

Disclaimer

Notice: This presentation has been provided as part of the U.S. Environmental Protection Agency Resource Conservation Challenge Web Academy Recycling and Solid Waste Management Educational Series. This document does not constitute EPA policy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use. Links to non-EPA web sites do not imply any official EPA endorsement or a responsibility for the opinions, ideas, data, or products presented at those locations or guarantee the validity of the information provided. Links to non-EPA servers are provided solely as a pointer to information that might be useful to EPA staff and the public.

Timonie Hood
C&D Recycling in California

California Construction & Demolition Debris Highlights



Timonie Hood, LEED AP
U.S. EPA Pacific
Southwest Office

Foundation for CA's Leadership

- **Legislation:** AB939 – local jurisdictions must divert 50% solid waste from landfills (includes C&D) by 2000 – up to \$10,000/day fines



- **Earthquakes >**
C&D INFRASTRUCTURE

- **Ordinances & Specifications**

- **Green Building Requirements**



C&D Infrastructure

- C&D Material Recovery Facilities

+90% diversion / 135 tons/hr

<http://www.z-best.com>



- Deconstruction/Building Material Reuse

15% of national total

<http://www.buildingreuse.org>

<http://www.threusepeople.org>



CA Appraised Donation Values

City	Sq. Feet	Donation Value
Oakland	1,400	\$74,144
Napa	2,804	\$102,025
Santa Monica	1,400	\$46,694
Newport Beach	6,771	\$333,000

Ordinance Language

- **City of San Jose Model C&D Ordinance**

<<http://www.sjrecycles.org/business/cddd.htm>>

- Fee paid up front & refunded only if proof of recycling and reuse submitted

- Sliding fee (includes renovations)

- **Certified Facility List** (Reuse & Recycling Centers)

- Significant unredeemed deposits

- **CA Model Ordinances**

<<http://www.ciwmb.ca.gov/ConDemo/SampleDocs/>>



Specification Language: Bay Area Rapid Transit District

- BART's Facility Standard requires contractors to:
 1. Divert 70% of construction waste from landfill disposal
 2. Divert a minimum of 100% of steel and concrete demolition waste from landfill and an overall minimum of 50% of remaining demolition waste from landfill.
 3. **Weight ticket proof** (disposal & recycling is required)
- **Results**
 - Estimated diversion of C&D: 6,450 tons
 - Estimated tipping fees avoided: \$645,000

San Jose C&D Deposit System

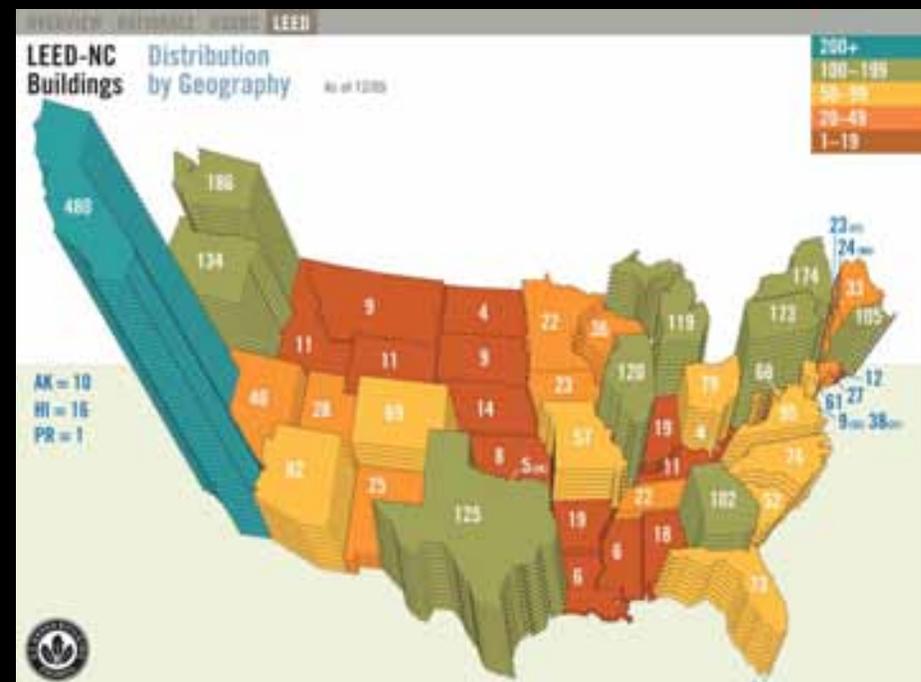
How is my deposit calculated?

Building Segment	Deposit per Sq. Ft.	Minimum Valuation	Maximum Sq. Ft. Subject to Deposit
Residential new construction	\$0.20	\$115,000	125,000 detached 100,000 attached
Non-residential new construction	\$0.10	\$135,000	25,000 commercial 75,000 industrial
Residential alterations	\$1.16	\$2,000	None
Non-residential alterations	\$0.35	\$5,000	None
Residential demolition	\$0.35	\$5,000	None
Non-residential demolition	\$0.10	None	None
	Flat Rate		
Roof project with tear-off	None	None	None

Updated: 12-11-07

California Green Building

- CA has most U.S. Green Building Council LEED projects in the nation +LEED 1,500 registered projects
- LEED Credits:
 - Building Reuse: 75% & 95%
 - existing walls, floors & roof
 - Building Reuse: Maintain 50% interior non-structural
 - C&D Recycling 50% & 75%
 - Materials Reuse: 5% & 10%
- Numerous other green building rating systems:
All include C&D



Bob Brickner
Case Study: C&D Recycling at
Fauquier County, VA

Procurement of the Fauquier Co VA C&D Processing/Recycling System



Presentation by: Bob Brickner , Executive V-P
Gershman, Brickner & Bratton, Inc. (GBB)

Presented on RCC Webinar Feb. 21, 2008

With GBB's Client Contact: Mike Dorsey
Environmental Services , Director
Fauquier Co., VA

GBB

Gershman, Brickner & Bratton, Inc.

Why am I here?

- In Jan. 2006 and March 2006 the County BOS voted to endorse the development of a C&D recycling facility at the County solid waste management complex
- GBB was hired (mid-March 2006) by County to lead the C&D recycling system procurement & negotiations effort (incl. Acceptance Testing of the System)

- Bob Brickner is GBB's Project Manager for the overall effort
- Items to be covered in this talk will include:
 - Review of the Project Needs & Specifications
 - RFP Process & Evaluation of Proposals
 - Vendor Interview Process, Short listing & Field Trips
 - Final Selection & Contracting
 - Current Status of Project

County Solid Waste Complex

- The County owns a 250-acre solid waste complex and has operated the site since 1990
- Currently has several private sector contractors providing services at the complex
- This complex includes, amongst other functions:
 - a MSW Landfill (Permit 575)
 - a C&D Landfill (Permit 149)

Synergy of Fauquier Co. System

- Operates a MSW landfill – 70,000 tons in 2005
- Operates of a C&D Landfill - 112,000 tons in 2005 from the County and out-of-County sources.
- Operates the scale house
- Receives & recycles of scrap metal & white goods
- Receives and mulches of yard waste at the site.
- Brush & pallet drop-off area w/ grinding operation
- Receives tires for further processing/recycling.
- Accepts clean soils for use at the landfills
- Operates the MRF & citizens drop-off area
- Operates a reuse center
- Privatized LFG recovery system w/power production.

Fauquier Co. Solid Waste Complex



Why County Issued the RFP

- Less than one year of C&D waste disposal capacity existed within the C&D Landfill
- The disposal of C&D Waste within the MSW Landfill) was not deemed in the County's best interests.

Scope of Basic Services

- The County sought Proposals for:
Design, Supply, Installation, Startup and Acceptance Testing of a C&D Waste processing/recycling System to demonstrate the ability of the turnkey equipment system to handle the level of C&D Waste throughput capacity proposed/contracted, on a cubic yards per hour basis;

Note: The County took responsibility for the operation and all marketing of the recovered/processed C&D Waste constituents and ultimate disposal of any non-recovered Residuals.

C&D Project Site Location



Key “Front-End” Project Dates

- GBB was interviewed by County, selected, and the March 16, 2006 GBB Proposal to County stated “GBB expects to have private-sector proposals within 75 days of GBB’s formal Notice-to-Proceed”
- RFP Issued by County: April 4, 2006
- Proposals Received: May 18, 2006 (63 days!)
- Proposer Interviews: May 24, 2006
- Facility Tours: May 31 & June 1, 2006
- Contractor Selection Approval by County Board of Supervisors: originally scheduled for June 8 but changed to July 13, 2006

Picture is “Middle of Prepared Site”
during filling and soil compaction activity



GBB

Gershman, Brickner & Bratton, Inc.

Underground Electrical Conduits



GBB

Gershman, Brickner & Bratton, Inc.

Permit Requirements

- Commonwealth of Virginia --- Permit by Rule, Materials Recovery Facility
Permit application documents Include:
 - Certificate of Design
 - O&M Plan
 - Unauthorized Waste Program
 - Closure Plan
- Fauquier Co. Building Department
 - Local Zoning Approval
 - Land Disturbance Permit
 - Detailed Site Approval
 - Construction Permit

Overview of County RFP

- Design, Installation and Acceptance Testing of C&D Recycling System, plus an Alternative for a Two (2) Year Operating Contract from the date of Acceptance with options to renew for three (3) successive one year periods

GT&C & Draft Contract

General Terms and Conditions for
Construction Contracts (Appendix A)
Draft Contract (Appendix B)

Proposer was required to indicate **any text within the Draft Contract and the General Terms and Conditions, that was not acceptable**, and furthermore, provide alternative suggested language to these identified areas with the proposal for the County to consider during the proposal evaluation process.

Commencement Date of Work

- As of the release of the RFP, the County had already set aside capital funds for the site improvements and the purchase of the C&D System equipment described herein.

The new C&D System would potentially consist of the following:

- Site management equipment (front-end loader and an excavator with a bucket and thumb)
- Excavator (or alternative feed system conveyor) load the C&D Waste to a screen used for separation of Fines;
- Screen which separates the Fines and distributes the waste materials before discharging the mixed C&D waste materials onto a sorting conveyor.
- Sorting conveyor with a minimum of seven (7) stations per side
- Possibility of a grinding operation to grind the C&D residuals (possibly into an ADC) to conserve space in the MSW Landfill.
- The separated materials will be chute loaded into containers and hauled to other appropriate storage locations within the complex

RFP Figure 3 C&D System Site Dimensions

- Concrete: Truck Delivery/Unloading, Equipment for Loading; 125' X 175' plus Sorting/ Processing Operation Stockpiling area: 80' X 200'
- Perimeter Asphalt: 425' X 490' (uneven sides)
- Total < 5 acres

System Design Capacity

- Based on historical receipts, the County required proposals to be a C&D System with the design capacity of at least 470 cubic yards per hour of mixed C&D waste.

Required Feeding Alternate

- The Base C&D System shall start with the Mixed C&D on the tipping floor being loaded onto the Primary Screen by an Excavator. However, due to site constraints, the Proposer must also provide a “Required Feeding Alternate” that consists of a “Primary Feed Conveyor” that could be loaded by either a large front-end loader or excavator, with this “Primary Feed Conveyor” elevating the C&D Waste to discharge onto the “Primary Screen”.

Main Sorting Conveyor

- The “Main Sorting Conveyor” was required to be at least eighty (80 feet long) and provide seven (7) chutes on each side of the conveyor as vertical discharge points for constituents pulled off of the “Main Sorting Conveyor.”
- The center of the first picking station had to be at least ten (10) feet away from the inclined/transfer conveyor feeding materials onto the Main Sorting Conveyor”.
- The Project design was to provide a positive sort from up to seven (7) sorting stations for all recyclable materials along both sides of the entire length of the “Main Sorting Conveyor”.

Key Guidelines for the Main Sorting Conveyor Platform

- The support structure for the “Main Sorting Conveyor” had to provide a ten (10) foot “wide” drive-through area under each of the material drop chute zones
- The support steel and any chutes for the “Main Sorting Conveyor” must all be “higher” than thirteen (13) feet clear span above grade to allow full mobile equipment travel and access under the structure.
- All dividing steel installed at grade for each constituent collection zone must be at least twenty (20) feet of horizontal wall partition and be ten (10) feet high to allow constituent separation even if discharge boxes are not under the chutes.

Main Sorting Conveyor Enclosure/Weather Protection

- The County required some form of enclosure/weather protection for the labor sorters along the “Main Sorting Conveyor”.

County Permit Costs

- The County is owner of the property and will also obtain/retain the Virginia DEQ permit for operations.
- However, the development and the cost of any other supporting documents specifically associated with the C&D System that may be required shall be the responsibility of the Contractor.

Six Proposals Received

- **Ace Waste, Reston, VA**
- **Alliance Technology Group, McLean, VA**
- **Continental Biomass Industries, Inc., Newton, NH**
- **Krause Manufacturing, Inc., Bellingham, WA**
- **Mid Atlantic Waste Systems, Clinton, MD**
- **Sherbrooke OEM, Ltd, Sherbrooke (Quebec), Canada**

- **Four Proposer's Selected for Interviews: on May 23-24, 2006**
 - Sherbrooke OEM
 - Krause
 - CBI
 - ACE Waste

- **May 31 & June 1, 2006 conducted Facility Tours of Systems of the two Firms Short listed: (Sherbrooke & CBI)**

- **Final Capital Cost: Nominal \$1.2 Million**

Key Project Dates

- Notice-to-Proceed (NTP): Sept. 11, 2006 and Scheduled Start Date of Feb. 7, 2007
- Addendum 4: Signed Feb. 7, 2007
 - Due to delay in getting site permits and equipment has been built, mutual agreement to change payment terms
- County Building Permit Required
 - Final Building Permit rec'd Feb. 5, 2007

C&D Facility as Constructed (System is outside at LF, no building)



GBB

Gershman, Brickner & Bratton, Inc.

C&D Feed Conveyor



GBB

Gershman, Brickner & Bratton, Inc.

Finger Screen & Fe Magnet



GBB

Gershman, Brickner & Bratton, Inc.

Fe Magnet Discharge Area



GBB

Gershman, Brickner & Bratton, Inc.

“Overs” & “Unders” Conveyors



GBB

Gershman, Brickner & Bratton, Inc.

Fines Removal w/Star Screen



GBB

Gershman, Brickner & Bratton, Inc.

Collection of Recovered Materials



GBB

Gershman, Brickner & Bratton, Inc.

Two Residuals Drop-offs Areas



GBB

Gershman, Brickner & Bratton, Inc.

New Wheeled Loader



GBB

Gershman, Brickner & Bratton, Inc.

New Excavator w/grapple



GBB

Gershman, Brickner & Bratton, Inc.

Winter Weather Enclosure



GBB

Gershman, Brickner & Bratton, Inc.

Finger Screen In Action



GBB

Gershman, Brickner & Bratton, Inc.

Sorting Crew (13 County staffers) (Co. added Wind Protection, Heaters & Lights)



GBB

Gershman, Brickner & Bratton, Inc.

Dust Curtain over Screened Fines



GBB

Gershman, Brickner & Bratton, Inc.

Recovered Ferrous Metal



GBB

Gershman, Brickner & Bratton, Inc.

Wood Discharge Zone



GBB

Gershman, Brickner & Bratton, Inc.

Recovered Inerts Container



GBB

Gershman, Brickner & Bratton, Inc.

Wind Screen & Residue Guide w/old Roll-Off Containers



GBB

Gershman, Brickner & Bratton, Inc.

Misc. Bin for Metal Collection along Sorting Conveyor



GBB

Gershman, Brickner & Bratton, Inc.

Sorted Mixed Containers



Misc. Plastic Containers



Sorted Wire Collected



GBB

Gershman, Brickner & Bratton, Inc.

Vinyl Siding Being Sorted



GBB

Gershman, Brickner & Bratton, Inc.

Plastic Tubs in Mixed Plastic Sorting Bin



GBB

Gershman, Brickner & Bratton, Inc.

Non-Recycled Rejects -2nd Belt (in the Finger Screen Unders Stream)



GBB

Gershman, Brickner & Bratton, Inc.

Separated Carpet & Padding



GBB

Gershman, Brickner & Bratton, Inc.

Recovered Plastic Piping



GBB

Gershman, Brickner & Bratton, Inc.

Storage of Recovered Glass & Inerts Awaiting Crushing into Fines Aggregate Products



GBB

Gershman, Brickner & Bratton, Inc.

Key Material Markets

- Clean Wood – 3,000 ft away – RT
- Scrap Metal – 3,000 ft away – RT
- OCC (MRF) – 5,000 ft away – RT
- Plastics (MRF) – 5,000 ft away – RT
- A,B & C (Inerts) – 8,000 ft away–RT
- Shingles – 3,000 ft away – RT
- Fines (LF) – 5,000 ft away – RT
- ADC (if made) LF – 5,000 ft away – RT
- Residue (LF) – 5,000 ft away – RT

C&D Materials Marketed

Startup – July 1, 2007

- July: 19%
- August: 21%
- September: 30%
- October: 39%
- November: 38%
- December: 46%

C&D Waste Processed & Recovered (first 6 months)

- Total C&D Received (7/1/07 – 12/31/07)
34,089 Tons
- Based on a 5 day/week Operation, the average processing rate is approx.
260 tons per day
- If density assumption is 6 CY/T as received (333 pounds per CY), the daily rate is about 1500 CY per day (equiv. to fifty 30 CY roll-off boxes of C&D waste)

C&D Waste Processed & Recovered (first 6 months)

TYPE OF MATERIAL	Tons	%
Asphalt Shingles (1)	37	0.1%
Carpet	191	0.6%
Fines	5,131	15.1%
Inerts (1)	4,329	12.7%
Metal - Ferrous 8"+	997	2.9%
Metal - Ferrous 8"-	191	0.6%
Metal - Non Ferrous	10	0.03%
Old Cardboard	408	1.2%
Plastic (Vinyl Siding, Piping & Buckets)	127	0.4%
Clean Wood	1,604	4.7%
Subtotal Recovered:	13,025	38.2%
Non-Recovered - C&D Waste to Landfill	21,064	61.8%
TOTAL C&D Received (7/1/07 - 12/31/07)	34,089	100.0%

(1) Includes Separated Loads

Fauquier Co. Recycling Revenues, Systemwide

Materials Marketed	Net Revenue (Loss) \$ per Ton (Incl. Hauling)	
Metal (Ferrous)	\$123	
Metal (Ferrous Fines)	\$77	
Metal (Non-ferrous)	\$1,074	
Aluminum Cans	\$1,000	
Steel-Tin Cans	\$62	
Total Metal		Total Metal = 73.9%
Loose Cardboard (OCC)	\$30	
Baled Cardboard (OCC)	\$116	
Books	\$60	
Loose Newspaper (ONP)	~\$50	
Office Paper	\$160	
Mixed Paper - Baled	\$102	
Total Paper	\$0	Total Paper = 12.8%
Baled Plastic - HDPE (Natural)	\$545	
Baled Plastic - HDPE (Colored)	\$466	
Baled Plastic - PETE	\$268	
Loose Plastic - # 1 thru # 7	\$186	
Baled Plastic - Buckets	\$260	
Plastic - Siding & Piping	\$88	
		Total Plastic = 6.6%

Fauquier Co. Recycling Revenues, Systemwide

<u>Material Marketed</u>	<u>Net Revenues, incl. Hauling</u>
<u>OTHER:</u>	
Textiles, Belts, Shoes	\$107
Tires	\$23
Used Motor Oil	\$54
Asphalt Shingles	(\$65)
Batteries	\$178
Carpet, Padding & Foam Cushions	(\$51)
Inerts (Concrete, Block)	\$0
E-Waste	\$148
Glass Containers	\$0
Pallets	~\$25

Total Revenues from Other Materials = 6.9%

Thank You....any f/u questions

Bob Brickner 703-573-5800

Bbrickner@gbbinc.com

GBB

Gershman, Brickner & Bratton, Inc.

What is the EPA doing?

Kimberly Cochran, PhD
US EPA Office of Solid Waste

Timonie Hood
US EPA Region 9

RCC Web Academy
February 21, 2008

Not Just C&D Materials ...

Remember:

It is important to reuse/recycle C&D materials, but

It is also important to use recyclable materials from other industries in construction design.



Other Industrial Materials

- Coal fly ash
- Iron/steel slag
- Foundry sand



- Fill
- Structural material
- Masonry material
- Many more...



Industrial Materials Recycling Team

- Promotes the reduction, reuse, and recycling of industrial materials
 - Construction and demolition (C&D) materials
 - Coal combustion products (CCPs)
 - Foundry sands
 - Tires
 - Slags
 - Pulp and paper residuals

Industrial Materials Recycling Team

- Measure – “What gets tracked gets managed”
- Explore barriers and how to overcome them
- Increase awareness
- Recognize success

Green Highways, Sites, Buildings

- Helping develop criteria
- Promoting industrial materials recycling in green structures/sites
- Promoting coordination between transportation and environmental agencies

www.greenhighways.org

www.sustainablesites.org

Cement Specifications	Concrete Specifications
ASTM C 595, "Standard Specification for Blended Hydraulic Cements."	ASTM C 618, "Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete."
ASTM C 150, "Standard Specification for Portland Cement."	ASTM C 311, "Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete."
AASHTO M 240, "Blended Hydraulic Cements."	ASTM C 989, "Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars."

Exploring Barriers, Increasing Awareness

- Asphalt Shingle Recycling Forums
- Foundry Sand Forum
- Beneficial Use Summit

EPA's Innovative Grants

- 2005 Grant to CMRA for Tear-Off Asphalt Shingles Recycling
 - Update www.shinglerecycling.org website
 - Recycling Asphalt Shingles: Best Practices Guide
 - Environmental Issues Associated with Asphalt Shingle Recycling

Partners

- Federal Highway Administration
- Associated General Contractors of America
- Building Materials Reuse Association
- Construction Materials Recycling Association
- National Association of Home Builders
- National Demolition Association
- Association of State and Territorial Solid Waste Management Officials
- American Public Works Association
- National Association of Counties
- Foundry Sand Recycling Starts Today
- American Coal Ash Association
- Rubber Manufacturers Association
- National Council for Air and Stream Improvement
- National Slag and Slag Cement

EPA's Partnership with AGC

- White paper

“Industrial Materials Reduction, Reuse, and Recycling: Vital to Our Environment, Valuable to the Construction Industry”

- Demonstrate a support for reduction, reuse, and recycling
- Reuse and recycling should be performed in a safe manner

THE CONTRACTOR TOOLKIT FOR RECYCLING AND USING RECYCLED INDUSTRIAL MATERIALS

This toolkit contains a collection of resources that can help:

- Contractors who want to reduce, reuse, or recycle construction and demolition (C&D) materials generated at their job sites

AND

- Contractors who want to use recycled industrial materials in the construction or renovation of a structure.

Find out why EPA and AGC support reusing and recycling industrial materials in a jointly authored white paper.

[White Paper](#)

Learn about how to recycle C&D materials or use industrial materials.

[How do I ... ?](#)

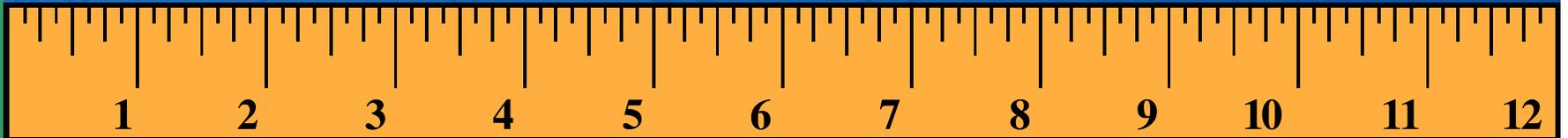
[Case Studies](#)

EPA's Partnership with AGC

- Measurement tool for contractors

How much did my
company
reused/recycled?

How much did my
company SAVE?



EPA's Partnership with AGC

- Recognition
 - Case Studies
 - Investigating other methods...



LIFECYCLE BUILDING CHALLENGE 2



National competition for students and professionals to reduce C&D and GHG emissions by designing buildings for adaptability and disassembly.

<<http://www.lifecyclebuilding.org>>

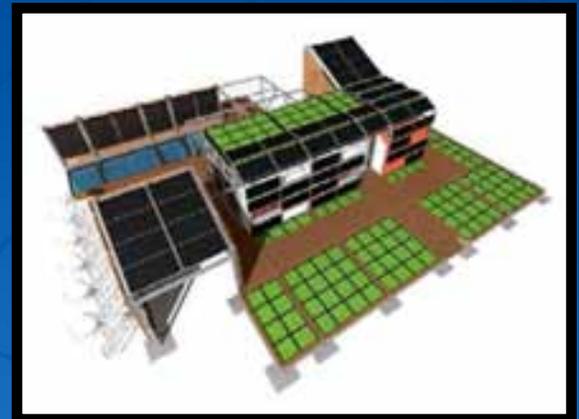
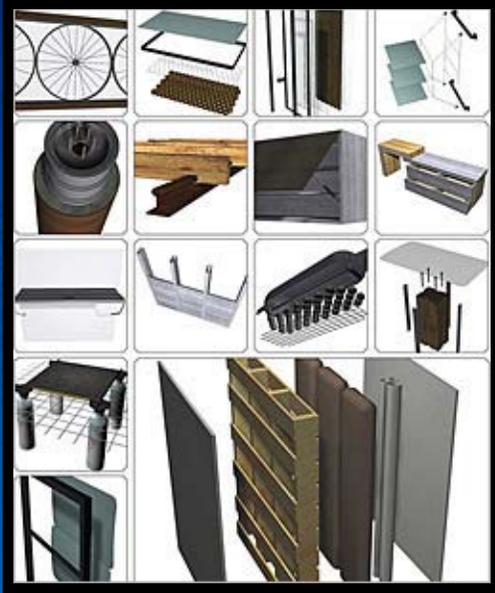
Partners:

U.S. EPA

American Institute of Architects
Building Materials Reuse Association



LBC Winners 2007



Lifecycle Building Challenge 2 Timeline

March Launch competition + start registration

July Close competition for judging

September Notify winners

Winter 2008 Recognize winners

Participate & join us as outreach partners!

Contact us: info@lifecyclebuilding.org

Contact Information

Cochran.Kimberly@epa.gov

703-347-8950

www.epa.gov/industrialmaterials

www.epa.gov/cdmaterials

More information...

www.buildingreuse.org

www.cdrecycling.org

www.concreterecycling.org

www.shinglerecycling.org

www.drywallrecycling.org

www.ccaresearch.org

These websites are non-EPA web sites. These external links provide additional information that may be useful or interesting and are being provided consistent with the intended purpose of this presentation. However, EPA cannot attest to the accuracy of information provided by these links. Providing links to non-EPA web sites does not constitute an endorsement by EPA or any of its employees of the sponsors of the sites or the information or products presented on the sites.