



Sustainable Building Sourcebook

Supplement to the Green Building Program

A Program of the City of Austin

January 2000

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First Edition

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Second Edition

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Our Green Building Program members are the best! We thank them all for their support and enthusiasm. Special kudos go to Shellie Reott, Dennis Brown, and Jim Walker for their writing and editing assistance. Contributors from City of Austin staff include Dick Peterson, John Gleason, and Patrick Hartigan. Further rewrites and new contributions were made by the current Green Building Program Staff:

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CONSTRUCTION WASTE MANAGEMENT

INTRODUCTION:

In the United States, construction and demolition debris (the waste produced in the course of constructing, renovating, and demolishing buildings) accounts for 10 percent to as much as 30 percent of the total municipal waste stream. This debris is composed of excess building materials that contain valuable resources and embodied energy from their production and transportation to the jobsite. Once materials have been consigned to the landfills, these resources are virtually impossible to recover. Recognizing and fully utilizing building materials' value is the foundation of construction waste management. Both architects and contractors can greatly impact the amount of construction waste generated on the site.

Construction waste management is the process of planning and implementing the handling and disposal of building materials on a construction site. It involves applying the conservation hierarchy: reduce, reuse, and recycle to construction materials and methods. Research, training, and development of a construction waste management plan are integral parts of this process.

AT-A-GLANCE NOTES:

TECHNOLOGY: Technology is quickly developing for recycling of materials into reconstituted building materials. Unfortunately, few new technologies are available locally. Reuse of excess waste materials requires some additional effort and coordination with a salvage company, non-profit organization, or materials reseller.

SUPPLIERS: There are salvage companies, recycling companies, nonprofit organizations, and materials resellers in the Austin area that can reuse or recycle some of the construction waste generated on site.

COST: There is some additional cost in developing a construction waste management plan until the new process is established. However, long term savings can result from construction waste management practices. For instance, donations to nonprofit organizations that specialize in reuse of construction materials can result in tax deductions. Reusing and recycling instead of landfilling can reduce waste disposal fees. Minimizing waste through the efficient design and use of materials also results in cost savings. However, local phenomena, such as low tipping fees, transportation costs, abundant resources, and the lack of companies using recycled materials as raw materials, make recycling of some materials that are not directly reusable too expensive to be feasible at the present time. For example, concrete recycling (for use as aggregate) is occurring in Houston but locally abundant aggregate currently makes concrete recycling unfeasible in Austin.

FINANCING: No financing issues.

PUBLIC ACCEPTANCE: Strong public concern for the environment and belief in waste minimization and recycling gives the builder who employs a construction waste management plan a positive image with the client.

CONSTRUCTION WASTE MANAGEMENT

AT-A-GLANCE NOTES, *continued*

REGULATORY: Building codes limit the use of used materials (i.e., reused studs) as structural members unless stamped by an engineer or architect. Non-structural materials such as trim or siding are not regulated. Concrete rubble and other materials used for fill must be free of trash,

CONSIDERATIONS:

Eight thousand pounds of waste are typically thrown into the landfill during the construction of a 2,000 square foot home. Most construction waste goes into landfills, increasing the burden on landfill capacity and operation. Waste from solvents or chemically treated wood can result in soil and water pollution. Reusing and recycling materials, instead of landfilling them, extends local landfill life, preserves natural resources, reduces pollution, and saves energy.

Thorough planning is the key to a successful construction waste management strategy. However, planning starts well before any materials are ordered or need disposal. The building's architect should base the design on standard sizes and materials to eliminate waste on site. For instance, designing walls to use full sheets of drywall instead of having to cut sheets eliminates both time in cutting the material and the resulting waste.

In general, using scraps throughout the construction process can save money and allows materials to be used efficiently. Additionally, using high quality materials to produce engineered products, such as finger-jointed studs reduces rejects. This approach can reduce the amount of material needing to be reused or recycled and bolster profitability and economy for the builder and customer.

Another key element to consider is the training of construction workers. Workers should be instructed on material use and handling and waste minimization. Materials will be received and handled differently on site, when using a construction waste management plan. On site separation of reusable and recyclable materials from other materials will require training, signage, and follow-up. Bins must be monitored periodically to prevent waste mixing as a result of crews or passersby contamination. However, once separation habits are established, on site separation can be done at little or no additional cost.

Many construction materials that are still usable can be donated to nonprofit or other material reseller organizations. This keeps the material out of the landfill and allows the embodied energy of the product to be retained.

Construction waste management does not include hazardous substances such as asbestos, lead, PCBs (Polychlorinated Biphenyls), mercury, radioactive materials, and CFCs (chlorofluorocarbons). These materials need to be handled by trained hazardous materials specialists. Improper removal and disposal can result in extreme human and environmental health impacts.

CONSTRUCTION WASTE MANAGEMENT

GUIDELINES:

The first step in the conservation hierarchy is to reduce or minimize both consumption and waste. Reduction involves minimizing excess and leftover materials as well as doing more with less. For instance, using concrete as a finished floor instead of tile eliminates the need for both the tile and its adhesive. Careful storage of materials away from weather and pilfering to prevent loss is a waste minimization strategy.

Setting Goals And Incentives

Setting goals is necessary groundwork for a successful construction waste management plan. Establishing construction waste management goals for a project allows results to be measured and communicated. In order to garner greater participation, establish incentives such as hardhat stickers, t-shirts, and snacks/meals for workers who excel at meeting construction waste management goals.

The contractor should designate an on-site party (or parties) to be responsible for instructing workers, overseeing, and documenting results of the construction waste management plan for the project. Additionally, construction waste management goals and results should be discussed at all on-site gatherings including pre-construction, weekly project, and safety meetings.

The next step is reuse, which involves finding another use for leftover and surplus materials either on or off site. It includes reusing excess materials on site or selling/donating materials to a used building materials supplier or salvage company. Reuse can also be applied to materials that were salvaged during deconstruction/demolition or remodeling projects. These materials can be stored for use on site or sold/donated for use by a third party.

Waste Minimization/Reduction and Reuse Guidelines

General

The Contractor and Subcontractors should exercise the following waste minimization practices to the greatest extent possible:

- Careful takeoffs and tight ordering.
- Return of over-ordered materials to supplier (if not required by owner for maintenance and repairs). If a supplier will not take materials back, donate leftovers (see Resources).
- Careful installation to avoid tearing out and redoing.
- Use of centralized cutting area(s) to facilitate the use of cutoffs rather than cutting into new material when only a small piece is required (studs, gypsum board, insulation, etc.).
- Proper on-site storage of new materials to prevent damage.

Cardboard and Paper

Avoid excessively packaged materials and supplies. However, be sure packaging is adequate to prevent damage and waste.

Minimize the number of blueprints and reproductions necessary during the design and construction process.

Drywall

Order drywall in optimal dimensions to minimize cut-off waste. Drywall is available in different lengths, and designed dimensions should correspond to standard sizes.

Large drywall scraps can be set aside during hanging for use as filler pieces in areas such as closets.

Although technology does exist for recycling

CONSTRUCTION WASTE MANAGEMENT

GUIDELINES, continued

drywall into textured wall sprays, acoustical coatings, gypsum stucco, fire barriers, or agricultural products, there are currently no local markets. Large pieces of drywall (full to half sheets) can be donated (see Resources). Some composting operations want to use gypsum from the drywall as a soil amendment.

Reuse joint compound buckets for tool or material storage by clients or crews.

Insulation

Install leftover insulation in interior wall cavities or on top of installed attic insulation if it cannot be used on another job.

Lumber

Optimize building dimensions to correspond to standard lumber dimensions.

Modify framing details to optimize lumber use and reduce waste and inform the framing contractor of your plan.

Develop detailed framing layouts to avoid waste when ordering and cutting lumber.

Store lumber on level blocking under cover to minimize warping, twisting, and waste. Avoid losing scrap wood in soil; it can attract termites to the building.

Set aside lumber and sheathing/composite board cut-offs that can be used later as blocking, spacers in header construction, etc.

In remodeling, evaluate whether salvaging used lumber is possible.

Save small, untreated wood scraps to use as kindling for clients or crew members.

Larger pieces of leftover lumber (6' or more

in length) can be donated. (see Resources)

Save clean sawdust for use in compost piles or around gardens. Avoid sawdust that might contain painted or treated wood. This should be bagged separately. Untreated bagged sawdust may be donated. (see Resources.) Minimizing sawdust and small wood scraps from getting buried in the soil also reduces the attraction of your site to termites.

Masonry

Estimate masonry material needs carefully to avoid waste.

During construction, collect, stack and cover brick and other masonry materials to prevent soiling or loss.

Clean concrete chunks, old brick, broken blocks and other masonry rubble can be buried on-site during foundation backfilling.

Salvage usable bricks, blocks, slate shingles, tile and other masonry materials from remodeling and construction. Store for future jobs or divert to salvage operations. (See Resources.)

Check to see if your masonry supplier will accept the return of materials in good condition.

Metals and Appliances

During remodeling, separate old appliances and metal building materials, such as aluminum siding and roofing, metal ductwork, and conduit for reuse.

Consider holding a salvage sale of usable items during the construction process.

Miscellaneous

CONSTRUCTION WASTE MANAGEMENT

GUIDELINES, continued

Branches and trees from land clearing can be stored separately and chipped for use on site to create landscaping mulch. Composting operations also will accept branches and trees.

Old nickel cadmium batteries from portable power tools should be disposed of properly (See Resources: General Assistance).

Donate clean, reusable building materials such as cabinets, doors, windows, tile, wood, plywood, drywall, light fixtures, bathtubs, sinks, mortar mix, hardware, latex paint, nails, screws, electrical and plumbing supplies (see Resources).

Paints, Stains, Solvents and Sealants

Donate unused portions (see Resources) or save unused portions for your next job.

Plastic and Vinyl

Minimize waste of vinyl siding, flooring, and countertop materials by ordering only quantity needed.

Recycling is a system of collecting, sorting, and processing discarded materials for use as raw materials in the manufacture of new products. If construction materials cannot be reduced or reused, then they should be recycled (pending local market availability). Some materials can be recycled directly into the same product. Others can be reconstituted into other usable products. Recycling is not usually economically feasible unless a facility using recycled resources is located near the material generation source.

What to Reuse and Recycle

Before collecting construction waste for reuse or recycling, identify who will accept it. This is important in designating the type of waste

to separate and in making arrangements for drop-off, collection, and storage of materials. In Austin, materials that can be reused include:

- appliances and fixtures
- asphalt (for road repair)
- brush, trees, and land clearing debris (for compost and mulch)
- fixtures
- lumber and plywood
- masonry (bricks, concrete masonry units, etc.) and concrete rubble (for fill)
- roofing
- windows and doors

In Austin, materials that can be recycled include:

- carpet (usually in a renovation, check with new carpet installer)
- cardboard and paper
- metals (including copper piping, wire and flashing, aluminum siding, flashing and guttering, iron and steel banding from bundles, nails and fasteners, galvanized flashing and roofing, rebar, and aluminum beverage cans)
- plastics (numbered containers, bags, and sheeting)

Materials Storage Area

Designate a specific area to facilitate separation of materials for potential reuse, recycling, and return. This area should be kept neat and clean. Bins or areas for all materials to be separated should be provided. Bins should be clearly labeled with the material to be collected in both English and Spanish in order to avoid contamination of materials. Pictures and symbols can also accompany verbiage. (for example: *METAL RECYCLING*)

CONSTRUCTION WASTE MANAGEMENT

GUIDELINES, continued

ONLY and UNICAMENTE METAL PARA RECICLAR.) Signage should be easy to read from a distance and from the angle of the disposer. Signage does not have to be elaborate but should be sturdy and removable for use on other bins as needed.

Bins should suit the site – crunable for multi-story projects, small and mobile for quick-moving or hard-to-get-at projects, or sectioned with dividers for smaller quantity projects. They should be monitored periodically

for contamination so that the problem can be more readily corrected and preventative measures implemented. The area should be in a location out of the way of construction traffic but provide adequate space for pick-up and delivery and convenience to workers. Protection from rain and pilfering may be required.

RESOURCES:

PROFESSIONAL ASSISTANCE:

Shellie Reott
Earthly Ideas
510 E. Mary St.
Austin, TX 78704
(512) 444-0980
earthly@io.com
Consultant, project and construction manager specializing in sustainable building strategies including construction/demolition recycling.

Jim Walker
3102 Breeze Terrace
Austin, TX 78722
(512) 499-0526
construction waste consultant

COMPONENTS/MATERIALS/SYSTEMS:

See "Demolition Contractors" in Yellow Pages for salvage companies.

Firms by Service Type **Landfills**

These are regional landfills accepting mixed debris and garbage. Separated materials are accepted where noted, all landfills accept clean fill and rubble. Landfill owners which also provide hauling services are listed again in the Haulers section. Fees listed are for comparison purposes only.

City of Austin Landfill
10108 FM 812
(1 mi. E. of Hwy. 183 at Pilot Knob)
(512) 243-1200
M-F 8-5, separate brush and clean wood area, diversion area for resaleable items, Type IV Landfill for Construction and Demolition

County of Williamson Landfill
600 County Rd. 128
(15 mi. E. of I-35, left on Hwy. 79 at Hutto)
(512) 759-8881
M-F 8-5, Sa 8-3, fee: \$5.70/cy mixed debris, \$4.70/cy brush, separate brush area

CONSTRUCTION WASTE MANAGEMENT

RESOURCES, continued

Longhorn Community Landfill
 a Waste Management Inc. Company
 9708 Giles Ln.
 (5 mi. E. of I-35 on Hwy. 290 E.)
 (512) 272-4329
M-F 7-6, Sa 7-4, fee: \$6.15/cy, separate brush area

Sunset Farms Landfill
 (Browning-Ferris Inc.)
 9912 Giles Ln.
 (5 mi. E. of I-35 on Hwy. 290 E.)
 (512) 272-4327
M-F 4-6, Sa 4-3

Texas Disposal Systems
 7500 FM 1327
 (3 mi. E. of I-35 on FM 1327,
 1 mi. S. of Onion Creek Parkway)
 (512) 243-0400
M-Sa 7-7 (or dusk), separate brush and clean wood area, areas for source-separated metal, diversion area for resaleable items, will take clean dry-wall for composting

Select Conversion Table
 Cubic Yards (cy) to Tons

Wood	300 lbs/cy	6.7 cy/ton
OCC (loose)	30-100 lbs/cy	20-50 cy/ton
Drywall	400 lbs/cy	5 cy/ton
Mixed Waste	350 lbs/cy	5.7 cy/ton

Source: NAHB, 1997

Haulers

All of these companies divert materials from landfill when possible. Most of these companies provide both containers and pickup services, some provide same-day site pickup. Larger firms which can provide 20-40 cubic yard rollofs are noted.

AAA Disposal
 (512) 388-7851
trailers available, will separate landclearing, some rubble and metal

Action Disposal
 (512) 251-4810
20, 30, 40 yard containers available, material separation on request by client

Browning-Ferris Industries, Inc.
 (512) 247-5647
20, 30, 40 yard containers available, separate containers for OCC

Capital City Rolloffs, Inc.
 (512) 288-2070
20, 30, 40 yard containers available, separate containers for OCC, metal, landclearing and clean wood

Central Texas Refuse
 (512) 243-2833
20, 30, 40 yard containers available, material separation on request by client, handles rolloff services for Round Rock Refuse

CONSTRUCTION WASTE MANAGEMENT

RESOURCES, continued

He Haul

(512) 326-4285

trailer service, material separation depends on job needs

Longhorn/WMI Disposal

(512) 272-4341

20, 30, 40 yard containers available, separate containers for OCC, metal, glass

Reconstruction Specialties Co.

(512) 335-9733

limited containers available, primarily landclearing

Texas Disposal Systems

(512) 243-4100

20, 30, 40 yard containers available, separate containers for OCC, paper, landclearing and wood, metal

U Call We Haul

(512) 331-5929

trailers available, separates OCC and metal

Special Services

These companies provide construction and demolition waste related services.

Austin Corporate Recycling Council

PO Box 161482

(512) 708-4496

A non-profit public partnership of members promoting recycling and waste minimization efforts in the Austin area.

Jer-Met Metal Brokerage

Drapers Cv.

(512) 267-1818

Distributor and reseller of construction and demolition debris and recycling equipment.

Recycling Sciences, Inc.

1600 W. Stassney Ln.

(512) 326-1303

Manufacturer of stainless steel liquid waste han-

Firms by Material Type

Landclearing

Landclearing debris includes stumps, trees and brush. It is primarily processed into mulch or a compost base. These companies receive and process landclearing debris as noted.

Austin Wood Recycling

4950 RR 1431

(512) 259-7430

no pallets or cut-offs, hauling services available

Chittins' Chipping Co.

5804-B Circulo Dr.

(512) 267-4274

on-site chipping services

Reconstruction Specialties Co.

13071 Pond Springs Rd.

(512) 219-1954

limited containers available

Trees Unlimited

2304 Hancock Dr., Ste. 6B

(512) 452-6620

on-site mulching

Whittlesey Recycling

9405 Dessau Rd. & 16813 N. IH 35

(512) 836-7423 & 251-5695

M-F 7-5, Sa 7-3 & M-F 7:30-5, Sa 8-5 drop-off services

CONSTRUCTION WASTE MANAGEMENT

RESOURCES, continued

Clean Fill and Rubble (concrete)

Clean fill is earthen material free of garbage, concrete or asphalt, oil and other petroleum contamination, as well as any organic material such as trees or brush. Landfills commonly accept clean fill and rubble for road and berm improvements. These companies provide diversion for clean fill as backfill excavation or site leveling. Call ahead for dumping fees and hours of operation.

Marcelo's Sand & Loam
800 Dalton Ln.
(512) 385-5205

Rio Materials Inc.
(also Falcon Hauling)
3901 Norwood Ln.
(512) 247-3400

Rogers Materials
15000 IH 35
(512) 312-1730
only small chunks of asphalt

Schumakers Enterprises Inc.
(also Austin Sand & Gravel)
901 Dalton Ln.
(512) 385-5379

Dimensional Wood

These companies handle and process large quantities of dimensional wood as noted. Clean, site separated wood is strongly preferred.

Habitat for Humanity Re-Store
310 Comal St.
(512) 478-2165
T-F 10-6, Sa 8:30-6, a wide variety but low quantity of dimensional lumber, including trim and hardwoods for sale

Del Valle Recycling
1713 E. Hwy 71
(512) 385-4617
M-F, a wide variety of lengths for sale

Roadrunner Pallet Recycling
13609 N. IH 35
(512) 990-1090
pallets only

Texas Disposal Systems
7500 FM 1327
(512) 243-4100
separate containers may be available, dimensional wood is ground with landclearing debris for compost

Metal

These companies are able to receive large quantities of metal scrap as noted, buying some metals depending on market prices.

AMP Recycling
1704 W. Howard Ln.
(512) 251-3407
M-F 8-5, non-ferrous and ferrous, containers and pickup service available

Austin Metal and Iron
1000 E. 4th St.
(512) 477-4640
M-F 7:30-4:30, Sa 7:30-11, ferrous and non-ferrous, containers and pickup available for structural steel

Commercial Metals
710 Industrial Blvd.
(512) 442-2384
M-F 8-4:30, non-ferrous and ferrous, containers and pickup service available

CONSTRUCTION WASTE MANAGEMENT

RESOURCES, continued

DNT Recycling

705 W. St. Johns Ave.

(512) 467-0063

M-F 8:30-5:30, non-ferrous only, small containers and pickup available

Double D Recycling

14003 Rock Cliff Dr. Leander.

(512) 259-5683

M-F 8:30-5:30

Gardner Iron and Metal

1201 E. 4th St.

(512) 477-3900

M-F 7-4

non-ferrous only

On the Road Salvage

4826 E. Cesar Chavez St.

(512) 389-1119

ferrous and non-ferrous, drop-off and pickup only available for contractors, call for arrangements, limited containers available

River Salvage

2818 N. FM 973

(512) 926-8250

M-F 7-5

ferrous and non-ferrous, limited containers available

Whittlesey Recycling

9405 Dessau Rd. & 16813 N. IH-35

(512) 836-7423 & 251-5695

M-F 7-5, Sa 7-3 & M-F 7:30-5, Sa 8-5, ferrous and non-ferrous, large quantities preferred

Gypsum (drywall)

There are currently no companies in the Austin area that accept and process gypsum and drywall scraps.

Habitat for Humanity Re-Store

310 Comal St.

(512) 478-2165

T-F 10-6, Sa 8:30-6, prefers half to whole sheets of reusable drywall, no small scraps

Used Building Materials

These companies receive and resell usable building materials.

Action Lumber, Salvage and Demolition

1424 South Loop Dr.

Killeen, Tx.

(254) 752-9759

M-F 9-5, primarily residential dimensional wood for resale, limited availability of other building materials

Habitat for Humanity Re-Store

310 Comal St.

(512) 478-2165

T-F 10-6, Sa 8:30-6, a wide variety of building materials, pickup service available

Texas Disposal Systems

7500 FM 1327

(512) 243-0400

M-Sa 7-7 (or dusk), diversion area for resaleable items includes some building materials

City of Austin Landfill

10108 FM 812

(512) 243-1200

M-F 8-5, construction and demolition material only

CONSTRUCTION WASTE MANAGEMENT

RESOURCES, continued

Paper

These companies focus on paper fiber such as newspaper and office paper but may accept similar grades of paper from construction projects depending on type and quantity.

Austin Recycling Co.
10047 E. Hwy 290
(512) 272-9344
primarily a residential drop-off facility

Balcones Recycling
2416 E. 6th St.
(512) 472-6200
may provide container depending on material type and quantity

BFI Recycling
4712 Bolm Rd.
(512) 385-7600
may provide container depending on material type and quantity

Ecology Action
707 E. 9th St.
(512) 322-0000
primarily residential and office drop-off

Recycling Opportunities
40109 Industrial Park Circle
(512) 863-7968
call for services

Old Corrugated Cardboard

These companies handle and process OCC. Many of these companies can also provide OCC containers.

Austin Recycling Co.
10047 E. Hwy 290
(512) 272-9344
can receive separated OCC

Balcones Recycling
2416 E. 6 St.
(512) 472-6200
may provide container depending on material type and quantity

BFI Recycling
4712 Bolm Rd.
(512) 385-7600
may provide container depending on material type and quantity

Ecology Action
707 E. 9 St.
(512) 322-0000
receives and bales OCC

Plastic

These companies receive and market select types of plastic. Call in advance to make arrangements for large quantities.

Poly Resource Recycling
6406 Bureson Rd.
(512) 385-0030
focus on industrial and commercial sources of plastic

CONSTRUCTION WASTE MANAGEMENT

RESOURCES, continued

GENERAL ASSISTANCE:

City of Austin Solid Waste Services
Commercial Waste Reduction Assistance
Program

Bob Fernandez

P.O. Box 1088

Austin, Texas 78767

(512) 499-2737, www.ci.austin.tx.us/sws/wrapcesqg.htm

bob.fernandez@ci.austin.tx.us

Free consulting services for businesses to reduce waste and associated costs. Also provides hazardous waste disposal services for Conditionally-Exempt Small Quantity Generators (CESQG) (i.e., businesses generating less than 220 pounds of hazardous waste in a month).

Texas Natural Resource Conservation
Commission (TNRCC)

Brian Noble

P.O. Box 13087

Austin, TX 78711

(512) 239-6780

bnoble@tnrcc.state.tx.us

Construction and demolition waste recycling assistance

Environmental Building News

E Build Inc.

122 Birge Street Suite 30

Brattleboro, VT 05301

(802) 257-7300, www.ebuild.com

Residential Construction Waste Management: A Builder's Field Guide

by the National Association of Homebuilders Research Center

400 Prince George's Blvd.

Upper Marlboro, MD 20774

(301) 249-4000, www.nahbrc.com

Reducing Construction and Demolition Waste. Guide to Resource Efficient Building Elements

by the NCAT/Center for Resourceful
Building Technology

P.O. Box 100

Missoula, MT 59806

(406) 549-7678, www.montana.com/crbt

WasteSpec: Model Specifications for Construction Waste Reduction, Reuse, and Recycling

by the Triangle J Council of Governments

P.O. Box 12276

Research Triangle Park, NC 27709

(919) 549-0551

Recycling Plus Program Manual: A Best Practices Manual for Construction Jobsite Recycling

distributed by the Clean Washington Center
(Publication # CDL-96-1)

Attn. Publications

2001 Sixth Ave., Suite 2700

Seattle, WA 98121

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