



Case Studies: Construction and Demolition Waste Management

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IRN Active & Recent Projects



Boston Scientific – Demo, Renovation (Office)

Brigham & Women's Hospital – Demo, New Const (Hospital)

Dartmouth – Renovation, New Construction (Engr School)

Emerson – New Construction (Dorm)

Harvard (8) – Demo, Renovation, New Constr. (Multiple)

Liberty Mutual – Renovation (Office)

Maine Medical Ctr – Demolition (Admin)

Maine General MC – New Construction (Outpatient)

Mt. Washington Valley Econ Council – New Construction

Olin College – New Construction (Dorm)

USM – New Construction (Community Ctr)

URI – New Construction (Dorm)

VT Trans – Deconstruction (Residential)

VT Law School – Renovation, New Construction (Multi Fctn)

Yale (2) - Renovation (Med School)

IRN Active & Recent Projects



- ◆ 6 States
- ◆ 20 Architects
- ◆ 14 Contractors
- ◆ ~25 Markets
- ◆ ~15 Haulers
- ◆ 5,000 - 400,000 Square Feet
- ◆ \$3 Million - \$38 Million
- ◆ Recycling: 75% - 99%

Recyclable Materials



Furniture, Furnishings

Architectural Salvage

Concrete (incl. Rebar)

Brick and Block

Asphalt

Dimensional Lumber, Plywood

Engineered, Treated Wood

Porcelain, Ceramics (Fixtures)

Fixed Assets (doors, windows)

Ferrous Metals

Non-Ferrous Metals

Gypsum Wallboard

Shingles

Roofing (Metal, Slate, Membrane)

Landclearing Wastes

Glass

Mixed Debris

Boston Scientific Campus



Description: Complete interior demolition and reconstruction. 483,000 sq ft, three stories, three buildings (1980's). Steel frame on slab.

Size/Duration: \$38M,
24 months

Location: Marlborough
(exurban)

Contractor: Payton (GC),
SOS (demo)

Architect: BKA



Challenges



- ◆ Single loading dock (inbound + outbound)
- ◆ Long carries
- ◆ Large number of materials
- ◆ Oddball materials (dismountable partitions, rooftop HVAC units, etc.)
- ◆ Phased construction (with employee move-in as phases completed)



Materials Recycled



Furnishings (reuse)	49	Carpet	157
Building Mat'ls (reuse)	39	Plate Glass	34
Metals, Mixed	430	Gypsum (Partitions)	2,762
Wire & Cable	135	Wood	12
Metals, HVAC	3,134	Aggregate	34
Ceiling Tiles	581	Mixed C&D (Net at 85%)	964
Total Project Reuse and Recycling			8,331
Total Waste Disposed			371
Project Recycling Rate (Through 9/20/05)			95.7%

Keys to Success



- ◆ Hampers and carts (indoor staging to live-load)
- ◆ Union support
- ◆ On-site presence
- ◆ Training, communications
- ◆ Flexibility from all involved



Harvard Blackstone



Description: Complete interior gut, interior reconstruction (office), exterior renovation. 40,000 sq ft in three buildings (1890s). Structural brick, concrete, wood beams.

Size/Duration: \$10M,
9 months

Location: Cambridge
(urban, tight)

Contractor: Consigli

Architect: Bruner-Cott



Challenges



- ◆ Tight site; Site work during construction
- ◆ Two projects on same site
- ◆ Hazardous materials (working around abatement)
- ◆ Identifying reuse options



Materials Recycled



Furnishings (Reuse)	9	Brick	15
Fixed Assets (Reuse)	10	Concrete	395
HVAC Equipt	7	Asphalt	461
Metal	73	Gypsum Wallboard	25
Wood	61	Mixed C&D (Net at 70%)	6
Total Reuse and Recycling			1,061
Total Disposed			4
Project Recycling Rate			99.6%

Keys To Success



- ◆ Early involvement
- ◆ Recycling requirements inserted into each section of specifications
- ◆ Good waste management spec
- ◆ Use selection process to identify committed contractor
- ◆ Committed owner
- ◆ Lots of concrete and asphalt



VT Law School Debevoise Hall



Description: Demolition, interior gut, renovation, new construction of historic 28,000 sq ft class/admin building. Wood frame (old), steel frame (new).

Size/Duration: \$6.5M,
15 months

Location: S. Royalton, VT
(rural)

Contractor: H.P.
Cummings

Architect: Truex Cullins



Challenges



- ◆ Historic building (National Register)
- ◆ Commitment to reuse (casework, wainscoting, etc.)
- ◆ Distance to markets
- ◆ Complex project
- ◆ Difficult climate (mud, snow, site conditions)



Materials Recycled



Furnishings (Reuse)	100%	Wood	111
Building Mat'ls (Reuse)	12	Gypsum Wallboard	35
Metals	45	Asphalt Paving	13
Concrete	356	Mixed Debris (Net)	15
Total Reuse and Recycling			577
Total Disposed			141
Project Recycling Rate			80.3%

Keys to Success



- ◆ Local Reuse
(workers, friends)
for many materials
(wood, concrete,
fixtures, etc.)
- ◆ Committed owner,
involved students
- ◆ Won the super



Maine General Medical Center



Description: Site Work and New Construction of a 3 floor 30,000 sf Outpatient Cancer Treatment Facility. Steel frame Concrete, Glass, Brick and Stone.

Size/Duration: \$20M,
18 months

Location: Augusta, Maine
(Rural)

Contractor: H. P. Cummings
Architect: SMRT



Challenges



- ◆ Rural Site
- ◆ Long Distance to End Markets (60 + miles)
- ◆ Huge Site
- ◆ Oddball materials (Lead Lined Gypsum)
- ◆ Trades asked to recycle for the first time (First LEED Project)
- ◆ High Recycling Goals - 95+% *LEED SILVER*



Recycling Projections



Cardboard	5	Wood	90
Metals, Mixed	45	Aggregate	100
Gypsum	55	Mixed C&D (Net at 85%)	65
Total Project Reuse and Recycling			360
Total Waste Disposed			20
Project Recycling Rate			95%

Keys to Success



- ◆ Deconstruction of farm building (100% reuse)
- ◆ Trades willing to learn - Interested in LEED - Communication
- ◆ On-site presence; Training
- ◆ Room on site to recycle
- ◆ Flexibility from all involved



Brigham & Women's Hospital



Description: 14 Story New Hospital Building, 450,000 sf. LEED Silver; Moved a full city block of houses from site.

Size/Duration: \$500 M, 30 months

Location: Boston, MA (Urban)

Contractor: W. A. Berry

Architect: Cannon Design



Challenges



- ◆ Urban site
- ◆ No space on site to recycle
- ◆ Very large project
- ◆ Accelerated schedule
- ◆ Multiple trades
- ◆ Multiple materials
- ◆ High recycling goals - 95+% *LEED SILVER*



Recycling Projections



Relocated Houses	550	Slurry Wall	120
Cardboard	25	Wood	90
Metals, Mixed	360	Aggregate	580
Gypsum	495	Mixed C&D (Net at 85%)	540
Total Project Reuse and Recycling			2,760
Total Waste Disposed			135
Project Recycling Rate			95.3%

Keys to Success



- ◆ Relocation of houses
- ◆ Strong support from Owner, Contractor and Architect
- ◆ On-site presence, Training
- ◆ Comprehensive CWMP, specifications
- ◆ Flexibility from all involved



Summary: Making Recycling Work



- ◆ Don't believe naysayers
- ◆ Early planning, good specification
- ◆ Committed contractor
- ◆ Committed superintendent
- ◆ Recycling integrated into project
- ◆ Flexibility, imagination
- ◆ Training, communications, reporting

The IRN...



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Construction Waste Management