Presentation Overview

- Provide overview of C&D management
- Provide examples of C&D management across the United States
- Support and complement today’s presentations
Presentation Overview (continued)

- Define C&D and Impact on Central Texas
- The “Three R’s” Applied to C&D
- Long-Term Building Strategies
- Market Development
- Role of Public Sector and Private Companies
- Summary
What is Construction & Demolition Debris?

- Wood, concrete, metal, roofing, fixtures, etc. from new construction, demolition and renovation projects.
- The terms construction debris and demolition debris discussed together, the material streams can be quite different.

<table>
<thead>
<tr>
<th>Construction</th>
<th>Demolition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean wood scraps</td>
<td>Painted, stained wood or wood with nails</td>
</tr>
<tr>
<td>Excess concrete or cement</td>
<td>Concrete with rebar or other materials imbedded</td>
</tr>
<tr>
<td>Clean drywall scraps</td>
<td>Drywall with paint, wallpaper, etc.</td>
</tr>
<tr>
<td>Extra bricks</td>
<td>Bricks with mortar</td>
</tr>
</tbody>
</table>
What is Construction & Demolition Debris?

- Demolition and renovation projects typically produce more debris than construction projects.

<table>
<thead>
<tr>
<th>Source</th>
<th>Residential</th>
<th>Commercial</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>4.8%</td>
<td>3.2%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Renovation</td>
<td>23.5%</td>
<td>20.7%</td>
<td>44.2%</td>
</tr>
<tr>
<td>Demolition</td>
<td>14.5%</td>
<td>33.3%</td>
<td>47.8%</td>
</tr>
<tr>
<td>Total</td>
<td>42.8%</td>
<td>57.2%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

C&D in Central Texas (FY 2007)

- Residential: 43.2%
- Commercial: 28.5%
- C&D: 23.4%
- Other: 5.0%

Source: TCEQ Annual Report for FY 2007
Why Divert C&D from Landfills?

- Approximately 25% of material disposed in landfills in FY 2007 was C&D.
- Increased diversion of C&D can:
  - Add years of landfill life
  - Conserve natural resources
  - Reduce energy and resources required to make new products
C&D Integral Part of Waste Diversion Strategies

- Key components of successful diversion programs typically include:
  - MSW recyclables (paper, plastic containers, etc.)
  - Organics (food waste, green waste, etc.)
  - Construction & demolition materials

- While the benefit of diverting C&D is recognized in Central Texas, much progress can be made
What Can be Done?

- Approach C&D like any other diversion initiative
  - Reduce
  - Reuse
  - Recycle
Reducing C&D Waste Stream

- There are number of strategies to reduce the amount of material generated from construction activities, including:
  - Reusing existing building structures
  - Using standardized or pre-engineered building components
  - Reducing disposable packaging for materials delivered to site
  - Educating builders and site workers on efficient use of materials on site
Reusing Building Structures

- El Arbol Restaurant (Austin, TX)
Use Standardized or Modular Components

Source: Western Wood Truss Association

Source: LivingHomes
Reusing C&D Materials

- Reused materials typically serve one of two functions:
  - Item serves same or similar function (e.g., using a salvaged door as a door in new construction)
  - Items serves new function (e.g., using salvaged door as a table top)
- Deconstruction (versus demolition) allows greater recovery of reusable materials
Deconstruction Example

- Deconstruction is the selective dismantlement or removal of materials from buildings for reuse or recycling.

- Hensley Field Operations Center (Dallas, TX) ¹
  - Detailed solid waste management plan was completed prior to project initiation
  - Approximately 97% of material (by weight) was diverted from landfill
  - Cost was comparable to demolition

Material Reuse Centers

- Reuse centers serve as place to buy, sell or exchange salvaged building materials
  - Habitat for Humanity Restore
  - City of Huntsville C&D warehouse (picture to right)
- The Houston-Galveston Area Council published *Guide to Developing Material Reuse Centers*
Recycling C&D

- The three primary categories of C&D recycling are:
  - Onsite recycling
  - Source separation
  - Mixed C&D recycling
Onsite Recycling

- Common example is onsite grinding of wood, drywall, stone/masonry, cardboard, etc. for use on site.

- Uses for material include:
  - Erosion control
  - Fill material
  - Drainage
  - Mulch
  - Soil amendment
Source Separation

- Source separation typically involves one container for each type of material targeted for recycling and one for disposal.

- Factors to consider:
  - Space for additional containers
  - Labor costs to sort materials
  - Education of site workers
  - Potential revenue from diverted materials
  - Avoided landfill disposal cost
Mixed C&D Recycling

- Mixed loads of C&D taken to processing location so materials can be sorted by type
- Can be as simple as manually sorting materials (City of Denton) to more complex sorting facilities, often referred to as C&D material recovery facility (MRF)
- More costly to process than source separated materials, but more convenient and therefore may increase diversion of materials
Material Recovery Facilities

- C&D MRFs can range from simple sorting lines to more complex screening systems.
- Equipment can vary in price from $75,000 to several million dollars.
- Less expensive systems are simply conveyors with pick stations to allow laborers to manually pull materials.
- More advanced systems add mechanized screening (e.g., finger screens, magnetic separators, trommel screens, float tanks, etc.).
Examples of Mixed C&D Recycling

City of Denton, TX

Private C&D MRF near Ft. Lauderdale, FL
Example Process Flow Diagram - C&D MRF

Incoming Material

- Finger Screen
- Magnet
- Screen For Fines

“Overs” Pick Line

Recovered Materials

To Market

“Unders” Pick Line

To Landfill

Recovered Materials

Baler

Wood Grinder
C&D MRF Feasibility Study - NCTCOG

- Conceptual design based on visual characterization of over 600 roll-off loads
- Material stream resulted in creating two processing areas - one for “typical” C&D and one for concrete, asphalt
- The general C&D processing area capable of processing 60-80 tons per hour, depending on staffing
- Initially configured to capture 7 material types (plus residual screen material), with expansion capability
C&D MRF Feasibility Study - NCTCOG
Buildings Should be Developed with Long Term Vision

- Green building programs focus on long-term efficiency and reduced burden of new building on natural resources
  - Austin Energy Green Building
  - U.S. Green Building Council LEED
- Design and build with “cradle to grave” mentality - similar to extended producer responsibility for products
  - Example: carpet leasing
Where C&D applies to LEED 2009

- 110 total points available (not including prerequisites)
- Minimum of 40 points required for certification

<table>
<thead>
<tr>
<th>Category</th>
<th>New Construction</th>
<th>Commercial Interiors</th>
<th>Core and Shell</th>
<th>Existing Buildings</th>
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</thead>
<tbody>
<tr>
<td>Building Reuse</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Construction Waste Management</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Materials Reuse</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td></td>
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<tr>
<td>Recycled Content</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Regional Materials</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Sustainable Purchasing - Durable Goods</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
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<tr>
<td>Sustainable Purchasing - Facility Alterations/Additions</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Solid Waste Management - Facility Alterations/Additions</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
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**Total**: 12 11 12 3
### Understanding material streams is critical

<table>
<thead>
<tr>
<th>Category</th>
<th>NCTCOG Study</th>
<th>Bartow County, GA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete/Masonry</td>
<td>37.0%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Soil</td>
<td>22.6%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Paper</td>
<td>13.8%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Wood</td>
<td>7.0%</td>
<td>52.5%</td>
</tr>
<tr>
<td>Asphalt</td>
<td>5.8%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Metal</td>
<td>5.1%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Drywall</td>
<td>3.7%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Refuse</td>
<td>1.4%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Shingles</td>
<td>0.9%</td>
<td>13.6%</td>
</tr>
<tr>
<td>Glass</td>
<td>0.5%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Plastic</td>
<td>0.4%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Carpet</td>
<td>0.4%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Yard waste</td>
<td>0.4%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Other Materials</td>
<td>1.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Market Development

- There must be markets for the material to make diversion feasible. Example: asphalt shingles
- CAPCOG and other local governments can service as information portals
- Markets for C&D are typically more localized than MSW recycling
  - Additional benefits - more sustainable and reduced emissions from transportation
- Specify and purchase recyclable materials
How Can the Public Sector Help Encourage C&D Diversion?

- Should have a strategy for encouraging diversion and have necessary infrastructure in place.
- Must have infrastructure to process material and markets for recoverable material

Encouraging diversion:

- Building permit deposits (San Jose, Plano)
- C&D diversion ordinances (Chicago, San Diego, Massachusetts)
- Green building programs, including requirements on municipal facilities (Austin)
- Specifications that include recycled materials
- Purchasing programs to give preference to recycled/recovered materials
What Can the Private Sector Do?

- Waste management companies
  - Provide processing services to recover for C&D materials
  - Coordinate with local governments on regulations

- Engineering & architecture firms
  - Specify materials with recycled content
  - Design with green building principles

- Construction companies
  - Documentation and planning for green building activities
  - Onsite training for reuse and recovery efforts
Summary

- C&D is a significant part of the waste stream in Central Texas
- Efforts are underway to divert C&D, but much progress can be made
- Diverting C&D goes beyond recycling waste material - reduce, reuse, and recycle
- The people in this room are the ones that can lead and influence changes to C&D diversion
Contact Information

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