

DfD

Design for Disassembly
in the built environment:
a guide to closed-loop design and building



HAMER CENTER





**How many years will
your next building last?**

Then what?

Design for Disassembly

Guidance for keeping your life's work out of the landfill. The free guide can be downloaded at www.metrokc.gov/dnrp/swd/construction-recycling/DfD.asp.

For additional information contact
Kinley Deller at kinley.deller@kingcounty.gov
or 206-296-4434

What is DfD?

The design of buildings to facilitate future change and the eventual dismantlement (in part or whole) for recovery of systems, components and materials.

State Farm Office Building



Harbor Island Fisher Mill



The Six S's

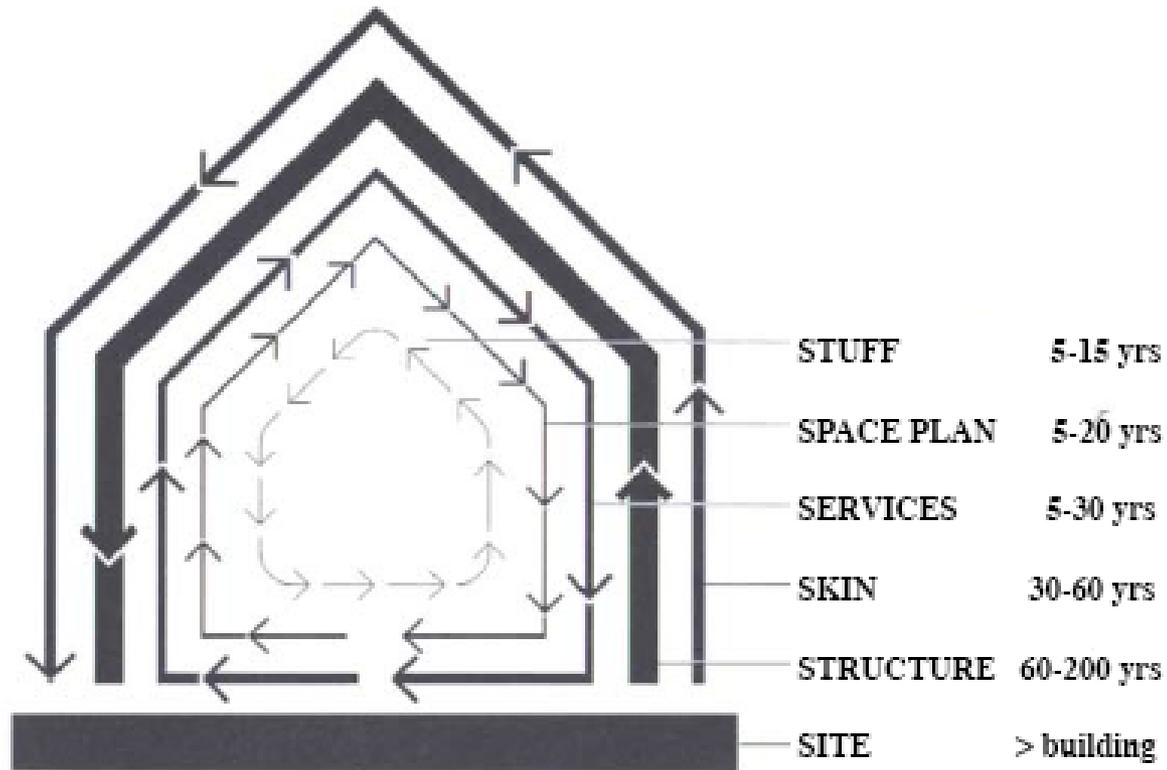


Fig. 25

Stewart Brand's Six S's diagram

Are you asking the right
questions?

How long will the building last?



How easily can it be transitioned to different uses?



What will happen to the building when it has reached the end of its life?



How easy is the building to maintain?



How efficient is the building (energy, water, human, etc.)?



How adaptable is the building to changing local climate conditions?



Will the people taking the bldg down in 100 years know how to disassemble the building? Will the tools to do so be readily available?



What connections are used between all the different building elements? How easy are they to undo?



Will people who use the building like it?



Sears craftsman-style bungalow kit home, 1920

Cost: \$4275

From: Sears, Roebuck & Co. Catalog (Chicago: 1920).

How toxic are the materials?



How long will the different layers last?



Type of Project	Percent
Interior floor finish	20.42 %
Electrical / Plumbing	11.84 %
Doors and Windows	10.21 %
Interior walls alteration w/ plumbing	9.21 %
HVAC equipment	8.56 %
Fixtures	8.31 %
Roofing	7.76 %
Interior room alteration (dry)	7.06 %
Exterior addition	5.08 %
Interior wall cavity	3.50 %
Exterior wall cavity	3.32 %
Exterior siding	2.80 %
Interior wall / ceiling finish	1.94 %

Percentage of Projects per Type per Year Adapted from the Supplement to the American Housing Survey, 2001

How many different materials are going into the building?



Who else has been asked to think and provide input on these issues ?



How are MEP run/attached? Can MEP be minimized?



The Six S's

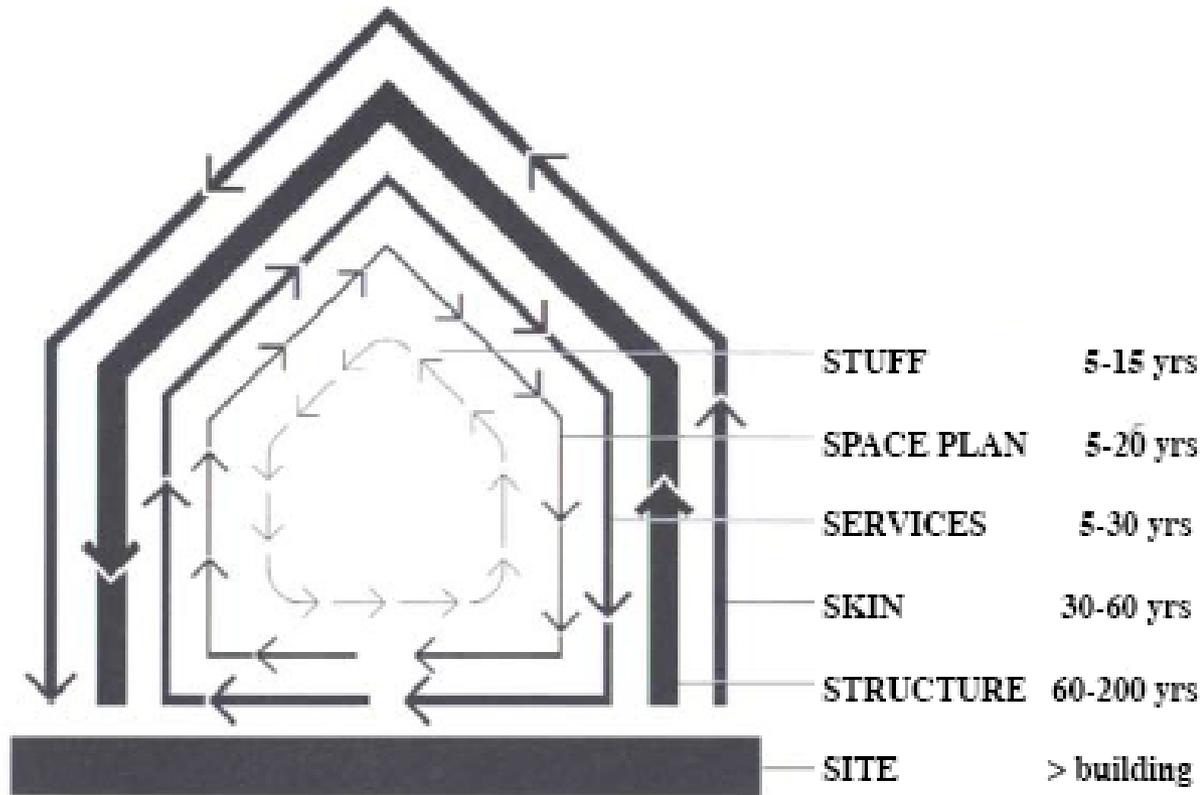


Fig. 25

Stewart Brand's Six S's diagram

DfD in Action

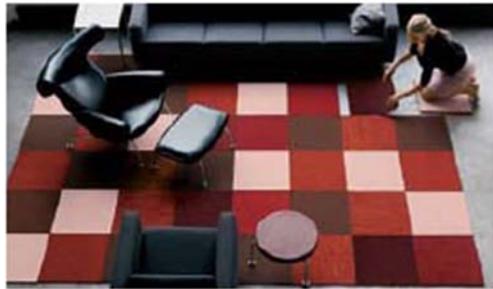


Fig. 81

FLOR carpet panels



Fig. 75

electrical raceways



Fig. 35 preassembly of an interior wall



Fig. 36

ceiling panels



Fig. 80

raised access flooring



Fig. 77

Flat wire



Fig. 76

fabric air dispersion systems

There's no time like the
present to change the future.

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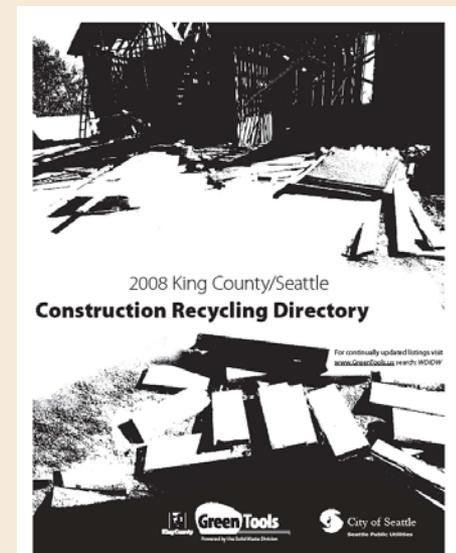
Extra Slides



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Basic C&D Education and Outreach

- Information on web site
- Facility recycling/diversion rates on web site
- Presentations and classes on C&D
- Construction Recycling Directory
- Contractors Guide



Basic C&D Education and Outreach

- Develop marketing plan (w/ Patti)
- Coordinate ads and outreach (Patti)
- Develop case studies
- Educate contractors on 2-bin requirement and 3-bin option
- Update C&D materials handed out at transfer stations (Pam)
- Lobby display at DDES (w/ Cynthia)

Education and Outreach

- Alternatives to demolition/building removal
 - Deconstruction and salvage
 - Hybrid deconstruction
 - House moving
- Design for Disassembly
- Hybrid Deconstruction Center

Technical Assistance

- Phone and e-mail assistance
- In-depth assistance on County projects
- Creating BMPs for C&D processing facilities with regard to lead and asbestos issues
- Provide C&D technical assistance on King County capital projects – including assistance with RFP/contract specifications
- Modification and implementation of Division 0 and Division 1 boiler plate language regarding C&D issues

Technical Assistance

- Coordinate with King County's Historic Preservation Program on County projects and to help develop a barn salvage, salvage storage, and restoration program
- Work with DDES on updating house moving bulletin.
- Manage the King County Reusable Building Materials Exchange web site (Jay)

Contracts

- \$0 Salvage and Deconstruction Contract
- C&D Technical Assistance Task Under the GreenTools contract
- Market Development Contracts – LinkUp Program (Kris)
- CDL Contracts with WM and Allied (Pam)
- C&D related emergency services contract (Pam)

Research

- C&D Materials Characterization Study (Alexander)
- Update WDIDW C&D listings (Greg)
- Track C&D related green economy jobs
- Provide C&D related inputs into the SEPA GHG process
- Stay current on local and national C&D developments
- Find the hooks for getting architects and designers to use more salvage material in their projects

Policy

- Industry stakeholder meetings
- Agency stakeholder meetings
- Review and prepare comments on draft policies by other agencies (Bill, Kinley, Jim, Jeff, Pam)
- Provide C&D related input on the SWD Comprehensive Plan (Josh, Bill, Jim, Kinley, Pam, Kris)
- Coordinate with transfer station planners to ensure the collection of C&D materials (which have strong markets) are collected from self haulers at the new generation of SWD transfer stations (TRD)

Policy

- Work with DDES to develop new codes for building removal and construction materials diversion
- Coordinate with Seattle on C&D policy issues
- Lead multiagency policy discussions on landfill uses of C&D residuals
- Facilitate multiagency process to guide development of best management practices for minimizing the presence of asbestos at C&D processing facilities.
- Communicate directly w/ public health and other regulators (Bam)

Waste Prevention and Recycling

- Consider encouraging increased diversion from disposal of C&D generated at job sites through city and county permitting requirements.
- Clarify the definitions of recycling and beneficial use. Endeavor to establish consistent definitions with the Washington State Department of Ecology, the City of Seattle, and other regional governments.

Collection and Processing

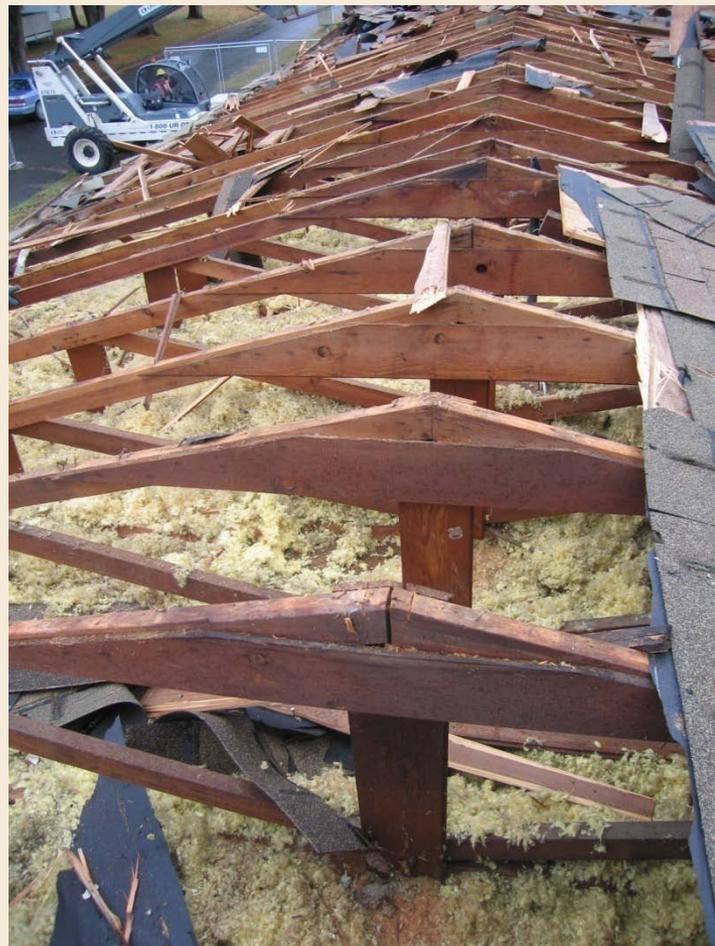
- Explore options to increase the diversion of C&D from disposal by C&D processors under contract to the division, particularly for wood, metal, and cardboard.
- Encourage contractors and homeowners to use at least two containers on construction, demolition, or remodeling sites – one for garbage and one for mixed recyclables. If there is sufficient space, individual recyclables could be sorted on site to maximize diversion from disposal.

Priority Work for Q3-Q4 2009

- Looking at future policy options
- Create a coordinated approach to working on C&D issues

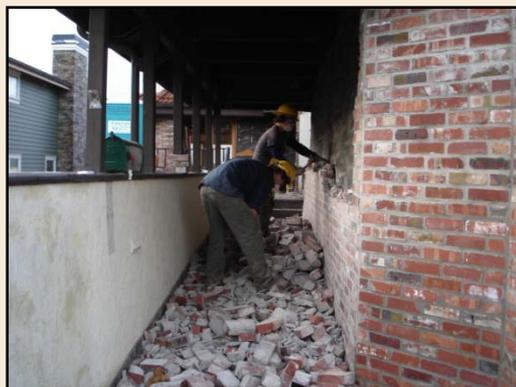
The Range of Building Removal Diversion Opportunities

- Whole Building Reuse
- Full Deconstruction
- Hybrid Deconstruction
- Salvage
- Pick and grab
- Demolition



What is Deconstruction?

The process of taking down a building in such a way as to maintain the highest value practical of its components.





Goal of C&D Materials Diversion

- Divert the greatest amount of materials possible
 - Without negatively impacting schedules
 - Without negatively impacting budgets
 - Without increasing liability
- We do this by focusing on “materials of value”





Construction and Demolition Materials

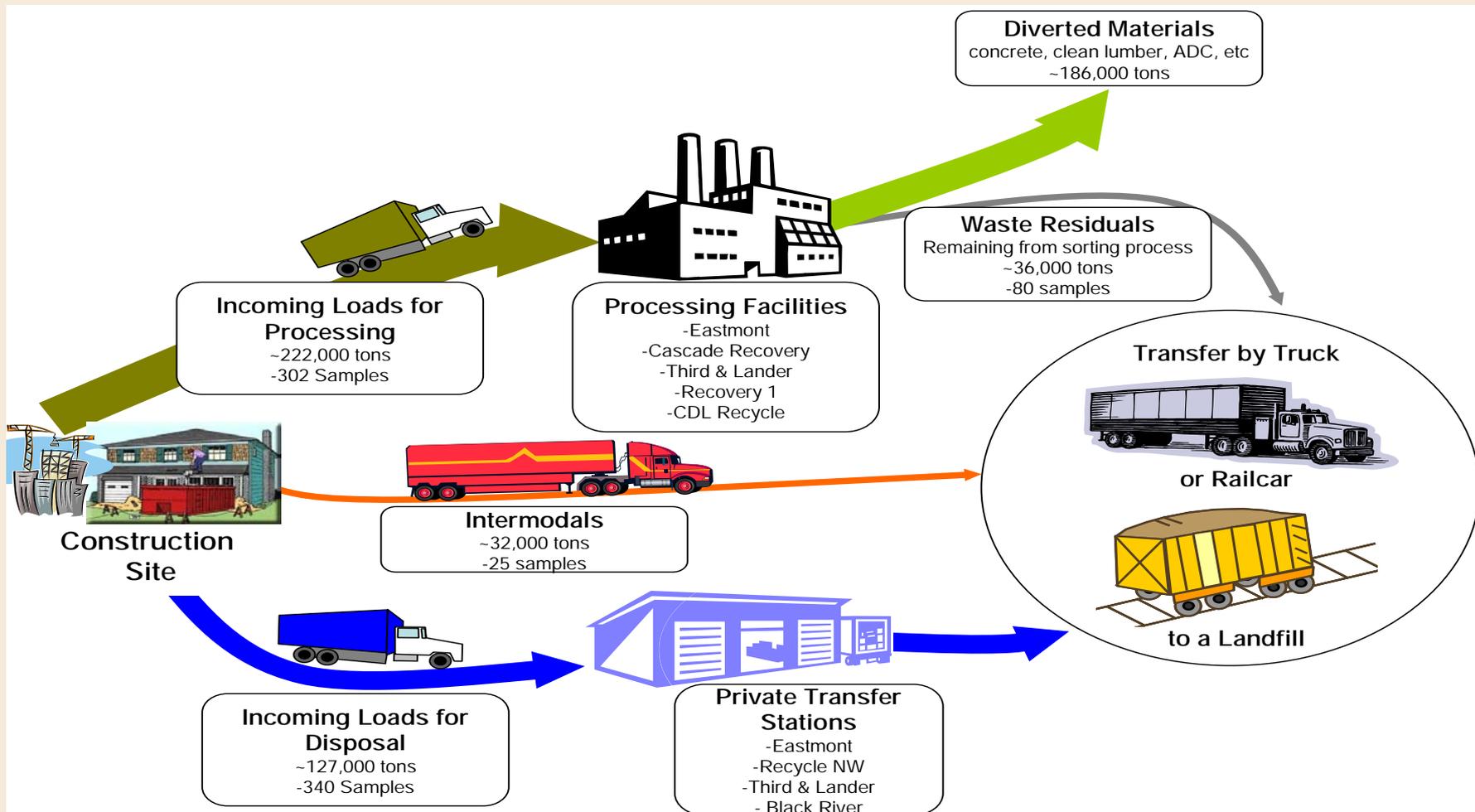


What is Diversion?

- Recycling
- Reusing
- Boiler Fuel
- Soil Amendment
- Alternate Daily Cover
- Industrial Waste Stabilizer



Flow of C&D Materials



C&D Data

- 1.5 million tons C&D in 2007
 - 1 million tons of concrete recycled
 - 245,000 tons of other materials recycled/diverted
 - 263,000 tons disposed
- 2007 C&D diversion rate: 82.4%
 - w/o concrete: 48.1%



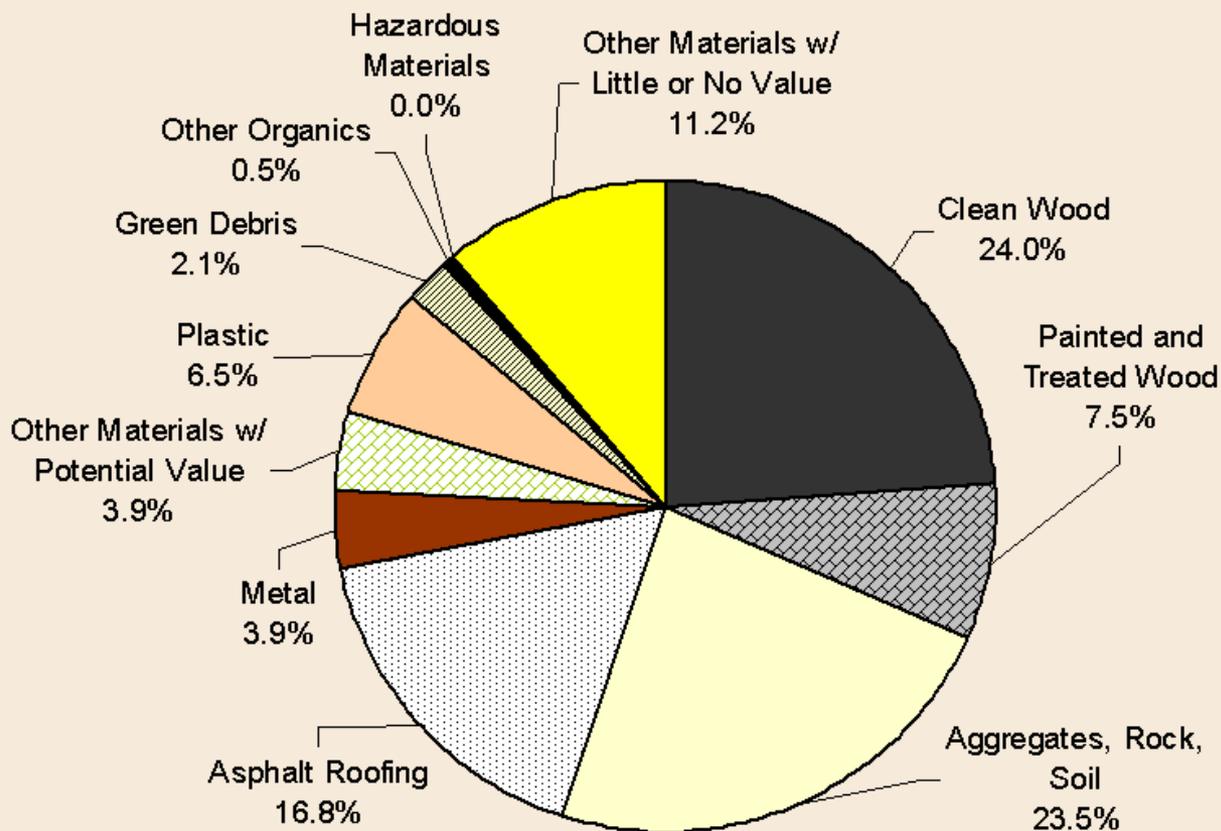
C&D Data

Mixed C&D contracted facility diversion rates

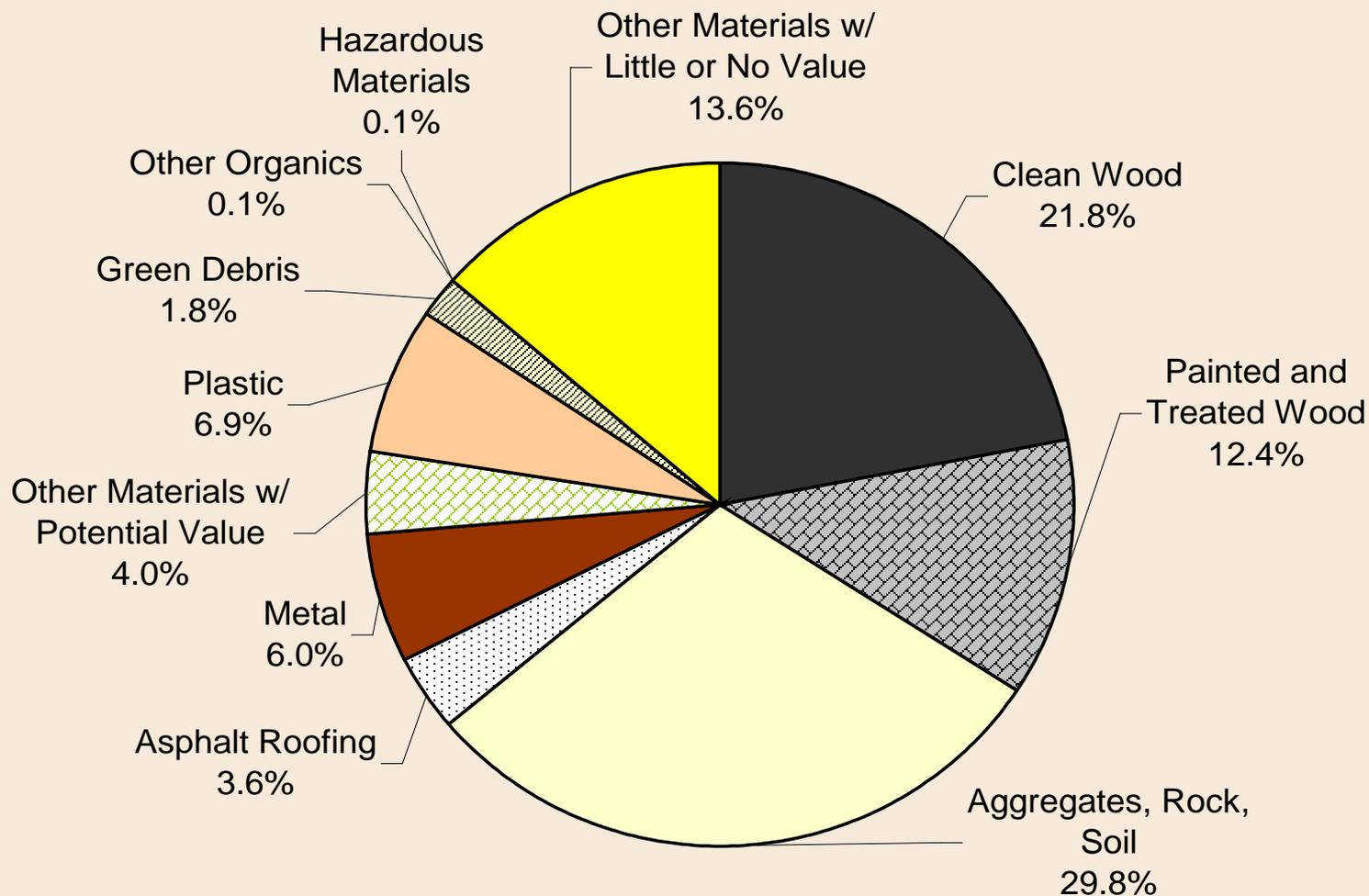
- 2006: 8.5%
- 2007: 4.7%
- 2008: 8.5%



Composition Summary Overall Disposed C&D



Remodeling Disposal



C&D Diversion Strategies

- Education and outreach to contractors
- Alternatives to demolition/building removal
 - Deconstruction and salvage
 - Hybrid deconstruction
 - House moving
- Hybrid Deconstruction Center
- Design for Disassembly

Greenbridge



Kingdome

