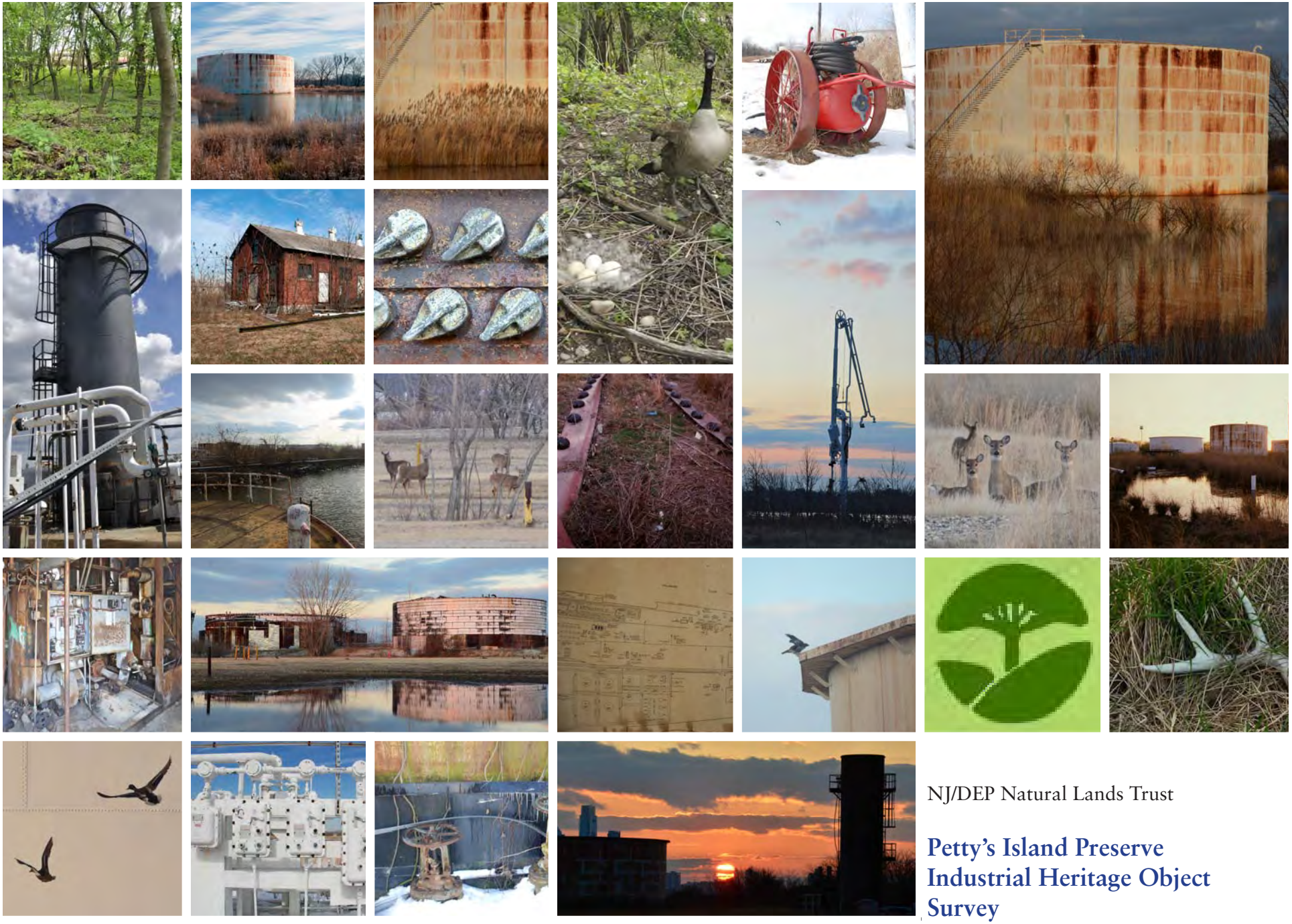


NJ/DEP Natural Lands Trust

Petty's Island Preserve Industrial Heritage Object Survey

VITETTA

April 15, 2015

Industrial Heritage Object Survey

Table Contents

Early photograph of industry on Petty's Island.

Summary

Petty Island is a 300-acre[1] island in the Delaware River surrounded by extensive tidal mud flats. CITGO Petroleum Corporation owns the island on which it had operated a fuel/oil storage facility for many decades. CITGO currently leases a portion of the island to Crowley Maritime Corporation for a barge facility that will continue operating until January 31, 2017.

In 2009, CITGO donated a conservation easement on the island to the New Jersey Natural Lands Trust. Once CITGO has fully remediated the island, the Trust plans to take ownership of the island and create an urban nature preserve. The Trust also hopes to construct and operate a cultural and environmental education center at the Petty's Island Preserve that will serve the local community as well as the greater New Jersey and Philadelphia areas.

Vitetta was retained to review the site and its existing structures to determine if any of the objects on site should be kept for future interpretation of the industrial heritage of the island. This report is to provide recommendations to the Natural Lands Trust regarding those pieces that could be salvaged for future use in art, interpretive displays and/or landscaping at public access locations that best represent the industrial heritage of Petty Island.

One of the stipulations of the project was that no large structures would be able to remain due to the remediation activities and potential contamination of the materials. In our review of the objects on site, it was confirmed that many of the smaller objects that were used to facilitate the refining and storage of the fuel and oil on the site had already been removed and sent away for use at other facilities. This prompted the team to evaluate the objects not only for their interpretive potential but also their potential reuse. The recommendations in this report are meant to provide possible ideas for interpretation and are not meant to be exhaustive of the potential of each object.

1 http://nj.gov/dep/njnlt/pettysisland.htm

Focus Area for the report.

Methodology

Vitetta walked the property on February 25, 2015. Access to the Crowley Maritime portion was not permitted. Interior access to all buildings was not possible due to the condition of the buildings. We selected objects that both represent the oil refining process and have the potential to be reused into pieces that will serve the property as a nature center.

Research was completed to help better understand the industrial history of the site. Aerial photographs from 1940, 1963, 1970, 1992 and 2002 were obtained in order to see the differences in the constructed elements on the site (See Appendix A). We obtained a digital copy of the "Romance of Petty's Island" by John Morrison printed in 1916 (See Appendix B).

We also contacted Marshall Mott-Smith who has over 32 years of experience including being president of his own consulting company focusing on above ground storage tanks. He is also the vice president of the board of directors for the National Institute for Storage Tank Management (NISTM). Mr. Mott-Smith was able to provide guidance on the original function of the existing equipment as well as the historic significance of the pieces (See Appendix C).

A general history on the construction of tanks was also found and used to help identify the approximate dates of the tanks (See Appendix D).

Industry on the Island

The Crew Levick Company purchased the island in 1916. It began operations that made the island into a major source of oil for the east coast. A tank farm, refinery, and tanker ship port was erected by 1927. As early as 1930 it had storage capacity for 26 million gallons, increased soon to 100 million gallons. The oil activities were concentrated on the center of the island, leaving the southern end undisturbed.

Tanks on the site were constructed at various times throughout the history of the site. This can be seen in the aerial photographs as well as the construction methods of the tanks. Large above ground steel storage tanks began being used around the 1880s. At this time they were riveted steel panels. The riveted tanks were used up into the 1920s and 1930s when arc welding was developed. Welded tanks were installed from that point forward. Both riveted and welded tanks are present on site.

Fixed roof tanks as well as floating roof tanks are also on site. Fixed roof tanks are the early iteration of fuel & oil storage. These kept out rain water, but did not provide for loss of vapor. Fixed roof tanks are used for diesel and kerosene. Floating roof tanks are used for gasoline. They were developed to help prevent loss of gasoline through the loss of vapor. There are also tanks that have been insulated (possibly with asbestos insulation) on site. It is believed that these held either crude oil or asphaltic material.

The large tanks on site are approximately 100 feet in diameter and hold approximately 4 million gallons.

Riveted Tank.

Welded Tank.

Floating Roof element of tank.

Dykes were required to be installed around tanks. Their purpose was to contain any leaks or spills that happened at the tanks. Currently the requirement for the dykes is that they hold 110% of the contents of the tanks and prevent the fuel/oil from going into the ground water. Both earthen dykes and concrete dykes are present on the site.

Metal pipe was used to move the fuel and oil around the tank farm. The fuel/oil must be heated in order to run freely through the pipe. Heat pumps were used to heat up the liquid as it traveled through the pipes. Insulation was required around pipes that contained crude oil and asphaltic material. Asphaltic material was used in paving and roofing materials. Insulated pipe can be found on the site particularly at the tanker truck fueling stations indicating that asphaltic material may have been one of the exports from the island.

Originally, the export of fuel/oil was done through a railway system. Later this was changed to a truck system. Remnant of the rail lines can be seen on the site.

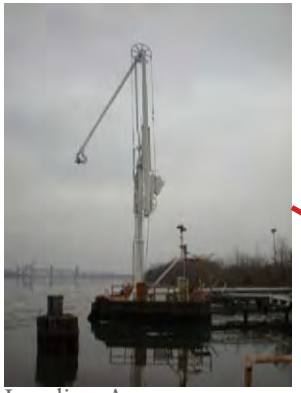
Above: Insulated tank with insulated pipe.

Left: Abandoned rail lines.

Between 1970 and 1992 the two story brick building at the north side of the island was removed and the three breasting dolphins were built. The ability to directly load vessels is one of the features of the island that make it unique among many tank farms. Ships were able to dock at the wharf and later on the breasting dolphins and either unload or load fuel/oil. On the center breasting dolphin is a loading arm. This arm was swung out over the river to the ship and either pumped or extracted fuel/oil to the ship. Neither rail lines nor truckers were needed to transport the fuel/oil.

As seen in the aerial photographs, the number of tanks on site began dwindling between 1940 and 1963. This pattern continues through the present. Structures were also demolished over time. CITGO currently owns the property, but it has not been an active tank farm for the last 15 years.

Industrial Heritage Object Survey



Loading Arm on Breasting Dolphin to load/unload ships.

Typical Large Tank

Carpentry/Welding Shop

Vapor Exhaust

Abandoned Rail Lines

Tanker Fueling Station

Remediation Equipment

Tanker Fueling Station

1940

The aerial photograph shows the storage building on the north shore of the island and the extensive number of tanks. The wharf runs along the storage building and is where shipping vessels would dock to be loaded and unloaded.

1963

1963 show a decrease in the number of storage tanks and structures on site as well as some new traffic patterns. A new structure was built on the south side of the storage building. The south side of the island has what appears to be new retention areas along the shore line.

1970

The number of tanks appears to be similar from 1963. The non-industrial section of the island appears to be filling in with plant life.

1992

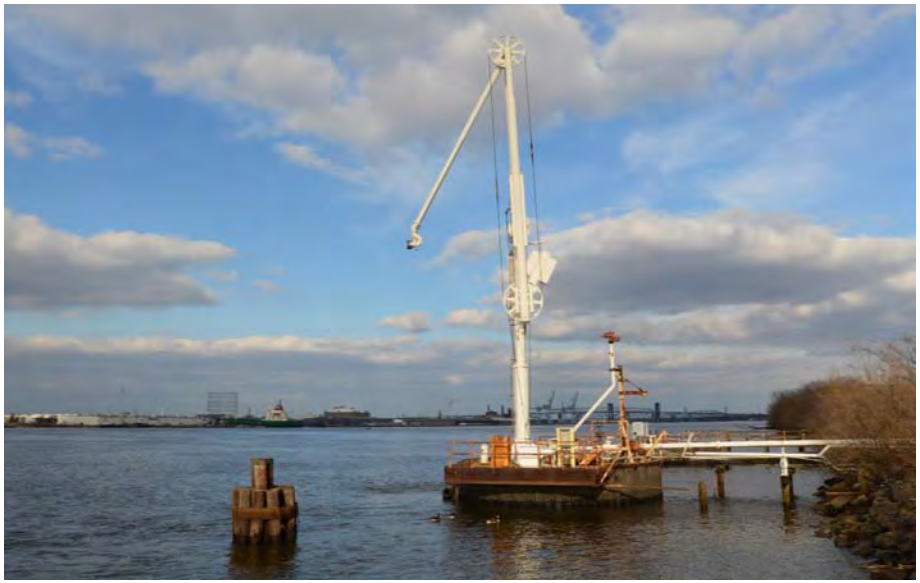
The storage building was removed sometime between 1970 and 1992. The breasting dolphins were constructed during this time as well. Some of the smaller tanks on the north side have been removed and three larger tanks installed to the east of the old storage building. The retention areas on the south side have also been removed.

2002

2002 is approximately when CITGO ceased its operations on the island. Buildings and tanks have been removed and the unindustrialized portion of the site becomes more heavily forested.

2013

This aerial photograph shows the island as it exists today, a much pared down version of the 1940 site.



Breasting Dolphin with Loading Arm

Current Latitude: 39.970439

Current Longitude: -75.09944

Object Description: Under the conservation easement, the Trust agreed that the three breasting dolphins (also called a berthing dolphins or a mooring dolphins) located off the shoreline of Petty's Island can remain in place. With structural improvements, the Trust plans to use the breasting dolphins as river overlooks. The breasting dolphins were used as piers for shipping vessels to dock during loading and unloading. They were also used to display regulatory information for passing ships. A loading arm is located on the center dolphin. This arm would swing out and connect to the ships so fuel/oil could be loaded or unloaded from the ship. Being able to load and unload directly onto shipping vessels was one of the unique elements to Petty's Island as a storage and refinery operation. Under the easement, the loading arm is to be removed by CITGO.

Potential Use A: Subject to structural integrity analysis, leave the loading arm in place and interpret it as a sculptural element to explain ship loading.

CITGO Sign

Current Latitude: 39.968964

Current Longitude: -75.10299

Object Description: The CITGO emblem was placed on one of the tanks that face the Delaware River to identify the property.

Potential Use A: Use as a sign/symbol of the industrial heritage of the property. Location of interpretive material.

Potential Use B: Incorporate into new site structure.

Concrete Culverts

Current Latitude: 39.58184

Current Longitude: -75.05625

Object Description: A structure that allows water to flow under a road, railroad, trail, or similar obstruction.

Potential Use A: Planters

Potential Use B: Benches

Potential Use C: Water Feature

Concrete Dikes

Current Latitude: 39.969824

Current Longitude: -75.09361

Object Description: Dikes were required around all fuel storage tanks to contain the fuel if the tank leaked. They were designed to hold 110% of the tanks capacity and prevent soil contamination.

Potential Use A: Habitat - Currently they surround areas of marshy soil and tall grasses that support wildlife.

Potential Use B: Location where native plants can be cultivated before they reach maturity and can be relocated on the site.

Corrugated Metal Roofing

Current Latitude: 39.971331

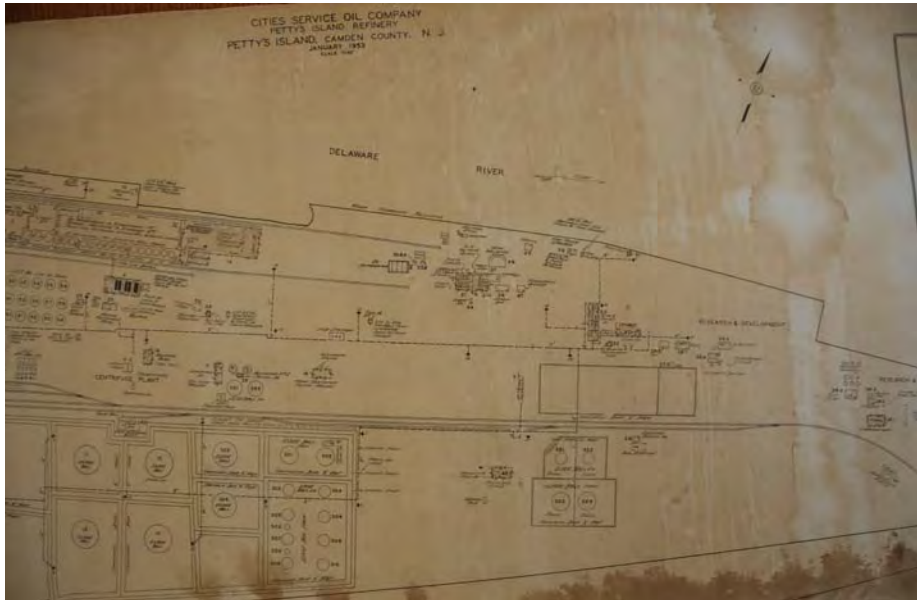
Current Longitude: -75.09477

Object Description: Light-weight metal roofing with a corrugated profile found on the welding and carpenter shop building as well as other buildings on the site.

Potential Use A: Wall cladding for composting toilets or other site structures.

Potential Use B: Incorporated into site activity space such as a maze or amphitheater area.

Potential Use C: Used as signage. Maps and interpretive material could be painted on the metal to serve as information and wayfinding.



Drawings

Current Latitude: In CITGO Office

Current Longitude: In CITGO Office

Object Description: Drawings of the site were found in CITGO's office that depict the site and the structures located on it. There is a drawing from 1953 and an earlier drawing on vellum.

Potential Use A: We recommend that the Natural Land's Trust acquire these drawings or copies of them to be used as part of the history and interpretation of the site.

Exhaust Hoods

Current Latitude: 39.971039

Current Longitude: -75.09492

Object Description: Exhaust hoods were used on top of buildings where people were working with dust and fumes. The hoods usually contained fans that could be used to draw the fumes away from the work below and exhaust them to the outside.

Potential Use A: Signage stands. The interpretive material can be inset into the hoods and be sheltered from the elements.

Potential Use B: Path lighting.

Potential Use C: Sculptural elements to explain how ventilation of buildings was accomplished when working with the strong fumes of refining oil.

Fire Cart

Current Latitude: 39.968451

Current Longitude: -75.10027

Object Description: Used to put out fires that occurred in the fuel pipe and occasionally within the tanks. The storage tank below would have been filled with either a chemical or foam material that could be used on gas fires.

Potential Use A: Artifact placed on site to explain potential dangers of oil storage/refining and the measures that were taken to prevent them.

Fuel Pump

Current Latitude: 39.970283

Current Longitude: -75.095742

Object Description: Fuel pump to move fuel/oil through the pipes around the site.

Potential Use A: Artifact placed on site to explain how fuel and oil were moved around the site.

Fuel Shelter

Current Latitude: 39.968947

Current Longitude: -75.09879

Object Description: Tanker trucks pulled under the shelter and loaded/unloaded for distribution. The structural integrity of the shelter has not been evaluated.

Potential Use A: Picnic Shelter for visitors.

Potential Use B: Classroom shelter for when students come to do small experiments and learn about the flora/fauna of the island.

Potential Use C: Location of a series of small interpretive materials/objects about the industrial heritage of the island.

Pump

Current Latitude: 39.969798

Current Longitude: -75.09328

Object Description: Vertical pump within the dikes used to pump water/ fuel out of the reservoir created by the dike. May have been used as part of the site remediation process in the past.

Potential Use A: Leave within concrete wall habitats for context.

Potential Use B: Sculpture

Remediation Equipment

Current Latitude: 39.968815

Current Longitude: -75.09932

Object Description: Used to monitor the amount of contamination that was being removed from the soil. The large tanks to either side is where the contaminated material that had been removed was stored. The controls did not come in contact with the hazardous material and are therefore safe. This is a piece of early remediation equipment from when remediation regulations were first put in place. And while it is no longer functioning, it represents early remediation technology.

Potential Use A: Outdoor sculptural element.

Rivets

Current Latitude: 39.96833

Current Longitude: -75.10150

Object Description: Prior to the 1920s when welding was developed, storage tanks were constructed using rivets. After the 1930s tank construction was entirely done through welding steel panels together.

Potential Use A: Sculpture to describe tank technology through time - the use of rivets then welding.

Stairs

Current Latitude: Any tank

Current Longitude: Any tank

Object Description: The stairs provided access to the top of the storage tanks where sample of the fuel were taken to assess quality as well as to measure the amount of fuel that was in the tank. Typically the stairs run up the side of the tanks in a spiral fashion; however, on Petty's Island there are also straight runs of stairs that run in front of the tanks. This fairly unique to typical tank construction.

Potential Use A: Treads reads used to create a bridge of wetland habitats to see the flora/fauna of the habitat.

Potential Use B: Treads used for paths to provide traction where paths get muddy.

Potential Use C: Sculptural element to interpret the height of the fuel storage tanks.

Tank/Portion of a Tank/ Tank Walls

Current Latitude: Any tank

Current Longitude: Any tank

Object Description: Tanks are used to store fuel and oil. They were constructed out of steel panels that were either riveted or welded together. Standard-size tanks are 40 feet high and vary in diameter based on the number of gallons they are meant to hold. The large tanks on the island hold approximately 4 million gallons each.

Potential Use A: Use tank elements to form sculptures that interpret the island's industrial heritage in the areas surrounding the visitor's center.

Potential Use B: Use tank elements to construct low-tiered amphitheater within a dimensional footprint of an actual tank that could serve as an area to conduct outdoor lectures and classes associated with the center.

Potential Use C: Use wall panel of the tank to interpret the overall size of the tanks that were on the site.

Valves

Current Latitude: 39.970088

Current Longitude: -75.09531

Object Description: A valve is a device that regulates, directs or controls the flow of a fluid by opening, closing, or partially obstructing various passageways. These were used extensively throughout the site to get the fuel/oil around the site and into and out of the storage tanks.

Potential Use A: Sculpture to interpret the number of valves that it took to move the fuel/oil through the site.

Potential Use B: Benches - recycle the valve wheels into the legs and backs of benches used throughout the site.

Potential Use C: Bicycle rack - recycle the valve wheels as bicycle racks throughout the site.

The exhaust hoods as path lighting and as signage.

The area within the concrete dikes can be used as a marsh habitat for the local wildlife. A viewing bridge can be constructed using the stair treads of the tank stairways. Visitor's can get a closer view of the habitat and wildlife.

The corrugated metal roofing from the existing structures can be used as wall cladding for new site structures that will be needed when the site because a nature preserve. Shown is composting toilet facility that uses the metal for walls.

Once the property becomes a nature preserve, much of the pavement will be removed and new paths installed. The existing fuel shelter can be used as a picnic structure for visitor's who are coming to spend the day.

Appendices

Included on the attached disk is the following appendices information:

Appendix A

Aerial Photographs from 1940, 1963, 1970 & 2002

Appendix B

"Romance of Petty Island" by John Morrison, 1916

Appendix C

Recommendations by Mott-Smith Consulting

Appendix D

"UST History" - Excerpt from the Handbook of Storage Tank Systems Available Now, by Wayne Geyer,

Appendix E

Photos from site walk-thru on February 25, 2015.