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TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

Revenue DEPARTMENT

G.O. No.	<u>430</u>	Press.
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Dated	<u>11. 2. 1977</u>	<u>197</u>

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GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

6th January 1879, No. 6 I.

Irrigation.

Read the following paper:—

No. 8.

No. 373 I.

MEMORANDUM.

In paragraph 2 of G.O., No. 871 I, of the 31st October 1878, the undersigned was directed to state his views on the general question of the system of founding masonry works practised in Southern India, with reference to the remarks at the end of Major Skipwith's letter on which that order was passed.

2. The system in Southern India is, in its leading characteristic, the provision of shallow protected foundations instead of deep foundations without protection. Moreover sand is considered, under suitable arrangements, to be a better material to found on than many or most soils, and it is therefore deemed not even desirable to go down through it for the purpose of reaching some other soil, unless its depth be small and insufficient.

3. It will probably suffice to refer in the following remarks to two classes of works which are differently circumstanced, viz:—

- (1) Those not liable to pressure from difference of water-level above and below, of which bridges may be taken as an example.
- (2) Works which hold up water, of which head sluices will serve as an example.

The masonry works with which the Irrigation Department has for the most part to deal are hydraulic works or works which are acted upon by water pressure or water in motion.

4. Bridges when built over streams the velocity of which is ordinarily, or may be occasionally, sufficient to remove the soil of the bed of the stream are deemed to need protected foundations. This would here be considered requisite with what would be called deep foundations. Assuming the protection to be adequate to secure the surface of the bed of the stream from scour or erosion, the system of Southern India requires only that the foundations should be carried down sufficiently far to be beyond the reach of minor surface changes; no advantage, but much increased expense, would be occasioned by going lower.

Bridges across rivers are usually in Southern India built on sand, and a depth of 10 to 12 feet in the foundations has generally been found sufficient, while a depth of 14 or 15 feet has seldom been exceeded. About two-fifths of the depth are usually of solid masonry and three-fifths consist of circular wells. Floorings under the arches and for a few feet beyond the cut-waters, with rough-stone aprons beyond, secure the sand from movement, and so long as this is the case the sand under the foundations is not disturbed.

When soil other than sand has to be built on, beds of concrete, of width and depth suited to the circumstances, are laid down and the surface protection provided as before.

In the case of bridges then it is deemed that only surface protection is needed to secure the foundations from the action of the water.

5. Turning now to the other class of works, or those liable to the pressure of a head of water, it is clear that surface protection alone is inadequate when the soil built on is porous. The requirements then are lateral protection as well as surface protection; for without the former the water in its passage through the porous soil might, and probably would, remove it little by little from below the masonry work.

This action of the water in all probability caused the destruction of the head sluice of the main canal, Godavari Central Delta, in August last.

When, therefore, sand or porous soil is met with, it is necessary for safety to provide deep retaining or curtain walls and to prevent the water passing through from above to below the work, except at a depth which would make it harmless owing to the great thickness of soil to be traversed. These retaining walls should be built solid from as low a level as possible; and when wells are necessarily used for the lower part, the space between each pair of wells should be closed by a pile so as to prevent all movement of soil above the level of the base of the wells. The rest of the work may then be built on a bed of concrete proportioned to the weight to be carried.

6. Shallow protected foundations are believed to be not only far cheaper but more secure than deep unprotected foundations. The undersigned is of opinion that the cylinders sunk to 80 or 90 feet for some railway bridges do more than involve a great waste of money, and that, though carried down to rock, such piers are not safe; for, unless the bed of the river be protected from scour, the latter may go down to very great depths, and a tall cylinder surrounded by moving sand or water to two-thirds or three-fourths of its depth is not necessarily stable, but may give way at any moment.

7. Occasionally failures will occur, whatever the system followed, either from injudicious designing or from want of adequate data, but the economy resulting from shallow protected foundations is great, and experience in Southern India indicates that it is better to have to meet an occasional failure than to spend much more money than general security requires. In the Central Delta, Godavari, several locks and lock weirs were submerged in consequence of the failure of the head sluice, and those 8 miles below the head of the main canal were under water for about a fortnight. None of them suffered, and the only masonry work destroyed was a bridge over the Gorinkala drain.

CUTTACK,
11th December 1878.

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
Chief Engineer for Irrigation, on Special duty.

To the Acting Joint Secretary to Government, Public Works Department, Irrigation Branch.

No. 9. ORDER THEREON, 6th January 1879, No. 6 I.

ORDERED that copy of the above Memorandum be forwarded to the Government of India with reference to letter from the Assistant Secretary to the Government of India, Public Works Department, (Civil Works Irrigation,) No. 362 I, dated 3rd October 1878.

(True Extract.)

John Mullins
Lt.-Col., R.E.,
Acting Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Chief Engineer for Irrigation.
To Superintending Engineers for information.
To the Revenue Department.

Edw. G. Freeman.

11 Spare Copies

Revenue 1879 Sept
No 722.

ILLUSTRATION

Sept. of 1879 Madras.
PUBLIC WORKS.

1. CHART ENGINEER - ILLUSTRATION.

Cost of January 5th.

Amount

Rs. 27

G. O., 6th January 1879, No. 41.

JANUARY.

Nos. 3-9.

System of funding Public Works from
land in Southern India - Memorandum by
Colonel Mallins, R.E., on the general
principles of the system, forwarded to the Government
of India.

No 430

Communicated to the
Board of Revenue.

19 Feb/79 J.P.

1st Feb. 1879 (Received)