Recycling Drop-off Center Operations Manual

for Michigan Communities

July 2025

GRAHAM SUSTAINABILITY INSTITUTE
CENTER FOR EMPOWERING COMMUNITIES
UNIVERSITY OF MICHIGAN

Holland MICHIGAN

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

CATALYST COMMUNITIES

Acknowledgements

This project was made possible by a wide network of support and expertise. Dan Broersma, Sustainability Manager for the City of Holland, and Kristen Wieland, Senior Consultant at Resource Recycle Systems, were invaluable resources for guidance, industry knowledge, and feedback. The bulk of the information gathered in this manual was collected from recycling facilities and associated staff, who were generous enough to share their space, time, and experience with the author for the sake of this project. Contacts include Chris Hewitt at Michigan State University's Surplus Store and Recycling Center, Andy Gale, Audrey Lawens, and Chris Ursum at Bay Area Recycling for Communities, Lindsey Walker and Ashley McMurry at Emmet County Recycling, Samantha Buterbaugh at Biz Aid LLC, and Laura Jarels and Lyndsay Ferguson at Recycle Ann Arbor. Additional consultants shared their opinions and particular expertise: Jill Brown of Metro Recycling Solutions, Sarah Lundy from Calhoun County, Andrea Ryswick and Doug Koop in the Remediation and Redevelopment Division of the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Bill Haagsma from Speed-Tech Equipment, Matt Flechter, Recycling Market Development Specialist at EGLE, and Kerrin O'Brien, Executive Director of the Michigan Recycling Coalition. Special thanks to the Graham Sustainability Institute, Sarah Lee, Alexandra Haddad, Fatimah Bolhassan, and my fellowship cohort: Wulan Kencana Adjani, Paloma Calvin, Mateo Garcia, Isaac Harter, Natalie Overton, Alisa Sehgal, Jeewon Suh, Ann Wilkinson, and Bonny Wysocki.

This material is based upon work supported by the Department of Energy and the Michigan Department of Environment, Great Lakes, and Energy (EGLE) under Award Number EE0008653. The views expressed herein do not necessarily reflect those of the United States Government or any agency thereof. Find this document and more about the CLC Fellowship that supported this project at graham.umich.edu/clcf.

Background and Purpose

The development of this operations manual aims to address intersecting challenges at several levels. Nationally, the EPA aims to achieve a 50% recycling rate by 2030. In Michigan, 2022 updates to the Natural Resource and Environmental Protection Act laid out a goal recycling rate of 45% by the same year, which was reiterated in the MI Healthy Climate Plan. Given the current national and Michigan recycling rates of 32% and 25% respectively, progress in recycling systems, including the expansion of access and participation, is imperative to meet such goals.

In the City of Holland, Michigan, a new recycling drop-off center will expand municipal recycling services beyond the current curbside, single-stream system. The drop-off center will ensure access to recycling for residents who are not currently served by the curbside system, particularly those in apartment buildings and condos, and small businesses, as well as residents from surrounding communities. The center will also accept hard-to-recycle materials that are not currently accepted by the curbside program, expanding the overall scope of recycling opportunities for the greater Holland community. This manual will directly support Holland's new drop-off center by acting as a guiding resource for city staff and incoming drop-off center staff to assure on-going cost-effective operations that can be maintained for years to come.

Lastly, the operations of a municipal recycling drop-off center are complex and varied, depending on community intentions and local capacity. The operation of such a center includes decisions about what materials should be accepted; acquiring, running, and maintaining equipment; locating and managing materials markets; health, safety, and environmental procedures; staffing and administration; and public education and marketing, all of which are nuanced and, to varying degrees, technical. While there are a few organizations, namely the Michigan Recycling Coalition and The Recycling Partnership, that create and host valuable resources such as training and descriptions of community recycling programs, there is no centralized repository of recycling operations information. As a result, municipalities spend significant resources locating relevant information for decision-making, and the process of facility development and enhancement can be unnecessarily complex and time-intensive. The recycling industry is also relatively new and in flux as technology and strategies evolve. Therefore, this manual addresses the need for the collection of information related to the set up and operations of a municipal recycling drop-off center. The information here should also be updated as relevant knowledge evolves.

For all the reasons outlined above, this manual is an accessible reference guide to the operations of a recycling drop-off center for local governments in Michigan. The document was written by Lillian Wege, a master's student and Catalyst Leadership Circle Fellow at the Graham Sustainability Institute at University of Michigan.

Table of Contents

About this Operations Manual

This manual assumes some experience interacting with recycling facilities, and is designed specifically for local governments or other community organizations that are considering or beginning the process of developing or enhancing a drop-off center. Drop-off centers can offer opportunities to recycle to residents in rural or sparsely populated areas, and where apartments, condominiums, and other multifamily dwellings are prevalent but do not receive curbside service. Drop-off centers can also create opportunities to recycle materials that are not accepted through existing curbside systems. Importantly, drop-off centers are not replacements for curbside service, which should be offered to achieve greater participation and convenience if such a system is feasible. As much as possible, drop-off centers should serve to fill in gaps of access and be complementary to curbside recycling.

Drop-off centers, like the communities they serve, are diverse. In general, a drop-off center is any recycling site where residents bring their recyclable material. A single roll-off container on a country road, hauled once a month, is a drop-off center, just like a multi-acre material recovery facility (MRF) with a dozen containers for specific materials under full-time supervision is a drop-off center. Recycling operations at a drop-off center could include five pieces of consolidating equipment, or one. As you read this manual, keep in mind that it presents a broad array of options and perspectives, many of which will not be applicable or appropriate for your facility. The scale of a drop-off center is determined by the materials collected, which may mirror or expand upon the materials collected by curbside service, and the size and needs of your community. The operations of a drop-off center don't need to be complicated to be effective.

The next ten sections offer an overview of key topics, terms, and considerations related to the operation of a recycling drop-off center. No two recycling facilities are the same, so this manual is not exhaustive. Rather, it seeks to provide an informative framework with which local governments and community organizations can approach the idea of setting up a drop-off facility. Understanding terms, topics, and aspects to consider provides a healthy introduction to the world of recycling operations. The sections of the manual are organized by common topics, and the text can be read in whatever order suits the needs of the project. The appendix holds links to additional resources, definitions and additional terms, and example materials and templates that may be relevant to your facility. With this knowledge and the additional resources in the appendix, operators should feel confident beginning the development of their own recycling drop-off facility.

This manual is the initial phase of an ongoing project which aims to provide comprehensive guidance for communities developing or enhancing recycling drop-off centers. The manual will be augmented and updated as additional information is collected and as best practices and technology change. The project was initiated by the City of Holland to support the development of their own recycling drop-off center, and the manual was written by a graduate student fellow hosted by the Catalyst Leadership Circle Fellowship program overseen by the Graham Sustainability Institute at the University of Michigan and funded by the Michigan Department of Environment, Great Lakes, and Energy (EGLE).

The City of Holland will house the manual and review it annually, updating as more and/or different information is collected. In the case of editing, the dates of both the original publication and newest version should be noted on the cover of the manual. Older versions of the document should be retained so that changes can be tracked over time, and an informal review mechanism should allow for facilities to provide feedback on changes. Because information on drop-off center operations is variable over time and location, a platform for feedback on the manual's content at large should also be established. Future work on this project will include developing customizable resources and building upon the information here.

This document is a general guide only and should not replace consultation with relevant experts in the establishment of your drop-off center. The information and advice herein was sourced from experts, but was written by a graduate student fellow. Additional resources and expert support can be found through these organizations: Michigan Municipal League, Michigan Townships Association, The Michigan Association of Counties, Michigan Department of Environment, Great Lakes, and Energy - Materials Management Division, Michigan Recycling Coalition, and The Recycling Partnership.

1. Siting a Drop-off Center

The location and condition of your drop-off center will determine participation and may impact material marketing options. More than anything, it will set into motion the overall life and function of the facility. Siting should take into consideration the expected scale of operations as well as anticipated future expansion. Efficiency of collection, processing, storage, and transportation are also important priorities. Below is a list of site features that will contribute to the successful and efficient development of your drop-off site. See the siting checklist in **Appendix D** for a related, actionable resource.

- **Location:** Locating your drop-off center close to major transportation arteries and destinations such as schools and shopping centers may make users more likely to stop by your facility while doing daily tasks or driving to or from work. Siting near a large road also accommodates tractor-trailer traffic. However, be cautious of proximity to residential areas to avoid conflicts over noise, dust, and other nuisances.
- **Size:** Acreage should accommodate the structure, outside storage, parking, and have enough space for orderly vehicular movement including tractor-trailers and buffers between your and neighboring properties. Size will be determined by the materials to be collected, stored, and necessary traffic flow for both residents and material handlers.
- **Natural barriers:** Trees and hills can serve your facility for security, as a buffer for noise, and aesthetics.
- **Notice features:** Features such as inclines and blind curves may make operations more difficult for workers, customers, or buyers. Conversely, consider whether they could be leveraged to make operations more efficient.

You may want to use an existing structure.

Retrofitting an existing facility can decrease costs, materials, construction emissions, and the construction timeline of your facility. Existing sites may be better situated than lots available for new construction, and sites such as industrial parks may provide desirable infrastructure and features such as roads, fencing, drainage, and loading docks as well as commercial neighbors who may become customers. Key considerations related to the reuse of an existing building as a drop-off center include:

- **Building shell type**: Pre-engineered steel buildings are often desirable for their durability. Former buildings suitable for drop-off centers include warehouses, distribution centers, and light industrial manufacturing facilities.
- **Interior structure:** Clear span buildings allow for operational flexibility because layout and equipment arrangement can be changed to serve various functions. There are also no support pillars for vehicles to run into.
- **Ceiling height:** Ideal dimensions for your facility depend on the specific functions anticipated. For example, an eave height of 25 feet accommodates the tipping of roll-off containers, and 15 feet accommodates a vertical baler. Keep in mind the possibility of expansion and/or additional equipment in the future.
- **Utilities:** HVAC, lighting, water, sewer or septic, and electrical services should be adequate for anticipated staffing, material capacity, and equipment. Consider future expansion in the allocation of utilities. For example, electrical capacity may become a limiting factor if you decide to upgrade or invest in additional equipment. Air handling should be evaluated by an engineering or technical design

firm based on the level of dust anticipated. Temperature control may not be necessary for your entire facility, and can be distributed for cost savings.

What if your site is a brownfield? Redevelopment of previously polluted properties can bring neglected land back into organized use, and may rally community buy-in for your new site. Brownfield redevelopment can also bring in new funding structures for your project. Specific remediation measures depend on the cause and status of contamination at your site, but an overview of the redevelopment process is offered here. The steps to working with a brownfield facility include:

1. Continuous collaboration with an environmental consultant to identify the necessary cleanup steps, precautions for use, and to meet appropriate state agency standards throughout planning and construction.
2. A Phase I environmental assessment to identify existing contamination, if there is any. **All facility development projects should conduct a preliminary environmental assessment even if legacy pollution is not suspected to establish a record of environmental conditions and avoid liability for any contamination discovered later.** A Phase I environmental assessment results in an environmental report that declares the environmental conditions found on the site.
3. A Phase II study should be conducted to identify exactly what and where contamination is on the property. This includes soil and water samples. If only part of a property is contaminated, you may be interested in arranging your buildings and operations around the different levels of protection that may be necessary.
4. The compilation of a baseline environmental assessment after Phase I and Phase II assessments to be submitted to the appropriate state agency.
5. Establishing a due care plan to ensure your use and operations remain within safe limits, and nothing contributes to expanding or exacerbating contamination. This plan includes environmental assessments, development plans, and remediation or protection measures.

Additional notes on brownfield redevelopment:

- Your regional Brownfield Coordinator will oversee your project and discuss results and opportunities for your site. Call them at the beginning of your project to make sure you meet the necessary requirements and take advantage of all opportunities.
- The EGLE Brownfield Site Assessment (BSA) Program offers environmental assessments to sites with suspected or documented environmental contamination at no cost.
- EGLE offers funding in the form of grants and loans. Grants and loans are managed through your local government unit, and are each capped at $1 million per project per local government per year. Sites receiving grants and loans are subject to different requirements such as demonstrated local capital investment and economic potential. Your county or local government may also have access to EPA brownfield funds.
- EGLE's RIDE Mapper platform can help you locate sites with reported contamination. Key features includes the "Inventory of Facilities" window, which offers a spreadsheet of identified contaminated sites and access to relevant records and reports for most sites, and "RIDE Mapper," an interactive map that allows you to locate known contaminated sites and filter by status, EGLE support received, and regulatory type.

The process and timeline of developing or enhancing a drop-off center will vary depending on multiple factors, including who is leading the project and the governance structure within which it will take place. In general, as you discuss the drop-off center with your governing body, make sure that you…

- **Identify your community's need for a drop-off center.** In one community, this was done by a materials taskforce. Community needs may include the geographic limitations of current curbside service or public demand for specific services such as electronics recycling or paint collection. Your circumstance will be unique, but understanding the "why" of your facility is integral to building community and organizational buy-in, and will make your facility actually useful!
- **Develop a preliminary plan of costs and facility needs.** When you're presenting your plan to your governing body, consider separating capital costs such as construction, infrastructure, and equipment, and operational costs such as staff, marketing, and transportation. Consider hiring external consultants to provide expertise and tap into professional networks when developing budgets and financial plans. Include other public offices in the siting process such as planning, facilities, and utilities if applicable.
- **Verify the sites.** A site must not only be available but also financially and logistically feasible. Check zoning, deed restrictions, easements, and any site-specific conditions such as soil type that may cause the development of your site to take longer or be more expensive. Run an extensive title search to locate historical deed restrictions. Minimize liability for environmental contamination by conducting a Phase I environmental assessment. The necessary utility infrastructure, such as water, sewage, septic, electrical, and natural gas, must be available and appropriate for the scale of your facility. The electrical needs of the equipment you plan on using should be communicated to your utility provider. Also for this reason, locating your facility in an established industrial area may make the development of your site simpler.
- **Identify funding and develop financial plans.** Really, this should be done throughout. See **Organizational Structure** and **Appendix A** for more information and resources regarding funding a drop-off center. State grants may be available to support the placement of needed infrastructure but can not be used to offset operational costs. If you're using grant funding to support the development of your facility, make sure you understand any restrictions the grantee may place on your site, such as your ability to lease versus buy a site. Clarify any grant restrictions before starting the siting process. Material sales will generally not cover operational costs, so additional funding mechanisms will need to be established. Understanding your community's financial "philosophy" towards the facility will help decide which services can be feasibly offered, and where services must be limited to maintain financial viability.
- **Put together a plan for presentation.** This will look different for every organization. Understand what the group wants, and where their priorities lie. Include unique aspects of the facility that will get both the governing body and greater community interested in your project in particular. This could be the creation of opportunities for recycling local materials like boat wrap that residents are interested in diverting, specialised equipment you'll be able to manage the material, such as a densifier, or a resale store that will create a new market for devalued goods.

2. Facility Design

Facility design should prioritize efficiency, ease of use for customers and employees, access for maintenance and transportation, maintaining the integrity of your materials, and spatial adaptability. Ideally, the arrangement of equipment and processing zones should facilitate optimal function in the least time, with the fewest people, and across the shortest distance. The layout of the drop-off site itself should be easy to understand to encourage accurate use by customers. Logistically, design should consider the variable storage needs of materials, and be adaptable to the changing needs of the facility and markets. This section includes lists of designed facility elements and notes on their importance and function.

Exterior:

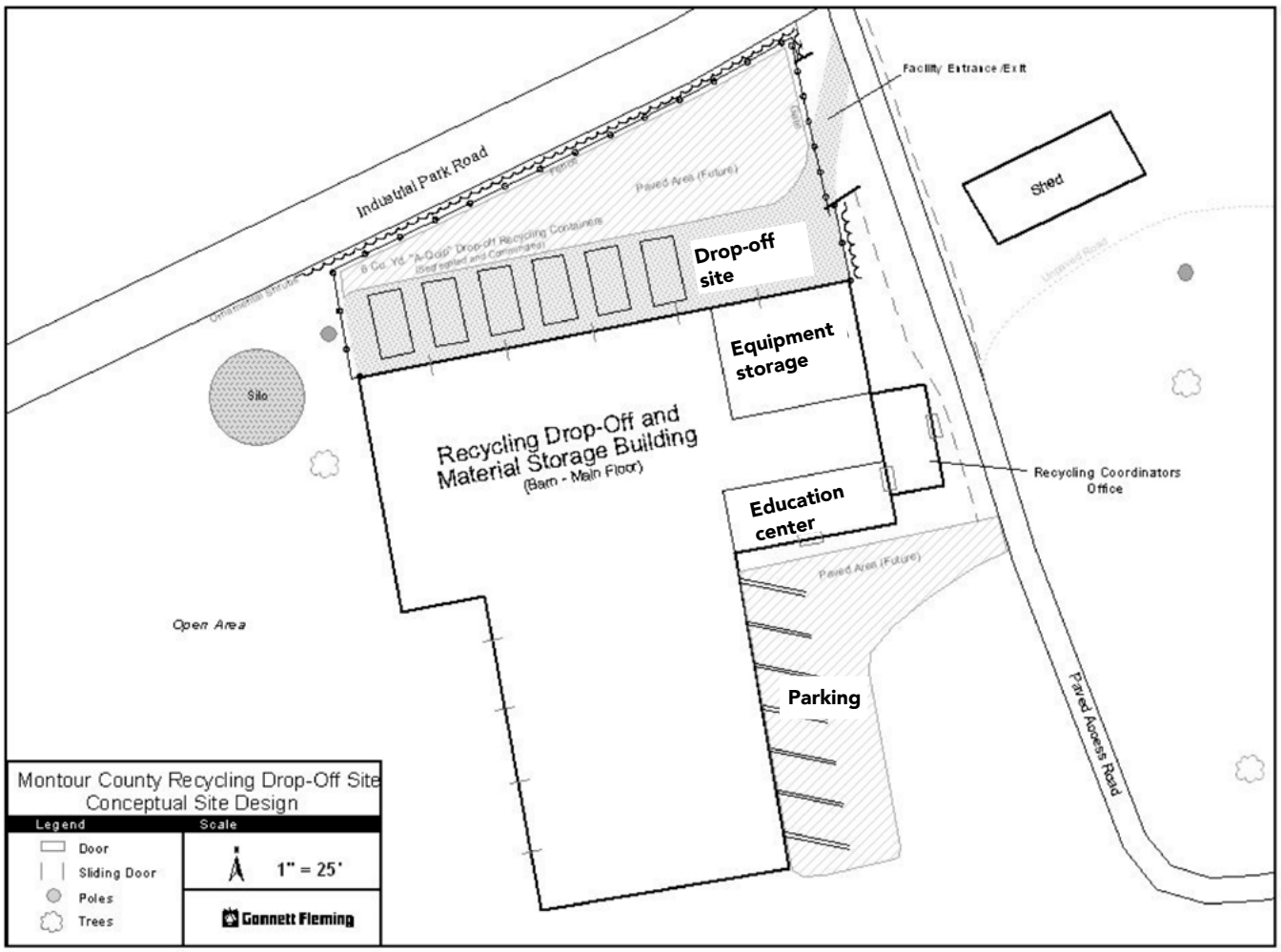
- **On-site traffic flows** should minimize the number of intersections and merges, and customer traffic, delivery traffic, and tractor-trailer traffic should be kept separate.
- **Roads and turnaround spaces** should accommodate tractor-trailer maneuvering.
- **Signage** maintains safety, advertises services, and facilitates successful pedestrian and vehicular traffic flows by telling customers and truck drivers where to go. Signs should be clear and large.
- **Stormwater runoff management** can mitigate pollution from your facility and prevent puddling that may disturb your operations.
- **Water diversion** via the arrangement of permeable and paved surfaces can increase accessibility, maintain cleanliness, and decrease necessary outdoor maintenance.
- **Lighting** makes a facility feel safe and accessible, especially in the winter, in addition to its obvious visibility benefits.
- **Exterior security cameras** are valuable to monitor facility surroundings for safety and operational standards, especially if your site isn't overseen by staff.
- **Perimeter fencing** offers additional security, prevents illegal dumping, and prevents littering by catching blowing debris around the site.
- **Parking** should accommodate as many workers, staff, and visitors as would be expected on a busy day with a special event such as a tour or field trip.
- **Materials storage and collection** outside your facility can take the form of bunkers, bins, silos, tents, and trailers. All external storage should keep materials dry and out of direct sunlight.
- **Consider maintenance and longevity**. Leverage trees as wind barriers, utilize geography and building placement to minimize heat loss in the winter or take advantage of shading to minimize cooling in the summer.

Interior:

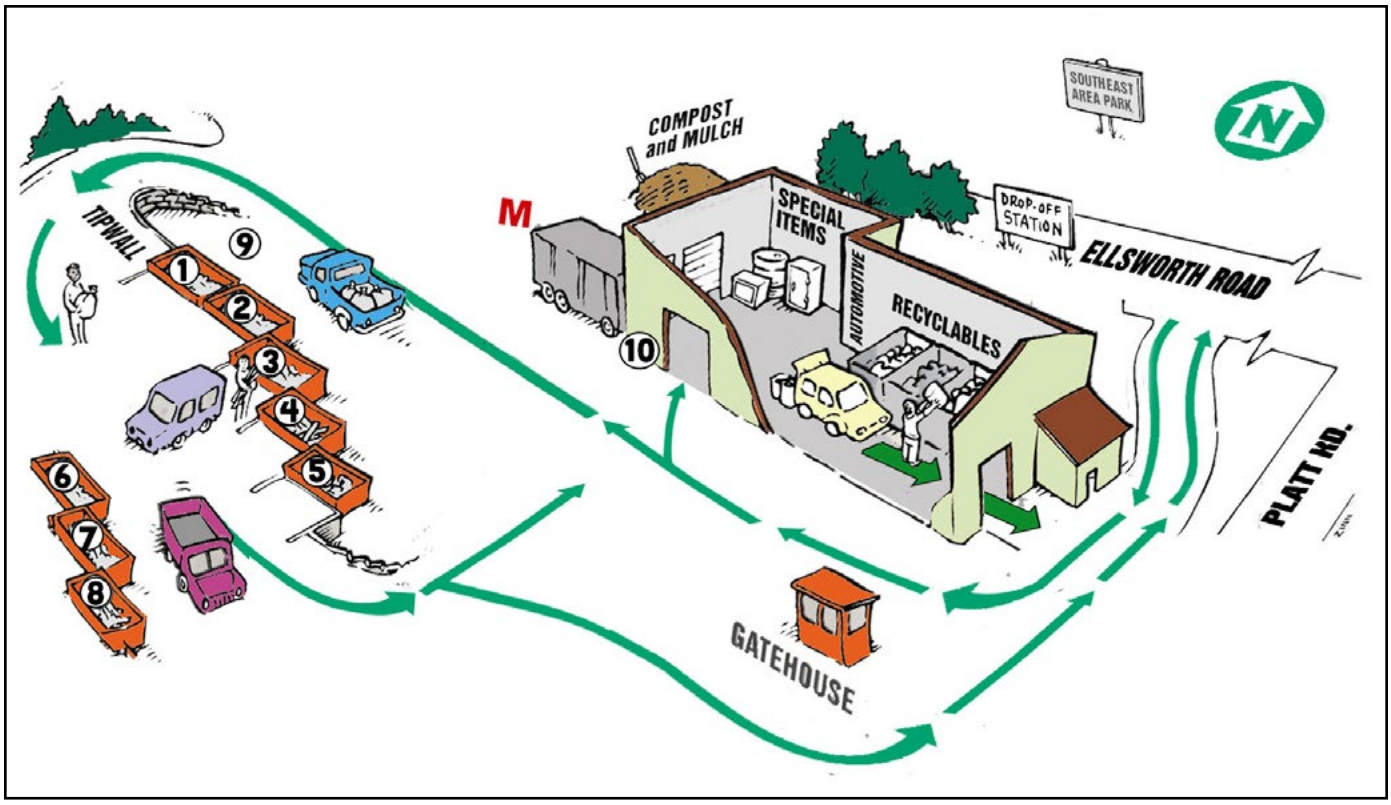
- **Adequate area within the building** should be available to incorporate a layout that is efficient, logical, minimizes multiple handling of materials, and accommodates all operations safely. Facility footprint can be estimated by considering the size and necessary operational space for proper functioning of equipment, necessary navigable room for rolling stock, and the volume of materials you plan to receive and store before and after processing. (For example, volume X of material is collected in 6 gaylord boxes which occupy up about 144 square feet before consolidation, and creates one bale which takes up about 20 square feet after consolidation.) The space available for storing bales or other processed materials before shipping may also determine your markets, as buyers want to minimize the cost of shipping by maximizing load volume.
- **Entrance/egress** routes should be of sufficient height to accommodate the types of vehicles and equipment that will be using them.
- **Loading dock** space should be adequate to accommodate delivery of supplies as well as the staging/loading of several tractor-trailers. For some facilities, having at least two loading docks is ideal as they allow for one docked trailer to be consistently loaded from storage and another to be kept available for pick-ups or deliveries. Assess the needs of your facility.
- **Air handling** should be evaluated by an engineering or technical design firm based on the level of dust anticipated.
- **Fire suppression** including sprinklers and extinguishers is necessary, and additional measures should be in place if you plan on handling hazardous waste.
- **Room for regular access to equipment** for maintenance access must be planned.
- **Restrooms** will likely be required for employees based on the size of your facility, and showers may be a desirable additional feature.
- **Pedestrian traffic** for staff and visitors should maintain safety by keeping visitors separate from moving equipment and rolling stock.
- **Signage** inside your facility maintains safety and allows for successful drop-off interactions. Signs should be clear and large.
- **Lighting** inside your facility should be adequate for operational demands.
- **Interior security cameras** surveil the facility for security and operational monitoring.
- **Drainage and liquids management** should be considered for facility and equipment maintenance. One facility interviewed for this manual listed floor drainage as a feature they wish they had included in their initial design, specifically because receiving bagged or contaminated recycling can be easier on staff when cleaning mechanisms, like rinsing away beverage residue, are more accessible.
- **Materials contamination** can be prevented by design features such as the layout of collection and storage areas, and by making staging areas distinct from receiving areas. If you plan on handling hazardous waste, design areas so that it can be kept separate from everything else. Glass should similarly be isolated, as it can easily contaminate other materials and be dangerous for workers.
- **Energy usage and efficiency** should be considered in facility design. Will people be working near doors that will be kept open? How can you maximize the use of daylight in the facility?
- **Additional areas** that may be relevant for some facilities include an educational or classroom space for field trips, tours, and meetings, a resale market for the sale of reusable goods such as furniture, books, and electronics, and office space.

Example Designs

Here is a conceptual site design from Montour County, PA. In this example, the new recycling center will take over an existing barn owned by the county, and enhancements to the site include new paved driveways, staging areas, and a parking lot. Note that one driveway specifically brings traffic to the six roll-off containers on the north side of the building, and parking is available through a different route. This distinction keeps drop-off traffic moving and limits the convergence of pedestrian and vehicular traffic near materials collection areas. The interior is mostly storage, with a designated area for equipment, an education center, and an administrative office. The new recycling drop-off center is also located near a community center and office building, which makes visiting the site more convenient for residents.



Conceptual site design from Montour County, PA (1)



Drop-off Station map from Recycle Ann Arbor (2)

Above is an example of interior and exterior facility design from Recycle Ann Arbor. After years in operation, staff highlight the importance of having the rest of the drop-off site visible from the gatehouse so that workers can monitor customer movement, and so that customers can understand directions they receive from the gatehouse worker. Staff admit that the traffic flow is consistently confusing to users, and "wrong way" signs are sometimes ignored so that customers drive the wrong way through the horseshoe-shaped tipwall route. In future changes, Recycle Ann Arbor plans to redesign the tipwall area to divide customer traffic from loader and backhoe traffic by creating one main avenue for facility vehicles between two parallel rows of roll-off containers, which will be accessed by customers on the opposite sides. This division of customer and operational traffic will better protect customer safety and increase efficiency for material movement from the tipwall to other collection areas.

3. Organizational Structure

The organizational structures of drop-off facilities will be unique to specific communities and local government structures. However, all facilities should share common priorities when it comes to the administrative side of operations. These priorities include knowledge of internal structure, awareness of the hierarchical and financial systems within which the facility must operate, and clear internal and broader communication streams. Municipalities will have different thresholds for operational and administrative aspects such as vendor contracts based on internal structures and rules.

Financial structure

Funding mechanisms for recycling facilities include general fund dollars including special assessments established specifically for the benefit of your municipal recycling program, special purpose millages, and more. Intergovernmental agreements that share development and/or operational costs across municipalities, with user fees (see below), and/or host community fees/agreements with private waste management companies in your jurisdiction can reduce costs for all involved. In general, materials sales will not cover the operational costs of a drop-off center. Grants and low-interest loans can help support specific facets of infrastructure development and operations such as initial construction, new equipment, and educational or outreach programs but not day-to-day operational costs.See **Appendix A** for additional resources about funding options and opportunities.

User fee options include flat-rate gate fees, differentiated resident vs. non-resident gate fees, tiered fees by volume, monthly and annual membership plans, fees for certain materials (such as electronics and appliances), fees for certain services (such as paper shredding), and fees for commercial drop-offs. Monthly or annual passes may attract regular local customers. Offering additional paid services can aid in offsetting your costs, such as truck weighing or a “per bag” fee for trash disposal. Keep in mind the trade-off between sustaining revenue and maintaining usership. In one Michigan community, a drop-off center saw a temporary 66% drop in usership after they increased their gate fee by $2. Today, their numbers have recovered and increased, but the role of fees as a potential barrier to use was an important lesson. See the table below for the fee structures of facilities visited for this manual.

Relevant staff roles

Depending on the capacity of your facility, some of these roles may be filled by the same people.

Owner/Operator: The owner or operator of your facility is in charge of making decisions regarding all aspects of facility operations, from staffing to financing to safety measures. Owner/operators should possess skills and experience in many if not all areas of facility operations, including marketing, public relations, equipment operation, financing and budgeting, human resources, and materials management.

Budget officer: A budget officer is responsible for overseeing financial planning and budgeting for the facility. They analyze financial data, create budgets, monitor spending, and develop and oversee strategies to help the facility reach and maintain its financial goals. Valuable skills and qualifications for budget officers include accounting, communications, financial analysis, and budgeting principles.

Advisory committee: Your community or municipal government may be interested in establishing an advisory board of recycling experts to provide feedback and strategic guidance. Advisory committees do not have any fiduciary or legal responsibility; rather, they support the organization via operations and management support.

Board of Commissioners: A Board of Commissioners may be established to oversee facility operations and hold the facility accountable to community goals, standards, and regulations. This external board may be made up of experts, residents, local government staff, or a mixed group.

Public relations/media director: A public relations or media director is responsible for communicating your facility's message through various media to reach target audiences. Their tasks may include overseeing daily activities for media coverage, running social media accounts, writing newsletters, maintaining your website, developing and running advertising campaigns, and conducting public outreach and community engagement. Valuable skills and qualifications for a public relations or media director include writing, marketing, communications, project management, advertising, creativity, design, and media platform-specific skills (social media, television, etc.).

Advisor: "Advisor" is an umbrella term for a worker with expertise in a specific area who provides strategic guidance to a facility or a specific person or office within the facility. This could include topics such as accounting, environmental assessment or protection, or legal services.

Site manager: A site manager oversees facility operations including staff, the collection, processing, and storage of materials, buyer coordination and communication, transactions, and coordination with external parties such as municipal offices and communities. The site manager may also oversee administrative processes such as operational records, inventory, and reporting, and liaise between employees and facility operators. Important skills and qualifications for a site manager include management, safety compliance, facility operations, communications, sales, and negotiation.

Floor manager: The role of a floor manager overlaps with that of a site manager but occupies a more focused level. This position entails supervising various aspects of operations including personnel, materials management, customer and buyer transactions, communications, equipment operation, and safety in a facility. Floor manager skills and qualifications include management, quality control, equipment operation, and safety compliance.

Materials manager: A materials manager specifically oversees transactions and communications with materials markets. Responsibilities include marketing materials, setting up sales, quality control, as well as managing any problems with buyers including load rejection. Valuable skills and qualifications for a materials manager include sales, negotiation, communication, and business, as well as technical knowledge about relevant materials and industry.

Safety officer: Safety officers are specialists in devising and executing safety protocols for specific facilities, and oversee compliance with official safety requirements and best practices. Safety officers can come to the job with a specialized college degree or receive on-the-job training and education in relevant topics.

Site assistant: Site assistants may support site managers by overseeing operations and communications They may also relay information between managers and floor workers and operators. Having multiple people overseeing operations can make processes run more smoothly. Site assistants will have similar experience and qualifications as site managers, including management, safety compliance, facility operations, communications, sales, and negotiation.

Floor worker/ operator: Floor workers and operators oversee materials collection and consolidation, transportation, equipment operation, and storage. These staff members are responsible for following working instructions and maintaining safety compliance. Ultimately, they make your facility run. Valuable skills and qualifications for floor workers and operators may include safety training, equipment operations certificates,

technical knowledge about materials and recycling processes, and collaboration. Many of the necessary skills can be gained on the job.

Volunteer: You may be interested in involving community volunteers in tasks such as overseeing the drop-off site and organizational and administrative tasks. Volunteers may bring a diversity of experience, but should undergo foundational safety training before participating in any operations.

Facility type	User fees
University	• No fee for general residential materials • $10 fee for TVs and computer monitors
Public, county	• No fee for general residential materials • $5 large appliances • $35 appliances with refrigerant (freon) • commercial lightbulbs $0.50-$0.80 per bulb • $20-$26 mattresses • $10-$12 paper shredding (per bankers box) • $10 truck weighing service • $8 minimum for electronics • $8-$40 TVs and computer monitors based on size • $6-$88 furniture based on size
Private, for-profit	• $2 for all residential materials (except cardboard, styrofoam, and batteries, which are free) • $45 standard annual membership, $65 super annual membership • business membership ranging from $45-$125 based on volume • electronics $0.25/lb
Non-profit, Northern Michigan	• $35-$100 appliances with refrigerant (freon) based on size • $15-$100 various construction materials based on size • $15-$30 appliances based on size • $15-$75 TVs and computer monitors based on size • $2/lb batteries • $2-$7 lightbulbs based on type and size • $10-$40 mattresses based on size and features
Non-profit, Southeast Michigan	• $3 residential gate fee • $15 large volume gate fee • $25 10-visit punch pass • $100 annual residential pass • $5 hard-to-recycle gate fee (oil, styrofoam, plastic bags) • $17 large volume hard-to-recycle gate fee • $1-$2.50 light bulbs based on size and type • $2-$60 electronics based on size

Table of the fee structures of facilities visited for this manual.

4. Equipment

The decision about what kind of equipment will operate in your facility intersects not only with capital allocation but facility design, and equipment will determine which markets are appropriate for your materials. Drop-off center equipment can be categorized in four groups: Storage, Consolidation, Processing, and Transportation. For additional supplies considerations see **Safety**.

Storage

Concrete bunkers with recycled material (3)

Gaylord box (6)

Roll-off container (7)

Industrial storage tent (4)

Wood pallet (5)

Tipping cart (8)

For decisions about storage equipment, consider the cost, durability, and scale of the options. Keep in mind that to maintain the highest grade of materials and therefore collect the highest price from markets, contamination between materials should be avoided as much as possible, and materials should be kept clean and dry. If you expect to receive significantly more of one material than others, plan storage for each material accordingly. Similarly, if you expect to receive a volume of one material such that it will take an extended period of time to accumulate enough for shipment, plan post-processing storage so that you can accommodate having such quantities on site for that long. If you plan to store materials outside, make sure that they are kept dry and out of the sun in covered bunkers or roll-off containers, that bales are on pallets, and open-air containers are under tents, as UV exposure can degrade materials, especially plastic. The longer materials stay outside, the greater the risk that some kind of contamination occurs from weather, animals, or other materials.

Consolidation

- **Horizontal baler / Compactor:** A baler is a piece of equipment that compresses and binds material with hydraulic force into compact bundles, known as bales. Baling increases weight per volume and facilitates easier storage and transportation. Bales are typically 60” x 42” x 30” and weigh between 800 and 1,000 lbs. A horizontal baler, also known as a compactor, is the largest standard baler type. Horizontal balers are often preferred for drop-off centers, and recycling facilities in general because a single machine can handle multiple materials and they create more solid and heavy bales, which are desired by markets, compared to other baler types (below). Horizontal balers are top-loaded, and may therefore necessitate investment in complementary equipment such as a tipper to tip gaylords and other bins that cannot be lifted by hand. Horizontal balers also require more power to run than vertical balers.
- **Vertical / Downstroke baler:** Vertical balers are smaller and faster than horizontal balers, but each

machine should only process one material. Vertical balers also create smaller bales that may be less desirable to markets. Vertical balers can prove more difficult to load given their front-facing chambers, and one recommendation is to keep the ram down to maintain pressure on your materials, especially lighter materials like plastic, otherwise bales may be smaller than necessary. Other types of balers include closed door and auto-tie balers. Custom balers are also available, but their application is largely limited to specific industries. Auto-tie balers will save you time and money in the long run.

- **Bale ties** are steel wire or plastic bands used for securing bales. For baling plastic, use non-corrosive galvanized (zinc-coated) wire and apply single wire wrapped in the same direction to facilitate easier debaling. The choice of bale tie should consider the material and market.
- **Densifier:** Sometimes synonymous with balers, densifiers create dense blocks from sparse materials by melting and condensing material for easier handling and more efficient storage and transport. Densifiers are specialized for the type of materials they accept, and EPS and plastic film are common materials suitable for densifiers.

When making choices about consolidating equipment, consider factors such as available space, budget, electrical capacity, accepted materials, and market preferences. Vertical balers are largely being phased out of recycling facilities for more versatile compactors, but may be a wise choice for facilities with few materials and limited space. Also, keep in mind that some design and utility choices may depend on equipment decisions, just as equipment decisions can depend on design and utilities. In the planning process, negotiate these features. A record of bale materials, weights, and status (i.e., "in storage," "shipped") should be kept to cross-reference with buyers, and for regulatory and reporting requirements. In the case of load discrepancies, the receiver's weight takes priority. See **Appendix B** for information on materials specifications.

Vertical baler (9)

Horizontal baler (10)

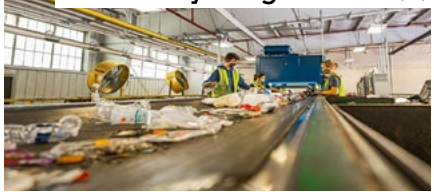
Plastic and cardboard bales (11)

Processing

- **Glass crusher:** A glass crusher does just that: crushes glass into "cullet." At all stages of storage and processing, glass should be separated by color. Glass should also be kept separate from other materials and from work areas, as broken glass and cullet can easily contaminate other materials and pose an immediate safety risk. Glass can be transported short distances in roll-off containers, and in gravel trains or rail for longer distances.
- **Shredder:** Different types of shredders can help in the processing of various materials, such as paper, plastic, and electronics.
- **Sorting line:** A conveyor belt onto which materials are placed and via which materials can be sorted, or a "sorting line," may be necessary for larger facilities and facilities with higher front-end contamination rates.
- **Granulator:** A granulator, or plastic pelletizer, cuts used plastic into small pieces in preparation for use in the production of new materials.

- **Scale:** An industrial floor scale is a likely choice for small facilities. Be sure that your scale(s) have ample allowance for the size of materials you will be dealing with. In larger facilities, truck scales can offer another layer of monitoring. Buyers often already have the empty weight of their trailers, and you can cross-reference the weight of the loaded trailer with the weight of your materials.
- **Tags:** Tags are paper slips attached to the baling wire of bales which label bales with their weight for inventory and transport.

Sorting line at MSU Recycling Center (12)



Glass crusher (13)

Bale tags (14)

Whether and how materials are processed at your facility will determine where they go from there. Equipment choices are a trade-off between power and price, but keep in mind that you may pay more in maintenance and repairs for a weaker machine. Different types of processing equipment are available for different scales of recycling facilities. A scale is non-negotiable if you plan to transfer materials from your facility, and tags allow for the inventory and tracking of specific bales. Processing can add value and make it more economical to accept certain materials that are expensive to manage, such as glass.

Transportation

Forklift (15)

Pallet jack (16)

Loader (17)

- **Loader:** A vehicle with an attachment for moving sizable loads, to be used moving larger quantities of materials from one place to another.
- **Shovels/ Squeegees/ Brooms:** Small handheld equipment for moving smaller quantities of materials from one place to another.
- **Bale gripper:** A vehicle with specialized prongs for moving bales.
- **Forklift:** A vehicle with a specialized lift for moving pallets and other materials.
- **Pallet jack:** A manual hydraulic lift for moving pallets.

Transportation equipment decisions should primarily consider the size of equipment, necessary space for proper maneuvering (i.e. turning radius), and the volume of materials you will be handling. Using engine-based vehicles in your facility adds specific safety concerns, and facility design should account for vehicle routes throughout the building and the relationship between pedestrian and vehicular traffic at all points.

In all equipment decisions, consider not only the space you have, but the practical space each machine needs for proper functioning. Equipment positioning in the facility should allow for access for maintenance and for easy maneuvering of workers and materials. See **Maintenance** for information on properly caring for your equipment.

5. Processes, Procedures, and Work Instructions

Processes, procedures, and working instructions outline what needs to be done, how it needs to be done, and how to carry out those actions, respectively. The processes, procedures, and working instructions for your facility will depend on your location, municipality, and the equipment and materials you handle. Standard operating procedures (SOPs) are step-by-step instructions for performing complex and routine tasks. SOPs help facilities maintain high quality and consistent operations and materials. This manual cannot tell you which procedures and working instructions you need, but rather that facilities should have processes for every task they complete to make operations more approachable for workers and create an efficient workflow. Topics that may require processes may include:

- How to bale
- How much material you should have before baling
- SOPs for each piece of equipment
- Supervising the drop-off site
- Storage/movement of material
- Customer service

Consider reaching out to other recycling or manufacturing facilities about the processes and procedures they have in order to better understand your own. Drop-off center processes can learn from and borrow procedures from other existing operations, but they should be customized to suit your facility and operations. As your operations change and grow, so will your SOPs. An annual review and update of these procedures and standards should be scheduled and implemented.

6. Maintenance

Good maintenance practices will keep your equipment running efficiently, and in turn preserve the long-term function of your facility and the safety of your workers. In general, maintenance plans are a combination of honest conversations between maintenance workers and facility operators, and the recommendations and standards of equipment manufacturers. Depending on the size of your facility and municipal resources, you may want to use internal or external maintenance services, or a combination of both.

The core of equipment maintenance is regular preventative maintenance (PM) checks. Manufacturing recommendations often suggest PM checks occur every six months, but the condition and/or use of some equipment may necessitate more frequent checks. Each piece of equipment in your facility will have its own PM regimen. During PM checks, all aspects of a piece, such as lubricant levels, oil quality, and hydraulic pressure, will be inspected, and systems will be reset to the manufacturer's specifications. Whether your maintenance team is internal, municipal, or a contracted third-party, PM checks should result in a report of service with notes and a summary of problems identified, as well as any associated repairs, if necessary.

Budgeting for regular maintenance and inevitable repairs can be made easier by contracting service in advance, such as setting up an annual or multi-year plan that includes PM, service calls, and parts. A capital improvement plan and budget can help your facility plan for big purchases by building up a fund. With such a plan, funds are available when equipment replacement or major repairs are necessary, and you can ensure that you are getting as much life out of the equipment as possible to ensure its reliability. In the long term, repairs costs are minimized by adhering to regularly scheduled downtime, appropriate preventative measures, and addressing equipment issues as soon as they arise.

For the maintenance of equipment, facilities should adhere to the following:

- **Keep a log** with a list of all equipment and corresponding notes about equipment operations, any repairs done or needed, and maintenance notes.
- **Maintain an equipment maintenance checklist** with daily or weekly checks for each piece of equipment.
- **Schedule routine downtime** for equipment to rest mechanisms. This is especially important for any equipment running at or near full capacity.
- **Secure connections** to whoever will be doing your maintenance and repairs. This could include specialized contractors, equipment dealers, municipal maintenance staff, or an in-house team. If maintenance is external, consider investing in a maintenance contract to project financial needs.
- **When in doubt, default** to the manufacturer's maintenance instructions.

For maintenance of the building and grounds, facilities should have a gate and/or fence to prevent dumping and catch loose debris as well as a routine and accountable party (i.e. an individual or team of workers) for litter prevention and cleanup on the premises. Clean storm drains of debris, prohibit the dumping of liquids, and include vegetation on the grounds to prevent flooding. Care for paved surfaces to maintain functionality and accessibility for users. See **Safety** for more opportunities for environmental protection.

Vendors

Lastly, recycling facilities depend on a number of vendors to maintain not only operations but aesthetics and the efficacy of the facility itself. Vendors for equipment and building maintenance may include contracted

maintenance for forklifts, truck doors, and loading docks, balers and shredders, scales, plumbing, HVAC, driveways and paving, fences and gates, building roof, and pest/vector control. Vendors for materials marketing include brokers, should you choose to use them, and the mills to which you directly sell. (See **Materials Management and Marketing** for more information.) Facilities will likely work with suppliers for items like baling wire, gaylord bins, pallets, cleaning supplies, and uniforms. Additional contractors include graphic designers and artists for marketing or on-site labelling materials, as well as consultants used throughout the planning process and for special projects such as replacing equipment or advertising campaigns.

Keep track of your own vendors and contacts here.

Service(s)	Vendor name	Location	Contact	Notes

7. Safety

The waste industry is historically one of the ten most dangerous industries for accidents and injuries, including death. Health and safety risks at recycling drop-off centers include traffic accidents, moving machine parts, crushing equipment, lifting and falling heavy materials, handling of potential sharp or abrasive material, and slips and falls. Additional risks are posed by handling combustible or hazardous waste such as batteries, electronics, and flammable substances. Health and safety should be a priority for all drop-off center staff.

In general, signage and labeling throughout a drop-off center plays an important part in ensuring safe operations. All areas for pedestrian and vehicular traffic should be marked accordingly to prevent intermingling. Areas with moving machinery or heavy loads should be labeled to ensure workers are aware of risks. Equipment should be labeled with safety information including emergency shutoff procedure.

Worker safety

All staff should be trained in standard operational safety and know what to do in the event of an injury or emergency. Workers feeding or operating equipment should be specifically trained in the safe operation of equipment, proper procedure for clearing debris and blocks without entering machinery, the lockout/tagout system, and emergency response. All workers should be familiar with emergency shutoff procedures for equipment. Safety equipment for your facility may include safety glasses, visible outerwear (Hi Vis vests), cut-resistant gloves, leather or steel-toe shoes, hard hats, and earwear if the facility has regularly running heavy machinery. Design considerations that promote safety at drop-off centers include clearly separating and marking customers areas and staff areas, as well as areas for educational observation. Even if your facility does not accept household hazardous waste, protocols should be in place for the proper handling of hazardous material that is received anyway. Proper equipment maintenance is integral to safety, see **Maintenance** for more information.

This manual is not a resource for specific safety training or protocol. Consult expert resources and organizations including the Solid Waste Association of North America (SWANA), National Waste and Recycling Association (NWRA), the Occupational Safety and Health Administration (OSHA), and National Institute for Occupational Safety and Health (NIOSH) for training resources, precautionary practices, illness and injury reporting, and additional advice. Safety measures will depend on your operations, and especially on your equipment. Seek out equipment-specific recommendations, such as the NIOSH report on Preventing Deaths & Injuries While Compacting or Baling Refuse Material.

Environmental safety

All types of recycling facilites have a relationship with the surrounding environment. Maintaining environmental, and therefore community, safety is a responsibility of drop-off centers that can be accomplished through certain operational practices such as those listed below.

- Conduct processing operations indoors or under cover and prevent runoff from coming into contact with the equipment and becoming contaminated.
- Keep loose fiber/materials away from open doors to prevent litter.
- Regularly inspect material storage, handling, and transfer areas, equipment, containment areas, storage and waste containers/drums, and bulk liquid tanks for spills, leaks, signs of corrosion, worn parts or components, and leaking seals and gaskets. Immediately repair any problems.

- Conduct routine preventative maintenance.
- Prevent scrap metal that may be contaminated with oil from coming into contact with stormwater runoff.
- Educate customers regarding the proper cleaning of materials and which materials are acceptable, and provide avenues for the proper disposal of hazardous materials that are not accepted.
- Establish procedures for inspecting and rejecting material that may be hazardous or for which you do not have the infrastructure to manage, process, and store.
- Do not wash down material storage and tipping floor areas unless there is a wash water system in place or permits or agreements have been obtained or made with waste water treatment.
- Prohibit discharges and dumping into drains connected to the storm drain system.

8. Materials Management and Marketing

This section offers an introduction to aspects of materials management and marketing. For a successful recycling operation, materials must be valued and purchased for future use. Ethical and honest recycling is a collaborative process between consumers, facilities that collect and process materials, and the end markets that give materials a new life. For specific information about materials terms and specifications, as well as an introductory list of buyers, please see **Appendix B**.

Materials Management

Choosing materials: The list of materials you choose to take in will always be a trade-off between the things customers want to recycle, and the things you're able to sustainably manage – logistically and financially. In general, the facilities studied for this manual accept only materials they know they will be able to sell, but make some exceptions for materials that are abundant in the supply chain or locally relevant, such as boat wrap in waterfront communities and foam from industrial shipping/receiving. In general, commonly accepted materials include cardboard (OCC), paperboard, clear, brown and green glass, plastics # 1, 2, and 5, aluminum, tin, steel, office paper, and mixed paper. Materials that are accepted less commonly include plastics 3, and 4, 6 & 7, film plastic, rigid plastic, scrap metal, and electronics. Note that some materials may be in supply seasonally, such as wrapping paper (around winter holidays) and plant pots (in the spring), and so management may need to be arranged accordingly. When deciding which materials to accept, consider the volume of supply, the facility's storage and processing capacity, and (reliable) market opportunities.

Sorting: Procedures for sorting materials often include a mix of sorting for value (prioritizing the sorting of materials that bring in the highest value sales) and sorting for volume (prioritizing the sorting of those materials of which you receive the greatest amount). Larger drop-off facilities receiving single- or dual-stream materials should consider one or more conveyors to facilitate manual (or automated) sorting. Smaller facilities should consider thorough front-end sorting (i.e. sorting by customers at the drop-off point) to minimize labor hours handling materials. Lower contamination rates decrease operational costs by minimizing overall sorting needs on the back end, and can be achieved with supportive supervision and public education at the drop-off site. One facility visited credits drop-off site supervision, staff availability to answer customer questions, and multi-prong public education for their nearly 0% contamination rate. Some facilities also ask users to drive through and remain in their vehicles, so that staff members can unload materials and sort accordingly. Even if front-end sorting is thorough, continued scrutiny should follow materials through baling or other processing steps. After baling (or collection in gaylords, etc.), packaged materials should be examined and any remaining outthrows should be removed. Any bales with visible contamination, even within the bounds of material specifications, will give the appearance of contamination at the receiving facility, which may make load devaluation or rejection more likely.

Shipping: Depending on your materials, equipment, and buyers, shipping processes will vary. For almost all materials, bales should be 60" x 42" x 30" and weigh between 800 and 1,000 lbs. Gaylords or other storage containers should be as full as possible to achieve maximum haul capacity, but not overfull so that they cannot be stacked or properly handled. All units (bales, gaylords, etc.) should be secure. Broken bales will likely result in load rejection, as will materials that are wet or smell bad. When shipping direct to the mill, do not load onto pallets. For miscellaneous materials such as large appliances or mattresses, always try to load trailers to maximum manageable capacity, and refer to buyers loading preferences. Keep in mind the burden of unloading, and organize materials to minimize labor on both sides. Do not load units too close to trailer

doors to protect the safety of workers on the receiving end of your shipment, as materials can shift during transport and fall forward when doors are opened. Always weigh and inventory materials before shipment, but note that load weights default to the weight recorded on the receiving end in the case of discrepancies. A bill of lading should detail the contents of each shipment, and shipper's letters of instruction (SLI) should accompany long-distance and international shipments.

Marketing and Relationships

Locating buyers: To market your materials, you may want to use a broker to access markets or you can manage your own sales directly with end markets. The process of finding buyers is done through networking and community connection. Either through a broker or organizations such as the Michigan Recycling Coalition or regional business council, facilities can reach out and discuss the grade and volume of materials they have with buyers. As you pursue and build relationships, look to verify information by hearing the same thing about buyers from multiple sources. Your connections with markets will also keep you apprised of prices and price trends. If your municipality decides to use a broker to manage market relationships, you may have access to a more comprehensive buyer network. Again, an introductory list of buyers in and around Michigan can be found in **Appendix B**.

Contracts: Creating contracts can establish reliable relationships with your buyers and lock in prices, but several facilities visited have only one or no contracts with their buyers. Rather, facilities' buyers may change from shipment to shipment depending on prices offered. Contracts may be more desirable for materials with consistent prices, such as glass, and you may want to keep materials with volatile prices, such as certain plastics, available for various deals as values change. On the whole, facilities and consultants who contributed to this manual do not use or recommend contracts, and instead encourage facilities to create trusting relationships with many buyers among whom you may negotiate purchases from load to load. For monthly loads, specific communications should detail prices, premiums, and conditions for your records.

Load rejection: If the material received by a buyer is determined to not match the specifications initially marketed to them, they may offer a decreased price, reject part of the load, or reject the whole load. In the case of load rejection, your facility, the "generator," can choose to either pay for freight of the rejected material back to your operation, after which you can try to sell it to another party, or you can have the material sent to the landfill. For the sake of protecting your liability in the case of load rejection, materials should be sorted and inspected throughout processing, accurately marketed to buyers (i.e. pictures sent should be up-to-date and honest), and documented for internal records and in case of negotiation.

Pricing: Market prices for each material can be found in subscription-based databases and are specific to your region (i.e. Midwest). For fiber (paper), prices are based on market indices such as PPI's Yellow Sheet for OCC and Mixed Paper for the Midwest. For plastics and metals, refer to RecyclingMarkets.net indices for the region. Pricing should be based on the "High Side" or "High Price" for each product. Fiber prices will be locked each month at the first week's price, plastic and metal prices can change throughout the month, and glass is at a set price that will be locked for a minimum of one year.

Freight on board, also known as free on board, (FOB) is a shipping term that indicates when ownership and responsibility for goods transfer from seller to buyer. Bids, contracts, and prices should be "FOB _____ (with the blank filled with the location of origin, your recycling center)," meaning that responsibility for the material shifts to the buyer once the goods have been shipped. When a bid is FOB Origin, the cost of freight is excluded from the listed price. Freight costs will be provided separately from the bid on your materials. Pricing will include the High Side pricing index and any premiums such as handling costs. The proposer in a bid should also note any minimum guaranteed pricing, or floor pricing, they will provide during the term of the contract. Contracts should include monthly (or as needed) volume and the length of the contract, as well

as any additional details that will enhance their bid, such as turnaround time, patent timing, and providing trailers. A proposer may bid on partial or all monthly volumes, and contracts can last between 6 months and 5 years.

Advice from experienced recyclers

- Beware of buyers initially sending generous prices to hook you, and later claiming inadequate shipments or dropping their prices. Work to build reciprocal relationships with buyers you can trust.
- For materials you collect in large volumes, selling may not always be the most effective or efficient option for your facility. Examples of this include returnable UBCs, which can be returned at grocery stores for more than they're worth in recycling markets, and items that may be brought in by users but have other, more established recycling options (e.g. plant pots can be recycled at Meijer's Garden Center).

Keep track of your own buyers and contacts here.

Service(s)	Vendor name	Location	Contact	Notes

9. Regulation and Permitting

This section introduces policies relevant to recycling facilities of all sizes including permitting and reporting regulations. Municipalities will have local ordinances about solid waste management. Zoning, deed restrictions, and easements may also interact with the use and function of your facility. This manual section is meant to serve as a guide. Legal and regulatory experts should be consulted as drop-off centers are set up to navigate regulations and reporting. For more educational resources related to these policies, see **Appendix A**.

Part 115, Solid Waste Management, of Act 451 was updated in 2022 to shift the focus of solid waste management from landfills to more comprehensive materials management including recycling and compost. Part 115 is the guiding law that oversees the function and role of recycling in Michigan's waste streams. Familiarize yourself with the law, which can be found in **Appendix A**, to understand what it means to recycle in Michigan.

- Part 115 defines a **materials recovery facility (MRF)** as a facility that both "receives primarily source separated material and sorts, bales, or processes the source separated material for reuse, recycling, and utilization as a raw material or new product" and "on an annual basis, does not receive an amount of solid waste equal to or more than 15% of the total weight of material received by the facility unless the materials recovery facility is making a reasonable effort and has an education program to reduce the amount of solid waste."
- Part 115 requires each county or group of neighboring counties to develop a **Materials Management Plan (MMP)**, and that recycling facilities that collect more than 100 tons of material per year maintain operations consistent with their county MMP.

Part 175, Recycling Reporting, of Act 451, passed in March of 2016, requires recycling establishments to register and report the amount of recycled material they recycle each year with EGLE. Reporting is mandatory for all facilities that fit the definition of a recycling establishment in the law, and reporting covers seven materials.

- Part 175 defines a **recycling establishment** as "an establishment engaged in the recycling of, or brokering of, reportable recyclable materials."
- Part 175 defines **recycling** as "an action or process such as separation, sorting, baling, or shipping applied to reportable recyclable materials for the purposes of reuse, or conversion into raw materials or new products."
- **Reportable materials** are: glass, paper and paper products, plastic and plastic products, ferrous metal including white goods, non-ferrous metal, textiles, and single-stream recyclables. Voluntary reporters are able and encouraged to report on more types of materials than are listed here.
- Facilities that process **less than 100 tons** of these materials per year are exempt from mandatory reporting, but may report voluntarily.
- Drop-off facilities that receive materials but do not sort or process are exempt from mandatory reporting **if they ship the materials to another recycling facility that does report under Part 175**. If any material is sorted and sent to an establishment that is exempt from reporting, such as an end user, the drop-off facility must report the material that was sorted. Example: If a drop-off center sorts cardboard and sends it directly to a paper mill, the drop-off center must report the cardboard because the paper mill is exempt from reporting under Part 175.
- Exemptions exist for scrap metal subject to the Scrap Metal Regulatory Act and electronic waste subject to Part 173, Electronic Equipment, of Act 451.

- The online platform Re-Trac is used to collect both mandatory and voluntary reports, and reporters can opt to report annually or quarterly each year.
- Recycling facilities that collect more than 100 tons of material per year but have less than 100 tons on site at any one time are required to register every five years. Facilities that have more than 100 tons on site at any one time are required to obtain a general permit every five years.

Parts 171 and 173 of Act 451 explain regulations on the handling and disposal of batteries and electronics, respectively. Staff and operators should familiarize themselves with the policy if your facility plans on handling these materials. Consult experts internally and at the appropriate state agency with questions, particularly about volatile substances. For additional specific permits such as air and water, reach out to your regional state agency contact and consult with internal experts.

10. Marketing, Public Relations, and Education

Ultimately, the success of your drop-off facility depends on the success of its users. Effective marketing, public relations, and education make sure that people know about the facility, which services are offered, and how to use them. While setting up the operations of your drop-off center might seem like the hard part, it's up to your users to make the site a successful recycling facility. Raising community awareness, education, and engagement are key to making your recycling program work.

Identifying your audiences is the first step in crafting your community, public, and media relations. "The public" is not an audience, but rather many sub-groups with different interests and capacities. Audiences for recycling drop-off centers may be split between an *internal group*, referring to individuals and departments within the local government, and *external groups*, referring to everyone beyond it. The internal audience may also benefit from further separation since some offices, such as fire and police departments, may have more contact with residents, and therefore be better equipped with more or different information about your drop-off center. External audiences can include residents, neighborhood groups, schools, community organizations, businesses, news media, and the public at large (i.e. all public audiences).

Outreach for your facility will take a multimedia approach to reach different audiences with different amounts of information. The primary consideration in marketing for your facility is that information is made clear and accessible. All public relations, including promotional campaigns before your facility opens, should prioritize educating users.

- **Word of mouth** should not be discredited as an essential part of promoting a drop-off center. While engaging and educating those who use the drop-off site, encourage them to take extra handouts, tell their family, neighbors, churches, townships, and more. For some facilities, this is the most effective way of increasing participation in their community and beyond.
- **Your website** is home base for all information about your facility and services including location, hours, contact information, materials accepted versus those not accepted, events, other services (paper shredding, resale, HHW drop offs, etc.), FAQs, and a how-to of using your facility. The website should also post facility updates such as weather closures, and may contain additional background information including history, mission or motivation, staff, and where recycled materials go from there. Other optional website features include a video tour of the facility, calendar of events, a map of your facility, a general explanation of the recycling process, and an option to schedule a tour. While answering questions may be labor intensive, providing a form for users to submit questions can help identify gaps in your marketing and promotion. Referral links, for example from the city's home page to the recycling facility's page, can make finding information more intuitive. Transparency and information availability will foster trust between your facility and users.
- **A Google maps site** with the facility's hours, location, and details about materials and services is crucial to catching customers as they look for recycling options. For some communities, a Google (or Apple) maps presence is even more important than a full website when it comes to attracting initial users.
- **A newsletter and/or mailing list** can be used to send out regular updates, event announcements, and announcements for new or temporary services. Receiving regular emails can also build user awareness and engagement, but be mindful not to saturate users' inboxes.
- **Social media platforms** such as Facebook, Instagram, and TikTok may be useful depending on your

community. Facebook is often used by older residents, and Instagram and Tiktok can be useful for garnering engagement from younger residents or students. On any of these platforms, basic information about your facility including location, hours, materials, and services should be plainly visible on your account. Content should showcase your services and operations, and call residents to use your facility. Posting frequently can expand your digital audience and boost engagement.

- **Advertising** options such as billboards, mailers, door hangers, radio ads, and gas station TV ads can serve to fill in any gaps in outreach. Advertising is more expensive than other outreach methods, and content may be more general than other avenues since they target a broad audience.
- **Media relations** may include press releases, tours for media personnel, and press conferences.
- **Community partnerships** with commercial customers and schools, for example, build enthusiasm for your services. Special events like a mascot design competition with local schools can encourage families to feel involved in their own waste management and increase community engagement with your facility.

When marketing your facility, consider developing a slogan that can be used across platforms to build recognition and public understanding of your mission. Keep your slogan short, ideally less than nine words. Lastly, keep colors and designs cohesive across platforms and connected to the municipal brand to maintain public recognition and build a cohesive voice.

In public education, be mindful of your methods for explaining different concepts. Labels on bins, handouts about accepted materials, and social media posts should explain one topic at a time. Newsletters and mailers may explain a few topics, and your website or a booklet can explain more than five things. In general, less is more. Stick to the basics, and have additional information available upon request. Share crucial information with your users, and leave the rest.

Signage outside and throughout your recycling facility will attract customers and determine the effectiveness of supply streams as customers drop off materials. Signage should be visible and clear to read, interpret, and understand.

- **Wayfinding** signs for the drop-off center should be on major roads. For facilities that have a specific drive-thru structure, signs should denote entrances and exits. Flow of traffic arrows and "wrong way" signs are especially important. Signs such as "Drop-off center," "Resale Store," and "Compost pick-up" tell your customers where to go and also advertise the services you offer.
- **Labeling** services and materials is critical to your facility running smoothly. At Michigan State University Surplus Store and Recycling Center, three posters with three levels of information are posted on each drop-off container. The posters include increasing amounts of detail so that users with varying levels of time or consideration can find the information they need. In the most detailed descriptions of accepted materials, consider including the color, texture, size, level of cleanliness, and any defining characteristics (e.g. the number 5 on the bottom of an item for PP plastics). Properly labeling material receptacles guards against contamination and makes the drop-off process more efficient by minimizing both customer time at the facility and staff time spent either helping customers or sorting materials later. For all signs about materials and facility use, prioritize the use of pictures over words and make signs large and easy to find. Images and graphics may be sourced from a local artist, using stock images, or from original photos. About labelling signs, one facility remarked "When you think they're big enough, they're not. The bigger the better."
- **Safety signage** prevents any harm to customers and staff, and protects your facility from the liability and expense that comes with accidents. Areas closed to the public should be clearly marked as such, and areas with mechanical equipment and vehicles should remain separate from customers. All equipment should be labeled with operations information and safety notices.

Advice from experienced recyclers

- Your customers can either be your greatest obstacle or your greatest asset – Educate them to improve your operations!
- Be encouraging. Many people think recycling is hard because they don't know how it works; show them that it's easy.
- Similarly, be available to answer questions! The key to a successful recycling system is being able to answer the inevitable question of "What do I do with ____?" Answering questions establishes trust between users and your facility, and builds user confidence in your facility.

Drop-off bin labels for glass and aluminum (18)

Accepted materials mailer/poster (18)

Sources

Manual sources

Interview sources:

Dan Broersma, Sustainability Manager, City of Holland

Jill Brown, Account Executive, Metro Recycling Solutions

Samantha Buterbaugh, Owner, Biz Aid LLC

Lyndsay Ferguson, Assistant Operations Manager, Recycle Ann Arbor

Matt Flechter, Recycling Market Development Specialist, Michigan Department of Environment, Great Lakes, and Energy

Bill Haagsma, Regional Sales, Speed-Tech Equipment

Chris Hewitt, Operations Coordinator, Michigan State University Surplus Store and Recycling Center

Laura Jarels, Division Manager, Recycle Ann Arbor

Doug Koop, Brownfield Coordinator, Remediation and Redevelopment Division, Michigan Department of Environment, Great Lakes, and Energy

Sarah Lundy, Solid Waste and Recycling Coordinator, Calhoun County

Ashley McMurry, Recycling Grants and Resources Coordinator, Emmet County Recycling

Kerrin O'Brien, Executive Director, Michigan Recycling Coalition

Andrea Ryswick, Brownfield Coordinator, Remediation and Redevelopment Division, Michigan Department of Environment, Great Lakes, and Energy

Chris Ursum, Kaleva Floor Manager, Bay Area Recycling for Communities

Lindsey Walker, Recycling Outreach, Market Development and Commercial Accounts, Emmet County Recycling

Kristen Wieland, Senior Consultant, RRS (Resource Recycling Solutions)

Additional sources:

"Best Operational Practices Manual for Materials Recovery Facilities and Recycling Drop-off Facilities," Patrick Engineering for Illinois Recycling Association, 2005. https://www.csu.edu/cerc/researchreports/documents/BestOperationalPracticesManualForIllinoisRecyclers.pdf

"How to Promote Your Community Recycling Program," Houston-Galveston Area Council and Clean Houston. https://www.houstonbeautiful.org/uploads/4/6/6/7/4667856/an_advertising_and_public_relations_handbook.pdf

Brownfield Redevelopment, Michigan Department of Environment, Great Lakes, and Energy. https://www.michigan.gov/egle/about/organization/remediation-and-redevelopment/brownfields

Michigan Guide of Environmental Regulations, Chapter 2: Waste Materials Management, Mich-

igan Department of Environment, Great Lakes, and Energy. https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Regulatory-Assistance/Guidebooks/MI-Guide-to-Environmental-Regulations/MI-Guide-Environmental-Regulations-Ch2-Waste.pdf?rev=dbffa1651dd84e67b1e2c411fbbdd563

Best Practices for Community Recycling Programs, The Recycling Partnership. https://recyclingpartnership.org/best-practices-for-community-recycling-programs/#section_five

Free On Board (FOB) Shipping: Meaning, Incoterms & Pricing In 2025, Majd Shuman, Feightos, 2025. https://www.freightos.com/freight-resources/fob-everything-you-need-to-know-about-free-on-board-shipping/#:~:text=The%20term%20'free'%20refers%20to,your%20goods%20are%20on%20board.

What is a Shipper's Letter of Instruction?, Dimerco, 2024. https://dimerco.com/blog-post/what-is-a-shippers-letter-of-instruction/

Choosing the Right Baling Equipment for Your Facility, AES, 2024. https://advancedequipmentsales.com/choosing-the-right-baling-equipment-for-your-facility/

What is Gauge in Baling Wire & How to Choose the Right Size, Wickwire, 2021. https://wickwire-warehouse.com/what-is-gauge-in-baling-wire-how-to-choose-the-right-size/

Densifiers and Recycling, Wastecare Corporation. https://www.wastecare.com/Products-Services/Densifiers/Densifiers-Guide.htm

Balers, DeHart Recycling Equipment, 2016. https://www.dehartbaler.com/balers.php

3 Basic Guides to Plastic Pelletizing Machine for Recycling, Genius Machinery, 2022. https://www.geniusplas.com/en/article/Plastic-Recycling-Pelletizing-Machine-Guide.html

Why Choose a Pre-enginnered Metal Building, Pearson Construciton, 2025. https://pearsonconstruction.com/why-choose-a-pre-engineered-metal-building/

Architect's Guide to the Glass Recycling Supply Chain, Norah Dick, Glass Magazine, 2025. https://www.glassmagazine.com/article/architects-guide-glass-recycling-supply-chain

What Are Plastic Flakes? Types, Uses & PET Flake Grades in Recycling Explained, Boxin Machinery Company, 2025. https://www.boxinpm.com/news/industry-news/what-are-plastic-flakes.html

Red Metals 101, GLE Scrap Metal. https://glescrap.com/blog/red-metal-recycling/

Recycling Center Equipment & Operations Study: City of Holland, Michigan, RRS, 2024.

Photo credits

Cover image: Lillian Wege, Emmet County Recycling Center, 2025.

1. Montour County conceptual site design: Gannet Fleming. https://files.dep.state.pa.us/waste/recycling/lib/landrecwaste/recycling/techreports/Montour.pdf
2. Reycle Ann Arbor Drop-off Station map: Recycle Ann Arbor. https://www.recycleannarbor.org/divisions/drop-off-station/services/waste-recycling-options
3. Concrete bunkers: Lillian Wege, Emmet County Recycling Center, 2025.
4. Industrial stroage tent: Container Canopy. https://containercanopy.us/products/30x40x15-single-trussed-storage-tent
5. Wood pallet: The Architecture Designs. https://thearchitecturedesigns.com/benefits-and-us-

es-of-wooden-pallets/

6. Gaylord box: Box Buddy. https://boxbuddy.co/collections/gaylord-boxes
7. Roll-off container: Durabec. https://durabac.net/en/product/divisions/durabac/roll-off-containers/roll-off-container-for-various-recycling/
8. Tipping cart: Webstrauant Store. https://www.webstaurantstore.com/lavex-industrial-1-cubic-yard-black-forkliftable-heavy-duty-tilt-truck-1250-lb-capacity/475TT10125FK.html
9. Vertical baler: BaleForce. https://baleforce.com/products/vertical-balers/
10. Horizontal baler: Altitude Recycling. https://altituderecycling.com/news/used-horizontal-balers/
11. Plastic and OCC bales: Adobe Stock.
12. Sorting line: MSU Surplus Store and Recycling Center. https://msurecycling.com/public-drop-off-center/
13. Glass crusher: Andela Products. https://andelaproducts.com/complete-systems/glass-crusher-systems/
14. Bale bags: Trade West. https://tradewest.com/products/bale-tags-1-000-case
15. Forklift: Adobe Stock.
16. Pallet jack: Adobe Stock.
17. Loader: Adobe Stock.
18. Drop-off bin labels for glass and aluminum: Lillian Wege, Biz Aid LLC, 2025.
19. Accepted materials mailer/poster: The Recycling Partnership. https://recyclingpartnership.org/effective-recycling-bin-labels-reduce-consumer-confusion-about-recycling/

Appendix

Appendix A: Additional Information

Safety Resources:

Green Job Hazards - Recycling: Waste Management and Recycling | Occupational Safety and Health Administration - Occupational Safety and Health Authority (OSHA)

Preventing Deaths & Injuries While Compacting or Baling Refuse Material | NIOSH | CDC - OSHA

Hazardous Waste Operations and Emergency Response (HAZWOPER) - HAZWOPER Training FAQs - OSHA

Education and Public Relations Resources:

How to Promote your Community Recycling Program Handbook - Houston-Galveston Area Council and Clean Houston

Recycling Education Guide for Community Programs - Emmet County, Michigan Recycling Coalition

Create Your Customized Campaign Materials - website portal from The Recycling Partnership

Materials Marketing Resources:

Michigan Recycled Materials Market Directory | RecycleSearch

Model Bale Specifications - Association of Plastic Recyclers (APR)

What Recyclable Materials can be Baled? - Harmony, specifications of equipment for different materials

Scrap Specifications Circular - Institute of Scrap Recycling Industries, Inc., July 2022

Michigan Materials Marketplace - Rheaply

Facility Financing Resources:

Operational and Funding Options for Municipal Recycling Programs - DEQ (now EGLE)

Guide: Use of Special Assessments to Fund Recycling Services & Facilities - DEQ (now EGLE)

Grants and other financial opportunities:

Closed Loop Partners

EGLE Recycling Grants

EGLE Recycling Grant guidelines

All EGLE funding opportunities, updated periodically with new programs

Accelerator Tracks — NEXTCYCLE MICHIGAN

Seed Funds — NEXTCYCLE MICHIGAN

Available Grants for Recycling Programs + Processors - The Recycling Partnership

Regulatory, Permitting, and Reporting Resources:

Materials Management Facilities regulations and reporting - EGLE summary page

Part 175 Summary - EGLE

Part 115 law - State of Michigan

Part 115 Q&A sheet - EGLE

Re-Trac Platform Registration Page - Re-Trac

How to list your facility in the Michigan Recycling Directory (video tutorial) - EGLE

Recycling Reporting with Re-Trac (video tutorial) - EGLE

Mandatory vs. Voluntary Reporting under Part 175 (video tutorial) - EGLE

General Permit form - EGLE

Other Resources:

Choosing the Right Baling Equipment for Your Facility - AES

General Operations Plan Template for Material Utilization Facilities - EGLE

Recycling Roadmap: How to Plan, Site and Finance Your Recycling Facility - Guide from the Institute for Local Governments in California

Operations and Maintenance Manual Template - State of Maine

Single Stream/Dual Stream: Contending Approaches to Recycling in the US - Article from the Institute for Local Self-Reliance

Adopting a Brownfield Plan - Guide from EGLE

Appendix B: Materials Information

Key terms

Bale: A compacted and bound cube of material.

Coating: A layer of adhesive, clay, varnish, or any other barrier applied to paper.

Contamination: Contamination refers to non-recyclable material that does not belong in the material stream such as food residue and trash. Contaminants disturb or devalue recyclable materials. Contamination is measured in percentages of total volume. For many curbside programs, the contamination rate may hover around 30%, and the contamination rate of a self-sorted drop-off facility might be around 3-5%. Common contaminants in community recycling programs include dirty food containers, paper towels, and plastic bags. Poor public understanding of recycling and "wishcycling," a term for when residents put non-recyclable materials in recycling streams to feel better about their consumption or because they think or hope they will be recycled anyway, are common reasons for high contamination. Under Part 115 (see **Regulation and Permitting**), facilities receiving more than 15% nonrecyclable materials may be subject to reclassification as a solid waste facility.

Residuals: Also known as residual waste, residuals refers to non-recyclable material that is left over or "missed" after sorting. All recycling centers will have residuals of some type, but larger and more automated ones will often have higher rates of residuals. Residuals will largely be sent from recycling facilities to a landfill.

Densified: Processing, consolidating, and/ or compacting materials increases weight by volume and facilitates easier and more cost effective storage and handling. Densification processes include shredding, pelletizing (below), compression, compacting, and baling.

Ferrous metals: Metals predominantly composed of iron. Most ferrous metals, with the exception of some stainless steels, are magnetic.

Flake: Plastic flakes are small, flat pieces of shredded plastic that serve as the primary material for plastic recycling. Plastic flakes are often derived from PET bottles, and can be processed to produce different grades of flake material or further processed into plastics pellets, or "nurdles," which can in turn be used to create new plastic products that are approved for certain uses (food-grade, filament-grade, and fiber-grade).

Freon: A generic term for halocarbon products that are stable, nonflammable gases and liquids and used as refrigerants and aerosol propellants. Recycling facilities often have freon removed from appliances before further processes, scrapping, or recycling.

Non-ferrous metals: Metals that do not include a significant amount of iron, are rust resistant, and are not magnetic.

Pellet/Pelletized: Plastic pelletizing is a process through which recycled plastic is turned back into a raw material for new plastic production; pellets are small granules of a specific type of plastic, and can be made from used plastic with a plastic pelletizing machine, which chops the materials into small sizes for later melting and reuse.

Red metal: Metals that are orange/red in color and contain copper. Common red metals include copper, bronze, and brass. Red metal is non-ferrous (see below) and often rust-resistent.

Ton vs Tonne: A ton is 2,000 lbs and a (metric) tonne is 1,000 kgs = 2,204 lbs.

Material Grade Specifications

Metals Table

This information is from the Institute of Scrap Recycling Industries, Inc. (ISRI) as of July 2022.

Steel can bundles	Steel can scrap compressed to charging box size and weighing not less than 75 pounds per cubic foot. Cans may be baled without removal of paper labels, but free of other non-metallics. May include up to 5 gallon tin coated containers.
Post-Consumer Aluminum Can Stock	Shall consist of old aluminum food and/or beverage cans. The material is to be free of other scrap metals, foil, tin cans, plastic bottles, paper, glass, and other non-metallic items. Variations to this specification should be agreed upon prior to shipment between the buyer and seller.
Baled Aluminum Used Beverage Can (UBC) Scrap	Shall have a minimum density of 14 pounds per cubic foot (225 kg/m3), and a maximum density of 17 pounds per cubic foot (273 kg/m3) for unflattened UBC and 22 pounds per cubic foot (353 kg/m3) for flattened UBC. Size: Minimum 30 cubic feet (.85 m3), with bale range dimensions of 24" to 40" (61 to 132 cm) by 30" to 52" (76 to 132 cm) by 40" to 84"(102 to 213 cm). The only acceptable tying method shall be as follows: four to six 5/8" (1.6 cm) x .020" (5 mm) steel bands, or six to ten #13 gauge steel wires (aluminum bands or wires are acceptable in equivalent strength and number). Use of skids and/or support sheets of any material is not acceptable. Must be magnetically separated material and free of steel, lead, bottle caps, plastic cans and other plastic, glass, wood, dirt, grease, trash, and other foreign substances. Any free lead is basis for rejection. Any and all aluminum items, other than used beverage cans, are not acceptable. Variations to this specification should be agreed upon prior to shipment between the buyer and seller.

Tires

Rubber Primarily Used for Civil Engineering	The ISRI categorizes 15 types of Tire-derived material (TDM) by size of rubber pieces and levels of protrusion of steel. See the specifications here: https://www.isrispecs.org/orpheus_resource_categories/rubber-primarily-used-for-civil-engineering/

Paper Stock Table

This information is from the Institute of Scrap Recycling Industries, Inc. (ISRI) as of July 2022.

OCC (Old corrugated containers)	Consists of corrugated containers having liners of either test liner or kraft.
Mixed paper (MP)	Consists of all paper and paperboard of various qualities not limited to the type of fiber content, sorted and processed at a recycling facility.
Sorted Residential Papers and News (SRPN)	Consists of sorted newspapers, junk mail, magazines, printing and writing papers and other acceptable papers generated from residential programs (such as residential household and apartment collections and drop-off centers) sorted and processed at a recycling facility. Material should be free of containerboard and brown grades (OCC, Kraft bags, boxboard and Kraft carrier board). Prohibitive Materials may not exceed 2% Outthrows may not exceed 3%
Sorted Office Paper (SOP)	Consists of paper, as typically generated by offices, containing primarily white and colored groundwood-free paper, free of unbleached fiber. May include a small percentage of groundwood computer printout and facsimile paper.
Books with Covers	Books with covers.
Aseptic Packaging and Gable-Top Cartons	Consists of liquid packaging board containers including empty, used, polyethylene (PE)-coated, printed one-side aseptic and gable-top cartons containing no less than 70% bleached chemical fiber and may contain up to 6% aluminum foil and 24% PE film.

Glass Cullet Table

This information is from the Institute of Scrap Recycling Industries, Inc. (ISRI) as of July 2022.

Material Recovery Facility-derived 3-Color Mixed Container Glass ("MRF Glass")	MRF Glass consists of crushed or whole scrap Flint (clear), Amber (brown), and Green (emerald) container/bottle glass made from soda-lime-silica. These standards and practices apply to 3-color mixed glass for purchase or sale in the United States and Canada. Transactions covering shipments to or from other countries may also be in accordance with these standards and practices and may be modified by mutual agreement between buyer and seller. These specifications are guidelines for buying and selling MRF glass and are always subject to the buyer and seller's agreement. It is recognized that MRF Glass may be mixed with other materials as a result of recycling collection convenience and efficiency, and that quality levels vary widely based on the amount of contamination mixed in with the glass.
Processed (Furnace Ready) Green Container Glass Cullet	Soda-lime-silica container glass. Container Glass Cullet Colors Segregation: Green Cullet. Green 70-100%, Flint 0-15%, Amber 0-15%, Other Colors 0-10%, Total NON-Flint Cullet = <30%. The color green typically consists of a variety of shades, for example: emerald green or lime green.
Processed (Furnace Ready) Amber Container Glass Cullet	Soda-lime-silica container glass. Container Glass Cullet Colors Segregation: Amber Cullet. Amber 90-100%, Flint 0-10%, Green 0-10%, Other Colors 0-5%, Total NON-Flint Cullet = <10%.
Processed (Furnace Ready) Flint (Clear) **Container Glass Cullet**	Soda-lime-silica container glass. Container Glass Cullet Colors Segregation: Flint Cullet. Flint 95-100%, Amber 0-5%, Green 0-1%, Other Colors 0-.5%, Total NON-Flint Cullet = <5%.

Electronics Table

This information is from the Institute of Scrap Recycling Industries, Inc. (ISRI) as of July 2022.

Circuitboards and Shredded Circuitboards From the Processing of End-of-Life Electronics	Shall consist of whole or shredded copper/precious metal bearing populated or unpopulated circuitboards from the manual dismantling of electronic products. May also consist of shredded circuitboards from end-of-life electronic product processing systems with a maximum piece size of 2 inches.
Electronics Scrap Glass and CRT Cullet	Whole Monitors/TVs with or with cords. The equipment is intact with housing. Minimal to no disassembly has occurred. Whole Intact Tubes with gun and vacuum intact or released and with or without the band. Whole Tubes without gun and with or without the band. Processed Tubes to include both funnel and panel glass. Particle size will be determined by contract between shipper and smelter or treatment facility. Material should be free of all loose metals, bands, and shadow masks. May or may not be cleaned prior to shipping. Leaded Funnel Glass and Frit for smelting or other recovery/treatment. This material may include up to 10% panel glass. May or may not be cleaned prior to shipment. Particle size will be determined by contract between shipper and smelter or treatment facility Panel Glass (minimal or lead free) for multiple uses including construction, sand blasting, art glass, etc. May or may not be cleaned prior to shipment. Particle size will be determined by contract between shipper and receiving facility. Clean Panel Glass with metal oxide concentrations of less than 5 ppm, free of coatings.

Plastics Table

This information is from the Institute of Scrap Recycling Industries, Inc. (ISRI) as of July 2022.

RIGID	
HDPE Colored Bottles	Any whole, blow-molded, high-density polyethylene (HDPE) bottle containing the ASTM D7611 "#2, HDPE" resin identification code that is pigmented and opaque, and was generated from a curbside, drop-off, or other public or private recycling collection program. Bottles are defined as containers that have a neck or mouth that is smaller than the base. All bottles should be free of contents or free flowing liquids and direction should be provided to consumers to empty and rinse containers. While including closures (caps, lids, and rings) on bottles is acceptable, removal of closures is also acceptable. Loose caps and closures should not be added to the bale.
HDPE Natural Bottles	Any whole, blow-molded, high-density polyethylene (HDPE) bottle containing the ASTM D7611 "#2, HDPE" resin identification code that is unpigmented, and was generated from a curbside, drop-off, or other public or private recycling collection program. Bottles are defined as containers that have a neck or mouth that is smaller than the base.
Mixed Bulky Rigid Plastic	Any large rigid polypropylene (PP) high-density polyethylene (PE) and/or Low-Density Polyethylene (LDPE) plastic items that may have the ASTM D7611 resin identification codes #5 PP, #2 HDPE and/or #4 LDPE, generated through a positive sort from curbside, drop-off or other public or private recycling collection program. Examples include: buckets, crates, waste bins, laundry baskets, large toys, large storage bins, and lawn furniture or other large PP/HDPE items. Buckets/pails with metal handles are accepted. Small injection molded HDPE containers may be included. PP small items can also be included but are encouraged to be put in a PP Small Rigid bale.
PET Bottles (No PET Thermoforms)	Any whole Polyethylene Terephthalate (PET, #1) postconsumer bottle or jar with a screw-neck top that contains the ASTM D7611 "#1, PET or PETE" resin identification code and that is clear, transparent green, or transparent light blue. All bottles should be free of contents or free flowing liquids. Closures (caps, lids, rings, and labels) may be left on bottles.
PET Bottles With Thermoforms	Any whole Polyethylene Terephthalate (PET, #1) postconsumer bottle or jar with a screw-neck top that contains the ASTM D7611 "#1, PET or PETE" resin identification code and that is clear, transparent green, or transparent light blue. All bottles should be free of contents or free flowing liquids. Closures (caps, lids, rings, and labels) may be left on bottles. This specification allows inclusion of PET thermoforms of more than two percent, but not to exceed 10 percent of bale, by weight. PET thermoforms are defined as any whole, extrusion grade, clear polyethylene terephthalate (PET) package labeled with the ASTM D7611 "#1, PET or PETE" resin identification code, including and not limited to egg cartons, baskets, clamshell containers, cups, lids, cake domes, covers, blister pack without paperboard backing, tubs, deli containers, trays and folded PET sheet containers. All thermoform pieces must be optically sorted (as PET).
PET Thermoforms	Any whole, extrusion grade, clear or transparent light blue polyethylene terephthalate (PET) postconsumer package labeled with the ASTM D7611 "#1, PET or PETE" resin identification code, not including bottles and jars, but including and not limited to egg cartons, baskets, clamshell containers, cups, lids, cake domes, covers, blister pack without paperboard backing, tubs, deli containers, trays and folded PET sheet containers. All packages should be free of contents or free flowing liquids. Closures (caps, lids, rings, and labels) may be included. All thermoform pieces must be optically sorted (as PET), and no other thermoform shall come from any other sorting stations. (This is specified to prevent lookalike thermoform—PS, PLA, PVC—from being mixed with PET.)
Rigid PVC - Siding	Typically consists of PVC siding used in residential applications. May contain PVC downspouts. Not all siding is PVC and may contain PE variants, which are typically molded. Recyclability and market value increases with additional color segregation.

Rigid PVC - Pipe	PVC pipe that is round in shape and can be green, white, blue, purple and grey in color. Comes from installed and un-installed sources or scrap. Is mainly used in water plumbing applications. Care should be taken when compressing the bale as too much pressure will crush material and make identification and inspection difficult. Recyclability and market value increases with additional color segregation.
Rigid PVC - Window Profiles	Typically consists of window and door frames. Sourced primarily from door and window manufacturers.
Mixed Small Rigid Plastic (1-7 or 3-7 plastics)	Small rigid plastic items that are a mix of resins and generated in a positive sort from a curbside, drop-off, or other public or private recycling programs. Primary PP, PET and HDPE with some other resins. Items include bottles, non-bottle containers, other packaging and non-containers/packaging or products. PET and HDPE bottles are present to varying levels and are typically presorted out with some remaining. Items containing metal or electronics should be removed when possible.
Mixed Bulky Rigid Plastic	Any large rigid polypropylene (PP) high-density polyethylene (PE) and/or Low-Density Polyethylene (LDPE) plastic items that may have the ASTM D7611 resin identification codes #5 PP, #2 HDPE and/or #4 LDPE, generated through a positive sort from curbside, drop-off or other public or private recycling collection program. Examples include: buckets, crates, waste bins, laundry baskets, large toys, large storage bins, and lawn furniture or other large PP/HDPE items. Buckets/pails with metal handles are accepted. Small injection molded HDPE containers may be included. PP small items can also be included but are encouraged to be put in a PP Small Rigid bale.
FILM	
PE (Polyethylene) **MRF Film**	Mix of polyethylene bag and overwrap collected from consumers and businesses and sorted at Material Recovery Facilities (MRF), often collected through curbside collection. Bags, wraps, and films may be mixed color or printed and are a mix of High-Density Polyethylene (HDPE), Low-Density Polyethylene (LDPE) and Linear Low-Density Polyethylene (LLDPE). Films may be coded with ASTM D7611resin identification code "#2, HDPE" and "#4, LDPE/LLDPE."
PE Retail Mix Film	Polyethylene stretch wrap, shrink wrap or other film generated by retailers back-of-house, and any polyethylene bag and overwrap accepted by retailers from their customers may be included. Bags, wraps and film may be mixed color or printed and are a mix of High-Density Polyethylene (HDPE), Low-Density polyethylene (LDPE) and Linear Low-Density Polyethylene (LLDPE) films. Films may be coded with ASTM D7611 resin identification code "#2, HDPE" and "#4, LDPE/LLDPE."
PE Clear Film (Grade A)	Any mix of clear or natural polyethylene film, Low-Density Polyethylene (LDPE) or Linear Low-Density Polyethylene (LLDPE), totaling at least 95% clear or natural polyethylene film is acceptable. Films may be coded with ASTM D7611 resin identification code "#4, LDPE/LLDPE." Includes stretch wrap, shrink wrap, and clear, natural bags.
PE Clear Film (Grade B)	Any mix of polyethylene film, Low-Density Polyethylene (LDPE) or Linear Low-Density Polyethylene (LLDPE), totaling at least 80% clear or natural polyethylene film is acceptable. Films may be coded with ASTM D7611 resin identification code "#4, LDPE/LLDPE." Up to 20% colored and printed polyethylene film is acceptable.
PE Colored Film	Any mixture of mixed color, clear/natural and printed Low-Density Polyethylene (LDPE) and Linear Low-Density Polyethylene (LLDPE) film with limited label contamination is acceptable. More than 20% by weight is expected to be colored film. Films may be coded with ASTM D7611 resin identification code "#4, LDPE/LLDPE."

Polystyrene Table

This information is from the Association of Plastic Recyclers.

Densified Depot Grade Foam Polystyrene	Foam Polystyrene blocks must include at least 98% polystyrene foam. Moisture content must be less than 2%. This specification is intended for densified foam that will be used as a raw input and not further processed before extrusion. Depot grade foam is collected from the public at municipal or private drop-off facilities. Material can be densified through cold or thermal compression.
Densified MRF Grade Foam Polystyrene	Foam Polystyrene blocks must include at least 95% polystyrene foam. Moisture content must be less than 5%. This specification is intended for densified foam that will be used as a raw input and not further processed before extrusion. MRF grade foam is foam sorted from residential recycling programs by material recovery facilities. Material can be densified through cold or thermal compression.
Solid/Foam Polystyrene	Solid/Foam Polystyrene bales must be optically sorted by material recovery facilities and include at least 95% foam and solid/rigid polystyrene (GPPS/Crystal/HIPS). Moisture content must be less than 5%.
Solid Polystyrene	Any non-foam container or product, with a #6 PS resin code, generated through a positive sort from curbside, drop-off or other public or private recycling collection program. Examples of solid PS containers and products include: yogurt cups and tubs, red party cups, CD “jewel” cases, disposable coffee lids, and some clamshell containers.

Materials Buyers List (July 2025)

Location	Name	Material(s)
Michigan, various	Padnos	Metal, paper
Northern Michigan, various	A&L Metals	Scrap metal
Grand Rapids, MI	Krell Paper Stock	Mixed paper
Manistee, Plymouth, Grand Rapids, MI	PCA	OCC
Adrian, MI	Evergreen Grease Services	Oil and grease
East Jordan, South Haven, MI	East Jordan Plastics	Plastic
Dundee, MI	Clean Tech/Plasti-Pak	PETE #1, HDPE plastic
Listowel, ONT	EFS Plastics	Mixed plastic
Mason, MI	Cleanlites Recycling	Lightbulbs
Saginaw, MI	Heritage-Crystal Clean	Hazardous and non-hazardous liquids (antifreeze, motor oil)
Kaleva, MI	Bay Area Recycling for Communities	Mattresses
Wixom, MI	Cirba Solutions	Batteries
Coleman, MI	CM Rubber Technologies/ Geocycle	Tires
Jenison, MI	Nu Wool	Cellulose padding
Jonesville, MI	Omnisource Jonesville	Metal, appliances
Livonia, MI	Golden Refrigerant	Refrigerant, freon

Appendix C: Facilities visited

	Bay Area Recycling for Communities	Biz Aid LLC	Emmet County	MSU Surplus Store and Recycling Center	Recycling Ann Arbor
Facility type	Non-profit	Private	County	University	Non-profit
Services	Pick up, drop-off, resale store	Drop-off, commercial pick up	Transfer station, MRF, drop-off, compost	Campus/ curbside, drop-off, MRF, compost, resale store	Drop-off, MRF, C&D recovery yard
Volume		650 tons	5,300 tons	3,000 tons	
Footprint	82,800 sq ft including designated space for resale store	15,000 sq ft		17,000 sq ft including outdoor storage and parking	
Funding sources	Grants, resale store revenue, de/re construction services	Commercial service, material sales, gate fees		University, user fees, and Surplus Store revenue	County support, municipal passes, gate fees, material sales
Staff	22 throughout the organization	2 FT, a few seasonal PT	10 workers at the MRF at a time	100 employees of which 60 are PT students	55 total, 5 at the drop-off station at a time
Contact	Audrey Lawens: recyclingresale@mybarc.org	Samantha Buterbaugh: sam@bizaidllc.com	Lindsey Walker: lwalker@emmetcounty.org	Chris Hewitt: hewittc4@msu.edu	Laura Jarels: Laura@recycleannarbor.org

Appendix D: Examples and supportive materials

Film Plastics Recycling Guide

This list is in constant revision due to the means by which film plastics are recycled. This is the most current iteration, however if a Drop Off Station Processor or Manager indicated otherwise, they are to be taken at their word **without exception**.

A general rule of thumb is "if you can reasonably stretch the plastic with your finger, its probably recyclable at the DOS"

All items being recycled must be clean and dry. Dirty or wet soft plastics will not be accepted.

We Accept:	We Do **NOT** Accept:
• Grocery/Shopping Bags • Bread Bags • Case Overwrap (toilet paper packaging, water bottle packaging, etc.) • Dry Cleaning Bags • Newspaper Sleeves • Ice Bags • Ziploc (or similar brand) Bags • Air Pillow Packaging • Plastic Envelopes (**NOT** bubble mailers) • Grocery Produce Bags • Cereal Box Liner Bags • Bubble Wrap • **CLEAN** Wood Pellet/Salt/Sandbags	• Saran/Cling Wrap • Frozen Food Bags • **SHEIN** bags • Premade Salad Bags/Spinach Bags • Chip/Candy Bar Wrappers • Pet Food/Animal Feed Bags • Mulch Bags • Compostable 'plastic' Bags • Bob's Red Mill Style Food Bags • **ANYTHING** that cannot be reasonably stretched •

These lists are not all encompassing but are used to communicate FAQ's and help educate our customers on should or should not be saved for recycling at the Drop Off Station.

Thank you for continuing to help the Drop-Off Station divert soft plastics from landfill.

Tackling the climate crisis through community-based zero waste action.

RECYCLING DROP-OFF CENTER SITING CHECKLIST

Description	Got it?
Proximity to major roadways and other community assets (schools, shopping, etc.)	
Distance from residential areas	
Adequate acreage for planned operations and future growth	
Barriers from neighboring properties (fences, trees, hills)	
Zoning that meets the building's planned use **OR** a plan for feasible rezoning	
An extended title search to investigate previous land use and restrictions	
Awareness of any deed restrictions and easements on the property	
A Phase I environmental assessment to establish baseline environmental conditions	
A Phase II environmental assessment to investigate specific environmental risks	
Identification of community need – Why are you setting up a drop-off center?	
A financial plan, ideally split between construction and operations	
Identification of funding sources for construction **AND** operations	
A financial philosophy **AND / OR** understanding of long term financial goals	
Electricity at the level needed for the equipment you plan to use	
Water and sewage connection **OR** well and septic system **OR** successful Perc test and plan to install well and septic	
Stormwater management plan and vegetation	
Necessary water and / or air permits	
Collaboration / communication with other offices (facilities, planning, etc.)	

SAFETY AND TRAINING

HEALTH AND SAFETY PLANS	Yes	No	Unsure	N/A
1. Do you have an active safety and health program?	[ ]	[ ]	[ ]	[ ]
a. If yes, is one person clearly responsible for the overall activities of the safety and health program?	[ ]	[ ]	[ ]	[ ]
b. Do you have a safety committee?	[ ]	[ ]	[ ]	[ ]
c. What is the frequency of safety meetings?				
2. Do you have a written safety and health plan?	[ ]	[ ]	[ ]	[ ]
3. Do you have a working procedure for handling employee complaints regarding safety and health?	[ ]	[ ]	[ ]	[ ]
4. Do you provide safety training for employees?	[ ]	[ ]	[ ]	[ ]
a. If yes, please check all that apply:				
First Aid [ ] Blood borne Pathogen [ ] Hazard Communication [ ] Fire Safety [ ]				
Personal Protection Equipment [ ] Ergonomics [ ] Forklift Operator [ ]				
Lock-out/Tag-out [ ] Quality Improvement [ ] Material Identification [ ]				
Confined Space [ ] Spill Control [ ]				
Other, Please list: _____				
MEDICAL SERVICES AND FIRST AID	**Yes**	**No**	**Unsure**	**N/A**
5. Is there a written emergency contingency plan for what to do in case of a medical emergency (other than calling 911)?	[ ]	[ ]	[ ]	[ ]
6. Do you require each employee to have a pre-employment physical examination?	[ ]	[ ]	[ ]	[ ]
a. Are hearing tests included in the exam?	[ ]	[ ]	[ ]	[ ]
7. Is there a hospital or clinic in the proximity of your workplace?	[ ]	[ ]	[ ]	[ ]
a. If yes, how far away is the hospital? _____miles				
b. If medical and first aid facilities are not in the proximity of your workplace, is at least one employee on each shift qualified to render first aid?	[ ]	[ ]	[ ]	[ ]
8. Is there a phone at the facility to use in case of an emergency?	[ ]	[ ]	[ ]	[ ]
9. Are emergency phone numbers posted?	[ ]	[ ]	[ ]	[ ]
10. Are first aid kits easily accessible to each work area?	[ ]	[ ]	[ ]	[ ]
a. If yes, are the necessary supplies periodically inspected and replenished?	[ ]	[ ]	[ ]	[ ]

11. Are means provided for flushing the eyes in the area where materials are being handled that may injure the eyes?	[ ]	[ ]	[ ]	[ ]
12. Are employees CPR trained?	[ ]	[ ]	[ ]	[ ]
FIRE PROTECTION	**Yes**	**No**	**Unsure**	**N/A**
13. Does your facility have a fire alarm system?	[ ]	[ ]	[ ]	[ ]
a. If yes, is it tested annually?	[ ]	[ ]	[ ]	[ ]
14. Does your facility have an automatic sprinkler system?	[ ]	[ ]	[ ]	[ ]
a. If yes, are automatic sprinkler system water control valves, air and water pressure checked weekly or periodically?	[ ]	[ ]	[ ]	[ ]
15. Are portable fire extinguishers provided?	[ ]	[ ]	[ ]	[ ]
a. If yes, how many are there? #_____				
b. Are all extinguishers serviced, maintained and tagged at intervals not to exceed one year?	[ ]	[ ]	[ ]	[ ]
c. Are employees periodically instructed in the use of extinguishers and fire protection procedures?	[ ]	[ ]	[ ]	[ ]
d. If yes, how often?				
GENERAL WORK ENVIRONMENT	**Yes**	**No**	**Unsure**	**N/A**
16. Are all work sites clean and orderly?	[ ]	[ ]	[ ]	[ ]
17. Are work surfaces kept dry or are appropriate means taken to assure the surfaces are slip-resistant?	[ ]	[ ]	[ ]	[ ]
18. Are all spilled materials or liquids cleaned up immediately?	[ ]	[ ]	[ ]	[ ]
19. Are covered metal waste cans used for oily waste?	[ ]	[ ]	[ ]	[ ]
20. Are all toilets and washing facilities clean and sanitary?	[ ]	[ ]	[ ]	[ ]
21. Are all work areas adequately illuminated?	[ ]	[ ]	[ ]	[ ]
22. Are pits and floor openings covered or otherwise guarded?	[ ]	[ ]	[ ]	[ ]
23. Is there a public drop off area for materials?	[ ]	[ ]	[ ]	[ ]
a. If yes, does the drop off area present any noticeable safety concerns for the public. List concerns:				
ENVIRONMENTAL CONTROLS	**Yes**	**No**	**Unsure**	**N/A**
24. Is all water provided for drinking and washing potable?	[ ]	[ ]	[ ]	[ ]
25. Are all outlets for water not suitable for drinking clearly identified?	[ ]	[ ]	[ ]	[ ]

26. Are employees prohibited from smoking or eating in any area where contaminants, which could be injurious if ingested, are present?	[ ]	[ ]	[ ]	[ ]
27. Is machinery cleaned with compressed air?	[ ]	[ ]	[ ]	[ ]
a. If yes, is air pressure controlled and personal protective equipment or other safeguards utilized to protect operators and other workers from eye and body injury?	[ ]	[ ]	[ ]	[ ]
28. Is vacuuming used for dust removal instead of lowing or sweeping?	[ ]	[ ]	[ ]	[ ]
29. Are employees' physical capacities assessed before being assigned to jobs requiring heavy work?	[ ]	[ ]	[ ]	[ ]
30. Are employees instructed in the proper manner of lifting heavy objects?	[ ]	[ ]	[ ]	[ ]
31. Where heat is a problem, have all fixed work areas been provided with spot cooling or air conditioning?	[ ]	[ ]	[ ]	[ ]
32. Are employees screened before assignment to areas of high heat to determine if their health condition might make them more susceptible to having an adverse reaction?	[ ]	[ ]	[ ]	[ ]
WALKWAYS	**Yes**	**No**	**Unsure**	**N/A**
33. Are aisles and passageways kept clear?	[ ]	[ ]	[ ]	[ ]
34. Are aisles and walkways marked?	[ ]	[ ]	[ ]	[ ]
35. Are wet surfaces covered with non-slip materials?	[ ]	[ ]	[ ]	[ ]
36. Are holes in the floor, sidewalks or other walking surfaces repaired properly, covered or otherwise made safe?	[ ]	[ ]	[ ]	[ ]
37. Is there safe clearance for walking in aisles where motorized or mechanical handling equipment is operating?	[ ]	[ ]	[ ]	[ ]
38. Are aisles or walkways that pass near moving or operating machinery, welding operations, or similar operations arranged so employees will not be subjected to potential hazards?	[ ]	[ ]	[ ]	[ ]
39. Is adequate headroom provided for the entire length of any aisle or walkway?	[ ]	[ ]	[ ]	[ ]
40. Are standard guardrails provided wherever aisle or walkway surfaces are elevated more than 30 inches above any adjacent floor or the ground?	[ ]	[ ]	[ ]	[ ]
ELEVATED SURFACES	**Yes**	**No**	**Unsure**	**N/A**
41. Are signs posted, when appropriate, showing the elevated surface load capacity?	[ ]	[ ]	[ ]	[ ]

42. Are all elevated surfaces (beneath which people or machinery could be exposed to falling objects) provided with standard 4-inch toe boards?	[ ]	[ ]	[ ]	[ ]
43. Is a permanent means of access and egress provided to elevated storage and work surfaces?	[ ]	[ ]	[ ]	[ ]
44. Is material on elevated surfaces piled, stacked or racked in a manner to prevent it from tipping, falling, collapsing, rolling or spreading?	[ ]	[ ]	[ ]	[ ]
EXITING	**Yes**	**No**	**Unsure**	**N/A**
45. Are all exits well marked with an EXIT sign?	[ ]	[ ]	[ ]	[ ]
46. Are the directions to exits, when not immediately apparent, marked with visible signs?	[ ]	[ ]	[ ]	[ ]
47. Are all exits kept free of obstructions?	[ ]	[ ]	[ ]	[ ]
48. Are there sufficient exits to permit prompt escape in case of emergency?	[ ]	[ ]	[ ]	[ ]
ELECTRICAL	**Yes**	**No**	**Unsure**	**N/A**
49. Are electrical appliances such as vacuum cleaners and vending machines grounded?	[ ]	[ ]	[ ]	[ ]
50. Do extension cords being used have a grounding conductor?	[ ]	[ ]	[ ]	[ ]
51. Are flexible cords and cables free of splices or taps?	[ ]	[ ]	[ ]	[ ]
52. Are all cord, cable, and raceway connections intact and secure?	[ ]	[ ]	[ ]	[ ]
53. Are ground-fault circuit interrupters installed on outlets in wet areas?	[ ]	[ ]	[ ]	[ ]
54. In wet or damp locations, are electrical equipment and tools appropriate for the use, or location or otherwise protected?	[ ]	[ ]	[ ]	[ ]
55. Are all disconnecting switches and circuit breakers labeled to indicate their use or equipment served?	[ ]	[ ]	[ ]	[ ]
56. Are all energized parts of electrical circuits and equipment guarded by approved cabinets or enclosures against accidental contact?	[ ]	[ ]	[ ]	[ ]
57. Is sufficient access and working space provided and maintained about all electrical equipment to permit ready and safe operations and maintenance?	[ ]	[ ]	[ ]	[ ]
58. Is the location of electrical power lines and cables (overhead, underground, underfloor, other side of walls, etc.) determined before digging, drilling, or similar work is begun?	[ ]	[ ]	[ ]	[ ]
59. Are employees who regularly work on or around energized electrical equipment or lines instructed in the cardio-pulmonary resuscitation (CPR) methods?	[ ]	[ ]	[ ]	[ ]

60. Has the facility been inspected by an electrician within the last 3 years?	[ ]	[ ]	[ ]	[ ]
HAND AND POWER TOOLS	**Yes**	**No**	**Unsure**	**N/A**
61. Are appropriate safety glasses, face shields, gloves, etc. used while using hand tools or equipment, which might produce flying materials, or be subject to breakage?	[ ]	[ ]	[ ]	[ ]
62. Are grinders, saws and similar equipment provided with appropriate safety guards?	[ ]	[ ]	[ ]	[ ]
63. Are rotating or moving parts of equipment guarded to prevent physical contact?	[ ]	[ ]	[ ]	[ ]
64. Are all cord-connected, electrically-operated tools and equipment effectively grounded or of the approved double-insulated type?	[ ]	[ ]	[ ]	[ ]
PERSONAL PROTECTIVE EQUIPMENT (PPE) AND CLOTHING	**Yes**	**No**	**Unsure**	**N/A**
65. Is personal protective equipment provided for the employees? (Check all that apply)	[ ]	[ ]	[ ]	[ ]
Goggles [ ] Safety Glasses [ ] Face Shields [ ] Aprons [ ] Steel Toe Boots [ ]				
Hard Hats [ ] Ear Plugs [ ] Respirators [ ] Gloves [ ] Other:				
66. Are employees required to wear PPE ?	[ ]	[ ]	[ ]	[ ]
67. Are employees wearing personal protection equipment?	[ ]	[ ]	[ ]	[ ]
68. Is personal protective clothing or equipment that employees are required to wear or use of a type capable of being easily cleaned and disinfected?	[ ]	[ ]	[ ]	[ ]
69. When employees are required to change from street clothing into protective clothing is a clean change room with separate storage facility for street and protective clothing provided?	[ ]	[ ]	[ ]	[ ]
NOISE	**Yes**	**No**	**Unsure**	**N/A**
70. Has there been a determination that noise levels in the facilities are within acceptable levels?	[ ]	[ ]	[ ]	[ ]
71. Are there areas in the workplace where continuous noise levels exceed 85dba?	[ ]	[ ]	[ ]	[ ]
72. Have work areas where noise levels make voice communication between employees difficult been identified and posted?	[ ]	[ ]	[ ]	[ ]
73. Are steps being taken to use engineering controls to reduce excessive noise levels?	[ ]	[ ]	[ ]	[ ]
74. Is approved hearing protective equipment (noise attenuating devices) available to every employee working in noisy areas?	[ ]	[ ]	[ ]	[ ]
75. Are employees wearing hearing protection?	[ ]	[ ]	[ ]	[ ]

76. If hearing protectors are used, are employees properly fitted and instructed in their use?	[ ]	[ ]	[ ]	[ ]
HAZARDOUS SUBSTANCES COMMUNICATION	**Yes**	**No**	**Unsure**	**N/A**
77. Have hazardous substances been identified which may cause harm by inhalation, ingestion, skin absorption or contact?	[ ]	[ ]	[ ]	[ ]
78. Are employees aware of the hazards involved with the various chemicals they may be exposed to in their work environment?	[ ]	[ ]	[ ]	[ ]
79. Is there a list of hazardous substances used in your workplace?	[ ]	[ ]	[ ]	[ ]
80. Is there a written hazard communication program dealing with Material Safety Data Sheets {MSDS), labeling, and employee training?	[ ]	[ ]	[ ]	[ ]
81. Is there an employee-training program for hazardous substances?	[ ]	[ ]	[ ]	[ ]
82. Is each container for a hazardous substance {i.e., bottles, tanks, etc.) labeled with product identity and a hazard warning {communication of the specific health hazards and physical hazards)?	[ ]	[ ]	[ ]	[ ]
CONTROL OF HARMFUL SUBSTANCES BY VENTILATION	**Yes**	**No**	**Unsure**	**N/A**
83. Is the volume and velocity of air in each exhaust system sufficient to gather the dusts, fumes, mists, vapors or gases to be controlled, and to convey them to a suitable point of disposal?	[ ]	[ ]	[ ]	[ ]
84. Is the source point for makeup air located so that only clean, fresh air will enter the work environment?	[ ]	[ ]	[ ]	[ ]
85. Are areas, in which motorized vehicles using internal combustion engines are operated, sufficiently ventilated to avoid dangerous accumulation of exhaust fumes?	[ ]	[ ]	[ ]	[ ]
SPILL CONTROL	**Yes**	**No**	**Unsure**	**N/A**
86. Do you have a spill control plan for materials used at the facility and/or for unknown and potentially hazardous materials that may be received inadvertently?	[ ]	[ ]	[ ]	[ ]
87. Are spill control equipment and materials available and located where spills are most likely to occur?	[ ]	[ ]	[ ]	[ ]
88. Are employees trained in spill control procedures?	[ ]	[ ]	[ ]	[ ]
FLAMMABLE AND COMBUSTIBLE MATERIALS	**Yes**	**No**	**Unsure**	**N/A**
89. Is proper storage practiced to minimize the risk of fire, including spontaneous combustion?	[ ]	[ ]	[ ]	[ ]
90. Are combustible scrap, debris, and waste materials stored in covered metal receptacles?	[ ]	[ ]	[ ]	[ ]

a. Are they removed from work areas daily?	[ ]	[ ]	[ ]	[ ]
91. Are approved containers and tanks used for the storage and handling of flammable and combustible liquids?	[ ]	[ ]	[ ]	[ ]
92. Are all flammable liquids kept in closed containers when not in use (e.g. parts cleaning tanks, etc.)?	[ ]	[ ]	[ ]	[ ]
93. Are fire extinguishers selected and provided for the types of materials in areas where they are to be used?	[ ]	[ ]	[ ]	[ ]
94. Are extinguishers free from obstructions or blockage?	[ ]	[ ]	[ ]	[ ]
95. Are all extinguishers fully charged and in their designated places?	[ ]	[ ]	[ ]	[ ]
96. Are NO SMOKING signs posted where appropriate?	[ ]	[ ]	[ ]	[ ]
FUELING	**Yes**	**No**	**Unsure**	**N/A**
97. Is it prohibited to fuel an internal combustion engine with a flammable liquid while the engine is running?	[ ]	[ ]	[ ]	[ ]
98. Are fueling operations done in such a manner that likelihood of spillage will be minimal?	[ ]	[ ]	[ ]	[ ]
99. When spillage occurs during fueling operations, is the spilled fuel washed away completely, evaporated, or other measures taken to control vapors before restarting the engine?	[ ]	[ ]	[ ]	[ ]
100. Are fuel tank caps replaced and secured before starting the engine?	[ ]	[ ]	[ ]	[ ]
101. Is handling or transferring gasoline in open containers prohibited?	[ ]	[ ]	[ ]	[ ]
102. Is smoking prohibited in the vicinity of fueling operations?	[ ]	[ ]	[ ]	[ ]
MOTORIZED VEHICLES	**Yes**	**No**	**Unsure**	**N/A**
103. Are only employees who have been trained in the proper use of industrial trucks allowed to operate them?	[ ]	[ ]	[ ]	[ ]
104. Are lift truck operating rules posted?	[ ]	[ ]	[ ]	[ ]
105. Are motorized vehicles with internal combustion engines operated in enclosed areas carefully checked to ensure such operations do not cause a harmful concentration of dangerous gases?	[ ]	[ ]	[ ]	[ ]
106. Are motorized vehicles inspected daily or prior to use?	[ ]	[ ]	[ ]	[ ]
a. If yes, are inspections documented?	[ ]	[ ]	[ ]	[ ]
107. Are trucks shut off and the brake set prior to loading or unloading?	[ ]	[ ]	[ ]	[ ]
108. Are bollards or other similar devices used to protect the building or machinery inside the building from collision with a moving vehicle or forklift?	[ ]	[ ]	[ ]	[ ]

109. Does each motorized vehicle have a warning horn, whistle, gong, or other device which can be clearly heard above the normal noise in the areas where operated	[ ]	[ ]	[ ]	[ ]
MATERIAL HANDLING	**Yes**	**No**	**Unsure**	**N/A**
110. Is there safe clearance for equipment through aisles and doorways?	[ ]	[ ]	[ ]	[ ]
111. Are aisle ways designated, permanently marked, and kept clear to allow unhindered passage?	[ ]	[ ]	[ ]	[ ]
112. Are trucks shut off and the brake set prior to loading or unloading?	[ ]	[ ]	[ ]	[ ]
113. Are trucks and trailers secured from movement during loading and unloading operations?	[ ]	[ ]	[ ]	[ ]
114. Are dock plates and loading ramps constructed and maintained with sufficient strength to support imposed loading?	[ ]	[ ]	[ ]	[ ]
115. Are hand trucks maintained in a safe operating condition?	[ ]	[ ]	[ ]	[ ]
116. Are chutes equipped with sideboards of sufficient height to prevent materials from falling off?	[ ]	[ ]	[ ]	[ ]
117. Are skids and pallets inspected before being loaded or moved?	[ ]	[ ]	[ ]	[ ]
MACHINE GUARDING	**Yes**	**No**	**Unsure**	**N/A**
118. Is there a training program to instruct employees on safe methods of machine operation?	[ ]	[ ]	[ ]	[ ]
a. If yes, are employees tested or otherwise certified in someway that they have been properly trained?	[ ]	[ ]	[ ]	[ ]
119. Is there a regular program of safety inspection of machinery and equipment?	[ ]	[ ]	[ ]	[ ]
a. If yes, How often are inspections?				
b. Are they documented?	[ ]	[ ]	[ ]	[ ]
120. Are provisions made to prevent machines from automatically starting when power is restored after a power failure or shutdown?	[ ]	[ ]	[ ]	[ ]
121. Is all machinery and equipment kept clean and properly maintained?	[ ]	[ ]	[ ]	[ ]
122. Is sufficient clearance provided around and between machines to allow for safe operations, set-up and servicing, material handling, and waste removal?	[ ]	[ ]	[ ]	[ ]
123. Is equipment and machinery securely placed and anchored to prevent tipping or other movement that could result in personal injury?	[ ]	[ ]	[ ]	[ ]

124. Is there a power shut-off switch within reach of the operator's position at each machine?	[ ]	[ ]	[ ]	[ ]
125. Can electric power to each machine be locked out for maintenance, repair, or security?	[ ]	[ ]	[ ]	[ ]
126. Are foot-operated switches guarded or arranged to prevent accidental actuation by personnel or falling objects?	[ ]	[ ]	[ ]	[ ]
127. Are switches and valves used by a machine operator clearly identified and readily accessible?	[ ]	[ ]	[ ]	[ ]
128. Are all emergency stop buttons colored red?	[ ]	[ ]	[ ]	[ ]
129. Are all pulleys and belts that are within 7 feet of the floor, or at the working level, guarded?	[ ]	[ ]	[ ]	[ ]
130. Are methods provided to protect the operator and other employees in the machine area from hazards created at the point of operation, ingoing nip points, rotating parts, flying chips, and sparks?	[ ]	[ ]	[ ]	[ ]
131. Are fan blades protected with a guard having openings no larger than one-half inch when operating within 7 feet of the floor?	[ ]	[ ]	[ ]	[ ]
LOCKOUT/TAG OUT PROCEDURES	**Yes**	**No**	**Unsure**	**N/A**
132. Is all machinery or equipment capable of movement required to be de-energized or disengaged and blocked or locked-out during cleaning, servicing, adjusting or setting up of operations?	[ ]	[ ]	[ ]	[ ]
133. Is the locking-out of control circuits in lieu of locking-out main power disconnects prohibited?	[ ]	[ ]	[ ]	[ ]
134. Does the lockout procedure require that stored energy (mechanical, hydraulic, air, etc.) be released or blocked before equipment is locked-out for repairs?	[ ]	[ ]	[ ]	[ ]
a. Are appropriate employees provided with individually keyed personal safety locks?	[ ]	[ ]	[ ]	[ ]
135. Are employees required to keep personal control of their key(s) while they have safety locks in use?	[ ]	[ ]	[ ]	[ ]
136. Is it required that only the employee, exposed to the hazard, place or remove the safety lock?	[ ]	[ ]	[ ]	[ ]
137. Are employees required to check the safety of the lockout by attempting a start up after making sure no one is exposed?	[ ]	[ ]	[ ]	[ ]
138. Is there a means provided to identify any or all employees who are working on locked-out equipment by their locks or accompanying tags?	[ ]	[ ]	[ ]	[ ]
139. Are a sufficient number of tags and padlocks provided for any reasonably foreseeable repair emergency?	[ ]	[ ]	[ ]	[ ]