BURGESS & NIPLE

Engineers ■ Planners ■ Environmental Scientists

Establishing a Green Deconstruction Project

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Objectives of Presentation

- Define "**green deconstruction**".
- Provide background for green deconstruction projects.
- Describe green deconstruction processes.
- Present deconstruction economic issues.
- Describe advantages and disadvantages.
- Present an example

Basic Premise of Green Deconstruction

REDUCE

RECYCLE

REUSE

Definitions

- **Deconstruction** is the selective dismantlement of building components.
- **Sustainable** – broadest sense of the word and includes the concept of livable.
- **Green** – broadest sense of the word; essentially means less materials going to a landfill

Benefits of Green Deconstruction

- **Potential cost savings** through the reuse and recycling of materials
- **Creates employment** opportunities.
- **Saves money** - cuts down demolition costs.
- **Reduces** the production of greenhouse gas emissions, and other pollutants, and saves energy.

Benefits (Continued)

- **Conserves** landfill space and costs.
- **Reduces** the need to manufacture or harvest virgin materials.
- **Tax benefits** by donating recovered materials to qualified 510(c)(3) charities.
- **Achieve green goals and compliance** with various agency sustainability directives
- **Creates community** good will

Benefits (Continued)

- **Supports** local recycling and sustainability related businesses and charities.
- **LEED 3.0 Credits**
  - M&R Credit 1.1 Building Reuse
  - M&R Credit 2 Construction Waste Management
  - M&R Credit 3 Materials Reuse

Materials for Potential Reuse and Recycling

- Concrete
- Asphalt
- Wood
- Metals – wiring and structural framing
- Brick
- Glass
- Others – gypsum and plastics

Materials (Continued)

- Landscaping Materials
- Roofing
- Doors
- Lighting Fixtures
- Windows
- Plumbing Fixtures
- Electrical and Electronic Components
- HVAC Components

Debris Quantities

Component	Percentage by Weight	Potential Reuse	Potential Recycle	Potential Salvage
Concrete, brick, and mixed rubble	40 - 50%	X	---	---
Wood	20 - 30%	X	X	X
Drywall	5 - 15%	---	X	---
Roofing	1 - 10%	---	X	---
Metals	1 - 5%	X	X	X
Bricks	1 - 5%	X	X	X
Plastics	1 - 5%	X	X	X
Carpet/Textiles	4%	X	X	X
Cardboard	1%	---	X	---

Disadvantages

- Project schedule stretched out for material separation (about 15 to 20% longer).
- Increased labor costs due to longer schedule
- Pre-planning is more intensive.
- Material handling challenges
- Health and safety issues are different.

Issues to be Considered

- Build green deconstruction elements into the project approach
  - Discuss with Project Stakeholders
  - Agree to final goals of project
  - Develop procedures to address waste management
  - Discuss and agree on project impacts of cost and schedule
- Have current up to date market values and trends for materials
- Documentation is CRITICAL!

Contract Management Options

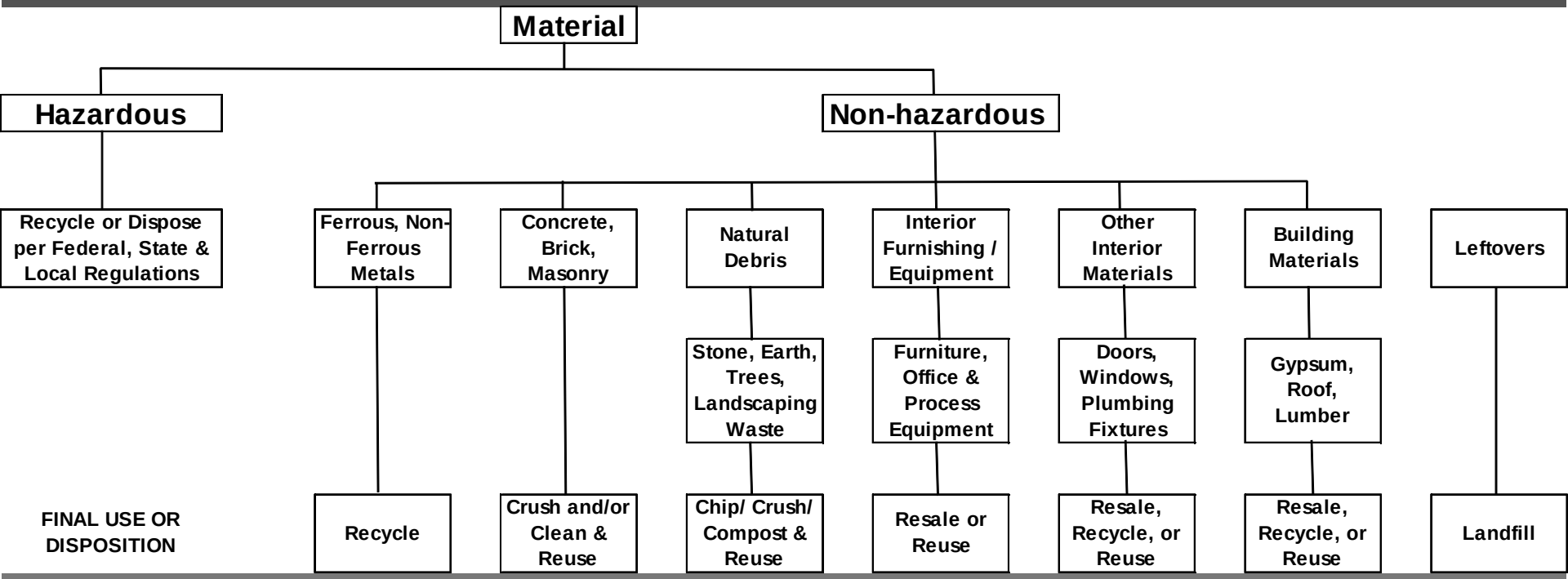
- Owner contracts out deconstruction project but retains ownership of all salvaged materials
- Owner allows contractor to retain salvaged materials as in-kind payment – reduces cost of contract.
- Owner allows contractor to retain salvaged materials – reduces cost of contract based on resale revenues.
- Owner contracts a non-profit contractor to conduct deconstruction for a fee and then donates salvaged materials to the contractor.

Deconstruction Methods

- **Soft Skimming**
  - Salvage selected components
- **Manual**
  - Requires extensive time but yields highest amount and best quality
- **Panelized**
  - Structural components removed more quickly which reduces material value
- **Mechanical**
  - Mechanical removal of material which may also reduce material value
- **Combination of Methods**

Reference: DOA, 2007, NYWM, 2009

Deconstruction Procedure



Implementation of Green Deconstruction Project

- Site Walk with Project stakeholders
- Environmental Due Diligence
- Health & Safety Plan
- Markets for Recycled/Reused Materials
- Determine Deconstruction Goals
- Define Methods for Deconstruction
- Develop Project Budget and Schedule
- Implement /Monitor/Document

Recycled/Reuse Material Markets

- USEPA Waste Website
  www.epa.gov/epawaste/conserve/rrr/imr/cdm/bytype.thm
- National Bulletin Boards for salvaged or surplus building materials
  www.recycle.net
  www.greenguide.com
  www.rbme.com
- Local Recycling Centers
- Habitat for Humanity, Goodwill, and other non-profits.

Simplified Green Economics

- Demolition: Demolition labor + Demolition equipment + Disposal cost + Permitting + Engineering + Other

- Deconstruction: Deconstruction labor + Deconstruction equipment + Permitting + Engineering + Other – Salvage revenue

Reference: Dantata, et.al., 2004; Deconstruction Institute website, 2011

Summarized Economic Comparisons

Items	Deconstruction	Demolition
Labor	Higher labor costs (hand labor maybe required)	Traditional demolition costs
Equipment	May require specialized equipment (handling equipment)	Traditional demolition equipment
Transportation	Reduced waste transport (less waste to landfill)	Depends upon distance to disposal facilites
Permits	Demolition Permit Asbestos Abatement Permit Other waste disposal/abatement permits	Demolition Permit Asbestos Abatement Permit Disposal Permits Other waste disposal/abatement permits
Tipping Fees	Reduced Fees	Depends on amount of wastes to be disposed as well as distance to disposal facilities
Taxes	Tax Credits for Deconstruction	Taxes on transport and disposal
Return Value	Revenue from salvaged materials and items, reduced tipping/disposal fees, tax donation for donated items.	Minimal, if any
Potential Loss	Schedule extensions, higher labor costs	If reconstruction at same location, costs for raw materials.

Real World Example

Middletown Regional Hospital
105 McKnight Drive
Middletown, OH

Project Team

Peck Hannaford + Briggs *Contractors since 1899*

O'ROURKE
Wrecking Company Cincinnati

Complete Resources Company

ATCS//SHOOK
JOINT VENTURE
GENERAL CONTRACTOR . CONSTRUCTION MANAGER

Preferred

FIRE PROTECTION

KLEINGERS & ASSOCIATES

CHAPEL
SINCE 1946

SK

SK CONSTRUCTION

Ox Blue
Construction Camera Service

CIS

Bio-Trauma 911, Inc.

Hospital History

Hospital initially developed in 1917. Expanded facilities in 1922, 1938, 1956, 1964, 1978, 1987, and 1993.

Community and regional needs outgrew hospital.

Plans for entirely new complex approved in 2004.

Project Planning

- Planning Activities
  - Develop recycling plan
    - Crushed aggregate – to be used as backfill
    - Hospital equipment - donations
    - Miscellaneous materials – scrap metal, re-use of materials, etc.
  - Identification of Donor Organizations
  - Planned involvement of regulatory agencies
  - Planned community involvement
    - How to deal with complaints and questions

Project Schedule

Task Name	Start	Finish	2008				2009								
			S	O	N	D	J	F	M	A	M	J	J	A	S
Contract Award	9/1/2008	9/11/2008													
Temporary Fence	9/12/2008	9/12/2008													
Erosion Control	9/15/2008	11/28/2008													
Investment Recovery & Equipment Salvage	9/15/2008	12/12/2008													
Utility Isolation, Relocations & Disconnects	9/15/2008	1/16/2008													
Site Set-up and Equipment Mobilization	12/8/2008	12/15/2008													
Engineering Survey & Project Planning	9/15/2008	10/24/2008													
Preparatory Interior Removals	9/29/2008	11/21/2008													
Asbestos/Hazardous Materials Abatement	10/13/2008	6/12/2009													
Garage/Building Demolition	12/15/2008	7/31/2009													
Asphalt & Concrete Flatwork Removal	5/18/2009	7/31/2009													
Demolition of Demolition Equipment	7/20/2009	8/7/2009													
Underground Utility Removal	2/2/2009	7/3/2009													
Rough Grade Site	5/11/2009	8/14/2009													
Final Site work/Topsoil/Seeding Work	8/17/2009	8/31/2009													
Project Complete	8/31/2009	8/31/2009													

Deconstruction Process

- **Soft Skimming**
  - **Medical Equipment**
  - **Office Furniture**
- **Manual**
  - **Electronic equipment**
  - **Tube System**
- **Panelized**
  - **Wiring**
  - **Structural steel**
  - **Bricks**
  - **Landscaping**

Reused

- Medical Equipment

  - Donated to Avon Lake United Church of Christ Missions for medical mission in India

Reused

- Medical Supplies
  - Caring Partners International
  - Matthew 25 Ministries

Reused

- Miscellaneous Supplies and Equipment
  - Boy Scouts
  - Fenwick High School
  - Carlisle Fire Dept.
  - City of Middletown
  - Butler Co Port Authority

Reused

- Several Local Nursing Homes
- Camp Chautauqua
- Several Local Schools
- Other Groups

Recycled

- Habitat for Humanity
  - Paint
  - Soap Containers
  - Building materials
    - Doors
    - Windows
    - Sills
    - Blinds

Recycled

- Pneumatic Tube System
  - To be installed at Atrium Medical Center

Recycled

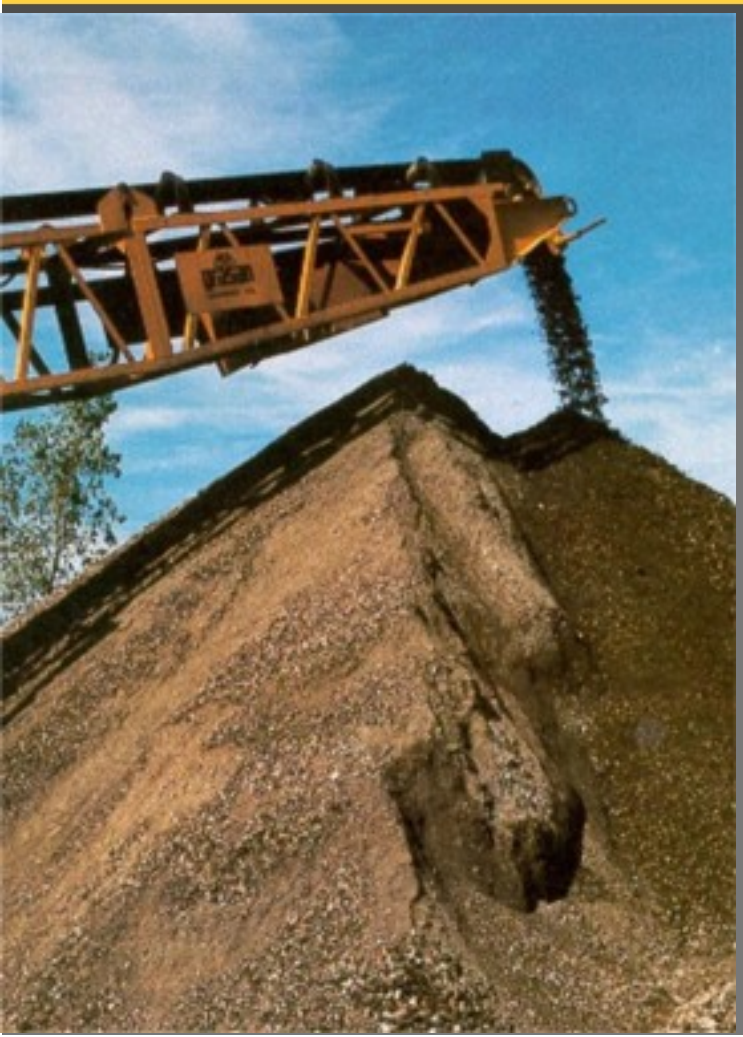
- Landscaping Materials

Before

After

Relocated at the Employee Walking Trail, Cancer Survivor, and Memorial Gardens at the AMC Campus

Recycled



- Concrete Crushing
  - On-site backfill

Sustainability

Police Special Response Team (SRT) or SWAT

- Middletown Police SRT
- Kettering Police SRT
- Cincinnati Police SRT
- Other SRT / SWAT

Sustainability

K-9 Training: Local / Regional Police K-9 Training at MRH

Fire Fighters Training:

- Middletown FD
- Franklin Township FD
- Madison Township FD
- JEMS

Benefits of Green Deconstruction

Concrete Recycled:	25,000 CY
Metal Recycled:	3,127 Tons
Salvage Items Reused:	900 CY
Construction & Demolition (C&D) Debris Not Recycled:	25,975 CY
Net Benefit of Recycling vs. Landfilling:	$635,000
Avoidance of Importing 25,000 CY of engineered-fill	$195,800
Total Benefit of Recycling vs. Landfilling:	**$830,800**
Estimated Value of Donated Materials:	**$450,000**

Green Deconstruction

Questions?

BLOOPER