PROCEEDINGS

OF THE

SOUTHERN SOCIETY CIVIL ENGINEERS

Annual Reports for 1885 and 1886,

WITH

PROFESSIONAL PAPERS.

No. 3.

PACOSTA PRINTING AND PURLISHING HOUSE JACKSONVILLE, FLA.

Southern Society of Civil Engineers.

OFFICERS FOR 1887.

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HEADQUARTERS.

The rooms of the Society, and the office of the Secretary, are at Nos. 4 and 5 Bostwick's building, foot of Pine street, Jacksonville, Fla.

MEETINGS.

REGULAR MEETINGS.

On the third Monday of each month, at 7. P. M., standard time.

ANNUAL MEETING.

Third Monday in January.

FEES AND DUES.

	Seniors.	Juniors.
Entrance fee		\$5.00
Annual dues	10.00	5.00

It is requested that all changes of address be immediately communicated to the Secretary.

cause of want of punctuality, i. e., the separation of members

at distant points.

The elaborate digests of the French and Italian administrations of public works, on which I have been engaged for Council Engineering Society; the terrible earthquake, which has caused so much disaster and loss in every way imaginable, disturbing the usual business routine and moving bodies to and fro out of line, not only moved me out of line of reports, but made my duties much more onerous.

Regretting that I cannot attend to the duties, being so far removed from headquarters and other members of the committees, I tender my resignation as chairman, and shall be glad to act as a member of the committees and contribute the result of my past study, as well as what I may do in future, to the cause of the advancement of the Society, in which I feel the deepest interest.

Hoping I may look for the indulgence of our honored President and Society, and relying on your kind feeling, I remain

Very truly yours,

Louis J. Barbot.

DRAINAGE OF THE SARASOTA SAW-GRASS.

Report of J. F. LeBaron, of the Committee on Drainage and Reclamation. Read before the Society, at the adjourned Annual Meeting, February 21, 1887.

H. S. Duval, President Southern Society Civil Engineers.

SIR: I have the honor to submit my first annual report on

Drainage and Reclamation, for the year 1886.

The only work of this kind that I have had the opportunity of personally inspecting during the last year, is the drainage of the Sarasota Saw-grass, in Manatee county, Florida, by the Florida Mortgage and Investment Company, (Limited.)

This work is situated about three miles east of the new town of Sarasota, on Sarasota Bay, and was conceived by Mr. Piers E. Warburton, late General Manager of that Company, and carried out under his general direction and the immediate supervision of Mr. D. R. Greene, Mechanical Engineer, of New York. Levels were taken by Mr. W. H. Garrett, Civil Engineer, and

Mr. H. C. Litchfield, Civil Engineer. Latterly Mr. Richard Paulson, the Company's Engineer, has been in charge. The fall was found to be 6.5 feet from the surface of the saw-grass to tidewater in Phillip's Creek, and the distance 7,000 feet. Phillip's Creek is five miles long in a direct line and empties into the northern end of Little Sarasota Bay. The distance by the sinuosities of the creek is probably twelve miles or more. A ditch was dug from the upper end of this creek, where the width is about six or eight feet, to the lower end of the saw-grass pond, and thence up through the middle. This ditch was 3,000 feet long and the creek was widened and deepened about 4,000 feet, and some of the points cut off, straightening it.

The main ditch is 12 feet wide on top, 6 feet wide on bottom and 4 feet deep, giving a side slope of 3/4 to 1 foot. The material was thrown up on each side. The work was all done by negroes, with shovels, under contract, and the total cost of the main ditch and outlet was \$650, and it is stated that the contractors made \$2.50 per day, or nearly 7 cents per cubic yard, estimating the outlet work the same as solid ditch, which is largely in excess, for the outer work consisted in deepening in some places not more than 2 feet, and straightening a few narrow reaches. A nearer estimate would be about 12 cents per

cubic yard, for earth actually removed.

The area of the saw-grass pond was stated to be 500 acres, of which only 200 belongs to the Company, the balance belonging to different individuals who are benefited by the operations of the Company without any expense to themselves.

The drainage area or water shed was stated by Mr. Greene to

be about 3,500 acres.

The ditch was planned to carry off 4 inches of rainfall in an hour, as stated by Mr. Greene. The land is laid out into 5 acre lots fronting on the main ditch about 350 feet. Each one of these lots is surrounded by a ditch, on its three sides. The subdrain is 3 feet wide on top, 1 foot on bottom, and three feet deep.

They were dug by contract for \$25.

The surface of the saw-grass is apparently level. At the time of my visit, December 28th, the soil was dry and friable for two inches below the surface. It then commenced to grow moist and at six inches water could be squeezed out in the hand. I caused a pit to be dug on the drained land and found water about two feet below the surface about the same height as the water in the ditch. The soil is a black, mucky peat, growing finer and more decomposed as you descend. The top is quite light and porous. The black, peaty soil extends for a depth of three feet. Then a layer

of sand about six inches thick is encountered and below that a layer of fine, soft, sandy marl, unctious to the feel, about eight or ten inches thick and then sand again. At the period I visited the land, this region had experienced a dry time of about two months. English peas, radishes, and turnips, were growing nicely, and Irish potatoes were being planted. The main ditch was completed in June, 1886, and the land appeared to be completely drained. A small stream was running out of the side ditches, and the water stood about two ieet deep in the bottom of the main ditch, owing to improper grade; no grade stakes were set, and the contract called for the ditch to be four feet deep. At the lower edge of the pond the ditch passes through a narrow neck of palmetto flat which is higher than the average level of the saw-grass, and so the bottom of the ditch is higher here also.

The saw-grass, in its natural condition, was evidently very soft and boggy. The Superintendent told me that when they commenced work that a horse would sink at one step to his body, but at the time of my inspection I rode my horse easily over it.

The main drain was completed in June, and last fall, five acres of the land about in the center of the pond was broken up. It was then found impossible to do this with horses, as they bogged in the rich muck, but it was easily accomplished with oxen. No grubbing was required. The saw-grass was simply moved down before putting the plow in. It could be burned but if dry there would be danger of much of the soil burning up with the grass, it is so peaty.

The total cost of this drainage, including the side ditches, is \$6.30 per acre, making it by far the cheapest land in Florida.

The company propose to cut an intercepting drain all around the pond on the edge next the pine land, to catch the surface water and seepage from the higher lands, and although this is contrary to the theory and rules of land drainage as laid down by French and Wareing, I believe in this and analogous cases that it will be desirable and efficacious. I was led to this opinion by observing that near the edge of the pond, my horse sank deeper and the ground appeared more moist.

The theory of drainage is that the lines of the drains should follow the natural lines of drainage as shown by the superficial contours, and never be at right angles to them, but in this region the differences of level are so very slight, and so much water is brought down during the rainy season from the almost level pine lands, that I think the rule, which is a good one in comparatively hilly countries, should be modified in this country,

where lands are so nearly level.

The outlet of this drainage system requires immediate and careful attention. Unless the outlet is free and lowered the whole system is clogged. In this case it was never made deep enough, and the creek was not thoroughly straightened as it should have been. After the completion of the work, and during the last rainy season, the banks of this creek were overflowed, and the water swept across the bends. Unless these sharp bends are straightened and the creek thoroughly cleaned out to its mouth, the work already done will be jeopardised and probably rendered nugatory.

I think the outlet of the main drain should be calculated to deliver the rainfall of at least 6 inches in not more than 1 hour from 500 acres. I do not think four inches enough. The grade of the bottom of the ditch should be made uniform at 1.88

per mile, which is all that can be obtained.

Trautwine gives a table for the mean velocity in feet per second in a rectangular channel 10 feet wide and 4 feet deep at 2.27 for a fall of 1.5 feet per mile and 2.64 for 2. feet per mile. By interpolation we obtain 2.55 feet per second for velocity, with a fall of 1.88 with a proportionate discharge of 102 cubic feet per

second, or 367,200 cubic feet per hour.

A rainfall of 1 foot on 500 acres would amount to 1,773,000 cubic feet of water to be disposed of after filling the ditch and without making any allowance for absorption, would require nearly 5 hours to run off, but owing to the extremely porous and absorptive character of the soil the water would permeate the soil, almost instantly, leaving a very large and almost unknown margin of safety. In case, however, of a heavy rain following within a few hours of another, a case might occur, where the subsoil was already surcharged with water, which had not had time to run off. In order to prevent any possible overflow the main drain should be made large enough to dispose of this rainfall before it could rise above the land. This would require for a precipitation of 6 inches in 1 hour a ditch 100 feet wide and 4 feet deep, allowing about 3 hours for the water to run off, and not supposing any absorption. However, in the light of previous experience here during the last rainy season, it would appear that the main ditch was probably large enough to carry off the water, under ordinary circumstances, provided the outlet was properly preserved and maintained.

The result of this experiment will be looked forward to with great interest, for there are millions of acres of these lands in Florida. The land when relieved of this surplus water appears capable of bearing immense crops without exhaustion. It is at first sour from a superabundance of crenic and apocrenic acid,

but this is neutralized by the application of lime which was being used here.

Very respectfully, your obedient servant,

J. Fras. LeBaron.

COUNCIL OF ENGINEERING SOCIETIES ON NATIONAL PUBLIC WORKS.

Report of Louis J. Barbot, Delegate from the Southern Society of Civil Engineers to the Cleveland Convention.

(Read before the Society May 17, 1886.)

CHARLESTON, May 14, 1886.

To the President and Members of the Southern Society of Civil Engineers:

Gentlemen—It is my pleasing duty this evening, as the representative of the Southern Society of Civil Engineers to the Convention of the Civil Engineers' Committee on National Public Works, to say a few words about the Convention, which was held at Cleveland, Ohio, March 31, 1886, to transform the temporary organization into a permanent organization and define its character and policy. For the action of the Convention during its session, I respectfully direct your attention to the printed proceedings, which I had the honor to transmit to our worthy Secretary for distribution among the members, and for the character and purpose of the permanent organization, inaugurated by delegates from the several engineering societies of the United States, I would refer you to the very able address of the Executive Board of the Council of Engineering Societies, prepared by L. E. Cooley, President.

During the period of four months, extending from the date of the temporary organization, in the month of December, 1885, to the date of its transformation into a permanent organization, in the month of April, 1886, the Executive Board, through their zealous and indefatigable co-worker and Secretary, Wm. T. Blunt, had an extensive correspondence with and issued information in form of bulletins to the chairmen of the National Committees on Public Works of all the engineering societies of the United States, who transferred such papers to the secre-