In 1901, King C. Gillette had several failed businesses behind him. His eventual success came only after he heeded the advice of a friend, who had simply pointed out to Gillette that if he manufactured something that was disposable, he would have a customer for life. Based on that idea, he built up a business making disposable safety razors that people first came to know 100 years ago, and from that busines evolved the Gillette company we know today.

Businesses are still following that century-old advice, and it still works. As a convenience to consumers, manufacturers are making more products – such as mop heads and toilet bowl brushes – disposable. Foods can come in single-serving packages; even apples are pre-sliced and wrapped up in the name of convenience. All of this convenience comes at a price, and that price is not paid by the consumers or the manufactures, but by the environment.

Much of what Americans throw away ends up in dumps or landfills. Americans seem to have an infinite capacity to generate waste; however, there is a finite amount of space in which to put this waste. Europe, for example, has run out of space for dumps and landfills. As a consequence, very little of their waste is actually thrown away. Most of it is recycled, reused, or incinerated and converted into energy. They do this out of necessity. Because of its sheer size, America has no such need yet; sooner or later, that need will come.

S1 Number	Major Components	Range (% of wet weight)
1	Food waste	4.4–15.3
2	Garden waste	12.5–24.2
3	Glass	6.5–10.9
4	Metals (iron and aluminum)	4.0–9.0
5	Moisture	27.1–35.0
6	Other combustibles	1.6–12.1
7	Other noncombustibles	1.8–11.1
8	Paper	41.6–53.5
9	Plastics	0.76–5.7

(Dig. 1) This table shows the typical composition of municipal waste. Materials that could potentially be composted make up from 16.9% to 39.5% of the waste while 52.8% to 79.1% of the garbage is recyclable.

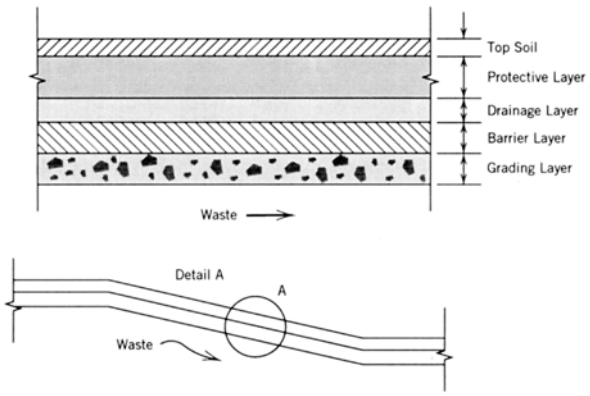
In order to address this issue, the general public needs to be aware that a problem exists. However, that would require us to think about the unsavory topic of garbage, something that most people around the globe seem to loathe. In *Rubbish! The Archeology of Garbage*, W. L Phillips says that “Garbage . . .is something that appears to bring differing populations to common agreement. Everyone produces it, nevertheless, no one wants anything to do with it, other than to take it ‘out.’” An old adage tells us that out of sight is out of mind; however, when it comes to garbage, people seem to stop thinking about it as soon as it leaves their hands, even if it is still in sight.

What is the path a piece of garbage typically takes once it leaves our hands? The last contact most of us have with our refuse is when we put it out on the curb to be picked up by the trash collectors. Depending on how close the nearest dump or landfill is, the trash may change hands several times before being abandoned in a dump or a landfill. This report will focus on landfills, although dumps are an equally hefty problem. In a landfill, new garbage is compressed. To avoid unsightliness, smells, and wind-blown litter, the

compressed trash is covered over and more garbage is piled on above the old. This process continues until the landfill is full. Then the landfill is capped, planted with turf and a new one is dug somewhere else. This process will go on indefinitely unless something changes.

There are several problems with this process. The manner in which the garbage is continually covered inhibits decomposition. Once a section of a landfill is capped, air exchange with the outside is cut off. Also, the purpose of the cap is primarily to keep water out of the landfill. In the absence of oxygen and water, decomposition is nearly impossible. Newspapers that are decades old have been recovered from landfills with their stories and pictures still intact. Anaerobic decomposition is possible, but has some undesirable "side effects." One such byproduct is methane gas, which is a potent greenhouse gas. Years after a company closes a landfill, the owners must monitor the gas production and keep most of the gas from escaping into the environment. Many companies accomplish this by simply burning the gas off.

Anaerobic decomposition can cause another problem through the formation of leachate. Leachate is liquid that contains the chemical by-products of anaerobic decomposition. While these chemicals do not present a problem in small quantities, they are dangerously concentrated in landfill leachate. Leachate quality and quantity also must be monitored after the landfill closes.



(Dig. 2) This is a diagram of a typical landfill cap. There is only a thin layer of topsoil, but there are several layers intended to keep water out of the landfill.

If many people from several different fields agree that there is a problem, the next question is: what can anyone do about it? I believe that a major component of the problem is a general lack of public awareness. It is important to keep in mind that, while it is true that each individual person contributes little to such a vast problem, the summation of many individuals are a large portion of the problem. Also, while one person may not be able to bring about a change in, for example, local recycling programs, many people banded together can bring about such change.

The problems created by landfills formed my design challenge. The goals of this project were:

- To bring the problem of waste and waste disposal to the attention of many individuals
- To show people that there is a better way to manage our waste
- To show people that better waste management practices do not require huge life changes

People can try to solve a problem only if they know that it exists. They also need to know what to do or how they can help. However, most people also tend to resist change; our brains evloved to distrust the unfamiliar and follow the well-worn path of least resistance. However, the ways in which people can help mitagate the problems caused by landfills do not have to take much effort on a personal level. In an individual household, it could be as simple as sorting your own garbage instead of throwing food scraps and empty cereal boxes into the same trash bag. A single individual making these changes may not be the solution to such a vast problem; however, just as the thoughtless actions of many individuals are a main cause of the problem, thoughtful changes by these same individuals can be a large portion of the solution.

The Site

The most logical choice for such a design statement is on the site of a capped landfill. The managers of many closed and capped landfills simply plant turf on the site to control erosion. There is a movement to reclaim this land for public use, usually as parks. However, these parks usually erase the traces of the land's prior use and ignore the issue that made reclamation necessary. In fact, there have been cases where the people using the park had absolutely no idea that they were walking over a closed landfill. I intend to make visitors aware of the refuse lying beneath their feet.

The landfill that I chose as my site for this design challenge is the Wayne County Landfill, located along Rt. 220 McElhattan, which is north of Lock Haven, PA. This particular landfill handles an average of 500 tons of waste each day. It accepts most types of waste (municipal, sewage sludge, demolition) except hazardous waste. Aside from a small residential community in McElhattan and Lock Haven University, much of the surrounding area remains farmland. The drive on Rt. 220 is quite attractive; the views from the road alternate between stretches of woods creeping up to the road and open vistas of farmland

One of the things that attracted me to the site was its proximity to a major road; Rt. 220 actually goes through the site, splitting it into two pieces. On the western side is the older section of the landfill which obtained its permit in 1973. This was befor many of the regulations that protect the environment from landfills were in place. Both the trench and area fill disposal methods were used here, and both were unlined. These methods of waste disposal left much of the garbage open to the weather longer than current practices do, which generated more leachate. Since these sections of the landfill were not lined, the only protection the environment had from the leachate was the clay floor, which may or may not have stopped the leachate from seeping into the surrounding soil. The managers of the Wayne County Landfill propose to redevelop this section, which would not only provide more space for waste disposal but would also offer the opportunity to line this section.

The Municipal Waste Management Rugulations were instituted in 1988; these regulations require landfills to implement practices that protect the environment, such as lining the landfills with HDPE (a non-permeable plastic). The portion of the Wyane County Landfill on the eastern side of Rt. 220 was permitted in 1990, after these regulations were in place. This secion was state-of-the-art when it was built, even double lined with 100-mil HDPE. The current plans for the landfill call for this side to be built up several feet above the elevation of Rt. 220, creating a hill on one side of the road.

The managers of the Wayne County Landfill try to stay current in their management practices, which means that their management of the landfill is continually becoming more ecologically sound. For example, instead of burning off the methane gas generated in the landfill, as was once standard practice, they sell

the gas to a manufacturing company whose property happens to adjoin that of the landfill. The leachate was once treated on-site; after treatment, the water was as clean as the water coming out of the municipality's waste water treatment plant. However, the landfill managers are now trying something new. Past practices included keeping the garbage as dry as possible to avoid the production of leachate. At the Wayne County Landfill, they are recirrculating the leachate through the garbage. This keeps the garbage moist, which is intended to aid decomposition. The Wayne County Landfill also provides on-site recycling facilities, and even has a facility to produce mulch from woody yard waste.

The Design

The design response to this many-faceted problem took the form of an educational park. Called Refuse Park, it has five distinct sections. Throughout the design process, I thought of these sections as representing: (1) current practice (2) consequences of current practice (3) personal responsibility (4) taking action (5) the clue. These sections are, respectively, Trash Heap Hill, the Wastelands, Memorial Meadow, Compost Commons, and the gazebo and play area. Each of these sections is described in more detail in the folowing paragraphs.

Trash Heap Hill

Trash Heap Hill is a portion of the landfill that has been constructed above ground level. On the side that faces Rt. 220, there is a large panel of transparent material showing that this is no ordinary hill. People will be able to see the many layers of liners and covers that seal a landfill off from the surrounding environment. Through one corner of the hill is a tunnel, also transparent. People going through will walk on the synthetic fibers that protect our groundwater from our own filth. Visitors will be able to see the layers of garbage up close. In doing so, they should be able to better understand the enormity of out wastefulness.

The Wastelands

When deciding on a name for this place, I had considered "The Wastelands," meaning land that had been created by our waste. However, most people think of a barren and desolate place when they hear that word. Still, the name stayed in my mind. When I thought that I wanted to include in the design an example of what can result from our throw-away lifestyle, the word "wastelands" came back to me. The Wastelands, located immediately adjacent to Trash Heap Hil, will not be cultured by human hands. It usually takes quite a bit of effort to make plants grow over a landfill; there is typically only a thin layer of soil over the cap, which leaves roots little room to grow. It also gets quite dry. Under these conditions, only those plants that most people consider weeds will prosper; so that is what will be allowed to grow. If people ever decide to stop maintaining the plantings that now exist over landfills, the Wastelands is an example of what could result.

Memorial Meadow

There are people who now do the job that no one wants to do – take care of our waste. Memorial Meadow is dedicated to those people. This was inspired, in part, by photographs of sculpture that I saw. The sculpture took the shape of a person and was made entirely of materials that had been thrown away and. Similar sculpture would be present in the meadow. Each sculpture would stand for someone in waste management. As people walk through the meadow, they will be joining the sculpture and the ranks of those who take responsibility for our waste. This is why, to my mind, Memorial Meadow also represents personal responsibility.

Compost Commons

If our current practices are bad, what would be better? Compost Commons gives one of many answers to that question. Every day people throw away compostable materials while every spring gardeners buy compost. Composting literally takes trash and turns it into a desirable product. Composting can even help solve some of the problems of trying to grow plants on a capped landfill by providing rich growing medium for plants. The commons will consist of a series of raised beds. On the bottom of these beds there will be a layer of soil and compostable material will be dumped on the soil. As the beds fill up, they will have to be turned to ensure good decomposition. After the composting process is complete, the compost and soil will be mixed together. Then the beds are ready to be planted. The Compost Commons will have to be built gradually, starting in the parking lot. People are already accustomed to seeing raised beds in parking lots; these beds are just a bit more ecologically responsible.

Gazebo and Playground

The gazebo and playground are central to the site. I acknowledge that some visitors will not want to go through the entire site, while others may walk through it blissfully unaware of what is going on around them. This feature is for those visitors. Most parks have a playground of some sort, right? The playground in this park is a little different. It has no brightly colored, plastic slides. This playground is modeled after the adventure playgrounds of the 1960s, which in turn were modeled after junkyards. After all, kids love junk. They like places where they can find debris, such as construction sites or junkyards. By all accounts, these adventure playgrounds were a hit with the kids. The adults, however, did not like them, so they faded out of existence. I intend to resurrect this nearly-extinct form of fun. The playground will be made of rescued materials and should have many different types of spaces: tunnels, perches and things that the kids can move in order to create their own spaces.

(Dig. 3) This is a section of how the Compost Commons would work. The bed on the right has been completed, the finished product being a planted bed. The bed on the left is still in progress, with a layer of soil on the bottom and the composting materials on top.

(Dig. 4 & 5) Mention of adventure playgrounds seems to disappear after the 1970s, but kids haven't changed much since then.

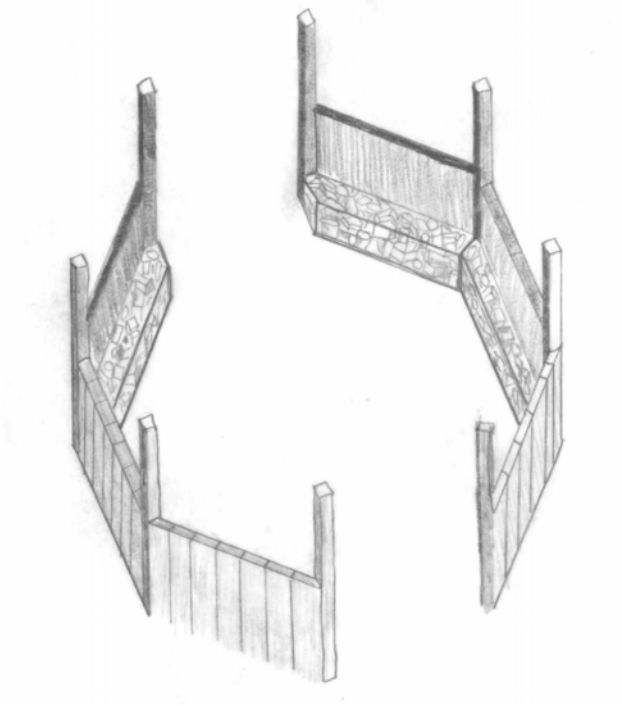
The gazebo is intended to make the meaning of the site transparent. It is to be built using recycled plastic "wood." Transparent benches filled with plastic containers line the inside of the structure. Signage inside the gazebo will explain the material with which the gazebo is made, and that the things inside the benches could easily have become the boards to this structure had they been recycled. More signage will explain some of the features of the site, such as outlining the composting process or a labeled diagram showing the different layers of Trash Heap Hill.

There are two elements that are meant to travel through the site. One is people, the other is water. A landfill cap is designed to shed water as efficiently as possible. The site is carefully manipulated to direct water as accurately as it would be inside a pipe. As a part of the design, I will attempt to make that manipulation evident. Embedded in the ground will be pipes cut in half to leave the upper side open to the sky. These pipes will be like dry stream beds

Dig. 7

most of the time. During a rainfall, however, they will fill up and shunt the water directly to the retention pond. This is not manipulating the water any more than it would be on a typical landfill cap; it is only an effort to make the manipulation more visible.

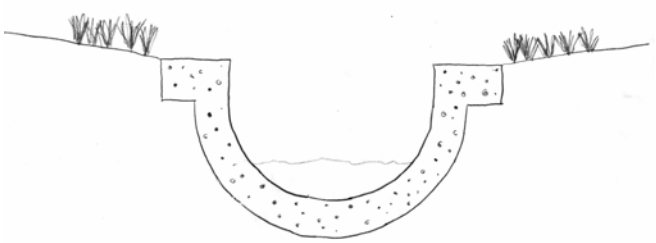
All of these different features are located on the west side of Rt. 220, the side of the landfill that is capped. The other side is still active. The current plans call for this side of the landfill to be built up into a mound several feet above the level of the road. My design calls for no change in that plan. Until that side, too, closes, there will be an active landfill across



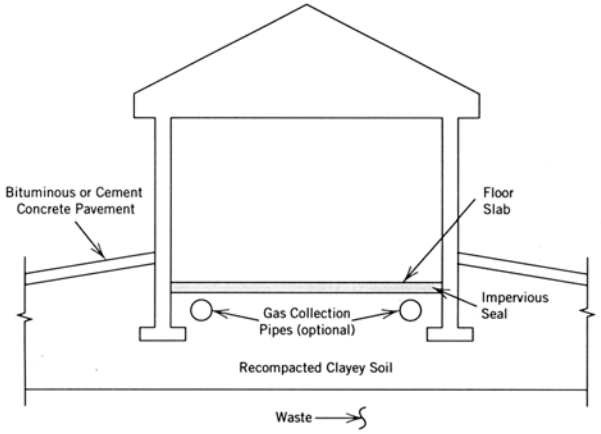
The benches in the gazebo are clear, revealing the unrecycled plastic within (Dig. 7). When building on a landfill, one must consider issues such as methane collection and ground instability (Dig. 8).

from the park. The shape of Trash Heap Hill is intended to reflect the geometry of the mound

(Dig. 9) The pipe waterways don't necessarily control the water more than usual, but they make that control visible.



Dig.8



across from it, although Trash Heap Hill is closer to being at a human scale.

Throughout the design, the different elements are familiar, but with a difference. For instance, people are accustomed to seeing formal gardens with raised beds. However, that tidy, orderly image is in conflict with the dirty, messy process of composting. We are accustomed to gazebos and playgrounds in parks; in this park these features are more ecologically conscience than in most. My hope is to convey to people that being environmentally responsible doesn't need to entail dramatic changes in their lifestyle. On the surface, things look much the same. At a deeper level, they could make a difference in the quality of life for future generations.

Sources:

Bagchi, Amalendu; Design, Construction, and Monitoring of Landfills. John Wiley & Sons; New York, New York. 1994.

Bengtsson, Arvid; Environmental Planning for Children's Play. Praeger Publichers; New York, New York. 1970.

Koerner, Robert M. and David E. Daniel; Final Covers for Solid Waste Landfills and Abandoned Dumps. American Society of Civil Engineers; Reston, VI. 1997.

Rainbow, A. K. M.; Why Recycle?. A. A. Balkema Publishers; Brookfield, VT. 1994.

Diagrams:

Diagram 1: Bagchi, p61

Diagram 2: Koerner, p5