# "The Description of SOANE CANALS" by HERBERT M. WILSON

**-Compiled by Saryu Roy from the book" Irrigation in India ''**

Like the Sirhind canal in the Punjab, the Soane system in Bengal may be taken as an examples of the most recent practice in the construction of a perennial canal system. The Soane canals are included in one system heading at a common point and having a common divertion wier. They consist of two main lines, one flowing from each bank of the soane river. The soane river is a tributary of the Ganges, rising in the Central plateau of India and having a course of about 350 miles through the high country. Near Rohtas it breaks through the hills, which at this point are 2100 feet above the sea, whence it flows north easterly for 75 miles through the Gangetic plain to its junction with the Ganges near Arrah. In the plain it flows through the districts of Shahabad on the left or west bank and Patna and Gaya on east bank. These are among the most fertile and highly cultivated districts in Bengal, densely populated and studed with ancient cities. The successful operation of soan canals is largely due to the acreage which is cultivated during the autumn season.

The works of the soane canals were first undertaken by the 'East India Irrigation Company,' but given over to the govt. when scarcely any work had been done. The scheme was originally proposed in 1853 by leiut. C.H. Dickens. A plan to utilize the larger portion of the volume of the soane was however, amplified by the same officer in 1861. In 1862 the secretary of state approved of the project, and after discussion by Sir A. Cotton and colonel Rundle it was forwarded for the approval of the govt. in 1864. In addition to the feature now existing it was proposed in the original project to construct reservoirs in the hills south of Rajmahal to supplement the available discharge of the river. This part of the schme was considerd too expensive, however, and the plans were changed. **In 1869 the works was undertaken by the govt. It was estimated to give a net profit of 12.5% on the outlay.** In 1871 it was decided to reconstruct the slop of the canal, as the supply of water was not as great as had been anticipated.

The catchment basin of the soane above Dehree, where the headworks are situated, is about 22,000 square miles in area and in flood the river discharges 750,000 second feet (cusec), though the maximum flood provided for is 1,250,000 for about 40 miles below the diversion weir the flood seldom overtop the river banks, but below that point to its

junction with the Ganges it is almost deltaic in character, considerable over flow taking place. To about this point the canal follows the bank of the river rather closely, after which in diverges and follows the high ridge between the soane and the Ganges.

The diversion weir across the soane is at Dehree, a point 25 miles below where the river lines the 'kymore hills,' and is the longest weir in one unbroken length of masonry that has ever been constructed, being $2^{1/3}$ miles long and 8 feet high. In high flood the river rises 8.5 feet above the crest of the weir. The main western canal takes off from the weir on the weir bank where it encounters a rather deep cut. It crosses the kayo torrent by a large siphon aquaduct in the $9^{th}$ miles and similar drainage channels in $17^{th}$ and $21^{st}$ miles.

The Arrah canal leaves the main western at the $5^{th}$ mile and follows the bank of the soane to the $33^{rd}$ mile, where it leaves it and passes close to the town from which it takes its name taking into the Ganges. On this line are 13 locks with an aggregate fall of 161 feet.

The Buxar canal leaves the main western at the $12^{th}$ mile and is almost straight from that point to the Ganges at Buxar. The total fall in this line is 153.75 feet, and in the $29^{th}$ mile the canal crosses the THORA torrent on an aqueduct with 4 arches, each of 30 feet span.

The other main canal of this system, the main eastern, takes off from the soane weir on the eastern bank opposite to Dehree and is 7 miles long at termination being at poon-poon torrent. The Patna canal leaves the main eastern at the $4^{th}$ mile, and after following the river bank for 60 miles, is diverted to the ridge and tails into the the Ganges near patna. It was eastimate by F.T. HAIG, R.E., when chief engineer, that these canals would pay both interest and working expenses on the outlay until 1887, when it was expected that they would return a net profit of 4.5%.

The important feature of the headworkers is the mode of construction of the weir, the automatic action of the scouring sluices, and the arrangement of regulating gates. These are else where described in detail in connection with the subject of automatic scouring sluices (page 121-122, 127-128). The weir and principal works were designed by H.C. leavings, chief engineer of the East India Irrigation Company.

The minimum discharge of the Soane River at Dehree is 5,620 second feet in summer and 1870 second feet in autumn. The maximum discharge of the canals is 6,350 second feet, of which the main eastern canals discharge 1,850 cusecs and the main western series 4500 cusecs. The average rainfall upon the area irrigated is 41 inches. The gross area commanded by the entire system is 1,733,509 acres, of which 1,016,400 acres one irrigated. There are 367 miles of main canals 1,217 miles of distributaries. The average discharge utilised in the autumn of 1901 was 3,300 second feet, and the duty performed during the autumn was 110 acres per second feet of the supply utilized. The water rate per acre was 85 cents. The total length of village channels or minor canals is 1,525 miles. The total number of outlets for distribution of water is 6,000, the area irrigation per outlet being 93 acres.

In the Arrah division, Mr. W.A. Inglis, the executive engineer, calculated the supply of water spread over the country was equal to an effective rainfall of 5.7 inches. On the assumption that one watering of 6 inches in depth is given every 15 days, 1 second feet  of discharge should irrigate 60 acres if the outlet were continuously open or 40 acres if  the outlets discharge outlet were open only ten out of 15 days.

The cost of repairs to the headworks in 1890 was about 16,000 usd, per annum and the cost of maintenance execlusive of headworks about 81,000 usd. The charges for silt clearance amount to 30,000 usd, per annumn, the total amount of clearances' being 10,850,000 cubic feet and the rate about 3 usd, per 1000 c.ft.

The silt clearances were made by means of large steam dredges. The total cost for weed clearance was 1600 usd in 1888 and the mileage rate or cost of repairs varied from 30 usd, per mile on distributaries to 65 usd per mile on smaller branches, 2,11 usd, on larger branches, and 2800 on the main western canal.

The following is a statement of traffic on there canals foe the year 1,888. These were 218 miles of canal open for navigation. The tollage receipts from private boats amounted to 12000 usd, on govt. boats 1400 usd, and on rafts 3500 usd. These with minor items make the total receipt from tollage 18,600 usd, the maintenance charges, including navigation establishment were 11,800 usd, and the net revenue from navigation was 6800 usd. The total number of cargo boats was 4,547, of passenger boats

530. The total tonnage of these boats for cargo traffic was 71,243 long tons and for passenger traffic 12,437 long tons and the total ton mileage was 4,635,000 miles. The estimated value of the corgoes was 1,785,000 usd and the passengers carried numbered 46,170. There were estimated to be 3,089,000 cubic feet of rafts, valued at 107,000 Usd. The tollage receipts per ton-mile on boats were 3 mills and the tollage on rafts per hundred cubic feet was 11 cents.

The total outlay on the soane system to the end of 1901 was 17,558,000 usd, and the revenue in 1901 was 17,5,000 usd. The gross receipts were 370,000 usd. There was a net revenue, after deducting all working expenses, of 162,000 usd, or 1.8%, on the capital outlay.

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## WATER DUTY AT THAT TIME AS MENTIONED IN WILSION'S WRITE-UP

Scale – 1 acre foot = 43560 cubic feet

**Mutha Canal Puna in 1888 –**

Wheat required 2.18 Acre feet per acre irrigated or water performed a duty of 170 acres per cusecs (Second feet). Sugarcane required 19 Acre feet or water performing duty of 43 Acres per cusec (Second feet)

**Jamuna canal-** 1 cusec = 218 Acre

**Doab Canal-**   1 cusec water running for a month will cover an area of 60 Acres to a depth of 1 foot.

1 cusec = 180 acre in summer, 320 acre in autumn

(500 acre theoretically)

**Ganges Canals-** Actual duty is 160 to 180 Acres per cusec = 1/3 of theoretical

**Soan Canals-** In drawing up the project of Soan Canals colonel Dicknes reckoned three quarters of a second feet (3/4 cusec) to every square mile of gross area. To date the soan canals have been in operation for (15) fifteen years, and yet there is a demand now for not over 100 acres in 640, and the system of distribution as designed for these canals have proved to be unnecessarily elaborate.