Deconstruction

What is Deconstruction?

Deconstruction is the process by which something in the built environment (structure, building, road, bridge, house, shopping center, etc.) is systematically dismantled (in part or whole) to reuse, recycle or salvage various building components and materials.

Dismantled

Systematic removal of building components in a manner that maintains the value of the item for either reuse or recycling.

Demolition

Demolition uses rapid means to tear down or level a structure.

Little if any materials can be salvaged in this process.

Some recycling may still take place, but only after the structure has been leveled.

Deconstruction is NOT demolition.

Why Deconstruct?

Reduce the amount of natural resources used to produce a component.

Limit the amount of waste sent to landfills.

Creates jobs.

Smaller site impact.

Energy Usage

Some demolition/construction site debris from one state are shipped to another state where there are lower dump fees.

Deconstruction lowers transportation costs associated with such shipping.

Material Options

One of three options exist for almost all building materials.

Reuse

Recycling

Repurposing

Reuse

Materials in good shape might be able to be reused to perform the same function from which they were removed.

Examples: Windows removed from a house will be reused as functioning windows in another project (house).

Reuse

Items should be checked to insure they perform as required for the new application.

Structural members should be thoroughly INSPECTED and TESTED to insure that their reuse is feasible and safe.

Reuse - Exterior Examples

Doors

Windows

Light Fixtures

Plumbing Fixtures

Decorative Items

Face Brick

A/C Refrigerant

Reuse - Interior Examples

Appliances
Furnaces
Hardwood Flooring
Sinks, Toilets, Tubs
Doors and Door Frame
Handrails

Reuse - Interior Examples

Cabinets

Water Heater

Plumbing Fixtures

Electrical Fixtures

Electrical Panel and Breakers

Recycling

Many products that cannot be removed in large enough sections or pieces can typically still be recycled.

Example: The reuse of drywall is almost non existent, though the pieces of drywall can be recycled.

Structural materials unsuitable for reuse may be recycled.

Example: A structural steel beam that does not pass testing for reuse could be recycled.

Recycling

Some projects will only have recycling as a viable option.

Example: Removing a concrete roadway will be accomplished through breaking up the concrete into manageable pieces. The concrete pieces, including the reinforcing steel (rebar), can be recycled.

Recycling

Some projects may have material that can only be recycled, because removing it may cause an unsafe situation.

Example: Structural steel girders can only be removed after the building is razed because removal before hand might compromise the strength of the building and any occupants.

Interior – Recycling Examples

Water Supply Lines - Copper, Cast Iron
Electrical Wiring - Copper, Aluminum
Electrical Conduit
Drywall
Carpet
Ceiling Tile
Ductwork

Interior – Recycling Examples

Insulation

Wood framing/sheathing

Vinyl Flooring

Steel Studs

Steel Beams, Girders, Strapping, Bracing

Nails, Bolts, Nuts, Rivets

Exterior – Recycling Example

- Siding (vinyl, aluminum)
- Glass (windows, dividers, transoms)
- Concrete (drive, sidewalk, foundation, footing)
- Asphalt Shingles
- Asphalt Paving
- Any Metal Members – Decorative and Structural

Difficult to Recycle

While just about everything in a building CAN be recycled, at times the cost to do so heavily outweighs the cost of new product.

PVC – Polyvinyl chloride (water supplies, drain, waste and vent piping).

Repurposing

For components that are not worthy of reuse and their value is worth more than the that of the recycling value, it may be repurposed.

Repurposing uses a component in a new way.

Many of these repurposes are accomplished with architectural details.

These components are often referred to as “Architectural Salvage”.

Repurposing

Examples:

A single pane window and frame used as picture frames.

Decorative building cornices used as bookends.

Red barn siding used as wainscoting in a finished basement.

Designing for Deconstruction

As landfill regulations and costs increase, architects and engineers can help offset future expenses by designing with deconstruction in mind.

While most architects and engineers would like to think that the structure that they help create will be around for eons, the truth is that many structures will face not only environmental and human use wear and tear, but a changing built environment.

Commercial Lifespan

The average lifespan for a commercial building is **78** years.

Source: 2008 Buildings Energy Data Book, Buildings Technologies Program, Energy Efficiency and Renewable Energy, U.S. Department of Energy, page 3-12.

Safety Management

Deconstruction can be physically demanding and has its own set of hazards.

The safety considerations of a deconstruction project should be treated similarly to a construction project.

On Site Dangers

Mold – located in non ventilated areas, usually as a result of flooding or water penetration.

Dust – both existing in the structure and generated on site while cutting and sawing.

On Site Dangers

Falls – while working on roof, elevated platform, above others

Protruding Objects – nails, sharp corners

Utilities – should confirm that the electric, gas, water are turned off by the supplier

Rust – ensure workers are current on tetanus shots

Material Hazards

- Asbestos
  - Used as an insulation until early 1970's
  - Wrap for duct work connections
  - Needs to be handled by a certified remediation contractor only

Personal Protective Equipment

Hardhat – For overhead hazards

Lanyard – For elevated work

Goggles – For cutting, chipping, striking (especially metal to metal such as hammer to crowbar)

Boots – Preferable steel toe with a steel shank

Gloves – Protect hands from splinters, cuts

Power Tools

Power to a structure slated for deconstruction should be turned off by the supplier.

As a result most power tools will need to be battery operated.

Hand Tools and Equipment

Hammers
Crowbar
Reciprocating Saw
Chainsaw
Snips
Handsaw
Tool Belt
Screwdrivers

Heavy Equipment

Forklift

Skid Steer

Crane

Dump Truck

Use caution when operating or working near (proximity work) heavy machinery; the field of view for the operator is generally rather small.

Electrical Generation

A need for on site power generation is accomplished through a portable generator.

Follow manufacturers recommendations (run in an ventilated area) to prevent injury or exhaust poisoning.

Order of Operations

Once the doors and windows are removed, the structure is no longer weather tight nor secure.

Start inside and remove the most valuable items first.

Architectural Salvage may hold the most value.

Architectural Salvage

Anything with fine craftsmanship or details.

- Interior doors and frames
- Handrail/balustrades
- Fireplace mantels
- Cabinets

Functional Mechanics

Furnace
Water Heater
Appliances
  Stove, refrigerator, dishwasher
Claw foot bathtubs
Plumbing fixtures
Electrical fixtures
Sinks

Fine Details

Woodwork

Casing

Flooring

Sconces

Ornamental work

Exterior Items

Doors

Windows

Siding

Roofing Materials

Raw Items

Wall coverings

Structural Components

- Start at the top of the structure and work down!

Consider load bearing support before removal.

Site Management Before

Site Layout

- Staging/storage of materials
- Location of heavy equipment (crane, lift)
- Location of temporary facilities (restroom)

Secure the site – perimeter fencing, signs

Site Management During

Safety and efficiency is key.

Keep neighbors and pedestrians away and safe.

Have a central location for on site management, sign in, paperwork, etc.

Location for material assessment.

Material Assessment

Not all material that was intended to be reused or salvaged will survive deconstruction.

All material needs to be inspected after removal to insure it still meets the standards for its reuse.

Material Assessment, Cont.

Before Deconstruction

- General condition of material
- Structural suitability (reuse)
- Raw material value (recycle)
- Aesthetic value (repurpose)

After Deconstruction

- General condition after removal and handling
- Denailing and demetaling using metal detectors
- Removal of damaged/poor/unusable material

Industry Growth

Deconstruction is more labor intensive than demolition.

Semi skilled persons to carefully remove building component's versus a few pieces of heavy machinery with operators.

Challenges

Getting designers to think about deconstruction during the design process.

Storage space for materials and components in between removal and sale.

Educating the general public as to the environmental and cost benefits from deconstruction.

Challenges, Cont.

Making the general public aware that deconstructed building components are available.

Deconstruction takes much longer than demolition and may put a wrinkle in a contractors timeline if not properly scheduled.