

HISTORIC AMERICAN ENGINEERING RECORD

Estate Reef Bay ("Par Force")

VI-2

Location: South central coast of St. John Island, United States Virgin Islands, adjacent to Reef Bay.

Date of Construction: Sugar Estate ca. 1725  
Sugar Factory ca. 1760  
Steam Mill installed 1862 with accompanying alteration of factory.

Original Owner:

Present Owner: Virgin Islands National Park, United States National Park Service.

Significance: The factory at Estate Reef Bay affords one of the finest surviving examples of the sugar industry in the West Indies. Boiling coppers, used for processing cane-juice, remain in place in their masonry boiling bench, and traces remain of other steps in the sugar-making process. The Estate is also one of only two on St. John known to have converted to steam power for crushing sugar cane.

Current Condition: Factory well preserved and recently restored by Virgin Islands National Park. Steam Mill in excellent condition.

Present Use: Abandoned; serves as historic exhibit in National Park.

Historian: John C. Rumm

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Estate Reef Bay, located on the south coast of St. John, has been described as "potentially the foremost exhibit of the sugar plantation within the Virgin Islands." [1] The recently restored factory building contains a complete set of boiling coppers in situ and includes several other remains of the sugar and rum-making processes. A horizontal steam engine and cane crusher, manufactured in 1861, survive in excellent condition, while an earlier animal mill, missing the crushing apparatus, has been reconstructed on its grinding platform. The estate Great House [2], an animal pen, and five small structures which were auxiliary buildings and housing quarters for the factory workers, also remain in varying states of preservation.

The present "Estate Reef Bay" represents the mid-19th century union of what previously had been two separate plantations. The first of these, "Estate Par Force," was situated on the east side of Reef Bay Valley "in the midst of a sizeable amount of open ground across the valley and north around and up the mountain slopes." [3] It was presumably settled soon after the Danish settlement of St. John in 1718. The name "Zytsema" appears on a letter signed by several planters informing the governor of St. Thomas of the slave rebellion on St. John in 1733. [4] Oxholm's 1780 map of St. John [5] names Anthony Zytsema as the owner of Estate Par Force and depicts five structures, including an estate house, a presumed sugar factory, and an animal mill, on the plantation. [6]

The second tract was situated on the northeast end of Reef Bay and was unnamed by Oxholm. His 1780 map indicates that this land belonged to C. Weyle [7] and was a site of cotton cultivation and livestock raising. [8] No facilities for sugar manufacturing are indicated.

Ownership records show that in 1792 the executors for Zytsema's estate transferred the land to Juro Vriehus. [9] Oxholm's 1800 St. John map [10] indicates that the estate, still named "Par Force," continued to employ an animal mill in its sugar factory. [11] Its neighboring estate is not named on Oxholm's chart but is designated with the number 4, "the same as Par Force up the valley a little way, perhaps suggesting that it may have already been linked with this estate." [12] As of 1800 this was apparently still only a cattle ranch.

John Vetter, who assumed ownership of Par Force in 1830, passed his holding on in 1833 to A. E. Vetter. Although the exact date is uncertain, presumably it was between 1800 and 1844 that the unnamed estate was consolidated with Par Force to become "Estate Reef Bay," and the existing factory at Par Force was replaced by "a factory on the more advantageous site of the former cattle farm." [13,14] A. M. Perth acquired the estate in 1844 and later that same year sold it to L. D. Smith. [15]

The Reef Bay factory building, recently restored from its ruinous state by the National Park Service, is modeled upon Oxholm's ideal T-shape design for a sugar factory. It is situated with the head of the T (curing and storage rooms) facing to the north and oriented east to west, and with the stem of the T (sugar-works room) oriented north to south.

The stem of the T measures 40 feet, 6 inches in width by 38 feet in length. [16] A boiling bench made of masonry runs along the seaward west wall and supports five coppers, all of which are in good condition except for the second "grand" copper. The dimensions of these five coppers are: first grand copper, 6-1/2 feet in diameter; second grand copper, 6 feet; third copper, 5-1/2 feet; fourth copper, 5 feet; fifth copper or "teache," 5-1/2 feet. There were no clarifiers in this factory, suggesting that the amount of cane-juice to be clarified was small enough to be performed in the coppers alone. A firing trench to the west of the boiling bench serviced the coppers, with the heat controlled by a series of vents opening into a flue also below the boiling bench. A roof supported on arches and square pillars covered the firing trench, and "three rectangular windows below the level of the trench roof and two circular vents in the space between the roof of the firing trench and the higher roof of the boiling bench allowed the steam from the boiling bench to escape." [17]

A wall running north and south, broken by three archways, divided the sugar-works room into two sections. The eastern section housed two rectangular wooden cooling pans, 14 feet long and 6-1/2 feet wide. The east and south walls both carried a door and two windows for ventilation. The roof over the eastern section was lower than the roof over the boiling bench. [18]

The roughly circular grinding platform of the animal mill measures approximately 80 feet in diameter and is raised about 6 feet above the surrounding ground level. It is bounded by a stone retaining wall roughly 2 feet thick. [19] The grinding apparatus is missing, but the wooden framework has been reconstructed. A stone gutter conveyed juice from the mill to the boiling house, entering the structure through an opening in the south wall about 4-1/2 feet above ground level. There was apparently never a windmill at Reef Bay. The valley location was presumably ill-suited for such an apparatus.

Cane-juice passed from the stone gutter into the boiling bench coppers, where it was clarified. Presumably the furnace below the boiling bench was fueled by bagasse (cane trash) or wood. As the juice boiled, impurities were skimmed off into a skimming gutter running along the front of the boiling bench. These skimmings flowed or were

washed into a copper resting on the ground, where they were stored for later use as fermenting mash in rum-distilling. Workers ladled the cane-juice from one copper to the next, and gradually the juice took on the constituency of a thick syrup. "Sticking" occurred in the teache, which was slightly elevated above the other coppers, and the syrup was conveyed, using gravity and a portable wooden trough, to either of the two wooden cooling pans in the east section of the sugar-works room. The syrup slowly cooled in these pans and formed crystals. Molasses and other products which drained off during this process were released, presumably through a petcock, into a small receptacle beneath the cooling pans, and these products were also used in the rum-distilling process.

The head of the T is divided into three rooms, and measures 18 feet, 3 inches wide and 65 feet, 8 inches long. To the west is the storage and fermentation room. Here sugar and rum were held for shipment, and the mash mixture for rum was fermented in casks. A small central room provided access to the sugar works room; it also held a tapping pit for rum passing from the still through the worm, which was housed in a cistern built against the head of the T. The eastern section of the T-head was the curing room, in which hogsheads containing crystallized sugar were supported on a wooden framework to allow molasses to drain out. This framework is missing, but the three coppers that collected the draining molasses remain in place.

A simplified rum-distilling process was carried on at Reef Bay. The lack of a doubler indicates that the entire process took place solely in the still and the cooling cistern. The still, measuring 5-1/2 feet in diameter, was serviced by a furnace beneath and a chimney to the east, and it was built against the north side of the cistern. Measuring 10 feet wide and 17 feet long, this cistern held the water which cooled the hot vapors passing from the still through the worm, causing them to condense into rum which was then gathered in the interior tapping pit of the central T-head room. A vent flue east of this cistern runs beneath the T-head and connects with the main furnace beneath the boiling bench.

Smith owned Estate Reef Bay until 1855, when O. I. Bergust and Company acquired it. The estate manager, William H. Marsh, improved and enlarged the sugar factory in the early 1860s. A steam engine and cane crusher, numbered 286 and 291 respectively, both manufactured in 1861 by W. A. McOnie in Glasgow, Scotland, were installed in 1862.

This cast-iron horizontal steam engine survives in remarkably well-preserved condition. Its major features include a bore of 12 inches and a stroke of 24 inches; a D slide-valve; a cast-iron connecting rod with box ends; a two-ball Watt-type governor; and an eccentric that provided

lateral motion for a pump on one side and the valve gear on the other. The flywheel, 10 feet in diameter with a 4-3/4-inch face is mounted on the shaft that drove two reduction gears whose ratio was 11-7/11:1. The cane mill's three crushing rollers have diameters of 19 inches, and the two bottom rollers are slightly longer than the three-foot top roller.

The engine room, added in the early 1860s to house the machinery, measures 25 feet, 5 inches in width by 27 feet, 3 inches in length, and with its associated chimney was "constructed solely for ... utilitarian purpose and little effort [was] given towards creating an architectural impression." [20] Turning 90-degrees to the west from the boiling bench, the flue passes beneath the steam boiler and extends 7 feet, 6 inches beyond the engine room to a stack 25 feet, 8 inches high. The addition of a furnace at the south end of the firing trench made it possible to operate the boiling bench and the steam engine separately. A small cistern to the east of the engine room serviced the steam boiler. The feedwater was preheated by passing through a 7-foot long heat-exchange pipe that enclosed the engine's smaller exhaust pipe.

Bergust and Company put their estate up for auction in 1864. They advertised it in the St. Croix Avis as "Sugar Estate Parforce with steam mill, stock and cattle and all appurtenances." Regarding the sugar-works, the advertisement listed "fixtures, cookers, coppers, etc." and further noted "one steam mill without clarifiers, 8 horsepower," and "1 still and worm." The animal mill and grinding platform were termed "useless." [21]

The estate went to Marsh, who owned it until his death in 1909. Marsh erected a small wooden house east of the factory building, and apparently he and his family members used it as a dwelling. [22] Another small structure, a masonry building of field stone and brick (the same materials used in the factory walls), was apparently used for storage. [23] This building, situated to the southeast of the dwelling-house, is, like the dwelling, in ruins. Marsh also purchased neighboring tracts, including parcels from Estate Little Reef Bay and Lameshur, and Carolina and Maho Bay holdings. [24]

While other estates closed down their sugar-works and converted to cattle ranches or simply reverted to forested land before the turn of the century, Marsh maintained his operations until the early years of the 20th century. There are several versions as to when and why the operations were finally halted. By one account, a factory worker, Ivan Dalmida, "was caught in the flywheel of the cane crusher and mangled to death" in 1908, and "the machinery was stopped and never run again." [25]

Family recollections maintain that operations ceased in 1916 after a hurricane caused considerable damage. [26] Still another account, from 1925, notes that Reef Bay had the "only sugar-mill now on the island." [27] Whatever the case, following Marsh's death in 1909, [28] the estate passed to his four daughters Malvina, Idina, Ella, and Anna. Apparently for a brief time (during the "Bay Oil Boom" on St. John) the rum still and furnace were utilized in the production of Bay Rum. [29] The sugar plantation, once cultivation had ceased, reverted to pasture land for cattle.

Ella Marsh lived at the Parforce Great House until 1951, when she sold the estate to Frank Faulk. By this date the factory building was "roofless and in ruins," and Faulk laid temporary roofing over part of the structure. [30] The ruins at Reef Bay were restored to their present condition in the 1960s by the Virgin Islands National Park.