Division of Environmental Quality
Solid Waste Management Plan Criteria

The purpose of a solid waste management plan is to identify opportunities to reduce, reuse, and recycle materials that would otherwise end up as waste in the landfill. The implementation of such a plan is required for every major siting project in order to reduce direct and cumulative impacts to the CNMI's limited waste management system. These plans can also help developers and operators save time and money by reducing the amount of waste materials produced during project construction and operations. At minimum each solid waste management plan must include:

1. ***Projection/estimate of wastes to be generated, disposed and reduced/recycled**
   From the Construction Phase to the Operation Phase
2. **Account of how waste will be managed**
   During the Construction Phase and Operation Phase
3. **Strategies used to reduce the amount of waste generated at the source**
   During Construction Phase and Operation Phase

An example of an accepted solid waste management plan from a past major siting application is include below for reference. Please use the following EPA sources to determine project specific waste generation projections:
- Municipal Solid Waste Generation, Recycling, and Disposal in the U.S. (Attachment 1)
- Construction Waste Management Guidance for Section 01 74 19 (Attachment 2)
- Construction Waste Management for Section 01 74 19 (Attachment 3)

Solid Waste Management Plan Prepared by:

January 2018

> The existing I has a total of 50 rooms and the planned expansion will include an additional 50 for a total of 100 rooms. Assuming an average occupancy of 2 people per hotel room, the total occupancy of the completed development will be 200 (100 in the existing hotel + 100 in the expansion).

> Operational waste production data was obtained from a US EPA Report, "Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures 2012", which identifies a waste generation rate of 4.38 pounds per person per day. Recycling data also comes from the same report, which identifies recycling rates for each category of wastes. It is assumed that individual waste production and recycling habits will mimic those in the US EPA report with the exception of the food and yard waste, as described below.

> Food and yard waste will be diverted for livestock feed and composting. These wastes are primarily produced by cafeteria staff and maintenance staff through onsite operations, and it is reasonable to expect that these wastes can be controlled and diverted 100% for the hotel.

> Solid waste will be sorted on site. Recyclable items will be taken to one of the recycling centers in Lower Base, Saipan and the other refuse will be transported to the Marpi Landfill by Five Star G Co. The completed development will utilize Artman Co. for solid waste and recycling collection and disposal services

> Construction & demolition debris data is based on "Estimating 2003 Building-Related Construction and Demolition Materials Amounts" published by US EPA.

Operational Waste Production by Category

	Per Capita Gross Production [lb / (person*month)]	Percent Composition	Expected Recycling Rate	Per Capita Net Production [lb / (person*month)]	Site-Wide Annual Diversion [tons]	Site-Wide Annual Net Production to Landfill [tons]
food and yard waste	13.72	28%	100%	0.000	44.15	0.000
paper	36.004	27%	65%	12.745	27.909	15.295
glass	6.044	5%	28%	4.370	2.009	5.245
metal	11.695	9%	34%	7.719	4.773	9.264
plastic	16.688	13%	9%	15.219	1.764	18.264
other	24.178	18%	17%	20.000	5.015	24
hazardous waste	0	0%	0%	0.000	0.000	0.000
Total Waste:	131.4	100%	54%	60.053	85.62	72.068

Construction & Demolition Debris Production

Activity	Building Area (sf)	Generation Rate (lb/sf)	Debris Generated (tons)	Recovery Rate	Debris Recovered (tons)	Net C&D Waste (tons)
Construction	20,000	4.34	43.4	48%	20.832	22.568

Attachment 1 – EPA Municipal Solid Waste Generation, Recycling, and Disposal in the U.S.

EPA
United States
Environmental Protection
Agency

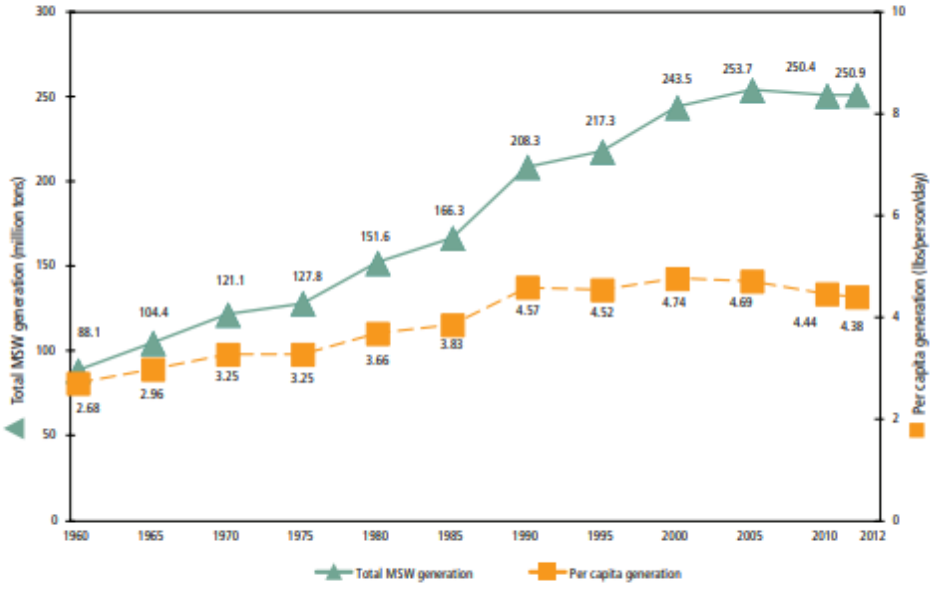
Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2012

The U.S. Environmental Protection Agency (EPA) has collected and reported data on the generation and disposal of waste in the United States for more than 30 years. We use this information to measure the success of waste reduction and recycling programs across the country. These facts and figures are current through calendar year 2012.

In 2012, Americans generated about 251 million tons[1] of trash and recycled and composted almost 87 million tons of this material, equivalent to a 34.5 percent recycling rate (See Figure 1 and Figure 2). On average, Americans recycled and composted 1.51 pounds out of our individual waste generation rate of 4.38 pounds per person per day.

EPA is thinking beyond waste and seeking a systematic approach that provides a transition from waste management to sustainable materials management (SMM). In this year's report, EPA explores the connection between personal consumer expenditures and the generation of wastes. The transition is well under way, with the U.S. economy continuing to provide goods and services for household consumption more efficiently when looking at the MSW generated from consuming those goods and services.

Figure 1. MSW Generation Rates, 1960 to 2012



[1] U.S. short tons unless specified.

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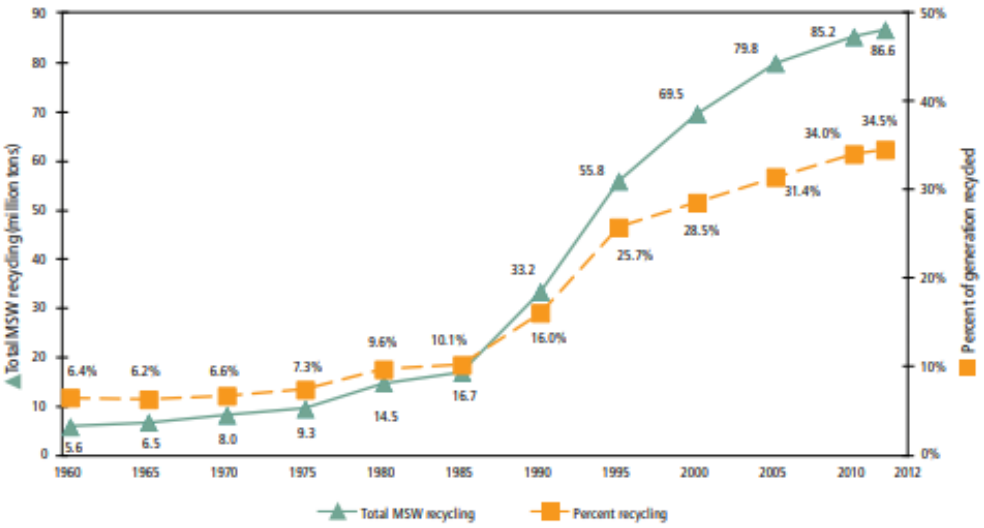
Figure 2. MSW Recycling Rates, 1960 to 2012



Trends in Municipal Solid Waste in 2012

Our trash, or municipal solid waste (MSW), is comprised of various items Americans commonly throw away after being used. These include items such as packaging, food waste, grass clippings, sofas, computers, tires, and refrigerators. MSW does not include industrial, hazardous, or construction waste.

In 2012, Americans recovered over 65 million tons of MSW through recycling and over 21 million tons through composting. We combusted about 29 million tons for energy recovery (about 12 percent). Subtracting out what is recycled and composted, we combusted (with energy recovery) or discarded in landfills 2.9 pounds per person per day of MSW.

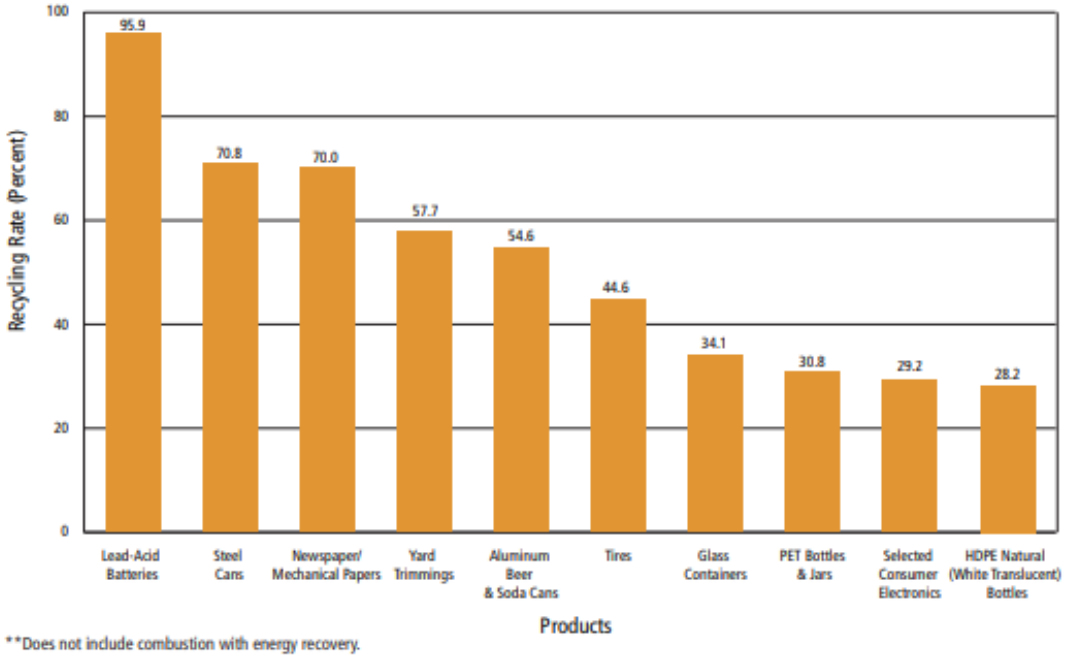
In 2012, lead-acid battery recovery was about 96 percent (2.8 million tons). Newspaper/mechanical papers recovery was about 70 percent (5.9 million tons), and over 57 percent of yard trimmings were recovered (19.6 million tons) (see Figure 3). About 135 million tons of MSW (53.8 percent) were discarded in landfills in 2012 (see Figure 4).

Over the last few decades, the generation, recycling, composting, and disposal of MSW have changed substantially. Solid waste generation per person per day peaked in 2000 while the 4.38 pounds per person per day is the lowest since the 1980's. The recycling rate has increased–from less than 10 percent of MSW generated in 1980 to over 34 percent in 2012. Disposal of waste to a landfill has decreased from 89 percent of the amount generated in 1980 to under 54 percent of MSW in 2012.

Sources of MSW

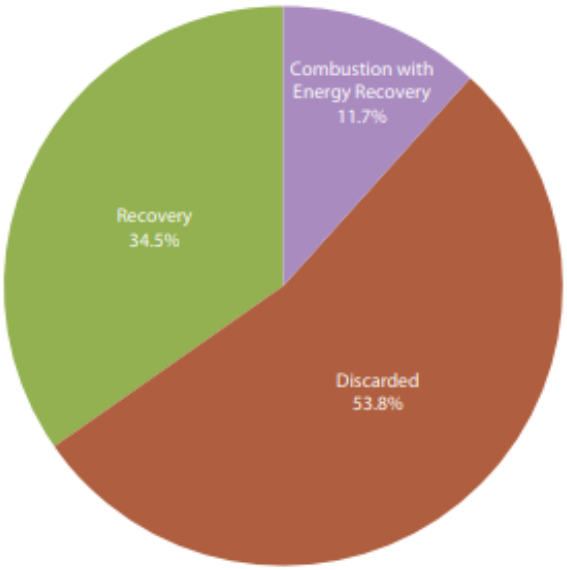
Sources of MSW include residential waste (including waste from apartment houses) and waste from commercial and institutional locations, such as businesses, schools, and hospitals.

Figure 3. Recycling Rates of Selected Products, 2012**



**Does not include combustion with energy recovery.

Figure 4. Management of MSW in the United States, 2012



Analyzing MSW

We analyze waste by material, such as plastics, and paper and paperboard, and by major product categories, which include durable goods (such as furniture), nondurable goods (such as paper or clothing), containers and packaging (such as milk cartons and plastic wrap), and other materials (such as food waste).

Nationally, Americans recycled and composted almost 87 million tons of municipal solid waste. This provides an annual benefit of more than 168 million metric tons of carbon dioxide equivalent emissions reduced, comparable to the annual GHG emissions from over 33 million passenger vehicles.[2]

Materials in MSW

Total MSW generation in 2012 was 251 million tons. Figure 5 shows the breakdown of MSW generated, by material. Organic materials such as paper and paperboard, yard trimmings, and food waste continue to be the largest component of MSW. Paper and paperboard account for over 27 percent and yard trimmings and food waste accounts for another 28 percent. Plastics comprise about 13 percent; metals make up 9 percent; and rubber, leather, and textiles account for almost 9 percent. Wood follows at over 6 percent and glass at almost 5 percent. Other miscellaneous wastes make up approximately 3 percent of the MSW generated in 2012.

Total MSW recovery in 2012 was almost 87 million tons. Paper and paperboard account for over 51 percent and yard trimmings account for over 22 percent, while food waste accounts for another 2 percent. Metals comprise about 9 percent; glass about 4 percent; and plastic and wood about 3 percent each. Other miscellaneous materials make up about 6 percent of MSW recovery in 2012 (see Figure 6).

After MSW recovery through recycling and composting, 164 million tons of MSW were discarded in 2012. Food waste is the largest component of discards at 21 percent. Plastics comprise about 18 percent; paper and paperboard make up almost 15 percent; and rubber, leather, and textiles account for about 11 percent of MSW discards. The other materials account for less than 10 percent each (see Figure 7).

Recycling and composting almost 87 million tons of MSW saved more than 1.1 quadrillion Btu of energy; that's the same amount of energy consumed by almost 10 million U.S. households in a year.

Significant amounts of material from each category were recycled or composted in 2012. The highest recovery rates were achieved in paper and paperboard, yard trimmings, and metals. Americans recycled more than 64 percent of the paper and paperboard generated. Over 19 million tons of yard trimmings were composted, representing almost a five-fold increase since 1990. Recycling these three materials alone kept over 28 percent of MSW generated out of landfills and combustion facilities. Recycling amounts and rates (recovery as a percent of generation) for all materials in 2012 are listed in Table 1. This table also presents millions of tons of discarded materials.

[2] All benefit calculations in this fact sheet are derived from EPA's Waste Reduction Model (WARM). Please see www.epa.gov/warm. All benefits information that was included in last year's report only took into account the CO_2 reduction for recycling of materials. In the report this year, we are accounting for both the recycling of those materials and the CO_2 emissions that may occur in the alternative waste management scenarios of landfilling and combustion. This gives us the net overall benefit of recycling these materials.

Figure 5. Total MSW Generation (by material), 2012
251 Million Tons (before recycling)

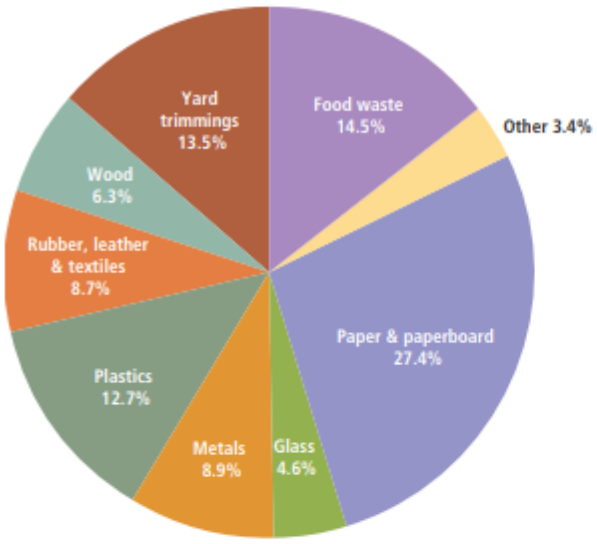


Figure 6. Total MSW Recovery (by material), 2012
87 Million Tons

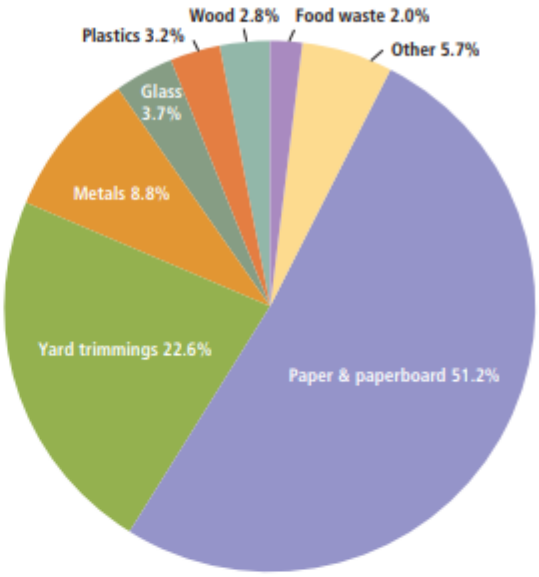


Figure 7. Total MSW Discards (by material), 2012
164 Million Tons (after recycling and composting)

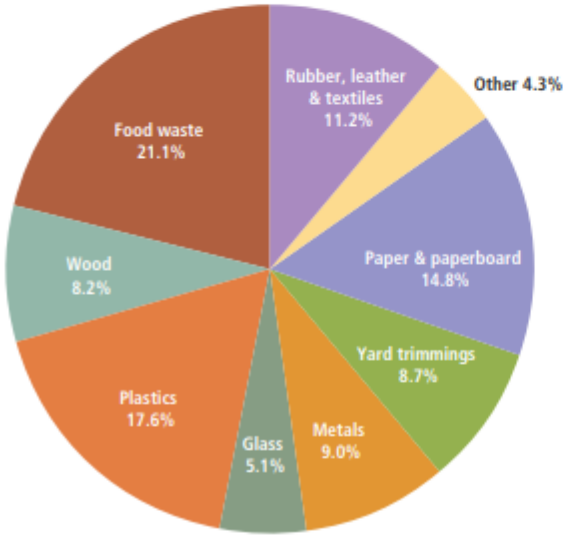


Figure 8. Total MSW Generation (by product category), 2012
251 Million Tons (before recycling)

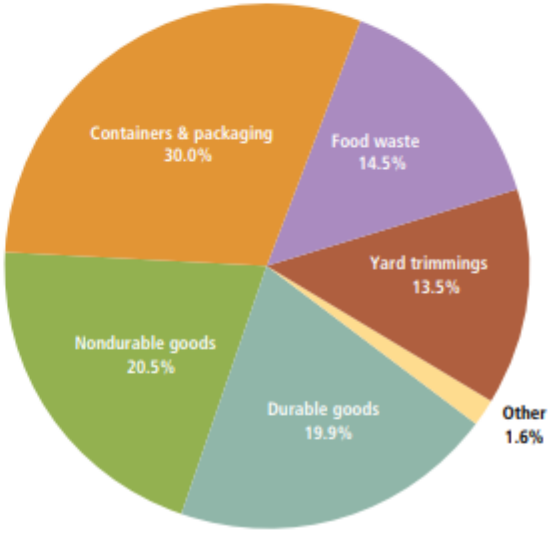


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Table 1. Generation, Recovery, and Discards of Materials in MSW, 2012*
(in millions of tons and percent of generation of each material)

Material	Weight Generated	Weight Recovered	Recovery as Percent of Generation	Weight Discarded
Paper and paperboard	68.62	44.36	64.6%	24.26
Glass	11.57	3.20	27.7%	8.37
Metals				
Steel	16.80	5.55	33.0%	11.25
Aluminum	3.58	0.71	19.8%	2.87
Other nonferrous metals†	2.00	1.36	68.0%	0.64
Total metals	**22.38**	**7.62**	**34.0%**	**14.76**
Plastics	31.75	2.80	8.8%	28.95
Rubber and leather	7.53	1.35	17.9%	6.18
Textiles	14.33	2.25	15.7%	12.08
Wood	15.82	2.41	15.2%	13.41
Other materials	4.60	1.30	28.3%	3.30
Total materials in products	**176.60**	**65.29**	**37.0%**	**111.31**
Other wastes				
Food, other‡	36.43	1.74	4.8%	34.69
Yard trimmings	33.96	19.59	57.7%	14.37
Miscellaneous inorganic wastes	3.90	Negligible	Negligible	3.90
Total other wastes	**74.29**	**21.33**	**28.7%**	**52.96**
Total municipal solid waste	**250.89**	**86.62**	**34.5%**	**164.27**

* Includes waste from residential, commercial, and institutional sources.
† Includes lead from lead-acid batteries.
‡ Includes recovery of other MSW organics for composting.
Details might not add to totals due to rounding.
Negligible = Less than 5,000 tons or 0.05 percent.

Materials and Products

We track both materials and products. Materials are what products are made of and will ultimately be what is recovered and be reprocessed in the recycling process. Examples are metals and plastic. Products are what people buy and handle. Products are manufactured out of materials. Examples include packaging and newspapers. We track products to learn how people are consuming, using, and discarding materials. This information allows us to target activities that will ultimately maximize the recovery of materials.

Products in MSW

The breakdown of MSW generated in 2012 by product category is shown in Figure 8. Containers and packaging made up the largest portion of MSW generated: 30 percent, or over 75 million tons. The second largest portion came from nondurable goods, which amounted to over 20 percent, or about 51 million tons. Durable goods make up the third largest segment, accounting for about 20 percent, or 50 million tons.

Recycling Trends

In percentage of total MSW generation, recycling (including composting) did not exceed 15 percent until 1990. Growth in the recycling rate was significant over the next 15 years. The recycling rate has grown more slowly over the last five years.

The generation, recovery, and discards of materials in the product categories, by weight and recovery as a percent of generation, are shown in Table 2. This table shows that the recovery of containers and packaging was the highest of the four product categories, with over 51 percent of the generated materials recycled. Paper products, steel, and aluminum were the most recycled materials by percentage in this category. Over 76 percent of paper and paperboard containers and packaging was recycled. Over 72 percent of steel packaging (mostly cans) was recycled. The recycling rate for aluminum packaging was 38 percent, including almost 55 percent of aluminum beverage cans.

Over 34 percent of glass containers were recycled while about 25 percent of wood packaging, mostly wood pallets, was recovered. About 14 percent of plastic containers and packaging were recycled, mostly from soft drink, milk, and water bottles. Plastic bottles were the most recycled plastic products. Polyethylene terephthalate (PET) bottles and jars were recovered at about 31 percent. Recovery of high density polyethylene (HDPE) natural (white translucent) bottles was also estimated at over 28 percent (see 2012 MSW full data tables).

Overall recovery of nondurable goods was about 34 percent in 2012. Nondurable goods generally last less than three years. Newspapers/mechanical papers and other paper products were the most recycled nondurable goods. Newspapers/mechanical papers include newspapers, directories, inserts, and some advertisement and direct mail printing. Seventy percent of newspapers/mechanical papers were recovered. Collectively, the recovery of other paper products such as office paper and magazines was over 43 percent in 2012. Clothing, footwear, and other textile products are included in the nondurable goods category. These products were recovered for recycling at a rate of over 16 percent.

Overall, more than 18 percent of durable goods was recovered in 2012. Nonferrous metals other than aluminum had one of the highest recovery rates due to the high rate of lead recovery from lead-acid batteries. With an almost 96 percent recycling rate, lead-acid batteries continue to be one of the most recovered products. Recovery of steel in all durable goods was 27 percent, with high rates of recovery from appliances and other miscellaneous items. Recovery of selected consumer electronics was 29% (see 2012 MSW full data tables).

Measured by percentage of generation, products with the highest recovery rates in 2012 were lead-acid batteries (96 percent), corrugated boxes (91 percent), steel cans (71 percent), newspapers/mechanical papers (70 percent), major appliances (64 percent), yard trimmings (58 percent), aluminum cans (55 percent), tires (45 percent), and mixed paper (43 percent) (see 2012 MSW full data tables).

Every ton of mixed paper recycled can save the energy equivalent of 165 gallons of gasoline.

Table 2. Generation, Recovery, and Discards of Products in MSW, 2012*
(in millions of tons and percent of generation of each product)

Products	Weight Generated	Weight Recovered	Recovery as Percent of Generation	Weight Discarded
Durable goods				
Steel	14.57	3.94	27.0%	10.63
Aluminum	1.52	Not Available	Not Available	1.52
Other non-ferrous metals†	2.00	1.36	68.0%	0.64
Glass	2.19	Negligible	Negligible	2.19
Plastics	11.46	0.77	6.7%	10.69
Rubber and leather	6.52	1.35	20.7%	5.17
Wood	6.16	Negligible	Negligible	6.16
Textiles	3.88	0.55	14.2%	3.33
Other materials	1.73	1.30	75.6%	0.42
Total durable goods	**50.03**	**9.27**	**18.5%**	**40.76**
Nondurable goods				
Paper and paperboard	30.60	15.44	50.5%	15.16
Plastics	6.51	0.13	2.0%	6.38
Rubber and leather	1.01	Negligible	Negligible	1.01
Textiles	10.15	1.70	16.7%	8.45
Other materials	3.07	Negligible	Negligible	3.07
Total nondurable goods	**51.34**	**17.27**	**33.6%**	**34.07**
Containers and packaging				
Steel	2.23	1.61	72.2%	0.62
Aluminum	1.87	0.71	38.0%	1.16
Glass	9.38	3.20	34.1%	6.18
Paper and paperboard	38.01	28.92	76.1%	9.09
Plastics	13.78	1.90	13.8%	11.88
Wood	9.66	2.41	24.9%	7.25
Other materials	0.30	Negligible	Negligible	0.30
Total containers and packaging	**75.23**	**38.75**	**51.5%**	**36.48**
Other wastes				
Food, other‡	36.43	1.74	4.8%	34.69
Yard trimmings	33.96	19.59	57.7%	14.37
Miscellaneous inorganic wastes	3.90	Negligible	Negligible	3.90
Total other wastes	74.29	21.33	28.7%	52.96
Total municipal solid waste	**250.89**	**86.62**	**34.5%**	**164.27**

* Includes waste from residential, commercial, and institutional sources.
† Includes lead from lead-acid batteries.
‡ Includes recovery of other MSW organics for composting.
Details might not add to totals due to rounding.
Negligible = less than 5,000 tons or 0.05 percent.

Disposing of MSW

While the number of U.S. landfills has steadily declined over the years, the average landfill size has increased. At the national level, landfill capacity appears to be sufficient for our current disposal practices, although it is limited in some areas.

- Since 1990, the total amount of MSW going to landfills dropped by over 11 million tons, from 145.3 million to 135.0 million tons in 2012 (see Table 3).
- The net per capita discard rate to landfills (after recycling, composting, and combustion for energy recovery) was 2.36 pounds per day, lower than the 3.19 per capita rate in 1990 (see Table 4).

Composting Collection Programs[1]

- About 3,120 community composting programs were documented in 2012, a decrease from 3,227 in 2002.
- Over 2.4 million households were served with food waste composting collection programs in 2012.

Table 3. Generation, Materials Recovery, Composting, Combustion With Energy Recovery, and Discards of MSW, 1960 to 2012 (in millions of tons)

Activity	1960	1970	1980	1990	2000	2005	2008	2010	2011	2012
Generation	88.1	121.1	151.6	208.3	243.5	253.7	252.5	250.4	250.4	250.9
Recovery for recycling	5.6	8.0	14.5	29.0	53.0	59.2	61.9	65.0	66.3	65.3
Recovery for composting*	Negligible	Negligible	Negligible	4.2	16.5	20.6	22.1	20.2	20.6	21.3
Total materials recovery	5.6	8.0	14.5	33.2	69.5	79.8	84.0	85.2	86.9	86.6
Discards after recovery	82.5	113.0	137.1	175.0	174.0	173.9	168.5	165.3	163.5	164.3
Combustion with energy recovery†	0.0	0.4	2.7	29.7	33.7	31.6	31.6	29.3	29.3	29.3
Discards to landfill, other disposal‡	82.5	112.6	134.4	145.3	140.3	142.3	136.9	136.0	134.2	135.0

* Composting of yard trimmings, food waste, and other MSW organic material. Does not include backyard composting.

† Includes combustion of MSW in mass burn or refuse-derived fuel form, and combustion with energy recovery of source separated materials in MSW (e.g., wood pallets, tire-derived fuel).

‡ Discards after recovery minus combustion with energy recovery. Discards include combustion without energy recovery.

Details might not add to totals due to rounding.

[1] Source: For 2002 data: BioCycle 2006.
For 2012 data: EPA, Municipal Solid Waste in the United States: 2012 data tables and BioCycle, 2013.

Table 4. Generation, Materials Recovery, Composting, Combustion With Energy Recovery, and Discards of MSW, 1960 to 2012 (in pounds per person per day)

Activity	1960	1970	1980	1990	2000	2005	2008	2010	2011	2012
Generation	2.68	3.25	3.66	4.57	4.74	4.69	4.55	4.44	4.40	4.38
Recovery for recycling	0.17	0.22	0.35	0.64	1.03	1.10	1.12	1.15	1.17	1.14
Recovery for composting*	Negligible	Negligible	Negligible	0.09	0.32	0.38	0.40	0.36	0.36	0.37
Total Materials Recovery	0.17	0.22	0.35	0.73	1.35	1.48	1.52	1.51	1.53	1.51
Discards after recovery	2.51	3.03	3.31	3.84	3.39	3.21	3.03	2.93	2.87	2.87
Combustion with energy recovery†	0.00	0.01	0.07	0.65	0.66	0.58	0.57	0.52	0.51	0.51
Discards to landfill, other disposal‡	2.51	3.02	3.24	3.19	2.73	2.63	2.46	2.41	2.36	2.36
Population (millions)	179.979	203.984	227.255	249.907	281.422	296.410	304.060	309.051	311.592	313.914

* Composting of yard trimmings, food waste, and other MSW organic material. Does not include backyard composting.

† Includes combustion of MSW in mass burn or refuse-derived fuel form, and combustion with energy recovery of source separated materials in MSW (e.g., wood pallets, tire-derived fuel).

‡ Discards after recovery minus combustion with energy recovery. Discards include combustion without energy recovery.

Details might not add to totals due to rounding.

The Benefits of Recycling

Recycling has environmental benefits at every stage in the life cycle of a consumer product—from the raw material with which it's made to its final method of disposal. By utilizing used, unwanted, or obsolete materials as industrial feedstocks or for new materials or products, Americans can each do our part to make recycling, including composting work. Aside from reducing GHG emissions, which contribute to global warming, recycling, including composting also provides significant economic and job creation impacts.

The energy and GHG benefits of recycling and composting shown in Table 5 are calculated using EPA's WARM methodology (see: www.epa.gov/warm). WARM calculates and totals GHG emissions of baseline and alternative waste management practices, including source reduction, recycling, composting, combustion, and landfilling. Paper and paperboard recovery at about 44 million tons resulted in a reduction of 130 MMTCO2E in 2012. This is equivalent to removing 27 million cars from the road in one year.

In 2012, nationally, we recycled and composted almost 87 million tons of MSW. This provides an annual benefit of more than 168 million metric tons of carbon dioxide equivalent emissions reduced, comparable to removing the emissions from over 33 million passenger vehicles from the road in one year.

Table 5. Greenhouse Gas Benefits Associated with Recovery of Specific Materials, 2012*
(in millions of tons recovered, $MMTCO_2E$ and in numbers of cars taken off the road per year)

Material	Weight Recovered (millions of tons)	GHG Benefits $MMTCO_2E$	Numbers of Cars Taken Off the Road per Year
Paper and paperboard	44.4	130.5	27 million
Glass	3.20	1	210 thousand
Metals			
Steel	5.55	9	1.9 million
Aluminum	0.71	6.3	1.3 million
Other nonferrous metals†	1.36	5.3	1.1 million
Total metals	**7.62**	**20.6**	**4.3 million**
Plastics	2.80	3.2	670 thousand
Rubber and leather‡	1.35	0.7	145 thousand
Textiles	2.25	5.7	1.2 million
Wood	2.41	4.2	900 thousand
Other wastes			
Food, other^	1.74	1.4	290 thousand
Yard trimmings	19.6	0.8	170 thousand

* Includes materials from residential, commercial, and institutional sources.

These calculations do not include an additional 1.30 million tons of MSW recovered that could not be addressed in the WARM model. $MMTCO_2E$ is million metric tons of carbon dioxide equivalent.

All benefits information that was included in last year's report only took into account the CO_2 reduction for recycling of materials. In the report this year, we are accounting for both the recycling of those materials and the CO_2 emissions that may occur in the alternative waste management scenarios of landfilling and combustion. This gives us the net overall benefit of recycling these materials.

† Includes lead from lead-acid batteries. Other nonferrous metals calculated in WARM as mixed metals.

‡ Recovery only includes rubber from tires.

^ Includes recovery of other MSW organics for composting.

Source: WARM model (www.epa.gov/warm)

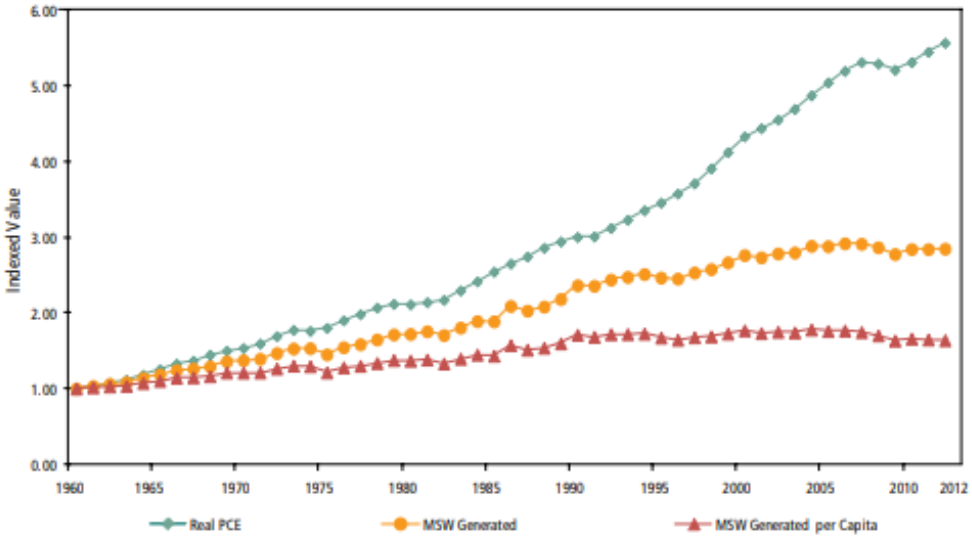
MSW Generation and Household Spending

Over the years, the change in the amount of MSW generated has typically imitated trends in how much money American households spend on goods and services. Personal Consumer Expenditures (PCE) measures U.S. household spending on goods and services such as food, clothing, vehicles, and recreation services. PCE accounts for approximately 70 percent of U.S. Gross Domestic Product, a key indicator of economic growth. PCE adjusted for inflation is referred to as real PCE. This is a more useful metric in making comparisons over time because it normalizes the value of a dollar by considering how much a dollar could purchase in the past versus today. Figure 9 explores the relationship between MSW generated and real PCE since 1960.

Figure 9 is an indexed graph showing the relative changes in real PCE, MSW generated, and MSW generated per capita

Recycling just 1 ton of aluminum cans conserves more than 153 million Btu, the equivalent of 26 barrels of oil, or 1,665 gallons of gasoline.

Figure 9. Indexed MSW Generated and Real PCE over Time (1960-2012)



over time. It is indexed to allow all three of these metrics to be shown on the same graph and compare their relative rates of change since 1960. The indexed value indicates the change in the value of the data since 1960. For example, if for a given year the value is three then the data value for that year would be three times the 1960 value. In this case, if the 1960 value was 200 then the resulting year's value would be 600. The 2012 MSW per capita generation indexed value is 1.6 which means MSW per capita generation has increased by 60 percent since 1960.

Figure 9 shows that real PCE has increased at a faster rate than MSW generation, and the disparity has become even more distinct since the mid 1990s. This indicates the amount of MSW generated per dollar spent is falling. In other words, our economy has been able to enjoy dramatic increases in household spending on consumer goods and services without this being at the expense of the societal impact of similarly increasing MSW generation rates. This figure also shows that the MSW generated per capita leveled off in the early- to mid-2000s and has fallen since then. This is important because as population continues to grow, it will be necessary for MSW generated per capita to continue to fall to maintain or decrease the total amount of MSW generated as a country.

Thinking Beyond Waste

EPA is helping change the way our society protects the environment and conserves resources for future generations by thinking beyond recycling, composting, and disposal. Building on the familiar concept of Reduce, Reuse, Recycle, the Agency is employing a systemic approach that seeks to reduce materials use and associated environmental impacts over their entire life cycle, called sustainable materials management

Energy Recovered from Waste Combustion

- In 2012, over 29 million tons of materials, or 11.7 percent, were combusted for energy recovery.
- MSW combustion for energy recovery has decreased from about 34 million tons in 2000 to 29 million tons in 2012.

(SMM). This starts with extraction of natural resources and material processing through product design and manufacturing then the product use stage followed by collection/processing and final end of life (disposal). By examining how materials are used throughout their life cycle, an SMM approach seeks to use materials in the most productive way with an emphasis on using less; reducing toxic chemicals and environmental impacts throughout the material's life cycle; and assuring we have sufficient resources to meet today's needs and those of the future. Data on municipal solid waste generation, recycling and disposal is an important starting point for the full SMM approach.

Resources

The data summarized in this fact sheet characterizes the MSW stream as a whole by using a materials flow methodology that relies on a mass balance approach. For example, to determine the amounts of paper recycled, information is gathered on the amounts processed by paper mills and made into new paper on a national basis plus recycled paper exported, instead of counting paper collected for recycling on a state-by-state basis. Using data gathered from industry associations, businesses, and government sources, such as the U.S. Department of Commerce and the U.S. Census Bureau, we estimate tons of materials and products generated, recycled, and discarded. Other sources of data, such as waste characterizations and research reports performed by governments, industry, or the press, supplement these data.

The benefits of recycling and composting, such as elimination of GHG emissions, are calculated using EPA's WARM methodology. WARM calculates and totals GHG emissions of baseline and alternative waste management practices including source reduction, recycling, composting, combustion, and landfilling. The model calculates emissions in metric tons of carbon equivalent (MTCE), metric tons of carbon dioxide equivalent ($MTCO_2E$), and energy units (million Btu) across a wide range of material types commonly found in MSW. EPA developed GHG emissions reduction factors through a life-cycle assessment methodology. Please see: www.epa.gov/warm.

Full data tables on MSW characterization that support this Report and Summaries of the MSW characterization methodology and WARM are available on the EPA website along with information about waste reduction and recycling. Please see:

www.epa.gov/epawaste/nonhaz/municipal/msw99.htm

www.epa.gov/recycle

EPA
United States
Environmental Protection
Agency

United States Environmental Protection Agency
Solid Waste and Emergency Response (5306P)
Washington, DC 20460

Official Business
Penalty for Private Use $300

EPA-530-F-14-001
February 2014
www.epa.gov/wastes

Additional Tables and Figures available here: https://www.epa.gov/sites/production/files/2015-09/documents/2012_msw_dat_tbls.pdf

GUIDANCE for SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT

This Specification section is intended to define terms and lay out general procedures and requirements for waste management on construction and renovation projects in U.S. EPA's Research Triangle Park campus.

Relationship to LEED

The requirement to divert 95% of construction and demolition waste from landfills and incinerators significantly exceeds the requirement in LEED-NC MR credit 2 and LEED-EB MR credit 1, which provide one point for a 50% diversion and a second point for 75% diversion. The LEED requirements are designed to be usable nationwide. In the Research Triangle Park area, 95% diversion has been shown to be feasible. The 95% diversion rate would qualify the project for both points in LEED-NC MR credit 2 and in LEED-EB MR credit 1, and a potential "Innovation and Design" point for exemplary performance.

1.4 Performance Requirements

Commercial construction typically generates between 2 and 2.5 pounds of solid waste per square foot, the majority of which can be recycled. Salvaging and recycling C&D waste reduces demand for virgin resources and the associated environmental impacts. Effective construction waste management, including appropriate handling of non-recyclables, can reduce contamination from and extend the life of existing landfills. Whenever feasible, reducing initial waste generation is environmentally preferable to reuse or recycling.

1.5 Submittals

The Construction Waste Management Plan should ideally recognize project waste as an integral part of overall materials management. The premise that waste management is a part of materials management, and the recognition that one project's wastes are materials available for another project, facilitates efficient and effective waste management.

1.6 Quality Assurance

Any topical application of processed clean wood waste and ground gypsum board as a soil amendment must be done in accordance with local and state regulations.

Waste management requirements should be the topic of discussion at both preconstruction and ongoing regular job meetings, to ensure that contractors and

appropriate subcontractors are fully informed of the implications of these requirements on their work prior to and throughout construction.

1.8 Construction Waste Management Resources

The directory listing in paragraph 1.8 (B) 1, "Triangle Region Construction & Demolition Waste Recycling and Disposal Directory" from the Triangle J Council of Governments dated August 1997 is not up-to-date, so a more current directory of regional materials recyclers should be cited if available. In addition, a listing of recommended recyclers should be included in the Specification.

The specification section lists two resources that may be of specific value to the contractor. The LEED-NC reference guide and USGBC website list additional resources that may be of value to the spec writer or contractor.

3.1 Plan Implementation

Waste management should be coordinated with or part of the standard quality assurance program and waste management requirements should be addressed regularly throughout the project. If possible, adherence to the plan would be facilitated by tying completion of recycling documentation to one of the payments for each trade contractor.

Date of Publication: *December 2007*

Title: *Construction Waste Management*
Section 01 74 19

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Salvaging non-hazardous demolition and construction waste.

2. Recycling non-hazardous demolition and construction waste.

3. Disposing of non-hazardous demolition and construction waste.

B. Related Sections include the following:

1. Section 01 12 00 “Summary of Multiple Contracts” for coordination of responsibilities for waste management

There should be language in the Summary of Multiple Contracts to explain that each of the prime contractors and subs have obligations in meeting the Construction & Management Waste specifications.

2. Division 1 Section “Sustainable Design Requirements”

3. Division 1 Section “Temporary Facilities and Controls” for environmental-protection measures during construction

There should be language in the “Temporary Facilities and Controls” to provide a staging area for separation of staging waste.

4. Sections within 02 41 00 “Demolition” for disposition of waste resulting from demolition of buildings, structures, and site improvements.

Depending on how the Project documents are being assembled, there may be other Di- vision 1 sections that should be listed here. Note that there are myriad technical sections in Divisions 2 and beyond that could be cited here, but it is generally more useful to cite this Division 1 section as a Related Section in each of those sections.

1.3 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, paint, or the like.

B. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

Land clearing is excluded because it is no longer considered construction waste and generally is not landfilled, so is no longer included in the LEED calculation.

C. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations

D. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction

E. Diversion: Avoidance of demolition and construction waste sent to landfill or incineration. Diversion does not include using materials for landfill, alternate daily cover on landfills, or materials used as fuel in waste-to- energy processes

F. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitability, corrosiveness, toxicity or reactivity

G. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse

H. Recycling: The process of sorting, cleansing, treating, and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Salvage: Recovery of demolition or construction waste and subsequent reuse or sale in another facility

J. Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work

K. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste

L. Toxic: Poisonous to humans either immediately or after a long period of exposure

M. Trash: Any product or material unable to be reused, returned, recycled, or salvaged

N. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.4 PERFORMANCE REQUIREMENTS

A. The Owner has established that this Project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed.

B. Of the waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills or incinerators shall be minimized, thereby reducing disposal costs.

C. Develop a construction waste management plan that results in end-of-Project rates for salvage/recycling of 95 percent by weight of construction and demolition waste.

The requirement to divert 95% of construction and demolition waste from landfills and incinerators significantly exceeds the LEED-NC and LEED-EB construction waste management credits, which provide one point for a 50% diversion and a second point for 75% diversion. The LEED requirements are designed to be usable nationwide. In the Research Triangle Park area, 95% diversion has been shown to be feasible. The 95% diversion rate would qualify the project for both points and a potential "Innovation and Design" point for exemplary performance.

D. Salvage/Recycle Requirements: Salvage and recycle as much non- hazardous demolition and construction waste as possible, including the following materials:

1. Demolition Waste:

a. Asphaltic concrete paving
b. Concrete
c. Concrete reinforcing steel
d. Brick
e. Concrete masonry units
f. Wood studs
g. Wood joists
h. Plywood and oriented strand board
i. Wood paneling
j. Wood trim
k. Structural and miscellaneous steel
l. Rough hardware
m. Roofing
n. Insulation
o. Doors and frames
p. Door hardware
q. Windows
r. Glazing
s. Metal studs
t. Gypsum board
u. Acoustical tile and panels
v. Carpet
w. Carpet pad
x. Demountable partitions
y. Equipment
z. Cabinets
aa. Plumbing fixtures
bb. Piping
cc. Supports and hangers
dd. Valves
ee. Sprinklers
ff. Mechanical equipment
gg. Refrigerants

hh. Electrical conduit

ii. Copper wiring

jj. Lighting fixtures

kk. Lamps

ll. Ballasts

mm. Electrical devices

nn. Switchgear and panelboards

oo. Transformers

2. Construction Waste:

a. Masonry and CMU

b. All untreated wood, including lumber and finish materials

c. Wood sheet materials

d. Wood trim

e. Metals

f. Roofing

g. Insulation

h. Carpet and pad

i. Gypsum board

j. Unused (leftover) paint

k. Piping

l. Electrical conduit

m. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper

2) Cardboard

3) Boxes

4) Plastic sheet and film

5) Polystyrene packaging

6) Wood crates

7) Plastic pails

n. Beverage and packaged food containers

1.5 SUBMITTALS

A. Construction Waste Management Plan (CWMP): It is the intent of this specification to maximize the diversion of demolition and construction waste from landfill disposal. Accordingly, not more than 30 days after receipt of Notice to Proceed and prior to the

generation of any waste, prepare and submit a draft Construction Waste Management Plan including, but not limited to, the following:

1. Procedures for Recycling/Reuse Program to divert a minimum of 95% (by weight) of construction and demolition waste from landfill disposal, including waste resulting from demolition of any existing building and site paving scheduled for demolition; any site paving is required to be ground on site and reused as granulated fill on site.
2. Approval of the Contractor's CWMP shall not relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.

A. Submit a 3-ring binder with calculations on end-of-project recycling rates, salvage rates, and landfill rates itemized by waste material, demonstrating that a minimum of 75% of construction wastes were recycled or salvaged and diverted from landfill. Include documentation of recovery rate (if commingled), waste hauling certificates or receipts, and a brief narrative explaining how and to where each waste type has been diverted.

B. Construction Waste Management Plan: Submit four copies of plan within 45 days of date established for the Notice to Proceed.

C. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit four copies of report. Include separate reports for demolition and construction waste. Include the following information:

1. Material category
2. Generation point of waste
3. Total quantity of waste in tons
4. Quantity of waste salvaged, both estimated and actual in tons
5. Quantity of waste recycled, both estimated and actual in tons
6. Total quantity of waste recovered (salvaged plus recycled) in tons
7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste
8. Include up-to-date records of donations, sales, recycling and landfill/incinerator manifests, weight tickets, hauling receipts, and invoices.

D. Waste Reduction Calculations: Before request for Substantial Completion, submit four copies of calculated end-of-project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work. Complete a table similar to the example below.

Recycled/Salvaged/Diverted Materials	Hauler or Location	Quantity of Material (tons)

Total Construction Waste Diverted		
Landfilled Materials		
Total Construction Waste Landfilled		

		Total Construction Waste Diverted + Total Construction Waste Landfilled
Percentage of Construction Waste Diverted from Landfill		(Total Construction Waste Diverted / Total Construction Waste)*100

E. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax-exempt.

F. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax-exempt.

G. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills (or transfer stations) and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with all applicable requirements of North Carolina Department of Environment, Health, and Natural Resources Policy Memorandum #16 Concerning Management of Construction, Demolition, Land Clearing, Inert, and Yard Trash Debris and any and all subsequent modifications and amendments to same. Comply with all applicable local ordinances and regulations.

B. Waste Management Meetings: Conduct an initial conference at Project Site to comply with requirements in Division 1 Section “Project Management and Coordination.” Contractor shall include discussions on construction waste

management requirements in the preconstruction meeting. Contractor shall include discussions on construction waste management requirements in the regular job meetings conducted during the course of the Project; at these meetings, review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of the Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.3 CONSTRUCTION WASTE MANAGEMENT PLAN

A. General: Develop and implement a CWMP consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume, but use the same units of measure throughout the CWMP.

B. Draft Construction Waste Management Plan: Within 30 days after receipt of Notice to Proceed, or prior to any waste removal, whichever occurs sooner, the Contractor shall submit to the Owner and Architect a Draft Waste Management Plan.

C. Final Construction Waste Management Plan: Once the Owner has determined which of the recycling options addressed in the draft Waste Management Plan are acceptable, the Contractor shall submit, within 10 calendar days, a Final Waste Management Plan.

D. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

E. Landfill Options: Indicate the name of the landfill(s) and/or transfer station(s) and/or incinerator(s) where trash will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all Project waste in the landfill(s).

F. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, reused, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals

and organizations, include list of their names, addresses, and telephone numbers.

4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Describe method that will be used for separating recyclable waste, including sizes of containers, container labeling, and designated location on Project Site where materials separation will be located.

G. Materials: The following list of required materials, at a minimum, must be included for salvaging/recycling:

1. Cardboard
2. Clean dimensional wood
3. Beverage and food containers
4. Paper
5. Concrete
6. Concrete Masonry Units (CMUs
7. Asphalt: Include the approximate weight of the asphalt paving to be crushed and utilized as granulated fill from the existing paving as a component of waste material diverted from the landfill.
8. Ferrous and non-ferrous metals (banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze)
9. Stretch and shrink wrap
10. Gypsum wallboard
11. Paint containers and other clean, empty plastic containers

The specifications writer may want to customize this list based on what is easily recycled or salvaged for resale or reuse at the Project and in local markets.

H. Meetings: Provide a description of the regular meetings to be held to address waste management.

I. Materials Handling Procedures: Provide a description of the means by which any waste materials identified will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

J. Transportation: Provide a description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site) and destination of materials.

1.4 CONSTRUCTION WASTE MANAGEMENT RESOURCES

A. General information contacts regarding construction and demolition waste:

1. North Carolina Department of Environment and Natural Resources Division of Pollution Prevention and Environmental Assistance; www.p2pays.org.

2. EPA Construction and demolition (C&D) debris website: http://www.epa.gov/epaoswer/non-hw/debris-new/bytype.htm

3. Directory of Wood-Framed Building Deconstruction and Reused Building Materials Companies: http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr150.pdf

4. Additional resources to be developed by Contractor with assistance from Owner and Architect, as requested.

B. Material Recyclers: For information on local recycling entities, visit the following websites:

1. Triangle Region Construction & Demolition Waste Recycling and Disposal Directory, Triangle J Council of Governments, August 1997: www.tjcog.org.

The specifications writer could include a list of acceptable local entities and transfer stations for recycling, incineration, and landfilling.

2. Carolina Recycling Association (CRA): www.cra-recycle.org

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Architect and Owner. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with Division 1 Section “Temporary Facilities and Controls” for operation, termination, and removal requirements.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at the Project Site full-time for duration of Project.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project Site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.

2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and

disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project Site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Recycling and waste bin areas are to be kept neat, and clean, and clearly marked in order to avoid contamination of materials.
3. Comply with Division 1 Section “Temporary Facilities and Controls” for controlling dust and dirt, environmental protection, and noise control.

E. Hazardous Wastes: Hazardous wastes shall be separated, stored, and disposed of according to local regulations and should not be included in Construction Waste Management Plan’s calculations of waste.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Owner's Use:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

1. List to be developed by Contractor.

C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project Site to the maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

4. Store components off the ground and protect from the weather.

5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphaltic Concrete Paving: Break up and transport paving to asphalt- recycling facility or recycle on-site into new paving.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 4-inch (100-mm) size.

2. Crush concrete and screen to comply with requirements in Division 2 Section “Earthwork” for use as satisfactory soil for fill or subbase.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum 1-1/2-inch (38-mm) size.

a. Crush masonry and screen to comply with requirements in Division 2 Section “Earthwork” for use as general fill or subbase.

b. Crush masonry and screen to comply with requirements in Division 2 Section “Exterior Plants” for use as mineral mulch.

2. Clean and stack undamaged, whole masonry units on wood pallets.

D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, and panel products for reuse and/or recycling. Separate wood material treated with heavy metal preservatives for reuse or landfill disposal.

E. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.

2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts for recycling into asphalt paving or by other recycling entities.

G. Gypsum Board: Stack large, clean pieces on wood pallets and store in a dry location for recycling off-site. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

1. Moisture-damaged gypsum board with evidence of significant mold growth shall be disposed of in accordance with New York City's "Guidelines on Assessment and Remediation of Fungi in Indoor Environments": http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml

H. Acoustical Ceiling Panels and Tile: Stack large, clean pieces on wood pallets and store in a dry location.

1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.

I. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet and pad in a closed container or trailer provided by a carpet recycler or manufacturer-related carpet reclamation agency.

J. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

K. Plumbing Fixtures: Separate by type and size.

L. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

M. Lighting Fixtures: Separate lamps by type and protect from breakage.

N. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

O. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

2. Polystyrene Packaging: Separate and bag materials.

3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site.

1. Comply with requirements in Division 2 Section "Exterior Plants" for use of

chipped organic waste as organic mulch.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into material appropriate for mulch or erosion control.

2. Lumber Treated with Heavy-Metal Preservatives: Do not grind, chip, or incinerate; must be reused or landfilled.

D. Gypsum Board: Stack large, clean pieces on wood pallets and store in a dry location for recycling and/or reuse on-site or off-site.

1. Moisture-damaged gypsum board with evidence of significant mold growth shall be disposed of in accordance with New York City's "Guidelines on Assessment and Remediation of Fungi in Indoor Environments": http://www.nyc.gov/html/doh/html/epi/moldrpt1.shtml

2. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

a. Comply with requirements in Division 2 Section "Exterior Plants" for use of clean ground gypsum board as inorganic soil amendment.

E. Miscellaneous: Anything called out to be ground and used on site should utilize an on-site grinder.

1. Grinder should be able to accommodate a variety of materials including masonry, asphalt shingles, wood, and drywall.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3. Do not burn or bury waste materials on or off site. Appropriate on- site topical application of ground gypsum or wood, or use of site paving as granulated fill is considered reuse, not waste.

END OF SECTION 01 74 19