) 558-9343
O75	Pacific Press Building Demolition: 95% Recycled	Greater Vancouver Regional District	1999	Case Study	Demolition process; salvage and recycling summary	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O76	PICC Up Waste...for a Healthier, Cleaner Community	Partners in Clean Construction	1994	Guide	Summarizes construction "3R's" and job site programs; includes factsheets for a variety of building contractors, from drywall, electrical and framing to plumbing, roofing and siding	City of Edmonton, Gary Spotowski, (780) 496-5681
O77	PNE Showmart Deconstruction Recycles 75%	Greater Vancouver Regional District	1999	Case Study	Cost-effectiveness of deconstruction, lumber is salvaged	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O78	Presidio of San Francisco, Building 901	California Integrated Waste Management Board	1996	Case Study	Chronicles the recovery of over 78,800 board feet of lumber from a 2,450 square-foot building built in the 1940's and the sale of that lumber to showcase cost-effectiveness, of hand deconstruction	http://www.ciwmb.ca.gov/ConDemo/Pubs.htm
O79	Processing C&D Debris for Markets	Dave Block	1998	Journal Article	Iowa company extends the life of its landfill by strategically recycling an extensive list of material	Biocycle - Journal of Composting and Recycling, Vol 39, No 10, pp 35-36

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
O80	Provincial Demolition Material Diversion Strategy - British Columbia	Demolition/Deconstruction Planning Committee	1999	Report	Overview of deconstruction, benefits and barriers	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O81	Recovering Materials Via Deconstruction	Adrienne Touart	1998	Journal Article	Seattle firm uses a system of "construction in reverse" to salvage over half of the materials in a house to be torn down	Biocycle - Journal of Composting and Recycling Vol 39, No 8, pp 30-32
O82	Recycled Aggregate	California Integrated Waste Management Board	1998	Factsheet	Overview of recycling concrete and asphalt into aggregate base, including specifications, organizations and siting considerations in California	http://www.ciwmb.ca.gov/ConDemo/factsheets/Aggregat.htm
O83	Recycled Latex Paint	California Integrated Waste Management Board	1998	Factsheet	Overview of reusable and recycled latex paint for purchase in California	http://www.ciwmb.ca.gov/ConDemo/factsheets/Paint.htm
O84	Recycling at Construction Sites	Adrienne Touart	1998	Journal Article	Thanks to more savvy customers, greater environmental interest and positive impact on the bottom line, one of Seattle's leading construction companies pushes recycling to the forefront	Biocycle - Journal of Composting and Recycling Vol 39, No 2, pp 53-55
O85	Recycling Cuts Garbage Costs by 10%	Greater Vancouver Regional District	1999	Case Study	Wood waste recycling program at residential home construction site	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O86	Recycling Debris From Construction Projects	Robert Steuteville	1992	Journal Article	An Illinois firm developed a curbside system for collecting C&D material from residential development projects	Biocycle - Journal of Composting and Recycling, Vol 33, No 8, pp 62-63
O87	Recycling in the Fast Track	King County Solid Waste Division	1997	Case Study	Office remodeling saves \$195,100 for combined demolition and construction phases	King County Solid Waste Division, (206) 296-8480
O88	Recycling Markets Directory - Industrial, Commercial and Institutional	Toronto Works and Emergency Services	1998	Guide	Listing of companies in the surrounding area that recycle materials from the ICI sector	Toronto Works and Emergency Services, Kevin Vibert, (413) 0203
O89	Recycling Pays off at Construction Site	Dave Block	1999	Journal Article	Pilot project in Maui shows that source separation of leftover materials during residential construction actually saves money	Biocycle - Journal of Composting and Recycling Vol 40, No 9, pp 50-52
O90	Recycling Plus Program Manual: A Best Practices Manual for Construction Job Site Recycling	Fletcher Wright Construction, O'Brien & Company and Sound Resource Management Group	1996	Guide	Provides construction companies with a structured program for reducing construction waste on job sites by utilizing the "3 R's"	Clean Washington Center (206) 464-7040
O91	Recycling Saves \$245 at Co-housing Project	Greater Vancouver Regional District	1999	Case Study	Construction wood waste recycling program	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
O92	Redevelopment Site Recycles 1,100 Cubic Yards	Greater Vancouver Regional District	1999	Case Study	Demolition of gymnasium/fitness studio and construction of apartment building	http://www.gvrd.bc.ca/waste/bro/dlcgde.html

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
O93	Reducing Construction and Demolition Waste Through Planning, Job Site Reuse and Recycling	Center for Resourceful Building Technology	1995	Report	Outlines the "3 R's" for C&D waste diversion, and the barriers and rewards of job site recycling	Center for Resourceful Building Technology, (406) 549-7678
O94	Regional Justice Center Demolition Recycles 95%	King County Solid Waste Division	1996	Case Study	Old Regional Justice Center diverts 35,817 tons of demolition debris, cost savings approximately \$265,000	King County Solid Waste Division, (206) 296-8480
O95	Renovation of a Residential Home - Nova Scotia	Construction and Demolition Waste Website	1993	Case Study	Brief description of construction waste management program	http://www.cdwaste.com/english/cases/renre3.htm
O96	Residential Construction Waste Management: A Builder's Field Guide	National Association of Home Builders Research Center	1997	Guide	General resource for builders interested in reducing construction waste or developing a waste management plan	http://www.nahbrc.org/builders/green/WASTEPUB.htm
O97	Residential Construction Waste Management: A Coordinator's Guide to Conducting Workshops at the Local Level	National Association of Home Builders Research Center	1999	Guide	All the key steps required to host a construction waste management workshop in your area; includes modules on waste reduction and recycling, and developing a directory of outlets	National Home Builders Association Research Center (301) 249-4000
O98	Resource Efficient Building: A Handbook for Building Owners, Designers and Project Managers	METRO Portland, Regional Environmental Management	1994	Guide	Discusses reuse and salvage, construction site recycling, recycled-content construction materials and design for occupant recycling	METRO Portland, Regional Environmental Management (503) 797-1650
O99	Resource-Efficient Building Construction, Demolition and Design	UBC Continuing Education for Engineers and Architects	1999	Seminar Outline	Seminar agenda	Greater Vancouver Regional District, (604) 436-6818
100	School Gets High Marks for Sustainability	King County Solid Waste Diversion	1997	Case Study	High School has 60% recycling rate during construction, nearly 1,700 tons of recycled material used in building	King County Solid Waste Division, (206) 296-8480
101	Sir William Logan Building - Green Floors Project - Ontario	Construction and Demolition Waste Website	1995-1996	Case Study	Discusses environmental achievements and economic factors of green demolition procedures	http://www.cdwaste.com/english/cases/sirwill.htm
102	Skeptics Save \$242,630 With Job Site Recycling	King County Solid Waste Division	1997	Case Study	Construction of a new 600,000 square foot Regional Justice Center, recycling rate 61%	King County Solid Waste Division, (206) 296-8480
103	Solid Resources Management Specification: Contractor Guidelines and Requirements of Construction, Demolition, and Landclearing Materials	City of Los Angeles, Bureau of Sanitation	1998	Guide	Describes procedures for ensuring optimal diversion of solid waste resources generated by construction, demolition and landclearing projects	City of Los Angeles, Solid Resources Citywide Recycling Division, (213) 847-1444
104	Spawning Great Ideas for Construction	Construction, Demolition, and Landclearing Council	1999	Seminar Outline	Seminar agenda, presentation topics and speakers history	King County Solid Waste Division, (206) 296-8480

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
105	Study of Demolition Recycling: Tennessee NFL Stadium	Wilmot & Associates Inc. and Bovis Construction Corporation	1998	Case Study	Record of plans, procedures and lessons learned which made the demolition phase of the recycling effort such a success	http://www.smartgrowth.org/casestudies/demolitionstudy.htm
106	Strategies For Successful Construction and Demolition Waste Recycling Operations	Chun-Li Peng, Domenic Scorpio and Charles Kibert	1997	Journal Article	Overview of construction and demolition waste recycling and machinery	Construction Management and Economics, 15, pp 49-58
107	Success in Residential Construction Recycling Rocky Ridge Recycling Pilot Project	Willow Root Environmental Ltd.	1999	Case Study	458, 312 kg of 'waste' from 191 new homes is diverted from the landfill	Calgary Region Home Builders Association, (403) 235-1911
108	Sustainability in Practice: Reducing Construction Waste in the Ontario Residential Construction Industry	Habitat Associates	1997	Report	Identifies the most effective strategies for minimizing residential construction waste in Ontario	Canada Mortgage and Housing Corporation, 1-800-668-2642
109	Sustainable Building Source Book	City of Austin, Green Building Program	1994	Guide	Collection of information and sources of materials, assistance and further research on many aspects of sustainable construction and remodeling	http://www.greenbuilder.com/sourcebook/
110	Taking on the Construction Waste Stream	Robert Steuteville	1996	Journal Article	A large-scale demonstration project in the Des Moines, Iowa region seeks to determine just how much material can be recovered from job sites	Biocycle - Journal of Composting and Recycling, Vol 37, No 10, pp 64-66
111	Team Approach Saves \$186,000	King County Solid Waste Division	1997	Case Study	Construction of new office building recycles 2,310 tons, 74% recycling rate	King County Solid waste Division, (206) 296-8480
112	Technical Manual for Material Choices in Sustainable Construction	California Environmental Protection Agency Integrated Waste Management Board	1999	Report	Highlights sustainable waste management principles for planning, design and construction of large-scale residential and commercial projects, recycled-content building materials highlighted	California Environmental Protection Agency, Integrated Waste Management Board, (916) 255-2296
113	The Amazing Recyclability of Construction and Demolition Wastes	Louis Perez	1994	Journal Article	C&D waste recovery program can improve a community's recycling rate and increase economics for public or private waste management programs	Solid Waste Technologies, January/February, 1994
114	The Construction, Renovation and Demolition Resource/ Waste Management Workshop	by dEsign consultants	1999	Workshop Notes	Covers reuse and recycling, pre-design and design planning, specifications, material audits, and resource management workplan implementation	by dEsign consultants, Ottawa, ON, (613) 759-4605
115	The Environmentally Responsible Construction and Renovation Handbook	Environment Canada and Public Works and Government Services Canada	1995	Guide	Construction and renovation waste reduction strategy; detailed discussion on numerous products and materials used in this industry	Environment Canada Information 1-800-668-6767 enviroinfo@ec.gc.ca

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
116	The Many Routes to Recycling Wood	Kevin Gray	1999	Journal Article	North Carolina companies figure out ways to reach markets - instead of landfills that still have low tip fees	Biocycle - Journal of Composting and Recycling, Vol 40, No 3, pp 64-66
117	UBC Deconstruction Project Achieves 94% Recycling Rate	Greater Vancouver Regional District	1999	Case Study	Deconstruction process, and recycling and salvage summary	http://www.gvrd.bc.ca/waste/bro/dlcgde.html
118	Urban Waste Wood	California Integrated Waste Management Board	1995	Factsheet	Includes estimated quantities of wood waste generated from most C&D operations and markets available for the processed wood	http://www.ciwmb.ca.gov/ConDemo/factsheet/UrbanWd.htm
119	Waste Diversion During Construction of a Residential Home - Ontario	Construction and Demolition Waste Website	1993	Case Study	Waste diversion program for the construction of a 3,800 square foot residential home	http://www.cdwaste.com/english/cases/wastediv.htm
120	Waste Edmonton - Partners in Clean Construction	City of Edmonton	1994	Video (VHS)	Partners in clean construction, finding ways to manage waste before someone tells you to, overview of 8 house case study (13 minutes)	City of Edmonton, Gary Spotowski, (780) 496-5681
121	Waste Management and Recovery: A Field Guide for Residential Remodelers	National Association of Home Builders Research Center	1998	Guide	Addresses the unique situations confronted by the remodeler, including reuse opportunities and the handling of lead-based paint and asbestos; provides real case studies	http://www.nahbrc.org/builders/green/WASTEPUB.htm
122	Waste Minimization Construction and Demolition	Alberta Environment	1992	Factsheet	Outlines a number of reduce, reuse and recycle options to help the C&D industry minimize waste	Alberta Environment, Action on Waste Hotline, 1-800-463-6326
123	Waste Minimization Manual: Construction and Demolition Industry	Alberta Environment	1992	Guide	Detailed self-help guide for the C&D industry for developing a waste minimization plan	Alberta Environment, Action on Waste Hotline, 1-800-463-6326
124	Waste Reduction and Recycling Opportunities for Construction and Demolition Debris	Washtenaw County, Department of Environment and Infrastructure Services - Public Works Division	1997	Factsheet	Brief overview of waste diversion opportunities in the C&D industry	http://www.co.washtenaw.mi.us/depts/eis/constfs.htm
125	What Goes Up Must Come Down: A Deconstruction Strategy for British Columbia	Recycling Council of British Columbia	1999	Report	Benefits of deconstruction, identifies barriers that must be overcome and suggests solutions to facilitate the development of a provincial Demolition Material Diversion Strategy	http://www.rcbc.bc.ca/publications/reiterate/0299/
126	What to do With Home Renovation Waste: A3R's Guide to Home Improvement	Capital Regional District	1997	Brochure	Brief discussion of "3 R's" with regards to home renovation	Capital Regional District Hotline, (250) 360-3030

ID Number	Title	Author	Year Published	Media Type	Description	Availability as of January 20, 2000
127	Wood You Recycle? A Guide to Wood Re-use and Recycling in the Los Angeles Area	City of Los Angeles, Bureau of Sanitation	1999	Guide	3R's opportunities for wood waste and listing of processors	City of Los Angeles, Solid Resources Citywide Recycling Division, (213) 847-1444

APPENDIX C
CRD GUIDE SUMMARIES

The following are summaries of guide documents that are referred to the CRD Waste Reduction Advisory Committee as particularly good examples of “how-to” publications.

1) Hosting a Waste Reduction Event: A Kit for Local Home Builders Associations

Author: Habitat Associates

Publication Date: 1997

Availability as of January 20, 2000: Ontario Home Builders Association
(416) 443-1545

Audience: Home Builders Association

Summary: Designed to assist with the organization of an event that raises waste reduction awareness. Describes who would be appropriate event speakers and sponsors, as well as event promotion. Includes an event day checklist and samples of advertising options.

Table of Contents:

- I Focus on Waste Reduction
- II Event Planning Overview
 - Choose a Topic or Theme
 - Choose a Format
 - Set a Budget
- III Speakers and Sponsors
 - Builders, Suppliers and Manufacturers
 - Waste Haulers and Recycling Agencies
 - Municipalities
 - Speaker Confirmation is Critical
- IV Promoting the Event
 - Encouraging Attendance
 - Tips for Dealing with the Media
 - Placing Press Releases and Public Service Announcements
 - Sample Flyers, Posters, Advertisements and Press Releases
- V Running the Event
 - Readiness Checklist and Meeting Agenda
- VI Resources
 - Documents, Internet and Videos

2) How Home Builders and Renovators Can Build a Green Future

Author: Canada Mortgage and Housing Corporation

Publication Date: 1993

Availability as of January 20, 2000: Canada Mortgage and Housing Corporation
(800) 668-2642

Audience: Home Builders and Renovators

Summary: Demonstrates the need for environmental pro-action and green building. Overview of reduction, reuse and recycling options for construction materials. Discusses green options for reducing water and energy consumption. Includes waste audit worksheet and a waste management action plan checklist.

Table of Contents:

- I Overview
 - Challenges Facing Builders and Renovators
- II How Green are You?
- III What you Can do About Job Waste
 - Waste Audit is the Essential First Step
 - Waste Management Plan is Smart Business
 - Waste Management in Action
- IV Less Wasteful Building Practices
 - Practical Guide to the 3R's and Building Materials
 - Lumber, Drywall, Masonry, Cardboard and Paper
 - Metal, Appliances, Plastic and Vinyl
 - Shingles and Insulation
 - Paints, Solvents and Sealants
- V Building and Renovating to Preserve and Conserve
 - Water Consumption
 - Toilets, Shower Heads, Faucets and Landscaping
 - Energy Consumption
 - Building Materials
 - Furnaces, Water Heaters and Heat Distributing Systems
 - Lights and Lighting Strategies
 - Appliances
- VI Waste Management Action Plan
 - Key Principles
 - Recycling Materials

Waste Management Action Plan Checklist

3) Lower Costs Through Waste Reduction: Practical Ideas for Ontario Home Builders

<u>Author:</u>	Habitat Associates
<u>Publication Date:</u>	1997
<u>Availability as of January 20, 2000:</u>	Ontario Home Builders Association (416) 443-1545
<u>Audience:</u>	Home Builders Association
<u>Summary:</u>	Documents several benefits of waste reduction. Discusses strategies for addressing construction waste that other builders have proven effective. Can be utilized for promoting an event and for preparing presentations. Gives waste reduction design tips for wood and drywall.
<u>Table of Contents:</u>	<ul style="list-style-type: none">I Introduction<ul style="list-style-type: none">• Focus on Waste ReductionII Facts and Figures<ul style="list-style-type: none">• Background: Residential Construction Waste• Waste Management at a Glance• Edmonton's Residential Waste Management Audit• CMHC's Residential Construction Waste Management ChallengeIII Waste Reduction Tips<ul style="list-style-type: none">• General Waste Reduction<ul style="list-style-type: none">- Set Goals, Monitor Costs and Waste Production- Nurture Good Relationships and Communication• 3 Principles: Design, Precision, Tools<ul style="list-style-type: none">- Design- Precision with Materials- Pre-cut or Custom Manufactures Materials• Wood: Advanced Framing Techniques<ul style="list-style-type: none">- Reducing Framing Wood- Value-Engineered Roof Design• DrywallIV Resources<ul style="list-style-type: none">• Documents, Internet and Videos

4) Recycling Plus Program Manual: A Best Practices Manual for Construction Job Site Recycling

Author: Fletcher Wright Construction, O'Brien & Company and Sound Resource Management Group

Publication Date: 1996

Availability as of January 20, 2000: Clean Washington Center
(206) 464-7040

Audience: Construction Industry

Summary: A model program for reducing construction waste on job sites using reduction, reuse and recycling options. This is a user-friendly program emphasizing cost-effective methods to minimize waste on the job site and to ensure that the majority of waste is recycled. The program is divided into three parts, (1) Management Guide, (2) Field Guide and a (3) Subcontractor Kit. Includes worksheets for job site action plans, waste audits, tracking materials and job site evaluations.

Table of Contents:

- I Management Guide
 - Introduction
 - Management's Role in the Recycling Plus Program
 - Appendices
- II Field Guide
 - Introduction
 - Planning Issues
 - Planning Tools
 - Communication Tools
 - Motivational Tools
 - Evaluation Tools
 - Working with Subcontractors
- III Subcontractor Kit
 - Introduction
 - Subcontractor Tip Sheet

5) Residential Construction Waste Management: A Builder's Field Guide

Author: National Association of Home Builders Research Center

Publication Date: 1997

Availability as of January 20, 2000: <http://www.nahbrc.org/builders/green/WASTEPUB.htm>

Audience: New Home Builders

Summary: Presents several cost-effective methods that builders can use for construction waste management, and provides real case studies to support the recommended actions. The field guide is based on numerous waste assessments, workshops, and pilot projects involving builders and waste haulers. Included in the pilot project profiles are framing waste reduction exercises, job site recycling strategies, and marketing strategies from several regions of the United States.

Table of Contents:

- I First Steps
 - Developing a Waste Management Plan
 - Construction Waste: Types and Quantities
 - Some Basics about Disposal Costs
- II Options
 - Reducing Framing Waste
 - Contract Structure
 - Waste Recycling
 - Job Site Clean-up Services
 - Comingled Recovery
 - Job Site Separation
 - Self-Haul
 - Building Materials Reuse Centers
 - On the Cutting Edge: New Ideas
- III Marketing
 - Builder Marketing
 - Home Builder Association Outreach
- IV Appendices
 - Value-Engineered Roof Design
 - Guidelines for Requiring Subcontractors to Remove Waste
 - Guidelines for Storing Drywall Scraps in Vacant Wall Framing Cavities
 - Supporting Documents for Agricultural Uses of Wood and Drywall
 - National and State Information Sources

6) Residential Construction Waste Management: A Coordinator's Guide to Conducting Workshops at the Local Level

<u>Author:</u>	National Association of Home Builders Research Center
<u>Publication Date:</u>	1999
<u>Availability as of January 20, 2000:</u>	National Association of Home Builders Research Center (301) 249-4000
<u>Audience:</u>	Home Builders Association
<u>Summary:</u>	Outlines all of the key steps required to host a community construction waste management workshop. The guide includes individual modules on waste reduction, waste recycling and developing a directory of outlets. A disk contains sample agendas, handouts, invitation lists and mailings.
<u>Table of Contents:</u>	<p>Start-Up: Planning a Construction Waste Management Workshop</p> <ul style="list-style-type: none"> • Agenda, Mailing List, Invitation, Sample Case Study, Evaluation <p>Module I: Introduction to Waste Management</p> <ul style="list-style-type: none"> • Waste Stream Components, Conditions Affecting Decisions and Waste Management Plans <p>Module II: Waste Reduction</p> <ul style="list-style-type: none"> • Efficient Framing Techniques • Structuring Contracts which Require Subcontractors to Remove Their own Waste <p>Module III: Waste Reuse and Recycling</p> <ul style="list-style-type: none"> • Recovery Methods • Material Specific Markets <p>Module IV: Developing a Directory of Markets/Outlets</p> <ul style="list-style-type: none"> • Identifying Companies • Directory Structure and Locator Maps • Updating Directory and Distribution <p>Module V: Marketing Waste Management</p> <ul style="list-style-type: none"> • Builder Marketing, Home Builder Association Outreach and Green Builder Program <p>Resources: References and Information Sources</p>

7) Waste Management and Recovery: A Field Guide for Residential Remodelers

Author: National Association of Home Builders Research Center

Publication Date: 1998

Availability as of January 20, 2000: <http://www.nahbrc.org/builders/green/WASTEPUB.htm>

Audience: Residential Remodelers

Summary: Presents several waste management strategies and provides real case studies to support the recommended actions. As a follow up guide to the *Builders Field Guide*, the *Remodelers Field Guide* addresses the unique situations confronted by the remodeler, including reuse opportunities and the handling of lead-based paint and asbestos.

Table of Contents:

- I First Steps
 - Developing a Waste Management Recovery Plan
 - Waste Management at a Glance
 - Remodeling Waste Basics
 - Conditions Affecting Decisions
- II Options
 - Waste Reduction
 - Reuse
 - Recycling
- III Marketing
 - Remodeler Marketing
 - Green Builder/Remodeler Programs
- IV Appendices
 - Guidelines for Requiring Subcontractors to Remove Waste
 - Lead and Asbestos Handling
 - National and State Information Sources