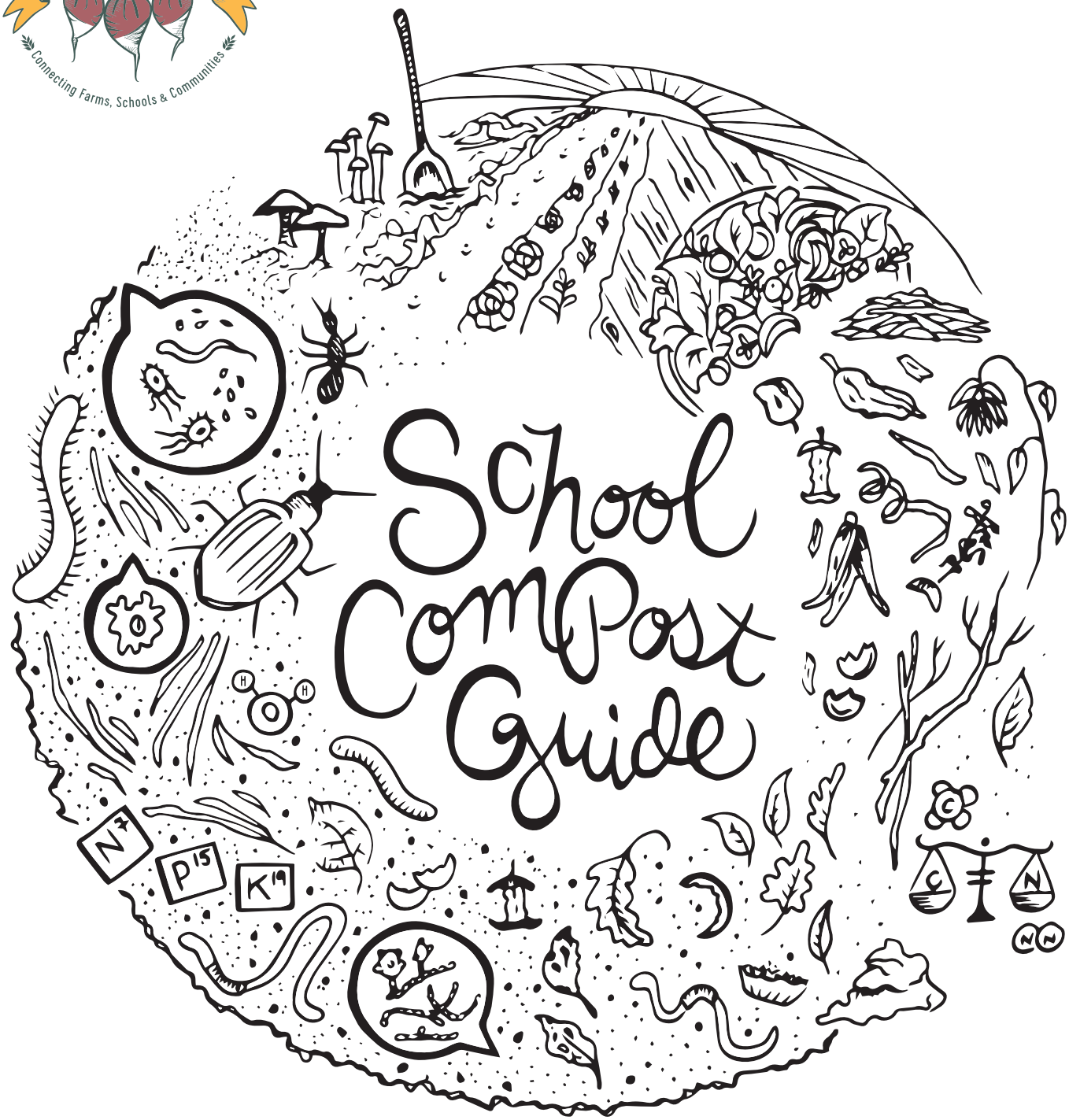

SCHOOL COMPOST GUIDE

A GUIDE TO STARTING A COMPOSTING PROGRAM IN YOUR SCHOOL

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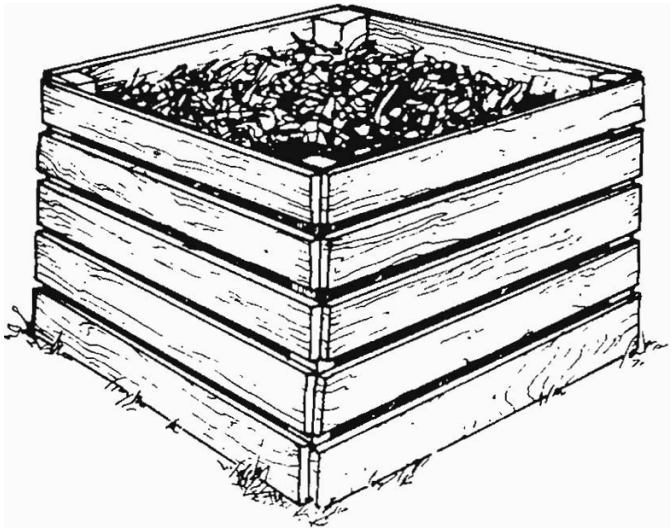

GREEN MOUNTAIN FARM-TO-SCHOOL

Green Mountain Farm-to-School (GMFTS) is a non-profit organization in Newport, VT that strengthens local food systems by promoting positive economic and educational relationships between schools, farms, and communities. GMFTS supplies fresh, local food to schools and institutions and gives students of all ages the knowledge and skills they need to make healthy food choice through school gardens, farm-to-school programs, a regional food hub, and mobile learning kitchen. For more information, visit www.GreenMountainFarmtoSchool.org.

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INTRODUCTION & GOALS

The goal of this manual is to help aid schools in establishing a successful composting program by providing information, tips, resources, and best practices. Specifically, this guide provides a basic understanding of the process of composting; discusses the difference between on-site and off-site composting, and lists option for selecting a compost shed design. Print-outs to use in your school and other resources to consult are provided in the appendices.

BENEFITS OF COMPOSTING:

- Finished compost can be spread on school grounds to feed microorganisms, boost fertility, and enhance soil quality in school gardens and grounds.
- Providing educational opportunities for students and staff that promote sustainable environmental practices.
- Reducing the school's cost of waste removal.
- Providing a medium for a spectrum of classroom subjects including environmental science, mathematics, chemistry, biology, economics, sociology and related topics. It also provides opportunities for student development, responsibility, art, and inspiration projects.
- Engaging the community in an environmentally beneficial program, and serving as a model for the community to follow.
- Meeting state mandated legislation requiring institutions, including schools, to begin composting food scraps. By beginning a composting program schools can help ensure compliance with state mandates or can prepare for future legislative mandates.

COMPOSTING BASICS

WHAT IS COMPOSTING?

Nature recycles by breaking down organic material and re-using it. Composting is an accelerated and controlled form of this decomposition process. In this decomposition process, microorganisms eat and inhabit decaying matter to break these materials down and return their nutrients to the soil. Compost happens when materials are gathered in a bin or pile, moistened, and aerated. Fungi, bacteria, yeast, and other microorganisms, as well as invertebrates, are able to take over and eat away at the material. In the end, the finished product is potent humus. This dark brown organic matter can be spread to enhance soil, save space in the landfill, and, in the process, compliment the teaching of a myriad of school subjects.

MAKING GOOD COMPOST

Making good compost comes down to 5 essential ingredients:

- Nitrogen
- Carbon
- Water
- Air
- Time

This section breaks down those five elements and includes a few other tips for creating a great compost pile.

NITROGEN

Materials high in nitrogen are traditionally thought of as 'greens' or recently living and have a higher moisture ratio.

Examples include:

- Food scraps
- Manure
- Grass clippings
- Garden weeds

For a school composting system the majority of your nitrogen will come from food scraps but in order to kick start the composting process you will also want some aged manure.

CARBON

High carbon materials are generally brown in color, contain less moisture, and consist of things that have been dead for a long time.

Common examples of these materials are:

- Straw
- Hay
- Shredded paper
- Wood chips
- Sawdust
- Dried leaves

You will want to have many sources and types of carbon. Diversity in carbon sources promotes diversity of microorganisms in the pile.

WATER

Like all life, the microorganisms in the compost pile need water to live. The ideal moisture ratio in a pile is from 50%-60%. The moisture level can easily be checked by reaching in to the center of the pile and squeezing a handful of compost. Ideally a few drops of water will come out of the compost when firmly squeezed. If no water comes out you may need to add a small amount of water to your pile to increase the moisture. If a trickle of water appears then the compost is too wet. Try aerating the pile by turning it with a pitch fork or adding dry materials.

AIR

As the compost breaks down, the pile will sink and eventually the microbes will run out of oxygen. When this happens the pile will drop in temperature. Turn the pile with a pitchfork to reintroduce oxygen. After a few days the pile will climb in temperature again. How often you turn your piles will depend on how much time and effort you have to devote to the compost program, it is recommended that you turn your compost pile at least every few weeks.

HEAT

An active compost pile will naturally heat up. As the microorganisms eat the materials they produce heat. As composters we take advantage of this heat to sterilize the materials, eliminate pathogens, and kill weed seeds. Keeping the center of the pile above 135 degrees for at least 3 days will kill most plant based diseases and any weed seeds. However, temperatures on the outside of the pile will be much lower, so it is important to turn the pile to make sure that all the material has a chance to spend some time in the hot center of the pile. This process should take at least a few weeks.

TIME

Good compost takes time. How long the composting process takes greatly depends on how much time and effort are devoted to the piles. More frequent turning and maintenance will generally produce compost quicker. Under normal conditions in a healthy compost pile, the bulk of the material is broken down in the first two to five months. During this period temperatures should remain high (above 130 degrees) and the pile should be turned frequently. After the temperature drops the curing stage begins. During this 2-3 month period the compost attracts beneficial bacteria and protozoa to break down the complex plant materials and produce high quality compost. Adding partially-decomposed (or uncured) compost to a garden can harm or even kill plants due to unstable nitrogen and salt contents. Additionally it can decrease the nitrogen available to your plants because the micro-organisms are still breaking down the material and using all the nitrogen for their own growth. To prevent this, be sure to "cure" the compost before adding it to your garden. To cure, let the pile sit for the next several months, turning occasionally and keeping it moist. When the large particles have broken down, it will be ready to use as compost.

RECIPE CREATION

Potent compost is created when mixing materials in the proper quantities. This is easily understood as a carbon to nitrogen ratio. On a scientific level, after blending all materials together the pile should have a carbon to nitrogen ratio between 26:1 and 30:1. Essentially that entails adding two parts of carbon-rich material for every one part of nitrogen-rich material. However, this is a best practice and recipe development can be much more nuanced and will depend significantly on which carbon materials you are able to source. See the compost recipe chart in appendix II for possible recipe ideas.

BUILDING A PILE

Proper pile construction can ensure food scraps compost efficiently and can help reduce potential problems with odor and vermin. The best practice here is making a "food scraps sandwich". After dumping the food scraps on the pile, spread them out to create one layer across the top of the pile. Then cover the food scraps entirely with the desired carbon source. Keep the sides of the pile insulated with carbon materials as well. This will help keep the odors to a minimum and will help insulate the pile and keep it hot.

REGULATIONS & HEALTH CONCERNS

Composting is an incredibly safe practice; however practical health and safety precautions should be taken. Establish a few basic safety procedures to ensure a healthy community.

- Always wash hands with soap and warm water after working around the compost pile or food scraps.
- Always wear disposable gloves when checking the pile's moisture.
- Students, faculty, and staff with compromised immune systems, or who are otherwise susceptible to disease or reaction to materials used in the pile should not participate in the turning or handling of the piles.
- Students with food allergies should not be asked to empty food scraps or interact with the immature piles.
- Anyone with cuts or abrasions should cover the area with bandages
- Consult your local Health Department's code to ensure that your pile and your process comply with all regulations.

PLANNING YOUR COMPOST PROGRAM

Here are some simple steps to follow when planning the composting program in your school:

1. Share your ideas and seek out a steering committee

A school composting program will require the support of the entire community. It is important to include people from diverse perspectives and positions. Ask the principal, food service staff, custodial staff, teachers, parents, school board members, and students to join in. All of these people need to have a voice in the beginning stages to help identify potential problems and solutions and insure the program's success and sustainability. This group will be responsible for developing a clear plan of action, promoting the program, coordinating the actual work, and evaluating what's working and what's not. Finally, in order to ensure support from school administration, make sure you follow all school protocol while developing this program.

2. Research what is involved in a school-wide composting operation

See the "resources appendix" in the back of this guide for more books, websites, and organizations to seek out. Doing the research ahead of time and analyzing the specifics of your school will aid the steering committee in deciding on compost bin design, location and necessary supplies.

3. Look at the big picture and clearly define the scope of the project

Once you learn as much as you can, the committee can begin the planning process. At the outset it is important to clearly define the scope of the project and think through major decisions such as whether the school will compost on-site or off-site (the detailed differences between the two are covered in the next section). As you move forward, it is important to keep in mind that the program may change over time. It is okay to start small or reverse a decision as the needs and abilities of the school evolve.

4. Develop a detailed flow plan of food scraps based on you site's specifics

Details to consider include:

Where will the compost collection tote live?

How will implementing a compost program change the lunch clearing lines?

Who will scrap the lunch trays and monitor the compost for inorganic materials? How much time will this add to lunch?

How will food scraps get from the cafeteria to the compost shed or collection site?

Is the pickup site easily accessible for off-site haulers?

Or is the compost shed easily accessible for food service directors and students? Where will the funds come from to build the compost structure?

Who will build compost bins?

Additional tips to help formulate your plan:

- The convenience and efficiency are important as students move through the cafeteria garbage line. Placing a table next to the compost buckets will allow students to set their tray down while clearing which will not only expedite the dumping process but will encourage proper decision making and decrease trash in the compost buckets. Or, consider cutting a table to fit three buckets for the different options (compost, trash, recycle). Think about who will take the compost outside, their physical capabilities, and how much time they have to complete these tasks.
- Use strong signage to aid the visual connection of separating waste items. Remember that some of the younger students may not be able to read yet, so pictures help them make good decisions. Engage student participation throughout the process with artwork like poster contests and stickers (for cafeteria and kitchen). Posters and signage should visually reflect the specific types of waste generated at the school. Examples are located in Appendix II.
- Create a strong/fun incentive program that encourages participation. Your school can celebrate a compost awareness week where the students receive tickets for separating compost correctly. During the week, have a drawing at the end of each day for a prize.

5. Publicize the program

Ensure that the student body, staff and surrounding community is aware of the program. Sending home flyers with the students can help parents understand what is happening and why, and will enable them to offer their support or voice and concerns in a productive manner. Putting a segment in the local newspaper will also help garner support and potentially motivate and encourage other schools to embark on their own composting adventure.

6. Educate the Students and Staff

For many people, especially younger students, composting may not be an intuitive practice. Students may not understand why we are composting or how to separate food scraps properly. Hosting in class workshops, reading books, and showing videos will help students better understand the process (see appendix 45 for these resources). Moreover, giving students responsibility and encouraging them to take ownership of the compost are keys to a successful compost program.

Involving and educating teachers will help ensure student participation and encourage integrating composting into the culture of the school. Compost is a wonderful teaching tool and provides a fantastic, hands-on experience that can be used to teach countless classroom subjects. By integrating the compost into classrooms it becomes part of the culture at the school as opposed to a novelty or side-project. Students who interact with the compost in a classroom setting will have a fuller understanding of the process and begin to take ownership of the program. Obvious connections exist between compost and many subjects, such as: earth science, ecology, physical science, mathematics, scientific process, biology, and nutrition. However, with some creativity almost any class could be taught through the compost pile. Compost curriculum is listed on page 46 of this guide.

ON-SITE VS. OFF-SITE COMPOSTING

Choosing to compost at your school or to send your compost off site is a decision each school needs to make early on. What you ultimately decide will be based on space, time and staff. While choosing a path is important, know that there is some flexibility as the program evolves. Schools who began composting off-site have switched to on-site as they realized the potential benefits. Conversely, schools who at one time composted on-site have switched to off-site when they ran into space limitations and found the proper off-site partner.

ON-SITE COMPOSTING The school maintains composting bins on the school grounds. All food scraps go directly into those bins. With daily monitoring and maintenance, the finished compost can be used in the school gardens.		Off-Site Composting The school has a local contact that offers to take the cafeteria's food scraps on a regular basis. The school must arrange a pick up time or the transportation of the scraps. Generally the local waste hauler or a farm in the community will be the off-site partner.	
BENEFITS	CHALLENGES	BENEFITS	CHALLENGES
Ability to demonstrate a full composting system to students	Compost pile needs to be maintained on a daily basis	Builds community connections	Must coordinate with hauler or community member to pick up compost
School keeps the finished composted product	Need enough space to install a 3-bin compost system	Less logistics to figure out (ex: construction of bins)	School probably does not keep final composted product
Few costs to maintain program after initial structure is built	Costs money to build a composting structure	Initially cheaper since no structures need to be built.	Continual cost of pick up (if hauler).
More potential for classroom engagement.	To ensure success and sustainability, you must have the full support of staff and students.	No daily maintenance or problems with odor and vermin.	Fewer opportunities to make connections to student learning

OFF-SITE COMPOSTING

The remainder of this manual is divided between off-site and on-site sections. Feel free to read both to grow your understanding of what each will entail, or read just the section that you plan on implementing at your school.

POTENTIAL SUPPLIES AND EQUIPMENT:

All of the parts of the composting process need to be in place before you can start collecting food scraps during the school day. Make sure to secure the materials you need to compost at school. The supplies you need will vary depending on the specifics of your site and the desires of your off-site partner.

However listed below are some common supplies:

5 gallon buckets

Cloth rags

Outdoor tote

Clipboard with record sheets

1 cart for housing/moving buckets

Scale

Sawdust

Often local businesses or community members are willing to donate some of these materials to schools. Check on that option before purchasing anything.

FIND AN OFF-SITE PARTNER

1. A good place to start looking for an off-site compost partner is your current waste hauler. Many waste haulers now offer a compost pick-up service. However, local farmers or private composting facilities are other potential partners. Publicize a request with-in your community. If you are struggling to find a partner, a quick web search will probably yield a database of haulers in your area.
2. Accept an offer and figure out the following details:
   - When will they pick up and how often? Arranging a consistent schedule, like every day at 2:30, will be easy to remember. Make sure the time works for the school and staff, and is appropriate for the amount of food scraps you will be generating.
   - What is a collection container that they recommend using? Will they empty the contents during pick up or take the containers with them? If they take them, how and when will they be returned?
   - Who is responsible for cleaning the collection containers?
   - Where will the food scraps be picked up? Can students (or staff) easily bring food scraps to this area in a short amount of time? Does the off-site partner have convenient accessibility to this area? Storage containers kept outside the cafeteria doors are typically the most convenient location for both storing and collecting food scraps.
   - What are the do's or do not's of their composting program? Some places allow meat, others do not. Finding out their system up front will allow you fewer problems in the future. Additionally, if you partner with a local farm who will feed livestock with the food scraps, investigate the legislation surrounding what can and cannot be fed to animals.
3. Arrange transportation from the school to the composting site if needed.

DAILY TASKS

1. Collect Food Scraps
2. Weigh Food
3. Transport Food Scraps Outside
4. Clean Up
5. Have Food Scraps Picked Up

PROCEDURES

1. Place a sign above compost buckets that show students what to compost. Some food service staff use a small white board to write what lunch items can be composted each day. Examples of signs can be seen in Appendix IV.
2. Students scrape food scraps into 5 gallon buckets that sit on a cart in lunch room. Some schools have staff help with this process to expedite the line and ensure only compostable materials end up in the buckets.
3. Weigh food scraps by placing bucket on a scale and subtracting the weight of the container. Record the amount to show savings in the disposal of solid wastes produced by the cafeteria. The weights can also be used to construct math problems or track the composting operation.
4. A designated staff or a group of students (one grade can be the compost keepers) take the buckets with lids outside to the pick up location after every lunch. If using large totes, empty buckets into totes and clean out buckets.
5. Adjust your trash pickup schedule accordingly to reflect the diversion of food scraps and recycling. Be sure to monitor cost change to keep track of the monetary value of composting.

ANNUAL TIME LINE

- Form a Steering Committee.
- Draft a plan.
- Find an off-site partner.
- Secure the materials and supplies
- Train the kitchen staff. Develop a daily routine, food handling procedures, and container placement.
- Have an all-school assembly with an engaging or interactive compost presentation. Or have a waste audit (see page __) to build enthusiasm and interest in your school.
- Offer a small group training for staff, students, and volunteers on cafeteria procedures to ensure a smooth transition.
- Have an in-class training with ALL classes about how they will compost during the school day.
- Train one of the older grades as Compost Captains by holding an in-class workshop that will teach them about monitoring the compost in the cafeteria and assign extra duties as they become necessary.
- Send a note home to parents describing the composting that is going on at school and the role their children have in it.
- On the first day of composting, make an announcement during lunch. Have the Compost captains stand by the trashcans and compost buckets to remind students where food and trash goes.
- Use community volunteers or staff to monitor cafeteria food waste recycling system for approximately 2 weeks.
- Thank You Cards- Be sure to properly thank everyone that helped started, cared for, or provided materials for the compost.

- Program Report- Evaluate the effectiveness of your composting infrastructure. Keep track and share the volume of compost collected, the students who helped and community members involved. Use your program report to challenge your school to make a bigger impact next year.
- Adjust your trash pickup schedule accordingly to reflect the diversion of food scraps and recycling, monitor cost change.
- Use the data collected from compost logs in classroom settings to ensure student engagement and interest in the program.

Some of these tasks will only be necessary during the launch year. Adjust your timeline as necessary for subsequent years.

ROLES & RESPONSIBILITIES

In order to have a successful compost program, the responsibilities need to be clearly defined and designated. The staff that works with food the most, Food Service Directors, will probably have the largest role, but they should not be alone. Don't be afraid to get the students involved or throw a work party and inviting parents for the largest tasks.

- Coordinator: This person will be in charge of making sure all of the tasks are assigned and completed. A Coordinator is the go-to person for any questions or contacts. (A compost contact form can be found in Appendix V.)
- Compost Monitor: This person will set up and maintain the compost station in the kitchen, keep signage and bins in good order, and assure there is appropriate time to sort wastes between lunch periods. The Compost Monitor has a crucial role of reminding other assigned adults and students when they are to volunteer as the Lunch Sorter.
- Lunch Sorter: This can be one person or a rotating group that watches the emptying of trays at lunch to ensure that food scraps, recyclables and garbage go into the correct bins.
- Compost Keeper Class: One class in the school, typically 6th grade or older, is in charge of the compost. After lunch, a few of the students take the food scrap bins to the collection site. They can also be the lunch sorters.

STAFF AND COMMUNITY CONNECTIONS

As you know, there is a wealth of talent and resources in a school building. Make sure everyone in your school is aware of the program and ask them to share their expertise. Teachers of all ages and disciplines can involve their classrooms in composting in different ways. Students can takeon leadership roles or engage with the compost through extra-curricular activities. Off-site partners might be willing to give a presentation at the school or host field trips to their facilities. Custodial staff, food service directors, and parents can all play a role in the composting program. Encourage everyone to get involved!

ON-SITE COMPOSTING

CHOOSING A SYSTEM

While you can always start small and scale up your system as the students and staff become accustomed to composting, many schools want to build a full scale system at the outset. Choosing the proper sized composting system can save headaches and hang-ups down the road.

We recommend at least a 3 bin system. Food scraps and bulking materials are loaded into the first bin until it is full. Once the bin is full (this usually takes 2-3 months) turn the food scraps into the second bin, and continue adding food scraps into the first bin. While continuing to collect food scraps in the first bin the material in the second bin begins to actively compost in the second. Continue moving material down the line as the food scraps bin fills up. The compost is ready to be cured once it leaves the 3rd bin. Larger schools may require a 4th bin.

System size will depend on how much food scraps your school creates. Food scrap generation is inversely correlated with the age of the students. Elementary schools produce significantly more food scraps than do high schools. See the table below to estimate how many pounds of food scraps your school will likely generate.

The table on the following page shows the cubic footage you will need in your compost bin based on the number of students and type of school. The color of the cell indicates the bin's estimated fill time and how many bins your school will likely require.

These bin systems can be as simple as a few pallets held together with screws and rebar or they can be elaborate structures with insulated bins and sliding doors for easy access. Amongst other things choosing a system that fits your school will depend on the funds available, the amount of space you have to commit, and your climate. A minimalistic, open air system will be cheapest and likely take up less space, but it might attract more vermin and freeze during the winter in cold climates. A complex compost shed with insulated bins might not have problems with freezing and vermin, but will take up more space on the premises and is significantly more expensive.

A few examples of on-site composting systems can be found in appendix __. Each plan includes a materials list and estimated budget.

DESIGNING A BIN SYSTEM FOR HOT COMPOSTING

Compost bin size by school size (FT^3)

# of Students in the School	Elementary School	Middle School	High School
50	60	39	N/A
75	90	58	28
100	60	77	37
150	90	58	56
200	120	77	74
250	150	97	93
300	180	116	56
400	240	133	74
500	299	193	93
600	359	232	111
700	419	271	130
800	479	310	148
900	539	348	167
1000	599	387	186

3 Bins & 3 Month Fill Time/Bin

4 Bins & 2 Month Fill Time/Bin (Should consider using a bucket loader)

4 Bins & Month Fill Time/Bin (Not recommended without a bucket loader)

The full guide is available on the Agency of Natural Resources website.

POTENTIAL SUPPLIES AND EQUIPMENT:

All of the parts of the composting process need to be in place before you can start collecting food scraps during the school day. Make sure to secure the materials you need to compost at school. The specifics of each site will factor in to exactly what is necessary for each school.

Below is a common list of materials you will probably need:

5 gallon buckets
(start with at least 5)

Clipboards and record logs

Work gloves and
disposable kitchen gloves

1 cart for housing buckets

Shovel or pitchfork

Supply of carbon sources
and manure

Cloth rags

Compost thermometer

Sifting screen

FUNDING YOUR PLAN

On-Site Composting is most likely the cheaper option in the long run, however finding the funds necessary to build a composting system can be tricky. Many agencies and organizations have offered grants to help schools keep costs low while starting composting programs.

As you look through sample systems in appendix __ keep in mind how much each system will cost. Think about your budget and how much money can come from grants or outside sources and how much the school can devote to the project.

BUILDING THE STRUCTURE

Please see the Highfields Composting guide for designing a shed for hot compost in the resources section for more information about the construction of a shed.

Thinking critically and creatively about who will construct your shed is crucial. Will you use volunteers or a construction company? Is a local carpenter willing to donate time? Does your school have a woodshop class that could get involved? Can the framing be done in a single workday with many volunteers? Remember if you are using volunteer labor to bring food/water, have a clear plan for the day, and go over safety rules before work begins.

DAY TO DAY PROCEDURES

1. Place a sign above compost buckets that show students what to compost. Some cafeterias use a small white board to write what lunch items can be composted that each day. Examples of signs can be seen in Appendix IV.
2. Students scrape ALL food scraps into 5 gallon buckets that sit on a cart in the lunch room.
3. Weigh food scraps by placing a bucket on a scale and subtracting the weight of the container. Record the amount to show savings in the disposal of solid wastes produced by the cafeteria. The weights can also be used to construct math problems or track the composting operation. Alternatively, you can catalogue the amount of compost by volume (e.g. number of buckets).
4. Designate a staff member or group of students (one grade can be the compost keepers) to take the buckets to the compost pile outside.
5. Take the compost temperature by placing the long probe into the center of the compost pile. Record the reading. If the temperature has dropped, decomposition has taken place or the balance of the compost needs to be adjusted. (See Trouble Shooting Guide in Appendix VII.)
6. Spread the food scraps onto the pile, do not pile them high.
7. Follow the specific recipe designed for your site and layer with the bulking material recommended (wood chips, wood shavings, leaves or hay). See the recipe formation guide in appendix II. Spread with a pitchfork to cover the food completely. This will make it less attractive to animals.
8. Adjust your trash pickup schedule accordingly to reflect the diversion of food scraps and recycling. Be sure to monitor cost change to keep track of the monetary value of composting.

DAILY TASKS

1. Collect Food Scraps
2. Weigh Food
3. Transport Food Scraps Outside
4. Take Compost Temperature
5. Spread Food Scraps
6. Layer with Bulking Material
7. Clean Up

ON-GOING PROCEDURES

Lots of decomposition takes place in a compost pile. In fact, food wastes and bulking materials are reduced as much as two thirds! To get the most out of your compost, you will need to:

1. Check and Maintain Your Bin

- Any structural problems should be reported to a supervising adult so they can be fixed right away.

2. Turn Your Pile

- When there is a drop in temperature or the pile is overflowing out of the bin, it is time to turn your pile. Simply, this means to mix it up or to move it from one bin to another.
- The best way to turn your pile is to use a garden fork or pitch fork to move the materials in one bin to another bin. The “green” materials and “brown” materials will be mixed up and this will give compost organisms the opportunity to break down more food scraps.

3. Test and Cure Your Compost

- After the pile is no longer actively composting let the pile rest for a few months and turn occasionally. This process is called curing and is essential for making potent mature compost. When the large particles have broken down and the compost is dark, crumbly, and sweet-smelling it will be ready to use as compost. For more information on curing compost see the Composting Basics section on page 6 of this guide.

4. Use Your Compost

- Use the finished compost as a soil amendment by mixing into garden soil before planting or use it as mulch around plants.

5. Source Bulk Materials

- Having a steady supply and large stockpile of bulk materials makes school composting less stressful. Reach out to farms, local businesses, or community members that might be able to supply you with carbon materials and manure.

6. Develop Curriculum Connections

- Integrating the compost program into classroom work is crucial to maintaining student and teacher involvement.
- For examples of possible curriculum see page __.

TIME LINE

- Form a Steering Committee
- Draft a Plan
- Find Funding
- Secure Materials and Supplies
- Build the Composting Structure
- Train kitchen staff: develop daily routine, food handling procedures, and container placement
- Have an all-school assembly with an engaging or interactive compost presentation. Or have a waste audit (see page __) to build enthusiasm and interest in your school.
- Offer a small group training for staff, students, and volunteers on cafeteria procedures to ensure a smooth transition
- Have an in-class training with all classes about how they will compost during the school day
- Train one of the older grades as Compost Keepers by holding an in-class workshop that will teach them about monitoring and caring for the compost throughout the year.
- Send a note home to parents describing the composting that is going on at school and the role their children have in it. This is a great way to build enthusiasm and create a connection to home.
- Start Composting- On the first day of composting, make an announcement during lunch. Have the Compost Keepers stand by the trashcans and compost buckets to remind students where food and trash goes.
- Check in on compost regularly. Take temperature daily and make sure students are following proper compost recipes.
- Turn the piles frequently (at least every few weeks.
- Once food scrap bin is full, transfer pile to next bin and continue this process as bins continue to fill up.
- Cure older piles, to finish composting process.
- Sift compost through screen to keep large particles out of the garden (larger particles can be returned to younger piles to kick start the composting process)
- Use compost on gardens or school grounds as desired!
- Thank You Cards- Be sure to properly thank everyone who helped start, cared for, or provided materials for the compost.
- Program Report- Evaluate the effectiveness of your composting infrastructure. Keep track and share the volume of compost collected, the students who helped and community members involved. Use your program report to challenge your school to make a bigger impact next year.
- Adjust your trash pickup schedule accordingly to reflect the diversion of food scraps and recycling, monitor cost change.

- Integrate the compost program and required duties into classroom curriculum to keep students engaged.

Some of these steps will only be necessary during the launch year. Adjust this timeline as necessary for subsequent years.

ROLES & RESPONSIBILITIES

In order to have a successful compost program, the responsibilities need to be clearly defined and designated. The staff the works with food the most, Food Service Directors, will probably have the largest role, but they should not be alone. Don't be afraid to get the students involved or throw a work party and inviting parents for the largest tasks. Some of the tasks listed below can be done by the same person, however being clear about who has what responsibility and distributing the workload fairly will save headaches down the road.

- Coordinator: This person will be in charge of making sure all of the tasks are assigned and completed. A Coordinator is the go-to person for any questions or contacts. (A compost contact form can be found in Appendix V.)
- Compost Monitor: This person will set up and maintain the compost station in the kitchen, keep signage and bins in good order, and assure there is appropriate time to sort wastes between lunch periods. The Compost Monitor has a crucial role of reminding other assigned adults and students when they are to volunteer as the Lunch Sorter.
- Lunch Sorter: This can be one person or a rotating group that watches the emptying of trays at lunch to ensure that food scraps, recyclables and garbage go into the correct bins.
- Compost Keeper Class: One class in the school, typically 6h grade or older, is in charge of the compost. After lunch, a few of the students take the food scrap bins to the compost pile. They will take the compost's temperature, record it, add the food scraps, and top it off with hay. If they notice a temperature drop, damage to the bin, or anything unusual, they will report it to their teacher or the coordinator.
- Bin Mover: A few times each year (at least), the resting compost bin needs to be emptied to make room to the new food scraps. If the compost in the final bin is fully decomposed and cured, it can be added to the garden. This job is strenuous but is done infrequently. Having the help of several students or staff will make it easier and more fun.
- Pile Monitor: The compost needs to be monitored on a regular basis by taking the temperature and layering with hay. This can be done by the compost keeper class on a daily basis.
- Materials and Resource Coordinator: Materials like hay, manure or even tubs and lumber, need to be acquired. A person needs to be assigned the task of finding free, donated, or cheap sources of materials. They should also make sure those supplies are at the school when they are needed. You can keep track of your contacts with the Compost Contact form in Appendix V.

- Pile Turner: Compost piles need to be turned frequently to ensure proper aeration. By having a designated person or class turn the pile on a regular basis will help increase compost production. Simply, they will use a pitch fork to mix the pile up or move it from one bin to the next bin. By following a proper recipe you can keep the smell of a compost pile to a minimum. However, turning an improperly cared for compost pile can be a stinky job. Be sure students are aware of this before involving them in the job.

STAFF AND COMMUNITY CONNECTIONS

As you know, there is a wealth of talent and resources in a school building. Make sure everyone in your school is aware of the program and ask them to share their expertise. Teachers or all ages and disciplines can involve their class rooms in composting in different ways. Having a compost program on-site is a particularly valuable tool for teachers and countless lessons can be taught through the compost pile. Students can take-on leadership roles or engage with the compost through extra-curricular activities. Custodial staff, food service directors, and parents can all play a role in the composting program. The compost pile can also be a tool for community education or community engagement. The opportunities of having a compost pile on school grounds are essentially endless!

EVALUATION

The steering committee should meet regularly to evaluate the composting program and operation. A short summary describing the successes, including food scraps diverted from the landfill or soil health improvements may justify the continuation of the program. Below are some sample questions to keep in mind while evaluating your program.

- Is the daily processing of food scraps running smoothly?
- Are the bins and equipment in good repair?
- Are the students and staff volunteers working well?
- What is the general attitude of the students and staff about the composting program?
- Is the compost program being used in classroom curriculum?
- How many food scraps are we diverting from the landfill?
- Has the soil health of school gardens/grounds improved?
- Is the compost program financially beneficial to the school?
- What other benefits has the compost program brought to the school?
- What unexpected challenges have we seen so far?
- What adjustments can be made to make the process more efficient?
- How can we recognize and celebrate our accomplishments thus far?

APPENDIX

APPENDIX I: FAQ ABOUT STARTING A COMPOST PROGRAM AT SCHOOL

Will the compost pile smell bad?

A properly maintained compost pile with the right mix of food scraps, hay, moisture and oxygen has a balance of microorganisms to break the pile down and prevent any odor. If food is uncovered or the pile is not turned frequently, then the organisms cannot break the food down and a smell may occur. If you do have a foul smell, try turning the pile, or adding more carbon. Keeping meat out of the pile will also help in reducing the smell. This takes more effort and training in the lunch sorting lines, but it can make a big difference in the smell of your compost. If you continue to have problems see the troubleshooting appendix on page __ or contact a master composter in your area for assistance.

Will the compost pile look unpleasant?

The compost bin should be built with sturdy materials that will hold up in four- season weather. If aesthetics are a main concern, you can place the compost in the back of the school, plant shrubs or erect a fence. Choosing the proper design for your school will also affect the aesthetics of the compost pile. See the design appendix (page __) for more information on picking an aesthetically pleasing system.

Can people get disease from handling composting food waste?

The heat generated from compost is between 130-150 degrees F. While this is hot enough to kill most pathogens, anyone coming into contact with the compost should take proper precautions by wearing gloves and washing their hands when they are done. Once the food scraps are fully decomposed, it can be used and touched just as soil.

Won't the compost pile attract wildlife?

If a compost bin is well-constructed and maintained, it will discourage and prevent unwanted wildlife. When planning your composting system, pick a design that creates a good defense against intruders. For example, using mesh wire or strong wood will help eliminate rodents and a latched lid will discourage raccoons. Keeping the bins maintained and following proper compost procedures when constructing the piles will keep odors to a minimum and attract fewer intruders.

Isn't composting a lot of work?

Composting is certainly more work than throwing food scrap in the trash. Create a simple and convenient system to make it as easy as possible. When designing, keep in mind placement of buckets, bins and supplies as well as accessibility for younger children. Turning the piles will take time and planning ahead, but it can easily become part of a routine. Much of the rest is done for you by the organisms in the compost pile!

**For specific composting problems and solutions, refer to the Trouble Shooting Guide in Appendix VII.*

APPENDIX II: RECIPE FORMULATION CHART

Below is a quick guide to creating high-quality compost. The recipe you choose will depend on the availability of the materials listed in the chart. Ideally, your school composting program would have a stockpile of each of these materials. However, we understand that will not always be the case. You can utilize one recipe for the entire year or fluctuate between different recipes as your carbon sources change. If it is beneficial you can post this chart near your composting system for easy reference.

MATERIAL	RECIPE 1	RECIPE 2	RECIPE 3	RECIPE 4
Food Scraps				
Horse Manure				
Leaves				
Chips/ Sawdust				
Mulch Hay				
Shredded Paper				

APPENDIX III: RECORDING LOG

An effective and efficient composting program that will make all stakeholders happy requires monitoring and recording. There are several components to a successful pile that should be recorded. This form is simple enough for students (the Compost Keepers) or staff to use in observing the pile on a daily basis.

Compost Log 1: A two week log to monitor the amount of food scraps being composted daily. This will work for an off-site composting program.

Compost Log 2: A one week log that monitors the amount of food scraps being composted, the temperature of the compost pile, and any observations of the structure or compost. This is designed for an on-site composting program.

COMPOST LOG 1

Start of the Week Date: _____

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Menu items:					
Weight of plate scrapings					
Recorder:					
Total Weight for Week:					

Start of the Week Date: _____

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Menu items:					
Weight of plate scrapings					
Recorder:					
Total Weight for Week:					

COMPOST LOG 2

Start of the Week Date: _____

	Menu items:	Amount of Food Scraps:	Type and amount of carbon source added	Temperature of Piles	Observations*
MONDAY				BIN 1: BIN 2: BIN 3:	
TUESDAY				BIN 1: BIN 2: BIN 3:	
WEDNESDAY				BIN 1: BIN 2: BIN 3:	
THURSDAY				BIN 1: BIN 2: BIN 3:	
FRIDAY				BIN 1: BIN 2: BIN 3:	
		TOTAL WEIGHT:		AVERAGE TEMPERATURE:	

*Make observations about the compost bin structure, any animal activity, the temperature of the compost, or any other important information. Report your observations to your teacher.

APPENDIX IV: COMPOST SIGNS

Sings above the compost buckets and trash cans will make it easier for students to compost the items on their food trays. We have included sign templates to meet the needs of any composting program.

Set 1: Compost and garbage sign templates: print and add pictures of appropriate items. Be sure meat is included in the correct sign (compost if allowed, or garbage if not).

Set 2: Word compost & garbage signs that include meat being composted

Set 3: Word compost & garbage signs that do not include meat being composted

GARBAGE

COMPOST

COMPOST

FRUITS & VEGETABLES
BREAD
CHEESE
PEANUT BUTTER & JELLY
CHIPS
CHOCOLATE

GARBAGE

MILK/JUICE CARTONS
MEAT
NAPKINS
PLASTIC BAGS
PLASTIC FORKS
ANYTHING PLASTIC,
METAL, OR GLASS

COMPOST

FRUITS & VEGETABLES
MEAT
BREAD
CHEESE
PEANUT BUTTER & JELLY
CHIPS
CHOCOLATE

GARBAGE

MILK/JUICE CARTONS
NAPKINS
PLASTIC BAGS
PLASTIC FORKS
ANYTHING PLASTIC,
METAL, OR GLASS

APPENDIX V: COMPOST CONTACTS

This is a location to store important compost contacts. When you secure a source for hay or manure, or an individual to transport compost, be sure to note that information. However, this is also a meaningful tool to help you clearly define who is responsible for what duties, and to help see where there might be gaps or overlap in duties.

Contact Name	Service Provided/ Duties	Phone Number	Address

APPENDIX VI: COMPOST BIN DESIGN

The following design is for a 3-Bin Composting System prepared by HighFields for Holland Elementary School.

Notes and Suggestions:

- Sauna tubing and concrete below frost level for the structural posts--this prevents twist to the structure during freezing and warming of ground
- At least four inches of ¾" inch gravel for appropriate drainage and as a rodent deterrent, in front, beneath and around bins–roughly 2 cubic yards
- An appropriate step-stool for when food scraps in bin reach 2+ feet in height and top Dutch door needs to be closed

Tools Needed (multiples of each):

Hammers, staple gun, hand saw, circular saw, square, tape measure, table saw, portable drill with bits for drilling and roofing screws, posthole digger, shovel, and level.

Unnoted costs in materials list (prices are a rough estimate and may vary depending on location and market)

Lumber (costs are rounded up to the half dollar):

(1) 2x4x12: bin bottom supports – cost: $3.50

(10) 2x4x8: ridge supports – cost: $20.50

(2) 2x4x16: rafter braces – cost: $8.50

(2) 2x4x10: rafter braces – cost: $5.50

Hardware:

(6) hook and eye set – cost: $18.00

Gravel:

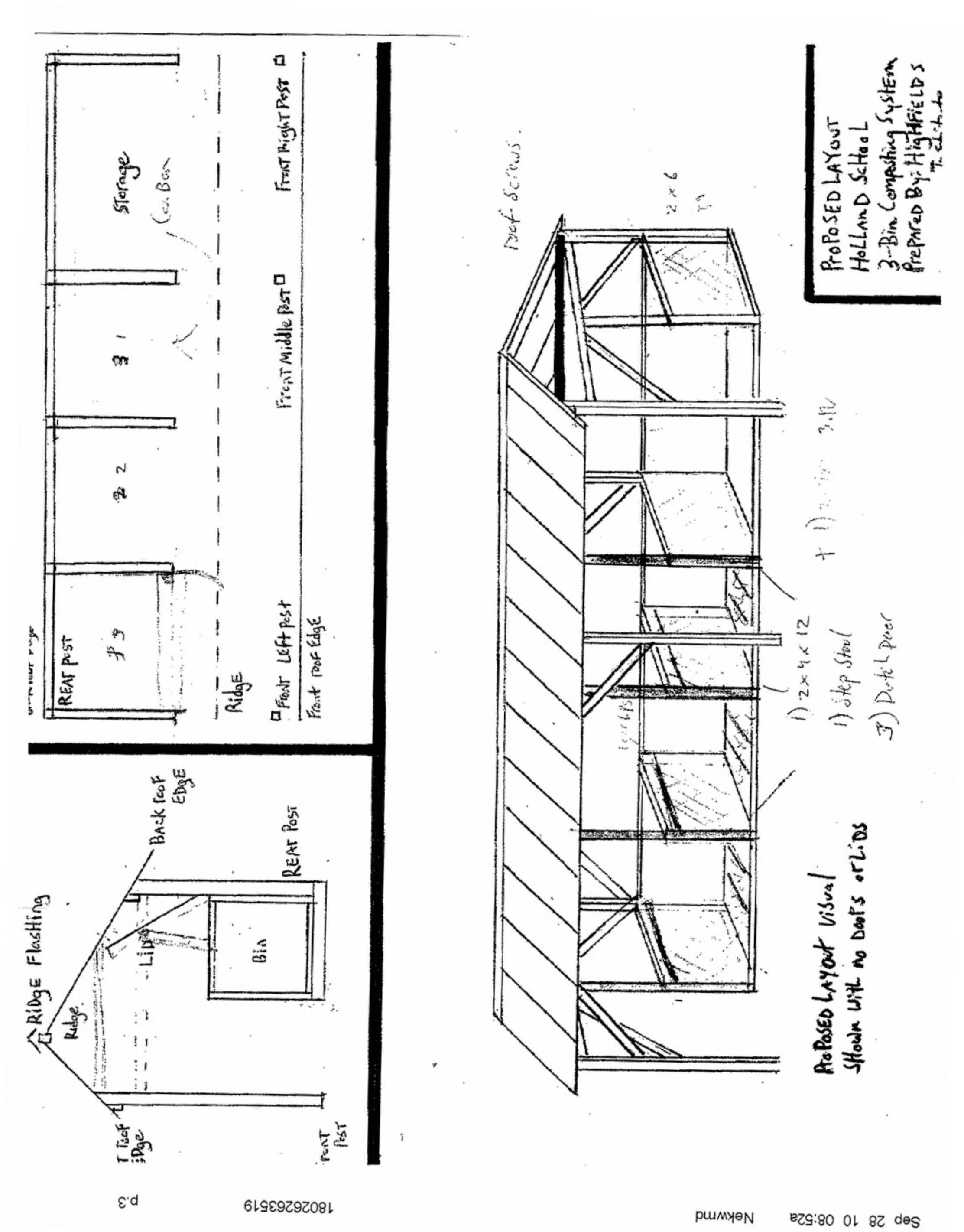
(2) Cubic yard bank run gravel – cost: $20

Subtotal Cost: $76

Materials List Subtotal: $846.11*

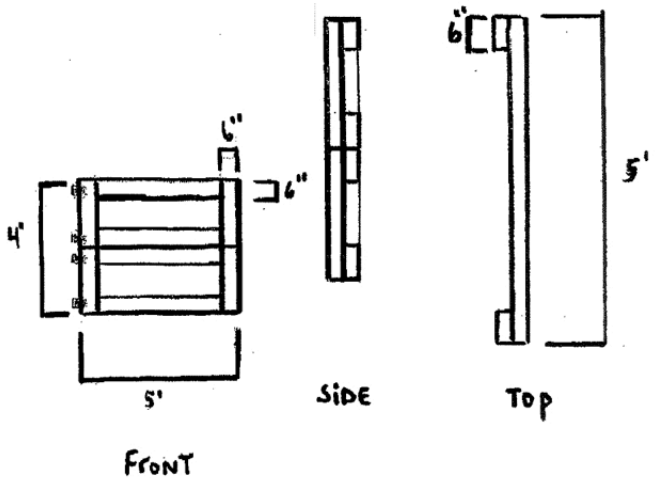
Grand Total: $922.11

**Lumber in this quote is dressed. Using rough cut lumber is likely to reduce the cost substantially.*


PROPOSED LAYOUT
HOLLAND SCHOOL
3-Bin Composting System
Prepared By: HIGHFIELDS
Proposed Layout Visual
Shown with no Doors or Lids
Storage
Front Right Post
Front Middle Post
Front Left Post
Front roof Edge
Ridge
Rear Post
Ridge Flashing
Back roof Edge
Lid
Bin
Front Post
2 x 6
1) 2 x 4 x 12
1) Step Stool
p.3
18026263519
Sep 28 10 08:52a

p.4

18026263519



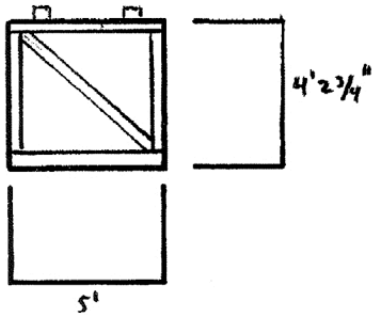
Doors x 3

Total Lumber:

6)	2x6x10	$ 23.0
3)	2x6x8	$ 9.1
12)	3" Hinges	$ 36.
15' of 48" Hardware cloth 1/4"		(includ

TOTAL: $ 68.5

Back



Front

Lids x 3

Nekwmd

Sep 28 10 08:52a

Total Lumber
* ALL LIDS

3)	2x4x10	$ 7.00
1)	2x4x20 (cross brace)	$ 5.50
3)	2x4x8	$ 6.5
6)	3" Hinges	$ 18.00
3)	Appropriate handles	$ 9.00
3)	2x4x8 (Lid stops ripped in 1/2)	$ 6.50

Total: $ 52.50

APPENDIX VII: TROUBLE SHOOTING GUIDE

Problem	Cause	Solution
Compost pile contains earwigs, slugs and/or other insects	Pile is composting correctly	Insects are a good sign of a productive compost pile!
Compost pile is attracting raccoons, dogs, flies or other pests	Amount or type of greens incorrect	Avoid meats, bones, oils
	Exposed food scraps	Place food scraps in center of pile and cover completely with browns
	Compost bin needs repair	Keep the bin well maintained
Compost isn't heating up	If it seems damp and sweet-smelling, it may be a lack of nitrogen	Mix in food scraps or other materials high in nitrogen
	Not enough moisture	Add water
	Not enough oxygen	Turn or fluff the pile
	Pile may be too small (less than a cubic yard)	Build the pile up to 3' x 3' x 3'
Temperature levels off	More food scraps needed	Add more greens
	Composting is finished	If it looks dark and crumbly and smells earthy, it is time to remove compost and let it cure. Begin a new pile.
Matted, undercomposed layers of leaves or food scraps	Compaction, poor aeration	Break up layers with garden fork, or shred them, them re-layer or turn the pile Avoid adding thick layers of bulking materials

Problem	Cause	Solution
Large, undercomposed materials	Size and composition of materials	Screen out undercomposed items, shred and reuse in new pile
		Reduce particle size by shredding
Compost pile has a bad odor like a mixture of rancid butter, vinegar and rotten eggs	Not enough oxygen, compaction	Turn the pile and shake materials to loosen and aerate
	Not enough oxygen, too wet	Turn the pile and add coarse dry materials such as leaves, wood shavings, sawdust, straw or shredded newspaper to soak up excess moisture
Compost has a bad odor like ammonia	Pile may have too much nitrogen	Add materials high in carbon such as leaves, wood shavings, sawdust, straw or shredded newspaper
		Mix in to aerate

*Taken from: School Composting: A Manual for Connecticut Schools. (2002). Connecticut, Connecticut Department of Environmental Protection.

APPENDIX VIII: RESOURCES

ORGANIZATIONS:

COMPOST ASSOCIATION OF VERMONT

www.compostingvermont.org/

U.S. COMPOSTING COUNCIL

631-737-4931

www.compostingcouncil.org/

WASTE MANAGEMENT DISTRICT

Marcus Berry: Outreach Coordinator

outreach@nekwmd.org

802-626-3532

www.nekwmd.org/composting.html

UVM EXTENSION MASTER GARDENER OFFICE

Nancy Hulett, Director

Lisa Avery, Program Assistant

Master.gardener@uvm.edu

802-656-9562

www.uvm.edu/mastergardener/mastercomposter

• Vermont Master Composter Course

CHITTENDEN SOLID WASTE DISTRICT

Jessica Sankey

802-872-8111

info@cswd.net

http://www.cswd.net/programs/schools-students/

• Trash on the Lawn Day- Trash Audits

• Customizable Posters

• School Composting Guides

• Presentations and Consultation

• Recycling and Composting Containers

• Signs, Stickers and Posters

• Phone and E-mail Contact for Questions

• Ongoing discounted Compost Bin Sales

• Video Library

GREEN MOUNTAIN SOIL IN STOWE, VT

Kurt Reichelt

kurt@greenmountainsoil.com

802-595-9681

www.greenmountainsoil.com

• Red Wigglers – Worm Composting

DOWN TO EARTH WORM FARM

281 The Bend Rd

Greensboro Bend, VT 05842

802-533-9836

www.downtoearthwormfarmvt.com

• Red Wigglers – Worm Composting

BOOKS:

Let It Rot
by Stu Campbell

Worms Eat My Garbage
by Mary Applehof

The Rodale Book of Composting
edited by Deborah Martin & Grace Gershuny

Compost! Growing Gardens from Your Garbage
by Linda Glaser and Anca Hariton

CURICULUM GUIDES:

Do the Rot Thing
Central Vermont Solid Waste Management District, 2007
Funded by State of Vermont Department of Environmental Conservation
www.cvswmd.org/wp/wp-content/files/pdf/Do_the_Rot_Thing_CVSWMD1.pdf

Composting Across the Curriculum, A Teacher's Guide to Composting
Marin County Office of Waste Management
Funded by the U.S. EPA
10 N. San Pedro Rd, Suite 1022
San Rafael, CA 94903

Project Learning Tree Exploring Environmental Issues: Municipal Solid Waste
American Forest Foundation with the Council for Environmental Education, 1997
Kellogg Environmental Center
PO Box 435
Derby, CT 06418

A Quest for Less, A Teacher's Guide to Reducing, Reusing, and Recycling
U.S. EPA
1200 Pennsylvania Ave, NW (5305W)
Washington, DC 20460
November 2000
www.epa.gov/osw (you can download or print all or part of the document)

The Wonderful World of Wigglers
Julia Hand
Food Works
64 Main Street
Montpelier, VT 05602
A Common Roots Book, 1995

What a Waste! A Teacher's Resource for Integrating the Solid Waste Crisis into the Classroom
The Garbage Museum
1410 Honeyspot Rd. Extension
Stratford, CT 06615
1992

MAGAZINES:

Biocycle

Emmaus, PA

www.biocycle.net

Composting News

Cleveland, OH

(440) 238-6603

www.recycle.cc

WEBSITES:

Cornell University website: www.cfe.cornell.edu/compost

Master Composter: www.mastercomposter.com

The Virtual Composter: www.compostinfo.com

University of Minnesota Extension Service:
www.extension.umn.edu/distribution/horticulture/DG3296.html

VIDEO:

www.cswd.net/wp-content/uploads/2010/10/CSWDSchoolPrograms.pdf

www.highfieldscomposting.org/CompostVideo1.htm “Compost Only” School Composting Instructional Rap Video – Highfields

downtoearthwormfarmvt.com/videos Worm Composting - Down to Earth Farm