

# SpawGlass construction waste management plan

## GOALS

- Recycle/Salvage 50%-75% of construction waste by weight.

## COMMUNICATION PLAN

- Waste management plan will be discussed by Architect and Contractor at conference.
- The Contractor and subcontractors will be expected to make sure all their crews comply with the waste management plan.
- All containers must be clearly labeled.
- Lists of acceptable and unacceptable materials must be posted clearly throughout site.

## EXPECTED PROJECT WASTE, DISPOSAL AND HANDLING

Material	Quantity	Disposal Method	Handling Procedure
Concrete	(2) 20-yd dumpsters	Recycle: Cherry Demolition or Southern Crushed Concrete	Break up and put in concrete bin
Wood	(5-6) 40-yd dumpsters	Recycle: Novus Wood, Inc.	Put untreated/ unpainted wood in wood bin
Drywall	(4) 40-yd dumpsters	Landfill	Put in misc. garbage bin

**EXPECTED PROJECT WASTE, DISPOSAL AND HANDLING (CONTINUED)**

<b>Material</b>	<b>Quantity</b>	<b>Disposal Method</b>	<b>Handling Procedure</b>
Metal	(4) 40-yd dumpsters	Recycle: Gulf Coast Scrap Metal	Put in Gulf Coast Scrap Metal bin
Paper/ Cardboard	(3) 40-yd dumpsters	Recycle: Vista Fibers	Put paper and cardboard in Vista Fibers bin
Dirt	1000 yd	Recycle: on-site	Store on-site for later reuse
Miscellaneous Waste	Unknown	Landfill	Dispose of in trash dumpster

## percentage of waste

Percentages of Waste (calculated with no dirt, with average paper and metal waste\*)

	2 dumpsters of garbage	3 dumpsters	4 dumpsters	5 dumpsters
Concrete	43.4%	42.4%	41.4%	40.5%
Paper/Cardboard	3.8%	3.7%	3.6%	3.5%
Metal	17.3%	16.9%	16.6%	16.2%
Drywall	9.4%	9.2%	9%	8.8%
Wood	21.4%	20.9%	20.4%	20%
Garbage	4.7%	6.9%	9%	11%

Percentages of Waste (calculated with no dirt, with high paper weight and low metal waste\*)

	2 dumpsters	3 dumpsters	4 dumpsters	5 dumpsters
Concrete	45.5%	44.4%	43.4%	42.4%
Paper/cardboard	5.1%	4.9%	4.8%	4.7%
Metal	12.1%	11.8%	11.6%	11.3%
Drywall	9.9%	9.7%	9.4%	9.2%
Wood	22.5%	21.9%	21.4%	20.9%
Garbage	4.9%	7.2%	9.4%	11.5%

It is clear that increasing the number of dumpsters of miscellaneous garbage does not have a significant impact on the percentage of waste certain components comprise. It is also clear that using the high or low weights for paper or metal\* do not significantly impact this percentage. Based on these results, the best options for achieving 50% and 75% recycling rates by weight are as follows:

50%: concrete and wood or concrete and metal (keeping in mind that wood costs money to recycle while metal makes money)

75%: concrete, wood and metal

(\*high and low weights will be discussed at the end of the document)

However, the inclusion of dirt as a waste material significantly impacts the results. If SpawGlass has 1000 yd<sup>3</sup> of dirt, which they intend to reuse, this will weigh approximately 810,000 lb. This is approximately 70% of the waste. Again, we will clarify this point as soon as possible.

#### **CALCULATIONS AND MEASUREMENTS**

Specific Weight:

- Concrete: .150 kips/ft<sup>3</sup> (one kip=1000 lb; one yd<sup>3</sup>= 27 ft<sup>3</sup>)
- Cardboard and Paper:
  - Cardboard: 85 lb/yd<sup>3</sup>
  - Paper: 150 lb/yd<sup>3</sup>
  - Average: 117.5 lb/yd<sup>3</sup>
- Metal:
  - Aluminum: 270 lb/yd<sup>3</sup>
  - Other metals: 540 lb/yd<sup>3</sup>
  - Average: 405 lb/yd<sup>3</sup>
- Drywall: No specific weight was available for drywall. Thus, I averaged the specific weights of plastics (110 lb/yd<sup>3</sup>) and glass (330 lb/yd<sup>3</sup>) to get 220 lb/yd<sup>3</sup>
- Wood: 400 lb/yd<sup>3</sup>
- Dirt: 810 lb/yd<sup>3</sup>
- Misc. Garbage: 220 lb/yd<sup>3</sup>

Calculations: Total weights of materials

- Concrete:  
150 kips/ft<sup>3</sup>=150 lb/ft<sup>3</sup> x 540 ft<sup>3</sup> (20 yd<sup>3</sup> dumpster)=81,000 lb x 2 dumpsters = **162,000 lb.**
- Cardboard and paper:
  - Cardboard: 85 lb/yd<sup>3</sup> x 40 yd<sup>3</sup>=3400 lb x 3 dumpsters = **10,200 lb.**
  - Paper: 150 lb/yd<sup>3</sup> x 40 yd<sup>3</sup>=6000 lb. X 3 dumpsters = **18,000 lb.**
  - Average: 117.5 lb/yd<sup>3</sup> x 40 yd<sup>3</sup>=4700 lb. X 3 dumpsters = **14,100 lb.**
  - For the purpose of these calculations, the high weight used was 18,000 lb., the average weight was 14,100 lb., and the low weight was 10,200 lb.
- Metal:
  - Aluminum: 270 lb/yd<sup>3</sup> x 40 yd<sup>3</sup>=10,800 lb x 4 dumpsters= **43,200 lb.**
  - Other: 540 lb/yd<sup>3</sup> x 40 yd<sup>3</sup>=21,600 lb. X 4 dumpsters= **86,400 lb.**
  - Average: 405 lb/yd<sup>3</sup>=16,200 lb x 4 dumpsters= **64,800 lb.**
  - For the purpose of these calculations, the high weight used was 86,400 lb., the average weight was 64,800 lb., and the low weight was 43,200 lb.
- Drywall: 220 lb/yd<sup>3</sup> x 40 yd<sup>3</sup>=8,800 x 4 dumpsters= **35,200 lb.**
- Wood: 400 lb/yd<sup>3</sup> x 40 yd<sup>3</sup>= 16,000 lb x 5 dumpsters= **80,000 lb.**
- Dirt: 810 lb/yd<sup>3</sup> x 100 yd<sup>3</sup> = 810,000 lb.
- Garbage: 220 lb/yd<sup>3</sup> x 40 yd<sup>3</sup>= 8,800 lb.
  - 8,800 x 2 dumpsters= **17,600 lb.**
  - 8,800 x 3 dumpsters= **26,400 lb.**
  - 8,800 x 4 dumpsters= **35,200 lb.**
  - 8,800 x 5 dumpsters= **44,000 lb.**

**RESOURCES**

Specific weights were found at the following websites:

<http://simscience.org/cracks/advanced/forces.html>

<http://www.ecs.umass.edu/cee/reckhow/courses/370/370hw9s.html>

Dumpster estimations were provided by SpawGlass on 07/31 during a meeting.

**PERCENTAGE OF MATERIALS RECYCLED VS. TOTAL MATERIALS RECYCLED  
BY WEIGHT**

<b>Metal</b> (4 pulls)	<b>Concrete</b> (2 pulls)	<b>Wood</b> (5 pulls)	<b>Paper/Cardboard</b> (3 pulls)	<b>Total</b>
100	100	100	100	80.2
90	90	90	90	72.18
80	80	80	80	64.16
70	70	70	70	56.14
60	60	60	60	48.12
50	50	50	50	40.1
40	40	40	40	32.08
30	30	30	30	24.06
20	20	20	20	16.04
10	10	10	10	8.02

## **recyclers**

### **cherry crushed concrete**

4601 Holmes Rd. Houston, TX 77033

713 731 2040

- We can deliver in a dumpster
  - Roll-off would be best – easiest to get concrete out
  - If we don't use a roll-off, we have to supply the people to remove the concrete from the dumpster
- We can also hire someone they work with to pick up the concrete and transport it to Cherry.
- Concrete must be clean – no trash. Rebar is okay, but no other materials can be in the concrete.

### **southern crushed concrete**

5625 Griggs Rd. Houston, TX 77021

281 987 8789

- Same situation as cherry

### **novus wood inc.**

5900 Haynesworth Ln. Houston, TX 77034

281 922 1000

**Roger: 281 381 9150**

- We can deliver in a 40-yd dumpster
  - If it can unload itself (by tipping), that would be best
  - If not, we have to unload by hand
- Wood must not be treated or painted

## **gulf coast scrap metal**

8770 Hempstead Rd. Houston, TX 77008

**Chano: 713 868 4111**

- We pay no money whatsoever
- He will provide containers and pick up for no charge
- He pays for material
- We call when we are set up and he will come out and give us a quote

## **vista fibers**

1200 Brittmoore Houston, TX 77043

**Mike Ortiz: 713 461 9933**

- They will provide containers free of charge
- They will pick up. They will probably charge \$50 for a pick up fee, but this may be waived depending on material.
- Open top container must be kept in dry place
- They pay for materials

## recycling segregated materials

### WOOD: 40 TONS

- Labor: 12.5 hours to separate x \$18/hour = \$225
- Hauling: \$150 per pull x 5 dumpsters = \$750
- Tipping: \$3 per yd<sup>3</sup> x 200 yd<sup>3</sup> = \$600
- **Total cost: \$1575**

### CARDBOARD AND PAPER: 7 TONS

- Labor: 7.5 hours to separate x \$18/hour = \$135
- Hauling: \$50 per pull x 3 dumpsters = \$150
- Tipping: No cost
- Additional: Will pay us for materials (varies depending on quality)
- **Total cost (without revenue from materials): \$285**

### CONCRETE: 81 TONS

- Labor: no additional cost to separate (materials are typically separated)
- Hauling: \$150 per pull x 2 dumpsters = \$300
- Tipping: No cost
- **Total Cost: \$300**

### METAL: 32.4 TONS

- Labor: no additional cost to separate
- Hauling: none
- Tipping: no cost
- Additional: Will pay for materials
- **Total cost: NONE – will generate revenue**

### MISCELLANEOUS WASTE + DRYWALL: 30.8 TONS

- Labor: no additional cost
- Hauling/tipping: \$265 per pull x 7 dumpsters= \$1855
- **Total cost: \$1855**

**TOTAL COST: LESS THAN \$4015**

**SENDING EVERYTHING TO LANDFILL:**

- Labor: no additional cost
- Hauling/tipping: (19) 40 yd<sup>3</sup> dumpsters; (2) 20 yd<sup>3</sup> dumpsters
  - \$265 per pull x 19 dumpsters = \$5035
  - \$200 per pull x 2 dumpsters = \$400

**TOTAL COST: \$5435**

**MONEY SAVED BY RECYCLING: MORE THAN \$1420**

