

RECYCLING TECHNICAL ASSISTANCE

PROJECT #575

YORK COUNTY SOLID WASTE AUTHORITY

YORK COUNTY

**An Action Plan
To Assess the Effectiveness of
Construction and Demolition
Waste Management
In York County**

**Sponsored by the Pennsylvania Department of Environmental Protection
through the
Pennsylvania State Association of Township Supervisors.**

PROJECT CONSULTANT

Nestor Resources, Inc.
Valencia, PA 16059

www.nestorresources.com

CONTACT

Michele Nestor, President
724-898-3489

michele@nestorresources.com

Purpose of the Project

The York County Solid Waste Authority is the implementing agent for the York County Municipal Solid Waste Management Plan. As such, it is responsible for ensuring that the recommendations of the Plan are executed. During the development of the Plan, it was determined that construction and demolition waste may hold a two-fold opportunity for the County and the Authority. The Plan suggested a study to determine the feasibility of diverting greater quantities of construction and demolition debris from landfill disposal. To make an informed decision on whether or not to become more involved with construction and demolition waste management would require the Authority to understand a number of market conditions.

The purpose of this project was threefold. First, it was to identify, define, and categorize the key indicators of construction and demolition waste management. Second, it was to establish the information and level of detail needed within each category as well, as the best way to obtain that data. Finally, the project was to develop a strategic outline to conduct the study, analyze the data, and act on the results.

The intent of developing the outline was to provide YCSWA with a roadmap to conduct all or parts of the investigation on their own, or to seek contractors to provide select pieces of the work. To accomplish this YCSWA retained Nestor Resources as a consultant through the Recycling Technical Assistance Program.

Approach and Methodology

To initiate the project, Nestor Resources, Inc. discussed the desired outcome with Authority personnel. The consultant conducted a literature search and review of known practices and methodologies for the various steps that would be required. As part of the research, the consultant compiled a list of useful tools used to estimate and project waste quantities, types and costs. Regulatory references, equipment suppliers and other information were among the pieces of information provided.

The Final Report

The resulting scope of work for the study was designed as a stand-alone document, incorporated into this report as Appendix A. The scope of work contains the recommended systematic process for the Authority to follow in assessing the waste stream, how it is currently managed and by whom. It also contains useful resources for the Authority to use as part of its investigation and analysis.

Appendix A

Prepared for the York County Solid Waste Authority



Action Plan to Assess the Effectiveness of Construction & Demolition Waste Management

Alternatives and Opportunities for York County



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PLAN OVERVIEW

Conducting an assessment of the construction and demolition waste activities and management practices in York County and in the surrounding area was a recommendation of the York County Municipal Solid Waste Management Plan, which was approved in February 2014.

This action plan outlines the steps necessary to identify how construction demolition waste is generated, handled, transported and also its final disposition. In addition, the plan provides basic instructions and exercises to determine what if any changes could be made to improve the overall system. The ultimate goal of the action plan is to determine the feasibility of diverting more construction & demolition material from disposal, recycle materials when possible, increase the amount of energy recovered, and protect the environment.

The outline categorically establishes key factors about construction & demolition waste, which should be considered in the decision making process. These include waste composition and characteristics, current management practices, facilities and capacity, a competitive market analysis, and alternatives that could be made available.

In addition, a bibliography of reference and informational materials and a list of equipment types and sources is included.

STEP 1 - WASTE CHARACTERIZATION

In this section, clearly delineate the types of materials that will be included for consideration and the likely sources.

DEFINE CONSTRUCTION & DEMOLITION WASTE

Establish a general broad definition, probably the regulatory one.

Break that down into categories that further defines it by where/how it is generated.

POINTS OF ACTIVITIES

Establish categories that may impact the types of materials expected to be generated

- New Commercial Construction
- New Residential Construction
- Commercial Renovation
- Residential Remodeling
- Roofing
- Commercial Demolition
- Residential Demolition
- Deconstruction

VARIABLES IN COMPOSITION PER ACTIVITY

Establish the types of materials most commonly found as a result of categorized activities/projects

Use broad categories with more specific items listed under each.

Wood

- Trim
- Flooring
- Framing
- Paneling
- Cabinetry
- Pallets
- Support Timbers
- Crown Moldings
- Staircases

Glass

- Windows
- Mirrors

Metals

- Siding
- Piping
- Wiring
- Fencing/Ironworks

Plastics

- Piping
- Film Wrap
- Packaging

Packaging

- Cardboard
- Styrofoam
- Paper

Durable Goods

- Appliances
- Carpeting
- Furniture
- Architectural Features

CHARACTERISTICS PER COMPONENT

Consider the value of materials based on whether they can be recovered, processed, converted, etc.

Identify the current and potential value/uses of materials

- Reused
- Refurbished
- Recycled
- Processed for Beneficial Use
- Alternate Daily Cover
- Construction Aggregates
- Soil Additives
- Engineered Fuel
- Combusted for Energy Recovery
- Disposal

STEP 2- CURRENT MANAGEMENT PRACTICES

In this section, describe the variety of ways materials are handled at job sites and away from the job site. Include the types of people who may handle the material.

AT POINT OF ACTIVITY

Identify what contractors do on site with material

- Open burning
- Salvage materials before demolition or renovation begins
- Segregate some materials into different containers (metals, wood, OCC, etc.)
- No sorting of materials
- Take back to own point of operation
- Contract to have material removed
- Suppliers take back old product when buying replacement

OFF SITE

IDENTIFY WHAT CONTRACTORS DO OFF SITE WITH MATERIAL

- Salvage materials at own point of operation
- Open burning at own point of operation
- Deposit it in roll-off at own point of operation
- Consolidate at own point of operation and then self-haul
- Take to transfer station where materials are salvaged
- Haul directly to landfill
- Haul directly to processing facility

METHODS OF TRANSPORTING OFF SITE

Identify the various ways that contractors currently deliver material for disposal and/or processing.

Consider how each may impact a receiving facility

- Pick-up
- Small dump trailer
- Bagster
- Roll-off
- Dump trucks
- Trailers

STEP3 - CURRENT INFRASTRUCTURE

Identify the names and locations of the various types of facilities that accept C&D material

Plot the facilities on a map

DISPOSAL OUTLETS

Identify the types of disposal facilities, with names, owners, and locations

- Municipal Waste Landfills
- Construction Demolition Waste Landfills

PROCESSING/RECYCLING OUTLETS

Identify the types, with names, owners, and locations

- Scrap Yards
- Recyclers
- Processors

REUSE/RESALE OUTLETS

Identify the types, with names, owners, and locations

- i.e. Habitat for Humanity

NETWORK OF CONTRACTORS & TRANSPORTERS

Compile lists of those who generate construction & demolition waste

- Local Government Public Works
- Property Management Firms
- Roofers, Remodelers
- General Contractors
- Installers
- Demolition Companies
- Hauling Companies

STEP 4- WASTE GENERATION

Knowing the total combined amount of material as well as estimating the ratio of various components are important factors in evaluating how construction & demolition waste could be managed.

Establish a waste generation rate by looking at historic trends in known data and comparing it to expected results based on national, state, regional performance. Waste generation is generally assumed to be calculated at the point the material is discarded before any reuse, recovery for energy, beneficial use, or recycling may occur. Determine whether the generation rate will assume the inclusion of materials before any on site source reduction occurs (i.e. grinding wood for mulch on-site, drywall as soil additives, etc.).

REPORTED DATA

Construction & demolition waste disposal is not reported in a consistent fashion. Different requirements apply to the various types of facilities permitted to accept the material. Research the following sources:

- Annual Facility Reports
- Annual County Reports
- Annual Operations Reports
- Biennial Residual Waste Generator's Report
- Potentially records from General Permits
- Transporter's Reports

GENERALLY ACCEPTED ASSUMPTIONS

Use a variety of methods and sources to calculate estimated total volumes and weights of materials that are likely to be generated. Use those that are most representative of the demographics, climate, economic profile, and building practices.

References and tools for calculating construction & demolition waste generation are included in the appendix. Some of the tools focus solely on construction/building related activities. Others explore specific materials or points of origin.

OTHER KEY INDICATORS

Municipal waste generation is largely influenced by population. However, the generation of construction & demolition waste has numerous variables and fluctuates widely. These include:

- Population Projections
- Approvals for Planned Residential Developments
- Building Permits
- Demolition Permits
- Seasonal influences
- Economy

STEP 5- MARKET ANALYSIS

The foundation of any future enhancements to the existing infrastructure or practices is if it can be competitive in the current marketplace. This section establishes some key figures that will be useful in conducting any cost benefit analysis.

AVAILABLE CAPACITY

Determine the amount of construction & demolition waste that can be managed utilizing the currently available outlets.

- What is the maximum average daily volume allowable at each facility?
- What is the remaining permitted available capacity?
- When will the permit expire?
- Are there any pending permit applications in review?

CURRENT MARKET SHARE

Identify those who potentially control the largest volume/flow of each type of construction & demolition material. Transporter reports should provide a better market perspective than simply relying on facility reports.

Establish individual market shares by categories:

- disposal
- processing
- recycling
- transporter/contractor

Compare the results within each category as well as comparing the combined categories.

Will market consolidation have a future impact on the historic reported data?

MARKET RATES/VALUES

It is important to not only understand the cost of handling construction & demolition waste, but also the revenue that might be generated if materials are segregated and prepared for resale.

- Research the current gate rates and actual transporter rates for construction & demolition waste at municipal waste landfills as well as construction & demolition waste landfills.
- Do the same for processors
- Calculate the current market value of the materials that could be recovered. Resources and tools to project these values are included in the appendix.
- Calculate the BTU values of certain materials to determine their impact on the current operation

LOGISTICS

Establish zones within the county based on travel time using 30-minute increments

- radius from current facilities
- radius from YCSWA

Establish average hourly rate for fuel, labor, vehicle maintenance, etc. Although each company has different costs and profit margins, a safe assumption would be in the range of \$125 to \$150 per hour.

STEP 6- POLICY DRIVEN ALTERNATIVES

Compare the pros and cons of implementing a variety of legal and monetary incentive based policies and procedures to increase construction & demolition waste recovery.

- Consider the capital investment necessary for each –by YCSWA and transporter/contractor.
- Consider what additional operating costs may impact YCSWA and transporter/contractor.
- Consider the political will necessary to enact adopt changes.
- Consider the ease of enforcement.
- Consider how this would impact YCSWA’s existing operation
- Project what, if any revenue could result from tipping fees, salvaged materials, etc.

RECOVERY/RECYCLING ORDINANCES

- Counties and municipalities have the statutory power to require construction & demolition waste to be separated for recycling or energy recovery.
- Ordinances can require submission of a construction & demolition site waste management plan.

FLOW CONTROL ORDINANCES

- The current York County Municipal Solid Waste management plan includes provisions, which incorporate the ability of the YCSWA to flow control construction & demolition waste.
- In conjunction with ordinances that require the separation of specific materials, YCSWA could flow control select segments of the control construction & demolition waste stream.

CONTRACTUAL INCENTIVES

- Public and private sector construction & demolition projects can be bid with requirements and goals for material recovery.
- Points can be allotted for prioritized categories: beneficial use, ADC, energy recovery, recycling, etc.
- Deconstruction can also be required or set as a contractual preference.
- YCSWA could consider a discount to municipalities that have enacted C&D separation ordinances

PERMITS WITH MONETARY INCENTIVES

- Counties can issue demolition permits that require proof of recycling or energy recovery in return for a partial refund of the permit fee.
- Municipalities can issue building and/or occupancy permits that require proof of recycling or energy recovery in return for a partial refund of the permit fee.
- Demolition permits can require preliminary salvaging of reusable materials prior to demolition.
- Points can be allotted for prioritized categories: beneficial use, ADC, energy recovery, recycling, etc.

TIERED TIPPING FEES

- YCSWA can establish tipping fees based on fully segregated, partially segregated, and mixed load of construction & demolition waste.
- Fully segregated loads of combustible materials could get a higher discount.

STEP 7- PROCESSING DRIVEN ALTERNATIVES

- Research methods that could be implemented and technologies and processes that could be made available to enhance the current construction & demolition waste management system.
- Consider the capital investment necessary for each –by YCSWA and transporter/contractor.
- Consider what additional operating costs may impact YCSWA and transporter/contractor.
- Consider the political will necessary to enact adopt changes.
- Consider the ease of enforcement.
- Consider how this would impact YCSWA’s existing operation
- Project what, if any revenue could result from tipping fees, salvaged materials, etc.

ON SITE PROCESSING

- Mobile Mechanical Processing

OFF SITE PROCESSING

- Manual Source Separated Processing
- Mixed Waste Processing
- Mechanical Processing

STEP 8 –PUBLIC AWARENESS EDUCATION AND ENFORCEMENT

- Consider the resources, tools, personnel, and efforts to successfully implement changes.
- What type of outreach efforts will be necessary?
- What are the best avenues to reach contractors, builders associations, transporters, municipal officials, etc.?
- What is a realistic timeframe to reach the stakeholders?
- Will extra staff be required?
- Can the changes be realistically enforced? How?

STEP 9 –ENVIRONMENTAL REGULATORY CONSIDERATIONS

How will this impact YCSWA’s current operating permit?

What additional permits/approvals are necessary? For YCSWA? For transporters, contractors?

STEP 10 - OPPORTUNITY QUALIFICATION PROCESS AND CRITERIA

Based on the research and the fundamental market analysis determine if there are any opportunities for construction & demolition waste recovery that could be pursued further.

WHAT IS THE DESIRED OUTCOME?

For each of the options establish a goal/objective

- Waste diversion from landfill disposal
- Increased recycling
- Energy recovery
- Increased revenue
- Pollution prevention

METRICS AND EXPECTATIONS

Determine how the changes will be measured. Calculate some sample projections.

- Tons diverted
- Tons recycled
- BTU values maintained
- Revenue-ROI per year

BUDGET

Using the findings from the investigation, compile a capital improvement and operating budget for each option

- Equipment
- Land development and facility construction
- Engineering and permitting
- Personnel
- Communication
- Residual disposal
- Revenue
- Etc.

COST BENEFIT ANALYSIS

Compare the financial outlays to the expected results to determine the best options.

IMPORTANT RESOURCES, TOOLS AND REFERENCES

Characterization of Building-Related Construction and Demolition Debris in the United States.

Prepared for The U.S. Environmental Protection Agency, Municipal and Industrial Solid Waste Division, Office of Solid Waste, Report No. EPA530-R-98-010, by Franklin Associates. 1998

Although a little dated, it still provides good insight into the materials that are likely available from different building related activities. It eliminated things like concrete and asphalt, and only focuses on structures. Therefore it is more appropriate for the types of waste that York County SWA is seeking.

Estimating 2003 Building-Related Construction and Demolition Materials Amounts. 60 p. U.S. Environmental Protection Agency. 2009.

This is an update to the original 1998 publication listed above.

Municipal Solid Waste (MSW) and Construction and Demolition (C&D) Wood Waste Generation and Recovery in the United States. Dovetail Partners, Inc., Minneapolis, MN. 2014

Estimating Construction and Demolition Debris Generation Using a Materials Flow Analysis Approach. Cochran, K., and T. Townsend. 2010.

Construction & Demolition Waste Management in the Northeast in 2006. Northeast Waste Management Officials' Association Boston, MA. 2009

Public Works Technical Bulletins (PWTB) PWTB 200-1-128 Update of Market Value for Demolition Salvage Materials NEW (12-05-2014) [183 KB](#)

USEPA assumes construction/building/renovation waste is generated at 2.8 pounds per person per day. It does not account for the bricks, mortar and concrete and asphalt commonly found in demolition waste.

Estimating 2003 Building-Related Construction and Demolition Materials Amounts (PDF) (60 pp, 722K) Developed for the USEPA, this publication has a number of useful calculators that can be applied to different key indicators of construction activity

CONSTRUCTION AND DEMOLITION (C&D) DEBRIS DETAILED COMPOSITION ANALYSIS FOR 2010 (EXCEL FILE, 65 KB)

LIST OF GENERAL PERMITS FOR CONSTRUCTION AND DEMOLITION WASTE

WMGM011

Beneficial use of processed construction waste to produce mulch as a soil additive and an aggregate in concrete or asphalt mixtures for construction purposes.

WMGM014

Beneficial use of roadway excavation waste as roadway construction material.

WMGM015

Processing and beneficial use of wood and timber waste (i.e., tree stumps, limbs, clean wood, untreated and unpainted wood, and pallets) and the leaf and yard waste as mulch and compost to compliment the mulch production.

WMGM016

Processing and beneficial use of trees, tree stumps, limbs, clean pallets, untreated and unpainted scrap lumber, packing crates, and brush.

WMGM019

Processing and beneficial use of concrete, asphalt, hardwood timber as mulch and uncontaminated soil as construction material, and topsoil for commercial purposes.

WMGM022

- 1.Processing and beneficial use of waste concrete, brick, aggregate previously used as sub-grade or sub-base material in roadway construction, shot rock, roof ballast, and waste asphalt to produce a roadway or parking lot construction material, and/or substitute for PennDOT approved aggregate; and
- 2.Processing and beneficial use of timber waste (i.e., tree stumps, limbs, clean wood, untreated and unpainted lumber, shrubs, clean pallets, clean skids and packing crates), and leaf and yard waste (i.e., source segregated leaf and yard waste, grass clippings) to produce bedding material for livestock.

WMGM023

On site processing and beneficial use of gypsum board from new home construction as an on-site soil amendment.

WMGM024

Processing and beneficial use of concrete and asphalt waste as: an aggregate, sub-grade or sub-base material for roadway construction; cold-mix or hot-mix construction material for compacted roadway applications covered with a pavement; or construction material for compacted roadway shoulder applications covered with a sealer.

WMGM025

Onsite processing and beneficial use of unpainted and untreated wood waste, gypsum board, brick, block and concrete waste from new residential and commercial construction for use as (1) mulch for landscaping purposes, (2) soil erosion control, and/or (3) temporary walkway material at new residential home or commercial building construction sites or distributed to wholesale outlets.

WMGM027

Processing of:

1. wood waste (clean and uncontaminated land clearing, grubbing and excavation waste, yard waste, and residual and municipal wood scrap) to produce mulch for landscaping purposes,
2. leaf and yard waste, food-processing residuals, and spent mushroom substrate (SMS) to produce compost,
3. organic, non-organic residuals with a BTU value of at least 5000 BTU/lb for use as alternative fuels,
4. compost, drinking water treatment plant sludge, waste gypsum, foundry sand and SMS with non-waste soils to produce topsoil for landscaping purposes, and
5. clean, uncontaminated rock, stone, gravel, brick, block, concrete and used asphalt) for use as a construction material at the processing facility only.

WMGM038

Grinding, shredding, and screening of untreated and unpainted standard gypsum wallboard, commonly known as Type X, generated at residential home and commercial construction sites, or manufacturing facilities, and backing paper for beneficial use as: (i) a component of mushroom growing media, (ii) a soil additive material, (iii) a soil amendment, (iv) a component or ingredient in a manufacturing process, and (v) an animal bedding material.

WMGM039

The general permit is for the processing and beneficial use of post-consumer asphalt shingles (tear-offs) and pre-consumer asphalt shingles (i.e., imperfections, tabs, trimming scraps, etc., generated in the manufacturing of new asphalt shingles and damaged, unused shingles) as an ingredient in hot-mix and cold-mix asphalt paving material, a component of a sub-base material, as dust control on rural roads when applied with a binder, and as a component or ingredient in fuel used in cement or manufacturing or in the generation of electricity or steam. The processing is limited to transferring, screening, shredding, grinding, sorting, and magnetic removal of ferrous metal.

WMGM043

Acceptance, transfer, and processing prior to beneficial use of construction and demolition waste materials as follows:

1. Processing by sorting, screening, and/or shredding of unpainted and untreated natural wood waste prior to delivery to a permitted processing or recycling facility;
2. Processing by sorting, screening, and/or crushing of stone, brick, block, and concrete prior to delivery to a permitted processing or recycling facility;
3. Processing by sorting and screening prior to delivery to a permitted processing or recycling facility of cardboard, gypsum board, asphalt shingles, particle board, plastic, scrap metal, and glass.
4. Sorting of construction and demolition waste is authorized using manual labor and heavy equipment for movement of materials.

WMGM044

Processing of unpainted and untreated wood waste; gypsum board; brick, block and concrete waste; various organic wastes; non-asbestos containing asphalt shingles; pallets; skids; saw dust; source segregated paper; cardboard and newspaper; plastic waste; scrap metal; unused structural sound building materials; and architectural elements. The processed waste materials are beneficial use as (a) mulch or wood chips for further processing off-site, (b) aggregate material in roadway construction, (c) soil conditioner or soil amendment, (d) alternative fuel, (e) animal bedding, or (f) distributed to wholesale outlets.

WMGM045

Processing and beneficial use activities performed by facilities that, at any one time, do not exceed (i) 5 acres and (ii) 6,000 cubic yards per acre of wastes as follows: 1. Processing by mixing or blending, screening and composting of (a) source separated food processing waste, (b) source separated pre-and-post consumer food wastes, (c) yard waste, (d) unpainted and untreated wood waste, (e) source segregated paper and cardboard, (f) land clearing and grubbing waste, and (g) agricultural waste on an active or abandoned mine site approved by the Department as part of a mine reclamation permit or project. 2. Beneficial use of the cured compost as (a) a soil additive, (b) a mulch for landscaping purposes, (c) a fertilizer in normal farming operations or mine reclamation activities, or (d) in the production of a manufactured topsoil .

WMGR090

Processing and beneficial use of reclaimed asphalt pavement (RAP) materials as roadway construction material.

WMGR096

Beneficial use of regulated fill when moved offsite or received onsite in accordance with DEP Guidance Document 258-2182-773 (Management of Fill). Application for Regulated Fill General Permit 2540-PM-LRWM0403 (eLibrary)

LOCAL CONSTRUCTION & DEMOLITION SALVAGED MATERIAL OUTLETS

Re-Source York

[Re-Source York Website](#)

Building and Renovation Materials

235 N. Beaver St.

York, PA 17403

717-852-7574

e-mail: restoryorkinc@aol.com

Indoor Yard Sale & Furniture Warehouse

405 Carlisle Ave.

York, PA 17403

717-852-7574

e-mail: restoryorkinc@aol.com

Retail sales and tax-deductible donations of hardware, cabinets, fenestration, and building materials

Sylvan Brandt

[Sylvan Brandt Website](#)

651 Main St.

Lititz, PA

717-626-4520

Historic York Architectural Warehouse

[Historic York Architectural Warehouse Website](#)

465 Prospect St.

York, PA 17403

717-843-0320

Fax: 717-854-6050

e-mail: info@historicyork.org

LOCAL CONSTRUCTION & DEMOLITION RECYCLERS AND PROCESSORS

GYPSUM DRYWALL

[Gypsum Agri-cycle, Inc.](#)

295 Oremine Rd.
Mount Joy, PA 17552
717-426-1990

[Agri Marketing, Inc - USA Gypsum](#)

190A Texter Mountain Road
Reinholds, PA 17569
717-335-0379

CARPET

[Foam Recycle Center](#)

3761 Commerce Dr
Baltimore, MD 21227 (approx. 49 miles)
800-787-3626
Items Recycled: Carpet, carpet pad

MIXED WASTE/COMMINGLED

[Revolution Recovery](#)

7333 Milnor Street, Suite 220
Philadelphia, PA 19136
215-333-6505

CONSTRUCTION & DEMOLITION RECYCLING EQUIPMENT SUPPLIERS

Krause Manufacturing

Located at the CP Group Headquarters:

6795 Calle de Linea

San Diego, CA 92154

Toll-Free: 1-800-381-5101

For Sales: info@krausemanufacturing.com

<http://www.krausemanufacturing.com/material-recovery-facility/construction-and-demolition-recycling/stationary-c-and-d-recycling-systems/>

Machinex Recycling Services Inc.

817 Brock Rd South, Unit 11

Pickering, ON, L1W 3L9, CANADA

Toll Free: 1 800 463-4298

Phone: 905 420-0466

Fax: 905 420-0319

sales@machinexrt.ca

<http://www.machinexrecycling.com/>

General Kinematics Corp.

5050 Rickert Rd.

Crystal Lake, IL 60014

office: 815-373-0643

fax: 815-455-2285

<https://www.generalkinematics.com/>

Bulk Handling Systems (BHS)

3592 West 5th Avenue

Eugene, OR 97402

Phone: 541.485.0999

Toll Free: 1.866.688.2066

<http://www.bulkhandlingsystems.com/>