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This report is the result of a survey of the three remaining locks of the Santee Canal—all of which are located on a single tract of land in Pineville, South Carolina. This tract of land runs from SC Highway 45 to the Santee River.

The purpose of this survey was to document as much information as possible for the construction of displays and the building of a Diorama depicting a typical lock to be displayed in the proposed museum at Stoney Landing.

It should be noted that the time frame allowed us by the property owner(s) to gather this information was limited to seven hours. No excavating was done during this time; therefore, some areas shown are conjectural. Further permission should be pursued to return to the area to do some minor excavating. Items such as gate remains, hardware and sluice mechanisms should still remain within the lock area. Other features, partly covered and threatened by erosion, may soon crumble, and their design lost forever, if not documented within the near future.

Since the Santee Canal is considered to be the oldest true canal in America, every effort should be made to retrieve components from these three remaining locks in order to fully understand their design and thereby present a true description of an early engineering marvel in South Carolina History.

William R. Judd
THE SANTEE CANAL

GENERAL NOTES

The walls of lock No. 1, for the most part, have collapsed in upon each other while other portions have shifted or broken loose due to erosion. While these conditions classify this lock as being "ruined", its collapsed walls have allowed the gathering of construction data that was unattainable at locks No. 2 and No. 3. So as not to be repetitious, the following features are listed here as general notes because they are considered typical and basic to the design of all three remaining masonry locks.

FOUNDATION

Due to the above mentioned conditions foundation posts or pilings are visible beneath the wall structure. (Photo 1) The diameter of these posts range from 3 inches to 8 inches. They appear to be cypress, pointed on one end and approximately 8 feet long. (Photo 2) The spacing between each post is roughly 18 to 24 inches. They seem to have been set at random, though a pattern may have been used. Figure 1 is drawn from an old European print of a lock showing rows of piling, each capped with a timber running crossways. Atop these timbers are other timbers running lengthwise the lock. Some timbers were found in this location at Lock No. 1. This piling/timber method is thought to have been under the walls of the lock only. The brick floor being laid directly on packed earth.

WALLS

The walls were 8 feet thick at each end but only 4 feet thick along the middle. Approximately every 10 feet along this middle, on the back side of the wall, is a 32 inch wide buttress projecting 4 feet into the embankment. (See lock drawing) The height of the walls varied due to the drop of the locks chamber and the terrain. The brick at the top of lock No. 1 was laid in row-lock fashion. Possibly all locks were like this.

The abutment at the upper and lower end of each lock angles outward at forty five degrees then angles again at ninety degrees to the chamber wall.
SLUICE OPENINGS

Sluice openings were built into the locks masonry wall for the passage of water from the upper level to the lower level of the lock. This feature was found in the same location at all three remaining locks. The sluice opening in the lower level is 24 inches wide by 3 feet high at the middle of the arch. It is 16 inches above the chamber floor. The arch over the sluice opening is of regular shaped brick laid soldier fashion. One or two bricks within the arch are "chipped" into a wedge shape to fit a space, as needed.

Each sluice penetrates the masonry wall at the upper level and runs at a downward angle, curving and exiting into the lock at the lower level. The water was controlled by some type of door at the upper level. What this door looked like is unknown at this time. (See lock No. 1 - Area 4 and 5)

COINS

The coins at each lock were stacked stone blocks. They are said to have come from a quarry in St. Stephen Parrish near Pineville. They were shaped and cut from different types of stone - some granite, some sandstone and others possibly limestone. The workmanship was excellent. There was no standard size to the stones and no set pattern in assembling a coin. (Photo 3) The two features they all had in common were the size of the gate post pocket and a 1½ inch square hole located in the middle of the top and the bottom. Whether this hole passed through the block is unknown at this time. (Photo 4) As the blocks were stacked, a 1½ inch square iron bar was embedded, horizontally, in the brick wall. (The intervals at which these bars were spaced is unknown) One end of this bar projected out. This end is diamond shaped with a 1½ inch square hole to match the square hole of each block. A recess was chiseled in each matching block to receive the diamond shaped end of the horizontal iron bar. (Photo 5) This allowed one block to set flush on top of the other block.

As the stone blocks of a coin were assembled a one inch square iron alignment rod was placed in the square hole of each block and horizontal iron bar. (Photo 6) These iron rods would pin the whole coin together. (See Figure 2)

Photo 4 shows the top portion of a coin. The capping block which sat on top is missing. The 1½ inch square iron bars are eyed on one end. The diameter of the hole is one inch. The opposite ends are bent at ninety degrees and made stationary by being embedded within the masonry structure of the lock wall.

Photo 7 is a coin complete with capping block - only the eyes of the bars are showing. The capping block or in some cases, the mating block, was indented to receive the iron bars. (Photo 8) This allowed the capping block to set flush atop the coin. What the item looked like that attached to the eyes and held the gate post to the coin is unknown at this time. Possibly it resembled Figure 3.

Photo 9 is a capping block. No square holes appear in any capping blocks.
BRICKS

The bricks used in all the masonry structures of the Santee Canal were of local manufacture. The location of the factory (or factories) is unknown at this writing. Charleston was a producer of brick during this era - also the St. Stephen area has been suggested as a possible location.

A typical inside measurement of a masonry lock is ten feet wide by sixty feet long. It is estimated that approximately 175,000 bricks were used to construct one single lock. This figure was calculated from information gathered at lock No. 1 pertaining to wall construction and wall thickness. This figure times eleven locks (9 single locks and one double lock) equals approximately 1,925,000 bricks. This figure does not include the number of bricks required to construct all the aqueducts, overfalls, flood gates and dams. This would probably bring the total to over 2,500,000 bricks. A reasonable number of bricks that could be made in a day by a brickmaker or molder was 5,000.

A typical measurement of a brick used in the walls of the locks is 8" x 3-3/4" x 2-3/4". The workmanship varies from good to very crude. (See Photo 10) Some bricks measuring 8" x 3-3/4" x 3" were found under the overturned wall at lock No. 1 (Photo 11) but most were of the smaller size.

The brick pattern used at all three remaining locks is Flemish bond. In Flemish bond each course alternates stretcher and header to produce a basket weave pattern. (See Photo 12 - Figure 4)

A specially designed stretcher and header brick was used to achieve the forty-five degree angles at each end of a lock. (See Photo 13 and 14 - Figure 5) Possibly the header brick (b) was produced at the brickyard with the angles on both ends. When building the wall of the locks the brick mason would break it in half, thus having two bricks from one. The opposite angled end would have been wasted within the wall. Only broken half bricks have been found.

CEMENT

The cement joints between the bricks were struck flush with the face of the brick. The lime used in the manufacture of the cement was produced from oyster shells. Photo 15 shows oyster shells within the cement. These shells range in size from 1/8" in diameter to larger fragments measuring 1 3/4" long by 3/4" wide. These shells were probably shipped from Charleston - that being the closest salt water area to produce oyster beds.
GATES

No gates or gate remains were visible at any of the three locks. Each lock has approximately 30 inches of sand or silt covering the chamber floor. Some remains could be beneath this sedimentation.

The description of a lock as stated in "The History of the Santee Canal" by Porcher, would lead one to believe that all the masonry locks were built identically. The only difference being whether it was a single or a double lock. This does not appear so when comparing the lower ends of locks No. 1, No. 2, and No. 3. (See Figure 6)

The gates located at this end of the locks had sluice doors built in at the bottom to pass water out of the lock chamber. The recessed area for the gates in lock No. 1 had another recess for its sluice door. This door appears to have been located more toward the middle of the gate. Lock No. 2 had its sluice door at the outer end whereas lock No. 3 appears to have had none at all or possibly one that did not require a recessed area. Also take note that the gates recess angles into the wall at lock No. 3.

FIGURE 6
LOCK NO. 1
(SINGLE LOCK)
NO SCALE
Lock No. 1 is located approximately 100 feet from the Santee River. It was a single lock. The width of the chamber is 16 feet. Its length is 72 feet from coin to coin. The height from the brick floor of the lower level to the top of the lock is 13 feet 6 inches.

Area 1 - A slot, eight inches wide and twelve inches deep is recessed into the lock wall on both sides. It runs from the top of the lock down to a point sixteen inches from what is believed to be the bottom. (Photo 16 - See Photo 29, lock No. 2) Individual timbers (called stop planks by the American Canal Society) were stacked in these slots during an emergency to stop the passage of water. If this is true it would seem more logical to have this feature at the upper end of the lock rather than the downhill end.

Area 2 - This area is recessed 8½" to allow the gate, when opened, to be flush with the lock wall.

Area 3 - Is a double recess. This area is for the sluice door which was attached to the gate. It is unknown at this time what these doors looked like. As mentioned earlier in the general notes, the sluice doors in the gates at the lower end of these remaining locks apparently were, each, of a different design.
AREA 4 - This is the curved perpendicular wall of the lower level. Its height is five feet. Photo 17 shows the sluice opening in the lower level. This view is typical of the opposite wall.

AREA 5 - The upper sluice areas at locks No. 2 and No. 3 have suffered extensive damage or been destroyed. The upper sluice located on the south side of lock No. 1 has also been destroyed but the north side appears to be intact. This area is covered with dirt which has washed down from the area above. Behind this dirt, approximately five 8" x 8" vertical timbers were recessed into the masonry. Attached, horizontally, to the front of these timbers, was planking. The upper sluice, with its door, is believed to have been located between two of these timbers. (See Figure 7.) This planked area is also recessed to receive the gate, when opened.

The arrowed area in Photo 18 points at the remains of what is believed to be a sluice door. It appears to be made up of a double layer of 1½" thick boards. The boards on one side run horizontally. The boards on the opposite side run vertically.

AREA 6 - The timber located in the lower right hand corner in Photo 17 runs the full width of the lock. At the east end its ends were embedded within the wall at the coin. This timber was part of the mitered sill. (See Figure 8)
AREA 7- Photo 19 shows a flat bar located at the back side of the wall on the north side. This flat iron bar is approximately 4 feet long. It measures 2" wide by ⅛" thick. The top 9-3/4" tapers to 5/8 of an inch in diameter. The end is threaded with a 2" square x ⅛" thick nut. The bottom portion is secured loosely to some other object. No other bars were seen at similar locations along the lock wall. This apparently held a timber in place. This area could possibly be the location of a bridge. No other signs of a bridge location was found.

AREA 8- Located at the east end of lock No. 1 are the timber remains of a wooden floor. It was 10 feet wide by 55 feet long. (Photo 20) These timbers, eleven inches wide by eight inches high, are spaced approximately five feet apart. Some planking, 2½" x 11", remain under the soil at each side. They were secured to the floor timbers with 3/8" square spikes, six inches long. (Photo 21)

Some vertical timbers used within the walls are still visible. Since these walls were not of a crib design a possible method for anchoring them vertically is shown in Figure 9.

The presence of this wooden floor is a puzzle. It is not thought to be part of the design of a typical lock as this feature does not appear at lock No. 2 or No. 3. Possibly it was a remedy to erosion or a leak below the surface. Porcher's booklet, "The History of the Santee Canal" - Pg 15, states in 1844 a leak developed between locks No. 7 and No. 8 due to the "sinking of a portion of the lower rock upon which that whole country lies". To solve this problem, a wooden floor was laid at the bottom of the canal for nearly one quarter of a mile. Another thought entertained was that this area incorporated additional gates. Page 11 of the above mentioned booklet stated that "ten solidly constructed gates" were at the upper level. This is believed to be a typographical error and should read "two solidly constructed gates."

Approximately 150 yards further east of lock No. 1, are the remains of another wooden floor area. This area measures 9 feet wide by 30 feet long. The vertical timbers measure 8" x 8" on 32 inch centers and are set in a low brick foundation wall. This low brick wall was flush with the front of the timbers. (Photo 22) Spikes of similar size, as mentioned earlier, are visible in both the floor timbers and the wall timbers. A complete section of floor planking is visible. (Photo 23)

Another 150 yards further east of this flooring is a shallow slew, 15 feet wide. It branches off the right side of the canal at a backward angle running back to the Santee River. This slew parallels the canal at a distance of 30 yards. (See Figure 10) It is covered with vegetation but void of water. Located within this slew, approximately half way between lock No. 1 and the 30 foot long wooden floor area, are four coin positions. They are laid out in the same manner as a lock. They measure 72 feet apart in length, 15 feet apart in width and project 16 inches above ground level. Another coin stone appears below these. None of the four coin stones have a square hold that would receive the vertical alignment rod. (Photo 24) No other construction material appears in this area.

The appearance of the canal resembles a deep narrow ditch from lock No. 1 to a point approximately 40 yards past the aforementioned slew branch. At that point the canal widens to reflect the documented width of 35 feet on the surface of the water. Time did not permit a further survey of the canal from this point to lock No. 2.
LOCK NO. 2

Lock No. 2 is approximately one mile from lock No. 1. It was a single lock running north to south. The inside width is 10 feet at the north end. It measures sixty-seven feet from the north coin to the south coin. The height at the north end, from the brick floor to the top of the lock, is 15 feet, 6 inches. Its condition is excellent compared to locks No. 1 and No. 3: Photo 25 is looking south into the lock.

AREA 1—At the north end only (Photo 26) a stepped incline, 5 feet wide at the top, is present on both sides. Photo 27 is a close-up of Area 1. This feature does not appear at locks No. 1 or No. 3. There is a total of seven steps. Their tread is 11 inches—the rise is 12⅛ inches. At the bottom is a landing. Its tread is 3 feet, 3 inches.

Pockets, 3½ inches wide by 5 inches high, appear where the nose of the steps meet the abutment. They project 24 inches into the brickwork. Another pocket of a similar size appear at the middle of each step. This pocket projects into the step brickwork 12 inches. (Photo 27) At the outer end of these steps is a 3½ inch by 5 inch recessed area 20 to 24 inches long. (Photo 28) These pockets and recesses apparently received timber for framing wooden steps. Why wooden steps as opposed to brick is unknown. Photo 29 is looking northwest at the west wall. It is typical of the opposite wall.

AREA 2—is a slot 8 inches wide by 12 inches deep. (See lock No. 1—Area 1)

AREA 3—is recessed for the gate. This area measures 7 feet long by 8½ inches deep. Photo 30 shows the lower area of the east wall coin within the gate recess. The brick floor lies approximately 20 inches below the sand and mud. Located within the pocket of this coin may be the remains of a gate post or it may be part of the cypress knee at the right. Photo 31 is a spike 8 inches long, found in this area. It was probably used in the construction of the gate.

AREA 4—is part of Area 3 and is recessed for the sluice door which was part of the gate. This recess measures 8½ inches deep by 3 feet, 4 inches long. (See general notes)
AREA 5 - Is the level change at the south end. (Photo 32) The lower level was
terminated by a curved brick wall which rose five feet to the upper level.

AREA 6 - (Photo 33) is the bottom portion of the coin on the east side of the south end. The cavity at the left in the photo was for the mitered sill timber that span the width of the lock. (See lock No. 1, figure 8) The vertically cemented recess to the right of the coin once held an 8' x 8' timber. This end of the lock is believed to be typical of the east end of lock No. 1 - that being the area of the upper cluice opening. (See lock No. 1, Area 5)

AREA 7 - Is the location of the sluice opening in the lower level. Photo 34 is the east wall and Photo 35 is the west wall.

AREA 8 - Is the sluice opening at the upper level. Photo 36 is the east wall and Photo 37 is the west wall. The brickwork surrounding both sluices at the upper level have suffered some damage at an earlier date.

AREA 9 - Is believed to be the location of the bridge that crossed the lock. The brickwork here is two feet higher than the top of the lock. (Photo 38) It is flat on top for a distance of eight feet. It is stepped down on each end to the level of the top of the lock. The stepping appears to be due to missing bricks rather than a planned design. The total distance is sixteen feet. Porcher's map states "over every lock of the canal is a bridge 16 feet wide...".
LOCK NO. 3

Lock No. 3 is approximately 1 1/2 miles from Lock No. 2. It runs northwest to southeast. It was a double lock located at the summit of the canal. The distance between the coin at the northwest end of the lower lock to the coin location at the highest level is approximately 120 feet. This distance would agree with the stated length of a lock which was 60 feet. This being a double lock, its length would be 120 feet. Its width at the northwest end is 9 feet, 6 inches. The height from the floor of the lower end to the top of the lock is 10 feet. Approximately 3 feet, 6 inches of mud and sand covers the floor in this area.

AREA 1—(Photo 39) is recessed 1 3/4 inches. This is typical of the opposite wall. This recessed area is higher on the west wall than it is on the east wall (?). Within this area was located four, flush recessed timbers measuring 7 inches square. They were bolted to the masonry. (Photo 40) Nailed horizontally to these timbers were 2 inch thick boards. Notice the square nails in Photo 41. The purpose of this wooden feature is unknown. It does not appear in the construction of the other two locks.

AREA 2—Three notches appear along the top of each wall. (Photo 42) They probably received a 8" x 8" timber which span the lock at this point. This area is not wide enough to have been the location of the sixteen foot bridge which crossed this lock. Possibly, these timbers were associated with the timbers secured within the wall at Area 1.

AREA 3—The middle portion of this lock has been destroyed, possibly for its brick. The harvesting of pulpwood at an earlier time may have contributed to its destruction.

AREA 4—(Photo 43) shows the curved brickwork which formed the rise to the highest level on the east end. This level formed the summit of the canal, the lower sluice opening in the east wall is also visible.