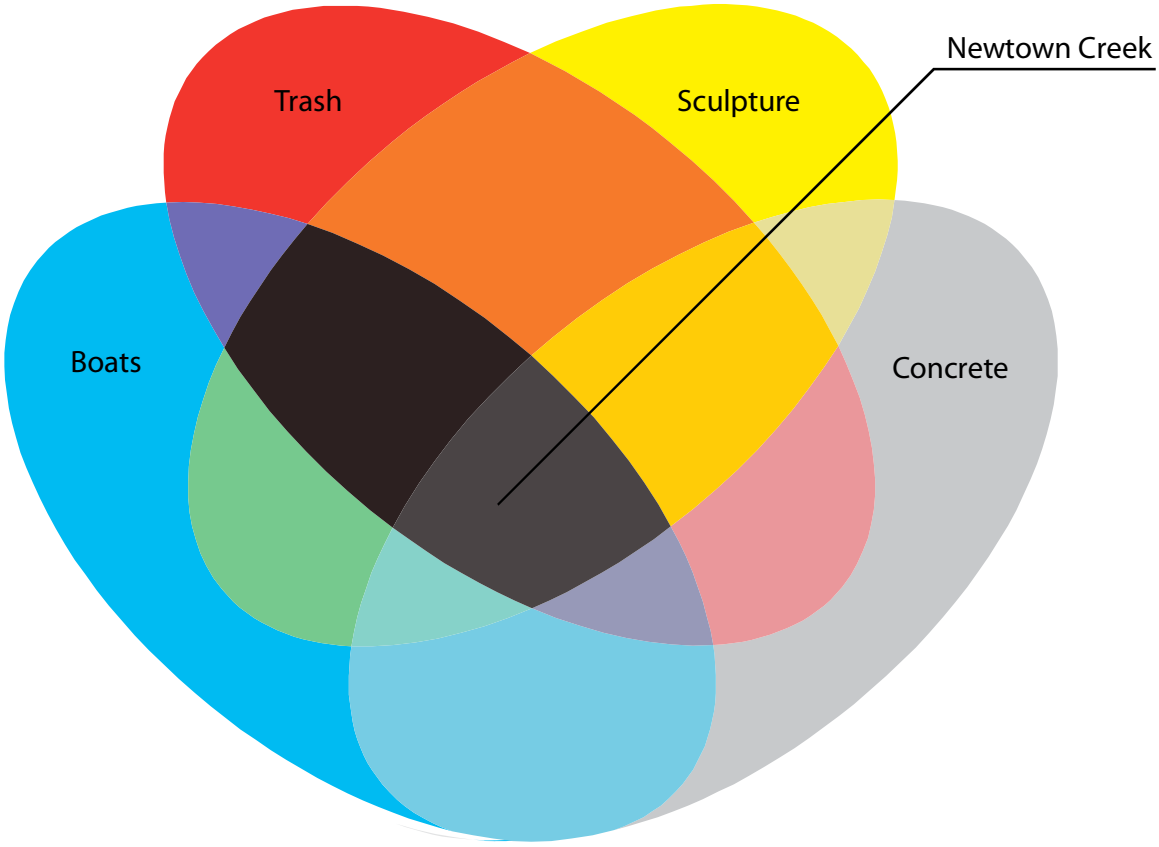
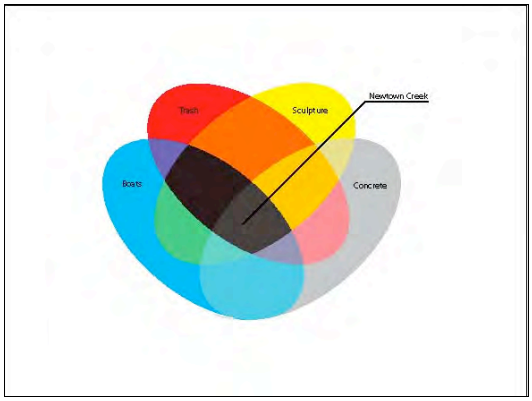
SCULPTURE SEMINAR:
Concrete Boats

University of Trash
The Sculpture Center

July 5-19, 2009

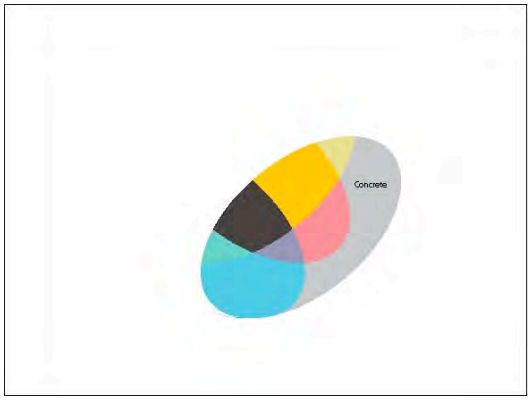



Brian O'Connell



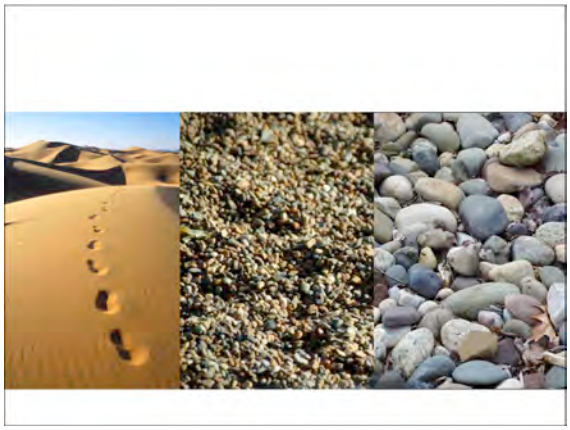

I would like to use this as a chance to provided some context; to develop an idea of why it might make sense to have a seminar on building concrete boats at the University of Trash and then on top of it all to call it a sculpture seminar.

I'd like to explain this as the intersection of four terms: Concrete, Boats, trash and sculpture. This intersection seems in a strange way to find itself at Newtown Creek. Just behind these walls, in fact.



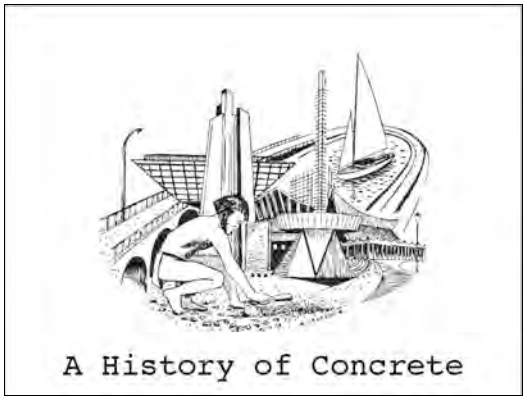

Let's begin with Concrete. Concrete is a form of artificial stone. It is in fact the mixture of three elements: Cement, Aggregate, and Water.

Cement is the product of super heating Limestone. The most common cement in use today is Portland Cement which is produced by heating limestone to about 1400°C resulting in something called clinker. This clinker is then ground and mixed with gypsum and other compounds to produce cement.



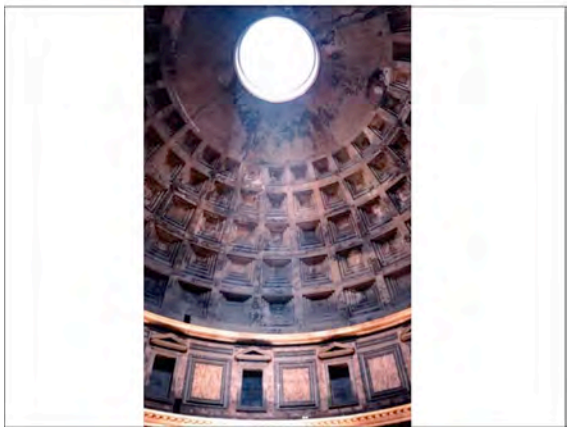
All concretes and mortars contain an amount of aggregate. Aggregate is stone material which when mixed with cement and water bind together producing chemical bonds which strengthen over time. Aggregates can range from sand to gravel and even cobble-sized stones.

Water is the third and in many ways most crucial component of concrete. By mixing cement and aggregates with water a process called hydration takes place. Only through continued contact with water will a concrete mixture achieve its maximum strength. Concrete does not dry, it sets and then hardens only through continued contact with water.




Now let us turn to a brief history of concrete and its uses.

It has been suggested that early humans may first have discover the properties of cement by observing that the limestone used to contain a fire became brittle and ultimately broke down. They may further have noticed that when exposed to rain this powdery substance became plastic but eventually hardened again into a rock-like substance.



Though various lime-based cements were used by both the Egyptians and the Greeks concrete construction only really took off with the Romans whose uses of concrete as a building, as well as, a decorative material is legendary. Take for example the Pantheon. The dome of the Pantheon is a single massive concrete structure the exact construction method of which remains a thing of conjecture.

A.D. 1824 . . . . . N° 5022.

Artificial Stone.

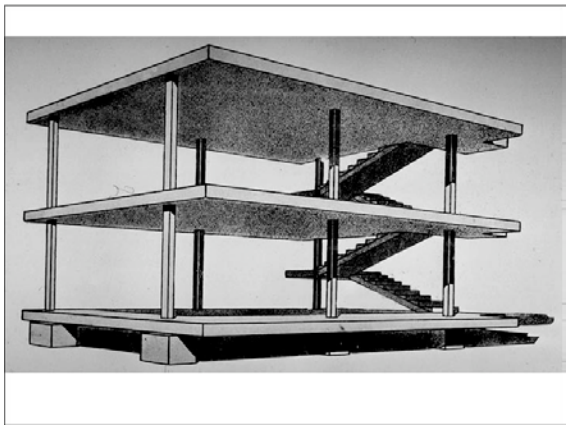
ASPDIN'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, Joseph Aspdin, of Leeds, in the County of York, Bricklayer, send greeting.

WHEREAS His present most Excellent Majesty King George the Fourth, by His Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Twenty-first day of October, in the fifth year of His reign, did, for Himself, His heirs and successors, give and grant unto me, the said Joseph Aspdin, His especial license, that I, the said Joseph Aspdin, my executors, administrators, and assigns, or such others as I, the said Joseph Aspdin, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon-Tweed, my Invention of "AN IMPROVEMENT IN THE MODE OF PRODUCING AN ARTIFICIAL STONE;" in which said Letters Patent there is contained a proviso obliging me, the said Joseph Aspdin, to an instrument in writing under my hand and seal, particularly to describe and ascertain the nature of my said Invention, and in what manner the same is to be performed, and to cause the same to be inrolled in His Majesty's High Court of Chancery within two calendar months next and immediately after the date of the said in part recited Letters Patent (as in and by the same), reference being thereunto had, will more fully and at large appear.

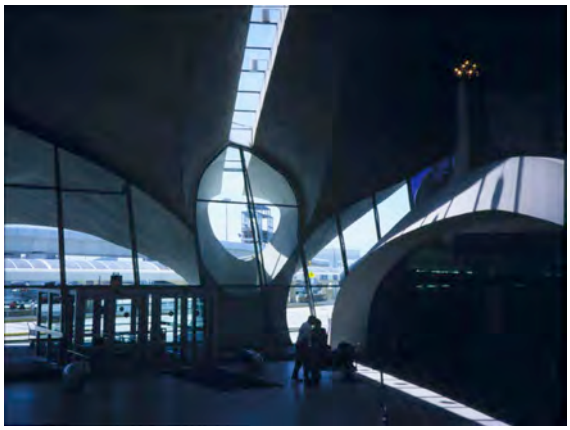
NOW KNOW YE, that in compliance with the said proviso, I, the said Joseph Aspdin, do hereby declare the nature of my said Invention, and the manner in which the same is to be performed, are particularly described and ascertained in the following description thereof (that is to say):—

This is the patent for Portland Cement invented by Joseph Aspdin, bricklayer, in 1824. Portland cement takes its name from its color which was said to resemble the gray limestone taken from Portland for the construction of houses in London at the time.

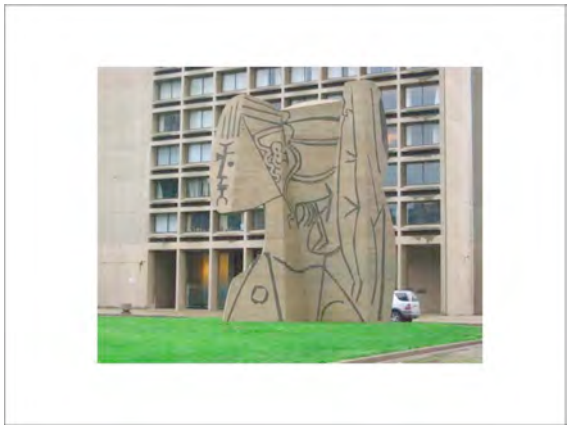


Concrete's contribution to modern architecture and the development of Modernism both technically and stylistically cannot be under-estimated.

Concrete's ability to be formed, molded and shaped allowed for the expansion of design and form.



It has often been said that concrete allowed for the expansion of architecture into 'sculptural form' and sculpture to take on architectural dimensions.



I'm not always sure how true that is.

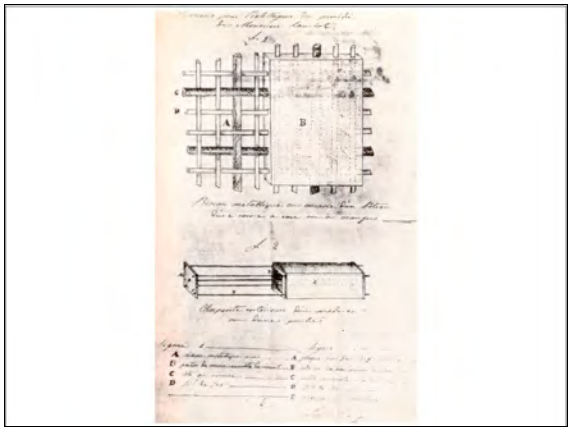
The I-35W Bridge in Minneapolis collapsed on Aug. 1, 2007 killing 13 and injuring 145. It was a steel truss bridge.

The new I-35W St. Anthony Falls Bridge Mississippi River Crossing in downtown Minneapolis was commissioned on Sept 19 2007 and opened for traffic one day less than a year later.

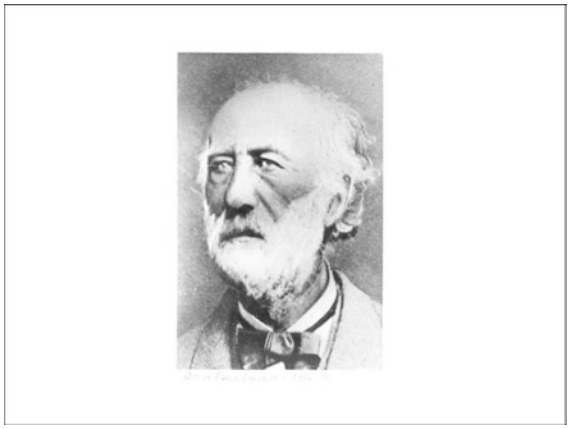

The new bridge incorporated a number of methods and technologies that attempt to mitigate the global warming impact of the use of so much concrete.

Concrete sculptures on both ends of the bridge serve not only as memorials but as air cleaners.

This construction photo shows a crucial element in concrete construction not yet mentioned. Notice all the green steel used to reinforce the bridge. This is crucial because concrete on its own only has compression strength but NO appreciable tensile strength. A fact that make the pantheon all that much more remarkable.



This is the first patent for ferrocement invented in Joseph Lambot in 1855.

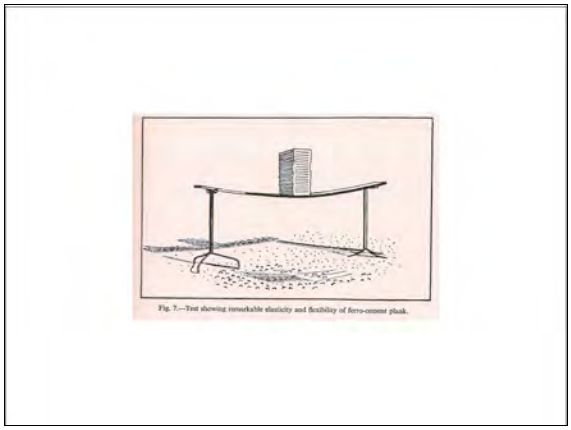


Joseph Lambot

Located approximately 25 kilometers southeast of downtown Vientiane on the Mekong River, Xieng Khuan or “Spirit City” is just as much a monument to one man’s eccentric and perhaps bizarre ambition as it is an impressive collection of massive ferro-concrete sculptures dotted around a riverside meadow.

Ferrocement has been used around the world to produce any number of innovative architectural forms.

A popular use of ferrocement is the construction of water tanks in arid environments where wood is scarce.

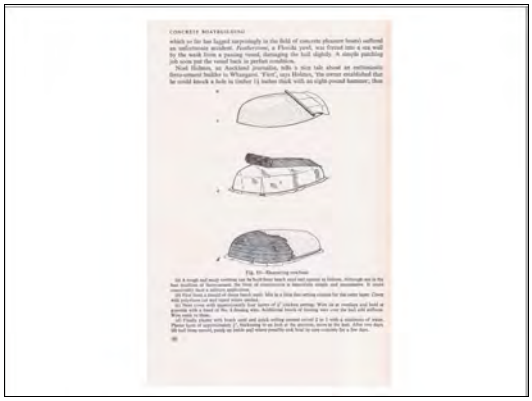


A remarkable property of ferrocement is its flexability. Let's take this opportunity to demonstrate/test this:

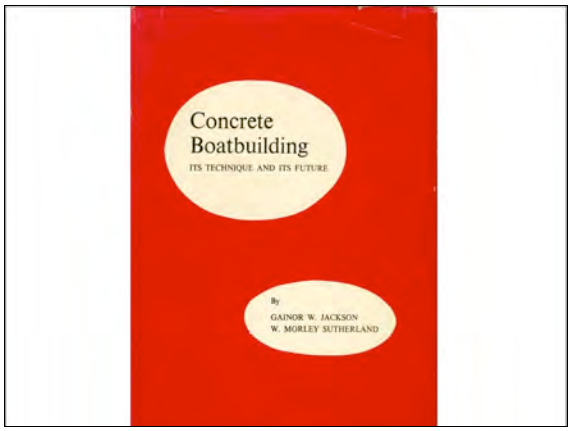
The results.


BOATS AND CONCRETE

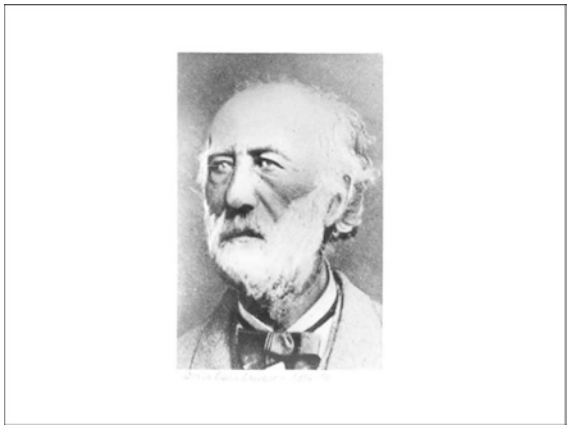

The process used to produce a concrete boat using beach sand as both a form and a material is described in the 1971 edition of the The Whole Earth Catalog. This is a process I will describe in some detail later



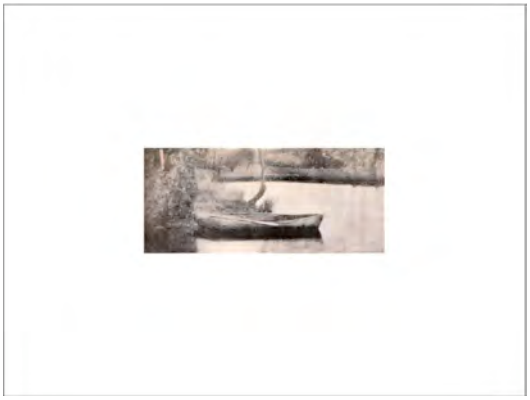
Here is a brief description of the process




This 1969 book is an exhaustive history and guide to concrete boat building. It is the original source of the beach boat concept. The use of concrete in boat building is traced back to Joseph Lambot who first patented fericement in 1855. Fericement or ferrocement is cement combined with significant amounts of flexible steel.



Before applying for the patent for fericement Joseph Lambot had already made fericement row boats which he used on a lake at his home in Miraval.



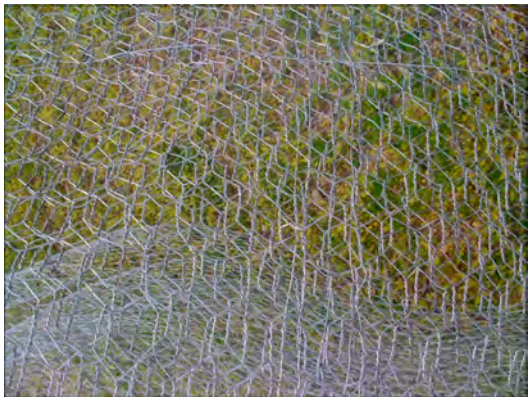
The boat eventually sank but was recover after more than 50years under water.

He exhibited his boats at the 1855 Paris Worlds Fair under catalog #4094

Concrete boats and barges gained popularity in the late nineteenth and early twentieth century. During the First World War, steel was becoming scarce. President Woodrow Wilson approved the construction of 24 concrete ships. Of the 24, only 12 were built, at a total cost of $50 million. By the time the ships were completed, the war had already ended. One of these was the SS Atlantus which after service as a transport ship for returning soldiers was scrapped and then sold to be made part of a ferry landing. In 1926 it broke free of its moorings and ran aground.

By the 50's the S.S. Atlantus had split in two. Despite or perhaps because of its dramatic condition it remains a tourist attraction to this day off of Cape May NJ.

Though Concrete boats were popular and useful through out the beginning of the 20th c. especially during the World Wars - many WWII era ships are still afloat as part of breakwaters - it is Pier Luigi Nervi who is considered in Concrete Boat circles the father of the modern concrete boat. Though known far beyond these circles for his important contributions to modern reinforced concrete construction and architecture.



Nervi's greatest contribution to the construction of ferrocement boats was the 'observation that the elasticity of a reinforced concrete member increases in proportion to the subdivision and distribution of the reinforcement of the mass.' This meant that it was not only how much steal was used but how it was distributed. An ideal means for the distribution of steal through out a skin is the use of chicken wire which has been the primary reinforcement used in ferricement boat construction since Nervi's groundbreaking work at the end of WWII as an Italian naval engineer.

In the '50s and '60s cement became a popular material for producing sailing yachts and fishing boats

The Falcon a cement ketch at the start of the Auckland to Suva yacht race. The next day a bad storm sank one of the yachts. The falcon was undamaged.

In the 1970's concrete boat building found a new following among the counter culture as a means of living and building in an "era of instant plastic and just about everything pre-fabricated,"

1977: Joe Cordova: To Build a Boat

How do you actually build a ferrocement boat?

I spent from April 3rd and 18th, 2009 on a beach near LA constructing a concrete boat. The form used to make the boat and the hull itself was made of beach sand.

Having built the form by piling up sand a protective layer of plastic is applied to the complete form. Before the form is covered with wire mesh.

The layers of chicken wire are held together with wire to make a single tight layer of mesh about 3/4-inch thick.

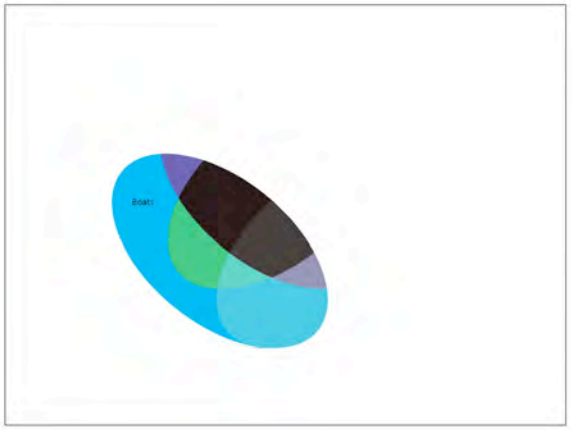
The final form including the keel is now ready for the external layer of concrete.

We mixed a total of 9 batches of concrete and sand mortar over the course of the day.

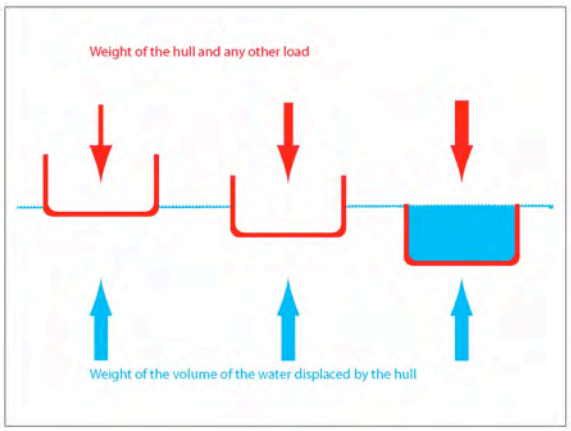
The mortar must be applied in one day to ensure that the hull cures as a continuous surface.

Flipping a boat estimated to weigh about 1000lbs poses a significant challenge. But a solution was found.

The edge of the hull is trimmed and the inside of the boat is finished with mortar.

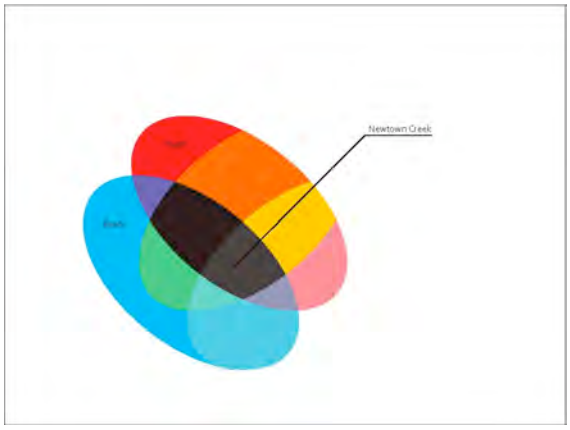


BOATS




Displacement Hull: A vessel will float as long as its weight and whatever it contains is less than the weight of the water that would be in its place (its displacement)

It works!




BOATS, TRASH AND NEWTOWN CREEK.


On March 22 the tug boat *Break of Dawn skippered by Capt. Duffy St. Pierre, left Long Island City towing the Mobro 4000 a barge 230ft long piled 18ft high with bails of approx 3200 tons of Trash. The Trash came mostly from Islip as the result of a deal brokered by Lowell Harrelson of Morehead City NC and Islip Town Supervisor Frank Jones*

Having left Long Island City the Break of Dawn made its way to North Carolina.

By early April NC rejected the Break of Dawn saying it could not unload anywhere in North Carolina. On April 6 it moved on to Louisiana

Louisiana rejected it

Mississippi...

Alabama...

and Texas barred the Break of Dawn which then turned south.

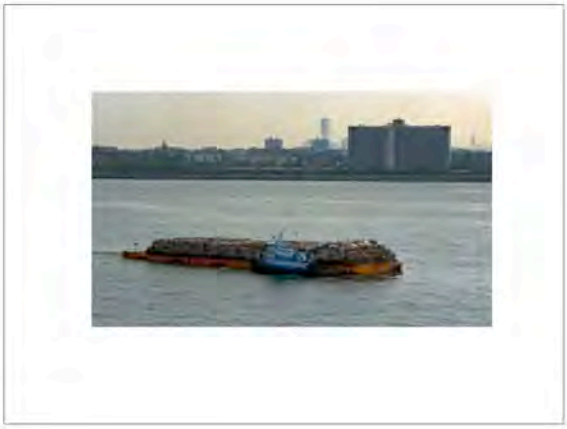
Mexico tracked it with two naval destroyers and aircraft

Belize also tracked it militarily.

The barge then turned toward Key West.

Florida Governor Bob Martinez blocked it from state waters.

The Break of Dawn returned to NY



Eventually Capt. St. Pierre gave up and returned to Louisiana Leaving the Mobro and it 32000 tons of trash to rot off NY harbor. It became the City, State and Fed. Gov.'s prob.

New York City refused to take it.

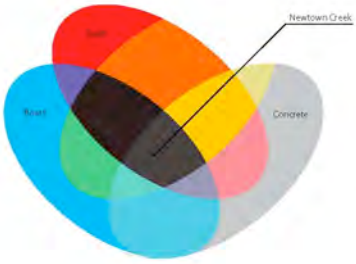
FOR TRASH BARGE CREW, EMPTY DAYS AND FLIES - May 4, 1987
FOR ALABAMIAN, L.I.'S GARBAGE IS DREAM GONE BAD - May 6, 1987
WANDERING TRASH BARGE TO RETURN TO NEW YORK - May 15, 1987
NEW YORK CITY SHUNS BARGE BEARING WELL-TRAVELED TRASH - May 16, 1987
TRASH BARGE ENTERS NEW YORK HARBOR, HEADS FOR BROOKLYN - May 17, 1987
GARBAGE BARGE RETURNS IN SEARCH OF A DUMP - May 18, 1987
QUEENS COURT BARS DOCKING OF TRASH BARGE FOR 2 DAYS - Tuesday, May 19, 1987
JUDGE LIFTS BAN IN GARBAGE CASE BUT CITY DOESN'T - Friday, May 29, 1987
Garbage Barge to Get Anchorage on Hudson - June 2, 1987
Tugboat Goes Home; Garbage Barge Stays - June 19, 1987
Trash Barge To End Trip In Brooklyn - Saturday, July 11, 1987
BROOKLYN JUDGE CLEARS BURNING OF BARGE TRASH - August 11, 1987
THE END BEGINS FOR TRASH NO ONE WANTED - Sept. 2, 1987

Kotch: "It's Islip's garbage, I don't think we should have to deal with it"

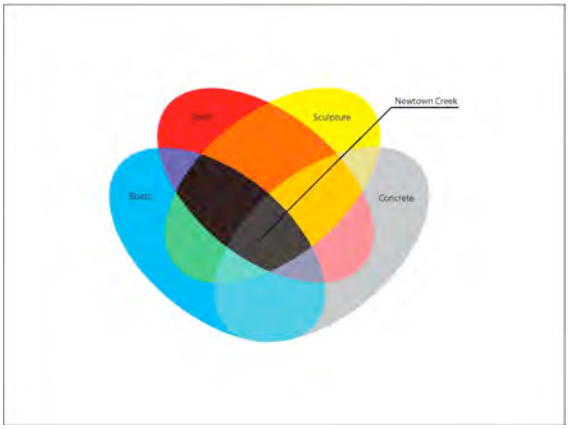
Frank Jones: "They can haul the garbage to Gracie Mansion and compost it on the lawn along with the rest of the garbage that visits"

The well traveled garbage barge floats moments before its bales broken apart and inspected on its way to the incinerator, Sept. 1, 1987, Brooklyn, N.Y.

In part due to the attention drawn to solid waste management issues by the Mobro 4000 Congress passed the Clean Air and Clean Water Acts of 1990.



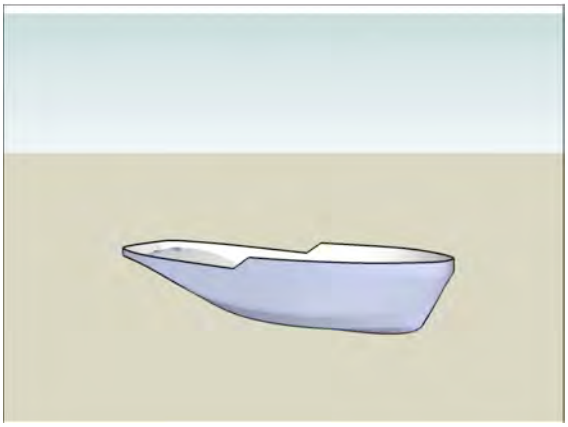

BOATS, TRASH, CONCRETE AND NEWTOWN CREEK...




BOATS, TRASH, CONCRETE, NEWTOWN CREEK AND SCULPTURE

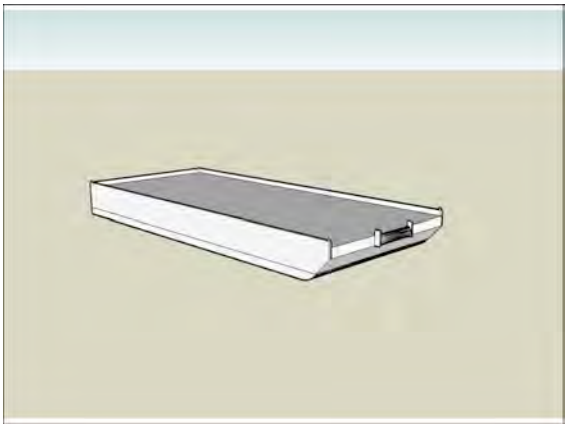
The Sculpture Center

Tugs in Newtown Creek

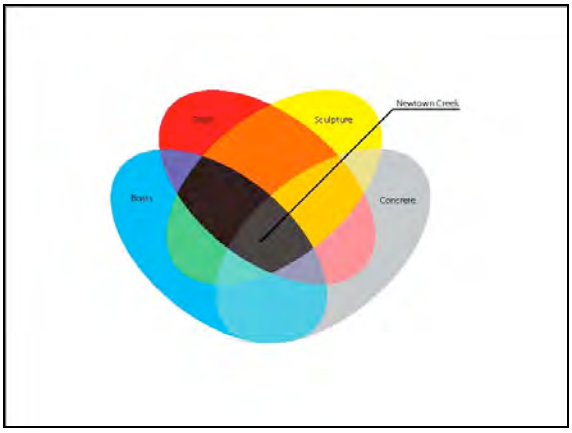


Tugboat Hulls

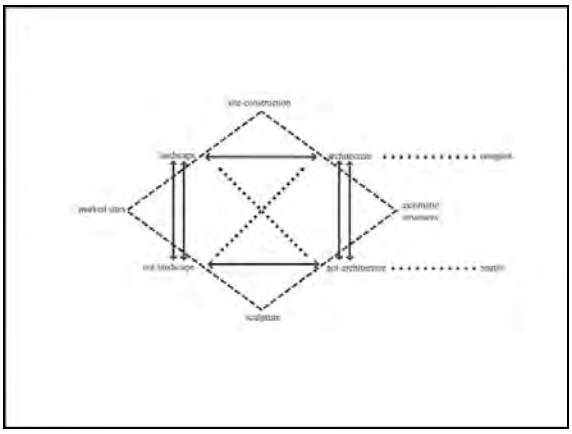
Barges in Newtown Creek



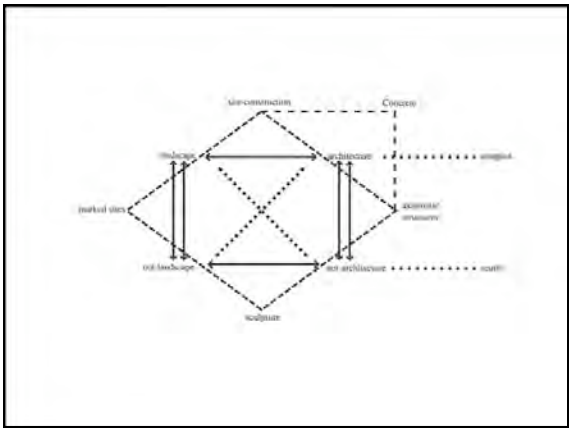
Barge Hulls

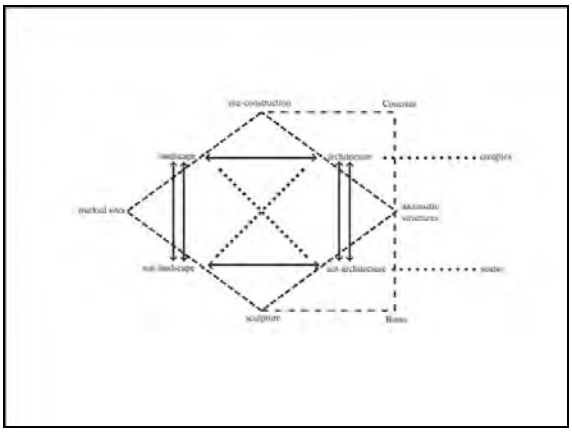



Let's rethink this diagram. How can we reorganize these relationships in light of this discussion?



As a sculpture seminar, perhaps we can make use of this familiar diagram. Can we find a way to expand it to suit our situation?

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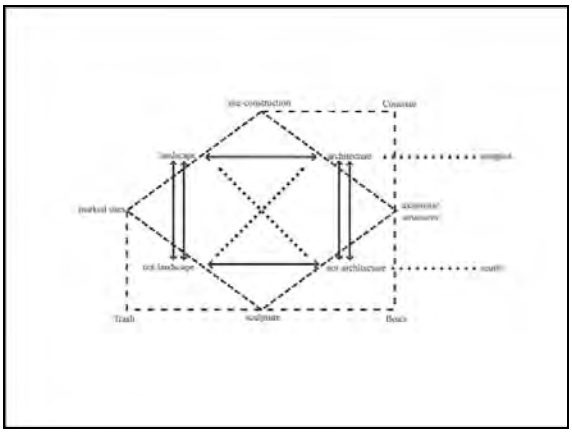
sculpture
Boats


site-construction
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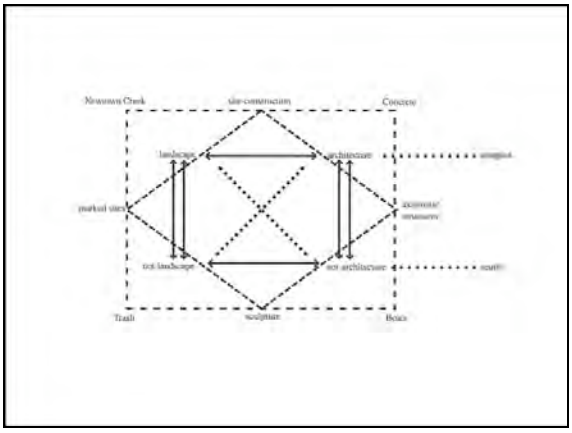
Trails
sculpture
Boats


Newtown Creek
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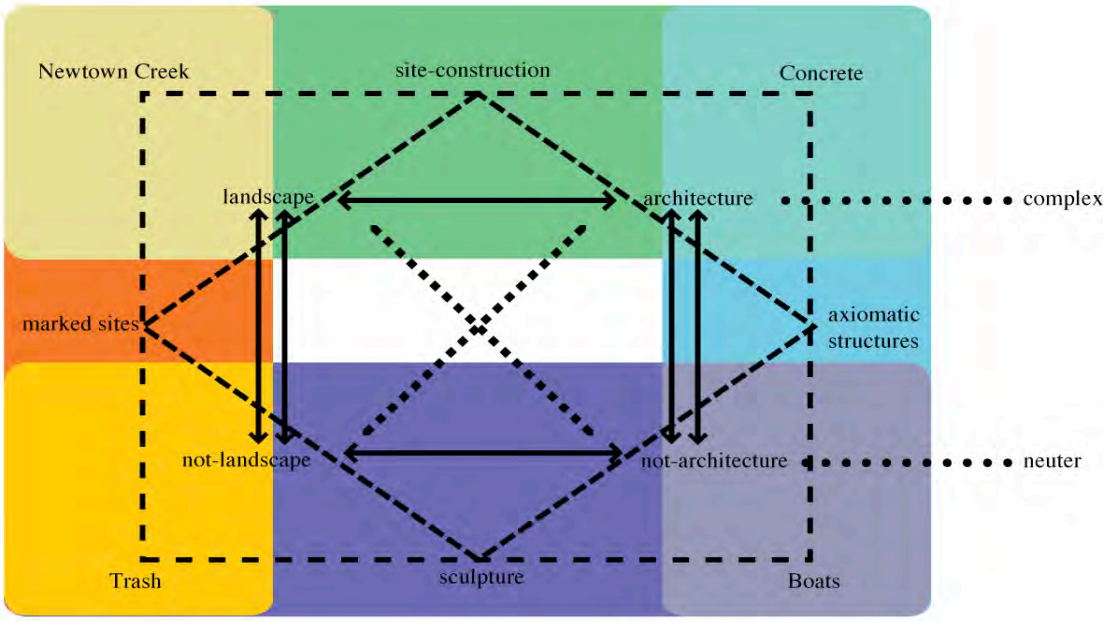
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